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A DICHOTOMOUS KEY FOR THE IDENTIFICATION OF SPECIES OF *XIPHINEMA* (NEMATODA: DORYLAIMIDA) WITHIN THE *X. AMERICANUM* — GROUP

by

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Summary. A dichotomous key for the identification of species of the genus *Xiphinema* within the *X. americanum*-group is proposed. Thirty eight species are attributed to the group. The key is based mainly on the length of the body and the odontostyle, on the value of ratios a , c , c' and V , and on the lip region shape and is complemented by tail shapes.

In 1990 Loof and Luc published a polytomous key for the identification of species of *Xiphinema* Cobb, 1913, but with the exclusion of the *X. americanum*-group. They justified this exclusion by the fact that all species included in the group would share the same code and they further claimed that no key for the *americanum*-group has been published because of the uncertainty of the validity of several species. This latter statement is incorrect, since Lamberti in 1980 had published a dichotomous key to the 25 species then known within the group. However we agree that a revision of this key is now necessary as abundant information has accumulated on the morphometric variability of many species and several other species have been newly described.

We consider that it is difficult to identify single species belonging to the *americanum*-group in a polytomous key for the genus comprising over 200 species, because of the close similarities of many species within the group. However, it would be possible to devise a polytomous key for the identification of those species included solely in the *americanum*-group.

In our opinion a dichotomous key is more practical than a polytomous one, especially when trying to differentiate species that resemble each other in several characters. Therefore we present in this paper a dichotomous key to the species attributed by most taxonomic specialists of the genus to the *americanum*-group.

Loof and Luc (1990) list 32 species within the *americanum*-group, all of which are included in our key. *X. neoamericanum* Saxena, Chhabra *et* Joshi, 1973 considered to be species inquirenda and *X. neoelongatum* Bajaj *et* Jairajpuri, 1977, considered to be a synonym of *X. pachtaicum* are also included. Sturhan (1983) attributes *X. pachyder-*

mum to the *americanum*-group and Lamberti *et al*; (1991) described three new species, namely *X. parvum*, *X. taylori*, and *X. pseudoguivani*, within the group. Therefore the key leads to the identification of 38 species. The tail shapes of these species, except for *X. paramonovi* Romanenko, 1981, for which we have never seen a specimen or a description, are illustrated in fig. 1.

The key is based on the following parameters: — tail shape defined as an acute end as with *X. californicum* or *X. pachtaicum*; a subacute end as with *X. floridae* or *X. peruvianum*; or a round end as with *X. incognitum* or *X. parvum*. Sometimes tail length is also been taken in account;

— in connection with tail length great importance has been given to the value of « c' », one of the most stable characters within the group;

— the length of the odontostyle is also a stable character within *Xiphinema* species;

— the lip region can be clearly distinguished as continuous or expanded with respect to the rest of the body; it may be separated from the rest of the body by a depression or incisure; in some cases the weight of this former character can be affected by personal judgement;

— position of vulva (V) permits the separation of the group into at least three subgroups;

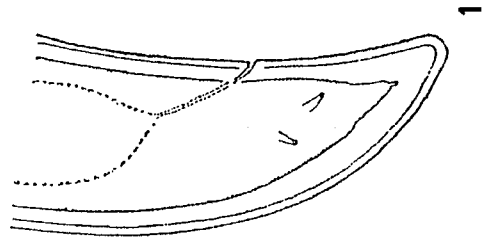
— the length of the body is variable; however, the character can be useful in separating species at the opposite extremes;

— the values of ratios « a » and « c » are affected by the variability of body length, but can be useful in some circumstances;

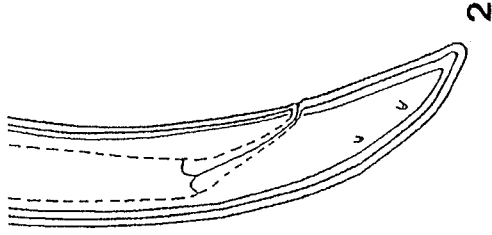
— finally, the distance of the basal guiding ring from the oral aperture and the length of the hyaline portion of the tail (J) can be used sometimes profitably.

Fig. 1 - 38: Tail shapes of species of *Xiphinema americanum* group.

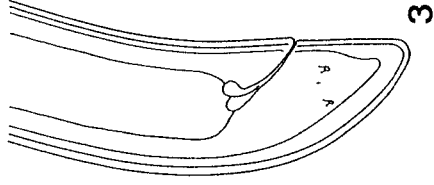
X. inaequale



X. fortuitum



X. brevicolle

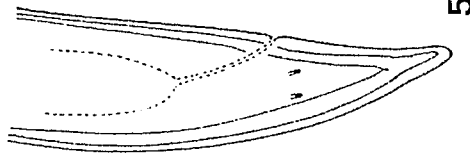


X. paramonovi

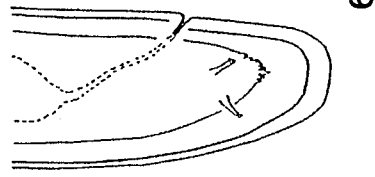
[not available]

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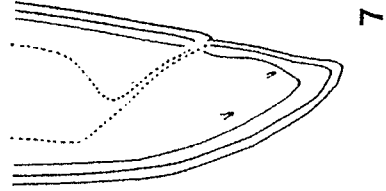
X. georgianum



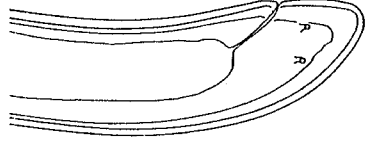
X. silvaticum



X. sheri



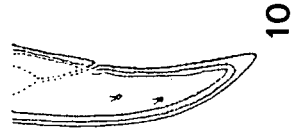
X. pseudoguirani



X. lambertii



X. opisthohysterum



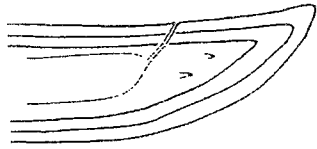
20µm

X. simile



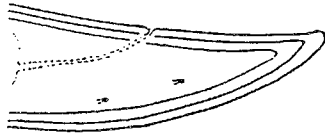
11

X. neoamericanum



12

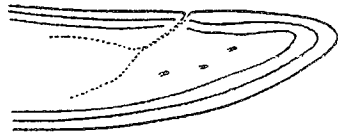
X. laevistriatum



13

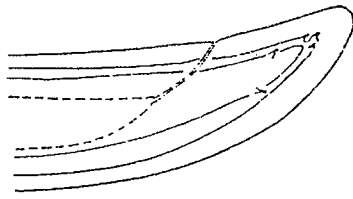
20 μ m

X. luci



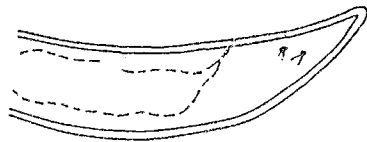
14

X. rivesi



15

X. kosaigudense



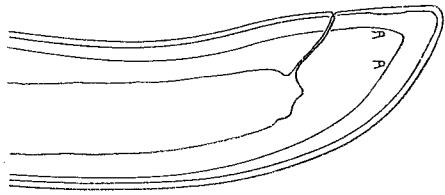
16

X. tarjanense



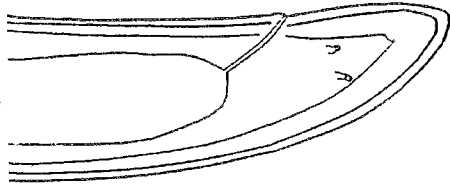
17

X. diffusum



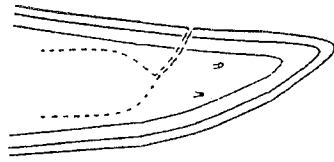
18

X. taylori



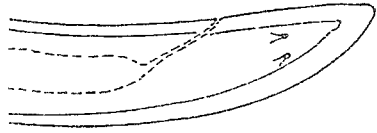
19

X. occidentale



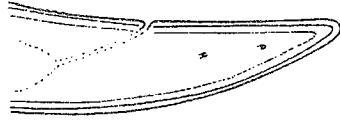
20

X. thornei



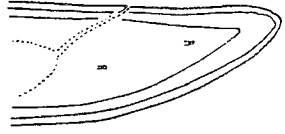
21

X. utahense



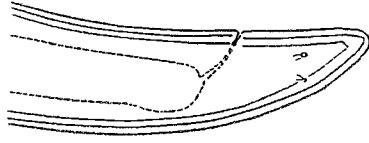
22

X. incognitum



23

X. parvum



24

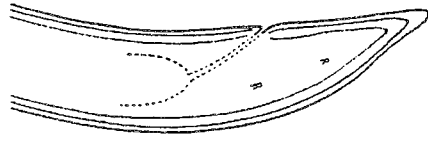
X. floridae



25

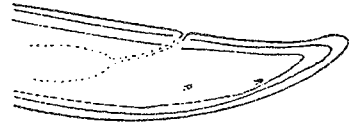
20 μ m

X. peruvianum



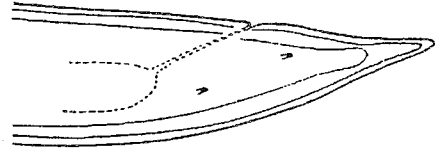
26

X. intermedium



27

X. citricolum



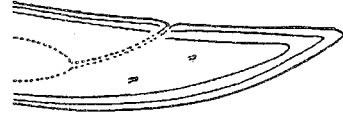
28

X. incertum



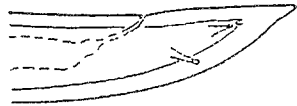
29

X. californicum



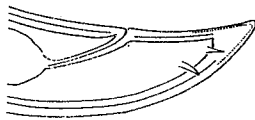
30

X. pachtaicum



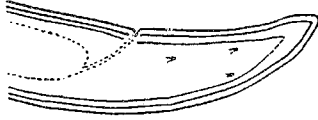
31

X. pachydermum



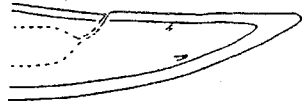
32

X. americanum



33

X. pacificum



34

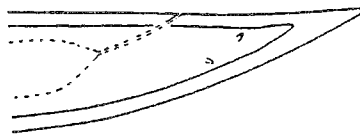
20 μ m

X. bricolense



35

X. neolongatum



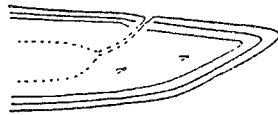
36

X. oxycaudatum



37

X. tenuicuttis



38

Dichotomous key for the identification of species of the Genus *Xiphinema* attributed to the *X. americanum* Group
(in brackets the reference number to Fig. 1)

1. Odontostyle 100 μm or longer 2
Odontostyle less than 100 μm long 9
2. Value of c' more than 1.5 3
Value of c' less than 1.5 4
3. Lip region continuous with the rest of the body
X. inaequale (1)
(Khan *et* Ahmad, 1975), Khan *et* Ahmad, 1977
Lip region expanded with respect to the rest of the
body *X. fortuitum* (2)
Roca, Lamberti *et* Agostinelli, 1987
4. Value of c' between 1 and 1.5 5
Value of c' less than 1 7
5. Value of c around 80 *X. brevicolle* (3)
Lordello *et* Da Costa, 1961
Value of c less than 70 6
6. Tail with round end *X. paramonovi* (4)
Romanenko, 1981
Tail with subacute end *X. georgianum* (5)
Lamberti *et* Bleve Zacheo, 1979
7. Lip region continuous with the rest of the body
X. silvaticum (6)
Luc *et* Williams, 1978
Lip region set off from the rest of the body 8
8. Oral aperture to guiding ring distance more than 90
 μm *X. sberi* (7)
Lamberti *et* Bleve Zacheo, 1979
Oral aperture to guiding ring distance less than 90
 μm *X. pseudoguirani* (8)
Lamberti, Ciancio, Agostinelli *et* Coiro, 1991
9. Odontostyle length less than 70 μm 10
Odontostyle length more than 70 μm 12
10. Body length less than 1.5 mm *X. lambertii* (9)
Bajaj *et* Jairajpuri, 1976
Body length more than 1.5 mm 11
11. V more than 55 *X. opisthobysterum* (10)
Siddiqi, 1961
V less than 55 *X. simile* (11)
Lamberti, Choleva *et* Agostinelli, 1983
12. Lip region, continuous with the rest of the body .. 13
Lip region set off from the rest of the body 16
13. Odontostyle length less than 90 μm 14
Odontostyle length more than 90 μm 15
14. Value of c' about 1 *X. neoamericanum* (12)
Saxena, Chhabra *et* Joshi, 1973
Value, of c' about 1.5 *X. laevistriatum* (13)
Lamberti *et* Bleve Zacheo, 1979
15. Value of a around 50 *X. luci* (14)
Lamberti *et* Bleve Zacheo, 1979
Value of a around 40 *X. rivesi* (15)
Dalmasso, 1969
16. Body length less than 1.5 mm 17
Body length more than 1.5 mm 18
17. V less than 50 *X. kosaigudense* (16)
Quraishi *et* Das, 1984
V more than 52 *X. tarjanense* (17)
Lamberti *et* Bleve Zacheo, 1979
18. Value of c' less than 1.5 19
Value of c' 1.5 or more 27
19. Value of c' 1 or less 20
Value of c' more than 1 21
20. Body length 2 mm or less *X. diffusum* (18)
Lamberti *et* Bleve Zacheo, 1979
Body length more than 2 mm *X. taylori* (19)
Lamberti, Ciancio, Agostinelli *et* Coiro, 1991
21. Odontostyle length less than 85 μm 22
Odontostyle length more than 85 μm 23
22. Body length more than 2 mm *X. occiduum* (20)
Ebsary, Potter *et* Allen, 1984
Body length around 2 mm or less *X. thornei* (21)
Lamberti *et* Golden, 1986
23. Value of a more than 60 *X. utahense* (22)
Lamberti *et* Bleve Zacheo, 1979
Value of a less than 60 24
24. Tail with round end 25
Tail with subacute end 26
25. Tail length around 30 μm and J more than 8 μm
X. incognitum (23)
Lamberti *et* Bleve Zacheo, 1979
Tail length around 25 μm and J less than 7 μm
X. parvum (24)
Lamberti, Ciancio, Agostinelli *et* Coiro, 1991
26. Body diameter at lip region more than 12 μm . *X. flo-*
ridae (25)
Lamberti *et* Bleve Zacheo, 1979
Body diameter at lip region less than 11 μm
X. peruvianum (26)
Lamberti *et* Bleve Zacheo, 1979
27. Lip region expanded with respect to the rest of the
body 28
Lip region set off by constriction from the rest of the
body 33
28. Value of c around 50 29
Value of c more than 60 30
29. Tail with subacute end *X. intermedium* (27)
Lamberti *et* Bleve Zacheo, 1979
Tail with acute end *X. citricolum* (28)
Lamberti *et* Bleve Zacheo, 1979

30. Tail with subacute end *X. incertum* (29)
Lamberti, Choleva *et* Agostinelli, 1983
Tail with acute end 31
31. V around 50 *X. californicum* (30)
Lamberti *et* Bleve Zacheo, 1979
V definitely post equatorial 32
32. V around 55 *X. pachtaicum* (31)
(Tulaganov, 1938), Kir'Janova, 1951
V around 58-60 *X. pachydermum* (32)
Sturhan, 1983
33. Value of c' more than 1.7 34
Value of c' less than 1.7 35
34. Value of a around 50 *X. americanum* (33)
Cobb, 1913
Value of a more than 60 *X. pacificum* (34)
Ebsary, Vrain *et* Graham, 1989
35. Value of a more than 55 *X. bricolense* (35)
Ebsary, Vrain *et* Graham, 1989
Value of a less than 50 36
36. Odontostyle length more than 90 μm
X. neoelongatum (36)
Bajaj *et* Jairajpuri, 1977
Odontostyle length less 85 μm 37
37. value of c around 50 *X. oxycaudatum* (37)
Lamberti *et* Bleve Zacheo, 1979
Value of c around 60 *X. tenuicutis* (38)
Lamberti *et* Bleve Zacheo, 1979

Descriptions of the species attributed to the *X. americanum*-group can be found in the publications listed in table I.

TABLE I - Publications with descriptions of species belonging to the *Xiphinema americanum*- group.

Reference	<i>Xiphinema</i> species
Bajaj and Jairajpuri, 1977	<i>X. lambertii</i> , <i>X. neoelongatum</i>
Dalmaso, 1969	<i>X. rivesi</i>
Ebsary, Potter and Allen, 1984	<i>X. occiduum</i> , <i>X. rivesi</i> , <i>X. americanum</i>
Ebsary, Vrain and Graham, 1989	<i>X. bricolense</i> , <i>X. pacificum</i> ,
Lamberti and Bleve-Zacheo, 1979	<i>X. americanum</i> , <i>X. californicum</i> ,
	<i>X. citrocolum</i> , <i>X. diffusum</i> ,
	<i>X. floridae</i> , <i>X. georgianum</i> ,
	<i>X. inaeguale</i> , <i>X. incognitum</i> ,
	<i>X. intermedium</i> , <i>X. laevistriatum</i> ,
	<i>X. luci</i> , <i>X. opisthobysterum</i> ,
	<i>X. oxycaudatum</i> , <i>X. peruvianum</i> ,
	<i>X. sheri</i> , <i>X. tarjanense</i> ,
	<i>X. tenuicutis</i> , <i>X. utahense</i>
Lamberti, Choleva and Agostinelli, 1983	<i>X. incertum</i> , <i>X. simile</i>
Lamberti, Ciancio, Agostinelli and Coiro, 1991	<i>X. brevicolle</i> , <i>X. diffusum</i> ,
	<i>X. parvum</i> , <i>X. pseudoguirani</i> ,
	<i>X. taylori</i>
Lamberti and Golden, 1984	<i>X. americanum</i>
Lamberti and Golden, 1986	<i>X. thornei</i>
Lamberti and Martelli, 1971	<i>X. pachtaicum</i>
Luc and Williams, 1978	<i>X. silvaticum</i>
Quraishi and Das, 1984	<i>X. kosaigudense</i>
Roca, Lamberti and Agostinelli, 1988	<i>X. fortuitum</i>
Romanenko, 1981	<i>X. paramonovi</i>
Saxena, Chhabra and Joshi, 1973	<i>X. neoamericanum</i>
Siddiqi, 1961	<i>X. opisthobysterum</i>
Sturhan, 1983	<i>X. pachydermum</i>

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