

## Description of two new free-living marine nematode species of the subgenus *Desmolorenzenia* (*Desmoscolecida*, genus *Desmoscolex*) from Korea

H. S. RHO<sup>1</sup>, W. KIM<sup>2</sup> & C. Y. CHANG<sup>3</sup>

<sup>1</sup>Marine Ecosystem and Environment Research Division, Korea Ocean Research and Development Institute, Ansan, Korea, <sup>2</sup>School of Biological Sciences, Seoul National University, Seoul, Korea, and <sup>3</sup>Department of Biology, College of Natural Sciences, Daegu University, Gyeongsan, Korea

(Accepted 11 December 2006)

### Abstract

Two new species of marine desmoscolecid nematodes, *Desmoscolex* (*Desmolorenzenia*) *coreensis* sp. nov. and *D. (D.) pedunculus* sp. nov., are described based on specimens obtained from the washings of shallow sublittoral invertebrates from the eastern and southern coasts of Korea. Both species possess 17 desmens and a typical setal pattern. *Desmoscolex (D.) coreensis* sp. nov. is most similar to *D. (D.) hupferi* (Steiner, 1916) in the number of desmens, setal pattern, and head shape, but differs by the structure of the cephalic setae, the cylindrically elongated end ring, and a lower “c” value. *Desmoscolex (D.) pedunculus* sp. nov. is closely related to *D. (D.) crassicauda* (Timm, 1970) in the number of desmens, setal pattern, subdorsal setae inserted on a peduncle, and a similarly shaped end ring, but is easily discernible by the globular head shape, the distinctly differentiated lip region and the position of the cephalic setae, centrally on the head capsule.

**Keywords:** *Desmolorenzenia*, free-living marine Nematoda, Korea, new species, SEM

### Introduction

The genus *Desmolorenzenia* Freudenhammer, 1975 was classified as a subgenus of the genus *Desmoscolex* by Decraemer (1986), which is the genus with the largest number of species in the order Desmoscolecida. *Desmolorenzenia* is characterized by desmens with a triangular outline and an abrupt inversion of orientation of these rings (Freudenhammer 1975; Decraemer 1985). The genus is distributed worldwide, and has been recorded from marine sediments, ranging from intertidal to deep-sea habitats, or more rarely from terrestrial environments (Steiner 1916; Lorenzen 1969; Timm 1970; Decraemer 1978, 1986; Decraemer and Sturhan 1982, 1997; Lal 1990).

Since Steiner (1916) first described two *Desmolorenzenia* species from the Atlantic Ocean (as *Desmoscolex hupferi* and *Desmoscolex platycricus*), 17 nominal species are currently recognized in this subgenus. However, the taxonomic record of *Desmolorenzenia* in the northwest Pacific is entirely lacking.

---

Correspondence: C. Y. Chang, Department of Biology, College of Natural Sciences, Daegu University, Gyeongsan 712-714, Korea. Email: cychang@daegu.ac.kr

Published 26 March 2007.

ISSN 0022-2933 print/ISSN 1464-5262 online © 2007 Taylor & Francis

DOI: 10.1080/00222930601176571

During a survey of the free-living marine nematofauna of Korea, two desmoscolecid species were collected from washings of sublittoral invertebrates from the eastern and southern coasts of Korea. A morphological study of several males, females, and juveniles under a differential interference microscope and a scanning electron microscope indicated that both species are new to science. They are described herein as *Desmoscolex (Desmolorenzenia) coreensis* sp. nov. and *D. (D.) pedunculus* sp. nov. and are illustrated, based on light microscopic and scanning electron microscopic (SEM) observations.

### Materials and methods

The nematodes were obtained from the washings of shallow sublittoral invertebrates such as sponges (*Callyspongia elegans* and *Chiona celata*), bryozoans (*Adeonella plataea* and *Thalamoporella lioticha*), and polychaetes (*Pomatoleios krausii* and *Serpula vermicularis*). All material was collected from depths between 3 and 25 m by scuba diving on the eastern and southern coasts of Korea (Figure 1). In the field, samples were soaked in freshwater for less than a minute for osmotic shock (Kristensen 1989). Nematodes were decanted and sieved through a fine-mesh net with a mesh size of 67  $\mu\text{m}$ . The filtered specimens were fixed in 4% buffered formalin in sea water.

Specimens were mounted in anhydrous glycerin between two coverslips on H-S slides (Shirayama et al. 1993), a recently developed type of the Cobb slide, observed, measured,

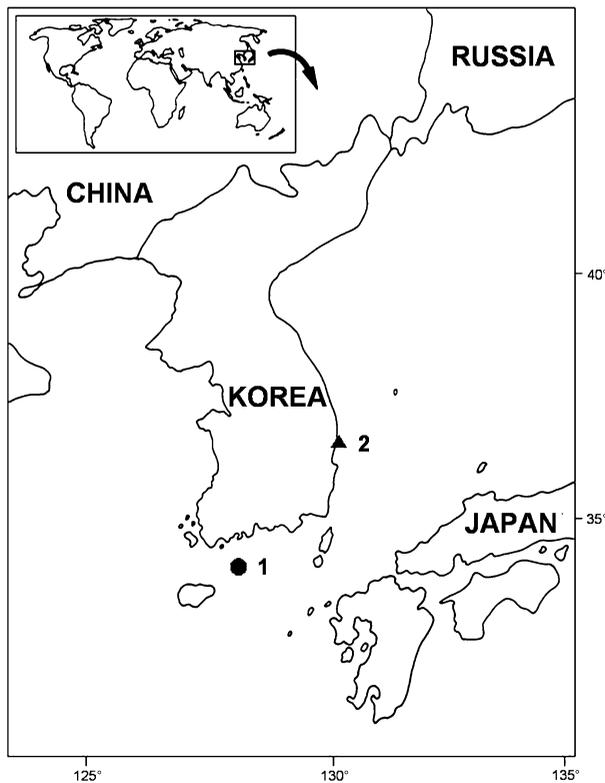


Figure 1. Map showing the sampling localities: 1, Geomundo Island; 2, Geumjin, Youngdeok. *Desmoscolex (Desmolorenzenia) coreensis* sp. nov. (●); *D. (D.) pedunculus* sp. nov. (▲).

and photographed using a differential interference contrast microscope (Olympus BX-60) equipped with Nomarski optics. All drawings were made with the aid of a camera lucida. Specimens for SEM study were prefixed for 4–6 h at 4°C in 2.5% glutaraldehyde in 0.1 M phosphate buffer (pH 7.4), followed by post-fixation with 2% cold osmium tetroxide in the same buffer for 1.5–2 h. After dehydration through a graded series of ethanol (50–100% at 10% intervals of 30 min each), the specimens were critical-point dried, coated with gold-palladium, and electron-micrographed using a Hitachi S-520 scanning electron microscope, at 15 kV voltage acceleration. Terminology mostly follows Decraemer (1986).

Abbreviations used in the text are as follows: L, body length; hd, maximum head diameter; cs, length of cephalic setae; sd<sub>n</sub>, length of subdorsal somatic seta on desmen n; sv<sub>n</sub>, length of subventral somatic seta on desmen n; ph, length of pharynx; t, tail length; tmr, length of terminal ring; tmrw, maximum width of terminal ring; mbd, maximum body diameter; mbde, maximum body diameter, external material not included; spic, length of spicules measured along the median line; gub, length of gubernaculum; V%, distance of vulva from anterior body end as percentage of total body length; a, b, c, proportions of de Man: a, body length divided by body maximum width; b, body length divided by the pharynx length; c, body length divided by the tail length. All measurements are in micrometres (µm); mean values are provided between parentheses.

## Species descriptions

### Order DESMOSCOLECIDA

#### Family DESMOSCOLECIDAE

#### Genus *Desmoscolex* Claparède, 1863

#### Subgenus *Desmolorenzenia* Freudenhammer, 1975

#### *Desmoscolex (Desmolorenzenia) corensis* sp. nov.

(Figures 2, 3)

#### *Type material*

Holotype male (RIT699) and one paratype (juvenile female) (RIT700), mounted in glycerine on H-S slide, are deposited in the nematode collection of the Royal Belgian Institute of Natural Sciences, Brussels, Belgium. Three paratypes (one male and two juvenile females) (DB30002-30004) are deposited in the nematode collection of the Department of Biology, Daegu University, Korea. Another six paratypes (one male and five juvenile females) (SNU10005-10010) are kept in the first author's (H. S. Rho) research collection at the School of Biological Sciences, Seoul National University, Korea.

#### *Type locality*

Geomundo Island (34°05'32" N, 127°14'55" E), collected on 6 October 2001 by H. S. Rho and J. W. Choi.

#### *Type habitats*

The nematodes were obtained from sponges and bryozoans on subtidal rocks (25 m deep), collected by scuba diving.

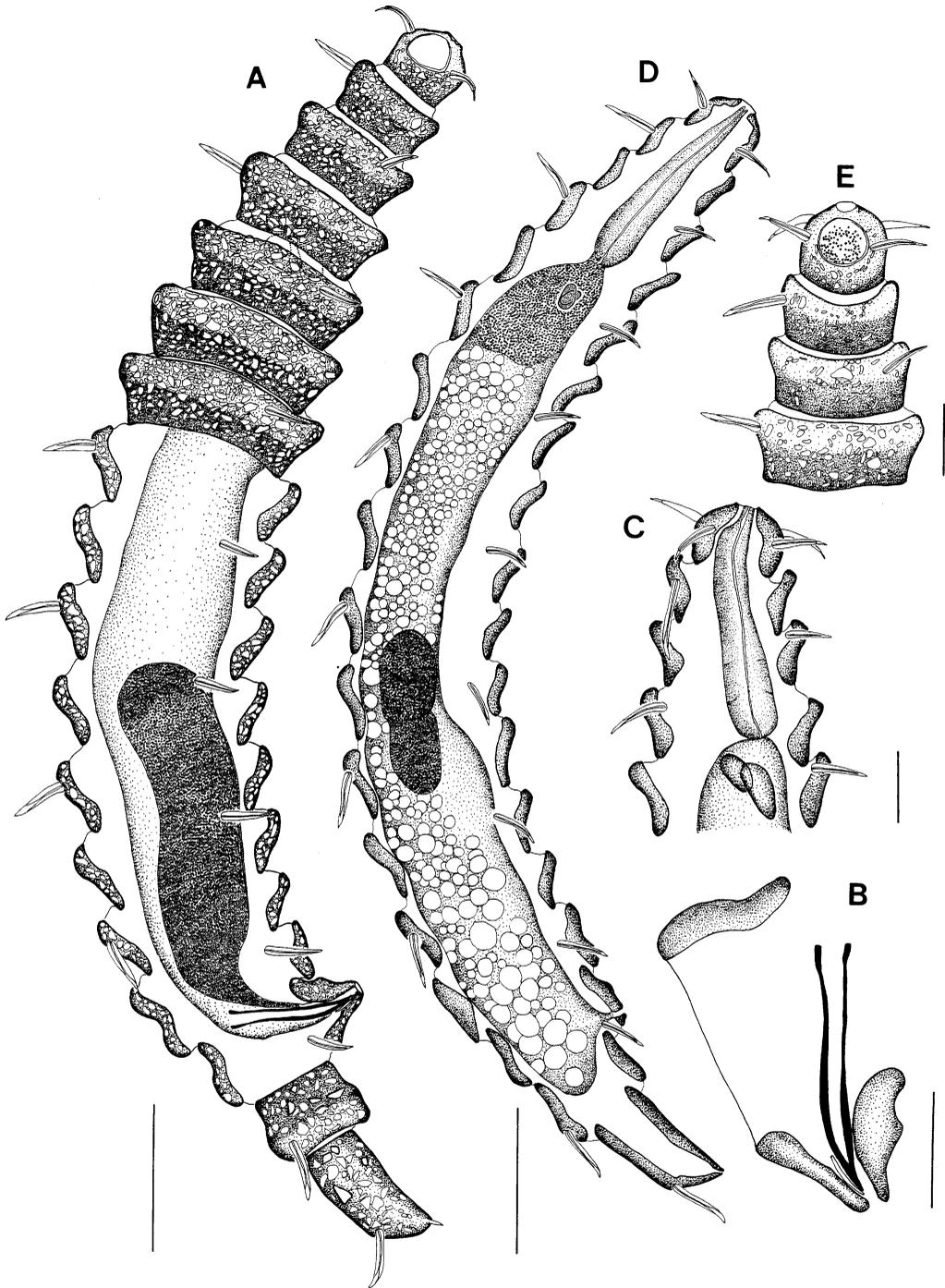


Figure 2. *Desmoscolex (Desmolorenzenia) coreensis* sp. nov. (A–C) Males: (A) habitus (holotype), with anterior region and tail in surface view (a subdorsal seta on desmen 5 in right side is broken off); (B) copulatory apparatus, right side in optical section (holotype); (C) head and pharyngeal region, right side in optical section (paratype). (D, E) Juvenile female: (D) habitus in optical section; (E) head region, right side in surface view. Scale bars: 50  $\mu\text{m}$  (A, D); 20  $\mu\text{m}$  (B, C, E).

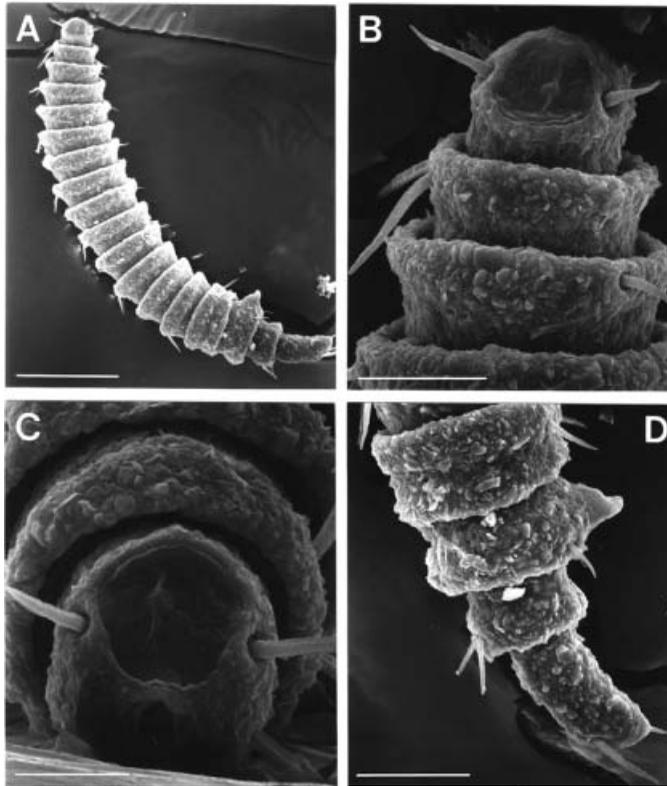


Figure 3. *Desmoscolex (Desmolorenzenia) coreensis* sp. nov., paratype male (SEM micrographs). (A) Habitus; (B) anterior body region, right side; (C) amphideal fovea and mouth region, slightly oblique en face view; (D) posterior body region, right side. Scale bars: 80  $\mu\text{m}$  (A); 20  $\mu\text{m}$  (B); 10  $\mu\text{m}$  (C); 30  $\mu\text{m}$  (D).

### Etymology

The specific name, *coreensis*, alludes to the type locality of the new species.

### Measurements

Holotype male: L=480; hd=27; cs=22; sd<sub>1</sub>=17; sd<sub>3</sub>=17; sd<sub>7</sub>=17; sd<sub>9</sub>=21; sd<sub>11</sub>=21; sd<sub>13</sub>=19; sd<sub>16</sub>=21; sd<sub>17</sub>=25; sv<sub>2</sub>=13; sv<sub>4</sub>=14; sv<sub>6</sub>=16; sv<sub>8</sub>=13; sv<sub>10</sub>=14; sv<sub>12</sub>=16; sv<sub>14</sub>=19; sv<sub>15</sub>=16; ph=78; t=90; tmr=49; tmrw=21; mbd=76; mbde=63; spic=46; gub=10; a=6.3; c=5.3.

Paratype males ( $n=2$ ): L=370–420 (395); hd=26–27; cs=14–17; sd<sub>1</sub>=17; sd<sub>3</sub>=19–21; sd<sub>5</sub>=17–21; sd<sub>7</sub>=15; sd<sub>9</sub>=19; sd<sub>11</sub>=19–21; sd<sub>13</sub>=18–21; sd<sub>16</sub>=20–21; sd<sub>17</sub>=24–25; sv<sub>2</sub>=13; sv<sub>4</sub>=15–16; sv<sub>6</sub>=13–15; sv<sub>8</sub>=15; sv<sub>10</sub>=17; sv<sub>12</sub>=16; sv<sub>14</sub>=15–20; sv<sub>15</sub>=15; ph=68; t=75–86; tmr=43–56; tmrw=22–23; mbd=63–71; mbde=54–59; spic=42–43; gub=9; a=5.2–6.7; b=6.2; c=4.9.

Juvenile females ( $n=6$ ): L=420–465 (441); hd=23–29; cs=15–19; sd<sub>1</sub>=19–20; sd<sub>3</sub>=16–18; sd<sub>5</sub>=17–18; sd<sub>7</sub>=16–23; sd<sub>9</sub>=18–20; sd<sub>11</sub>=19–20; sd<sub>13</sub>=19–24; sd<sub>16</sub>=20–21; sd<sub>17</sub>=22–28; sv<sub>2</sub>=13–17; sv<sub>4</sub>=17; sv<sub>6</sub>=15–17; sv<sub>8</sub>=15–17; sv<sub>10</sub>=15–17; sv<sub>12</sub>=14–18; sv<sub>14</sub>=15–19; sv<sub>15</sub>=16–17; ph=75; t=73; tmr=46–53; tmrw=22–26; mbd=59–71; mbde=49–61; a=6.6–7.6; b=6; c=6.2.

*Description*

*Males.* Body short, ventrally curved (Figures 2A, 3A), slightly tapered towards the anterior and posterior. Cuticle (Figures 2A, 3A) with 17 desmens. Desmen quadricomoid with inversion in orientation at level of desmen 14. Each desmen consisting of a layer of secretion and finely granular foreign material (= desmos) on annulated body cuticle.

Somatic setae (Figure 2A) arranged according to the typical desmoscolecoid setal pattern: nine pairs of subdorsal setae on desmens 1, 3, 5, 7, 9, 11, 13, 16, 17; eight pairs of subventral setae (located somewhat lateroventrally) on desmens 2, 4, 6, 8, 10, 12, 14, 15. Subdorsal setae with fine mid-central canal, gradually tapered to an open tip; external opening of tip oval-shaped. Subdorsal somatic setae inserted without peduncle on body cuticle, and longer than subventral somatic setae. Posteriormost pair of subdorsal somatic setae slightly longer. Subventral somatic setae (Figure 2A) inserted somewhat lateroventrally; setae small and relatively stumpy with fine mid-central canal; cylindrical basal part broad and tapering distally, without differentiated apical part. Subventral somatic setae all about same length (except slightly longer seta on desmen 14), inserted almost directly into cuticular rings without peduncle.

Head wider than long, rounded (Figures 2A, 3A, B), anteriorly tapered and truncated, and posteriorly with more or less cylindrical neck-region. Head cuticle completely covered with thin layer of fine granular desmos, except in amphideal zone. Labial region not distinct, apparently without separate lips. Labial sensilla not observed. Cephalic setae, 22 µm long, shorter than head width; jointed distally, i.e. finer distal part socketed into broad, cylindrical basal part near the tip of setae (Figure 2A, C, E); setae inserted directly on head cuticle just anterior to mid-head. Amphideal fovea (Figures 2A, 3B, C) rounded, largely covering head laterally; extending anteriorly to truncated end and posteriorly beyond level of insertion of cephalic setae. Small buccal opening leading to thin-walled stoma, 7 µm in length. Oesophagus not observed in holotype, but extending to end of desmen 3 in paratypes (Figure 2C).

A pair of oval (18 µm × 8 µm long), dark yellowish ocelli situated between desmens 3 and 4 (Figure 2A). Digestive system typical of *Desmolorenzenia*. Reproductive system typical of Desmoscolecidae. Single testis outstretched, extending anteriorly up to level between desmens 9 and 10 (Figure 2A). Ejaculatory glands not observed. Spicules 46 µm long (Figure 2A, B), nearly straight; corpus tapering caudally to pointed tip and proximally adjacent with poorly developed, offset capitulum. Gubernaculum 10 µm long, adjacent to tip of spicules. Cloacal tube broad, clearly protruded from medioventral body wall in desmen 15 (Figure 2A, B).

Tail consisting of two desmens (Figures 2A, 3D). End ring, 49 µm long, about 2.3 times longer than wide, consisting of broad cylindrical anterior part, extending up to insertion of terminal subdorsal somatic setae, and ventrally bent posterior part, tapering towards short, uncovered spinneret. End ring, with exception of terminal spinneret, totally covered with layer of secretion and foreign material. Caudal glands not observed.

*Juvenile females.* Similar to males in most respects. Body short, ventrally curved (Figure 2D). Cuticle (Figure 2D, E) with 17 desmens. Naked part of cuticle not annulated. Somatic setae with typical desmoscolecoid arrangement: nine pairs of subdorsal somatic setae on desmens 1, 3, 5, 7, 9, 11, 13, 16, 17; eight pairs of subventral setae on desmens 2, 4, 6, 8, 10, 12, 14, 15. Amphideal fovea (Figure 2E) broadly rounded (4 µm long), largely covering head laterally. One pair of ocelli (Figure 2D) dark yellowish, elliptical (10 µm × 5 µm long), situated between desmens 3 and 4. Reproductive

system not well developed, situated between desmens 9 and 11 (Figure 2D). Vagina and vulva not observed in all specimens. Anal tube not protruding from body wall; anus at posterior border of desmen 15. Tail with two desmens (Figure 2D). End ring 46 µm long, about 2.1 times longer than wide.

#### *Diagnosis*

*Desmoscolex (Desmolorenzenia) coreensis* sp. nov. is characterized by the following combination of characters: (1) presence of 17 desmens and typical desmoscolecoid setal pattern (nine pairs of subdorsal somatic setae and eight pairs of subventral somatic setae); (2) globular head with truncated anterior end; (3) cephalic setae jointed distally, i.e. a finer tip socketed into broad, cylindrical basal part; (4) presence of a pair of ocelli situated between desmens 3 and 4; (5) somatic setae directly inserted on to cuticle; and (6) shape of end ring with a broad, cylindrical anterior part ranging up to insertion of posteriormost subdorsal somatic setae, and a ventrally bent terminal part tapering towards short naked spinneret.

For differential diagnosis, see Discussion.

**Order DESMOSCOLECIDA**  
**Family DESMOSCOLECIDAE**  
**Genus *Desmoscolex* Claparède, 1863**  
**Subgenus *Desmolorenzenia* Freudenhammer, 1975**  
***Desmoscolex (Desmolorenzenia) pedunculus* sp. nov.**  
 (Figures 4–6)

#### *Type material*

Holotype male (RIT701) and one paratype female (RIT702), mounted in glycerine on H-S slide, are deposited in the nematode collection of the Royal Belgian Institute of Natural Sciences, Brussels, Belgium. Two paratypes (one male and one female) (DB30005, 30006) are deposited in the nematode collection of the Department of Biology, Daegu University, Korea. Another two paratypes (one male and one juvenile) (SNU10011, 10012) are kept in the first author's (H. S. Rho) research collection at the School of Biological Sciences, Seoul National University, Korea.

#### *Type locality*

Geumjin, Youngdeok (36°21'56" N, 129°23'40" E), collected on 26 September 1998 by H. S. Rho and J. W. Choi.

#### *Type habitats*

The nematodes were obtained from shallow subtidal invertebrates (sponges, bryozoans, and polychaetes), which were collected from depths of 3 to 5 m by scuba diving.

#### *Etymology*

The specific name, *pedunculus*, refers to the well-developed peduncles of insertion of both subdorsal and subventral somatic setae.

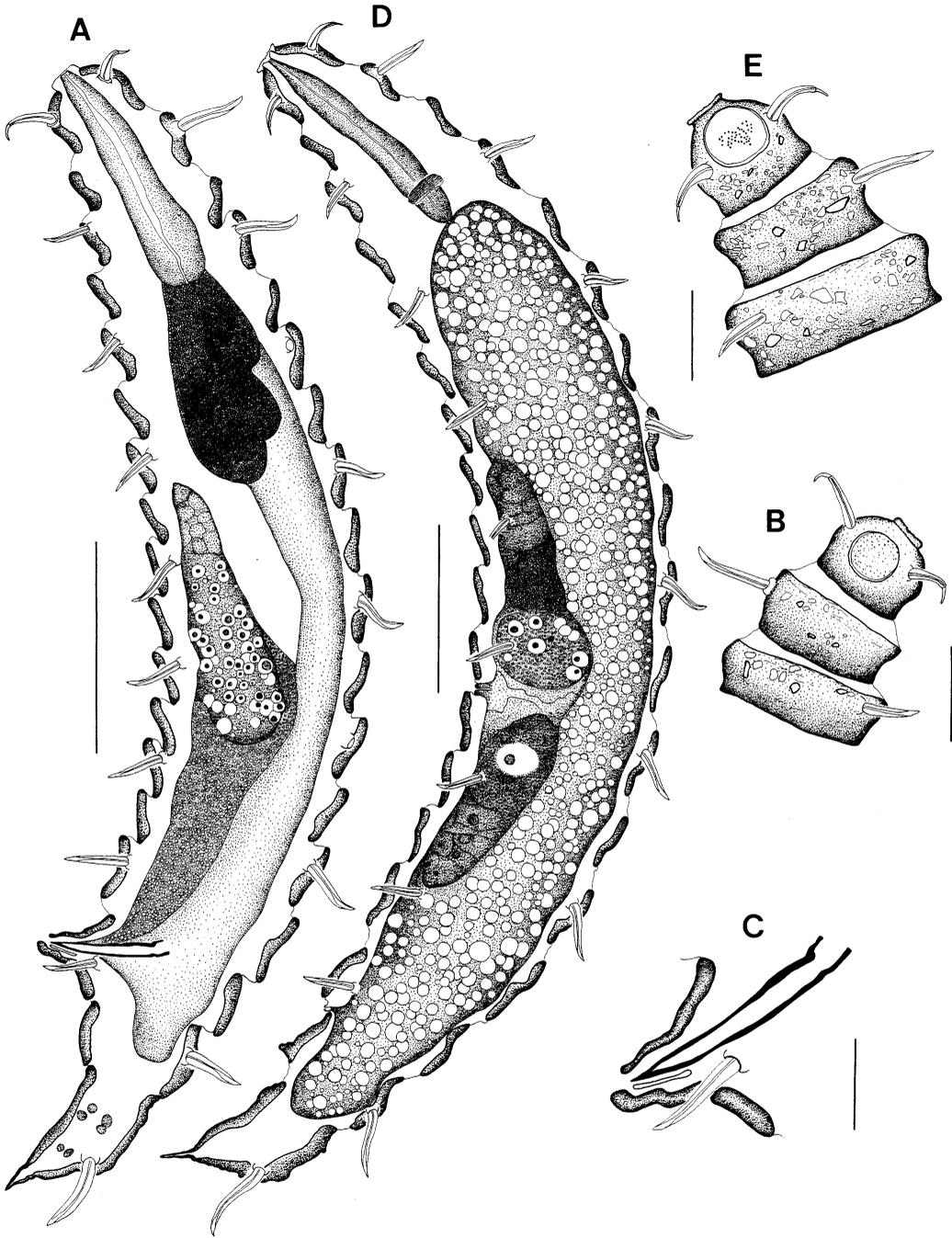


Figure 4. *Desmoscolex* (*Desmolorenzenia*) *pedunculus* sp. nov. (A–C) Holotype male: (A) habitus (subdorsal setae on desmens 5 and 11 left side are broken off); (B) head region, right side in surface view; (C) copulatory apparatus, left side in optical section. (D, E) Allotype female: (D) habitus; (E) head region, left side in surface view. Scale bars: 50  $\mu\text{m}$  (A, D); 20  $\mu\text{m}$  (B, E); 10  $\mu\text{m}$  (C).



Figure 5. *Desmoscolex (Desmolorenzenia) pedunculus* sp. nov., paratype male (SEM micrographs). (A) Habitus, lateral view; (B) habitus, oblique lateral view; (C) head, en face view; (D) head region, right side. Scale bars: 60  $\mu\text{m}$  (A); 40  $\mu\text{m}$  (B); 10  $\mu\text{m}$  (C, D).

### Measurements

Holotype male: L=290; hd=21; cs=19; sd<sub>1</sub>=18; sd<sub>3</sub>=17; sd<sub>7</sub>=13; sd<sub>9</sub>=13; sd<sub>13</sub>=15; sd<sub>16</sub>=15; sd<sub>17</sub>=23; sv<sub>2</sub>=11; sv<sub>4</sub>=12; sv<sub>6</sub>=12; sv<sub>8</sub>=14; sv<sub>10</sub>=14; sv<sub>12</sub>=13; sv<sub>14</sub>=15; sv<sub>15</sub>=13; ph=59; t=62; tmr=39; tmrw=16; mbd=52; mbde=47; spic=26; gub=7; a=5.7; b=4.9; c=4.7.

Paratype male (*n*=1): L=470; hd=23; cs=24; sd<sub>1</sub>=22; sd<sub>3</sub>=21; sd<sub>5</sub>=21; sd<sub>7</sub>=20; sd<sub>9</sub>=20; sd<sub>11</sub>=20; sd<sub>13</sub>=20; sd<sub>16</sub>=19; sd<sub>17</sub>=26; sv<sub>2</sub>=13; sv<sub>4</sub>=15; sv<sub>6</sub>=16; sv<sub>8</sub>=17; sv<sub>10</sub>=14; sv<sub>12</sub>=17; sv<sub>14</sub>=16; ph=95; t=88; tmr=53; tmrw=21; mbd=53; mbde=47; spic=29; gub=8; c=5.3.

Paratype females (*n*=3): L=355–420 (398); hd=23–25; cs=15–18; sd<sub>1</sub>=17; sd<sub>3</sub>=15–16; sd<sub>5</sub>=13–16; sd<sub>7</sub>=15–17; sd<sub>9</sub>=17–19; sd<sub>11</sub>=17–19; sd<sub>13</sub>=17–18; sd<sub>16</sub>=16–21; sd<sub>17</sub>=24–27; sv<sub>2</sub>=13–14; sv<sub>4</sub>=13; sv<sub>6</sub>=13–15; sv<sub>8</sub>=13; sv<sub>10</sub>=15; sv<sub>12</sub>=15; sv<sub>14</sub>=13–15; sv<sub>15</sub>=15; ph=73–75; t=64–74; tmr=43–50; tmrw=24–26; mbd=55–65; mbde=45–58; V%=50; a=6.5–6.9; b=4.9–5.6; c=5.6.

### Description

**Males.** Body small, ventrally curved, slightly tapered anteriorly and posteriorly; cuticle with 17 broad desmens (Figures 4A, 5A, B). Desmen quadricomoid with inversion in

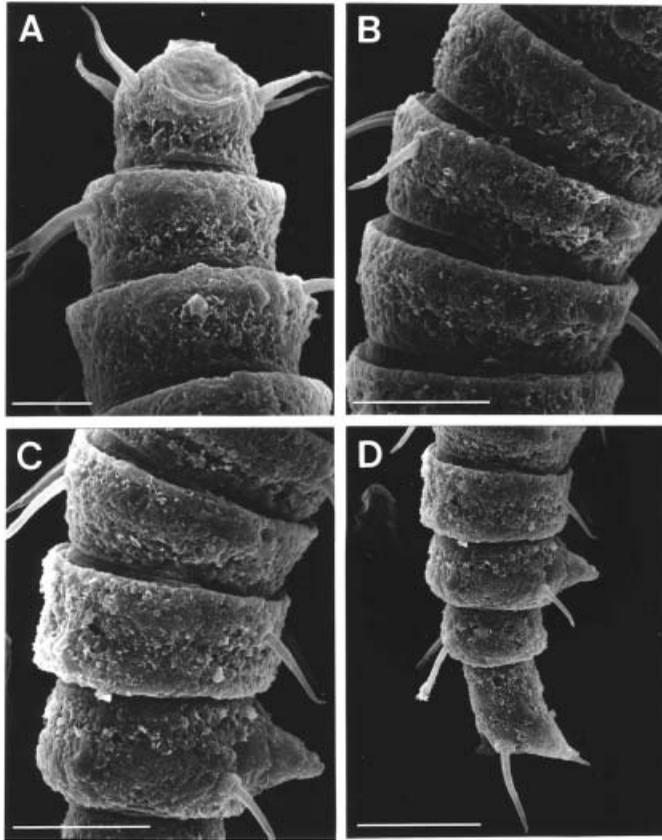


Figure 6. *Desmoscolex (Desmolorenzenia) peduncululus* sp. nov., paratype male (SEM micrographs). (A) Head region, right side; (B) detail of body wall at the level of desmens 4–6, right side; (C) detail of body wall at the level of desmens 13–15, right side; (D) posterior body region, right side. Scale bars: 10  $\mu\text{m}$  (A); 20  $\mu\text{m}$  (B, C); 30  $\mu\text{m}$  (D).

orientation at level of desmen 14 (Figure 6B–D). Each desmen covered with layer of secretion and finely granular foreign material.

Somatic setae (Figure 4A) arranged according to typical desmoscolecoid setal pattern: nine pairs of subdorsal somatic setae on desmens 1, 3, 5, 7, 9, 11, 13, 16, 17; eight pairs of subventral somatic setae on desmens 2, 4, 6, 8, 10, 12, 14, 15. Subdorsal somatic setae (Figure 4A, B) gradually becoming finer to an open tip, with fine mid-central canal, longer than subventral somatic setae, and inserted on peduncle. Anteriormost and posteriormost pair of subdorsal somatic setae slightly elongate compared to other setae. Subventral somatic setae (Figure 4A) small and relatively slender, inserted on peduncle; cylindrical basal part broad, with fine mid-central canal, tapered to open tip. Subventral somatic setae all about same length, except for those on desmen 14, which are slightly longer.

Head globular, wider than long, anteriorly tapered and truncated, and posteriorly with more or less cylindrical neck-region (Figures 4A, B, 5A, 6A). Cephalic cuticle completely covered with thin layer of fine granular desmos, except in amphideal zone. Labial region (Figures 4B, 5C, D) hexagonal, offset with separate lips. Circle of six minute, papilliform labial sensilla situated near edge of oral aperture (Figure 5C). Specialized cephalic tubercles situated between cephalic tubercles and labial sensilla. Elliptical cephalic tubercles arranged in single crown near labial sensilla. Outer margin of lip region surrounded by

well-developed cephalic ridge. Cephalic setae (Figure 4A, B) tapering distally, 19  $\mu\text{m}$  in length, shorter than head width. Cephalic setae jointed distally, i.e. finer distal part socketed into broad, cylindrical basal part near the tip of setae (Figures 4B, E, 5C, D), inserted on peduncles just anterior to mid-head. Amphideal fovea (Figure 4B) rounded, largely covering head laterally, situated at level of mid-head.

Digestive system typical of *Desmolorenzenia*. Buccal opening with minute buccal cavity. Oesophagus 59  $\mu\text{m}$  long, posteriorly extending to level of posterior margin of desmen 3 (Figure 4A); intestine dorsal to reproductive system. Ocelli not observed. Reproductive system typical of Desmoscolecidae: single outstretched testis, extending up to level between desmens 6 and 7 (Figure 4A). Ejaculatory glands not observed. Spicules relatively short (26  $\mu\text{m}$  long) (Figure 4A, C), nearly straight; blade tapering caudally to pointed tip, proximally provided with well-developed offset capitulum. Gubernaculum thin, trough-shaped, 6  $\mu\text{m}$  long, adjacent to tip of spicules. Cloacal tube broad, clearly protruding from medioventral body wall in desmen 15 (Figure 4A, C).

Tail with two desmens (Figure 4A). End ring 39  $\mu\text{m}$  long, about 2.4 times longer than wide, consisting of broad cylindrical anterior part extending up to insertion of terminal subdorsal somatic setae, and ventrally bent terminal part, tapering towards well-developed naked spinneret. End ring, with exception of terminal spinneret, totally covered with desmos. Caudal glands not observed.

*Females.* Similar to males in most respects (Figure 4D). Body cuticle (Figure 4E) with 17 desmens. Somatic setae (Figure 4D) arranged according to typical desmoscolecoid setal pattern: nine pairs of subdorsal setae on desmens 1, 3, 5, 7, 9, 11, 13, 16, 17; eight pairs of subventral setae on desmens 2, 4, 6, 8, 10, 12, 14, 15. Amphideal fovea (Figure 4E) rounded (14  $\mu\text{m}$  long), largely covering head laterally, situated on anterior part of head capsule. Reproductive system didelphic–amphidelphic with both branches outstretched, situated ventrally to intestine, between desmens 7 and 13. Vulva situated between desmens 10 and 11 (Figure 4D). Anal tube not protruded at all, situated between desmens 15 and 16 (Figure 4D). Tail with two desmens (Figure 4D). End ring 50  $\mu\text{m}$  long, about 1.9 times longer than wide.

### Diagnosis

*Desmoscolex* (*Desmolorenzenia*) *pedunculus* sp. nov. is mainly characterized by the following combination of characters: (1) presence of 17 desmens with inversing desmen 14 and typical desmoscolecoid setal pattern (nine pairs of subdorsal somatic setae and eight pairs of subventral somatic setae); (2) globular head with well-developed lip region, provided with six minute labial sensilla; (3) hexagonal cephalic ridge and numerous cephalic tubercles surrounding lip region; (4) cephalic setae jointed at their distal part; (5) presence of peduncle for both subdorsal and subventral somatic setae; and (6) end ring with broad, cylindrical anterior part, extending up to insertion of posteriormost subdorsal somatic setae, and ventrally bent terminal part tapering towards a well-developed naked spinneret.

For differential diagnosis, see Discussion.

### Discussion

Within the subfamily Desmoscolecinae, the taxonomic status of *Desmolorenzenia* Freudenhammer, 1975 has been questioned. Decraemer (1986) classified

*Desmolorenzenia* as a subgenus of the genus *Desmoscolex* Claparède, 1863, because the two taxa only differ in the outline of the desmen and presence or absence of an abrupt inversion in the orientation. Furthermore, this character shows intraspecific variation. Species identification within the subgenus *Desmolorenzenia* depends on the following characters: (1) head shape; (2) shape and length of spicules; (3) shape and length of somatic setae in both sexes; (4) number and arrangement of subdorsal and subventral somatic setae; (5) ratio of length to width of end ring; (6) number of desmens and tail rings; (7) position of inversion ring; (8) structure of interzone; (9) position and shape of cephalic setae; and (10) shape of labial setae (Decraemer 1977, 1986). At present, 17 nominal species (including new species) are currently known in the subgenus *Desmolorenzenia*. Of these, only 13 species have been recognized as valid (Decraemer 1977, 1983): *D. (D.) hupferi* (Steiner, 1916) Freudenhammer, 1975; *D. (D.) platycricus* (Steiner, 1916) Freudenhammer, 1975; *D. (D.) eurycricus* (Filipjev, 1922) Freudenhammer, 1975; *D. (D.) frontalis* (Gerlach, 1952) Freudenhammer, 1975; *D. (D.) vittatus* (Lorenzen, 1969) Freudenhammer, 1975; *D. (D.) crassicauda* (Timm, 1970) Freudenhammer, 1975; *D. (D.) desmoscoleoides* (Timm, 1970) Freudenhammer, 1975; *D. (D.) cooleni* Decraemer, 1978; *D. (D.) curvicauda* (Timm, 1978); *D. (D.) montana* Decraemer and Sturhan, 1982; *D. (D.) goubaultae* Decraemer, 1986; *D. (D.) indicus* Lal, 1990; and *D. (D.) camerunensis* Decraemer, 1997.

The subgenus *Desmolorenzenia* can be subdivided artificially into two groups on the basis of the number of desmens, as adopted by Decraemer (1977, 1986). The first group is characterized by 17 desmens, and includes, besides the two new species, *D. (D.) hupferi*, *D. (D.) platycricus*, *D. (D.) eurycricus*, *D. (D.) frontalis*, *D. (D.) vittatus*, *D. (D.) crassicauda*, *D. (D.) desmoscoleoides*, *D. (D.) cooleni*, and *D. (D.) curvicauda*. Another group bearing 16 or 18 desmens comprises *D. (D.) montana*, *D. (D.) goubaultae*, *D. (D.) camerunensis*, and *D. (D.) indicus*. The first group can be further subdivided into two subgroups based on the arrangement of somatic setae: a group of six species with a typical arrangement of nine pairs of subdorsal setae (on desmens 1, 3, 5, 7, 9, 11, 13, 16, 17) and eight pairs of subventral setae (on desmens 2, 4, 6, 8, 10, 12, 14, 15) (cf. Timm 1970) and the other group of two species with the different arrangement of somatic setae.

*Desmoscolex (D.) coreensis* sp. nov. belongs to the species group with 17 desmens and the typical setal pattern. Within this group it is most closely related to *D. (D.) hupferi* mainly by possessing a similar head shape. However, *D. (D.) coreensis* sp. nov. differs from *D. (D.) hupferi* by: (1) the position of jointed region of the cephalic setae (jointed in the distal part versus jointed in the middle part); (2) the presence of ocelli (a pair of ocelli between desmens 3 and 4 versus ocelli absent); (3) the shape of the end ring (consisting of a broad cylindrical anterior part extending till insertion of terminal subdorsal somatic setae and of a ventrally bent terminal part tapering towards a small naked spinneret in *D. (D.) coreensis* versus equally rounded in *D. (D.) hupferi*); and (4) a lower "c" value (4.9–6.2 versus 6.3–6.5).

*Desmoscolex (D.) coreensis* sp. nov. is also close to *D. (D.) curvicauda*, but discernible from it by smaller body, different head shape (without rectangular part posterior to insertion of cephalic setae), different end ring, and shorter spicules (42–46 µm versus 64–70 µm).

*Desmoscolex (D.) coreensis* sp. nov. also shares the character combination of a similar globular head and the presence of ocelli (= pigment spots) with *D. (D.) desmoscoleoides*. However, *D. (D.) coreensis* sp. nov. is clearly distinguished from *D. (D.) desmoscoleoides* by: (1) the shape of amphideal fovea (circular versus somewhat triangular); (2) the number of annuli between desmens (absence of annulus in *D. (D.) coreensis* versus presence of one or two tiny annuli in *D. (D.) desmoscoleoides*); (3) the number of subventral somatic setae

(eight versus six); (4) a shorter tail (73–90 versus 125–175  $\mu\text{m}$ ); and (5) a higher “c” value (4.9–6.2 versus 4.0–4.3).

*Desmoscolex (D.) pedunculus* sp. nov. also belongs to the species group with 17 desmens and a typical desmoscolecoid somatic setal pattern as *D. (D.) coreensis* sp. nov. *Desmoscolex (D.) pedunculus* sp. nov. resembles *D. (D.) crassicauda* in having a similar end ring and subdorsal setae inserted on peduncles. The new species, however, is easily discernible from *D. (D.) crassicauda* by the shape of the lip region (offset versus not distinctly marked) and the presence of insertion peduncles for the subventral somatic setae (subventral somatic setae inserted on well-developed peduncle versus setae inserted almost immediately on the cuticular rings, thus without a distinct peduncle).

*Desmoscolex (D.) pedunculus* sp. nov. is morphologically similar to *D. (D.) coreensis* sp. nov. in having: (1) 17 desmens; (2) a typical desmoscolecoid somatic setal pattern; (3) a globular head; (4) similar somatic setae, with fine mid-central canal, gradually tapered to an open tip; and (5) cephalic setae jointed at its distal part. *Desmoscolex (D.) pedunculus* sp. nov., however, is distinguished from *D. (D.) coreensis* sp. nov. by the following characters: (1) shape of lip region (distinctly indicated versus indistinct lip region); (2) presence of insertion peduncle for somatic setae (presence of a well-developed peduncle versus peduncle lacking); (3) spicule length (short versus long); and (4) cephalated capitulum in spicules (more developed versus less developed).

During a SEM observation of *Desmoscolex (D.) pedunculus* sp. nov., we observed the ultrastructure in the labial region which was previously unknown (Shirayama and Hope 1992; Decraemer and Sturhan 1997). Hitherto, the ultrastructure of the lip region in the subgenus *Desmolorenzenia* was known from only two species: *D. (Desmolorenzenia) sp. 1* from a marine habitat (Shirayama and Hope 1992) and *D. (D.) camerunensis* from a terrestrial habitat (Decraemer and Sturhan 1997). The lip region of *D. (D.) pedunculus* sp. nov. is morphologically more similar to that of *D. (D.) sp. 1* than to that of *D. (D.) camerunensis* in having cephalic tubercles, arranged in a single crown near the labial ridge, and the presence of clear labial sensilla. *Desmoscolex (D.) pedunculus* sp. nov., however, is distinguished from *D. (D.) sp. 1* by the following features of the lip region: (1) presence of a well-developed cephalic concretion ridge in the outermost margin (versus no cephalic concretion ridge); (2) presence of six well-developed labial sensilla (versus not well-developed); and (3) the shape of cephalic tubercles (relatively thick and short versus thin and long).

## Acknowledgements

The authors are grateful to Dr. Wilfrida Decraemer for her critical review of the manuscript that greatly improved the paper. We also appreciate the anonymous reviewers for their helpful comments. The authors thank “IANTD KOREA” members for their assistance in collecting samples, and Dr. Ji Min Lee (Daegu University) for her help in modifying the figures. This work was partly supported by the Korea Research Foundation Grant funded by the Korean Government (MOEHRD) (KRF-2003-015-C00617).

## References

- Decraemer W. 1977. The genus *Desmolorenzenia* Freudenhammer, 1975 with a redescription of *D. crassicauda* (Timm, 1970) (Nematoda—Desmoscolecida). Contribution no. VIII on the nematodes from the Great Barrier Reef, collected during the Belgian Expedition in 1967. *Cahiers de Biologie Marine* 18:49–58.

- Decraemer W. 1978. Scientific report on the Belgian expedition to the Great Barrier Reef in 1967. Nematodes XIV: *Prototricoma dherdei* sp. nov. and *Desmolorenzenia cooleni* sp. nov. with a discussion of the genus *Prototricoma* Timm (Nematoda, Desmoscolecida). Annales de la Société Royale Zoologique de Belgique 107:109–123.
- Decraemer W. 1983. Five new species of deep-sea desmoscolecids (Nematoda—Desmoscolecida) from the Bay of Biscay. Bulletin de l'Institut Royal des Sciences Naturelles de Belgique, Biologie 55:1–26.
- Decraemer W. 1985. Revision and phylogenetic systematics of the Desmoscolecida (Nematoda). Hydrobiologia 120:259–283.
- Decraemer W. 1986. Marine nematodes from Guadelope and other Caribbean Islands IV. Taxonomy of the *Desmoscolex frontalis* complex (Desmoscolecini). Bulletin du Muséum National d'Histoire Naturelle, Paris, Série 4 8A:295–311.
- Decraemer W, Sturhan D. 1982. A new terrestrial desmoscolecid, *Desmolorenzenia montana* (Nematoda, Desmoscolecida). Nematologica 27:357–365.
- Decraemer W, Sturhan D. 1997. *Desmoscolex (Desmolorenzenia) camerunensis* sp. nov. (Nematoda: Desmoscolecida) from Cameroon. Fundamental and Applied Nematology 20:233–238.
- Freudenhammer I. 1975. Desmoscolecida aus der Iberischen Tiefsee, zugleich eine Revision dieser Nematodenordnung. "Meteor" Forschungsschiffe-Ergebnisse 20:1–65.
- Kristensen RM. 1989. Marine Tardigrada from the southeastern United States coastal waters I. *Paradoxipus orzeliscoides* n. gen., sp. nov. (Arthrotardigrada: Halechiniscidae). Transactions of the American Microscopical Society 108:262–282.
- Lal A. 1990. *Desmoscolex indicus* sp. n. (Nematoda: Desmoscolecida) from forest soil of northern India. Indian Journal of Nematology 19:55–58.
- Lorenzen S. 1969. Desmoscoleciden (eine Gruppe freilebender Meeresnematoden) aus Küstensalzwiesen. Veröffentlichungen des Instituts für Meeresforschung in Bremerhaven 12:169–203.
- Shirayama Y, Hope WD. 1992. Cephalic tubercles, a new character useful for the taxonomy of Desmoscolecidae (Nematoda). Transactions of the American Microscopical Society 111:211–222.
- Shirayama Y, Kaku T, Higgins RP. 1993. Double-sided microscopic observation of meiofauna using an HS-slide. Benthos Research 44:41–44.
- Steiner G. 1916. Neue und wenig bekannte Nematoden von der Westküste Afrikas (Fortsetzung). Zoologischer Anzeiger 47:337–351.
- Timm RW. 1970. A revision of the nematode order Desmoscolecida Filipjev, 1929. University of California Publications in Zoology 93:1–99.
- Timm RW. 1978. Marine nematodes of the order Desmoscolecida from McMurdo Sound, Antarctica. Biology of the Antarctic Seas VI. Antarctic Research Series 26:225–235.