

## Description of *Xiphinema souchaudi* n. sp. and observations on *X. yapoense* Luc, 1958 and *X. algeriense* Luc & Kostadinov, 1982 (Nematoda: Longidoridae)

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Accepted for publication 27 November 1997.

**Summary** - *Xiphinema souchaudi* n. sp. is described from *Eucalyptus* plantations in Congo (Brazzaville) and from secondary cultures on *Vigna radiata*. The new species is close to *X. imitator* and to *X. yapoense* Luc, 1958. A third population of *X. yapoense* is described. Like the two previously recorded populations of this species, it came from a virgin forest in Ivory Coast. The present sample included all four juvenile stages. A small population of *X. algeriense* Luc & Kostadinov, 1982, from Senegal, was also studied; it included only one female but also the complete series of juveniles stages, which made it possible to complete the original description. © Orstom/Elsevier, Paris

**Résumé** - *Description de X. souchaudi* n. sp. et observations sur *X. yapoense* Luc, 1958 et *X. algeriense* Luc & Kostadinov, 1982 (Nematoda: Longidoridae) - Les auteurs décrivent *Xiphinema souchaudi* n. sp. provenant de plantations d'*Eucalyptus* du Congo (Brazzaville) et secondairement élevé sur *Vigna radiata*. La nouvelle espèce est proche de *X. imitator* Heyns, 1965 et de *X. yapoense* Luc, 1958, espèce dont une troisième population rencontrée également en forêt primaire de Côte d'Ivoire, est étudiée, en particulier les quatre stades juvéniles. Une petite population de *X. algeriense* Luc & Kostadinov, 1982, provenant du Sénégal, ne contenait qu'une seule femelle, mais la présence des quatre stades juvéniles a permis de compléter la description originale. © Orstom/Elsevier, Paris

**Keywords:** nematode, taxonomy, *Xiphinema algeriense*, *X. souchaudi*, *X. yapoense*.

Since 1978, the coastal hills in Congo (Brazzaville) have been gradually planted with *Eucalyptus* for industrial purposes, following the development of clonal plantation techniques by CTFT (Centre Technique Forestier Tropical) in the 1970's. In 1995, the plantations covered over 400 000 ha and were managed by UAIC (Unité d'Afforestation Industrielle du Congo). A general description of these plantations was given by Delwaulle and Laplace (1988).

A nematological survey (280 samples) was made by one of the authors (GR) from 1989 to 1992 in the oldest part of the *Eucalyptus* plantation. Only 41% of the samples contained plant-parasitic nematodes, all pertaining to only one genus, *Xiphinema*. The most common species was *X. parasetariae* Luc, 1961 (40%), followed by *X. setariae* Luc, 1956 (1%). However, two of the samples contained a third species, which proved to be new and is described here as *X. souchaudi* n. sp. Samples were also taken in the original savannah, some of them containing some *X. parasetariae* specimens. These three species of *Xiphinema* developed very well in the laboratory on several clones of the two main hybrids of *Eucalyptus*

used by UAIC, PF1 and HS2, and on *Vigna radiata* (L.) R. Wilczek.

In this article, additional data are also given for *X. yapoense* Luc, 1958, a species close to *X. souchaudi* n. sp., found for the third time in primary (or very ancient) forest in Ivory Coast. The sample studied included the complete series of juveniles stages. This is also the case for a small population of *X. algeriense* Luc & Kostadinov, 1982, found in Senegal; it included only one female, but the four juvenile stages were present, which made it possible to complete the description of this species.

### *Xiphinema souchaudi*<sup>\*</sup> n. sp. (Figs 1, 2)

#### MEASUREMENTS

*Females* and *Juveniles*: see Table 1.

\* This species is named in honour of M. Bernard Souchaud, Assistant-Ingénieur at ORSTOM, who was the kingpin of ORSTOM nematology laboratories in Ivory Coast, Senegal, and Paris-Muséum from 1958 until his retirement in 1993.

**Table 1.** Morphometric data for *Xiphinema souchaudi* n. sp. (All measurements in  $\mu\text{m}$ , except L in mm).

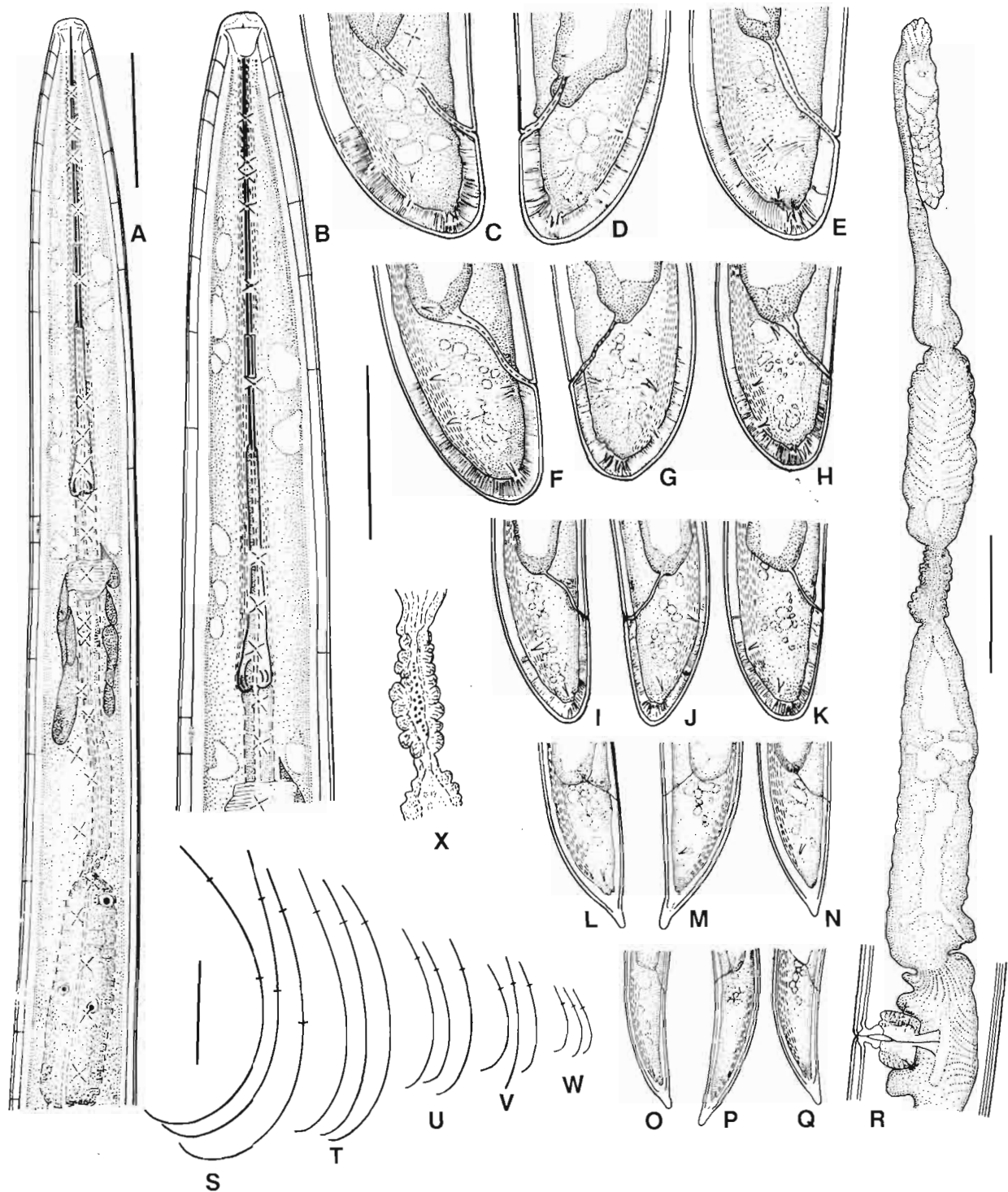
	Pop. <i>Vigna radiata</i>			Type population			
	Females	Female Holotype	Females Paratypes	J4	J3	J2	J1
n	20	1	19	10	9	12	10
L	3.62 $\pm$ 0.29 (3.08-4.30)	3.26	3.59 $\pm$ 0.28 (3.22-4.18)	2.57 $\pm$ 0.20 (2.26-2.9)	1.40 $\pm$ 0.53 (1.32-1.65)	1.19 $\pm$ 0.15 (1.06-1.58)	0.70 $\pm$ 26.5 (0.67-0.75)
a	63.7 $\pm$ 2.4 (60-70)	57.2	60.9 $\pm$ 3.6 (56-67)	52.1 $\pm$ 2.8 (46-57)	48.1 $\pm$ 1.8 (44-50)	42.6 $\pm$ 2.54 (39-48)	40.2 $\pm$ 2.0 (38-44)
b	8.7 $\pm$ 0.5 (7.4-9.8)	7.6	8.5 $\pm$ 0.6 (7.5-10.0)	6.5 $\pm$ 0.5 (6.0-7.3)	5.3 $\pm$ 0.3 (4.9-5.7)	4.8 $\pm$ 0.4 (4.3-5.5)	3.7 $\pm$ 0.2 (3.4-4.1)
c	126.4 $\pm$ 8.6 (116-146)	105.2	123.2 $\pm$ 12.6 (101-149)	84.7 $\pm$ 5.2 (78 $\pm$ 91)	49.9 $\pm$ 3.7 (46-58)	31.7 $\pm$ 2.6 (27.5-38)	19.3 $\pm$ 1.5 (16-21)
c'	0.8 $\pm$ 0.04 (0.7-0.9)	0.84	0.78 $\pm$ 0.04 (0.7-0.8)	0.9 $\pm$ 0.06 (0.8-1.0)	1.2 $\pm$ 0.1 (1.0-1.3)	1.8 $\pm$ 0.1 (1.6-2.1)	3.05 $\pm$ 0.4 (2.5-3.7)
V	41.7 $\pm$ 1.5 (39-45)	39.6	39.9 $\pm$ 1.4 (38-43)	-	-	-	-
Odontostyle	124.1 $\pm$ 3.8 (113-130)	124	122.9 $\pm$ 2.6 (118-127)	105.7 $\pm$ 2.2 (102-109)	82.8 $\pm$ 1.9 (81-87)	63.0 $\pm$ 1.65 (61-67)	47.7 $\pm$ 1.2 (46-49)
Repl. odont.	-	-	-	126.3 $\pm$ 2.26 (122-129)	105.9 $\pm$ 2.8 (100-109)	84.5 $\pm$ 3.5 (79-89)	62.2 $\pm$ 1.8 (59-65)
Odontophore	66.5 $\pm$ 3.1 (55-69)	69	67.8 $\pm$ 3.1 (57-72)	56.5 $\pm$ 2.9 (53-60)	48.9 $\pm$ 2.9 (42-52)	39.7 $\pm$ 1.45 (37-41)	31.4 $\pm$ 1.4 (29-34)
Stylet	191.0 $\pm$ 4.2 (180-197)	193	190.7 $\pm$ 3.4 (184-197)	162.2 $\pm$ 4.4 (157-169)	131.7 $\pm$ 3.5 (124-135)	102.7 $\pm$ 1.9 (100-107)	79.1 $\pm$ 2.1 (76-82)
Guiding ring	106.0 $\pm$ 6.2 (91-114)	106	102.1 $\pm$ 6.4 (88.5-111)	-	-	-	-
Tail length	28.5 $\pm$ 2.0 (23-33)	31	29.2 $\pm$ 1.5 (27-32)	30.3 $\pm$ 2.1 (26-33)	31 $\pm$ 2.4 (27-33)	37.6 $\pm$ 2.46 (34-42)	36.7 $\pm$ 3.35 (33-44)
Ant. uterus	273.8 $\pm$ 17.2* (251-321)	286.6	291.6 $\pm$ 16.2** (265-321)	-	-	-	-
Post. uterus	314.8 $\pm$ 29.2 (238-372)	341.2	347.2 $\pm$ 17.5 (319-369)**	-	-	-	-
Number of caudal pores	3.6 $\pm$ 0.8 (2-5)	4	3.6 $\pm$ 0.8*** (3-5)	-	-	-	-

\*n = 19; \*\*n = 11; \*\*\*n = 10.

## DESCRIPTION

*Female:* In specimens killed by gentle heat, body elongated, tapering towards anterior and posterior ends, ventrally curved in open C, curvature more pronounced in posterior third. Cuticle smooth, with very fine cross striation on tail, 3-4  $\mu\text{m}$  thick on most of body, thicker at base of lip area (5  $\mu\text{m}$ ) and on tail (7-10  $\mu\text{m}$ , on dorsal side). Lateral epidermal chord 12-14  $\mu\text{m}$  wide, or 19-22% of corresponding body diameter. Pores: 90-140 lateral pores, 10-49 ventral pores, and 5-9 dorsal pores. Labial area rounded anteriorly, continuous with body contour. Amphids stirrup-

shaped; aperture straight, 80% of the corresponding body diameter, at 3-3.5  $\mu\text{m}$  from anterior end. Odontostyle and odontophore typical for the genus; flanges 10.5-14  $\mu\text{m}$  wide. Guiding tube variable in length (11.5-15  $\mu\text{m}$ ). Hemizonid 6-11  $\mu\text{m}$  long, at 196-227  $\mu\text{m}$  from anterior end; hemizonion 4-5  $\mu\text{m}$  long, 39-58  $\mu\text{m}$  posterior to hemizonid. Pharyngeal bulb 92  $\pm$  5.33 (79.5-100)  $\mu\text{m}$  long (n = 18); pharyngo-intestinal valve hemispherical/conical. Nerve ring at 219-233  $\mu\text{m}$  from anterior end. Vulva anterior to mid-body. Reproductive system amphidelphic, both branches equally developed and about the same



**Fig. 1.** *Xiphinema souchaudi* n. sp. A, B: Female pharyngeal region. Tails: C-E: Female; F-H: J4; I-K: J3; L-N: J2; O-Q: J1; R: Female genital tract. Habitus: S: Female; T: J4; U: J3; V: J2; W: J1; X: Female pseudo-Z organ (Scale bars: S-W = 1 mm; A, R = 50  $\mu$ m; B-Q, X = 50  $\mu$ m).

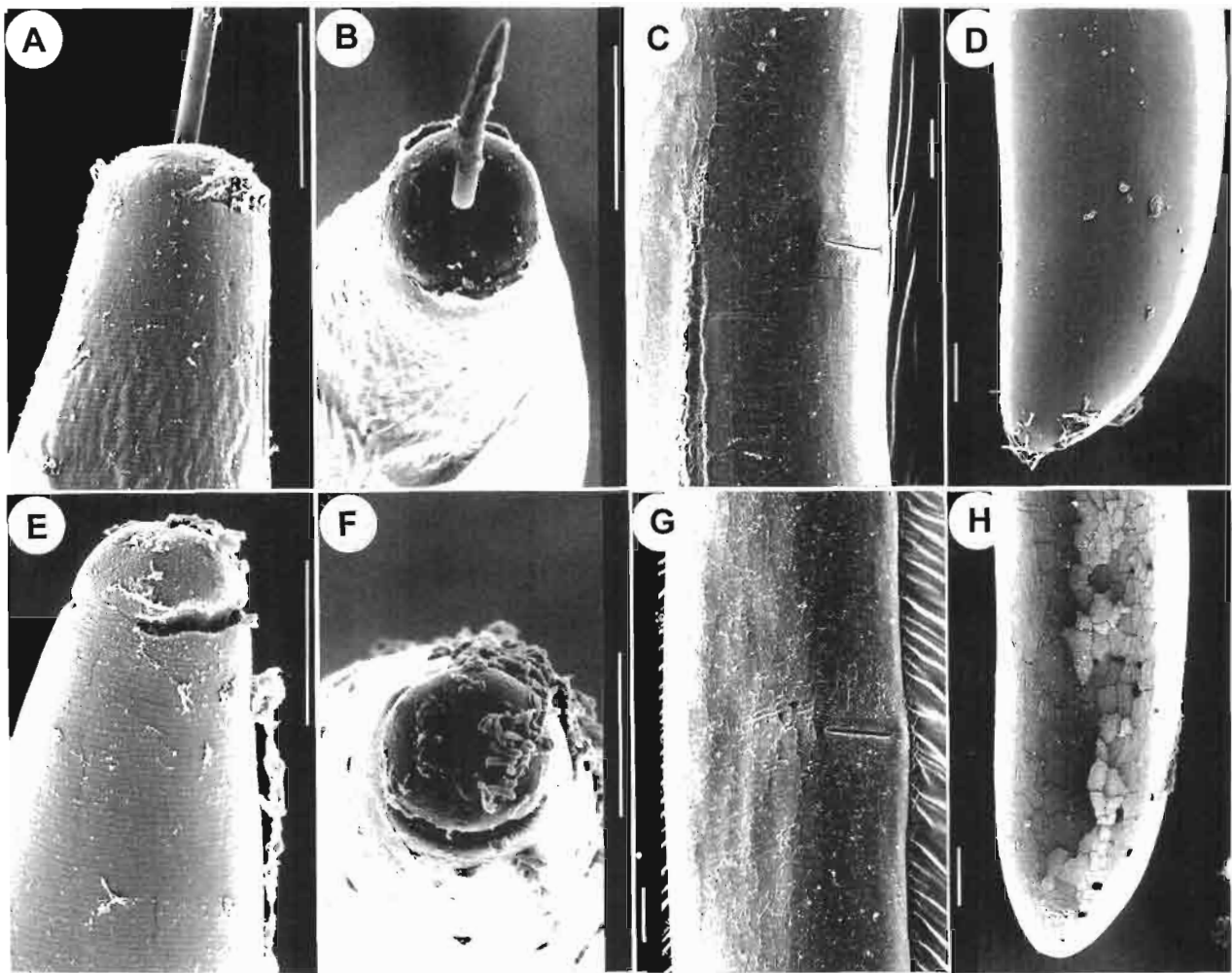


Fig. 2. SEM micrographs of *Xiphinema souchaudi* n. sp. (A-D) and *X. yapoense* (E-H) females. A, E: Head, lateral view; B, F: Head, face view; C, G: Vulva; D, H: Tail (Scale bars = 10  $\mu$ m).

length. Ovary reflexed. Oviduct with a slender part consisting of disc-shaped cells followed by a dilated part. Medium size sphincter between oviduct and uterus. Uterus consisting of a wide part followed by a narrow and muscular pseudo-Z-organ with thick walls and filled with numerous small granules. Ovejector short, strong; vagina about one half of corresponding body diameter long, encircled by a strong sphincter. No spermatozoa observed in the genital tract. Tail dorsally convex-conoid, *i.e.*, ventral profile in line with the body profile and curvature mainly dorsal; broadly rounded terminus devoid of blind canal; four to six pores on each side of the tail.

*Male.* Not found.

*Juveniles:* Generally similar to female, except for genital tract. Body not so curved, except in the posterior part of J1 and J2. Tail of J1 conical, with curva-

ture mainly dorsal and sub-digitate extremity. Tail of J2 conical, but plumper and with digitation often more pronounced. Tail of J3 and J4 conoid-rounded. Tail length similar in J1 and J2, slightly shorter in J3; J4 tail length similar to female tail length.

#### TYPE HOST AND TYPE LOCALITY

Rhizosphere of industrial plantations of *Eucalyptus* hybrid PF1 (*Eucalyptus alba*  $\times$  *Eucalyptus* sp.) clone 1.41; sandy soil with 5% clay; Unité d'Afforestation Industrielle du Congo (UAIC), plot 84-16, Hinda, 40 km East of Pointe Noire (Kouilou region), Congo (Brazzaville).

#### TYPE SPECIMENS

Holotype and fourteen female paratypes in the Collection Nationale des Nématodes, Muséum National

d'Histoire Naturelle, Paris, France. One female paratype in each of the following collections: Instituut voor Dierkunde, University of Gent, Belgium; Entomology and Nematology Department, Rothamsted Experimental Station, Harpenden, Herts, UK; Plant Nematology Laboratory, United State Department of Agriculture, Beltsville, MD, USA.

#### DIAGNOSIS AND RELATIONSHIPS

In the group of amphidelphic species with a pseudo-Z-organ and a rounded tail, *X. soucaudi* n. sp. is distinguished by lip region continuous with body contour, position of vulva anterior to mid body ( $V = 37.7-44.7$ ), tail shape conoid-rounded with curvature mainly dorsal, and absence of blind terminal canal. In the polytomous key of Loof and Luc (1990), *X. soucaudi* n. sp. is represented by the following code: A4 - B2 - C6b - D6 - E34 - F34 - G2 - H1 - I3 - J6b - K2b - L1.

*X. soucaudi* n. sp. is close to *X. imitator* Heyns, 1965, but differs from it in longer body ( $L = 3.08-$

$4.30$  vs  $1.95-2.63$  mm), longer stylet ( $180-197$  vs  $146-170$   $\mu\text{m}$ ), absence vs presence of a depression at the base of the lip region, and more anterior vulva ( $V = 38-45$  vs  $42-51$ ). *X. soucaudi* n. sp. is also close to *X. yapoense* Luc, 1958, but differs from it in shape of amphids (very wide with wavy opening slit in *X. yapoense*), notably longer uterus (ant. uterus:  $108-148$  vs  $251-321$   $\mu\text{m}$  and post. uterus:  $134-190$  vs  $239-372$   $\mu\text{m}$  in *X. yapoense* and *X. soucaudi* n. sp., respectively), presence vs absence of pseudo-Z-organ, tail shape (perfectly hemispherical with symmetrical curvature in *X. yapoense*), and presence vs absence of tail blind canal in female tail. Moreover, changes in tail length during development are notably different between the two species (compare Figs 1 and 3).

#### *Xiphinema yapoense* Luc, 1958 (Figs 2, 3)

*Xiphinema yapoense* Luc, 1958 has been originally described from a few females found in the rhizosphere of *Drypetes mutikoro*, a small tree in the virgin (or very ancient) forest of Yapo, Ivory Coast. Another population was found later (Luc, 1981) in another virgin forest in Ivory Coast, near Tai ("host unknown"). From the larger sample (23 females) extracted from the second population, it was possible to obtain additional morpho-anatomical data, to specify the intraspecific variability, and to describe the third and fourth juvenile stages.

*X. yapoense* was found for the third time in the rhizosphere of trees (*Mapaca* sp.) at Parc National du Banco, a virgin forest close to Abidjan, Ivory Coast. Thus, *X. yapoense* seems to be a characteristic component of the nematological fauna of soils in primary (or very ancient) forests of Ivory Coast.

The sample contained only three females, but representatives of the four juvenile stages were present, which makes it possible to describe the complete juvenile series.

#### MEASUREMENTS

*Females and juveniles*: see Table 2.

#### OBSERVATIONS

*Females*: All morphometric and morpho-anatomical data conform to the redescription of the species (Luc, 1981) with only two exceptions: the groove separating the lip area from the rest of the body is not as pronounced as illustrated earlier (Luc, 1958: Fig. 2B; Luc, 1981: Fig. 1B), and the tail extremity is provided with a narrow blind canal, contrary to an earlier statement. These two points were confirmed by examination of both type (Yapo) and Tai specimens. Otherwise, the main discriminating characters, i.e., the shape of the female tail, nearly hemispherical with ventral and dorsal curvature equivalent, and the

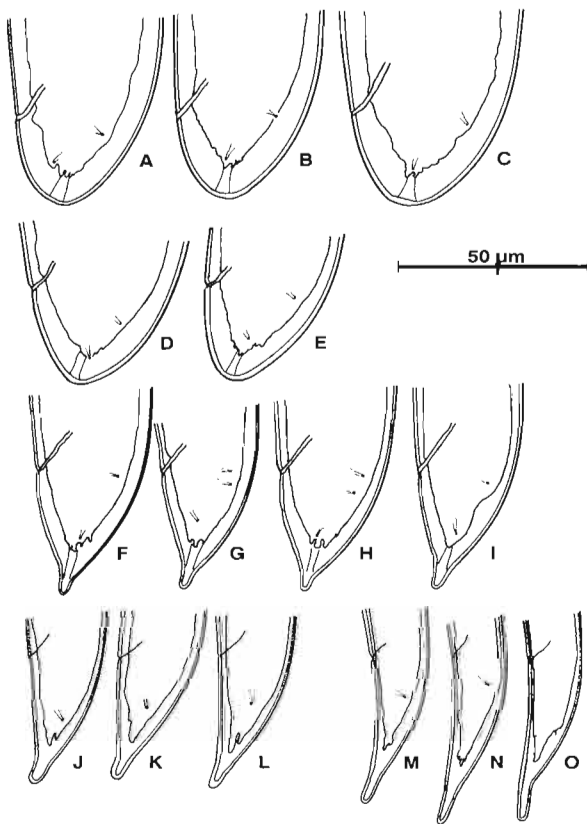


Fig. 3. *Xiphinema yapoense* Luc, 1958. Tails. A-C: Females; D-E: J4; F-I: J3; J-L: J2; M-O: J1.

**Table 2.** Morphometric data for *Xiphinema yapoense* Luc, 1958 (All measurements in  $\mu\text{m}$ , except L in mm).

	Females				J4		J3		J2	J1
	Holotype*	Topotypes*	Tai pop.**	Le Banco pop.	Tai pop.**	Le Banco pop.	Tai pop.**	Le Banco pop.	Le Banco pop.	Le Banco pop.
n	1	2	26	3	12	2	14	4	3	3
L	3.03	2.82, 2.95	2.72 (2.25-3.38)	2.73 (2.47-3.11)	1.99 (1.77-2.46)	2.17, 2.0	1.52 (1.29-1.77)	1.51 (1.40-1.69)	0.99 (0.98-1.01)	0.405 (0.38-0.42)
a	51.3	52.6, 54.3	47.7 (38.1-54.6)	48.8 (47.9-50.0)	49.5 (45.1-56.7)	38.5, 43.9	41.0 (34.2-46.7)	43.7 (42.4-45.9)	35.7 (33.5-37.6)	20.3 (19.8-20.7)
b	6.7	8.7, 9.1	7.7 (6.0-9.7)	8.0 (6.8-9.5)	5.6 (4.9-7.0)	6.5, 6.1	5.7 (4.6-7.8)	4.9 (4.3-5.3)	3.6 (3.4-3.7)	1.9 (1.8-2.0)
c	110.9	98.3, 115.0	117 (98-147)	104.3 (96.5-114.9)	75.7 (64.1-98.4)	76.9, 72.4	46.3 (38.0-63.2)	42.3 (38.2-49.8)	25.9 (24.7-27.2)	8.6 (8.3-8.8)
c'	0.7	0.7, 0.8	0.7 (0.6-0.8)	0.75 (0.7-0.8)	0.9 (0.7-1.0)	0.8, 0.9	1.3 (1.0-1.6)	1.4 (1.25-1.5)	2.0 (1.9-2.2)	3.3 (3.2-3.5)
V	43.9	39.3, 41.7	39.0 (36.3-42.0)	39.3 (38.7-40.5)	-	-	-	-	-	-
Odontostyle	138	142, 148	133 (125-144)	133.5 (126.5-138)	112 (107-118)	118.5, 115	89.5 (73-99)	96.3 (92-99)	73.0 (38.0-79.2)	58.3 (56-60)
Repl. odont.		69, 68	-	-	126.5 (117-134)	131, 134.5	111.5 (102-118)	112.6 (109-117)	90.4 (88.5-93)	74.2 (73-76)
Odonto- phore	71	211, 216	67 (62-74)	66.5 (65-69)	60 (55-65)	59.5, 60.5	54.5 (50-59)	52 (51-55)	42 (41-43.5)	32.5 (29-35)
Stylet	209	-	200 (188-215)	200.2 (191.5-207)	172 (166-180)	178, 175	144 (130-135)	148.5 (109-117)	115 (110-123)	91 (89.5-92)
Guiding ring	107	107, 106	116*** (108-123.5)	113 (103-118.5)	-	103, 126.5	-	81 (75-84.5)	64 (63.2-65.1)	48.5 (45.2-51.5)
Tail length	27	24, 29	23 (20-27)	25 (23-27)	26.5 (23-28)	28, 27.5	33.5 (28-41)	35.5 (34-37)	38.5 (36-40)	47 (44-50)
Ant. uterus		120, 170	146*** (107.9-123.5)	143 (136-148)	-	-	-	-	-	-
Post. uterus		134, 190	159*** (141-185)	165**** (156-175)	-	-	-	-	-	-
Number of caudal pores	1	1, 2	1.8*** (1-2)	2 (2-2)	-	-	-	-	-	-

\* Luc (1958); \*\* Luc (1981); \*\*\*n = 10; \*\*\*\*n = 2.

unique structure of the amphids, with amphidial slit very wide (about 80% of the corresponding body diameter), wavy instead of straight as typical in other species of the genus, and rather short fovea, were observed.

*Juveniles:* Generally similar to females, *e.g.*, in the characters of labial and amphidial areas. Tail length and shape change during postembryonic development. Tail mean length shortens from 48.5  $\mu\text{m}$  to 38.5  $\mu\text{m}$  (J2), 34  $\mu\text{m}$  (J3), and 26.5  $\mu\text{m}$  (J4), which is comparable to the overall mean tail length of females (23  $\mu\text{m}$ ). Tail shape also changes. J1 tail is long conical, slightly concave ventrally and clearly convex dorsally, with terminal portion more or less spicate, and extremity rounded. In J2 tail, the ventral curvature

and the spicate terminal portion are less pronounced. J3 tail appears conical, with both ventral and dorsal profiles concavely curved close to tip; the spicate portion is shorter. In J4, the spicate terminal portion has disappeared and the tail is conoid-rounded, with dorsal and ventral curved profile similar or nearly so. This J4 tail differs from female tail only by its actual (see above) and relative length (*c'* ca 0.9 in J4 and 0.8 in female). So the juvenile tail shape corresponds to the type of variation with three different shapes: elongated (*c'* = 3), conical, and spicate in J1, more plump (*c'* = 1.8) with rounded-conical shape and shorter mucro in J3 (J2 being intermediate), and rounded without mucro in J4 and female.

**Table 3.** Morphometric data for *Xiphinema algeriense* Luc & Kostadinov, 1982 (All measurements in  $\mu\text{m}$ , except L in mm).

	Algeria*		Senegal				
	Females	J4	Female	J4	J3	J2	J1
n	10	1	1	3	5	8	7
L	4.27 (3.91-4.96)	2.9	4.65	3.02 (2.67-3.40)	2.12 (2.0-2.25)	1.39 (1.31-1.57)	1.03 (0.97-1.06)
a	107.2 (97.8-118.2)	96.5	145.0	103.9 (99.2-112.7)	82.4 (71.1-89.6)	64.1 (52.7-73.6)	52.6 (47.8-57.9)
b	9.7 (7.4-9.8)	7.3	10.9	8.1 (7.6-9.1)	6.6 (6.3-6.9)	5.1 (4.7-5.5)	4.2 (4.0-4.4)
c	102.7 (86-124)	55.4	145.0	64.8 (54.7-77.6)	40.3** (38.1-42.6)	26.8 (24.0-29.8)	21.5*** (20.4-23.2)
c'	1.7 (1.5-2.1)	2.2	2.05	2.2 (2.1-2.4)	3.2** (2.7-3.6)	3.8 (2.9-4.5)	3.9*** (3.5-4.2)
V	48.8 (47.1-50.4)	-	52.7	-	-	-	-
Odontostyle	116 (106-125)	101	108	89.8 (88.5-92)	74.7 (72-76)	64.1 (60-68)	49.4 (49-51)
Repl. odont.		112	-	102.9 (101-107)	88.6 (86-92)	74.7 (73-78)	66.0 (64-68)
Odontophore	63 (56-66)	60	58	51.2 (50-52.5)	47.1 (45-49)	41.7 (40-44)	38.3 (38-39)
Stylet	179 (163-190)	161	166	141.3 (140-143)	121.7 (117-124)	105.7 (102-111)	87.8 (87.5-88.5)
Guiding ring	96 (88-105)	-	100	76.8 (74-80)	65.6 (64-67)	52.8 (51-56)	41.3 (40-43)
Tail length	42 (36-47)	54	32	47.0 (44-51)	52.2** (50-53.5)	52.3 (45-60)	47.4*** (46-49)

\* from Luc and Kostadinov (1982); \*\*n = 4; \*\*\*n = 6.

#### REMARK

The code (see Loof & Luc, 1990) for *X. yapoense* must be modified as follows: A4 - B4 - C7a (instead of C7b) - D6 - E34 - F23 - G23 - H2 - I3 - J67a (instead of 6b) - K2 (instead of ?) - L1.

#### *Xiphinema algeriense* Luc & Kostadinov, 1982 (Fig. 4)

A small population of this species was found deep (50-100 cm depth) in sandy soil (2.8% clay; 1.0% fine loam; 4.6% coarse loam; 61.7% fine sand; 30.4% coarse loam;  $\text{pH}_{\text{H}_2\text{O}}$  5.3;  $\text{pH}_{\text{KCl}}$  4.9; 2.1‰ total carbon; 0.19‰ total nitrogen) in the rhizosphere of millet (*Pennisetum typhoides* Rich.), at Nebe (km 5, road Diourbel to Kaolack), Senegal. Only one female was present but all the juvenile stages were represented.

This species was originally described from highly sandy soil, around roots of declining grapevine in Algeria (Luc & Kostadinov, 1982).

#### MEASUREMENTS

*Female* and *Juveniles*: see Table 3.

#### OBSERVATIONS

*Female*: The female from Senegal generally conforms with the original description, with minor differences: body slimmer ( $a = 145$  vs 97.8-118.2), vulva slightly more posterior ( $V = 52.7$  vs 47.1-50.4), tail somewhat shorter ( $32$  vs 36-47  $\mu\text{m}$ ;  $c = 145$  vs 86.2-123.9), Z-organ less muscular and with more numerous and smaller inclusions (but it is difficult to observe since it is located in a circonvoluted portion of the uteri and cannot be observed in lateral view), and uterus with small spines (spines are also present in two of the five paratypes examined).

The diagnostic morphological characters of the species were observed in the Senegalese female, *i.e.*, knob-like anterior end separated from the rest of the body by a deep groove, circular line present at level of the groove, narrow amphids with aperture slit length

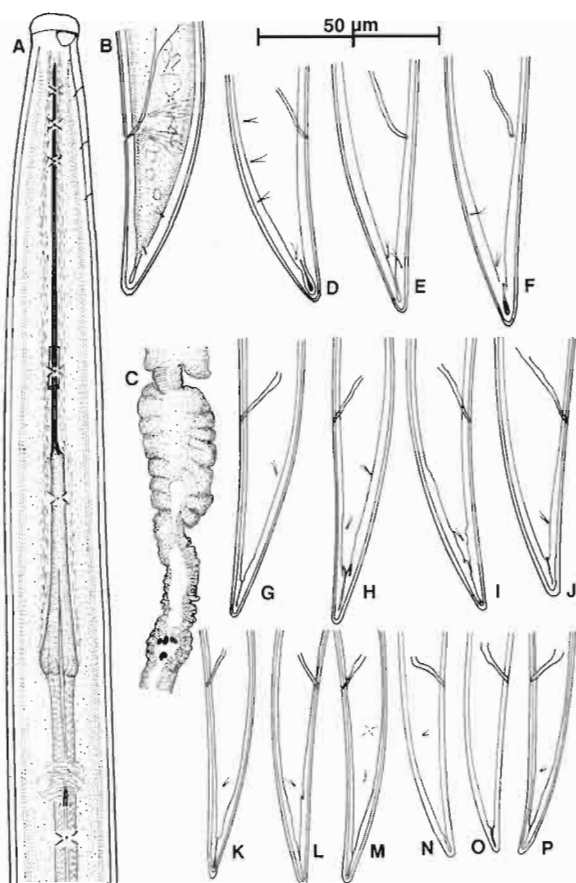


Fig. 4. *Xiphinema Algeriense* Luc & Kostadinov, 1982 - Female. A: Anterior part; B: Tail; C: Anterior uterus - Juveniles tails; D-F: J4; G-J: J3; K-M: J2; N-P: J1.

less than half the corresponding body diameter, absence of ventral body pores and presence of only a few dorsal body pores, stylet flanges weakly developed, presence of Z-organ, and tail conical, with terminal inner canal expanded at its extremity.

*Juveniles:* The juveniles generally resemble the female. The tail has the same shape and anatomy in all stages, i.e., similar to female tail, conical with tail

ventral profile in line with body profile and a slight and progressive dorsal curvature, tail extremity rounded, and inner canal pronounced but less expanded terminally than in female. The tail length is rather constant in the different juvenile stages and the female, but the diameter at anus level increases from J1 to adult, so the mean value of c' also decrease, from 3.9 for J1 to 2.2 for J4.

REMARKS

The present observations confirm the peculiar characteristics of this species (see Luc & Kostadinov, 1982). In particular, the thin body (a over 100), the very tapering neck portion, the button-like lip area, the narrow amphidial slit, and the reduced odontophore flanges are somewhat similar to the genera *Longidoroides/Paralongidorus*.

The finding is also interesting because it demonstrates that this species is present in areas situated North and South of the Sahara desert, in both cases in a very sandy soil.

The codes for *X. Algeriense* (see Loof & Luc, 1990) must be modified or completed as follows: A4 - B1 - C3 - D4 - E56 (instead of 5) - F45- G2 - H3 -I23 (instead of 3) - J3 - K2 (instead of ?) - L2.

References

DELWAULLE, U.C. & LAPLACE, Y. (1988). La culture industrielle de l'Eucalyptus en République populaire du Congo. *Bois For. trop.*, 216: 35-42.

HEYNS, J. (1965). Four new species of the genus *Xiphinema* (Nematoda: Dorylaimoidea) from South Africa. *Nematologica*, 11: 87-99.

LOOF, P.A.A. & LUC, M. (1990). A revised polytomous key for the identification of species of the genus *Xiphinema* Cobb, 1913 (Nematoda: Longidoridae) with exclusion of the *X. americanum*-group. *Syst. Parasitol.*, 16: 35-99.

LUC, M. (1958). *Xiphinema* de l'ouest africain: description de cinq nouvelles espèces (Nematoda: Dorylaimida). *Nematologica*, 3: 57-72.

LUC, M. (1981). Redescription of *Xiphinema yapoense* and description of male and juveniles of *X. douceti* (Nematoda: Longidoridae). *Nematologica*, 27: 199-206.

LUC, M. & KOSTADINOV, A. (1982). *Xiphinema Algeriense* n. sp. (Nematoda: Longidoridae). *Bull. Mus. natn. Hist. nat., Paris, 4ème sér.*, 3, section A (1981): 777-781.