

Nematodes of the order Dorylaimida from Andalucía Oriental, Spain. The genus *Mesodorylaimus* Andrassy, 1959. I. Two short-tailed new species

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Summary. Two new species belonging to the genus *Mesodorylaimus* Andrassy, 1959 are described from specimens collected from the rhizosphere of wild plant communities in southeastern Spain. *M. brevicaudatus* sp. n. is characterized by its medium size ($L=1.3\text{--}1.6$ mm) body, lip region set-off by depression, odontostyle 11–14 μm long or almost equal to the lip region width, $V=50\text{--}57\%$, female tail conical, digitate (25–37.5 μm , $c=38\text{--}61$, $c'=0.9\text{--}1.4$), spicules 46.5–54 μm and 6–9 regularly spaced ventromedian supplements. *M. pseudorecurvus* sp. n. is characterized by its medium sized ($L=1.1\text{--}1.3$ mm) body, lip region set-off by a weak depression, odontostyle 10–11 μm long, $V=51.8\text{--}53.2\%$, presence of irregularities of the cuticle near the vulva, and tail conical, elongate (35.5–43.5 μm , $c=28.6\text{--}34.3$, $c'=1.6\text{--}2.0$) with the posterior half cylindrical and dorsally bent. Both species are illustrated and tables of morphometrics are given.

Key words: *Mesodorylaimus brevicaudatus* sp.n., *Mesodorylaimus pseudorecurvus* sp. n., Spain.

Seven species of the genus *Mesodorylaimus* Andrassy, 1959 have been recorded from Spain during the last half century; the species are listed in Table 1 with the localities and provinces from where they were recovered, and the corresponding references. A comparative study of the taxonomy and morphology of Spanish material has not been made. During several general surveys, carried out mainly in natural areas in Andalucía Oriental (southeastern Spain), numerous specimens of the distinct species belonging to the genus were collected. In this first of a short series of papers on the taxonomy and morphology of Andalucian species two new species are described which are characterized by the females having rather short tails.

MATERIAL AND METHODS

Nematodes were extracted from soil samples by the Flegg (1967) method, somewhat modified, killed by heat, fixed in 4% formalin and processed to anhydrous glycerin (Seinhorst 1959, 1962; Siddiqi, 1964).

DESCRIPTIONS

Mesodorylaimus brevicaudatus sp. n. (Fig. 1 & Table 2)

Female. Relatively slender nematodes, 1.3–1.6

mm long. Habitus after fixation ventrally curved, usually "C"-shaped. Body cylindrical, tapering towards both extremities, but more so towards the posterior end. Outer cuticle layer thin and with very fine transverse striations. Inner cuticle layer wider than the outer layer and clearly thickened at level of tail. Lateral chord occupying about one-third of the midbody diameter; appearing to be formed by two cell rows, one of longer cuboid cells and the other of smaller, elongate cells, both situated in tandem. Lateral pores obscure. Lip region set-off from the adjacent body by a depression and with angular contour; 2.4–2.6 times as wide as high and about one-third of the body diameter at neck base. Lips amalgamated for most part. Labial and cephalic papillae easily visible as a result of a clear innervation. Amphid cup-shaped, opening at level of the cephalic depression and occupying somewhat less than half of the corresponding body width. Odontostyle relatively robust, with the ventral side slightly dorsally bent; its length almost equal to the lip region width and the aperture occupying half, or more, of the total length. Odontophore rod-like, apparently as long as the odontostyle but its precise length difficult to establish because the separation from the pharyngeal lining becomes obscure. Guiding ring simple. Pharynx with a slender but muscular anterior part which expands

Table 1. Species of *Mesodorylaimus* previously found in Spain.

Species	Locality (Province)	References
<i>M. bastiani</i> (Bütschli, 1873) Andrassy, 1959	Sierra de Albarracín (Teruel) Serranía de Ronda (Málaga) Sanabria (Zamora) Galicia Menorca (Baleares) Islas Pitiusas (Baleares) Various Sierra Nevada (Granada) Cazorla (Jaén) Macizo de Quinto Real (Pirineos Occ.) Pirineos Orientales Peñas de Echauri (Navarra) Sierra de la Pandera (Jaén) Various Sierra de Gata (Salamanca) Navarra Valencia	Gadea, 1952 Gadea, 1953 & 1979 Gadea, 1954 Gadea, 1955 Gadea, 1962 Gadea, 1964 Jiménez Millán <i>et al.</i> , 1965 Jiménez Guirado, 1976 Gadea, 1979 Monreal & Campoy, 1982 Gadea, 1983 Mateo & Campoy, 1983 Castillo <i>et al.</i> , 1985 Jiménez Guirado, 1987 Palomo, 1979 Hernández & Jordana, 1990 Thorne & Swanger, 1936
<i>M. clavicaudatus</i> (Thorne & Swanger, 1936) Andrassy, 1959	Varias (Galicia)	Gadea, 1955
<i>M. hofmaenneri</i> (Menzel in Hofmanner & Menzel, 1914) Goodey, 1963	Menorca (Baleares) Sierras de Gata and Béjar (Salamanca) Sierra Nevada (Granada)	Gadea, 1962 Palomo, 1979 Jiménez Guirado, 1976
<i>M. litoralis</i> Loof, 1969 <i>cf. paralitoralis</i> Basson & Heyns, 1974 <i>cf. pseudosubtilis</i> Basson & Heyns, 1974	Sierra Nevada (Granada) Sierra Nevada (Granada) Navarra	Ocaña <i>et al.</i> , 1986 Ocaña <i>et al.</i> , 1986 Hernández & Jordana, 1990
<i>M. tenellus</i> (Thorne & Swanger, 1936) Andrassy, 1959	Peñas de Echauri (Navarra)	Mateo & Campoy, 1983

gradually into the basal bulb. Latter practically cylindrical, about six times as long as wide and occupying 35-39% of the total neck length. Pharyngeal gland nuclei and outlets usually visible: distance DO-DN 2.0-2.3% of the total neck length, S₁N situated in the posterior half of the DN-S₂N distance. Nerve ring at two-fifths of the total neck length. Cardia conoid, as wide as long and encompassed by intestinal tissue which forms a tongue-shaped extension which intrudes into the intestinal lumen; its junction with the pharynx base is encircled by a ring-shaped tissue. Genital system didelphic-amphidelphic. Ovaries reflexed and moderately sized since they often reach, but do not extend past, the oviduct-uterus junction. Oocytes numerous, initially as a double row, then as a single row. The oviduct joins subterminally to the ovary and consists of a slender part with prismatic cells and a well developed *pars dilatata*. Oviduct and uterus are separated by a poorly differentiated sphincter. Uterus a relatively short tube, about twice as long as the corresponding body width, alveolar in appearance. Vagina cylindrical or barrel-shaped, extending inwards to half of the corresponding body width; the part adjacent to the vulva as two abutting triangular sclerotized pieces, the remainder encircled by musculature. Vulva a

transverse slit. Sperm present into the uterus and in the *pars dilatata* of the oviduct. Prerectum 1-4 anal body widths long. Rectum about 1.5 anal body widths in length. Tail conical, almost always more straight on the ventral side, and with a short digitate terminal portion. Two pairs of caudal pores at the middle of the tail: one subdorsal, the other lateral.

Male. General appearance similar to the female but with rounded tail and the posterior body region more ventrally curved. Genital system diorchic with opposite testis. In addition to an adanal pair there is a series of 6-9 regularly spaced ventromedian supplements situated outside the spicules range. Spicules relatively stout and ventrally curved; 1.5-1.7 times the anal body width in length. Lateral guiding pieces tapering at the terminus. Spermatozoa ovoid. Tail rounded, ventrally somewhat more straight. Five pairs of caudal pores: two subdorsal, one lateral and two ventral.

Type habitat and locality. Soil around roots of willow growing on the bank of a dry stream, near the Cúllar-Huéscar road, province of Granada, Spain.

Type material. Nine females (holotype and pa-

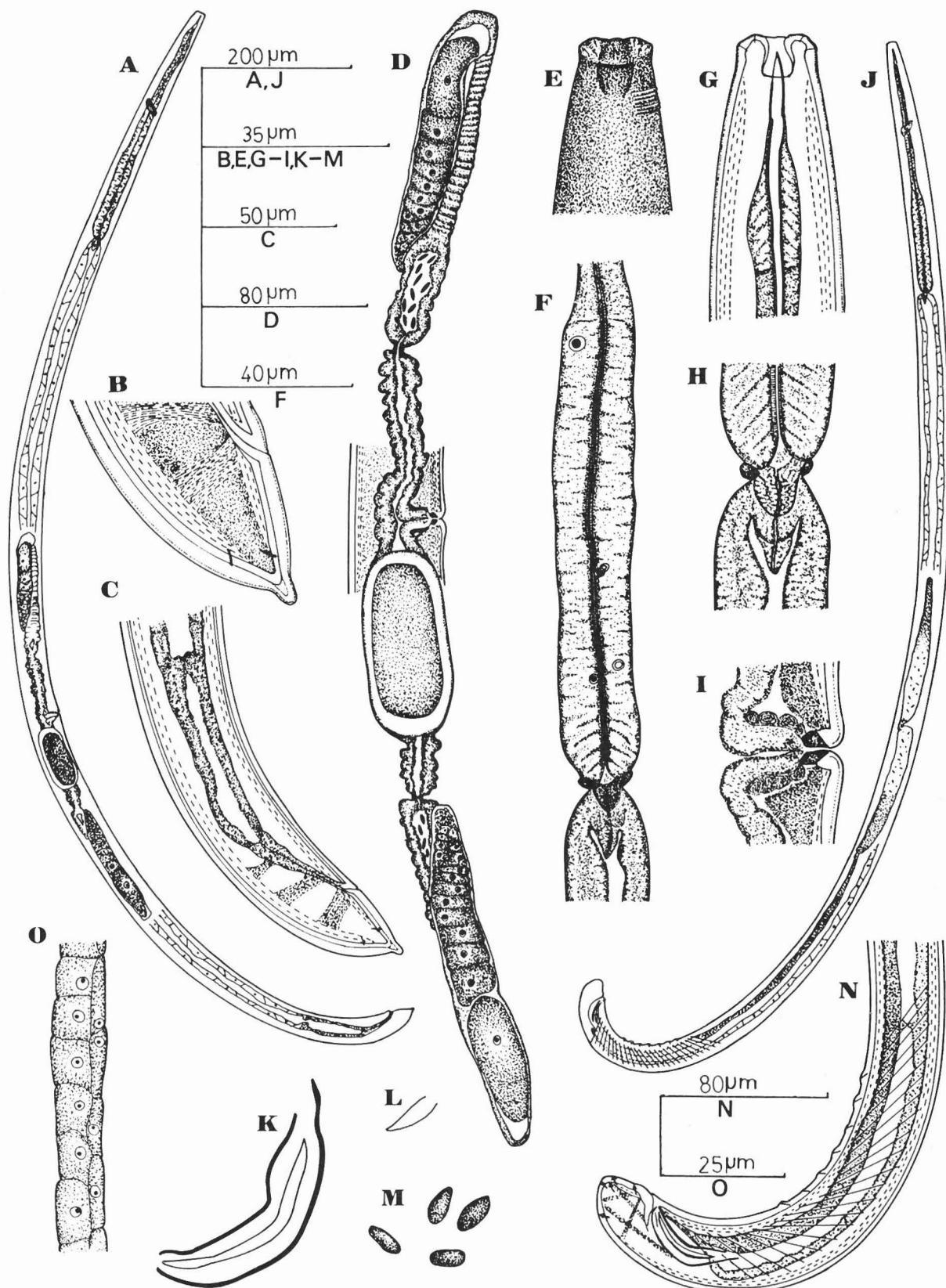


Fig. 1. *Mesodorylaimus brevicaudatus* sp. n. A: Female; B: Female tail; C: Female posterior body region; D: Female genital system; E: Lip region in surface view; F: Pharyngeal bulb; G: Lip region in median view; H: Cardia; I: Vagina; J: Male; K: Spicule; L: Lateral guiding piece; M: Sperm; N: Male posterior body region; O: Lateral chord.

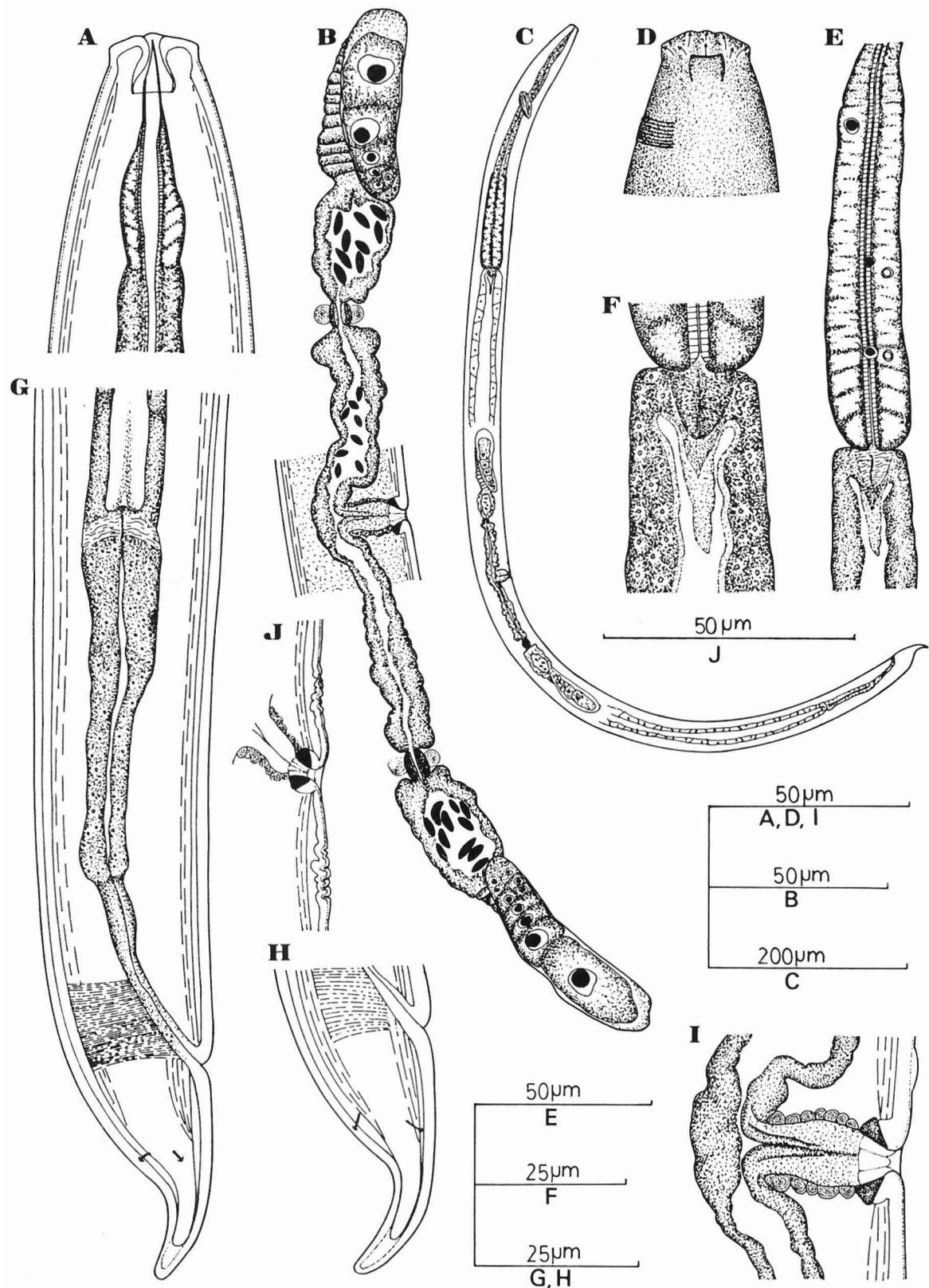


Fig. 2. *Mesodorylaimus pseudorecurvus* sp. n. (female). A: Lip region in median view; B: Genital system; C: Entire; D: Lip region in surface view; E: Pharyngeal bulb; F: Cardia; G: Posterior body region; H: Tail; I, J: Vagina.

ratypes) and five males (allotype and paratypes) deposited in Departamento de Biología Animal, Vegetal y Ecología, Universidad de Jaén, Spain, on slides n° 0153-0162. Two female paratypes and one male paratype deposited in the following sites: Instituut voor Dierkunde, Rijksuniversiteit Gent; Muséum National d'Histoire Naturelle, Paris, France; and Lanbouwuniversiteit, Wageningen, the Netherlands.

Etymology. The specific epithet derives from the Latin roots "brevis" = brief or short, and "cauda" = tail, and refers to the morphology of the female tail.

Differential diagnosis and relationships. *Mesodorylaimus brevicaudatus* sp. n. is characterized by being of medium size ($L=1.3\text{--}1.6$ mm), lip region somewhat angular and set-off by a depression, odontostyle $11\text{--}14 \mu\text{m}$ or similar in length to the lip region width, pharyngeal bulb $89\text{--}127 \mu\text{m}$ long, $V=50\text{--}57\%$, female tail conical digitate ($25\text{--}37.5 \mu\text{m}$, $c=38\text{--}61$, $c'=0.9\text{--}1.4$), male tail rounded ($18.5\text{--}37.5 \mu\text{m}$, $c=18.5\text{--}37.5$, $c'=0.6\text{--}1.3$), spicules $46.5\text{--}54 \mu\text{m}$ and 6-9 regularly spaced ventromedian supplements.

M. brevicaudatus sp. n. is close to *M. deuberti* (Andrássy, 1958) Goodey, 1963 and *M. aduncus* Andrássy, 1986. From the former it can be distinguished by having a more angular lip region (vs more rounded and continuous), different morphology of the tail (vs more conical and dorsally straight) and fewer ventromedian supplements which are spaced apart (vs 10-19 contiguous). From *M. aduncus* it can be distinguished by having a more slender body (vs $a=24\text{--}28$), shorter odontostyle (vs $15\text{--}16 \mu\text{m}$), transverse vulva (vs longitudinal), different morphology of the tail and fewer separate ventromedian supplement (vs 19 contiguous).

Mesodorylaimus pseudorecurvus sp. n.

(Fig. 2 & Table 2)

Female. Relatively slender nematodes, 1.1-1.3 mm long. Body cylindrical, obviously tapering to the posterior end and less so to the anterior. Habitus after fixation ventrally curved forming "C" or "J" shape. Outer cuticle layer relatively thin, with fine transverse striations which are more visible in the anterior region. Inner cuticle layer thicker than the outer layer, especially at level of tail. Lateral chord with granular aspect and occupying about one-third of the midbody width. Lateral pores obscure. Lip region set-off by a weak depression, somewhat angular; little more than twice as wide as high and about one-third of the body diameter at neck base. Lips amalgamated for the most part. Labial and cephalic papillae clearly visible, somewhat interrupting the head contour.

Amphid opening at level of the cephalic depression, occupying less than half of the lip region width. Cheilostome a truncate cone. Odontostyle 0.8-1.0 times the lip region width long; the aperture almost half of the total length. Odontophore rod-like, 1.5 times the odontostyle length. Guiding ring simple. Pharynx with a slender but muscular anterior part which expands gradually into the basal bulb. Latter cylindrical and occupying one-third to two-fifths of the total neck length. Pharyngeal gland nuclei hardly visible in the specimens examined: S_1N situated in the posterior half of the $DN-S_2N$ distance. Cardia conoid, encompassed by intestinal tissue which forms a long conical projection extending into the intestine lumen. Nerve ring situated at one-third of the total neck length. Female genital system didelphic-amphidelphic. Ovaries relatively small, not reaching the oviduct-uterus junction; oocytes not numerous, initially as a double row, then in a single row. The oviduct joins the ovary subterminally and consists of the slender part and a well developed *pars dilatata*. Sphincter between oviduct and uterus; its inner part refractive and appearing encircled by a muscular ring. Vagina cylindrical, extending inwards to half of the corresponding body width; the part adjacent to the vulva with two medium-sized, well separated, triangular pieces. Vulva a longitudinal slit. Body cuticle adjacent to the vulva showing irregularities consisting of coarse folds (two specimens) or somewhat swollen areas (more frequently). Sperm spindle-shaped or elliptical. Prerectum 2-3 anal body widths long. Rectum 1.5 times the anal body width long. Tail conical elongated with two parts: the anterior part ventrally almost straight, dorsally convex; the posterior part practically cylindrical and dorsally bent. Inner core of the tail extending into the cylindrical portion to half or even more of its total length. Two pairs of caudal pores: one dorsal, another subventral.

Male. Not found.

Type habitat and locality. Soil around roots of rushes and riverside brushwood growing at Los Genoveses, province of Almería, Spain.

Type material. Three females (holotype and paratypes) deposited in Departamento de Biología Animal, Vegetal y Ecología, University of Jaén, Spain, on slides n° 0163-0165. One paratype female deposited at Instituut voor Dierkunde, Rijksuniversiteit Gent, Belgium and Landbouwuniversiteit, Wageningen, the Netherlands.

Etymology. The specific epithet refers to *M. recurvus*, a very similar species.

Table 2. Measurements and diagnostic features of *Mesodorylaimus brevicaudatus* sp. n. and *M. pseudorecurvus* sp. n. (All measurements in μm except L in mm).

Species Habitat, locality, province	<i>M. brevicaudatus</i> sp. n.				<i>M. pseudorecurvus</i> sp. n.	
	Brushwood, Cúllar-Vega, Granada				Rushes, Los Genoveses, Almería	
	Holotype (female)	Paratypes (14 females)	Allotype (male)	Paratypes (7 males)	Holotype (female)	Paratypes (4 females)
L	1.6	1.4±0.1 (1.3-1.6)	1.6	1.5±0.1 (1.3-1.6)	1.3	1.2±0.1 (1.1-1.3)
a	38.2	36.7±2.9 (32.5-39.4)	45.9	42.3±2.9 (35.7-45.9)	35.7	35.5±2.2 (33.3-39.1)
b	5.0	4.9±0.5 (4.4-6.2)	5.1	4.8±0.4 (4.4-5.9)	4.3	4.4±0.2 (4.2-4.6)
c	62.5	49.8±6.6 (38.0-60.9)	74.1	60.1±15.6 (34.8-82.1)	34.3	31.4±1.9 (28.6-34.3)
V(%)	58.3	54.8±1.9 (50.4-56.9)			53.0	52.7±0.5 (51.8-53.2)
G1/T1	8.0	15.5±2.9 (12.7-20.4)	53.8	57.2±2.9 (54.8-61.0)	11.6	11.6±1.4 (9.6-13.0)
G2/T2	17.1	13.7±3.2 (7.3-17.7)	32.1	30.7±5.3 (22.9-41.9)	12.5	12.2±5.8 (4.7-15.0)
c'	1.0	1.2±0.1 (0.9-1.4)	0.8	0.8±0.2 (0.6-1.3)	1.6	1.8±0.1 (1.6-2.0)
Lip region: width	13.5	(12.0-13.5)	14.0	(13.0-14.0)	11.5	(11-12)
height	5.0	5.0	5.0	5.0	5.0	5.0
Amphid aperture	6.0	(4.5-6.0)	6.0	(5.0-6.5)	4.5	(4.5-5)
Odontostyle	12.0	12.3±0.7 (11.0-14.0)	12.0	12.4±0.8 (11.5-13.5)	10	10.6±0.4 (10-11)
Odontophore	11.0	14.0±2.5 (13.0-18.0)	12.0	11.1±2.3 (8.0-13.5)	?	?
Guiding ring	7.0	(6.5-8.0)	7.0	(7.0-8.5)	8	(7.5-8)
Nerve ring-ant. end	120	117±12.6 (106-147)	162	119±17.6 (101-133)	110	118±4.0 (114-122)
Neck length	325	297±28.2 (225-331)	314	310±21.0 (268-337)	300	284±19.9 (250-294)
Pharyngeal bulb length	118	112±7.4 (97.0-127)	116	112±11.8 (89.0-127)	102	97.2±11.7 (86-117)
Cardia: width	8.0	(6.5-12.0)	7.0	(6.0-10.0)	11	(8-10)
length	17.0	(11.0-24.0)	27.5	(15.0-36.5)	31	(10-16.5)
Cuticle: head	2.0	(1.5-2.5)	2.0	2.0	1	1
midbody	2.5	(2.0-3.0)	2.5	(2.0-2.5)	1.5	(1-1.5)
tail	3.5	(3.0-4.0)	3.0	3.0	3	(2.5-3)
Body width: neck base	36.5	(31.0-44.0)	31.5	(32.5-34.5)	36.5	32.5
midbody	42.5	(35.0-46.5)	35.5	(33.5-39.5)	36	(34.5-35.5)
anus	26.0	(21.0-26.0)	27.5	(27.5-31.0)	23	(20-22)
Lateral chord	15.0	(11.5-22.0)	14.0	(11.0-13.0)	13	(11-13)
Anterior ovary/testis	128	129±38.0 (84.0-241)	181	197±33.7 (128-226)	91	67.3±7.4 (57-74)
Anterior genital branch	132	230±47.8 (167-327)	878	868±52.1 (794-968)	150	144±9.7 (130-152)
Posterior ovary/testis	162	137±38.2 (89.0-250)	171	207±46.7 (140-289)	122	66.8±20.6 (40.5-91)
Posterior genital branch	279	217±47.1 (164-280)	525	463±62.3 (424-548)	162	133±48.8 (64-173)
Vagina: width	12.0	(10.0-15.0)			11	(8.5-10)
length	18.0	(15.5-26.0)			18	(15-18)
Vulva-ant. end	950	814±69.1 (762-913)			681	652±31.8 (612-700)
Prerectum	72.0	64.5±16.6 (32.4-92.0)	164	106±42.4 (42-140)	53.5	53.8±8.5 (43.5-63)
Rectum/Cloaca	36.5	36.7±3.1 (30.5-42.0)	10.0	12.7±1.6 (12.0-15.0)	33.5	34±2.9 (32.5-38.5)
Tail	26.0	30.1±3.4 (25.0-37.5)	22.0	27.0±6.5 (18.5-37.5)	37.5	39.5±4.0 (35.5-43.5)
Spicules			39.5	(46.5-54.0)		
Lateral guiding piece			10.5	(10.5-13.0)		
Ventr. suppl.			7	(6-9)		
Spermatozoa			9.0	(6.0-9.0)		

Differential diagnosis and relationships. *Mesodorylaimus pseudorecurvus* sp. n. can be distinguished by its medium size (L=1.1-1.3), lip region set-off by a weak depression, odontostyle 10-11 μm long, pharyngeal bulb 86-117 μm long, V=51.8-53.2%, presence of irregularities in the body cuticle near the vulva, and tail conical, elongated (35.5-43.5 μm , c=

28.6-34.3, c'=1.6-2.0) with the posterior half dorsally bent.

The new species is close to *M. recurvus* Andrássy, 1964, but can be distinguished from this species by several small but reliable differences: more slender body (vs a=26-31), smaller amphid, shorter odontostyle (vs 14-17 μm), presence of irregularities of the

body cuticle near the vulva (vs without irregularities), and female tail with different morphology (vs inner cuticle rather thickened, and inner core not extending into the posterior and more slender portion).

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Резюме. Описываются два новых вида рода *Mesodorylaimus* Andrassy, 1959 из сообществ диких растений юго-восточной провинции Испании. *Mesodorylaimus brevicaudatus* sp. n. характеризуется средними размерами тела ($L=1,3-1,6$ мм), областью губ, отделенной перетяжкой, одонтостилем 11-14 мкм длиной, почти равной ширине губной области, $V=50-57\%$, коническим хвостом с пальцевидным отростком у самок (25-37,5 мкм, $c=38-61$, $c'=0,9-1,4$), спикулами 46-54 мкм длиной, 6-9 регулярно расположенными вентро-медиальными супплементами. *M. pseudorecurvus* sp. n. характеризуется средними размерами тела ($L=1,1-1,3$ мм), областью губ, слабо отделенной перетяжкой, одонтостилем 10-11 мкм длиной, $V=51,8-53,2\%$, наличием нарушений кутикулы в области вульвы, удлиненно коническим хвостом (35,5-43,5 мкм, $c=28,6-34,3$, $c'=1,6-2,0$), цилиндрическим и дорсально изогнутым в задней половине. Приводятся иллюстрации и таблицы с морфометрией этих двух видов.
