

*Laboratorio di Nematologia Agraria del C.N.R.*  
70126 Bari - Italia

TWO NEW SPECIES OF *LONGIDORUS*  
(NEMATODA: LONGIDORIDAE) FROM ITALY

by

F. LAMBERTI and TERESA BLEVE ZACHEO<sup>(1)</sup>

In 1971 (Prota *et al.*, 1971) a species of *Longidorus* (Micol.) Filipjev collected in a vineyard in Sardinia was identified and described as *L. attenuatus* Hooper, but it was emphasized that the specimens examined differed from British and German populations in having a shorter, more robust tail with rounded terminus, which in the latter is rather pointed. A series of publications between 1973 and 1976 (Rana and Roca, 1973; Roca *et al.*, 1975; Roca *et al.*, 1975; Vovlas and Roca, 1975; Rana and Roca, 1976; Taylor *et al.*, 1976) report an Apulian population belonging to the same genus and again identified as *L. attenuatus*, as the vector of strains of Artichoke Italian Latent virus.

A more detailed study of our material and comparison with specimens of similar species and of British or German populations of *L. attenuatus* indicate that we are dealing with two new species. They are described here from specimens killed either in hot 5% formalin or TAF, fixed in the same media and mounted in glycerine by the slow method (Lamberti and Sher, 1969).

---

<sup>(1)</sup> Grateful thanks are expressed to Mrs. A. Agostinelli and Mr. F. Elia for valuable technical assistance.

*LONGIDORUS PROTAE* sp. n. (Fig. 1; Table I).

*Holotype female*: L = 7.2 mm; a = 164; b = 16; c = 198; V = 46; c' = 1; distance from the anterior end to the guiding ring = 27  $\mu$ m; odontostyle = 80  $\mu$ m; odontophore = 57  $\mu$ m; tail = 37  $\mu$ m; j = 6  $\mu$ m.

### *Description*

*Females*: Habitus as spiral, when well relaxed. Body tapering very gradually toward the extremities (Tab. I) and bearing glandular structures in the lateral cords. Cuticle smooth, 2  $\mu$ m thick along body but more thickened at the posterior extremity (5  $\mu$ m on both sides immediately after anus). Lateral region expanded with respect to the rest of the body, flat anteriorly. Amphidial pouches bilobed more or less asymmetrically with aperture not detectable. Odontostyle slender, typical of the genus as are the odontophore and guiding sheath. Oesophagus dorylaimoid with the basal bulb, which contains three nuclei, occupying 1/3 of its total length. The muscular bulb is 125-140  $\mu$ m long and 15-20  $\mu$ m wide. Vulva almost equatorial, vagina occupying a little more than 1/2 of the corresponding body diameter, consisting of two parts of almost equal dimensions: *vagina vera* and *vagina uterina*. Gonads paired, amphidelphic reflexed with very long uteri (around 200  $\mu$ m), separated from the oviduct by a robust sphincter. Prerectum between 400 and 500  $\mu$ m long; rectum 2/3 or equal to the body diameter at anus. Tail bearing three caudal pores, conoid, convex dorsally, rounded at terminus, with the hyalin portion measuring 6-8.5  $\mu$ m.

*Male*: not found.

*Juveniles*: morphologically similar to adult females, differing mainly in size of body. The tail is longer and slightly acuminate in the first stages.

*Type material*: holotype, 5 paratype females and 33 juveniles on slides 2/1/1-9, in the collection of the Laboratorio di Nematologia Agraria del Consiglio Nazionale delle Ricerche, Bari, Italy; 3 paratype females, Nematology Department, Rothamsted Experimental Station, Harpenden, Herts, England, and 4 paratype females, Plant

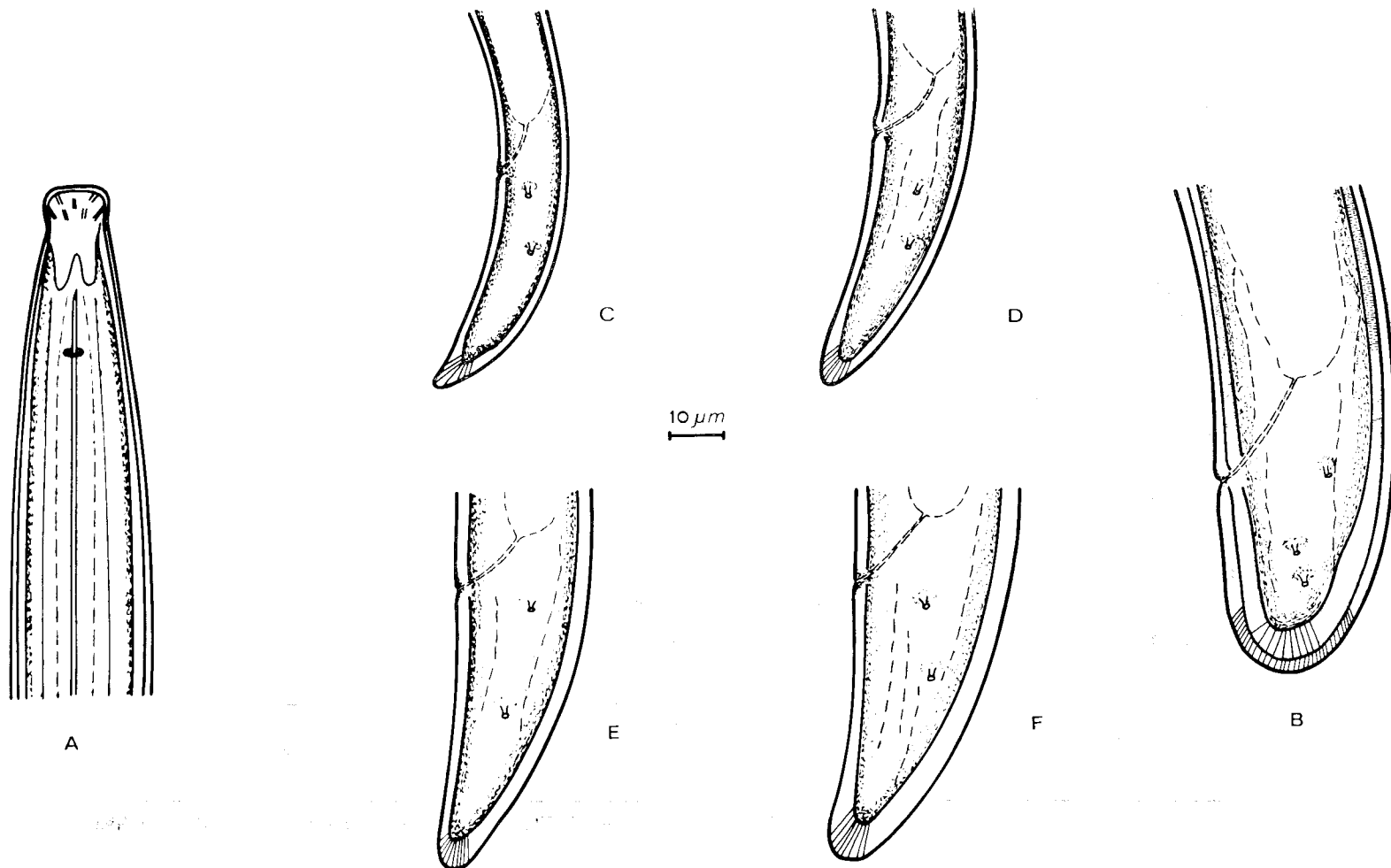


Fig. 1 - *Longidorus protae* n. sp.: A and B, anterior and posterior regions of female; C, D, E and F, tails of I, II, III and IV larval stages respectively.

Table I - *Morphometrical characters of Longidorus protae n.sp.*

Stages	Paratypes				
	L <sub>1</sub>	L <sub>2</sub>	L <sub>3</sub>	L <sub>4</sub>	♀
n	1	5	10	10	10
Length mm	1.4	2.3(2.1-2.5)	3.4(3.1-3.7)	4.9(4.4-5.6)	6.7(5.9-7.5)
a	71	92(88-96)	116(107-124)	140(126-150)	156(137-166)
b	5.4	8(7.3-9)	11(9-12)	13.7(11-16.5)	15.8(13-18.7)
c	31	48(45-52)	65(56-74)	108(100-118)	190(167-205)
v					48(46-51)
c'	3.3	2.6(2.5-2.9)	2.2(2-2.5)	1.6(1.5-1.7)	1.1(1-1.2)
Odontostyle $\mu\text{m}$	49	56(54-59)	63(61-65)	71(68-73)	79(73-83)
Odontophore $\mu\text{m}$	30	44(43-48)	48(44-50)	57(52-68)	57(50-60)
Replacement odontostyle $\mu\text{m}$	56	62(61-64)	70(65-74)	77(73-80)	
Oral aperture to guiding ring $\mu\text{m}$	15	19(18-21)	23(21-24)	25(24-26)	27(25-29)
Tail $\mu\text{m}$	44	48(45-51)	51(48-60)	45(40-51)	35(32-37)
J (hyalin portion of tail) $\mu\text{m}$	7	6.5(5-7.5)	7(5.5-9)	7(5-8)	7(6-8.5)
Body diam. at lip region $\mu\text{m}$					12(11-13)
Body diam. at guiding ring $\mu\text{m}$					18(17-19)
Body diam. at base of oesophagus					35(32-38)
Body diam. at vulva $\mu\text{m}$					43(40-47)
Body diam. at anus $\mu\text{m}$					32(30-33)
Body diam. at beginning of J $\mu\text{m}$					20(17-22)

Nematology Laboratory Collection, United States Department of Agriculture, Beltsville, Maryland, U.S.A.

*Type habitat and locality:* in the rhizosphere of grapevine plants (*Vitis* sp.) at Platamona, in the province of Sassari, Sardinia, Italy.

*Differential diagnosis:*

*Longidorus protae* has similarities to two other species of the genus: *L. attenuatus* Hooper, 1961 and *L. globulicauda* Dalmasso, 1969. However, it differs from both in its larger size, shorter tail and different shape of the tail, which is rounded at the end in *L. protae* and more or less pointed in the two other species. Moreover, the hyalin portion of the tail in *L. attenuatus* is 11 to 18  $\mu\text{m}$  long viz. 6 to 9  $\mu\text{m}$  in *L. protae*.

*LONGIDORUS APULUS* sp. n. (Fig. 2; Table II).

*Holotype female:* L = 6.6 mm; a = 136; b = 17; c = 165; V = 51.5; c' = 1; distance from the anterior end to guiding ring = 30  $\mu\text{m}$ ; odontostyle = 103  $\mu\text{m}$ ; odontophore = 68  $\mu\text{m}$ ; tail = 40  $\mu\text{m}$ ; j = 11  $\mu\text{m}$ .

*Allotype male:* L = 7 mm; a = 145; b = 15.7; c = 176; c' = 1; distance from anterior end to guiding ring = 30  $\mu\text{m}$ ; odontostyle = 103  $\mu\text{m}$ ; odontophore = 67  $\mu\text{m}$ ; tail = 40  $\mu\text{m}$ ; j = 11  $\mu\text{m}$ ; spicules = 57  $\mu\text{m}$ ; supplements = adanal pair plus 12.

*Description*

*Females:* Body in dead position coiled in a more or less open C when relaxed; tapering very gradually toward the extremities and bearing glandular structures in the lateral cords. Cuticle smooth, thin, about 1  $\mu\text{m}$  thick along the body except at the extremities where it is 2  $\mu\text{m}$  thick anteriorly, just before the lip region, and 4 to 5  $\mu\text{m}$  thick either dorsally or ventrally, immediately posterior to anus. Flattened labial region offset from the rest of the body by a slight constriction. Amphidial pouches almost symmetrically bilobed with obscure aperture. Odontostyle delicate, very slender with odontophore and guiding sheath typical of the genus. Oesophagus dorylaimoid with the basal bulb containing three nuclei and occupying

Table II - *Morphometrical characters of Longidorus apulus n.s.*

Stages	Paratypes	Population from	
	♀	L <sub>1</sub>	L <sub>2</sub>
n	20	5	5
Length mm	6.7(5.3-8.3)	1.6(1.5-1.8)	2.8(2.5-3.6)
a	139(123-154)	69(63-73)	95(89-106)
b	15.1(12.1-17.7)	6.5(6-7)	9(7.6-11.1)
c	170(128-209)	36(32-41)	57(47-77)
v	52(51-54)		
c'	1(0.9-1.2)	2.9(2.2-3.3)	2.2(1.7-2.4)
Odontostyle $\mu\text{m}$	103(91-112)	64(60-69)	73(71-79)
Odontophore $\mu\text{m}$	68(62-75)	38(35-41)	52(49-58)
Replacement odontostyle $\mu\text{m}$		72(70-74)	83(80-86)
Oral aperture to guiding ring $\mu\text{m}$	31(27-34)	18(17-19)	21(19-26)
Tail $\mu\text{m}$	40(31-46)	45(36-50)	49(46-52)
J $\mu\text{m}$	12(9-17)	8.5(7.5-9)	8(7-10)
Body diam. at lip region $\mu\text{m}$	15(14-17)		
Body diam. at guiding ring $\mu\text{m}$	22(19-25)		
Body diam. at base of oesophagus	41(36-49)		
Body diam. at vulva $\mu\text{m}$	48(41-58)		
Body diam. at anus $\mu\text{m}$	40(33-47)		
Body diam. at beginning of J $\mu\text{m}$	24(19-29)		

1/2 of the oesophagus total length. Muscular bulb 120-140  $\mu\text{m}$  and 20-22  $\mu\text{m}$  wide. Vulva equatorial, the vagina occupying 2/3 of the corresponding body diameter and consisting for 2/3 of its length of the *vagina uterina* and 1/3 of the *vagina vera*. Gonads paired, amphidelphic reflexed with uteri 90 to 130  $\mu\text{m}$  long, separated from the oviduct by a little developed sphincter. Prerectum 280-350  $\mu\text{m}$

Palese (Bari)			Population from Palese reared in glass-house	
L <sub>3</sub>	L <sub>4</sub>	♀	♀	♂
5	4	20	20	2
4.5(4.1-4.9)	5.6(5.1-5.9)	7.3(6.4-9.1)	6.5(5.3-7.3)	6.2-6.3
105(90-123)	118(107-124)	142(123-155)	119(110-143)	129-131
13(10.4-17.4)	13(11.6-14.7)	15.6(10.7-17.8)	15.5(13.3-18.3)	13.8-15.3
102(88-123)	129(113-133)	188(164-216)	170(139-197)	142-143
		51(49-52)	51(49-53)	
1.5(1.4-1.6)	1.2(1.1-1.3)	1(0.9-1.1)	1(0.9-1.1)	1.2
86(81-90)	93(88-98)	104(98-108)	99(93-104)	102-103
54(50-59)	63(62-66)	67(60-75)	68(60-80)	64-66
95(92-100)	105(101-110)			
25(24-27)	26(24-30)	31(29-34)	29(24-31)	31
46(40-51)	42(38-45)	39(34-44)	39(34-42)	44
8.5(7-10)	12(11-13)	17(13-19)	16(10-19)	13-14
		15.5(14.5-16.5)	15(14-16)	16
		24(21-25)	22(21-24)	22-24
		42(38-45)	42(38-45)	37-41
		51(46-60)	52(46-60)	
		41(36-45)	38(34-42)	37-38
		29(22-32)	27(18-33)	18-20

long and rectum of about 2/3 of the body diameter at anus. Tail, bearing three caudal pores, conoid, slightly convex dorsally with rounded terminus and hyalin portion measuring 9 to 17  $\mu\text{m}$ .

*Male*: very rare, biometrically and morphologically similar to female but more coiled in the posterior region. The adanal pair of supplements 12 to 18  $\mu\text{m}$  antieriad to anus preceded by a ventro-

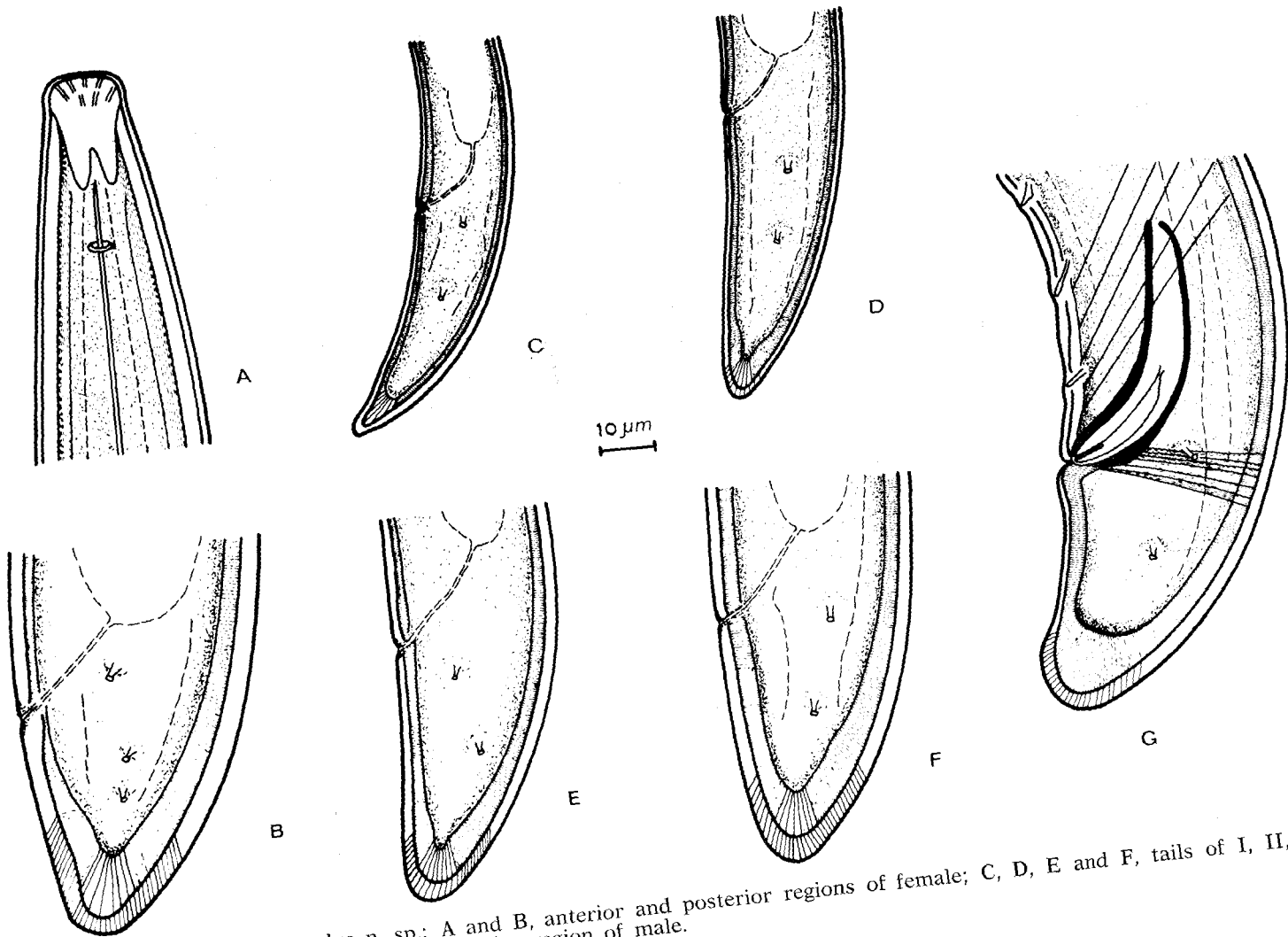


Fig. 2 - *Longidorus apulus* n. sp.: A and B, anterior and posterior regions of female; C, D, E and F, tails of I, II, III and IV larval stages respectively; G, posterior region of male.



median row of 10-12 supplements. The tail is ventrally concave. The testis are full of sperms.

*Juveniles*: Similar to adult females, but differing in size of the body. The tail is also longer and more pointed than in adult females, especially in the first larval stages.

*Type material*: Holotype, allotype and 15 paratype females on slides 2/2/1-14 in the collection of the Laboratorio di Nematologia Agraria del Consiglio Nazionale delle Ricerche, Bari, Italy; 2 paratype females, Nematology Department, Rothamsted Experimental Station, Harpenden, Herts, England, and 2 paratype females, Plant Nematology Laboratory Collection, United States Department of Agriculture, Beltsville, Maryland, U.S.A.

*Type habitat and locality*: rhizosphere of artichoke plants at Mola (Bari), Italy. This species is, however, widespread throughout Apulia (Roca *et al.*, 1975), where it has been found in association with various crops such as potato, chicory, fennel and weeds.

#### *Differential diagnosis*:

*Longidorus apulus* is similar to *L. vineacola* Sturhan *et* Weischer, 1964, *L. closelongatus* Stoyanov, 1964, and *L. euonymus* Mali *et* Hooper, 1973. It differs from *L. vineacola* in having a smaller body (6.7 viz. 8.2 mm) and a shorter odontostyle (103 viz. 141  $\mu\text{m}$ ), from *L. closelongatus* because of its shorter odontostyle (103 viz. 114  $\mu\text{m}$ ) and tail ( $c = 170$  viz. 146), and from *L. euonymus* in its less robust body ( $a = 139$  viz. 153), shorter tail (40 viz. 45  $\mu\text{m}$ ) and longer odontostyle (103 viz. 86  $\mu\text{m}$ ).

It seems useful to note that specimens of *L. apulus* obtained from individual collected at Palese (Bari) reared for two years in glass-house in pots planted with *Chenopodium amaranticolor* L. have given rise to a population of smaller size individuals (Tab. II). It should also be noted that *L. apulus* is a new species among the list of nematode vectors of plant viruses.

#### S U M M A R Y

*Longidorus protae* and *L. apulus*, two new species from Italy are described. The first differs from *L. attenuatus* Hooper, 1961 and *L. globulicauda* Dal-

masso, 1969 in its larger size, shorter tail and different shape of the tail. *L. apulus* differs from *L. vineacola* Sturhan et Weischer, 1964 in its smaller size and shorter odontostyle; from *L. closelongatus* Stoyanov, 1964 because of its shorter odontostyle and tail, and from *L. euonymus* Mali et Hooper, 1973 in its less robust body, shorter tail and longer odontostyle.

## R I A S S U N T O

*Due nuove specie di Longidorus (Nematoda: Longidoridae) trovate in Italia.*

Vengono descritte *Longidorus protae* e *L. apulus*, due nuove specie trovate in Italia. La prima si differenzia da *L. attenuatus* Hooper, 1961 e da *L. globulicauda* Dalmasso, 1969 per una maggiore taglia e per avere la coda più corta e di forma differente. *L. apulus* differisce da *L. vineacola* Sturhan et Weischer, 1964 per la minore taglia e per avere l'odontostilo più corto, da *L. closelongatus* Stoyanov, 1964 per avere odontostilo e coda più corti e da *L. euonymus* Mali et Hooper, 1973 per avere corpo meno robusto, coda più corta ed odontostilo più lungo.

## LITERATURE CITED

- DALMASSO A., 1969 - Etude anatomique et taxonomique des genres *Xiphinema*, *Longidorus* et *Paralongidorus* (Nematoda, Dorylaimidae). *Mem. Mus. natn. hist. nat., Paris, Serie A, Zoologia*, 61: 33-82.
- HOOPER D.J., 1961 - A redescription of *Longidorus elongatus* (de Man, 1876) Thorne et Swanger, 1963 (Nematoda, Dorylaimidae) and descriptions of five new species of *Longidorus* from Great Britain. *Nematologica*, 6: 237-257.
- LAMBERTI F. and SHER S.A., 1969 - A comparison of preparation techniques in taxonomic studies of *Longidorus africanus* Merny. *J. Nematol.*, 1: 193-200.
- MALI V.R. and HOOPER D.J., 1973 - Observations on *Longidorus euonymus* n. sp. and *Xiphinema vuittenezi* Luc et al., 1964 (Nematoda: Dorylaimida) associated with spindle trees infected with *Euonymus mosaic virus* in Czechoslovakia. *Nematologica*, 19: 459-467.
- PROTA U., LAMBERTI F., BLEVE ZACHEO T. and MARTELLI G.P., 1971 - I Longidoridae (Nematoda: Dorylaimoidea) dei vigneti sardi. *Redia*, 52: 601-618.
- RANA G.L. and ROCA F., 1973 - Trasmissione con nematodi del virus latente italiano del carciofo (AILV). Abstracts Atti II Congresso Internazionale del Carciofo, Bari, 21-24 Nov. 1973, 139.
- RANA G.L. and ROCA F., 1976 - Trasmissione con nematodi del virus «Latente Italiano del Carciofo» (AILV). Atti II Congresso Internazionale del Carciofo, Bari, 21-24 Nov. 1973, 855-858.
- ROCA F., MARTELLI G.P., LAMBERTI F. and RANA G.L., 1975 - Distribution of *Longidorus attenuatus* Hooper in Apulian artichoke fields and its relationships with artichoke Italian latent virus. *Nematol. mediterr.*, 3: 91-101.
- ROCA F., MARTELLI G.P. and RANA G.L., 1975 - Distribution of artichoke Italian latent virus and its nematode vector in Apulia. In *Nematode Vectors of Plant Viruses* (ed. F. Lamberti, C.E. Taylor and J.W. Seinhorst) Plenum Press, London, New York, 279-280.
- STOYANOV D., 1964 - [A contribution to the nematode fauna of the grape vine.] *Rastit. Zashit.*, 12: 16-24.

- STURHAN D. and WEISCHER B., 1964 - *Longidorus vineacola* n. sp. (Nematoda: Dorylaimidae). *Nematologica*, 10: 335-341.
- TAYLOR C. E., ROBERTSON W. M. and ROCA F., 1976 - Specific association of artichoke Italian latent virus with the odontostyle of its vector, *Longidorus attenuatus*. *Nematol. medit.*, 4: 23-30.
- VOVLAS C. and ROCA F., 1975 - Trasmissione con nematodi dell'agente della maculatura anulare clorotica della cicoria, un ceppo del virus latente italiano del carciofo. *Nematol. medit.*, 3: 83-90.

---

Accepted for publication on 21 March 1977.