

DESCRIPTION OF *LONGIDORUS TRAPEZOIDES* N.SP., AND
MORPHOMETRIC DATA ON *L. ELONGATUS* (DE MAN,
1876) THORNE & SWANGER, 1936 (DORYLAIMIDA:
LONGIDORIDAE) FROM PAKISTAN

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Abstract

Longidorus trapezoides n.sp., collected from soil around the roots of potato (*Solanum tuberosum*) from Peshawar is described and illustrated. This new species is characterized by narrow trapezoid, slightly offset lip region, long and slender body (L = 5.8-7.2mm), convex conoid, bluntly rounded tail; asymmetrical amphidial pouch. Morphometric data of some population of *L. elongatus* (de Man, 1876) Thorne & Swanger, 1936 are also given.

Earlier from Pakistan three species of *Longidorus* viz., *L. africanus* Merny, 1966; *L. elongatus* (de Man, 1876) Thorne & Swanger, 1936 and *L. pisi* Edward, Misra & Singh, 1964 have been reported (Maqbool, 1992).

During a survey of plant parasitic nematodes, specimens of an undescribed species of the genus *Longidorus* Micoletzky, 1922 were found in soil around the roots of potato (*Solanum tuberosum*). This new species is described under the name *Longidorus trapezoides* n.sp. Morphometric data, description and illustrations of this species are presented. Specimens of *L. elongatus*, earlier reported by Anwar & Sarwar (1981) from citrus orchards, were recently collected in abundance from cauliflower (*Brassica oleracea*) (Faisalabad) and chillies (*Capsicum annum*) (Karachi) are also described and morphometric data and illustrations are given.

Materials and Methods

Specimens were extracted from soil samples by Baermann funnel technique, killed and fixed in hot 5% formalin, processed to glycerol by slow method and mounted on slides. Measurements of curved structures were made with the aid of a curvimeter along their median line and figures were prepared with a drawing tube.

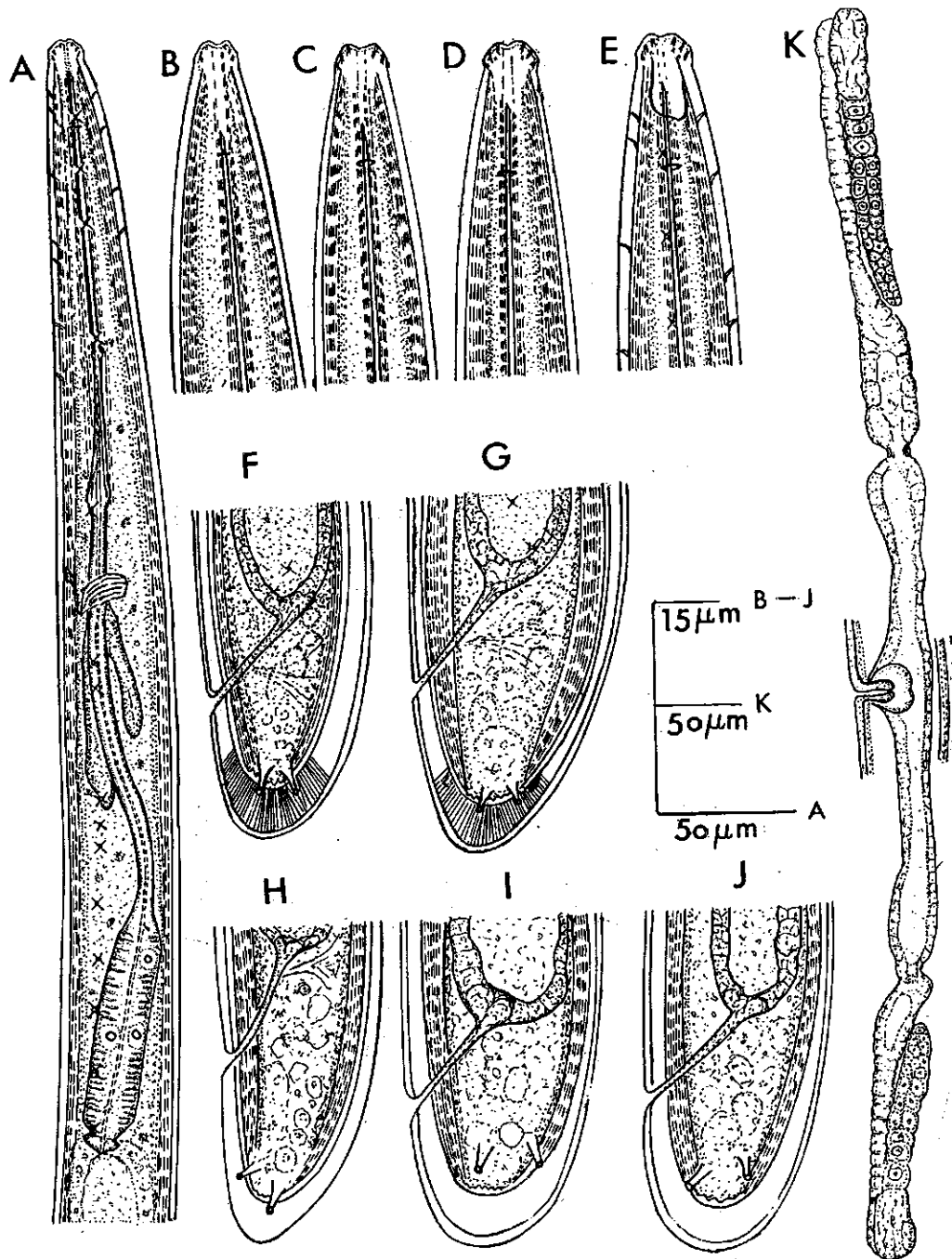


Fig. 1. (A-K) *Longidorus trapezoides* n.sp. A. Oesophageal region of female. B. Anterior body region of J3. C,D. Anterior body region of J4. E. Anterior body region of female. F,G. Tails of female. H-I. Tails of J3, J4, respectively. K. Reproductive system.

Longidorus trapezoides n.sp.
(Fig. 1, A-K)

Measurements

Female and Juveniles: See Table 1.

Holotype (Female): L = 5.8 mm; a = 112.4; b = 14.4; c = 166.0; c' = 0.95; v = 48.1; odontostyle = 105.6 μ m; odontophore = 56 μ m; anterior end to guiding ring = 32 μ m; tail - 35.2 μ m.

Description Female: Habitus in specimens killed by gentle heat as open C, almost straight anteriorly and curved behind the vulva. Body cylindrical, tapering very gradually toward the anterior extremity and slightly widened at anus. Cuticle apparently smooth along the body, but with very fine transverse striae, visible only on the tail region. Cuticle is 2-3 μ m thick along the body. It measures 2.4-2.6 μ m at the base of the lip region, and in the caudal region it is 6.4-6.8 μ m ventrally and 9.0-9.5 μ m dorsally in the post-anal region. Lateral hypodermal chords visible throughout the length of the body, 20-24 μ m wide at mid body, or 40-46% of the corresponding body diameter. Lateral body pores thirteen to fifteen in the oesophageal region, four in the range of the odontostyle, arranged in a single row in the neck region and on the rest of the body distributed irregularly along the lateral chords. Six to seven ventral and three to four dorsal body pores are visible in the neck region within the stylet range. Labial region 4.0-4.5 μ m high, trapezoid, offset by a slight but distinct depression. Amphidial pouch long and asymmetrical at the base, occupying slightly more than half the distance of guiding ring from anterior end, amphidial pore indistinct. Guiding ring 4 μ m wide; odontostyle long and slender, odontophore enlarged at the base. Nerve ring wide, at a distance of 21.6-24.0 μ m from the base of the odontophore. Hemizonid about 4-4.5 μ m long and almost at same level as nerve ring, about 190-193 μ m from the anterior end. Oesophagus dorylaimoid with pharyngeal bulb cylindrical, containing three gland nuclei, the two subventral nuclei situated at almost the same level in the middle of the bulb, the dorsal nucleus situated about half way from the beginning of the bulb to the subventral ones.

Oesophageal bulb long cylindrical, measuring 80-82.4 x 16.8-19.2 μ m. Pharyngo-intestinal valve heart-shaped, conoid, surrounded by intestinal tissue. Vulva a transverse slit, vagina heavily cuticularized, extending about half the body width. Ovejector weakly muscularized; reproductive tracts opposed, reflexed with both branches about equally developed. Each branch consisting of a relatively large ovary, long narrow oviduct, uteri without special features. Sphincter between uterus and oviduct moderately developed. Oviduct with a prominent pars dila-

tata; ovaries typical for the genus. Prerectum between 280-336 μm , rectum shorter than anal body width. Tail short bluntly rounded, convex conoid; two caudal pores present on each side.

Male: Not found.

Juveniles: Only three juveniles with two different stages were found. They are distinctly separated, particularly by differences in length of body, functional and replacement odontostyle. With increased body length, the specimens become more slender and also the "b" and "c" values increase. The tail length decreases from J2 to less than one anal body width in the female.

Table 1. Morphometrics of *Longidorus trapezoides* n.sp. (all measurements in μm except L).

	Female (n=13)			Juveniles	
	$\bar{X} \pm \text{SD}$	Range	CV%	J ₃	J ₄
L (mm)	6.50+0.7	5.8-7.2	8.79	3.49	4.7, 5.2
a	129.00+16.6	112.4-145.5	10.40	63.20	92.9, 103.6
b	15.20+0.85	14.4-16.1	4.56	10.80	9.8, 10.7
c	166.00+7.75	158.0-173.5	3.81	82.30	141.5, 145.1
c'	0.86+0.07	0.8-0.95	7.25	1.20	0.80, 0.88
v	46.60+1.27	45.8-48.1	2.23	-	-
Lip region width	12.20+0.46	12.0-12.8	3.07	8.80	12, 12
Lip region height	4.00+0.0	4.0-4.5	0.00	3.20	4, 4
Odontostyle	109.00+40.03	105.6-113	2.99	84.00	101.6, 101.6
Odontophore	58.00+2.0	56.0-60	2.81	56.00	58.4, 64
Total stylet	167.90+6.02	161.6-173.6	2.92	140.00	160, 165.6
Repl. odontostyle	-	-	-	96.00	112, 120
Guide ring	32.00+0.8	31.2-32.8	2.04	25.60	28, 32
Phar. bulb length	82.10+2.0	80.0-84	2.00	80.00	129, 124
Phar. bulb width	18.00+1.20	16.8-19.2	5.44	13.60	20.8, 21.6
Ant. gen. branch	372.00+10.2	364.0-384	8.37	-	-
Post. gen. branch	366.00+46.3	324.0-416	37.80	-	-
Ant. gen. branch%	5.80+0.86	5.0-6.71	0.70	-	-
Post. gen. branch%	5.20+0.59	4.5-5.54	0.48	-	-
Body diam. guide ring	22.00+0.74	21.0-23.0	3.27	20.00	20.8, 20
Body diam. mid body	50.50+1.28	49.6-52	1.04	34.40	51.2, 50.4
Body diam. anus level	41.90+4.47	36.8-45	8.71	35.20	41.6, 40.8
Rectum	29.40+1.63	28.0-31.2	1.33	28.00	28, 28
Tail	38.00+2.53	35.2-40	5.44	42.40	33.6, 36
Hyaline tail tip	12.20+0.46	12.0-12.8	0.37	12.00	12, 12
Prerectum	305.00+28.4	280.0-336	23.17	328.00	220, 240

Table 2. Comparison of the main features of *Longidorus trapezoides* n.sp., *L. proximus* Sturhan & Argo, 1983; *L. moesicus* Lamberti, Choleva & Agostinelli 1983, *L. raskii* Lamberti & Agostinelli, 1993 and *L. silvae* Roca, 1993.

	<i>L. trapezoides</i> n.sp. (n = 13)	<i>L. proximus</i> (n = 33)	<i>L. moesicus</i> (n = 10)	<i>L. raskii</i> (n = 16)	<i>L. silvae</i> (n = 11)
L (mm)	6.5 (5.8-7.2)	7.33 (6.50-8.20)	7.2 (6.4-8.0)	7.4 (6.5-8.1)	6.9 (5.9-8.0)
a	129.3 (112.4-145.5)	124 (104-138)	120 (96-147)	82.6 (71.9-96)	99.4 (87.5-123.5)
b	15.2 (14.4-16.1)	15.4 (14.0-16.8)	15.8 (13.8-18.8)	14.1 (12.3-17.7)	12.7 (11.0-16.3)
c	165.8 (158-173.5)	192 (165-249)	170 (146-186)	174.7 (147.4-211.7)	166.7 (132.0-189.0)
c'	0.86 (0.8-0.95)	0.85 (0.73-0.95)	1 (0.8-1.2)	0.7 (0.7-0.8)	0.79 (0.72-0.84)
v(%)	46.6 (45.8-48.1)	47.6 (45-50)	53 (50-54)	51 (47-56)	48.6 (44.9-50.7)
Odontostyle	109.8 (105.6-113)	107 (102-112)	119 (115-124)	98.0 (90-103)	122.5 (113.5-133.0)
Odontophore	58 (56-60)	45 (41-51)	63 (59-66)	66.1 (61.2-72.9)	54.5 (44.5-70.0)
Total stylet	167.9 (161-173.6)	153 (148-160)	-	-	177.0 (164.5-198.0)
Ant. end to guide ring	32 (31.2-32.8)	34 (31.5-37.5)	34 (32-38)	35.8 (32.9-38.2)	40.0 (37.0-44.0)

Type habitat and locality: Specimens were collected from cultivated sandy loam soil around the roots of potato (*Solanum tuberosum*) from Peshawar, Pakistan.

Type specimens: Holotype slide No. 49/1 and paratypes on slide No. 49/2-3 (female and juveniles) deposited in the National Nematode Collection of NNRC, University of Karachi, Pakistan. Slide No. NNRC 49/4 (two females) deposited in USDA Nematode collection Beltsville, Maryland, USA.

Diagnosis and Relationship: *Longidorus trapezoides* n.sp., is characterized by the narrow trapezoid slightly offset lip region, long and slender body (5.8-7.2) mm, convex conoid, bluntly rounded tail, asymmetrical amphidial pouch. The new species is similar to *L. proximus* Sturhan & Argo, 1983; *L. moesicus* Lamberti, Choleva & Agostinelli, 1983; *L. raskii* Lamberti & Agostinelli, 1993 and *L. silvae* Roca, 1993 in having almost the same body length and c' ratio and rounded, hemispherical tail terminus. It differs from *L. proximus* in having longer odontophore (56-60 vs 41-51) and narrow lip region (lip width 12-12.8 vs 17-19); from *L. moesicus* in having an anteriorly situated vulva (V=45.8-48% vs 50-54%), shorter odontostyle (105.6-113 vs 115-124), shorter distance of guiding ring from the anterior end (31.2-32.8 vs 32-38) and shorter tail (35.2-40 vs 40-49); from *L. raskii* in having a slender body ('a' value 112.4-145.5 vs 71.9-96), longer odontostyle (105.6-113 vs 90-103), slightly shorter odontophore (56-60 vs 61.2-72.9), shorter distance of oral opening to guide ring (31.2-32.8 vs 32.9-38.2), narrower lip region (12-12.8 vs 15-19) and shorter anal body width (36.8-45 vs 52-63.5); from *L. silvae* in having a slender body ("a" value 112.4-145.5 vs 87.5-123.5), shorter odontostyle (105.6-113 vs 113.5-133.0), shorter distance of guide ring from the anterior end (31.2-32.8 vs 37-44), slightly narrower lip region (12-12.8 vs 14-17), lesser anal body diameter (36.8-45 vs 49-57).

Longidorus elongatus (de Man, 1876) Thorne & Swanger, 1936
(Fig. 2, A-G)

Measurements and other biometrical data: See Table 3.

Description female: Body C-shaped to spiral when killed by gentle heat, cylindrical, tapering very gradually toward the anterior extremity. Cuticle marked by very fine striations which are more easily seen in the neck and tail region, generally 2-2.5 μm thick along body, thicker just behind lip region and 4-4.4 μm ventrally and 5.6-6.5 μm dorsally posterior to anus. Lateral hypodermal chord about one third of the body width.

Table 3. Comparison of the main features of females of *Longidorus elongatus* (de Man, 1876, 1876) Thorne & Swanger, 1936.

	Pakistani specimens (Original)		Hooper (1961)	Micoletzky (1922)	Kozłowska & Seinhorst (1979)
	$\bar{X} \pm SD$	Range	(n=84)	(n=?)	(n=100)
L (mm)	4.00±0.31	3.8-4.4	4.5-6.4	4.42-6.06	5.8 (5.2-6.3)
a	102.00±9.89	90.2-116.4	76.0-123.0	94.00-96.0	110.0 (106-116)
b	13.60±2.28	10.2-18.5	9.7-15.9	11.00-14.0	14.5 (13.2-15.1)
c	106.30±23.7	83.2-168.2	73.0-141.0	86.00-118.0	135.0 (126-139)
c'	1.50±0.19	1.2-1.93	-	-	-
v	46.00±1.89	43.2-50.9	45.0-53.0	46.30-48.0	50.0 (49-51)
Lip region width	9.97±0.51	8.8-10.4	-	-	12.0 (11.5-13.5)
Lip region height	3.73±0.39	3.2-4.0	-	-	-
Odontostyle	85.70±3.32	77.6-88.8	81.0-102.0	85.00-112.0	89.0 (85-92)
Odontophore	37.70±1.76	35.2-40.0	34.0-71.0	-	45.0 (42-47)
Total stylet	123.50±3.19	117.6-128	-	-	-
Guide ring	28.60±1.31	25.6-30.4	30.0-36.0	-	30.0 (28-31)
Phar. bulb length	92.20±6.50	80.0-104	-	-	-
Phar. bulb width	15.80±1.40	14.4-20	-	-	-
Ant. gen. branch	243.70±78.87	125.6-428	-	-	-
Post. gen. branch	278.50±95.71	133.0-485	-	-	-
Ant. gen. branch%	5.99±1.91	3.3-10.9	-	-	-
Post. gen. branch%	6.86±2.28	3.4-13.38	-	-	-
Body diam. guid ring	20.30±0.89	19.0-22.4	-	-	-
Body diam. mid body	39.80±3.95	36.0-46.4	-	-	-
Body diam. anus level	26.20±2.28	5.6-10.4	-	-	-
Rectum	18.80±1.34	16.8-20.0	-	-	-
Tail	40.18±4.91	30.4-49.6	-	-	-
Hyaline tail tip	7.73±1.30	5.6-10.4	-	-	-
Prerectum	269.00±55.8	172.0-380	-	-	-

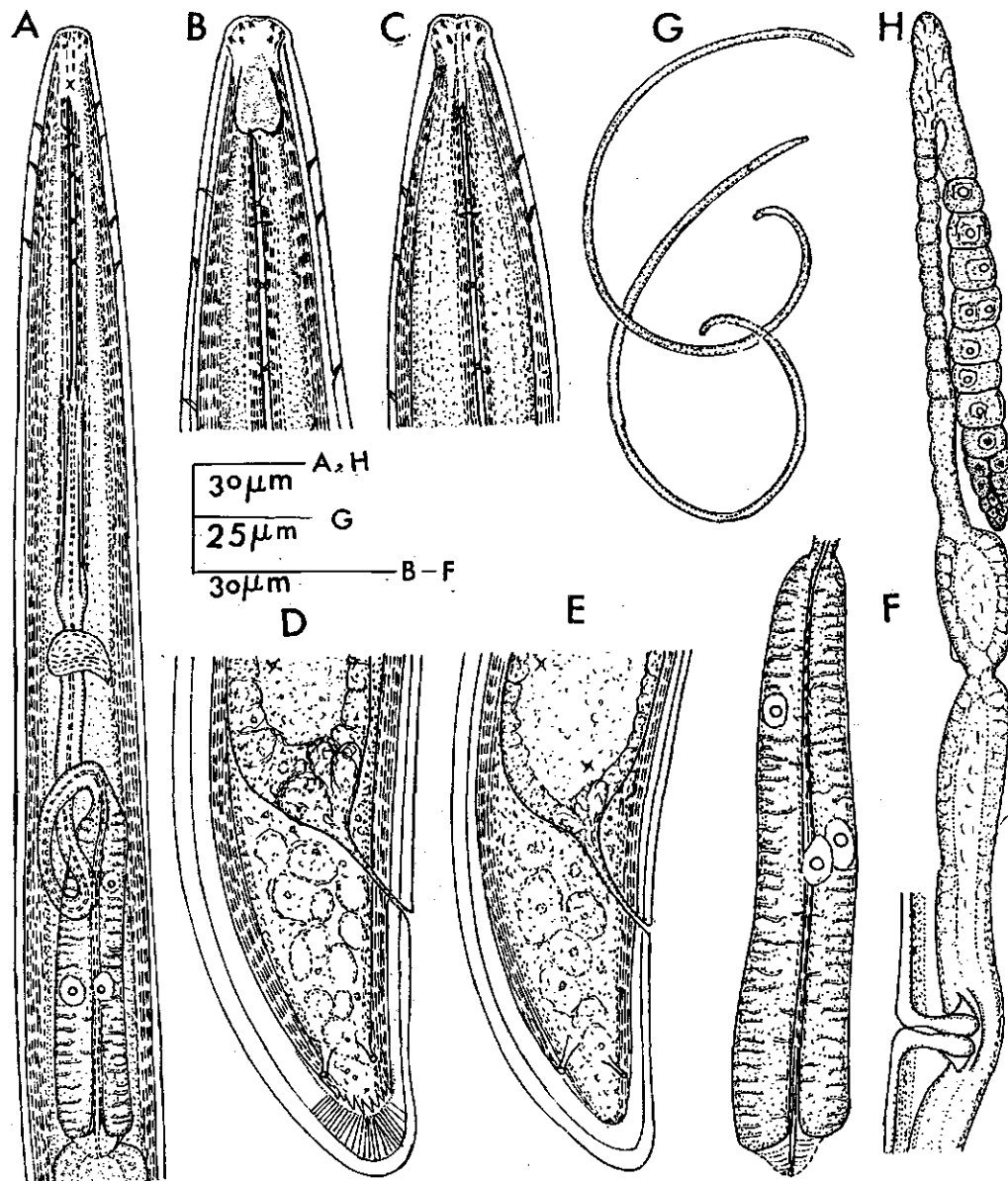


Fig. 2. (A-H) *Longidorus elongatus* (de Man, 1876) Thorne & Swanger, 1936. A. Oesophageal region of female. B, C. Anterior region of females. D, E. Tails of females. F. Oesophageal bulb. G. Body posture of females. H. Reproductive system.

Lateral body pores in two irregular rows over most of the body; four ventral, three dorsal and five lateral body pores in region of odontostyle; labial region 4-4.8 μm high, rounded laterally and slightly flattened frontally, narrow and separated from the rest of the body by a very slight depression at the base. Amphidial pouch large, bilobed, extending over little more than half the distance from oral opening to guiding ring with aperture not evident. Odontostyle robust, 1.5- 1.6 μm thick, odontophore weak, guiding sheath typical of the genus with strong guiding ring. Oesophagus dorylaimoid with oesophageal bulb occupying $1/3$ of the oesophagus total length; muscular bulb 80-104 μm long and 14.4-20 μm wide and contains three gland nuclei, the two subventral located almost at the mid bulb, the dorsal anterior to them in the first third of basal bulb. Oesophago-intestinal valve large conoid; vulva almost equatorial, slit like vagina occupying more or less $1/2$ of the corresponding body diameter; gonads amphidelphic, reflexed; prerectum 172-380 μm long; rectum extending $2/3$ the body width at anus. Tail rounded, almost hemispherical, bearing two caudal pores.

Remarks: *Longidorus elongatus* was earlier reported from citrus orchards from Punjab by Anwar & Sarwar (1981) without providing any morphological data. Recently specimens of *Longidorus elongatus* were collected in high frequency from Faisalabad and Karachi around the roots of cauliflower and chillies respectively. The measurements of *L. elongatus* from Pakistan correspond with the description and measurements given by Hooper (1961), Micoletzky (1922), and Kozłowska & Seinhorst (1979) (Table 3), except for slightly smaller body length, greater 'b' ratio, shorter odontostyle and odontophore, lip region slightly narrower. Males were not found among numerous females.

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