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Two New Marine Gastrotrichs of the Genus *Ptychostomella* (Macrodasyida, Thaumastodermatidae) from South Korea

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ABSTRACT—Two new thaumastodermatid gastrotrichs belonging to the genus *Ptychostomella* are described from the shallow sublittoral sand bottom in the eastern coast of South Korea. In having the embossed cuticular armature, *Ptychostomella orientalis* n. sp. is most allied to *P. lepidota* Clausen, 2000, the only congeneric species so far known as possessing such a cuticular armature. *Ptychostomella papillata* n. sp. is characterized by the terrace-shaped cuticular protrusion on head region, and the numerous papillae with sensory hair(s). Description of the two new species is prepared with a character comparison table and a key to the species of *Ptychostomella*. This is the first record of genus *Ptychostomella* from the North Pacific.

Key words: taxonomy, meiofauna, Gastrotricha, *Ptychostomella*, Korea

INTRODUCTION

Genus *Ptychostomella* belongs to the family Thaumastodermatidae which is a representative taxon constituting the most diversified natural group of marine gastrotrichs (Chang *et al.*, 1998a). Thaumastodermatid gastrotrichs usually have evolved the various cuticular armature such as sculptured plates, spines, or combinations of both. However, it had been supposed that *Ptychostomella* gastrotrichs had lost the cuticular sculpture (Ruppert, 1988), before Clausen (2000) described *P. lepidota* from the Tromsø region, Norway, which was armed with “scale-like cuticular elevations”. The genus *Ptychostomella* is still poorly known, and only seven species have been recognized so far since it was established by Remane (1926) on the basis of *P. pectinata* from the North Sea (Kiel, Germany).

So far twelve thaumastodermatid species of four genera have been recorded in the Northwest Pacific, including four species from Japan: *Tetranchyroderma dendricum* Saito, 1937 from Hiroshima (Saito, 1937), *T. schizocirratum* Chang, Kubota and Shirayama, 2002, *Thaumastoderma clandestinum* Chang, Kubota and Shirayama, 2002, and *Platydasys itoi* Chang, Kubota and Shirayama, 2002 from Nanki-Shirahama, southwest Honshu (Chang *et al.*, 2002), and eight species from South Korea: *Th. copiophorum* Chang, Lee and Clausen, 1998, *T. gracillium* Chang, Lee and Clausen, 1998, *Th. coronarium* Chang, Lee and

Clausen, 1998, *Th. appendiculatum* Chang, Lee and Clausen, 1998, *T. heterotentaculatum* Chang and Lee, 2001, *T. hoonsooi* Chang and Lee, 2001, *Pseudostomella longifurca* Lee and Chang, 2002, and *P. koreana* Lee and Chang, 2002 (Chang *et al.*, 1998a, b; Chang and Lee, 2001; Lee and Chang, 2002). However, the report on *Ptychostomella* is still lacking from this area.

This paper deals with the description of two new *Ptychostomella* species, *P. orientalis* and *P. papillata*, from South Korea. The intraspecific variability of the new species and the affinities with seven congeners are discussed. We also provide a key to the species of the genus.

MATERIALS AND METHODS

Materials were collected from the shallow sublittoral sand bottom at five rocky shores of Sokcho, Yangyang, Uljin, Ganggu and Namho in the East Sea of Korea (Sea of Japan, Fig. 1).

Samplings were made by scooping the top sediment into polyethylene vinyl bag or 700 ml volume plastic bottles by SCUBA or skin diving. In the laboratory the gastrotrichs were extracted by the anesthetization-decantation technique using 7% MgCl₂ (Ruppert, 1988), and fixed in 5% buffered formalin.

Specimens were mounted in glycerin on H-S slide (Shirayama *et al.*, 1993) after treatment in a solution of 5% glycerin–95% ethyl alcohol for 1–2 days, and observed and photographed using a differential interference contrast microscope (Olympus BX-50) equipped with Nomarski optics. All drawings and measurements were made with the aid of a camera lucida. Minute morphological characters like sensory hairs and inner genital organs were examined and video-recorded in living worms using a CCD camera (Olympus DP-11).

The SEM material was prefixed for 4–6 hr at 4°C with 2.5% glu-

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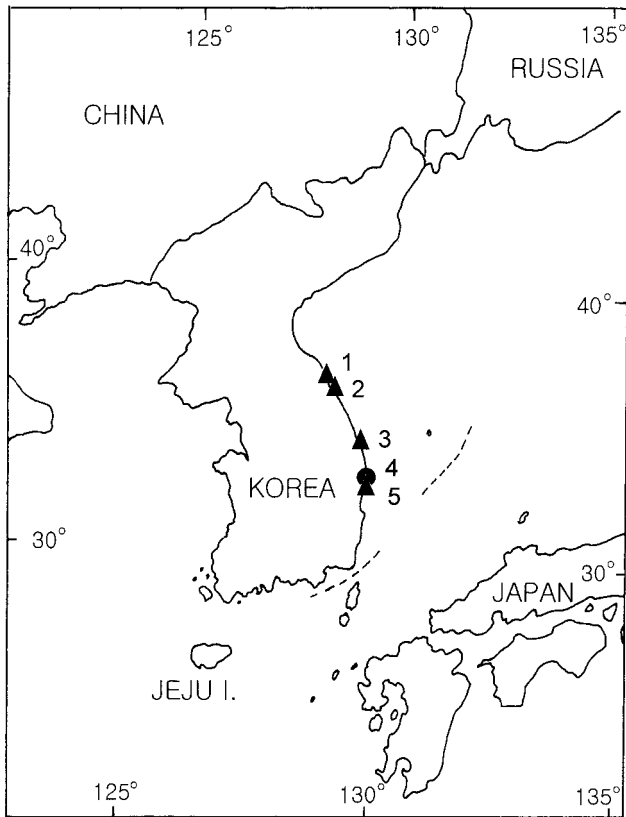


Fig. 1. A map showing the localities. 1, Sokcho; 2, Hajodae, Yangyang; 3, Uljin; 4, Ganggu; 5, Namho, Youngdeok. (Symbol as follows: *Ptychostomella orientalis*, *P. papillata*)

taraldehyde in 0.1M phosphate buffer (pH 7.4), then followed by postfixation with 2% cold osmium tetroxide in the same buffer for 1.5–2 hr. After dehydration through a graded series of ethanol (50–100% at 10% intervals) for 30 min each, the material was critical point dried, coated with lead and platinum-palladium in a high evaporator, and then examined in a Hitachi S-4300 scanning electron microscope operated at 15KV.

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

DESCRIPTION

Family Thaumastodermatidae Remane, 1926

Genus *Ptychostomella* Remane, 1926

Ptychostomella orientalis new species

(Figs. 2–4)

Material examined: Nine individuals, Yangjeong, Uljin (37°00'57"N, 129°24'52"E), 10 May 2001, C. Y. Chang, J. M. Lee and Y. H. Song. Holotype (DG0701) and six paratypes (DG0702–0707) are kept in the author's collection at the specimen room of the Department of Biology, Daegu University. Another two paratypes, mounted in glycerin on H-S

slide, are deposited in the U.S. Natural Museum of Natural History, Smithsonian Institution (USNM1008311) and the Natural History Museum, Ewha Womans University, Seoul (EWNHM60271).

Additional material examined: Four individuals, Bongpo, Sokcho (38°14'57"N, 128°34'08"E), 25 Aug. 1996, H. S. Rho; 1 individual, Hajodae, Yangyang (38°01'16"N, 128°43'38"E), 11 Jun. 1998, J. M. Lee and C. Y. Chang; 11 individuals, Namho, Youngdeok (36°19'38"N, 129°22'54"E), 23 Jun. 2001, J. M. Lee and Y. H. Song.

Diagnosis: *Ptychostomella* with small body; with a short, bilobed caudum; lacking eyespot; bearing paired knob-like tentacles; dorsal surface embossed with smooth hemispherical cuticular elevations; adhesive tubes: 3 TbA per side; 1 stumpy TbVL a little behind TbA; TbV with 1 + 2(3) + 1 + 1 + 2 arrangement per side in intestinal region, of which second and fifth ones forming feet; 2 TbL per side, first one just behind mid-trunk and second at lateroposterior edge of body; bilobed caudum furnished with 7–8 TbP per side, each forming a pedicle; pedicle with 2 distal, 2 lateral and 3–4 medial tubes; copulatory organ oblong.

Description of the holotype: Body relatively minute and vase-shaped, Lt 246 μ m long; pharynx 66 μ m long, measured from the lower lip of the mouth opening, with paired pharyngeal pores opening at U35; lateral sides of body weakly constricted at neck region and a little swollen at trunk region. Widths of oral opening/neck/PhJn/trunk/caudal base 45/37/43/54/26 μ m at U07/U21/U38/U57/U94, respectively.

Oral hood slightly protruding anteriorly with gently undulating border. Sensory hairs situated along anterior margin of oral hood, ranging 6–13 μ m long; 4 pairs of hairs implanted on anterodorsal surface of oral hood consisting of 2 submesial pairs and 2 lateral ones; more than 10 minute hairs lined ventrally in a row behind the oral opening at U11; several pairs scattered on lateral or dorsolateral side from neck to trunk region (U12–U95). Eyespot lacking. Paired knob-like tentacles protruding dorsolaterally, just behind posterolateral corner of head (U09), each furnished with 1 short sensory bristle and 1–2 hairs. Numerous epidermal glands irregularly situated at subdorsal and subventral surface along nearly whole body length (U09–U94), with generally circular shape, mixed in size (from 2 to 8 μ m in diameter).

Cuticular armature embossed with small (2–3 μ m in diameter) and smooth hemispherical tubercles on dorsal and lateral surfaces as in Fig. 3B.

Ventral cilia covering the entire mid-ventral surface, from just behind the anterior adhesive tubes to the base of caudum.

Adhesive tubes: TbA 3 per side, ca. 7–10 μ m long, distributed in a nearly horizontal row behind oral opening at U14, composed of 1 medial tube and 2 lateral ones a little apart from medial one; 1 TbVL rather short and stumpy, 7 μ m long, situated a little behind TbA at U18; TbV 7–8 per side more or less evenly spaced in intestinal region (from

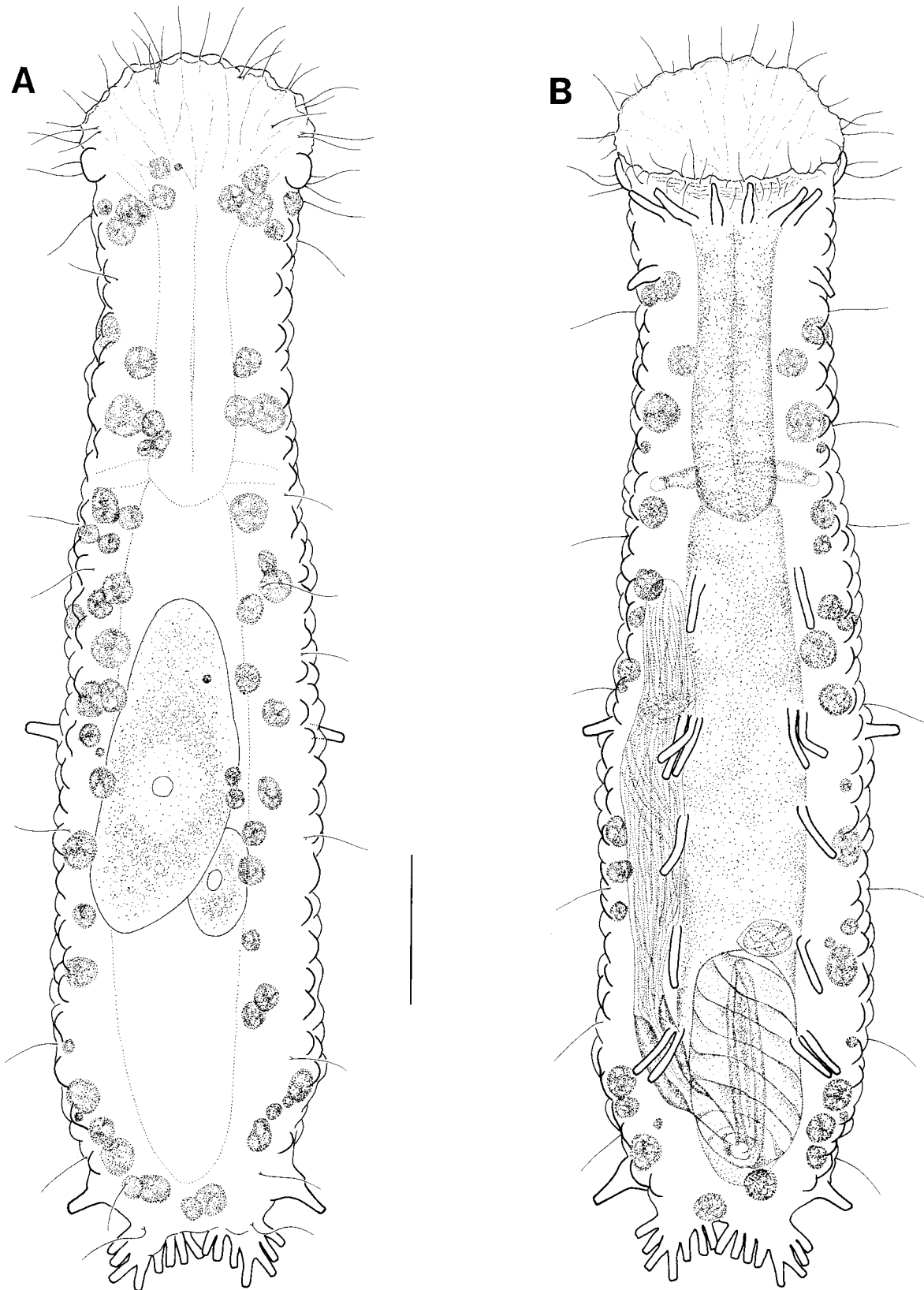


Fig. 2. *Ptychostomella orientalis* new species. A, habitus, dorsal; B, habitus, ventral. Scale bar=30 μ m.

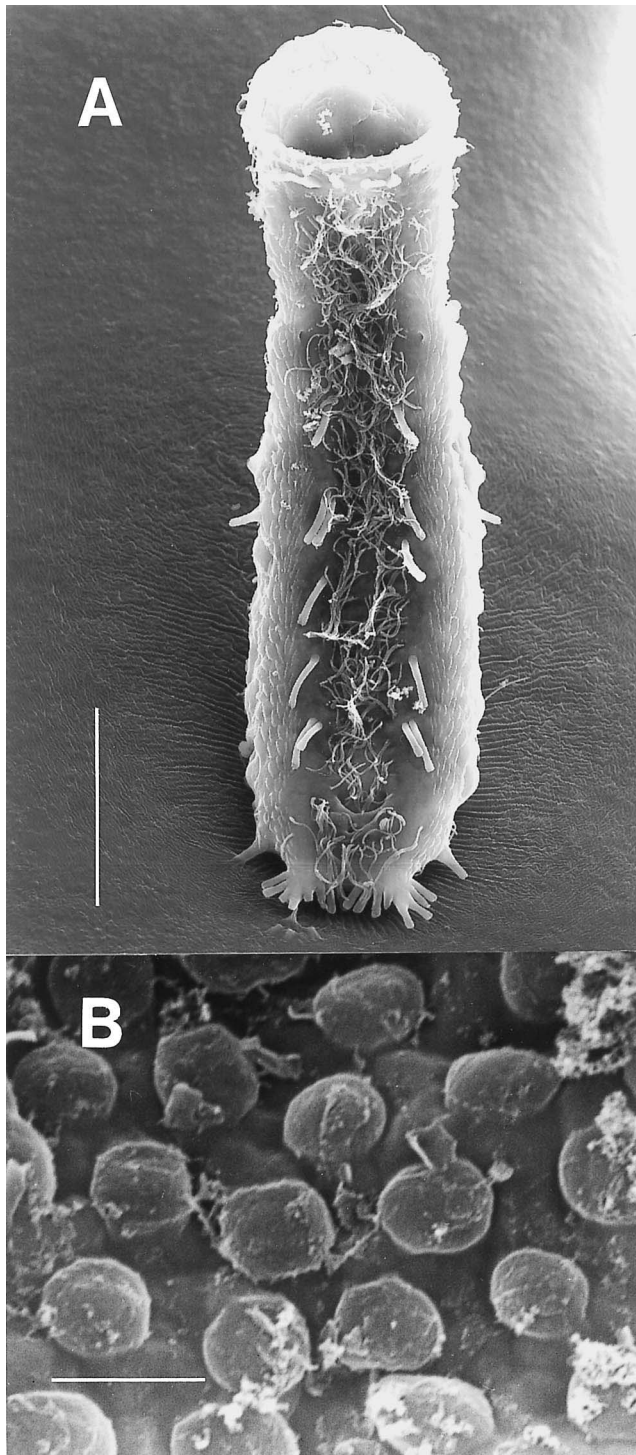


Fig. 3. *Ptychostomella orientalis* new species. A, habitus, ventral; B, dorsal surface embossed with smooth hemispheres. SEM micrographs. Scale bars: A=30 μm ; B=3 μm .

U42 to U79), somewhat slender and ranged ca. 10–13 μm long, with 1 + 2(3) + 1 + 1 + 2 arrangement (at U42/U54/U62/U71/U79), of which second and fifth ones forming feet; 2 TbL per side, first one 7 μm long, rather ventrolaterally (U67), and second 9 μm long, quite robust, located at latero-posterior edge of body (U91); a short bilobed caudum each

forming a pedicle, furnished with 7–8 TbP, comprising 2 distal (8 μm long), 2 lateral (5 μm) and 3–4 medial tubes (6 μm).

Reproductive apparatus: Testis single on right side, its tip at U43 not reaching PhJIn; vas deferens apparently not coiled, and inner wall shown as a little thickened at its posterior portion (U80-U86). Copulatory organ large, elongate and rather oblong (22 μm X 42 μm , 9U X 18U), located at U73-U91, surrounded spirally with thin muscles. Seminal receptacle oval (8 μm X 10 μm), just in front of copulatory organ, containing spermatozoa. Spermatozoa filiform. Two suboval eggs with different sizes (ca. 24 μm X 61 μm and 10 μm X 18 μm , respectively) situated dorsally in mid-intestinal region, maturing anteriorly.

Specimens occurred in the subtidal medium sands along the middle coast of the East Sea (the Sea of Japan).

Measurements and variability: Body lengths of ten adult type specimens ranged from 223 μm to 262 μm (mean 240 μm , standard deviation 10), maximum widths 46–69 μm (19U-26U), when mounted in glycerin.

The arrangement and number of adhesive tubes showed some variability according to individuals. TbA showed a relatively consistent arrangement as 3 pairs in a horizontal row, except for only one of 24 specimens examined, which possessed an additional tube. As shown in Fig. 4, the arrangement and number of TbV were much variable and often asymmetrical, however, second and last TbV unexceptionally formed the feet. Pedicles were equipped with 2 distal TbP in all adults examined, while the arrangement of lateral or medial TbP were variable, ranging 1-2 and 2-4 tubes per side respectively, sometimes with the asymmetrical array.

Pre-mature individuals not found among the specimens examined.

Etymology: The specific name *orientalis* alludes to the type locality of this new species, the first record of genus *Ptychostomella* in the East Asia.

Remarks: Seven species are currently recognized in the genus *Ptychostomella* Remane, 1926: *P. pectinata* Remane, 1926, *P. ommatophora* Remane, 1927, *P. mediterranea* Remane, 1927, *P. helana* Roszczak, 1939, *P. tyrrhenica* Hummon, Todaro and Tongiorgi, 1993, *P. bergensis* Clausen, 1996, and *P. lepidota* Clausen, 2000.

As already mentioned, *Ptychostomella* had been known as the unusual thaumastodermatid genus with the smooth cuticle. Recently, Clausen (2000) described *P. lepidota* from the Tromsø region, Norway, which was armed with a sculptured cuticular structure of “circular, convex and smooth, scale-like cuticular elevations”. In having the embossed cuticular armature of hemispherical elevations, much similar to those of *P. lepidota*, the new species is supposedly most related to it. Moreover, both species share two pairs of TbL and the absence of eyespot. However, *P. orientalis* is discernible from *P. lepidota* in having three pairs of TbA, paired knob-like tentacles, and an oblong copulatory organ.

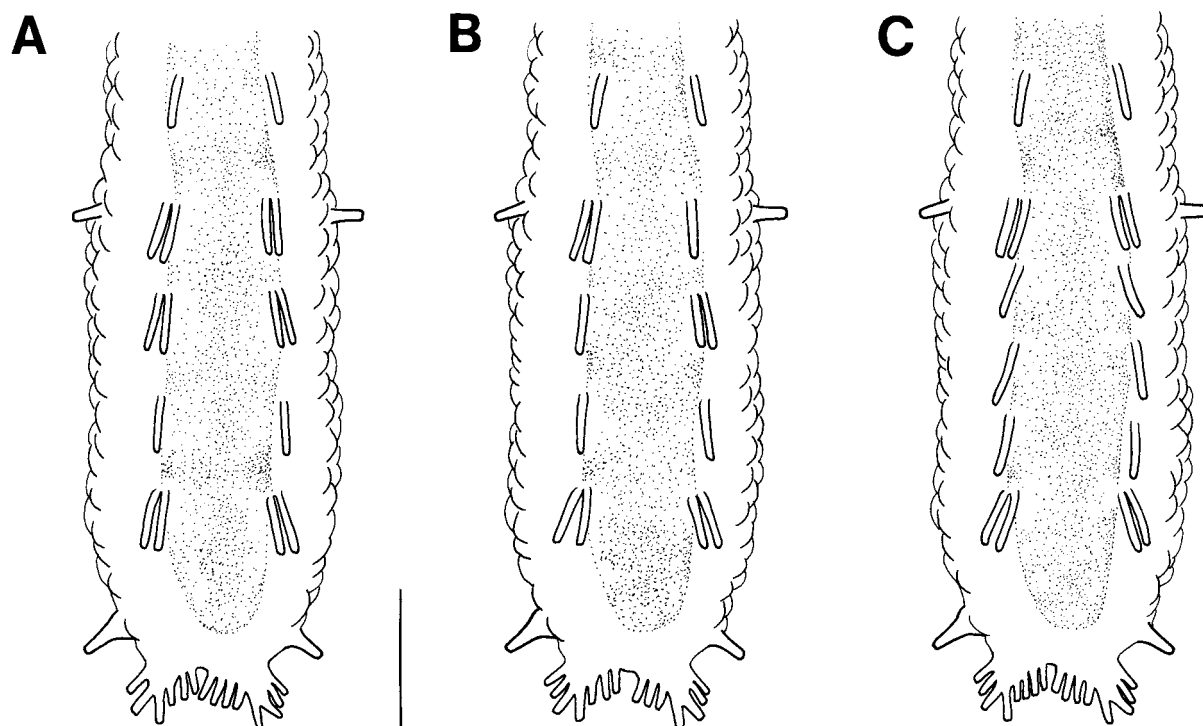


Fig. 4. *Ptychostomella orientalis*, variations in the number and arrangement of ventral adhesive tubes. Scale bar=30 μ m.

Beside the presence of the cuticular armature, *P. orientalis* is clearly distinguished from the other congeners by the character combination, as shown in Table 1: (1) bearing the paired knob-like cephalic tentacles; (2) lacking eyespot; (3) the arrangement of adhesive tubes, especially, number of TbA, presence of ventral foot (TbV), number and location of TbL, and arrangement of TbP; (4) shape of copulatory organ.

Ptychostomella papillata new species

(Figs. 5, 6)

Material examined: Fourteen individuals (1 juvenile), Ganggu, Youngdeok (36°22'38"N, 129°24'40"E), 17 Oct. 2000, J. W. Choi and Y. H. Song. Holotype (DG0801) and 11 paratypes (DG0802–0812) are kept in the authors' collection at the specimen room of the Department of Biology, Daegu University. Another two paratypes, mounted in glycerin on H-S slide, are deposited in the U.S. Natural Museum of Natural History, Smithsonian Institution (USNM1008312) and the Natural History Museum, Ewha Womans University, Seoul (EWNHM60272).

Diagnosis: *Ptychostomella* with scalloped anterior border and short, bilobed caudum; terrace-shaped cuticular protrusion with papillae on head region; 7 small papillae on each subdorsal surface; 13 dorsolateral groups of papillae along each side, each group composed of 2–3 papillae; 12 ventrolateral subconical papillae per side, each with a long sensory hair; adhesive tubes: 5–6 TbA per side forming an arc; 20 TbVL and 3 TbL per side; caudum with pedicles poorly developed, each bearing 2 distal, 1 medial and 5–7

lateral TbP; copulatory organ weakly pyriform; vas deferens coiled or folded at its middle.

Description of the holotype: Body relatively short, 234 μ m long; pharynx length 80 μ m long; pharyngeal pores basal, but extend forward to exit at U36. Body sides more and less parallel in pharyngeal region, weakly swollen in trunk region, then a little narrowing to a short bilobed caudum. Widths of oral opening/neck/PhJIn/trunk/caudal base 40/39/53/58/37 μ m at U06/U26/U45/U66/U93 respectively.

Oral hood a little protruding with scalloped border; anterior edge furnished with 12–13 papillae each bearing 2–3 sensory hairs on its tip. A terrace-shaped cuticular protrusion (Figs. 5A, 6B) prominent on anterodorsal surface of head, bilaterally forming arcs (U04–U10), each with 5 papillae; medialmost papilla notably bigger, with 3 sensory hairs, pointing outward; second one with only 1 sensory hair, rather slenderer than others, close to the former; outer 3 papillae each with 1–3 sensory hairs, along anterior rim of the terrace. A pair of transverse ridges situated slightly behind the terrace (U07); one small papilla with 1 short sensory hair situated on the ridge.

Dorsal surface somewhat swollen, and ornamented with 7 small papillae located subdorsally at U20–U80 in 2 columns; one small papilla locating just ahead of posterior edge of trunk (U95). Dorsolateral sides aligned by 13 groups of papillae, comprising 5 pairs in pharyngeal region (from U12 to U40) and 8 pairs in trunk region (from U47 to U98); first group made of single papilla, second and fourth of 3 papillae each, and others of 2 papillae (one of which bears a long hair, 14 μ m long, and the other a short one, 3 μ m

Table 1. Character comparison of two new *Ptychostomella* species with known congeners.

	<i>P. pectinata</i>	<i>P. ommatophora</i>	<i>P. mediterranea</i>	<i>P. helana</i>	<i>P. tyrrhenica</i>	<i>P. bergensis</i>	<i>P. lepidota</i>	<i>P. orientalis</i> n. sp.	<i>P. papillata</i> n. sp.
Body Length (µm)	220	360	190	700–800	170–180	320–360	280–300	264	234
Cuticular armature on dorsal surface	smooth	smooth	smooth	smooth	smooth	smooth	cuticular elevations	embossed with hemispherical elevations	terrace-shaped cuticular protrusion on head; papillae with sensory hair(s)
Tentacle	absent	absent	1 pair (knob-like)	1 pair (club-shaped)	1 pair (knob-like)	absent	absent	1 pair (knob-like)	absent
Eyespot	absent	present	absent	absent	absent	absent	absent	absent	absent
TbA (per side)	5	4	4	5–8	4	7	6	3	5–6
TbL (per side)	2	4	2	absent	2	2	2	2	3
Foot (TbV)	absent	absent	–	absent	absent	1 pair (of 4 tubes)	1 pair (of 4–5 tubes)	2 pairs (of 2–3 tubes)	absent
TbVL (per side)	7	12–16	–	absent	6	9	9	1	20
Pedicle	bifid	bifid	trifid	absent	bifid	bifid	bifid	bifid	bifid
Copulatory organ	pyriform	–	–	–	bladder-like	pyriform	pyriform	oblong	weakly pyriform
Distribution	North Sea (Germany), Baltic Sea (Poland)	North Sea (Germany, Norway)	Mediterranean (Italy)	Baltic Sea (Poland)	Mediterranean (Italy)	North Sea (Norway)	North Sea (Norway)	NW Pacific (Korea)	NW Pacific (Korea)

long); third pair implanted more laterally; penultimate one (U92) situated just ahead of the third TbL; last papillae issuing from dorsal surface of caudum at the base of bifurcated pedicle.

Ventrolaterally, 12 subconical papillae per side evenly spaced along nearly whole length of body (U12–U87) each with 1 long sensory hair (ranging 9–13 µm long); comprising 2 anteriormost papillae lateral to TbA, 2 in mid-pharyngeal region, 2 around PhJIn, and remaining 6 papillae in trunk region (U51–U87). A pair of small papillae present on ventral side near pharyngeal pore (U36).

Eyespot lacking. Epidermal glands 15–16 per side aligned along body length from U13 to U90, generally oval in shape, mixed in size (4–7 µm in diameter). The openings of anteriormost glands (Fig. 6B) can be seen dorsolaterally along the second transverse ridge.

Ventral cilia arranged in transverse rows that cover the whole ventral surface, from just behind the anterior adhesive tubes to the base of caudum.

Adhesive tubes: TbA 5–6 per side (ca. 6–10 µm long), forming an arc behind oral opening at U12–U16, of which 3 tubes ventrally and 2–3 ventrolaterally. TbVL 20 per side, located somewhat ventrally, rather slender and ranged from

ca. 6 to 12 µm in length; foremost one at U20, and remaining tubes more or less evenly distributed in intestinal region from U46 to U84. TbV absent. TbL shown as hollow, cuticular tube without granular content (apparently not cirratum-type); 3 TbL per side, first tube 6 µm long, situated just behind PhJIn at U46, second one 8 µm long, at an anterior third of trunk (U63), and third one 10 µm long, at posterolateral edge of body (U93), approaching to lateral TbP. TbP, up to 8–9 per side, forming a pedicle poorly developed, with 2 distal (8 µm long), 1 medial (6 µm long) and 5–7 lateral tubes (ca. 5 µm long).

Reproductive apparatus: A single testis on right side, its anterior end reaching far behind PhJIn (U49). Vas deferens coiled or folded at the level of anterior tip of copulatory organ (U74), joining copulatory organ at posterior end. Copulatory organ weakly pyriform, narrowing posteriorly (14 µm X 40 µm, 06U X17U), located in U73–U90, wrapped with thin muscles spirally. Seminal receptacle appeared suboval, just ahead of copulatory organ, and containing several spermatozoa. Spermatozoa apparently filiform. One large ovum situated dorsally in mid-intestinal region (ca. 58 µm X 24 µm).

Specimens collected in medium sands on sublittoral bottom (12 m depth).

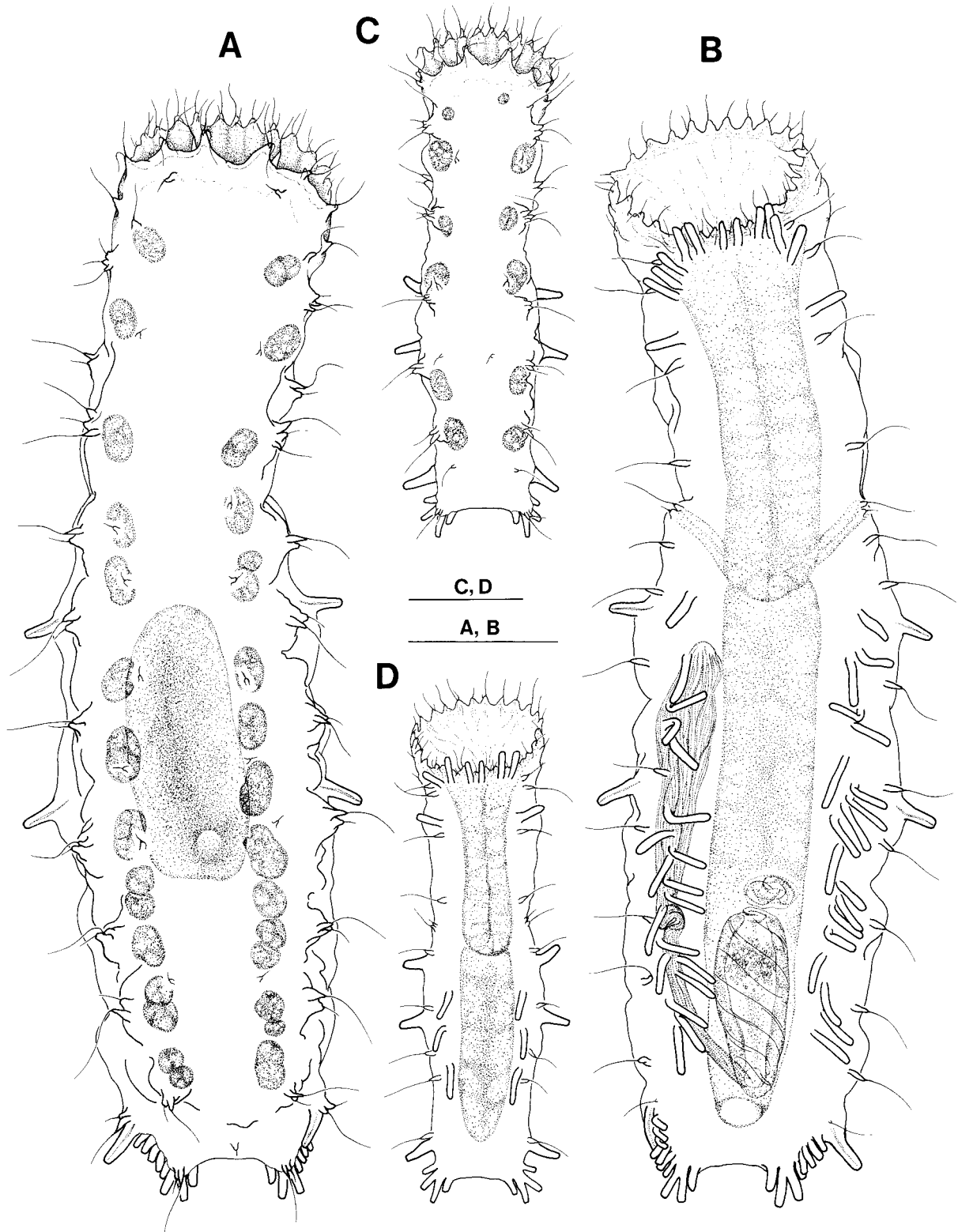


Fig. 5. *Ptychostomella papillata* new species. A, habitus, dorsal; B, habitus, ventral; C, juvenile, dorsal; D, juvenile, ventral. Scale bars=30 μm .

Description of juvenile: A juvenile (Fig. 5C, D) 135 μm long; pharynx 49 μm long. Compared with adults, the juvenile specimen possessed nearly all the characters of adults

in general, except that the number of papillae and adhesive tubes were fewer, and pharyngeal pore not clear. The terrace-shaped cuticular protrusion was composed of 5 projec-

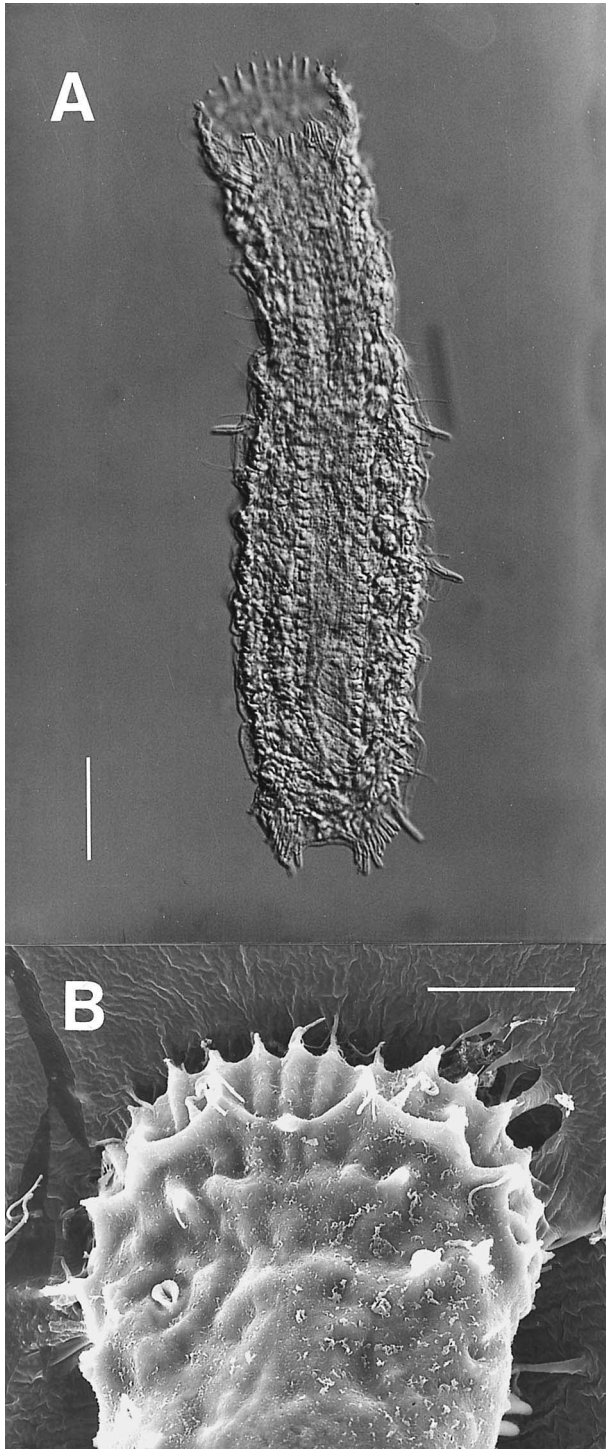


Fig. 6. *Ptychostomella papillata* new species. A, habitus, ventral. Nomarski optics; B, head, dorsal. SEM micrographs. Scale bars: A=30 μm ; B=10 μm .

tions as in adults. However, a pair of papillae on dorsal ridge behind it were not detected. Only 4 small papillae per side situated on dorsal surface at U27–U87. Single papilla near posterior edge of trunk was absent. Dorsolateral papillae consisted of 8 pairs per side, including anterior 4 in pharyngeal region, 3 in intestinal region, and 1 on caudum; fore-

most one single, second and fourth pairs of 3 papillae, and others of 2 papillae; third pair situated rather laterally as compared with that of adult specimens. Ventrolaterally, 9 subconical papillae were present per side, each with 1 long sensory hair; first 4 papillae located at pharyngeal region, fifth one at PhJn, and remaining 4 papillae including the last one beside third TbL, inserted in intestinal region. TbA consisted of only 3 pairs, lacking ventrolateral ones. TbVL was composed of only 4 tubes per side, first one (7 μm long) located in the pharyngeal region at U24, and other 3 tubes (8–10 μm) in the mid-intestinal region at U58, U66 and U72, respectively. Each pedicle was furnished with 2 distal TbP flanking only 1 medial and 1 lateral tube.

Measurements and variability: Body lengths of 12 adult type specimens in glycerin ranged from 218 μm to 266 μm (mean 230 μm , standard deviation 13), maximum widths 48–67 μm (21U–27U). The location and number of small papillae on dorsal surface were rather variable as 6–8 per side. The number of dorsolateral and ventrolateral papillae pairs were somewhat variable, ranging 10–13 and 12–15, respectively; dorsolateral papillae showed the symmetrical arrangement, but ventrolateral ones were sometimes asymmetrical. The arrangement and number of adhesive tubes also showed some variability. TbA was almost composed of 5–6 pairs, however, one paratype had 7 pairs, and another specimen 4 tubes on one side and 5 on the other. TbVL in the pharyngeal region was consistently single, but the number of TbVL in intestinal region was much variable, varying from 12 to 20 per side, and often showed the asymmetrical arrangement. Each pedicle was furnished with 2 distal and 1 medial TbP in all specimens examined, while the number of lateral tubes was variable, ranging 5–7.

Etymology: The specific name *papillata* (papillatus, L. meaning “of papilla” or “with papilla”) refers to the possession of numerous papillae, the decisive feature differentiating this species from all the congeners.

Remarks: The new species is unique in having the terrace-shaped cuticular protrusion on head and the numerous papillae arranged in bilateral columns on dorsal, dorsolateral and ventrolateral surface.

Ptychostomella mediterranea Remane, 1927, *P. helana* Roszczak, 1939 and *P. tyrrhenica* Hummon, Todaro and Tongiorgi, 1993 differ from the new species in bearing (club-shaped or knob-like) cephalic tentacles and less than two pairs of TbL (against three pairs of TbL in *P. papillata*). Moreover *P. papillata* has the pedicle with two distal tube, while *P. mediterranea* bears the pedicle with three distal tubes, and *P. helana* lacks the pedicle altogether.

Ptychostomella papillata is closely allied with *P. pectinata* Remane, 1926 and *P. bergensis* Clausen, 1996 in sharing the absence of cephalic tentacles and eyespots, and the bilobed caudum, but it is discernible from them in possessing more TbL (three tubes per side against two both in *P. pectinata* and *P. bergensis*) and TbVL (20 tubes per side in *P. papillata*), and a relatively longer copulatory organ than in *P. pectinata* and *P. bergensis*. Moreover, *P. papillata*

lacks the group of seven tubes near first TbL in *P. pectinata* as well as the foot-type TbV in *P. bergensis*. On the other hand, *P. ommatophora* Remane, 1927 has a pair of eyespots and four pairs of TbL.

Based upon the character comparison table (Table 1), a key to the species of genus *Ptychostomella* Remane is prepared as follows.

A key to the species of genus *Ptychostomella* Remane

1. Dorsal surface smooth 2
 Dorsal surface embossed with hemispherical elevations 6
 Dorsal surface with terrace-shaped cuticular protrusion on head and numerous papillae with sensory hair(s)
 *P. papillata* n. sp.
2. Eyespots present..... *P. ommatophora* Remane, 1927
 Eyespots absent 3
3. With paired club-shaped tentacles.....
 *P. helana* Roszczak, 1939
 With paired knob-like tentacles 4
 Without cephalic tentacles 5
4. Pedicle with 3 distal TbP.....
 *P. mediterranea* Remane, 1927
 Pedicle with 2 distal TbP.....
*P. tyrrhenica* Hummon, Todaro and Tongiorgi, 1993
5. With a pair of foot-type TbV; TbVL evenly spaced in trunk region..... *P. bergensis* Clausen, 1996
 Without foot-type TbV; TbVL gathered near first TbL
 *P. pectinata* Remane, 1926
6. With paired knob-like cephalic tentacles.....
 *P. orientalis* n. sp.
 Without cephalic tentacles *P. lepidota* Clausen, 2000

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