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Research Note

Cosmocercid Nematodes of Three Species of Frogs (Anura: Hylidae) from Corrientes, Argentina

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ABSTRACT: We collected 142 hylid frogs representing 3 species, chaco treefrog *Hypsiboas raniceps*, dwarf treefrog *Dendropsophus nanus*, and sanborn treefrog *Dendropsophus sanborni*, near the city of Corrientes, Corrientes Province, Argentina, between January 2002 and December 2003, and we examined them for nematodes. Two species of cosmocercid nematodes were found infecting the large intestine of these hosts. *Cosmocerca parva* was found infecting *H. raniceps* and *D. sanborni*, whereas *Cosmocerca podicipinus* was found infecting *D. nanus*. These nematode species are reported for the first time from these hylids from Corrientes, Argentina.

KEY WORDS: Hylidae, *Hypsiboas raniceps*, *Dendropsophus nanus*, *Dendropsophus sanborni*, Nematoda, *Cosmocerca parva*, *Cosmocerca podicipinus*, Corrientes, Argentina.

Most nematode parasites of Argentinean amphibians are known from leptodactylid and bufonid hosts from the northeastern and northwestern regions of Argentina (Mordeglia and Digiani, 1998; González and Hamann, 2006a, b, 2007a, b; Ramallo et al., 2007, 2008), whereas the nematode fauna of hylid hosts is poorly known (González and Hamann, 2008). In this study, we report nematode parasites of 3 species of sympatric hylids collected from northeastern Argentina: chaco treefrog *Hypsiboas raniceps* Cope, 1862; dwarf treefrog *Dendropsophus nanus* (Boulenger, 1889); and sanborn treefrog *Dendropsophus sanborni* (Schmidt, 1944). These frogs have a generalist diet and are sit-and-wait predators. They are generally arboreal species, with *H. raniceps* occurring at greater heights that the other 2 species (Duré, 2004; unpublished thesis, Universidad Nacional de La Plata, Argentina). In addition, *D. nanus* and *D. sanborni* occur in herbaceous plants along the shoreline of water bodies or in damp soil on the coast. To our knowledge, larval anisakids and adults from the superfamily Cosmocercoidea infecting *D. nanus* collected in Corrientes Province are the only reports of nematodes parasitizing hylids in Argentina (Hamann and Kehr, 1998).

We collected 142 frogs (*D. nanus*, $n = 110$; *D. sanborni*, $n = 23$; and *H. raniceps*, $n = 9$) near the city of Corrientes, Province of Corrientes, in Argentina (27°28′S; 58°50′W) between January 2002 and December 2003. Amphibian taxonomy is in accordance with Frost et al. (2006). Hosts were transported live to the laboratory and killed in a chloroform ($CHCl_3$) solution. At necropsy, host sex was determined, and the lungs, esophagus, stomach, small intestine, large intestine, bladder, and body cavity of each specimen were examined. Nematodes observed in vivo were counted and then killed in hot distilled water, fixed in 70% ethanol, and cleared in glycerine or lactophenol. Specimens were examined as temporary mounts. Prevalence and mean intensity were calculated according to Bush et al. (1997). Nematodes were deposited in the Colección Helmintológica of the Centro de Ecología Aplicada del Litoral, Corrientes, Argentina (CECOAL).

Nine (6.33%) of the 142 specimens of these 3 hylid species were infected, with 38 cosmocercid nematodes in total, representing 2 species: *Cosmocerca podicipinus* ($n = 30$) and *Cosmocerca parva* ($n = 8$).

Cosmocerca podicipinus Baker and Vaucher, 1984

Hosts: D. nanus.

Prevalence and mean intensity: 4.54%, 6 ± 8.66; (1–21); total number of parasites 30.

Sites of infection: Large intestine.

Type host and type locality: Leptodactylus podicipinus (Cope, 1862), Capitan Bado (Amambay), Paraguay (Baker and Vaucher, 1984).

Other reported amphibian hosts: Leptodactylus fuscus, *Leptodactylus macrosternum*, *Leptodactylus elenae* (Baker and Vaucher, 1984); *Leptodactylus latinasus* (Hamann, González and Kehr, 2006);

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Leptodactylus chaquensis (Baker and Vaucher, 1984; Hamann, Kehr and González, 2006; Schaefer et al., 2006); *L. fuscus*, *Leptodactylus leptodactyloides*, *Leptodactylus ocellatus*, *Leptodactylus petersii*, *Leptodactylus pustulatus* (Goldberg et al., 2009); *Leptodactylus bufonius* (González and Hamann, 2006a); *L. podicipinus* (Campião et al., 2009); *Rhinella margaritifera* (=*Bufo typhonius*), *Allobates marchesianus* (=*Colostethus marchesianus*), *Allobates femoralis* (=*Epipedobates femoralis*), *Pristimantis imitatrix* (=*Eleutherodactylus imitatrix*), *L. leptodactyloides* (Bursey et al., 2001); *Atelopus spurrelli*, *Oophaga histrionica* (=*Dendrobates histrionicus*) (Goldberg and Bursey, 2003); *Oophaga pumilio* (=*D. pumilio*) (Martinez and Maggenti, 1989); *Craugastor rhodopis* (=*Eleutherodactylus rhodopis*) (Goldberg, Bursey, Salgado-Maldonado et al., 2002); *Pseudopaludicola falcipes* (González and Hamann, 2004, 2009b); *Rhinella granulosa* (=*Chaunus granulosa major*) (González and Hamann, 2006b); *Rhinella bergi* (=*C. bergi*), *Rhinella fernandezae* (=*C. fernandezae*) (González and Hamann, 2007a, b); *Rhinella schneideri* (González and Hamann, 2008); *Scinax fuscomarginatus* (Goldberg et al., 2007); *Odontophrynus americanus* (González and Hamann, 2009a); *Leptodactylus melanonotus*, *Smilisca cyanosticta* (Goldberg and Bursey, 2002; Goldberg, Bursey, Salgado-Maldonado et al., 2002); *Lithobates* cf. *forreri* (=*Rana* cf. *forreri*) (Bursey and Goldberg, 2005; Cabrera-Guzmán et al., 2007); *Lithobates vibicarius* (=*R. vibicaria*) (Bursey and Goldberg, 2006); *Lithobates warszewitschii* (Bursey and Goldberg, 2007); *Lithobates forreri* (=*R. forreri*) (Goldberg and Bursey, 2002); *Craugastor fitzingeri*, *Craugastor melanostictus*, *Craugastor ranoides*, *Craugastor taurus*, *Craugastor underwoodi*, *Pristimantis caryophyllaceus* (=*Eleutherodactylus caryophyllaceus*), *Pristimantis cruentus* (=*E. cruentus*), *Pristimantis ridens* (=*E. ridens*) (Goldberg and Bursey, 2008a); *Agalychnis annae*, *Agalychnis callidryas*, *Agalychnis spurrelli*, *Dendropsophus ebraccatus*, *Isthmohyla pictipes*, *Isthmohyla rivularis*, *Isthmohyla tica*, *Smilisca phaeota*, *Smilisca sordida*, *Tlalocohyla loquax* (Goldberg and Bursey, 2008b); and *Pseudis platensis* (Campião et al., 2010).

Geographic range in amphibians: Argentina (González and Hamann, 2004, 2006a, b, 2007a, b, 2008, 2009a, b; Hamann, González, and Kehr, 2006; Hamann, Kehr, and González, 2006; Schaefer et al., 2006), Brazil (Goldberg et al., 2007, 2009; Campião et al., 2009, 2010), Colombia (Goldberg and Bursey, 2003), Costa Rica (Bursey and Goldberg, 2005, 2006, 2007; Goldberg and Bursey, 2008a, b), Mexico (Goldberg and Bursey, 2002; Goldberg, Bursey, Salgado-Maldonado et al., 2002; Cabrera-Guzmán et al., 2007), Panama (Martinez and Maggenti, 1989), Paraguay (Baker and Vaucher, 1984), and Peru (Bursey et al., 2001).

Specimens deposited: CECOAL 02022548 (1 gravid female), CECOAL 03033623 (1 male).

Remarks: In amphibians from Corrientes, Argentina, this nematode is one of the most common cosmocercids (González and Hamann, 2009a); it was found in leptodactylids, leiuperids, bufonids, and cycloramphids; and in this study, we incorporated amphibians of family Hylidae as a host of *C. podicipinus*. *Dendropsophus nanus* represents a new host record for this species.

Cosmocerca parva Travassos, 1925

Hosts: D. sanborni, *H. raniceps*.

Prevalence and mean intensity: D. sanborni 8.69%, 1 (total number of parasites 2); *H. raniceps* 22.2%, 3 ± 1.41 (2–4; total number of parasites 6).

Sites of infection: Large intestine.

Type host and type locality: Hylodes nasus (=*Helosia nasus*) (Lichtenstein, 1823), Angra dos Reis, Brazil (Travassos, 1925).

Other reported amphibian hosts: Leptodactylus mystaceus, *L. fuscus*, *L. ocellatus*, *L. marmoratus* (=*Adenomera marmorata*), *Physalaemus signifer* (=*Physalaemus signiferus*), *P. soaresi* (Fabio, 1982); *Leptodactylus* sp. (Masi Pallares and Maciel, 1974); *L. elenae*, *Scinax fuscovarius* (Baker and Vaucher, 1984); *Rhaebo glaberrimus* (=*Bufo glaberrimus*), *Rhinella marina* (=*B. marinus*), *Rhinella margaritifera* (=*B. typhonius*), *Ameerega picta* (=*Epipedobates pictus*), *Hypsiboas fasciatus* (=*Hyla fasciata*), *Phyllomedusa atelopoides*, *Scinax garbei*, *Scinax ictericus* (=*S. icterica*), *Edalorhina perezi*, *L. leptodactyloides*, *L. mystaceus*, *Pristimantis fenestratus* (=*Eleutherodactylus fenestratus*), *Pristimantis peruvianus* (=*E. peruvianus*), *Pristimantis toftae* (=*E. toftae*), *Elachistocleis ovalis*, *Hamptophryne boliviana*, *Scarthyla goinorum* (=*S. ostinodactyla*) (Bursey et al., 2001); *Leptodactylus bufonius* (González and Hamann, 2006a); *L. latinasus*, *L. chaquensis* (Baker and Vaucher, 1984; Hamann, González, and Kehr, 2006; Hamann, Kehr, and González, 2006; Schaefer et al., 2006); *R. granulosa* (=*C. g. major*) (Mordeglia and Digiani, 1998; González and Ha-

mann, 2006b); *R. bergi* (=*C. bergi*), *R. fernandezae* (=*C. fernandezae*) (González and Hamann, 2007a, b); *R. schneideri*, *Scinax acuminata* (Baker and Vaucher, 1984; González and Hamann, 2008); *Odontophrynus americanus* (González and Hamann, 2009a); *Scinax nasicus* (Hamann et al., 2009); *Lithobates vaillanti* (=*Rana vaillanti*) (Paredes-Calderón et al., 2004); *Leptodactylus macrosternum*, *L. nesiotus*, *Pristimantis turpinorum* (=*Eleutherodactylus turpinorum*) (Goldberg, Bursey, Trujillo et al., 2002); and *Craugastor crassidigitus*, *Craugastor gollmeri* (Goldberg and Bursey, 2008a).

Geographic range in amphibians: Argentina (Mordeglia and Digiani, 1998; González and Hamann, 2006a, b, 2007a, b, 2008, 2009a; Hamann, González, and Kehr, 2006; Hamann, Kehr, and González, 2006; Schaefer et al., 2006; Hamann et al., 2009), Brazil (Travassos, 1925; Fabio, 1982), Costa Rica (Goldberg and Bursey, 2008a), Mexico (Paredes-Calderón et al., 2004), Paraguay (Masi Pallares and Maciel, 1974; Baker and Vaucher, 1984), Peru (Bursey et al., 2001), and Trinidad and Tobago (Goldberg, Bursey, Trujillo et al., 2002).

Specimens deposited: CECOAL 02103140 (1 gravid female; 1 male); CECOAL 03074254 (1 gravid female).

Remarks: As with the previous species, *C. parva* has a wide distribution in amphibians from Corrientes Province, Argentina; it was previously found in hylids (Hamann et al., 2009) and in families Bufonidae, Leptodactylidae, Cycloramphidae, and Leiuperidae (see González and Hamann, 2009a). *Dendropsophus sanborni* and *H. raniceps* represent new hosts for *C. parva*.

Commonly, *C. podicipinus* is reported as an inhabitant of its host's digestive tract, but some studies have reported males of this species in the lungs (González and Hamann, 2004, 2007a, b, 2008, 2009b). In the present study, *C. podicipinus* was found in the large intestine only. In contrast, these specimens presented the same pattern in the disposition and morphology in the structures of the posterior end (5 pairs of fused plectanes; 3 pairs of adanal papillae + 1 unpaired papillae anteriorly to anus). All male specimens of *C. parva* analyzed in this study have 6 pairs of plectanes as observed by González and Hamann (2006a, 2008) in *S. acuminatus* and *L. bufonius*. However, this characteristic varies in specimens collected from different hosts and even in specimens collected from a single host species (Baker and Vaucher, 1984; Mordeglia and Digiani, 1998). Females are assigned to *C. parva* because the tail is slender proximally and tapers gradually to a spike-like posterior portion, as opposed to the tail of *C. podicipinus* females that is markedly thickened in the proximal half.

In Argentina, studies of the nematodes in 5 species of Hylidae frogs have shown these hosts to be parasitized by a few nematode species, with low prevalence and intensity of infection: tadpoles of *Pseudis platensis* (=*P. paradoxa*) and *S. nasicus* were infected with *Gyrinicola* spp. (Kehr and Hamann, 2003; González and Hamann, 2005); Hamann and Kehr (1998) reported *Contracaecum* sp. (larvae) and Cosmocercoidea gen. sp. (adults) from adult *D. nanus*; González and Hamann (2007c) reported *Serpinema* cf. *trispinosum* (larvae) from adult *Pseudis limellum*; González and Hamann (2008) reported *C. parva*, *Oxyascaris caudacutus*, and *Physaloptera* sp. (larvae) from adult *S. acuminatus*; and Hamann et al. (2009) reported *C. parva*, *O. caudatus*, and Rhabdochonidae gen. sp. (larvae) from adult *S. nasicus*. Similarly, in this study we recovered only 2 species of adult cosmocercoids from 3 species of hylids.

These results are in agreement with previous studies that analyzed the helminth fauna in other treefrog species in North America (*Hyla arenicolor*, *Hyla wrightorum*, and *Pseudacris triseriata* [Goldberg et al., 1996]; *Pseudacris c. crucifer* [Yoder and Coggins, 1996]; *Hyla cinerea* [Creel et al., 2000]; and *Hyla crysoscelis* [Bolek and Coggins, 1998]) and in Puerto Rico (*Eleutherodactylus coqui* [Dyer et al., 1995]). In all of these studies nematode prevalence is low, and all of these authors agreed with Aho (1990) that the arboreal habitat is less conducive to transmission of nematode parasites than terrestrial or aquatic habitats. This is due to the low vagility and sit-and-wait feeding strategy that reduces the probability that these treefrogs will come in contact with nematodes whose infective stages occur in the soil (e.g., genus *Cosmocerca*; see Anderson, 2000).

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