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ORIGINAL PAPER

Redescription of *Syphacia venteli* Travassos 1937 (Nematoda: Oxyuridae) from *Nectomys squamipes* in Argentina and Brazil and description of a new species of *Syphacia* from *Melanomys caliginosus* in Colombia

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Abstract *Syphacia venteli* Travassos, Mem Inst Oswaldo Cruz 32:607–613, 1937 is redescribed on the basis of specimens recovered from the type host, *Nectomys squamipes* (Brants 1827), from Brazil and Argentina. Specimens determined by Quentin (Bull Mus Natl Hist Nat 2:909–925, 1969) as *S. venteli* from *Melanomys caliginosus* (Tomes 1860) in Colombia were re-studied and assigned to a new species. In both species, structures such as the shape of the cephalic plate, details and distribution of the submedian papillae and amphids, presence and absence of the lateral and cervical alae, and shape and structure of the accessory hook of the gubernaculum were studied with the light microscope and scanning electron microscope. The present survey is the first detailed study of the species *S. venteli* since the original description, and the first record of this species from Argentina. Moreover, the present study suggests that the validity of some host species of *Syphacia* should be questioned and that through of the study of deposited specimens, a more exact number of parasitized host species can be confirmed, contributing to a better understanding of host specificity in this genus.

Introduction

The nematode genus *Syphacia* Seurat, 1916 (Oxyuridae: Syphaciinae: Syphaciini) includes more than 60 species. Of the about 20 species known from North and South America, 13 were described from sigmodontine rodents, of which seven parasitize species of the tribe Oryzomyini (Rodentia: Cricetidae: Sigmodontinae) (Quentin 1971; Dick et al. 1973; Hugot 1988; Robles and Navone 2007b).

The scanning electron microscope (SEM) has been infrequently used as a tool in the differentiation of species of *Syphacia*. To date, six species from rodents of the family Muridae and four species from rodents of the family Cricetidae have been examined by SEM, but only two species from rodents of the subfamily Sigmodontinae (Ogden 1971; Dick and Wright 1973a, b; Dick et al. 1973; Dick and Wright 1974; Wiger et al. 1978; Robles and Navone 2007a, b).

Syphacia venteli was described from *N. squamipes* (Brants 1827) (Sigmodontinae: Oryzomyini), from Angra do Reis, Brazil by Travassos (1937). This description is incomplete, and some features were not mentioned. Quentin (1969) redescribed *S. venteli* on the basis of specimens from *M. caliginosus* (Tomes 1860) (Sigmodontinae: Oryzomyini), collected in Valle del Cauca, Colombia. Although these specimens were well described and most of their measurements are near to those of Travassos (1937), there were some important discrepancies in diagnostic morphological features, indicating that their identification as *S. venteli* could be erroneous.

In addition, *S. venteli* has been reported in studies on the helminths of *N. squamipes* from Rio de Janeiro, Brazil (Gomes and Vicente 1984). However, no morphological details, drawings or measurements were given.

Herein, we redescribe *S. venteli* on the basis of the latter specimens and new specimens recovered from the type host *N. squamipes* captured in Misiones Province, Argentina.

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Moreover, the specimens of Quentin (1969) from *M. caliginosus* were re-studied and found to not be *S. venteli*, but a new species, which is also described herein.

Materials and methods

Nematodes were collected from the ceca of nine specimens of *N. squamipes*; eight in the Valle del Arroyo Cuña Pirú (27°05′S, 54°56′W), Departamento Cainguás, and one in Puerto Península (25°40′S, 54°38′W), Departamento de Iguazú, Misiones Province, Argentina, from July 1999 to June 2001. These nematodes were preserved in 70% ethanol, and more than 40 specimens were cleared in lactophenol, and studied by light microscopy. Drawings were made with the aid of a drawing tube. Eight specimens were dehydrated in ethanol series (75%, 80%, 85%, 90%, 96%, and 100%) dried using the critical point method, examined under SEM (Jeol 6360 LV), and photographed.

All measurements are in micrometers unless otherwise stated. Measurements of *S. venteli* are given as the mean ± the standard deviation, with the range in parentheses. In the description of the new species, measurements of the male or female are given, with the range of paratypes in parentheses. Voucher specimens of nematodes were deposited in the Helminthological Collection of Museo de La Plata (CHMLP), La Plata, Buenos Aires and hosts in the Mastozoological Collections of Museo de La Plata (MLP), La Plata, Buenos Aires, Argentina.

The following specimens of *Syphacia* spp. were studied: 16 specimens of *S. venteli* from *N. squamipes* from Rio de Janeiro, Brazil (CHIOC no. 31.606 Coleção Helmintológica do Instituto Oswaldo Cruz, Rio de Janeiro, Brazil) and 8 specimens of *Syphacia* sp. (= *S. venteli sensu* Quentin 1969) from *M. caliginosus* from Valle del Cauca, Colombia (MNHN 605 M, 610 M Muséum National d'Histoire Naturelle, Paris, France).

Results

A total of 1,096 specimens of *S. venteli* were found in *N. squamipes* from Valle del Arroyo Cuña Pirú and Puerto Península. Seven of nine hosts were infected (77%) and the mean intensity was 156 (range 2-619). Based on the material from both Argentina and Brazil, the species is redescribed and an emended diagnosis is given. The study of the specimens from *M. caliginosus* showed that these did not correspond to *S. venteli* or any other known species. So, they are assigned to a new species, which is described in this paper. Table 1 compares measurements of these specimens to those given by Travassos (1937) and Quentin (1969).

S. venteli Travassos 1937

Redescription

Emended diagnosis cuticle with fine transversal striations, fields between transverse striations with shallow longitudinal depressions. Cephalic plate quadrangular, lateral diameter of cephalic plate 17.5-19 in males (Fig. 3) and 21-22.5 in females (14 in Fig. 3). The amphids separate from one another about 16-18 in males and 20.5-22 in females. The submedian papillae and amphids slightly separate from one another when observed in apical view of cephalic plate. A porous badge is situated immediately below the amphids (15 in Fig. 3). Lips poorly defined, with cuticular edges around triradiate opening. Cervical alae, lateral alae, and deirids absent in both sexes (2 in Fig. 1, 8 in Fig. 2, 18 in Fig. 3). Excretory pore located in a depression, posterior to esophageal-intestinal junction. Males with three pairs of caudal pedunculate papillae not equidistant: one pre-anal pair, one ad-anal pair, and one large post-anal pair, these last ones located most posterior to the anterior pair (6 in Fig. 1). Accessory hook of gubernaculum very small and without ornamentation (5 in Fig. 1 and 17 in Fig. 3). Females with vulva not prominent (7 and 10 Fig. 2; Table 1)

Male Total length 0.98±0.22 (0.79-1.5)mm (Fig. 1). Body width 111±19 (75-150). Total esophagus 190±14 (160-212) long, esophageal bulb 50±4 (45-62) long (2 in Fig. 1). Nerve-ring 76±13 (60-87) and excretory pore 266±39 (200-340) from anterior end (2 and 3 Fig. 1). Three ventral mamelons of the *Syphacia* type present (1 and 4 Fig. 1 and 16 in Fig. 3). Anterior mamelon protruded, 50±12 (36-75) long; middle mamelon 45±10 (33-65) long, and posterior mamelon 53±11 (45-87) long. Anterior edges of each mamelon 462±71(360-580), 562±95 (438-720), and 676±128 (498-870) from anterior end, respectively. Mamelons equidistant; distance between anterior edge of first mamelon and anterior edge of second mamelon 117±37 (70-190); distance between anterior edge of second mamelon and anterior edge of third mamelon 112±34 (90-180). Spicule 54±8 (36-60) long. Gubernaculum 31±6 (21-50) long. Tail relatively long, 193±14 (180-220), and tip of tail 158±22 (120-180; 6 in Fig. 1 and 17 in Fig. 3).

Female Total length 2.77±0.4 (2.1-3.4)mm (7 in Fig. 2). Body width 242±19 (212-280). Total esophagus 277±27 (240-343) long, esophageal bulb 68±11 (54-93) long (8 in Fig. 2). Nerve-ring 106±13 (90-125), excretory pore 373±69 (267-490), 0and vulva 590±113 (400-750) from anterior end (8, 9, and 10 in Fig. 2). Tail relatively long, 582±87 (400-750; 11 in Fig. 2). Eggs elliptical with operculum, 77±5 (75-87)×26±3 (25-31; 12 Fig. 2).

Table 1 Main morphological features and measurements of *S. venteli* and *Syphacia quentini*

Species	*S. venteli*	*S. venteli*	*S. quentini*
Reference	Travassos 1937	present study	Quentin 1969 and present study
Type host	*Nectomys squamipes* (Brants 1827)	*Nectomys squamipes* (Brants 1827)	*Melanomys caliginosus* [a] (Tomes 1860)
Localities	Angra dos Reis, Rio de Janeiro (Brazil)	Aristóbulo del Valle and Iguazú, Misiones (Argentina)	Buenaventura and Pichiude, Depto Valle del Cauca (Colombia)
Male (N)	–	20	10
Body length (mm)	0.9-1.1	0.98±0.2 (0.79-1.5)	0.65-1.47
Body width	100	111±19 (75-150)	80-120
Nerve ring (dfae)	60-70	76±13 (60-87)	80-100
Deirids (dfae)	–	Absent	Absent
Excretory pore (dfae)	220-300	266±39 (200-340)	170-250
Cervical alae	–	Absent	Absent
Lateral alae	–	Absent	Absent
Total esophagus	–	190±14 (160-212)	140-180
Diameter esophageal bulb	–	50±4 (45-62)	50-60
Anterior mamelon length	–	50±12 (36-75)	40-62
Middle mamelon length	–	45±10 (33-65)	55-76
Posterior mamelon lenght	–	53±11 (45-87)	45-72
Anterior mamelon (dfae)	–	462±71 (360-580)	210-325
Middle mamelon (dfae)	–	562±95 (438-720)	260-450
Posterior mamelon (dfae)	–	676±128 (498-870)	370-650
Spicule	52-60	54±8 (36-60)	62-67
Gubernaculum length	30	31±6 (21-50)	25-30
Tail	190-210	193±14 (180-220)	130-170[b,c]
Tip of tail	–	158±22 (120-180)	80-147
Female (N)	–	20	30
Body length (mm)	2.2-2.6	2.77±0.4 (2.1-3.4)	2.43-3.45
Body width	220-330	242±19 (212-280)	200-250
Nerve ring (dfae)	110	106±13 (90-125)	100-160
Deirids (dfae)	–	Absent	Absent
Excretory pore (dfae)	510-700	373±69 (267-490)	440-520
Cervical alae	–	Absent	Absent
Lateral alae (dfae)	–	Absent	90
Lateral alae width	–	Absent	10-11
Total esophagus	–	277±27 (240-343)	290-350
Diameter esophageal bulb	–	68±11 (54-93)	90-100
Vulva (dfae)	510-700	590±113 (400-750)	500-700
Tail	500	582±87 (400-750)	350-480
Eggs length	78-80	77±5 (75-87)	80-82
Eggs width	32	26±3 (25-31)	30-33

[a] Cited as *Oryzomys caliginosus* by Quentin 1969. *dfae* Distance from anterior end

[b] Measurement obtained from drawing of respective description

[c] Instead of 580 µ (erroneous measure according to Quentin 1969)

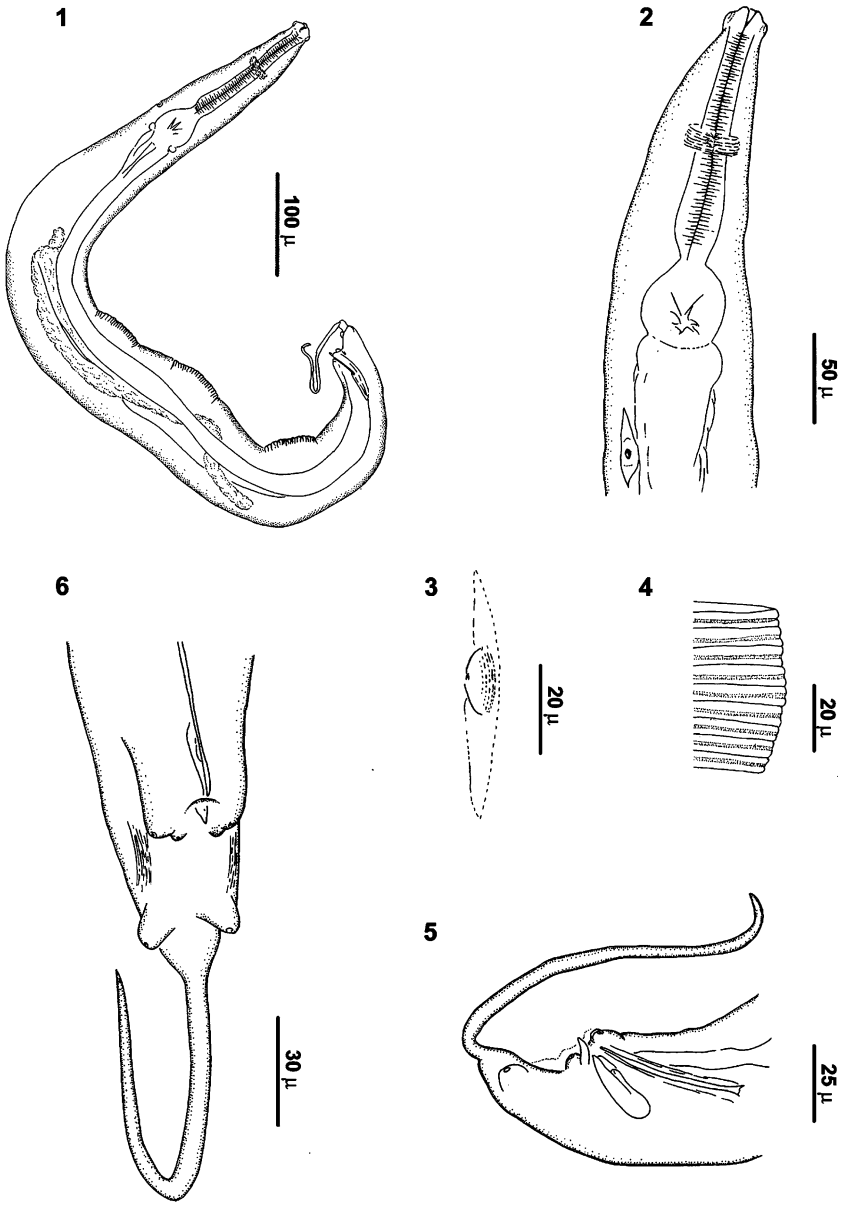

Fig. 1 *S. venteli*. Male: *1* complete male specimen; *2* anterior extremity, ventral view; *3* detail of excretory pore; *4* mamelon, lateral view; *5* posterior extremity, detail of spicule, gubernaculum and accessory hook of gubernaculum, lateral view; *6* posterior extremity, detail distribution caudal pedunculate papillae, ventral view

Site of infection Cecum

Host type N. squamipes (Brants 1827)

Type of locality Angra dos Reis, Rio de Janeiro, Brazil

Hosts deposited N. squamipes. Voucher specimens MLP 24.VIII.00.9, MLP 16.VII.02.4, MLP 16.VII.02.1, MLP 31. XII.02.89—Misiones Province, Argentina

Other localities Barra de Maricá, Maricá and Morro de São João and Casimiro de Abreu- Rio de Janeiro, Brazil, Valle del Arroyo Cuña Pirú, Departamento Cainguás, and Puerto Península, Departamento de Iguazú—Misiones Province, Argentina

Specimens studied Forty specimens of *N. squamipes* from Valle del Arroyo Cuña Pirú, and Puerto Península, Argentina; and16 specimens of *S. venteli* from *N. squamipes* from Barra de Rio de Janeiro, Brazil (CHIOC no. 31.606)

Specimens deposited Voucher specimens CHMLP 5980, 5981.

Remarks

Among the species of *Syphacia* of American murid rodents, *S. venteli* differs from *Syphacia peromysci* Harkema 1936, *Sarracenia alata* Quentin 1968, *Syphacia sigmodoni* Quentin and Kinsella 1972, and *Syphacia carlitosi* Robles and Navone 2007a, b in not having cervical alae well developed in the

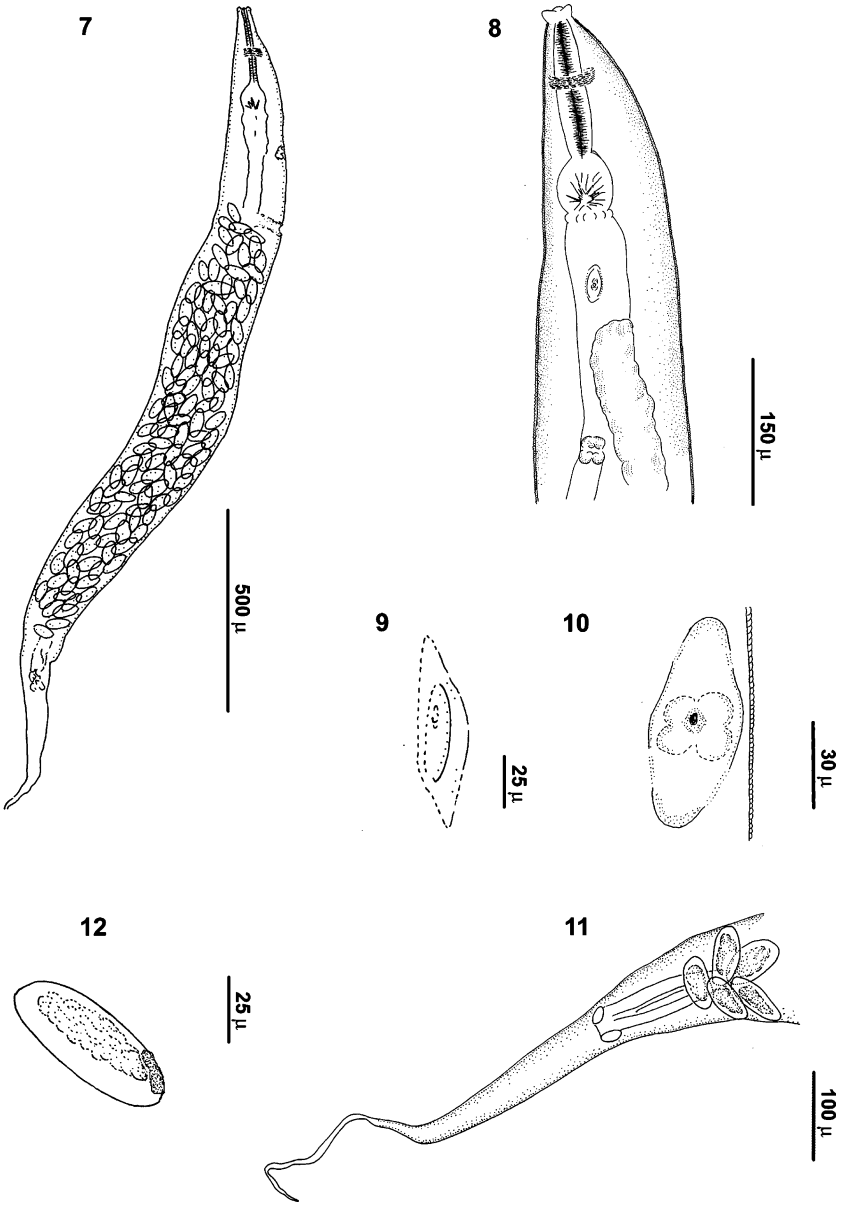

Fig. 2 *S. venteli*. Female: *7* complete female specimen; *8* anterior extremity, ventral view; *9* detail of excretory pore; *10* detail of vulva; *11* posterior extremity, ventral view; *12* egg

females. It also differs from *S. peromysci*, *Syphacia arctica* Tiner and Rausch1950, *S. megadeiros* Quentin 1969, *Syphacia mesocriceti* Quentin 1971, *Syphacia odilbainae* Hugot and Quentin 1985 by the absence of lateral alae in females. *S. venteli* can be distinguished from *S. peromysci*, *Syphacia criceti* Quentin 1969, *Syphacia megadeiros*, *S. petrusewiczi* Quentin 1969, *Syphacia sigmodoni*, *Syphacia oryzomyos* Quentin and Kinsella 1972, *Syphacia phyllotios* Quentin Babero and Cattan 1979, *Syhacia evaginata* Hugot and Quentin 1985, *S. odilbainae*, and *Syphacia kinsellai* Robles and Navone 2007a, b by the absence of deirids. Moreover, *S. venteli* has a shorter spicule than *Syphacia nigeriana* Baylis 1928, *S. arctica*, *S. alata*, *S. criceti*, *S. mesocriceti*, *S. oryzomyos*, *S. sigmodoni*, *S. phyllotios*, *S. evaginata*, and *S. carlitosi* (36-60 vs. 55-85, 80-94, 76, 96, 65-84, 99, 64, 76-82, 87, 60-85, respectively). The tail of the males of *S. venteli* is similar in length to *S. alata* and *S. carlitosi,* but longer than the remaining species. In addition, *S. nigeriana*, *S. arctica*, *S. criceti*, *S. megadeiros, S. phyllotios,* and *S. carlitosi* can be differentiated from *S. venteli* by having a longer tail in females (850-950, 900-1010, 780, 740, 940, 700-1125 vs. 400-750, respectively). *Syphacia nigeriana*, *S. arctica*, *S. megadeiros*, *S. petrusewiczi*, *S. mesocriceti*, *S. oryzomyos*, *S. phyllotios*, *S. odilbainae*, and *S. kinsellai* can be distinguished from *S. venteli* by the length and width of the eggs (Travassos 1937; Tiner and Rausch 1950; Quentin 1968, 1969, 1971; Quentin and Kinsella 1972; Quentin et al. 1979; Hugot and Quentin 1985; Robles and Navone 2007a, b; Table 1).

Among the *Syphacia* species from rodents outside of America, *S. venteli* can be separated from *Syphacia montana*

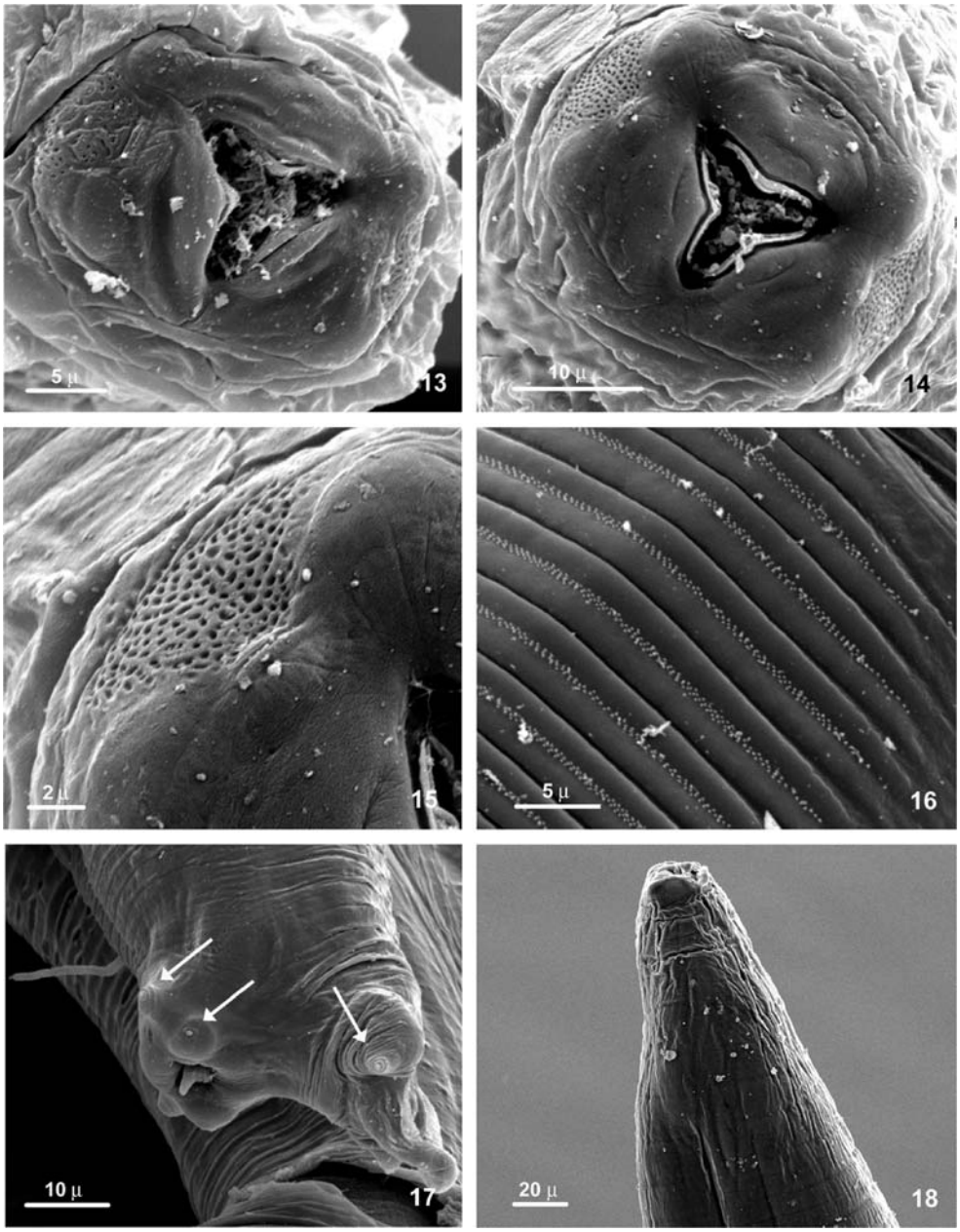

Fig. 3 SEM micrographs of *S. venteli*: *13* male, cephalic plate; *14* female, cephalic plate; *15* female, submedian papillae, amphids and porous badge, lateral view; *16* detail of mamelon; *17* posterior extremity, detail distribution caudal pedunculate papillae; *18* female, anterior extremity, cuticular detail

Yamaguti 1943, *Syphacia brachyuromyos* Quentin and Desset 1974, *Syphacia ramirohitra* Quentin and Desset 1974, *Syphacia okuensis* Hugot and Quentin 1985, *Syphacia darwini* Hugot and Quentin 1985, *Syphacia ohtaorum* Hasegawa 1991 and *Syphacia millardiae* Hugot 2005 by the presence of lateral alae in the females, and from *S. montana*, *S. brachyuromyos*, *S. ramirohitra*, *S. millardiae* by having a shorter tail in males (180-220 vs. 170, 95, 120, 95-110; Yamaguti 1943; Quentin 1971; Quentin and Durette-Desset 1974; Hugot and Quentin 1985; Hugot 1988, 2005; Hasegawa 1991).

Under the SEM, similarities were observed in the shape of the cephalic plate with *S. oryzomyos* and *S. muris* (Yamaguti 1935), and in the shape of the lips with *S. petrusewiczi* Bernard 1966. However, the patterns of distribution of the submedian papillae and amphids, and the shape and structure of the accessory hook of the gubernaculum have not been observed in other species (Ogden 1971; Dick and Wright 1973a, b, 1974; Dick et al. 1973; Wiger et al. 1978; Robles and Navone 2007b; Robles 2008a, b; Robles et al. 2008).

Syphacia quentini n. sp.

Description

Synonym S. venteli sensu Quentin (1969)

Diagnosis Cuticle with fine transversal striations. Cephalic plate rounded with lateral diameter is 25-30 in males (20 Fig. 4); cephalic plate oval with lateral diameter is 32-35 in females (27 in Fig. 5). Submedian papillae and amphids congregated in the midline and observed in apical view of cephalic plate. Porous badge situated immediately below the amphids. Lips poorly defined, with cuticular edges around triradiate opening. Deirids is absent in both sexes. Lateral alae present in females and absent in males (21 in Fig. 4 and 28 in Fig. 5). Excretory pore located in a depression, posterior to esophageal-intestinal junction. Males with three pairs of caudal pedunculate papillae equidistant: one pre-anal pair, one ad-anal pair, and one large post-anal pair (25 in Fig. 4). Accessory hook of gubernaculum very small and without ornamentation (24 in Fig. 4). Females with vulva not prominent (26 and 30 in Fig. 5; Table 1).

Male Total length 0.75 (0.65-1.47)mm (19 in Fig. 4). Body width 110 (80-120). Total esophagus 180 (140-180) long, esophageal bulb 60 (50-60) long (21 in Fig. 4). Nerve ring 80 (80-100) and excretory pore 180 (170-250) from anterior end (21 and 22 Fig. 4). Three ventral mamelons of the *Syphacia* type present (19 and 23 in Fig. 4). Anterior mamelon protruded, 40 (40-62) long; middle mamelon 55 (55-76) long, and posterior mamelon 45 (45-72) long. Anterior edges of each mamelon 230 (210-325), 265 (260-450), and 375 (370-650) from anterior end, respectively. Mamelons not equidistant; distance between anterior edge of first mamelon and anterior edge of second mamelon 65 (60-125); distance between anterior edge of second mamelon and anterior edge of third mamelon 110 (110-200). Spicule 62 (62-67) long. Gubernaculum 25 (25-30) long. Tail relatively long, 135 (130-170), and tip of tail 80 (80-147; 24 and 25 in Fig. 4).

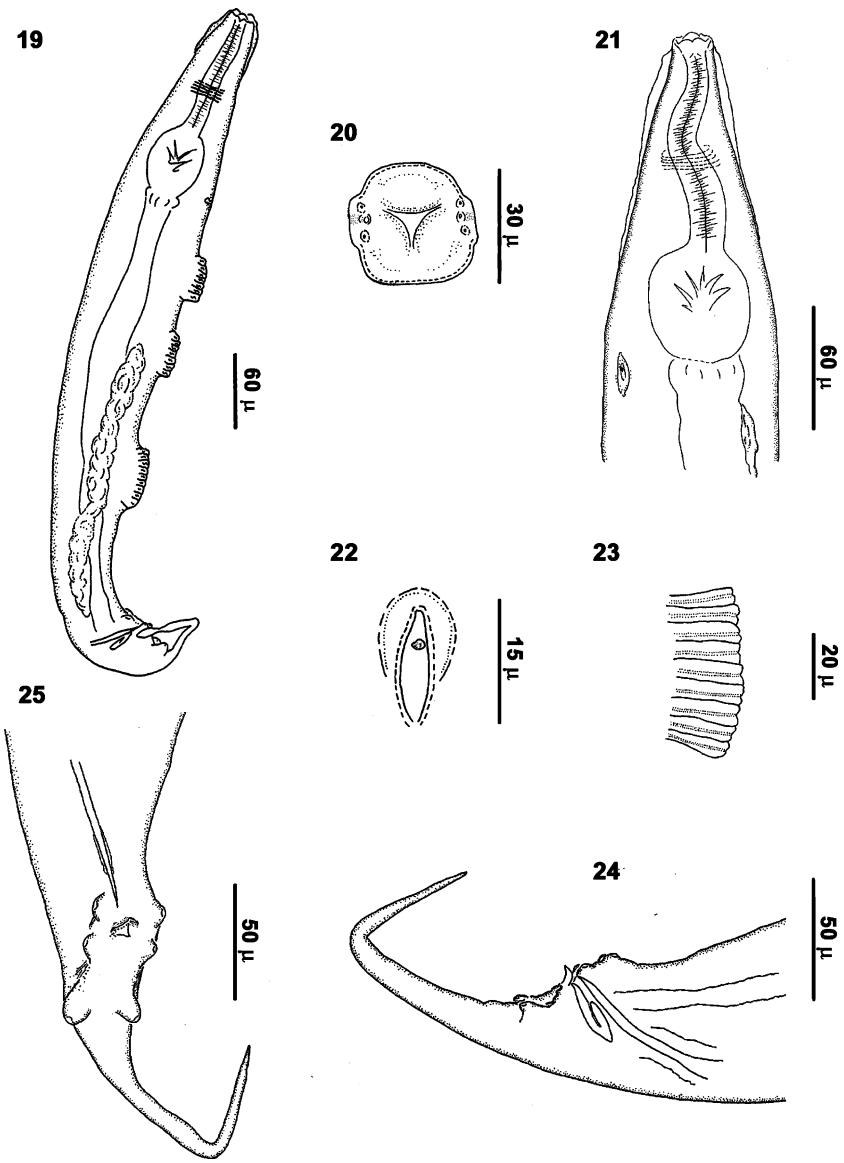

Fig. 4 *Syphacia quentini* n. sp. Male: *19* complete male specimen; *20* cephalic plate; *21* anterior extremity, ventral view; *22* detail of excretory pore; *23* mamelon, lateral view; *24* posterior extremity, detail of spicule, gubernaculum and accessory hook of gubernaculum, lateral view; *25* posterior extremity, detail distribution caudal pedunculate papillae, ventral view

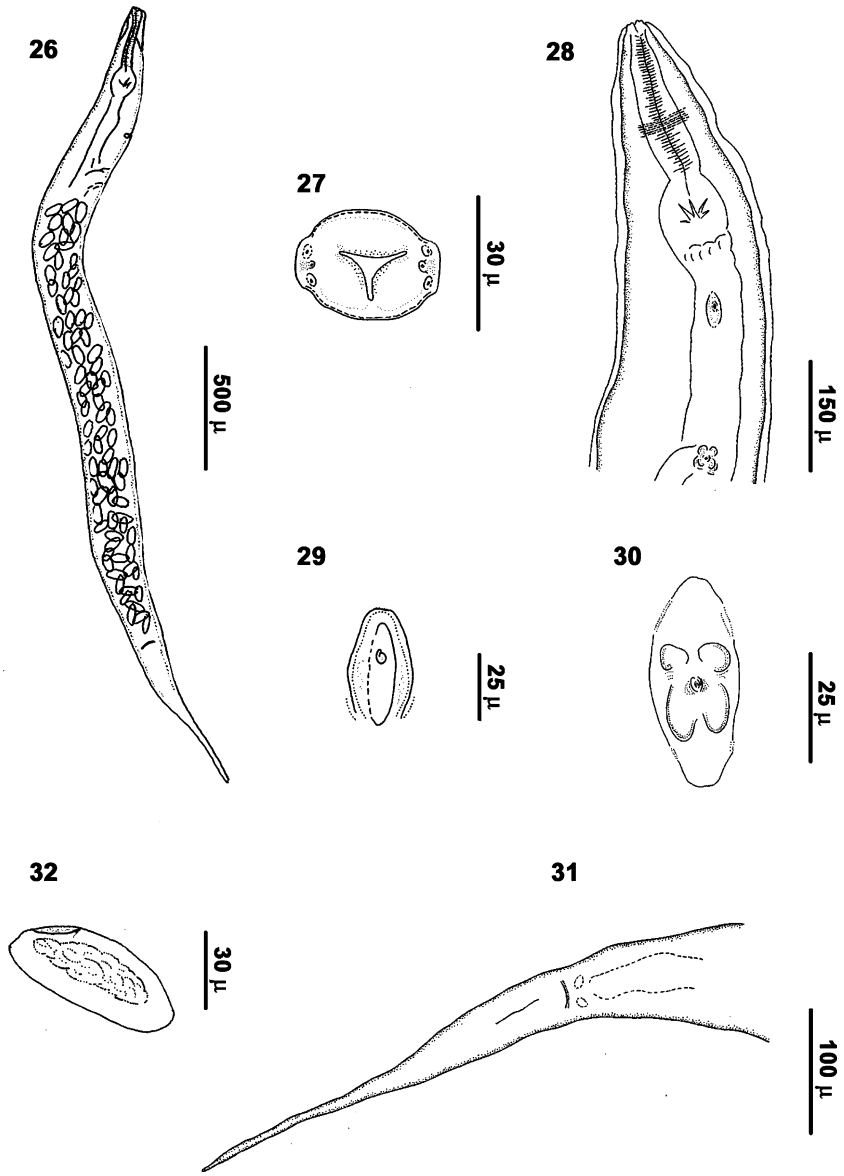

Fig. 5 *Syphacia quentini* n. sp. Female: *26* complete female specimen; *27* cephalic plate; *28* anterior extremity, ventral view; *29* detail of excretory pore; *30* detail of vulva; *31* posterior extremity, ventral view; *32* egg

Female Total length 2.43 (2.43-3.45)mm (26 in Fig. 5). Body width 240 (200-250). Total esophagus 290 (290-350) long, esophageal bulb 90 (90-100) long (28 in Fig. 5). Nerve ring 121 (100-160), excretory pore 440 (440-520), and vulva 540 (500-700) from anterior end (28, 29, and 30 in Fig. 5). Tail relatively long, 350 (350-480; 31 in Fig. 5). Eggs elliptical with operculum, 80-82×30-33 (32 in Fig. 5).

Site of infection Cecum

Host type M. caliginosus (Tomes 1860)

Type of locality Buenaventura, Departamento Valle del Cauca, Colombia

Other locality Pichiude, Departamento Valle del Cauca, Colombia

Specimens studied Eight specimens of *Syphacia* from *M. caliginosus* from Buenaventura and Pichiude, Departamento Valle del Cauca, Colombia (MNHN 605 M, 610 M)

Specimens deposited Holotype male (MNHN 605), paratypes (MNHN 605), and voucher specimens (MNHN 610 M).

Etymology Dedicated to J. C. Quentin for his pioneering work on the taxonomy and zoogeography of the genus *Syphacia*.

Remarks

Syphacia quentini n. sp. differs from *S. venteli* by the shape of the cephalic plate in males and females, the distance between mamelons, the distribution of the three pairs of caudal pedunculate papillae, spicule length, and tail length in the males.

This new species can be distinguished from *S. nigeriana*, *S. venteli*, *S. alata*, *S. criceti*, *S. petrusewiczi*, *S.oryzomyos*, *S. sigmodoni*, *S. evaginata*, *S. carlitosi*, and *S. kinsellai* by the presence of lateral alae in females. Moreover, *Syphacia quentini* n. sp. differs from *S. alata*, *S. sigmodoni*, and *S. carlitosi* in not having cervical alae well developed in the females. The new species differs from *S. peromysci*, *S. criceti*, *S. megadeiros*, *S. petrusewiczi*, *S. sigmodoni*, *S. oryzomyos*, *S. phyllotios*, *S. evaginata*, *S. odilbainae*, and *S. kinsellai* by the absence of deirids. *Syphacia quentini* n. sp. has a shorter spicule than *S. arctica*, *S. alata*, *S. criceti*, *S. mesocriceti*, *S. oryzomyos*, *S. phyllotios*, and *S. evaginata* (62-67 vs. 80-94, 76, 96, 65-84, 99, 76-82, 87, respectively). The tail of the males of this new species is longer than *S. criceti*, *S. oryzomyos*, *S. sigmodoni*, *S. phyllotios*, *S. evaginata*, and *S. odilbainae* (130-170 vs.96, 140, 65-69, 80, 75, 130, respectively). In addition, the tail of the females of *S. quentini* n. sp. is similar in length to *S. venteli*, but shorter than the remaining species. *Syphacia nigeriana*, *S. arctica*, *S. megadeiros*, *S. petrusewiczi*, *S. mesocriceti*, *S. oryzomyos*, *S. phyllotios*, *S. evaginata*, and *S. odilbainae* can be distinguished from *S. quentini* by the length and width of the eggs (Travassos 1937; Tiner and Rausch 1950; Quentin 1968; 1969; 1971; Quentin and Kinsella 1972; Quentin et al. 1979; Hugot and Quentin 1985; Robles and Navone 2007a, b; Table 1).

Among the *Syphacia* species from rodents, whose females have lateral alae, *S. quentini* n. sp. can be separated from *S. okuensis*, *S. darwini*, and *S. ohtaorum* by the absence of lateral alae in the males, from *S. peromysci*, *S. odilbaine*, *S. brachyuromyos*, *S. ramirohitra*, and *S. millardiae* by having a longer tail in males (130-170 vs. 64, 130, 95, 120, 95-110), and from *S. arctica*, *S. brachyuromyos*, *S. montana*, *S. okuensis*, and *S. darwini* by having shorter spicules (62-67 vs. 80-94, 92, 81-87, 125, 80, respectively; Yamaguti 1943; Quentin 1971; Quentin and Durette-Desset 1974; Hugot and Quentin 1985; Hugot 1988; Hasegawa 1991).

Discussion

The redescription of *S. venteli* was based on a large number of specimens from the type host, *N. squamipes*, from Argentina and specimens from *N. squamipes* from a locality (Barra de Maricá) near the type locality (Angra dos Reis) from Brazil. The present report extends the distribution of *S. venteli* to Misiones province, Argentina.

This survey is the first detailed study of *S. venteli* since the original description. Details of important diagnostic features were found that supplement the description of Travassos (1937), such as the quadrangular shape of the cephalic plate, details and distribution of the submedian papillae and amphids, absence of derids, presence of lateral alae, shape and structure of the accessory hook of the gubernaculum, distance between mamelons, and uneven distribution of the three pairs of caudal pedunculate papillae. Additionally, some of the above-mentioned structures and others more difficult to observe under light microscopy were studied with SEM.

The morphological study confirms the erroneous identity assigned to specimens of *Syphacia* from *M. caliginosus* by Quentin (1969). Morphological and morphometric data on the rounded to oval shape of the cephalic plate, details and distribution of the submedian papillae and amphids, presence of lateral alae in females, absence of cervical alae and deirids, equidistant distribution of the three pairs of caudal pedunculate papillae, spicule length, and tail length allowed them to be assigned to a new species, *S. quentini*.

Host specificity can be defined as the number and identity of host species that are used by a parasite population. Parasites that are highly host-specific will occur in a single host species, whereas generalist parasites will be dispersed unequally among individual hosts from several different species (Poulin et al. 2006). Several studies have demonstrated the high host specificity among Oxyuridae (e.g. Hugot et al. 1996; Hasegawa et al. 2003). In particular, these studies showed that the distribution of Syphaciinae belonging to the same family of rodents hosts have a closely parallel phylogeny with these hosts (e.g., Hugot 1990; Weaver and Smales 2008). Moreover, recent studies have shown that each *Syphacia* species appears to be specific to a host genus (Robles and Navone 2007b; Robles 2008a, b). However, similar to *S. venteli*, species such as *S. montana*, *S. nigeriana*, *S. alata*, and *S. criceti* have occasionally been reported from hosts of different genera (Quentin 1969, 1971; Hugot 1988). Studies that propose synonymies without a detailed study such as Ogden (1971) further confuse issues of host specificity. The present study suggests that the validity of some host species of *Syphacia* can be questioned and that through the study of deposited specimens, the real number of parasitized host species can be confirmed. Determining the macroevolutionary history of the genus *Syphacia* depends on knowing the true pattern of these host associations.

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