

## Nematodes of the order Dorylaimida from Andalucía Oriental, Spain. The family Tylencholaimellidae Jairajpuri, 1964. Part 2

Manuel PERALTA and Reyes PEÑA SANTIAGO

Universidad de Jaén. Departamento de Biología Animal, Vegetal y Ecología, Virgen de la Cabeza nº 4, 23008-Jaén, Spain.

Accepted for publication 16 December 1994.

**Summary** – This paper deals with six species of nematodes belonging to the family Tylencholaimellidae Jairajpuri, 1964 which have been collected from nature areas from Southeastern Spain: *Tylencholaimellus cinctus* Orr & Dickerson, 1965, *T. loofi* Peña Santiago, Peralta & Siddiqi, 1993, *T. paracinctus* sp. n., *T. raskii* Jairajpuri & Siddiqi, 1963, *Margollus hispanicus* (Peña Santiago & Coomans, 1990) Peña Santiago, Peralta & Siddiqi, 1993 and *Doryllium labiatum* Andrassy, 1987. Except for *T. loofi* and *M. hispanicus* the species are described and illustrated. *T. paracinctus* sp. n. is characterized by its small size (L = 0.65-0.86 mm), lip region slightly angular and offset by constriction, odontostyle = 10-12.5  $\mu\text{m}$ , odontophore = 6.5-9.0  $\mu\text{m}$  (total stylet length = 17.5-20.5  $\mu\text{m}$ ), V = 32.6-41.7, prevulval uterine sac = 23-80  $\mu\text{m}$  or 0.9-2.8 body diameters long, tail conical with rounded terminus (20.5-30  $\mu\text{m}$ , c = 26.9-43.4, c' = 1.05-1.58 in females and 20-23  $\mu\text{m}$ , c = 31.7-37.7, c' = 1.0-1.3 in males), spicules = 26-29  $\mu\text{m}$ , and a single ventromedian supplement.

**Résumé** – *Nématodes de l'ordre des Dorylaimida provenant d'Andalousie orientale, Espagne. La famille des Tylencholaimellidae. Partie 2.* – Le présent article traite de six espèces de nématodes appartenant à la famille des Tylencholaimellidae Jairajpuri, 1964 collectées dans des sites naturels du sud-est de l'Espagne: *Tylencholaimellus cinctus* Orr & Dickerson, 1965, *T. loofi* Peña Santiago, Peralta & Siddiqi, 1993, *T. paracinctus* sp. n., *T. raskii* Jairajpuri & Siddiqi, 1963, *Margollus hispanicus* (Peña Santiago & Coomans, 1990) Peña Santiago, Peralta & Siddiqi, 1993 et *Doryllium labiatum* Andrassy, 1987. A l'exception de *T. loofi* et de *M. hispanicus*, ces espèces sont décrites et illustrées. *T. paracinctus* sp. n. est caractérisé par: taille petite (L = 0,65-0,86  $\mu\text{m}$ ); région labiale quelque peu anguleuse et séparée par une constriction; odontostyle = 6,5-9,0  $\mu\text{m}$  (stylet total = 17,5-20,5  $\mu\text{m}$ ); V = 32,6-41,7; sac pré-vulvaire = 23-80  $\mu\text{m}$  (0,9-2,8 diam. du corps); queue conique à l'extrémité arrondie (20,5-30  $\mu\text{m}$ , c = 26,9-43,4, c' = 1,05-1,58 chez la femelle et 20-23  $\mu\text{m}$ , c = 31,7-37,7, c' = 1,0-1,3 chez le mâle); spicules = 26-29  $\mu\text{m}$ ; un seul supplément ventro-médian.

**Key-words**: Andalucía Oriental, Spain, *Tylencholaimellus*, *Margollus*, *Doryllium*, taxonomy, nematodes.

In this second paper dealing with the nematodes of the family Tylencholaimellidae Jairajpuri, 1964 from Southern Spain, we present four species, one new and three previously known, belonging to the genus *Tylencholaimellus* Cobb in M. V. Cobb, 1915 and two others already described and included in the genera *Margollus* Peña Santiago, Peralta & Siddiqi, 1993 and *Doryllium* Cobb, 1920, respectively.

For methods used previously see our paper on this group of dorylaims (Peralta & Peña Santiago, 1995).

### *Tylencholaimellus cinctus* Orr & Dickerson, 1965 (Fig. 1)

#### MEASUREMENTS

See Table 1.

#### DESCRIPTION

*Female*: Moderately slender nematodes of small size, 0.61-0.87 mm long. Body cylindrical, slightly tapering towards the anterior end. Habitus varying from almost

straight to ventrally curved, but normally more arched in the posterior half of the body. Outer layer of the cuticle thin and with fine transverse striations. Inner layer thicker than the outer one, specially at the level of the tail. Lateral chord occupying about one-fourth of the mid-body diameter. Lip region with rounded contour and offset from the adjacent body by a more or less marked constriction; it is 2.5-3 times as wide as high and about one-third of the body diameter at neck base. Lips fused but with their inner parts slightly elevated. Labial and cephalic papillae distinct, not protruding. Amphid cup-shaped, opening at level of the cephalic constriction and occupying one-half of the lip region diameter. Cheilostoma a cone truncate to cylindrical. Odontostyle provided with dorsal accessory stiffening piece and scarcely longer than the lip region diameter; its aperture one-tenth of its length. Odontophore with rounded basal knobs; its length about two-thirds the odontostyle. Guiding ring simple, refractive. Pharynx consisting of a slender and weakly muscular anterior portion

**Table 1.** Measurements and diagnostic features of *Tylencholaimellus cinctus* Orr & Dickerson, 1965 (all measurements in  $\mu\text{m}$  except L in mm).

Habitat Locality Province	<i>Buxus sempervirens</i> S. de la Pandera Jaén		<i>Asphodelus</i> sp. S. de la Pandera Jaén		Meadow Sierra Nevada Granada	
	12 ♀♀	6 ♂♂	8 ♀♀	4 ♂♂	4 ♀♀	2 ♂♂
n =						
L (mm)	0.77 ± 0.06 (0.68-0.84)	0.64 ± 0.06 (0.54-0.69)	0.69 ± 0.05 (0.62-0.77)	0.62 ± 0.05 (0.55-0.67)	0.81 ± 0.03 (0.79-0.85)	0.71,0.73
a	23 ± 1.8 (21.2-25.6)	24.2 ± 2.58 (21.3-27.6)	20.1 ± 1.29 (19.6-22.4)	24.4 ± 1.95 (21.8-27.3)	24.7 ± 0.61 (23.8-25.5)	27.2,31.9
b	5.36 ± 0.34 (4.8-6.0)	5.4 ± 0.4 (4.6-5.7)	5.22 ± 0.33 (4.9-5.8)	5.47 ± 0.53 (4.7-6.2)	6.0 ± 0.1 (5.8-6.1)	5.1,5.0
c	39.2 ± 3.77 (36.2-48.4)	33.5 ± 3.79 (30.3-40.1)	41.9 ± 8.82 (32.3-45.5)	34.4 ± 3.43 (28.6-37.5)	36.9 ± 1.95 (34.9-40.1)	34.5,30.6
V	35.7 ± 3.12 (32.0-41.1)	– –	36.5 ± 2.94 (31.6-41.5)	– –	39.8 ± 1.27 (38.3-41.6)	–
G1/T1	5.9 ± 0.9 (4.4-7.4)	54.5 ± 5.40 (47.3-60.4)	6.3 ± 0.73 (4.8-7.2)	55.8 ± 2.94 (50.8-58.1)	3.05 ± 0.25 (2.7-3.4)	60.6,55.2
G2/T2	24.6 ± 5.50 (12.9-29.3)	26.7 ± 4.74 (20.7-31.1)	24.9 ± 4.56 (20.0-30.5)	19.3 ± 2.64 (15.5-22.8)	26.5 ± 2.96 (22.5-30.6)	20.9,20.7
Ant. gen. br./body diam.	1.29 ± 0.28 (1.00-1.83)	– –	1.26 ± 0.15 (1.01-1.45)	– –	0.76 ± 0.07 (0.68-0.87)	–
c'	0.95 ± 0.09 (0.77-1.05)	1.09 ± 0.11 (0.95-1.20)	0.86 ± 0.13 (0.6-1.0)	1.04 ± 0.04 (1.0-1.1)	0.99 ± 0.02 (0.95-1.00)	1.08,1.26
Lip region : diam. height	(9.5-10) (4.0-4.5)	(9.5-10.5) (4-5)	(9.0-9.5) 4	9.5 (4.0-4.5)	(9.5-10) 4.5	9.5,9.5 4.5
Amphid width	5.4 ± 0.3 (5-6)	5.5 ± 0.5 (5-6)	5.2 ± 0.2 (5.0-5.5)	5.6 ± 0.2 (5.5-6.0)	5.0	5.5
Odontostyle	11.6 ± 0.88 (10.5-12.0)	11.8 ± 0.41 (11.5-12.5)	11.5 ± 0.80 (10.5-12.5)	10.9 ± 0.41 (10.5-11.5)	10.5	10
Odontophore	7.8 ± 0.5 (7-9)	7.0 ± 0.4 (6.5-7.5)	7.2 ± 0.7 (6.5-8.5)	7.2 ± 0.2 (7.0-7.5)	7.25 ± 0.25 (7.0-7.5)	7.5,7.5
Stylet length	(18-21)	19	(17.5-21.0)	(17.5-19)	(17.5-18.0)	17.5,17.5
Guiding ring-ant. end	(7-8)	(7.5-8.0)	(7.5-8.5)	(7.0-7.5)	7.5	7.5,7.5
Nerve ring-ant. end	75.7 ± 5.56 (69.0-84.5)	71.8 ± 4.60 (65-75)	71.5 ± 6.3 (65-78)	64 ± 1.3 (62-65)	78 ± 2.1 (75-81)	78,78
Neck length	132 ± 6.1 (125-145)	118 ± 4.3 (115-125)	134 ± 14 (112-150)	114 ± 5.6 (106-122)	137 ± 4.3 (131-141)	137,147
Pharyngeal bulb length	25 ± 1 (23-27)	23.3 ± 1.53 (22-25)	23.8 ± 2.4 (22-28)	22.5 ± 0.4 (22-23)	28.5 ± 0.5 (28-29)	25,26
Cardia : width length	(6-8) (5.0-6.5)	(6-7) (4-5)	(7.0-7.5) (4-6)	7 5	(6.5-7.0) (4.0-4.5)	7.0,7.5 4.0,4.0
Body diam. at neck base	28.3 ± 1.72 (26-31)	23.3 ± 2.73 (19.5-27.5)	29.7 ± 2.64 (25.5-33.0)	22.5 ± 2.18 (20-26)	26.9 ± 1.51 (25-29)	23.5,20.5
at midbody	33.7 ± 3.1 (29-39)	26.7 ± 4.1 (22-32)	34.6 ± 3.11 (29.5-39.0)	25.6 ± 1.29 (24-28)	33.0 ± 1.83 (31-36)	26,23
at anus	20.7 ± 1.25 (19-22)	17.6 ± 0.88 (16.5-19.0)	19.8 ± 1.36 (17.5-22.0)	17.6 ± 0.89 (16.5-19.0)	22.5 ± 1.50 (21-25)	19,19
Cuticle : head midbody tail	(1.5-2.0) (2.5-3.0) (4-6)	2.0 2.5 4.0	1.5 2.5 (4.5-5.5)	1.5 (2.0-2.5) (4.0-4.5)	1.5 2.0 (4.5-5.5)	1.5 2.0 5.5,6.0

Table 1 (continued).

Lateral chord : midbody	(7.5-12)	(6.0-7.5)	(8.0-10.5)	(7.0-7.5)	(9.0-9.5)	8.5,9.0
Ant. ovary/testis	–	94.5 ± 24.1 (56-131)	–	116 ± 18 (94-144)	–	137,125
Ant. genital branch	42.8 ± 6.90 (34-53)	347 ± 39 (287-412)	44.1 ± 7.44 (30-54)	348 ± 27.8 (307-379)	25.0 ± 1.87 (22-27)	429,405
Post. ovary/testis	126 ± 19 (110-159)	93.5 ± 13.6 (69-114)	159 ± 58 (78-213)	110 ± 11.2 (94-125)	171 ± 29 (138-218)	144,128
Post. genital branch*	190 ± 46 (88-225)	159 ± 25 (138-212)	171 ± 37 (125-232)	122 ± 25 (84-153)	216 ± 30 (181-262)	148,152
Vagina : width	(8-12)	–	(9.5-10)	–	(10-11)	–
length	(7-11)	–	(7.5-10.5)	–	11	–
Vulva-ant. end	276 ± 22.3 (246-313)	–	252 ± 21 (236-301)	–	324 ± 7.6 (315-334)	–
Prerectum	65 ± 14 (44-79)	54.7 ± 23.9 (31-94)	51.7 ± 8.9 (40-65)	72 ± 17 (50-94)	54.5 ± 12.3 (40-72)	66,62
Rectum/cloaca	15.2 ± 2.06 (13-19)	29.3 ± 3.06 (25-32)	13.5 ± 1.17 (12.5-15.5)	28.5 ± 2.77 (24.5-31.0)	14.7 ± 0.47 (13.5-16.5)	29,28
Tail	19.2 ± 1.60 (17-22)	19.2 ± 1.79 (16.5-20.0)	18.2 ± 1.79 (15.5-21.5)	18.3 ± 0.75 (17.5-19.0)	22.1 ± 1.59 (20-24)	20.5,24
Spicules (arc)	–	30.6 ± 1.39 (28.5-32.0)	–	28.0 ± 1.54 (26.0-29.5)	–	28.5,29
Ventromedian supplements	–	1	–	1	–	1,1
Sperm length	–	(5-6)	–	(5.0-5.5)	–	5,5
Copulatory muscles	–	(4-5)	–	(4-5)	–	5,5

\* In males, this measurement is the distance from the posterior end of the testis to the cloacal aperture.

expanding abruptly in a pear-shaped basal bulb occupying one-sixth to one-fifth of the total neck length. Pharyngeal gland nuclei hardly visible. Cardia rounded-conoid, surrounded by the intestine and relatively small. Nerve ring located at midway of the neck length. Genital system monodelphic-opisthodelphic. Ovary reflexed and provided with numerous oocytes arranged first in several rows and then in a single one. Oviduct joining the ovary subterminally and consisting of a slender distal part with cuboidal cells and a well developed *pars dilatata* often containing sperm. Oviduct-uterus junction marked by a poorly developed sphincter. Uterus very short, without specializations. Anterior genital branch a simple sac 1.0-1.8 body widths long. Vagina cylindrical, occupying half of the corresponding body diameter; its wall adjacent to the vulva not offset from the body cuticle and its inner part surrounded by muscles. Vulva a transverse slit. Prerectum 2-6 anal body widths long. Guard cells not observed, probably absent. Rectum slightly shorter than the corresponding body diameter. Tail short, rounded-conoid to hemispheroid. Two pairs of caudal pores located subterminally.

*Male* : General morphology similar to female but the posterior body region is more ventrally curved. Diochic with testes opposed. Apart from the " adanal " pair only

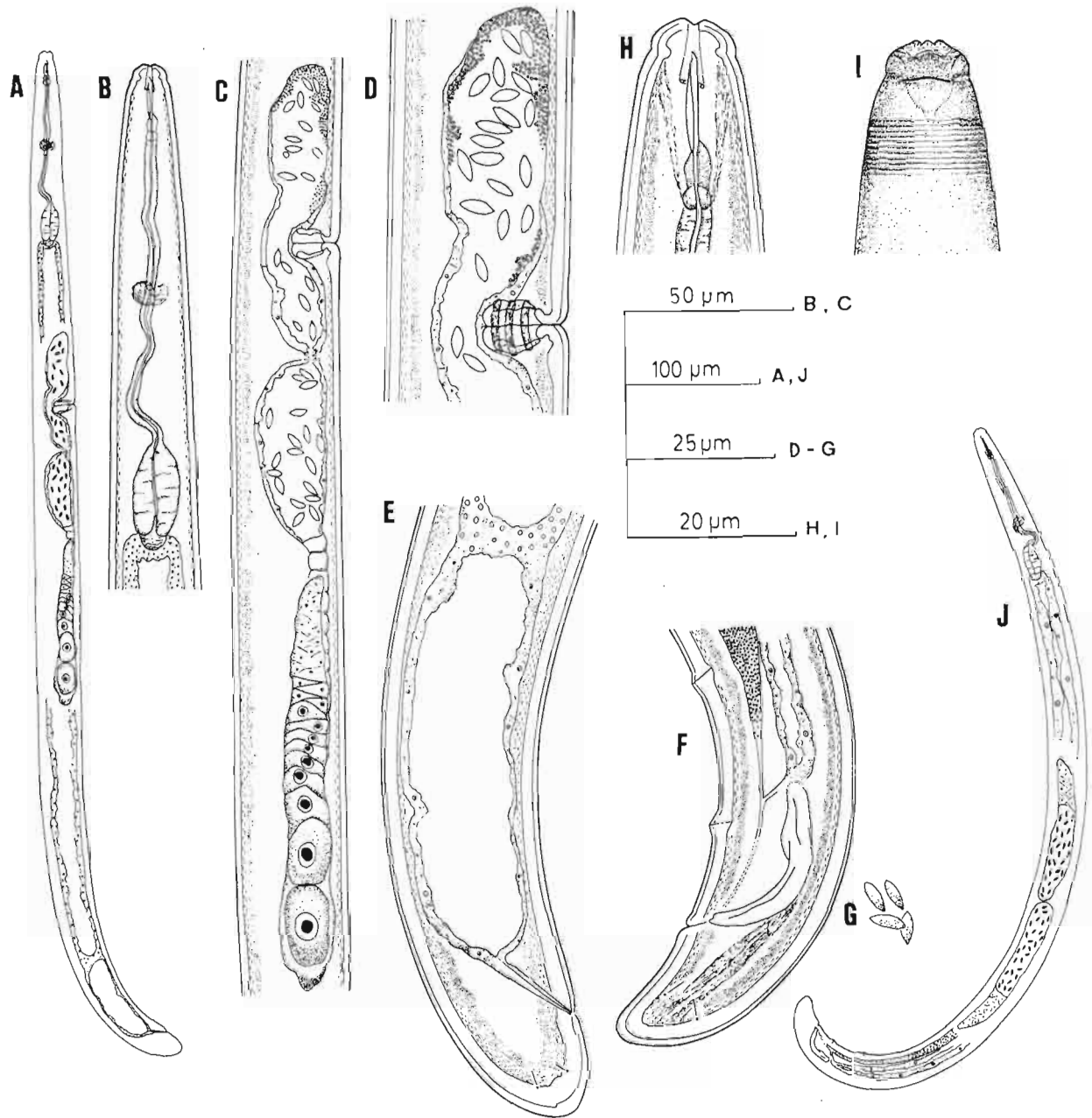
one ventromedian supplement is present, located outside the range of the spicules and separated from the adanal pair by 1-2 times the distance of the adanal pair to the anus. Rectum very short, joining the ejaculatory duct at level of the anterior end of the spicules. Tail slightly longer than that of the female; its ventral side straight or slightly concave and the dorsal side convex. Spicules ventrally arched, slender, 1.2-1.8 anal body widths long and poorly sclerotized. Lateral guiding pieces not observed clearly. Sperm spindle-shaped.

#### DISTRIBUTION

The species was found in eleven different localities of the provinces of Granada and Jaén, associated with *Buxus sempervirens*, *Festuca scariosa*, *Erinacea anthyllis*, *Lavandula latifolia*, *Berberis hispanica*, *Teucrium polium*, *Quercus rotundifolia*, *Crataegus monogyna*, *Corylus avellana*, *Pinus halepensis*, *Thymus vulgaris*, *Stipa tenacissima*, *Ulex parviflorus* and *Asphodelus* sp.

#### REMARKS

The Spanish populations of this species are very similar in morphology and measurements to the original one (Orr & Dickerson, 1965) and agree with the data reported by Goseco *et al.* (1976). However, we noted small differences in several features (relative length of odon-



**Fig. 1.** *Tylencholaimellus cinctus* Orr & Dickerson, 1965. *A* : Entire female; *B* : Neck region; *C* : Female genital system; *D* : Vagina and prevulval uterine sac; *E* : Female caudal region; *F* : Male caudal region; *G* : Sperm; *H* : Anterior end in lateral view; *I* : Same in surface view; *J* : Entire male.

tostyle and odontophore, anal body width, etc.) which in our opinion must be considered as intraspecific variability.

The species is recorded for the first time in Europe.

***Tylencholaimellus loofi* Peña Santiago,  
Peralta & Siddiqi, 1993**

In addition to the original population, the species was found in the following sites : Sierra de la Pandera, province of Jaén, associated with brushwood (three females); Arenas de Rey, province of Granada, around roots of *Rosa canina* (two females). No important differences have been found with respect to the original description.

***Tylencholaimellus paracinctus* sp. n.**  
(Fig. 2)

MEASUREMENTS

See Table 2.

DESCRIPTION

*Female* : Moderately slender nematodes of small size, 0.71-0.86 mm long. Body cylindrical, slightly tapering towards both extremities. Habitus from ventrally curved, particularly in the posterior half of the body, to C- or G-shaped. Outer layer of the cuticle thin and with fine transverse striations. Inner layer thicker than the outer one, specially at the caudal region. Lateral chord with granular appearance and occupying one-fourth of the midbody width. Lateral pores obscure. Lip region with slightly angular contour and scarcely offset from the adjacent body by a usually weak constriction; twice as wide as high and about one-third of the body diameter at neck base. Lips almost fused together with their inner parts somewhat elevated. Cephalic and labial papillae distinct, well delineated from the head contour. Amphid cup-shaped, opening at level of the cephalic constriction and occupying two-thirds to three-fourths of the lip region diameter. Stoma cylindrical or a truncate cone, its wall appearing clearly sclerotized near the peri-oral area. Guiding ring simple. Odontostyle 1.3-1.4 lip region widths long, typical of the genus. Odontophore three-fourths to four-fifths the odontostyle length and with rounded basal knobs. Anterior part of the pharynx slender and weakly muscular, separated from the basal bulb by a constriction. Pharyngeal bulb cylindrical and occupying about 17 % of the total neck length. Pharyngeal gland nuclei and outlets obscure. Cardia rounded-conoid, surrounded by the intestinal tissue. Nerve ring located at midway of the neck length. Genital system monodelphic-opisthodelphic. Ovary reflexed, often not reaching the oviduct-uterus junction and with oocytes arranged first in several rows, then in a single one. Oviduct joining the ovary subterminally and con-

sisting of a slender distal part with high cells and a *pars dilatata* with conspicuous lumen and often filled with sperm. Oviduct-uterus junction marked by a poorly developed sphincter. Uterus undifferentiated and short. Anterior genital branch reduced to a simple sac 1.1-2.3 body widths long. Vagina cylindrical or pear-shaped, encircled by strong musculature; its wall adjacent to the vulva not offset from the body cuticle. Vulva transverse. Sperm present throughout the genital tract. Prerectum 2-5 anal body widths long. Guard cells not seen. Rectum shorter than the corresponding body diameter. Tail conical with blunt terminus; its ventral side straight or slightly concave and the dorsal side convex. Outer layer of the cuticle slightly thickened at tail tip. Two pairs of caudal pores located midway of the tail : one subdorsal, the other subventral.

*Male* : Similar in morphology to female but with the posterior body region more ventrally curved. Diorchic with testes opposed. Apart from the " adanal " pair, only one ventromedian supplement is present, located outside the range of the spicules. Tail slightly shorter than that of female and with a more concave ventral side. Spicules 1.5 anal body widths long. Lateral guiding pieces obscure. Sperm spindle-shaped. Caudal pores as in the female.

TYPE HABITAT AND LOCALITY

Associated with *Fraxinus angustifolia* in Sierra de Cazorla, province of Jaén, Spain.

OTHER HABITATS AND LOCALITIES

Around roots of *Rosmarinus officinalis*, *Thymus vulgaris*, *Ulex parviflorus* and *Cistus* sp. alongside the road from Torviscón to Órgiva, province of Granada, Spain.

DIAGNOSIS AND RELATIONSHIPS

The new species can be distinguished by its small size (L = 0.65-0.86 mm), lip region slightly angular, odontostyle 10-12.5  $\mu\text{m}$  long, odontophore 6.5-9  $\mu\text{m}$  (stylet length 17.5-20.5  $\mu\text{m}$ ), vulva anterior (V = 32.6-41.7), prevulval uterine sac 23-80  $\mu\text{m}$  or 0.9-2.8 body widths long, tail conical with blunt terminus, spicules 26-29  $\mu\text{m}$ , and only one ventromedian supplement.

*T. paracinctus* sp. n. is close to *T. cinctus* Orr & Dickerson, 1965 and *T. raskii* Jairajpuri & Siddiqi, 1963. From *T. cinctus*, it can be distinguished by having narrower (*vs* 9.5-11  $\mu\text{m}$ ) and angular (*vs* rounded or cap-like) lip region, and the morphology of the longer (*vs* 12.5-22.5  $\mu\text{m}$ ,  $c' = 0.6-1.05$ ) and conical tail with blunt terminus (*vs* rounded-conoid to hemispherical). From *T. raskii* the new species is distinguished by the morphology of the lip region, relatively shorter prevulval uterine sac (*vs* G1 = 8.5-9.5) and longer tail (*vs* 14-22  $\mu\text{m}$ ,  $c' = 0.82-1.1$ ) with conical shape.

**Table 2.** Measurements and diagnostic features of *Tylencholaimellus paracinctus* sp. n. (all measurements in  $\mu\text{m}$  except L in mm).

Habitat Locality Province	<i>Fraxinus angustifolia</i> Sierra de Segura Jaén				<i>Rosmarinus officinalis</i> Órgiva Granada	
	Holotype ♀ n =	Paratypes 18 ♀♀	Allotype ♂	Paratypes 5 ♂♂	13 ♀♀	5 ♂♂
L (mm)	0.80	0.81 ± 0.04 (0.71-0.86)	0.81	0.77 ± 0.04 (0.71-0.83)	0.75 ± 0.06 (0.65-0.82)	0.71 ± 0.01 (0.69-0.73)
a	27.2	26.6 ± 1.10 (24.3-28.8)	29.4	28.4 ± 1.35 (26.5-30.0)	26.3 ± 1.89 (22.2-29.3)	26.8 ± 2.67 (24.4-31.8)
b	5.8	5.9 ± 0.1 (5.7-6.2)	5.5	5.4 ± 0.1 (5.3-5.5)	5.4 ± 0.3 (5.0-5.8)	5.3 ± 0.1 (5.2-5.5)
c	30.9	32.7 ± 2.96 (26.9-39.3)	35.2	34.4 ± 2.06 (31.7-37.7)	34.1 ± 3.32 (29.6-43.4)	33.6 ± 1.48 (32.0-37.2)
V	38.4	39.3 ± 1.25 (37.7-41.7)	–	–	36.2 ± 2.48 (32.6-40.9)	–
G1/T1	5.1	5.6 ± 1.2 (3.0-8.3)	55.3	57.8 ± 4.93 (52.7-66.8)	6.25 ± 1.57 (3.5-9.7)	46.4 ± 3.68 (13.5-21.3)
G2/T2	22.2	21.8 ± 2.47 (15.8-26.8)	19.3	20.3 ± 2.41 (17.9-24.8)	24.0 ± 3.20 (19.7-29.9)	17.5 ± 2.96 (13.5-21.3)
Ant. gen. br./body diam.	1.40	1.52 ± 0.31 (1.15-2.30)	–	–	1.67 ± 0.50 (0.90-2.80)	–
c'	1.30	1.26 ± 0.10 (1.10-1.58)	1.20	1.23 ± 0.05 (1.14-1.30)	1.24 ± 0.14 (1.05-1.47)	1.16 ± 0.12 (1.0-1.3)
Lip region : diam.	8.0	(7.5-8.0)	7.5	(7.5-8.0)	(7.5-9.5)	(8.5-9.5)
height	3.5	3.5	3.5	3.5	(3.0-3.5)	(3.5-4.0)
Amphid width	5.0	5.20 ± 0.15 (5.0-5.5)	5.5	5.4 ± 0.1 (5.0-5.5)	5.5 ± 0.6 (4.5-6.5)	5.8 ± 0.3 (5.5-6.0)
Odontostyle	11.0	10.7 ± 0.38 (10.0-11.5)	10.0	10.3 ± 0.23 (10.0-10.5)	12.2 ± 0.63 (10.5-12.5)	12.4 ± 0.20 (12.0-12.5)
Odontophore	8.0	8.2 ± 0.3 (7.5-8.5)	9.0	8.2 ± 0.5 (7.5-9.0)	7.5 ± 0.3 (6.5-8.0)	7.3 ± 0.2 (7.0-7.5)
Stylet length	19.0	(18.0-19.5)	19.0	(18-19)	(17.5-20.5)	(19.5-20.0)
Guiding ring-ant. end	7.5	(7-8)	7.5	(7.0-7.5)	(7.5-9.0)	(7.5-8.5)
Nerve ring-ant. end	75.0	76.0 ± 2.60 (72-81)	81.0	77.0 ± 2.50 (72-81)	72 ± 3.4 (69-78)	71.3 ± 3.3 (67-75)
Neck length	139	137 ± 2.8 (137-140)	147	139 ± 9.5 (125-147)	137 ± 8.6 (128-150)	135 ± 5.0 (130-140)
Pharyngeal bulb length	24	24.5 ± 0.63 (23-25)	25	25	25 ± 1.1 (22-26)	24.8 ± 0.98 (23-26)
Cardia : width	7.5	(6-8)	7	(6.5-7.5)	(6.0-7.5)	(7.0-8.5)
length	4.0	(3.5-4.5)	3.5	(3-4)	(3.5-4.0)	(3.0-4.5)
Body diam. at neck base	25	25.6 ± 1.15 (23-28)	25	23.8 ± 0.74 (23-25)	25.2 ± 2.45 (21-29)	23.6 ± 1.2 (22-25)
at midbody	29.5	30.3 ± 1.65 (28.0-34.5)	27.5	27.0 ± 0.76 (25.5-28.0)	28.8 ± 1.83 (25.5-32.0)	26.8 ± 2.23 (23-29)
at anus	20	19.7 ± 1.34 (18-24)	19	18 ± 0.5 (17.5-19.0)	18.1 ± 1.59 (15-19)	18.0 ± 0.89 (17-19)
Cuticle : head	1.5	(1.5-2.0)	1.5	(1.5-2.0)	1.5	1.5
midbody	2.0	(2.0-2.5)	2.0	(2.0-2.5)	2.0	2.0
tail	5.0	(4.5-5.5)	4.5	(4.5-5.0)	(4.5-5.5)	(4.0-5.5)

Table 2 (continued).

Lateral chord : midbody	8.5	(7-9)	7.0	7.0	(7-10)	(7-9)
Ant. ovary/testis	-	-	138	146 ± 6.3 (138-153)	-	108 ± 14 (91-125)
Ant. genital branch	41.0	45.8 ± 9.16 (34.5-67.0)	447	445 ± 18 (421-478)	48.9 ± 14.8 (23-80)	332 ± 30 (275-362)
Post. ovary/testis	109	99.5 ± 25.4 (69-159)	153	142 ± 11 (122-153)	96.3 ± 38.1 (60-200)	99 ± 8.5 (88-109)
Post. genital branch*	178	178 ± 18 (147-225)	156	156 ± 12 (142-177)	182 ± 34 (134-244)	125 ± 23 (94-156)
Vagina : width	10	(9-10)	-	-	(8-11)	-
length	10	(10-11)	-	-	(10-12)	-
Vulva-ant. end	308	316 ± 19 (272-347)	-	-	276 ± 25 (236-307)	-
Prerectum	45	77.5 ± 16.7 (45-112)	88	90 ± 21 (58-121)	74.5 ± 24.3 (40-125)	61 ± 1.0 (60-62)
Rectum/cloaca	11.5	13.2 ± 1.40 (10-15)	30	28 ± 0.9 (27-30)	15 ± 2 (12-19)	28.7 ± 5.56 (21-34)
Tail	26	24.8 ± 1.95 (22-30)	23	22.3 ± 1.10 (20-23)	23 ± 1.5 (20.5-26.0)	20.8 ± 1.17 (20-22)
Spicules arc	-	-	28	27.3 ± 0.94 (26-29)	-	28 ± 0.9 (26.5-29.0)
Ventromedian supplements	-	-	1	1	-	1
Sperm length	-	-	6.5	6.5	-	(5.5-6.5)
Copulatory muscles	-	-	4	(4-5)	-	4

\* See footnote in Table 1.

***Tylencholaimellus raskii***  
**Jairajpuri & Siddiqi, 1963**  
 (Fig. 3)

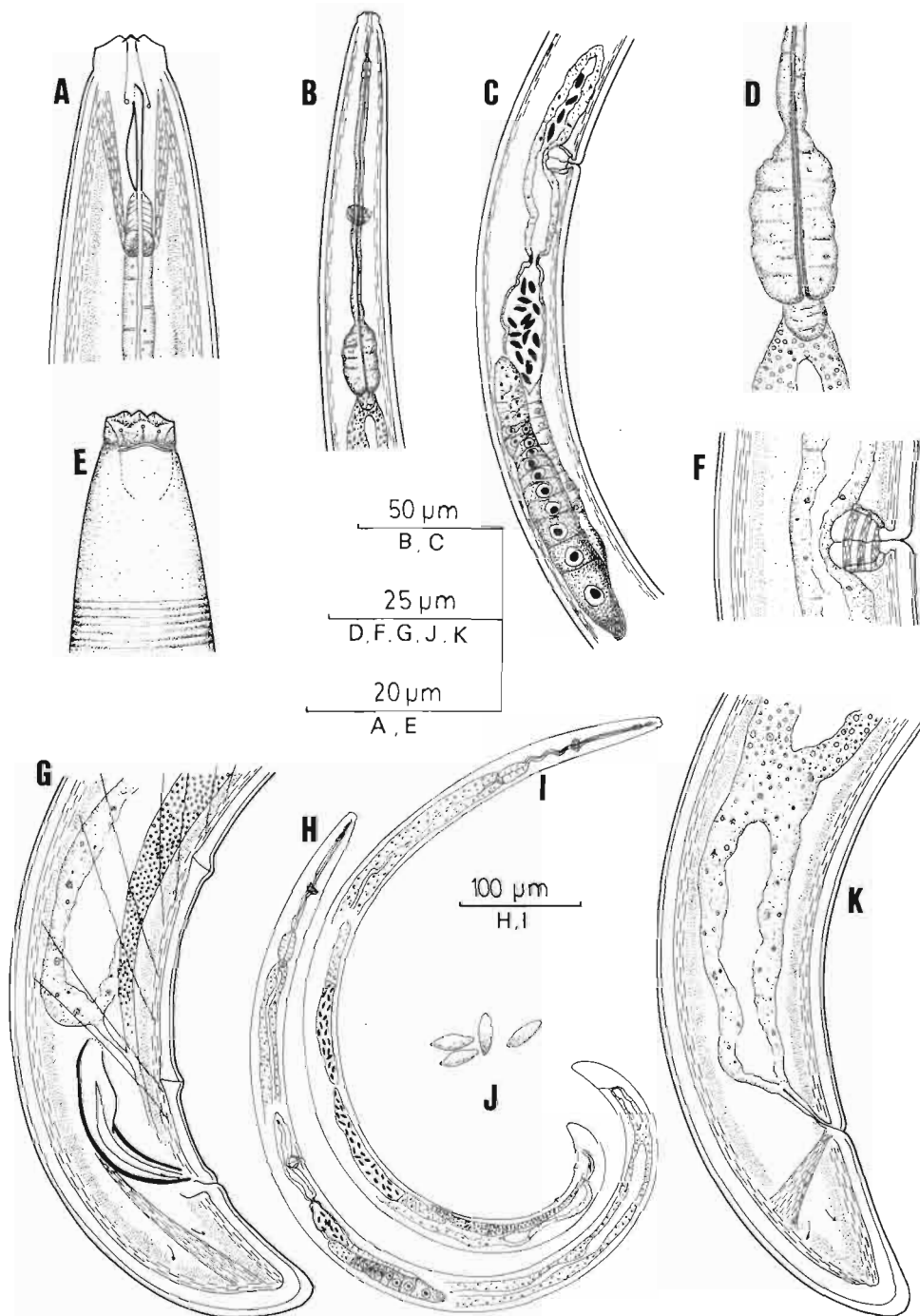
MEASUREMENTS

See Table 3.

DESCRIPTION

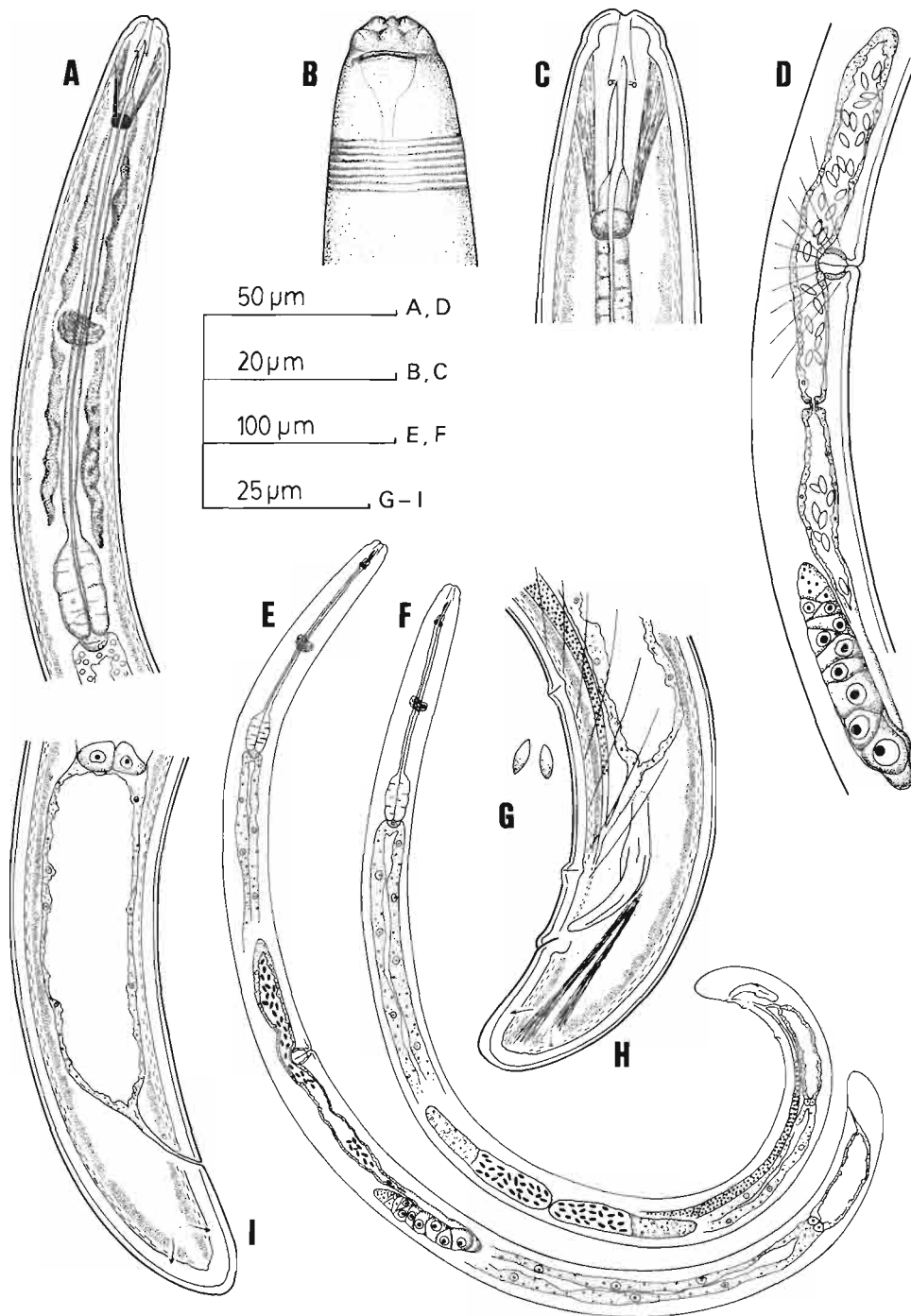
*Female* : Moderately slender nematodes of small size, 0.5-0.8 mm long. Body cylindrical, tapering towards both extremities. Habitus regularly ventrally curved to C-shaped. Outer layer of the cuticle thin and provided with fine but clear transverse striations. Inner layer wider than the outer one. Lateral chord occupying one-fourth to one-third of the body width; glandular bodies visible. Lateral pores obscure. Lip region with rounded contour and slightly offset from the adjacent body by a weak constriction or a depression; twice as wide as high and about one-third of the body diameter at neck base. Lips fused with their inner parts slightly elevated. Labial and cephalic papillae not modifying the head contour. Amphid cup-shaped and occupying three-fifths to two-thirds of the lip region diameter. Stoma a truncate cone. Guiding ring simple, slightly refractive. Odontostyle 1.1-1.3 lip region diameters long, typical of the genus.

Odontophore two-thirds to three-fourths of the odontostyle length and provided with basal knobs. Pharynx consisting of a slender and weakly muscular anterior part and a cylindrical basal bulb occupying one-sixth to one-fifth of the total neck length. Both parts of the pharynx separated by a more or less marked constriction. Cardia hemispherical and surrounded by the intestine. Nerve ring located at midway of the neck length. Genital system monodelphic-opisthodelphic. Ovary reflexed, with numerous oocytes. Oviduct joining the ovary subterminally and consisting of a slender distal part and a moderately developed *pars dilatata*. Uterus undifferentiated. Sphincter poorly developed. Anterior genital branch reduced to a simple sac 2.0-2.8 body widths long. Sperm present throughout the genital tract. Vagina cylindrical or spheroid, extending inwards for one-half of the corresponding body diameter and encircled by muscles; its wall adjacent to the vulva not offset from the body cuticle. Vulva anterior, apparently a transverse slit. Prerectum 2-6 anal body diameters long. Guard cells present at intestine-prerectum junction. Rectum slightly shorter than the corresponding body diameter. Tail rounded-conoid, often convex in both sides. Caudal pores two pairs located at midway of the tail : one subventral and the other subdorsal.



**Fig. 2.** *Tylencholaimellus paracinctus* sp. n. A : Anterior end in lateral view; B : Neck region; C : Female genital system; D : Pharyngeal bulb and cardia; E : Anterior end in surface view; F : Vagina; G : Male caudal region; H : Entire female; I : Entire male; J : Sperm; K : Female caudal region.





**Fig. 3.** *Tylencholaimellus raskii* *Jairajpuri & Siddiqi, 1963.* A : Neck region; B : Anterior end in lateral surface view; C : Same in median view; D : Female genital system; E : Entire female; F : Entire male; G : Sperm; H : Male caudal region; I : Female caudal region.

**Table 3.** Measurements and diagnostic features of *Tylencholaimellus raskii* Jairajpuri & Siddiqi, 1963 (all measurements in  $\mu\text{m}$  except L in mm).

Habitat Locality Province	n =	Meadow S. de la Pandera Jaén		<i>Thymus mastichina</i> S. de la Pandera Jaén		<i>Quercus rotundifolia</i> Sierra Nevada Granada	
		7 ♀♀	12 ♂♂	4 ♀♀	4 ♂♂	12 ♀♀	5 ♂♂
L (mm)		0.68 ± 0.04 (0.57-0.74)	0.70 ± 0.07 (0.61-0.80)	0.64 ± 0.08 (0.50-0.70)	0.57 ± 0.03 (0.51-0.61)	0.72 ± 0.03 (0.68-0.80)	0.69 ± 0.04 (0.65-0.76)
a		23 ± 2.7 (20.2-26.6)	27.9 ± 3.0 (22.8-33.0)	23.7 ± 3.09 (19.8-28.2)	23.5 ± 1.14 (22.1-24.9)	26.3 ± 1.32 (24.3-28.3)	28.4 ± 1.02 (26.4-29.1)
b		5.5 ± 0.3 (4.5-5.9)	5.2 ± 0.5 (4.5-6.0)	5.42 ± 0.05 (5.4-5.5)	4.40 ± 0.25 (4.1-4.7)	5.1 ± 0.3 (4.9-5.9)	4.8 ± 0.3 (4.4-5.4)
c		36.6 ± 3.10 (29.2-41.0)	42.9 ± 5.94 (34.6-53.1)	38.7 ± 3.36 (34.2-43.0)	35.8 ± 3.87 (31.3-41.9)	39.9 ± 1.96 (37.2-43.2)	36.4 ± 1.74 (34.8-39.0)
V		35.4 ± 4.89 (27.8-44.5)	–	37.9 ± 2.16 (35.5-41.4)	–	39.0 ± 1.80 (36.5-42.8)	–
G1/T1		9.8 ± 0.9 (8.3-10.9)	53.0 ± 4.70 (44.1-60.0)	8.7 ± 0.51 (8.1-9.5)	51.8 ± 3.79 (48.0-57.6)	9.0 ± 1.2 (7.2-11)	40.9 ± 8.14 (29.9-50.3)
G2/T2		28.1 ± 4.37 (19.5-31.5)	26.3 ± 7.0 (19.5-41.9)	22.9 ± 3.21 (19.8-28.3)	26.0 ± 2.44 (22.3-29.2)	23.6 ± 2.74 (18.6-27.5)	18.5 ± 5.0 (12.8-22.7)
Ant. gen. br./body diam.		2.30 ± 0.24 (2.1-2.7)	–	2.08 ± 0.35 (1.68-2.50)	–	2.36 ± 0.28 (2.04-2.79)	–
c'		1.10 ± 0.12 (0.94-1.30)	0.97 ± 0.09 (0.85-1.08)	0.97 ± 0.06 (0.91-1.08)	0.90 ± 0.03 (0.86-0.94)	0.95 ± 0.07 (0.82-1.08)	1.00 ± 0.01 (1.00-1.03)
Lip region : diam. height		(9.5-10) (4.0-4.5)	(9.5) (3.5-4.5)	9.5 (4.0-4.5)	9.5 (4-5)	(9.5-10) (4.5-5.0)	(9.5-10) (4.5-5.0)
Amphid width		5.7 ± 0.4 (5-6)	5.6 ± 0.5 (5-6)	5.5 ± 0.6 (4.5-6.0)	5.5 ± 0.0	6.0	6.0
Odontostyle		12.2 ± 0.24 (12.0-12.5)	12.1 ± 0.41 (11.5-12.5)	12.1 ± 0.22 (12.0-12.5)	11.4 ± 0.65 (10.5-12.0)	12.5	12.5
Odontophore		8.0 ± 0.9 (7-9)	7.4 ± 1.2 (6.0-9.5)	8.1 ± 0.6 (7.0-8.5)	8.0 ± 0.6 (7.5-9.0)	8.8 ± 0.53 (7.5-9.5)	9.1 ± 0.2 (9.0-9.5)
Stylet length		(19.0-21.5)	18-21	(19-21)	(18.5-21)	(20-22)	(21.5-22.0)
Guiding ring-ant. end		(7.5-8.0)	(7.0-8.5)	(6.5-7.5)	(6-7)	(8-9)	(8.5-9.0)
Nerve ring-ant. end		69 ± 2.3 (62-72)	70.0 ± 4.24 (64-78)	69 ± 0.0	63 ± 1.9 (60-65)	77.6 ± 2.05 (75-80)	77.5 ± 1.74 (75-80)
Neck length		127 ± 5.1 (122-134)	133 ± 13 (120-161)	128 ± 2.4 (125-131)	126 ± 14 (115-151)	142 ± 8.1 (123-153)	145 ± 6.7 (138-156)
Pharyngeal bulb length		24.5 ± 0.5 (24-25)	25.9 ± 1.90 (24-29)	22.4 ± 2.1 (20-25)	21.5 ± 2.2 (19-25)	26.1 ± 1.05 (25-28)	27.4 ± 0.80 (26-28)
Cardia : width length		(7.5-9.5) (4.5-5.0)	(6-9) (4-6)	(7.0-7.5) (4-5)	(5.0-6.5) (3-4)	(6.5-8.0) (3.5-5.0)	(6-7) (4-5)
Body diam. at neck base		27.2.3 ± 2.76 (23-30)	23.4 ± 2.64 (20.5-29.5)	23.4 ± 2.22 (20-26)	21.5 ± 1.55 (20-24)	24.4 ± 0.93 (23-26)	23.1 ± 1.02 (22-25)
at midbody		30.5 ± 3.6 (26-36)	25.2 ± 2.45 (22.5-32.5)	27.2 ± 2.49 (25-31)	24.9 ± 0.41 (24.5-25.5)	27.5 ± 1.43 (25-30)	24.3 ± 1.12 (22.5-26.0)
at anus		17.6 ± 0.54 (17-19)	17.1 ± 1.24 (16-20)	17.0 ± 0.87 (15.5-17.5)	18.0 ± 0.54 (17.5-19.0)	18.4 ± 0.78 (17.0-19.5)	18.8 ± 0.81 (18-20)
Cuticle : head midbody tail		(1.5-2.0) (2.0-2.5) (5-6)	(1.5-2.0) 2.0 (4.5-5.0)	1.5 2.5 (4.5-5.5)	2.0 (2.0-2.5) (4.0-4.5)	2.0 2.5 (4-5)	2.0 2.5 (4.0-4.5)

Table 3 (continued).

Lateral chord : midbody	(7-8)	(6-9)	(6.5-7.5)	(6-9)	(6-8)	7.5
Ant. ovary/testis	–	95.7 ± 27.2 (62.5-143)	–	73 ± 8.9 (58-81)	–	82.8 ± 19.9 (62-108)
Ant. genital branch	67 ± 9.4 (53-81)	371 ± 50 (293-428)	56.5 ± 9.05 (42-66)	295 ± 30 (252-325)	65.3 ± 10.2 (51-81)	284 ± 675 (210-381)
Post. ovary/testis	112 ± 18 (94-131)	92 ± 22 (53-119)	71 ± 3.9 (69-78)	75 ± 8.3 (61-82)	93.5 ± 30.1 (50-175)	73 ± 16 (56-101)
Post. genital branch*	185 ± 29 (135-213)	185 ± 55 (131-312)	145 ± 5.2 (140-151)	148 ± 15 (131-165)	171 ± 23 (128-215)	129 ± 35 (85-172)
Vagina : width	(8-11)	–	(7.5-9.5)	–	(8-10)	–
length	(8-12)	–	(8.0-11)	–	(11-12)	–
Vulva-ant. end	259 ± 30 (226-305)	–	243 ± 40 (181-292)	–	282 ± 14 (262-305)	–
Prerectum	88 ± 21 (66-112)	88 ± 19 (54-122)	58 ± 21 (32-89)	66 ± 12 (51-81)	78.7 ± 27.4 (38-125)	87 ± 9 (75-97)
Rectum/cloaca	16.5 ± 2.09 (13-15)	26.2 ± 2.73 (23-26)	15.0 ± 0.25 (14.0-15.5)	25.7 ± 0.25 (25.5-26.0)	15.5 ± 1.71 (13-18)	27.7 ± 2.49 (25-31)
Tail	18.5 ± 2.04 (17-22)	16.5 ± 1.58 (14.0-18.5)	16.6 ± 1.63 (14.5-19.0)	16.5 ± 0.54 (15.5-17.0)	17.8 ± 1.17 (16-20)	19.0 ± 0.83 (18-20)
Spicules arc	–	27.0 ± 1.67 (24-30)	–	26.0 ± 0.96 (25.0-27.5)	–	29.0 ± 0.96 (28.0-30.5)
Ventromedian supplements	–	1	–	1	–	1
Sperm length	–	(5.0-5.5)	–	(5.5-6.0)	–	(6.5-7.0)
Copulatory muscles	–	(5-7)	–	(5-6)	–	6

\* See footnote in Table 1.

*Male* : General appearance similar to female but with the posterior body region more ventrally curved. Diorchic with testes opposed. Apart from the adanal pair, only one ventromedian supplement present outside the range of the spicules and separated from the adanal pair by a distance at least twice that from the adanal pair to the anus. Tail shape similar to female but its ventral side straighter or slightly concave. Spicules slightly ventrally curved, 1.4-1.6 anal body diameters long. Lateral guiding pieces obscure. Caudal pores as in the female.

#### DISTRIBUTION

The species has been collected from nine different localities of the provinces of Granada and Jaén associated with *Thymus mastichina*, *T. vulgaris*, *Buxus sempervirens*, *Festuca scariosa*, *Teucrium polium*, *Erinacea anthyllis*, *Lavandula latifolia*, *Salvia lavandulifolia*, *Echinospartum boissieri*, *Stipa tenacissima*, *Ulex parviflorus* and *Quercus rotundifolia*.

#### REMARKS

The material examined agrees very well with the original description (Jairajpuri & Siddiqi, 1963) except for the shorter body (*vs* 0.82-0.94); in our opinion, such a

difference does not justify the proposal of a new species since other diagnostic features (size of the odontostyle, length of the prevulval uterine sac, vulva position, etc.) which are considered to be more taxonomically important are completely coincidental.

*T. raskii*, together with the two species described above forms, a group whose boundaries are difficult to establish because of its intricate taxonomy. However, this study indicates that they can be separated from each other.

This finding constitutes the second report of this species for the world, and the first for Europe.

***Margollus hispanicus***  
(Peña Santiago & Coomans, 1990)  
Peña Santiago, Peralta & Siddiqi, 1993  
= *Tylencholaimellus hispanicus*  
Peña Santiago & Coomans, 1990

Two females and one male were recently found in pastures in the following two sites : Sierra de Cazorla, province of Jaén, and Sierra de la Sagra, province of Granada. No major differences have been noted with respect to the known data of this species.

**Table 4.** Measurements and diagnostic features of *Doryllium labiatum* Andrassy, 1987. (all measurements in  $\mu\text{m}$  except L in mm).

Habitat Locality Province n =	<i>Nerium oleander</i> Nijar Almeria 14 ♀♀
L (mm)	0.80 $\pm$ 0.05 (0.70-0.92)
a	28.7 $\pm$ 1.72 (25.9-31.5)
b	5.2 $\pm$ 0.28 (4.7-5.6)
c	34.3 $\pm$ 1.70 (30.8-36.8)
V	34.4 $\pm$ 1.33 (32.3-37.1)
G1/T1	4.1 $\pm$ 0.6 (3.1-5.3)
G2/T2	22.2 $\pm$ 3.39 (16.9-27.7)
Ant. gen. br./body diam.	1.18 $\pm$ 0.16 (0.96-1.50)
c'	1.25 $\pm$ 0.08 (1.05-1.37)
Lip region : width width	(8-9) (3.5-4.5)
Amphid	4.4 $\pm$ 0.2 (4.0-4.5)
Odontostyle	5.5 $\pm$ 0.2 (5-6)
Odontophore	11.9 $\pm$ 0.57 (11.0-12.5)
Stylet length	(16-18)
Guiding ring-ant. end	(4.5-6.0)
Nerve ring-ant. end	78.5 $\pm$ 3.0
Neck length	154 $\pm$ 7.7 (137-164)
Pharyngeal bulb length	32.3 $\pm$ 1.26 (29-34)
Cardia : width length	(5-7) (7.5-9.5)
Body width : at neck base	25.2 $\pm$ 1.06 (23-27)
at midbody	28.1 $\pm$ 1.35 (25.5-31.0)
at anus	18.7 $\pm$ 0.75 (17.5-20.0)
Cuticle : head midbody tail	1.5 2.0 3.0
Lateral chord	?
Ant. genital branch	33.1 $\pm$ 5.08 (28-45)
Post. ovary	152 $\pm$ 28 (83-191)
Post. genital branch	178 $\pm$ 28 (131-234)
Vagina : width length	(10-12) (11-12.5)
Vulva-ant. end	276 $\pm$ 16.5 (259-305)
Prerectum	96.4 $\pm$ 16.9 (70-137)
Rectum/cloaca	17 $\pm$ 1.25 (15-19)
Tail	23.5 $\pm$ 1.73 (20-27)
Sperm	-

***Doryllium labiatum* Andrassy, 1987**

(Fig. 4)

## MEASUREMENTS

See Table 4.

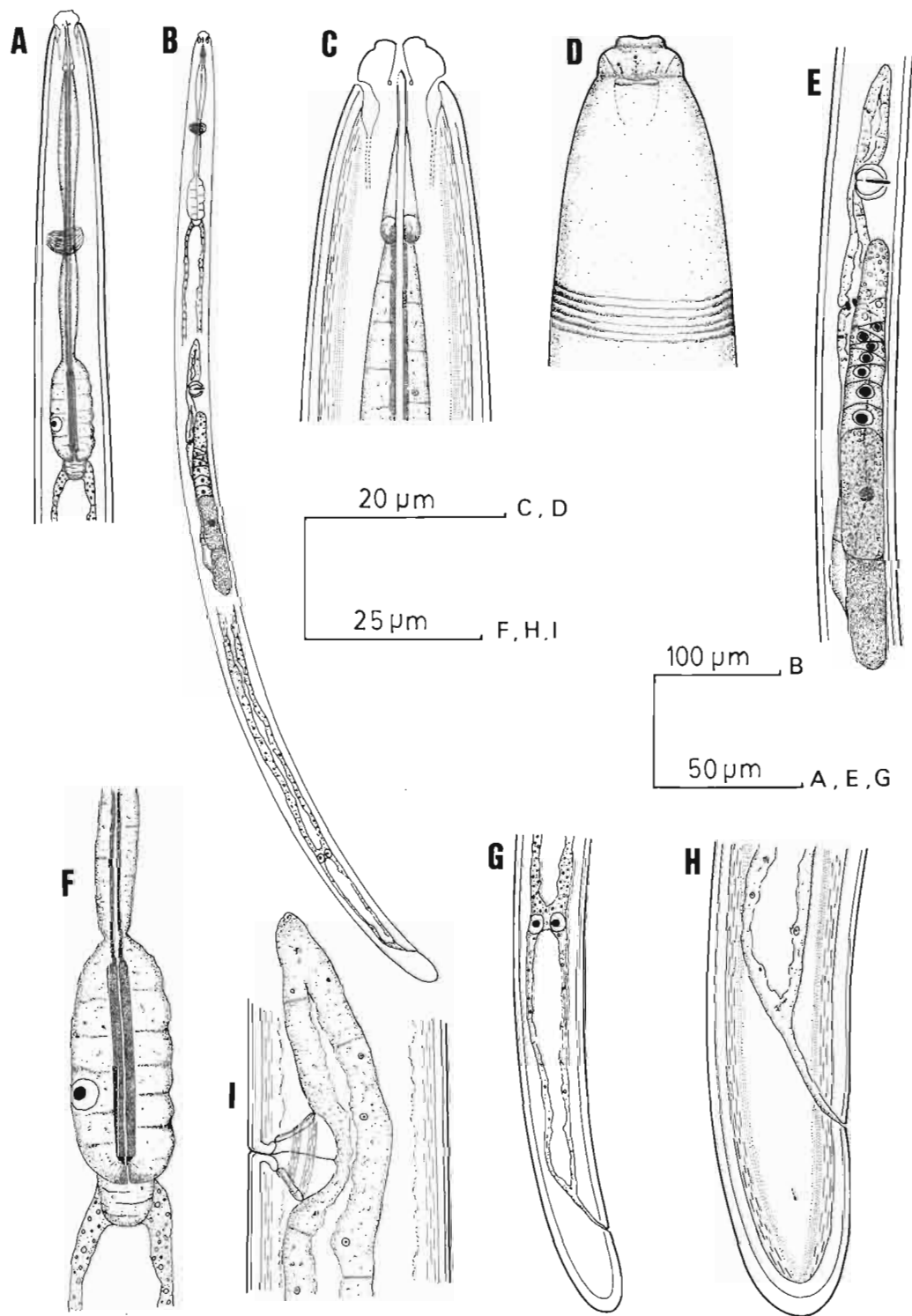
## DESCRIPTION

*Female* : Slender nematodes of small size. Body cylindrical, slightly tapering towards both extremities but somewhat more so towards the anterior end. Habitus almost straight but the posterior region can appear slightly ventrally arched. Outer layer of the cuticle thin and with fine transverse striations. Inner layer wider than the outer layer. Lateral chord and lateral pores obscure. Lip region almost continuous or slightly offset from the adjacent body by a weak constriction, twice as wide as high and about one-third of the body diameter at neck base. Lips fused with the inner parts transformed into a perioral disc. Cephalic and labial papillae visible but not protruding. Amphid cup-shaped and occupying half of the lip region diameter. Cheilostoma a truncate cone. Guiding ring simple. Odontostyle about two-thirds of the lip region diameter. Odontophore twice the odontostyle length and provided with basal knobs. Anterior part of the pharynx slender and weakly muscular, narrowing at level of the nerve ring. Pharyngeal basal bulb cylindrical and occupying about one-fifth of the neck length; its lumen is strongly sclerotized. Two parts of the pharynx separated by a constriction. Pharyngeal gland nuclei not clearly observed. Cardia rounded-conoid, surrounded by the intestine. Nerve ring located at midway of the pharynx. Genital system monodelphic-opisthodelphic. Ovary reflexed, often reaching the vulva and with numerous oocytes. Oviduct joining the ovary subterminally consisting of a slender distal part with cylindrical cells and a poorly developed *pars dilatata*. Oviduct-uterus junction marked by a weak sphincter. Uterus without specializations. Anterior genital branch reduced to a simple sac 1.0-1.5 body diameters long. Vagina conical or pear-shaped, extending inwards for half of the corresponding body diameter; its wall encircled by muscles. Vulva a transverse slit. Sperm absent. Prerectum 3.7-7.8 anal body diameters long. Intestine-prerectum junction with three guard cells. Rectum slightly shorter than anal body diameter. Tail cylindroid with hemispherical terminus and clearly longer than anal body diameter; inner layer of cuticle thickened at tail terminus. One pair of lateral pores located at midway of the tail, lateral or slightly subventral.

*Male* : Unknown.

## DISTRIBUTION

The species has been collected from the rhizosphere of *Nerium oleander* and *Tamarix gallica* in a "rambla" (dry gulch) near Nijar, province of Almeria.



**Fig. 4.** *Doryllium labiatum* Andr ssy, 1987. A : Neck region; B : Entire female; C : Anterior end in ventral view; D : Same in lateral surface view; E : Genital system; F : Pharyngeal bulb and cardia; G : Posterior body region; H : Female tail; I : Vagina and prevulval uterine sac.

#### REMARKS

This is probably the second record of the species. The measurements and diagnostic features of the studied population agree very well with those of the original description (Andrássy, 1987); however, some small differences such as a relatively shorter tail ( $vs\ c' = 1.6-1.7$ ), longer prevulval uterine sac ( $vs\ 24\ \mu\text{m}$ ) and longer pre-rectum ( $vs$  twice as long as anal body diameter) have been noted but the authors support the idea that both Spanish and Hungarian populations are conspecific.

The genus *Doryllium* is found for the first time in Spain.

#### Acknowledgement

The second author thanks Project entitled "Fauna Ibérica III" (DGICYT PB92-0121) for financial support.

#### References

- ANDRÁSSY, I. (1987). The free-living nematode fauna of the Kiskunság National Park. *Fauna Kiskunság natn. Park* : 15-46.
- GOSECO, C. G., FERRIS, V. R. & FERRIS, J. M. (1976). Revisions in Leptonchoidea (Nematoda : Dorylaimida). *Tylencholaimellus*, *Doryllium*, *Gerthus* n. gen. and *Agmodorus* in Tylencholaimellidae; and *Aulolaimoides* and *Adenolaimus* in Aulolaimoididae. *Purdue Univ. agric. Exp. Statn Res. Bull.*, 928 : 1-40.
- JAIRAJPURI, M. S. & SIDDIQI, A. H. (1963). A new and known species of the genus *Tylencholaimellus* M. V. Cobb, 1915 (Nematoda : Dorylaimoidea) from India with a key to its species. *Z. ParasitKde*, 22 : 489-494.
- ORR, C. C. & DICKERSON, O. J. (1965). *Tylencholaimellus cinctus* n. sp. (Dorylaimoidea : Leptonchidae) from Kansas. *Proc. helminth. Soc. Wash.*, 32 : 191-193.
- PEÑA SANTIAGO, R. & COOMANS, A. (1990). Nematodes of the order Dorylaimida from Andalucía Oriental, Spain : *Tylencholaimellus hispanicus* sp. n. and two new species of *Axonchium* Cobb, 1920. *Nematologica*, 36 : 144-160.
- PEÑA SANTIAGO, R., PERALTA, M. & SIDDIQI, M. R. (1993). Taxonomy of some new and known species of the genus *Tylencholaimellus* with a proposal for *Margollus* gen. n. (Nematoda : Dorylaimida). *Nematologica*, 39 : 218-233.
- PERALTA, M. & PEÑA SANTIAGO, R. (1995). Nematodes of the order Dorylaimida from Andalucía Oriental, Spain. The family Tylencholaimellidae Jairajpuri, 1964. Part 1. *Fundam. appl. Nematol.*, 18 : 479-492.