

Composition of the cyathostomin species in horses with a special focus on *Cylicocyclus brevicapsulatus*

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Summary

The aim of the study was to evaluate the composition of the cyathostomin species (Cyathostominae) in horses kept in the housed-pasture system. Specimens were collected in 2009 from the feces of 14 horses after treatment with Grovermina (1% ivermectin). Among 21,371 specimens collected, 19 species of cyathostomins were found. The most abundant genera were *Cyathostomum*, *Cylicostephanus* and *Cylicocyclus*, which constituted 93.56% of the total Cyathostominae community. *Cylicocyclus brevicapsulatus* was found for the first time in Poland.

Keywords: *Cylicocyclus brevicapsulatus*, Cyathostominae, horses

Infections with intestinal nematodes, especially cyathostomins (*Cyathostominae*), are the most common parasitosis among horses in Poland. The *Cyathostominae* in horses and other equids include 53 species from 14 genera (14). In the first necropsy-based research in Poland, Składnik (20) the following 24 species of cyathostomins were found: *Cyathostomum catinatum*, *C. pateratum*, *Coronocyclus coronatus*, *C. labratus*, *C. labiatus*, *Cylicostephanus longibursatus*, *C. goldi*, *C. calicatus*, *C. minutus*, *C. asymmetricus*, *C. hybridus*, *Cylicocyclus nassatus*, *C. leptostomum*, *C. insigne*, *C. elongatus*, *C. radiatus*, *C. ultrajectinus*, *Cylicodontophorus bicornatus*, *Poteriostomum imparidentatum*, *P. ratzii*, *Parapoteriostomum mettami*, *P. euproctus*, *Petrovinema poculatum* and *Gyaloccephalus capitatus*. Further research showed the presence of *Cylicocyclus ashworthi* among working horses (9). The parasitic fauna of *Cyathostominae* in Poland, therefore, includes 25 species of these nematodes, which were observed by other authors as well (10-12). The aim of the study was to evaluate the composition of the cyathostomin species (*Cyathostominae*) in horses kept in the housed-pasture system.

Material and methods

Cyathostomins for differential diagnostics were obtained in the year 2009 from 14 horses bred in the housed-pasture system in the area of Krakow. To determine the efficacy of treatment, the level of infection was checked twice using the McMaster method: one day before deworming and on the 14th day after the application of the drug. All horses were treated with Grovermina (1% of ivermectine). Fecal samples, weighing about 2 kg, were gathered from horse boxes 24, 48 and 72 hours after treatment. The parasites extracted from the feces were rinsed with water and then conserved in 70% ethanol with the addition of glycerin. In this manner, 21,371 specimens of *Cyathostominae* were collected and identified to species under stereoscopic and light microscopes using the key of Lichtenfels et al. (14). In order to produce photographic documentation, we used an AxioImager M1 light microscope (Carl Zeiss) equipped with differential-interferential contrast and AxioVision v.4 software.

Based on the obtained results, the prevalence of *Cyathostominae* infection as well as the relative abundance (the number of cyathostomins and the percentage of individual species within the total population) were determined.

Results and discussion

The treatment efficacy proved to be high as on day 14th after deworming no parasite eggs were detected in the feces. The absence of nematode eggs also showed that cyathostomins of all luminal stages had been expelled with horse feces.

Nineteen species of *Cyathostominae* (tab. 1) were found in the feces of the examined horses. The dominant nine belonged to three genera: *Cyathostomum*, *Cylicostephanus* and *Cylicocyclus*, and represented 93.56% of the total population of these nematodes. In horses worldwide the most prevalent, known as core species, are *Cyathostomum catinatum*, *C. pateratum*, *Coronocyclus coronatus*, *C. labratus*, *C. labiatus*, *Cylicostephanus longibursatus*, *C. goldi*, *C. calicatus*, *C. minutus*, *Cylicocyclus nassatus*, *C. leptostomum* and *C. insigne*. These core species comprise more than 95% of the whole *Cyathostominae* population among horses (1-6, 8, 15-16, 18-19, 21). In comparison to our study *Cylicocyclus ashworthi* was also abundant. On the other hand, common species reported by other

authors as dominant in parasite communities: *Coronocyclus coronatus*, *C. labratus*, *C. labiatus*, *Cylicostephanus minutus* were very rare in our study. *Cylicocyclus brevicapsulatus* and 5 other species (*Cylicocyclus radiatus*, *C. elongatus*, *Poteriostomum imparidentatum*, *Parapoteriostomum mettami*, *Petrovinema poculatum*) occurred rarely, which is in line with this study as well as with the works of previously mentioned authors. *Cylicocyclus brevicapsulatus* was found in Poland for the first time, but was observed in only one horse, and only one specimen (a female) of this nematode was found and collected (fig. 1). Morphological parameters of the species were in the range of the average values given by Lichtenfels et al. (14) and Costa et al. (7).

Kuzmina et al. (13) classified the cyathostomin species into two groups: core species, occurring with a prevalence greater than 50%, and satellite species with a prevalence of less than 50%. In our study the majority of infections showed correlation between a high prevalence of infection and high relative abundance. The exception was *Cylicostephanus minutus*, which infected 7 horses (50%) but was present with a low relative abundance – 1.95% (tab. 1).

Cylicocyclus brevicapsulatus found in the present study is a species which can rarely be observed in horses. In Europe it was found e.g. in Great Britain (16) and in the Netherlands (8). The prevalence of infection with this nematode among horses can sometimes be significant and may reach several percent of the animal population (1, 15, 19). Usually, however, even in those cases the number of observed specimens per host is very low (2, 19). Reinemeyer et al. (18) showed that 10 relatively rare species of cyathostomins, including *Cylicocyclus brevicapsulatus*, represented only 1.1% of the total community of *Cyathostominae*, which is in line with this study.

In both necropsies (3-6, 21) and in other studies based on the analysis of parasite species composition obtained from feces after deworming procedures (13, 17), conducted in recent years by other authors, *Cylicocyclus brevicapsulatus* was never observed despite a great diversity of cyathostomins. The impact of this species as an etiological pattern of cyathostomiasis is insignificant, similarly to other cyathostomins which occur with low intensity. It is interesting that world-

Tab. 1. Prevalence and relative abundance of 19 cyathostome species found in horses from Krakow area

Species	Prevalence (%) (n horses infected)	Overall genus relative abundance (%)	Overall species relative abundance (%) (n specimens)	Status
<i>Cyathostomum catinatum</i>	100 (14)	40.6	36.4 (7778)	C
<i>C. pateratum</i>	93 (13)		6.2 (1326)	C
<i>Coronocyclus coronatus</i>	43 (6)	2.93	0.51 (110)	S
<i>C. labiatus</i>	57 (8)		1.30 (278)	S
<i>C. labratus</i>	57 (8)		1.12 (240)	S
<i>Cylicostephanus longibursatus</i>	93 (13)	19.14	9.82 (2098)	C
<i>C. goldi</i>	86 (12)		3.97 (848)	C
<i>C. calicatus</i>	64 (9)		3.40 (726)	C
<i>C. minutus</i>	50 (7)		1.95 (416)	S
<i>Cylicocyclus nassatus</i>	86 (12)	34.845	17.58 (3758)	C
<i>C. ashworthi</i>	64 (9)		6.2 (1326)	C
<i>C. leptostomum</i>	64 (9)		5.49 (1174)	C
<i>C. insigne</i>	43 (6)		4.5 (962)	C
<i>C. radiatus</i>	29 (4)		1.04 (222)	S
<i>C. elongatus</i>	21 (3)		0.03 (6)	S
<i>C. brevicapsulatus</i>	7 (1)		0.005 (1)	S
<i>Poteriostomum imparidentatum</i>	21 (3)	0.4	0.4 (86)	S
<i>Parapoteriostomum mettami</i>	21 (3)	0.05	0.05 (10)	S
<i>Petrovinema poculatum</i>	7 (1)	0.03	0.03 (6)	S
Total specimens collected			21 371	
Core species relative abundance			93.56	
Satellite species relative abundance			6.435	

Explanations: C – core species (relative abundance more than 2%), S – satellite species (relative abundance less than 2%)

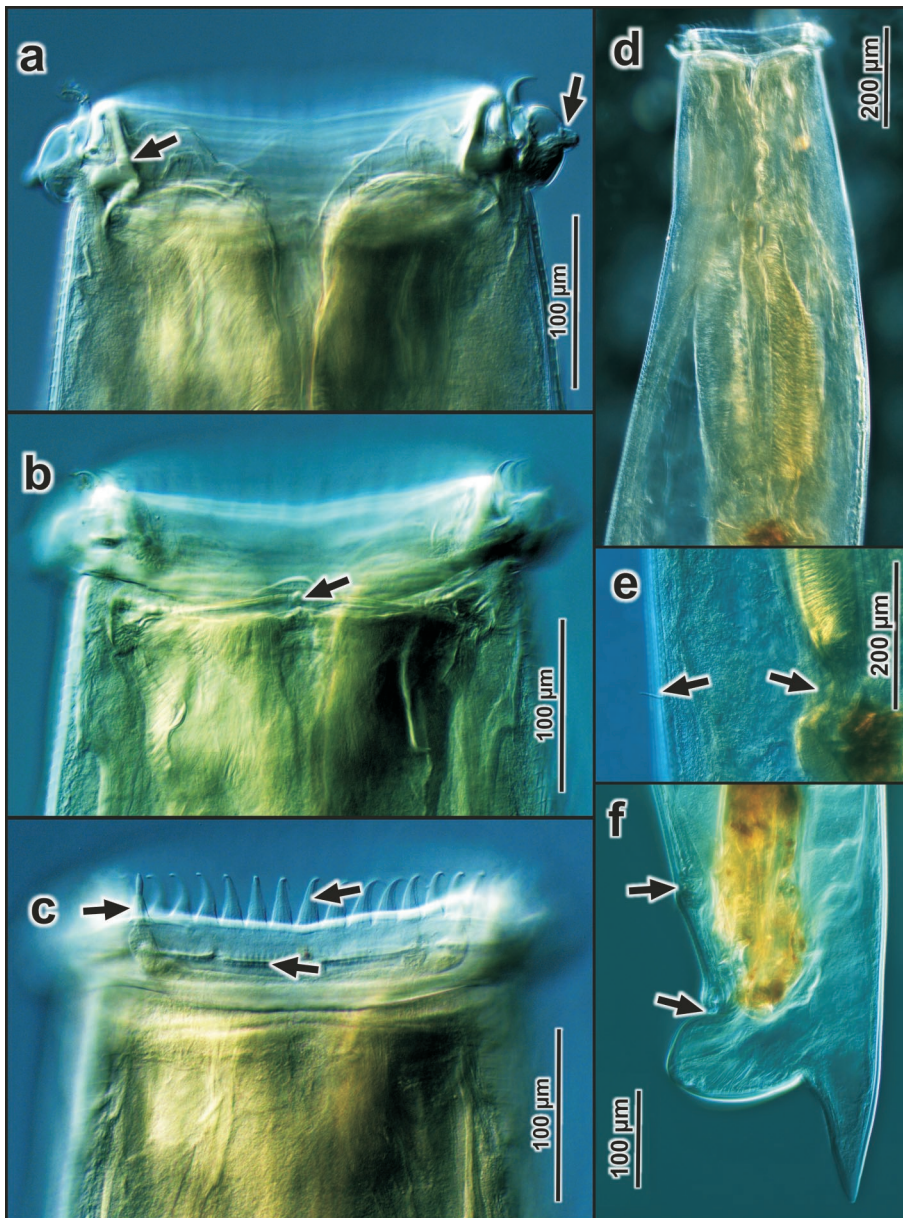


Fig. 1. *Cylicocyclus brevicapsulatus*. a-c. Buccal capsule, dorsoventral view. a. Left arrow marks buccal capsule wall and right arrow marks amphid. b. Arrow shows button like dorsal gutter. c. Left arrow shows submedian papilla, right upper arrow at external leaf-crown and right bottom arrow at internal leaf-crown. d. Esophageal region, ventral view. e. Esophago-intestinal junction (right arrow) and cervical papilla (left arrow) on the same level. f. Tail of female showing vulva (upper arrow) and anus (bottom arrow)

wide the occurrences of *C. brevicapsulatus* are scarce. On the other hand, this species should be more common because of its resistance to benzimidazole-based drugs (16). The *Cylicocyclus brevicapsulatus* observed in this study extends the list of *Cyathostominae* which occur in horses in Poland to 26 species.

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