

***Pseudostomella* Gastrotrichs (Macrodasyida, Thaumastodermatidae) from South Korea, with a Brief Review of the Genus**

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Two new marine gastrotrichs of the genus *Pseudostomella*, *P. longifurca* and *P. koreana*, are described from the shallow sublittoral sand bottoms of South Korea. *Pseudostomella longifurca* n. sp. is characterized by the cuticular armature with tetrancres, five dorsal papillae on the prebuccal apparatus, four dorsolateral adhesive tubes, and elongated pedicle. *Pseudostomella koreana* n. sp. is distinguished from its congeners by the small body, tetrancres, two pairs of dorsolateral adhesive tubes, and tube-shaped copulatory organ. A brief review of the genus is prepared, with the character comparison table for all congeners currently recognized, and a revised key to the species of *Pseudostomella*. This is the first record of the genus *Pseudostomella* from East Asia.

The fauna of marine gastrotrichs in Korea is poorly known. In the previous papers (Chang et al., 1998a, b; Chang and Lee, 2001), only six species of the family Thaumastodermatidae have been described so far: *Tetranchyroderma gracilium* Chang, Lee and Clausen, 1998, *Thaumastoderma coronarium* Chang, Lee and Clausen, 1998, *Th. appendiculatum* Chang, Lee and Clausen, 1998, *Th. copiophorum* Chang, Lee and Clausen, 1998, *T. heterotentaculatum* Chang and Lee, 2001, and *T. hoonsooi* Chang and Lee, 2001. Recently, two new thaumastodermatid species of the genus *Ptychostomella* have been described from the eastern coast of South Korea (Lee and Chang, in prep.). As one of serial reports on the gastrotrich fauna of Korea, we now deal with the genus *Pseudostomella* in the present study.

In possessing the peculiar oral apparatus, the genus *Pseudostomella* is surely the most characteristic one of the eight genera belonging to the family Thaumastodermatidae. Since *Pseudostomella* was first established by Swedmark (1956) on the basis of *P. roscovita* from Roscoff, France, seven species have been recognized in the genus. In the North Pacific, only one species has been reported: *P. malayica* Renaud-Mornant, 1969 from Karang, eastern Malaysia.

This paper deals with description of two new species of the genus *Pseudostomella*, *P. longifurca* and *P. koreana*, from South Korea. According to their morphological characters, they are fully described with the

brief comments on their intraspecific variability. Furthermore, we make a brief review of the genus and provide a character comparison table, with a revised key to the species of *Pseudostomella*.

Materials and Methods

Materials were collected from the shallow sublittoral sand bottoms at Taeon Peninsula and Anmyeon Island in the Yellow Sea, Yeongdeok in the East Sea, and Hwasun, Jeju Island.

The detailed methods of sampling, extraction, and preparation are referred to our previous study (Chang and Lee, 2001). Specimens were drawn and measured in glycerin, and observed and photographed under a differential interference contrast microscope with Nomarski optics. Minute morphological characters like sensory hairs and inner genital organs were examined and video-recorded when alive using a CCD camera (Olympus DP-11). Figures were prepared with the aid of a camera lucida.

Terminology mostly follows Ruppert (1991) and Clausen (2000). Abbreviations used in text are as follows: Lt = total length from anterior tip of prebuccal extension to posterior tip of caudum or pedicles including adhesive tubes; U = percentage unit of Lt, used for the location (U-) from anterior to posterior, or for the relative length (-U); PhJIn = junction between pharynx and intestine; TbA = anterior adhesive tubes; TbDL = dorsolateral adhesive tubes; TbVL = ventrolateral adhesive tubes; TbV = ventral adhesive tubes; TbP = posterior adhesive tubes.

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Taxonomic Accounts

Family Thaumastodermatidae Remane, 1926
Genus *Pseudostomella* Swedmark, 1956

Pseudostomella longifurca new species
(Figs. 1, 3A-D)

Type specimens: Seven individuals, Hwasun, Jeju Island (33° 14' 13" N, 126° 19' 23" E), 7 Oct. 2001, C. Y. Chang and J. M. Lee. Holotype and one paratype mounted in glycerin on H-S slide, sealed with nail polish, have been deposited in the Natural History Museum of Ewha Womans University, Seoul. Other five paratypes (DBG0901-0905) are kept in the authors' collection at the specimen room of the Department of Biology, Daegu University.

Additional materials examined: Three individuals, Ganggu, Yeongdeok, 17 Oct. 2000, J. W. Choi.

Diagnosis: *Pseudostomella* with slender body and elongated bilobed caudum; with long and extended prebuccal apparatus curving forward; 5 dorsal papillae on prebuccal apparatus; cuticular armature of tetrancretes on whole dorsal and ventrolateral surface except for the triangular area posterior to the prebuccal apparatus; 5 TbA per side in two rows each comprising 2 and 3 tubes; 4 TbDL per side, first tube on anterior pharyngeal region, second one just behind PhJIn, third one in mid-intestinal region, and last one at posterolateral corner of body; a pair of foot-type TbV consisting of 4 tubes; TbVL of 19-22 tubes per side, located from pharyngeal pore to seminal receptacle; 7 TbP per side, forming elongate pedicle with 3 distal and 4 medial tubes; the copulatory organ inverted-pyriform.

Description of the holotype: Body somewhat slender, a little swollen near first TbDL and at mid-trunk region; total body length 434 μ m long, including TbP of pedicles; pharynx 129 μ m long, measured from ventral border of oral opening to PhJIn; pharyngeal pores at U41; widths of neck/PhJIn/trunk/caudal base 46/44/58/33 μ m at U19/U44/U58/U90, respectively.

Head with well-developed and extended prebuccal apparatus incurving anteromedially, characterizing the genus *Pseudostomella*. Dorsal margin of the prebuccal apparatus a little beyond ventral one, equipped with 5 papillae; papillae nearly same in length, about 6 μ m long, evenly distributed and arranged in 2+1+2 pattern; each papillae supported by stiffening rod and bearing 1 short sensory hair (about 4 μ m long). Four ventral papillae per side along ventral border of apparatus, much smaller than dorsal ones, with 1 or 2 sensory hairs; first and second papillae close to each other. One pair of ventral epidermal folds protruding anteriorly, shown as small papillae.

Sensory hairs scattered on both sides of the prebuccal

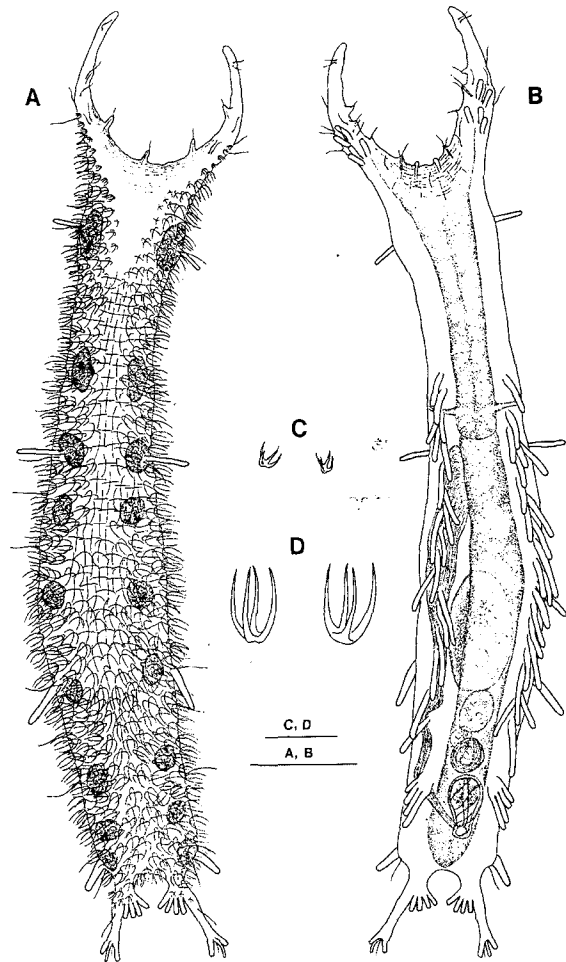


Fig. 1. *Pseudostomella longifurca*, new species. A, Habitus, dorsal. B, Habitus, ventral. C, Tetrancretes on head. D, Tetrancretes on trunk. Scale bars = 10 μ m (C, D) and 50 μ m (A, B).

apparatus: 2 pairs and 1 single per side dorsally, 5-6 per side ventrally, and 2-3 hairs per side laterally. Ten to 12 pairs of somewhat long hairs (about 14-20 μ m) more or less evenly distributed on dorsal and lateral body surfaces of which 4 pairs inserted near TbDL and 1 pair on middle of dorsal surface of pedicle.

Cuticular armature (Fig. 3C) with tetrancretes only, covering dorsal and ventrolateral surfaces excluding large bare triangular area behind prebuccal apparatus; arranged in 13-18 columns in mid-trunk region, each column with up to 25-39 tetrancretes; size of the tetrancretes variable, 4 μ m long between opposite tines at head portion (U17), 25 μ m at mid-trunk (U68), and 18 μ m near caudum (U90).

Epidermal glands granulated, mixed in size (8-12 \times 8-23 μ m) with generally oval shape consisting of 9 per side, showing symmetrical distribution from anterior pharyngeal region near first TbDL to posterior trunk region near last TbDL.

Adhesive tubes: 5 TbA per side (ranged 6-8 μ m long),

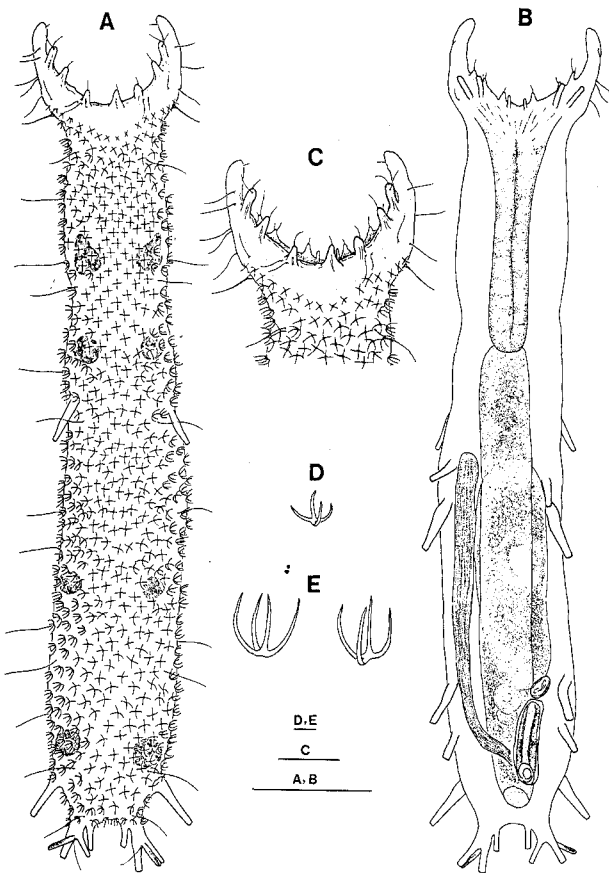


Fig. 2. *Pseudostomella koreana*, new species. A, Habitus, dorsal. B, Habitus, ventral. C, Prebuccal apparatus. D, Tetrancres on head. E, Tetrancres on trunk. Scale bars = 1 μ m (D, E) and 10 μ m (A-C).

arranged in 2 rows in the midst of ventral surface of prebuccal apparatus, of which first row consisting of 2 tubes, and second one of 3, rather forming an arc. TbVL, up to 19-22 per side, ranged from 15 μ m to 28 μ m long; more or less densely distributed from fore of pharyngeal pores to about two-thirds of intestinal region (U37-U75), with asymmetrical array. A pair of foot-type TbV located in posterior intestinal region at level of copulatory organ (U80); composing 4 tubes whose lengths gradually increase posteriorly (8, 10, 13, and 15 μ m long, respectively). TbDL 4 per side, all tubes evenly spaced along whole body length; first one (13 μ m long), rather slender, situated near anterior pharyngeal region at U23; second tube (21 μ m long) rather dorsal than in others, located just behind PhJIn at U45; third one 23 μ m long, in mid-intestinal region at U67; fourth tube (14 μ m long) at posterolateral edge of body at U88. TbP comprising 7 tubes per side, forming well-developed and elongated pedicle; each pedicle furnished with 3 distal tubes with 1 bristle directed dorsally between furca, and flanked by 4 medial tubes (7 μ m long), confluent on their bases.

Testis solitary, its distal end slightly not reaching

PhJIn (U47). Vas deferens not coiled and weakly folded near seminal receptacle. Copulatory organ inverted pyriform (13 μ m \times 29 μ m, 4 U \times 7 U), located in U80-U87, spirally wrapped with thin muscles. Seminal receptacle spherical (15 μ m \times 16 μ m, 3 U \times 4 U), in front of copulatory organ, containing a few spermatozoa. Spermatozoa filiform. Three eggs oval with different sizes (29 μ m, 15 μ m, and 9 μ m in maximum diameter, respectively), situated dorsally in mid-intestinal region; anteriormost one largest and matured.

The species occurred abundantly among medium sands on the subtidal bottom (3-5 m depth), often together with *Tetranchyroderma hoonsooi* Chang and Lee, 2001.

Measurements and Variability: Body lengths of five adult type specimens ranged from 359 μ m to 434 μ m (mean 412 μ m, standard deviation 31), maximum widths 50-65 μ m, when mounted in glycerin.

The adhesive tubes showed some variability in arrangement and number depending on individuals. The number of TbVL was somewhat variable, ranging 17-22, usually with asymmetrical array. Normally each foot consisted of 4 TbV, but two specimens possessed 3 TbV at one side and 4 at the other side asymmetrically. Mostly, each pedicle was furnished with 4 medial TbP, but one specimen had 3 medial tubes on one side.

Dorsal papillae of prebuccal apparatus, TbA, and TbDL showed consistency in the arrangement of 2 + 1 + 2 pattern, 2 horizontal rows of 5 TbA per side, and 4 TbDL, respectively.

Pre-mature individuals could not be found among the specimens examined.

Etymology: The proposed specific epithet is taken from the Latin *longus* (long) and *furca* (fork), which refers to the elongated, furcal pedicles of this species.

Remarks: Affinities are discussed in the remarks of the following species.

Pseudostomella koreana new species
(Figs. 2, 3E, F)

Type specimens: Five individuals, Kkotji, Anmyeon Island (36° 29' 19" N, 126° 20' 12" E), 13 June 2002, C. Y. Chang and J. M. Lee. Holotype and one paratype mounted in glycerin on H-S slide, sealed with nail polish, have been deposited in the Natural History Museum of Ewha Womans University, Seoul. Other three paratypes (DBG1001-1003) are kept in the authors' collection at the specimen room of the Department of Biology, Daegu University.

Additional materials examined: One individual, Sindu-ri, Taaen Peninsula, 14 June 2002, C. Y. Chang and J. M. Lee; five individuals, Kkotji, Anmyeon Island, 18

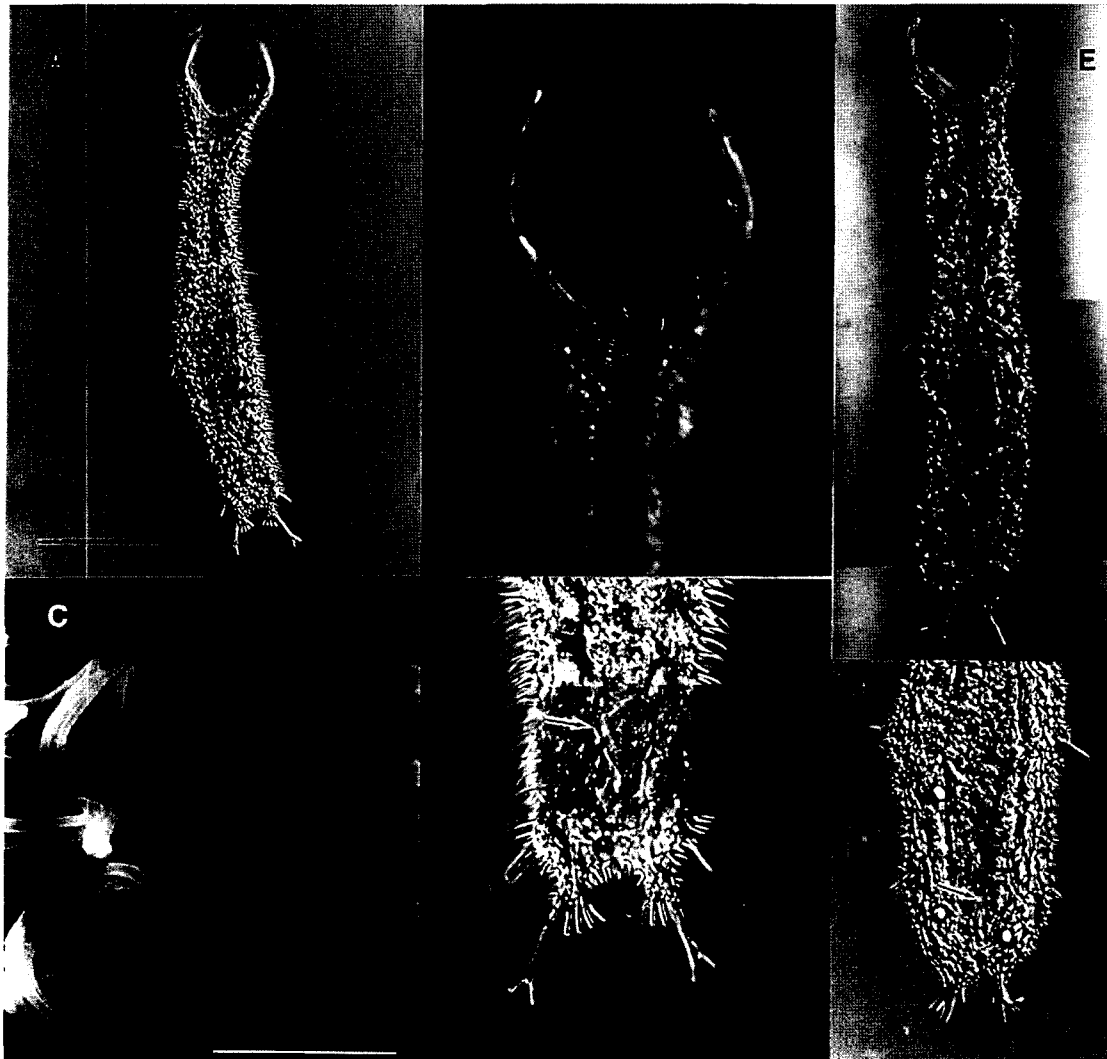


Fig. 3. *Pseudostomella longifurca*, new species (A-D). A, Habitus, dorsal. B, Prebuccal apparatus, dorsal. C, Tetrancres (mid-trunk region), dorsal. D, Copulatory organ (arrow) and caudum with pedicles, dorsal. *Pseudostomella koreana*, new species (E-F). E, Habitus, dorsal. F, Copulatory organ (arrow) and caudum with pedicles, dorsal. Scale bars = 5 μ m (C), 25 μ m (B, D-F), and 100 μ m (A).

July 2002, C. Y. Chang and J. M. Lee.

Diagnosis: *Pseudostomella* with oblong body; with short and fleshy prebuccal apparatus; 7 dorsal papillae on prebuccal apparatus; dorsal cuticular armature of tetrancres; 2 TbA per side on basal part of prebuccal apparatus; 2 TbDL per side, first tube situated at about middle of body and second one at posterolateral edge of body; 4 TbVL per side consisting of 2 groups, each comprising 2 tubes in intestinal region; bilobed caudum furnished with 4 TbP per side, each forming pedicle with 3 distal and 1 medial tube; copulatory organ tube-form.

Description of the holotype: Body small and oblong, 186 μ m long; a little constricted in front of PhJIn, swollen in posterior intestinal region, and then narrowing to

caudum; pharynx 54 μ m long and PhJIn at U39; pharyngeal pores not apparent; widths of neck/PhJIn/trunk/caudal base 22/23/27/16 μ m at U12/U39/U51/U94, respectively.

Head with short and fleshy prebuccal apparatus incurving forward; anterodorsal border of the prebuccal apparatus not beyond the ventral one. Seven dorsal papillae stout, protruding anteriorly, with 3 + 1 + 3 arrangement, evenly spaced; lateralmost one largest (6 μ m long); each papilla supported by stiffening rod and bearing 1 short sensory hair on its distal tip except for lateralmost one with 2 sensory hairs. Six ventral papillae of prebuccal apparatus present, smaller than dorsal ones, 1-2 μ m long, all papillae with 1 or 2 sensory hairs. A pair of small epidermal folds sprouting anteromedially. One sensory bristle (7 μ m long) implanted on posterolateral corner of prebuccal apparatus

(U11); sensory hairs occurring on dorsal, ventral and lateral surfaces of apparatus; 1 pair per side, inserted near second dorsal papilla; other 9-13 long hairs more or less evenly spaced along dorsal and lateral body surfaces. Epidermal glands 4 per side, aligned from about mid-pharyngeal region to near second TbDL, with generally circular shape, mixed in size (from 5 to 7 μm in diameter).

Cuticular armature with tetrancres, in about 14-16 columns and 25-28 rows at mid-trunk region; size of tetrancres variable, 3 μm long between opposite tines at head portion (U16), 5 μm at mid-trunk (U70), and 4 μm near caudum (U91), respectively.

Adhesive tubes: 2 TbA per side (5 μm long), at base of prebuccal apparatus (U9). Four TbVL per side forming 2 groups, each consisting of 2 tubes, situated at middle of trunk region and at posterior intestinal region, U52-U57, and U77-U83, respectively; second TbVL (U57) and third one (U77) longer (12 and 11 μm long). Foot-type TbV lacking. TbDL of 2 tubes per side, front one (9 μm long) situated just behind PhJIn at U88, and rear one (11 μm long) at posterolateral edge of body at U88. Paired pedicles short, each furnished with 4 TbP and 1 bristle; 2 distal tubes (5 μm long), 1 slender, cirrate tube and 1 bristle inserted dorsally between furca, and 1 medial tube (5 μm long).

Testis single on right side, its tip reaching U51, far behind PhJIn. Vas deferens not coiled, joining copulatory organ at its posterior end. The copulatory organ elongate, tube-form (5 $\mu\text{m} \times 17 \mu\text{m}$, 3 U \times 10 U), situated in U79-U89, wrapped with thin muscles. Seminal receptacle circular (3 μm in diameter) located in front of the copulatory organ at U77-U79. One large and 2 small eggs situated dorsally in mid-intestinal region at U51-U87.

This species occurred in fine sands on the subtidal bottom (2-3 m depth), often together with *Tetranychoderma heterotentaculatum* Chang and Lee, 2001, and two unrecorded macrodasyid species (*Acanthodasyis* sp. and *Dactylopodola* sp.).

Measurements and Variability: Body lengths of seven adult type specimens ranged from 156 to 224 μm (mean 189 μm , standard deviation 23), maximum widths 27-28 μm .

All adhesive tubes (TbA, TbDL, TbVL, and TbP), and papillae on the prebuccal apparatus showed high consistency in number and arrangement in all specimens examined. However, pharyngeal pore was not apparent and detected in only one specimen. The difference of protrusion between dorsal and ventral margins of the prebuccal apparatus appeared somewhat variable.

Juvenile could not be found among the specimens examined.

Etymology: The specific epithet *koreana* alludes to the type locality of this new species, Korea.

Remarks: Seven species are currently recognized in the genus *Pseudostomella* Swedmark, 1956: *P. roscovita* Swedmark, 1956, *P. malayica* Renaud-Mornant, 1969, *P. indica* Rao, 1970, *P. plumosa* Ruppert, 1970, *P. cataphracta* Ruppert, 1970, *P. andamanica* Rao, 1993, and *P. etrusca* Hummon, Todaro and Tongiorgi, 1993.

Pseudostomella belongs to the family Thaumastodermatidae, which is the most diversified natural taxon of marine gastrotrichs usually with various cuticular armature such as sculptured plates, spines, or combinations of both (Ruppert, 1988). As the dorsal cuticular armature, *Pseudostomella* gastrotrichs have evolved the pronged scales like triancres, tetrancres, and pentancres according to the species. The pronged dorsal cuticular armature has been regarded as the most important taxonomic character, and used as the primary criterion in classifying the species of this genus. Considering the characteristic feeding structure of the genus *Pseudostomella*, the papillary armature on the prebuccal apparatus and the ornamentation on the triangular area over the oral opening (posterior to the prebuccal apparatus) should be adopted as the second important characters for classification of the genus. Furthermore, other important characters would be the arrangement of the adhesive tubes including TbA, TbDL or TbVL (sometimes described and numbered as TbD or TbL depending on authors), foot-type TbV, and TbP (or the pedicle) as in the other interstitial macrodasyids. We tried to compare the similarities of all described species in the genus with the two new species from Korea, based upon the above-mentioned characters (Table 1).

The common dorsal armature owned by the members of the genus is the four-pronged scales or tetrancres, shown in *P. roscovita*, *P. malayica*, *P. indica*, *P. andamanica*, *P. koreana* n. sp., and *P. longifurca* n. sp. These species are distributed in the Indo-Pacific except for *P. roscovita* which occurs also from the west and east Atlantic as well as the Indian Ocean. These six congeners are evidently divided into two groups. The first group including *P. roscovita*, *P. andamanica*, *P. malayica*, and *P. koreana* shares the supposedly plesiomorphic character states, as inferred by the parsimony from the data of character distributions (Table 1) including geographical distributions: seven dorsal papillae on the prebuccal apparatus, lacking feet (TbV) and 0:3:1 TbP arrangement. *Pseudostomella roscovita*, comprising the four geographical forms of "Roscoff-form", "Kiel-form", "Carolina-form" and Indian "Waltair-form" (Ruppert, 1970), is apparently differentiated from the other species of the first group by the bare triangular area posterior to prebuccal apparatus. The repetitive engulfing actions of this creature might result in the loss of stiffening dorsal armature above the oral opening, then evolve the bare triangular area, which is shared only by *P. longifurca* from Korea, another seemingly derived species of the tetrancres-

Table 1. Character comparison of two new species with the congeners of the genus *Pseudostomella* Swedmark

Character	<i>plumosa</i>	<i>roscovita</i>	<i>malayica</i>	<i>andamanica</i>	<i>koreana</i> n. sp.	<i>indica</i>	<i>longifurca</i> n. sp.	<i>cataphracta</i>	<i>etrusca</i>
Body Length (µm)	400	230-300	220	500	156-224	180	359-434	300	410
Dorsal cuticular armature	triancres	tetrancres	tetrancres	tetrancres	tetrancres	tetrancres	tetrancres	pentancres	pentancres
Dorsal papillae on prebuccal apparatus	7 (3+1+3)	7 (3+1+3)	7 (3+1+3)	7 (3+1+3)	7 (3+1+3)	5 (2+1+2)	5 (2+1+2)	7 (3+1+3)	5 (2+1+2)
Bare triangular area behind prebuccal apparatus	absent	present	absent	absent	absent	absent	present	absent	absent
TbA (per side)	2	2	2	2	2	2	5	3	4
TbDL (per side)	—	—	3 ^a	8 ^c	2	—	4	3 ^b	2 ^d
TbVL (per side)	10	6 (variable)	2	—	4	22-24	17-22	11	13
Foot (TbV)	absent	absent	absent	absent	absent	3 tubes	4 tubes	4 tubes	absent
TbP (lateral:distal:medial)	4 (0:3:1)	4 (0:3:1)	4 (0:3:1)	4 (0:3:1)	4 (0:3:1)	5 (0:3:2)	7 (0:3:4)	5 (1:3:1)	4 (0:3:1)
Copulatory organ	pyriform	pyriform	pyriform (swollen)	pyriform	tube-type	pyriform	pyriform	pyriform	bladder-like
Distribution	North Carolina (Ruppert, 1970)	Roscoff (Swedmark, 1956); North Sea (Forneris, 1961); North Carolina (Ruppert, 1970); India (Ganapati & Rao, 1967)	east Malaysia (Renaud-Mornant, 1967); Andaman Sea (Rao, 1993)	Andaman Sea (Rao, 1993)	Korea (present study)	India (Rao, 1970)	Korea (present study)	North Carolina (Ruppert, 1970)	Italy (Luporini et al., 1970; Hummon et al., 1993; Balsamo et al., 1995)

^a TbL (Renaud-Mornant, 1967). ^b TbL (Ruppert, 1970). ^c TbL (Rao, 1993). ^d TbD + last TbL (Hummon, Todaro and Tongiorgi, 1993).

bearing *Pseudostomella*. *Pseudostomella koreana* n. sp. is most similar to *P. malayica* by small body size (around 200 µm long), the ornamentation of small tetrancre and the general body appearance with similar arrangement of TbP, but discernible from the latter species by the shape of copulatory organ (tube-form in *P. koreana*, while pyriform in *P. malayica*), two TbDL per side (against three tubes in *P. malayica*), and four pairs of TbVL (against two in *P. malayica*). The second group of tetrancre-armed *Pseudostomella* consists of two species, *P. indica* and *P. longifurca*. They share the five dorsal papillae on the prebuccal apparatus, the paired feet (TbV), numerous TbVL, and the modified (0:3:2 or 0:3:4) TbP arrangement. However, *P. longifurca* n. sp. is easily discriminated from *P. indica* by the shape of elongated pedicle with 0:3:4 TbP arrangement (against short pedicle with 0:3:2 arrangement), bare triangular area behind the prebuccal apparatus, and five TbA per side (against two in *P. indica*). The two new species from Korea, *P. longifurca* and *P. koreana*, are clearly differentiated from each other in the body size, the number and arrangement of dorsal papillae on the prebuccal apparatus and the adhesive tubes, the triangular area behind the prebuccal apparatus and the shape of copulatory organ.

Pseudostomella cataphracta and *P. etrusca* are armed with pentancres only. *Pseudostomella cataphracta*, known from the northwest coast of the Atlantic (Ruppert,

1970), has seven dorsal papillae on the prebuccal apparatus, the paired feet each of four TbV, 1:3:1 TbP arrangement, and pyriform copulatory organ. Meanwhile, the Mediterranean species *P. etrusca* is clearly distinguished from the former species in having five dorsal papillae on the prebuccal apparatus, lack of feet, 0:3:1 TbP arrangement, and bladder-like copulatory organ.

Pseudostomella plumosa, reported from the northwest coast of the Atlantic, is an unique species armed with triancre (three-pronged scales) of "a thin, almost transparent, feather shaped scales" (Ruppert, 1970). However, besides possessing the apomorphic dorsal armature, it seems to be a rather conservative species, retaining the supposedly plesiomorphic character states of seven dorsal papillae on the prebuccal apparatus, dorsal armature behind the prebuccal apparatus, lacking feet (TbV), pyriform copulatory organ, and 0:3:1 TbP arrangement. Therefore, *P. plumosa* looks somewhat similar to *P. koreana* n. sp. than *P. longifurca* n. sp., but it differs from *P. koreana* by the number and arrangement of TbDL or TbVL and the pyriform shape of copulatory organ (against tube-form in *P. koreana*).

Ruppert (1970) once made a key to the four species and four geographical forms of *P. roscovita*. We have prepared a revised key to the nine species including the three species described thereafter and the two new species in this study, based upon the character distributions as shown in Table 1.

A revised key to the species of the genus
Pseudostomella Swedmark

1. Cuticular armature of triancres
..... *P. plumosa* Ruppert, 1970
Cuticular armature of pentancres 2
Cuticular armature of tetrancres 3
2. Five dorsal papillae on prebuccal apparatus; foot-type TbV present; copulatory organ pyriform
..... *P. cataphracta* Ruppert, 1970
Seven dorsal papillae on prebuccal apparatus;
foot-type TbV lacking; copulatory organ bladder-
form
..... *P. etrusca* Hummon, Todaro, and Tongiorgi, 1993
3. Seven dorsal papillae on prebuccal apparatus;
paired feet of TbV lacking 4
Five dorsal papillae on prebuccal apparatus;
paired feet of TbV present 7
4. Bare triangular area posterior to the prebuccal
apparatus absent 5
Bare triangular area present
..... *P. roscovita* Swedmark, 1956
5. Copulatory organ pyriform 6
Copulatory organ tube-shaped .. *P. koreana* n. sp.
6. Body elongate (nearly 500 µm); 8 Tb(D)L per side
..... *P. andamanica* Rao, 1993
Body short (about 220 µm); 3 Tb(D)L per side ...
..... *P. malayica* Renaud-Mornant, 1967
7. Pedicle flanking 2 medial TbP; bare triangular
area absent *P. indica* Rao, 1970
Pedicle elongate, flanking 4 medial TbP; bare
triangular area present *P. longifurca* n. sp.

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