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ROTYLENCHUS CAZORLAENSIS SP. N. AND NEW RECORD OF *R. FALLOROBUSTUS* SHER, 1965 (NEMATODA: TYLENCHIDA) FROM SOUTH-EASTERN SPAIN

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A new species of *Rotylenchus* Filip'ev, 1936 from Sierra de Cazorla, Spain, with males and females is decribed as *R. cazorlaensis* sp. n. Females are characterized by a truncate cephalic region continuous with body, large size L = 1.79 mm (1.44-2.28) and well developed stylet. Close to *R. magnus* Zancada, 1986 in large size and lateral field areolated only anteriorly, it differs in stylet length 53 µm (46.5-56.5) compared to 64 µm (59-70), lip region and position of phasmids. It resembles *R. robustus* (de Man, 1876) Filip'ev, 1936, but differs in areolations of lateral field. *R. fallorobustus* Sher, 1965 is recorded and described for the first time in Spain.

Keywords: taxonomy, morphology, soil nematodes, Spain, spiral nematodes.

During a survey of plant parasitic nematodes an undescribed species of the genus *Rotylenchus* Filip'ev, 1936 and a new record from Spain, were collected from different plant communities in Sierra de Cazorla, Spain.

MATERIALS AND METHODS

Nematodes were killed by gentle heat, fixed in 4% formaldehyde and mounted in glycerine using the method of Seinhorst (1959, 1962). Straight measurements (stylet length, DGO, maximum body width, etc.) were made by means of a micrometer-scale in the eyepiece of a high-power (1250 ×) microscope and illustrated with the aid of a drawing tube. SEM micrographs were taken with a Zeiss DSM 950 scanning electron microscope at 10 and 15 kV, using specimens processed to glycerine and coated with gold.

DESCRIPTION

Rotylenchus cazorlaensis sp. n.
(Figs. 1 and 2)

Holotype ♀: L = 1.99 mm; a = 36.9; b = 8.7; b′ = 10.5; b_1 = 11.9; c = 64.9; c′ = 0.9; V = 54; stylet = 54.0 µm; O = 20.6; m = 50.6; tail annuli = 14; position of phasmid = 2 annuli posterior anus.

Paratype ♀♀: see Table I.

Allotype ♂: L = 1.67 mm; a = 46.4; b = 6.8; b′ = 7.9; b_1 = 10.9; c = 53.4;

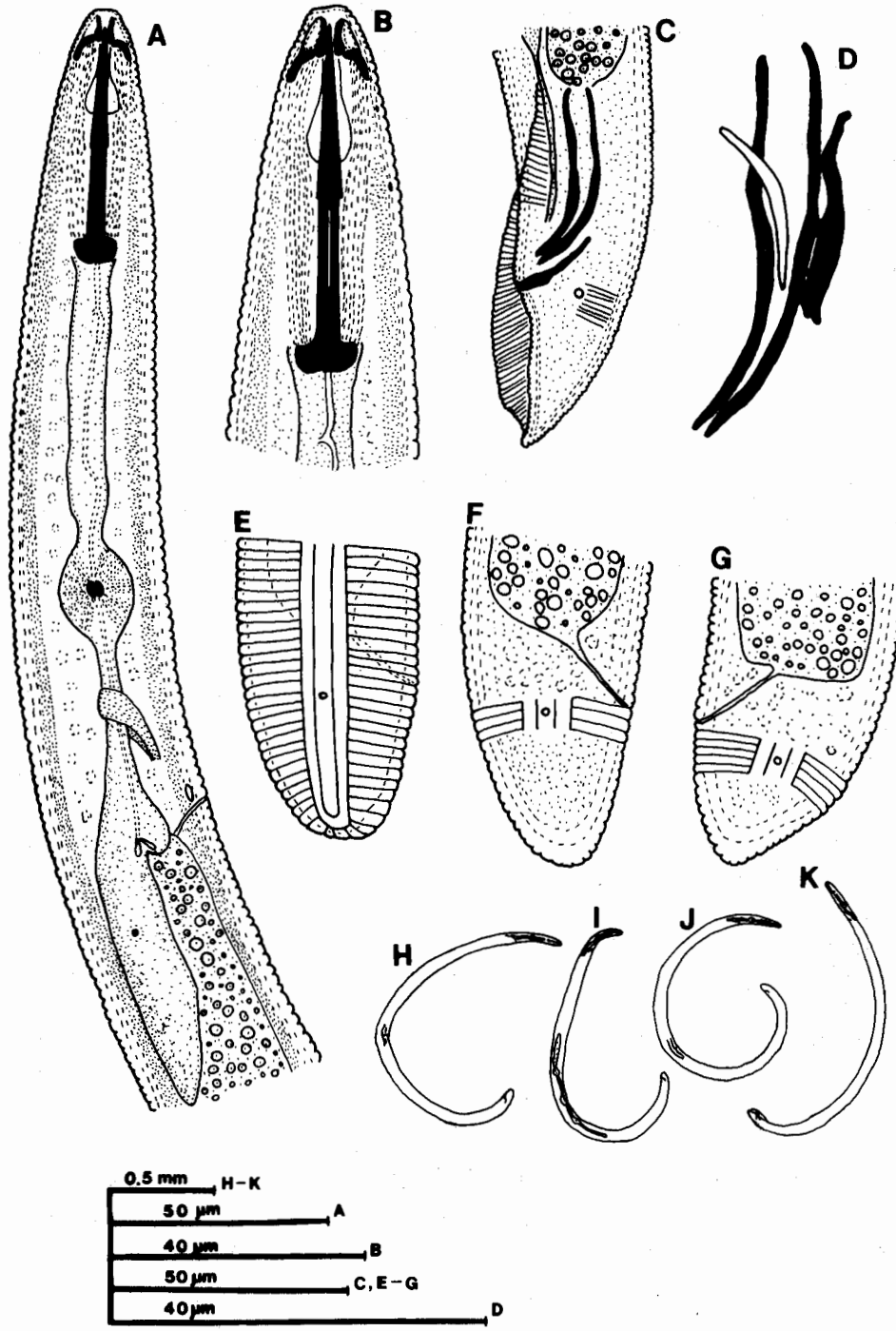

Fig. 1. *Rotylenchus cazorlaensis* sp. n. Female. A. Oesophageal region. B. Anterior end. E-G. Tails. H-J. Whole body. Male. C. Posterior end. D. Spicules and gubernaculum. K. Whole body.

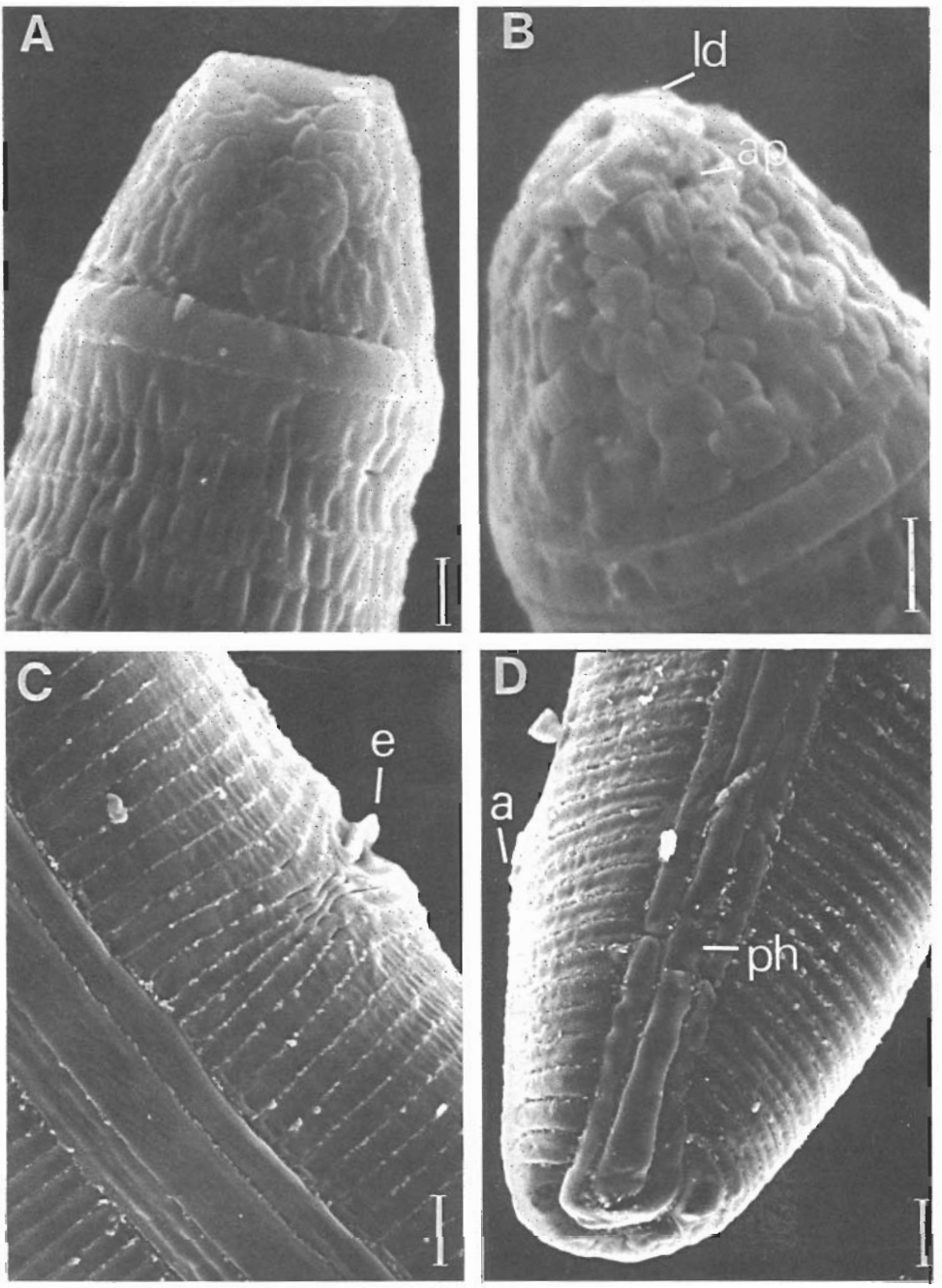

Fig. 2. *Rotylenchus cazorlaensis* sp. n. Female; SEM micrographs. A, B. Head end, 5000x, 6500x respectively (scale bar = 2 µm). C. Vulval region, 2000x (scale bar = 5 µm). D. Tail region, 2000x (scale bar = 5 µm). a = anus; ap = amphid; e = epiptygma; ld = labial disc; ph = phasmid.

TABLE I

Morphometric data of Rotylenchus cazorlaensis *sp. n.*

	Females (n = 32)			Males (n = 11)		
	Means ± S.D.	Range	C.V. %	Means ± S.D.	Range	C.V. %
L (mm)	1.79 ± 0.18	1.44-2.28	10.2	1.53 ± 0.13	1.27-1.68	8.3
a	35.5 ± 3.27	28.6-43.1	9.2	41.9 ± 4.03	37.2-51	9.6
b	7.4 ± 0.88	6.0-9.5	11.9	6.0 ± 0.78	4.9-7.3	12.9
b′	9.4 ± 1.07	7.8-12.2	11.4	7.8 ± 0.76	6.9-8.9	9.7
b_1	12.8 ± 1.25	10.1-15.5	9.7	11.2 ± 1.09	9.1-12.8	9.8
c	73.7 ± 19.1	51.7-152.6	25.9	43.0 ± 6.22	34.6-54.4	14.5
c′	0.7 ± 0.12	0.4-0.9	15.6	1.4 ± 0.18	1.1-1.7	12.9
V	54.5 ± 2.06	50-59	3.9	—	—	—
T	—	—	—	33.9 ± 6.77	25-45	20.0
G_1	22.1 ± 6.22	14-36	28.2	—	—	—
G_2	20.5 ± 5.36	13-31	26.2	—	—	—
Stylet (μm)	52.8 ± 2.25	46.5-56.5	4.2	49.8 ± 2.38	47.5-54.5	4.8
m	50.6 ± 1.34	48-54	2.6	51.4 ± 2.25	47-55	4.4
O	16.9 ± 1.61	14-21	9.5	17.4 ± 1.13	15-18	6.5
S	1.8 ± 0.12	1.6-2.1	6.6	2.1 ± 0.13	1.9-2.3	6.0
MB	54.3 ± 4.61	47-65	8.5	50.1 ± 3.83	44-55	7.6
Head width (μm)	12.5 ± 1.13	10-14	9.0	11.1 ± 0.94	10.0-12.7	7.8
Head height (μm)	7.8 ± 0.82	6.5-9.5	10.4	7.0 ± 0.94	6.0-8.5	13.5
Oesophagus (μm)	242 ± 23	208-293	9.7	255 ± 28	220-293	10.9
Nerve ring (μm)	150 ± 13	118-185	8.8	151 ± 12	129-168	8.2
Excretory pore (μm)	186 ± 17	145-219	9.1	183 ± 9	166-200	5.1
Maximum body width (μm)	50.5 ± 3.95	43.5-63.5	9.6	36.6 ± 3.45	30-41	9.4
Annulus width (μm)	1.9 ± 0.13	1.5-2.0	6.7	1.7 ± 0.25	1.5-2.0	14.6
Lateral field width (μm)	12.8 ± 1.52	10-17.5	11.8	10.2 ± 1.17	8-11.5	11.4
Tail length (μm)	25.3 ± 4.92	13-36.5	19.5	36.0 ± 4.03	29-43	11.2
Tail annuli	13 ± 1.8	9-17	14.0	30 ± 1.15	29-31	3.9
Spicules (μm)	—	—	—	44.9 ± 2.16	42-48	4.8
Gubernaculum (μm)	—	—	—	22.9 ± 1.77	19.5-25	8.0
Testis (μm)	—	—	—	508 ± 106	381-691	20.9

c′ = 1.2; T = 34; stylet = 48 μm; O = 18; m = 51; tail annuli = 34; position of phasmid = at anus level.

Paratype ♂♂: see Table I.

Female. Large body, forming a "C" shape to an open spiral when killed by heat. Cuticle 2.5-3.5 μm thick, clearly annulated; annuli 1.5-2 μm wide at mid-body, lateral field with four longitudinal smooth incisures areolated only anteriorly. Lip region truncate, continuous with body; bearing 6-7 thin annuli irregularly divided into blocks. Labial disc distinct with SEM but not in lateral view with light microscope. Cephalic framework well developed, 10.5 ± 0.3 μm

(10-11) long, its posterior edge at level of second or third body annulus. Anterior and posterior cephalids hardly distinguishable, at level of 3-4 and 10-11 annuli respectively behind lip region, at 15 ± 0.9 μm (14-16) and 28 ± 0.9 μm (27-29) from anterior end respectively. Basal ring 1.4 ± 0.15 μm (1.3-1.6) wide. Stylet 4.2-5.4 times longer than head diameter. Basal knobs slightly flattened anteriorly 9.5-11.5 μm wide, lying in the 24-27th annule behind head. Outlet of dorsal oesophageal gland 9.5 ± 0.8 μm (8.5-11.5) from stylet base or at 1/6-1/7 of stylet length. Procorpus of oesophagus cylindrical, with a slight depression just before the median bulb, 63 ± 5.1 μm (56-72) long. Median oesophageal bulb well developed, oval 19-23 × 16-18 μm, occupying 7-10 annuli; with valvular apparatus 4.5-5.5 μm long. Isthmus 28 ± 4.5 μm (22-34) long, enveloped by nerve ring in the middle. Oesophageal glands overlapping intestine 24-30 annuli or 55 ± 15.1 μm (47-77) long. Excretory pore located near the oesophago-intestinal junction level, seldom posterior. Hemizonid 2 to 2.5 annuli long, just anterior to excretory pore, rarely posterior. Reproductive system with the two genital branches equally developed. Vulva slightly posterior to mid-body with a distinct epiptygma 3-3.5 μm long. Ovaries with a single row of 12-15 oocytes, spermathecae spherical 25 μm (21-32) wide, filled with rounded sperms 3.5 μm (2.5-4) wide. One egg observed 36 × 144 μm in uterus. Intestine not extending over rectum. Rectum 17 ± 4.3 μm (14-23) or 0.5-0.7 times anal body width. Phasmids pore-like 1 ± 1.4 (0-4) annuli posterior to level of anus. Tail short with variable shape, from broadly rounded to dorsally convex-conoid, 25.3 ± 4.9 μm (13-36.5) long and 34 ± 2.8 μm (30-40) wide at anus with 13 ± 1.8 (9-17) annuli ventrally, terminus striated.

Males. Body ventrally arcuate. Common, similar to females apart from sexual dimorphism. Male stylet shorter than that of female. Tail slightly longer than that of female 36 ± 4.0 μm (29-43). Male phasmid distinct, situated at anus level. Testis with two rows of spermatogonia. Bursa 85 ± 4.1 μm (79-89) long surrounds the tail completely. A capitulum is usually visible between the spicules 14.2 ± 1.1 μm (12.5-15.5) long. The gubernaculum is prominent and has distinct titillae.

Type habitat and locality. Specimens collected from soil around the roots of gall oak (*Quercus faginea* Lam.) from Arroyo Frio and one female and one male from soil around roots of oak (*Quercus rotundifolia* Lam.) from Vadillo both in Sierra de Cazorla, Jaén, Spain.

Type specimens. Holotype, allotype, 25 female paratypes, 7 male paratypes and juveniles in the collection of the Instituto "López-Neyra" de Parasitología (C.S.I.C.), Granada, Spain; 2 female paratypes and one male paratype at Instituto de Edafología y Biología Vegetal (C.S.I.C.), Madrid, Spain; female and male paratypes at the Department of Nematology, Landbouwhogeschool, Wageningen, The Netherlands; 2 female paratypes and one male paratype at the Instituut voor Dierkunde, Rijksuniversiteit Gent, Belgium; 2 female paratypes and one male paratype at C.I.P. St. Albans, Herts., England.

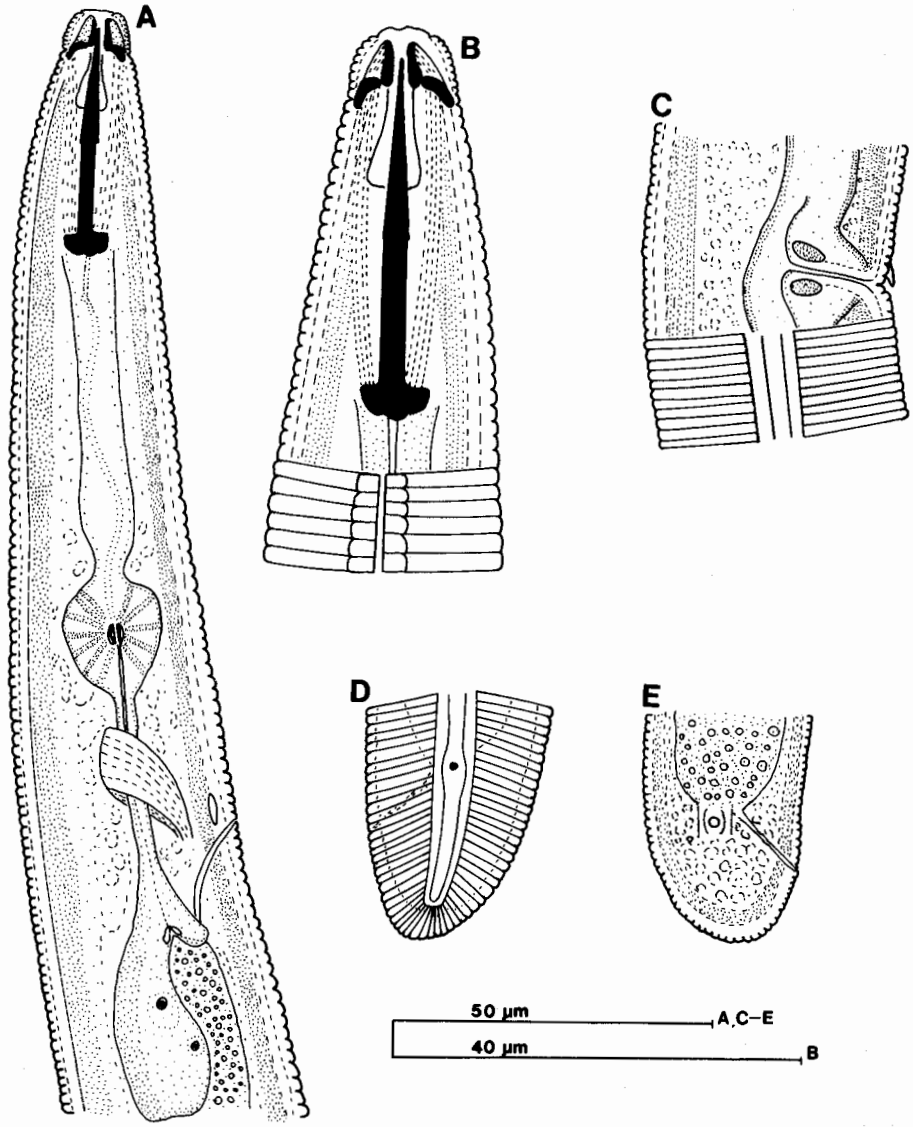

Fig. 3. *Rotylenchus fallorobustus* Sher, 1965. A. Oesophageal region. B. Anterior end. C. Vulval region. D-E. Tails.

Differential diagnosis. Rotylenchus cazorlaensis sp. n. is closely related to *R. magnus* Zancada, 1986 and resembles *R. robustus* (de Man, 1876) Filip'ev, 1936. It differs from *R. magnus* in having shorter stylet 52.8 ± 2.2 µm (46.5-56.5) versus 64 ± 2.9 µm (59-70); lip region (truncate, not set off versus hemispherical and set off), cephalic framework longer 10.5 ± 0.3 µm (10-11) versus 8 µm, longer oesophagus 242 ± 23 µm (208-293) versus 181 µm (170-

193); DGO longer 9.5 ± 0.8 µm (8.5-11.5) versus 8.5 µm (4.5-9.5) and phasmids (0-4 annuli posterior to anus versus 1-7 annuli anterior to anus level). It differs from *R. robustus* in having longer stylet (44-50 µm in *R. robustus*), lateral field (areolated only anteriorly versus irregularly areolated on mid-body) and large size (1.44-2.28 mm versus 1.22-1.87 mm). (The measurements of *R. robustus* are from Sher, 1965).

Rotylenchus fallorobustus Sher, 1965
(Fig. 3)

Females (n = 13): L = 0.97 ± 0.16 mm (0.83-1.07); a = 26.6 ± 2.0 (23.7-29.4); b = 5.9 ± 0.3 (5.5-6.6); b′ = 6.7 ± 0.3 (6.4-7.4); b_1 = 9.4 ± 0.6 (8.6-10.4); MB = 57 ± 1.9 (53-60); c = 77.0 ± 11.6 (57-94.3); c′ = 0.5 ± 0.08 (0.4-0.7); V = 56 ± 1.6 (53-59); G_1 = 23 ± 2.5 (20-28); G_2 = 23 ± 2.4 (20-28); stylet = 33.8 ± 1.2 µm (31-35); m = 49 ± 1.3 (47-51); O = 17.3 ± 0.7 (16-18); S = 1.6 ± 0.06 (1.5-1.7); nerve ring = 111 ± 8.8 µm (93-127); excretory pore = 131 ± 12.5 µm (104-147); tail length = 12.9 ± 2.2 µm (10-17); tail annuli = 12 (10-16); position of phasmids = 8 ± 1.6 (7-11) annuli anterior at anus level.

Male: not found.

These specimens were identified as *R. fallorobustus* because with 6-8 annuli in lip region, poorly developed spermatheca without sperm, lateral field areolated only anteriorly and no males they also had measurements similar to those given by Sher (1965). They were found in the soil around roots of black poplar (*Populus nigra* L.) from Arroyo Frio, Sierra de Cazorla, in a sample collected in September, 1986.

We thank M. C. Zancada for loaning the female paratypes.

RÉSUMÉ

Rotylenchus cazorlaensis *sp. n. et signalisation nouvelle de* R. fallorobustus *Sher, 1965 (Nematoda: Tylenchida) dans le sud-est de l'Espagne*

Une nouvelle espèce de *Rotylenchus* Filip'ev, 1936, provenant de la Sierra de Cazorla (Espagne) et comportant mâles et femelles, est décrite sous le nom de *R. cazorlaensis* sp. n. Les femelles sont caractérisées par une région céphalique tronquée et non séparée du reste du corps, une grande taille [L = 1, 79 mm (1,44-2,28)] et un stylet bien développé. Cette nouvelle espèce est proche de *R. magnus* Zancada, 1986 par sa grande taille et le champ latéral aréolé uniquement à la partie antérieure du corps; elle en diffère toutefois par le stylet légèrement plus court [53 µm (46,5-56,5) *vs* 64 µm (59-70)], la forme de la région labiale et la position des phasmides. Elle ressemble également à *R. robustus* (de Man, 1876) Filip'ev, 1936, mais s'en sépare par l'aréolation du champ latéral. *R. fallorobustus* Sher, 1965 est signalé, et décrit, pour la première fois en Espagne.

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