

The genus *Xiphinema* in southern Africa. XI. Description of *Xiphinema stockeri* n. sp. from Botswana (Nematoda: Dorylaimida)

J.C. de W. Kruger and J. Heyns

Department of Zoology, Rand Afrikaans University, Johannesburg

Xiphinema stockeri n. sp. is described from Botswana. The new species is characterized by an exceptionally long and conspicuous peg on the tail, and seems to be most closely related to *X. mammatum* Siddiqi, 1979, from which it can be distinguished by the a ratio, odontostyle and total stylet length, spicule length, the shape of the lip region and tail peg and the presence of a pseudo-z differentiation in *X. stockeri*.

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Xiphinema stockeri n. sp. word uit Botswana beskryf. Die nuwe spesie word gekenmerk deur 'n besonder lang en opvallende stertpen, en is skynbaar die naaste verwant aan *X. mammatum* Siddiqi, 1979, waarvan dit egter onderskei kan word deur die a-verhouding, odontostekel en totale stekellengte, spikulumlengte, lipvorm en stertpen en die aanwesigheid van 'n pseudo-z-differensiasie by *X. stockeri*.

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Specimens of an unknown *Xiphinema* species were collected in Botswana by Mr Gerhard Stocker during a survey in July, 1984. Both fresh and glycerine-mounted specimens were studied, and female sexual systems were dissected from fresh specimens to enhance the study and visibility of especially the pseudo-z organ. Specimens mounted on permanent slides were killed and fixed in hot F.A.A., then dehydrated and processed into glycerine according to Thorne's slow method. The body diameter has been corrected for flattening according to the formula $d = 1/2 (h + v)$, as given by Géraert (1961). This corrected a ratio is indicated as a' in Table 1. Coiled or curved structures (entire body, prerectum, uterus, oviducts, spicules) were measured along their median line with the aid of a precision curvimeter.

The new species is named after its discoverer.

Xiphinema stockeri n. sp. (Figures 1–3)

Morphometric data in Table 1.

Female

Body posture of heat-relaxed specimens ranging from somewhat ventrally curved to an open C-shape, mostly with a rather abrupt ventral flexure near the posterior end, as can be seen in Figure 2I. Cuticle 3,0–3,3 μm thick over greater part of body, 2,5–2,8 μm just posterior to lip region, 7,0–8,0 μm dorsally on tail and 4,0–4,5 μm ventrally on tail. Lip region 10–11 μm wide. With little variation in shape of lip region, which is rounded and slightly narrower than adjoining body, from which it is separated by a very shallow depression. Amphids typical of the genus, with the aperture just anterior to the shallow depression, and about two-thirds the lip region width. Odontostyle slender but well developed; the odontophore with relatively small flanges. Vestigium conspicuous, exceptionally long, 3,5–5,5 μm , and situated fairly far forward in the anterior slender part of the pharynx, sometimes even next to the flanges. Hemizonid 5,5–7,0 μm broad, 163–186 μm from anterior end. Hemizonion indistinct, 41–59 μm posterior to hemizonid. Nerve ring distinct, 191–210 μm from anterior end. Ventrosublateral gland nuclei situated beyond middle of basal bulb (Figure 2C). Gland nuclei and their outlets located as follows ($n=9$): DO = 8,9 (7,8–10,1); DN = 12,4 (9,7–15,2); LSN = 58,0 (56,0–59,9); RSN = 60,4 (58,2–62,5); SO = 84,5 (81,4–87,6). Cardia fairly distinct, bluntly conoid, 5,0–5,5 μm long. Intestine tessellated, two to three cells broad in lateral view. Prerectum obscure, relatively long, 465–490 μm in length, which is 17 to 18 times the anal body diameter. Rectum 26,5–29,5 μm long, about equal to the anal body diameter.

J.C. de W. Kruger and J. Heyns*

Department of Zoology, Rand Afrikaans University, P.O. Box 524, Johannesburg, 2000 Republic of South Africa

*To whom correspondence should be addressed

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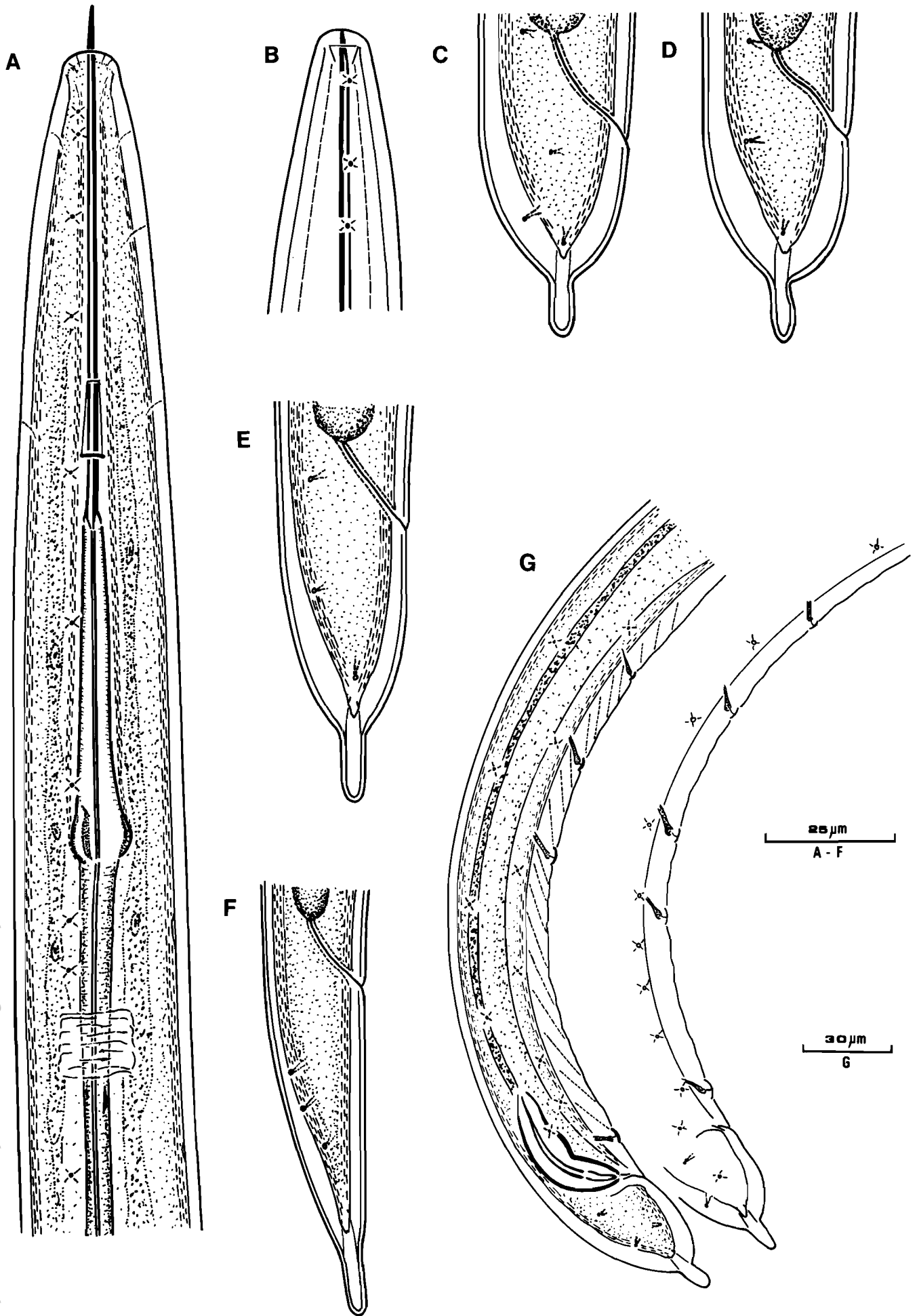


Figure 1 *Xiphinema stockeri* n. sp. A. Anterior body region. B. Head end. C & D. Female tail. E. Tail of pre-adult juvenile. F. Tail of third stage juvenile. G. Posterior body region of male.

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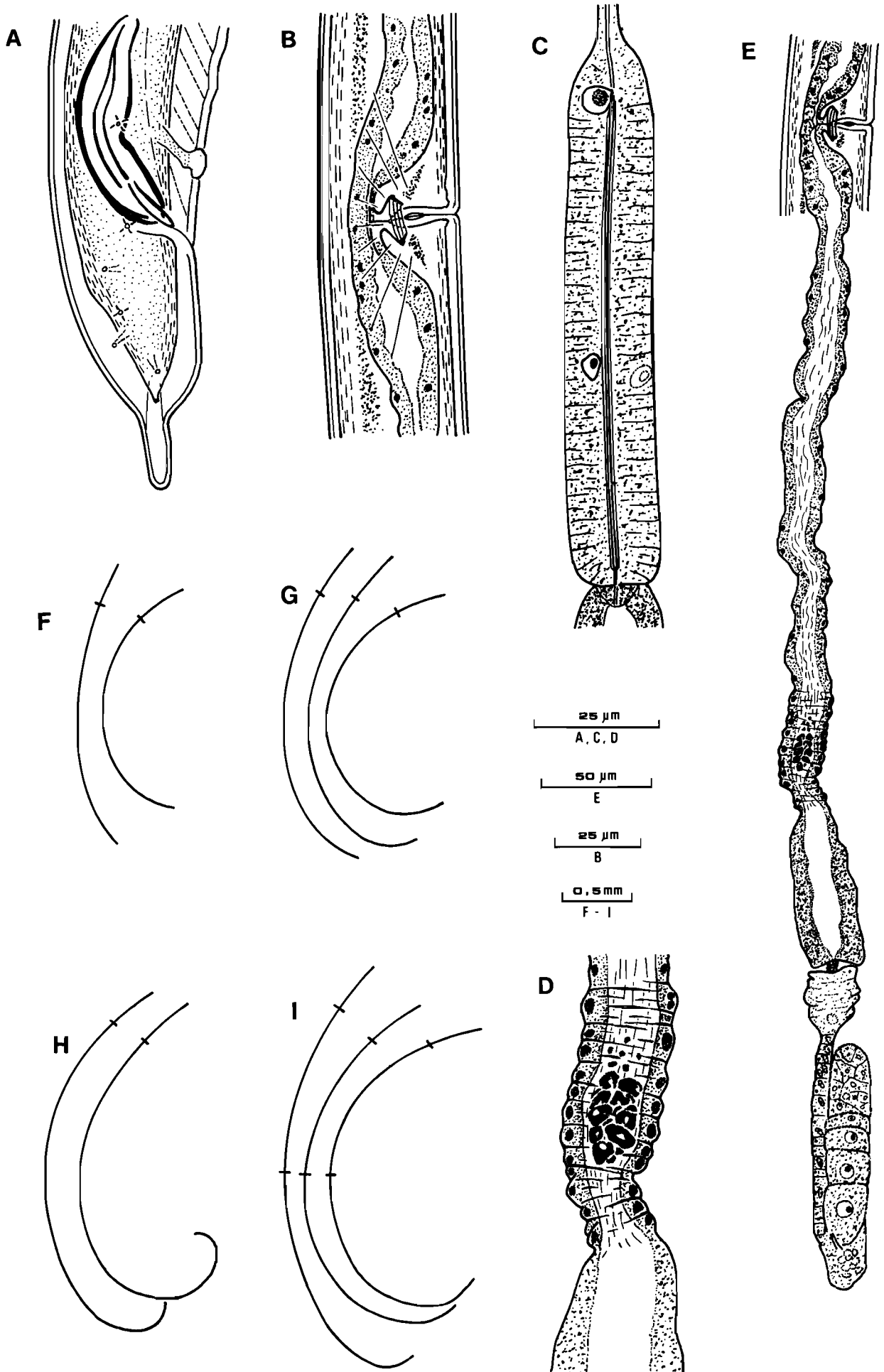


Figure 2 *Xiphinema stockeri* n. sp. A. Male tail. B. Ovejector region. C. Enlarged part of pharynx. D. Pseudo-z organ. E. Female reproductive system, posterior branch. F. Heat-relaxed body shape of third stage juvenile. G. Heat-relaxed body shape of pre-adult juvenile. H. Heat-relaxed body shape of male. I. Heat-relaxed body shape of female.

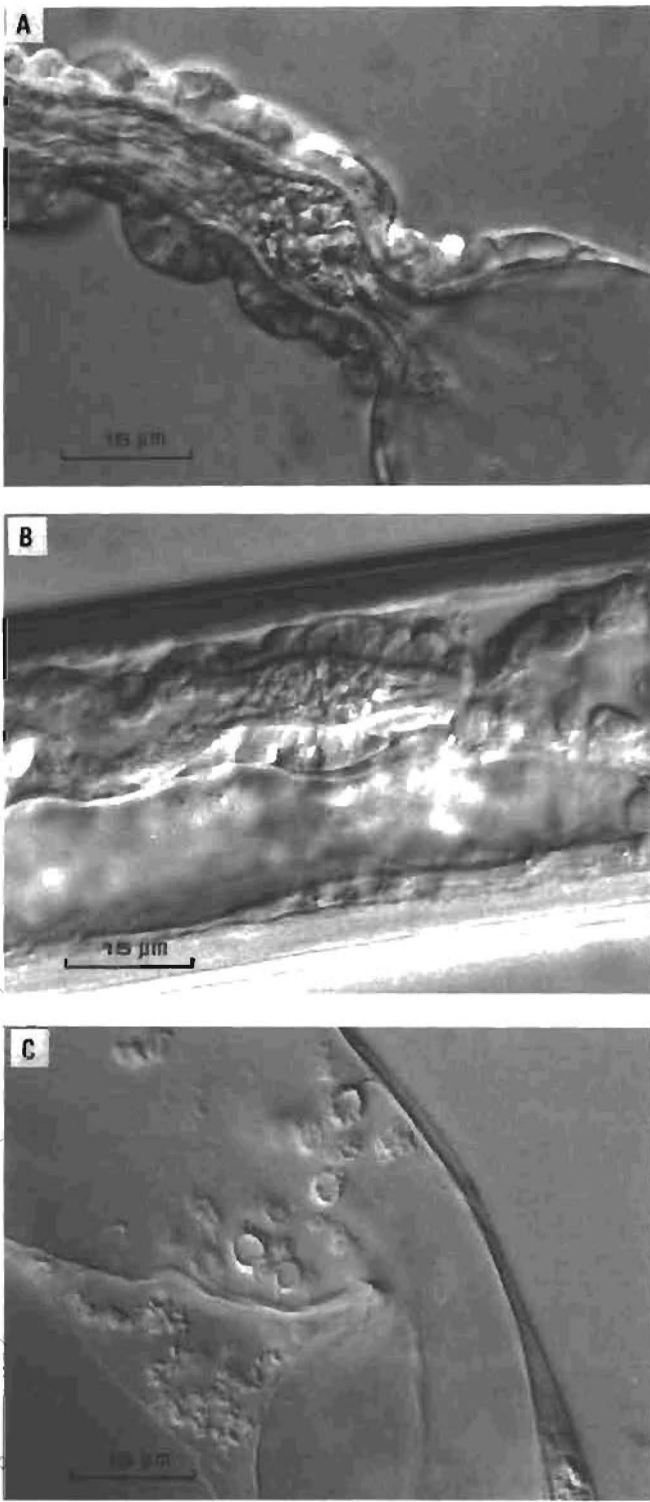


Figure 3 Structure of the pseudo-z organ of *X. stockeri* n. sp. A. Pseudo-z organ (reproductive system dissected). B. Pseudo-z organ (reproductive system *in situ*). C. Vesicles with stemlike processes (as seen in dissected specimens).

Tail hemispherical, slightly more convex ventrally than dorsally, with a very prominent peg situated approximately on the central axis of the body. Tail 40–50 µm long, the peg 11–12,5 µm long and 4–6 µm wide. With two or three pairs of caudal pores.

Female sexual system didelphic, with the posterior branch slightly more strongly developed. Both branches sometimes coiled to a greater or lesser degree. Each branch consisting of a relatively long, reflexed ovary with four or five oocytes; 50–80 µm long oviduct with spermatozoa in its proximal

part; slightly broadened pars dilatata oviducti (26–34 µm long); distinct sphincter muscle; pars dilatata uteri (57–73 µm long) with closely packed spermatozoa in its proximal part; uterus (excluding pars dilatata) varying in length from 185–268 µm and containing a distinct pseudo-z organ; and weakly demarcated ovejector of 80–115 µm. Vagina 24–25 µm long. No uterine eggs observed.

The pseudo-z differentiation (Figures 2D, 3A & B) consists of 15 to 28 irregularly rounded and closely associated inclusions or granular bodies of 1,5–4,5 µm in diameter and occupying an area of 16–20 µm some 21–35 µm from the proximal end of the pars dilatata uteri. In freshly dissected specimens each inclusion can be seen to contain a central vesicle, and to be attached to the wall of the uterus by a stem-like process (Figure 3C). The wall of the uterus in this area seems to be more strongly muscular. No spine-like structures could be seen in the uterus, not even in the freshly dissected specimens.

Male

Similar to female, except that posterior part of body is more strongly ventrally curved (Figure 2H). Sexual system typical of the genus. Spicules well developed. Crurae slightly curved, moderately sclerotized. Adanal pair of papillae situated 16–17 µm anterior to anus. Ventromedian papillae mostly three (71% of the males), sometimes four (15%) or two (14%); irregularly distributed (Figure 1G).

Juvenile

Only third and fourth stage juveniles were found. These resemble adults except for smaller size, body posture, being less strongly ventrally curved than adults, and differences in tail length and shape. Morphometric data of juveniles in Table 1.

Diagnosis

Xiphinema stockeri n. sp. closely resembles *X. mammatum* Siddiqi, 1979 and is also quite similar to *X. mammillatum* Schuurmans Stekhoven & Teunissen, 1938 and *X. manubriatum* Luc, 1975.

It can be distinguished from *X. mammatum* by the a ratio (70–82 versus 67), odontostyle length (98–105 µm versus 109–111 µm) resulting in a shorter total stylet length for *X. stockeri* (161–177 µm versus 178–183 µm), spicule length (50–58 µm versus 58–63 µm), slight differences in the shape of the lip region and tail peg and the presence of the pseudo-z differentiation in *X. stockeri*.

The most important differences that distinguish *X. stockeri* from the abovementioned species can be seen in Table 2.

Type locality and habitat

Type population consisting of 12 females, 14 males and 46 larvae from sandy soil in a dense stand of mopane (*Colophospermum mopane*), near Letlakane, Botswana, collected by G. Stocker, July 1984.

Type specimens

Holotype female on slide RAU type 165, paratypes on slides RAU type 166–186 in the nematode collection of the Department of Zoology, Rand Afrikaans University. Other paratypes deposited in the National Collection of Nematodes at the Plant Protection Research Institute, Pretoria, on slides 18589–18590, and one paratype in each of the following collections: Agricultural University, Wageningen, The Netherlands; Laboratorium voor Morfologie en Systematiek, Rijksuniversiteit Gent, Belgium; Muséum National d'Histoire Naturelle,

Table 1 Morphometrical characters of *Xiphinema stockeri* n. sp.

	Holotype	Paratypes		Juveniles	
	Female	Females	Males	Pre-adult juveniles	Third stage juveniles
<i>n</i>	1	11	6	7	5
L (mm)	3,25	3,25 (3,06– 3,62)	3,25 (2,97– 3,51)	2,50 (2,31– 2,68)	1,91 (1,83– 2,04)
a	81,3	75,9 (69,8 – 82,1)	78,8 (75,3 – 85,5)	69,9 (65,0 – 76,1)	62,7 (57,4 – 66,9)
a'	84,4	80,2 (74,0 – 84,4)	81,3 (76,1 – 85,5)	72,8 (68,4 – 76,1)	64,4 (60,8 – 67,1)
b	7,7	8,2 (7,5 – 9,2)	8,7 (8,1 – 9,9)	6,9 (6,2 – 7,5)	6,4 (5,9 – 7,2)
c	73,8	74,6 (64,8 – 83,0)	70,4 (66,0 – 79,5)	45,7 (39,6 – 49,1)	33,0 (27,7 – 40,0)
c'	1,49	1,52 (1,37– 1,69)	1,52 (1,37– 1,76)	2,18 (1,88– 2,60)	2,91 (2,49– 3,34)
V%	46,0	46,5 (44,3 – 50,0)	–	–	–
Odontostyle (µm)	103,8	102,1 (98,3 – 105,0)	102,9 (99,4 – 107,5)	85,0 (82,5 – 87,5)	69,1 (68,1 – 70,6)
Odontophore (µm)	70,0	69,0 (65,0 – 75,0)	66,2 (61,9 – 69,4)	59,6 (58,1 – 61,3)	50,3 (48,8 – 52,5)
Total stylet (µm)	171,3	168,3 (161,3 – 176,6)	166,8 (160,0 – 172,5)	142,4 (140,6 – 145,0)	117,9 (116,3 – 121,3)
Width of lip region (µm)	10,5	10,6 (10,0 – 11,0)	10,5 (10,0 – 11,0)	9,2 (9,0 – 9,5)	8,3 (8,0 – 8,5)
Width of flanges (µm)	11,0	11,4 (10,5 – 12,5)	11,5 (10,5 – 12,3)	11,0 (10,5 – 11,5)	9,2 (9,0 – 9,5)
Basal guiding ring to					
front end (µm)	81,3	84,1 (79,4 – 90,0)	84,8 (76,9 – 91,3)	63,5 (55,0 – 68,8)	51,6 (47,5 – 53,8)
Basal bulb length (µm)	103,3	99,0 (93,0 – 104,0)	101,0 (98,0 – 103,0)	94,0 (90,0 – 99,0)	80,0 (76,0 – 83,0)
Basal bulb width (µm)	17,5	19,0 (17,5 – 21,0)	19,0 (18,0 – 21,0)	17,0 (16,0 – 18,0)	16,0 (15,0 – 17,0)
Hyaline tail tip (µm)	16,8	16,4 (15,0 – 18,8)	14,7 (12,5 – 18,0)	16,7 (15,0 – 17,5)	15,2 (14,5 – 16,0)
Tail length (µm)	44,0	43,8 (40,0 – 50,0)	46,2 (42,8 – 48,0)	54,8 (46,5 – 60,5)	58,9 (50,8 – 66,0)
Replacement odontostyle length (µm)	–	–	–	103,0 (99,4 – 105,0)	83,8 (80,0 – 88,8)
Body width					
Ca	27,1	28,8 (26,8 – 30,8)	28,9 (28,0 – 29,8)	–	–
Mid-body	38,5	41,0 (36,6 – 45,4)	40,6 (38,5 – 42,6)	–	–
Anal body	26,8	27,8 (25,3 – 30,3)	32,9 (27,4 – 38,4)	–	–
Length of spicules	–	–	53,7 (50,0 – 57,5)	–	–
Length of crurae	–	–	12,8 (12,5 – 13,0)	–	–

Table 2 Comparison of morphometrical characters of *Xiphinema stockeri* n. sp. and three other *Xiphinema* species

	<i>X. stockeri</i> n. sp.	<i>X. mammatum</i> Acc. to Sidiqi (1979)	<i>X. mammillatum</i> Acc. to Luc & Tarjan (1963)	<i>X. manubriatum</i> Acc. to Luc (1975)
<i>n</i>	12	1	4	23
L (mm)	3,1– 3,6	3,2	2,5– 2,9	1,8– 2,2
a	70,0– 82,0	67	43– 51	39– 53
b	7,5– 9,2	7,5	5,3– 5,8	4,0– 6,6
V%	44,3– 50,0	44,6	38– 42	51– 56
Odontostyle (µm)	98,3– 105,0	110	126 ^a	132– 144
Odontophore (µm)	65,0– 75,0	73	78 ^a	61– 70
Total stylet (µm)	161,3– 176,6	183	190– 210	194– 210
Width of lip region (µm)	10,0– 11,0	11,5	12,6 ^a	13
Tail length (µm)	40,0– 50,0	46	28– 38	42– 60
Length of peg (µm)	11,0– 12,5	13,0	3,5– 10,0 ^a	17– 30
Males present	Yes	Yes	No	No
Pseudo-z-differentiation	Irregularly rounded globular bodies	Absent (Only stellate spines)	Absent	With a true z-organ

^aCalculated from Luc & Tarjan's (1963) illustration.

Paris, France; and the Commonwealth Institute for Parasitology, St Albans, England.

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