

Description of two new *Longidoroides* species (Nematoda: Dorylaimida) from South Africa, with a note on *L. strelitziae* (Heyns, 1966)

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Summary – Two new *Longidoroides* species are described from South Africa, and compared with *L. strelitziae*, which they closely resemble. *L. seinhorsti* n. sp. is distinguished by a unique amphid structure, while *L. jacobsi* n. sp. is characterised by a very small amphid aperture, slender body, truncate lip region, and short odontostyle. Jacobs and Heyns (1982) previously identified specimens of this species as *L. strelitziae*. Some comments are made on *L. strelitziae* after the type specimens of this species were examined. Comments are also made on the status of genera in the Longidoridae. © Orstom/Elsevier, Paris

Résumé – Description de deux nouvelles espèces de *Longidoroides* (Nematoda: Dorylaimida) d'Afrique du Sud et note sur *L. strelitziae* (Heyns, 1966) – Deux nouvelles espèces de *Longidoroides* d'Afrique du Sud sont décrites et comparées à *L. strelitziae* dont elles sont très proches. *L. seinhorsti* n. sp. est caractérisé par la structure unique des amphides, alors que *L. jacobsi* n. sp. est caractérisé par une ouverture amphidiale réduite, un corps étroit, une région labiale tronquée et un odontostyle court. Jacobs et Heyns (1982) avaient préalablement identifié les spécimens de cette espèce comme *L. strelitziae*. Des commentaires sont faits sur *L. strelitziae* dont des spécimens types ont été examinés ainsi que sur le statut des genres de Longidoridae. © Orstom/Elsevier, Paris

Keywords : Nematoda, Longidoridae, *L. jacobsi* n. sp., *L. seinhorsti*, n. sp., *Longidoroides strelitziae*.

Longidoroides strelitziae (Heyns, 1966) Khan, Chawla & Saha, 1978 was described from Port St. Johns in the Transkei, Eastern Cape Province, South Africa. In 1982 Jacobs and Heyns gave a short description of six specimens collected in sugar cane fields in two nearby localities in northern Kwa-Zulu-Natal. These specimens were identified as *L. strelitziae* in spite of several morphological differences. Recently, the author examined two new *Longidoroides* populations resembling *L. strelitziae*. The first one is a large population from sugar cane near Mtubatuba, in the same area as the populations of Jacobs and Heyns. SEM photographs of a specimen from this population were previously published by Swart and Heyns (1987a, b) under the name *L. strelitziae*. A second, smaller population was collected near Christiana in the North West Province. Although both of these populations resembled *L. strelitziae*, they could not be assigned to this species with certainty. This prompted a re-examination of the type specimens and of the specimens studied by Jacobs and Heyns (1982). This led to the conclusion that these specimens are conspecific with the Mtubatuba population, which is now regarded as a distinct species and is herein described as *Longidoroides jacobsi* n. sp. The population from Christiana is likewise described as a new species under the name *Longidoroides seinhorsti* n. sp.

Longidoroides strelitziae (Heyns, 1966) Khan, Chawla & Saha, 1978

= *Longidorus strelitziae* Heyns, 1966
= *Paralongidorus strelitziae* (Heyns, 1966)
Aboul-Eid, 1970
(Fig. 1 A-C; Table 1)

The original description of this species was based on several specimens collected around the roots of *Strelitzia nicotae* in virgin sandy soil near the beach opposite 'Bird rock' beyond Third Beach at Port St. Johns in the Transkei, Eastern Cape Province, in January and December 1964. Unfortunately, the holotype and paratypes which were in the nematode collection of the Plant Protection Research Institute in Pretoria were borrowed in the early 1970's and never returned, and are now considered lost. Two paratypes which were deposited in the Rothamsted collection, one male and one female (slides 168/19/1 and 168/19/2 respectively) are in near perfect condition, and their examination confirmed the accuracy of the original description and illustrations as presented by Heyns (1966).

COMMENTS

The Rothamsted specimens are both very flattened. A comparison of the a-ratios calculated with non-corrected as well as corrected body diameters (using the

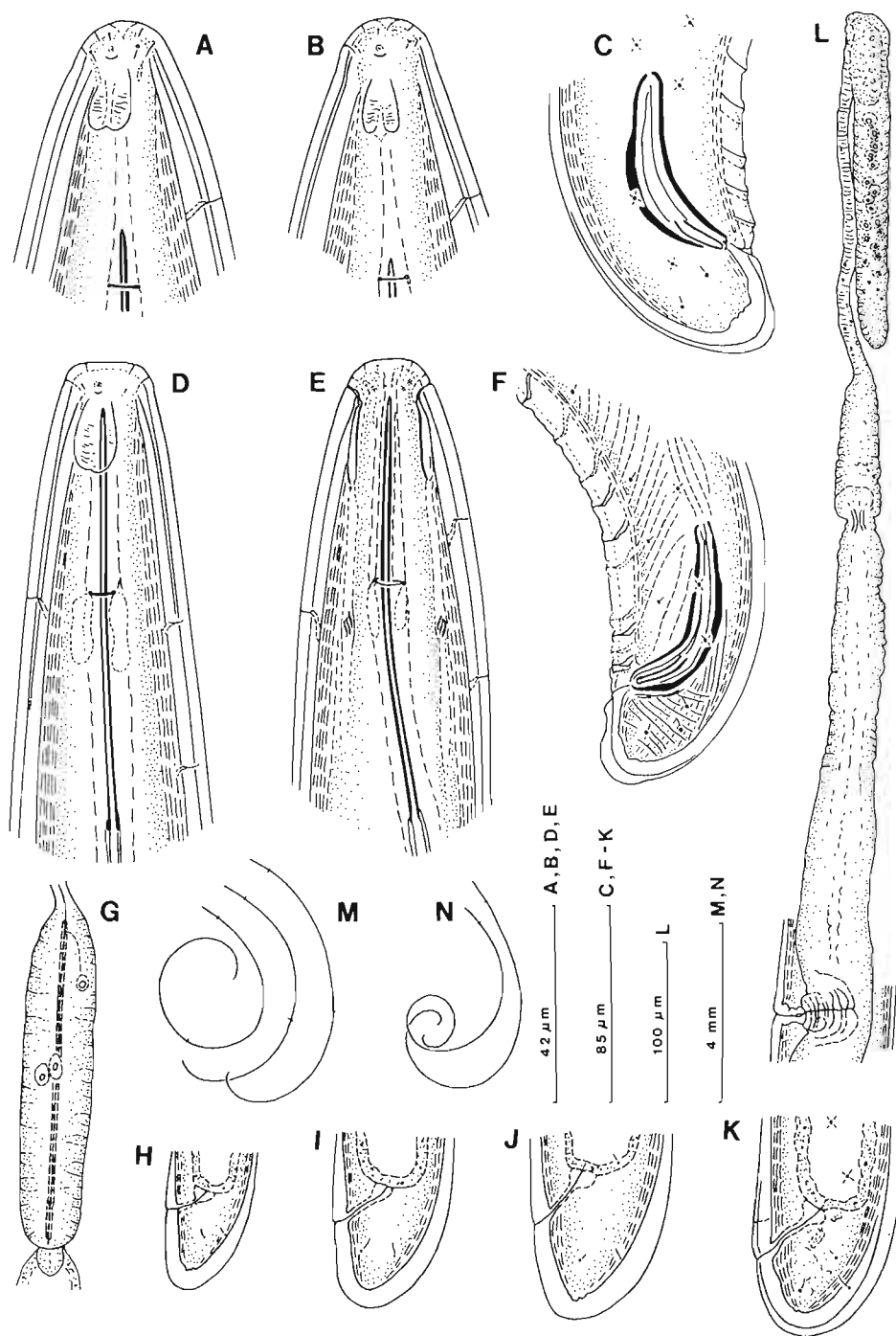


Fig. 1. *Longidoroides strelitziae*. A: Head of paratype female; B, C: Head and tail of paratype male — *Longidoroides jacobsi* n.sp. D, E: Head, lateral and dorso-ventral views, respectively; F: Male tail; G: Basal bulb; H: Tail of J3; I, J: Tail of J4; K: Female tail; L: Anterior branch of reproductive system; M, N: Body posture of female and male, respectively.

Table 1. Morphometric data of *Longidoroides strelitziae* Heyns, 1966 and *L. seinhorsti* n. sp. (all measurements in μm , except *L.* in mm.).

	<i>L. strelitziae</i>				<i>L. seinhorsti</i> n. sp.				
	Female		Male		J3	J4	Female		Male
	Acc. to Heyns (1966)	Paratype*	Acc. to Heyns (1966)	Paratype*			Holotype	Paratypes	
n	4		2		2	9			1
L	5.48-7.46	5.83	4.98-5.50	5.37	3.30 ; 3.56	4.90 (4.11-5.96)	6.7	5.56-9.08	7.22
a	54-67	53/83**	54-66	53/77**	65 ; 61	78 (72-89)	72	66-89	102
b	9.4-13.0	13.1	10.2-14.9	10.5	6.9 ; 10.2	10.7 (9.0-12.3)	12.6	12.9-16.5	16
c	148-161	182	119-179	149	90 ; 108	131 (105-148)	168	150-216	134
c'	0.5-0.6	0.5	0.6-0.7	0.65	1.01 ; 0.85	0.83 (0.69-1.00)	0.71	0.70-0.79	1.06
V	48-50.5	50	-	-	-	-	50.1	49.9-51.2	-
Tail length	27-30	32	28-34	36	36.5 ; 33	37.6 (33-41)	40	37-45	54
Lip region diam.	18-19	19	?	19	11.5 ; 11	14.1 (13-15)	16	16-17	16
Odontostyle	117-131	127	123	120	85 ; 80	93.3 (88.5-99)	97	105-115	102
Repl. od.style	-	-	-	-	92 ; 94	104 (99-111)	-	-	-
Odontophore	70-82	82	70	103	61 ; 56	71 (68-77)	75	67-89	70
Stylet	191-210	209	193	223	146 ; 136	164 (158-171)	172	174-204	172
Guiding ring to front end	55-65	56		56	32.5 ; 33	37.2 (33-40)	43	41-48.5	46
Greatest body diam.	-	110/70**	-	102/70**	51 ; 58	59 (54-67)	93	84-102	71
Anal body diam.	-	67	-	55	36 ; 39	45.3 (39-51)	56	52-60	51
Rectum length	37	37	-	-	-	-	29	33-34	-
Spicule length	-	-	88-91	96	-	-	-	-	83
Lateral guiding pieces	-	-	20	26	-	-	-	-	23

*Borrowed from Rothamsted Experiment Station

**Uncorrected and corrected values

correction formula of Geraert, 1961) with the a-ratios in Heyns (1966) indicates that the specimens were already quite flattened at the time of the original description. This should be kept in mind when comparing the morphometrics of the three species in

Tables 1 and 2, since not only a-ratio, but also c and c' are affected by flattening, as shown by Heyns (1983).

The number and arrangement of supplements in the Rothamsted male paratype are rather similar to those illustrated by Heyns (1966, Figs 28-29) and

described as "a more or less equidistant ventromedian series of twelve or thirteen, diverging into two lines posteriorly so that there are three pairs in the region of the spicules, the last of which may be regarded as the adanal pair." In the Rothamsted specimen, there are ten ventromedian supplements followed by eight off-centre, staggered supplements, becoming more closely approximated posteriad so that the final two form an adanal pair.

In Table 1, the original measurements given by Heyns (1966) are compared with data obtained from the Rothamsted paratypes. Additional measurements, not previously given, are the following: amphid aperture 3 μm long, constituting 15.2-15.8% of the lip region diameter as measured at the level of the outer circlet of labial papillae. Distance from amphid aperture to base of bilobed fovea 15.5 - 18.5 μm .

***Longidoroides seinhorsti* n.sp.**

(Figs 2D, E; 3A-S)

MEASUREMENTS

See Table 1

DESCRIPTION

Adults: Cuticle 4-5.5 μm thick on anterior part of neck, 4.5-6 μm around midbody, 12.1 (9.5-14) μm dorsally on female tail, only 6 μm dorsally on male tail, and 12.8 (11-15) μm around tail terminus (=h) in both sexes. Body pores indistinct except on front part of neck, arrangement typically longidoroid, with seventeen to twenty lateral, five to seven dorsal, and nine to eleven ventral pores in neck region. Lip region evenly rounded and confluent with body. Amphid aperture crescent-shaped, 4-4.5 μm long, or 25.0-28.1% of lip region diameter at level of outer circlet of labial papillae. A funnel-shaped structure present posterior to the aperture, internally in the fovea, with the stem of the funnel projecting between the two lobes of the fovea. Distance from aperture to base of fovea 14-16 μm . External wall of fovea thickened, darkly colored (sclerotized?), conspicuous in dorso-ventral view; this sclerotization apparently encircling the neck at the level of the foveae. Posterior one-fourth of fovea differentiated into a separate cavity. Stylet typical for the genus; base of odontophore difficult to observe. Pharyngeal bulb 149 (135-156) \times 27.8 (26-29) μm . Gland nuclei mostly indistinct. Cardia hemispherical.

Female: Relaxed body strongly ventrally arcuate, posture varying from open C-shape to more than one full circle. Tail bluntly rounded to hemispherical, bearing two pairs of caudal papillae. Reproductive system typical; vulva transverse; vagina reaching to middle of body diameter; without clearly demarcated ovejector; uterus a 337 (330-345) μm long broad

duct without *pars dilatata*, separated from oviduct by well-developed sphincter. Reflexed ovary 239 (200-287) μm long.

Male: Body of single male specimen strongly ventrally arcuate and describing more than two full circles. Tail conoid, dorsally convex, ventrally concave, with outer as well as inner layers of cuticle thickened around the terminus. Two pairs of caudal papillae near middle of tail, and a third pair at the level of the cloaca. Spicules 83 μm long (measured along curved median line). Lateral guiding pieces 23 μm long, exceptionally broad and heavily sclerotized. Supplements with rather prominent papillae. Number and arrangement of supplements as follows: nine ventromedian ones, followed by five off-centre, staggered ones, plus one adanal pair, making a total of sixteen, more or less equidistant supplements.

Juveniles: Only J3 and J4 found. Habitus, especially in J3, much less ventrally arcuate than in adults, otherwise similar to female in general appearance.

TYPE SPECIMENS

Holotype female, two paratype females and one paratype male in the collection of the Biosystematics Division, ARC-Plant Protection Research Institute, Pretoria, slides 31798-31801.

TYPE LOCALITY AND HABITAT

Soil among reeds and grasses on the bank of the Vaal River, Rob Ferreira Resort, Christiana, North-West Province, South Africa. Collected by E. van den Berg, 3 September 1990.

DIAGNOSIS AND RELATIONSHIPS

L. seinhorsti n. sp. is characterized by the unique structure of the amphid.

The new species differs from the very similar *L. strelitziae* in odontostyle length (97-115 *vs* 117-131 μm), position of the guiding ring (41-48.5 *vs* 55-65 μm from front end), diameter of lip region (16-17 *vs* 18-19 μm), and length of the amphid aperture (4-4.5 *vs* 3 μm , or 25-28 *vs* 15.2 - 15.8% of lip region diameter).

The new species differs from *L. jacobsi* n. sp. in odontostyle length (97-115 *vs* 83 -104 μm), a-ratio (66-102 *vs* 93* - 171 μm ; *based on non-corrected body diameter of a flattened specimen), shape of lip region (rounded *vs* flattened), and length of amphid aperture (4-4.5 *vs* 1.5 μm or 25-28 *vs* 8.8% of lip region diameter).

L. seinhorsti n. sp. differs from both the above mentioned species in the length of the fovea, which is only 14-16 μm compared with 15.5 - 18.5 μm in *L. strelitziae* and 17-20 μm in *L. jacobsi* n. sp.

***Longidoroides jacobsi* * n. sp.**

= *L. strelitziae* apud Jacobs & Heyns, 1982,
apud Swart & Heyns, 1987
(Figs 1D-N; 2A-C)

MEASUREMENTS

See Table 2

DESCRIPTION

Adults: Cuticle thickness: in anterior part of neck: 5.6 (5-6) μm in female and 6.3 (6-7) μm male; at mid-body: 4-5 μm in both sexes; on dorsal side of tail: 11.8 (10-13) μm in female and 7.3 (6-8) μm in male; and around tail tip (=h): 12.7 (11-15) μm in both sexes. Lateral body pores mostly distinct, ventral pores indistinct except the first few behind the lip region being quite conspicuous. Arrangement of pores typical, with three or four dorsal, nine to eleven ventral, and fifteen to eighteen lateral pores in neck region. Lateral chord exceptionally narrow, and lateral pores over greater part of body practically in a single line. Lip region rather truncate, continuous with body. Amphid aperture close behind outer lateral labial papilla, very small, only 1.5 μm long, which is only 8.5-8.8% of lip region diameter at level of outer circlet of labial papillae. Distance from aperture to weakly bilobed base of fovea 18.3 (17-20) μm . Stylet typical for the genus, odontostyle base without collar, and odontophore base, as seen with SEM, with three longitudinal ridges delimiting the three sinuses. Pharyngeal bulb 150 (137-170) \times 29.7 (27-33) μm . Gland nuclei and their outlets situated as follows: DO = 6.2 (5.1-9.3); DN = 19.9 (16.4-21.1). DO - DN = 12.7 (10.5-14.5); LSN = 50.4 (45.4-53.1); RSN = 52.3 (49.3-55.3); SO = 87.3 (82.9-90.0). Cardia prominent, heart-shaped.

Female: Relaxed body posture ventrally arcuate, ranging from open C-shape to one full circle. Tail bluntly rounded, with two or three pairs of caudal papillae, the third pair at or near the level of the anus. Reproductive system typical: vulva transverse; vagina reaching half body diameter; without individualized ovejector; uterus 253 (190-300) μm long, without differentiated *pars dilatata*, but separated from oviduct by well-developed sphincter; reflexed ovary 297 (270-330) μm long.

Male: Posterior part of body more strongly arcuate than in female. Tail conoid, dorsally convex, ventrally concave; outer layer of the cuticle thickened around the bluntly rounded terminus. Three pairs of caudal papillae, one of which situated at or near the level of the cloaca. Spicules 80-90 μm long (measured along the curved median line). Lateral guiding pieces

21-27 μm long. Supplements varying from 17 to 23 in number, including the adanal ones. Only some of them, notably the more anterior ones, actually mid-ventral, the rest being irregularly arranged either to the left or right of the midventral line, and posteriorly forming one, two, or three pairs, the last of which is adanal (see Fig. 2.7 in Jacobs & Heyns, 1982). Seven or eight prominent subventral papillae in the region of the supplements.

Juveniles: Only J3 and J4 found. Similar to female in general appearance, except smaller and less strongly ventrally arcuate.

TYPE SPECIMENS

Holotype female (slide 1736) and seven female and seven male paratypes in the nematode collection of the Rand Afrikaans University, Johannesburg, slides 1731-1741. One female and one male paratype each deposited in the collections of the Instituut voor Dierkunde, University of Ghent, Belgium, and Muséum National d'Histoire Naturelle, Paris, France.

TYPE LOCALITY AND HABITAT

Sugar cane field next to the Msiduzi River on the estate of Kirko & Co., south of Mtubatuba in northern KwaZulu-Natal. Collected J. Heyns, 26 July 1985.

Also found in sugar cane fields in the Hluhluwe area, northern KwaZulu-Natal. For details see Jacobs and Heyns (1982) under *L. strelitziae*.

DIAGNOSIS AND RELATIONSHIPS

Longidoroides jacobsi n. sp. is distinguished by its very small amphid aperture, flattened lip region, slender body, and short odontostyle.

It is rather closely related to two species, *L. strelitziae* and *L. seinhorsti* n. sp., from which it differs in being more slender (a=93-137 *vs* about 80 in *L. strelitziae* and 66-102 in *L. seinhorsti* n. sp.), in having more truncate *vs* rounded lip region, slightly more posterior vulva (V = 51-56 *vs* 48-50.5 in *L. strelitziae* and 50-51 in *L. seinhorsti* n. sp.), shorter odontostyle (84-97 *vs* 117-131 μm in *L. strelitziae* and 97-115 μm in *L. seinhorsti* n. sp.), very small amphid aperture (1.5 *vs* 3 μm in *L. strelitziae* and 4-4.5 μm in *L. seinhorsti* n. sp.), and longer fovea (17-20 *vs* 15.5-18.3 μm in *L. strelitziae* and 14-16 μm in *L. seinhorsti* n.sp.).

COMMENTS

Four of the six specimens described by Jacobs and Heyns (1982) under the name *L. strelitziae* were available for study. This confirmed the conspecificity of these specimens with the Mtubatuba population. Although the short description and illustrations in Jacobs and Heyns (1982) were quite accurate, one fault has to be pointed out, viz. the amphid aperture

* This species is named after Dr. P.J.F. Jacobs in recognition of his valuable work on South African longidorids.

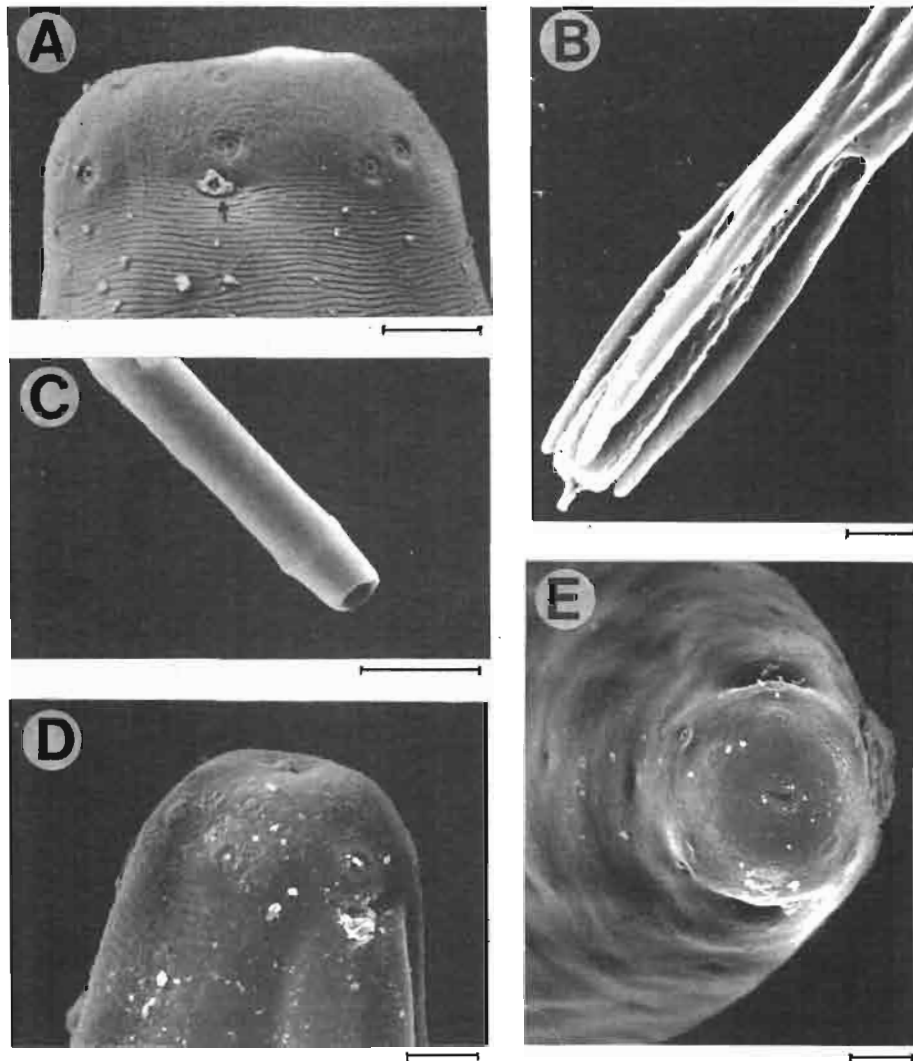


Fig. 2. *Longidoroides jacobsi* n. sp. *A*: Lateral view of head (arrow points towards amphid aperture covered by debris); *B*: Base of odontophore; *C*: Odontostyle base — *Longidoroides seinhorsti* n.sp. *D*: Sublateral view of head; *E*: En face view of head (Scale bars = 4 µm).

in their Fig. 2.2 which is shown in the wrong position due to a misinterpretation.

REMARKS

It is interesting to note that, while amphid structure is one of the main generic characters employed in the Longidoridae *sensu* Coomans, 1996, it is also an important diagnostic character differentiating the three species considered in this paper. Such variation in amphid structure within otherwise quite similar (=closely related?) species must obviously be taken

into account when evaluating the validity of the genera. This validity has recently been the subject of some difference of opinion, as evidenced by the synonymization first of *Siddiqia* with *Paralongidorus* by Luc and Doucet (1984), followed by synonymization of *Longidoroides* also with *Paralongidorus* by Siddiqi *et al.* (1993). At the same time, however, Hunt (1993) considered *Longidoroides* as valid, while he regarded *Siddiqia* as a subgenus of *Paralongidorus*. Coomans (1985, 1996) endorsed the synonymization of *Siddiqia* with *Paralongidorus*, but agreed with Hunt in regarding

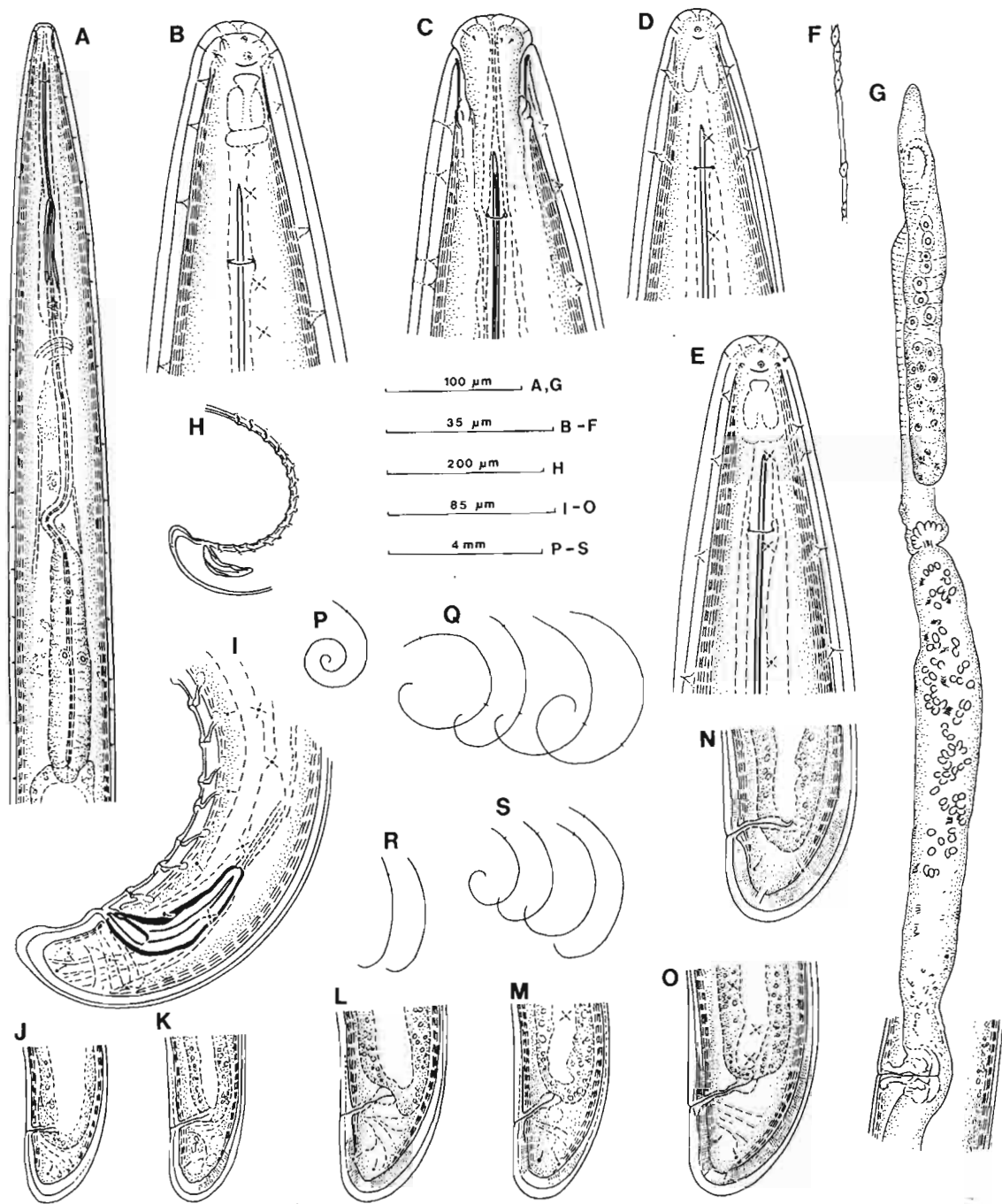


Fig. 3. *Longidoroides seinhorsti* n.sp. A: Anterior body region; B, C: Head, lateral and dorso-ventral views; D, E: Head, J3 and J4, respectively; F: Lateral chord on front part of neck; G: Anterior branch of female reproductive system; H: Male posterior end showing supplements; I: Male tail; J, K: Tail of J3; L, M: Tail of J4; N, O: Female tail; P, Q: Body posture of male and female, respectively; R, S: Body posture of J3 and J4, respectively.

Table 2. Morphometric data of *Longidoroides jacobsi* n. sp. (all measurements in μm , except L in mm).

	J3	J4	Female			Male	
			Holotype	Paratypes	Acc. to Jacobs & Heyns (1982)	Paratypes	Acc. to Jacobs & Heyns (1982)
n	5	15		10	3	9	3
L	3.55 (3.04-4.05)	5.32 (4.04-6.44)	17.9	7.72 (6.38-9.26)	6.19-8.39	7.55 (6.09-8.62)	7.96-9.28
a	70 (60-79)	85 (79-102)	100	106 (93-125)	135-138*	113 (97-137)	137-171*
b	11.2 (8.7-13.1)	12.5 (11.5-14.6)	14.1	15.1 (12.7-16.8)	12.8-12.9	15.5 (10.5-18.9)	16.1-18.7
c	106 (91-123)	154 (116-192)	266	245 (181-298)	252-276	203 (142-233)	230-330
c'	0.78 (0.61-0.92)	0.68 (0.59-0.74)	0.6	0.67 (0.55-0.98)	0.6-0.7	0.83 (0.69-0.90)	0.7-0.8
V	-	-	56.2	52.9 (50.9-56.3)	52.5-54.7	-	-
Tail	31.8 (27-34)	32.9 (29-39)	27	31.9 (27-40)	25-30	37.6 (35-43)	28-34
Lip region diam.	12.4 (12-13)	15.7 (14-17)	18.5	17.4 (16-18.5)	20-21	17.8 (17-19)	19-20**
Odontostyle	64.6 (63-67)	78.7 (70-86)	92	90.7 (87-97)	83-102	90.9 (84-94)	89-104
Repl. od.style	74.5 (72-80.5)	89.5 (85.5-100)	-	-	-	-	-
Odontophore	53 (48-59)	64 (56-72)	71	73 (65-79)	53-63	78.2 (75-83)	53-56
Stylet	118 (111-126)	143 (136-151)	163	164 (156-169)	-	169 (159-176)	-
Guiding ring to front end	37.1 (33-41)	41.5 (40.5-51)	50	50.7 (46-60)	47-56	50.4 (48-54)	51-54
Greatest body diam.	47.5 (47-48)	62.5 (53-72)	72	70 (65-75)	-	67 (54-75)	-
Anal body diam.	37.5 (36-43)	47.5 (44-54)	45	47.4 (41-51)	-	48.8 (44-54)	-
Rectum length	21.8 (18-26)	31.6 (26-35)	37	33.7 (34-40)	-	-	-
Spicule	-	-	-	-	-	85.4 (80-90)	73-81
Lateral guiding pieces	-	-	-	-	-	23.6 (21-27)	20-28

*Based on corrected body diameter

**In Jacobs and Heyns (1982) misprinted as 19-30

Longidoroides as valid, even though in his 1996 paper he lists it more tentatively as '*Longidoroides*' and suggests that a reappraisal of the distinguishing characters

is necessary, a view with which I concur. Such a study may well show that the most logical solution is to recognize only one genus, *Longidorus*, with four sub-

genera: *Longidorus*, *Paralongidorus*, *Siddiqia* and *Longidoroides*. In the mean time, I prefer to recognise *Longidoroides* as a separate genus and to retain *L. strelitziae*, together with the two new species described herein, in *Longidoroides* rather than in *Paralongidorus*.

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