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Xiphidorini (Nematoda: Longidoridae) from Uruguay

by A. COOMANS, E. CHAVES & L. DE LEÓN

Abstract

Soil samples from a nature reserve for indigenous animals in Uruguay yielded one new and two known *Xiphidorus* species and one new *Paraxiphidorus* species. The new *Xiphidorus* is described as *X. uruguayensis* n.sp. It can be distinguished from other *Xiphidorus* species by its large body size, cylindrical anterior end offset from the remainder of the body by a sudden expansion of the latter and by its barrel- to heart-shaped amphid with small slit-like aperture. The other species found were *X. balcarceanus* CHAVES & COOMANS, 1984 and *X. minor* RASHID, COOMANS & SHARMA, 1986. The new *Paraxiphidorus* species, *P. heynsi* n.sp., is larger and more stout than the other species of the genus *P. michelluci* COOMANS & CHAVES, 1995 and has a relatively shorter tail, longer odontostyle, longer spicules and more supplements. The female is described for the first time in the genus and the genus diagnosis is emended accordingly.
Key words: Xiphidorini, *Paraxiphidorus, Xiphidorus*, Longidoridae, Uruguay.

Résumé

Xiphidorini (Nematoda: Longidoridae) d'Uruguay

Des échantillons de sol provenants d'une réserve naturelle pour animaux indigènes en Uruguay contenaient une nouvelle espèce et deux espèces connues de *Xiphidorus* et une nouvelle espèce de *Paraxiphidorus*. La nouvelle espèce de *Xiphidorus* est décrite comme *X. uruguayensis* n.sp. Elle peut être différenciée des autres espèces du genre par sa taille, partie antérieure cylindrique et séparée du reste du corps par une dilatation soudaine du dernier et par une amphide à forme de tonneau ou de coeur avec une petite fente comme ouverture. Les autres espèces trouvées étaient *X. balcarceanus* CHAVES & COOMANS, 1984 et *X. minor* RASHID, COOMANS & SHARMA, 1986.
La nouvelle espèce de *Paraxiphidorus, P. heynsi* n.sp. est plus large et plus robuste que l'autre espèce du genre *P. michelluci* COOMANS & CHAVES, 1995 et possède une queue relativement plus courte, un odontostyle plus longue, des spicules plus longues et un plus grand nombre de suppléments. La femelle est décrite pour la première fois dans ce genre et la diagnose générique est émendée conformément.
Mots-clés: Xiphidorini, *Paraxiphidorus, Xiphidorus*, Longidoridae, Uruguay.

Material and methods

During a field trip in December 1994 a female and a juvenile of a new *Paraxiphidorus* species were recovered from soil samples collected in a faunal reserve in Uruguay. As this represented the first female of the genus to be identified, further samples were collected by the second author in November 1995 and two males, five females and seven juveniles were recovered. Also, a new and two known species of *Xiphidorus* were found. The four species are described here.
The nematodes were present in samples collected in the "Reserva de fauna autóctona del Uruguay", at the East side of the Cerro Pan de Azúcar, near Piriápolis, Departamento de Maldonado, Uruguay. The presence of three species, belonging to two genera in a single soil sample is interesting. It may indicate that Xiphidorini are less rare than previously thought, and that more sampling in natural habitats may reveal their more common presence.
The specimens were extracted from the soil by centrifugation-flotation, fixed with 4% formaldehyde and propionic acid and mounted in pure dehydrated glycerine using a modified SEINHORST's (1959) method.

Xiphidorus uruguayensis sp.n.
(Figs 1 & 5 A, B)

MEASUREMENTS : Table 1.

DESCRIPTION

Females (n = 3)
Body spiral after relaxation, very long and slender, tapering towards both ends. Cuticle 3-4 μm thick at mid-body, thicker near anterior end and 12-13 μm thick at tail tip; with three main layers; with fine transverse striations at the surface and inner radial striations which are clearest in the tail region. Lateral chord 20.6 (18-23.5)μm wide at mid-body, i.e. 27 (22-31)% of the corresponding body width. Body pores clearly visible: in the neck region there are 5-7 dorsal pores (confined to the stylet region), 9-13 ventral pores (last one anterior to pharyngeal bulb), 15-17 lateral pores on the left side and 16-17 pores on the right side of the body.

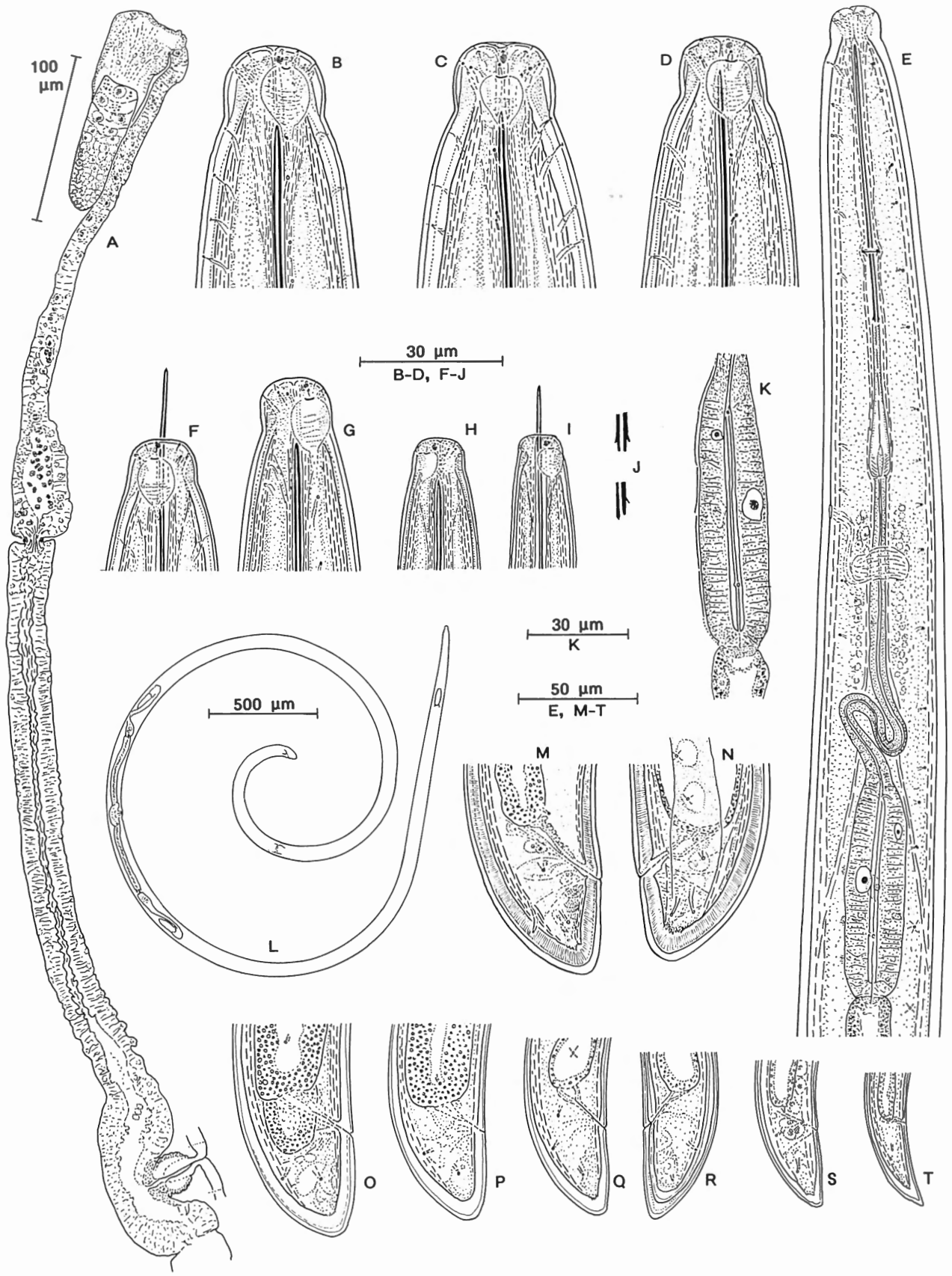

Fig. 1. – *Xiphidorus uruguayensis* n.sp. A: Anterior branch of female reproductive system. B-C: Anterior end females. D: Anterior end J_4. E: Neck region of female. F-G: Anterior end J_3. H: Anterior end J_2. I: Anterior end J_1. J: Odontostyle base in females. K: Pharyngeal bulb of female. L: Female, entire. M-N: Female tails. O: Tail of J_4. P-Q: Tails of J_3. R: Tail of moulting juvenile ($J_2 \rightarrow\rightarrow J_3$). S: Tail of J_2. T: Tail of J_1. Figs A, E, L & N from holotype.

Table 1: Morphometrics (mean, minimum and maximum) of type specimens of *Xiphidorus uruguayensis* n.sp.

	Females		Juveniles				
	Holotype	Paratypes (n=2)	J_4	J_3 (n=3)	$J_2 \rightarrow J_3^4$	J_2	J_1
L	7.48	6.76, 8.03	5.33	3.58 (3.27-3.80)	2.50	2.09	1.43
a	92.3	89.4, 110.0	88.8	79.8 (77.6-82)	67.6	65.4	57
b	17.9	17.1, 21.3	17.4	11.3, 13.2[3]	9.05	7.6	6.9
c	199	167, 201	124	95.4 (87-107)	71.4	61.6	40.9
c'	0.78	0.85, 0.73	0.96	1.08 (0.97-1.17)	(1.34) 1.37	1.40	2.20
V	45.7	47.0, 45.8	–	–	–	–	–
lip region width	21.5	21, 21.5	16.5	14.0 (13.5-14.5)	(12.5) 13.5	10.5	9
dem.w.[1]	21	21, 21	17.5	14.7 (14.5-15)	–	11	9.5
dem.w.-AE[2]	15	15, 13.5	13	10.0 (9-10.5)	–	6.5	5.5
odontostyle	117	117, 117	102	83.5 (80.5-87)	(67.5) 87	65	52
odontophore	64	57, 51	54	43.3 (38.5-47)	–	38.5	30
flanges (w)	8	6.5, 7.5	7.5	6.8 (6.5-7)	5	5.5	3.5
guide ring-AE	102	103, 102	89	71.8 (71-73)	75	55.5	35[5]
repl.od.st.	–	–	120	96.7 (93.5-101)	105	79	66
neck length	417	396, 377	306	285, 289[3]	276	276	206
pharynx:							
slender part	199	147, 161	170	144.5 (128-154)	102	104	93
bulb - length	90	80, 94.5	68	59, 63[3]	62	57	45
- width	25	21.5, 18		19[3]	17	13	12
Body width							
- at cardia	60	50, 54	48	38 (36-39)	(35) 31	29.5	21.5
- mid-body	81	75.5, 73	60	45 (41-49)	(37) 33	31.5	25
- at anus	48	47.5, 54	45	24.8 (32-36.5)	(29.5) 25.5	23	16
G_1 (μm)	706	625, 749	–	–	–	–	–
- %	9.4	9.2, 9.3	–	–	–	–	–
- ovarium	120	229, 368	–	–	–	–	–
- oviduct	307	240, 339	–	–	–	–	–
- uterus	393	333, 346	–	–	–	–	–
G_2 (μm)	702	609.5, 1006	–	–	–	–	–
- %	9.4	9.0, 12.5	–	–	–	–	–
- ovarium	120	273, 376	–	–	–	–	–
- oviduct	303	248, 403	–	–	–	–	–
- uterus	415	304, 525	–	–	–	–	–
Gen. prim.	–	–	76.5	28, 44[3]	23.5	29.5	16
Prerectum	799	478,?	?	?	130	121	131
in a.b.w.	16.6	10.1,?	?	?	5.1	5.3	8.2
Rectum	30	37.5, 34.5	31	21.8 (15-28)	17	17	10
in a.b.w.	0.62	0.79, 0.93	0.69	0.64 (0.42-0.87)	0.67	0.76	0.62
Tail	37.5	40.5, 40	43	37.7 (35.5-40)	(39.5) 35	32	35

[1] dem.w. = width at demarcation of head end.
[2] AE = anterior end.
[3] n = 2
[4] The moulting juvenile was in the late stage of the moulting process with the new replacement odontostyle complete but not yet fully retracted. When two valves are given the one within parenthesis refers to the old cuticle and odontostyle.
[5] With protuded stylet.

Head end cylindrical with rounded, more or less dome-shaped apical part; offset from the remainder of the body by a sudden expansion of the latter at 14.5 (13.5-15) μm from the anterior end. The narrower head end comprises a completely amalgamated lip region with the usual 6 + 10 sensilla and the region of the amphidial foveae. Under SEM the sensilla appear as minute pores at the surface of the lip region. The four cephalic sensilla are slightly posterior to the outer labial sensilla. Two lateral refringent structures as described for other *Xiphidorus* species in Decraemer *et al.* (1996) present between the cheilostoma wall and the inner labial sensilla. The amphid has a small but clear, curved 2.0 (1.5-2.5) μm wide slit-like aperture at 5.8 (5.5-6.5) μm from the anterior end[1]. The amphidial fovea is heart- to barrel-shaped, 10.0 (9.5-10.5) μm wide, i.e. 47.7 (46.5-49)% of the corresponding head width. Nerve ring surrounding slender part of pharynx at 231.7 (229-236) μm from anterior end. Hemizonid 213.7 (207-225) μm from anterior end.

Odontostyle narrow, with weakly forked base because the collar does not extend to the dorsal side. Odontophore with poorly developed 6.5-8 μm wide flanges. Whereas the odontostyle length of the three females was the same, the odontophore length varied considerably hence stylet length ranges from 168 to 181 μm. Guiding ring position was nearly the same in the three females each of which had the stylet in the retracted position. Slender part of pharynx rather variable in length, with posterior loop before joining the basal bulb; in one female a small (1.5 μm) vestigium was present in the wall 260 μm from the anterior end. Pharyngeal bulb with a small dorsal gland nucleus and two large ventrosublateral ones; positions of nuclei and outlets as % of bulb length (n = 2):

DO:	10.0-11.8	LSN:	47.0-49.3
DN:	21.0-24.7	RSN:	47.3-50.5
DO-DN:	9.2-14.7	SO:	71.8-77.0

Pharyngeal retractors very long and slender, attached to the body wall in the region of the pharyngeal bulb. Cardia small, flattened. Intestine very opaque due to the presence of dark granules in two of the females. Rectum less than an anal body width long. Tail dorsally convex-conoid with bluntly rounded tip, without blind canal. Two caudal pores and one adanal pore at each side.

Female reproductive system didelphic, amphidelphic. Ovaries varying in length from 120 to 376 μm depending on stage of maturation. Different parts of gonoduct also quite variable. Slender part of oviduct with 1-4 encapsulated spermatozoa in some cells; *pars dilatata oviductus* functioning as spermatheca. Uterus without *pars dilatata*, largest part of the lumen with highly folded wall, appearing refractive under the light microscope. Proximal part of both uteri forming together a 96-100 μm long ovejector. Vagina extending inward halfway the body. Vulva a transverse slit. A small cuticular pore present just in front of and just behind the vulva.

Male: not found. The presence of sperm in the genital tract of the three females indicates that the species reproduces by amphimixis and that the probability of finding males appears similar to that of finding females.

Juveniles:

Seven juveniles were found: 1 J_1, 1 J_2, 1 moulting J_2 → J_3, 3 J_3 and 1 J_4.

MEASUREMENTS: Table 1.

The demarcation of the head end is almost non-existent in J_1, weak in J_2, more or less pronounced in J_3 and pronounced in J_4. The amphid aperture could only be measured with certainty in the J_4 (2.5 μm) and two of the J_3 (1.5 and 2 μm), its distance to the anterior end 5 μm in the J_4 and 4-6 μm in the J_3 (mean of both sides). Stylet length increases from around 80 μm (J_1) to about 100 μm (J_2), 120-130 μm (J_3) and 150-160 μm (J_4). The hemizonid occurs at 110 μm (J_1), 135 μm (J_2), 155-170 μm (J_3) and 185 μm (J_4) from the anterior end. Cuticle at mid-body 2.5 μm (J_4), 1.5-2 μm (J_3), 1.5 μm (J_2), 1 μm (J_1) and 8.5 μm (J_4), 7.5-8.5 μm (J_3), 5.5 μm (J_2), 8 μm (J_1) at tail tip. Tail shape changes from elongate conoid and slightly ventrally curved in J_1 through dorsally convex-conoid (J_2, one J_3) to broad dorsally convex-conoid (two J_3 and J_4). One of the J_3 was parasitised by *Pasteuria* sp. The J_4 had a postrectal intestinal blind sac at the left side.

Differential diagnosis: Xiphidorus uruguayensis n.sp. is the largest species of the genus and apart from body size it differs from all other species in the genus in its peculiar anterior end which has a sudden expansion behind the heart- to barrel-shaped amphidial fovea, and in having a small but clearly visible slit-like amphidial aperture (as opposed to smaller body size, differently shaped anterior end and fovea, pore-like amphidial aperture). In body size, *X. achalae* LUC & DOUCET, 1984 (L = 4.78-6.33mm) and *X. amazonensis* UESUGI, HUANG & CARES, 1985 (L = 4.85-6.03 mm) are similar to *X. uruguayensis* n.sp., but both these species - apart from the differences above - possess spines in their uteri (spines or crystalloids lacking in the new species).

Remarks

1. Due to the thickened cuticle in the head region, the anterior end may give the impression of being more or less bulbous. However, in the three females the width at the level of the outer circlet of ten sensilla was either the same (1 ♀) or only 0.5 μm larger than that at the level of the demarcation. In juveniles the width was either the same (one J_3) or was 1 μm smaller at the level of the sensilla than at the demarcation (two J_3 and the J_4) or only 0.5 μm smaller (J_2). This offset portion is unique among

[1] This value was obtained for each specimen as a mean of the distance measured at both sides of the head.

longidorids and not comparable to the offset or demarcated lip region present in many other longidorid species.
2. The slit-like amphidial aperture is, despite its small size, considered as intermediate between the typical wide slit of *Paraxiphidorus* and the pore-like opening of other *Xiphidorus* species. To some extent this situation is comparable to that which occurs in the *Paralongidorus* - *Longidoroides* - *Longidorus* complex (see COOMANS, 1996 for discussion). At present it is not possible to assess the importance of this and other characters of this species with regard to supraspecific level. Further Xiphidorini species are likely to be identified when South America is more intensively studied for the presence of longidorids and only then will intrageneric variability be reliably interpreted.
3. The forked base of the odontostyle in adults is somewhat less developed than in some other species of the genus but comparable to that of e.g. *X. saladillensis* CHAVES & COOMANS, 1984.
Type locality and habitat: soil under various grasses, site *Eucalyptus*, Reserva de fauna autóctona del Uruguay, Piriápolis, Uruguay.

Type specimens: holotype female on slide n° 3919 in the collection of the Instituut voor Dierkunde, University of Gent, Belgium. One paratype female on slide n° 3920, and three juveniles in the same collection. One female paratype in the collection of INTA-EEA, Balcarce, Argentina. Other juveniles used for SEM.

Etymology: the specific epithet refers to Uruguay, where the species was found.

Xiphidorus balcarceanus CHAVES & COOMANS, 1984 (Fig. 2 A-D)

A single female specimen of this species was found. It agrees in most dimensions with described populations (CHAVES & COOMANS, 1984; DECRAEMER *et al.*, 1996) except for having a slightly longer stylet (157 μm vs. 117-152 μm). Head- and tail shape and the reproductive system are similar to those of described populations. This species has transverse striae which are rather far apart compared to other species, i.e. 0.7-0.8 μm (mean of twenty gaps between striae). This character was confirmed by examination of the type population and a population from Corrientes (Argentina).

Dimensions: L: 3.77 mm; a: 72.5; b: 13.0; c : 132; c': 0.90; V: 45. Lip region 14 μm wide, 7 μm high. Odontostyle 107 μm; odontophore 50 μm; anterior end to guiding ring 96.5 μm; slender part of pharynx 116 μm; bulb 55 μm long and 16.5 μm wide; anterior end to nerve ring 183 μm. Lateral chord occupying one fourth of the corresponding body width. G_1: 10.1%; G2: 5.6% (because of contorted uterus). Anterior ovary 95μm; posterior ovary 115 μm; anterior oviduct 150 μm; posterior oviduct 127 μm; anterior uterus 199 μm; posterior uterus 170 μm. Ovejector 80 μm. Vagina occupying 58% of the corresponding body diameter.

Locality and habitat: same as for *P. heynsi* n.sp. (see below).

Xiphidorus minor RASHID, COOMANS & SHARMA, 1986 (Fig. 2 E-H)

An intact and a damaged female, without posterior end, were found. Both specimens agreed with the original description and the type material in head shape, shape of amphidial fovea and reproductive system. The intact specimen is considerably longer than the type specimens (L = 2.47 mm vs. 1.72-1.74 mm) and the stylets were 113.5 and 123 μm vs. 109-116 μm in the type specimens.
The morphological similarities between the two specimens and *X. minor* are considered more important than the difference in body length, which is quite variable in longidorids. Hence the Uruguay specimens are here identified as *X. minor*. In an identification key for *Xiphidorus* species (DECRAEMER *et al.*, 1996) the species is more readily distinguished from other *Xiphidorus* species by its very short uterus, as originally diagnosed (RASHID *et al.*, 1986) than by its small body length.

Dimensions (those for the damaged specimen are in parenthesis): L: 2.47 mm; a: 65; b: 10; c: 99; c': 1.21; V: 49. Lip region 9 (9) μm wide; fovea 6 (4) μm wide; odontostyle 84 (75.5) μm; odontophore 39 (38) μm; anterior end to guiding ring 72 (64) μm. Slender part of pharynx 116 μm, bulb 50 × 14.5 μm (52 × 15.5 μm). Anterior end to hemizonid 134 μm and to nerve ring 146 μm. G_1: 8.1, G_2: 6.1. Ovaries: 152 (G_1) and 89 μm; oviduct: 114 G_1 and 119 μm; uterus: 24 (G_1) and 22μm.

Locality and habitat: same as for *P. heynsi* n.sp. (see below).

Paraxiphidorus heynsi n.sp. (Figs 3, 4, 5 C, D)

MEASUREMENTS: Table 2.

DESCRIPTION

Females (n = 6)
Body long and rather slender, spiral upon fixation. Cuticle 4 (3.5-4.5) μm thick at mid-body, thicker near anterior end and 13.8 (12-17) μm thick at tail tip ; with three main layers; with very fine transverse striations at the surface (SEM) and inner radial striations which are most prominent in the tail region. Lateral chord 20.3 (18-24) μm wide at mid-body, i.e. 24.4 (20.5-30) % of the corresponding body width. Lateral body pores numerous, but dorsal and ventral body pores few and restricted to the odontostyle

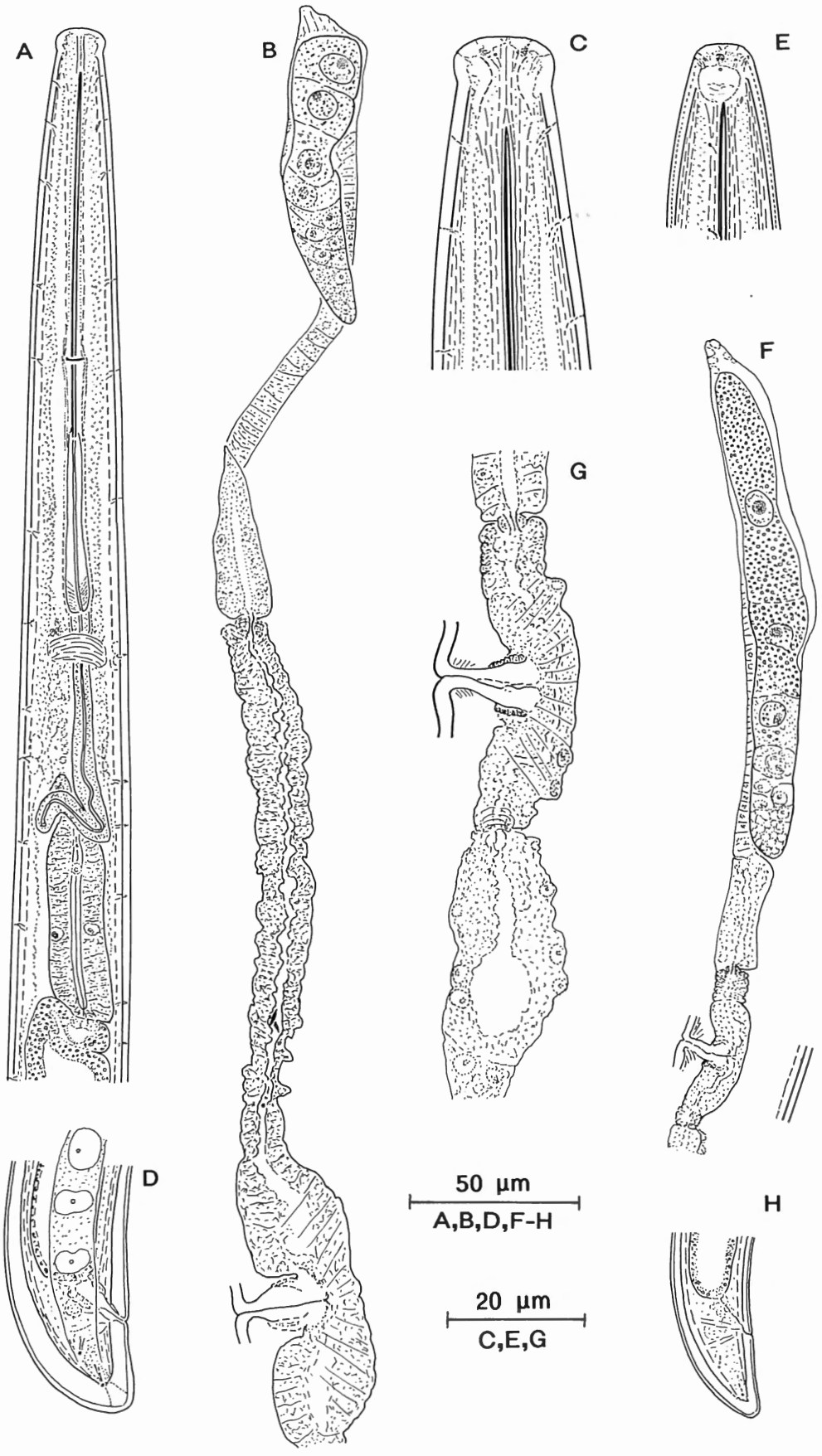

Fig. 2. – *Xiphidorus balcarceanus*. Female. A: Neck region. B: Anterior genital branch. C: Anterior end. D: Tail.
Xiphidorus minor. Female. E: Anterior end. F: Anterior genital branch. G: Central part of reproductive system. H: Tail.

Table 2: Morphometrics (mean, minimum and maximum) of type specimens of *Paraxiphidorus heynsi* n.sp.

	Holotype	Females (n=5)	Males (n=2)	Pre-adult juveniles (n=6)
L	6.61	6.40 (5.10-7.32)	6.46, 6.37	4.53 (3.76-5.11)
a	72	78.7 (63-93)	80.2, 85.5	71.5 (60-85)
b	17.5[1]	15.0 (13.3-16.9)	14.6, 12.9	12.3 (10.4-15.3)
c	139.1	142.2 (134-149.5)	149, 124	104.9 (90.9-124.7)
c'	0.77	0.79 (0.70-0.87)	0.78, 0.96	0.91 (0.81-0.98)
V / T	45	46.9 (46-48)	63, 64	–
Lip region width	20	20.5 (19-21.5)	20, 21	16.8 (16-18)
Lip region height	9.5	8.4 (7.5-9)	7.5, 8.5	7.2 (6.5-8)
Amphid aperture	12.5	12.2 (10.5-14)	15, 13.5	11 (10-12)
Odontostyle	166	158.8 (147-168.5)	165, 149.5	127.2 (118-133.5)
Odontophore	68	65.1 (61-72)	60, 66.5	56.9 (52.5-64)
Flanges	9	9.9 (8.5-11)	9, 10	8.6 (7.5-9)
Guide ring - AE	143	143.2 (124-157)	151, 133	114.2 (107.5-121)
Replacement odontostyle	–	–	–	153.8 (140-169)
Neck length	388[1]	425.4 (348-549)[2]	443, 492	412 (315-491)[2]
Pharynx				
- slender part	–	169.4 (152-186)[2]	204, 179	210.4 (190-247)[2]
- bulb - length	70	91.9 (75-108)[2]	74, 100	91.0 (81-97)[2]
- width	27	28.7 (27-31)	26, 28	25.5 (25-27)[2]
Hemizonid	249	244.2 (214-272)	-, 256	212.6 (198-234)
Nerve ring	269	261.6 (220-285)	281, 267	224.1 (198-250)
Body width				
- at cardia	66	64.1 (60-71)	61, 57.5	52.7 (50.5-54)
- at mid-body	92	82.2 (76-95)	80.5, 74.5	63.3 (57-68.5)
- at anus (or cloacal opening)	61	55.1 (50.5-59)	55.5, 53.5	47.6 (43-51.5)
G_1 (µm)	1102	818 (526-1170)	–	–
- %	16.7	12.6 (11.0-16.0)	–	–
- ovarium	–	325 (132-599)	–	–
- oviduct	–	334 (204-440)	–	–
- uterus	–	380 (314-446)	–	–
G_2 (µm)	908	809 (703-866)	–	–
- %	13.7	12.8 (10.5-14.9)	–	–
- ovarium	–	323 (157-538)	–	–
- oviduct	–	327 (206-376)	–	–
- uterus	–	393 (290-465)	–	–
Genital primord.	–	–	–	101.7 (65.5-169)
Prerectum (µm)	521	379 (310-425)[2]	-, 476	369.2 (239-554)
Prerectum in a.b.w.	8.5	6.9 (6.1-7.6)[2]	-, 8.9	7.7 (5.3-11.2)
Rectum (µm)	41	31.2 (27-39)[2]	–	28.0 (18-32)
Rectum in a.b.w.	0.67	0.57 (0.45-0.77)[2]	–	0.59 (0.43-0.71)
Tail	47.5	43.5 (36.5-49.5)	43.5, 51.5	43.2 (40-48)
Spicule left	–	–	80, 86	–
Spicule right	–	–	83, 85.5	–
Lateral guiding piece left	–	–	17, 20	–
Lateral guiding piece right	–	–	20.5, 18	–
Supplements from cloacal opening	–	–	–	–
- paired papilla	–	–	22.5, 22	–
- pap. 1	–	–	95.5, 89	–
- pap. 2	–	–	116, 109.5	–
- pap. 3	–	–	131, 129	–
- pap. 4	–	–	148, 148	–
- pap. 5	–	–	163, 168	–
- pap. 6	–	–	178.5, 190	–
- pap. 7	–	–	193.5, 213.5	–
- pap. 8	–	–	209.5, 233	–
- pap. 9	–	–	228, 252.5	–
- pap. 10	–	–	247, 273	–
- pap. 11	–	–	-, 290	–

[1] pharynx distorted;
[2] n = 4.

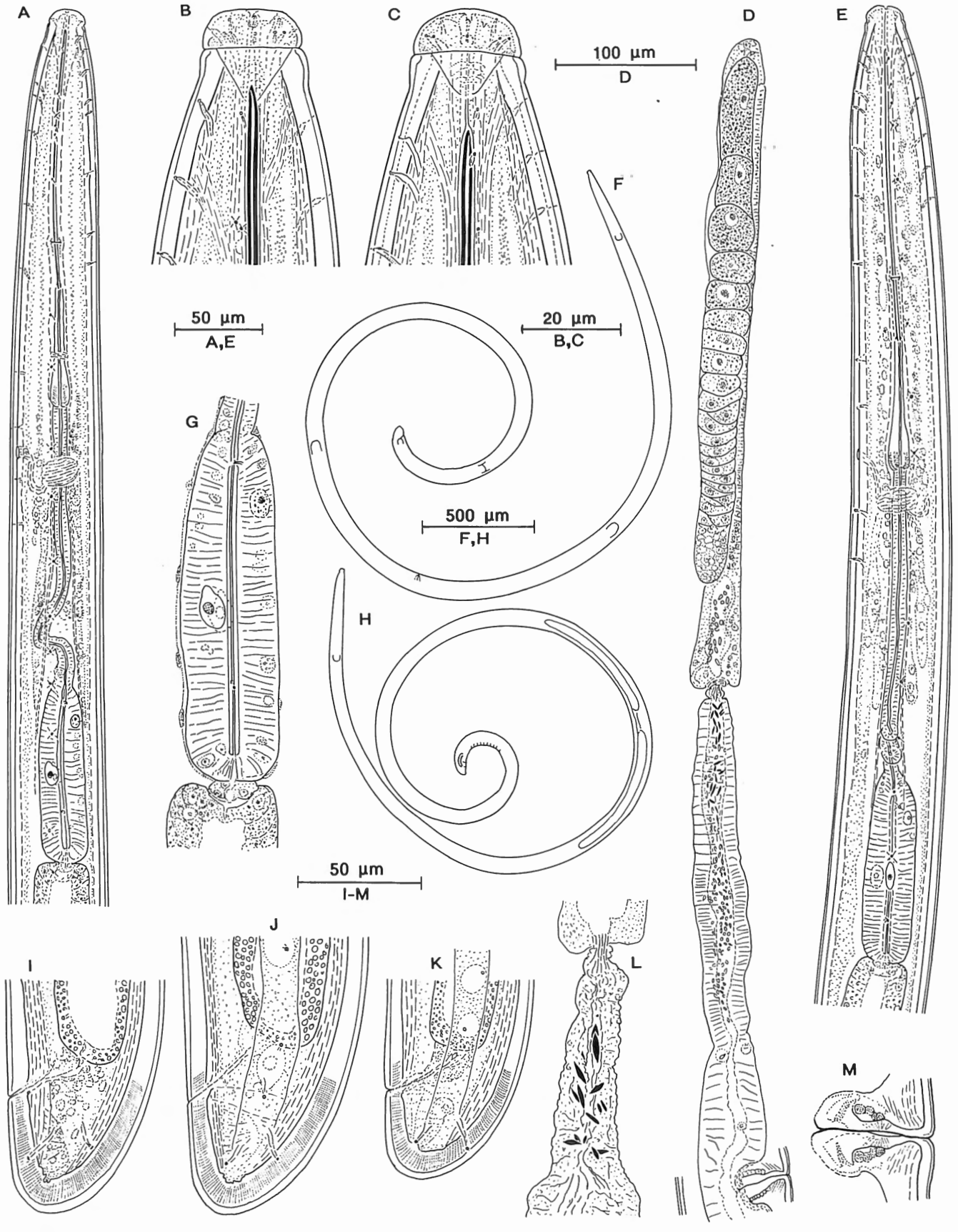

Fig. 3. – *Paraxiphidorus heynsi* n.sp. A: Neck region of male. B: Anterior end of male. C: Anterior end of female. D: Anterior branch of female reproductive system (note presence of sperm in *pars dilatata oviductus* and throughout uterus and of crystalloids in distal part of uterus). E: Neck region of female. F: Female, entire. G: Pharyngeal bulb of male. H: Male, entire. I-K: Female tails. L: Detail of distal part of uterus. M: Vagina and vulva in lateral view. Figs F, J, M are from holotype.

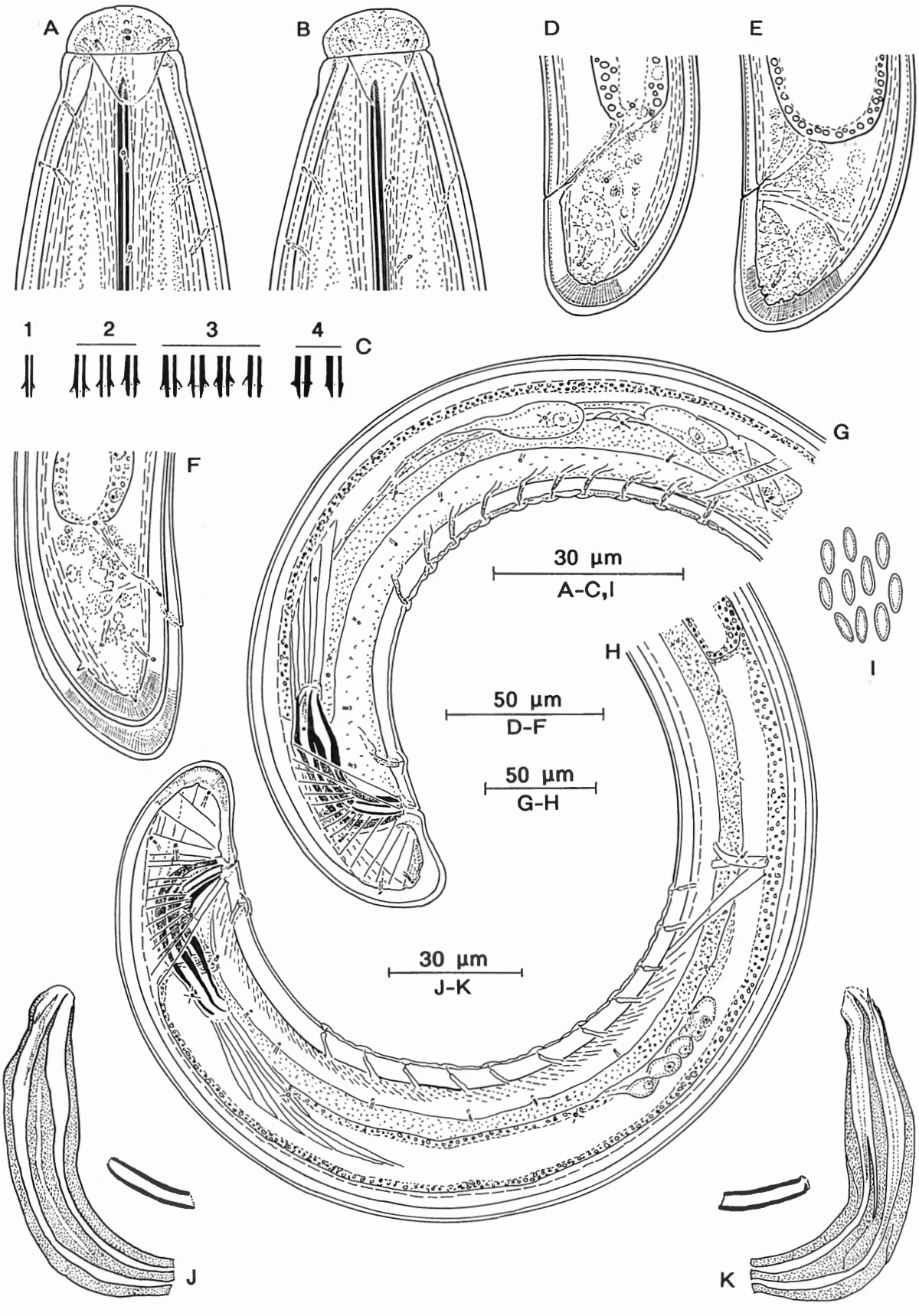

Fig. 4. – *Paraxiphidorus heynsi* n.sp. A-B: Anterior end of pre-adult juvenile. C: Functional odontostyle base of juvenile moulting to pre-adult (1), pre-adult (2), female (3), male (4). D-E: Tail of pre-adult. F : Tail end of juvenile (moulting to pre-adult). G-H: Posterior body regions of two males. I: Sperm (from testis). J-K: Spicules and lateral guiding pieces.

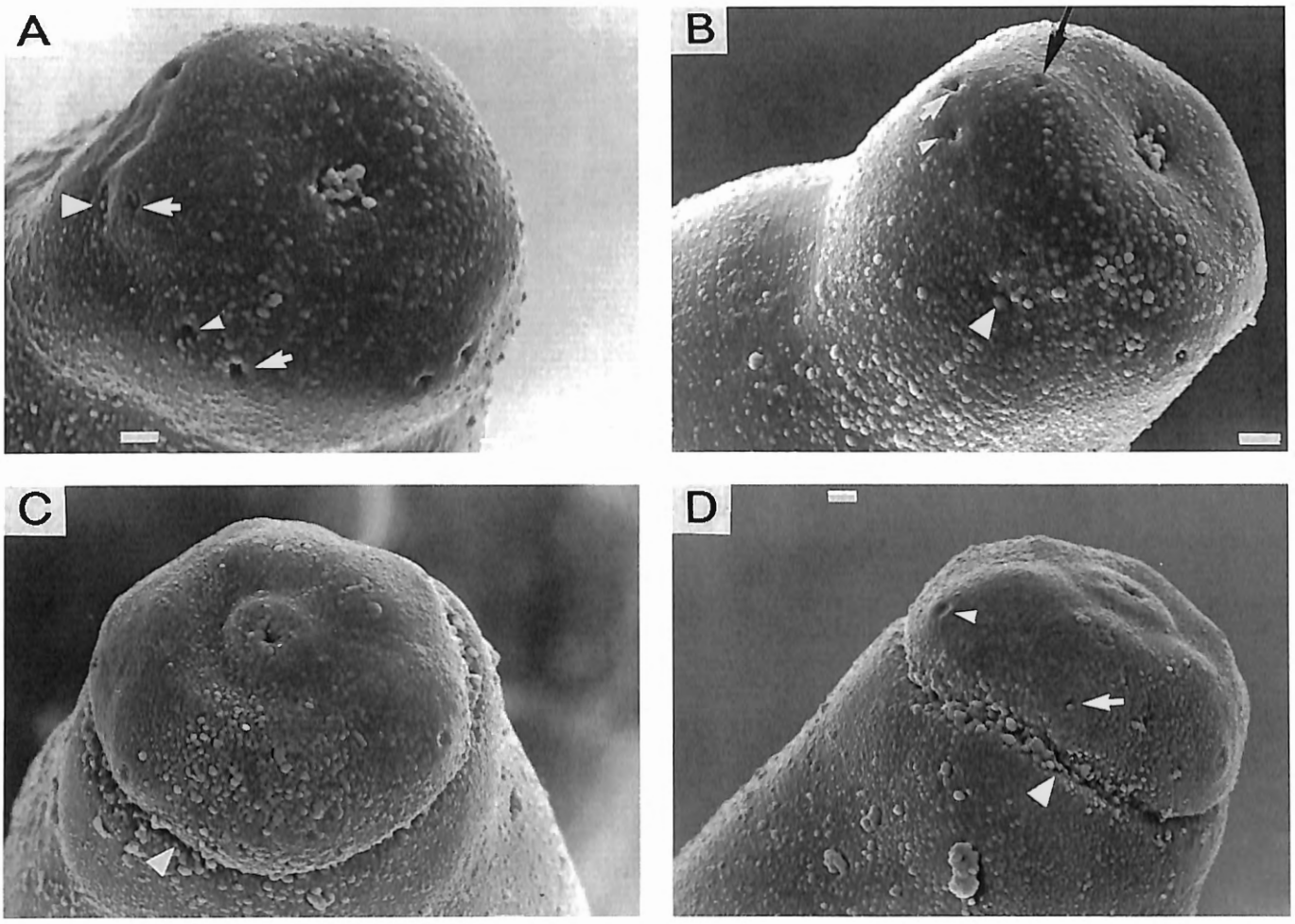

Fig. 5. – *Xiphidorus uruguayensis* n.sp. A: Anterior end, "en face". B: Oblique lateral view of anterior end. *Paraxiphidorus heynsi* n.sp. C: Anterior end, "en face". D: Lateral view of anterior end. White arrows indicate outer labial sensilla, small arrowheads point to cephalic sensilla, large arrowhead to amphid aperture and black arrow to inner labial sensilla. Scale bar = 1 μm.

region and neck region anterior to bulb, respectively; 7 (5-9) dorsal, 11.3 (10-13) ventral and 16.6 (15-18) lateral pores in the neck region. Lip region hemispherical to slightly flattened anteriorly, offset by a marked constriction. Body cuticle behind constriction bulging outward due to thickening of median layer. Anterior sensilla 6 + 10, appearing as minute pores under SEM. Amphids with stirrup-shaped fovea and wide slit-like opening occupying 70-80% of the width at the constriction. Odontostyle long and slender, with forked base. Guiding ring single, located posteriorly. Odontophore with weak, but clearly visible flanges. Pharyngeal retractors well developed. Slender part of pharynx not offset from enlarged part; latter at first conical, then cylindrical. Dorsal gland nucleus smaller than ventrosublateral nuclei. Positions of outlets and nuclei as percentage of bulb length (n = 3):

DO:	10.1 (9.1-10.7)	LSN:	51.3 (45.5-54.7)
DN:	23.5 (20.8-26.9)	RSN:	51.7 (46.5-54.7)
DO-DN:	13.5 (11.7-16.2)	SO:	75.0 (73.1-76.6)

Pharyngo-intestinal junction wide and flattened. Intestine very opaque due to the presence of dark granules. Tail dorsally convex-conoid with bluntly rounded terminus, without blind canal. Two caudal pores at each side in all females and one adanal pore at each side in two females and at one side in one female.

Female reproductive system didelphic, amphidelphic. Different parts variable in length according to stage of maturation. Uterus with rhomboid crystalloids mainly in its distal part; without *pars dilatata*. Sperm may be present throughout the uterus, it is stored in the *pars dilatata oviductus* (functional spermatheca); small numbers may be encapsulated in the slender part of the oviduct. Proximal part of both uteri forming a poorly defined ovejector. Vagina 43 (40-46) μm long, extending inward to 49-55% of the corresponding body width. Vulva a transverse slit.

Males (n = 2): similar to females in most respects except for sexual characters. Body more curved in posterior

region. Cuticle 4-4.5 μm thick at mid-body, 12 μm at tail tip. Lateral chord 15-16 μm wide or 19-20.5% of the mid-body width. In the neck region there are eight dorsal, ten ventral and 17-18 lateral pores. Odontostyle base less clearly forked than in females. Tail with slightly concave ventral side; with 2-3 caudal pores at each side and one adanal pore at each side or at one side of tail.
Reproductive system typical for genus, with 4-5 ejaculatory glands; 60-64 copulatory muscles and ten (4 + 6) accessory copulatory muscles; 10-11 ventromedian supplements and 6-8 subventral body pores in the region of the copulatory muscles. Spicules stout, ventrally curved; lateral guiding pieces rod-shaped.

Juveniles (n = 8): six juveniles belong to the pre-adult stage. One juvenile moulting to become a pre-adult stage and another moulting from pre-adult to male.
In general body shape the juveniles are similar to the adults, but are less ventrally curved. Cuticle 2.5-3.5 μm thick at mid-body and 8.5-9.5 μm at tail tip. Lateral chord 9-17 μm wide, occupying 16-26% of the mid-body width. Tail similar to that of female, with two caudal pores.
Old odontostyle in the cuticle of the youngest moulting juvenile broken, new functional odontostyle 130 μm, new replacement odontostyle not yet fully formed, 132 μm long. Genital primordium 56 μm.
Moulting pre-adult to male with pre-adult odontostyle 140 μm and adult odontostyle 179.5 μm long. Genital system partly formed, with anterior testis 142 μm, posterior testis 112 μm, posterior part of vas deferens 274 μm long; spicules and lateral guiding pieces partly formed in lateral pockets behind developing cloaca.

Differential diagnosis: Paraxiphidorus heynsi n.sp. differs from only other species of the genus *P. michelluci* COOMANS & CHAVES, 1995 in body length, ratio's a and c' (L = 4.75-5.91 mm, a = 116-118, c' = 1.03-1.14 in *P. michelluci*), length of odontostyle (123-128.5 μm in *P. michelluci*), shape and length of spicules (54-57 μm in *P. michelluci*), and number of ventromedian supplements (6-7 in *P. michelluci*).

Type locality and habitat: humid soil covered with decaying leaves close to the cages of wild indigenous animals in the "Reserva de fauna autóctona del Uruguay", East side Cerro Pan de Azúcar, near Piriápolis, Maldonado, Uruguay.

Type specimens: holotype female and one male paratype on slide 3921 in the Collection of the Instituut voor Dierkunde, University of Gent, Belgium. Three female paratypes on slides 3922 and 3923 as well as six juveniles in the same collection. One male, two female and one juvenile paratypes in the nematode collection of INTA-EEA Balcarce, Argentina.

Etymology: named after Prof.Dr. J. HEYNS in recognition of his life-time work on longidorids.

Emendation of the genus diagnosis

The diagnosis of the genus *Paraxiphidorus* can be emended with the female characters: female reproductive system didelphic, amphidelphic, dorylaimoid, with *pars dilatata oviductus* functioning as spermatheca, uterus without *pars dilatata*.

Remark: the restriction of ventral pores to the body region anterior to the pharyngeal bulb may be an additional character of the Xiphidorini.

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A. COOMANS
Instituut voor Dierkunde
Universiteit Gent
K.L. Ledeganckstraat 35, B-9000 Gent, Belgium

E. CHAVES
INTA - Estación Experimental de Balcarce
Laboratorio de Nematologia
Casilla Correo 276, 7620 Balcarce, Argentina

L. DE LEÓN
Servicio de Protección Agricola
Av. Millan 4793, Montevideo, Uruguay