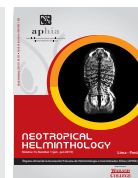




Neotropical Helminthology



ORIGINAL ARTICLE / ARTÍCULO ORIGINAL

A NEW SPECIES OF *COSMOCERCA* (NEMATODA: ASCARIDIDA: COSMOCERCIDAE) FROM GYMNOPTHALMID LIZARDS OF WESTERN BRAZIL

UNA NUEVA ESPECIE DE *COSMOCERCA* (NEMATODA: ASCARIDIDA: COSMOCERCIDAE) DE SAURIOS GIMNOFTÁLMIDOS DEL OESTE DE BRASIL

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ABSTRACT

Cosmocerca gymnophthalmicola n. sp., an intestinal parasite of the gymnophthalmid lizards *Alopoglossus angulatus* (Linnaeus, 1758) and *Cercosaura eigenmanni* (Griffin, 1917) from western Brazil is described and illustrated. *Cosmocerca gymnophthalmicola* n. sp. represents the 31st species assigned to the genus, and the 11th to be reported in the Neotropical region. Moreover, *C. gymnophthalmicola* n. sp. is the fourth species reported from lizard hosts, and is distinguished from other species of the genus *Cosmocerca* by possessing 6 pairs of plectanes and by a combination of spicule and gubernaculum length and by the absence of lateral alae in both sexes. The new species is more similar to *C. banyulensis*, *C. chilensis*, *C. longicauda*, *C. parva* and *C. rara* in having 6 pairs of plectanes, but differ from these species by larger spicules and absence of lateral alae in both sexes.

Keywords: *Cosmocerca gymnophthalmicola* n. sp. - Gymnophthalmidae - Neotropical - New species - Sauria - Squamata

RESUMEN

En este artículo se describe e ilustra a *Cosmocerca gymnophthalmicola* n. sp., un parásito intestinal de los lagartos gimnoftálmidos *Alopoglossus angulatus* (Linnaeus, 1758) y *Cercosaura eigenmanni* (Griffin, 1917) del oeste de Brasil. *Cosmocerca gymnophthalmicola* n. sp. representa la 31^a especie asignada al género, y la 11^a en la región Neotropical. Por otra parte, *C. gymnophthalmicola* n. sp. es la cuarta especie que tiene hospederos lagartos, y se distingue de otras especies del género *Cosmocerca* por poseer 6 pares de plectanas y por una combinación de espículas y gubernáculo y por la ausencia de alas laterales en ambos sexos. La nueva especie es más similar a *C. banyulensis*, *C. chilensis*, *C. longicauda*, *C. parva* y *C. rara* en tener 6 pares de plectanas, pero se diferencian de estas especies por espículas más grandes y ausencia de ala lateral en ambos sexos.

Palabras clave: *Cosmocerca gymnophthalmicola* n. sp. - Gymnophthalmidae - Neotropical - Nueva especie - Sauria - Squamata

INTRODUCTION

The nematode genus *Cosmocerca* Diesing, 1861 is composed by 30 species (Burse *et al.*, 2015; Sou *et al.*, 2018). They are distributed worldwide, and the Neotropical region harbors one third of the known species, mostly described from amphibian hosts (see Burse *et al.*, 2005; 2015).

To date, three species of *Cosmocerca* have been described from lizard hosts, with two being from gekkonids: *C. zugi* Burse, Goldberg & Kraus, 2005 from *Cyrtodactylus louisianensis* (De Vis, 1892) and *C. leytensis* Burse, Goldberg, Siler & Brown, 2015 from *Cyrtodactylus gubaot* Welton, Siler, Linkem, Diesmos & Brown 2010 and *C. vricibradici* Burse & Goldberg, 2004 from the gymnophthalmids *Cercosaura* (= *Prionodactylus*) *eigenmanni* (Griffin, 1917) and *C. oshaughnessyi* (Boulenger, 1885) (Burse & Goldberg, 2004; Burse *et al.*, 2015). The last species was described from Ecuador and the Brazilian states of Rondonia, Acre and Amazonas (Burse & Goldberg, 2004), neighbor states of Mato Grosso, where during parasitological surveys we found an undescribed species of *Cosmocerca* from gymnophthalmids, which is described herein.

MATERIALS AND METHODS

Three adult specimens of *Alopoglossus angulatus* (Linnaeus, 1758) (mean snout vent length = 50.20 mm, standard deviation 7.72 mm) and nine adult specimens of *Cercosaura eigenmanni* (Griffin, 1917) (mean snout vent length = 34.86 mm, standard deviation 5.48 mm) were analyzed. All lizards were collected by hand, between May and October 2002, during a faunal rescue program at the site of construction of the reservoir of Guaporé hydroelectric power plant, Vale de São Domingos municipality, Mato Grosso State, Brazil. Helminths found in the small and large intestine of the lizards were fixed in a solution of alcohol-formalin-acetic acid, cleared in lactophenol and examined using an optical microscope.

The holotype and allotype of the new nematode species described here were deposited in the

Coleção Helminológica of the Instituto Oswaldo Cruz (CHIOC 35867a and 35867b, respectively), Rio de Janeiro State, Brazil. Paratypes were deposited in the Coleção Helminológica of the Departamento de Parasitologia, Instituto de Biociências (CHIBB 3122, 3128, 3130, 3136, 3138 and 3141), Universidade Estadual Paulista - UNESP, Botucatu municipality, São Paulo State, Brazil. Morphology was studied using a computerized system of image analysis (LAS DIC, Leica Microsystems, Wetzlar, Germany) and illustrations were made with the aid of a drawing tube in a Leica microscope.

The host lizards were fixed in 10% formalin, preserved in 70% ethanol and deposited in the Coleção Zoológica da Universidade Federal de Mato Grosso, Cuiabá municipality, Mato Grosso State, Brazil (*A. angulatus* – UFMT 5727, 5730 and 5735; *C. eigenmanni* - UFMT 842, 844, 845, 857, 5055, 5061, 6064, 5065 and 5067).

Morphological data are generally presented as mean \pm 1 standard deviation (minimum and maximum) values. Measurements in μ m, unless otherwise noted.

This study was approved by the ethics committee of Universidade Regional do Cariri (CEUA/URCA, process No. 00260/2016.1).

RESULTS

Necropsy revealed 14 nematodes in the small and large intestine of 5 lizards. Two adult females of *A. angulatus* had 1 and 4 nematodes each, and two adult males and one female of *C. eigenmanni* harbored three nematodes each. The nematodes were found in the small and large intestine of 2 from the 3 examined specimens of *A. angulatus*, a prevalence of 66.7%, and of 3 from the 9 examined specimens of *C. eigenmanni*, a prevalence of 33.3%. After careful examination and comparison with available descriptions of congeners, it became clear that nematodes found in *A. angulatus* and *C. eigenmanni* belong to a previously undescribed species of *Cosmocerca*.

***Cosmocerca gymnophthalmicola* n. sp.**
(Figs. 1A–D, 2)

Description: Small nematodes, with males smaller than females. Lateral alae absent in both male and females. Cuticle transversely striated. Mouth with three lips, with the dorsal lip bearing two large submedian papillae and the two ventrolateral lips with one submedian papillae and one amphid each. Esophagus starting with a short pharynx, elongated body, small isthmus and valved bulb. Excretory pore situated above the bulb in both male and females. Tapered conical tail in both sexes. Male with 2 large spicules, a relatively small gubernaculum and two rows of plectanes on ventral surface.

Male (Figs. 1B, D; 2) based on 1 adult specimen (Holotype, CHIOC 35867a): Length 2.2 mm; width at midbody 171.7. Esophagus 260.7 long: pharyngeal portion 34.8 long, corpus 225.9 long, bulb length 86.9; bulb width 95.8. Nerve ring 40.8; excretory pore 142.8 from anterior end. Tail 145.3 long, flexed ventrally. Spicules equal, heavily sclerotized at anterior portion, 266.1 long, width at distal portion 5.4. Gubernaculum V-shaped, 108.3 long, anterior portion heavily sclerotized with width 10.8. Posterior end with six pairs of preanal plectanes (Fig. 1D), with the last pair 52.8 from anal aperture. Six plectanes on each side, disposed parallel to long axis of body, consisting of complete rosettes of 15–16 punctuations and underlying supports (Fig. 2). One pair of rosette papillae closer

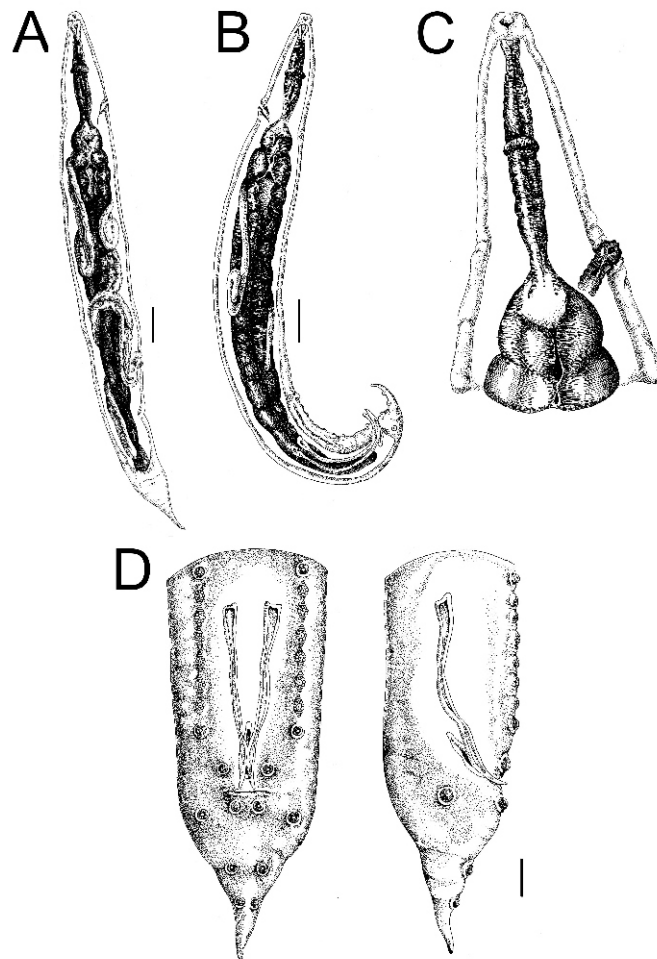


Figure 1. *Cosmocerca gymnophthalmicola* n. sp. (A) female allotype. Scale bar = 200 µm. (B) male holotype. Scale bar = 100 µm. (C) anterior end of female, lateral view. Scale bar = 50 µm. (D) posterior end of male, ventral view. Scale bar = 50 µm. (E) posterior end of male, lateral view. Scale bar = 50 µm.

to the first pair of plectanes and 7 pairs of simple papillae: One preanal pair closer to last pair of plectanes; one adanal pair in the anterior lip of anus; five postanal simple papillae, with 1 subdorsal pair and 4 ventral papillae (being two just before the tail filament and two in the middle of tail filament).

Female (Fig. 1A, C), based on 5 adult specimens CHIOC 35867b, CHIBB 3130: Length 3.7 ± 0.9 mm (3.1–4.9 mm); width at midbody 279 ± 120.6 (197–458). Esophagus 314 ± 75 (262.8–425.6)

long; pharyngeal portion 58.3 ± 13.3 (47.6–77.6) long, corpus 313.9 ± 75.1 (262.8–425.6) long, bulb length 94.4 ± 11.1 (82.1–104.1); bulb width 107.7 ± 23.1 (93.6–142.1). Nerve ring 93.2 ± 29.8 (71.5–136.6) from anterior end. Excretory pore 231.8 ± 48.7 (171.6–279.3) from anterior end. Uteri prodelphic. Vulva 2.0 ± 0.4 mm (1.8–2.0) from anterior end. Eggs (N = 20) oval, thin-shelled with embryos, 57.8 ± 7.8 (42.9–68.0) long, 35.2 ± 3.9 (28.4–42.1) wide. Tail 243.6 ± 28.3 (231.7–267.6) long.

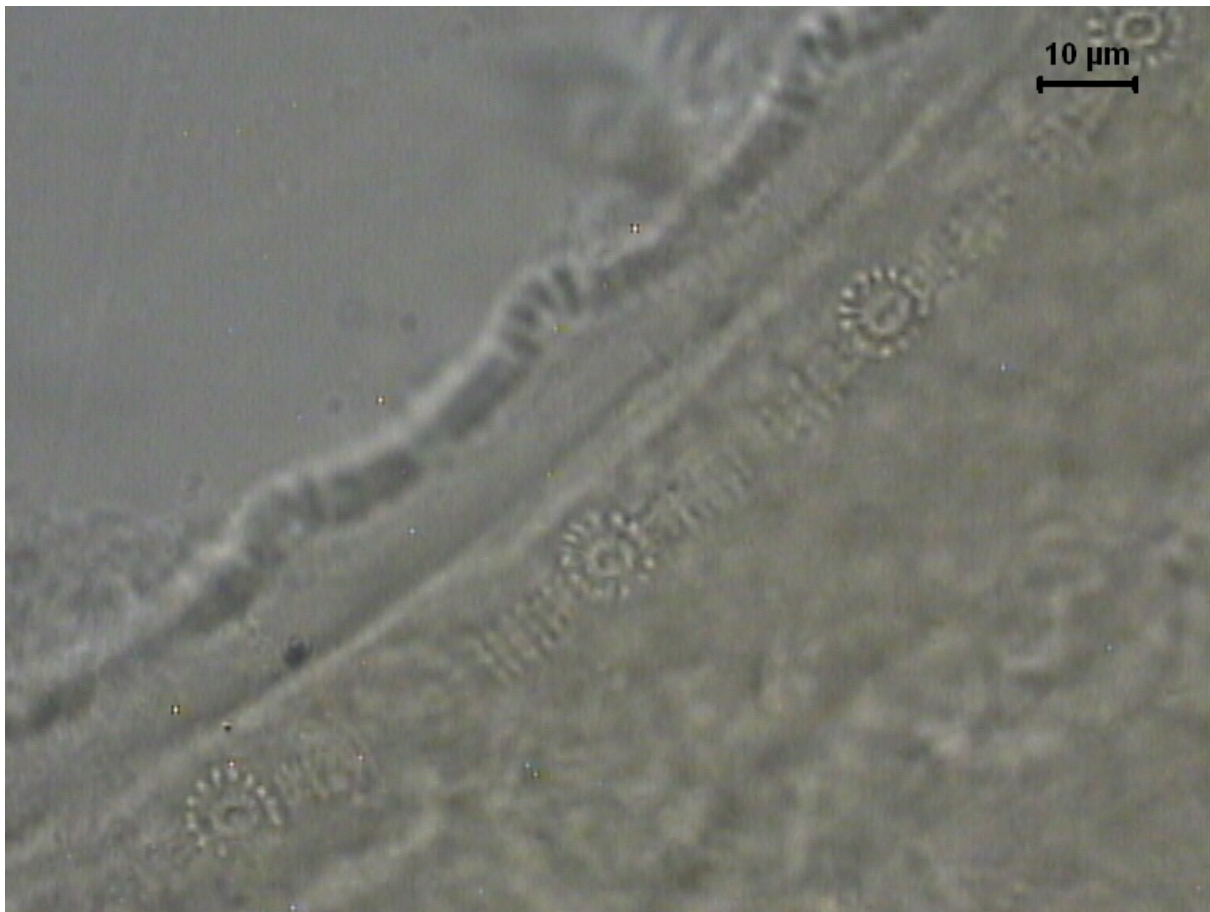


Figure 2. Plectanes ornamentation in *Cosmocerca gymnophthalmicola* n. sp., ventral view.

Taxonomic summary. *Type host:* *Alopoglossus angulatus* (Northern teiid); Deposited in the Universidade Federal de Mato Grosso (UFMT 5730); Collection date 3 October 2002.

Additional host: *Cercosaura eigenmanni* (Eigenmann's Prionodactylus).

Type locality: Vale de São Domingos municipality, Mato Grosso state, Brazil, longitude 58° 58' W, latitude 15° 07' S.

Site of infection: Small and large intestine.

Voucher specimens: Instituto Oswaldo Cruz, Rio de Janeiro, RJ, Brazil; Holotype No. CHIOC 35867a, adult male; Allotype No. CHIOC 35867b, adult female; Coleção Helmintológica do Instituto de Biociências, Botucatu, SP, Brazil; Paratypes, 4 adult females, CHIBB 3130, 1 juvenile female, CHIBB 3136, 3 juvenile females, CHIBB 3138, 3 juvenile females, CHIBB 3128 and 2 juvenile females, CHIBB 3122.

Etymology: The new species is named in reference to infecting lizard members of the Gymnophthalmidae family.

DISCUSSION

From the other *Cosmocerca* species, the new species is promptly distinguished from 18 species, including six Australian and Oceanian species (*C. archeyi*, *C. australis*, *C. limnodynastes*, *C. novaguineae*, *C. oroensis* and *C. zugii*), one Nearctic (*C. acanthurum*), four Neotropical (*C. cruzi*, *C. paraguayensis*, *C. podicipinus*, and *C. travassosi*), two Palearctic (*C. sardiniae* and *C. ornata*), four Oriental (*C. bengalensis*, *C. kalesari*, *C. leytensis* and *C. microhylae*) and one Sino-Japanese species (*C. japonica*) by possessing 6 pairs of plectanes instead of 3–5 pairs of plectanes. Three species have number of plectanes higher than the new species, the Neotropical *C. brasiliense* (9 to 11 pairs; Travassos, 1931), the Oceanian *C. tyleri* (9 pairs) and the Oriental *C. ishaqui* (11 pairs) (Burse et al., 2015; Sou et al., 2018).

Besides the number of plectanes (seven pairs), two Neotropical (*C. uruguayensis*, and *C. vrcibradici*), one Panamanian (*C. longispicula*) and one Palearctic species (*C. commutata*) have the spicule size smaller than the new species species (155–180

µm) except *C. longispicula* (Burse et al., 2015). *Cosmocerca gymnophthalmicola* n. sp. can also be distinguished from *C. longispicula* by both smaller size of spicules and gubernaculum (300 and 138 µm in *C. longispicula*; Moravec & Kaiser, 1994), absence of lateral alae (present in *C. longispicula*; Moravec & Kaiser, 1994) and also by lesser somatic papillae number (numerous in *C. longispicula*; Moravec & Kaiser, 1994) and size of eggs (72–81 µm long, 45–48 µm wide in *C. longispicula*; Moravec & Kaiser, 1994).

Finally, five species are known to possess 6 pairs of plectanes (Burse et al., 2015): three from Neotropical region (*C. chilensis*, *C. parva* and *C. rara*) and two from the Palearctic (*C. banyulensis* and *C. longicauda*). Of these, *C. parva*, *C. rara* and *C. banyulensis* have variable number of plectanes (5–7 in *C. parva*, 6–7 in *C. rara* and 5–6 in *C. banyulensis*), but as we found only one male we do not know if there is variation in the number of plectanes in the new species; however, the new species can be differentiated from these species by the larger spicules (90–110 in *C. parva*, 200 in *C. rara* and 10 in *C. banyulensis*), absence of lateral alae (present in both *C. parva*, *C. rara* and *C. banyulensis*), and gubernaculum length (larger than *C. parva* with 95–108 and 80 in *C. banyulensis* and smaller than *C. rara* with 206; Mordeglia & Digiani, 1998; Burse et al., 2005). *Cosmocerca gymnophthalmicola* n. sp. can be distinguished from *C. chilensis* by the larger spicule (80; Burse et al., 2015) and by possessing 7 pairs of simple papillae, being one preanal, one adanal and five postanal (numerous preanal, two adanal and four postanal in *C. chilensis*, Lent & Freitas, 1948). From *C. longicauda*, the new species is distinguished by possessing larger spicule (92) and smaller gubernaculum (190) and also by absence of lateral alae (present; Burse et al., 2015).

Cosmocerca gymnophthalmicola n. sp. is the 31th species assigned to the genus, and the 11th species recorded for the Neotropical region (Falcón-Ordaz et al., 2007; Burse et al., 2015; Sou et al., 2018). Species of *Cosmocerca* are known to infect mainly frogs (over 88% of the species; see Burse et al., 2005, 2013), and *C. gymnophthalmicola* n. sp. is the fourth species of the genus reported to have a reptilian definitive host. Species of *Cosmocerca* are monoxenous, with larvae actively infecting the hosts by penetration of integument (Anderson,

2000). Bursey & Goldberg (2004) suggested that high prevalence of infection by *Cosmocerca* in gymnophthalmid lizards is due to time spent in wet leaf litter by these hosts. The recent discovery of many species of cosmocercids infecting gymnophthalmid lizards elsewhere in South America (e.g. *Cosmocercoides sauria* in *Iphisa elegans* – Ávila *et al.*, 2010; *Cosmocerca vrcibradici* in *Alopoglossus angulatus*, and *A. atriventris* – Goldberg *et al.*, 2007) may corroborate this prediction.

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