

THREE NEW SPECIES OF THE GENUS *AXONCHIUM* COBB, 1920 (NEMATODA: DORYLAIMIDA) FROM NEW ZEALAND

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Summary. Three new species of the genus *Axonchium* Cobb, 1920 are described and illustrated from New Zealand. *Axonchium sturbani* sp. n. is characterized by having 1.7-2.1 mm long body; continuous lip region; labial amphid with duplex fovea; 13.5-14.5 μ m long odontostyle; short isthmus separating two parts of pharynx; very small anterior uterine sac and short hemispheroid tail. *Axonchium parassaculum* sp. n. is characterized by having 2.2-2.4 mm long body; continuous lip region; 11-12 μ m long odontostyle; anterior slender part of pharynx with almost indistinct constriction between two parts of pharynx; anterior uterine branch completely absent and short conoid tail with rounded terminus. *Axonchium zealandicum* sp. n. is characterized by having 2.7-2.8 mm long body, 13.5 μ m long odontostyle; isthmus-like constriction between two parts of pharynx; strong vaginal sclerotization and a crescent-shaped disc between *pars proximalis* and *pars refringens vaginae*; anterior uterine sac with rudimentary ovarial mass; male with massive spicules and ten spaced ventromedian supplements. A diagnostic compendium of *Axonchium* species with vaginal sclerotization is provided.

Key words: *Axonchium parassaculum* sp. n., *A. sturbani* sp. n., *A. zealandicum* sp. n., description, diagnostic compendium.

During 1999-2000, when one of us (WA) was working at the Institut für Nematologie und Wirbeltierkunde, Munster, Germany, Dr. Dieter Sturhan kindly made available the nematode specimens that he collected during 1988/89 and 1996/97 from New Zealand. While studying the dorylaim nematodes from this rich collection, Ahmad and Sturhan (2002) and Ahmad *et al.* (2003) described a new genus *Oriverutoides* and four new species, one from each of the genera *Capilonchus* Siddiqi, 1982; *Hulqus* Siddiqi, 1982; *Makatinus* Heyns, 1965 and *Proleptonchus* Lordello, 1955. The present paper deals with the description of three new species of the genus *Axonchium* Cobb, 1920 from the same collection. Except for the descriptions of *Axonchium sabulum* (Yeates, 1967) Coomans *et* Yeates, 1969, *A. coxi* Yeates, 1979 and *A. watti* Yeates, 1979, no other information is available on this important genus from New Zealand.

MATERIAL AND METHODS

The nematodes originated from soil samples collected from the upper 0-20 cm horizon, under native vegetation. They were isolated by decantation and sieving followed by extraction through a Baermann funnel with cotton filter. They were fixed with hot TAF and transferred to pure glycerol by a slow evaporation method. For the morphological studies, nematode specimens were permanently mounted in glycerol.

DESCRIPTION

AXONCHIUM STURHANI sp. n.

(Fig. 1 and 2; Table I)

Measurements. See Table I.

Female. Body slightly curved ventrally upon fixation. Cuticle finely striated, 4-5 μ m thick at mid body and 7-10 μ m on tail. Lateral chords about one-sixth to one-fifth of the corresponding body width at mid body. Lateral, dorsal and ventral body pores indistinct. Lip region narrow, rounded, slightly offset by depression, about one-fourth of the body width at neck base. Amphids labial, cup-shaped with duplex fovea, their aperture width about two-thirds of lip region width. Odontostyle fusiform, 1.0-1.3 times as long as lip region width, its aperture about one-third of its length. Guide ring single, about as long as lip region width from anterior end. Odontophore straight, 1.2 times the odontostyle length. Nerve ring at 19-21% of neck length from anterior end. A short isthmus separates the two parts of the pharynx; expanded portion surrounded by straight muscle sheath, occupying about 67-71% of total neck length. Cardia tongue-like, length about half of the corresponding body width. Genital system mono-opisthodelphic; ovary reflexed, measuring 148-269 μ m with oocytes arranged in a single row except near tip. Oviduct joining ovary subterminally, measuring 65-159 μ m. Sphincter present at oviduct-uterus junction. Uterus 75-105 μ m long. Anterior branch represented by a small sac, measuring 23-54 μ m or 0.50-0.75 times the corresponding body width. Vulva a transverse slit. Vagina extending inwards about half of the corresponding body width. *Pars proximalis vaginae* 12-18 μ m with convex walls surrounded by cir-

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cular muscles; *pars refringens vaginae* absent; *pars distalis vaginae* 10-15 μm , distinctly enlarged at the posterior half as crescent-shaped, with rounded walls. Prerectum length 2.3-4.0 times anal body width. Tail short, hemispheroid, length about 0.4-0.6 times anal body width. Two caudal pores on each side.

Male. Not found.

Type habitat and locality. Waipoua forest, Northland, New Zealand (35° 39'S, 173° 33'E), native forest, loamy soil; sample collected on 15 January 1989 by Dr. Dieter Sturhan.

Type material. Holotype female on slide *Axonchium sturbani* sp. n./1; paratype females on slides *Axonchium sturbani* sp. n./2-5; deposited with the nematode collection of the Department of Zoology, Aligarh Muslim University, India.

Diagnosis and relationships. *Axonchium sturbani* sp. n. is characterised by having 1.7-2.1 mm long body; almost continuous lip region; labial amphid with duplex fovea; 13.5-14.5 μm long odontostyle; short isthmus separating two parts of pharynx; small anterior uterine sac and short hemispheroid tail.

The new species is distinct from all other known species of the genus in having labial amphid with duplex fovea. However, in the presence of a continuous lip region with amalgamated lips, it belongs to the group of species placed under the subgenus *Syncheilaxonchium* Coomans *et* Nair, 1975. In this subgenus, because of the presence of a narrow, short isthmus-like junction between two parts of pharynx the new species comes close to *Axonchium* (*S.*) *rotundum* Thorne, 1964 and *A.* (*S.*) *baldum* Thorne, 1964. It differs from the former in having smaller and robust body (*vs* L = 2.23-2.40 mm; a = 48-57); wider lip region (*vs* 8.0-8.5 μm); wider amphid aperture with duplex fovea (*vs* 6.0-6.5 μm ; fovea not duplex); longer odontostyle and odontophore (*vs* odontostyle 9 μm and odontophore 13-14 μm); smaller anterior uterine sac (*vs* 6.5-13.5% of total body length); and in absence of male (*vs* male present).

From *A.* (*S.*) *baldum*, the new species differs, in addition to its characteristic amphids, in having longer odontostyle (*vs* odontostyle 6 μm), shorter anterior uterine branch (*vs* three times corresponding body width) and in the shape of tail being more hemispherical *vs* comparatively conical at tip.

In having a small anterior uterine sac the new species also comes close to *A.* (*S.*) *deconincki* Nair *et* Coomans, 1975, but differs in having comparatively wider lip region

Table I. *Axonchium sturbani* sp. n. (All measurements in μm except body length).

Character	Holotype female	Paratype females
n:	1	11
L (mm)	2.0	1.93±0.10(1.7-2.1)
a	29.5	31.78±1.48(29.0-33.8)
b	2.8	2.8±0.10(2.5-3.0)
c	83.5	82.92±9.29(68.0-103.5)
c'	0.61	0.53±0.07(0.4-0.61)
V	52	52±1.36(50.0-55.0)
G ₁	1.5	1.89±0.34(1.5-2.5)
G ₂	13.5	13.2±3.28(7.5-20.0)
Lip region width	13	12±1.27(10-13)
Lip region height	5	5.6±0.88(4.5-7.5)
Amphid aperture	9	8.5±0.80(7-10)
Odontostyle length	13.5	13.5±0.49(13.5-14.5)
Odontophore length	17	17.2±0.91(15.5-18)
Guide ring from anterior end	11	10.4±0.65(9-11)
Nerve ring from anterior end	147	139±4.74(130-147)
Neck length	714	680±36.05(625-743)
Expanded part of Pharynx	496	473±32.29(420-526)
Cardia length	20.5	27±3.74(20.5-33)
Body width at mid body	69.5	61±4.80(56-71.5)
Body width at neck base	69	57±3.04(52-62)
Body width at anus	40	41.3±2.41(37-47)
Anterior genital branch	29	37.5±6.81(29-54)
Posterior genital branch	282	256±65.99(140-395)
Vaginal depth	27.5	28.5±2.04(25-30)
Vulva from anterior end	1068	1008±41.1(945-1078)
Prerectum length	135	122±19.70(90-140)
Rectum length	44	43.2±2.67(40-50)
Tail length	24.5	23.5±2.36(22-27)

(vs 7.0-8.5 μm), longer odontostyle and odontophore (vs odontostyle 7-8 μm ; odontophore 10-13 μm), in the nature of the junction between two parts of pharynx (vs two parts of pharynx abutting each other); in the shape of

vagina (vs vagina posteriorly directed); comparatively shorter prerectum (vs 178-215 μm); comparatively shorter and differently shaped tail (tail rounded vs clavate, $c^2=0.7$), and in the absence of males (vs males present).

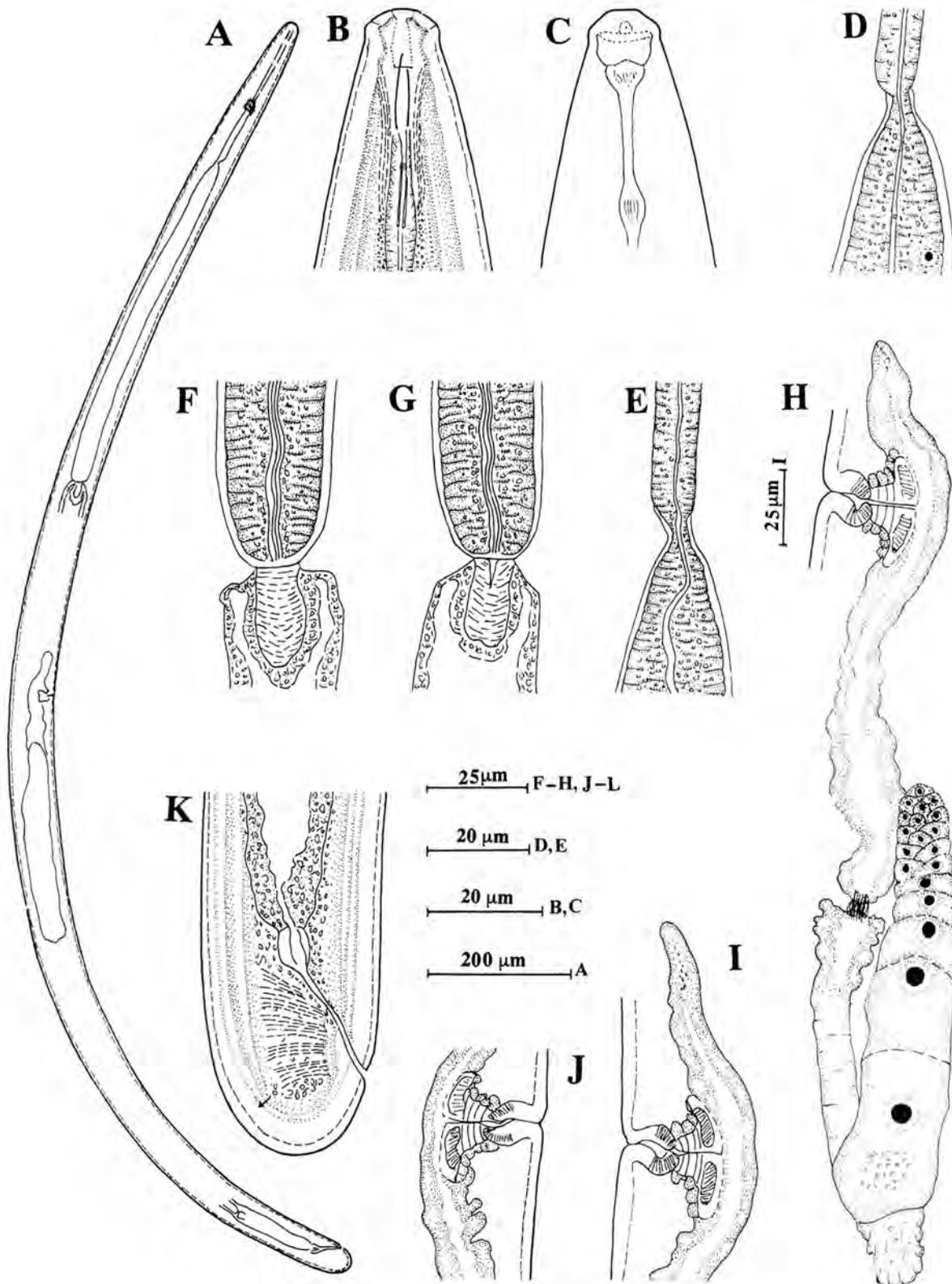


Fig. 1. *Axonchium sturbani* sp. n. A. Entire female; B. Anterior region; C. Anterior end showing amphid; D. and E. Junction between two parts of pharynx; F. and G. Pharyngo-intestinal junction; H. Female genital system; I. Vulval region showing anterior uterine sac; J. Vulval region; K. Female posterior region.

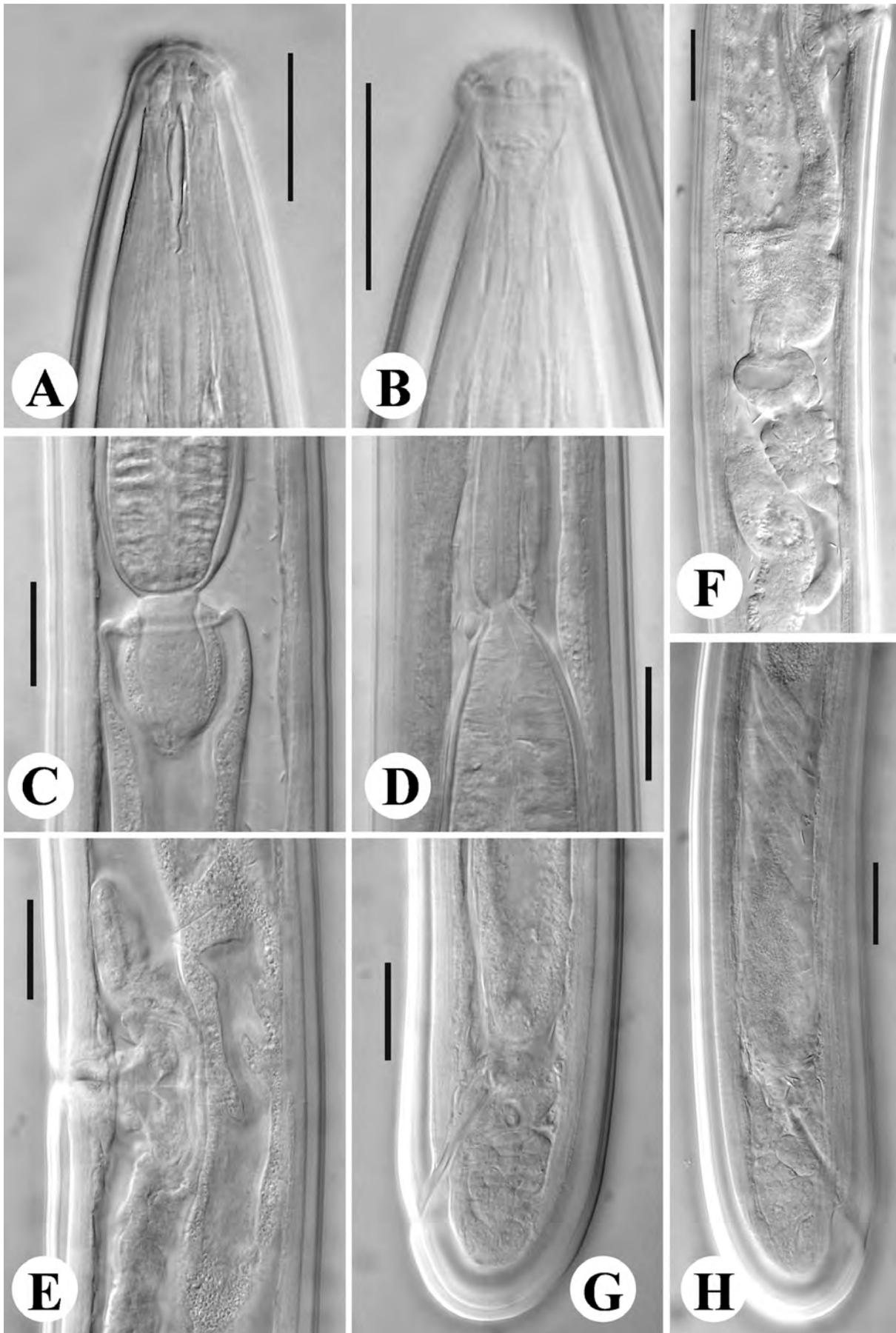


Fig. 2. *Axonchium sturbani* sp. n. A. Anterior region; B. Anterior end showing amphid; C. Pharyngo-intestinal junction; D. Junction between two parts of pharynx; E. Vulval region; F. Female posterior genital branch; G. and H. Female posterior region. (Scale bar = 20 μ m).

AXONCHIUM PARASSACULUM sp. n.

(Figs 3 and 4; Table II)

Measurements. See Table II.

Female. Body slightly curved ventrally upon fixation. Cuticle finely striated, 4 µm thick at mid body and 11-13 µm on tail. Lateral chords about one-seventh of the corresponding body width at mid body. Lateral, dorsal and ventral body pores indistinct. Lip region rounded, almost continuous, about one-fifth of the body width at neck base. Amphids cup-shaped, their aperture about two-thirds of lip region width. Odontostyle fusiform, 0.9-1.0 times lip region width long, its aperture about one-third of its length. Guide ring single, at about one lip region width from anterior end. Odontophore straight, 1.2-1.3 times the odontostyle length. Nerve ring at 26-28% of neck length from anterior end. Anterior slender part of pharynx narrow; posterior expanded part ellipsoidal in shape, occupying about 68% of total neck length, gradually narrowing both anteriorly and posteriorly and surrounded by straight muscle sheath. No marked constriction between two parts of pharynx. Cardia tongue-like, length about half of the corresponding body width. Genital system mono-opisthodelphic; anterior branch completely absent; posterior branch well developed. Ovary reflexed, measuring 105-300 µm with oocytes arranged in single row except near tip.

Oviduct joining ovary subterminally, measuring 110-120 µm. Sphincter present at oviduct-uterus junction. Uterus a differentiated tube with an intermediate narrower region and dilated distal portion, measuring 120-135 µm. Vulva transverse. Vagina directed posteriorly, extending inwards about half of the corresponding body width deep. *Pars proximalis vaginae* 24-27 µm with almost straight walls surrounded by circular muscle; *pars refringens vaginae* absent; *pars distalis vaginae* 10-13 µm. Prerectum length 3.1-4.0 times anal body width. Tail short, rounded conoid, length about 0.6 anal body widths. Two caudal pores on each side.

Male. Not found.

Type habitat and locality. Waipoua forest, Northland, New Zealand (35° 39'S, 173° 33'E), native forest, loamy soil; sample collected on 15 January 1989 by Dr. Dieter Sturhan.

Type material. Holotype female on slide *Axonchium parassaculum* sp. n./1; paratype females on slides *Axonchium parassaculum* sp. n./2; deposited with the nematode collection of the Department of Zoology, Aligarh Muslim University, India.

Diagnosis and relationships. *Axonchium parassaculum* sp. n. is characterised by having 2.2-2.4 mm long body; continuous lip region; 11-12 µm long odontostyle; ante-

Table II. *Axonchium parassaculum* sp. n. (All measurements in µm except body length).

Character	Holotype female	Paratype females
n:	1	2
L (mm)	2.4	2.2, 2.4
a	35	34.8, 34
b	3.5	3.0, 3.5
c	79.0	76.5, 83.5
c'	0.6	0.6, 0.6
V	39.5	40.0, 39.0
G ₁	-	-
G ₂	12.0	15.5, 12
Lip region width	10.5	12, 11
Lip region height	5.5	7, 5
Amphid aperture	9	8
Odontostyle length	11	11.5, 12.0
Odontophore length	14.5	15
Guide ring from anterior end	10.5	10, 10
Nerve ring from anterior end	140	130, 125
Neck length	700	720, 686
Expanded part of Pharynx	475	490, 472
Cardia length	42.5	38, 38
Body width at mid body	70	66, 71
Body width at neck base	68.5	65, 68
Body width at anus	46	55.5, 46.5
Posterior genital branch	300	357, 292
Vaginal depth	37	36, 35
Vulva from anterior end	965	924, 946
Prerectum length	145	185, 180
Rectum length	40	45, 50
Tail length	31	30, 29

rior part of pharynx slender, narrow; almost indistinct constriction between two parts of pharynx; mono-opisthodelphic genital system with anterior uterine branch completely absent and tail short conoid with bluntly rounded terminus.

In the presence of a continuous lip region with amalgamated lips, this species also belongs to the group of

species placed under the subgenus *Syncheilaxonchium* Coomans *et* Nair, 1975.

The new species differs from all other species of the genus in the absence of anterior uterine sac except for *A. (S.) assaculum* Siddiqi, 1968, which also lacks anterior uterine sac, but differs from it in having distinctly longer body (*vs* L = 0.90-1.17 mm); wider lip region (*vs* 6.0-6.5

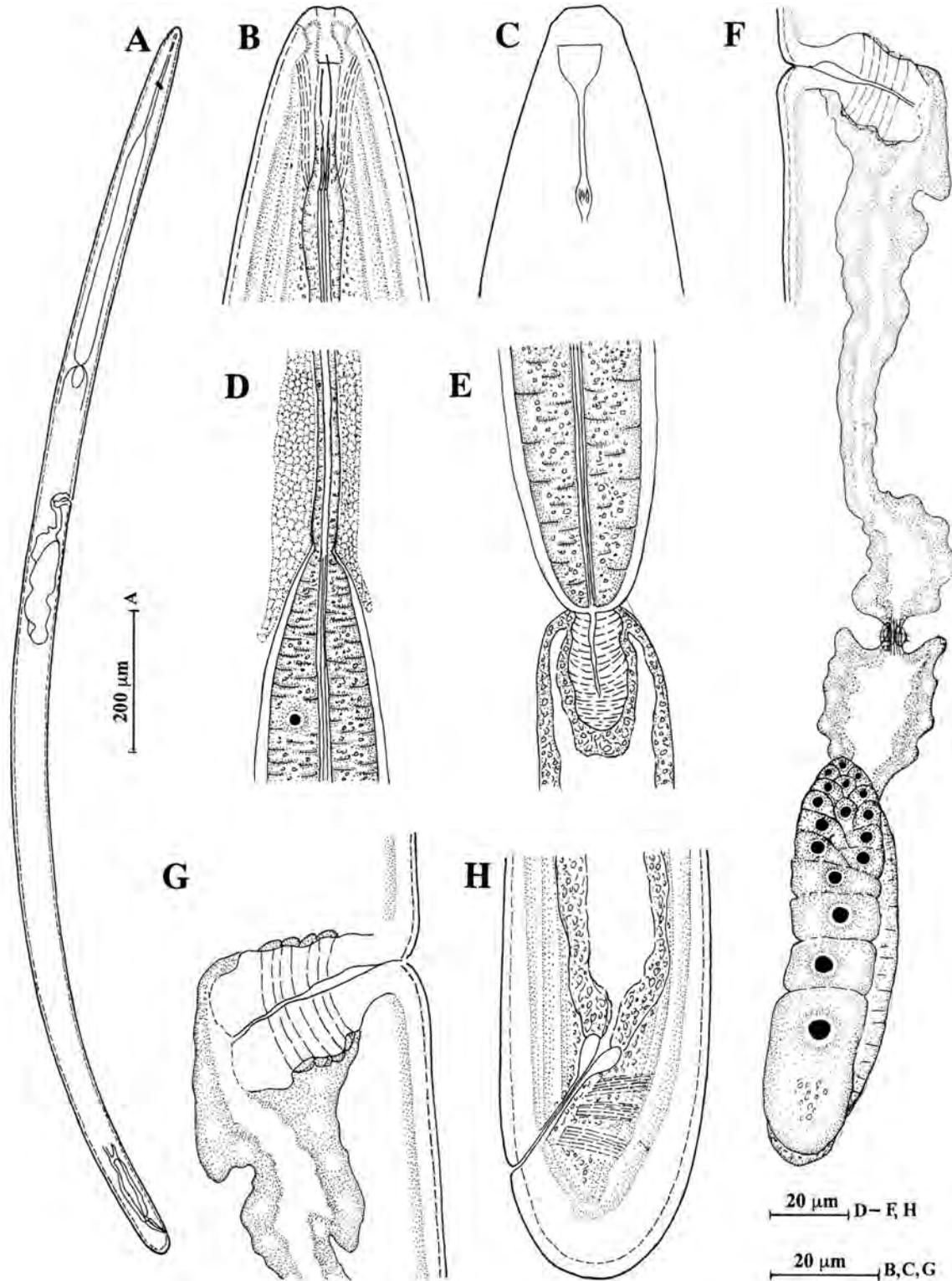


Fig. 3. *Axonchium parassaculum* sp. n. A. Entire female; B. Anterior region; C. Anterior end showing amphid; D. Junction between two parts of pharynx; E. Pharyngo-intestinal junction; F. Female genital system; G. Vulval region; H. Female posterior region.

μm); longer odontostyle and odontophore (*vs* odontostyle 7-8 μm ; odontophore 9-11 μm); in the nature of pharynx (*vs* anterior slender part very muscular; expanded part not ellipsoidal in shape and the two parts separated by distinct constriction, abutting each other; $b = 2.3-2.6$); more anterior vulva position (*vs* $V = 53-56\%$); in the shape of vagina (*vs* vagina distinctly narrower); longer tail (*vs* tail 17-20 μm ; $c = 49-64$; $c' = 0.9-1.0$).

AXONCHIUM ZEALANDICUM sp. n.

(Figs 5 and 6; Table III)

Measurements. See Table III.

Female. Body curved ventrally upon fixation, tapering towards both extremities. Cuticle with fine transverse striations, 6 μm thick at mid body and 9 μm on tail. Lateral chords about one-sixth of the body width at mid

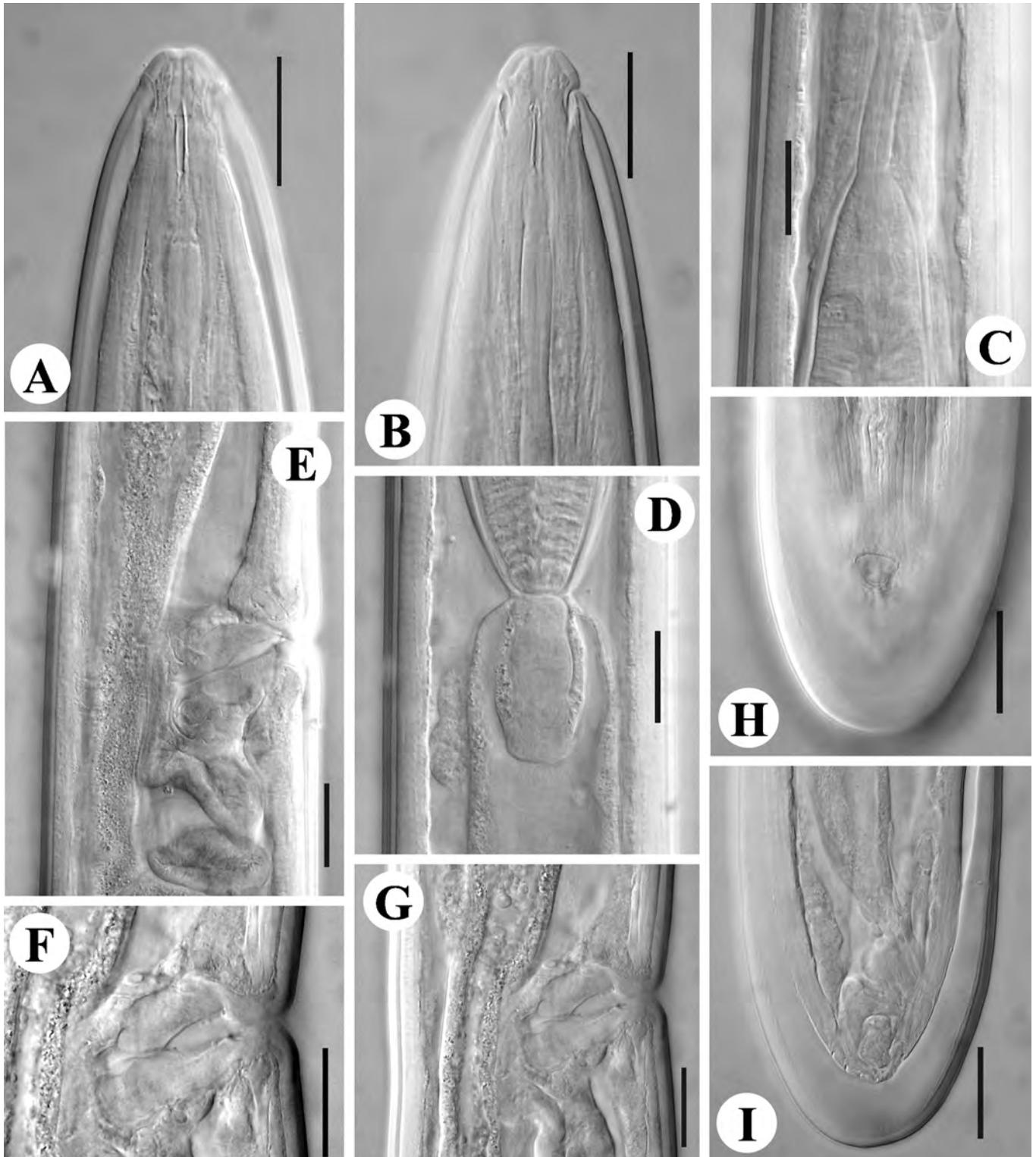


Fig. 4. *Axonchium parassaculum* sp. n. A. Anterior region; B. Anterior end (dorso-ventral); C. Junction between two parts of pharynx; D. Pharyngo-intestinal junction; E-G. Vulval region; H and I. Female posterior region (Scale bar = 20 μm)

body. Lateral, dorsal and ventral body pores indistinct. Lip region offset, about one-fourth the width of body at neck base. Amphids cup-shaped, their aperture about two-thirds of lip region width. Odontostyle fusiform, length 1.1 times lip region width, its aperture about one-third of its length. Guide ring single, at 0.8 times lip re-

gion width from anterior end. Odontophore straight, 1.4 times the odontostyle length. Nerve ring at about 20% of neck length from anterior end. A short isthmus separates anterior part of pharynx from expanded part, the latter occupying about 70% of total neck length and enclosed by straight muscles. Cardia tongue-like, length about

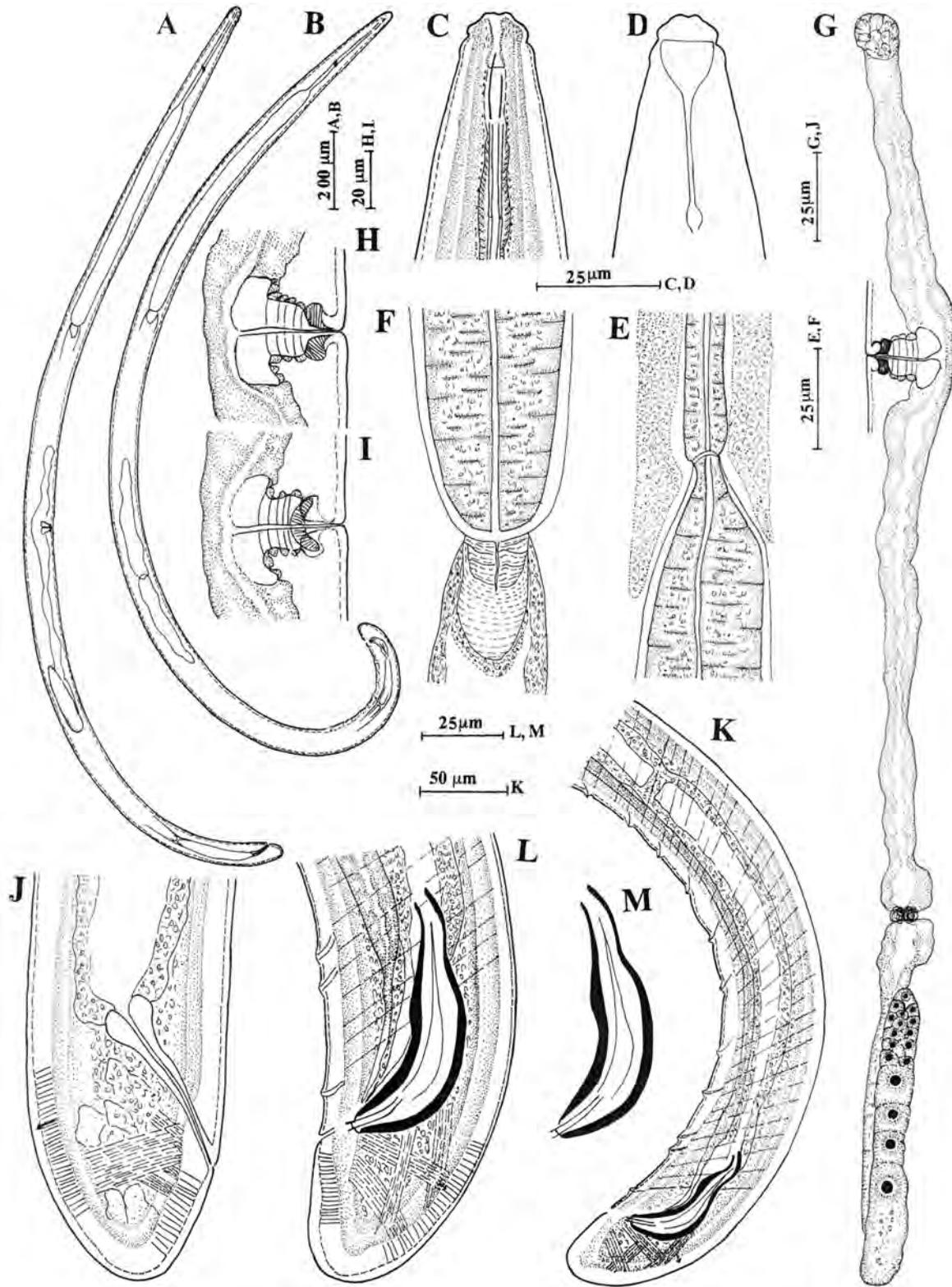


Fig. 5. *Axonchium zealandicum* sp. n. A. Entire female; B. Entire male; C. Anterior region; D. Anterior end showing amphid; E. Junction between two parts of pharynx; F. Pharyngo-intestinal junction; G. Female genital system; H and I. Vulval region; J. Female posterior region; K and L. Male posterior region; M. Spicule.

one-third of the corresponding body width. Genital system mono-opisthodelphic; anterior branch poorly developed, length 2.8 times corresponding body width with a rudimentary ovarial mass. Posterior branch well developed; ovary reflexed, measuring 549 μm with oocytes arranged in single row except near tip. Oviduct joining ovary subterminally, measuring 240 μm ; sphincter present at oviduct-uterus junction. Vulva transverse; vagina extending inwards about half of the corresponding body width. *Pars proximalis vaginae* 25 μm long with almost straight walls; *pars refringens vaginae* with two well developed sclerotized pieces with their outer wall concave, in lateral view, each measuring $9 \times 7 \mu\text{m}$, cw 19 μm ; *pars distalis vaginae* 4 μm with curved walls. A crescent-shaped disc present between *pars refringens* and *pars proximalis*. Prerectum length 3.8 times anal body width. Rectum length about one anal body width. Tail conoid, broadly rounded, length about 0.7 times anal body width. Two caudal pores on each side.

Male. Similar to female in general morphology except for posterior region being more curved ventrally upon fixation due to the presence of copulatory muscles. Spicules dorylaimoid, slightly ventrally curved, length about 1.5

times anal body width. Lateral guiding pieces about one-fifth of the spicule length. Supplements, an adanal pair and ten spaced ventromedians. Prerectum length 4.7 times anal body width. Rectum length about one anal body width. Tail similar to female, length about 0.8 times anal body width. Two caudal pores on each side.

Type habitat and locality. Putara, ca 25 Km east of Levin, Northland, New Zealand ($40^{\circ} 39'S$, $175^{\circ} 34'E$), native forest, loamy soil; sample collected on 2nd December 1996 by Dr. Dieter Sturhan.

Type material. Holotype female on slide *Axonchium zealandicum* sp. n./1; paratype male on slide *Axonchium zealandicum* sp. n./2; deposited with the nematode collection of the Department of Zoology, Aligarh Muslim University, India.

Diagnosis and relationships. The new species is characterized by having 2.7 mm (female) and 2.8 mm (male) long body; offset lip region; 13.5 μm long odontostyle; the two parts of pharynx separated by short isthmus-like structure; anterior genital branch with rudiments of ovary; vagina with distinct sclerotization and a crescent-shaped disc between *pars refringens* and *pars proximalis*

Table III. *Axonchium zealandicum* sp. n. (All measurements in μm except body length).

Character	Holotype female	Paratype male
L (mm)	2.7	2.8
a	39.3	41.0
b	3.5	2.7
c	73	71.0
c'	0.72	0.8
V	55	-
G ₁	7.8	-
G ₂	20	-
Lip region width	15	12
Lip region height	-	6
Amphid aperture	-	10
Odontostyle length	13.5	13.5
Odontophore length	19.5	20.5
Guide ring from anterior end	11	11.5
Nerve ring from anterior end	186	193
Neck length	937	1044
Expanded part of Pharynx	659	752
Cardia length	27.5	27.5
Body width at mid body	68.5	69.5
Body width at neck base	-	-
Body width at anus/cloaca	51	50
Anterior genital branch	211	-
Posterior genital branch	549	-
Vaginal depth	37	-
Vulva from anterior end	1490	-
Prerectum length	196	235
Rectum length	54	-
Tail length	37	40
Spicules	-	78
Lateral guiding pieces	-	20.5
Ventromedian supplements	-	10

part of vagina; and male with massive spicules and spaced ventromedian supplements.

In the presence of vaginal sclerotization, a short isthmus-like structure between two parts of pharynx and in having rudimentary ovarian mass in the anterior uterine

branch, the new species comes close to *A. coxi* Yeates, 1979, a species with vaginal sclerotization described from New Zealand, but it differs distinctly from it in the shape of vagina and vaginal sclerotization (*vs* see Fig. 6D in Yeates, 1979). This was confirmed by studying the digital

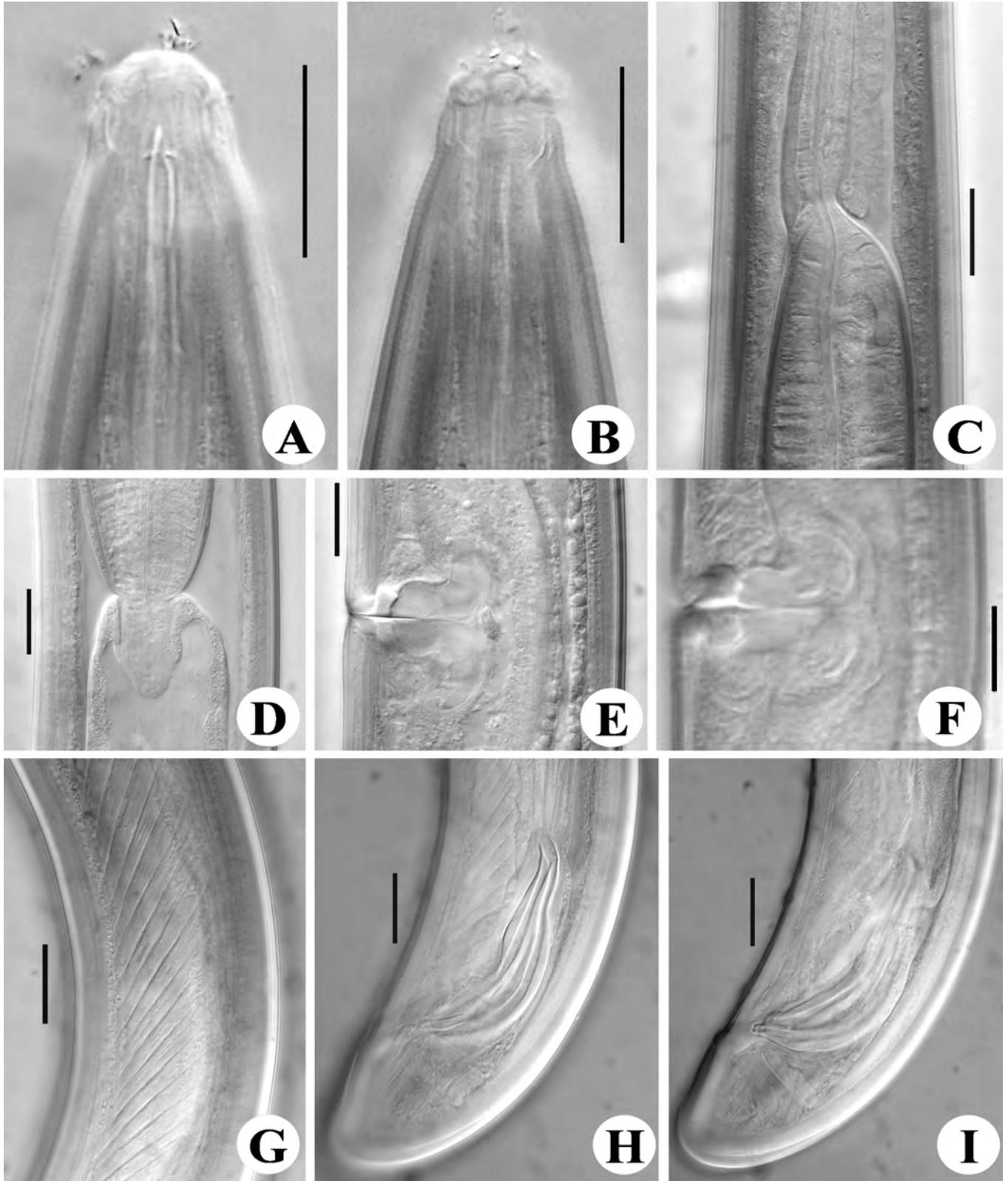


Fig. 6. *Axonchium zealandicum* sp. n. A. Anterior region; B. Anterior end showing amphid; C. Junction between two parts of pharynx; D. Pharyngo-intestinal junction; E and F. Vulval region; G. Male posterior region showing muscles; H and I. Male posterior region. (Scale bar = 20 μ m).

Table IV. Diagnostic compendium of *Axonchium* species with vaginal sclerotization.

Species	L (mm)	a	b	c	V	Odontostyle length (µm)	Odontophore length (µm)	Anterior genital branch in body width	Shape of vaginal sclerotization in lat. view	Prerectum length in ABD*	Spicule length (µm)	Ventromedian supplement	Reference
<i>A. cboristum</i>	♀	2.1-3.9	47	2.8-3.7	56-71	49-58	12-13	1.7, without ovarial mass	hemispherical	4-5	-	-	Nair, 1973
	♂	2.4-2.5	38-46	2.8-3.7	56-77	-	12-13	16-19	-	6	57-61	19-26, continuous	
<i>A. coronatum</i>	♀	2.99-4.2	36-58	2.8-3.8	79-112	47-53	12.5-16.0	14.0-19.5	3.3-3.6, with ovarial mass	weak, heart-shaped	4-10	-	Nair and Coomans, 1974
	♂	3.19-3.20	44-50	3.2-3.6	78-79	-	12-13	15.5-17.0	-	7-8	86.5-87.5	9-11, spaced	
<i>A. coxi</i>	♀	3.03-3.78	38-47	2.6-3.7	72.0-92.2	49-58	-	-	2.7-4.4, with ovarial mass	bean shaped	9.6	-	Yeates, 1979
<i>A. crassum</i>	♀	3.9	32.5-37.0	2.6-2.8	83-108	54.0-55.8	21	25	2.5, with rudimentary oviduct	heart shaped	6	-	Nair, 1973
<i>A. gigas</i>	♀	3.0-4.6	44-45	3.4-4.1	87-90	49	17	17	3.3, with ovarial mass	rectangular	6.6	-	Nair, 1973
	♂	3.9-4.2	45-50	3.9-4.0	83-85	-	19.5	27	-	-	-	103	17 evenly distributed
<i>A. leptocephalon</i>	♀	2.0-2.2	35-39	2.6-2.9	73-80	58-59	11	20-21	1.6, without ovarial mass	weak triangular	6	-	Nair and Coomans, 1974
<i>A. macrocephalon</i>	♀	1.56	41	2.9	78.5	58.5	12	15	5.5	triangular	-	-	Nair and Coomans, 1974
	♂	1.64	44	2.5	75	-	13	15	-	-	-	66	11, spaced
<i>A. micans</i>	♀	2.6-2.7	32-40	3.3-3.6	80-107	49-58	13	16-19	2.3, with ovarial mass	rectangular	8	-	Nair, 1973
<i>A. serpens</i>	♀	2.8-3.8	41-50	3.3-4.0	82.0-122.5	47.5-57.5	12.5-14.0	17-20	2.7-5, with ovarial mass	triangular	4.3-8	-	Nair, 1973
	♂	3.5-3.8	49-59	3.7-4.1	100-129	-	13	19	-	-	4.7	76	25, continuous
<i>A. solitare</i>	♀	2.2-2.3	47-56	3.3-3.7	67-83	56-58	12-13	14-15	3.5-4, with ovarial mass	weakly developed and bowl shaped	4.5	-	Nair, 1973
<i>A. spiculum</i>	♀	1.65-1.88	42-47	2.7-3.2	67-72	52-54	9-10	13-14	2-3, without ovarial mass	3 pieces forming heart shape	9-12	-	Ahmad and Jairajpuri, 1982
	♂	1.69-1.78	46-48	3.0-3.5	65-71	-	9-10	13-14	-	-	10-12	39-42	9, weak, in two groups
<i>A. tacitum</i>	♀	1.76-1.96	29-33	2.3-2.9	70-75	55-57	10-12	15-16	2-3, without ovarial mass	slightly elongate, cylindrical	6-7	-	Ahmad and Jairajpuri, 1982
	♂	1.73-1.99	29-33	2.3-2.9	70-75	55-57	10-11	15-16	-	-	7-9	52-57	7-9
<i>A. thornei</i>	♀	1.9-2.01	35-42	3.0-3.4	52-60	54-57	9.0-11.5	13.0-15.5	2-2.7, without ovarial mass	hemispherical in lateral view	4-7	-	Nair, 1973
	♂	1.8-1.9	42-47	2.9-3.6	54-66	-	10.5	12-15	-	-	5.6-7.0	40.5-42	13-15, continuous
<i>A. vaginatum</i>	♀	2.21-2.79	37-41	2.6-3.4	77-89	44-49	13-14	14-16	2.4-4.8, without ovarial mass	strong, heart-shaped	6-7	-	Ahmad and Jairajpuri, 1982
	♂	2.36-2.41	45-56	3.1	83-87	-	12-13	15	-	-	6-7	59-60	9, spaced
<i>A. vulvulatum</i>	♀	2.52-3.18	28-36	2.4-3.8	82-114	44.5-48	12-13	21-22	2.0-6.5	elongate, cylindrical	4-8	-	Nair and Coomans, 1974
	♂	2.85-3.24	33-38	3.7-3.8	91-93	-	11-12	22	-	-	8-10	104-107	11-14, spaced
<i>A. zealandicum</i>	♀	2.7	39.3	3.6	72.9	55	13.5	19.5	2.8, with ovarial mass	drop shaped concave outer wall	3.8	-	original
	♂	2.8	40.9	2.7	71.2	-	13.5	20.5	-	-	4.7	78	10, spaced

* ABD = Anal body diameter.

photographs of the type specimens kindly made available by Dr. Zeng Zhao), in having shorter prerectum (*vs* prerectum 9.6 times anal body diameter), and in presence of male (*vs* males absent)

In the presence of ovarial mass in the anterior genital branch, the new species comes close to *A. micans* Thorne, 1939 and *A. gigas* Thorne, 1939 but differs from the former in the shape of vagina and vaginal sclerotization (*vs* see Fig. 6C in Nair, 1973), in having comparatively longer anterior uterine branch (*vs* 2.3 times the length of the corresponding body width), shorter prerectum (*vs* length 8 times anal body width), in having longer and more conoid tail (*vs* tail 25 μm long, $c = 80\text{-}107$). From *A. gigas*, the new species differs in having smaller body size (*vs* $L = 3.0\text{-}4.6$ mm), smaller odontostyle and odontophore (*vs* odontostyle 17-19 μm , odontophore 17 μm), in the shape of vaginal sclerotization (*vs* vaginal sclerotization rectangular), shorter spicules (*vs* 103 μm), and fewer ventromedian supplements (*vs* 17 regularly spaced). *Axonchium serpens* Thorne, 1939 also has ovarial mass but is characterized by having a large number of contiguous supplements (*vs* 25).

In the presence of fewer ventromedian supplements and to some extent in the shape of vaginal sclerotization, the new species also resembles *A. vaginatum* Jairajpuri, 1965 but differs from it in the nature of the junction between the two parts of the pharynx (*vs* no isthmus-like structure at the junction between two parts), in the presence of ovarial mass in the anterior uterine branch (*vs* absent), the shape of vaginal sclerotization (*vs* outer wall of sclerotized pieces convex), in the absence of Z-organ in uterus (*vs* presence), posterior vulva position (*vs* $V = 44\text{-}49$), larger spicules (*vs* 59-60 μm), and irregularly spaced ventromedian supplements (*vs* regularly spaced).

Remarks. Coomans and Nair (1975), in their final paper among the series of papers on *Axonchium* Cobb, 1920, divided the genus into nine subgenera. Females of three of these subgenera, *Metaxonchium* with three species (*A. coronatum* (de Man, 1906) Thorne *et* Swanger, 1936; *A. leptcephalum* Altherr, 1953 and *A. vaginatum* Jairajpuri, 1965); *Epaxonchium* with two species (*A. valvulatum* Nair *et* Coomans, 1974 and *A. macrophallum* Thorne, 1939) and *Discaxonchium* with seven species (*A. serpens* Thorne, 1939; *A. choristum* Thorne, 1939; *A. crassum* Thorne, 1939; *A. gigas* Thorne, 1939; *A. micans* Thorne, 1939; *A. solitare* Thorne, 1939 and *A. thornei* Hechler, 1969) possess strongly developed sclerotization at vulva-vagina junction (*pars refringens vaginae*). Yeates (1979) added the species *A. coxi* to this group from New Zealand and Ahmad *et* Jairajpuri (1982) added a further two species, *A. tacitum* and *A. spiculum*, to this group from India. *Axonchium spiculum* has very distinctive spicules and they proposed a subgenus *Spiculaxonchium* for this species.

The differences between these three subgenera are so

minor that it is usually very difficult to assign a species with vaginal sclerotization to any of these three groups. Coomans *et* Nair (1975) specifically mention that several of the differentiating characters overlap in one or other of the groups. The subgenera *Metaxonchium* and *Epaxonchium* are differentiated on the basis of a slender to very slender anterior part of the pharynx in *Epaxonchium* and quite muscular in *Metaxonchium*, but in the subgenus *Syncheilaxonchium* both the types of pharynx occur. Similarly, the subgenus *Discaxonchium* is characterized by the presence of a disc-like structure between body cuticle and vaginal sclerotization and males with usually continuous supplements. But we have species in this group with spaced ventromedian supplements (cf. *A. gigas*) and the disc-like structure is usually very difficult to observe. In such a situation, while identifying a species of *Axonchium* with vaginal sclerotization, it is more reasonable to check all the species with vaginal sclerotization rather than restricting oneself only to species under a particular subgenus. A diagnostic compendium (Table IV) is provided for all the described species of *Axonchium* with vaginal sclerotization. The shape of spicule is a very important diagnostic character in species identification of *Axonchium*, and at times it is almost impossible to designate a species in the absence of males. Similarly, in the species with vaginal sclerotization, the shape of *pars refringens vaginae* is characteristic and can be used as a species specific character.

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