

First report of *Nematomystes scapteromi* (Ganzorig, Oku, Okamoto, Malgor & Kamiya, 1999) Jiménez-Ruiz & Gardner, 2003 (Nematoda, Aspidoderidae) in *Scapteromys tumidus* Waterhouse, 1837 (Rodentia, Sigmodontinae) from southern Brazil

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Abstract: Prior to the present study, *Nematomystes scapteromi* (Ganzorig, Oku, Okamoto, Malgor & Kamiya, 1999) Jiménez-Ruiz & Gardner, 2003 had been reported in *Scapteromys tumidus* Waterhouse, 1837 from Uruguay. Here, eight specimens of *S. tumidus* were collected in southern Brazil and necropsied. The nematodes encountered were determined as *N. scapteromi* through their morphometric traits. Prevalence was 87.5% and the mean intensity of infection of 18.3 helminths/host. This is the first report of *N. scapteromi* parasitizing *S. tumidus* in the state of Rio Grande do Sul, Brazil.

Key words: Waterhouse's Swamp Rat, rodent, taxonomy, helminth fauna, Neotropical Region

The genus *Nematomystes* Sutton, Chabaud & Durette-Desset, 1980 was proposed to accommodate *Nematomystes rodentiphilus* Sutton, Chabaud & Durette-Desset, 1980 due the presence of three lips with lateral projections, and the covering of the interlabial space by a V-shaped cuticular expansion (Sutton et al. 1980). Jiménez-Ruiz and Gardner (2003) emended the diagnosis of *Nematomystes* with a more detailed description of its characteristics, including those utilized to compare and distinguish the species of the family Aspidoderidae Skrjabin & Schikhobalova, 1947. The authors redescribed *N. rodentiphilus* and transferred *Ansiruptodera scapteromi* Ganzorig, Oku, Okamoto, Malgor & Kamiya, 1999 to *Nematomystes*, resulting in the inclusion of two valid species in the genus — *N. rodentiphilus* and *N. scapteromi*.

A number of helminths have been reported in

Scapteromys tumidus Waterhouse, 1837 — the digeneans *Conspicuum minor* Mane-Garzon & Holcman-Spector, 1975 in Uruguay (Mane-Garzon and Holcman-Spector 1975) and *Isthmiophora scapteromae* Sutton, 1983 in Argentina (Sutton 1983) and the nematode *N. scapteromi* in Uruguay (Ganzorig et al. 1999). In addition to Argentina and Uruguay, Waterhouse's Swamp Rat, *S. tumidus*, is known to occur in the state of Rio Grande do Sul, Brazil (Musser and Carleton 2005). This rodent feeds on plants, insects, and oligochaetes, including larvae that they capture by burrowing into the soil (Barlow 1969; Oliveira and Bonvicino 2006).

This region (Argentina, Uruguay, and the State of Rio Grande do Sul) coincides with the Pampa biome, an important biological domain, with a range of endemic fauna and endangered species (Roesch et al. 2009). Ongoing expansion of monocultures and pasture and the introduction of exotic species have led to increasing degradation of the biome, resulting in the loss of biodiversity, including that of the local helminths. Considering that *S. tumidus* occurs only in this biome, data on its helminth fauna may provide important insights into the ecology of the species. This study provides the first report of *N. scapteromi* from southern Brazil.

Between 2012 and 2013, eight specimens of *S. tumidus* were collected in the Municipalities of Rio Grande (32°07'06" S, 052°10'32" W) and Jaguarão (32°33'06" S, 053°20'32" W), in the state of Rio Grande do Sul, Brazil. These specimens were donated to the 'Laboratório de Zoologia de Invertebrados' of the 'Museu de Ciências Naturais da ULBRA' (MCNU). During necropsy, the organs were separated in Petri dishes containing 0.85% saline solution. The nematodes encountered were fixed

in A.F.A. at 65°C for 48 hours, and then conserved in 70° GL ethanol (Amato and Amato 2010). Specimens were clarified for identification with Amann's lactophenol, measurement and drawings.

All measurements are given in micrometers (μm), unless otherwise indicated, and are presented as in Galas and Silveira (2013). Ecological terminology followed Bush et al. (1997). Illustrations were produced using a drawing tube attached to a microscope. The systematics and determination of the helminths followed Chabaud (2009) and Gibbons (2010). Representative specimens of the hosts were deposited in the 'Coleção de Vertebrados' (MCNU) of the 'Museu de Ciências Naturais da ULBRA', while specimens of the nematodes were deposited in the 'Coleção Helminológica' (CHMU) of the same museum, in Canoas, Brazil.

Aspidoderidae Skrjabin & Schikhobalova, 1947
Lauroiinae Skrjabin & Schikhobalova, 1951

Nematomystes scapteromi (Ganzorig, Oku, Okamoto, Malgor & Kamiya, 1999) Jiménez-Ruiz & Gardner, 2003
Figures 1–4

Description based on the examination of 20 specimens (128 collected). Nematoda, Aspidoderidae. Nematodes elongated, cephalic region with three lips, two ventrolateral and one dorsal. Ventrolateral lips with two papillae and amphidial pore adjacent to one of these papillae and dorsal lip larger than the ventrolateral lips, with two papillae. Interlabia separated of the lips by a V-shaped cuticular expansion. Nerve ring anterior to the excretory pore. Esophagus ending in a bulb. Lateral alae beginning below the cephalic region, representing 24.75% of total body length (TBL).

Males measurements ($n = 10$). Body 4.23–5.63 mm

(4.86 ± 0.5 mm) long, 101–240 (158 ± 47) wide. Cephalic region 42–54 (48 ± 4) long, 45–71 (59 ± 6) wide. Lateral alae 1.11–1.55 mm (1.3 ± 0.12) long, representing 26.7% of the TBL. Nerve ring 255–302 (273 ± 14) from the anterior extremity. Excretory pore 304–349 (330 ± 13) from the anterior extremity. Esophagus 345–453 (404 ± 32) long, 26–45 (35 ± 8) wide, with bulb 52–87 (65 ± 10) wide. Pre-cloacal sucker 42–66 (54 ± 7) in diameter. Two spicules with ornamented surfaces, equal in length, 295–344 (316 ± 16) long. Gubernaculum robust, 75–99 (88 ± 7) long, 7–14 (10 ± 2) wide, typical of the Aspidoderidae. Cloaca 245–285 (259 ± 12) from the posterior extremity. Tail with numerous papillae, terminating in a hook-like structure, with a thin, conical tip.

Females measurements ($n = 10$). Body 5.8–7.45 mm (6.5 ± 0.6 mm) long, 138–175 (156 ± 14.05) wide. Cephalic region 50–57 (53 ± 2) long, 64–68 (66 ± 2) wide. Lateral alae 1.34–1.6 mm (1.5 ± 0.06) long, ending adjacent to the vulvar region, representing 22.8% of the TBL. Nerve ring 186–250 (223 ± 17) from the anterior extremity. Esophagus 411–463 (429 ± 14) long, 33–38 (34 ± 2) wide, with bulb 68–89 (79 ± 6) wide. Vulva located in the middle of the body, 1.4–1.66 mm (1.54 ± 0.08) from the anterior extremity. Uteri opisthodelphic. Eggs 66–87 (76 ± 7) long, 42–54 (48 ± 5) wide when embryonated and localized in the ovejector. Anus 451–628 (565 ± 56) from the posterior extremity. Tail ending in a thin, conical tip.

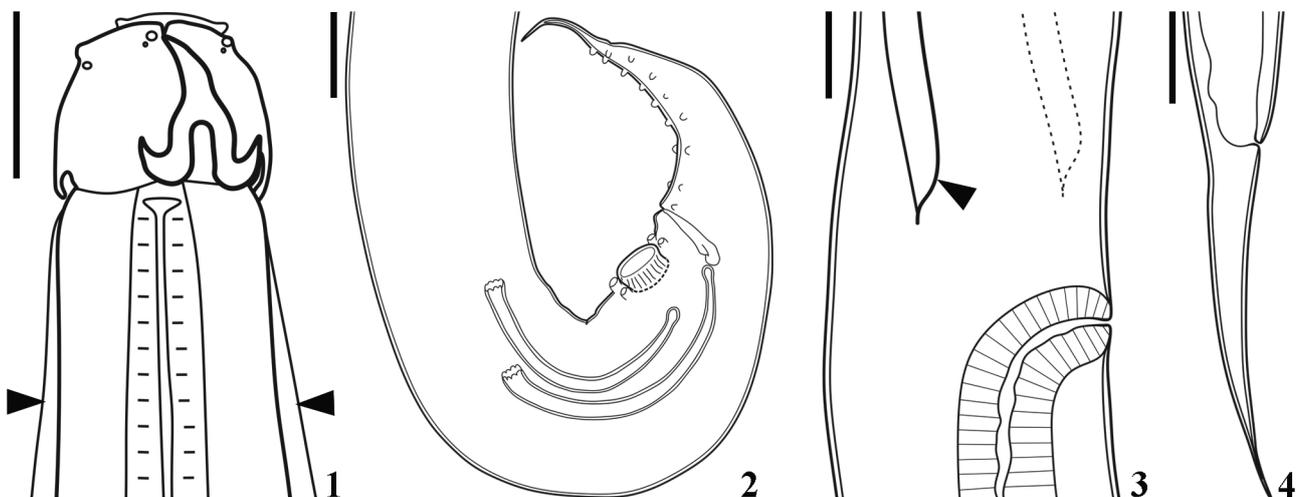
Taxonomic summary:

Host: *Scapteromys tumidus* Waterhouse, 1837.

Voucher specimen of host deposited: MCNU 3138 (female).

Site of infection: intestine.

Localities: Municipalities of Rio Grande ($32^{\circ}07'06''$ S, $052^{\circ}10'32''$ W) and Jaguarão ($32^{\circ}33'06''$ S, $053^{\circ}20'32''$ W),



Figures 1–4. *Nematomystes scapteromi* (Ganzorig, Oku, Okamoto, Malgor & Kamiya, 1999) Jiménez-Ruiz & Gardner, 2003. **1:** Anterior extremity showing the lateral alae (black arrow heads). Scale bar = 50 μm . **2:** Male posterior extremity. Scale bar = 100 μm . **3:** Vulvar region showing the end of the lateral ala (black arrow head). Scale bar = 50 μm . **4:** Female posterior extremity. Scale bar = 150 μm .

state of Rio Grande do Sul, Brazil.

Prevalence: 87.5%.

Mean intensity of infection: 18.3 helminths/host.

Mean abundance of infection: 16 helminths/host.

Voucher specimen of helminth deposited: CHMU 179-1-1 male; 179-1-2 female.

The nematode specimens recovered in the present study were determined as *N. scapteromi* due to the presence of three lips, interlabia separated from the lips by a V-shaped cuticular expansion, and the morphometric data (Ganzorig et al. 1999; Jiménez-Ruiz and Gardner 2003). The specimens presented measurements similar to the specimens examined by Ganzorig et al. (1999). However, despite the fact that body length was similar, the specimens examined here presented a nerve ring that was more distant from the anterior end, small spicules and gubernaculum, and much smaller lateral alae on the females than those on the specimens studied by Ganzorig et al. (1999).

Prior to the present study, *N. scapteromi* was reported only in three *S. tumidus* specimens from Uruguay with a prevalence of 100% and an intensity of infection of five to 36 helminths (Ganzorig et al. 1999). In the present study, a prevalence of 87.5% was recorded in the eight *S. tumidus* specimens from Brazil, with an intensity of infection of one to 40 helminths. The relatively high prevalence and intensity of infection recorded for *N. scapteromi* in both studies may be related to the habitat and diet of the *S. tumidus*. In addition, the nematodes of the superfamily Heterakoidea Railliet & Henry, 1914 have a monoxenous cycle with the infection of the definitive hosts occurring through the ingestion of eggs containing infective larvae found in the environment inhabited by the host (Anderson 2000).

The present study provides the first report of *N. scapteromi* from the state of Rio Grande do Sul, Brazil, extending the known distribution of the species north and west of Uruguay (Ganzorig et al. 1999). As *S. tumidus* is known to occur only in the Pampa biome (Musser and Carleton 2005), the present study provides an important expansion of the range of *N. scapteromi* in this biological domain.

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