

**CAPILLOSTRONGYLOIDES ANCISTRI SP. N.
(NEMATODA: CAPILLARIIDAE) A NEW PATHOGENIC
PARASITE OF AQUARIUM FISHES IN EUROPE**

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Abstract. A new nematode species, *Capillostrongyloides ancistri* sp. n., is described from the intestine of aquarium-reared catfish *Ancistrus dolichopterus* Kner in Czechoslovakia. This fish is of South American origin and, therefore, *C. ancistri* sp. n. has probably been brought into aquaria in Europe from there. The parasite is characterized mainly by the structure of the male caudal end (presence of two large postanal papillae and the cuticular bursa supported by two caudal lobes), the length of a spicule (0.258—0.297 mm), the presence of a non-spiny spicular sheath, shape of the female end, structure of the stichosome (23—30 stichocytes present), and the size of the eggs. The species appears to be highly pathogenic to aquarium-reared *Ancistrus dolichopterus*, causing death of these fish.

Capillariids are often found in a variety of aquarium fishes in which, occasionally, heavy infections occur; they may be the cause of the mass fish deaths. Until recently, all capillariids found in aquarium fishes in Europe were considered to belong to the species *Capillaria pterophylli* Heinze, 1933. This South American species was reported not only from fishes of the family Cichlidae, for which it seems to be host specific (see Heinze 1933, Moravec and Gut 1982, Moravec et al. 1984), but also from Cyprinidae (*Capoeta tetrazona*, *Tanichthys albonubes*) and Belontiidae (*Colisa lalia*) (Lucký 1972). However Moravec et al. (1984) demonstrated that capillariids found in the cyprinid *C. tetrazona* belonged to *Pseudocapillaria brevispicula* (Linstow, 1873) (= *P. tomentosa* (Dujardin, 1843)), a common parasite of free-living cyprinids in Europe. In their recent publications Frank et al. (1983) and Frank (1984) have reported the frequent occurrence of the species *C. pterophylli* in aquarium-reared catfishes (Siluriformes), but no information was given as to the species of catfishes infected; it is possible their identification of the parasite was erroneous.

In June 1984, mass capillariid infections were found in the armoured catfish *Ancistrus* sp. (probably *A. dolichopterus*) bred in an aquarium in Ostrava, causing the death of young fish (body length some 2 cm) in particular. However due to unsuitable fixation of this material, a detailed examination of the male caudal end was impossible and these nematodes were considered to be *P. tomentosa*, to which they corresponded on morphometrical grounds.

In December 1985, a further case of mass death of armoured catfishes *Ancistrus dolichopterus* Kner was reported in a private aquarium in České Budějovice. The only adult specimen of this fish examined (a female some 10 cm long) harboured in its intestine about 220 specimens of capillariids that proved to be members of a new, hitherto undescribed species; it is described here as *Capillostrongyloides ancistri* sp. n. The nematodes from *Ancistrus* sp. from Ostrava referred to above undoubtedly belong to the same species.

Other species of aquarium fishes were present in the same tank in České Budějovice

in which infected *A. dolichopterus* were kept. Five specimens of *Capillaria pterophylli* Heinze, 1933 were recovered from one *Pterophyllum scalare* (Lichtenstein) examined, as well as several capillariid larvae, probably conspecific with *C. pterophylli*, in the intestine of *Cichlasoma meeki* (Brind).

MATERIALS AND METHODS

The description of *Capillostrongyloides ancistri* sp. n. is based on specimens from *Ancistrus dolichopterus* Kner from an aquarium in České Budějovice. After washing in saline, the nematodes were fixed with hot 4% formalin and for examination were cleared in glycerine. Drawings were made with the aid of a Zeiss microscope drawing attachment. After examination the specimens were placed in 70% ethanol in which they are stored. They have been deposited, along with the specimens of *Capillaria pterophylli*, in the collections of the Institute of Parasitology, Czechoslovak Academy of Sciences, České Budějovice. The specimens of *C. ancistri* sp. n. from *Ancistrus* sp. from Ostrava have been deposited in the Research Institute of Fisheries and Hydrobiology, Ostrava.

RESULTS

Capillostrongyloides ancistri sp. n.

Pl. I, II

The following description is based on specimens from *A. dolichopterus*.

Description: Comparatively small nematodes; anterior end of body narrow, rounded, with indistinct mouth papillae; a very small stylet present. Cuticle smooth. Two fairly wide, easily visible lateral bacillary bands present, extending almost along whole length of body. Muscular oesophagus relatively short. Stichosome consisting of single row of large stichocytes subdivided into numerous transverse annuli and provided with conspicuously large cell nuclei; 1—2 darker (more granulated) stichocytes alternating with 1—2 lighter coloured ones. Nerve ring encircling muscular oesophagus approximately at border of its first and second thirds. Two distinct wing-like cells present at junction of oesophagus and intestine.

Male (10 specimens) (measurements of holotype in brackets): — Length of body 3.02—4.22 (4.22)*, maximum width 0.035—0.054 (0.054). Maximum width of lateral bacillary bands 0.015—0.021 (0.021). Length of entire oesophagus 1.27—1.94 (1.94), representing 38—50 (46)% of whole body length. (Length ratio of oesophagus and body 1 : 2.02—2.62 (1 : 2.17)). Length of muscular oesophagus 0.135—0.201 (0.180), distance of nerve ring from anterior extremity 0.060—0.102 (0.072). Length of stichosome 1.13—1.89 (1.89), stichocytes 23—26 (—) in number. Spicule slender, well sclerotized, colourless, 0.258—0.321 (0.297) long; its proximal end somewhat expanded, distal end rounded; width of spicule 0.005—0.009 (0.006). Spicular surface almost smooth. Spicular sheath nonspiny; evaginated sheath fairly long, 0.408—0.513 (0.408) in length and 0.012—0.015 (0.012) in width. Posterior end body rounded, provided with well developed membranous bursa supported by two wide lateral lobes; latter reaching posteriorly almost to posterior border of bursa. One pair of large round postanal papillae present at base of caudal lobes.

Female (10 specimens) (measurements of allotype in brackets): — Body length of gravid females 2.94—7.89 (7.89), maximum width 0.040—0.068 (0.054). Width of lateral bacillary bands 0.021—0.030 (0.030). Length of entire oesophagus 2.04—2.95 (2.79) (35—69 (35)% of body length). (Length ratio of oesophagus and body 1 : 1.44—2.83 (1 : 2.83)). Length of muscular oesophagus 0.204—0.249 (0.233), of stichosome 1.80—2.70 (2.56); number of stichocytes 26—30 (30). Distance of nerve-

* All measurements are in mm.

ring from anterior extremity 0.065—0.099 (0.099). Vulva situated 0—0.096 (0.045) below oesophagus end level, vulvar lips not elevating. Eggs oval-shaped, polar plugs not protruding. Egg wall two-layered, inner layer hyaline, outer layer with distinct superficial sculpture; content of eggs uncleaved. Size of eggs 0.048—0.054 × 0.024 to 0.027 (0.054 × 0.027), thickness of their wall being 0.003 (0.003). Width of polar plugs 0.006—0.007 (0.007), their height 0.003—0.005 (0.005). Eggs arranged in one file in uterus. Ovary reaching posteriorly to mid-length of rectum; length of rectum 0.054—0.060 (0.057). Posterior end of body rounded, anus distinctly subterminal; length of tail 0.006—0.012 (0.009).

Host: Armoured catfish, *Ancistrus dolichopterus* Kner, *Ancistrus* sp. (Loricariidae, Siluriformes).

Localization: intestine.

Localities: in aquaria in České Budějovice (type locality) (17. XII. 1985) and Ostrava (29. VI. 1984), Czechoslovakia; apparently introduced together with aquarium fishes from South America. Deposition of specimens: holotype (♂), allotype (♀) and numerous paratypes in helminthological collection of the Institute of Parasitology, Czechoslovak Academy of Sciences, České Budějovice (Cat. No. N 175), Czechoslovakia; other material in the Research Institute of Fisheries and Hydrobiology, Ostrava, Czechoslovakia.

DISCUSSION

The morphology of capillariids from the intestine of *Ancistrus dolichopterus*, particularly that of the caudal end of the male, shows these nematodes belong to the genus *Capillostrongyloides* Freitas et Lent, 1935 according to the taxonomic system of the family Capillariidae proposed by Moravec (1982). It is apparent from the recent world revision of the capillariids of fishes (Moravec 1987) that the genus *Capillostrongyloides* presently comprises 5 species: *C. sentinosa* (Travassos, 1927) (type species), *C. fritschi* (Travassos, 1914), *C. tandani* (Johnston et Mawson, 1940), *C. physiculi* (Johnston et Mawson, 1945) and *C. tasmanica* (Johnston et Mawson, 1945); the two last named species are parasites of marine fishes of the order Gadiformes off the coast of Tasmania and they can be distinguished from *C. ancistri* sp. n. on the basis of differences in the structure of the posterior end of the body of the male and in *C. tasmanica* also by a greater number of stichocytes (40—47 versus 23—30 in *C. ancistri*).

Of the freshwater members of *Capillostrongyloides*, *C. ancistri* sp. n. is most similar to *C. fritschi* parasitic in the stomach and intestine of some silurid fishes (*Malapterurus*, *Bagrus*) in Africa, differing from it mainly in the structure of the caudal bursa in the male; while the membranous bursa in the male of *C. fritschi* is long, far exceeding caudal lobes, in *C. ancistri* sp. n. it is relatively short, so that the well developed caudal lobes reach almost to its posterior border. The anus of the female of *C. ancistri* sp. n. is distinctly subterminal, whereas that of *C. fritschi* is almost terminal. It is necessary to take into account also the distribution of both these species (Africa, South America). From *C. sentinosa*, a stomach parasite of cypriniform fishes of the suborder Characoidei in Brazil, *C. ancistri* sp. n. differs in the much greater length of the spicule (0.26 to 0.32 mm versus 0.09—0.16 mm) and generally larger body measurements. The species *C. tandani*, described only from females from the intestine of the freshwater catfish *Tandanus tandanus* from South Australia, was assigned to *Capillostrongyloides* provisionally (see Moravec 1987) and it is necessary to consider it a *species inquirenda*; nevertheless, this species can be distinguished from *C. ancistri* sp. n. on the basis of the almost terminal situation of the anus in female and also by its geographical distribution.

Moravec (1987) has suggested that it cannot be excluded that subsequent studies will prove that *Paracapillaria* Mendonça, 1963 is only a synonym of *Capillostrongyloi-*

des Freitas et Lent, 1935; this is due to the inadequate description of the type species of the first genus, *P. piscicola* (Travassos, Artigas et Pereira, 1928).

Since this is the only freshwater member of the genus *Paracapillaria*, described from the stomach and intestine of the freshwater fish, *Acestrorhamphus* sp. (fam. Characidae) from Brazil, that appears to be morphologically and morphometrically similar to *C. ancistri* sp. n., it would be desirable to carry out a detailed comparison of the two forms. Unfortunately, our attempts to obtain the type or other specimens of *P. piscicola* for re-examination were unsuccessful.* Unfortunately, such details (e.g. the exact structure of the posterior end of male, structure of the stichosome, eggs, bacillary bands) are not apparent from the redescription of *P. piscicola* given by Mendonça (1963) and, therefore, it is difficult to make a comparison of this species with *C. ancistri* sp. n. Nevertheless, the shape of the male caudal end, its membranous bursa and the caudal lobes of *P. piscicola* are different from those of *C. ancistri* sp. n. and also the position of the anus in *P. piscicola* females is terminal (see drawing of Mendonça (1963)), whereas it is distinctly subventral in *C. ancistri* sp. n. Moreover, the host types should be considered for while the host of *P. piscicola* belongs to Cypriniformes, those of *C. ancistri* sp. n. are Siluriformes.

For these reasons, we consider the nematodes described from our material to be members of a new, hitherto undescribed species that we are designating as *Capillostrongyloides ancistri* sp. n. The species name is derived from the generic name of its host.

Accordingly, *Capillostrongyloides ancistri* sp. n. represents the third species and genus of capillariids recorded from aquarium fishes in Europe. In view of the fact that other freshwater members of *Capillostrongyloides* occur only in tropical and subtropical regions and since *C. ancistri* sp. n. is not known from free-living fishes in Europe, it can be presumed that this parasite was brought to Europe by importation of aquarium fishes from South America, like e.g. *Capillaria pterophylli* some 60 years ago. It is probable that, as in *C. pterophylli* (see Moravec 1983), the development of *C. ancistri* sp. n. is direct (homoxenous), without participation of an intermediate host, which facilitates reproduction of the parasite in the conditions of aquaria. The source of infection for host fishes are probably the nematode's larvated eggs that are swallowed up by armoured catfishes along with algae and detritus taken from the bottom of the tank.

Acknowledgements. We wish to express our gratitude to Prof. D. H. Molyneux, University of Salford, for his kindness in correcting the English translation of the manuscript.

CAPILLOSTRONGYLOIDES ANCISTRI SP. N. (NEMATODA: CAPILLARIIDAE) — НОВЫЙ ПАТОГЕННЫЙ ПАРАЗИТ АКВАРИУМНЫХ РЫБ В ЕВРОПЕ

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Резюме. Описан новый вид нематоды, *Capillostrongyloides ancistri* sp. n. из кишечника аквариумных сомиков *Ancistrus dolichopterus* Кнег в Чехословакии. Этот вид рыбы по происхождению из Южной Америки и потому можно предполагать, что *C. ancistri* sp. n. был завезен в европейские аквариума отсюда. Этот паразит характеризуется главным образом строением хвостового конца самцов (наличие двух крупных постанальных сосочков и кутикулярной бурсы, заключающей в себе две каудальные лопасти), длиной спикулы (0,258—0,297 мм), спикулярным влагалищем бес шпиков, формой заднего

* According to the information by Prof. J. J. Vicente, Instituto Oswaldo Cruz, Rio de Janeiro, the type specimens of *P. piscicola* are deposited at Faculdade de Medicina, Sao Paulo, Brazil.

конца тела самки, структурой стихосомы (наличие 23—30 стихоцитов) и размерами яиц. Этот вид кажется быть очень патогенным для аквариумных сомиков *Ancistrus dolichopterus*, у которых вызывает гибель.

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Received 26 February 1986

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FOLIA PARASITOLOGICA 34: 161—162, 1987.

MORPHOMETRIC DIFFERENCES IN THE GIARDIA CYSTS IN HUMANS

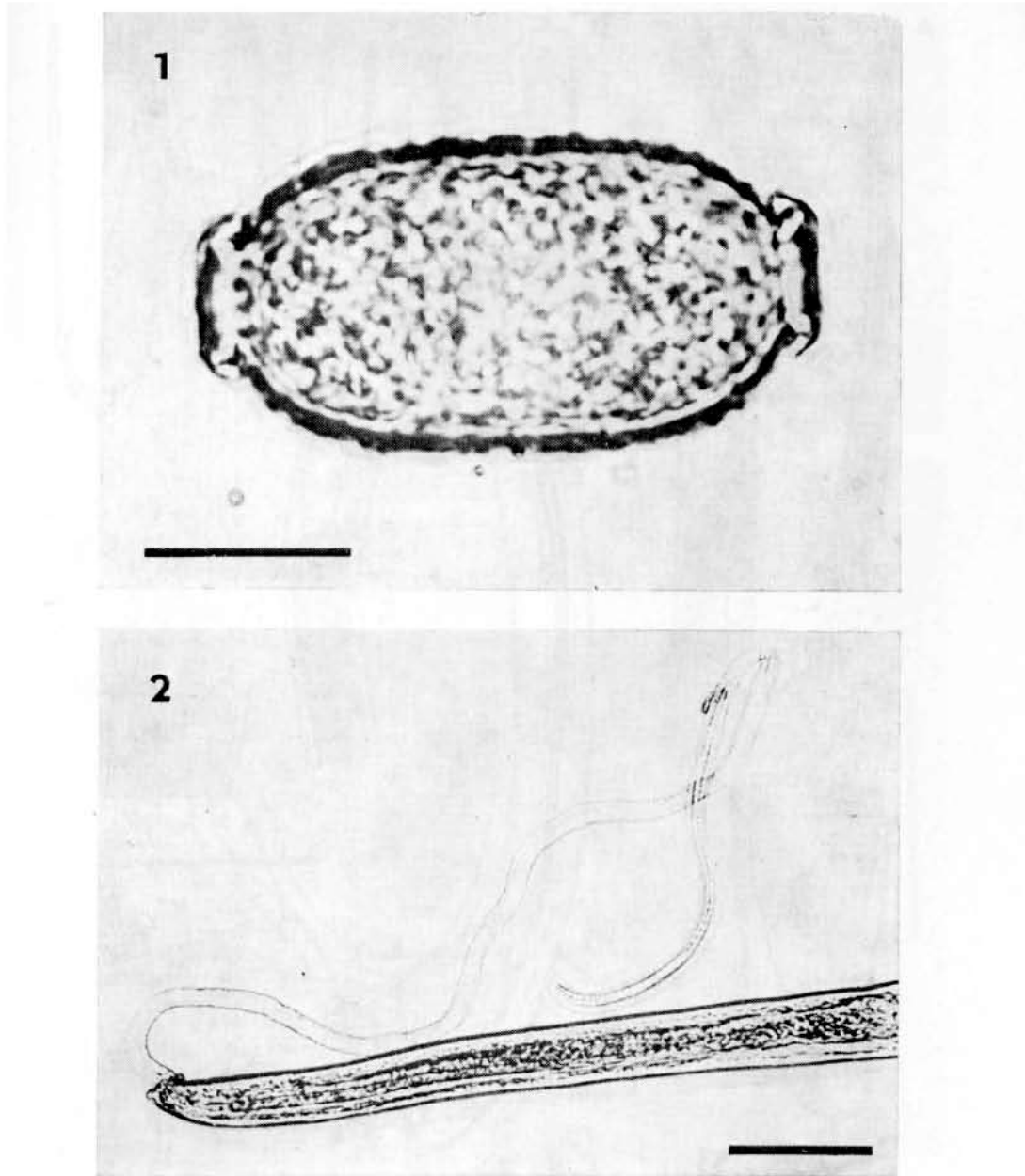
The protozoan *Giardia intestinalis* (Lambl, 1859) Alexeieff, 1914 parasitizes in the digestive tract of man. Filice (1952: Univ. Calif. Publ. Zool. 57: 53—143) distinguishes two giardia species in mammals: *G. muris* and *G. duodenalis* which differ in the form of median corpuscles.

Studies on the morphology of giardia cysts taken from the laboratory mouse, guinea pig, dog, white-tailed deer and man (Tombs A. S. et al., 1978: Proc. Natl. Symp. US Environm. Protect. Agency, Cincinnati: 22—37) have shown certain differences in their size

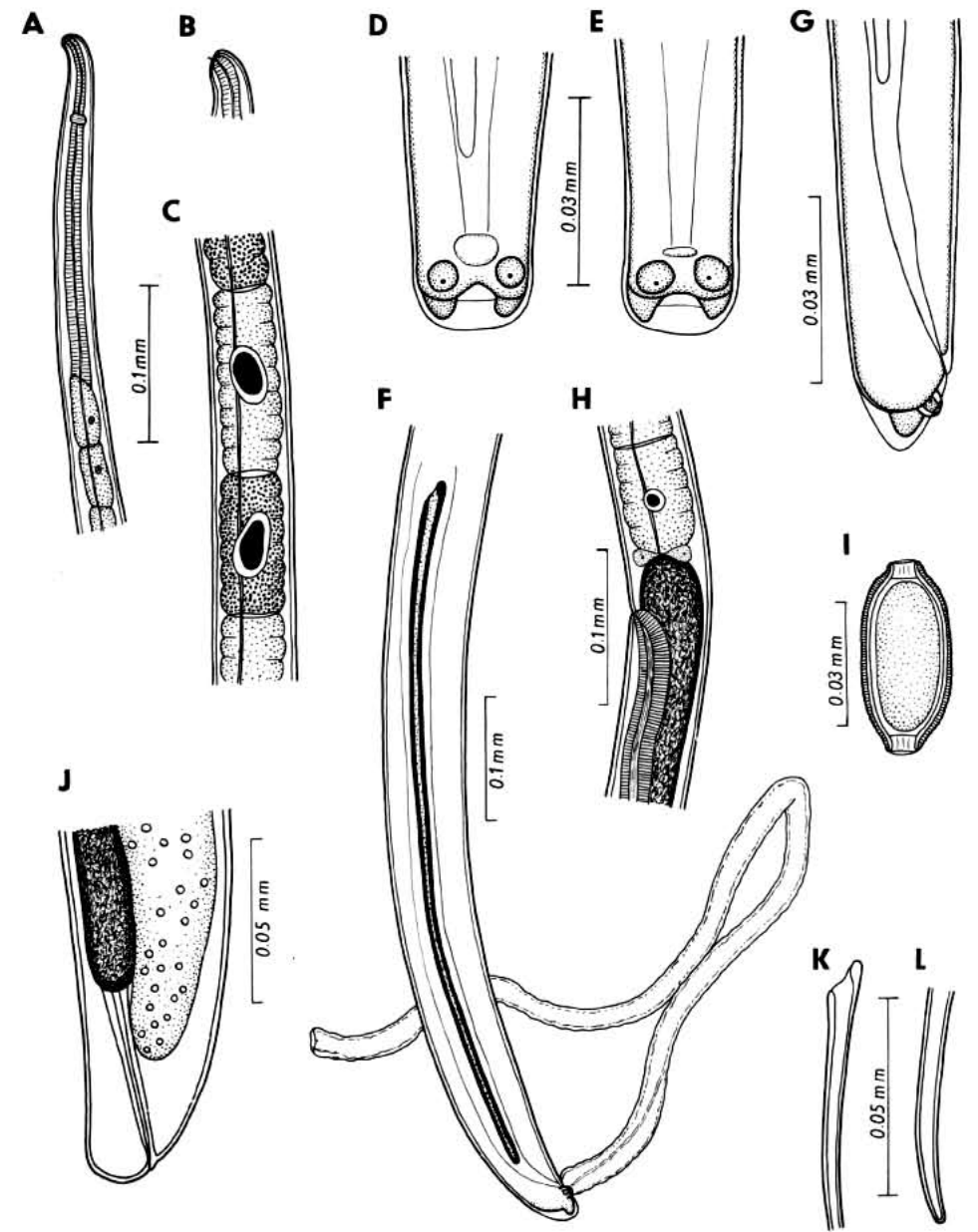
Table 1. Biometry of cysts in the two forms of *Giardia*

Number of cysts examined	78	73
Arithmetic mean of length	10.73	13.42
Standard deviation	1.00	1.10
Variance × 1.96	1.95	2.38
Maximum length	12.00	16.30
Minimum length	8.20	11.20
Ratio of length to width	1.4	1.5
Arithmetic mean of width	7.70	8.94
Standard deviation	0.76	0.80
Variance × 1.96	1.11	1.24
Maximum width	9.00	10.90
Minimum width	6.00	7.30

Note: dimensions of length are given in µm



Capillostrongyloides ancistri sp. n. from armoured catfish *Ancistrus dolichopterus*. Fig. 1. Egg. Fig. 2. Posterior end of male with evaginated spicular sheath. (Scales: Fig. 1—0.02 mm, Fig. 2—0.1 mm.)



Capillostrongyloides ancistri sp. n. from the armoured catfish *Ancistrus dolichopterus*. A — anterior end of female; B — head end; C — stichosome region; D, E, G — caudal end of male, ventral and lateral views; F — posterior end of male, lateral view; H — vulva region in female; I — mature egg; J — posterior end of female; K, L — proximal and distal ends of spicule.