

Short notes

Tetrameres globosa (Linstow, 1879) (Nematoda, Tetrameridae) – a nematode of the Eurasian coot *Fulica atra* (Linnaeus, 1758) recorded for the first time in Poland

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ABSTRACT. During parasitological studies of 23 Eurasian coot *Fulica atra* (Linnaeus, 1758), 91 nematodes were isolated. Three of them, found in the proventriculus, were identified as *Tetrameres globosa* (Linstow, 1879). This paper presents the morphological characteristics of the discovered males of *T. globosa*.

Key words: Nematoda, *Tetrameres globosa*, *Fulica atra*

Introduction

The *Tetrameres* Creplin, 1846 is a genus of cosmopolitan and polygenic parasitic roundworms that infects birds associated with terrestrial and aquatic environments [1–5]. These nematode are characterized by strict organ specificity, that is, their occurrence is limited to proventriculus. In addition, they are characterized by strong sexual dimorphism. Sexually mature females do not resemble nematodes; they are strongly shortened and almost spherical, with only their posterior and anterior ends being thin and sharp. The spherical shape corresponds to the central part of the female body, the uterus filled with a large numbers of eggs. This shape of the uterus is a big problem when isolating nematodes from the proventriculus because it easily breaks and the entire nematode is destroyed [6]. The specific structure of the female's body and its location (lumen of the gland) make it impossible to confuse these nematodes with other parasites, but the systemic position of *Tetrameres* nematodes is almost exclusively determined by the morphology of the male [6,7]. The male is smaller than the

female, located in the superficial layer of the gastric mucosa, and its filamentous body is surrounded by rows of spines.

There are 18 known species of *Tetrameres* Creplin, 1846 in Europe. Only five have been identified in Poland: *Tetrameres dubia* Travassos, 1917; *T. fissispina* Diesing, 1861; *T. pavonis* Tschertkova, 1953; *T. somateriae* Ryzhikov, 1963; *T. spinosa* (Maplestone, 1931) [1,6,8–11].

Parasitological research, conducted by Laboratory of Biology and Ecology Parasites of West Pomeranian University of Technology, determined presence of new nematode species in Polish fauna – *Tetrameres globosa* (Linstow, 1879). This parasite had previously been found in Moldova, Russia, Ukraine and Pakistan [9,12].

The aim of this study was to present the morphological characteristics of *T. globosa* isolated from the proventriculus of the Eurasian coot *Fulica atra*.

Materials and Methods

The study material consisted of nematodes

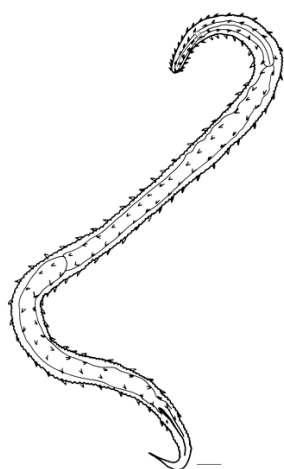


Fig. 1. Male of *Tetrameres globosa* Linstow, 1879. Scale bar: 100 μ m

isolated from the gastrointestinal tracts of 23 Eurasian coots in Western Pomerania, obtained from hunters from August 15 to December 21, 2012. Isolated nematodes were fixed and stored in 70% ethanol, cleared in glycerine or 80% lactic acid. All nematodes were measured, three of them (males) were identified as *T. globosa*. The parasites were identified according to keys based on species characteristics available in literature [6,8–10].

Results and Discussion

In total, 91 nematodes were isolated from the digestive tract sections of 23 examined Eurasian coots, from which three males were identified as *Tetrameres globosa* (Linstow, 1879). Females were not found. *T. globosa* males were located under the surface layer of the proventriculus of the young

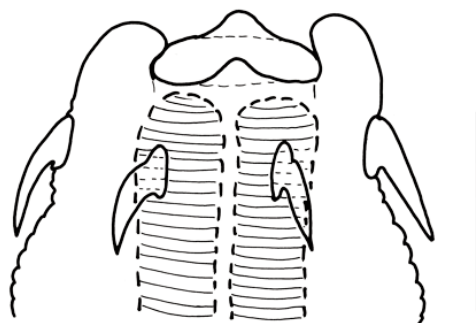


Fig. 3. Anterior end of male *Tetrameres globosa* Linstow, 1879. Scale bar: 50 μ m

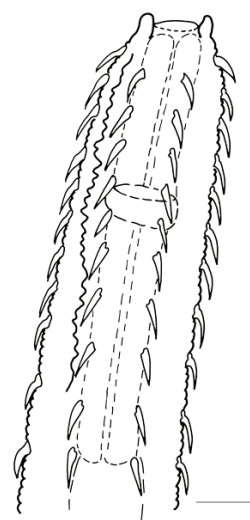


Fig. 2. Anterior end of male *Tetrameres globosa* Linstow, 1879. Scale bar: 50 μ m

male coots. The body was milky white and the cuticle clearly transversely striated with four rows of spines running along the length (Fig. 1). The entire body was cylindrical with a sharp-pointed distal end. Morphological description of male *T. globosa* is presented in Table 1. The total length of the male ranged from 4.35 to 4.7 mm (4.5 mm on average). The width of the specimens ranged 66.0 to 82.0 μ m in the proximal part of the body and 150.0 to 160.0 μ m in the widest part. The length and width of the body were similar to other individuals of this species (Table 1).

The nerve ring was located 167.5 μ m from the beginning of the body. The mouth was surrounded by labia equipped with papillae, and pseudolabia with a slight elevation in the center (Figs. 2,3). The buccal capsule had a depth of 10.0 to 14.85 μ m and a width of 20.0 to 35.0 μ m. The thickness of the buccal capsule wall was equal across its entire surface, at 5.0 μ m. The muscular oesophagus was 345.0 to 590.0 μ m long and 45.0 to 47.0 μ m wide. The length of the muscular oesophagus was significantly lower than that reported in literature (Table 1), which may be due to the low number of males examined by the authors of this paper.

Two parallel dorsal and two parallel ventral rows of spines extend across the entire length of the body, and a zigzag pattern could be seen between them on the surface of the epidermis. Each row contained from 40 to 43 spines arranged one below the other. They started to appear at about 40.0 μ m from the proximal end of the body where they were slender and pointed, with lengths ranging from 27.5 to 30.0 μ m. The spines were shortest in the area of the



Fig. 4. Posterior end of male *Tetrameres globosa* Linstow, 1879. Scale bar: 100 μ m

spicule, from 10.0 to 20.0 μ m (on average 14.2 μ m). Distances between spines averages 21.7 μ m (from 12.5 to 32.5 μ m) with the distance to the adjacent row of spines on average 25.0 μ m (12.5 to 37.5 μ m). The distance between the spines grew larger along the body toward the tail. All these dimensions were in line with the available descriptions (Table 1).

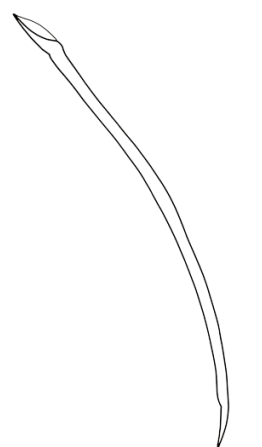


Fig. 5. Details of spicule of male *Tetrameres globosa* Linstow, 1879. Scale bar: 100 μ m

In two out of three isolated individuals, small laterally developed cuticle patches were found within the tail (Fig. 4). The tail length 170.0 to 190.0 μ m was considerably longer than in the *T. globosa* described by Skrjabin but within the range provided by Birmani et al. [12] (Table 1). The long and straight spicule ranged from 237.6 to 306.9 μ m (Fig.

Table 1. Morphological description of male *Tetrameres globosa* Linstow, 1879 (μ m)

Characteristics	Skrjabin and Sobolev [2]	Birmani et al. [12]	Own material
Length of body	3600–3750	2420–4630	4350–4700
Width of body (max)	140–160	80–140	150–160
Width of body at buccal capsule	–	–	66–78
Length of buccal capsule	10–12	10	10.0–14.85
Width of buccal capsule	24	–	20–35
Thickness of wall buccal capsule	–	–	5
Nerve ring distance from anterior body end	–	160–180	165.0–167.5
Spines number per row	–	40–41	40–43
Length of spines	20–24	10–30	–
Length of spines on anterior body end	–	–	27.5–30.0
Length of spines on posterior body end	–	–	10–20
Spines distance from anterior body end	28–30	20	40
Distance between spines per row	–	–	12.5–32.5
Distance between spines adjacent rows	–	–	12.5–37.5
Length of muscular oesophagus	–	750–950	345–590
Width of muscular oesophagus	–	–	45–50
Length of large spicule	300	290–560	237.5–306.9
Length of tail	130–150	160–200	170–190

5). The proximal part of the spicule was bent, bluntly ended, while the distal portion was straight and pointed. No gubernaculum was observed. The right spicule (poorly visible) was observed only in one of the three examined males. In literature there are reports of *T. globosa* males with one or two spicules [12].

The first description of *Tetrameres globosa*, provided by Linstow in 1879, was based on morphology of females isolated from proventriculus of Eurasian coot [13]. Males of *Tetrameres* genus, parasites of the same bird species, were isolated and described by Puchov as late as in 1939 [13]. He marked them as *Tetrameres crami*, the name of which was however previously used by Swales for nematodes of domestic duck [13]. Bearing in mind the priority right, Gushanskaya in 1951 named the parasite isolated by Puchov in 1939 another species name, that is, *T. puchovi* (Gushanskaya, 1949) [2,13]. Her objective was to prevent misunderstandings in differentiating *T. crami* males (Swales, 1933) from *T. crami* males (Puchov, 1939) [13].

Full morphological description of both females and males of *Tetrameres globosa* was provided only in 1948 by Serkova [13]. She determined in the course of coot parasitological tests that isolated females of *Tetrameres* genus fit Linstow's description, while accompanying them males do not differ from ones described by Puchov [13]. Thus, she confirmed systematic affiliation of the females described by Linstow and males *T. crami* described by Puchov, 1939, to the *Tetrameres globosa* species [2,13].

Numerous authors use morphology and morphometric parameters of *T. globosa* males and females provided by Serkova [2,13,14], however, three synonyms of *Tetrameres globosa* are still encountered in the available literature (Linstow, 1879): *Tropidocerca globosa* (Linstow, 1879), *Tetrameres crami* (Puchov, 1939), nec *T. crami* (Swales, 1933), and *T. puchovi* (Gushanskaja, 1949) [2,13,14].

Key features allowing to distinguish *T. globosa* species from other nematodes of *Tetrameres* genus are: spicules number, shape of the longer spicule, and spines rows number and length [2,7,12–15]. Researched structures dimensions are similar to the ones presented in works of other authors and place within determined ranges [6–9]. Small differences occurred in muscular oesophagus length, which is shorter in comparison to other authors measurements, and tail length, which is a bit longer

[2,12]. Four spines rows along the body, as well presence of one large and one small and second rudimentary spicule in examined nematodes are consistent with previous descriptions of *T. globosa* [2,12–14]. The only difference is the distal end of the large spicule, which is sharpened, as opposed to Serkova description (after Skrjabin and Sobolev, 1963). However, as Mollhagen notes, males of the species may experience change in spicule ending from blunt to sharp [14].

The obtained dimensions of the characteristic body parts of the discussed nematode and the host species (Eurasian coot) indicate that we encountered individuals of *Tetrameres globosa* Linstow, 1879. A lack of information on the occurrence of this parasite in birds in Poland suggests that this report is the first observed occurrence of this parasite in the fauna of this country.

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