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ADDITIONAL MORPHOMETRICAL DATA ON SOME HELIGMONELLIDAE (NEMATODA: TRICHOSTRONGYLINA) PARASITIC IN NEOTROPICAL RODENTS (CRICETIDAE)

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Summary:

Some additional morphological and metrical data are provided, particularly on the synlophe of the following species: *Hassalstrongylus dessetae* Pinto, 1978, *Stilestrongylus eta* (Travassos, 1937), *Stilestrongylus manni* Denké & Murúa, 1977 and *Stilestrongylus valdivianus* Durette-Desset & Murúa, 1979, based on type and voucher material deposited in Brazilian and French collections. *Heligmonoides crassidorsualis* Franco, 1967 is considered as a Nippostrongylinae *incertae sedis*: its synlophe not being known it is impossible to report the species to a given genus. However, it is unlikely that the species belong to the genus *Heligmonoides* Baylis, 1928, present only in commensal Murinae from the Old World. *Heligmonoides mirzai* Smales, 2009, is also regarded, temporarily, as a Nippostrongylinae *incertae sedis*.

KEY WORDS: *Hassalstrongylus dessetae, Stilestrongylus eta, Stilestrongylus manni, Stilestrongylus valdivianus, Heligmonoides crassidorsualis, Heligmonoides mirzai*, Nippostrongylinae *incertae sedis*, Cricetidae, Brazil, Chile.

Résumé : NOUVELLES DONNÉES MÉTRIQUES ET MORPHOLOGIQUES SUR QUELQUES HELIGMONELLIDAE (NEMATODA : TRICHOSTRONGYLINA) PARASITES DE RONGEURS NÉOTROPICAUX (CRICETIDAE)

Nous apportons quelques nouvelles données métriques et morphologiques, en particulier sur le synlophe des espèces suivantes: Hassalstrongylus dessetae *Pinto, 1978,* Stilestrongylus eta *(Travassos, 1937),* Stilestrongylus manni *Denké & Murúa, 1977 et* Stilestrongylus valdivianus *Durette-Desset & Murúa, 1979, sur la base de matériel type et de matériel complémentaire déposés dans des collections brésiliennes et françaises.* Heligmonoides crassidorsualis *Franco, 1967 est considéré comme un* Nippostrongylinae incertae sedis: *son synlophe étant inconnu, il est impossible d'attribuer l'espèce à un genre donné. Il est pourtant improbable que l'espèce concerne le genre* Heligmonoides *Baylis, 1928, présent seulement chez des Murinae commensaux de l'Ancien Monde.* Heligmonoides mirzai *Smales, 2009, est aussi considérée, temporairement, comme un* Nippostrongylinae incertae sedis.

MOTS CLÉS : Hassalstrongylus dessetae, Stilestrongylus eta, Stilestrongylus manni, Stilestrongylus valdivianus, Heligmonoides crassidorsualis, Heligmonoides mirzai, *Nippostrongylinae* incertae sedis, *Cricetidae, Brésil, Chili.*

INTRODUCTION

In the Trichostrongylina, the synlophe i.e the cuticular ridges present all along the body of the worm, is the main character used in the identification of the genera. Very often, the other characters like the pattern of the caudal bursa or the ovejector of the female are similar in different genera (see Durette-Desset, 1971, Durette-Desset, 1985). Unfortunately, before the discovery of its importance, the synlophe was either too poorly described or else was not described at all. Within the framework of a revision of the Heligmonellidae, we have tried as far as possible to complete the descriptions of valid species in which some characters and particularly the synlophe have not yet been described. This paper concerns some Neotropical Heligmonellidae belonging to the subfamily Nippostrongylinae.

MATERIALS AND METHODS

The following material was studied: 1) Material from the Helminthological Collections of the Instituto Oswaldo Cruz, Rio de Janeiro, Brazil: CHIOC collection numbers n° 9301 slides b-f registered as *Mirandaia riberoi* Travassos, 1937, n° 9510 slides b-l registered as *Longistriata eta* Travassos, 1937, n° 31426 slides e-j registered as *Hassalstrongylus dessetae* Pinto, 1978, n° 9047 registered as *Stilestrongylus stilesi* Freitas, Lent & Almeida, 1937, n° 2096 registered as *Heligmosomum delta* Travassos, 1918, n° 30020 slides e-h registered as *Heligmonoides crassidorsualis* Franco, 1967. All these specimens were mounted on slides in Canada balsam. Other specimens, n° 9067 registered as *Stilestrongylus stilesi*, and n° 2669 registered as *Heligmosomum beta* Travassos, 1918, were preserved in

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alcohol. For various reasons (damaged or dried specimens, preparations too transparent) only *Hassalstrongylus dessetae*, *Longistriata eta* and *Heligmonoides crassidorsualis*, could be studied. 2) Material from the Helminthological collections of the Muséum national d'Histoire naturelle, Paris, France: *Stilestrongylus manni* Denké & Murúa, 1977 MNHN 999 HA (paratypes) and MNHN 1002 HA (vouchers), *Stilestrongylus valdivianus* Durette-Desset & Murúa, 1979 MNHN 710 CA, both preserved in ethanol 70°. The synlophe was studied following the method of Durette-Desset (1985) and the number of dorsal and ventral ridges is counted with respect to the axis(es) of orientation. The measurements provided are given in micrometers except when stated otherwise. The abbreviation SpL/BL means the proportion of the spicules length relative to the body length expressed as a percentage. The nomenclature of the hosts follows Wilson & Reeder (2005).

RESULTS

Hassalstrongylus dessetae Pinto, 1978 (Figs 1-4)

Material studied: one male (slide CHIOC n° 31246 d), one female (slide CHIOC n° 31246 c), one section of a female (slide CHIOC n° 31246 g).
Host: *Neacomys* sp. (Cricetidae: Sigmodontinae).
Site: small intestine.
Geographic origin: Porto Terezinha, Rio Amapa, Brazil.
Synlophe: arising of ridges not observed. Ridges disappearing just anterior to vulva in female, not observable in male. In female, 35 (18 dorsal, 17 ventral) longitudinal uninterrupted cuticular ridges with struts. Ridges of similar size except on right ventral side where ridges slightly smaller. Double axis of orientation directed from right ventral quadrant to left dorsal quadrant. Right axis inclined at 67° to sagittal axis, left axis at 86° (Fig. 3).
Male: 4.8 mm long and 50 wide. Cephalic vesicle 50 long and 23 wide. Excretory pore situated at 235 from apex. Oesophagus 300 long (Fig. 1). Caudal bursa asymmetrical with left lobe more developed. Pattern of type 1-4 for right lobe and 2-2-1 with tendency to type 1-3-1 for left lobe. Right lobe: ray 2 as long as ray 3. Ray 6 arising first from common trunk of rays 3 to 6. Rays 4 and 5 divergent at extremities. Ray 8 well developed. Left lobe: ray 3 close to ray 2 arising within proximal third of common trunk of rays 3-5. Rays 4 and 5 diverging at extremities (Fig. 2). Dorsal lobe not observed. Spicules 150 long ending in one sharp tip. SpL/BL: 3.1%. Genital cone inconspicuous. Gubernaculum absent.
Female: 6.4 mm long and 110 wide. Anterior extremity not able to be measured. Vulvar opening situated at 120 from caudal extremity. Vagina vera 18 long. Ovejector 155 long including vestibule 45 long, sphincter 20 long and 38 wide, infundibulum 90 long (Fig. 4). Uterus 1.47 mm long containing 31 eggs 70 long and 32 wide. Tail 40 long, with rounded tip (Fig. 4).

Stilestrongylus eta (Travassos, 1937) Durette-Desset, 1971 = *Longistriata eta* Travassos, 1937 (Fig. 5)

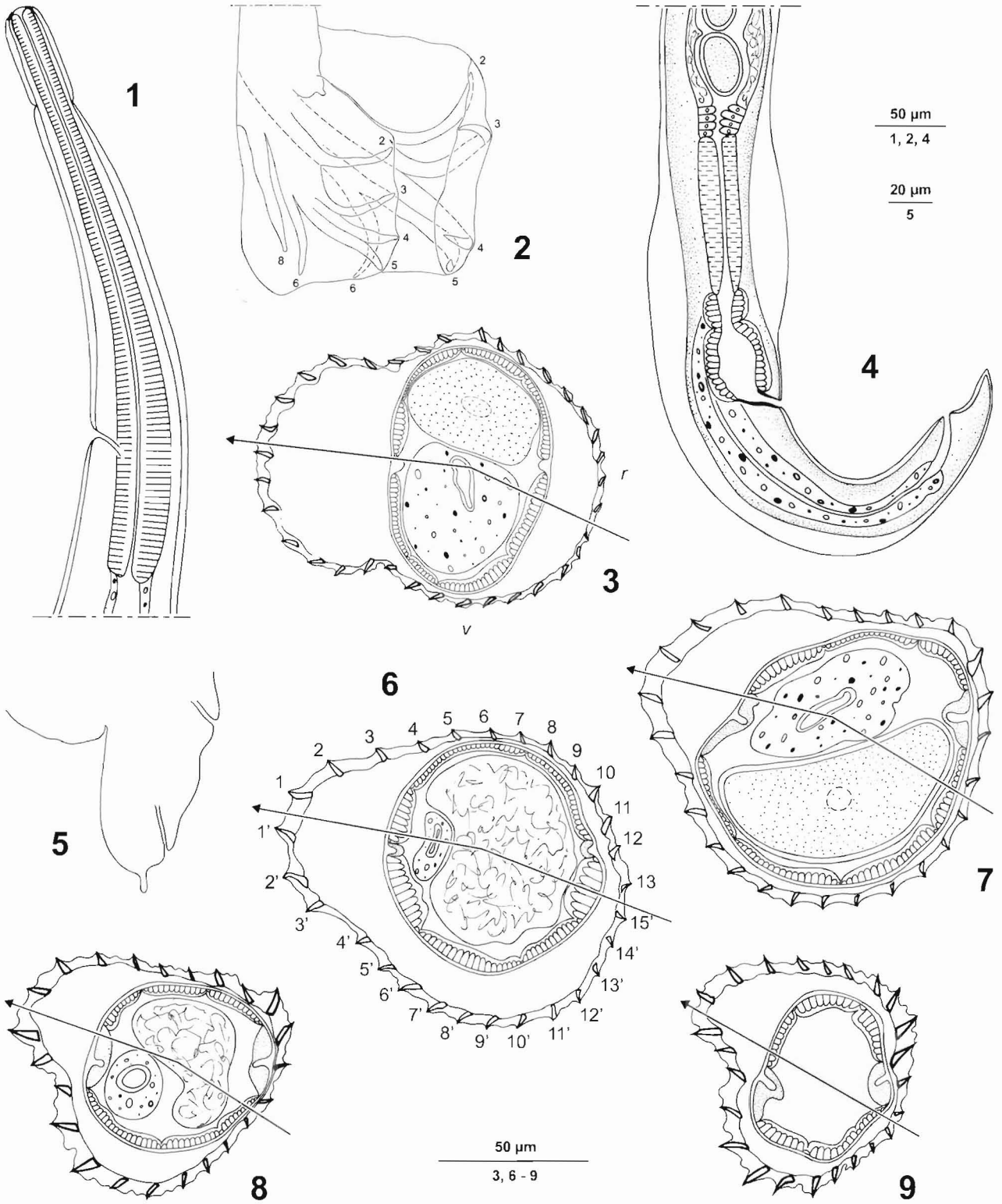
Material studied: two females, CHIOC n° 9510 slides c and e.
Host: *Akodon* sp. (Cricetidae: Sigmodontinae).
Site: small intestine.
Geographic origin: Angra dos Reis, Estado do Rio, Brazil.
Synlophe: cuticular ridges not visible, cuticule being too transparent.
Female: 1.1-1.8 mm long and 50-100 wide. Cephalic vesicle 20-23 long and 12-16 wide. Excretory pore situated at 80, 110 from apex. Oesophagus 195, 230 long. Vulvar opening situated at 40, 60 from caudal extremity. Ovejector (n = 1) included vestibule 30 long, sphincter 10 long and 15 wide, infundibulum 25 long. Uterus (n = 1) 380 long, containing 5 eggs 50 long and 30 wide. Tail 15 long (n = 2), with narrow extremity (Fig. 5).

Stilestrongylus manni Denké & Murúa, 1977 (Figs 6, 7)

Material studied: one male, one female paratypes MNHN 999 HA, one male, one female voucher MNHN 1002 HA.
Host: *Oligoryzomys longicaudatus* Bennett, 1832 (syn *Oryzomys longicaudatus*) (Cricetidae: Sigmodontinae).
Site: small intestine.
Geographical origin: Chile.
Synlophe: 999 HA: at mid-body, 28 (13 dorsal / 15 ventral) cuticular ridges in male, 27 (13 dorsal / 14 ventral) in female. 1002 HA: at mid-body, 26 (12 dorsal / 14 ventral) in male, 27 (13 dorsal / 14 ventral) in female. Carene absent. No gradient of size of the ridges. Ridges of right ventral quadrant smallest. Ridges of left dorsal quadrant largest. Other ridges of similar size. Double cuticular dilatation on left dorsal and right ventral side. 999 HA: double axis of orientation of ridges in both sexes: in male, right axis inclined at 70° to sagittal axis, left axis at 80°; in female, right axis at 60°, left axis at 77°.
1002 HA: double axis of orientation in male, right axis inclined at 65° to sagittal axis, left axis at 75°; in female, single axis inclined at 75°.

Comments

In the original description only a single axis of orientation is described in the female, inclined at 70° to sagittal axis. In the paratypes here described we observe some variations of the inclination of the axis of orientation within the same individual host. Some variations are also observed in the voucher material and are more



Figs 1-4. – *Hassalstrongylus dessetae* Pinto, 1978, CHIOC n° 31426. 1-3, male, 1, anterior extremity, left lateral view, 2, caudal bursa, right lateral view, 3, transverse section at mid-body. 4, female, posterior extremity, right lateral view.
Fig. 5. – *Stilestrongylus eta* (Travassos, 1937), CHIOC n° 9510. Female, tail, right lateral view.
Figs 6, 7. – *Stilestrongylus manni* Denké & Murúa, 1977, paratypes, MNHN 999 HA. Transverse sections at mid-body, 6, male, at 51.9 % of body length, 7, female at 51.8 % of body length.
Figs 8, 9. – *Stilestrongylus valdivianus* Durette-Desset & Murúa, 1979, paratypes, MNHN 710 CA. Transverse sections at mid-body, 8, male, at 46 % of body length, 9, female, at 52 % of body length.
Abbreviations: r, right side, v, ventral side. All sections orientated as Fig. 3.

pronounced than those existing in the specimens coming from the same individual host. These results are based on only two individual hosts and need to be confirmed by future studies.

Stilestrongylus valdivianus Durette-Desset & Murúa, 1979 (Figs 8, 9)

Material studied: one male and one female paratypes MNHN 710 CA.
Host: *Loxodontomys micropus* (Waterhouse, 1837) (syn *Phyllotis micropus*) (Cricetidae: Sigmodontinae).
Site: small intestine.
Geographic origin: Chile.
Synlophe: at mid-body, 23 cuticular ridges (12 dorsal / 11 ventral) in male, 24 (12 dorsal / 12 ventral) in female. Carene absent. No gradient of size of the ridges. Ridges of right ventral quadrant smallest. Other ridges of unequal size. Double cuticular dilatation on left dorsal and right ventral quadrant.
Double axis of orientation of ridges in male, right axis inclined at 60° to sagittal axis, left axis at 70°; single axis of orientation in female inclined at 60° to sagittal axis (Figs 8, 9).

Comments

In the original illustration of the female, the axis of orientation is double with the right axis inclined at 65° to sagittal axis and the left axis at 73°.

Heligmonoides crassidorsualis Franco, 1967

Material studied: one male CHIOC n° 30020 d, one female CHIOC n° 30020 f.
Host: *Oryzomys megacephalus* (Fischer, 1814) (syn *Oryzomys goeldi* Thomas, 1897) (Cricetidae: Sigmodontinae).
Geographic origin: Estado do Pará, Brazil.
Male: 5.6 mm long and 110 wide. Cephalic vesicle 70 long and 30 wide. Oesophagus 380 long. Spicules 570 long. SpL/BL: 10.2 %.
Female: 5.2 mm long and 100 wide at mid-body. Cephalic vesicle 60 long and 30 wide. Excretory pore situated at 250 from apex. Oesophagus 380 long. Vulva situated at 110 from caudal extremity. Vestibule 85 long, sphincter 40 long and 50 wide. Uterus plus infudibulum 800 long. Tail 50 long, with rounded extremity.

Comments

The total lack of knowledge on the synlophe does not enable us to identify the species at the genus level. The species being monodelphic, it most likely belongs to the superfamily Heligmosomoidea. Among this, three families are present in South America: Viannaidae, Ornithostrongylidae and Heligmonellidae. The species is not a Viannaidae nor an Ornithostrongylidae because members of Viannaidae possess short spicules and are usually parasites of New World marsupials and hystricognath rodents, whereas the Ornithostrongylidae are parasites of birds. The Heligmonellidae are made up of four subfamilies of which three are present in South America: the Heligmonellinae, the Pudicinae and the Nippostrongylinae. The subfamilies are mainly differentiated by the characters of the synlophe. However, they are known to parasitize different host groups. The Neotropical Heligmonellinae (two genera) are found in hystricognath rodents and in lagomorphs, and the Pudicinae (which are only Neotropical) are parasites of hystricognath rodents. Whereas the large sub-family Nippostrongylinae is known to parasitize only muroid rodents, mainly of the families Cricetidae and Muridae. *Heligmonoides crassidorsualis* being a parasite of Sigmodontinae (Cricetidae), we may consider it, at least temporarily as a Nippostrongylinae *incertae sedis*. However, it is unlikely that the species belongs to the genus *Heligmonoides* Baylis, 1928, a genus made up of 12 species from the Old World, all of them parasitic in commensal species of Murinae (genera *Mus, Rattus, Nesokia*) (Durette-Desset *et al.*, 2007). A thirteenth species, *Heligmonoides mirzai* Smales, 2009, was described in *Melomys rufescens* (Alston, 1877) from Papua New Guinea (Smales, 2009). However, this species is also unlikely to belong to *Heligmonoides* because the synlophe lacks a carene, which is characteristic of species of this genus. In addition, the data about the caudal bursa may be incomplete as only the left and the dorsal lobe are illustrated. The species requires re-examination before its generic placement can be determined with confidence. Consequently, we consider *Heligmonoides mirzai* temporarily also a Nippostrongylinae *incertae sedis*.

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