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DESCRIPTION OF *TRICHURIS TRAVASSOSI* N. SP. (NEMATODA: TRICHURINAE) FROM A BRAZILIAN RODENT, BY LIGHT AND SCANNING ELECTRON MICROSCOPY

DELIR CORRÊA GOMES/+; REINALDA MARISA LANFREDI*; ROBERTO MAGALHÃES PINTO/+ & WANDERLEY DE SOUZA*

Departamento de Helmintologia, Instituto Oswaldo Cruz, Av. Brasil, 4365, 21045-900 *Departamento de Parasitologia e Biofísica Celular, CCS, Instituto de Biofísica Carlos Chagas Filho, UFRJ, Bloco G, Cidade Universitária, Rio de Janeiro, RJ, Brasil

A new species of a trichurid nematode Trichuris travassosi *n. sp., recovered from a wild rodent in the State of Rio Grande do Sul, Brazil, is described and compared to* T. myocastoris *(Enigk, 1933) and their differentiation was on the basis of a detailed morphometrical study.* Oryzomys nigripes *(Olfers, 1818) is a new host record for the genus. The denomination spicular prepuce is proposed to designate the structure previously named spicular sheath and, conversely, spicular sheath to indicate the cuticle that covers the spicule.*

Key words: Nematoda – *Trichuris travassosi* n. sp. – *T. myocastoris* – rodent – *Oryzomys nigripes* – Brazil

Epidemiological reports often regard the wild rodents as one of the potential reservoirs in the spreading of some severe zoonoses, considering their behavior and feeding habits.

These hosts have been found to be naturally infected with a wide range of parasites, some of them deserving intense care, in order to determine their prevalence and/or incidence.

The present investigation, deals with a trichurid nematode, recovered from a wild rodent, *Oryzomys nigripes* (Olfers, 1818) captured in the Brazilian southern region, State of Rio Grande do Sul and was scheduled to add new data on some early findings concerning helminths parasitizing wild rodents from different Brazilian regions (Pinto & Gomes, 1980; Pinto et al., 1982; Vicente et al., 1982, 1987; Gomes & Vicente, 1984).

MATERIALS AND METHODS

Forty two specimens of *Oryzomys nigripes* (Olfers, 1818) were captured in Arvorezinha (28° 45' – 29° S; 52° – 52° 15' W) State of Rio Grande do Sul, Brazil.

Seventeen (40.4%) specimens out of the 42 necropsied for helminths, were positive for trichurid worms. Nematodes were recovered in a 0.85% NaCl solution and fixed in hot 10% formaldehyde. Samples were used for the study by light and scanning electron microscopy.

Light Microscopy (LM): worms were dehydrated in ethanol, stained or not in alcoholic carmine and mounted in beechwood creosote and preserved in balsam as wholemounts and deposited in the Instituto Oswaldo Cruz Helminthological Collection (CHIOC). Drawings were made with an Olympus camera lucida. Measurements are in micrometers (μm) unless otherwise indicated.

Scanning Electron Microscopy (SEM): worms were dehydrated in a graded ethanol series (60, 70, 80, 90 and 3 x 100), critical point dried by CO_2 (CPD 20 Balzers UNION), coated with sputtering gold (Balzers UNION, FL-9496) and examined in a JEOL JSM 25 SII SEM. Considering the large size of the studied helminths, some regions of the body were selected to permit a similar observation pattern for the examined specimens.

Specimens of *T. myocastoris* compared to the new species by light microscopy were deposited in the CHIOC under nos. 8,944 a-c, 8,945 a-b as wholemounts and were collected in intestine of *Myocastor coypus* from State of São Paulo and identified as *Trichuris nutria,*

+CNPq research fellows.
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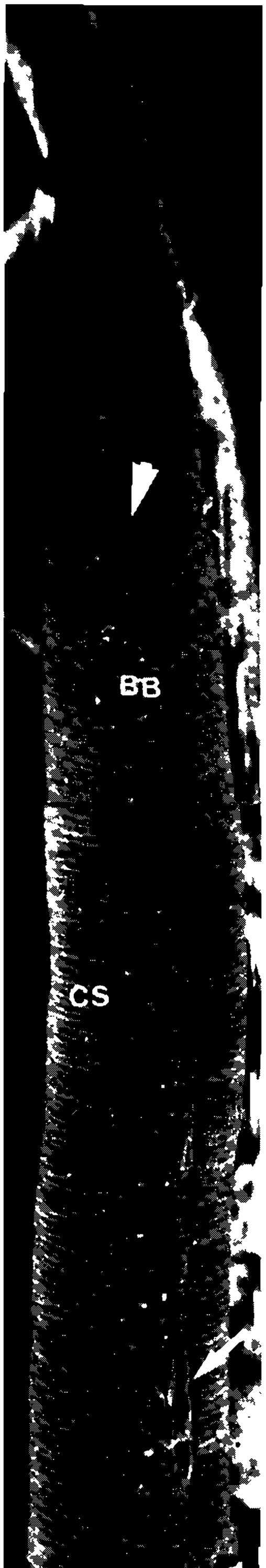
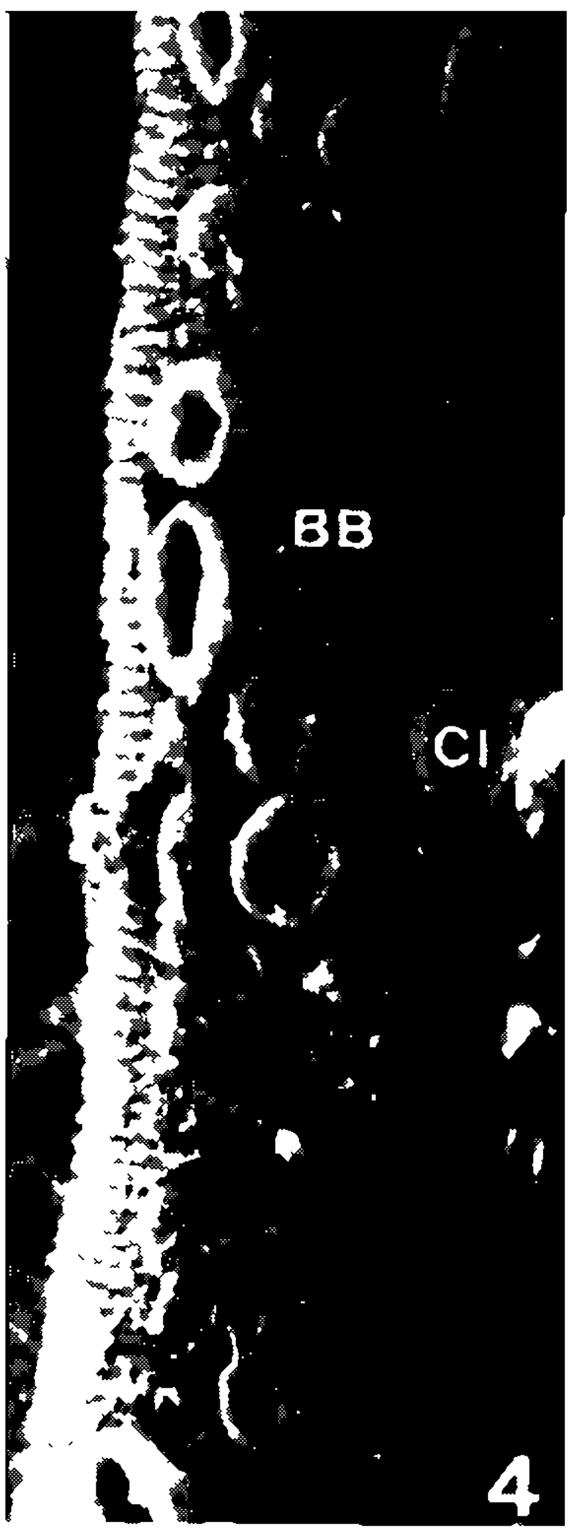
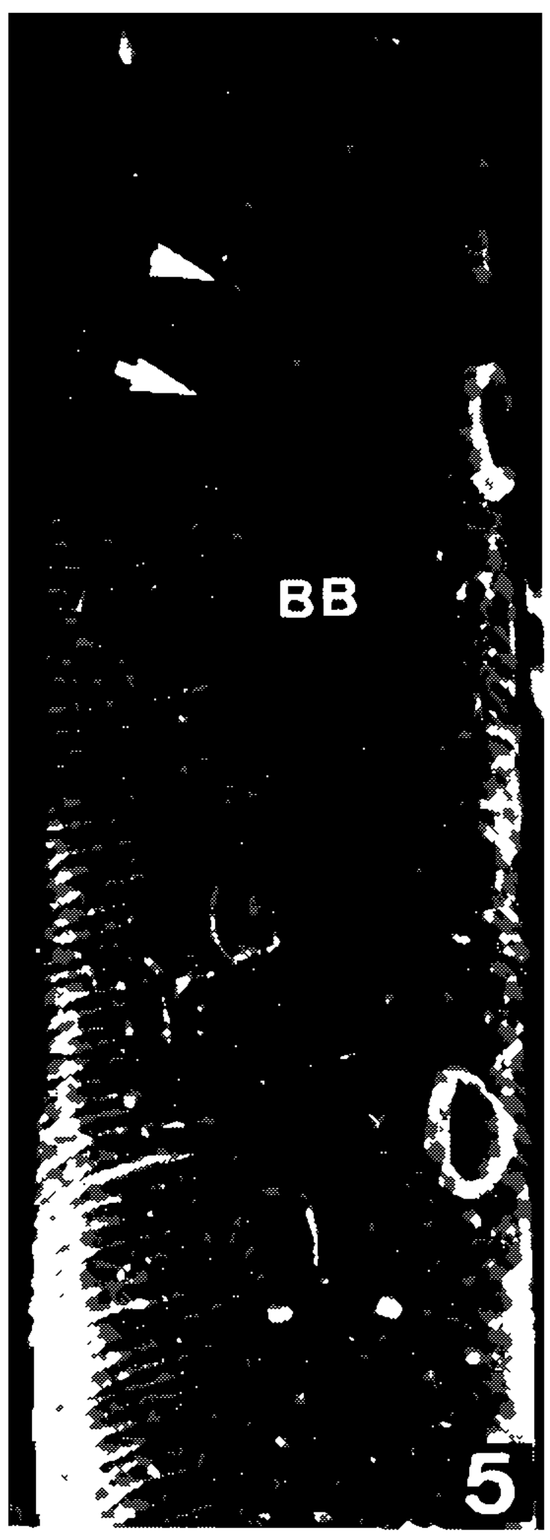
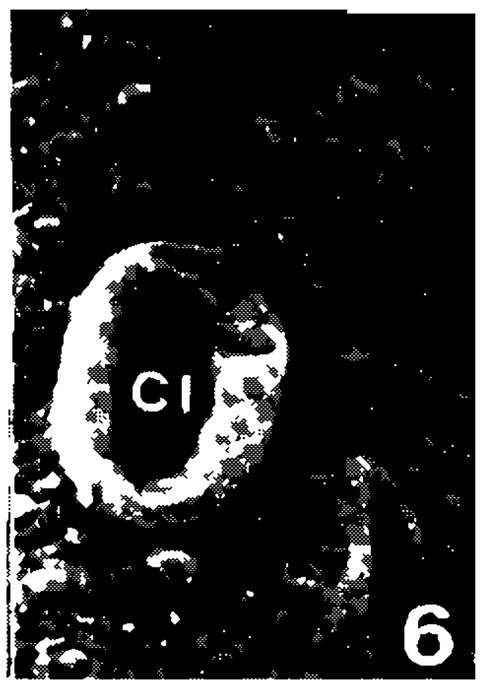
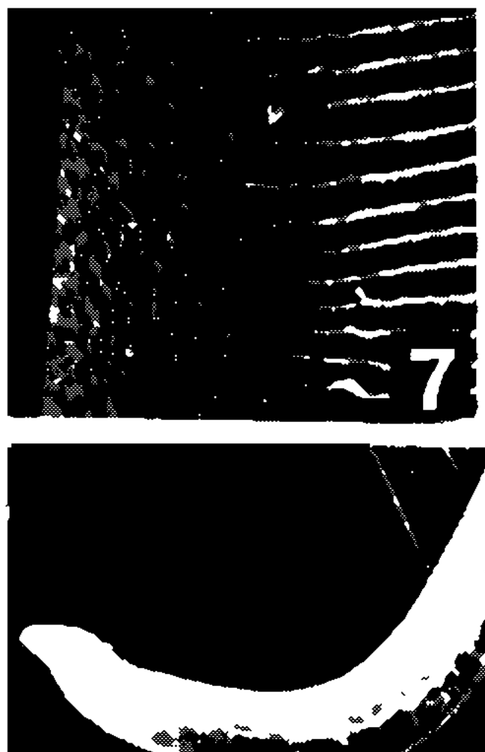


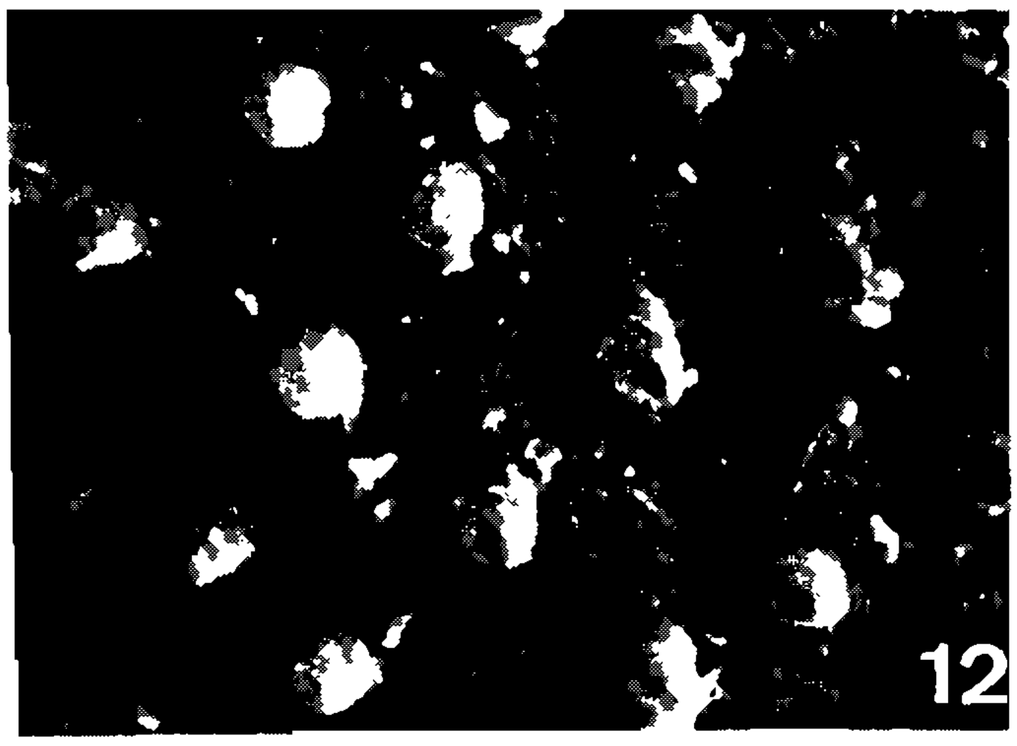


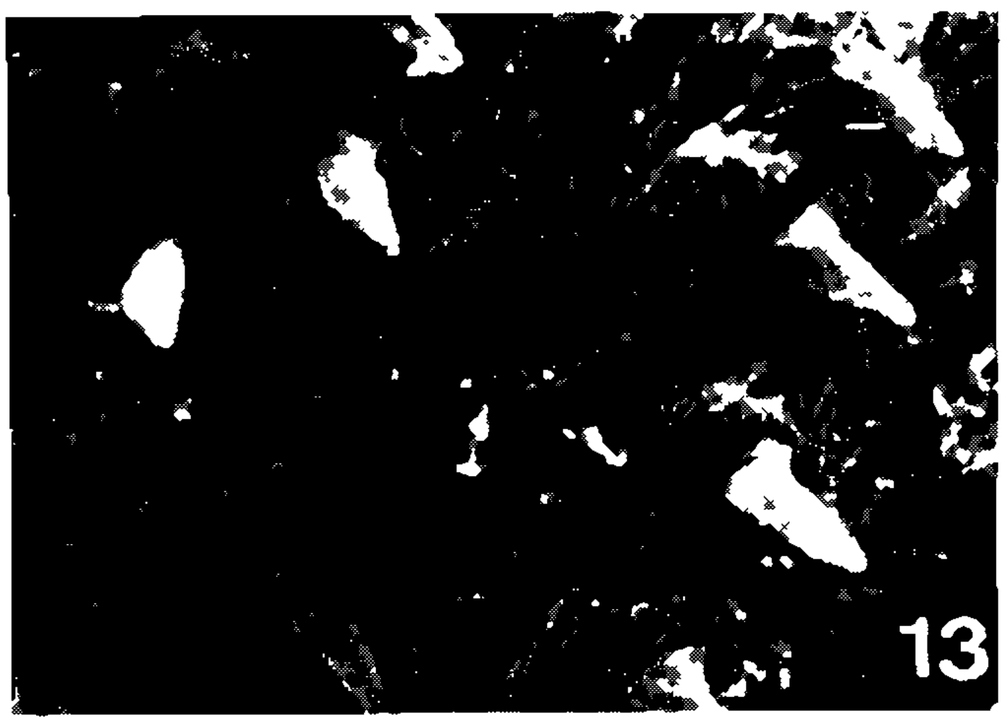


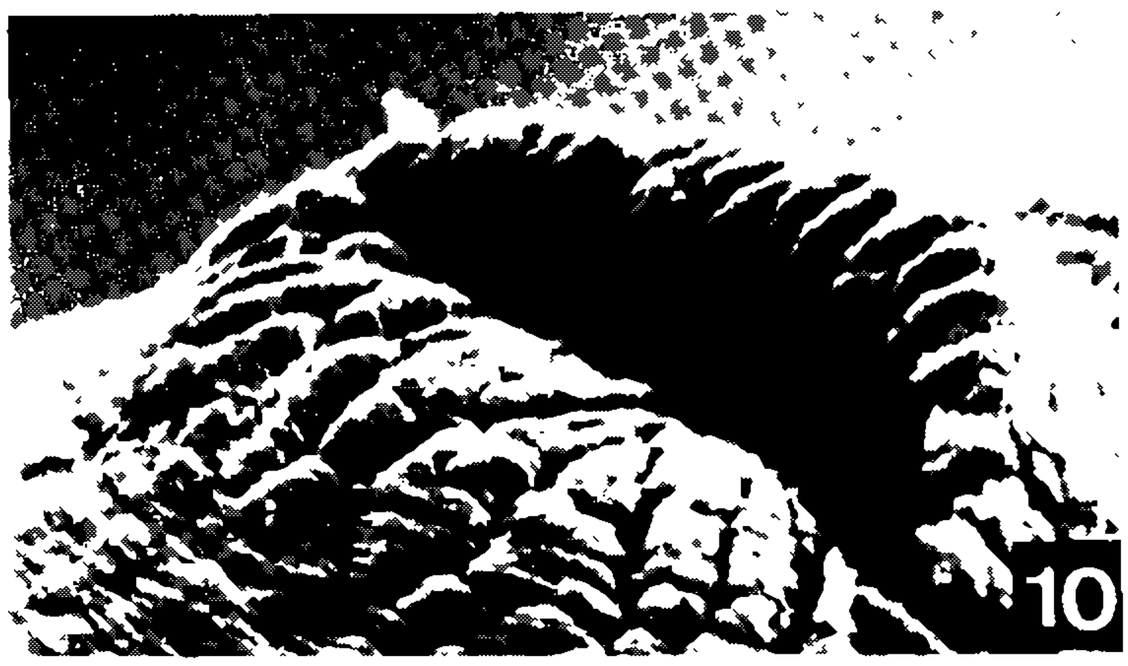


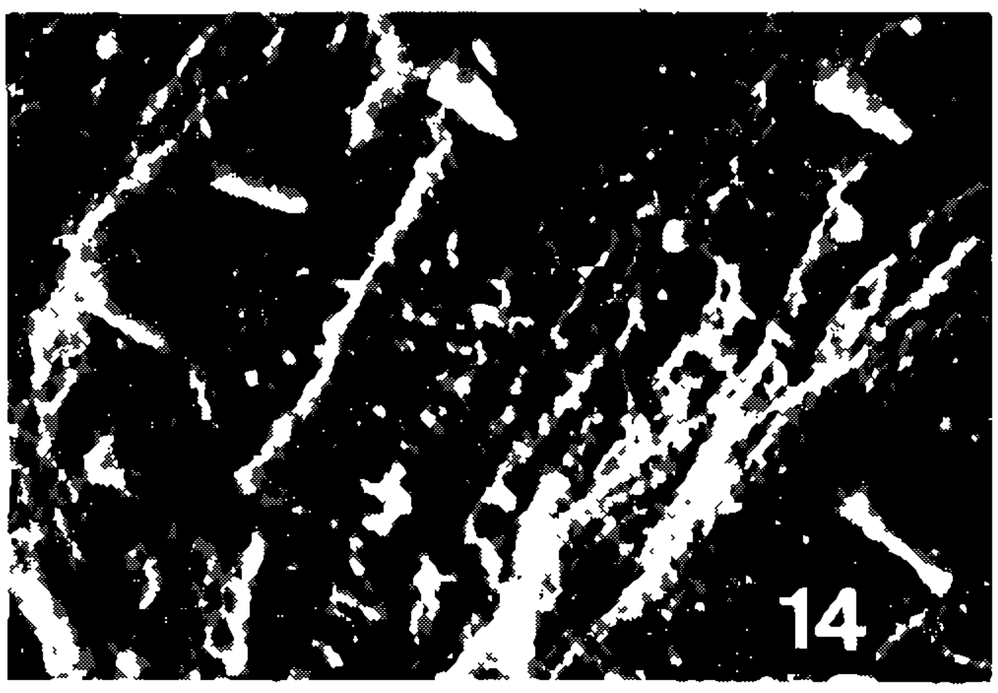


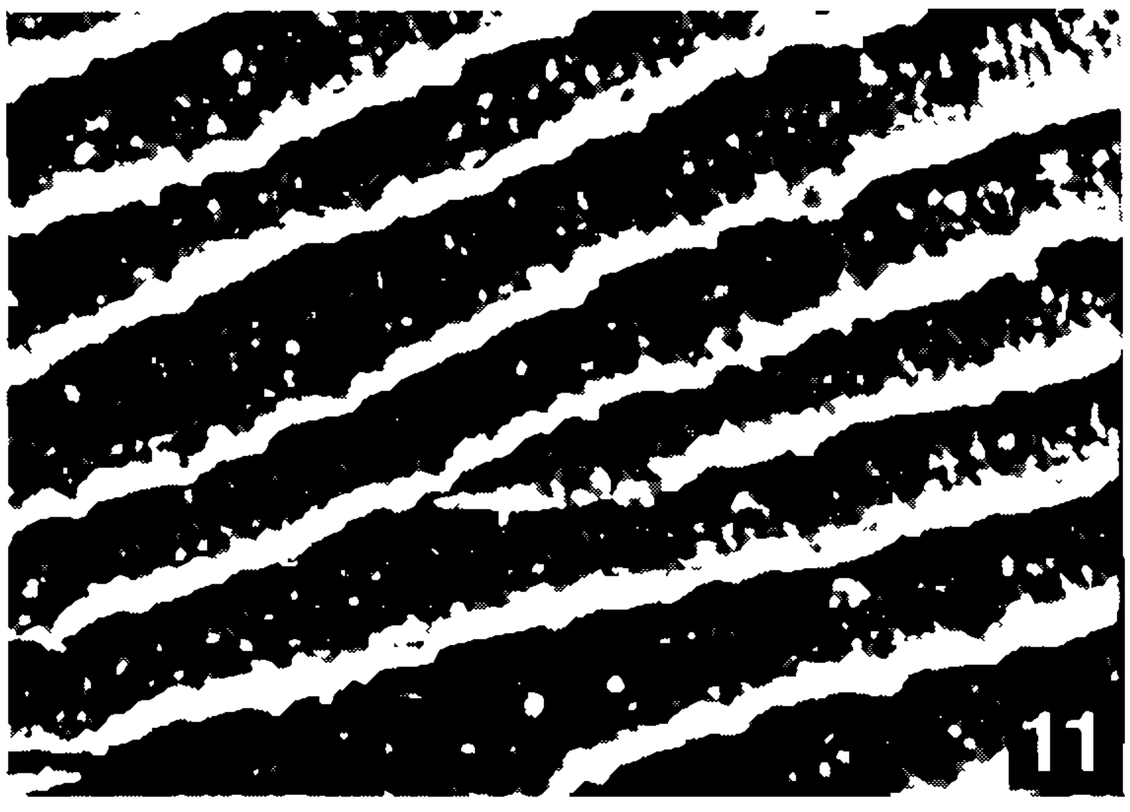
Trichuris travassosi n. sp. – Fig. 1: anterior extremity, initial region of BB (arrow), first CI (arrow). Fig. 2: two fused CI and some in the middle of BB. Fig. 3: middle portion of BB, CI with different sizes. Fig. 4: crater-like CI. Fig. 5: terminal region of CI, distended BG (arrow). Figs 1-5, 600 X. Fig. 6: higher magnification of CI. Fig. 7: higher magnification of BB, posterior to the last CI. Figs 6 and 7, 1300 X. Fig. 8: anterior extremity, showing BB, with BG, CI and CS, 130 X. (BB-Bacillary band; BG-Bacillary gland; CI-Cuticular inflation; CS-Cuticular striation).

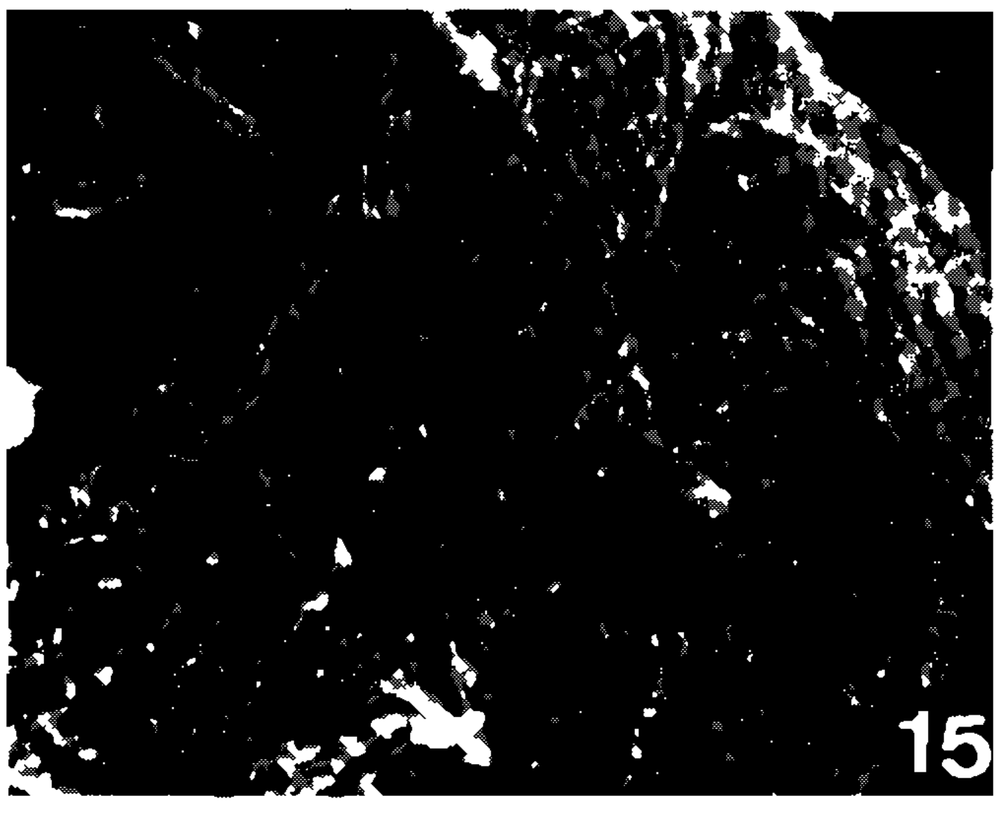




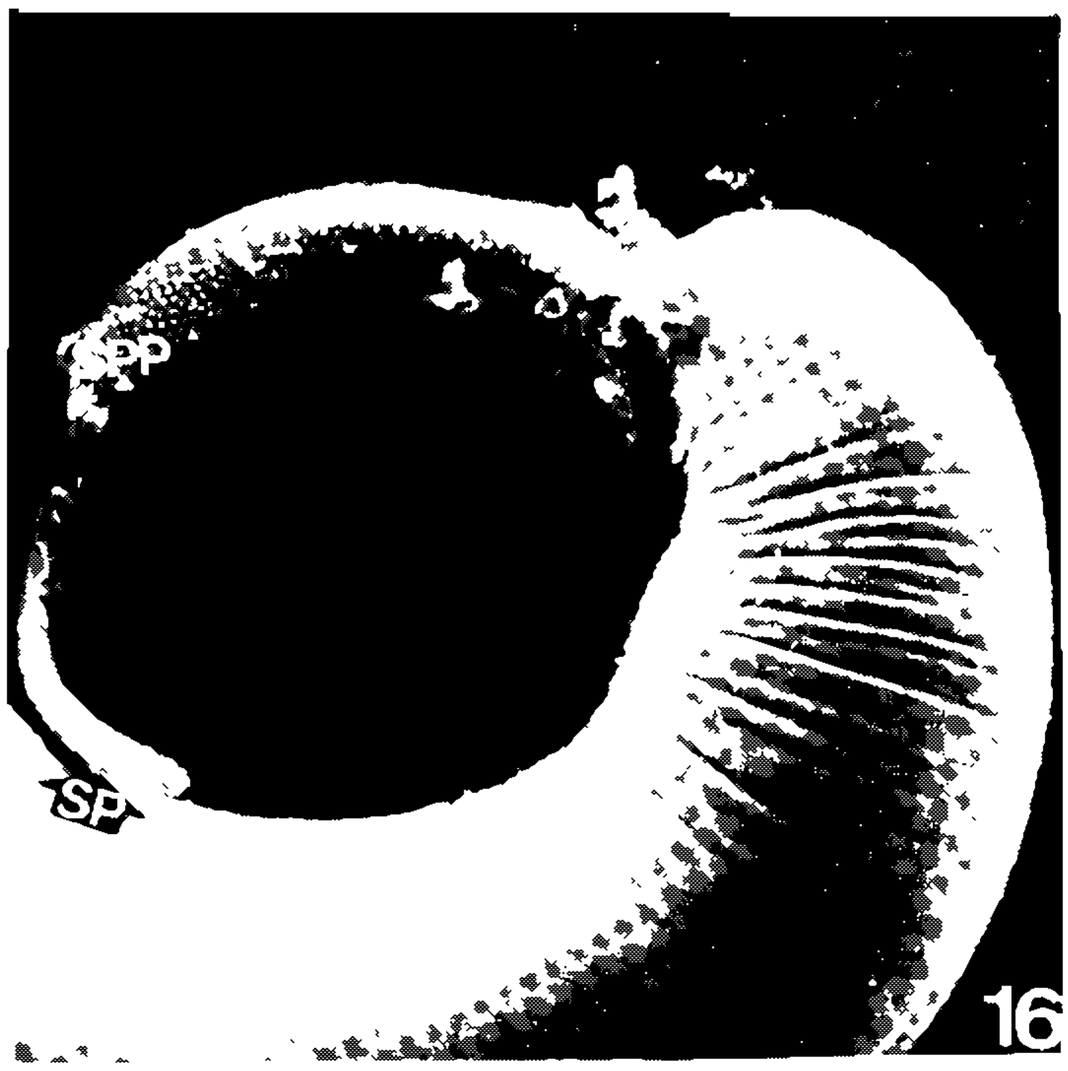


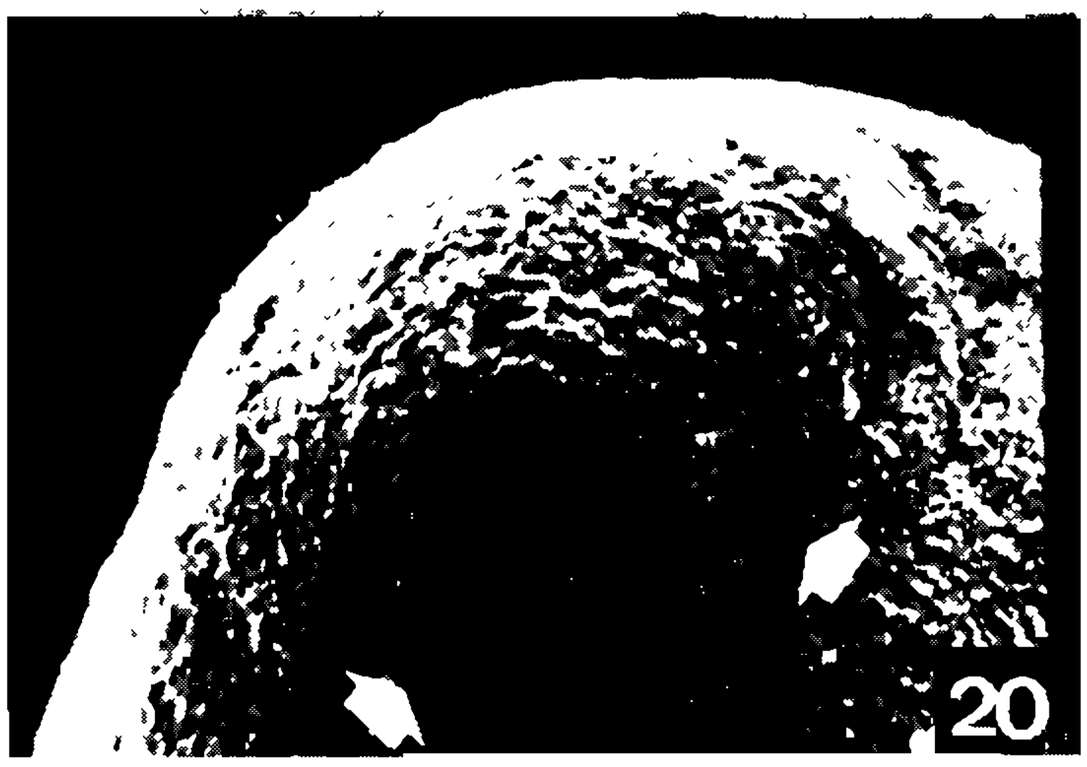


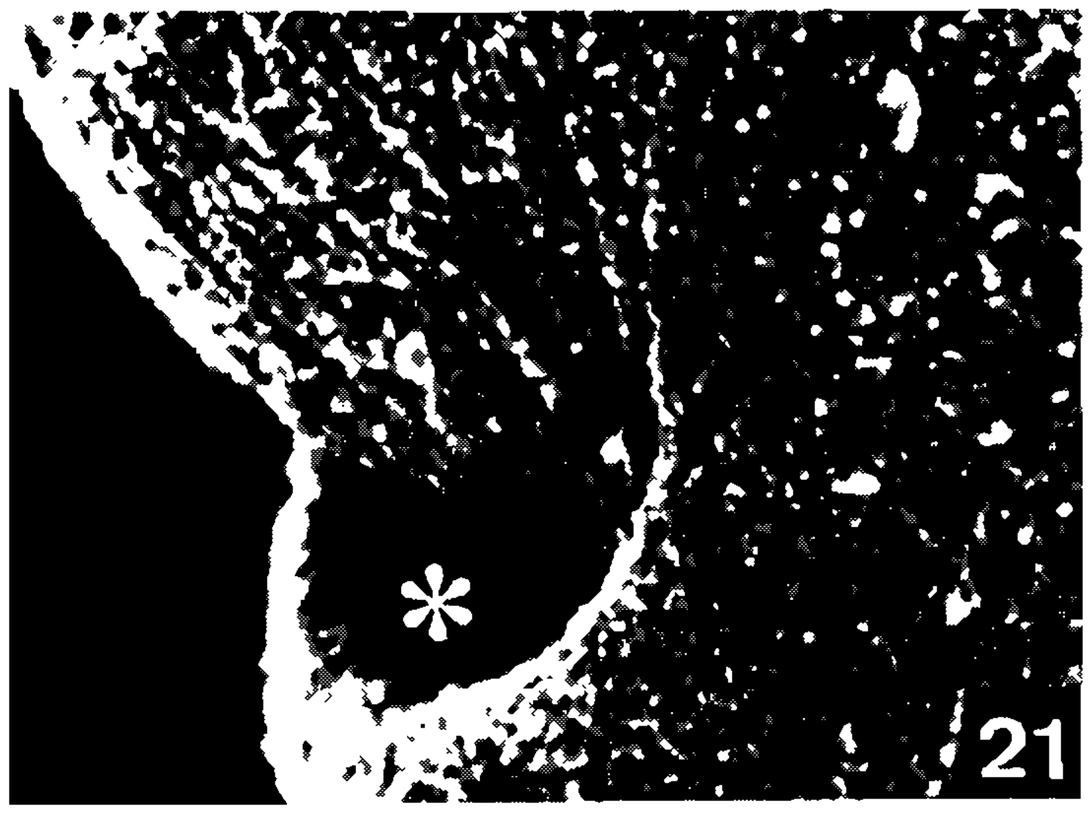


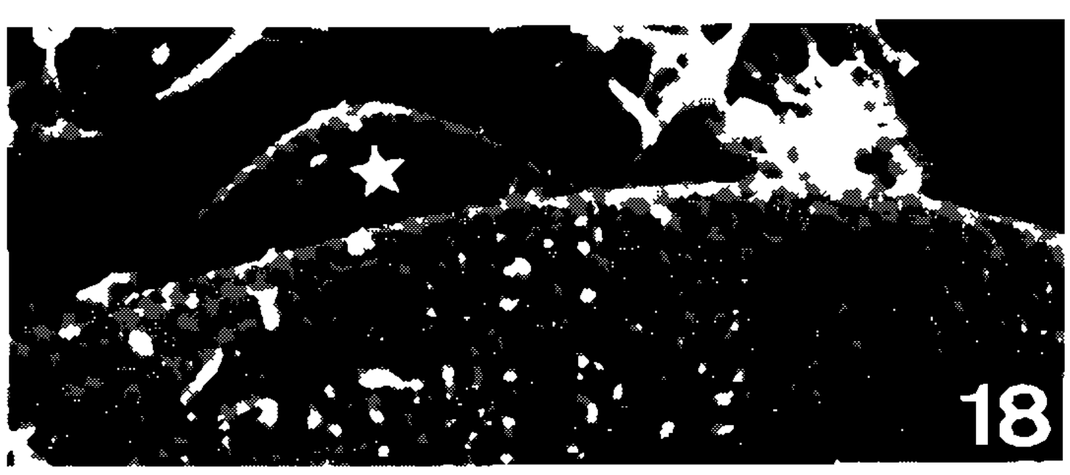


Trichuris travassosi n. sp. – Fig. 9: posterior of male, distended SPP, distal end (arrow), 85 X; Fig. 10: vulva. Fig. 11: CS near the vulva. Fig. 12: spines of proximal SPP. Fig. 13: spines of proximal middle SPP. Fig. 14: spines of distal middle SPP. Fig. 15: spines of distal SPP. Figs 10-15, 2600 X. (SPP-Spicular prepuce; CS-Cuticular striation).









Trichuris travassosi n. sp. – Fig. 16: posterior of male, SPP and SP, 85 X. Fig. 17: higher magnification of cloacal aperture, spines of SPP and ad-cloacal papilla (star). Fig. 18: ad-cloacal papilla, lateral view (star). Figs 17 and 18, 1750 X. Fig. 19: spicule (arrow) and SPP, 400 X. Fig. 20: posterior of female, showing anus (arrow), 900 X. Fig. 21: anal aperture (rosette), 2600 X. tip of SP, recovered by the SS, 1500 X. Fig. 23: tip of SPP with spines, 800 X. (SP-Spicule; SPP-Spicular prepuce; SS-Spicular sheath).

according to Lent & Freitas (1936). For scanning electron microscopy, the processed specimens were deposited as wet material, under nos. 8,967, 8,999, from the same host, locality and with the same identification.

Abbreviations are as follows: BB-Bacillary band; BG-Bacillary gland; CI-Cuticular inflation; CS-Cuticular striation; SP-Spicule; SPP-Spicular prepuce; SS-Spicular sheath.

Measurements are in micrometers (μm) unless otherwise indicated.

RESULTS

Light Microscopy: description based on nine males and five females.

Trichuris travassosi n. sp.
(Figs 28-31)

Description

Male: total length 32.0-40.0 mm; esophageal region 11.9-16.0 mm; posterior portion of body 20.1-24.0 mm. Width esophageal region at tip 28-43; in midregion 72-86; maximum width of posterior body 340. Cloaca long, divided into proximal and distal portions. Total length of proximal cloaca 420-710; maximum width 70-80. Total length of distal cloaca 1.2-1.4 mm; maximum width 5-10. Spicule with a hyaline sheath (Fig. 29) lies in distal cloaca 2.0-2.56 mm in length; width at proximal end 10-20; at midregion and tip 10. Spicular prepuce tube-like with numerous fine spines irregularly distributed throughout its length. Extension of spicular prepuce variable may extend from posterior end of body around which it may coil (Fig. 28). Ejaculatory duct 0.85-1.03 mm long, unites with intestine and vas deferens. Testes with 42-48 lobations. A pair of adcloacal papillae is present.

Female: total length 38.89-48.52 mm; esophageal region 14.07-20.01 mm; posterior portion of the body 24.82-28.51 mm. Width esophageal region at tip 43-52; at junction of intestine 86-120. Maximum width of posterior body 500-630. Vulva usually at level of esophageal intestinal junction with lips not prominent. Ovijector muscular 860-940 long (Fig. 30). Eggs 54-61 long and 25-28 wide (Fig. 31). Rectum 380-420 long.

Host: Oryzomys nigripes (Olfers, 1818)

Site: large intestine

Locality: Arvorezinha, State of Rio Grande do Sul, Brazil

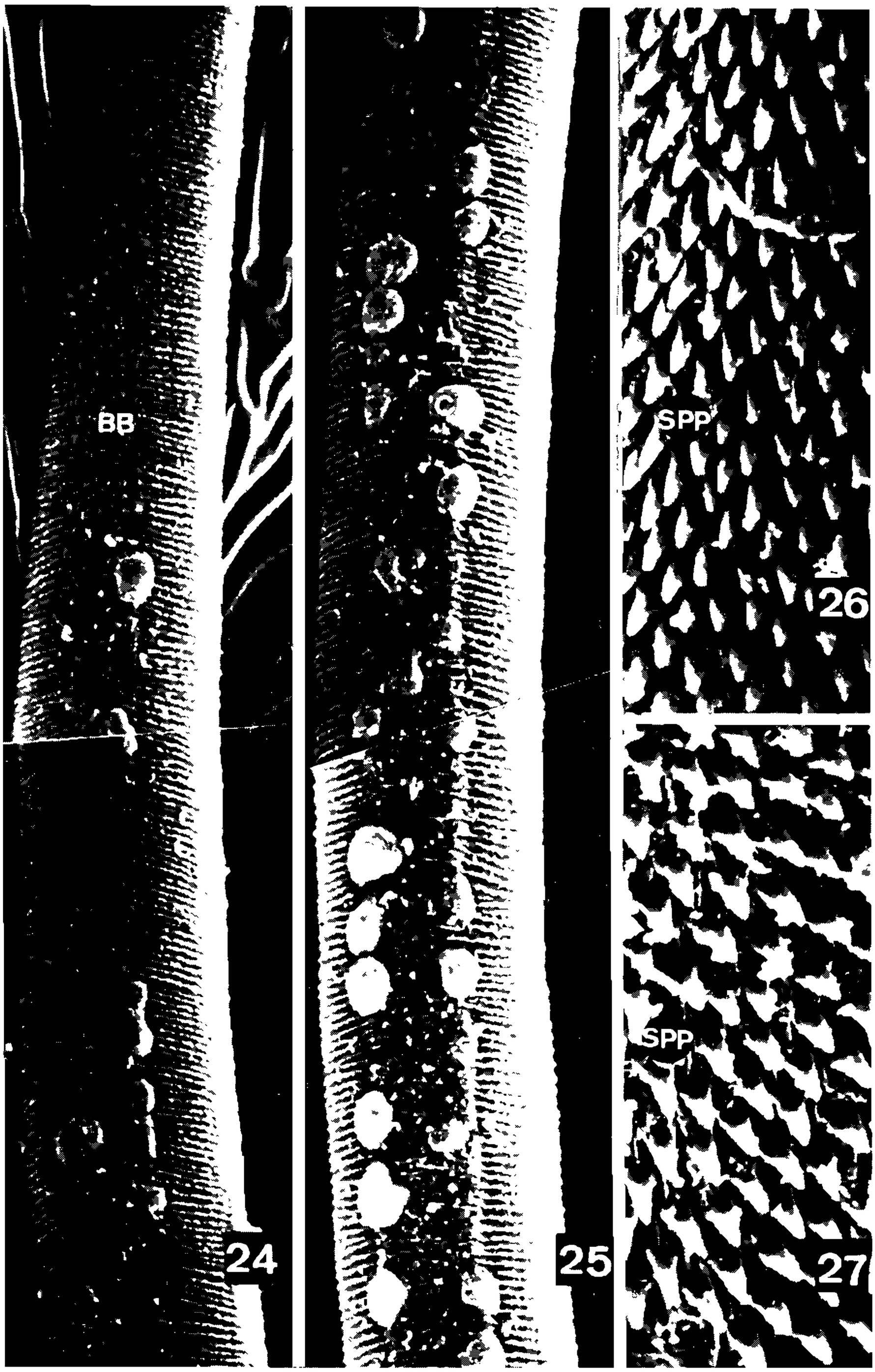
Specimens deposited: CHIOC – holotype no. 32,790 a, male; paratypes no. 32,790 b, 32,791 a-m.

Scanning Electron Microscopy
(Figs 1-23)

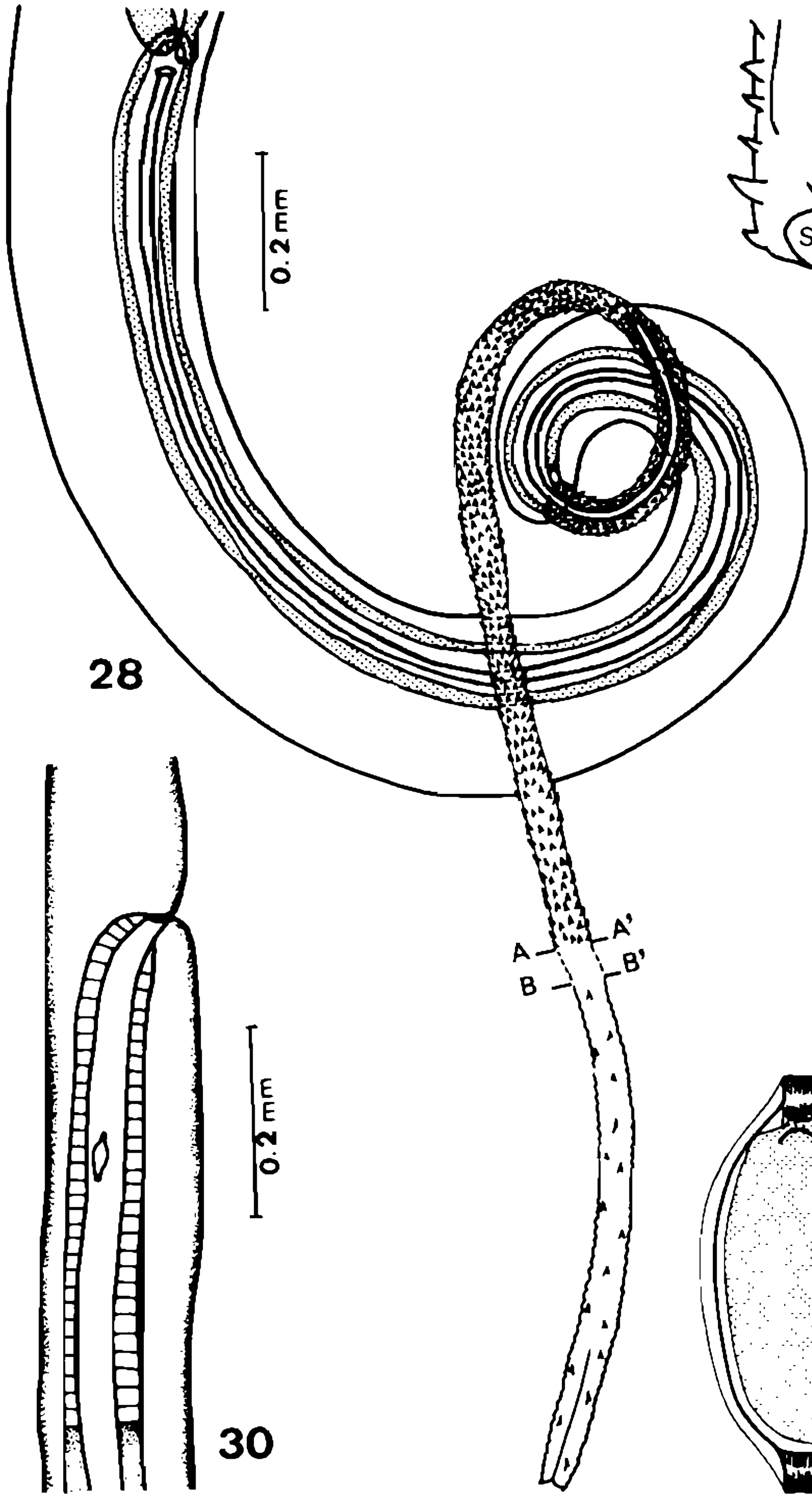
Bacillary band – The bacillary band runs from about 70-90 of the anterior extremity, at the region of the body 28-37 wide. It is formed by scarce bacillary glands, that increase in number and are transversally arranged, according to the cuticular striations (Fig. 7). This band is distinguished since it is disposed at a higher level than the surrounding cuticle. The first cuticular inflation occurs at about 233 from anterior extremity, and at this region the bacillary band presents two bacillary glands per each cuticular striation and is 10-13 in width while the body is 40.6-47 (Fig. 1). In the last cuticular inflation, the bacillary band presents 4 to 6 bacillary glands and is 30.5-31 in width while the body is 51-53 (Fig. 5). At the final posterior portion of the bacillary band, the bacillary glands are reduced in number. The cuticular inflations are distributed in an extension of about 460 and are 104 to 120 in number (Fig. 8). They appear bordering partially the bacillary band and located also at its middle region. These inflations are observed as rounded bulbs or crater-like if colapsed (Fig. 6), still rounded or elongated if fused (Figs 2, 3, 4). The major distance observed between them is about 120. The cuticle, in the anterior region of the body, is transverselly striated. At the cephalic region these striations are undulated, and at the level of first bacillary gland they are fringed, 1.5-2 wide and as the body widens, this cuticular fringe also does and is about 4.5-5 (Figs 1-5).

Female – The vulva is a transversal slit, with two lips projecting to the body level and is covered by a spineless wrinkled radiate cuticle; when opened, it is crater-like in form and closed, appears as a semicircular transversal slit. It is about 14-15 long; aperture 5-6 wide and 7.1-8.7 high (Fig. 10). The ratio between width/length in the greater dimention is 1:4.1. The cuticle around the vulvar aperture is modified, becoming shrunken, not presenting the transversal striation pattern that is observed in the posterior region of the body. The cuticular striations near the vulva are 2-4.3 (Fig. 11). Anus subterminal, a semicircular opening at the posterior extremity (Figs 20, 21).

Male – The cloaca is a longitudinal slit, subterminal, at the posterior extremity. In this region, the body is 87 in diameter (Fig. 16) presenting a pair of adcloacal papillae which seem to posses a pore in their peaks (Figs 17, 18). The cuticle is feeble striated, but further presents wrinklings, which are probably responsible for the characteristic twisting of the body in the trichurid males (Fig. 16). The spicular prepuce is cylindrical (Fig. 23), bulbless, and several stages of evertion were observed (Fig. 16), despite the spicular retraction (Fig. 9).



Trichuris myocastoris – Fig. 24: anterior region of the body showing the first CI. Fig. 25: mid-region of BB with only lateral CI in most of its length. Figs 24 and 25, 600 X. Fig. 26: spines of proximal region of SPP. Fig. 27: spines of distal region of SPP. 26 and 27, 2500 X. (BB-Bacillary band; CI-Cuticular inflation; SPP-Spicular prepuce).



Trichuris travassosi n. sp. – Fig. 28: posterior of male (AA'–BB' = 1.37 mm). Fig. 29: distal portion of SPP and SP, showing SS (CC'–DD' = 0.2 mm). Fig. 30: vulva and ovijector. Fig. 31: egg. (SP-Spicule; SPP-Spicular prepuce; SS-Spicular sheath).

The spicular prepuce is 34-47 wide. The prepuce, when everted, is covered with spines, stouter and conical in the proximal region (Fig. 12) and are about 4.6-6.1 in length and 3-4.6 in width at the base; at the middle region the spines are slender (Figs 13-14), 4.1-5.6 long and 1.3-2.2 wide; at the distal region 2.9-4.1 long and 1.1-1.7 wide, evenly distributed (Fig. 15). The spicule is long and slender, 12-19 in diameter. It is covered by the membranous and hyaline spicular sheath (Fig. 22) that appears attached to the spicule; when the spicular sheath is loose, the spicule seems to be wider (Fig. 19).

DISCUSSION

General surveys on helminth fauna, mostly on nematodes from Brazilian wild rodents, strictly on systematical and/or taxonomic basis, have been currently reported.

The proper identification of parasites occurring in different hosts provides, with no doubt, a very substantial background to further investigations concerning parasites distribution and probable infection patterns.

The tracking of parasites and hosts involved in their life-cycles, is an approach to be taken into account whenever there is a real interest in the understanding of the not yet clear mechanisms that occur during these interactions. Erroneous identifications most of times are due to inadequate evaluation of concepts regarding parasites and their host associations. Specifity must be regarded only as an indicator of these relationships and not as single criteria to identify a parasite species based only on data concerning its host, without a complete morphometric analysis of the parasitizing agent.

The systematical value of some characters in the study of trichurid worms have been discussed and according to Chandler (1930), in this group of nematodes, the size of the spicules is undoubtedly the most dependable character and in conjuction with others, is valuable in differentiation of species. The shape and armature of the spicular prepuce is even more variable, since it is a retractile organ and apparently capable of considerable expansion and contraction, since the prepuce in retracted position is much narrower than when extruded. It has no permanent shape as the spicule has. The spicular prepuce is, according to Wright (1978) the cloacal cuticle everted through the cloacal opening. The spiny armature of the spicular prepuce seems to have a little more value although the regularity of arrangement of spines, their variation in size in different regions, their distribution and form, have all been included in description of species of *Trichuris* Roederer, 1761. The size of eggs is only ocasionally of value, for the measurements as given for most species lie between a same range. Total size is of value in the case of certain species, but not in most of them. The length of thick part of the body, measured from the junction of intestine and esophagus, appear to be more reliable than total length in the genus *Trichuris*. The length and thickness of the posterior portion of the body are the most reliable size measurements.

By light microscopy, on the basis of a detailed study of the morphology and metrical characters of our nematode specimens, we concluded that they should be regarded as a new species of *Trichuris,* as well as *Oryzomys nigripes* referred as a new host record for the genus.

In Central and South America, eight species of *Trichuris* from rodents have been reported (Babero et al., 1975; Babero & Murua, 1990).

Trichuris travassosi n. sp. was compared to *T. myocastoris,* which seems to be the closest species, mainly considering the great size of the spicule (2.0-2.56 mm in *T. travassosi* n. sp. and 2.96-4.50 mm in *T. myocastoris*), which also differs from the other species from rodents.

Trichuris myocastoris was redescribed in Brazil by Lent & Freitas (1936) as *T. nutria* (Schulz & Petrow in Schulz & Landa, 1934) since *Trichocephalus myocastoris* Heidegger, 1931 in Enigk (1933), according to these authors, was considered a *nomem nudum.* But, as far as the priority of the name *T. myocastoris* is concerned, we agree with Barus et al. (1975) and accept this specific designation.

The new species differs from *T. myocastoris* by presenting the thick portion of body of males and females, twice as long as the esophageal portion. The same ratio is reversed in *T. myocastoris* and this parameter is considered a reliable one (Baylis, 1929). Other differences are related to the spines of spicular prepuce and body ornamentations. These structures were analyzed by SEM, to be compared in both species. The bacillary glands, as well as the

cuticular inflations that occur for the most part of the bacillary band, were referred in some species (Skrjabin et al., 1970) and not considered of taxonomic value. The spicule, the spicular prepuce and the vulva aperture have been used in the specific differentiations of trichurid worms, by LM according to Francis et al. (1986), Lent & Freitas (1936), Kikuchi & Okuyama (1964), Pfaffenberg & Best (1989) and Skrjabin et al. (1970), and these structures were considered in the present study. Based on strutural and ultrastrutural avaible data we adopted the denomination spicular prepuce, to identify the cuticular structure, spiny or not, that everts through the cloacal opening. This spicular prepuce is the cuticle that covers the inner cloaca (Wright, 1978). The designation spicular sheath is to indicate the membranous covering of the spicule.

Some structures, namely bacillary band, cuticular inflations, cuticular striations, are to be considered of taxonomic value in the specific differentiation. The bacillary glands in *T. travassosi* n. sp. are sometimes distended in rounded protusions or appear as punctuated structures, surrounded by a cuticular swelling (Fig. 6). There are 104-120 cuticular inflations; most of times, two or more inflations are close together and appear on the border and in the middle region of the bacillary band and also can occupy all the glandular band (Figs 3-4). Wright (1975) reports that *T. myocastoris* presents cuticular inflations in both sides of the bacillary band and 108-113 of them were observed. This species does not present cuticular inflations in the mid-region of the bacillary band (Figs 24-25) while *T. travassosi* n. sp. presents these structures in this region.

These species can be also distinguished considering the spicular prepuce. In *T. travassosi* n. sp. (Figs 12-15), it is covered with spines, 2.9-6.1 long and 1.1-4.6 wide, that according to the distance of the prepuce from the cloacal aperture, are different in size, shape and distribution. In *T. myocastoris* (Figs 26-27), the spines are equal in size (0.28-0.34 x 0.10-0.14), shape and are uniformily distributed throughout the spicular prepuce.

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