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Longidoridae (Nematoda: Dorylaimida) from the rhizosphere of the wild growing grape (*Vitis vinifera* ssp. *silvestris*) in the riparian woods of the rivers Danube and March in Austria

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Summary

69 soil samples, mostly from the rhizosphere of *Vitis vinifera* L. ssp. *silvestris* (Gmelin) Hegi, were taken in the riparian woods along the rivers Danube and March. A total of 11 longidorid species were registrated: *Longidorus attenuatus, L. elongatus, L. intermedius, L. juvenilis, L. macrosoma, L. poessneckensis, Xiphinema diversicaudatum, X. pachtaicum* and *X. histriae* and two unidentified longidorid species. Among these species, four are virus vectors. A morphometrical description of all species is given, with a comparison to literature. The question, which longidorid species are propably associated with the wild vine, is discussed.

Key words: *Vitis vinifera* ssp. *silvestris*; *Longidorus*; *Xiphinema*; *riparian woods*; *Danube and March rivers*

Introduction

The riparian woods along the rivers Danube and March near the Austrian - Slovakian border are partly belonging to the National Park "Donau-Auen", partly to a protected area of the World Wildlife Fund (near Regelsbrunn and Marchegg). In the river plains the wild grapevine *Vitis vinifera* ssp. *silvestris* is native (Jacquin, 1762, Kirchheimer, 1955) and was very abundant here and near Vienna. This has been changed, but some specimens of this interesting species – the ancestor of the cultivated grapevine – had remained. Since Kirchheimer (1955) there was little research activity on the wild grapevine: In 1996 the WWF started a cultivation programme for the wild grape and Arnold *et al.* (1998) explored its occurrence in Europe, and listed two female specimens in Marchegg, eight near Orth/Donau (two females, six males) and six in the Lobau near Vienna (five females, one male).

In 2001 a team (H. Gangl[1], G. Leitner[1], F. Regner[2] & W. Tiefenbrunner[1]), supported by the WWF, the Nationalpark Donau-Auen GmbH and the Österreichische Bundesforste began to search for the last wild vines in the riparian woods along the Danube river near the village Orth/Donau and Regelsbrunn and along the March river near Marchegg. Occurrence and distribution, sex and host plants of this liana, their bacterial and virus pathogens, and also their genetical variability were analysed. Furthermore, soil samples of the rhizosphere of the grapevine were taken to find out which longidorid nematodes (some of them are vectors of viruses causing vine viroses) are occurring and are probably associated with grapevine.
The present paper deals only with these nematodes and describes them morphometrically; the other results of our research programme and the detailed description of the sampling locations will be published elsewhere.

Materials and Methods

To minimize root destruction we used a cylindrical 22 mm diameter soil auger (the disadvantage of the small diameter is that a lot of specimens become destroyed). The samples were taken from a depth of 0 down to 90 cm and had a volume of ca. 340 cm^3. For the extraction an Oostenbrink-Elutriator with a 150 µm sieve was used. The specimens were killed in a weak lactophenol blue solution, mounted in NemaMix (1/3 Glycerol, 1/3 Aqua dest., 1/3 Mark Andre II) on microscope slides and covered not before half an hour. They were measured with the aid of a sensor object dish (Zeiss) with sensor control display and the software GetPosSCD. Distance matrix based multivariate analysis

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with nonlinear presentation of the morphometrical data was done with Scramble 2.2 (Tiefenbrunner *et al.* (2002), www.visualdataflow.de/biologies). This programme minimises the quantity:

1) $66\sim(a_{ij}-b_{ij})/a_{ij}\sim$,

where a_{ij} is the distance matrix value, b_{ij} is the corresponding distance of the two objects i and j in the graphic's. For the multivariate comparison between species of the genus *Longidorus* the characters: body length, body diameter at vulva, tail length, body diameter at anus, oral aperture to vulva, odontostyle, oral aperture to guiding ring, body diameter at guiding ring and body diameter at lip region were used. For comparing *Xiphinema* spp. the same characters as for *Longidorus* were used and in addition the length of the odontophore was included.

During 2001 and 2002 38 soil samples (2 near Stopfenreuth, 4 near Regelsbrunn and 32 at Orth) were taken in the Danube river plains and 31 near Marchegg in the March riparian woods. From a total of 69 samples, 61 were from the rhizosphere of wild grape vine and 8 from meadow- or forest soil nearby.

Results and Discussion

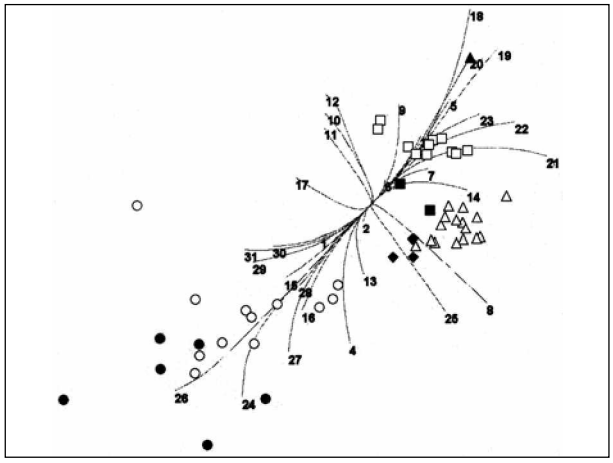
From all samples 769 specimens of the genus *Longidorus* and 313 of *Xiphinema* were extracted. 11 species of Longidoridae were registered, but two of them could not be identified due to the lack of specimens and preservation quality (e.g. they were partly distroyed). From the nine remaining species, six belong to the genus *Longidorus* and three to *Xiphinema*. The *Longidorus* species are: *L. attenuatus, L. elongatus, L. intermedius, L. juvenilis, L. macrosoma* and *L. poessneckensis.*

They are morphometrically compared (multivariate comparison) with metrical data from literature (Fig. 1).

From *Xiphinema* the species *X. diversicaudatum, X. pachtaicum* and *X. histriae* were identified. The multivariate comparison with data from literature is presented in Fig. 2.

Longidorus attenuatus Hooper, 1961 33 specimens (22 adults, only one a male) were recovered in 10 samples, most of them near Orth and only one in the March river plains. The samples of Stopfenreuth and some of Orth are not from the rhizosphere of *Vitis* and, hence, there is no strict connection with the ocurrence of wild vine. No *L. attenuatus* individual was found in the samples from meadow soil.

Brown *et al.* (1997) described two populations of *L. attenuatus* from England and Germany, respectively. They recognise that the English specimens have a shorter odontostyle (81 *vs* 94 Пm). In mean the specimens of the Danube plains have a longer odontostyle, even longer than that of the German population (97 Пm), with a variation between 93 and 102 Пm (Tab.1). The animals are shorter than those described by Brown *et al.* (1997), with a shorter tail, but a longer distance between anterior end and guiding ring (Tab. 1).



Reference Objects
1 – *L.arthensis* (BKGR98) ^ 1; 2 – *L. arthensis* (BKGR98) ^ 2; 3 – *L. attenuatus* (T01) ^ 3; 4 – *L. carpathicus* (LRB97) ^ 4; 5 – *L. distinctus* (LICBAR97) ^ 5; 6 – *L. elongatus* (L97) ^ 6; 7 – *L. elongatus* (T01) ^ 7; 8 – *L. eridanicus* (RLA84) ^ 8; 9 – *L. euonymus* (LICBAR97) ^ 9; 10 – *L. euonymus* (L97) ^ 10; 11 – *L. euonymus* (T01) ^ 11; 12 – *L. fagi* (PCN97) ^ 12; 13 – *L. goodeyi* (LB98) ^ 13; 14 – *L. intermedius* (PLPB01) ^ 14; 15 – *L. iuglandis* (T01) ^ 15; 16 – *L. iuglandis* (T01) ^ 16; 17 – *L. juglandicola* (LRB97) ^ 17; 18 – *L. juvenilis* (B89) ^ 18; 19 – *L. juvenilis* (L97) ^ 19; 20 – *L. juvenilis* (T01) ^ 20; 21– *L. pisi* (LICBAR97) ^ 21; 22– *L. leptocephalus* (T01) ^ 22; 23 – *L. lepto-cephalus* (T01) ^ 23; 24 – *L. macrosoma* (B89) ^ 24; 25 – *L. piceicola* (LRB97) ^ 25; 26 – *L. picenus* (L97) ^ 26; 27 – *L. picenus* (RLA84) ^ 27; 28 – *L. poessneckensis* (LS00) ^ 28; 29 – *L. raskii* (LA93) ^ 29; 30 – *L. raskii* (T01) ^ 30; 31 – *L. raskii* (T01) ^ 31

Fig. 1. Nematodes of the genus *Longidorus* in the riparian woods of Danube and March rivers – results of a multivariate morphometrical analysis. Reference species from literature. In brackets: first letter of the authors and year of publication

▲ – *L. juvenilis* (also ref. spec. 18, 19, 20), o – *L. attenuatus* (also ref. spec. 3), r -*L. intermedius* (also ref. spec. 14), n – *L. elongatus* (also ref. spec. 6, 7), t – unidentified species, ¡ – *L. poessneckensis* (also ref. spec. 28), l – *L. macrosoma* (also ref. spec. 24)

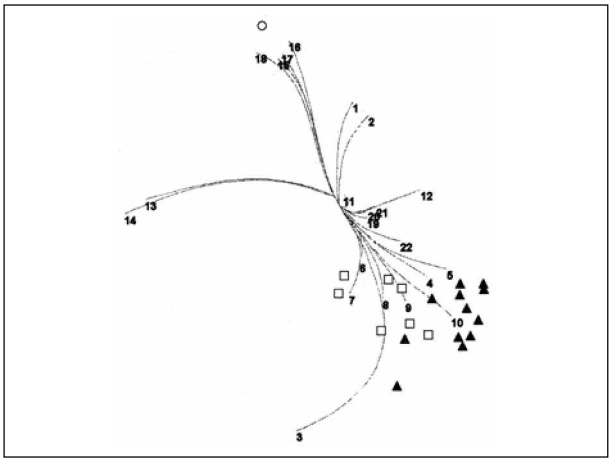
In the Slovak Republic, at the Danube river bank near the Hungarian/Slovakian border, *L. attenuatus* was identified by Lišková and Brown (1999) in three samples from light, sandy soil with pine vegetation. We found the species mostly in sandy soil near the river or its branches. The vegetation was dominated by different trees and bushes, e. g. *Populus* sp., *Quercus* sp., *Crataegus monogyna* Jacq., *Alnus glutinosa* (L.) Gaertn., *Salix* sp., *Acer campestre* L., *Cornus sanguinea* L., *Carpinus betulus* L.

L. attenuatus is a virus vector species of the tomato black ring virus (Brown and Trudgill 1997).

Longidorus elongatus (de Man, 1876) Micoletzky, 1922

Only four specimens of this species were extracted, three of them were female adults. In one of them (as in nearly all *L. elongatus* found in Austria) the distance between anterior end and guiding ring is smaller (Tab. 1) than accepted from the key of Chen *et al.* (1997), and thus the code of it is C2 instead of C3. According to Kozlowska and Seinhorst (1979) *L. elongatus* is closely related to *L. intermedius.*

Beside *V. vinifera* ssp. silvestris, *A. glutinosa*, *C. sanguinea* and *C. monogyna* appeared on both sites where *L.*



Reference Objects
1 – *X. brevicollum* (L95) ^ 1; 2 – *X. brevicollum* (TT02) ^ 2; 3 – *X. densispinatum* (BLA98) ^ 3; 4 – *X. dentatum* (B89) ^ 4; 5 – *X. dentatum* (L95) ^ 5; 6 – *X. diversicaudatum* (B89) ^ 6; 7 – *X. diversicaudatum* (L95) ^ 7; 8 – *X. diversicaudatum* (TT01) ^ 8; 9 – *X. histriae* (LCA93) ^ 9; 10 – *X. histriae* (TT02) ^ 10; 11 – *X. index* (B89) ^ 11; 12 – *X. index* (TT01) ^ 12; 13 – *X. italiae* (LICBAR97) ^ 13; 14 – *X. italiae* (L95) ^ 14; 15 – *X. pachtaicum* (LICBAR97) ^ 15; 16 – *X. pachtaicum* (L95) ^ 16; 17 – *X. pachtaicum* (TT01) ^ 17; 18 – *X. simile* (L95) ^ 18; 19 – *X. vuittenezi* (B89) ^ 19; 20 – *X. vuittenezi* (LICBAR97) ^ 20; 21 – *X. vuittenezi* (L95) ^ 21; 22 – *X. vuittenezi* (TT01) ^ 22

Fig. 2. Nematodes of the genus *Xiphinema* in the riparian woods along the rivers Danube and March – results of a multivariate morphometrical analysis. Reference species from literature. In brackets: first letter of the authors and year of publication

o – *X. diversicaudatum* (also ref. spec. 6,7,8), ▲ – *X. histriae* (also ref. spec. 9), ¡ – *X. pachtaicum* (also ref. spec. 13, 14, 15)

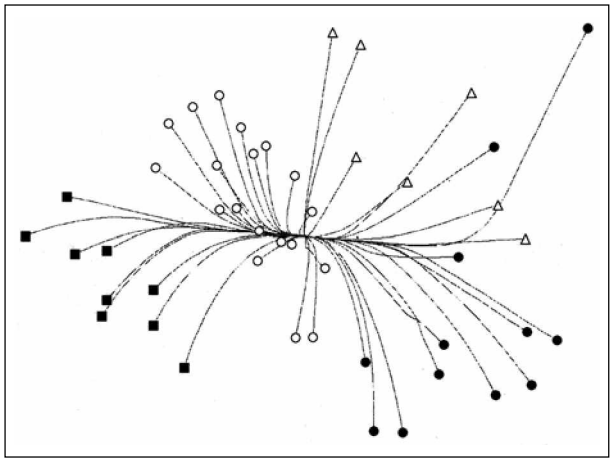


Fig.3. Multivariate comparison of the specimens we believe to belong to *X. histriae* with *X. vuittenezi* from very different locations of Austria, *X. index* from the Mosel (Germany) and *X. diversicaudatum* from the riparian woods along the rivers Danube and March. The specimens of all taxons can be separated clearly by using the ten characters also used in Fig. 2 and therefore it is likely that they belong to different species

¡ – *X. vuittenezi*, r – *X. diversicaudatum*, l – *X. histriae*, n – *X. index*.

elongatus was found. The species seems to be ecologically very diverse, but it is definitifely not abundant in forest soils (Lišková and Brown, 1999) – not even in floodplain forests (Lišková and Sturhan, 2000). It is common in vineyards of the nearby vine growing region Carnuntum (Tiefenbrunner and Tiefenbrunner, 2003) and appears rarely in vineyards of Slovakia (Lišková, 1997). Therefore, an association to the wild vine seems likely.

Longidorus intermedius Kozlowska & Seinhorst, 1979
L. intermedius is morphologically very similar to *L. elongatus*, but the latter has a broader lip region, its odontostyle is shorter and the distance from the anterior end to the guiding ring is shorter. Furthermore, the body length is greater in *L. elongatus*. In mean the specimens of our collection are very similar to the holotype (Kozlowska and Seinhorst, 1979), with one exception: the de Man index 'a' is smaller (68.2 vs 88). The 'a'-value of the holotype is not even reached as maximum (Tab. 1). *L. elongatus* is a virus vector (raspberry ringspot, tomato black ring and peach rosette mosaic virus) and it is very interesting whether the two species can be separated morphometrically. Indeed, this is possible by multivariate comparison with the use of the nine biometrical characters, that were also shown in Fig. 1. However, the intraspecific variability is high and hence the identification might be difficult, if only one specimen is available.
Ecologically, the two species are very different. *L. intermedius* is widespread in oak forests of Bulgaria (Peneva *et al.*, 2001). Originally it was recovered from sandy soil with *Prunus serotina* (Ehrh.) Borkh., *Quercus robur* L. and *Crataegus oxyacantha* L. em. Jacq. in the Netherlands and in woodland sites in Germany (Kozlowska & Seinhorst, 1979). Lišková and Sturhan (2000) found them in floodplain forests, in clay soil near the border to Hungary in the East and the West of Slovakia, but, interestingly, not near Austria. According to Lišková and Brown (1999) the species occurs in various soil types in forests of Slovakia and is associated mainly with *Quercus* spp. and less frequently with *Acer* spp., *Carpinus* spp. and *Robinia pseudoacacia* L.
We collected 514 specimens of this species, 295 of them adult and all females, present in 24 samples. 22 of these were from the riparian woods of the March near Marchegg and only two from the surrounding of Orth/Donau. On both sites *Fraxinus excelsior* L. and *C. monogyna* were registered – and, of course, *Vitis*. Besides *Vitis* the Marchegg sites were dominated by *Quercus* spp., *A. campestre* and *F. excelsior*. The soils were loamy, and rich of humus.

Longidorus juvenilis Dalmasso, 1969
L. juvenilis was described from France (Dalmasso, 1969), and subsequently reported from Italy (Lamberti *et al.*, 1980), the former Yugoslavia (Barsi, 1989) and Slovakia (Lišková, 1997). There are also non-Europaean populations (Jacobs and Heyns, 1987). We discovered only one specimen in the sandy soil of the Danube river bank at Re-

gelsbrunn in the rhizosphere of *V. vinifera* ssp. *silvestris*. Morphometrical data are shown in Tab. 1.

Longidorus macrosoma Hooper, 1961
L. macrosoma was discovered at 11 sites in the riparian woods along the river Danube near Orth/Donau. A total of 91 individuals were registered, 22 adults, males were common. The species was not only discovered in the rhizosphere of the wild vine, but also in the meadows nearby.
The specimens are in mean 8.7 mm long (females; the males 8.5) with a maximum of 10.2 mm (males: 10.0). Morphometrically and also ecologically this specimens are more similar to the Slovakian *L. picenus* (Lišková, 1997), than to the data of *L. macrosoma*, described by Barsi (1989) (Fig. 1), but we believe, that the original description of *L. picenus* by Roca *et al.* (1984) does not fit perfectly to the individuals we explored. Unfortunately, until now there exists no complete morphometrical description of *L. macrosoma* from the Slovak Republic (Lišková, pers. comm.), although this species seldomly occurs there (Lišková and Brown, 1999; Lišková, 2001). Furthermore, as can be seen in Fig. 1, the morphometrical description of *L. picenus* by Lišková (1997) is much more similar to that of *L. macrosoma* by Barsi (1989) than to that of *L. picenus* by Roca *et al.* (1984). On the other hand, morphologically the Slovakian specimens are clearly more similar to the description of *L. picenus* by Roca *et al.* (1984) (Lišková, pers. comm.). In their original description, Roca *et al.* mentioned that *L. picenus* differs from *L. macrosoma* "in having a bilobed amphidial pouch and shorter body (9 mm in *L. macrosoma*)". They described *L. picenus* as being nearly 7 mm long and the "amphidial pouch (is) deeply and more or less asymetrically bilobed". Barsi (1989) wrote about *L. macrosoma* from former Yugoslavia: "The Yugoslavian population is most similar to the German … taking into consideration the smaller length of the body, slightly rounded labial region in both sexes and smaller number of supplements in males (adanal pair plus 10 -12)". The mean length of this specimens is 7.5 mm, and they seem to be not only morphometrically very similar to that one described by Roca *et al.* (1984) - but the difference of the shape of the amphidial pouch remains.
Lišková (1997) recovered *L. picenus* in Slovakian vineyards and found the species to be associated with walnut trees (Lišková and Brown, 1998). This is ecologically adequate to *L. macrosoma* in Austria. The species was recognized in vineyards by El-Shafeey (1993), as well as by Gangl *et al.* (2000) and Gangl *et al.* (2002) in vineyards near the Danube. One sample where *L. macrosoma* was registered was near a walnut tree. Lišková (2001) discovered *L. macrosoma* in one site of grassland of fluvial plains and at one in a *Picea abies* (L.) Karsten and *Pinus silvestris* L. forest (Lišková and Brown, 1998).
Brown and Taylor (1987) reported *L. macrosoma* from Austria. Two of the sites are near the Danube and the Slovakian border.
It may be that *L. picenus* is a junior synonym of *L. macrosoma*, however according to Lišková (pers. comm.) who has analysed both species, they are morphologically separated.

Longidorus poessneckensis Altherr, 1974
This species was discovered in samples from the riparian woods of the rivers Danube and March. In the whole 106 specimens were registered in 18 samples, 41 were adult and all were female. It is likely that it is not strictly associated with grapevine, because *Vitis* was not present at all sites. The species occured at Stopfenreuth, not far away from the Slovakian border (1 sample), at Orth/Donau (5 samples) and near Marchegg in forest soil with diverse bushes and trees. We could not find it in the soil of meadows.
L. poessneckensis is morphometrically very variable (Fig. 1) and furthermore, the morphometrical description by Lišková and Sturhan (2000) (ref. spec. 28 of Fig. 1) is very similar to that of *L. iuglandis* by Roca *et al.* (1984) (ref. spec. 15 of Fig. 1). The specimens analysed by Lišková and Sturhan (2000) are partly from sites near the Austrian border and are morphometrical almost identical to the Austrian specimens of the riparian woods of the Danube, especially to those of Stopfenreuth.
A lot of the specimens have a de Man Index 'a' < 80 which is – according to the identification key of Chen *et al.* (1997) – not characteristic for this species.
In Slovakia *L. poessneckensis* was found in the soil of river banks (Lišková, 2001) and in floodplain forests (Lišková and Sturhan, 2000; Sturhan and Loof, 2001).

Xiphinema diversicaudatum (Micoletzky, 1927) Thorne 1939
This species was recognised in 28 samples of the riparian woods along the rivers Danube and March and with a total of 284 specimens it is abundant. 177 were adult, males were common. We discovered it in samples that were positioned very near to the river banks or the banks of its branches, but also in relatively dry meadows. There is no strict association with *Vitis*.
Xiphinema diversicaudatum very often occurs together with *L. poessneckensis*. This connection between the two species is mentioned by Lišková and Sturhan (2000), too. The species was reported from vineyards (e.g. Barsi, 1989; Lišková, 1997), orchards (Lišková, 1997; Gangl *et al.*, 2002), from the rhizosphere of walnut trees (Lišková and Brown 1998), forests (Lišková and Brown, 1999; Lišková and Sturhan, 2000) and from grassland of fluvial plains and river banks (Lišková, 2001).
X. diversicaudatum is a vector of the arabis mosaic and the strawberry latent ringspot virus (Brown and Trudgill, 1997).

X. pachtaicum (Tulganov 1938) Kirjanova, 1951
One specimen of *X. pachtaicum* was found at Orth/Donau in the rhizosphere of *V. vinifera* ssp. *silvestris*. The species is very common in the vineyards of the nearby vine growing region Carnuntum (Gangl *et al.* 2001).

Table 1. Important morphometrical character states and de Man indices of the Longidoridae of the riparian woods along the rivers Danube and March

L. attenuatus	female (n=11)					male (n=1)
	Mean	Median	± SD	Min.	Max.	
a	110.83	113.6	14.31	87.28	130.78	128.87
c	125.23	123.65	14.04	105.94	155.69	139.35
c'	1.5	1.5	0.14	1.28	1.75	1.34
V	49.92	49.58	8.86	33.95	61.66	
Body length	5443	5305	680.65	4544	6480	5451
Body diam. at vulva/midbody	49	50	3.89	42	56	42
Tail	44	43	3.87	39	53	39
Body diam. at anus	29	30	2.14	26	32	29
Oral aperture to vulva	2653	2640	339.21	2200	3240	
Odontostyle	97	98	2.48	93	102	95
Oral aperture to guiding ring	31	31	1.86	28	34	31
Body diam. at guiding ring	21	20	1.43	19	24	22
Body diam. at lip region	13	13	0.75	12	14	13

L. elongatus	female (n=2)
a	88.15
c	125.95
c'	0.99
V	47.9
Body length	5011
Body diam. at vulva	57
Tail	40
Body diam. at anus	40
Oral aperture to vulva	2400
Odontostyle	88
Oral aperture to guiding ring	31
Body diam. at guiding ring	25
Body diam. at lip region	17

L. intermedius	female (n=16)				
a	68.19	67.71	7.78	56.6	87.63
c	102.48	100.63	14.29	73.2	124.98
c'	1.05	1.03	0.11	0.88	1.28
V	47.18	47.34	1.71	43.01	50.24
Body length	4084	3988	317.98	3703	4645
Body diam. at vulva	60	60	5.84	48	70
Tail	40	41	5.64	30	51
Body diam. at anus	39	38	4.55	28	45
Oral aperture to vulva	1925	1881	149.86	1747	2218
Odontostyle	116	117	4.49	108	123
Oral aperture to guiding ring	34	34	1.96	31	38
Body diam. at ring	26	26	2.18	21	30
Body diam. at lip region	13	13	1.04	11	14

L. juvenilis	female (n=1)
a	97.88
c	75.64
c’	2.44

V	46.39
Body length	4160
Body diam. at vulva	43
Tail	55
Body diam. at anus	23
Oral aperture to vulva	1930
Odontostyle	68
Oral aperture to guiding ring	26
Body diam. at ring	19
Body diam. at lip region	11

L. macrosoma	female (n=6)					male (n=2)
a	85.28	82.41	9.12	75.27	99.61	95.44
c	236.32	221.62	33.64	206.59	286.49	277.95
c'	0.51	0.51	0.02	0.49	0.54	0.48
V	49.46	49.62	2.32	46.17	52.76	
Body length	8688	8783	1138.84	6867	10199	8528
Body diam. at vulva/midbody	102	103	8.14	91	110	90
Tail	37	36	6.09	31	48	32
Body diam. at anus	72	69	9.79	63	90	66
Oral aperture to vulva	4285	4227	504.72	3623	5116	
Odontostyle	134	134	5.52	127	141	133
Oral aperture to guiding ring	42	42	3.96	37	49	41
Body diam. at ring	42	41	4.32	37	49	40
Body diam. at lip region	22	23	1.4	20	24	24

L. poessneckensis	female (n=14)				
a	81.83	81.58	8.99	68.34	97.26
c	170.97	172.11	27.39	108.7	218.23
c'	0.66	0.63	0.12	0.54	0.96
V	54.81	54.52	1.14	52.84	56.54
Body length	7160	7188	771.72	5898	8398
Body diam. at midbody	88	89	10.27	69	104
Tail	43	40	10.34	35	74
Body diam. at anus	65	68	7.2	51	77
Oral aperture to vulva	3926	3888	450.24	3116	4662
Odontostyle	130	131	4.81	118	138
Oral aperture to guiding ring	38	38	2.16	33	41
Body diam. at ring	34	33	4.05	30	44
Body diam. at lip region	17	16	1.38	15	19

X. diversicaudatum	female (n=7)				
a	67.11	67.13	7.55	57.08	79.65
c	95.56	88.2	18.13	66.81	116.67
c'	0.93	0.92	0.11	0.78	1.12
V	44.03	43.45	1.87	41.75	46.36
Body length	4257	4246	414.33	3598	4789
Body diam. at vulva	64	64	6.42	52	71
Tail	45	45	5.5	40	54
Body diam. at anus	49	49	2.37	46	53
Oral aperture to vulva	1873	1968	183.8	1639	2081
Odontostyle	132	133	4.11	125	136
Odontophore	77	77	3.17	72	81
Oral aperture to guiding ring	129	126	13.21	119	158
Body diam. at ring	44	43	4.54	36	51
Body diam. at lip region	15	15	0.75	14	16
X. diversicaudatum	male (n=6)				
a	72.41	73.45	4.21	66.92	75.83
c	88.37	87.75	7.75	78.71	98.41
c'	1.05	1.07	0.08	0.91	1.16
Body length	4452	4442	261.52	4148	4761
Body diam. at midbody	62	62	1.09	60	63
Tail	51	50	2.8	47	55
Body diam. at anus	48	47	2.86	45	53
Odontostyle	135	134	4.81	129	143
Odontophore	78	78	2.12	75	81
Oral aperture to guiding ring	117	121	21.21	90	143
Body diam. at ring	42	41	4.42	37	49
Body diam. at lip region	13	13	1.1	12	15

X. pachtaicum	female (n=1)
a	70.82
c	56.95
c'	2.18
V	55.02
Body length	1810
Body diam. at vulva	26
Tail	32
Body diam. at anus	15
Oral aperture to vulva	996
Odontostyle	82
Odontophore	42
Oral aperture to guiding ring	55
Body diam. at ring	18
Body diam. at lip region	9

Xiphinema histriae	female (n=12)				
a	58.86	58.49	7.39	48.64	75.89
c	111.84	118.65	22.12	63.46	134.55
c'	0.73	0.7	0.14	0.58	1.02
V	42.6	42.5	1.07	41.29	44.12
Body length	4190	4134	346.96	3639	4702
Body diam. at vulva	72	74	5.67	60	78
Tail	39	36	8.76	30	61
Body diam. at anus	53	54	3.87	46	60
Oral aperture to vulva	1786	1771	164.62	1524	2013
Odontostyle	151	150	3.8	144	158
Odontophore	90	90	2.64	86	97
Oral aperture to guiding ring	144	149	12.51	116	157
Body diam. at ring	51	51	2.5	46	55
Body diam. at lip region	16	16	0.83	14	17

X. histriae Lamberti, Coiro & Agostinelli, 1993

On two sites at Orth/Donau we discovered a species, that was not easy to identify. From two samples of the rhizosphere of wild vine and one of a wild pear tree that grows near one of the *Vitis* lianas we extracted 28 specimens, 18 of them adult and females. In majority they originated from the rhizosphere of the pear tree. We could not find a total accordance with the polytomous key by Loof and Luc (1990). Using this key the code of these specimens is: A4, B4, C5, D6, E4, F45, G3(4), H2, I3, J-, K-, L1. Species with only one divergence are: *X. histriae*: L2, *X. basilgoodeyi*: F3, *X. lanceolatum*: B23, *X. mammillatum*: F23 (this species cannot be separated from *X. basilgoodeyi* by the use of the key of Loof and Luc (1990)), and *X. vuittenezi*: E56.

In fact this species is morphologically very similar to *X. vuittenezi* and hence we compared them with specimens of *X. vuittenezi* sampled from the soil of different Austrian vine growing regions. Furthermore, we used *X. diversicaudatum* and *X. index* specimens for the multivariate presentation (Fig. 3).

In mean the body of the specimens is somewhat shorter than that of *X. diversicaudatum*, but ca. one mm longer than that of *X. vuittenezi*. Odontostyle and odontophore are much longer and the distance between oral aperture and guiding ring is much larger in the individuals from our samples than in *X. diversicaudatum* and *X. vuittenezi*. The body diameters are larger in them, too (Tab. 1).

The specimens are surely not *X. vuittenezi* and also not *X. diversicaudatum*, but what are they? There is one species, that is morphologically and morphometrically similar enough to produce an identical code: *X. histriae*. The only difference to our specimens is, that Lamberti *et al.* (1993) recovered males which we did not find (therefore code L2 in *X. histriae*). We also did not recognise any rhomboidal crystalline structures in the uteri and – as can be seen in Fig. 2 – the morphometrical data do not fit perfectly. Lamberti *et al.* (1993) recovered *X. histriae* in the rhizosphere of *Vitis* sp. at San Michele del Carso, Italy.

Before creating a new species, we believe it is better to accept small differences to the original description. We plan to use PCR-based molecular diagnostics to get further information about the specimens of this population and their characters.

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