

***Tenuidraconema koreensis*, a New Species of Marine Nematodes (Adenophorea: Desmodorida) from South Korea**

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Key Words:

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***Tenuidraconema koreensis*, a new species of free-living marine nematodes, collected from the subtidal coarse sediments and various invertebrates of Namae, is described. The new species differs from *T. fiersi* Decraemer, 1989, the only other species in the genus, by having the combination of the following characters: the position of twelve cephalic adhesion tubes in both sexes (anterior six cephalic adhesion tubes inserted on the rostrum and posterior six inserted on the body annules), and the number of posterior sublateral adhesion tubes (12 in male and 13 in female) and posterior subventral adhesion tubes (15 in male and 19 in female). This paper contains the description of the new species with illustrations and scanning electron microscope (SEM) photomicrographs. This is the first discovery of the monotypic genus *Tenuidraconema* outside the type locality.**

The genus *Tenuidraconema* Decraemer, 1989 in the family Draconematidae Filipjev, 1918 was established by Decraemer (1989) to incorporate a single species, *T. fiersi*, from the sediment between roots of the mangrove, *Avicennia* sp., which was sampled by hand dredging at the intertidal zone of Motupore Island, Papua New Guinea. This rare monotypic genus is differentiated from all other genera of the Draconematidae by the morphology of its unique habitus, that is, long slender body (Decraemer, 1989; Decraemer et al., 1997).

A new draconematid species, *T. koreensis* n. sp., was identified during an investigation of the free-living marine nematodes collected from the subtidal coarse sediments and various invertebrates on the eastern coast of South Korea.

This paper contains the description of a new draconematid species, *T. koreensis* n. sp., with illustrations and scanning electron microscope (SEM) photomicrographs. This is the first discovery of the genus *Tenuidraconema* outside the type locality, and the first record in the Northwest Pacific.

Materials and Methods

The nematodes were obtained from the washings of subtidal coarse sediments and various invertebrates (hermit crabs, sponges and bryozoans), which were

taken from a fishing net set in 150 to 250 m depth at Namae harbor at the eastern coast of South Korea. Samples were filtered in the field through a plankton net (67 µm in pore diameter) after rinsing with freshwater for less than a minute for osmotic shock (Kristensen, 1989), and then fixed in 5% formalin. Specimens were mounted in anhydrous glycerin between two coverslips on H-S slides (Shirayama et al., 1993), and measured and photographed using a differential interference contrast (DIC) microscope (Olympus BX-60) equipped with Nomarski optics. All drawings were made with the aid of a camera lucida.

Several specimens were prepared for SEM examination. Four males and four females selected for SEM were prefixed overnight at 4°C in a 2.5% glutaraldehyde, followed by postfixation with 1% osmium tetroxide. After dehydration through a graded series of ethanol (50%-100%, 10% intervals) for 30 min each, the materials were critical point dried, coated with gold-palladium, and examined under a Hitachi S-520 scanning electron microscope.

Terminology mostly follows Decraemer (1989). Scale bars in figures are indicated in µm.

Description

Family Draconematidae Filipjev, 1918
Subfamily Draconematinae Filipjev, 1918
Genus *Tenuidraconema* Decraemer, 1989

Emended diagnosis

Body slender, shallow sigmoid; swollen pharyngeal region

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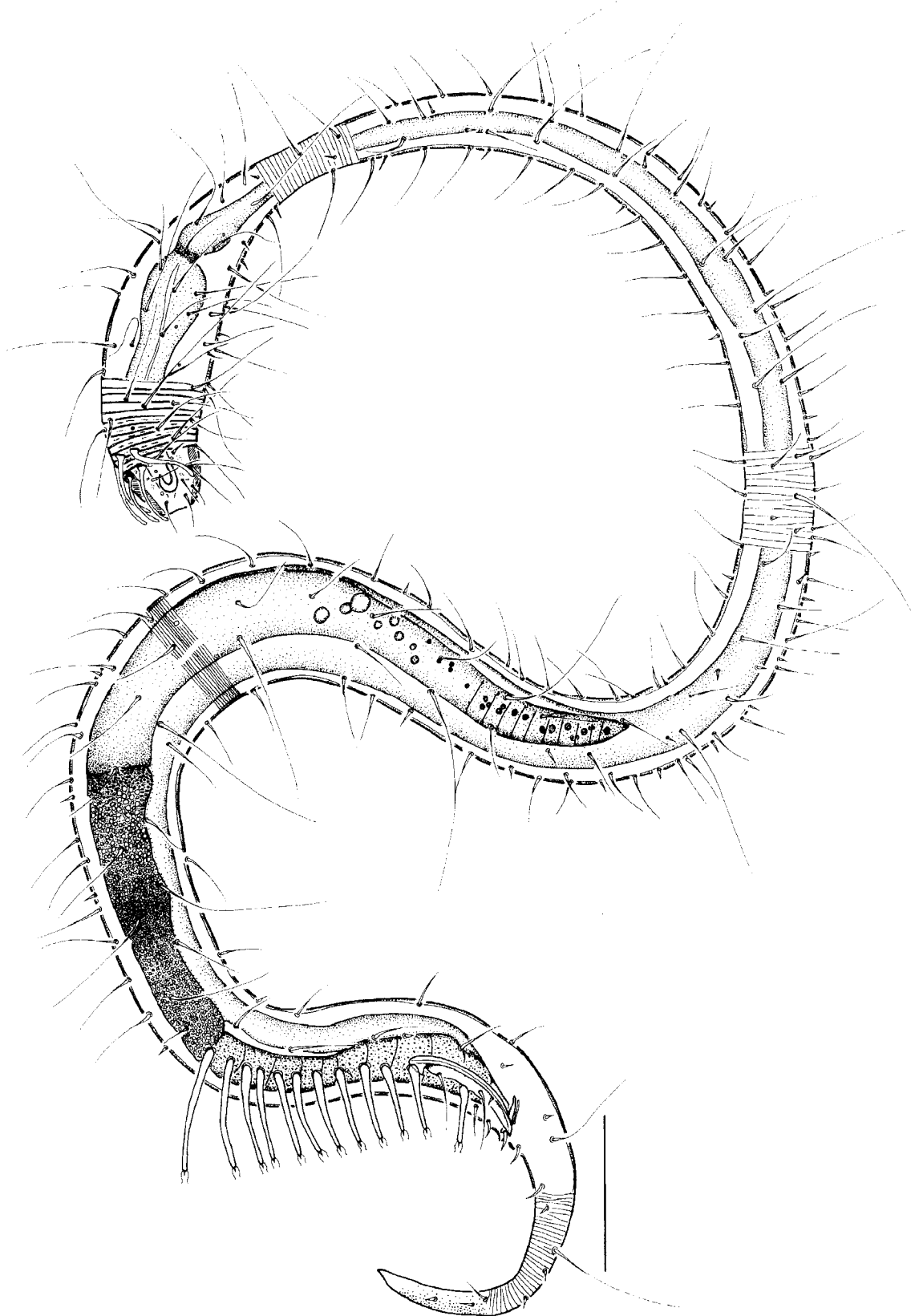


Fig. 1. *Tenuidraconema koreensis* n. sp., male habitus, lateral view. Scale bar = 50 μ m.

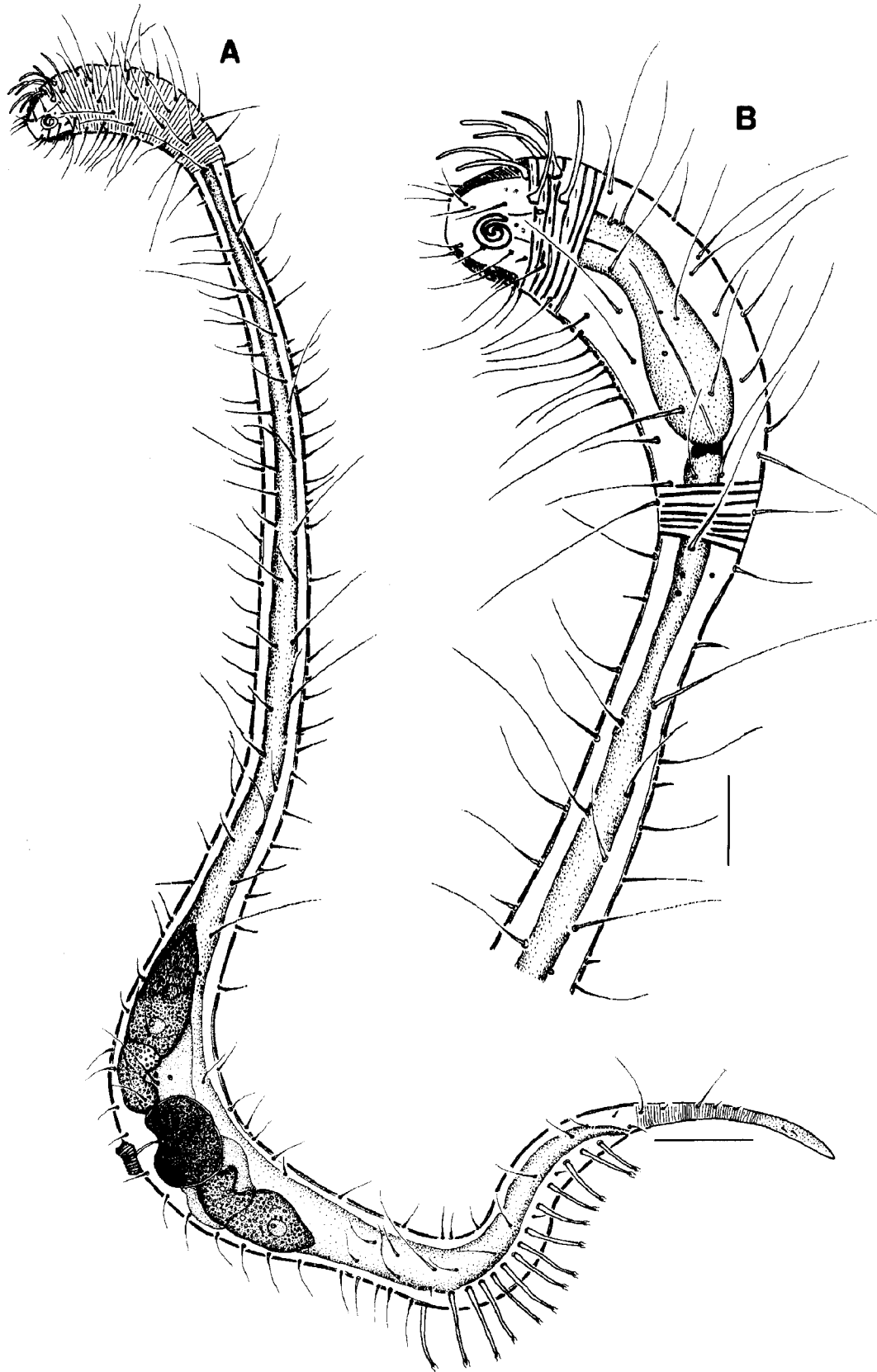


Fig. 2. *Tenuidraconema koreensis* n. sp., female. A, Habitus, lateral view. B, Head and narrow region, lateral view. Scale bars = 50 μ m (A) and 20 μ m (B).

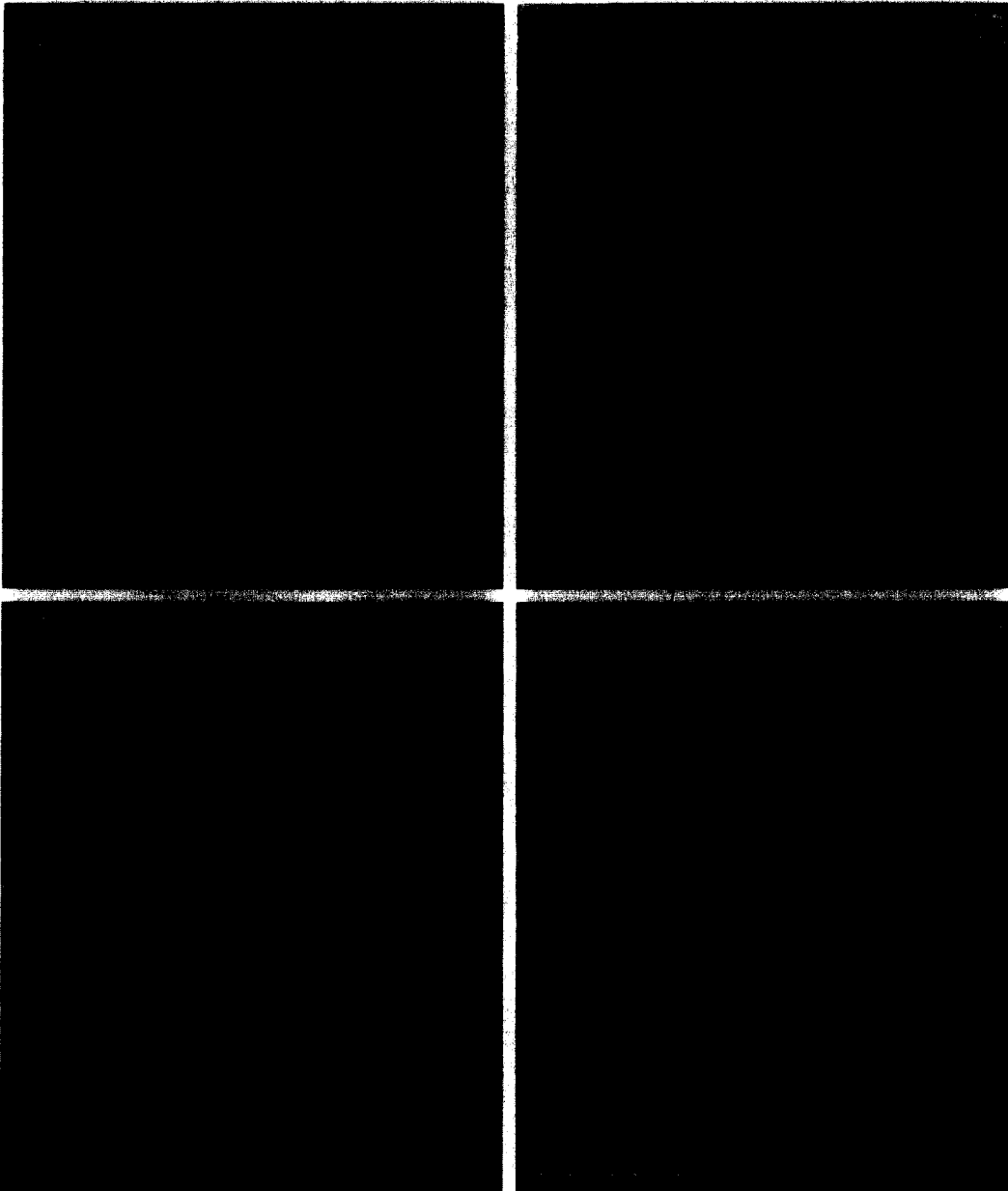


Fig. 3. SEM micrographs of *Tenuidraconema koreensis* n. sp., male. A, Habitus, lateral view. B, Head region, lateral view. C, Amphideal fovea, lateral view. D, Mouth and cephalic adhesion tubes, enface view. Scale bars = 120 μm (A), 23.1 μm (B), 7.5 μm (C), and 8.6 μm (D).

8 to 10% of total body length. Annulation of body cuticle anteriorly and posteriorly with vacuolar ornamentation; mid-body smooth and interrupted by marked lateral field (lateral differentiation). Twelve cephalic adhesion tubes (CAT): either all CAT inserted on rostrum or anterior 6 CAT inserted on rostrum and posterior 6 CAT inserted on body annules. Amphideal fovea loop-shaped in male, and spiral in female and juvenile. Pharynx with cylindrical corpus (with or without slight swelling at level of head base) and posterior muscular bulb without cuticularized valve.

Tenuidraconema koreensis n. sp.
(Figs. 1-6)

Material examined

Thirty males and 23 females, Namae (37°57' 07" N, 128°46' 41" E), 21 Apr. 2000, H. S. Rho and S. H. Kim. Holotype and 44 paratypes are mounted in anhydrous glycerine between two coverslips on H-S slides, sealed with nail polish. Holotype and two paratypes will be deposited in the nematode collection of the Royal Belgian



Fig. 4. SEM micrographs of *Tenuidraconema koreensis* n. sp., male. A, Posterior adhesion tubes, lateral view. B, Detail of posterior adhesion tubes, lateral view. C, Cloacal opening and anal setae, ventral view. D, Tail region and non-striated tail end, lateral view. Scale bars = 23.1 μm (A), 10 μm (B), 8.6 μm (C), and 12 μm (D).

Institute of Natural Sciences, Brussels, Belgium. Another paratypes are kept in the authors' collection at the specimen room of the School of Biological Sciences, Seoul National University.

Habitat

The nematodes were obtained from the washings of subtidal coarse sediments and various invertebrates

(hermit crabs, sponges and bryozoans), which were collected from 150 to 250 m deep using fishing net.

Diagnosis

Body slender, shallow sigmoid. Swollen anterior body region 8% of total body length. Body cuticle thin, with vacuolar ornamentation anteriorly and posteriorly; mid-body smooth and interrupted by marked lateral field

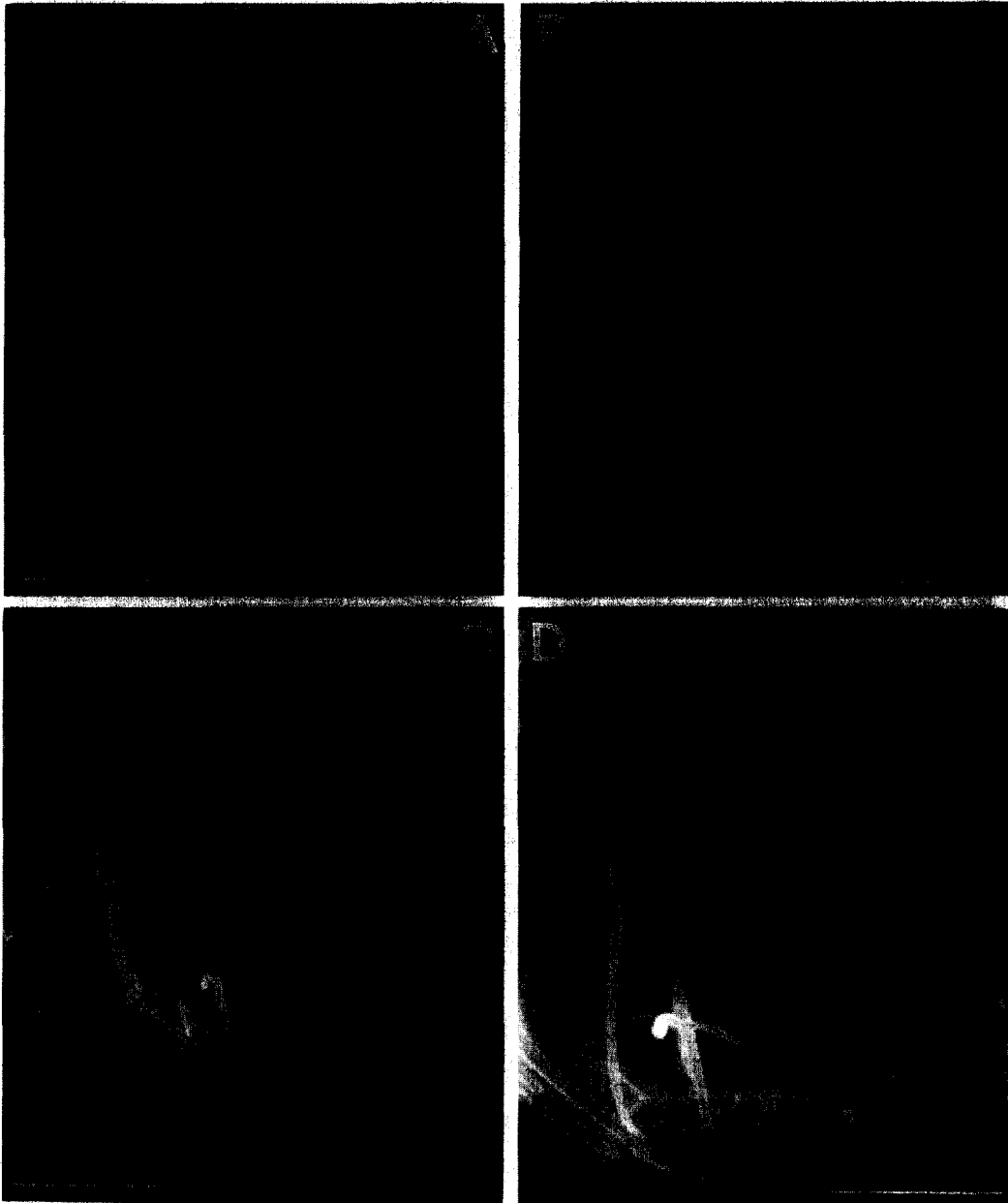


Fig. 5. SEM micrographs of *Tenuidraconema koreensis* n. sp., female. A, Habitus, lateral view. B, Head region, lateral view. C, Cephalic adhesion tubes and amphideal fovea, lateral view. D, Detail of amphideal fovea, lateral view. Scale bars = 120 μm (A), 27 μm (B), 10 μm (C), and 5 μm (D).

(lateral differentiation). Twelve CAT with widened base and blister-shaped tip: anterior 6 CAT inserted on rostrum and posterior 6 CAT inserted on body annules. Amphideal fovea loop-shaped in male (dorsal arm shorter than ventral arm) and spiral in female. Stoma narrow, unarmed. Pharynx with terminal muscular bulb, lumen wall not thickened. Adhesion tubes: CAT (12 in male and female) and PAT (sublateral rows with 12 adhesion tubes in male and 13 adhesion tubes in female, and subventral rows with 15 adhesion tubes in male and 19 adhesion tubes in female). A pair of intermingled somatic setae inserted

on between posterior SIAT 11 and posterior SIAT 12. Three pairs of subventral anal setae: 2 pairs anterior to cloacal opening and one pair posterior to cloacal opening. Three pairs of small somatic setae inserted on non-striated tail end.

Holotype male

Body long, slender, shallow sigmoid (Figs. 1A, 3A). Pharyngeal region 8% of total body length, slightly swollen, and about as wide as mid-body region. Tail narrow,

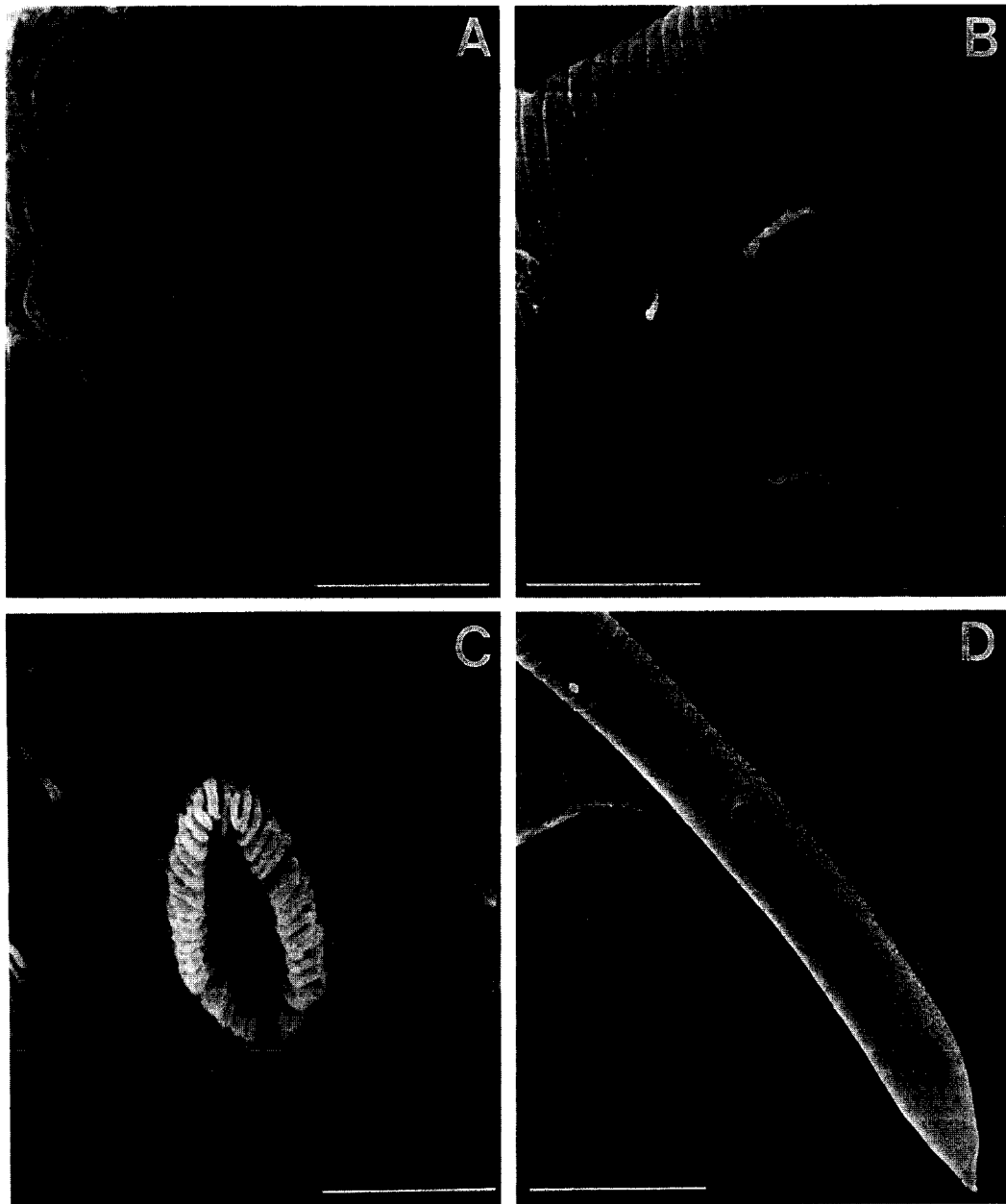


Fig. 6. SEM micrographs of *Tenuidraconema koreensis* n. sp., female. A, Mouth part, enface view. B, Lateral differentiation on mid-body region, lateral view. C, Vulva and paravulval setae, ventral view. D, Non-striated tail end, lateral view. Scale bars = 8.6 μ m (A-C) and 12 μ m (D).

cylindro-conoid. Body cuticle striated; cuticular rings broader in anterior and posterior body regions; laterally interrupted by well marked narrow lateral field (lateral differentiation) in mid-body region. Annules in anterior body region ornamented with fine vacuoles (Fig. 3C); these vacuoles becoming larger posteriorly and marked cuticular bars; annules smooth in mid-body region, and faintly vacuolated in anal region. Somatic setae arranged in 8 longitudinal rows (2 subdorsal, 4 sublateral, and 2 subventral) in pharyngeal region; 2 predominant lengths (45 μ m and 24 μ m); longest somatic setae (65 μ m) inserted on subdorsally in pharyngeal region (Fig. 3B).

Head rostrum with vacuolar ornamentation and numerous subcephalic setae (14 μ m). Lip region rarely extruded in fixed specimen (Fig. 3C, D). Four cephalic setae 18 μ m long, located in front of head border. Twelve CAT with widened base and blister-shaped tip, arranged in 2 transverse rows: anterior 6 CAT inserted on rostrum and posterior 6 CAT inserted on body annules (Fig. 3C, D). Amphidial fovea large, loop-shaped; longer ventral arm not reaching anterior annules (Fig. 3C).

Stoma narrow, unarmed. Pharynx largely cylindrical, ending on muscular posterior bulb without cuticularized valve. Cardia short. Intestine cylindrical, straightforward,

Table 1. Character comparisons between *Tenuidraconema koreensis* n. sp. and *T. fiersi*

Characters	<i>T. koreensis</i> n. sp.	<i>T. fiersi</i> Decraemer, 1989
Labial sensilla	Setiform	Papilloid
CAT	Six inserted on rostrum & six inserted on body annules	All inserted on rostrum
SIATn	12 in male & 13 in female	10-12 in male & 10-12 in female
SvATn	15 in male & 19 in female	10-11 in male & 12-13 in female
Spicules	Stout and with a well developed cuticularized velum	Slender and with a weakly cuticularized velum
Intermingled setae	Between SIAT 11 and SIAT 12	Between SIAT 1 and SIAT 2
Habitat	Subtidal sediment & various invertebrates	Intertidal sediment between roots of mangrove
Locality	Korea (Namae)	Papua New Guinea (Motupore Island)

gradually widening posteriorly, and lying dorsal of genital system. Excretory organ not observed.

Male reproductive system typical of Draconematidae, with single testis extending anteriorly. Spicules thick, slightly curved, 53 μm long, with well developed knob-like capitulum, small ventral apophysis and strongly cuticularized velum. Gubernaculum, 12 μm long, not parallel to spicules. Three pairs of subventral anal setae: 2 pairs anterior to cloacal opening (anus) and 1 pair posterior to cloacal opening (Fig. 4C). Anal flap short, not crenate, clearly protruding from body wall. Adhesion tubes: all PAT with well marked bell-shaped end (Fig. 4A, B). PAT arranged on 4 longitudinal rows: 2 sublateral rows each consisting of 12 (left side) and 12 (right side) adhesion tubes, and 1 pair of intermingled somatic setae inserted on between posterior SIAT 11 and posterior SIAT 12, and 2 subventral rows each consisting of 15 (left side) and 15 (right side) adhesion tubes, without intermingled somatic setae. Posterior adhesion tubes becoming obviously shorter caudally. All PAT anterior to cloacal opening.

Tail 130 μm long, tapered to very slender cylinder. Non-striated end finely vacuolated, 44 μm long, 34% of total tail (Fig. 4D). Three pairs of small somatic setae inserted on non-striated tail region. Caudal glands extending shortly beyond the cloacal opening.

Female

Similar to males in most respects, but mid-body swelling more pronounced (Figs. 2A, 5A). Annulation and cuticular ornamentation as in male (Fig. 6B). Twelve CAT with widened base and blister-shaped tip, arranged in 2 transverse rows: anterior 6 CAT inserted on rostrum and posterior 6 CAT inserted on body annules (Figs. 2B, 6A). Amphidial fovea spiral, with 2 coils and ventrally whirled, 9 μm in diameter (Figs. 2A, 5B-D). Digestive system as in male. Ovaries paired, opposed and reflexed (Fig. 2A). Vagina with well cuticularized wall. Two pairs of paravulval setae present (Fig. 6C). Vulva at 60% of total body length from anterior. Developing oocyte 28 by 45 μm .

Adhesion tubes: all posterior adhesion tubes (PAT)

with well marked bell-shaped end. PAT arranged on 4 longitudinal rows: 2 sublateral rows each consisting of 13 (left side) and 13 (right side) adhesion tubes, without intermingled somatic setae, and 2 subventral rows each consisting of 19 (left side) and 19 (right side) adhesion tubes, without intermingled somatic setae. Posterior adhesion tubes becoming obviously shorter caudally. All PAT anterior to cloacal opening/anus.

Tail 119 μm long, tapered to very slender cylinder. Non-striated end finely vacuolated, 48 μm long, 40% of total tail (Fig. 6D). Two pairs of small somatic setae inserted on non-striated tail region.

Measurements

Holotype male

L = 1039, mbd = 42, (mbd) = 12, mbd Ph = 38, ph = 83, abd = 18, t = 130, tmr = 44, spic = 53, gub = 12, SIAT1 = 46, SIATn = 12, SvATn = 15, a = 25, b = 13, c = 8.

Allotype female

L = 1000, mbd = 62, (mbd) = 16, mbd Ph = 33, ph = 86, abd = 14, t = 119, tmr = 48, SIAT1 = 39, SIATn = 13, SvATn = 19, a = 16, b = 12, c = 8, V = 60.

Etymology

The specific name is taken from Korea, the type locality.

Remarks

Until now, only one species, *T. fiersi* Decraemer, 1989 from the sediment between roots of the mangrove, *Avicennia* sp., at the intertidal zone of Motupore Island, Papua New Guinea, has been recorded in the genus *Tenuidraconema* (Decraemer, 1989). This rare draconematid nematode is mainly characterized by the following character combination: (1) long slender body, (2) presence of 12 CAT on the rostrum, (3) large loop-shaped amphideal fovea in male, and spiral shaped in female

and juvenile, (4) presence of papilloid external labial sensilla, (5) number of posterior SIAT (10-12 in male and 10-12 in female), (6) number of posterior SvAT (10-11 in male and 12-13 in female), (7) shape of copulatory apparatus, (8) well cuticularized vagina, and (9) a slender elongated cylindro-conoid tail shape (Decraemer, 1989; Decraemer et al., 1997).

Tenuidraconema koreensis n. sp. shares with *T. fiersi* four characteristics mentioned above. As shown in Table 1, however, both can be distinguished from each other by the position of CAT (anterior six CAT inserted on the rostrum and posterior six CAT inserted on the body annules in the new species, whereas in *T. fiersi* all CAT inserted on the rostrum); the larger number of PAT (respectively 12 posterior SIAT in male, 13 in female and 15 posterior SvAT in male and 19 in female in the new species compared to 10-12 posterior SIAT in male, 10-12 in female and 10-11 posterior SvAT in male, 12-13 in female in *T. fiersi*); the morphology of external labial sensilla (*T. koreensis* n. sp. has also six setiform external labial sensilla, while *T. fiersi* has six papilloid external labial sensilla). Moreover, the new species has a well developed cuticularized velum in spicules, while *T. fiersi* has a weakly cuticularized velum. Lastly, the new species

has a pair of intermingled somatic setae inserted between posterior SIAT 11 and posterior SIAT 12, while *T. fiersi* has a pair of intermingled somatic setae inserted between posterior SIAT 1 and posterior SIAT 2.

Acknowledgements

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