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# Research Note

## *Chordatortilis crassicauda* Mendonça et Rodriguez, 1965 (Spirurida, Acuariidae) in wren *Troglodytes troglodytes* (Passeriformes) in Europe: a new host and geographical record

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### Article info

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### Summary

The nematode *Chordatortilis crassicauda* Mendonça et Rodriguez, 1965 (Nematoda, Acuariidae) had previously been recorded only one time, in Brazil, as a parasite of *T. musculus musculus* Naumann. Thus the record of this species in Poland, in Europe, on another continent and in a different species of the genus *Troglodytes*, is worthy of presentation. The aim of the study is to document the presence of *Chordatortilis crassicauda* (Nematoda, Acuariidae) in the Wren *Troglodytes troglodytes*. Four *Chordatortilis crassicauda* individuals (three female and one male) were found between the proventriculus and muscular stomach of one *T. troglodytes* individual (adult female) collected in the village of Wicie on the Baltic Coast (north-western Poland) on 28 April 2013. The Wren is a new host record for *C. crassicauda*. The fact that *C. crassicauda* had not previously been recorded in Europe may indicate that it is a rare species, specific to birds of the genus *Troglodytes*, which seldom undergo necropsy.

**Keywords:** *Chordatortilinae*; Europe; parasites; Troglodytidae

### Introduction

The Eurasian Wren *Troglodytes troglodytes* (Linnaeus, 1758) (Troglodytidae) is one of the smallest migratory passerids, distributed over nearly the entire northern hemisphere. Several dozen subspecies are known, the most common in Europe being *Troglodytes troglodytes troglodytes*. In Poland, the Wren is a comparatively numerous breeding bird and part of its population overwinters in Poland. It does not undertake long-distance journeys due to its size and flying characteristics. Wren migrations are limited to a few hundred kilometres. During migrations, it very often appears on the Baltic Coast (Tomiałojć & Stawarczyk, 2003).

The family Acuariidae (Nematoda: Spirurida) is rich in nematode species and widely represented on both sides of the Atlantic, in both the Old and New World, and numerous acuariids have been reported from Australia; therefore the group is cosmopolitan.

Nematodes of the family Acuariidae are widely distributed in Europe. Information concerning nematodes of *T. troglodytes* around the world is scarce, probably because few wrens have been examined for the presence of helminths. To date, two nematode species of the family Acuariidae have been noted in *T. troglodytes*: *Synhimantus troglodytae* Oschmarin, 1963 (Russian Far East, Primorsk region – Oschmarin, 1963) and *Skrjabinocerca prima* Schikhobalova, 1930 (on Bering Island, Russia – Tsimbaliuk *et al.*, 1968). In the few available works the following other species of helminths have been recorded in *T. troglodytes*: the digenean trematodes *Leucochloridium macrostomum* Rudolphi, 1802 (in England – Ash, 1957; Clapham, 1957) and *Maritrema afanassjewi* Belopol'skaya, 1952 (on Bering Island, Russia – Tsimbaliuk *et al.*, 1968); the cestodes *Monopylidium exiguum* (Dujardin, 1845) Spasskii, 1968, *Taenia exigua* Dujardin, 1845, *Choanotaenia exigua* (Dujardin, 1845) (in France – Dujardin, 1845; England – Baylis, 1947; Curonian

Spit, Russia – Galkin, 1981; Komisarovas *et al.*, 2007) and *Monopylidium attenuatum* (Dujardin, 1845) Spasskaya et Spassky, 1977, syn *Dilepis attenuata* (Dujardin, 1845) (in France – Joyeux & Baer, 1936; England – see: Armstrong, 1953) and the acanthocephalans *Plagiorhynchus* (*Prosthorhynchus*) *cylindraceus* (Schrunk, 1788) (on the Island of Skomer – James & Llewellyn, 1967; the Netherlands – Borgsteede *et al.*, 2000; Czech Republic – Okulewicz & Sitko, 2002), *Sphaerirostris lancea* (Westrumb, 1821) (in the Czech Republic – Okulewicz & Sitko, 2002) and *Polymorphus boschadis* (Schrunk, 1788) (in England – Clapham, 1957; Ash & Sharpe, 1964). Moreover, the older literature contains a report of the occurrence of acanthocephalans in wrens: *Centrorhynchus fasciatus* (Westrumb, 1821), *Echinorhynchus decipiens* Dujardin, 1845, and *Prosthorhynchus transversus* (Rudolphi, 1819) (in England – see: Armstrong, 1953). In Poland, birds of the family Troglodytidae have not been subject to parasitological examination. J. Okulewicz conducted a necropsy of 5 adult wren specimens collected in winter and in autumn in the 1980s in Lower Silesia (J. Okulewicz pers. comm.), but no helminths were found in the birds at that time.

There is little information regarding helminths occurring in the related wren species *Troglodytes musculus* living in South America. In Brazil, one occurrence of the nematode *Chordatorilis crassicauda* (Mendonça & Rodriguez, 1965) (Acuariidae) was recorded in this bird. Trematodes *Lubens lubens* (Braun, 1901) (Travassos *et al.*, 1969) have been noted as well. Until now these helminths had not been found on the European continent.

The aim of the study is to document the presence of the nematode species *Chordatorilis crassicauda*, a representative of the Acuariidae (Nematoda), in Europe, in the Eurasian Wren *Troglodytes troglodytes*. The nematode *Chordatorilis crassicauda* had previously been recorded only one time, in Brazil, as a parasite of *T. musculus* Naumann (Mendonça & Rodriguez, 1965). Thus the record of this species in Poland, on another continent and in a different species of the genus *Troglodytes*, is worthy of presentation.

## Materials and Methods

A total of 7 Wren specimens were examined in spring and autumn in the years 2008 – 2010 and 2013 in the southern part of the Baltic Coast (north-western Poland) on the Hel Peninsula (56° 46' N, 18° 28' E (4 birds), near Bukowo and Kopań (54° 20' N, 16° 25' E) (2 birds) and near the village of Wicie (54° 30' N, 16° 28' E) (1 bird). The material used for helminthological analysis, conducted by means of necropsy, consisted of birds which had died of natural causes, such as exhaustion caused by seasonal migration or an attack by a predator, and were found dead. Four nematode specimens were found between the proventriculus and muscular stomach of one of the birds. They were removed, preserved in 75% ethyl alcohol and cleared in glycerol for light microscopy. Four nematode specimens were found in one adult *T. troglodytes* (female), which was found dead on 28 April 2013 in Wicie, a village on the Baltic Coast. Three of the nematodes were mature females filled with eggs and one was a male. The nematode specimens were deposited in the Polish Collection of Parasitic Helminths, Museum of Natural History, Wrocław University, Poland.

## Results

### Description of parasites:

Nematodes with transverse striations 4 – 5 µm apart. Four cuticular cordons with spiral torsion with respect to body axis, with dentated edges beginning on sides of lips and reaching to glandular parts of oesophagus, with ends recurrent towards head region. Cordons forming 'sinistral', i.e. left-handed (anticlockwise) spiral. Oral opening elongated and surrounded by two pseudolabia, each with a pair of papillae. Oesophagus divided into muscular (short and narrow) and glandular (longer and wider) parts. Deirids and excretory pore not visible.

Male (Fig. 3C): Body length: 6.55 mm; maximum body width: 300 µm; length of cordons: 970 µm. Length of buccal cavity:



Fig. 1. *Chordatorilis crassicauda* – anterior end of a female

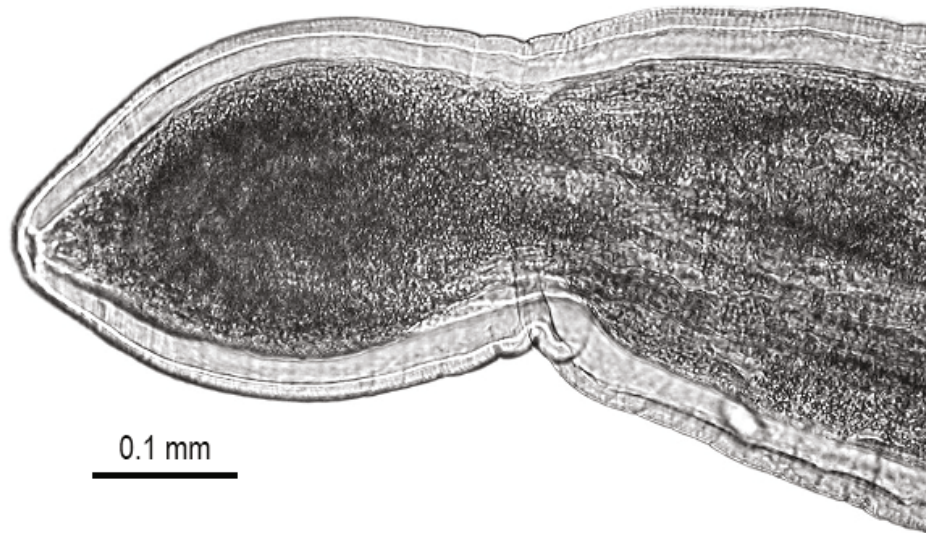


Fig. 2. *Chordatorilis crassicauda* – posterior end of a female

87  $\mu$ m. Length of muscular oesophagus: 510  $\mu$ m; width: 70  $\mu$ m. Length of glandular oesophagus: 1,950  $\mu$ m; width: 160  $\mu$ m. Two unequal and dissimilar spicules: 1 large thin spicule sharpened at end, 540  $\mu$ m long; 1 small, short and thick spicule, 123  $\mu$ m long and 15  $\mu$ m wide. Tail length: 140  $\mu$ m, curled spirally. Body width at level of cloaca: 115  $\mu$ m. In lateral view 8 single caudal papillae visible (3 precloacal anal and 5 postcloacal), located on one side of body, but no corresponding papillae visible on other side. Caudal alae very narrow. Boundaries of caudal alae not visible. *Area rugosa* not visible.

Female (3 adults) (Fig. 1 – 2 and 3A – B): Body length: 13.25 – 15.87 mm; maximum body width: 620 – 720  $\mu$ m; length of cordons: 2,000 – 2,100  $\mu$ m. Length and width of buccal cavity: 124 – 148 x 34  $\mu$ m. Length of muscular oesophagus: 770 – 800  $\mu$ m, width: 100 – 110  $\mu$ m. Length of glandular oesophagus 2,450 – 2,800  $\mu$ m; width: 200 – 210  $\mu$ m. Vulva situated at 220 – 370  $\mu$ m from posterior end. Body at level of vulva constricted, 200 – 280  $\mu$ m wide. Reproductive system didelphic. *Vagina vera* short. *Vagina uterina* long, with muscular walls, containing mature eggs. Uterus filled with eggs. Mature eggs oval, thick-walled, 42 – 45 x 25 – 30  $\mu$ m, containing formed larvae. Anus situated 102 – 110  $\mu$ m from posterior end. Body width at level of anus: 118  $\mu$ m. Tail rounded.

## Discussion

Nine nematode individuals (8 females and 1 male) had been found between the proventriculus and the muscular stomach (gizzard) in one specimen of the Southern House Wren *Troglodytes musculus musculus* collected in Brazil (near Rio de Janeiro) (Mendonça & Rodriguez, 1965). On the basis of the morphological charac-

ters of the parasites, the authors (Mendonça & Rodriguez, 1965) described a new subfamily, genus and species. The nematodes found were surrounded by a cyst. Due to the presence of cuticular cordons beginning on the sides of the lips in the anterior part of the body, the parasites were classified as representatives of the family Acuariidae. They could not be classified as belonging to the subfamily Acuariinae Railliet, Henry et Sisoff, 1912 due to the untypical spiral pattern of cuticular cordons on the head, and another character – a ring-shaped narrowing of the tail in the females (Mendonça & Rodriguez, 1965).

Morphological comparison of the new sample and the original description of the species (Mendonça & Rodriguez, 1965) shows that most characters are similar, and the differences in biometric measurements are minor and may indicate individual differences within the species. The anterior part of the body has four cuticular cordons with dentated edges, coiled spirally along the body, with ends recurrent towards the anterior end and terminating freely. The cordons in the male in the new sample are 360  $\mu$ m shorter than in the original description of the nematode, while in the females the length of the cordons is within the range reported by Mendonça & Rodrigues (1965). The ratio of cordon length to body length is similar in the new sample and the original description. The cordons occupy nearly 1/7 of the body length in the males and about 1/6 to 1/9 in the females in the original description, and nearly 1/7 in the new sample. The authors of the original description of the nematode do not provide descriptive information regarding the direction of the torsion of the cordons, i.e. to the right or to the left. The drawings of the holotype and allotype of *C. crassicauda* presented by Mendonça & Rodrigues (1965) are not consistent. The authors presented two contradictory drawings showing the direction of the



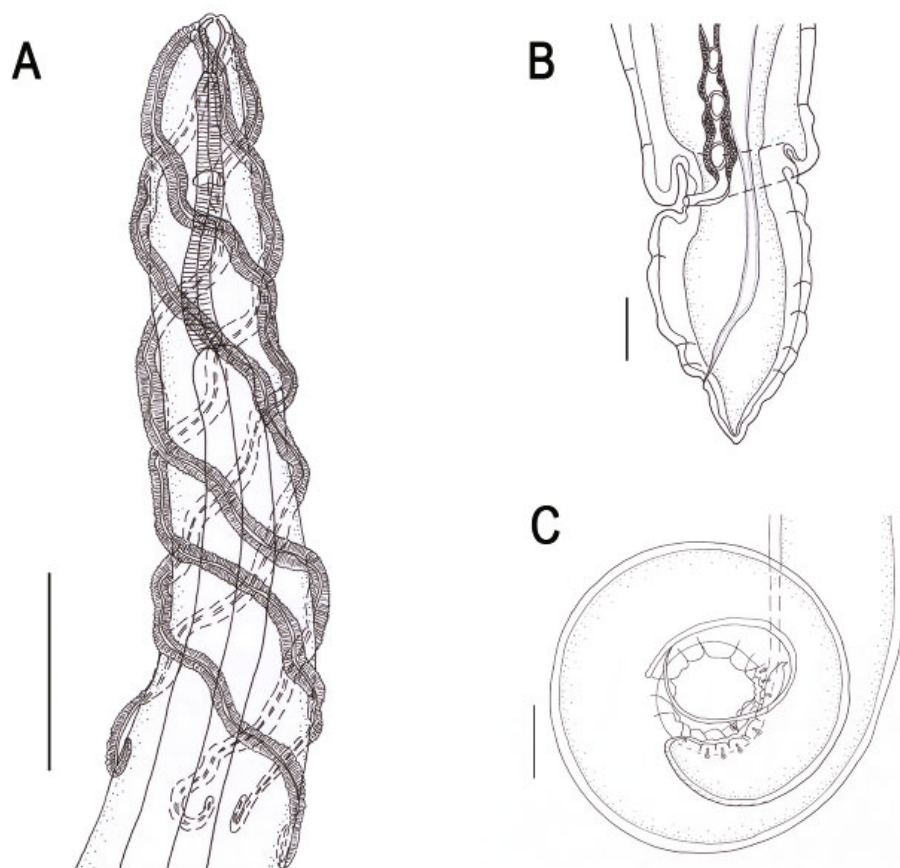


Fig. 3. *Chordatortilis crassicauda* Mendonça et Rodriguez, 1965. A, anterior end, female, lateral view; B, posterior end, female, lateral view; C, posterior end, male, lateral view. Scale bars: A, 250 µm; B, C, 100 µm

torsion of the cordons. To specify the direction of the torsion of the cordons, we used the concepts of 'dextral torsion' (to the right) and 'sinistral torsion' (to the left) used to describe traits observed in nature, e.g. in reference to gastropod shells or the shape of the DNA double helix. Applying the definitions of dextral and sinistral torsion used in the biological sciences, we find that the type material has cordons with dextral torsion in the drawing of the anterior end of the nematode body in the lateral view (Fig. 3 in: Mendonça & Rodrigues, 1965), and cordons with sinistral torsion in the two drawings showing the entire nematode and the anterior end in the ventral view (Fig. 1 and 4 in: Mendonça & Rodrigues, 1965). In our material, in all of the nematode specimens, both male and female, the cordons are tortuous to the left, corresponding to Fig. 1 and 4 in the article by Mendonça & Rodrigues, 1965. Mutafovich *et al.* (2010) studied type material of *C. crassicauda* during their examination and description of the new genus *Parachordatortilis*. According to Mutafovich *et al.* (2010), *Parachordatortilis* has cordons with spiral torsion to the left (sinistral), while *Chordatortilis* has cordons with spiral torsion to the right (dextral). We believe that the descriptions of the torsion of the cordons presented by Mutafovich *et al.* (2010) are not in agreement with the definition of dextral and

sinistral torsion. Mutafovich *et al.* (2010) presented drawings and photographs (SEM) of *Parachordatortilis mathevossianae* (Petrov & Chertkova, 1950) *n. comb.* enabling analysis of the morphology of the nematodes they described. We confirm the finding of the morphological examination of the nematode that the cordons are tortuous in opposite directions in *Parachordatortilis* and *Chordatortilis*, but *Chordatortilis* in our material possesses cordons forming a 'sinistral', i.e. left-handed (anticlockwise) spiral, while those of *Parachordatortilis* form a 'dextral', i.e. right-handed (clockwise) spiral. The male in the new sample is 2.44 mm smaller and 50 µm narrower than in the original description. The biometric measurements of the male in the new sample are proportionally smaller than in the original description: the buccal cavity is 73 µm smaller, the muscular oesophagus 210 µm shorter and 9 µm narrower, and the glandular oesophagus 320 µm shorter and 5 µm narrower. The posterior end of the male body is coiled and has two unequal and dissimilar spicules, which are somewhat smaller in the new specimen than in the original description. The larger spicule, which is long and thin, is 60 µm shorter, and the smaller spicule, which is shorter and thicker, is 10 µm shorter in the male in the new sample. In the original description there are 7 pairs of caudal

papillae, 2 precloacal and 5 postcloacal. The drawing of the posterior end of the male in the lateral view presented by the authors of the description is difficult to interpret because the number and arrangement of the papillae are not clearly visible (Mendonça & Rodrigues, 1965). In the new sample, 8 caudal papillae are visible (3 precloacal and 5 postcloacal), located on one side of the body of the male lying laterally. The other side of the body is not visible. As the posterior end of the male body is tightly coiled and the cuticle is wrinkled, the arrangement of the caudal papillae is irregular, both in the new specimen and in the original description. The distance from the anus to the posterior end of the body is somewhat smaller in the new specimen than in the original description, by 30 µm.

The body length of the female nematodes in the new sample is within the range for the length of females in the original description, but they are somewhat wider – about 40 – 60 µm. The structure of the reproductive system is the same. The uterus is didelphic, and the vulva is located in the posterior end in a narrowing of the body. The buccal cavity is 22 – 46 µm shorter in the new specimens than in the original description. The dimensions of the muscular oesophagus in the new specimens are within the range given in the original description, while the glandular oesophagus is about 80 – 360 µm shorter. The minimum length of the glandular oesophagus in the new specimens is about 49 µm greater than in the original description, but the maximum width does not exceed the upper range in the original description. The distance from the vulva to the posterior end of the body in the new specimens is within the range given in the original description; the minimum distance in the new sample is 20 µm greater and the maximum distance 60 µm smaller than in the original description. No morphological differences were noted in the structure of the ovijector. In both the new sample and the original description the ovijector is long and muscular and contains eggs with larvae. The uteri are filled with eggs, which are 2 – 5 µm longer in the new specimens than in the original description, and their maximum width is 4 µm greater. On the basis of observations of type-material characters, Mendonça & Rodriguez (1965) established a new subfamily Chordatorilinae with one genus *Chordatorilis* and one species *Chordatorilis crassicauda*. Apart from the original species description (Mendonça & Rodrigues, 1965), also given in *Osnovy Nematodologii* (Skrjabin *et al.*, 1967), the available literature contains only one work mentioning this nematode species. According to the classification of Acuariidae proposed in CIH Keys by Chabaud (1975), which is currently generally accepted, *Chordatorilis* belongs to the subfamily Acuariinae. Furthermore, Mutafovich *et al.* (2010) suggested that *Chordatorilis* may be related to the genera *Dispharynx*, *Synhimantus* and *Parachordatorilis*.

The fact that *Chordatorilis crassicauda* has not been recorded in Europe or elsewhere apart from the instance described in the present paper may indicate that it is a rare species, specific only to birds of the genus *Troglodytes*, which have rarely undergone necropsy.

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