

# **LINSTOWNEMA BREVE N. SP. (NEMATODA: SEURATIDAE) A PARASITE OF ANTECHINUS AGILIS (MARSUPIALIA: DASYURIDAE) FROM AUSTRALIA**

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## **Summary :**

A new echinonematine nematode, *Linstownema breve* sp. n., from the small intestine of the dasyurid marsupial *Antechinus agilis* is described. The species is distinguished from its congeners by the possession of the following suite of characters: small size; first and third row of cephalic hooks similar in size; second row larger; 13-15 rows of body hooks without undulating edges on the dilated cuticle of the oesophageal region; oesophagus terminating at the level of the 5th-7th row of body hooks; ten pairs of caudal papillae; a large pair of lateral ad-cloacal papillae extend into small lateral alae. *Linstownema* larvae previously recorded from *A. agilis* may be the same species. A key to species of the genus *Linstownema* is provided.

**KEY WORDS :** *Linstownema*, *Seuratidae*, nematode, dasyurid, marsupial, Australia.

**Résumé :** *LINSTOWNEMA BREVE* N. SP. (NEMATODA: SEURATIDAE), PARASITE D'*ANTECHINUS AGILIS* EN AUSTRALIE

Description de *Linstownema breve* n. sp. (Echinonematinae) parasite de l'intestin grêle du marsupial *Dasyuridae* *Antechinus agilis* en Australie. L'espèce se distingue de ses congénères par les caractères suivants : petite taille, crochets de la première et troisième rangée de même taille, plus petits que ceux de la deuxième rangée, cuticule de la région œsophagienne légèrement dilatée, portant 13 à 15 files de crochets sans ondulations sur leur racine, fin de l'œsophage au niveau des 5-7<sup>es</sup> rangées de crochets somatiques, dix paires de papilles caudales avec une grande paire latérale ad-cloacale soulevant de petites ailes latérales. La larve de *Linstownema* décrite précédemment chez le même hôte pourrait appartenir à la même espèce. Une clé de détermination des espèces de *Linstownema* est présentée.

**MOTS CLÉS :** *Linstownema*, *Seuratidae*, nématode, dasyures, marsupiaux australiens.

## INTRODUCTION

During investigations into the helminth fauna of dasyurid marsupials in Australia specimens of an echinonematine (Nematoda: Seuratidae) were found in an individual of *Antechinus agilis* Dickman, Parnaby, Crowther & King, 1998 from New South Wales. Having characters typical of the genus *Linstownema* Smales, 1997 (see Smales, 1999) which has been found in dasyurids (Chabaud *et al.*, 1980, Smales 1999), these specimens were sufficiently different to be considered a new species. This species is described below.

## MATERIALS AND METHODS

The specimens were fixed in hot 10 % formalin before storing in 70 % alcohol and clearing in lactophenol prior to examination. All measurements are given, as the range followed by the mean in parentheses, in millimetres, unless otherwise stated. Drawings were made with the aid of an Olympus microscope drawing tube.

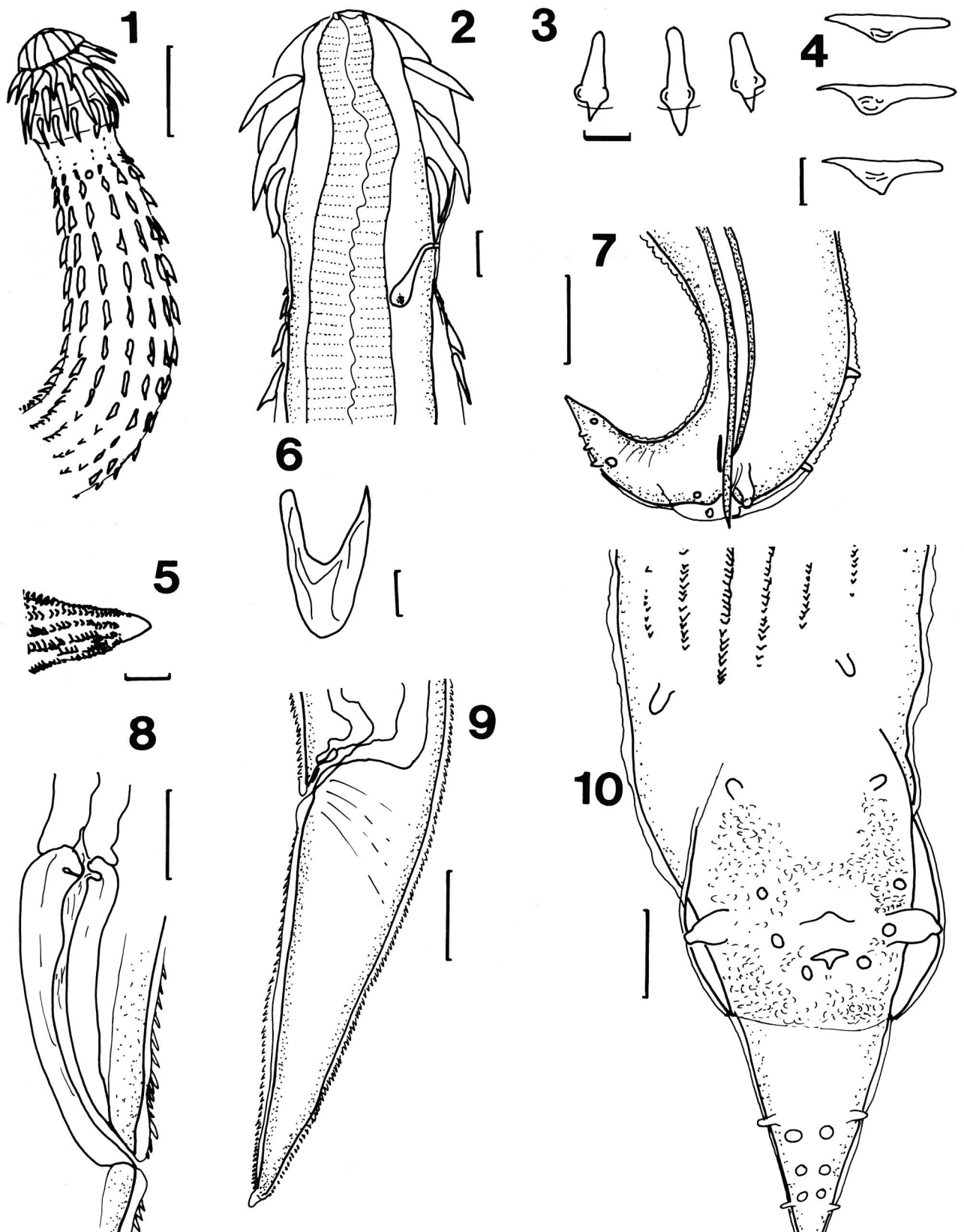
## RESULTS

*LINSTOWNEMA BREVE* SP. N.

(Figs 1-10)

Description: small nematodes, anterior end with cephalic bulb bearing three rows of 14 (male) or 16 (female) files of large hooks, second row longest. Mouth opening triangular in outline, without lips or lip-like structures. Four double submedian papillae, one pair amphids. Neck with 3-6 rows of tiny spines. Oesophageal region with slight cuticular dilation bearing 13-15 rows of 14 (male) or 16 (female) files

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Figs 1-10. – *Linstowinema breve* sp. n. 1. Anterior end of male, dorsal view; Bar = 200  $\mu$ m. 2. Cephalic end of male, optical section dorsal view; Bar = 50  $\mu$ m. 3. Body hooks, dorsal view; Bar = 25  $\mu$ m. 4. Body hooks, lateral view; Bar = 25  $\mu$ m. 5. Tip of female tail, lateral view; Bar = 25  $\mu$ m. 6. Gubernaculum, ventral view; Bar = 12  $\mu$ m. 7. Tail of male, lateral view right side; Bar = 100  $\mu$ m. 8. Vagina, lateral view right side; Bar = 50  $\mu$ m. 9. Tail of female, lateral view left side; Bar = 100  $\mu$ m. 10. Tail of male, cloacal region ventral view; Bar = 50  $\mu$ m.

of body hooks; first and last rows smallest, 4th and 5th rows largest; roots of hooks without undulating edges; remainder of body with up to 30 files of spines over entire body surface (female) or 95 % body surface dorsally, reaching to level of anterior pair of caudal papillae ventrally (male). Oesophagus simple, club-shaped, terminating about level with 5<sup>th</sup> – 7<sup>th</sup> row of hooks, within anterior body dilation;  $\frac{1}{7}$  –  $\frac{1}{9}$  body length. Nerve ring not seen; excretory pore in neck; deirids conical, between 1st and 2nd rows of body hooks.

Male (two specimens): length of body 4.9, 4.2, maximum width 0.290, 0.255. Cephalic bulb 0.255 long by 0.168 wide; cephalic hooks 1st row 0.076, 0.086, 2nd row 0.116, 0.125, 3rd row 0.080, 0.076, long. Oesophagus 0.605 long, cuticular dilation bearing 13-14 rows body hooks. Deirids 0.36, 0.30; excretory pore 0.30 from anterior end. Nerve ring not seen. Spicules equal, similar 0.570, 0.570 long, about  $\frac{1}{8}$  body length. Gubernaculum short, simple, subtriangular in ventral view 0.053, 0.050 long. Ten pairs caudal papillae, three pairs ventral and immediately pre-, ad- and post-cloacal respectively, one large pair lateral ad-cloacal, two pairs lateral pre-cloacal; four pairs papillae, pair phasmids well posterior to cloaca near tail tip. Cloacal region with small cuticular bosses; each large lateral ad-cloacal papilla extending onto small cuticula alae. Tail 0.070, 0.060 long.

Female (measurements of six specimens): length of body 4.7-5.6 (5.2), maximum width 0.31 – 0.36 (0.33). Cephalic bulb 0.135 long by 0.235 wide ( $n = 1$ ); cephalic hooks 1st row 0.076 – 0.092 (0.084), 2nd row 0.132, 3<sup>rd</sup> row 0.076-0.092 (0.081) ( $n = 4$ ) long. Oesophagus 0.61 ( $n = 1$ ) long, cuticular dilation bearing 14-15 rows body hooks. Deirids 0.19-0.32; excretory pore 0.26 ( $n = 1$ ) from anterior end; nerve ring not seen. Vulva 2.4 – 2.7 from anterior end. Vagina 0.20 ( $n = 1$ ) long. Tail 0.42 – 0.48 (0.46) long. Eggs not seen.

Type host: *Antechinus agilis* Dickman, Parnaby, Crowther & King, 1998 (Dasyuridae: Marsupialia).

Site of infection: small intestine.

Type locality: Mongarlowe River (35° 22' S, 149° 58' E) New South Wales, Australia.

Deposition of types: holotype (♂), allotype (♀). Australian Helminthological Collection, South Australian Museum, Adelaide (Cat. Nos. AHC 31332, 31333); paratypes Wildlife Collection, CSIRO Wildlife & Ecology, Canberra, ACT (Cat. No. N4566).

Etymology: the specific name relates to the small size of the species.

## DISCUSSION

Although only a small number of specimens from a single host, some in poor condition with damaged anterior ends, were examined, significant differences between them and other species of

*Linstowinema* could be found. *L. breve* is the smallest species within the genus described to date. It is also the only species that has the first and third rows of cephalic hooks of similar size. In all other species both the first and second rows of cephalic hooks are markedly larger than the third row (Smales, 1997, 1999). *L. breve* most closely resembles *L. gracile*, both species being from dasyurids hosts, in having 13-15 rows of body hooks without undulating edges and males having a large pair of lateral ad-cloacal papillae. In addition to the features described above, *L. breve* also differs from *L. gracile* in having a shorter oesophagus terminating at the level of the 5th-7th row of hooks rather than a longer oesophagus terminating at the level of the most posterior row of body hooks. The large pair of lateral ad-cloacal extend into the lateral alae in *L. breve* but not *L. gracile* and *L. breve* has four pairs of ventral post cloacal papillae, *L. gracile* three (Smales, 1999).

Of the other *Linstowinema* spp. occurring in dasyurids, *L. edmondsi* further differs from *L. breve* in having 17-20 rows of body hooks, the oesophagus terminating level with the 11th-13th row and *L. rosamondae* has 18-19 rows of body hooks, the oesophagus terminating at the level of the 10th row of body hooks (Smales, 1999).

Seven species of *Linstowinema* are found in bandicoots (Peramelidae: Marsupialia) of which *L. tasmaniense* with 12-15 rows of body hooks without undulating edges and a relatively short oesophagus is the most similar to *L. breve*. *L. breve* can be distinguished from *L. tasmaniense* in having the oesophagus terminate at the level of the 5th-7th row of body hooks not the 8th-10th, four pairs of post cloacal papillae, not three, and only one large pair of ventral papillae, not three. The spicules of *L. breve* are 0.57 mm and those of *L. tasmaniense* 0.89 mm long. The vagina of *L. breve* is 0.20 mm long with the vulva opening in the mid body region while *L. tasmaniense* has a vagina 0.175 mm long and vulva opening about  $\frac{1}{3}$  from anterior end (Smales, 1997).

The only record of *Linstowinema* occurring in *A. agilis* is of larval stages (Smales, 1999). Since there were no adult forms present in the same hosts these larvae could not be identified to species level. It seems likely, however, that they could have been *L. breve*.

## KEY TO SPECIES OF THE GENUS *LINSTOWINEMA* SMALES, 1997 (MODIFIED FROM SMALES, 1997)

1. Parasites of dasyurid marsupials ..... 2
  - Parasites of peramelid marsupials ..... 5
2. 1st row of cephalic hooks longer than 2nd row.
  - Oesophagus terminates at level of 11th-13th row of 17-20 rows of body hooks ..... *L. edmondsi*
  - 2nd row of cephalic hooks longer than 1st row. 3

3. 1st and 3rd rows of cephalic hooks of similar length. Oesophagus terminates at level of 5th-7th row of 13-15 rows of body hooks. With cuticular dilation of oesophageal region. Male with small lateral alae..... *L. breve*  
 - 1st row of cephalic hooks longer than 3rd row. Without cuticular dilation of oesophageal region. Male without lateral alae..... 4
4. Oesophagus terminates at level of 12th-13th row of 15 rows of body hooks. Neck with 16 rows tiny spines..... *L. gracile*  
 - Oesophagus terminates at level of 10th row of 18-19 rows of body hooks. Neck with five rows tiny spines..... *L. rosamundae*
5. Body hooks without undulating edges..... 6  
 - Body hooks with undulating edges..... 9
6. Oesophagus terminates posterior to hooks on cuticular dilation of oesophageal region. Male with four pairs of papillae, one pair of phasmids on tail tip..... 7  
 - Oesophagus terminates at or anterior to posterior row of body hooks on cuticular dilation of oesophageal region. Male with three pairs of papillae, one pair of phasmids on tail tip..... 8
7. Male with 8-10, female with 10-12 body hooks. Male with six pairs cloacal papillae all same size; body spines extend along 90 % of dorsal surface terminate at level of most anterior pair of lateral pre-cloacal papillae on ventral surface ... *L. latens*  
 - Male with 11-13, female with 12-13 body hooks. Male with six pairs of cloacal papillae, one pair lateral ad-cloacal papillae larger than other five pairs; body spines extended along 75 % of dorsal surface terminate markedly anterior to cloacal papillae on ventral surface. .... *L. maplestonei*
8. Male with ala-like expansions of body surrounding cloaca; with six pairs of cloacal papillae, three pairs of lateral cloacal papillae larger than three pairs of ventral cloacal papillae, spicule length about  $\frac{1}{9}$  of body length. Female with tail longer than 700  $\mu\text{m}$  ..... *L. tasmaniense*  
 - Male without ala-like expansions of body, with seven pairs cloacal papillae all same size, spicule length about  $\frac{1}{16}$  of body length. Female with tail shorter than 500  $\mu\text{m}$  ..... *L. peramelis*
9. Male with 13-16, female with 14-18 rows of body hooks. Male with ala-like expansions of body surrounding cloaca; body spines terminate at level of most anterior pair of lateral pre-cloacal papillae on ventral surface ..... *L. cinctum*  
 - Male with 9-12, female with 11-14 rows of body hooks. Male without ala-like expansions of body surrounding cloaca; body spines terminate markedly anterior to cloacal papillae on ventral surface ..... 10
10. Male with oesophagus shorter than 1,570  $\mu\text{m}$ , female with oesophagus shorter than 1,850  $\mu\text{m}$ . Male with six pairs of cloacal papillae, pair of lateral ad-cloacal papillae larger than other five pairs, three pairs of papillae, one pair of phasmids on tail tip; spicule length about  $\frac{1}{15}$  of body length. Female with tail shorter than 940  $\mu\text{m}$  ... *L. inglisi*  
 - Male with oesophagus longer than 1,570  $\mu\text{m}$ , female with oesophagus longer than 1,860  $\mu\text{m}$ . Male with six pairs of cloacal papillae all same size, four pairs of papillae, one pair of phasmids on tail tip; spicule length about  $\frac{1}{20}$  of body length. Female with tail longer than 980  $\mu\text{m}$  ..... *L. warringtoni*

## ACKNOWLEDGEMENTS

I would like to thank Dr. David Spratt for providing access to the material.

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Reçu le 15 juin 1999  
 Accepté le 25 août 1999