

# Three new species of *Xiphidorus* from Argentina, with comments on *Xiphinema sandellum* Heyns, 1966

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## SUMMARY

Three new species of *Xiphidorus* are described. *X. balcarceanus* sp. nov. differs from the type species *X. yepesara* Monteiro, 1976 in shape of amphids, tail shape and in reproducing parthenogenetically. It differs from *X. parthenus* Monteiro, 1981 in having a longer spear, a more anterior vulva, and a larger number of lateral body pores. *X. tucumanensis* sp. nov. resembles most closely *X. balcarceanus* sp. nov. but is a gonochoristic species; it also resembles *X. yepesara*, but has differently shaped amphids and tail, and longer spicules. *X. saladillensis* sp. nov. differs from the other species in its smaller size, shorter spear and shorter pharyngeal bulb; it further differs from *X. yepesara* and *X. tucumanensis* sp. nov. in shape and length of the spicules and smaller number of supplements. The generic diagnosis is amended. Reexamination of the holotype and some paratypes of *Xiphinema sandellum* Heyns, 1966 revealed the faint but slit-like apertures of the amphids, the peculiar odontostyle base, the *Xiphidorus*-like guiding apparatus and pharyngeal gland pattern. The differences in amphid structure, odontostyle base and odontophore base exclude *X. sandellum* from *Xiphidorus* as at present defined. The inclusion of the species in *Brevinema* Stegarescu, 1980 is accepted, but not its synonymy with *B. pisi*.

## RÉSUMÉ

Trois nouvelles espèces de *Xiphidorus* d'Argentine, et commentaires  
sur *Xiphinema sandellum* Heyns, 1966

Trois nouvelles espèces de *Xiphidorus* sont décrites. *X. balcarceanus* sp. nov. se différencie de l'espèce type *X. yepesara* Monteiro, 1976 par la forme des amphides et de la queue et par sa reproduction parthénogénétique. Il diffère de *X. parthenus* Monteiro, 1981 par un stylet plus long, la vulve en position plus antérieure et un nombre plus élevé de pores latéraux. *X. tucumanensis* sp. nov. ressemble le plus à *X. balcarceanus* sp. nov. mais est gonochorique; il est aussi fort proche de *X. yepesara* mais en diffère par la forme des amphides et de la queue et par des spicules plus longs. *X. saladillensis* sp. nov. se différencie des autres espèces par sa taille plus petite, un stylet plus court et un bulbe pharyngien plus court; il se sépare de plus de *X. yepesara* et de *X. tucumanensis* sp. nov. par la forme et la longueur des spicules et par un nombre plus petit de suppléments. La diagnose du genre est émise. Le réexamen de l'holotype et de quelques paratypes de *Xiphinema sandellum* Heyns, 1966 a montré

***Xiphidorus balcarceanus* sp. nov.**  
(Fig. 1 A-I, N-Q & 2)

## DIMENSIONS

*Females* : see Table 1.

*Juveniles* : see Table 2.

*Holotype* (♀) : L = 3.5 mm ; a = 84.5 ; b = 11.2 ; c = 131.5 ; c' = 0.96 ; V = 45.5 ; odontostyle = 101 µm ; odontophore = 47 µm ; total spear = 148 µm.

## DESCRIPTION

*Female* : Body slender ; C-shaped or more strongly ventrally curved upon fixation ; tapering towards both ends, but more so anteriorly. Cuticle smooth, internally with faint transverse striae ; 1.5-2 µm thick except for the tail where its thickness increases to 4-7 µm on the dorsal side. Lateral organs and pores usually clearly visible throughout the body

length, their number varying from 150 to 204, with 12-20 in the neck region. Dorsal and ventral body pores only visible in the anterior body region : three to four dorsal pores confined to the spear region and five to seven ventral pores anterior to the nerve ring. Lateral chords about one third to one fourth of the body width at mid-body. Lip region expanded and offset by a distinct depression ; 6-7 µm high and 13-14 µm wide ; with two circlets of small papillae (6 + 10). Amphids with a cup-shaped pocket (fovea) and a pore- or minute slit-like opening. The pocket extends anteriorly beyond the aperture along both sides of the lateral lip. The dendritic processes are highly convoluted inside the fovea. Fusus ("sensillar pouch") at 25-28 µm behind the opening. Spear similar to *Xiphinema* with forked odontostyle base and moderately developed flanges at the odontophore. Odontostyle slightly irregular in outline. Guiding ring far back, i.e. 65-92 µm ( $\bar{x}$  = 80 µm, n = 21) from the anterior end. Dilatorum buccae absent. The spear protractors as well as the

Table 1

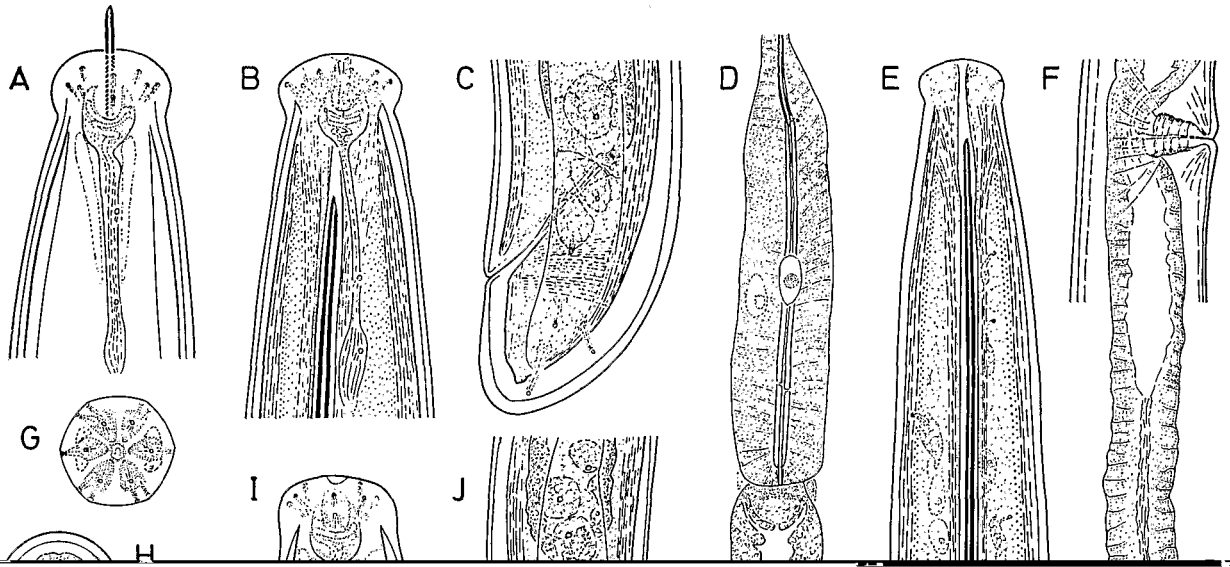
*Xiphidorus balcarceanus* sp. nov. : Dimensions of females

	Type population	Pop. a	Pop. b	Pop. c	Pop. d	Pop. e
n	25	9	1	5	1	3
L (mm)	3.36 (2.9-3.7)	3.62 (3.4-3.8)	3.0	3.62 (2.9-4.1)	4.1	3.39 (3.2-3.5)
a	83.8 (73.5-91)	87.8 (81.5-93.5)	85.2	87.6 (81-94)	100.0	87.2 (85.5-89.5)
b	11.6 (10-16)	11.3 (10.5-16)	10.6	11.8 (11-12.5)	12.5	10.6 (10.5-10.7)
Tail (µm)	27.3 (22-30)	26.5 (25.5-28)	24	26.6 (24-28)	27	25.5 (24.5-26.5)
c	123.3 (109-143.5)	136.7 (129-144)	123.5	135.3 (120-145)	152.5	133.3 (126.5-140)
c'	0.97 (0.8-1.1)	0.99 (0.9-1.1)	0.9	0.96 (0.9-1)	1	0.97 (0.9-1)
V	46.4 (43.5-49.5)	46.5 (44-49)	51.5	47.8 (46.5-49.5)	45.5	47.0 (45-49.5)
Od. style (µm)	98 (92-102)	96.9 (93.5-101.5)	95	97.6 (88.5-102.5)	97.5	91.5 (90.5-93.5)
Od. phore (µm)	45.5 (40-49)	46.7 (46-49)	46.2	49.0 (43-53)	52.1	47.9 (46-50)
Spear (µm)	143.4 (137-149)	143.7 (141-149)	141	146.7 (131-153)	149.7	139.4 (136.5-144)

retractors agree with those of *Xiphinema*, and the third group of *Longidorus* (cf. Robertson & Taylor, 1975). The eight protractors are most prominent in the region of the anterior odontophore, further back they merge to a circular strand that attaches to the flanges. The retractors consist of four muscle bands that attach to the body wall near the junction of the slender and enlarged portions of the pharynx. Slender portion of pharynx apparently with radial muscles. Enlarged portion of pharynx (= pharyngeal bulb) 58.5-74.5  $\mu\text{m}$  ( $\bar{x}$  = 68  $\mu\text{m}$ , n = 7) long and 15-19  $\mu\text{m}$  ( $\bar{x}$  = 16.9  $\mu\text{m}$ , n = 7) wide. Nucleus (DN) and nucleolus of the dorsal pharyngeal gland very

71.7-80.4 ( $\bar{x}$  = 76.6)% ; LSN = 49.6-54.5 ( $\bar{x}$  = 51.6)% ; LSO = 75.5-81 ( $\bar{x}$  = 77.8)% ; DO-DN = 12.1-16.5 ( $\bar{x}$  = 14.1)%.

Pharyngo-intestinal junction broadly flattened to hemispheroid (Fig. 1 D). Prerectum 237-539  $\mu\text{m}$  long. Nerve ring at 151-184  $\mu\text{m}$  ( $\bar{x}$  = 170  $\mu\text{m}$ , n = 15) from anterior end. Hemizonid 5-7  $\mu\text{m}$  wide, 152-182  $\mu\text{m}$  from anterior end ; hemizonion 1.5-2  $\mu\text{m}$  wide, 188-242  $\mu\text{m}$  from anterior end. Female reproductive system with equally well developed branches, situated either on the left or on the right side of the intestine. Each branch consisting of ovary, oviduct, spermatheca and uterus; the latter composed of two





tions : Nematology Collection, Rothamsted Experimental Station, Harpenden, Herts, England ; Nematology Collection, Landbouwhogeschool Wageningen, The Netherlands ; Nematology Collection, USDA, A.R.S. Northeastern Region, Beltsville, Maryland, U.S.A. ; Laboratoire des Vers, Muséum national d'Histoire naturelle, Paris, France. Other specimens with E. Chaves, INTA, Estacion Experimental Agropecuaria de Balcarce, Argentina.

***Xiphidorus tucumanensis* sp. nov.**

(Fig. 1 J-M)

**DIMENSIONS**

*Female* (holotype) : L = 4.20 mm ; a = 118.5 ;

**OTHER HABITAT AND LOCALITY**

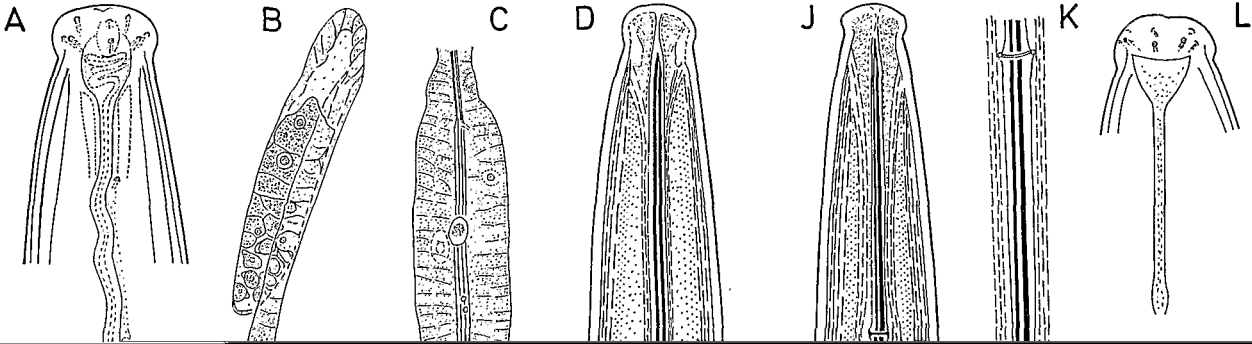
Soil around sugar cane, Concepcion, Province of Tucuman (4 juveniles).

**DIFFERENTIAL DIAGNOSIS**

*Xiphidorus tucumanensis* sp. nov. closely resembles *X. yepesara* and *X. balcarceanus* sp. nov. From the former it can be differentiated by the shape of the amphids and the longer spicules (spicules 31.5-39  $\mu$ m long in *X. yepesara*) ; from the latter it differs in its more slender body and in being gonochoristic.

**TYPE SPECIMENS**

Holotype (female) and one male paratype on slide 29944 deposited in the Nematode Collection of the Inst.



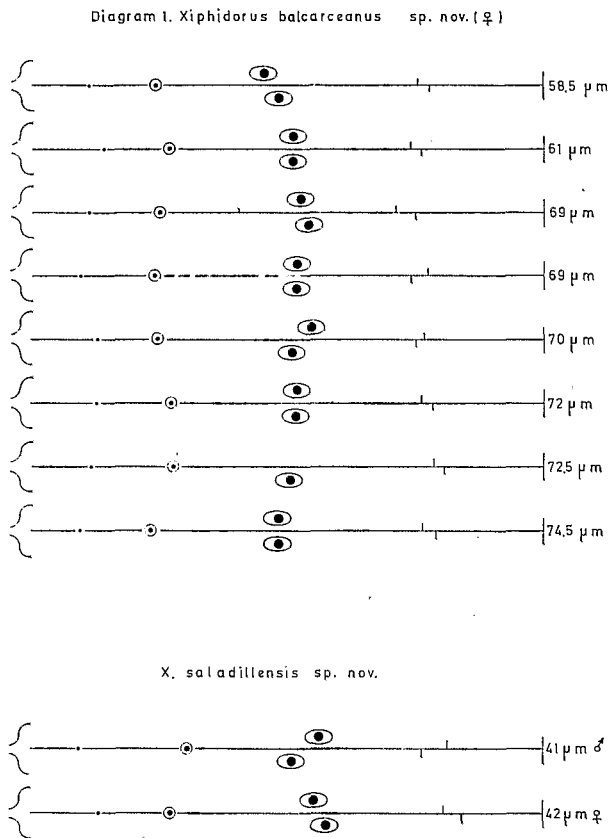


Fig. 4. Positions of pharyngeal gland nuclei.

*X. lucumanensis* sp. nov. in the number of medio-ventral supplements in males (four against six to eight) and shape and length of the spicules. From *X. lucumanensis* sp. nov. it also differs in tail shape and from *X. yepesara* in the shape of the amphids (bilobed in *X. yepesara*).

TYPE SPECIMENS

Holotype (female) on slide n° 245; paratype (male) cut into three pieces on slides n° 246 a-c, deposited in the Nematode Collection of the Instituut voor Dierkunde, Rijksuniversiteit Gent, Belgium.

*Xiphidorus* Monteiro, 1976

DIAGNOSIS (after Monteiro, 1976, amended).

Longidoridae. Lip region expanded, offset by a depression. Amphidial fovea large, symmetrical, bilobed or not; amphidial apertures small, slit- or pore-like. Odontostyle base forked. Odontophore with moderately developed basal flanges. Cheilostome long, hence guiding ring far backward; guiding sheath not folded anterior to the guide ring when spear is in resting position. Dilatores buccae absent. Spear retractor system consisting of a muscular sheath around the slender part of the pharynx, passing through the nerve ring and then diverging as four muscle bands to the body wall. Pharyngeal gland pattern with small rounded dorsal nucleus, far behind the corresponding opening (DO-DN = 12-21.5% of bulb length). Female reproductive



30.3% ; SN (R and L) = 53% ; RSO = 84% ; LSO = 85.6%.

A difference with the hitherto known species of *Xiphidorus* is found in the odontostyle base. The latter is not really forked, but presents a minute triangular ridge or small swelling depending on its orientation (Fig. 3 K, N). A similarly structured odontostyle base can be observed in some *Longidorus* species (e.g. *L. goodeyi* Hooper, 1961 and *L. indomitus* Kozlovskaya & Gribanov

*nemoides* Heyns, 1965 and pending further information on the amphid structure the synonymy of *B. pisi* and *X. sandellum* cannot be accepted. At present the genus *Brevinema* is poorly defined, but its main characteristics seem to be the posteriorly located single guiding ring, unforked odontostyle base and "muscular" instead of "sclerotised" flanges. For the time being *X. sandellum* can be included in the genus as *Brevinema sandellum* (Heyns, 1966) Stanger, 1980, but the type species and all

The pharyngeal gland pattern of *Xiphidorus* is essentially that of Longidorinae with a small and rounded dorsal nucleus far behind the outlet. The small dorsal nucleus is clearly an apomorphic character (but the large distance between DO and DN is a plesiomorphic condition (Loof & Coomans, 1970; 1972). In the species of *Xiphidorus* so far known DN is rounded, whereas it is usually elongate in Longidorinae, but rounded ones occur.

In conclusion, there seem to be more arguments to put *Xiphidorus* close to Longidorinae than to Xiphineminae. At present it is difficult to decide whether *Xiphidorus* should be placed in the Longidorinae or as a separate subfamily (Khan *et al.*, 1978 even proposed a separate family). It is however clear that any taxonomic change proposed should be amply discussed and should be based on evaluation of several characters. Especially if one relies mainly on one or two characters, e.g. the amphid (shape and aperture) or shape of lip region (as did Khan *et al.*, 1978), their character state should be defined. Only reliable synapomorphies can be used. Therefore important taxonomic changes should only be

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