

New data on *Psilenchus hilarus* Siddiqi, 1963 and description of two new species of *Psilenchus* de Man, 1921 (Nematoda : Tylenchida) from Argentina

Marcelo E. DOUCET

Laboratorio de Nematología, Centro de Zoología Aplicada,
Universidad Nacional de Córdoba, Casilla de correo 122, 5000 Córdoba, Argentina.

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Summary – One known and two new species of the genus *Psilenchus* are described from Argentina: *P. hilarus* Siddiqi, 1963, *P. pratensis* n. sp., and *P. bahiablancæ* n. sp. *P. pratensis* n. sp. is a medium sized and thin species, characterized by a smooth, conical-truncate, slightly set off from body labial area; knobless stylet; lateral fields with four incisures; conical tail with clavate terminus; male spicules 25-32 µm long. *P. bahiablancæ* n. sp. is a long and thin species, characterized by a smooth and rounded, slightly set off from body labial area; knobless stylet; lateral fields with four incisures; conical tail with clavate terminus; male spicules 30-38 µm long. *P. pratensis* n. sp. differs from *P. bahiablancæ* n. sp. by the shape of labial area (truncate *vs* rounded) and by the length of spicules (30-38 *vs* 25-32 µm).

Résumé – *Nouvelles données sur Psilenchus hilarus Siddiqi, 1963 et description de deux nouvelles espèces du genre Psilenchus de Man, 1921 (Nematoda : Tylenchida) originaires d'Argentine* – Trois espèces, une déjà connue et deux nouvelles, du genre *Psilenchus* de Man, 1921 originaires d'Argentine sont décrites: *P. hilarus* Siddiqi, 1963; *P. pratensis* n. sp. et *P. bahiablancæ* n. sp. *P. pratensis* n. sp. est caractérisé par: longueur moyenne du corps; région labiale conique-tronquée lisse, séparée du corps par une faible constriction; stylet dépourvu de boutons basaux; champs latéraux à quatre incisures; queue conique à extrémité légèrement renflée; spicules longs de 25-32 µm. *P. bahiablancæ* n. sp. est caractérisé par: région labiale lisse à contour arrondi, séparée du corps par une légère constriction; stylet dépourvu de boutons basaux; champs latéraux à quatre incisures; queue conique à extrémité légèrement renflée; spicules long de 30-38 µm. *P. pratensis* n. sp. se différencie de *P. bahiablancæ* n. sp. par la forme de la région labiale (tronquée *vs* arrondie) et par la longueur des spicules (30-38 *vs* 25-32 µm).

Key-words: Argentina, grasses, nematodes, *Psilenchus*.

Nematode surveys made in natural regions in Argentina provided three populations of plant-parasitic nematodes of the genus *Psilenchus* which are here described and illustrated. This genus was cited for the first time in this country associated with potato fields in several sites in the southeastern part of the province of Buenos Aires by Chaves and Torres (1993).

Nematodes were extracted from soil samples by use of centrifugal-flotation method (Jenkins, 1964). Specimens were killed and fixed in hot fixative (Netscher & Seinhorst, 1969) and processed to glycerin (Seinhorst, 1959). Measurements were made on nematodes mounted in glycerin; and are expressed as (range) $X \pm SD$, [coefficient of variation]; drawings were made with a camera lucida.

Psilenchus hilarus Siddiqi, 1963

(Fig. 1)

MEASUREMENTS

See Table 1.

DESCRIPTION

Female: Body ventrally curved after fixation like an open C, thin, elongate, with anterior end slightly flattened; posterior end conical elongate. Cuticle with fine transverse annulation about 1 µm wide at mid-body. Annulation of the subcuticle pronounced. Lateral field marked by four incisures, not areolated, occupying a variable percentage of body width: 23-38% (28 ± 4.4); the two internal incisures fainter than the external ones, delimiting a central band narrower than the lateral ones. Head conical truncate, with three to five faint transversal striae on the posterior part of the head, delimiting one first wide cephalic annule and two to four narrow posterior cephalic annules; head 4-6 µm (5 ± 0.4) in height, 8-11 µm (9 ± 0.9) in width, slightly demarcated from body. In face view, labial region divided into four sectors, two lateral, one ventral, and one dorsal, by faint oblique lines; oral aperture circular; amphidial apertures located along the external edges of the lateral sectors. Cephalic framework well marked for the genus, extending posteriorly up to five annules of body. Orifice of dorsal oesophageal gland about 10 µm behind base of stylet. Median bulb located at 90-110 µm (99 ± 5.7)

Table 1. Morphometrics of *Psilenchus hilarus* Siddiqi, 1963 from Córdoba, Argentina.

	Females	Males	Juveniles
n	19	16	3
L (mm)	1.25 ± 0.1 [8] (1.07-1.44)	1.07 ± 0.1 [9.3] (0.85-1.33)	0.90 ± 0.06 [6.6] (0.84-0.96)
Body diameter	32 ± 4.5 [14.1] (22-38)	22 ± 3.2 [14.5] (18-29)	22 ± 4 [18.1] (18-26)
a	44.7 ± 4.8 [10.7] (37.1-51.2)	48.4 ± 5.1 [10.5] (37.6-55.6)	41.7 ± 5.1 [12.2] (36.7-46.9)
Oesophagus length	164 ± 8.7 [5.3] (146-176)	155 ± 10.5 [6.7] (136-178)	145 ± 1.15 [0.7] (144-146)
b	7.6 ± 0.6 [7.8] (6.5-8.7)	6.9 ± 0.5 [7.2] (6.1-7.9)	6.2 ± 0.3 [4.8] (5.8-6.5)
MB	60.4 ± 2.1 [3.4] (57.9-65.8)	59.7 ± 1.8 [3] (56.2-63.5)	-
Stylet	17 ± 0.7 [4.1] (15-18)	17 ± 1.1 [6.4] (14-18)	16 ± 0.6 [3.7] (15-16)
Conus	7 ± 0.4 [5.7] (6-8)	6 ± 0.6 [10] (4-7)	5.5 ± 0.6 [10.9] (5-6)
m	37.7 ± 6 [15.9] (28.5-53.8)	37.3 ± 3.8 [10.2] (33.3-46.6); 10.2	-
dgo (n = 9)	7 ± 0.9 [13.4] (5-9)	-	-
O (n = 9)	46.5 ± 17.1 [36.7] (35.7-61.5)	-	-
V	50 ± 1.3 [2.6] (47-52)	-	-
V'	54.7 ± 1.4 [2.55] (51.1-56.9)	-	-
Tail length	122 ± 7.9 [6.4] (107-138)	120 ± 11.9 [9.9] (100-149)	102 ± 2.1 [2] (100-103)
c	10.6 ± 0.8 [7.5] (9.3-12.2)	8.9 ± 0.4 [4.4] (8.2-9.6)	9.5 ± 0.05 [0.5] (9.4-9.6)
Body diameter at anus	22 ± 4.2 [19.1] (18-38)	9 ± 1.9 [10] (16-24)	18 ± 2.6 [14.4] (16-21)
c'	5.5 ± 0.7 [12.7] (3.4-6.4)	6.3 ± 0.5 [7.9] (5.3-7.3)	5.4 ± 0.9 [16.6] (4.8-6)
Spicules	-	30 ± 1.7 [5.6] (27-33)	-
Gubernaculum	-	11 ± 1.1 [10] (10-13)	-

All measurements are in μm , except body length. The disposition of the measurements correspond to the following arrangement: arithmetic mean \pm standard deviation; coefficient of variation between square brackets; range.

from anterior end, 20-25 μm (22 ± 1.1) in length, 12-14 μm (13 ± 0.6) in width. Hemizonid two to four annules long located from the level of the excretory pore to four body annuli anterior to it. Nerve ring located

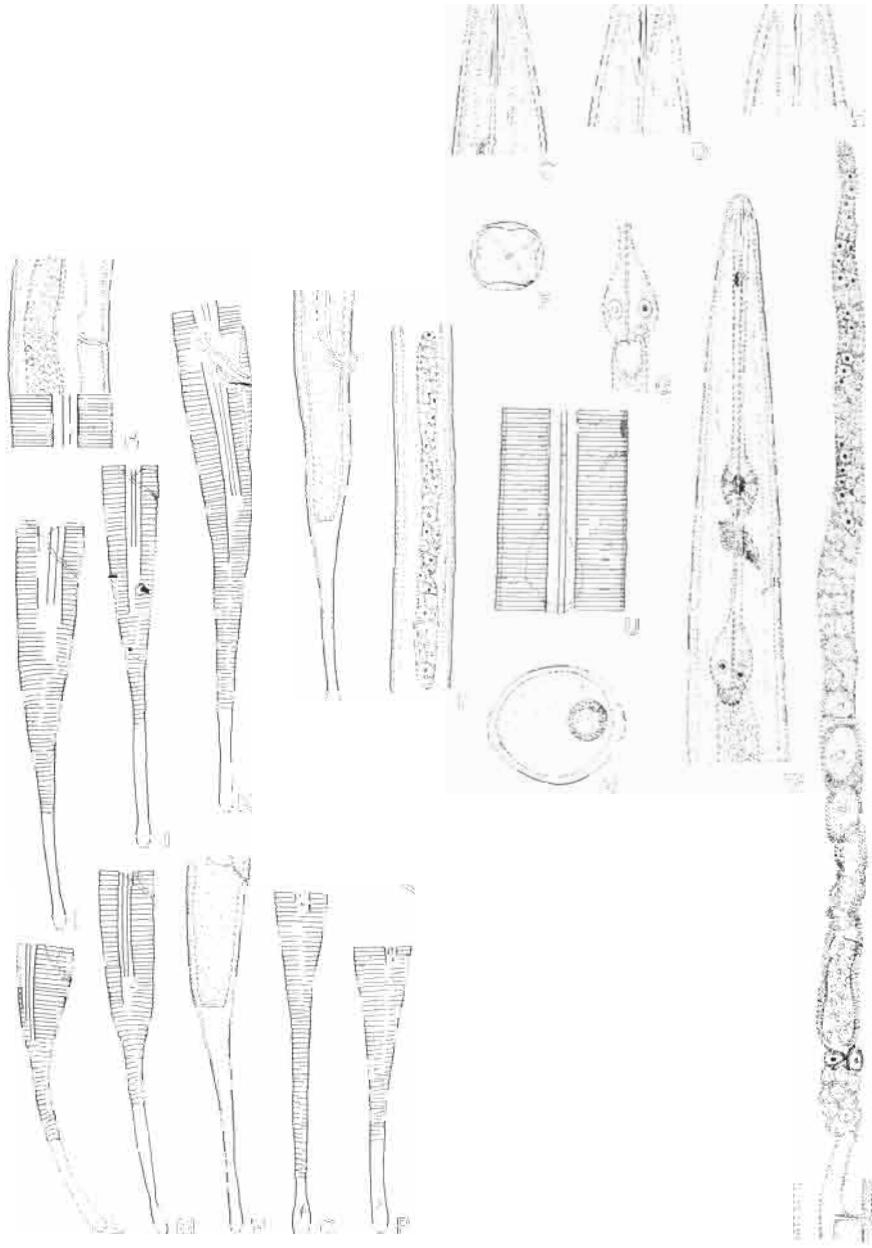
behind the median bulb, at 104-144 μm (117 ± 10.1) from anterior end. Excretory pore located at 112-150 μm (129 ± 7.9) from the anterior end. Deirids clearly visible at level of excretory pore. Isthmus long; oesophageal basal bulb 21-27 μm (24 ± 1.7) in length, 11-16 μm (13 ± 1.5) in width, always offset from intestine. Cardia voluminous, hemispheric. Intestine a straight tube. Genital branches outstretched; proximal region as a quadricolumella. Tail straight (in only one case a marked ventral curvature was observed), conical up to 50 % of tail and then almost cylindrical up to the clavate terminus. Hyaline part occupying 46-78 % of tail length (65 ± 11.3); terminal third of the tail smooth; on the cuticle of one specimen were observed structures similar to those described as parasites for *P. elegans* (Thorne & Malek, 1968). Phasmid punctiform, 10-42 μm (30 ± 6.9) posterior to the anus, at 7-34 % (26 ± 5.7) of tail length.

Male: Body slightly ventrally curved after fixation. General morphology similar to females. Cuticle with fine transverse annulation about 1 μm wide at mid-body. Annulation of the subcuticle pronounced. Lateral field with the same pattern as indicated for females, occupying 23-35 % (30 ± 3.9) of body width. Labial area 4-5 μm (4.5 ± 0.4) in height, 8-9 μm (8.5 ± 0.4) in width, continuous with body contour. Face view and cephalic framework as for females. Median bulb at 82-104 μm (92 ± 5) from anterior end, 17-23 μm (20 ± 1.9) in length, 10-15 μm (11 ± 1.3) in width. Hemizonid four to six annules wide, located from just above excretory pore to up to four body annules anterior to excretory pore. Nerve ring at 96-126 μm (108 ± 8.3) from anterior end. Excretory pore located at 107-136 μm (121 ± 7) from anterior end. Deirids well marked at level of excretory pore. Isthmus long; oesophageal basal bulb 20-25 μm (22 ± 1.2) in length, 10-14 μm (12 ± 0.9) in width, offset from intestine. Cardia and intestine as in females. One testis elongate. Spicules and gubernaculum ventrally curved; in some cases, proximal end of gubernaculum strongly curved. Bursa adanal, finely striated. Tail conical, straight, gradually tapering over its whole length; terminus clavate. Hyaline part between 50-65 % of tail length (55 ± 7.08); terminal fourth of the tail smooth. Phasmid punctiform at 21-45 μm (33 ± 5.6) behind anus, 21-40 % (28 ± 4.9) of tail length.

Juveniles: General characteristics similar to those of females. It is assumed that the specimens found belong to the third larval stage because their reproductive system is only an outline, and no outlines of vagina or spicules are observed yet. It is represented by a tube of cellular structure, 70-130 μm (98 ± 29.13) long.

GEOGRAPHIC LOCALITY AND HABITAT

Associated with the roots of *Poa* sp., soil of natural meadow, sandy acid soil (pH = 6) in Ciudad de Amér-



ica, Santa María Department, Province of Córdoba, Argentina.

VOUCHER SPECIMENS

Deposited in the nematode collection of the following institutions: Laboratorio de Nematología, Centro de Zoología Aplicada, Universidad Nacional de Córdoba, Argentina (twelve males, eleven females and three juveniles); Muséum National d'Histoire Naturelle, Paris, France (two males and six females); USDA Nematode Collection, Maryland, USA (two males and one female); Laboratorium voor Dierkunde, Faculteit Wetenschappen, Ghent, Belgium (one male and one female).

REMARKS

The population of *P. hilarus* has general morphometrical and morphological characters corresponding to those of the type population (Siddiqi, 1963). In the present population, transversal striae on the labial area are difficult to see and their numbers may vary, whereas five striae were found in the type population.

Psilenchus pratensis n. sp.

(Fig. 2)

MEASUREMENTS

See Table 2.

DESCRIPTION

Female: When killed by gentle heating habitus straight or slightly curved ventrally. Body thin, elongate, cylindrical, with anterior end slightly flattened; posterior end conical, elongate. Cuticle with fine transverse annulation about 1 μm wide at mid-body. Annulation of the subcuticle pronounced. Lateral field marked by four incisures, not areolated, 23-32% (27 \pm 3.3) of body width, delimiting three bands of equal width (in only two cases the internal band wider than the lateral ones). The four incisures extending up to the vicinity of the phasmid. Labial area conical flattened, smooth, 3-5 μm (4 \pm 0.6) in height, 7-8 μm (7.5 \pm 0.5) in width, slightly set off from body. In face view, oral aperture circular, slightly prominent; amphidial apertures dorso-ventrally elongate. Cephalic framework well marked for the genus, hexaradiate, extending posteriorly up to five annules of body. Stylet with thin walls, without thickening at its base. Orifice of dorsal oesophageal gland located about 10 μm behind stylet base. Median bulb ovoid with crescentic valves in the middle, located 70-92 μm (78 \pm 5.6) from anterior end, 16-22 μm (18 \pm 1.4) in length, 9-19 μm (11 \pm 2.4) in width. Hemizonid extending between three to four body annules wide, located from just over the excretory pore to up to ten body annules of body anterior to it. Nerve ring located below the median

bulb, at 86-106 μm (93 \pm 6.3) from the anterior end. Excretory pore located at 106-118 μm (112 \pm 3.7) from the anterior end. Deirids clearly visible at level of excretory pore. Isthmus long, expanded into oesophageal basal bulb, 18-22 μm (20 \pm 1.1) in length, 9-12 μm (11 \pm 0.9) in width, offset from intestine (in one case the dorsal part of the oesophageal basal bulb slightly recovering the intestine). Cardia voluminous, hemispheric. Intestine a straight tube. Reproductive system didelphic with genital branches outstretched; ovary with oocytes in two-three rows; oviduct straight or tortuous; spermatheca full of refringent spermatozoa, mostly rounded, sometimes oval or rectangular in shape; proximal region as a quadricolumella; uterus elongate with thin walls; vagina straight; vulva transversely located in a slight depression. Tail conical, slightly curved ventrally, gradually tapering to the clavate tip. Terminal third of the tail devoid of annulation. Phasmid punctiform located at 25-40 μm (33 \pm 3.9) from the anus, or 20-29% (25 \pm 2.8) of tail length.

Male: When killed by gentle heating, habitus ventrally curved or having the shape of an open C. Body thin, elongate, cylindrical, with anterior end slightly flattened; posterior end conical, elongate. Cuticle with fine transverse annulation about 1 μm wide at mid-body. Annulation of subcuticle pronounced. Lateral field marked by four incisures, not areolated, 25-39% (33 \pm 4.6) of body width, with the same pattern as indicated for females; external and internal incisures extending to the proximity of phasmid. Labial area same as in females, 3-4 μm (3.5 \pm 0.2) in height, 7 μm (7 μm \pm 0) in width, slightly set off from body. Face view, cephalic framework, and stylet as in females. Median bulb ovoid with crescentic valves in the middle, located 60-98 μm (77 \pm 8.3) from anterior end, 15-19 μm (17 \pm 0.8) in length, 7-10 μm (8 \pm 0.7) in width. Hemizonid between three to four body annules wide, located from just above the excretory pore to up to four body annules anteriorly. Nerve ring located below the median bulb, at 76-110 μm (90 \pm 7.4) from the anterior end. Excretory pore located at 96-114 μm (106 \pm 3.58) from the anterior end. Deirids clearly visible at the level of excretory pore. Isthmus long, expanded into oesophageal basal bulb, 17-23 μm (18 \pm 1.8) in length, 8-12 μm (10 \pm 0.9) in width, offset from intestine. Cardia and intestine as in females. Testis simple, elongate. Spicules well developed, ventrally curved. Gubernaculum regularly curved or with proximal end deeply curved. Bursa short, or extending to the level of phasmids (in two specimens), finely striated. Tail conical, straight, gradually tapering, terminus clavate; in one specimen tail terminus dorsally curved. Terminal third of the tail devoid of annulation. Phasmid punctiform located at 27-42 μm (35 \pm 4.8) from anus, 20-32% (25 \pm 3.3) of tail length.

Juveniles: General characteristics similar to those of females. It is assumed that the specimens found belong

Table 2. Morphometrics of *Psilenchus pratensis* n. sp. from Córdoba, Argentina.

	Females		Males		Juveniles
	Holotype	Paratype	Allotype	Paratype	
n		13		20	3
L (mm)	1.03	1.1 ± 0.08 [7.2] (0.97-1.24)	0.95	0.9 ± 0.06 [6.6] (0.84-1.1)	0.8 ± 0.04 [5] (0.76-0.84)
Body diameter	20	20 ± 2.6 [13] (17-26)	18	17 ± 1.7 [10] (14-20)	16 ± 0 [0] (16-16)
a	51.5	53.2 ± 4.4 [8.2] (45.4-59.3)	53	58.8 ± 5.5 [9.3] (49.1-76.2)	49.4 ± 2.4 [4.8] (47.6-52.2)
Oesophagus length	143	140 ± 10.1 [17.2] (130-166)	134	137 ± 12.7 [9.2] (116-174)	117 ± 3.5 [2.9] (114-119)
b	7.2	7.7 ± 0.8 [10.3] (6.2-9.1)	7.1	7.1 ± 0.5 [7] (6.1-7.8)	6.8 ± 0.6 [8.8] (6.4-7.3)
MB	56	55.9 ± 1.29 [2.3] (53.6-58.1)	60	56.3 ± 1.7 [3] (57.1-59.2)	-
Stylet	13	13 ± 1 [7.6] (12-15)	12	13 ± 0.7 [5.3] (11-14)	12.5 ± 0.57 [4.5] (12-13)
Conus	6	6 ± 0.8 [13.3] (5-7)	5	5 ± 0.8 [16] (4-6)	5 ± 1 [20] (4-6)
m	46.15	47.7 ± 5.6 [11.9] (38.4-58.3)	41.66	41.3 ± 5.5 [13.3] (30.7-50)	-
dgo	-	5.5 ± 1 [18.1] (4-6)	-	(n = 4) 7 ± 0.8 [11.5] (6-8)	-
O	-	40.7 ± 7.8 [19.1] (31-50)	-	(n = 4) 52.6 ± 5.8 [11] (46.1-61.5)	-
V	50	49 ± 2.1 [4.2] (46-55)	-	-	-
V'	58.76	54.7 ± 2.5 [4.5] (50.5-61.2)	-	-	-
Tail length	135	133.5 ± 10.1 [7.5] (110-144)	154	137 ± 11.1 [8.1] (110-157)	107 ± 13.9 [12.9] (91-116)
C	7.6	8.2 ± 0.7 [8.5] (7.2-9.8)	6.2	7.1 ± 0.5 [7] (6.1-8.7)	7.4 ± 0.8 [10.8] (6.7-8.4)
Body diameter et anus	13	14 ± 1.3 [9.2] (12-16)	16	14 ± 0.9 [6.4] (12-16)	13 ± 1 [7.6] (12-14)
c'	10.4	9.3 ± 0.9 [9.6] (8.3-11)	9.6	9.6 ± 0.9 [9.3] (7.3-11.1)	8.2 ± 0.6 [7.3] (7.6-8.7)
Spicules	-	-	29	28 ± 1.6 [5.7] (25-32)	-
Gubernaculum	-	-	10	10 ± 0.9 [9] (8-12)	-

All measurements are in μm , except body length. The disposition of the measurements correspond to the following arrangement : arithmetic mean \pm standard deviation; coefficient of variation between square brackets; range.

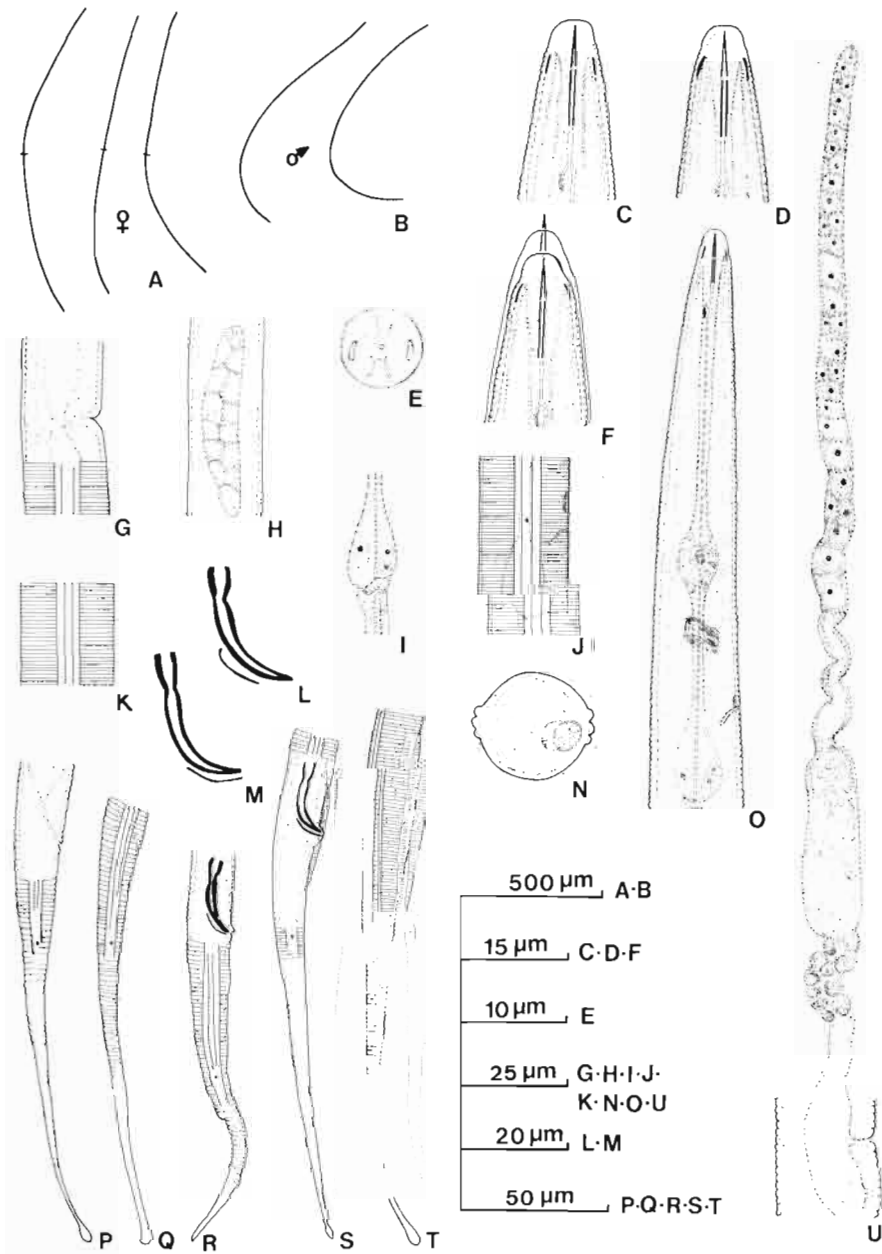


Fig. 2. *Psilenchus pratensis* n.sp. – Female. A : Habitus; C : Anterior region (lateral view); E : Anterior region (en face view); G : Vulvar region (lateral view); I : Oesophagus - intestine junction; J : End of oesophagus (lateral view); K : Mid-body region (lateral view); N : Cross section at middle of body; O : Oesophageal region (lateral view); P, Q : Tails (lateral view); U : Genital branch (anterior portion) – Male. B : Habitus; D : Anterior region (lateral view); K, L : Spicules and gubernaculum; R, S : Tails (lateral view); T : Tail (ventro-lateral view) – Juvenile (J3). H : Reproductive system.

Table 3. Morphometrics of *Psilenchus bahiablancae* n. sp. from Buenos Aires, Argentina.

	Females		Males		Juveniles (J2)	Juveniles (J3)	Juveniles (J4 ♀)	Juveniles (J4 ♂)
	Holotype	Paratype	Allotype	Paratype				
n		31		15	2	3	4	1
L (mm)	1.27	1.4 ± 0.1 [7.1] (1.1-1.5)	1.05	1.1 ± 0.1 [9] (0.9-1.3)	0.5 ± 0.07 [12.7] (0.5-0.6)	0.7 ± 0.02 [2.8] (0.7-0.8)	1 ± 0.04 [4] (0.9-1)	0.98
Body diameter	25	26 ± 3.1 [1.9] (18-32)	18	20 ± 1.9 [9.5] (16-23)	13 ± 1.4 [10.7] (12-14)	15 ± 2.3 [15.3] (14-18)	22 ± 1.2 [5.4] (21-24)	20
a	50.8	52.7 ± 4.9 [9.2] (45.7-70.2)	58	56.7 ± 3.1 [5.4] (50.5-61.8)	45.7 ± 3.9 [8.5] (45.2-48.5)	50.3 ± 5.6 [11.1] (43.9-54.5)	45.6 ± 1.9 [4.1] (43.1-47.9)	49.3
Oesophagus length	138	137 ± 7.2 [5.2] (122-148)	137	131 ± 7.5 [5.7] (117-148)	108 ± 2.8 [2.5] (106-110)	117 ± 1.1 [0.9] (116-118)	131 ± 8.7 [6.6] (120-138)	136
b	9.2	9.8 ± 0.7 [7.1] (8.4-11.6)	7.7	8.7 ± 0.8 [9.1] (6.9-9.9)	5.5 ± 0.1 [2.5] (5.4-5.6)	6.5 ± 0.1 [1.5] (6.3-6.7)	7.8 ± 0.4 [5.1] (7.3-8.2)	7.2
MB	55	54.7 ± 1.4 [2.5] (51.4-58.1)	57	55.9 ± 1.9 [3.3] (52.9-59.6)	-	-	-	-
Stylet	14	14.5 ± 0.9 [6.2] (13-17)	13	14 ± 0.9 [6.4] (13-15)	12 ± 0 [0] (12-12)	13 ± 1 [7.6] (12-14)	13 ± 1.5 [11.5] (12-15)	13
Conus	4	5 ± 0.8 [16] (4-7)	5	5 ± 0.6 [12] (5-7)	4 ± 0 [0] (4-4)	5 ± 1 [20] (4-6)	4.5 ± 0.5 [11.1] (4-5)	5
m (n = 28)	28.57	37.6 ± 6 [15.9] (28.5-53.8)	38.46	37.3 ± 3.8 [10.18] (33.3-46.6)	-	39.1 ± 9.6 [24.5] (31.7-50)	34.1 ± 5.4 [15.8] (28.5-41.6)	-
dgo (n = 9)	-	7 ± 0.9 [13.4] (5-9)	-	-	-	-	-	-
O (n = 9)	-	46.5 ± 17.1 [36.7] (35.7-61.5)	-	-	-	-	-	-
V	47	46 ± 1.8 [3.9] (43-50)	-	-	-	-	-	-
V'	53	51.5 ± 2.01 [3.9] (48.4-55.9)	-	-	-	-	-	-
Tail length	164	163 ± 17.4 [10.6] (114-192)	152	159 ± 19.9 [12.5] (131-186)	70 ± 11.3 [16.1] (62-78)	100 ± 0 [0] (100-100)	125.5 ± 6.2 [4.9] (120-134)	130
c	7.7	8.3 ± 0.7 [8.4] (7.4-11.5)	6.9	7.1 ± 0.5 [7] (6.3-8.1)	8.6 ± 1.6 [18.6] (7.4-9.6)	7.6 ± 0.2 [2.6] (7.3-7.9)	8.1 ± 0.3 [3.7] (7.6-8.4)	7.1
Body diameter at anus	16	18 ± 1.4 [7.7] (16-22)	18	17 ± 1.1 [6.4] (16-19)	10.5 ± 2.1 [20] (9-12)	13 ± 1.1 [8.4] (12-14)	16.5 ± 0.5 [3] (16-17)	18
c'	10.2	9.1 ± 0.9 [9.8] (6.7-11.1)	8.4	9.3 ± 1.2 [12.9] (8-11.6)	6.9 ± 2.4 [34.7] (5.1-8.6)	7.9 ± 0.7 [8.8] (7.1-8.3)	7.7 ± 0.2 [2.5] (7.5-7.8)	7.6
Spicules	-	-	30	33.5 ± 2.1 [6] (30-38)	-	-	-	-
Gubernaculum	-	-	11	12.5 ± 1.5 [12] (10-15)	-	-	-	-

All measurements are in μm , except body length. The disposition of the measurements correspond to the following arrangement : arithmetic mean \pm standard deviation; coefficient of variation between square brackets; range.



Table 5. Correlations coefficients between couplets of morphometrical characters in three species of *Psilenchus*.

Characters	r	<i>P.</i> <i>hilarus</i>	<i>P.</i> <i>pratensis</i> n. sp.	<i>P.</i> <i>bahiablancae</i> n. sp.
Body length/Oesophageal length	0.44	0.56*	0.09	0.17
Body length/Distance between anterior end and excretory pore	0.43	0.54*	0.08	0.50
Body length/Distance between base of oesophagus and vulva	0.80	0.79*	0.87*	0.89*
Body length/Distance between anterior end and vulva	0.87	0.87*	0.91*	0.94*
Body length/Distance between vulva-anus	0.83	0.93*	0.69*	0.77*
Body length/Tail length	0.60	0.74*	0.31	0.36
Oesophagus length/Distance between anterior end and excretory pore	0.45	0.46*	0.59*	0.29
Oesophagus length/Distance between base of oesophagus and vulva	0.10	0.33	-0.22	-0.05
Oesophagus length/Distance between anterior end and vulva	0.32	0.47*	-0.05	0.18
Oesophagus length/Distance between vulva-anus	0.41	0.53*	0.17	0.20
Oesophagus length/Tail length	0.48	0.65*	0.32	0.25
Distance between anterior end and excretory pore/Distance between base of oesophagus and vulva	0.23	0.41*	-0.16	0.13
Distance between anterior end and excretory pore/Distance between anterior end and vulva	0.33	0.48*	-0.05	0.47*
Distance between anterior end and excretory pore/Distance between vulva-anus	0.38	0.48*	0.27	0.34
Distance between anterior end and excretory pore/Tail length	0.40	0.44*	-0.07	0.62*
Distance between base of oesophagus and vulva/Distance between anterior end and vulva	0.95	0.91*	0.99*	0.97*
Distance between base of oesophagus and vulva/Distance between vulva-anus	0.50	0.63*	0.34	0.55*
Distance between base of oesophagus and vulva/Tail length	0.32	0.47*	0.28	-0.06
Distance between anterior end and vulva/Distance between vulva-anus	0.50	0.67*	0.34	0.60*
Distance between anterior end and vulva/Tail length	0.44	0.59*	0.35	0.22
Distance vulva-anus/Tail length	0.39	0.61*	-0.14	0.21
Tail length/Stylet length	0.05	0.04	0.40	-0.35
Body length/b	0.63	0.59*	0.74*	0.74*
Body length/c	0.24	0.00	0.49	0.64*
Body length/c'	0.03	0.24	0.47	-0.69*
Body length/V	-0.32	-0.49*	-0.43	-0.22
Body length/V'	-0.33	-0.39*	0.32	-0.49*
Body length/MB	-0.25	-0.29	-0.13	-0.19
Oesophagus length/V	-0.30	-0.45*	-0.20	-0.11
Oesophagus length/MB	-0.25	-0.43*	-0.02	-0.24
Distance between anterior end and vulva/MB	-0.15	-0.17	-0.36	-0.06
Distance between anterior end and vulva/V	0.17	-0.05	0.79*	0.13
Tail length/c	-0.62	-0.66	-0.67	-0.49*
Tail length/c'	0.65	0.73*	0.42	-0.13

(Numbers followed by * are significantly different at the 0.05 level)

and *P. hilarus*). In the rest of the characters, the CV can be different according to the species (oesophagus length: CV = 5.2 in *P. bahiablancae* n. sp., 5.3 in *P. hilarus*, and 17.2 in *P. pratensis* n. sp.; conus of stylet: CV = 5.7 in *P. hilarus*, 13.3 in *P. pratensis* n. sp. and 16 in *P. bahiablancae* n. sp.).

The CV for the same character was more or less different between females and males of each species depending on the considered species. If this difference is

indicated as a percentage, that for ratio "a", for example, is 2% in *P. hilarus*, 12% in *P. pratensis* n. sp., and 41% in *P. bahiablancae* n. sp.

Range of variability of morphometrical characters in the genus *Psilenchus* would be different for different species. It has been observed in *P. aestuarius*, *P. hilarulus* and *P. terextremus* that the smallest CV correspond to the following characters: oesophagus length, stylet length, distance between anterior end and excretory

Table 6. Ratios of correlation coefficients of selected characters in three *Psilenchus* species.

X	Y	<i>P. hilarus</i>	<i>P. pratensis</i> n. sp.	<i>P. bahiablanceae</i> n. sp.
Body length	Distance between base of oesophagus and vulva	0.99	0.49	0.86
Body length	Oesophagus length	1.51	1.05	1.34
Body length	Distance between anterior end and excretory pore	1.21	2.04	1.17
Body length	Distance between anterior end and vulva	1.10	0.68	1.04
Body length	Distance between vulva and anus	0.75	0.85	0.52
Body length	Tail length	0.74	0.93	1.08
Oesophagus length	Distance between anterior end and excretory pore	0.80	1.93	0.87
Oesophagus length	Distance between base of oesophagus and vulva	0.65	0.46	0.64
Oesophagus length	Distance between vulva and anus	0.50	0.80	0.39
Distance between anterior end and excretory pore	Distance between base of oesophagus and vulva	0.81	0.23	0.73
Distance between anterior end and vulva	Distance between vulva and anus	0.68	1.24	0.50
Distance between vulva and anus	Tail length	0.98	1.10	2.05

pore, stylet length + distance between stylet base and orifice of dorsal oesophageal gland (Brzeski, 1989). Despite that, the same author indicates for *P. vinciguerrae* that the smallest CV is of the "distance between anterior end and centre of median bulb" character (Brzeski, 1991).

Correlation coefficients between different morphometrical characters for each of *P. hilarus*, *P. pratensis* n. sp., and *P. bahiablanceae* n. sp. were calculated (Table 5). Significant correlations were observed only among few characters for all three species (body length – distance between oesophagus base and vulva; body length – distance between anterior end and vulva; body length – distance between vulva and anus; distance between oesophagus base and vulva – distance between anterior end and vulva; body length – ratio b; tail length – ratio c). For the majority of the other characters correlation is positive especially in *P. hilarus*. In this species, the correlation between distance between vulva and anus – tail length is significant; for the other two species correlation

is not significant, just as it was observed for *P. vinciguerrae* (Brzeski, 1991).

Ratios between coefficients of variability were calculated for some characters (Table 6). For a few of them, and not for all three species simultaneously, the values are near to 1 (the regression line does not pass through the origin); for the others, values were greatly different from other species in this genus (Brzeski, 1989; 1991).

The results obtained in this work and comparisons made between morphometrical characters do not allow definitive conclusions for the genus *Psilenchus* (the number of measured specimens was different for each species and probably not high enough in all the cases). They show that the morphometrical characters would change in different ways according to the species.

The following key is based in the use of morphological characters (except spicules length).

Key to the species of *Psilenchus*

- 1 – Labial area striated 2
- Labial area smooth 6
- 2 – Labial area rounded *gigas* Thorne & Malek, 1968
- Labial area truncate 3
- 3 – Lateral field with two incisures ... *striatus* Thorne, 1949
- Lateral field with four incisures 4
- 4 – Tail conical up to 50 % of its length and then almost cylindrical up to the tip *hilarus* Siddiqi, 1963
- Tail conical, gradually tapering to the tip 5
- 5 – External incisures of lateral field smooth. Post anal intestinal lobe present *iranicus* Kheri, 1970
- External incisures of lateral field crenated. Post anal intestinal lobe absent *elegans* Thorne & Malek, 1968
- 6 – Labial area rounded 7
- Labial area truncated 13
- 7 – Lateral field with two incisures 8
- Lateral field with four incisures 9
- 8 – Spicules 18–21 µm long *bilineatus* Mizukubo & Nakasono, 1987
- Spicules 24–26 µm long *pini* Lal & Khan, 1990
- 9 – External incisures of lateral field crenated. Post anal intestinal lobe present *aestuarius* Andrassy, 1962
- External incisures of lateral field smooth. Post anal intestinal lobe absent 10
- 10 – Tail tapering to bluntly rounded terminus *klingleri* Brzeski, 1989
- Tail terminus clavate 11
- 11 – Internal band of lateral field wider than the external ones *magnificus* Lal & Khan, 1991
- Bands of lateral field of equal width 12
- 12 – Tail conical up to 50 % of its length and then almost cylindrical up to the tip. Spicules 29 µm long *neoformis* Jairajpuri & Siddiqi, 1963
- Tail conical, gradually tapering to the tip. Spicules 30–38 µm long *bahiablanceae* n. sp.

- 13 - Lateral field with two incisures
 *intermedius* Thorne & Malek, 1968
 - Lateral fields with more than two incisures 14
- 14 - Lateral field with three or five incisures. Posterior end of stylet with minute swellings
 *vinciguerrae* Brzeski, 1991
 - Lateral field with four incisures. Posterior end of stylet without minute swellings 15
- 15 - Tail terminus clavate. Spicules 25-32 μm long
 *pratensis* n. sp.
 - Tail tapering to bluntly round terminus. Spicules shorter than 18-24 μm long 16
- 16 - External incisures of lateral field crenated, inner portion areolated around anal region
 *terextremus* Hagemeyer & Allen, 1952
 - External incisures of lateral field smooth, inner portion not areolated *hilarulus* de Man, 1921

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