

## *Pratylenchoides hispaniensis* n. sp. (Nemata: Pratylenchidae)

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**Abstract:** *Pratylenchoides hispaniensis* n. sp. is described and illustrated from a bisexual population found in a natural habitat at Santa Elena, Jaen, central Spain. Its main distinctive characters are very long esophageal gland lobe (81–117  $\mu\text{m}$ ;  $N' = 51\text{--}71$ ) overlapping the intestine 3 to 5 times the body width; lateral field with six incisures; stylet knobs sloping posteriorly; labial disc encircled by the irregular sectors of the first annule; tail cylindrical, extremity annulated, and frequently with a slight dorsal indentation of the hyaline portion at the end of the lateral field. *Pratylenchoides hispaniensis* n. sp. appears closely related to *P. megalobatus* and *P. nevadensis*. It differs from the former primarily by its longer body length (761–998 vs. 430–621  $\mu\text{m}$ ), longer stylet length (20.5–24.4 vs. 18–21  $\mu\text{m}$ ), six incisures in the lateral field vs. four for *P. megalobatus*, and posteriorly sloping stylet knobs vs. rounded or anteriorly flattened knobs in *P. megalobatus*. It differs from *P. nevadensis* mainly by the shape of the stylet knobs (sloping in *P. hispaniensis* vs. rounded in *P. nevadensis*), length of esophageal lobe (81–117 vs. 34–82  $\mu\text{m}$ ), and position of esophageal gland nuclei (all posterior to esophago-intestinal junction in *P. hispaniensis* vs. at least one nucleus anterior to junction in *P. nevadensis*).

**Key words:** morphology, nematode, new species, *Pratylenchoides hispaniensis*, scanning electron microscopy, taxonomy.

Specimens of a bisexual population belonging to the genus *Pratylenchoides* Winslow, 1958 and characterized by a very long esophageal gland lobe were found among plant-parasitic nematodes extracted from soil samples collected in a natural habitat in Central Spain. Talavera and Tobar (1996) described *P. nevadensis* from southern Spain as also having long esophageal gland lobes overlapping the intestine 1.5 to 2 body widths, and proposed a key for the 20 species of the genus, based on females. The long esophageal gland lobe overlapping the intestine is the primary distinguishing character for at least six species (*P. alkani*, *P. bacilisemenus*, *P. megalobatus*, *P. nevadensis*, *P. ritteri*, and *P. utahensis*). Observations with light and scanning electron microscopy indicated that our specimens should be assigned to a new species and included in the above-mentioned group primarily because they have a greater esophageal gland lobe length than any other known *Pratylenchoides* sp. This new taxon is described as *Pratylenchoides hispaniensis* n. sp. The specific

name refers to the geographic epithet (Latin *hispaniensis* = spanish, from Spain).

### MATERIALS AND METHODS

Specimens used in this study were extracted from soil samples with magnesium sulfate centrifugal flotation (Coolen, 1979). Specimens for light microscopy were killed with gentle heat, fixed in a solution of 4% formaldehyde + 1% propionic acid, and processed to pure glycerin with Seinhorst's method (1966). Wergin's methods (1981) were used for the preparation of specimens for SEM observations. Accelerating voltage of 5–10 kV was used during SEM observations. Abbreviations used are defined in Siddiqi (1986). The "overlapping coefficient" ( $N' = m/n \times 100$ ) is used as defined by De Guiran and Siddiqi (1967) and Baldwin et al. (1983). All measurements are in micrometers ( $\mu\text{m}$ ) unless otherwise stated. Means in the text are presented along with their standard deviations and ranges in parentheses.

### SYSTEMATICS

*Pratylenchoides hispaniensis* n. sp.  
(Table 1, Figs. 1–3)

*Holotype* (female in glycerin): L = 919; maximum body width = 29; anal body width =

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TABLE 1. Morphometric data of paratypes of *Pratylenchoides hispaniensis* n. sp.

Morphological characters*	Females (n = 20)			Males (n = 6)		
	Mean	SD	Range	Mean	SD	Range
Measurements in $\mu\text{m}$						
Body length	897	64.9	761–998	848	75.2	777–977
Maximum body width	29.5	2.6	24.0–35.3	27.1	4.1	22.4–32.2
Anal body width	19.3	3.1	13.2–13.6	19	1.1	17.2–20
Esophagus length (valve)	139	9.9	123–158	120	6.8	107–127
Esophagus length (total)	239	10.6	219–260	164	17.4	141–189
Esophagus overlap	101	9.5	81–117	44	17.7	22–63
Excretory pore from anterior end	136	7.5	124–146	125	11.1	113–139
Stylet length	22.7	0.9	20.5–24.4	20	1.3	18.5–21.8
D.G.O. from stylet base	3.1	0.4	2.3–3.6	2.0	0.4	1.5–2.6
Tail length	58.3	5.8	47.0–66.4	61	7.2	52.1–72
Spicules	–	–	–	25.8	1.6	23.1–27.7
Gubernaculum	–	–	–	7.2	1.0	5.9–8.6
Percentages						
O	14	2.1	10–16	12	2.1	8–14
V or T	57	2.3	53–62	30	3.4	27–36
G1	20	2.2	15–25	–	–	–
G2	20	2.0	16–25	–	–	–
Ratios						
a	30.6	3.0	24.0–35.4	31.6	2.7	28.7–35.1
b	6.5	0.6	5.6–7.7	7.1	0.8	6.5–8.3
b'	3.7	0.2	3.3–4.2	5.2	0.5	4.7–6.0
c	15.5	1.4	13.5–18.6	14	1.2	12.3–15.4
c'	3.1	0.5	2.4–4.6	3.2	0.3	2.7–3.8

\* Abbreviations defined in Siddiqi (1986).

19.8; distance from head to median bulb = 74; esophagus length = 250; esophagus overlap of intestine = 117;  $N' = 66$ ; excretory pore from anterior end = 137; stylet length = 23.1; D.G.O. = 2.3; tail length = 56;  $V\% = 57$ ;  $G1\% = 19$ ;  $G2\% = 21$ ;  $a = 31.7$ ;  $b = 6.9$ ;  $b' = 3.7$ ;  $c = 16.4$ ;  $c' = 2.8$ ; lateral field = 8.9; tail annuli = 30; tail hyaline portion = 10.8.

*Paratypes in glycerin* ( $n = 20$ ): Measurements and ratios are reported in Table 1.

### Description

*Female*: Body slender, with sinuous posture when heat-relaxed. Lip region bluntly rounded, with 4–5 annuli; labial sclerotization conspicuous. In SEM face view, labial disc, hexagonal encircled by a faintly and irregularly divided first lip annule (Figs. 2H, 3A). Lip pattern consisting of a partial fusion of the labial disc with fused submedial lip sectors, and weakly set off from the adjacent lateral lip sectors. Anterior and posterior cephalids  $8.0 \pm 0.4$  (7.3–8.6) and

$15 \pm 1.1$  (14–17), respectively, from anterior end. Stylet strong, knobs sloping posteriorly. Excretory pore level with esophago-intestinal junction; hemizonid 1 to 4 annuli anterior to pore. Deirids level with hemizonid (Fig. 2C). Esophagus strongly developed; median bulb oval,  $14 \pm 1.0$  (13–16)  $\times$   $23 \pm 1.3$  (20–25). Isthmus about twice the length of median bulb, surrounded in the middle by the nerve ring. Esophageal glands extremely long; measured from the esophago-intestinal valve to the terminus, glands overlapping intestine about 4 times the body width, with overlapping coefficient  $N' = 61 \pm 4.7$  (51–71). Dorsal and subventral gland nuclei appearing to be in a row, always posterior to esophago-intestinal junction (Fig. 2C). Gonads outstretched with oocytes in single row, anterior and posterior gonads  $181 \pm 18.8$  (148–219) and  $182 \pm 20.3$  (135–244) long, respectively; spermathecae rounded, filled with round sperm (Figs. 1C, 2H) in about the 20% of paratype females. Annuli  $1.8 \pm 0.1$  (1.6–2.1) wide at mid-body.

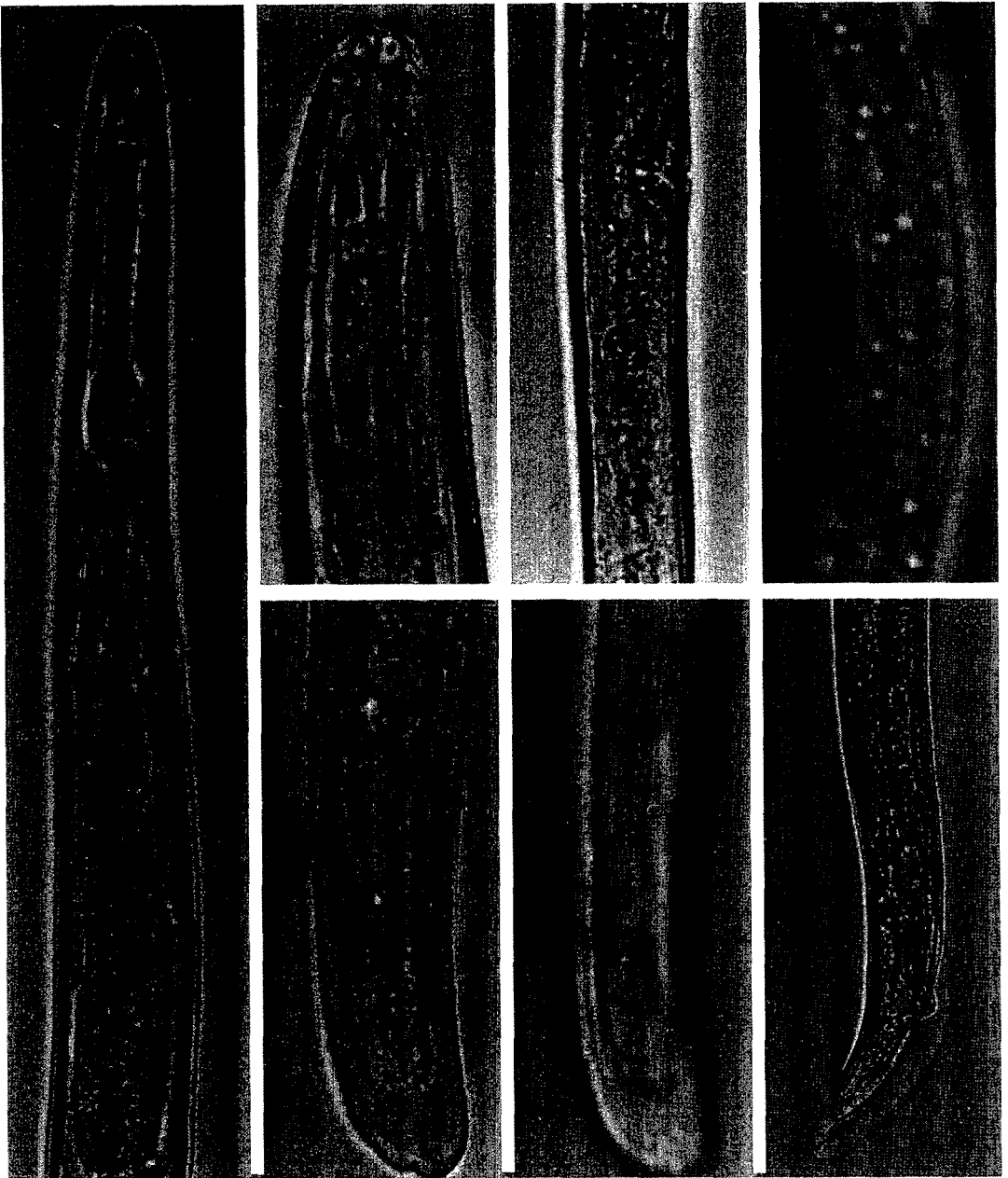


FIG. 1. Photomicrographs of *Pratylenchoides hispaniensis* n. sp. female (A-F), and male (G) (scale bar = 20  $\mu$ m). A) Esophageal region. B) Anterior body. C) Vulval region. D) Lateral field. E-G) Caudal regions at different foci (arrows: esophageal gland nuclei, ev = esophago-intestinal valve; lf = lateral field; ph = phasmid opening).

Each lateral field with six incisures (Figs. 1D, 2E, 3B, C); in the tail region the incisures reduced to 5 or 4 with external bands areolated (Figs. 1E, G, 2L). Tail nearly cylindrical, rounded and smooth posteriorly, or coarsely annulated. A slight dorsal indentation at terminus occasionally observed (Figs. 1E, 2J).

Phasmids in posterior part of tail,  $24 \pm 3.2$  (17-30) from terminus,  $34 \pm 5.4$  (20-42) from anal opening (Fig. 2J-L).

*Allotype (male in glycerin)*: L = 903; maximum body width = 27.7; anal body width = 20.5; distance from head to median bulb = 70; esophagus length = 184; esophagus over-

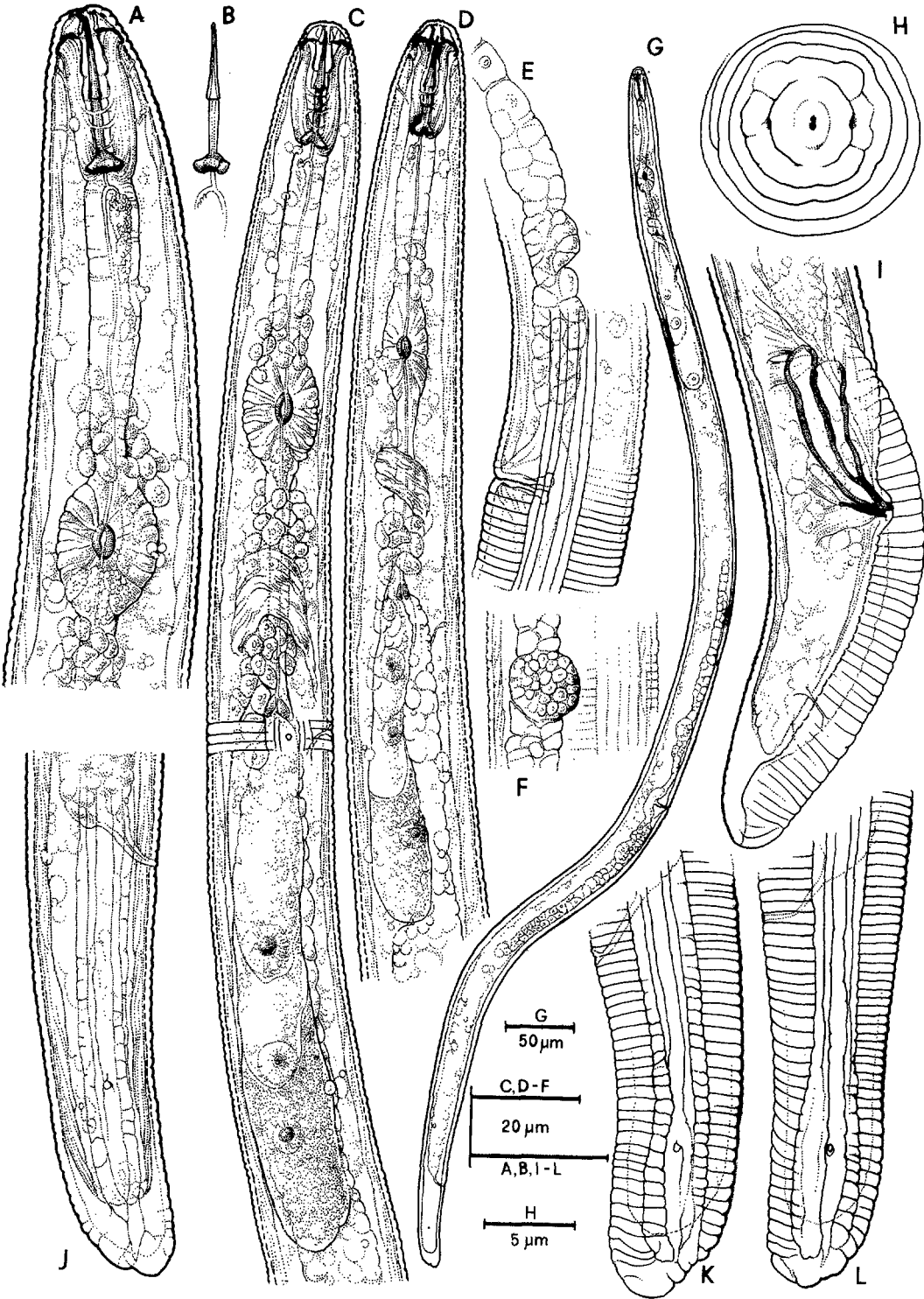


FIG. 2. *Pratylenchoides hispaniensis* n. sp. A) Female anterior region. B) Female stylet. C) Female esophageal region. D) Male esophageal region. E) Vulval region. F) Spermatheca with round sperm. G) Entire female. H) Female SEM face view. I) Male caudal region. J-L) Female tails.

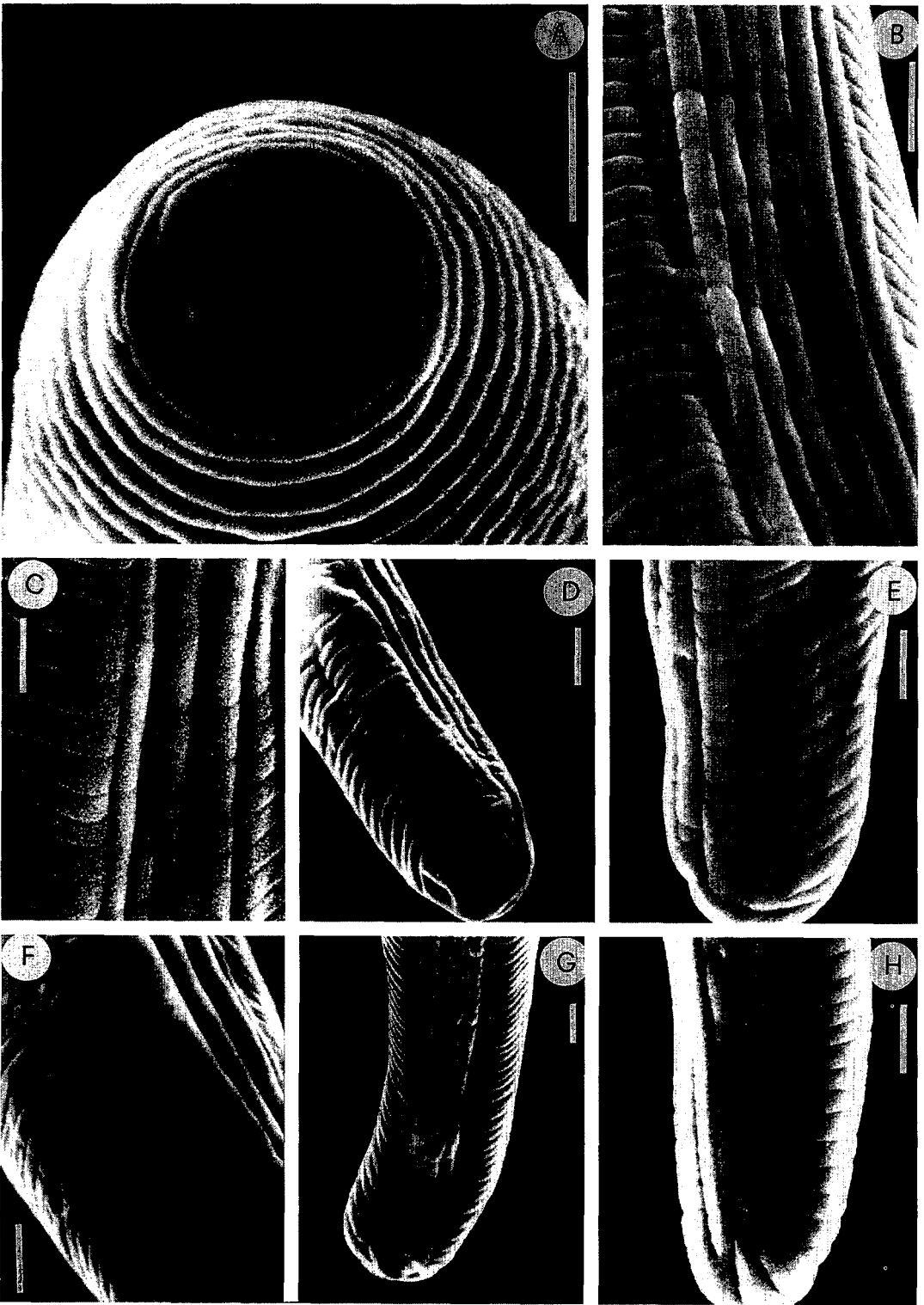


FIG. 3. SEM micrographs of female of *Pratylenchoides hispaniensis* n. sp. (scale bar = 5  $\mu$ m). A) Face view. B,C) Lateral field. D,E,G,H) Female caudal regions showing phasmid opening. F) Latero-ventral view at level of anus.

lap of intestine = 57;  $N' = 50$ ; excretory pore from anterior end = 145; stylet length = 19.1; D.G.O. = 2.6; tail length = 68; testis = 300; spicules = 26.4; gubernaculum = 7.3;  $T\% = 33$ ;  $a = 32.6$ ;  $b = 7.1$ ;  $b' = 4.9$ ;  $c = 13.3$ ;  $c' = 3.3$ ; lateral field = 9.2.

*Paratypes in glycerin* ( $n = 6$ ): Measurements and ratios are reported in Table 1.

### Description

Males less abundant than females. Body shape similar to female. Stylet less robust than that of female, knobs rounded and sloping posteriorly (Fig. 2D). Esophagus slightly less developed than in females, overlapping intestine 1 to 3 times the body width. Spicules curved, weakly cephalated; gubernaculum slightly curved (Fig. 2I). Tail conical, bursa enveloping tail, protruding moderately ventrally, slightly crenated, and extending to the tail tip. Lateral field with six incisures.

### Type host and locality

Holotype female, allotype male, and paratypes from a population extracted from soil samples collected in October 1996 in natural habitat at Santa Elena, Jaen, in central Spain, mainly in the rhizosphere of cork trees (*Quercus suber* L.).

### Type designations

Holotype female, allotype male, and additional paratypes deposited in the Nematode Collection at Istituto di Nematologia Agraria, CNR, Via G. Amendola, 168/5, 70126 Bari, Italy. Other paratype females deposited at the University of California, Davis Nematode Collection, Davis, California; USDANC, Beltsville, Maryland; Entomology and Nematology Department, Rothamsted Experimental Station, Harpenden, England; Museum National d'Histoire naturelle, Paris, France; and Nematode Collection of the Department of Nematology, Landbouwniversiteit, Wageningen, The Netherlands.

### Diagnosis and relationships

*Pratylenchoides hispaniensis* n. sp. is a bisexual species characterized by a long over-

lap of the esophageal gland lobes over the intestine, body length 761–998, stylet length 20.5–24.4 with posteriorly sloping knobs, and six incisures in the lateral field. According to the species-grouping scheme of Baldwin et al. (1983), *P. hispaniensis* n. sp. should be placed into group 3 on the basis of having both subventral gland nuclei posterior to the esophago-intestinal valve. *Pratylenchoides hispaniensis* n. sp. is close to *P. megalobatus* Bernard, 1984 (Bernard, 1984), but the two species, both with extremely long esophageal gland lobes, are distinctive in several respects: *P. hispaniensis* n. sp. has six incisures in the lateral field, whereas *P. megalobatus* has four; the stylet is stout in both species, but in *P. hispaniensis* n. sp. the knobs slope backward, while in *P. megalobatus* the rounded knobs have flattened anterior surfaces; and females of *P. hispaniensis* have a longer body (761–998 vs. 430–621) and a longer stylet (20.5–24.4 vs. 18–21). *P. hispaniensis* also resembles the bisexual Spanish species *P. nevadensis* Talavera & Tobar, 1996 (Talavera and Tobar, 1986), with respect to the long esophageal gland lobes, six incisures in the lateral field, stylet length, and tail shape, but differs from it in having sloping stylet knobs, longer intestinal overlap of the esophageal gland lobes (81–117 vs. 34–82), position of esophageal nuclei (all posterior to the esophago-intestinal valve vs. at least one nucleus anterior to the valve), median bulb more posterior than in *P. nevadensis* (head-MB = 60–81 vs. 48–57), and well-developed esophageal gland lobes in males vs. greatly reduced esophageal gland lobes in males of *P. nevadensis*.

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