

TAXONOMIC PROBLEM IN NEMATODES OF THE  
*XIPHINEMA AMERICANUM* GROUP (NEMATODA, DORYLAIMOIDEA)

N.D. ROMANENKO, O.P. STEGARES KU

*Parazitologiya*, 19(6): 434-442 (1985).

According to the classification of Lamberti and Bleve-Zacheo (1979) there are 23 phytoparasitic species of nematodes morphologically similar to *Xiphinema americanum*. From the shape and size of the tail and head, and ratio  $c'$ , we have grouped these nematodes into 3 subgroups of species similar to *X. pachtaicum*, *X. citricolum* and *X. brevicolle*. *X. variabile* Heyns, 1966 ( $c' = 2.4-2.9$ ) suggested a group of species similar to *X. elongatum*, whilst *X. inaequale* was considered as a synonym for *X. neoamericanum*. A new species was added to the list for the *X. americanum* group, a species detected on USSR territory. *X. paramonovi* sp. n. Romanenko, 1981 is described herein. In USSR, the most frequent recorded examples of these nematodes are *X. brevicolle*, *X. pachtaicum* and *X. paramonovi*.

The nematode species morphologically similar to *Xiphinema americanum* are obligate parasites of plants, mainly of perennial wood and shrub species, although they can parasitize the roots of annual herbaceous plants (Romanenko, 1973; 1976; 1981; Romanenko & Stegaresku, 1981; Stegaresku, 1980; Metlitskii et al., 1982; Lamberti & Bleve-Zacheo, 1979; Barbez, 1982; and others). Moreover, three species in this group (*X. americanum*, *X. brevicolle* and *X. rivesi*) are vectors of 6 phytopathogenic viruses --tomato ringspot, tobacco ringspot, peach mosaic, peach leafcurl, twisted leaves in cherry, necrotic ringspot of bilberry and an unidentified raspberry virus (Stegaresku, 1980; Jakobsen, 1974; Martelli, 1975; 1978; Forer, 1981; Forer & Stouffer, 1982; and others).

Lima (1965) suggested that *X. americanum* Cobb, 1913, was several species. After studying the morphometric variation of species similar to *X. americanum*, Tarjan (1969) came to the conclusion that *X. brevicolle*, *X. opisthohystrum* and the Mediterranean species described by Lima (1965), subsequently described as *X. mediterraneum* (Martelli & Lamberti, 1967), were valid species of the *X. americanum* group. In 1972, all species enumerated and including *X. rivesi* Dalmasso, 1969, as it had been described at that time, were placed into a subgenus *Xiphinema* sensu stricto with *X. americanum* as the type species (Cohn & Sher, 1972). Subsequently, the number of species in the *X. americanum* group increased considerably with the publication of descriptions of new species (Khan & Ahmad, 1975; 1977; Lamberti & Bleve-Zacheo, 1979; Lamberti & Martelli, 1971; Luc & Williams, 1978; Siddiqi & Lamberti, 1977; Saxena et al., 1973).

Defining species of *Xiphinema* in a given group is very difficult, as they are morphologically similar. Many of their metrical and morphological features overlap. The taxonomic status of the majority of species in this group cannot be established by any one distinguishing feature, but rather by a set of several features. To facilitate the diagnosis of *Xiphinema* species morphologically similar to *X. americanum*, we investigated the groupings described below.

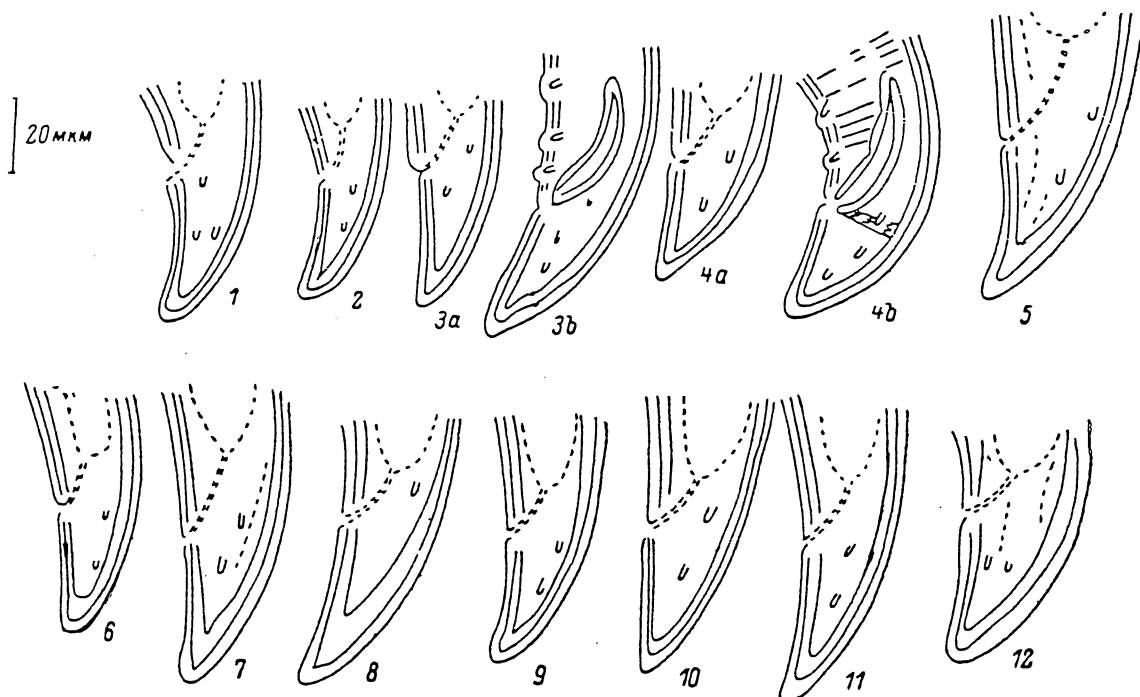


Fig. 1: The shape and dimensions of the tail in *Xiphinema* species, subgroup *X. pachtaicum* (after: Lamberti and Bleve-Zacheo, 1979). 1: *X. americanum*; 2: *X. opisthohystrum*; 3, a, b: *X. californicum*; 4, a, b: *X. peruvianum*; 5: *X. laevistriatum*; 6: *X. intermedium*; 7: *X. oxycaudatum*; 8: *X. pachtaicum*; 9: *X. utahense*; 10, 11: *X. tenuicutis*; 12: *X. rivesi*.

For the principal morphological and metrical features of nematodes of the *X. americanum* group, one should consider the size and shape of the tail and labial region, ratio  $c'$  (relationship of tail length to body diameter in the anal region) and also the most reliable biometric characters used specifically for the Longidoridae -- ratio  $J$  (the length of the hyaline part of the tail) and the diameters of the body at the labial region and at the beginning of the hyaline part of the tail. These characters were used for the first time by Lamberti for the diagnosis of species in the genus *Longidorus* (Lamberti, 1970; 1975) and were used as reliable diagnostic characters for the description of 15 new species of nematodes in the *X. americanum* group (Lamberti & Bleve-Zacheo, 1979). Moreover, the important diagnostic characters of nematodes in a given group are body diameters at the stylet guide ring, at base of the oesophagus, at vulva, and at anus, odontostyle and odontophore lengths, distance from the anterior end to the stylet guide ring, tail length, and ratios  $a$ ,  $b$ ,  $c$  (Lamberti, 1975; Lamberti & Bleve-Zacheo, 1979).

Variations in morphological characters tabulated by us, are presented in the tables that follow. Data in the tables were obtained from original descriptions of the species and from subsequent descriptions (Romanenko, 1981; Stegaresku, 1980; Tulaganov, 1938; Cobb, 1913; Dalmaso, 1969; Khan & Ahmad, 1975; 1977; Lamberti & Bleve-Zacheo, 1979; Lamberti & Martelli, 1971; Lordello & da Costa, 1961; Luc & Williams, 1968; Martelli & Lamberti, 1967; Saxena et al., 1973; Siddiqi, 1961; Siddiqi & Lamberti, 1977; Wojtowicz et al., 1982; and

Published variation in the morphometrics and ratios of the nematode group Xiphinema americanum (in  $\mu\text{m}$ )

Nematode species	Body length (mm)	de Man ratios					Odontostyle length	Odontophore length
		a	b	c	d	V%		
<u>X. americanum</u> Cobb, 1913	1.4-1.9	39-59	4.6-8.1	39-59	1.4-2.1	47-54	63-85	35-53
<u>X. opisthoxyterum</u> Siddiqi, 1961	1.8	56-63	7.4-7.5	50-62	1.9-2	56-59	64-68	34-38
<u>X. pachtaicum</u> Tulaganov, 1938	1.4-2.5	37-78	4.3-9.7	47-85	1.2-2.2	50-63	68-95	37-53
<u>X. rivasi</u> Dalmaso, 1969	1.4-2.1	33-54	4.7-7.8	36-70	1.2-2.5	46-54	72-104	44-60
<u>X. californicum</u> Lamberti, Bieve-Zacheo, 1979	1.6-2.2	44-68	5.5-8.9	50-76	1.3-2.1	48-55	78-98	43-58
<u>X. intermedium</u> Lamberti, Bieve-Zacheo, 1979	1.4-1.9	38-51	5.2-7.2	41-59	1.3-1.7	50-57	68-80	39-50
<u>X. oxycaudatum</u> Lamberti, Bieve-Zacheo, 1979	1.5-1.7	45-51	4.8-5.4	48-54	1.3-1.7	51-54	78-84	43-46
<u>X. peruvianum</u> Lamberti, Bieve-Zacheo, 1979	1.4-1.9	45-56	5.1-5.9	49-67	1.2-1.7	49-55	85-92	46-52
<u>X. wahense</u> Lamberti, Bieve-Zacheo, 1979	2.0-2.3	60-67	6.3-7.2	60-69	1.2-1.6	52-56	87-100	46-53
<u>X. tenuicollis</u> Lamberti, Bieve-Zacheo, 1979	1.6-1.9	40-53	6.0-8	58-65	1.4-1.7	47-52	73-80	38-46
<u>X. laevistriatum</u> Lamberti, Bieve-Zacheo, 1979	1.4-1.8	43-53	5.9-8.5	45-56	1.4-1.6	47-53	76-84	35-45
<u>X. neoamericanum</u> Saxena, Chhabra, Joshi, 1973	1.6-2.05	33-45	5.0-7.5	27-68.8	1.25-1.6	50-54	70-105	40-61
<u>X. inaequale</u> (Khan, Ahmad, 1975), Khan, Ahmad, 1977	1.6-1.8	45-46	5.4-6.6	48-50	1.6	52-53	86	45-49
<u>X. citricollum</u> Lamberti, Bieve-Zacheo, 1979	1.5-1.9	38-48	5.2-7	52-77	1-1.4	48-54	82-96	47-59
<u>X. floridae</u> Lamberti, Bieve-Zacheo, 1979	1.8-2.1	43-50	5.3-7.4	58-72	1.2-1.5	51-54	97-117	46-56
<u>X. georgianum</u> Lamberti, Bieve-Zacheo, 1979	1.2-1.4	34-42	5.4-6.1	42-48	1.5-1.7	53-56	78-88	43-47
<u>X. barjanense</u> Lamberti, Bieve-Zacheo, 1979	1.8-2.6	34-60	6.1-10.5	62-112	0.6-1.4	44-54	84-106	44-94
<u>X. brevicolle</u> Lordello et da Costa, 1961	1.6-2.0	41-51	5-6.5	67-106	0.7-0.9	52-58	92-112	52-56
<u>X. diffusum</u> Lamberti, Bieve-Zacheo, 1979	1.3-1.9	32-57	4.2-8.9	48-89	0.7-1.2	47-55	71-99	39-76
<u>X. guirani</u> Luc et Williams, 1978	1.7-2.1	41-49	5.0-8.8	47-75	0.9-1.3	48-53	82-93	46-56
<u>X. incognitum</u> Lamberti, Bieve-Zacheo, 1979	1.7-1.9	47-60	5.0-8.8	54-81	1.1-1.4	49-52	93-99	47-53
<u>X. lucii</u> Lamberti, Bieve-Zacheo, 1979	1.6-1.9	37-48	4.7-5.9	51-77	0.7-1	51-56	97-112	49-60
<u>X. stieri</u> Lamberti, Bieve-Zacheo, 1979	2.0-2.3	44-54	4.8-7.1	49-68	0.9-1.2	51-55	88-120	53-60
<u>X. paramonovi</u> Romanenko, 1981								

Nematode species	Oral aperture to guide sheath	Tail	J hyaline part of tail	Body diameters						Anterior end of tail hyaline
				Lip region	Guide sheath	Base of oesophagus	Greatest	Anus		
Subgroup <u>X. pachtaicum</u>										
<u>X. americanum</u> Cobb, 1913	48-71	27-40	5-12	8.5-11.5	20-26	26-34	28-38	16-22	5.5-10	
<u>X. opisthohystrum</u> Siddiqi, 1961	48-51	30-36	6-7	9	17	24-25	28-33	16	6-7.5	
<u>X. pachtaicum</u> Tuliaganov, 1938	51-82	23-38	6-12	7.5-10	18-28	22-35	24-41	14-22	5.5-11	
<u>X. rivessi</u> Dalmasso, 1969	62-88	30-40	4, 3-8.2	9.5-10	26-31	30-40	37-47	19-31	7.7-16	
<u>X. californicum</u> Lamberti, Bleve-Zacheo, 1979	63-84	27-36	5-11	9.5-11.5	22-31	26-36	28-40	17-22	5.5-11	
<u>X. intermedium</u> Lamberti, Bleve-Zacheo, 1979	58-67	31-38	9-12	9.5-11	24-29	32-38	34-40	20-24	7-11.5	
<u>X. oxycaudatum</u> Lamberti, Bleve-Zacheo, 1979	66-75	27-35	7.5-11	9-10	22-26	30-40	32-37	19-23	7-10	
<u>X. peruvianum</u> Lamberti, Bleve-Zacheo, 1979	67-78	26-35	6-10.5	9-10.5	23-28	26-31	32-36	18-24	7.5-12	
<u>X. utahense</u> Lamberti, Bleve-Zacheo, 1979	77-82	31-37	3.5-7	10-11.5	22-26	26-31	31-36	22-26	6.5-10.5	
<u>X. tenuiculis</u> Lamberti, Bleve-Zacheo, 1979	55-64	26-32	6.5-10	9-10	22-27	31-35	33-42	18-29	7-9	
<u>X. laevistriatum</u> Lamberti, Bleve-Zacheo, 1979	54-61	29-36	11-13	9-11	24-28	29-34	31-40	20-24	10.5-11.5	
Subgroup <u>X. citricolium</u>										
<u>X. neamericanum</u> Saxena, Chhabra, Joshi, 1973	85	-	-	10	-	-	-	-	-	
<u>X. inaequale</u> (Khan, Ahmad, 1975), Khan, Ahmad, 1977	64-69	34-36	12-14	12.5	31-32	36-37	38-39	21-23	8.5-9	
<u>X. citricolium</u> Lamberti, Bleve-Zacheo, 1979	68-86	22-34	5-11	11.5-13.5	28-34	32-44	35-47	21-27	7.5-12	
<u>X. floridae</u> Lamberti, Bleve-Zacheo, 1979	89-107	26-34	10-15	11-12.5	30-34	35-41	37-44	21-27	8-12	
<u>X. georgianum</u> Lamberti, Bleve-Zacheo, 1979	54-65	33-34	11.5-13.5	11.5-12.5	27-31	31-34	32-40	18-23	7-8.5	
Subgroup <u>X. brevicollie</u>										
<u>X. brevicollie</u> Lorbello et da Costa, 1961	64-90	21-32	6-13	12-14	28-43	31-52	34-68	24-40	5.5-21	
<u>X. diffusum</u> Lamberti, Bleve-Zacheo, 1979	73-90	18-27	8-10.5	10-12	27-32	33-41	35-48	23-31	14-19	
<u>X. guirani</u> Luc et Williams, 1978	60-95	18-33	5-14	10-13	23-27	26-49	29-47	20-31	8-20	
<u>X. incognitum</u> Lamberti, Bleve-Zacheo, 1979	67-78	25-38	8.5-12.5	11-13	26-31	34-42	36-45	24-33	12-18	
<u>X. luci</u> Lamberti, Bleve-Zacheo, 1979	68-85	23-34	7-9.5	10-11	24-29	30-38	31-40	22-27	12-15	
<u>X. sheri</u> Lamberti, Bleve-Zacheo, 1979	68-96	22-28	9-11	10-12	29-34	38-44	34-59	25-35	11.5-20	
<u>X. paramonovi</u> Romanenko, 1981	66-103	33-47	9-12	13-15	30-36	36-42	39-47	27-41	17.7-21	

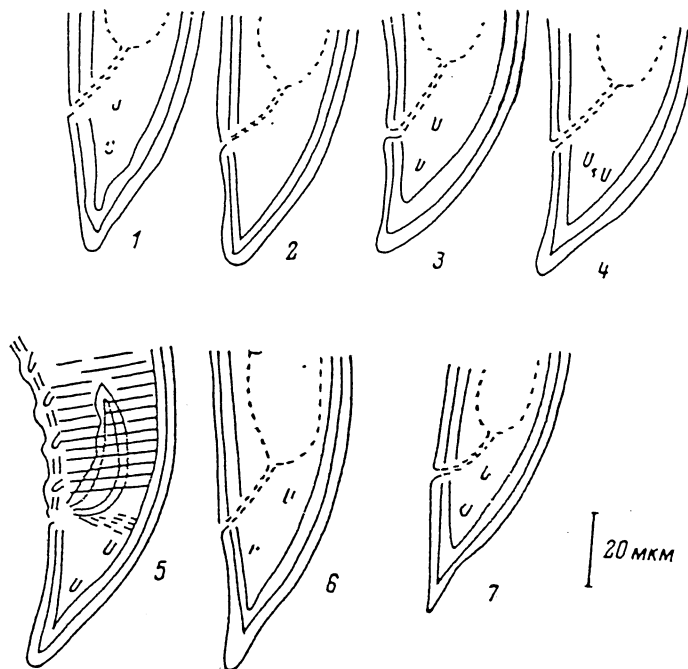


Fig. 2: The shape and dimensions of the tail in *Xiphinema* species, subgroup *X. citricolum* (after: Lamberti & Bleve-Zacheo, 1979). 1,2: *X. floridae*; 3: *X. neoamericanum*; 4,5: *X. citricolum*; 6: *X. georgianum*; 7: *X. tarjense*.

others). This information was used to prepare a differential diagnosis for a new species recorded from the territory of USSR --*X. paramonovi* Romanenko, 1981.

As the tables show, morphometrics of species of the *X. americanum* group (length of body, ratios a, b, c, length of odontostyle and odontophore) partly or completely overlap. Differentiation of these species therefore is very difficult. To facilitate diagnosis, the shape and dimensions of tails and lips and some metrical indexes may be used (c', body diameters at the labial region, at the anal level of the tail, and at the beginning of the hyaline part of the tail), to distinguish species of this group into 3 subgroups; *X. pachtaicum*, *X. citricolum* and *X. brevicolle*.

Included in the subgroup containing *X. pachtaicum* (Fig. 1) are species with comparatively long, ventrally curved, pointed tails and ratios c = 36.5 to 85 and c' from 1.2 to 2.5, with the body diameter at the beginning of the hyaline part of the tail no greater than 12  $\mu\text{m}$  (excepted *X. rivesi*). In the majority of species in this group the labial region is separated from the body by a distinct constriction with a diameter of 7.5 to 11.5  $\mu\text{m}$ .

Included in the second subgroup containing *X. citricolum* (Fig. 2) are species with short conical tails with finger-shaped ends and ratios c = 22 to 77 and c' = 1.2 to 1.6. The labial region is flat, dilated, sometimes button-shaped with a diameter of 11 to 13.5  $\mu\text{m}$ .

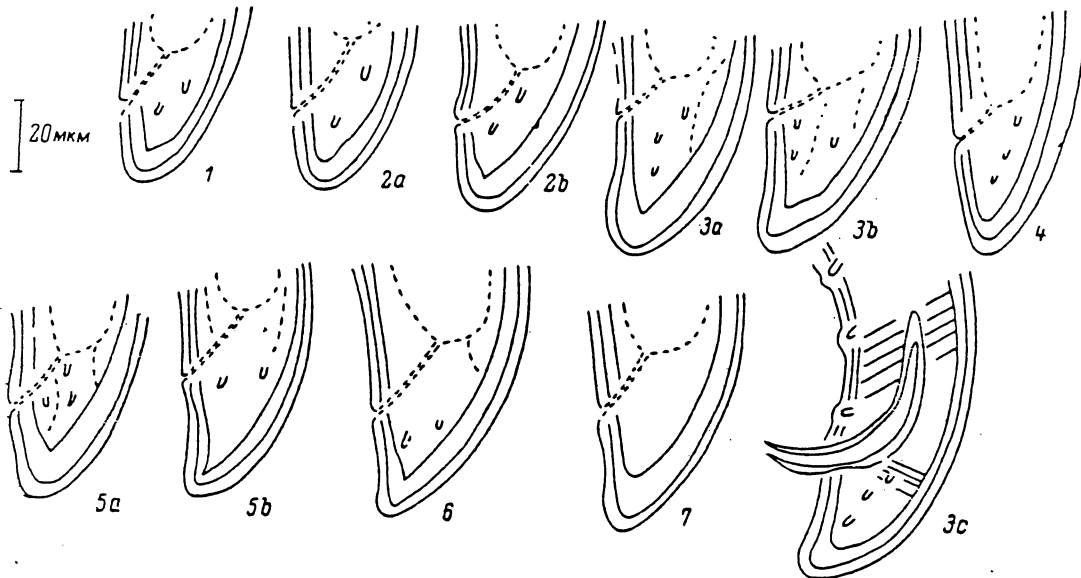


Fig. 3: The shape and dimensions of the tail in *Xiphinema* species, subgroup *X. brevicolle* (1-6 after: Lamberti & Bleve-Zacheo, 1979; 7: original). 1: *X. brevicolle*; 2, a, b: *X. guirani*; 3, a-c: *X. incognitum*; 4: *X. luci*; 5, a, b: *X. diffusum*; 6: *X. sheri*; 7: *X. paramonovi*.

Included in the third subgroup containing *X. brevicolle* are species with blunt-ended, short, often hemispherical tails, ratio  $c = 47$  to  $112$ , with a diameter up to  $21 \mu\text{m}$  at the beginning of the hyaline part of the tail, and ratio  $c' = 0.7$  to  $1.2$ . The labial region in the majority of species in this subgroup is broadly-rounded with a diameter of  $10$  to  $15 \mu\text{m}$ , not infrequently separated from the body line by a shallow constriction.

The most numerous is the first subgroup, morphologically similar to *X. pachtaicum*. There are eleven members of the subgroup, two of which -- *X. laevistriatum* and *X. peruvianum*-- occupy an intermediate position between the species in this subgroup and the subgroup of species similar to *X. citricolum*. There are 5 members in the *X. citricolum* subgroup and 7 in the *X. brevicolle* subgroup. The species *X. neoamericanum* is transitional between these two subgroups.

From morphometric investigations conducted on 23 species similar to *X. americanum* and attributed to it by Lamberti and Bleve-Zacheo (1979) we eliminated *X. variabile* Heyns, 1966, because its tail length and ratio  $c' = 2.4$  to  $2.9$  suggested that it was more similar to species contained in the *X. elongatum* group. Moreover, *X. inaequale* Kahn & Ahmad, 1977 was considered a synonym of *X. neoamericanum* Saxena, Chhabra & Joshi, 1973.

With the analysis of the morphological and biometrical ratios of the different species of *Xiphinema*, a succession of authors (Stegaresku, 1976; 1980;

Lamberti & Bleve-Zacheo, 1979) recorded that the tail of different juvenile stages were always longer than those of the adult specimens. We recorded an analogous occurrence with species in the *X. americanum* group. Apparently, a transformation of the tail in the evolutionary process occurred with the long, sharply-conical tailed species in the *X. pachtaicum* subgroup, and the bluntly-conical or rounded and hemispherical tails, as in the *X. brevicolle* group. This, apparently, would indicate that species of nematode morphologically similar to *X. pachtaicum* are phylogenetically more ancient forms than those species of *Xiphinema* which we refer to as the *X. citricolum* subgroup. Considering the fact that *X. americanum* was identified as being several species plus the fact that 23 similar but distinct new species, differing morphologically and ecologically, were subsequently described, we believe that a revision is required of all earlier descriptions and reports from the territory of USSR concerning nematodes belonging to this group.

During the last five years studies of ecological and morphological differences between discrete populations of nematodes in different regions of the Soviet Union and a re-examination of earlier records of nematodes being identified as *X. americanum* revealed the following species of *Xiphinema* in the territory of USSR: *X. brevicolle*, *X. pachtaicum* and *X. rivesi*. Also, it was necessary to describe a new species -- *X. paramonovi* Romanenko, 1981. The following is an enlarged description of *X. paramonovi*, named in memory of the eminent Soviet nematologist, A.A. Paramonov.

*Xiphinema paramonovi* Romanenko, 1981 (Fig. 3)

Holotype (♀): L = 2.26 mm; a = 52; b = 6.8; c = 68.5; c' = 1; V = 55.4%; length of odontostyle, 102 μm; length of odontophore, 60 μm; distance of guide ring from anterior end, 81 μm; length of tail, 33 μm; J 9 μm; diameters of body in the labial region, 13 μm; at guide-ring, 30 μm; at base of the oesophagus, 42 μm; at vulva, 43.5 μm; at anus, 33 μm; at beginning of the hyaline part of the tail, 18 μm.

Paratypes (♀): n = 27. The morphometric data of paratypes are presented in the tables and partly in the description and differential diagnosis of the species, therefore, they are not repeated here.

Males were not detected.

The holotype and paratype specimens are on slides kept in the collection of the Nematology laboratory at the Regional Scientific Research Institute for Horticulture of the Non-Chernozem Zone (Moscow).

Description: Body of the adult female cylindrical and when fixed assumes the form of a "C"; sometimes curving to form an incomplete spiral, that tapers anteriorly, sometimes the anterior part of the body is straight with the posterior curving ventrally, sometimes up to the level of the vulva to form a "J". Cuticle smooth, about 2 μm thick, except at the anterior and posterior extremities, where it is about 3 μm thick and up to 5 μm in the labial region. Labial region rounded, spherical with two circles of papillae, separated from the rest of the body by a shallow constriction, the height of the labial region

is 6.0-7.5  $\mu\text{m}$ . The amphidial openings are conspicuous slits. Average stylet length, 159.9 (146-168)  $\mu\text{m}$ , odontostyle, 2  $\mu\text{m}$  thick anteriorly and about 3  $\mu\text{m}$  at its junction with the odontophore. Stylet guiding sheath situated at mid-odontophore, 5-8  $\mu\text{m}$  in length. Oesophagus dorylaimid-like with very muscularized posterior part occupying about 1/3 of the length of the oesophagus; oesophagus length, 347.8 (306-402)  $\mu\text{m}$ , with posterior part 94.2 (65-103)  $\mu\text{m}$ . Intestine a straight tube containing granulated mass. Vulva a transverse slit. Two reproductive tracts, anterior and posterior to vulva showing similar development. Organ Z absent. Some females with 2 to 4 synchronous eggs, egg length not exceeding width of body. Tail of females short, regular, bluntly-conical, without finger-shaped terminus. 3 to 4 caudal papillae present. A distinctive peculiarity of the tail is its bluntly-conical shape and the presence of a slight ventral curvature. Index J (length of the hyaline part of the tail) is two times smaller than the diameter of the tail at the beginning of the hyaline part.

Distribution and plant-hosts. The species was discovered in 1968 in Tula province, on the state farm '8th March', Uzlovaya district in the rhizosphere of apple and pear trees on average loamy podzol chernozem, and in 1969 in Mordovskaya ASST on the state farm 'Romadonovski' in the rhizosphere of raspberry canes, affected by viral curl on chernozem of an average loam and fertility (Romanenko, 1973). Moreover, in 1979, this species was recovered from the rhizosphere of raspberries, black currants and wild strawberries on the experimental area of the Institute of Zoology and Physiology Academy of Science MSSR, Kishinev. The holotype was recovered from the rhizosphere of a pear tree on average-loamy chernozem on the state farm '8th March' in Tula.

Differential diagnosis: The species, distinguished by the shape and length of its tail, ratio  $c'$ , and body diameter at the anterior end of the hyaline part of the tail, belongs to the subgroup *X. brevicolle* (see Table). It differs from the other species in the subgroup in the diameter and shape of its labial area, with the exception of *X. brevicolle* that has lip diameter similar to that of *X. paramonovi*; and in the number and location of pre-anal and caudal papillae (Fig. 3) and tail length, except for *X. incognitum* that has tail length varying from 25 to 38  $\mu\text{m}$  and has several differences in the values for the ratios.

From data in the table and in Fig. 3 it appears that *X. paramonovi* differs from *X. brevicolle* by having a longer tail length, a labial region button-shaped instead of broadly-rounded one, and set-off from the body by a shallow constriction, and by ratio  $c$ ; from *X. guirani* in body length, tail length, body diameter at the labial region and ratios  $c$  and  $c'$ ; from *X. incognitum* in the shape and diameter of the labial region, the larger body diameters at the stylet guiding sheath and at the anterior end of the hyaline part of the tail; from *X. diffusum* in tail length, body diameters at the labial region, at the stylet guiding sheath and at the anterior end of the hyaline part of the tail; from *X. luci* in body length, tail length, odontophore length, body diameter along entire length especially at labial region and at the anterior end of the hyaline part of the tail and ratio J; and from *X. sheri* in body diameter at the labial region and length of body and tail.



## LITERATURE

- Barbez, D., 1982. The occurrence of virus vector nematodes in hops in Poperinge (Belgium) with notes on vertical and horizontal distribution, population structure and population density. *Meded Fac. LandbWettens. Gent*, 47(2): 741-755.
- Cobb, N.A., 1913. New nematode genera found inhabiting fresh water and nonbrackish soils. *J. Wash. Acad. Sci.* 3: 432-444.
- Cohn, E. & Sher, S.A., 1972. A contribution to the taxonomy of the genus *Xiphinema* Cobb, 1913. *J. Nematol.* 3: 36-45.
- Dalmaso, A., 1969. Etude anatomique et taxonomique des genres *Xiphinema*, *Longidorus* et *Paralongidorus* (Nematoda : Dorylaimida). *Mem. Mus. Hist. Nat. Nouv. Serie A., Zool.* 61: 32-82.
- Forer, L.B., 1981. *Xiphinema rivesi* associated with tomato ringspot virus-incited diseases in Pennsylvania. *Phytopathology* 71(7): 767.
- Jakobsen, J., 1984. Nematoder som virus-vektoter. *Ugeskr. agron. horton.* 3 (30): 555-558.
- Khan, S.H. & Ahmad, S., 1975. Longidoridae (Thorne, 1935) n. rank (Nematoda: Dorylaimida) with description of *Xiphinema neoamericanum* n. sp. from India and proposal of a new name for *X. americanum* sensu Carvalho (1956) non Cobb, 1913. *Nematol. medit.* 3: 23-28.
- Khan, S.H. & Ahmad, S., 1977. *Xiphinema inaequale* nom.nov. (syn. *X. neoamericanum* Khan & Ahmad, 1975). *Nematol. medit.* 5: 93.
- Lamberti, F., 1970. A new character for species identification in the genus *Longidorus* (Micol.) Filipjev. *10th Inter. Nematol. Symp. of the European Soc. of Nematologists, Pescara (Italy)*: 18-19.
- Lamberti, F., 1975. Taxonomy of *Longidorus* (Micoletzky) Filipjev and *Paralongidorus* Siddiqi, Hooper & Khan. In: Lamberti, F., Taylor, C.E., Seinhorst, J.W. (Eds), *Nematode vectors of plant viruses*, New York and London, Plenum Press: 71-90.
- Lamberti, F. & Blevé-Zacheo, T., 1979. Studies on *Xiphinema mediterraneum* sensu lato with descriptions of fifteen new species (Nematoda : Longidoridae). *Nematol. medit.* 7: 51-106.
- Lamberti, F. & Martelli, C.P., 1971. Notes on *Xiphinema mediterraneum* (Nematoda: Longidoridae). *Nematologica* 17: 75-81.
- Lima, M.B., 1965. *Studies on species of the genus Xiphinema and other nematodes*. Ph.D. Thesis, Univ. London, 165 pp.

- Lima, M.B., 1968. A numerical approach to the *Xiphinema americanum* complex. *Compte Rend. 8th Symp. Int. Nematol.*, Antibes, 1965, France, E.J. Brill, Leiden, Holland: 30.
- Lordello, L.G.E. & da Costa, C.P., 1961. A new nematode parasite of coffee roots in Brazil. *Rev. Brazil. Biol.* 21: 363-366.
- Luc, M. & Williams, J.R., 1978. *Xiphinema guirani* n. sp. et *X. silvaticum* n. sp. (Nematoda : Longidoridae). *Revue Nématol.* 1: 87-97.
- Martelli, G.P., 1975. Some features of nematode-borne viruses and their relationship with the host plants. In: Lamberti, F., Taylor, C.E., Seinhorst, J.W. (Eds), *Nematode vectors of plant viruses*, New York and London, Plenum Press: 223-251.
- Martelli, G.P., 1978. Nematode-borne viruses of grapevine their epidemiology and control. *Nematol. mediterr.* 6 p:1-27.
- Martelli, G.P. & Lamberti, F., 1978. Le specie di *Xiphinema* Cobb, 1913, trovate in Italia e commenti sulla presenza di *Xiphinema americanum* Cobb (Nematoda: Dorylaimoidea). *Phytopath. mediterr.* 6: 1-27.
- Metlitskii, O.Z., Romanenko, N.D., Trushechkin, V.G., & Metlitskaya, K.V., 1982. [On the problem of studying the nematodes of the Longidoridae family on fruit and berry cultures in the USSR.] *Abstracts of reports IV International Symposium of the Helminthological Institute of the SAS, Kosice, in High Tatras. Czechoslovakia*, 150 pp.
- Romanenko, N.D., 1973. [The distribution and spread of members of the nematode family Longidoridae (Thorne, 1935) Meyl, 1961 and Criconematidae (Taylor, 1936) Thorne, 1949 on fruit and berry cultures in non-chernozem soil of RSFSR.] Student Diss. M. VIGIS (Moscow), 23 pp.
- Romanenko, N.D., 1976. [Longidoridae on fruit and berry cultures.] *Defense of Plants* No.9: 52-53.
- Romanenko, N.D., 1981. [Discovery of a new species of nematode *X. paramonovi* n. sp. (Nematoda : Longidoridae) in the territory of the Soviet Union.] In: *1st Conference (9th Meeting) on the nematodes of plants and insects in soil and water, Tashkent*, pp. 68-69.
- Romanenko, N.D. & Stegaresku, O.P., 1981. [The problem of the taxonomy of nematodes of the *Xiphinema americanum* group (Nematoda, Dorylaimida)]. In: *1st Conference (9th Meeting) on nematodes of plants and insects in soil and water, Tashkent*, pp. 69-71.
- Saxena, P.K., Chhabra, H.K. & Joshi, R., 1973. *Xiphinema neoamericanum* sp n. (Nematoda : Longidoridae) from India. *Zool. Anz.* 191: 130-132.
- Siddiqi, M.R., 1961. On *Xiphinema opisthohysterum* n. sp. and *X. pratense* Loos, 1949, two dorylaimid nematode attacking fruit trees in India. *Z. Parasitkunde* 20: 457-465.

- Stegaresku, O.P., 1976. [The phylogenetic relationship of members of the Longidoridae (Nematoda, Dorylaimoidea)]. In: *8th all-Union conference on nematode diseases of agricultural culture, Kishinev*, pp. 33-34.
- Stegaresku, O.P., 1980. [Nematodes - Virus vectors from the family Longidoridae. Genus *Xiphinema*.] Kishinev, Shtiinitza, 240 pp.
- Tarjan, A.C., 1969. Variation within the *Xiphinema americanum* group (Nematoda: Longidoridae). *Nematologica* 15: 241-252.
- Tulaganov, A.T., 1938. [Nematode fauna of cotton plants and surrounding soil in the Katta-Kurganskii region of Uzbek SSR.] *Trudy Uzb. Gos. Univ., Samarakand* 12: 1-25.
- Wojtowicz, M.R., Golden, A.M., Forer, L.B. & Stouffer, R.F., 1982. Morphological comparisons between *Xiphinema rivesi* Dalmasso and *X. americanum* Cobb populations from the Eastern United States. *J. Nematol.* 14(4): 511-516.

Regional Scientific Research Institute for Horticulture of the Non-Chernozem Zone, Moscow  
Institute of Zoology and Physiology, Academy of Sciences of the Moldavian SSR, Kishinev

Received October 24, 1983  
Accepted for publication May 29, 1985

#### English Summary

The nematodes of "*Xiphinema americanum*" group according to the form and size of their tail and anterior regions, indexes  $c'$  and  $J$  were subdivided into three different subgroups: "*X. pachtaicum*", "*X. citricolum*" and "*X. brevicolle*". The species *X. variabile* Heyns, 1966 was excluded from "*X. americanum*" group. As suggested by Cohn and Sher (1972) according to the form and size of the tail this species stands closer to "*X. elongatus*" group. *X. inaequale* is regarded and a synonym of *X. neoamericanum*. The new species *X. paramonovi* Romanenko, 1981 found in the USSR was included into "*X. americanum*" group. Additional information is provided on morphology, biometrics and geographical occurrence of this species (*X. paramonovi*). In the USSR the species *X. brevicolle*, *X. pachtaicum*, *X. paramonovi* are common representatives of "*X. americanum*" group.