

MORPHOMETRICS OF *LONGIDORUS JUVENILIS* AND FIRST RECORD OF *L. AETNAEUS* AND *L. MOESICUS* (NEMATODA: DORYLAIMIDA) FROM SERBIA

L. Barsi and F. Lamberti

Faculty of Science, Department of Biology and Ecology, Trg D. Obradovića 2, 21000 Novi Sad, Serbia
Istituto per la Protezione delle Piante, Sezione di Bari, C.N.R., Via G. Amendola 168/5, 70126 Bari, Italy

Summary. Specimens of *Longidorus aetnaeus*, *L. juvenilis* and *L. moesicus* collected from various habitats in Serbia are studied. Brief descriptions, measurements and illustrations of the species are provided. Males and juvenile developmental stages of *L. juvenilis* are also reported. *Longidorus aetnaeus* and *L. moesicus* are recorded from Serbia for the first time.

Several soil samples collected in various parts of Serbia contained populations of *Longidorus aetnaeus* Roca, Lamberti, Agostinelli *et* Vinciguerra, *L. juvenilis* Dalmasso and *L. moesicus* Lamberti, Choleva *et* Agostinelli. *Longidorus juvenilis* is already known to occur in Vojvodina Province, Northern Serbia (Barsi, 1989). However, reported data on its morphology and intraspecific variability are scanty (Barsi, 1989) and information on juvenile developmental stages of this species has never been reported. *Longidorus aetnaeus* and *L. moesicus* were found for the first time in Serbia. Descriptions and illustrations are presented in this paper.

MATERIALS AND METHODS

Nematodes were extracted by Cobb's wet sieving technique, killed and fixed by hot FP 4-1 and transferred to glycerin by the slow evaporation method and mounted on permanent microscope slides. Measurements were made with an eyepiece scale, except body length, which was measured with the aid of a drawing tube and map measurer.

DESCRIPTIONS

LONGIDORUS JUVENILIS

Dalmasso, 1969 (Tables I and II; Figs 1-4)

Female (Novi Sad, *Sambucus nigra* L., n = 22): body posture varying from ventrally curved to a single spiral, tapering gradually toward the extremities. Lip region slightly expanded, frontally flattened, laterally rounded, and offset from the rest of the body by a slight depression. Amphidial pouches symmetrically bilobed. Odontostyle, odontophore and guide ring typical of the genus. Oesophagus dorylaimoid with the basal bulb measuring 79-91 μm long and 14-17 μm wide, occupying between 22-27% of the total oesophagus length.

Vulva a transverse slit, vagina occupying between 51-63% of the corresponding body diameter; *pars distalis vaginae* and moderately thick-walled *pars proximalis vaginae* 7-10.5 and 7-12 μm long, respectively. Reproductive system amphidelphic with equally developed genital branches; uterus 43-69 μm long, separated by a sphincter from *pars dilatata oviductus*; ovaries opposed, reflexed. Prerectum as long as 12-15 times the anal body width (n = 3); rectum about 0.8 to 1.1 times the body diameter at anus. Tail elongate-conoid, dorsally convex, ventrally slightly concave, with rounded terminus, bearing two caudal pores on each side.

Male (Novi Sad, *Populus* sp., n = 3): morphologically similar to females, with the posterior region of the body more coiled. The oesophagus basal bulb measuring 73-76 μm long and 15-17 μm wide. All the males with fully developed testes filled with sperm. The adanal pair of supplements is preceded by a row of 7-10 ventromedian supplements. Tail dorsally convex, ventrally concave, narrowly conoid with a slight constriction dorsally near the tip.

Juveniles (Novi Sad, *S. nigra*, n = 56): similar to adults with elongate-conoid tail, clearly separated into three stages (Fig. 3).

Remarks. All stages correspond well with juvenile stages described from France by Dalmasso (1969) and show a very similar developmental pattern (Table IV and Fig. 4). Dalmasso, in the original description, reported three groups of juveniles and designated the third group (pre-adult juveniles) as L3/L4 because he was unable to differentiate these specimens as two distinct developmental stages. Robbins *et al.* (1995), in their compendium of *Longidorus* juvenile stages, put *L. juvenilis* in the group of species with only three juvenile stages described. Based on the original description and the data presented here, it is obvious that *L. juvenilis* has only three developmental stages, like *L. intermedius* (reported by Peneva *et al.*, 2001).

The populations of *L. juvenilis* from Serbia corre-

Table I. Morphometric characters of a population of *Longidorus juvenilis* from Serbia.

Locality: Host:	Novi Sad <i>Sambucus nigra</i> (black elder)			
n	12 JI	18 JII	26 JIII	22 females
L (mm)	1.09±0.06 (1.00-1.19)	1.63±0.13 (1.43-1.87)	2.45±0.14 (2.14-2.67)	3.84±0.32 (3.11-4.45)
a	66.0±2.22 (61.6-69.1)	79.8±3.08 (72.5-84.7)	99.0±3.97 (91.4-106.1)	119.0±8.27 (96.1-130.6)
b	4.6±0.28 (4.2-5.2)	6.3±0.43 (5.5-7.0)	8.2±0.50 (7.3-9.1)	11.4±0.73 (9.9-12.9)
c	25.5±2.14 (23.2-30.4)	32.4±2.68 (27.5-37.4)	45.1±3.27 (36.5-50.9)	69.4±6.29 (59.4-79.7)
c'	3.49±0.24 (3.00-3.92)	3.35±0.25 (2.91-3.85)	2.84±0.18 (2.49-3.34)	2.43±0.17 (2.13-2.74)
d	1.3±0.04 (1.3-1.4)	1.4±0.04 (1.3-1.4)	1.5±0.04 (1.4-1.6)	1.5±0.04 (1.4-1.6)
d'	0.7±0.02 (0.6-0.7)	1.4±0.03 (1.4-1.5)	1.4±0.04 (1.4-1.5)	1.4±0.04 (1.3-1.4)
J'	0.9±0.11 (0.8-1.2)	1.0±0.10 (0.8-1.2)	1.1±0.14 (0.8-1.4)	1.3±0.12 (1.0-1.5)
V	–	–	–	47.4±1.16 (45.4-49.2)
Odontostyle µm	43.4±0.72 (42.5-45.0)	47.0±0.85 (45.0-48.7)	56.2±1.29 (53.7-58.7)	65.9±2.22 (61.2-68.7)
Odontophore µm	27.7±1.68 (25-30)	34.7±2.09 (31.3-38.8)	39.6±1.99 (36.3-42.5)	43.4±2.17 (37.5-46.3)
Total stylet µm	71.1±1.75 (68.7-73.7)	81.7±2.27 (77.5-85.0)	95.8±2.62 (91.3-101.2)	109.4±3.65 (98.7-113.7)
Replacement odontostyle µm	46.8±0.85 (45.0-47.5)	54.9±1.86 (51.2-58.7)	64.9±2.16 (61.2-70.0)	–
Oral aperture to guide ring µm	15.4±0.49 (14.4-16.3)	17.3±0.68 (15.6-18.8)	20.9±0.70 (20.0-21.9)	24.2±1.02 (21.9-25.6)
Tail µm	42.7±2.46 (39.3-46.4)	50.6±4.01 (42.8-58.5)	54.4±2.89 (48.9-58.5)	55.6±5.04 (47.1-66.2)
J (hyaline portion of tail) µm	4.1±0.40 (3.8-5.0)	5.3±0.46 (5.0-6.3)	7.4±0.99 (5.0-8.8)	12.3±0.96 (10.0-13.8)
Body diam. at lip region µm	7.5±0.00 (7.5-7.5)	8.8±0.24 (8.3-9.4)	9.9±0.21 (9.4-10.0)	11.3±0.29 (10.6-11.9)
Body diam. at guide ring µm	11.4±0.19 (11.3-11.9)	12.5±0.43 (11.6-13.4)	14.1±0.45 (13.3-15.0)	15.9±0.64 (14.7-16.9)
Body diam. at base of oesophagus µm	17.0±0.59 (15.9-17.8)	20.4±1.17 (18.4-22.5)	23.8±0.74 (21.9-24.7)	28.7±1.11 (26.3-30.9)
Body diam. at mid-body or vulva µm	16.5±1.00 (15.0-18.4)	20.5±2.01 (16.9-23.8)	24.8±1.18 (22.5-26.9)	32.3±2.12 (28.4-35.4)
Body diam. at anus µm	12.2±0.58 (11.3-13.1)	15.1±1.07 (13.1-17.2)	19.1±0.78 (17.5-20.9)	22.9±1.59 (20.0-26.6)
Body diam. at beginning of J µm	4.4±0.32 (3.8-4.7)	5.4±0.50 (4.7-6.3)	7.0±0.63 (5.9-8.8)	9.7±0.50 (8.8-10.6)

d, anterior to guide-ring/body width at lip region

d', body width at guide-ring/body width at lip region (Brown *et al.*, 1994);

J', length of the hyaline region of the tail/hyaline width (Lišková *et al.*, 1997).

spond with the description of this species by Dalmaso (1969) and with other populations reported from Italy (Cotroneo *et al.*, 1980; Coiro *et al.*, 1988a, 1988b, 1992; Roca *et al.*, 1986a, 1987, 1988a, 1988b, 1989, 1990, 1991a, 1991b; Roca and Lamberti, 1993), Slovakia (Lišková *et al.*, 1993; Lišková, 1997), South Africa (Van Reenen and Heyns, 1986; Jacobs and Heyns, 1987) and

Yugoslavia (Barsi, 1989). Compared to the type population (Dalmaso, 1969) our populations has a longer body (av. 3.59-3.84 mm *vs.* av. 3.32 mm), higher "a" value (av. 110.6-121.2 *vs.* av. 84.2), slightly shorter odontostyle (av. 61.9-65.9 µm *vs.* av. 66 µm) and odontophore (av. 42.3-47.7 µm *vs.* av. 47 µm), longer tail (av. 52.8-57.2 µm *vs.* av. 51 µm) and more slender body (av. 30.6-32.9 µm *vs.*

39 μm). Three paratypes of *L. juvenilis* deposited in the collection of Rothamsted Research were measured by Lišková *et al.* (1993) who, in comparison with the measurements given by Dalmaso (1969) for ten paratypes in

the original description, found considerable differences in body length (3.7-4.1 mm *vs.* 2.8-3.6 mm) and tail length (50-62 μm *vs.* 45-55 μm).

Males of *L. juvenilis* are very rare. They have been

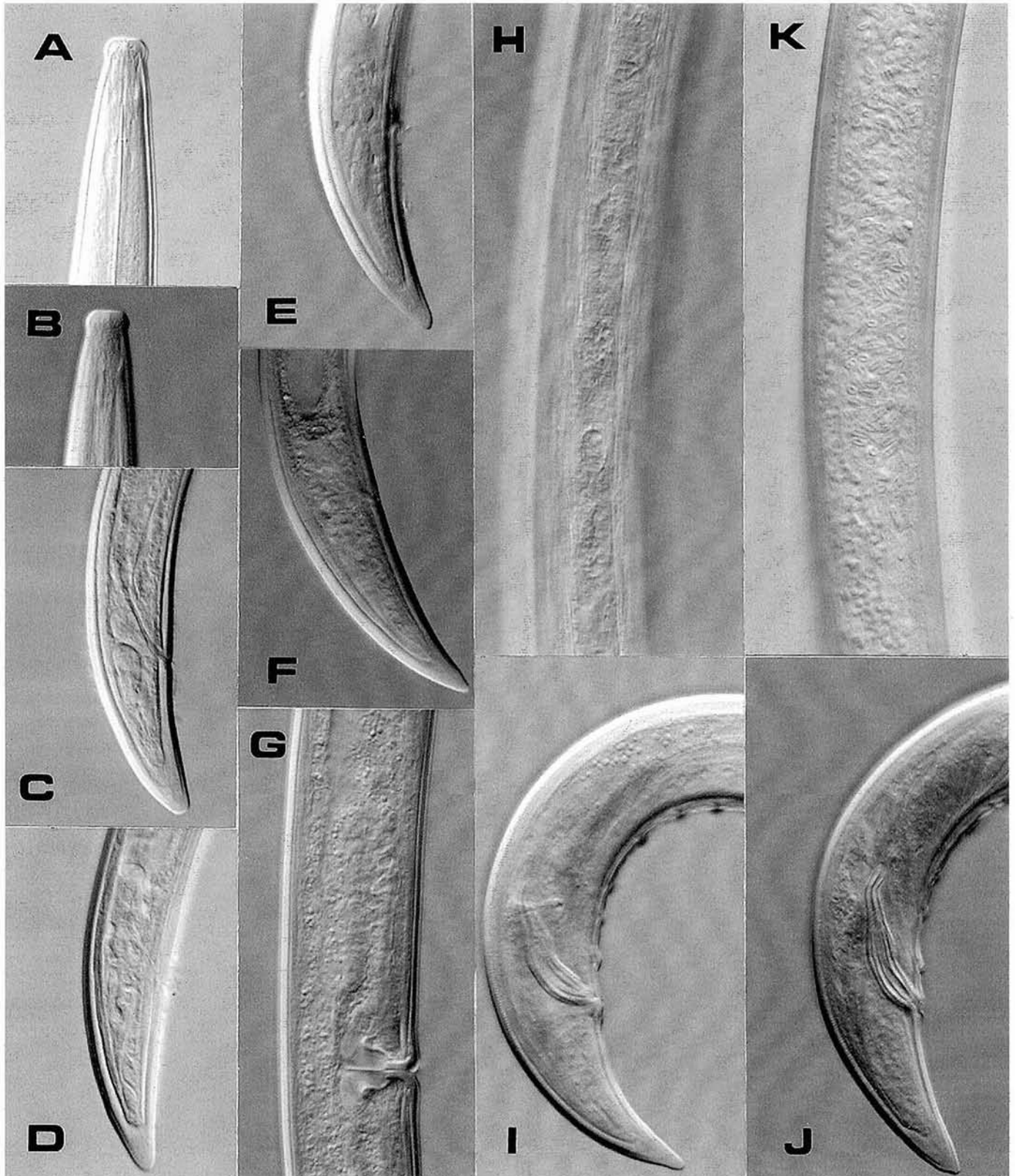


Fig. 1. Photomicrographs of *Longidorus juvenilis*: A and B, female anterior region; C-F female posterior region; G, vulva region and anterior uterus; H, hypodermal cord; I-J, male posterior region; K, testis with sperm.

Table II. Morphometric characters of adults from populations of *L. juvenilis* from Serbia.

Locality: Host:	Novi Sad <i>Populus</i> sp.	Novi Sad <i>Amorpha fruticosa</i>	Bačka Palanka <i>Populus</i> sp.	Apatin <i>Populus</i> sp.	
n	18 females	3 males	3 females	11 females	7 females
L (mm)	3.74±0.30 (3.37-4.47)	3.90±0.18 (3.71-4.07)	3.59±0.14 (3.48-3.79)	3.79±0.43 (3.01-4.60)	3.66±0.26 (3.3-4.02)
a	113.8±6.91 (103.8-130.6)	120.0±3.72 (115.9-123.1)	110.6±2.74 (107.2-113.9)	121.2±5.46 (111.9-128.8)	119.6±5.76 (111.4-126.7)
b	10.8±0.82 (9.3-12.4)	11.9±1.15 (10.8-13.1)	10.6±0.62 (10.1-11.5)	12.4±1.06 (10.6-13.9)	11.9±0.82 (11.3-13.7)
c	65.6±5.94 (54.9-78.1)	71.9±13.82 (59.0-86.5)	63.2±1.70 (60.8-64.7)	71.7±6.85 (62.0-83.7)	69.5±9.56 (58.8-89.5)
c'	2.47±0.18 (2.24-2.93)	2.13±0.18 (1.98-2.33)	2.48±0.04 (2.42-2.52)	2.40±0.15 (2.13-2.63)	2.44±0.29 (1.78-2.77)
d	2.2±0.10 (2.0-2.4)	2.2±0.06 (2.2-2.3)	2.2±0.07 (2.2-2.3)	2.2±0.09 (2.1-2.3)	2.2±0.09 (2.1-2.4)
d'	1.4±0.04 (1.4-1.5)	1.4±0.06 (1.3-1.4)	1.4±0.02 (1.4-1.5)	1.4±0.04 (1.4-1.5)	1.4±0.05 (1.3-1.5)
J'	1.3±0.16 (0.9-1.6)	1.5±0.33 (1.2-1.8)	1.4±0.05 (1.4-1.5)	1.3±0.10 (1.1-1.4)	1.2±0.13 (1.0-1.4)
V	47.1±0.63 (45.8-48.1)	–	47.7±0.47 (47.0-48.0)	47.8±0.90 (46.3-48.8)	47.1±0.96 (45.5-48.4)
Odontostyle µm	65.1±2.06 (61.2-70.0)	65.4±3.12 (62.5-68.7)	61.9±2.12 (59.0-64.0)	65.8±1.75 (62.7-67.8)	64.5±1.49 (62.7-66.5)
Odontophore µm	42.3±2.66 (35.0-46.3)	40.4±1.89 (38.8-42.5)	47.7±2.04 (45.2-50.2)	44.4±0.98 (42.6-46.4)	44.6±3.07 (41.4-50.2)
Total stylet µm	107.5±3.56 (100.0-115.0)	105.8±3.97 (101.3-108.7)	109.6±1.58 (107.9-111.7)	110.1±2.21 (106.6-113.0)	109.2±3.36 (105.4-114.2)
Oral aperture to guide ring µm	24.7±0.93 (23.1-26.3)	24.8±0.69 (24.4-25.6)	24.7±1.23 (23.8-26.4)	23.9±0.97 (22.6-25.1)	24.3±0.66 (23.8-25.7)
Tail µm	57.2±4.55 (50.7-68.5)	55.2±7.86 (47.1-62.8)	56.8±2.18 (54.0-59.3)	52.8±3.07 (47.2-58.6)	53.3±5.85 (40.2-60.1)
J (hyaline portion of tail) µm	11.3±1.89 (7.1-13.8)	13.0±1.00 (11.9-13.8)	12.3±1.07 (11.3-13.8)	12.7±1.14 (10.0-13.8)	10.9±1.94 (8.8-14.4)
Body diam. at lip region µm	11.2±0.20 (10.9-11.6)	11.3	11.0±0.24 (10.7-11.3)	10.9±0.28 (10.5-11.3)	10.9±0.44 (10.0-11.3)
Body diam. at guide ring µm	16.2±0.36 (15.4-17.2)	15.7±0.66 (15.0-16.3)	15.9±0.28 (15.7-16.3)	15.4±0.50 (14.7-16.3)	15.3±0.46 (14.7-16.3)
Body diam. at base of oesophagus µm	29.4±1.24 (27.5-31.3)	29.1±0.31 (28.8-29.4)	27.6±0.49 (27.0-28.2)	27.0±1.28 (24.3-28.9)	27.0±1.25 (25.1-28.6)
Body diam. at mid-body or vulva µm	32.9±1.91 (29.2-37.5)	32.5±1.68 (30.6-33.8)	32.4±0.78 (31.4-33.3)	31.2±2.57 (25.7-35.8)	30.6±1.60 (27.6-32.3)
Body diam. at anus µm	23.2±1.14 (21.9-26.3)	25.8±1.71 (23.8-26.9)	22.8±0.51 (22.3-23.5)	22.0±1.85 (18.5-25.5)	21.9±0.67 (21.0-22.6)
Body diam. at beginning of J µm	8.6±0.83 (7.2-10.0)	8.8±1.25 (7.5-10.0)	8.8±0.49 (8.2-9.4)	10.2±0.66 (9.2-11.3)	8.8±0.89 (7.2-10.0)
Spicules µm	–	39.8±1.26 (38.6-41.1)	–	–	–

reported from France (Dalmasso, 1969), Yugoslavia (Barsi, 1989) and Italy (Roca *et al.*, 1991a). The morphometrics of three males found in the rhizosphere of poplar at Novi Sad are within the range reported for

other males (Table IV), except for the length of the spicules, which are slightly shorter (38.6-41.1 μm *vs.* 41-44.5 μm), tail length, which is slightly longer (47.1-62.8 μm *vs.* 40-57 μm) and slightly higher value of c' ratio

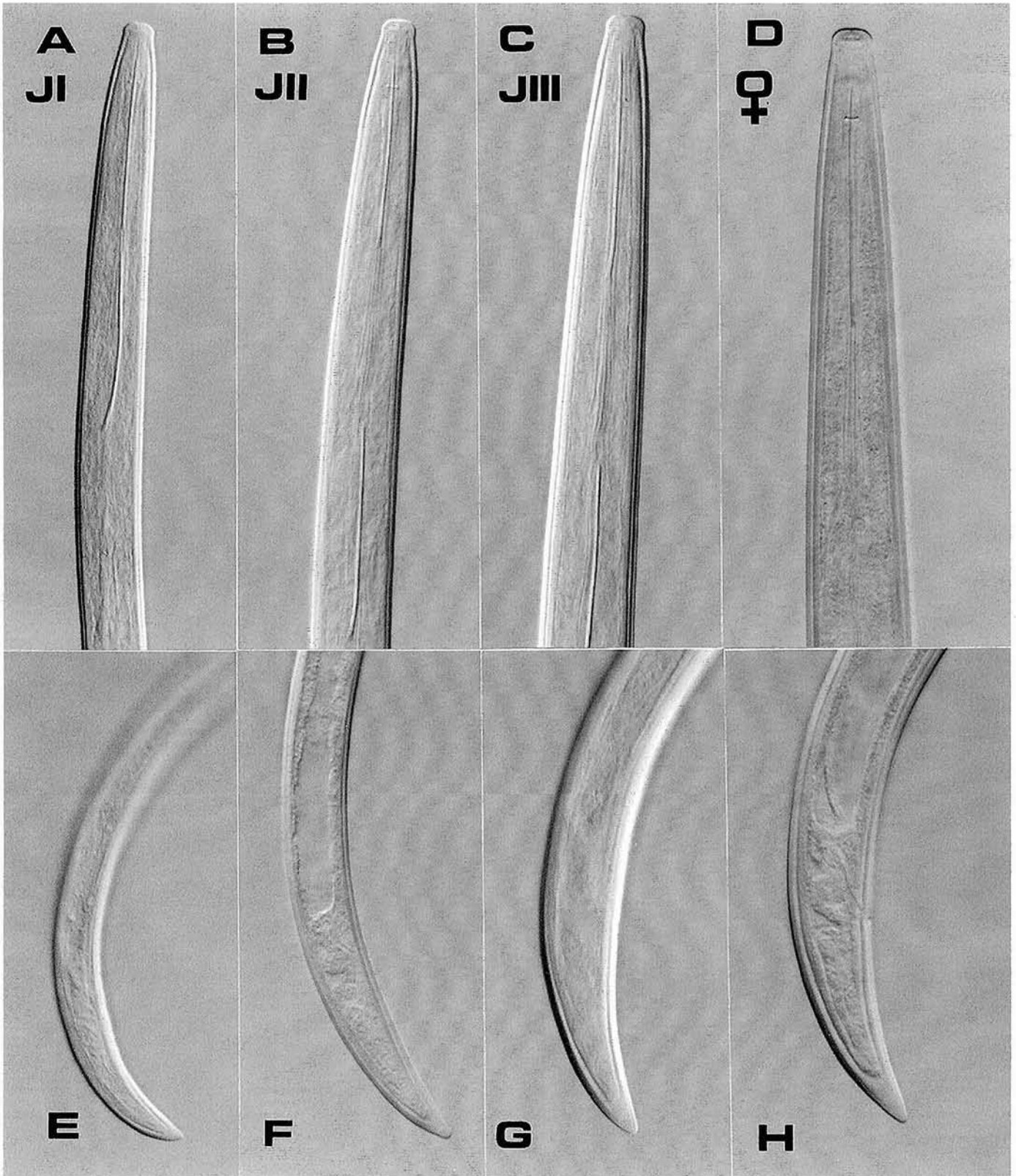


Fig. 2. Photomicrographs of juveniles and adults of *L. juvenilis*: A-D, anterior region of JI, JII, JIII stage and female, respectively; E-H, tail of JI, JII, JIII stage and female, respectively.

Table III. Morphometrics of juvenile stages and females of the *L. juvenilis* populations from France and Serbia.

Developmental stages and populations	Body length (mm) (mean)	Odontostyle (μm) (mean)	Replacement odontostyle (μm) (mean)
II			
Fréjus, France ¹	1.07	42.0	46.0
Novi Sad, Serbia ²	1.09	43.4	46.8
III			
Fréjus, France	1.62	47.0	55.0
Novi Sad, Serbia	1.63	47.0	54.9
III			
Fréjus, France	2.38*	56.0*	64.0*
Novi Sad, Serbia	2.45	56.2	64.9
Females			
Fréjus, France	3.32	66.0	–
Novi Sad, Serbia	3.84	65.9	–

¹Paratypes (Dalmasso, 1969); ²Original; *Designated as L3, L4 in Dalmasso, 1969.

Table IV. Morphometrics of males of *L. juvenilis*.

	Dalmasso, 1969 (allotype)	Barsi, 1989	Roca <i>et al.</i> , 1991a	Original
n	1	1	2	3
L (mm)	3.32	3.6	3.9, 4.3	3.90±0.18 (3.71-4.07)
a	79	118	131.4, 125.5	120.0±3.72 (115.9-123.1)
b	9.9	12.3	12.6, 16.5	11.9±1.15 (10.8-13.1)
c	65	62	96.6, 94.5	71.9±13.82 (59.0-86.5)
c'	1.8	2.2	1.6, 1.7	2.13±0.18 (1.98-2.33)
Odontostyle μm	67	64	62.5, 67.5	65.4±3.12 (62.5-68.7)
Odontophore μm	45	46.5	36.5, 41.5	40.4±1.89 (38.8-42.5)
Total stylet μm	112	–	–	105.8±3.97 (101.3-108.7)
Oral aperture to guide ring μm	24	26	22.5, 23.5	24.8±0.69 (24.4-25.6)
Tail μm	51	57	40, 45.5	55.2±7.86 (47.1-62.8)
J (hyaline portion of tail) μm	–	10.5	10.5, 13.5	13.0±1.00 (11.9-13.8)
Body diam. at lip region μm	–	11	10.5, 11	11.3
Body diam. at guide ring μm	–	16	14.5, 16	15.7±0.66 (15.0-16.3)
Body diam. at base of oesophagus μm	–	27.5	27.5, 29.5	29.1±0.31 (28.8-29.4)
Body diam. at mid-body μm	42	30	29.5, 34	32.5±1.68 (30.6-33.8)
Body diam. at anus μm	29	26	24, 26.5	25.8±1.71 (23.8-26.9)
Body diam. at beginning of J μm	–	7.5	9, 10.5	8.8±1.25 (7.5-10.0)
Spicules μm	–	41.5	41, 44.5	39.8±1.26 (38.6-41.1)
Number of ventromedian supplements	6	8	9, 10	7-10

(1.98-2.33 *vs.* 1.6-2.2) compared to other males.

Chen *et al.* (1997), in their revised polytomous key for the identification of the species of the genus *Longidorus*, gave for the code I (presence/absence of males) value 1, which meant that males were absent. In the Note 1 (page 20) they presented an additional key for differentiating *L. ampullatus* Jacobs *et* Heyns, 1987, *L. reneyii* Raina, 1966 and *L. juvenilis*. According to this key, *L. juvenilis* differs from *L. ampullatus* in absence of

males (“Males unknown”) and in female tail length. The authors ignored the fact that Dalmasso (1969) described a male specimen (allotype) in the original description of the species, and subsequently a male specimen was reported from Yugoslavia (Barsi, 1989) and two males from Italy (Roca *et al.*, 1991a).

The Serbian populations of *L. juvenilis* fit well with the polytomous key of Chen *et al.* (1997) with the code: A12, B1, C2, D2, E2, F2, G23, H56, I12. The only pro-

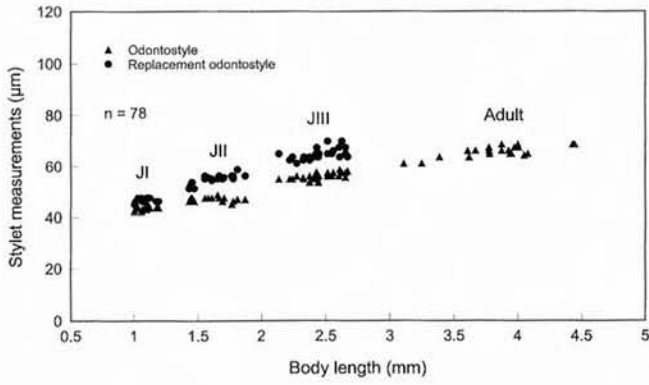


Fig. 3. Scatter diagram separating juveniles and females of *L. juvenilis*.

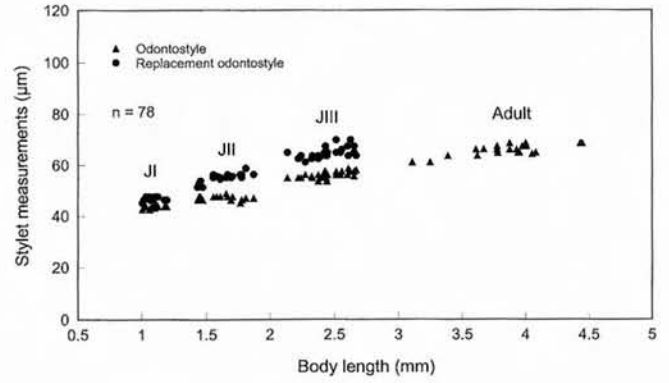


Fig. 4. Scatter diagram separating juveniles and females of *L. juvenilis* from populations from France and Serbia (for details see Table III).

posed amendment is I12, as a few populations with males have been found.

Longidorus juvenilis occurred in the rhizosphere of *Populus* sp. at Apatin (UTM:CR45) and Bačka Palanka (UTM:CR71) and of *Amorpha fruticosa* L., *Populus* sp. and *S. nigra* at Novi Sad (UTM:DR01).

LONGIDORUS AETNAEUS

Roca, Lamberti, Agostinelli et Vinciguerra, 1986 (Fig. 5)

Measurements: (females, n = 16). L = 3.12±0.23 (2.75-3.50) mm; a = 78.9±4.63 (72.0-87.6); b = 9.2±0.64 (8.4-

10.3); c = 67.2±7.16 (58.2-78.8); c' = 1.78±0.12 (1.64-2.10); d = 2.6±0.09 (2.4-2.8); d' = 1.8±0.10 (1.7-2.1); J' = 0.9±0.10 (0.7-1.0); V = 48.4±1.34 (45.7-50.7); odontostyle = 71.7±1.78 (68.7-75.0) µm; odontophore = 48.0±2.20 (45.0-51.3) µm; total stylet = 119.7±2.29 (116.3-123.8) µm; oral aperture to guide ring = 25.9±0.89 (24.4-27.5) µm; tail length = 46.6±2.96 (42.4-52.8) µm; J (hyaline portion of tail) = 10.4±1.09 (8.4-12.5) µm; body diam. at lip region = 9.7±0.28 (8.8-10.0) µm; body diam. at guide ring = 17.5±1.12 (16.3-20.9) µm; body diam. at base of oesophagus = 33.5±1.28 (31.3-35.0) µm; body diam. at vulva = 39.5±2.66 (35.6-44.2) µm; body diam. at anus = 26.2±1.18 (23.8-27.5)

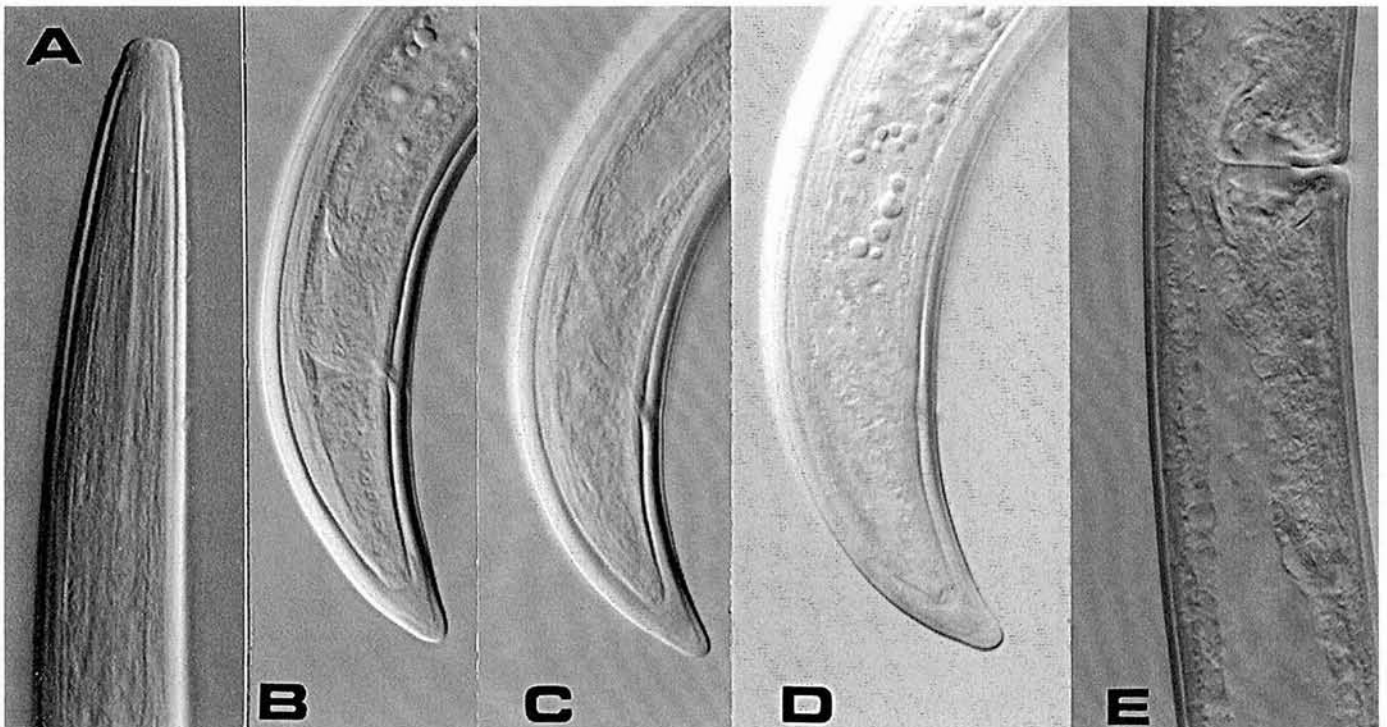


Fig. 5. Photomicrographs of *Longidorus aetnaeus*: A, female anterior region; B-D, female posterior region; E, vulva region and posterior uterus.

μm ; body diam. at beginning of J = 11.7 ± 1.03 (9.7-13.8) μm .

Body of heat-relaxed specimens curved ventrally to a more or less closed C and tapering gradually towards the extremities. Lip region flattened frontally and rounded laterally, separated from the rest of the body by a very shallow depression. Amphidial pouches more or less asymmetrically bilobed. Odontostyle, odontophore and guide ring typical of the genus. Oesophagus dorylaimoid, with the basal bulb occupying 1/4 of the oesophagus total length; the basal bulb measures 71-83 μm long and 16-19 μm wide. Vulva a transverse slit, slightly anterior to mid-body; vagina occupying more than 1/2 of the corresponding body diameter. Reproductive system amphidelphic with equally developed branches; a small sphincter separates the uterus from the short *pars dilatata* of oviduct; uterus short, 31-43 μm , not differentiated and with inconspicuous lumen. Prerectum between 206 and 300 μm long; rectum about one anal body width long. Tail conoid, dorsally convex, ventrally slightly concave with bluntly conoid terminus, bearing two caudal pores on each side.

Males and juveniles were not found.

Remarks. *Longidorus aetnaeus* was originally found in the rhizosphere of *Quercus ilex* L. on the slope of Mount Etna at Monte Minardo in Sicily, Italy (Roca *et al.*, 1986b). Subsequently, it was reported from several other localities (Roca *et al.*, 1987; 1989; 1991) and for the first time from Bulgaria (Peneva and Nedelchev, 1995). Morphologically our population is similar to the populations reported from Italy and Bulgaria. Compared to the type-population (Roca *et al.*, 1986b), *L. aetnaeus* from Ralja has a slightly shorter odontostyle (68.7-75.0 μm vs. 72-80 μm), longer odontophore (45.0-51.3 μm vs. 32-38 μm) and slightly shorter tail (42.4-52.8 μm vs. 42-60 μm).

The identification code of this population of *L. aetnaeus* is: A2, B1, C2, D23, E3, F12, G12, H56, I1, which fits the formula given for this species by Chen *et al.* (1997).

Longidorus aetnaeus occurred in the rhizosphere of *Acer tataricum* L. and *Quercus* sp. at Ralja, loc. Trešnjica (UTM:DQ63).

This is the first record of this species for Serbia.

LONGIDORUS MOESICUS

Lamberti, Choleva *et* Agostinelli, 1983 (Fig. 6)

Measurements: (females, n = 15). L = 6.50 ± 0.62 (5.70-7.56) mm; a = 124.4 ± 6.46 (115.4-139.5); b = 13.8 ± 1.30 (11.5-16.4); c = 166.8 ± 15.28 (141.0-197.4); c' = 0.94 ± 0.09 (0.79-1.06); d = 2.9 ± 0.16 (2.7-3.2); d' = 1.9 ± 0.07 (1.8-2.0); J' = 0.5 ± 0.04 (0.4-0.5); V = 48.9 ± 1.73 (44.8-51.5); odontostyle = 114.0 ± 5.60 (102.5-125.0) μm ; odontophore = 60.3 ± 3.70 (55.0-67.5) μm ; total sylet = 174.3 ± 5.05 (163.8-183.8) μm ; oral aperture

to guide ring = 37.6 ± 1.80 (34.4-41.9) μm ; tail length = 39.0 ± 2.45 (34.3-42.5) μm ; J (hyaline portion of tail) = 11.3 ± 1.31 (9.4-13.8) μm ; body diam. at lip region = 13.1 ± 0.36 (12.8-13.8) μm ; body diam. at guide ring = 25.1 ± 0.81 (23.4-26.3) μm ; body diam. at base of oesophagus = 44.4 ± 2.50 (40.0-49.7) μm ; body diam. at vulva = 52.1 ± 3.04 (48.1-58.4) μm ; body diam. at anus = 40.5 ± 1.67 (37.8-43.1) μm ; body diam. at beginning of J = 24.2 ± 1.90 (21.3-28.3) μm .

Female *habitus* curved ventrally to a more or less open C; body cylindrical, tapering gradually towards the anterior extremity. Lip region subacute, almost continuous with or very slightly set off from the rest of the body, anteriorly flattened, laterally rounded. Amphidial pouches more or less asymmetrically bilobed. Odontostyle, odontophore and guide ring typical of the genus. Oesophagus dorylaimoid with the muscular bulb 104-120 μm long and 20-24 μm wide, occupying slightly more than 1/4 of the total oesophagus length. Vulva a transverse slit, slightly anterior to mid-body. Reproductive system amphidelphic with equally developed genital branches; uterus relatively long, separated by a sphincter from the oviduct; ovaries opposed, reflexed. Prerectum as long as 9-18 times the anal body width; rectum as long as 3/4 the anal body width. Tail conoid with broadly rounded terminus, bearing two caudal pores on each side.

Males and juveniles were not found.

Remarks. The original description of *L. moesicus* was based on specimens associated with black currant (*Ribes nigrum* L.) at Kostinbrod, near Sofia, Bulgaria (Lamberti *et al.*, 1983). The morphology of fifteen females, found in various localities in Serbia, is similar to those reported in the original description of the species. Compared to the type population (Lamberti *et al.*, 1983) specimens from Serbia have slightly shorter body (av. 6.5 mm vs. av. 7.2 mm), slightly shorter odontostyle (av. 114 μm vs. av. 119 μm), slightly longer distance from oral aperture to guiding ring (av. 37.6 μm vs. av. 34 μm), slightly anteriorly situated vulva (av. 48.9% vs. av. 53%) and slightly shorter tail (av. 39 μm vs. av. 43 μm).

Longidorus moesicus from Serbia fits well with the polytomous key of Chen *et al.* (1997) with the code: A45, B2, C34, D1, E3, F34, G23, H12, I1.

Longidorus moesicus occurred in the rhizosphere of *Populus* sp. at Titel, loc. "Ločka pumpa" (UTM:DR40), of *Trifolium* sp. at Lok, loc. Titelski breg (UTM:DR30), of pear and grapevine at Senta, loc. "Mali rit" (UTM:DR28), of *Urtica* sp. on the bank of the Izvor river at Izvor (UTM:EP90), of *Rubus* sp. and *Urtica* sp. in Kovilj Marsh at Kovilj (UTM:DR20).

This is the first record of this species for Serbia.

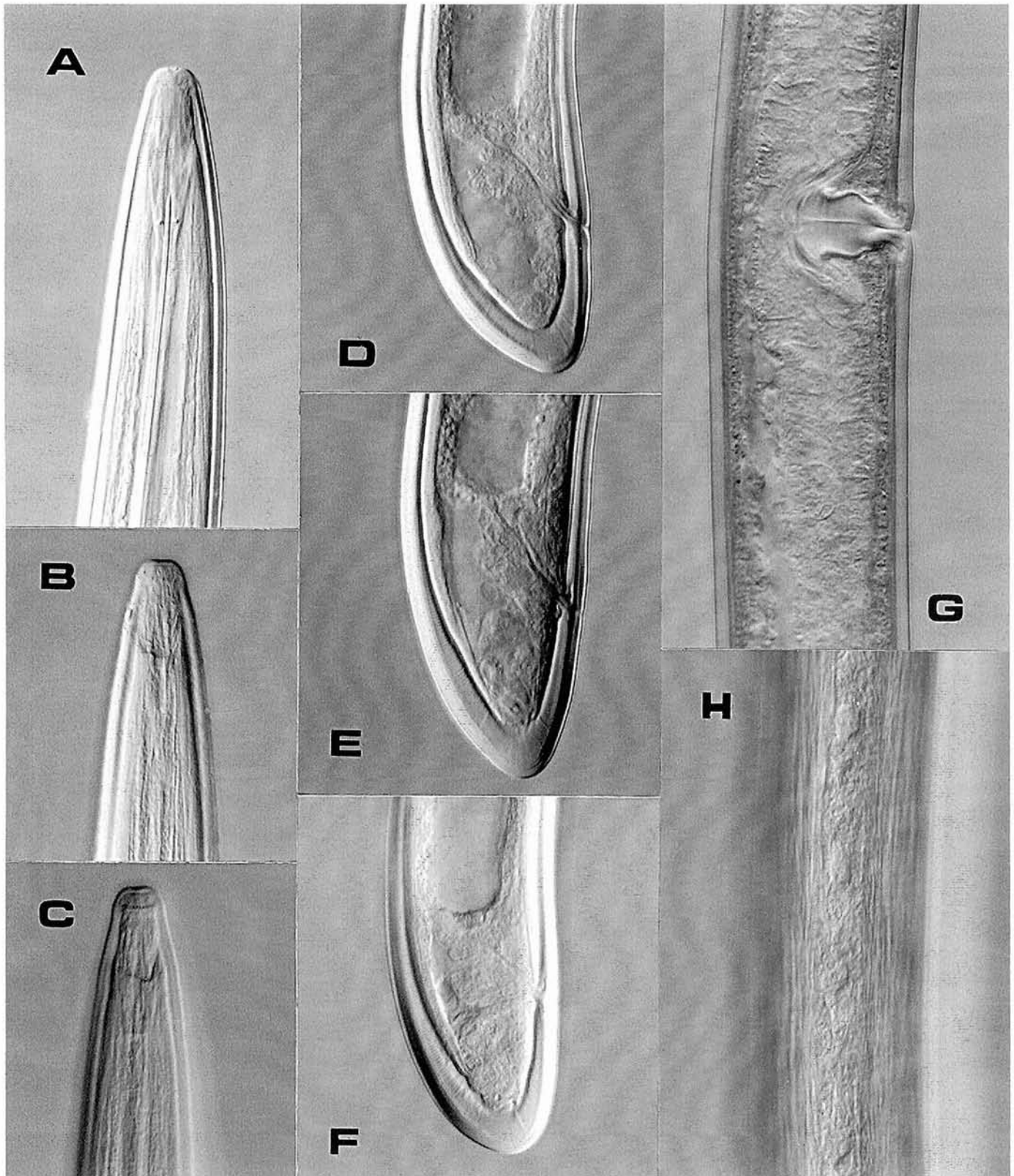


Fig. 6. Photomicrographs of *Longidorus moesicus*: A-C, female anterior region; D-F, female posterior region; G, vulva region; H, hypodermal cord.

ACKNOWLEDGEMENT

We thank Dr. Ivan Dulić, NIS Naftagas, Novi Sad for access to an Olympus BX50 photomicroscope.

LITERATURE CITED

- Barsi L., 1989. The Longidoridae (Nematoda: Dorylaimida) in Yugoslavia. I. *Nematologia Mediterranea*, 17: 97-108.
- Brown D.J.F., Grunder J., Hooper D.J., Klingler J. and Kunz P., 1994. *Longidorus arthensis* sp. n. (Nematoda: Longidoridae) a vector of cherry rosette disease caused by a new nepovirus in cherry trees in Switzerland. *Nematologica*, 40: 133-149.
- Chen Q., Hooper D.J., Loof P.A.A. and Xu J., 1997. A revised polytomous key for identification of the genus *Longidorus* Micoletzky, 1922 (Nematoda: Dorylaimoidea). *Fundamental and Applied Nematology*, 20: 15-28.
- Coiro M.I., Agostinelli A. and Lamberti F., 1992. I Longidoridae (Nematoda) nei vigneti della provincia di Verona. *Nematologia Mediterranea*, 20: 87-95.
- Coiro M.I., Lamberti F., Borgo M. and Brown D.J.F., 1988a. I Longidoridae nei vigneti della provincia di Treviso. II contributo: Il genere *Longidorus* (Micoletzky) Filipjev. *Nematologia Mediterranea*, 16: 189-195.
- Coiro M.I., Lamberti F., Vindimian M.E. and Agostinelli A., 1988b. I Longidoridae nei vigneti del Trentino. I: Il genere *Longidorus* (Micoletzky) Filipjev. *Nematologia Mediterranea*, 16: 53-58.
- Cotroneo A., Moretti F. and Mancini G., 1989. *Longidorus juvenilis* Dalmasso (Nematoda, Longidoridae) in Italia. *Nematologia Mediterranea*, 8: 205-206.
- Dalmasso A., 1969. Etude anatomique et taxonomique des genres *Xiphinema*, *Longidorus* et *Paralongidorus* (Nematoda: Dorylaimida). *Mémoires du Muséum National d'Histoire Naturelle. Série A, Zoologie*, 61: 33-82.
- Jacobs P.J.F. and Heyns J., 1987. Eight new and two known species of *Longidorus* from South Africa (Nematoda: Longidoridae). *Phytophylactica*, 19: 15-33.
- Lamberti F., Choleva B. and Agostinelli A., 1983. Longidoridae from Bulgaria (Nematoda, Dorylaimida) with description of three new species of *Longidorus* and two new species of *Xiphinema*. *Nematologia Mediterranea*, 11: 49-72.
- Lišková M., 1997. Nematodes of the family Longidoridae in the rhizosphere of grapevines in the Slovak Republic. *Helminthologia*, 34: 87-95.
- Lišková M., Lamberti F., Sabová M., Valocká B. and Agostinelli A., 1993. First record of some species of longidorid nematodes from Slovakia. *Nematologia Mediterranea*, 21: 49-53.
- Lišková M., Robbins R.T. and Brown D.J.F., 1997. Descriptions of three new *Longidorus* species from Slovakia (Nematoda: Longidoridae). *Journal of Nematology*, 29: 336-348.
- Peneva V., Loof P.A.A., Penev L.D. and Brown D.J.F., 2001. Description of the male and first-stage juvenile of *Longidorus intermedius* Kozłowska & Seinhorst, 1979 (Nematoda: Dorylaimida), and notes on its morphology and distribution. *Systematic Parasitology*, 49: 127-137.
- Peneva V. and Nedelchev S., 1995. *Longidorus aetnaeus* Roca et al., 1986 (Nematoda: Dorylaimida): a first record from Bulgaria and the description of a male specimen. *Systematic Parasitology*, 49: 215-219.
- Robbins R.T., Brown D.J.F., Halbrendt J.M. and Vrain T.C., 1995. Compendium of *Longidorus* juvenile stages with observations on *L. pisi*, *L. taniwha* and *L. diadecturus* (Nematoda: Longidoridae). *Systematic Parasitology*, 32: 33-52.
- Roca F. and Lamberti F., 1993. I Longidoridae (Nematoda, Dorylaimida) delle regioni italiane. XIII. La Toscana. *Nematologia Mediterranea*, 21: 261-272.
- Roca F., Lamberti F. and Agostinelli A., 1986a. I Longidoridae (Nematoda, Dorylaimida) delle regioni italiane. III. L'Abruzzo e il Molise. *Nematologia Mediterranea*, 14: 83-99.
- Roca F., Lamberti F. and Agostinelli A., 1987. I Longidoridae (Nematoda, Dorylaimida) delle regioni italiane. V. Il Lazio. *Nematologia Mediterranea*, 15: 71-101.
- Roca F., Lamberti F. and Agostinelli A., 1988a. I Longidoridae (Nematoda, Dorylaimida) delle regioni italiane. VII. Il Piemonte e la Valle d'Aosta. *Nematologia Mediterranea*, 16: 35-51.
- Roca F., Lamberti F. and Agostinelli A., 1988b. I Longidoridae (Nematoda, Dorylaimida) delle regioni italiane. VIII. L'Emilia-Romagna. *Nematologia Mediterranea*, 16: 179-188.
- Roca F., Lamberti F. and Agostinelli A., 1989. I Longidoridae (Nematoda, Dorylaimida) delle regioni italiane. IX. La Sicilia. *Nematologia Mediterranea*, 17: 151-165.
- Roca F., Lamberti F. Agostinelli A. and Vinciguerra M.T., 1986b. *Longidorus aetnaeus*, a new Longidoridae species from Italy. *Nematologia Mediterranea*, 14: 1-5.
- Roca F., Lamberti F. Agostinelli A., Zacheo F. and Landriscina S., 1990. I Longidoridae (Nematoda, Dorylaimida) delle regioni italiane. X. La Calabria. *Nematologia Mediterranea*, 18: 67-75.
- Roca F., Lamberti F. and D'Errico F.P., 1991a. I Longidoridae (Nematoda, Dorylaimida) delle regioni italiane. XI. La Campania. *Nematologia Mediterranea*, 19: 139-154.
- Roca F., Lamberti F. and Elia F., 1991b. I Longidoridae (Nematoda, Dorylaimida) delle regioni italiane. XII. L'Umbria. *Nematologia Mediterranea*, 19: 279-289.
- Van Reenen E. and Heyns J., 1986. A survey of Longidoridae in vineyards along the Berg River system. *Phytophylactica*, 18: 203-207.