

# GRAPHIDIOIDES SUBTERRANEUS N. SP. (NEMATODA: TRICHOSTRONGYLOIDEA) FROM THE SOUTH AMERICAN SUBTERRANEAN RODENT CTENOMYS TALARUM THOMAS, 1898 (RODENTIA: OCTODONTIDAE)

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## Summary:

A new nematode species, *Graphidioides subterraneus* n. sp., found in the stomach of *C. talarum* from Argentina is described. The new species more closely resembles *G. mazzai* Lent & Freitas, 1935, parasite of *Galea leucoblephara* from Argentina, and *G. kravetzi* Sutton & Durette-Desset, 1995, parasite of *Holochilus brasiliensis* from Uruguay. It can be distinguished by shorter spicules, by the shape of the gubernaculum, by shorter uterine branches, and by a different number of ridges of the synlophe all along the body.

**KEY WORDS :** Nematoda, Trichostrongylidae, *Graphidioides subterraneus* n. sp., neotropical rodents, *Ctenomys talarum*, Argentina.

**Résumé :** *GRAPHIDIOIDES SUBTERRANEUS* N. SP. (NEMATODA: TRICHOSTRONGYLOIDEA) DU RONGEUR SOUTERRAIN D'AMÉRIQUE DU SUD *CTENOMYS TALARUM* THOMAS, 1898 (RODENTIA: OCTODONTIDAE)

*Description de Graphidioides subterraneus n. sp., parasite de l'estomac de C. talarum en Argentine. L'espèce est proche de G. mazzai Lent et Freitas, 1935 parasite de Galea leucoblephara en Argentine, et de G. kravetzi Sutton et Durette-Desset, 1995 parasite de Holochilus brasiliensis en Uruguay. Elle s'en distingue par des spicules plus courts, par la forme du gubernaculum, par des branches utérines plus courtes, et par un nombre différent de crêtes cuticulaires tout le long du corp.*

**MOTS CLÉS :** Nematoda, Trichostrongylidae, *Graphidioides subterraneus* n. sp., rongeur neotropical, *Ctenomys talarum*, Argentine.

## INTRODUCTION

The genus *Graphidioides* Cameron, 1923 (Trichostrongylidae), is at present composed by seven species. Five of them are parasitizing the stomach and small intestine of caviomorph rodents (Caviidae, Chinchillidae, Octodontidae, and Myocastoridae), whereas the other two species are parasites of sigmodontin rodents and primates (Sutton & Durette-Desset, 1995).

The geographical distribution of this genus is restricted to the Southern Neotropical region (Argentina, Uruguay, Brazil, Chile, and Perú) as was reported by Sutton & Durette-Desset, 1995 and Dittmar, 2002.

During a parasitological survey carried out on samples of the subterranean rodent *Ctenomys talarum* Thomas 1898 (Rodentia: Octodontidae), 81 host were captured at Mar de Cobo (Buenos Aires Province, Argentina, 37° 58' S, 57° 34' W), parasitic nematodes belonging to the genus *Graphidioides* were found in the stomach.

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These parasites are herein described and a new species is proposed.

## MATERIALS AND METHODS

Hosts were dissected, and a total of 408 nematodes were collected from the stomach. Living nematodes were fixed in 4 % formaldehyde solution, and preserved in 70° ethanol.

Twenty two specimens (11 males and 11 females) were observed as temporary wet mounts in water and then cleared in lactophenol. They were studied and measured under a light microscope. Transversal sections of eight additional nematodes (four males and four females) were made, and studied in lactophenol. In order to account for the variability in number of eggs per female, eggs were counted in additional samples of 30 gravid females. Drawings were made using a drawing tube. For scanning electron microscopy (SEM), specimens were dehydrated using a series of ethanol washes, dried by evaporation with hexamethyldisilazane, coated with gold palladium and scanned in a Jeol JSM 6460-LV SEM. All measurements are given in millimeters, unless otherwise indicated.

Caudal bursa nomenclature follows Durette-Desset & Chabaud (1981), and that of synlophe follows Durette-Desset (1985). Prevalence and mean intensity were calculated according Bush *et al.* (1997). Sex ratio was cal-

culated on parasites from ten hosts. The studied material was deposited at the Helminthological Collection of the Museo de La Plata (CHMLP), La Plata, Argentina and the Muséum National d'Histoire Naturelle de Paris (MNHN).

## RESULTS

### *GRAPHIDIOIDES SUBTERRANEUS* N. SP.

#### Description

General (Figs 1-2, 18-19).

Medium sized nematodes. Head without cephalic vesicle, with subtriangular buccal ring. Four externo-labial papillae, two amphids and four cephalic papillae, situated at same level as externo-lateral labial papillae (Figs 2, 18). Nerve ring surrounding corpus at about its mid-length, fairly difficult to observe in most specimens. Spiniform deirids situated at short distance posterior to excretory pore (Figs 1, 19).

Synlophe (Based on four males and four females) (Figs 3-10, 20-25).

In both sexes, cuticular surface bears longitudinal ridges, some interrupted and other confluent, with reinforcing struts in anterior part of body, decreasing from head to tail. Ridges vanishing between vulva and anus in females, and in the anterior region to caudal bursa in males. Lateral fields are difficult to observe in transversal section at mid-body region.

Number of ridges variable along body: no ridges observed at 80 µm posterior to head (Fig. 3); 20-21 and 26-32 (males and females, respectively) at oesophago-intestinal junction (Figs 4, 20, 21); 21-25 and 26 (males and females, respectively) at end of anterior quarter of body (Figs 5, 9, 22, 23); 22-25 and 25-26 (males and females, respectively) at mid-body (Figs 6, 10, 24), 22-23 at 1 mm anterior to caudal bursa, and 24-26 at 1 mm anterior to level of anterior vestibule (Fig. 7).

In males, number of ridges at 1 mm anterior to caudal bursa remains constant until they disappear ventrally at 0.52 (0.37-0.66) from genital cone, and dorsally at 0.55 (0.47-0.63) from the end of caudal bursa. In females, ventral ridges disappear at level of anterior vestibule and reappear posterior to vulva. There are 21-22 ridges between vulva and anus (Fig. 8). Ridges absent on the tail. In transverse section, number and size of dorsal and ventral ridges are similar. In both sexes, size and thickness of ridges decrease along body, from oesophagus-intestinal junction to tail. Lateral ridges are more spaced than ventral and dorsal ones at level of the anterior quarter of body. All ridges oriented perpendicularly to body surface.

Male (Measurements of holotype are followed by means and by ranges in parentheses) (Figs 11-15).

Body 8.46, 10.41 (8.46-11.47) long and at mid-body 0.14, 0.14 (0.12-0.16) wide. Nerve ring, excretory pore, and deirids situated respectively at 0.20, 0.21 (0.17-0.24), 0.31, 0.37 (0.30-0.43) and 0.34, 0.38 (0.33-0.43), from apex. Oesophagus 0.52, 0.55 (0.52-0.59) long (Fig. 1). Caudal bursa symmetrical and transversally elongated with slight ornamentations between rays 3 and 6. Ray 2 shorter than ray 3. Extremities of ray 2 separated 0.08 (0.06-0.12) from extremities of ray 3. Distance between extremities of rays 3 and 4, 0.08 (0.06-0.11), of rays 4 and 5, 0.04 (0.02-0.05) and rays 5 and 6, 0.86 (0.64-0.95). Ray 4 shorter than 5. Ray 8 arising at base of dorsal ray and parallel to ray 6 (Fig. 15). Dorsal ray divided into two branches in distal third. Each branch divided into three small branches (9, 10, and phasmids) (Fig. 14).

Spicules alate, with simple point, similar in shape and size. Right spicule 0.91, 0.86 (0.64-0.95); left spicule 0.86, 0.87 (0.80-0.93), representing 8.35 (7.41-10.16) % of body length (Fig. 11). Gubernaculum slightly chitinised 0.061, 0.07 (0.04-0.08) long and 0.03, 0.03 (0.02-0.04) wide (Fig. 12). Genital cone with single papilla 0 on ventral lip, and papillae 7 on dorsal lip (Fig. 13). Prebursal papillae at 0.06, 0.06 (0.05-0.07) from caudal bursa.

Female (Measurements of allotype are followed by means and by ranges in parentheses) (Figs 16-17).

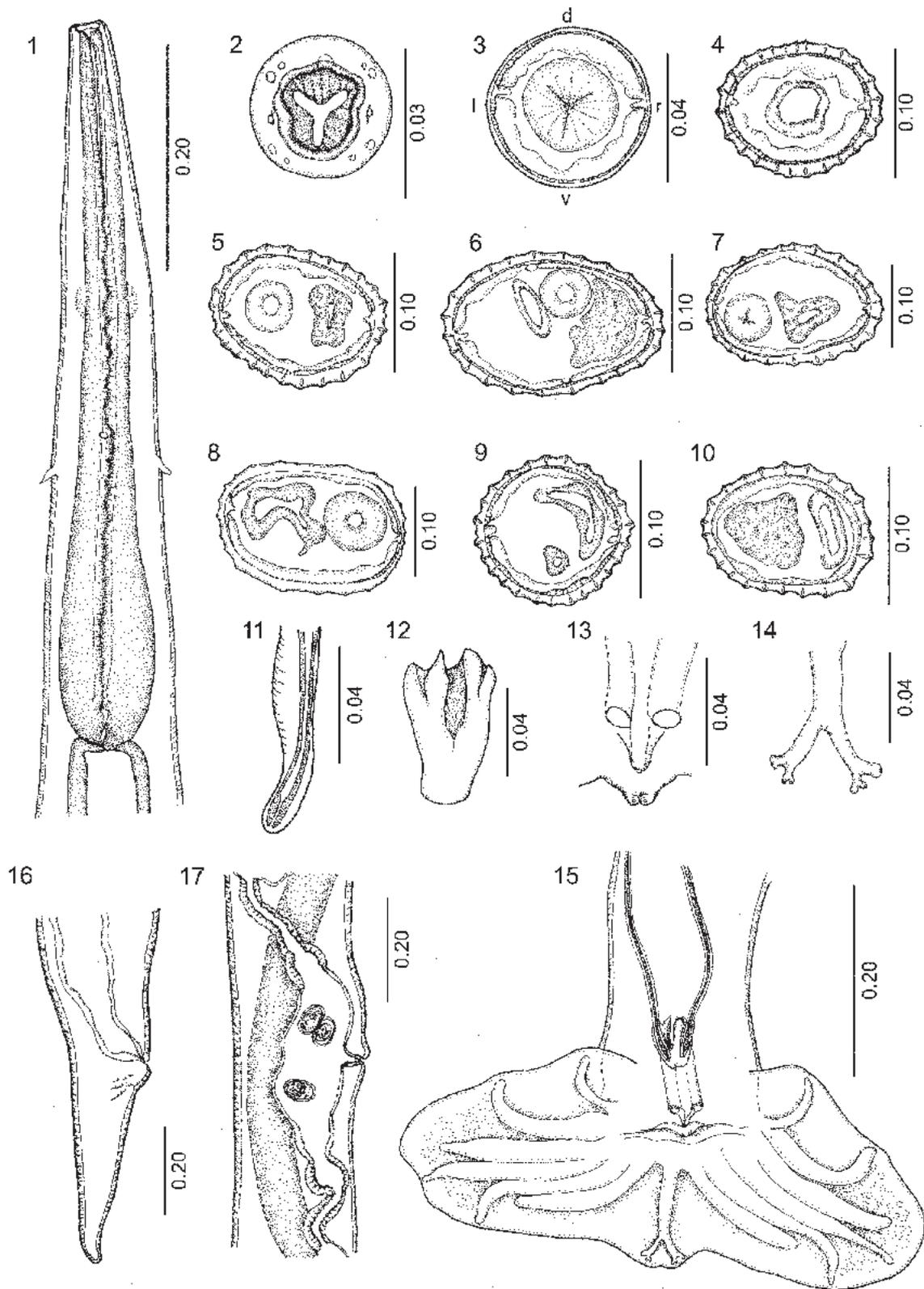
Body 20.98, 20.65 (19.25-28.40) long and at mid-body 0.22, 0.21 (0.21-0.25) wide. Nerve ring, excretory pore, and deirids situated, respectively, at 0.22, 0.23 (0.22-0.33); 0.41, 0.42 (0.40-0.52) and 0.42, 0.44 (0.41-0.53), from apex. Oesophagus 0.60, 0.65 (0.60-0.69) long (Fig. 1). Didelphic. Vulva at 4.96, 5.31 (4.62-5.75) from caudal extremity. *Vagina vera* 0.05, 0.06 (0.04-0.09) long. Vestibule 0.33, 0.33 (0.23-0.40) long. Sphincters 0.06, 0.07 (0.06-0.08) long and 0.07, 0.07 (0.07-0.09) wide. Anterior and posterior infundibula similar in size, 0.25, 0.22 (0.13-0.29) long (Fig. 17). Anterior uterine branch 2.92, 2.63 (2.60-3.36) long containing 50 (44-58) eggs, and posterior uterine branch 3.78, 3.31 (2.40-3.96) long, containing 44 (35-62) eggs. The total number of eggs registered from 30 additional females varied between 34 and 202. Eggs, with developed larvae inside, 0.12, 0.12 (0.11-0.14) long, 0.07, 0.07 (0.07-0.08) wide. Tail conical with rounded tip, 0.24, 0.25 (0.20-0.32) long (Fig. 16).

Prevalence: 24.7 %.

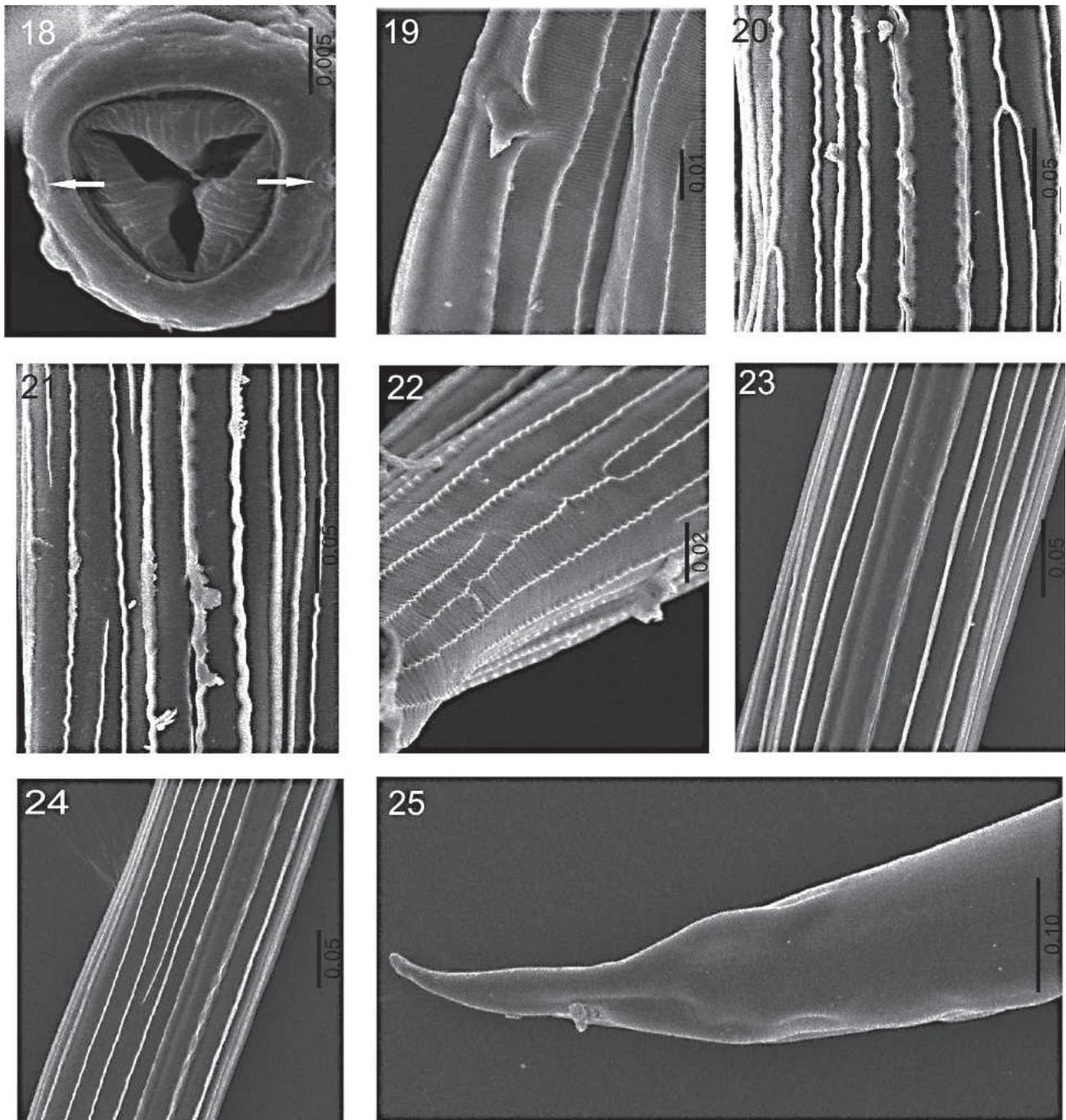
Mean intensity: 20.4 ± 21.5 (1-155).

Sex ratio: 34 males and 71 females from 10 hosts (rate 1: 2.1).

Type specimens: holotype: one male (CHMLP coll. no. 5423); allotype: one female (CHMLP coll. no. 5424);



Figs 1-17. – *Graphidioides subterraneus* n. sp. 1. Female, anterior extremity (ventral view). 2. Female head (apical view). 3-8. Female synlophes: 3, at 80  $\mu$  posterior to head; 4, at the level of oesophago-intestinal junction; 5, at end of anterior quarter of body; 6, at mid-body; 7, at 1 mm anterior to level of anterior vestibule; 8, between vulva and anus. 9-10. Male synlophes: 9, at end of anterior quarter of body; 10, at mid-body. 11. Right spicule tip (dorsal view). 12. Gubernaculum (ventral view). 13. Genital cone (ventral view). 14. Dorsal ray with detail of phasmid and papillae 9 and 10. 15. Caudal bursa (ventral view). 16. Female tail (right lateral view). 17. Ovejector (right lateral view). All the sections of the body are orientated as in 3. Abbreviations: d, dorsal; v, ventral; r, right; l, left.



Figs 18-25. – 18. Head (apical view) showing subtriangular buccal ring and amphids (arrows). 19. Deirid. 20-24. Synlophe showing interrupted and confluent ridges: 20-21, behind oesophago-intestinal junction; 22-23, at level of anterior quarter of body; 24, at level of mid-body. 25. Female tail devoid of ridges.

paratypes: five males and five females (CHMLP coll. no. 5425), five males (MNHN coll. no. 350 MQa) and five females (MNHN coll. no. 350 MQb).

Host: *Ctenomys talarum* Thomas, 1898

Site: stomach.

Locality: Mar de Cobo, Partido de Mar Chiquita, Mar del Plata, Argentina (37° 58' S, 57° 34' W).

Etymology: the specific name refers to the ecological behaviour of the host species.

## DISCUSSION

Following the key for species of *Graphidioides* proposed by Sutton & Durette-Desset (1995), the new species closely resembles both *G. mazzai* Lent & Freitas, 1935 from *Galea leucoblephara* Thomas from Argentina, and *G. kravetzi* Sutton & Durette-Desset, 1995 from *Holochilus brasiliensis* Desmarest from Uruguay. In that sense, males show a similar morphology of the caudal bursa, and the distances between the extremities of rays 2 and 3, and of rays 3 and 4 are the same. Furthermore, distance between the extremities of rays 4 and 5 is shorter than that of rays 5 and 6. Also, females show the same symmetry of the ovejector.

However, the new species differs from *G. mazzai* in having shorter spicules and a smaller and less chitinized gubernaculum, whereas it differs from *G. kravetzi* in having a smaller number of externo-labial papillae, shorter uterine branches, and deirids situated more posteriorly. Moreover, and in spite that in the new species the synlophe shows a high intraspecific variability in number of ridges (as a result of interrupting and or confluent ridges), differences with *G. kravetzi* and *G. mazzai* are evident. For instance, *G. mazzai* shows 16 ridges at 80 µ posterior to head, 18 at oesophago-intestinal junction, 14 at mid-body, and 19 between vulva and anus (Sutton & Durette-Desset, 1995). On the other hand, *G. kravetzi* shows 18 ridges at 80 µ posterior to head, 24 and 26 at oesophago-intestinal junction in males and in females, respectively, 21 and 26 at mid-body in males and females, respectively, and 25 ridges at tail. Whereas *G. subterraneus* shows no ridges at 80 µ posterior to head, 20-21 and 26-32 at oesophago-intestinal junction in males and in females, respectively, 22-25 and 25-26 at mid-body in males and females, respectively, and shows no ridges at tail.

The synlophe of *G. subterraneus* differs in fact more evidently with that of *G. mazzai* than with that of *G. kravetzi*. Thus, the number of ridges of the female synlophe in both *G. kravetzi* and *G. subterraneus* may overlap in some points, although they are clearly different in other points like the anterior end in both

sexes, at both oesophago-intestinal junction and mid-body in males, and at tail in females.

Therefore, a new species, *Graphidioides subterraneus* n. sp., is proposed.

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