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THE LONGIDORIDAE (NEMATODA: DORYLAIMIDA) IN YUGOSLAVIA. I

by
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Summary. A preliminary survey of longidorid nematodes was carried out in some regions of Yugoslavia. Four species of *Longidorus*: *L. distinctus*, Lamberti, Choleva et Agostinelli, 1983; *L. euonymus* Mali et Hooper, 1973; *L. juvenilis* Dalmasso, 1969 and *L. macrosoma* Hooper, 1961 and nine species of *Xiphinema*: *X. brevicolle* Lordello et Da Costa, 1961; *X. dentatum* Sturhan, 1978; *X. diversicaudatum* (Micoletzky, 1927) Thorne, 1939; *X. incertum* Lamberti, Choleva et Agostinelli, 1983; *X. index* Thorne et Allen, 1950; *X. italiae* Meyl, 1953; *X. pachtaicum* (Tulaganov, 1938) Kirjanova, 1951; *X. vuittenezi* Luc, Lima, Weischer et Flegg, 1964 and *Xiphinema* sp. were found. *L. distinctus*, *L. euonymus*, *L. juvenilis* and *X. incertum* are recorded for the first time from Yugoslavia. Morphological characteristics, morphometrics and distribution of the species are presented.

The occurrence and geographical distribution of longidorid nematodes in Yugoslavia have been referred to in several publications (Krnjaić, 1968, 1970, 1976, 1976a; Hrzić, 1973, 1978; Lamberti et al., 1973; Krnjaić et al., 1976; Lamberti et al., 1976; Pejčinovski, 1984; Ivezic, 1985; Ivezic et al., 1985; Barsi and Horvatić, 1986). This paper is concerned with the distribution and morphometrics of four *Longidorus* and nine *Xiphinema* species found during a preliminary survey undertaken in the period 1984-1987, mostly in some regions of the Socialist Republics of Croatia (abbr.: C), Makedonia (M), Montenegro (Mo) and Slovenia (S) and Vojvodina Province (VP) as indicated on Figs. 1 and 2.

Materials and methods

Circa 140 soil samples were collected from various habitats. Nematodes were extracted using a modified Cobb's decanting and sieving technique (Flegg, 1967). Specimens used in this study were killed by gentle heat or by hot FP 4-1/TAF, processed to glycerol by Andrassy's (1984) rapid method and mounted on permanent slides in dehydrated glycerin.

Results and discussion

Four species of *Longidorus*: *L. distinctus*, *L. euonymus*, *L. juvenilis* and *L. macrosoma* and nine species of *Xiphinema*: *X. brevicolle*, *X. dentatum*, *X. diversicaudatum*, *X. incertum*, *X. index*, *X. italiae*, *X. pachtaicum*, *X. vuittenezi*

and *Xiphinema* sp. were found. Their geographical distribution is indicated on Figs. 1 and 2.

LONGIDORUS DISTINCTUS Lamberti, Choleva et Agostinelli, 1983 (Fig. 3; A and B)

Female: labial region slightly expanded, rounded laterally and flat at the extremity; amphidial pouches irregularly bilobed; the uteri formed by two distinct parts, one proximal to the vagina without particular characters and the other portion of denser structure; tail elongate, conoid dorsally convex and slightly concave (Lamberti et al., 1983).

The morphometrics of six females found in the rhizosphere of grapevine at Senta (VP) are: L = 4.4 (3.1-5.5) mm; a = 101 (83-111); b = 10.8 (7.8-13.6); c = 72 (56-95); c' = 2.1 (1.8-2.3); V = 46.5 (43.5-49.5); odontostyle = 80 (78-82) µm; odontophore = 52 (49-55) µm; oral aperture to guiding ring = 30 (29-31) µm; tail = 61 (56-68) µm; J = 13 (11.5-16.5) µm; body diameter at lip region = 12 (11-12.5) µm; body diameter at guiding ring = 19 (18.5-20) µm; body diameter at base of oesophagus = 37 (33-41.5) µm; body diameter at vulva = 43.5 (37.5-49.5) µm; body diameter at anus = 29 (25.5-31.5) µm; body diameter at beginning of J = 10.5 (9-12) µm.

Their morphometrics are in general agreement with the original description of the species (Lamberti et al., 1983), except that the population found at Senta has a smaller b ratio. No granular and crystal-like material was seen in the

portion of the uterus with the denser structure. No males were found.

This species was also found in the rhizosphere of poplar at Zrenjanin (VP).

***LONGIDORUS EUONYMUS* Mali et Hooper, 1973**
(Fig. 3; C-E)

Female: labial region offset from the neck contour, rounded laterally and flattened anteriorly; amphidial pouches more or less asymmetrically bilobed; tail dorsally convex with more or less widely rounded terminus.

The morphometrics of seven females found in the rhizosphere of grasses at Novi Sad (VP) are: L = 7 (6.7-7.5) mm; a = 158 (153-161); b = 17.1 (15.9-20); c = 168 (145-188); c' = 1.2 (1.1-1.4); V = 50.5 (49-53); odontostyle = 84 (89-90) μm ; odontophore = 63 (60-68) μm ; oral aperture to guiding ring = 27 (25-30) μm ; tail = 42 (38-46.5) μm ; J = 10.5 (9-14) μm ; body diameter at lip region = 14.5 (14-15) μm ; body diameter at guiding ring = 19 (18-20) μm ; body diameter at base of oesophagus = 36 (34-38) μm ; body diameter at vulva = 44.5 (41.5-47)

μm ; body diameter at anus = 34 (32.5-36.5) μm ; body diameter at beginning of J = 19.5 (16-24) μm .

These values are within the range of those reported for various Czechoslovakian (Mali and Hooper, 1973), Bulgarian (Lamberti *et al.*, 1983) and Italian (Lamberti *et al.*, 1985; Roca *et al.*, 1985; Roca *et al.*, 1987) populations. No males were found.

L. euonymus was also found at Zrenjanin (VP) in association with poplar trees.

***LONGIDORUS JUVENILIS* Dalmasso, 1969**
(Fig. 3; F-H)

Female: lip region expanded, laterally rounded, amphids pouch-like, symmetrically bilobed; reproductive system without special features; tail elongate-conoid, ventrally curved, with rounded terminus.

Male: morphologically similar to female, but more coiled in the posterior region; spicules 41.5 μm long.

The morphometrics of ten females and one male found at Novi Sad (VP) are given in Table I. The values for fe

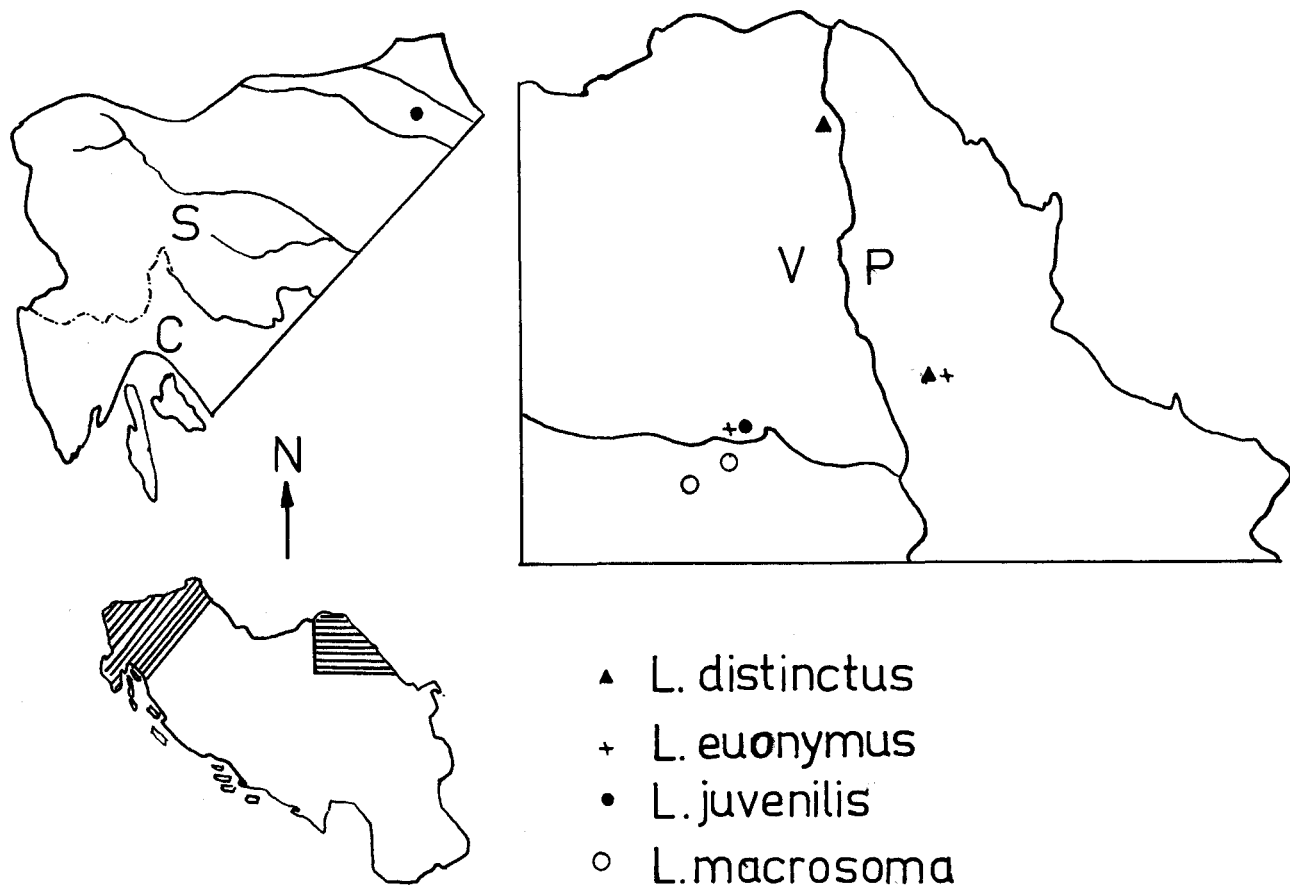


Fig. 1 - Distribution of species of *Longidorus* in Yugoslavia.

males are within the range of those reported for various French (Dalmasso, 1969), Italian (Cotroneo *et al.*, 1980; Roca *et al.*, 1986, 1987) and South African (Van Reenen and Heyns, 1986; Jacobs and Heyns, 1987) populations.

Only one male (allotype) was reported from France in the original description (Dalmasso, 1969). The male from Yugoslavia differs from the allotype in having a longer body and tail (3.3 mm and 51 μm in the allotype), higher value of a, b and c' ratios (79; 9.9 and 1.8 in the allotype), slightly lower value of c ratio (65 in the allotype), somewhat shorter odontostyle (67 μm in the allotype), posteriorly situated guiding ring (24 μm in the allotype) and thinner body width (42 μm in the allotype). It also differs from

the allotype in having more ventromedian supplements (8 viz 6).

L. juvenilis was found in association with grapevine near Ormož (S).

LONGIDORUS MACROSOMA Hooper, 1961
(Fig. 3; I-K)

Female: lip region wide, continuous with the neck contour, lips slightly rounded; amphid pouches large, flask-shaped; tail short and bluntly rounded.

Male: morphologically similar to female but more coiled in the posterior region, tail convex, bluntly conoid.

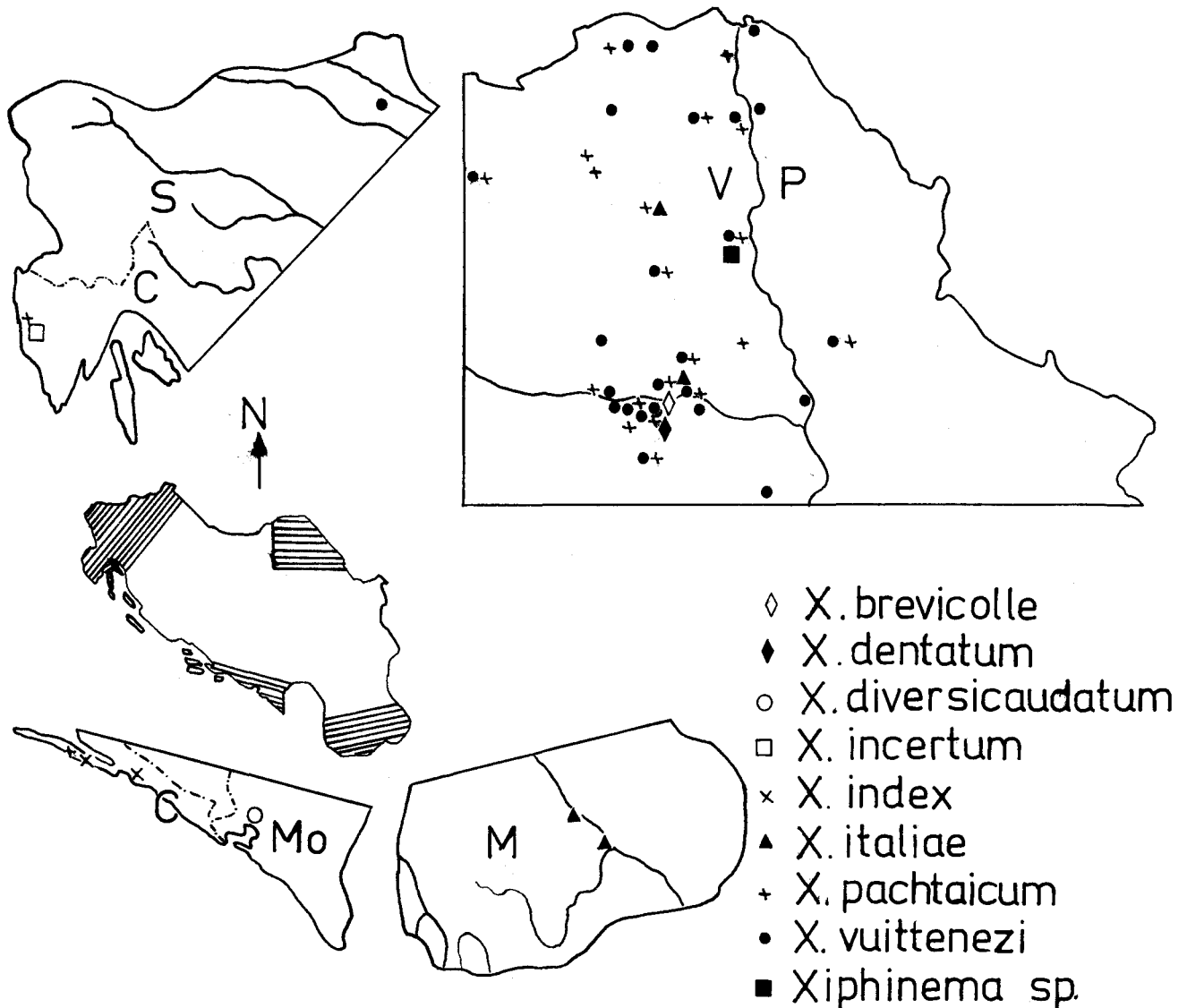


Fig. 2 - Distribution of species of *Xiphinema* in Yugoslavia.

TABLE I - *Morphometrics of Longidorus juvenilis from Yugoslavia.*

Locality and host	Novi Sad, <i>Mahonia aquifolia</i>	
n	10 ♀ ♀	1 ♂
L mm	3.7 (3.2-4.0)	3.6
a	110 (97-120)	118
b	11.5 (10.1-12.3)	12.3
c	69 (56-76)	62
c'	2.4 (2.2-2.7)	2.2
V	47 (45.5-49)	—
Odontostyle μm	65 (63-69)	64
Odontophore μm	46 (41.5-48)	46.5
Oral aperture to guiding ring μm	24 (24-26)	26
Tail μm	55 (50-57)	57
J μm	13 (11.5-15)	10.5
Body diam at lip region μm	11 (10-11)	11
Body diam at guiding ring μm	16 (15-16)	16
Body diam at base of oesophagus μm	28.5 (27-30)	27.5
Body diam at vulva μm	34 (31.5-39.5)	—
Body diam at middle body μm	—	30
Body diam at anus μm	22.5 (21-24)	26
Body diam at beginning of J μm	10 (9-11)	7.5

TABLE II - *Morphometrics of Longidorus macrosoma from Yugoslavia.*

Locality and host	Iriški, venac, blackberry	
n	3 ♀ ♀	3 ♂ ♂
L mm	7.5 (7-7.8)	7.3 (6.9-7.8)
a	80 (77.5-84)	85 (81-89)
b	12.1 (11.1-13.3)	11.9 (11.6-12.4)
c	172 (153-183)	172 (165-184.5)
c'	0.6 (0.6-0.7)	0.6 (0.6-0.7)
V	49 (48-51)	—
Odontostyle μm	140 (137-143)	148 (146-151)
Odontophore μm	75 (74-77)	77 (72-80)
Oral aperture to guiding ring μm	45 (43-46.5)	45 (44.5-46)
Tail μm	44 (42-46)	42 (41.5-43)
J μm	14 (14-15)	12 (11-12.5)
Body diam at lip region μm	22 (20-24)	22.5 (21-24)
Body diam at guiding ring μm	42 (40-43.5)	40.5 (39.5-42)
Body diam at base of oesophagus μm	73.5 (73-74)	71 (68-73)
Body diam at vulva μm	94 (90.5-99)	—
Body diam at middle body μm	—	85.5 (85-87)
Body diam at anus μm	66.5 (64-68)	63.5 (61-68)
Body diam at beginning of J μm	45 (44-46.5)	37 (36-39)
Spicules μm	—	102 (97-111)

The morphometrics of females and males of *L. macrosoma* found in the rhizosphere of blackberry at Iriški venac (Fruška gora mountain, VP) are in Table II. The Yugoslavian population is most similar to the German (Brown and Boag, 1975) taking into consideration the smaller length of body, slightly rounded labial region in both sexes and smaller number of supplements in males (adanal pair plus 10-12).

The species was also found in the rhizosphere of hazelnut and *Picea* sp. at Ledinci (VP).

XIPHINEMA BREVICOLLE Lordello et Da Costa, 1961
(Fig. 4; A and B)

Female: body C-shaped upon fixation; lip region gingly rounded, offset from body by a shallow constriction; genital branches similar, without special features; tail short, conoid rounded.

The morphometrics of a female of *X. brevicolle* found in the rhizosphere of *Picea* sp. at Ledinci (VP) are: L = 2.05 mm; a = 50; b = 5.7; c = 86.5; c' = 0.9; V = 51; odontostyle = 96 μ m; odontophore = 57.5 μ m; oral aper-

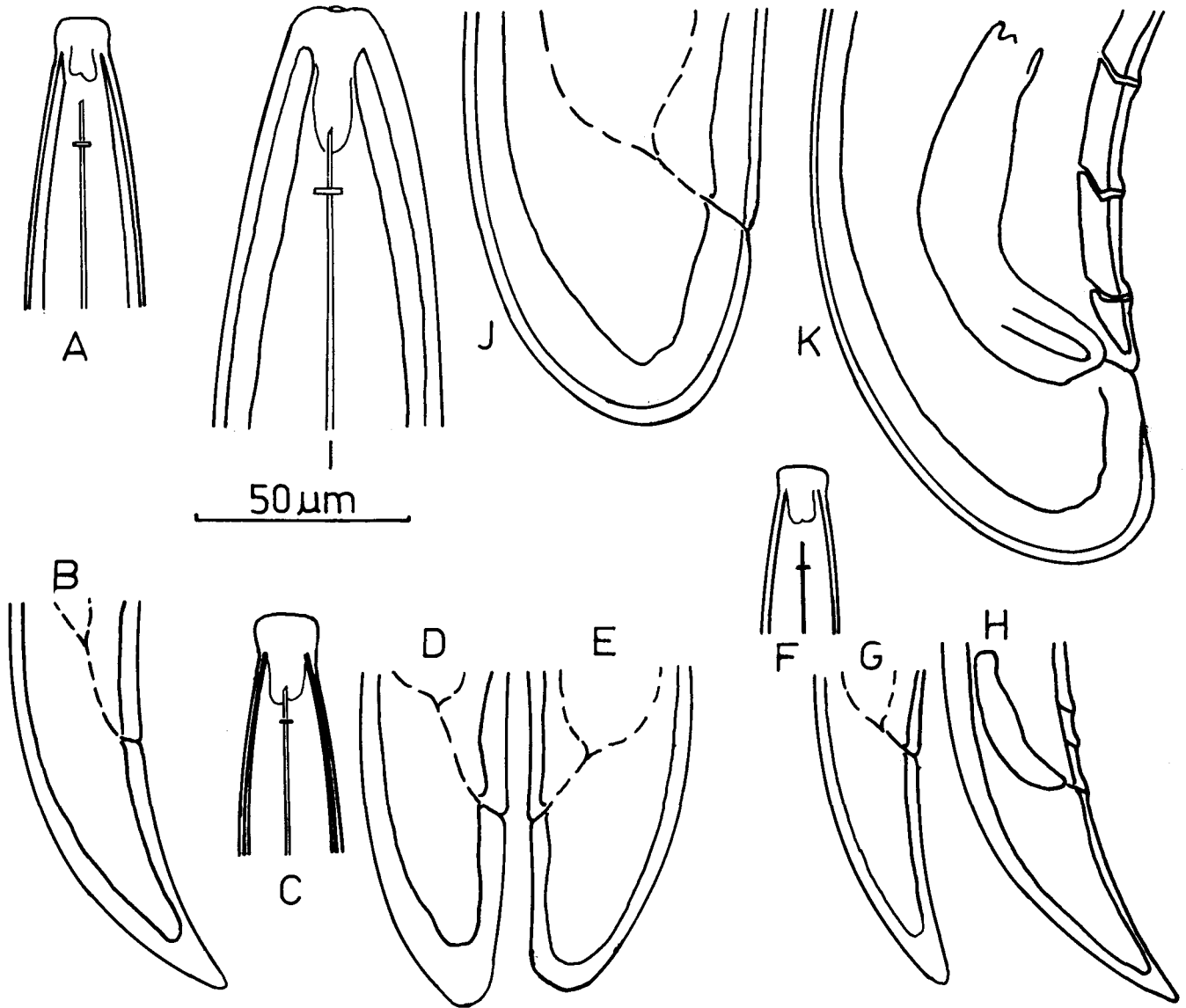


Fig. 3 - A-B: *Longidorus distinctus*. A: Female anterior region; B: Female tail; C-E: *L. euonymus*. C: Female anterior region; D and E: Female tails; F-II: *L. juvenilis*. F: Female anterior region; G: Female tail; II: Male tail; I-K: *L. macrosoma*. I: Female anterior region; J: Female tail; K: Male tail.

ture to guiding ring = 75.5 μm ; tail = 24 μm . No males were found.

***XIPHINEMA DENTATUM* Sturhan, 1978**
(Fig. 4; C and D)

Female: body C-shaped when killed; head rounded, slightly off from body by a slight depression; two similar genital branches with pseudo Z-organ containing 3-4 irregularly dentated weakly sclerotized bodies with vesicles; ovijector with characteristic inner epithelium in the form of more or less protruded tufts; tail short, rounded with characteristic middle cuticular layer.

The morphometrics of two populations of *X. dentatum* are given in Table III. They differ slightly in body length, position of fixed guiding ring and tail length. The morphometrics of Yugoslavian populations agree with those of the German populations in the original description (Sturhan, 1978), except for the body length and the distance of the fixed guiding ring from the oral aperture, which are longer in the first Yugoslavian population, the tail length which is shorter in the second one and the smaller number (3-4) of weakly sclerotized bodies in pseudo Z-organ (4-6 in German populations). No males were found.

This species was first found in Yugoslavia by Barsi and Horvatović (1986) in the rhizosphere of hazelnut and *Picea* sp. (in a forest) at Lendici (VP).

XIPHINEMA DIVERSICAUDATUM
(Micoletzky, 1927) Thorne, 1939
(Fig. 4; E-G)

Female: lip region low, smoothly rounded, continuous with body contour; gonads paired, symmetrical, pseudo Z organ present; tail rounded with more or less ventrally situated mammillate peg, 7 (0-9) μm long, which is occasionally absent.

Males common, morphologically similar to females, but more coiled in the posterior region; spicules massive, supplements adanal pair plus 3-5; tail rounded with more or less ventrally situated peg, 10 (8.5-11) μm long.

The morphometrics of the only females and males of *X. diversicaudatum* found in the rhizosphere of grapevine at Stoliv (Mo) are given in Table IV. The Yugoslavian population of this species is one of the smallest in size (mean body length) compared to those from other parts of Europe and USSR (Prota *et al.*, 1971; Lamberti *et al.*, 1983; Brown and Topham, 1984, 1985; Roca *et al.*, 1987, 1987a).

XIPHINEMA INCERTUM
Lamberti, Choleva *et* Agostinelli, 1983
(Fig. 4; H and I)

A single female of *Xiphinema* sp. with expanded labial region and conoid tail with narrowly rounded terminus was found in the rhizosphere of grapevine at Ferenci (C).

TABLE III - *Morphometrics of two populations of Xiphinema dentatum from Yugoslavia.*

Locality and host	Lendinci, <i>Picea</i> sp.	Lendinci, <i>Corylus avellana</i>
n	17 ♀ ♀	6 ♂ ♂
L mm	4 (3.7-4.3)	3.5 (3.4-3.7)
a	62 (57-67)	57 (50-59)
b	7.8 (7.2-8.8)	7 (6.8-7.4)
c	113 (98-122)	111 (107-121)
c'	0.7 (0.7-0.8)	0.7 (0.7-0.7)
V	46 (44-48)	46 (43.5-48)
Odontostyle μm	135 (130-139)	135 (129-139)
Odontophore μm	86 (79-94)	85 (81-89)
Oral aperture to guiding ring μm	129 (119-143)	120 (115.5-130.5)
Tail μm	35 (33-39)	32 (30-35)
J μm	11 (9-14)	10 (10-11)
Body diam at lip region μm	15.5 (14.5-16)	15 (15-16)
Body diam at guiding ring μm	45.5 (42-49)	44 (42.5-45.5)
Body diam at base of oesophagus μm	55 (49-60)	53 (50-57)
Body diam at vulva μm	64 (56-69)	62.5 (57.69)
Body diam at anus μm	46 (42.5-49)	44.5 (44-47.5)
Body diam at beginning of J μm	32 (29-37)	30 (29-32.5)

Species identification was made after comparison with morphometric and morphological data of the original description given by Lamberti *et al.* (1983).

The morphometrics are: $L = 1.85$ mm; $a = 60$; $b = 5.7$; $c = 67$; $c' = 1.56$; $V = 56.5$; odontostyle = 89 μm ; odontophore = 49 μm ; oral aperture to guiding ring = 78 μm ; tail = 27.5 μm ; $J = 7.5$ μm ; body diameter at lip region = 9 μm ; body diameter at guiding ring = 22 μm ; body diameter at base of oesophagus = 28 μm ; body diameter at vulva = 31 μm ; body diameter at anus = 17.5 μm ; body diameter at beginning of $J = 7.5$ μm . These val-

ues are within the range of those reported in the original description except for the slightly shorter odontophore and slightly thinner body width at anus and at the beginning of J .

XIPHINEMA INDEX Thorne *et Allen*, 1950
(Fig. 4; J-M)

Female: lip region somewhat flattened with rounded edge, almost continuous with body contour; genital tract without special features, Z-organ absent; tail short, dor-

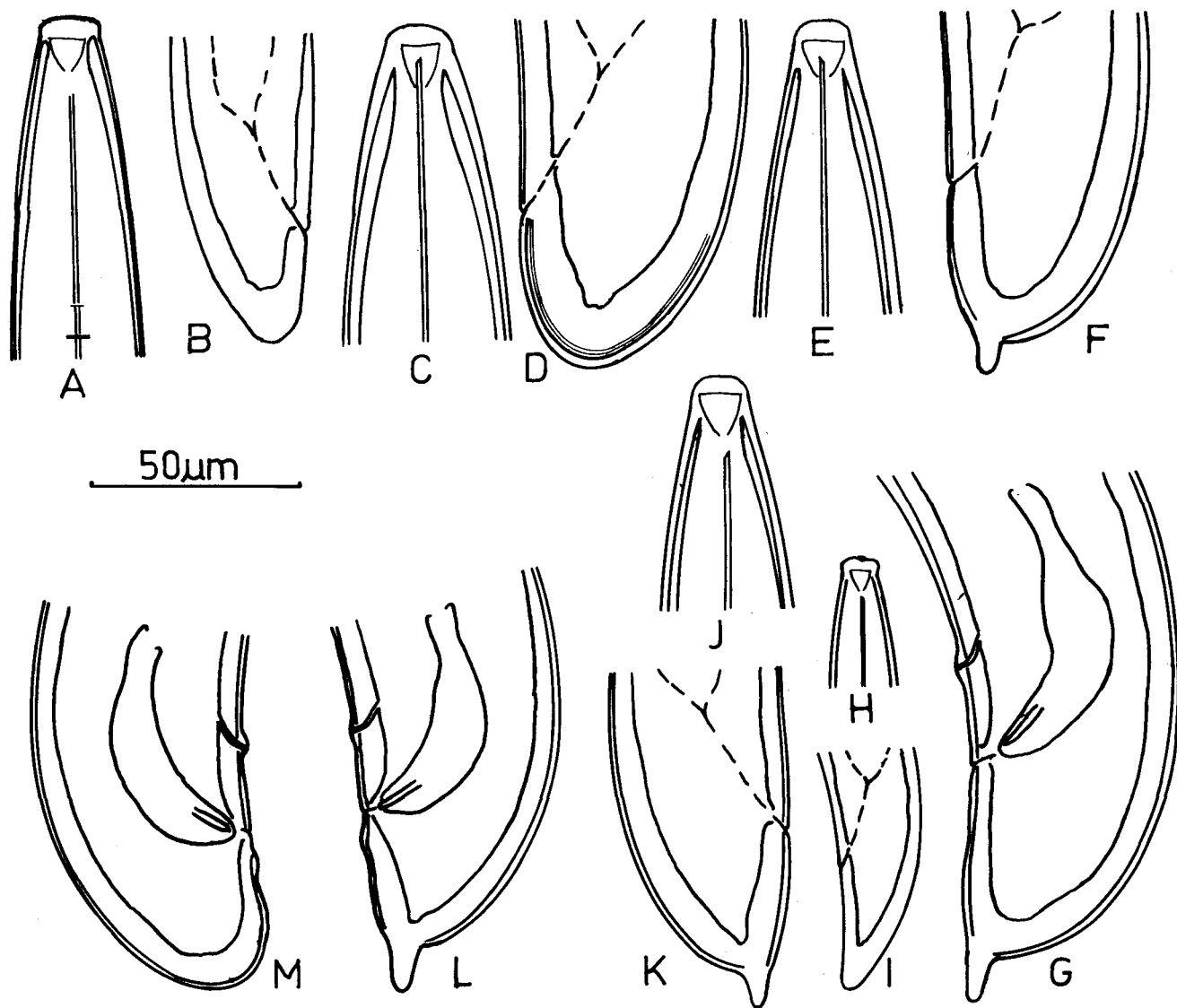


Fig. 4 - A-B: *Xiphinema brevicolle*. A: Female anterior region; B: Female tail; C-D: *X. dentatum*. C: Female anterior region; D: Female tail; E-G: *X. diversicaudatum*. E: Female anterior region; F: Female tail; G: Male tail; H-I: *X. incertum*. H: Female anterior region; I: Female tail; J-M: *X. index*. J: Female anterior region; K: Female tail; L and M: Male tails.

sally convex, ventrally straight or slightly convex with or rarely without mammillate peg, 8.5 (0-11) μm long.

Males are extremely rare. Morphologically similar to females, but more coiled in the posterior region; spicules massive, supplements adanal pair plus 3-4; tail as in female, with or rarely without mammillate peg, 9 (0-10) μm long.

The morphometrics of two populations of *X. index* from Polje (Krk island) and Slano (C) are given in Table V. They differ slightly in the length of the body, length of the odontostyle, position of the fixed guiding ring and position of the vulva. The morphometrics of the Yugoslavian populations generally agree with those of populations from Bulgaria (Lamberti *et al.*, 1983), Israel (Luc and Cohn, 1982), Italy (Martelli and Lamberti, 1967; Prota *et al.*, 1971; Lamberti *et al.*, 1985; Roca *et al.*, 1987, 1987a), Maltese islands (Lamberti *et al.*, 1982) and Yugoslavia (Hrzić, 1978). Some differences in morphometrics usually exist between these populations.

The morphometrics of males (Table V) are similar to those found in Italy (Prota *et al.*, 1971), Israel (Luc and Cohn, 1982) and Maltese islands (Lamberti *et al.*, 1982).

X. index was also found in the rhizosphere of grapevine at Zarodež (C).

XIPHINEMA ITALIAE, Meyl, 1953
(Fig. 5; A and B)

Female: lip region gently rounded, set off by a shallow constriction; body ventrally curved upon fixation with most of the curvature in the posterior third of the body; tail elegantly-conoid, varying in shape.

The morphometrics of eleven females collected from the rhizosphere of grapevine at Negotino (M), of *Linum austriacum* L. and *Vitis* sp., at Lovćenac (VP) and poplar, at Novi Sad (VP), are: L = 2.8 (2.3-3.2) mm; a = 81 (73-91); b = 7.2 (6.5-8.7); c = 35 (30-40); c' = 3.7 (3.1-4.2); V = 46 (44-47); odontostyle = 86 (80-91) μm ; odontophore = 55.5 (49-60) μm ; oral aperture to guiding ring = 80 (74-87) μm ; tail = 79 (68.5-87) μm ; J = 11.5 (7.5-15) μm ; body diameter at lip region = 10.5 (10-11) μm ; body diameter at guiding ring = 23.5 (20.5-25) μm ; body diameter at base of oesophagus = 30 (26-32) μm ; body diameter at vulva = 34 (28-38) μm ; body diameter at anus = 21.5 (18-24) μm ; body diameter at beginning of J = 7.5 (6-9) μm . They do not differ much from other populations from Italy (Martelli *et al.*, 1966; Martelli and Lamberti, 1967; Prota *et al.*, 1971; Lamberti *et al.*, 1985; Roca *et al.*, 1985,

TABLE IV - Morphometrics of *Xiphinema diversicaudatum* from Yugoslavia.

Locality and host	Stoliv, grapevine	
n	23 ♀♀	10 ♂♂
L mm	3.9 (3.4-4.7)	3.9 (3.5-4.3)
a	65.5 (58.5-74)	72 (66.5-80)
b	8.3 (7.2-9.6)	8.1 (7.6-9.5)
c	86 (63.5-110)	78 (72.5-80)
c'	1 (0.8-1.1)	1.2 (1-1.3)
V	43 (40-46)	—
Odontostyle μm	129 (121-135)	129 (122-135)
Odontophore μm	76 (71-80)	74 (71-76)
Oral aperture to guiding ring μm	114.5 (95-125.5)	114 (99-126)
Tail μm	45.5 (34-51)	50 (46-53)
J μm	16 (10-20)	19 (17-22)
Body diam at lip region μm	13 (12.5-14)	13 (11.5-14)
Body diam at guiding ring μm	38 (33-40.5)	37 (35.5-41)
Body diam at base of oesophagus μm	49 (45-54)	47 (42.5-51.5)
Body diam at vulva μm	60 (51-66)	—
Body diam at middle body μm	—	54 (47-60)
Body diam at anus μm	43.5 (39-46)	42.5 (38.5-46.5)
Body diam at beginning of J μm	28 (25-31)	24.5 (18.5-29)
Spicules μm	—	66.5 (62.5-71)

1987, 1987a) and France (Martelli *et al.*, 1966) except in having a slightly shorter odontostyle and odontophore. No males were found.

XIPHINEMA PACHTAICUM
(Tulaganov, 1938) Kirjanova, 1951
(Fig. 5; C and D)

Female: body cylindrical gradually tapering towards the extremities; when relaxed assuming the shape of an open to closed letter C; lip region rounded and set off by a deep constriction; tail short, conical, dorsally convex, ventrally varying from slightly convex to slightly concave with narrowly rounded end.

The morphometrics of 26 female of *X. pachtaicum* from

seven populations collected from the rhizosphere of grapevine in Yugoslavia are: L = 1.9 (1.7-2.2) mm; a = 65 (57-70); b = 5.9 (5.4-7.3); c = 62 (57-70); c' = 1.8 (1.5-2.1); V = 57 (55-58); odontostyle = 88 (82-94) μ m; odontophore = 50 (48-54) μ m; oral aperture to guiding ring = 80 (76-84) μ m; tail = 31 (28-34) μ m; J = 10 (9-12) μ m; body diameter at lip region = 9 (8-9.5) μ m; body diameter at guiding ring = 21.5 (20-24) μ m; body diameter at base of oesophagus = 26 (22.5-29) μ m; body diameter at vulva = 29 (25-34) μ m; body diameter at anus = 17.5 (15.5-19.5) μ m; body diameter at beginning of J = 8.5 (7-10) μ m.

These values are within the range of those reported for other populations of *X. pachtaicum* from various Mediterranean localities (Martelli and Lamberti, 1967; Lamberti and Martelli, 1971; Prota *et al.*, 1971; Hrčić, 1978; Lam-

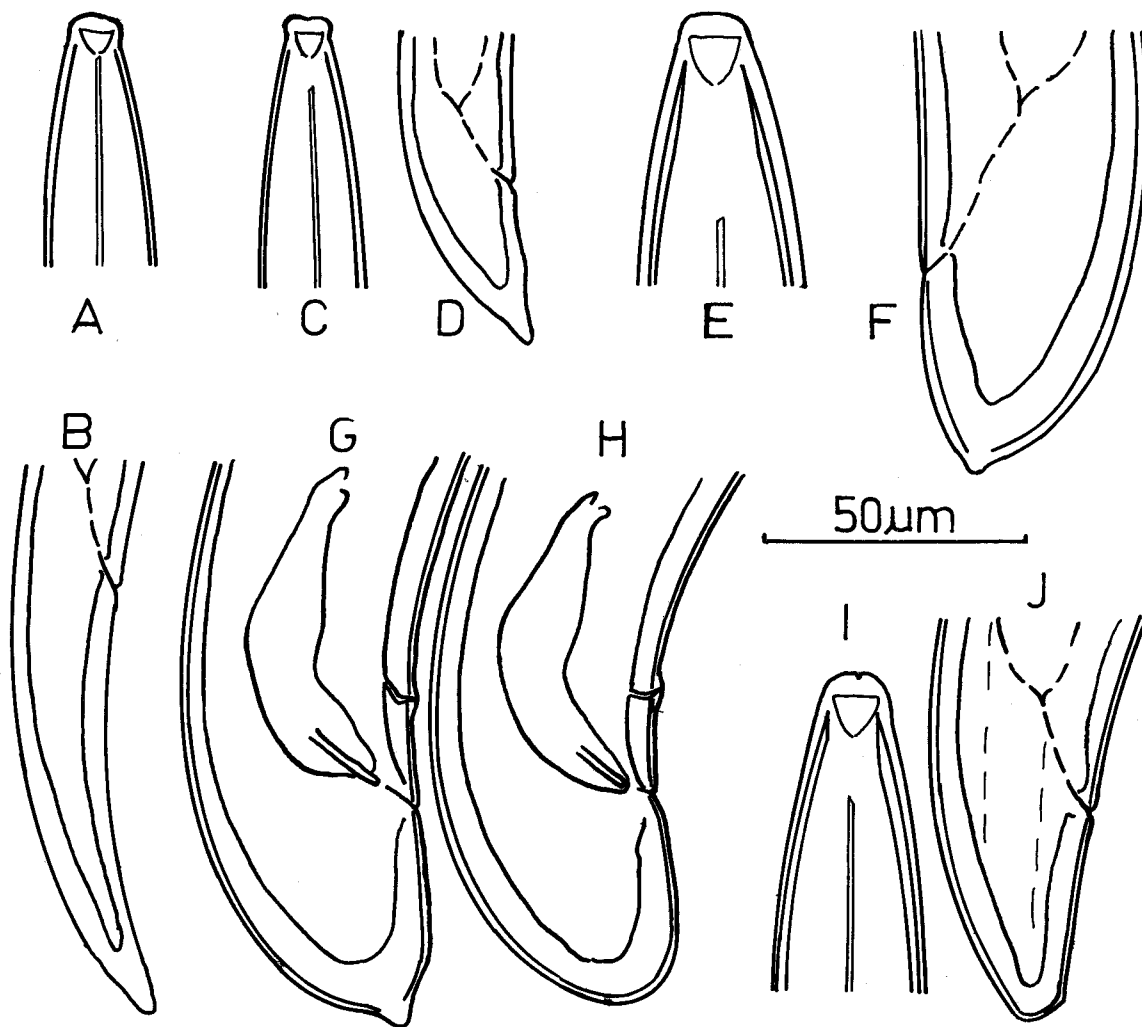


Fig. 5 - A-B; *Xiphinema italiae*. A: Female anterior region; B: Female tail; C-D: *X. pachtaicum*. C: Female anterior region; D: Female tail; E-II: *X. vuittenezi*. E: Female anterior region; F: Female tail; G and H: Male tails; I-J: *Xiphinema* sp. I: Female anterior region; J: Female tail.

berti and Bleve-Zacheo, 1979; Lamberti *et al.*, 1982, 1983, 1985; Roca *et al.*, 1987, 1987a). No males were found.

X. pachtaicum occurred in samples collected in Vojvodina Province from 20 localities: Bajša (*Verbascum phoeniceum* L.); Bečej (fig); Begeč (poplar); Bešenovo (peach); Bogaraš (*Thuja orientalis* L.); Čerević (grapevine); Kanjiža (ornamentals); Ledinci (grapevine, peach, *Picea* sp., walnut); Lovćenac (grass); Novi Sad [*Abies concolor* Lin. *et* Gor., *Thuja orientalis*, *Buxus sempervirens* L., *Mahonia aquifolia* (Pursh.) Nutt., *Picea excelsa* (Lam.) Lk., *Populus nigra* L., *Sequoiadendron giganteum* (Lindl.) Buchh., *Sophora japonica* L., *Taxus baccata* L., *Tilia tomentosa* Mch.]; Orešković (*Theucrium chamaedrys* L., *Salvia* sp.); Petrovaradin (grapevine); Rakovac (peach); Rimski Šančevi (maize, wheat); Senta (grapevine, maize); Sombor (ornamentals); Srbobran (ornamentals); Subotica (grapevine); Zrenjanin (ornamentals); Žabalj (maize) and in two samples collected in Croatia at Zarodež (grapevine) and at Ferenci (grapevine).

XIPHINEMA VUITTENEZI
Luc, Lima, Weischer *et* Flegg, 1964
(Fig. 5; E-H)

Female: lip region offset from body by a slight constriction; genital branches more or less equal, Z-constriction

present; vulva in the middle of the body; tail rounded with short peg, 3 (0-5) μm long, which is occasionally absent.

Males rare, morphologically similar to females, but more coiled in the posterior region; spicules massive, supplements adanal pair plus 3-6; tail rounded with, or exceptionally without, short peg, 3 (0-4) μm long.

The morphometrics of females and males from various localities in Yugoslavia are given in Table VI. These values for females generally agree with those reported for various European populations in the original description of the species (Luc *et al.*, 1964) and with those reported from Bulgaria (Lamberti *et al.*, 1983), Italy (Martelli and Lamberti, 1967; Lamberti *et al.*, 1985; Roca *et al.*, 1987), Poland (Szczygiel, 1974) and Yugoslavia (Hrzić, 1978).

The values for males are in the range of those reported from Germany, England and France in the original description of the species, except for the lengths of body and spicule, which in the Yugoslavian males are slightly longer.

X. vuittenezi was found in 26 localities in Vojvodina Province: Bački Petrovac (hop); Bečej (grapevine); Begeč (poplar); Beočin (rose); Bešenovo (peach); Bogaraš (*Thuja orientalis*); Čerević (grapevine); Čoka (grapevine); Djala (grapevine); Ledinci (grapevine, *Picea* sp.); Lovćenac (*Prinus avium* L., *Vitis* sp.); Novi Sad (*Abies concolor*, *Mahonia aquifolia*, *Picea excelsa*, *Pinus strobus* L., *Platanus acerifolia* Ait., *Sequoiadendron giganteum*, *Sophora japoni-*

TABLE V - Morphometrics of *Xiphinema* index from Yugoslavia.

Locality and host	Polje (Krk island), grapevine	Slano, grapevine
n	23 ♀ ♀	4 ♂
L mm	2.9 (2.6-3.3)	3.1 (3-3.1)
a	61 (52-66)	60 (55-65)
b	6.4 (5.7-7.1)	6.5 (5.8-7.6)
c	75 (59-95)	81 (75-88.5)
c'	1.1 (0.8-1.2)	0.9 (0.8-1)
V	41 (39-43)	—
Odontostyle μm	129 (121-136)	132.5 (125-137.5)
Odontophore μm	72 (65-78)	75 (74-76)
Oral aperture to guiding ring μm	117.5 (95.5-128)	123 (119-130)
Tail μm	40 (32.5-46)	38 (34-41)
J μm	16 (7.5-20)	10.5 (6-15)
Body diam at lip region μm	13 (12.5-13.5)	13 (12.5-14)
Body diam at guiding ring μm	37 (34.5-39)	37.5 (35.5-39)
Body diam at base of oesophagus μm	44 (40-47.5)	47 (45-51.5)
Body diam at vulva μm	48 (43-53)	—
Body diam at middle body μm	—	51.5 (48-55)
Body diam at anus μm	37 (34-40.5)	42 (41-43)
Body diam at beginning of J μm	21 (17.5-27)	22 (19-25)
Spicules μm	—	64 (62.5-66)

ca, *Taxus baccata*, *Thuja occidentalis* L.); Palić (*Festuca* sp.); Petrovaradin (grapevine); Rakovac (*Crataegus* sp., grapevine, peach); Rimski Šančevi (maize, sugar beet, wheat); Senta (*Thuja orientalis*, grapevine, pear, *Picea excelsa*, raspberry); Sombor (cauliflower), Srbobran (ornamentals); Sremski Karlovci (grapevine, *Prunus avium*); Stara Pazova (rose); Stari Ledinci (*Rubus* sp.); Subotica (grapevine, ornamentals); Titel (wheat); Zrenjanin (poplar); Zednick (*Euphorbia cyparissias* L.) and in a single locality in Slovenia: Jeruzalem (grapevine).

XIPHINEMA sp.
(Fig. 5; I and J)

The morphometric characters of a single female of *Xiphinema* sp. found in the rhizosphere of grapevine at Bečej are: L = 2.4 mm; a = 57.5; b = 5.1; c = 57; c' = 1.3; V = 43; odontostyle = 131 µm; odontophore = 64 µm; oral aperture to guiding ring = 113 µm; tail = 42 µm; J = 6.5 µm; body diameter at lip region = 12.5 µm; body diameter at guiding ring = 34 µm; body diameter at base of oesophagus = 38 µm; body diameter at vulva = 41.5 µm; body diameter at anus = 31.5 µm; body diameter at beginning of J = 14 µm.

This specimen probably represents an undescribed species (I. Andrassy, pers. comm.). More material is needed to ascertain its status.

Conclusions

Of the 13 species described, *Longidorus distinctus*, *L. eunonymus*, *L. juvenilis* and *Xiphinema incertum* are recorded for the first time from Yugoslavia.

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TABLE VI - Morphometrics of *Xiphinema vuittenezi* from Yugoslavia.

n	192 ♀ ♀	8 ♂ ♂
L mm	3.2 (2.7-3.9)	3.3 (3-3.7)
a	64 (57-73)	68 (65-71)
b	6.6 (5.4-8.1)	6.8 (6.2-7.8)
c	87 (70-109)	85 (76-95)
c'	1 (0.8-1.2)	1 (0.9-1)
V	50 (46-54)	—
Odontostyle µm	129 (114-138)	128 (118-138)
Odontophore µm	75.5 (65-80)	75 (73-78)
Oral aperture to guiding ring µm	118 (102-131)	118 (103-124)
Tail µm	37 (30-45)	39 (36-41.5)
J µm	12 (8-17)	10.5 (7.5-14)
Body diam at lip region µm	14 (12.5-15)	14 (14-14)
Body diam at guiding ring µm	37 (34-42)	37 (35-39)
Body diam at base of oesophagus µm	44 (38-49.5)	45 (42-48)
Body diam at vulva µm	50.5 (40-60)	—
Body diam at middle body µm	—	49 (44-53)
Body diam at anus µm	37.5 (32-43)	39 (37-40)
Body diam at beginning of J µm	25 (19-30)	24.5 (21-26)
Spicules µm	—	66.5 (61-71)

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