On five species of the genus *Xiphinema* Cobb, 1913 (Nematoda: Longidoridae) recently described from India

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Summary – Examination of paratypes of five species of *Xiphinema* from India described by Singh and Khan (1998) led to the following conclusions: *X. larliani* Khan & Singh, 1998 appears a valid species close to *X. simillimun* Loof & Yassin, 1971. The other four species are considered junior synonyms, *X. digicnidntii* of *X. brasilierise* Lordello, 1951; *X. grncilicniidntii* of *X. radicicola* Goodey, 1936; *X. aruachalense* of *X. brevicollum* Lordello & Da Costa, 1961; *X. pruni* of *X. basiri* Siddiqi, 1959. Complementary morphological data, measurements and illustrations based on the paratypes are given for the five species.

Keywords – taxonomic status, *Xiphinema aruachalense*, *X. basiri*, *X. brasilianense*, *X. brevicollum*, *X. grncilicniidntii*, *X. larliani*, *X. pruni*, *X. simillimun*, *X. radicicola*.

Singh and Khan (1998) described five new species of the genus *Xiphinema* Cobb, 1913 from India. Because the descriptions and illustrations did not permit an exact evaluation of these species, paratypes were requested for examination.

The five species are discussed hereunder.

*Xiphinema larliani* Khan & Singh, 1998**

= *X. filicudatum* Singh & Khan, 1998 nec Loof & Maas, 1972

(Fig. 1A-E)

MEASUREMENTS

See Table 1.

OBSERVATIONS

The specimens fit the original description, except that the amphidal aperture is slightly longer (Fig. 1). The lip region is not wholly continuous, but rather offset by a very slight depression (as indicated in Fig. 1B in Singh and Khan, 1998). The anterior genital branch, though reduced, is complete, with oviduct, oviduct sac and ovary. This was indicated in Fig. 1B of Singh and Khan (1998) and in their text.

DISCUSSION AND SYSTEMATIC POSITION

*X. larliani*, because of the reduced but complete anterior female genital branch, belongs in Group 3 ('anterior female genital branch complete but strongly reduced') of Loof and Luc (1990). The codes are: A3-B4-C12-D12-E2-F2-G12-H2-L1. They are closest to those of *X. simillimun* Loof & Yassin, 1971 but differ in D (c') and I (habitus). Singh and Khan (1998), however, compared it only with *X. longicudatum* Luc, 1961. This comparison is inappropriate because the latter is not didelphic (as their diagnosis says) but pseudomonodelphic. As, however, reduction of the anterior genital branch may have occurred repeatedly and is not indicative of relationship, it is probably correct to compare *X. larliani* with other...
Fig. 1. Xiphinema lariiani (A-E) and X. "pruni" (F-I). A, G: Head; B, I: Tail region; C: Ovejector and vulva region; D: Tail tip; E: Female reproductive system; F: Anterior branch of female reproductive system; H: Z-differentiation.
Xiphinema pruni Singh & Khan, 1998
(FIG. 1F-I)

MEASUREMENTS

See Table 1.

OBSERVATIONS

The specimens correspond well to the description. The lip region is not continuous as Fig. 5C of Singh and Khan (1998) suggests, but offset by a shallow but distinct depression (corresponding to their Fig. 5B). The drawing of the female genital apparatus is schematic; as the sphincter between uterus and oviduct was not drawn, we can only guess what the exact position of the small oval swelling is. In the paratypes a (not very distinct) pseudo-Z-organ is present.

Table 1. Measurements of females of Xiphinema tarlani and of X. pruni (all measurements in um except L in mm).

<table>
<thead>
<tr>
<th></th>
<th>X. tarlani</th>
<th>X. pruni</th>
</tr>
</thead>
<tbody>
<tr>
<td>n</td>
<td>9**</td>
<td>2**</td>
</tr>
<tr>
<td>L</td>
<td>1.57-1.95</td>
<td>1.91-1.97</td>
</tr>
<tr>
<td>a</td>
<td>41-57</td>
<td>42-47</td>
</tr>
<tr>
<td>b</td>
<td>4.8-9.5</td>
<td>5.4-5.6</td>
</tr>
<tr>
<td>c</td>
<td>12-18</td>
<td>13.3-14.3</td>
</tr>
<tr>
<td>c'</td>
<td>6.6-9.0</td>
<td>7.0-7.3</td>
</tr>
<tr>
<td>V</td>
<td>30-34</td>
<td>31-32</td>
</tr>
<tr>
<td>Odontostyle</td>
<td>78-98</td>
<td>91-97</td>
</tr>
<tr>
<td>Odontophore</td>
<td>50-68</td>
<td>58-61</td>
</tr>
<tr>
<td>Stylet</td>
<td>-</td>
<td>149-158</td>
</tr>
<tr>
<td>Guiding ring</td>
<td>75-80</td>
<td>84-94</td>
</tr>
<tr>
<td>Body diam.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>at mid body</td>
<td>34</td>
<td>42-45</td>
</tr>
<tr>
<td>at anus</td>
<td>18-18</td>
<td>19-20</td>
</tr>
<tr>
<td>Tail</td>
<td>120-143</td>
<td>136-145</td>
</tr>
<tr>
<td>h</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>h%</td>
<td>-</td>
<td>21</td>
</tr>
</tbody>
</table>

** Specimens flattened.

DISCUSSION AND SYSTEMATIC POSITION

The species belongs to Group 5 (‘both female genital branches equal; presence of a pseudo-Z-organ, or pseudo-Z-organ plus uterine spines’) of Loof and Luc (1990) and the codes are: A4-B2-C4-D45-E56-F3-G2-H2-I3-J7-K7-L1. These codes are wholly identical with those of X. basiri Siddiqi, 1959, from which X. pruni was said to differ by: i) length of hyaline part of tail in relation to anal body diameter (slightly less than 1 vs more than 0.5); ii) smaller number of caudal pores (two vs four pairs); iii) relative width of amphid aperture (over 70% vs 60%).

As to i): no exact values nor ranges were given. Study of descriptions of X. basiri showed: Siddiqi (1959, Fig. 3C): 12.5/17 = 72%; Loof and Yassin (1971, Fig. 4B): 10/24 = 42%; Zeidan and Coomans (1992, Fig. 4B): 9.5/15 = 63%; Nasira and Maqbool (1992, Fig. 2D): 16/22 = 73%; Swart and Quénéhervé (1998, Fig. 2C): 12/19 = 63%. Fig. 5F of Singh and Khan (1998) gives 29/34 = 75%. In view of the range 42-73 in X. basiri the difference from the single value 75 cannot be regarded diagnostic.

As to ii): as remarked above the number of caudal pores is variable, mainly due to the position of the anerior one which may lie behind, at level of, and before the anus. In fact, of the four pores drawn by Siddiqi (1959) two are preanal, one adanal and one postanal. Loof and Yassin (1971) show a similar arrangement. Fig. 9A-C, E-J of Khan (1998) shows the amphid aperture 10/16 = 63% of lip region diameter and Fig. 5C: 4.5/7 = 64%. Siddiqi (1959) says indeed that the aperture is three-fifths (or 60%) of lip region. Fig. 4C of Zeidan and Coomans (1992) gives 6.8/9.4 = 72%. So this difference also lapses.

Consequently, we conclude that X. pruni Singh & Khan, 1998 is a junior synonym of X. basiri Siddiqi, 1959, a species repeatedly recorded from India (cf. X. cobbii Sharma & Saxena, 1981 and X. hayati Javed, 1983, both considered junior synonyms of X. basiri by Luc et al. (1985)).

In the diagnosis X. pruni was also differentiated from X. vulgare Tarjan, 1964 (a junior synonym of X. setariae Luc, 1958), but this species belongs in a different group (7, ‘both female genital branches equal, without uterine differentiation, tail elongate to conical’).
Xiphinema digicaudatum Singh & Khan, 1998
(= X. digicata data emend.)
(Fig. 2A-C)

**Measurements**

See Table 2.

**Observations**

The specimens seen by us correspond to the original description and illustrations, except for possessing a less slender, somewhat clavate terminal peg. The description indicates some very wide ranges, e.g., tail length was given as 34 μm, c' = 1.7, so ABD = 20 μm, but in the holotype the tail measures about 55 μm (2115 : 38.4) thus ABD = 31 μm.

**Discussion and Systematic Position**

The species belongs in Group 1 (‘no anterior female genital branch’) of Loof and Luc (1990) and the codes are: A1-B4-C5a-D5-E1-F3-G3-H2-I23-J?-K?-L1. These codes are closest to those of X. brasiliense Lordello, 1951. Like all common and widespread species this has a very wide range of measurements; from literature we compiled: L = 1.30-2.37 mm; a = 30-52; c = 30-64; c' = 0.9-1.6; tail = 28-49 μm; V = 26-37; odontostyle = 108-162 μm; odontophore = 52-82 μm (Colin & Sher, 1972; Loof & Sharma, 1979; Luc & Coomans, 1992). Since 1990 new populations of X. brasiliense have been found and described, with the result that the codes have extended. The codes for X. gracilicaudatum and X. brasiliense now overlap and there are no clear-cut gaps except a small one for V (20-25 vs 26-37). The difference of head shape (round-elevated in X. digicaudatum, low truncated in X. brasiliense) is not convincing (Fig. 2A). The paratypes studied have tail pegs differing from Singh and Khan’s Fig. 2F but agreeing with Fig. 2E, F of Luc (1981).

We therefore consider X. digicaudatum Singh & Khan, 1998 a junior synonym of X. brasiliense Lordello, 1951, a species already known from India.

Xiphinema gracilicaudatum Singh & Khan, 1998
(= X. gracilicaudatus emend.)
(Fig. 2D-F)

**Measurements**

See Table 2.

**Observations**

The specimens seen agree generally with the description, but a dorsal body pore was observed in the odontostyle region (Fig. 2E) and the tail terminus is more rounded than depicted.

**Discussion and Systematic Position**

X. gracilicaudatum belongs in Group 1 (‘no anterior female genital branch’) of Loof and Luc (1990) and has the following codes: A1-B4-C4-D4-E1-F2-G2-H2-I3-J?-L1. These codes are wholly identical to those of X. radicicola Goodey, 1936. X. gracilicaudatum was diagnosed only against X. pararadicicola Phukan & Sanwal, 1982, but the authors did not take into account that the latter was synonymized, after comparison of many populations, with X. radicicola Goodey 1936 by Luc et al. (1986). These authors found the tail length of paratypes of X. pararadicicola not 55 μm, as Singh and Khan (1998) stated, but 60-62 μm; h was 28-31 μm and h% 47-53; these values are all identical with those given for X. gracilicaudatum. Number of caudal pores is an uncertain character: due to particles adhering to tails some may be missed and there is variation due to the position of the anterior pore (see above). This leaves the direction of the vagina; it is not known if this is a constant character or one influenced by other factors, e.g., by passage of eggs; moreover Fig. 3D (printed upside down) of Singh and Khan (1998) agrees with Fig. 1H of McLeod and Khair (1971) for X. australiae McLeod & Khair, 1971, a junior synonym of X. radicicola; moreover in Luc’s (1981) Fig. II the vagina is slightly directed posteriad.

Therefore, as the dimensions wholly lie within the limits for X. radicicola as given by Luc and Loof (1993) we consider X. gracilicaudatum Singh & Khan, 1998 a junior synonym of X. radicicola Goodey, 1936, a species reported from India many times.

Xiphinema arunachalense Singh & Khan, 1998
(= X. arunachalensis emend.)
(Fig. 2G-I)

**Measurements**

See Table 2.
On five new Xiphinema species from India

Fig. 2. Xiphinema 'digicaudatum' (A-C), X. 'gracilicaudatum' (D-F) and X. 'arunachalense' (G-I). A, E, G: Head; B, F, I: Tail end; C, D: Female reproductive system; H: Ovejector and vulva region.
Table 2. Measurements of Xiphinema ‘digicaudatum’, X. ‘gracilicaudatum’ and X. ‘arunachalense’ (all measurements in μm except L in mm).

<table>
<thead>
<tr>
<th></th>
<th>‘digicaudatum’</th>
<th>‘gracilicaudatum’</th>
<th>‘arunachalense’</th>
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</thead>
<tbody>
<tr>
<td>n</td>
<td>13*</td>
<td>16*</td>
<td>12*</td>
</tr>
<tr>
<td>L</td>
<td>1.96-2.45</td>
<td>1.60-2.06</td>
<td>1.40-1.56</td>
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<tr>
<td>a</td>
<td>33-49</td>
<td>38-41</td>
<td>37-41</td>
</tr>
<tr>
<td>b</td>
<td>5.1-6.7</td>
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<td>c’</td>
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<td>V</td>
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<td>24</td>
<td>53-60</td>
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<td>Odontostyle</td>
<td>110-125</td>
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<td>Odontophore</td>
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<td>Stylet</td>
<td>--</td>
<td>209-212</td>
<td>153</td>
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<tr>
<td>Guiding ring</td>
<td>102-144</td>
<td>121-123</td>
<td>153-175</td>
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<tr>
<td>Body diam. at mid body</td>
<td>58</td>
<td>65-68***</td>
<td>80-95</td>
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<tr>
<td></td>
<td>21-31</td>
<td>34-40***</td>
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<tr>
<td>at anus</td>
<td>34-55</td>
<td>48-55</td>
<td>25-29</td>
</tr>
<tr>
<td>h</td>
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<tr>
<td>h%</td>
<td>47</td>
<td>45</td>
<td>55-60</td>
</tr>
</tbody>
</table>

** Our own measurements.
*** One specimen flattened.

Observations

The description contains a contradiction: the head is first said to be continuous, but farther on considered slightly constricted at base. The latter is correct (Fig. 2G).

Discussion and Systematic Position

This species belongs in the X. americana-group. It was considered most close to X. brevicollum Lordello & Da Costa, 1961, from which it was differentiated by lower values of L: 1.40-1.56 mm vs 1.8-2.2; b: 4-6 vs 7-11; c: 55-70 vs 63-93. These data for X. brevicollum were evidently taken from the original description.

We consulted various redescriptions and found (excluding X. pseudoguinei Lambert et al., 1992 and X. taylori Lambert et al., 1992):

— L ranges from 1.51 (Rahman Razak & Loof, 1998) to 2.31 (Coomans & Heyns, 1997); including X. diffusum Lamberti & Bleve-Zacheo, 1979 (a junior synonym of X. brevicollum; see Luc et al., 1998), the lower limit even sinks to 1.30.
— Values for ‘c’ range from 56 (Rahman Razak & Loof, 1998) to 112 (Lamberti & Bleve-Zacheo, 1979); inclusion of X. diffusum gives a lower limit of 48. Here too allometry is a factor.

We conclude that there is no real difference and that X. arunachalense Singh & Khan, 1998 is a junior synonym of X. brevicollum Lordello & Da Costa, 1961, a species already recorded from India.

Acknowledgments

Dr E. Khan is cordially thanked for the loan of two sets of paratype slides for the five species studied.

References


