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A new species and new recorded species of Orbiniidae Hartman, 1942 (Annedia:  
Polychaeta) from China

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## Abstract

A new species of the orbiniid genus *Phylo*, *P. heterochaetus* sp. n., is described based on material collected from northern Yellow Sea, China. This is the thirteenth species in *Phylo* Kinberg, 1866. The new species can be easily identified by the combination of the following characters: anterior thorax with 13 setigers, interramal cirri absent, anterior thoracic neuropodia with 4–5 rows of uncini, intermixed with few subuluncini in the first 1–2 rows, ventral fringe of numerous of stomach papillae present on setigers 12–24. We also described and illustrated *P. fimbriata*, which is recorded for the first time from China seas.

**Key words:** Orbiniidae, *Phylo*, taxonomy, new species, China Seas

## Introduction

*Phylo* Kinberg, 1866 belongs to Orbiniidae Hartman, 1942 and differs from the other genera in having species with modified spines on posterior thoracic setigers. Although Bleidorn (2005) and Bleidorn et al. (2009) suggested that species of *Phylo* are closely related to *Orbinia* species based on molecular analyses, *Phylo* is retained as a genus for the modified spine makes species of *Phylo* to be identified easily (Blake, 2017). Hartman (1957) reviewed this genus and described four species in detail, including the type species, *P. felix* Kinberg. Subsequently, Day (1961; 1977), Mohammad (1980), and Hartmann-Schröder & Rosenfeld (1990), Blake (2017, 2020, 2021) described additional *Phylo* species. According to these literature, thirteen species of *Phylo* are considered valid (Read & Fauchald, 2021; Blake, 2021).

The genus *Phylo* is mainly characterized by the following characters: branchiae first present from chaetiger 5–7, thoracic neuropodia fringed, with several postchaetal lobes, posterior thorax and anterior abdominal setigers with subpodial lobes, usually forming ventral fringe, thoracic neurochaetae including blunt uncini or subuluncini and crenulated capillaries; posterior thoracic setigers with modified spines.

The present specimens, which collected from northern Yellow Sea, clearly belong to the genus, according to the characters listed above. They were identified as a new species, which is described and illustrated in this study. Additionally, we described and illustrated *P. fimbriata* based on species collected from East China Sea. This is the first discovery of this species from Chinese waters.

## Material and Methods

Material checked in this study are collected from northern Yellow Sea and East China Sea, and deposited in the Marine Biological Museum of Chinese Academy of Science, with a few specimens retained by the present college of the first author (Yancheng Teachers University, YCTU). All the specimens are preserved in 75% ethanol solution. Detailed morphological structures were examined under Zeiss Stemi 2000–C stereomicroscope. Photography and line drawings were made using an AxioCam MRc 5 digital camera attached to stereomicroscope and compound microscope. For scanning electron microscopes observations, the samples were prepared by critical point drying and sputter coating with gold–platinum.

The following abbreviations are used: MBM, Marine Biological Museum; YCTU: Yancheng Teachers University; spec: specimen; Sta.: station; ECS: East China Sea; nYS: northern Yellow Sea; SEM: scanning electron microscopes.

## Taxonomy

Family Orbiniidae Hartman, 1942

Subfamily Orbiniinae Hartman, 1957

Genus *Phylo* Kinberg, 1866

Type–species: *Phylo felix* Kinberg, 1866

### *Phylo heterochaetus* sp. n.

(Figures 1–3)

**Material examined. Holotype:** MBM286984: nYS, Sta. 3875–04, 38°45' N, 123°30' E, 64m, 16 Dec. 2015. **Paratype:** MBM286985: nYS, Sta. 16, 39°07' N, 122°54' E, 31 meters, 18 Dec. 2016. MBM286986: nYS, Sta. C3, 39°00' N, 122°55' E, 45 meters, 18 Dec. 2016. Sta. MBM286987: nYS, Sta. A1, 39°05' N, 122°35' E, 36 meters, 18 Dec. 2016. MBM023255: nYS, Sta. 2049, 122°45' N, 38°09' E, 51 meters, coll. Mu Chen. 11 Jul. 1959. **Additional material:** MBM023221: nYS, Sta. 2056, 38°30' N, 123°30' E, 63 meters, Mu Chen. 15 Apr. 1959. MBM009975: nYS, Sta. 2057, 38°00' N, 123°30'

E, 70.5 meters, coll. Yuheng Cui. 1 Oct. 1958. YCTU000004: nYS, Sta. A3, 39°00' N, 122°35' E, 35meters, 18 Dec. 2016. YCTU000005: nYS, Sta. 48, 39°16'N, 123°18' E, 37 meters, 18 Dec. 2016.

**Description.** All specimens incomplete, posterior end missing, holotype with 60 setigers, 34 mm long and 5 mm wide. Body elongate, about same width throughout; thorax depressed, abdomen cylindrical.

Prostomium short, conical, tapering to rounded tip. Eyepots absent, nuchal organs narrow groove at junction with peristomium (Fig. 1). Peristomium a narrow asegmentous segment, distinctly separated from prostomium and setiger 1, mouth with anterior oral lip arising from posterior margin of peristomium, posterior oral lip from anterior margin of setiger 2. Holotype with proboscis everted, consisting of two large, inflated lobes (Fig. 1).

Holotype with 21 thoracic setigers, divided into anterior and posterior sections: anterior thorax with 13 setigers (Figs. 1; 2A), posterior thorax with modified spines beginning on setiger 14 continuing over 8 setigers. Intersegmental annulations first present from chaetiger 1, well developed (Figs. 1; 2A). Thoracic notopodial postchaetal lobe arising from narrow base, broadly triangular, narrowing apically (Fig. 2B), becoming long and narrow in abdominal setigers (Fig. 2C–D). Thoracic neuropodia thick, elongate, fringed, bearing rows of uncini and several capillaries. First setiger with two rounded postchaetal lobe, increasing to 13–14 on middle thoracic setigers (Fig. 2A), then decreasing to 6–7 on last thoracic setigers. Subpodial lobes or stomach papillae from setiger 12, numbering one at first, then extending to ventral midline on setigers 18–25, then abruptly absent (Figs. 1; 2A). Abdominal neuropodia bilobed, with inner lobe blunted, outer lobe cirriform (Fig. 2C–D). First abdominal setiger with 6 extra lobes or ventral cirri ventral to neuropodium, then reduced to two on following three setigers and single or two on subsequent setigers (Fig. 2C–D). Interramal cirrus absent.

Branchiae beginning from setiger 5, on anterior setigers short, triangular, tapering to narrow papillate rounded apex (Fig. 2B), then becoming narrower and longer, leaflike and ciliated (Fig. 2C–D).

Thoracic notopodia with fascicles of crenulated capillaries. Abdominal notopodia with less long, thin capillaries, 2–4 furcate chaetae and 3–5 imbedded aciculae, furcate chaetae with unequal tynes, each tyne with fine needles directed medially, shaft with transverse rows of barbs (Fig. 3E).

Anterior thoracic neuropodia with 4 rows and one short posterior rows of yellow uncini, and posterior row of crenulate capillaries (Figs. 2E; 3A, B, E, F). Anterior two rows mixed with 10–12 subuluncini, last row with 7–9 uncini, curved ventrally to

anterior rows (Fig. 3A–B). Uncini of first 1–4 rows short, with blunt-tipped apex, with 10–18 transverse rows of blunt barbs on convex side, with conspicuous groove apically (Fig. 3B, D); uncini of last row longer than anterior ones, only located in the ventral side of the neuropodium (Fig. 3A); subuluncini resemble uncini, but with distally pointed tip, with more than 30 rows of blunt barbs, surrounded by sheath (Fig. 3B). Posterior thoracic neuropodia with 4–7 modified spines (Fig. 3C), single short row of uncini and 1–2 rows crenulate capillaries. Modified spines large, hastate, superior one projecting from neuropodium, with glandular pouch (Fig. 3C). Abdominal neurochaetae including 4–6 thin capillaries and single acicula, thin and imbedded.

Anterior thoracic neuropodia with 5–6 rows of yellow uncini and posterior row of crenulate capillaries (Figs. 2E; 3A–B). Anterior two rows mixed with 10–12 subuluncini, last row with 7–9 uncini, curved ventrally to anterior rows (Fig. 3A–B). Uncini of anterior 4–5 rows short, with blunt-tipped apex, with 10–18 transverse rows of blunt barbs on convex side, with conspicuous groove apically (Fig. 3B, D); uncini of last row longer than anterior ones, only located in the ventral side of the neuropodium (Fig. 3A). Subuluncini resemble uncini, but with distally pointed tip, with more than 30 rows of blunt barbs, surrounded by sheath (Fig. 3B). Posterior thoracic neuropodia with 4–7 modified spines (Fig. 3C), single short row of uncini and 1–2 rows crenulate capillaries. Modified spines large, hastate, superior one projecting from neuropodium (Fig. 3C). Abdominal neurochaetae including 4–6 thin capillaries and single acicula, thin and imbedded.

Pygidium not observed.

**Variation.** One paratype (MBM286986) with 13 and 14 anterior thoracic setigers on left and right side respectively, posterior thorax with 9 and 8 setigers respectively. Holotype and other specimens with 13 anterior thoracic setigers, posterior thorax with 4–8.

**Etymology.** The species is named for the thoracic neuropodia with two kinds of uncini.

**Type locality:** northern Yellow Sea.

**Remarks.** This species is unusual in the genus in having anterior thoracic neuropodia with 5–6 rows of uncini intermixed with few subuluncini in the first 1–2 rows. *Phylo heterochaetus* sp. n. is similar to *P. ornatus* (Verrill, 1873) for: 1). anterior thoracic neuropodia with rows of uncini, 2). lacking interramal cirri, 3). anterior thorax with 13–14 setigers. While they can be easily distinguished by 1). species of *P. heterochaetus* sp. n. with 4–8 posterior thoracic setigers while the latter species with 13 or more setigers; 2). species of *P. heterochaetus* sp. n. with 10–11 subuluncini

intermixed with first 2 rows uncini, while the latter species with no subuluncini; 3). modified spines hastate in *P. heterochaetus* sp. n. and acicular in *P. ornatus*.

### ***Phylo fimbriata* (Moore, 1903)**

(Figures 4–6)

*Aricia fimbriata*, Moore, 1903: 464–467, pl. XXIV, figs. 33–35; — Okuda, 1937: 99–101, figs. 1–2.

*Phylo fimbriata*—Hartman, 1957: 267.

**Material examined.** YCTU000006: ECS, Sta. 3100–8, 31°00'N, 126°00'E, 51 meters, soft mud substrate, Jun. 2014. YCTU000007: ECS, Sta. I3, 33°00'N, 123°00' E, 34 meters, soft mud substrate, 20 Sep. 2015. MBM009966: ECS, Sta. 4134, 29°30' N, 123°00' E, 50 meters, soft mud substrate, 20 Jan. 1959. MBM 023276: ECS, Sta. 4007, 33°30' N, 122°30' E, 37 meters, soft mud substrate, 13 Apr. 1959.

**Description.** All specimens incomplete, posterior end missing. Body elongate, about same width throughout; thorax depressed, abdominal setigers cylindrical.

Prostomium short, conical, tapering to rounded tip. Eyepots absent, nuchal organs narrow groove at junction with peristomium. Peristomium an asetigerous segment, distinctly separated from prostomium and setiger 1, mouth with anterior oral lip arising from posterior margin of peristomium, posterior oral lip from anterior margin of setiger 2. Proboscis everted, consisting of two large, inflated lobes.

Thorax with 16 setigers, divided into anterior and posterior sections: anterior thorax with 12 setigers, posterior thorax with modified spines beginning on setiger 13 continuing over 4 setigers. Intersegmental annulations first present from chaetiger 1, well developed (Fig. 4A).

Both thoracic notopodia and neuropodia with fringed postchaetal lobes, notopodium half as broad as the neuropodium, broadly palmate (Fig. 4A, 5A). Notopodia with single conical postchaetal lobe from chaetiger 1, increasing gradually to about 6 lobes on posterior thoracic setigers, postchaetal lobes equivalent in size and shape on anterior setigers, with inner lobe separate and becoming longer than the outer ones on the posterior setigers (Fig. 4A, C). Abdominal notopodial postchaetal lobe arising from narrow base, broadly triangular (Fig. 4B).

Thoracic neuropodia thick, elongate, strictly lateral, bearing numerous subuluncini and capillaries (Figs. 4A, C). Neuropodium with 1–3 conical postchaetal lobe from chaetiger 1, increasing gradually to about 15 lobes on setigers 9 (Fig. 4A, C; 6A). Subpodial lobes or stomach papillae presenting on setiger 17–19, numbering 2–3. Abdominal neuropodia bilobed, with inner lobe blunted, outer lobe cirriform (Fig. 4B).

First abdominal setiger with 3–6 extra lobes or ventral cirri ventral to neuropodium, then reduced to single on subsequent setigers (Fig. 4B). Interramal cirrus absent.

Branchiae from setiger 5, each anterior branchia broad, tapering to narrow rounded tip (Fig. 4C), subsequent branchiae narrower and longer, leaflike and ciliated (Fig. 4B).

Thoracic notopodia with fascicles of crenulated capillaries (Figs. 5A, 6A–B). Abdominal notopodia with less long, thin capillaries, 3–4 furcate chaetae and 4 – 8 imbedded aciculae (Fig. 4B). Anterior thoracic neuropodia with numerous yellow subuluncini and crenulate capillaries (Figs. 5B, 6A). Subuluncini arranged in dense phalanx, with anterior ranks strongly curved, much shorter than posterior ranks (Fig. 5A–B). Subuluncini tapering to narrow pointed tip, covered with sheath, shaft with transverse rows of minute ribs or barbs (Fig. 5C). Posterior thoracic neuropodia with 4–5 modified spines, several subuluncini and crenulated capillaries ventral to the modified spines (Fig. 6B). Modified spines large, superior one projecting from neuropodium, with glandular pouch (Figs. 4D; 5D; 6B–C). Abdominal neurochaetae including thin capillaries and 1–3 aciculae (Fig. 5B).

Pygidium not observed.

**Distribution.** East China Sea (China); Suruga Bay, Miyagi Prefecture (Japan).

**Remarks.** *Phylo fimbriata* (Moore, 1903), the species which was first recorted by Moore (1903) from Suruga Bay and North Japan, unlike most species of *Phylo*, thoracic notopodia has fringed postchaetal lobes. Okuda (1937) redescribed this species based on specimens from Miyagi Prefecture. The morphology of present specimens agrees well with original description of specimens from Japan.

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## Legends:

Fig. 1 anterior end of *Phylo heterochaetus* sp. n. Scale bar: 2mm.

Fig. 2 *Phylo heterochaetus* sp. n. **A**, anterior body in lateral view; **B**, parapodium of chaetiger 7; **C**, parapodium of anterior abdominal chaetiger; **D**, parapodium of chaetiger 62; **E**, diagram showing arrangement of anterior thoracic neurochaetae. Scale bars: A, 2 mm; B–D, 400  $\mu$ m; E, 200  $\mu$ m.

Fig. 3 SEM pictures of *Phylo heterochaetus* sp. n. **A**, neurochaetae of thorax; **B**, uncini and subuncini; **C**, modified spines; **D**, uncini of last rows of thoracic neuropodia; **E**, furcate chaeta; **F–G**, crenulate capillaries. Scale bars: A, 200  $\mu$ m, B, 50  $\mu$ m, C, 250  $\mu$ m, D, 10  $\mu$ m, E, 200  $\mu$ m, F, 200  $\mu$ m, G, 30  $\mu$ m.

Figure. 4 *Phylo fimbriata* (Moore, 1903). **A**, anterior end, left lateral view; **B**, parapodium of abdominal setigers; **C**, parapodium of thoracic setigers; **D**, modified spine from posterior thoracic chaetiger. Scale bars: A, 1mm, B–D, 500  $\mu$ m.

Fig. 5 SEM pictures of *Phylo fimbriata* (Moore, 1903). **A**, anterior thoracic setiger, anterior view; **B**, same, detail, showing arrangement of neurochaeta; **C**, same, detail, showing neurochaetae; **D**, modified spines. Scale bars: A, D, 5mm; B, 200  $\mu$ m; C, 50 $\mu$ m; D, 50  $\mu$ m.

Fig. 6 *Phylo fimbriata* (Moore, 1903). **A**, anterior thoracic setiger, anterior view; **B**, posterior thoracic setiger, anterior view; **C**, modified spines. Scale bars: A, 0.2mm; B–C. 0.5mm.

Fig. 1



Fig. 2

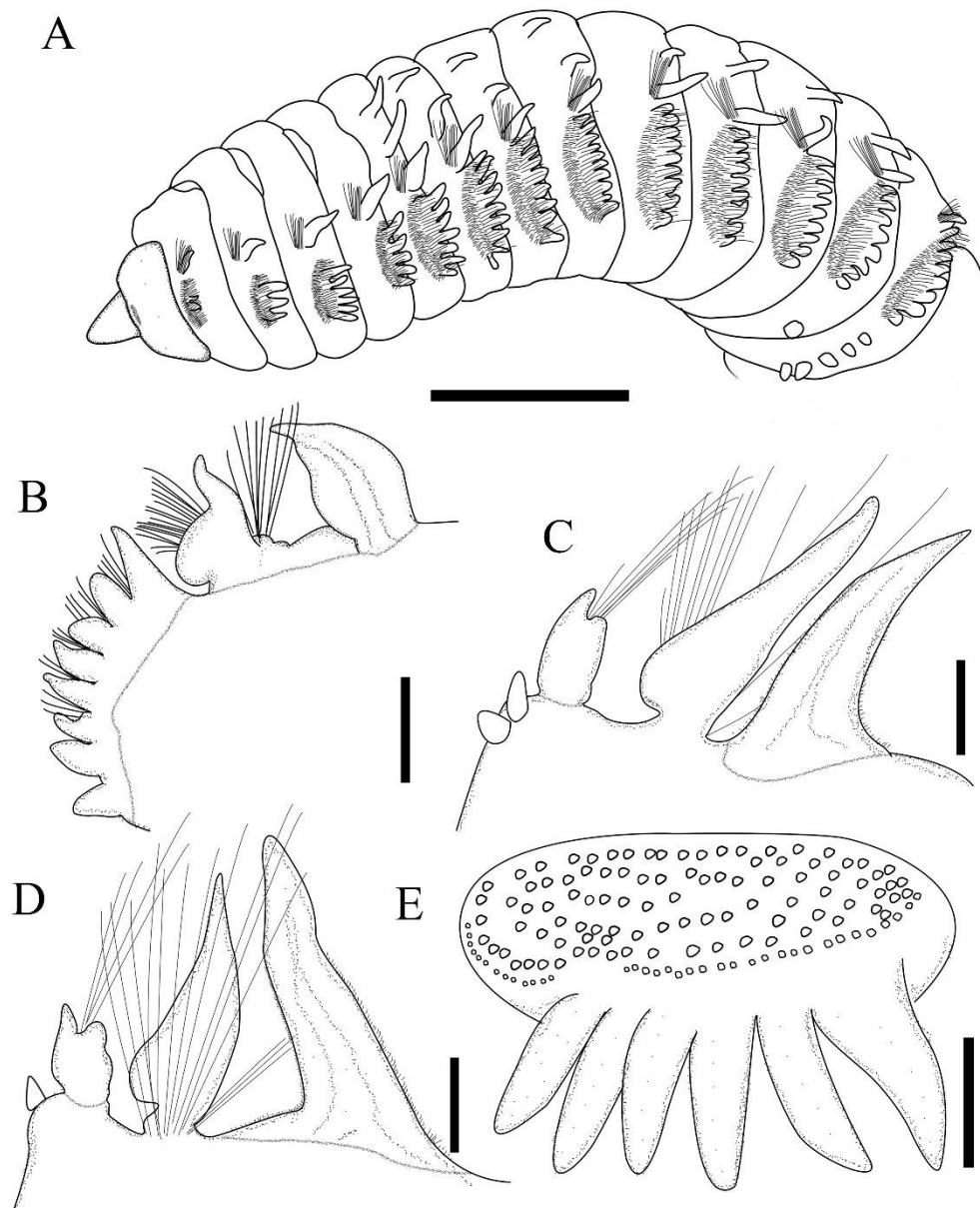


Fig. 3

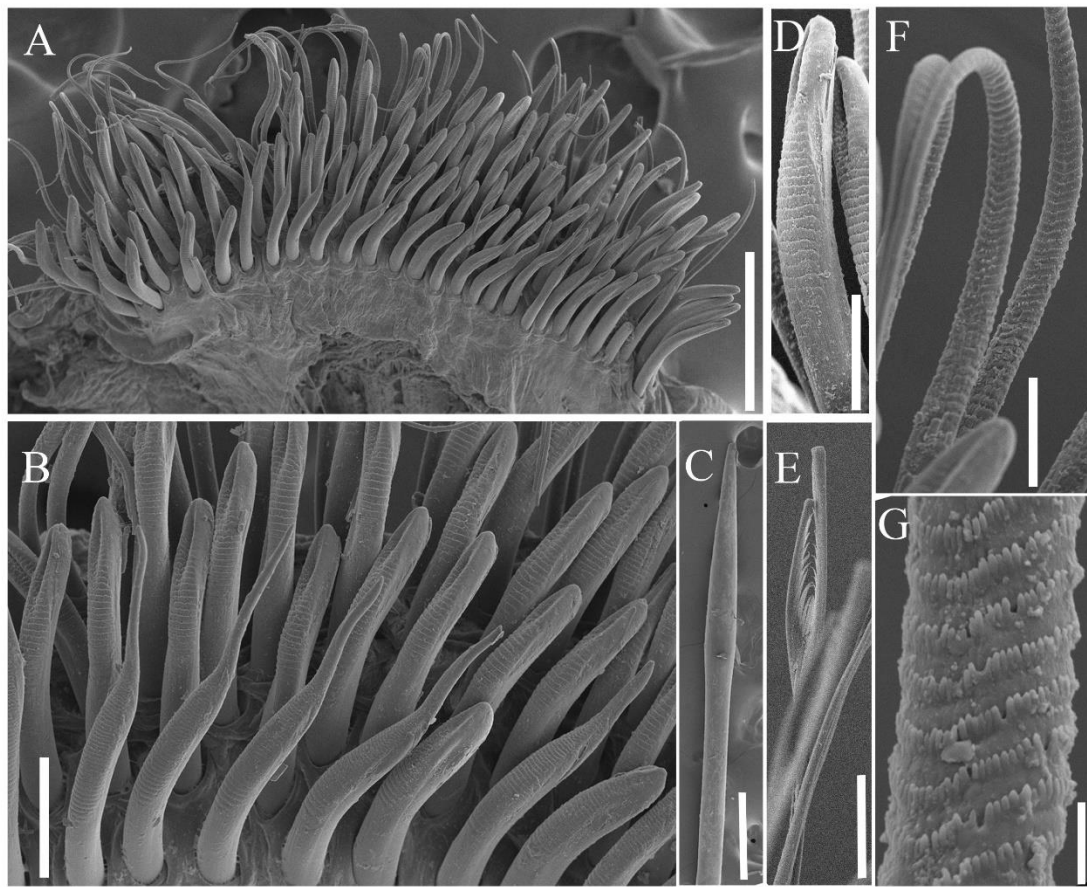


Fig. 4

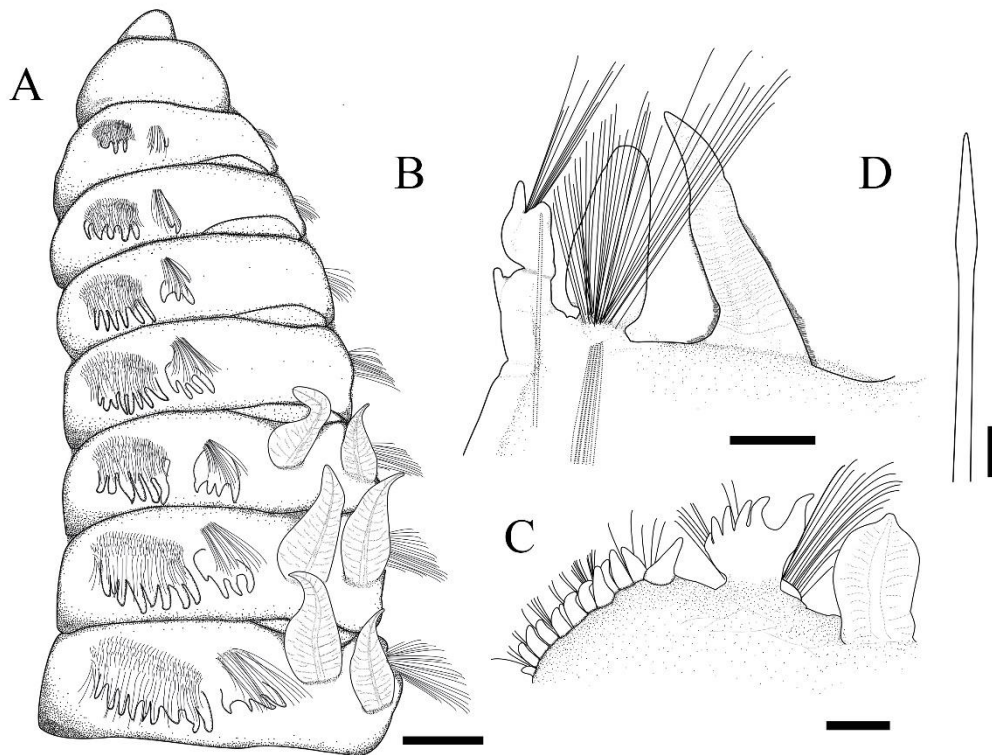




Fig. 5

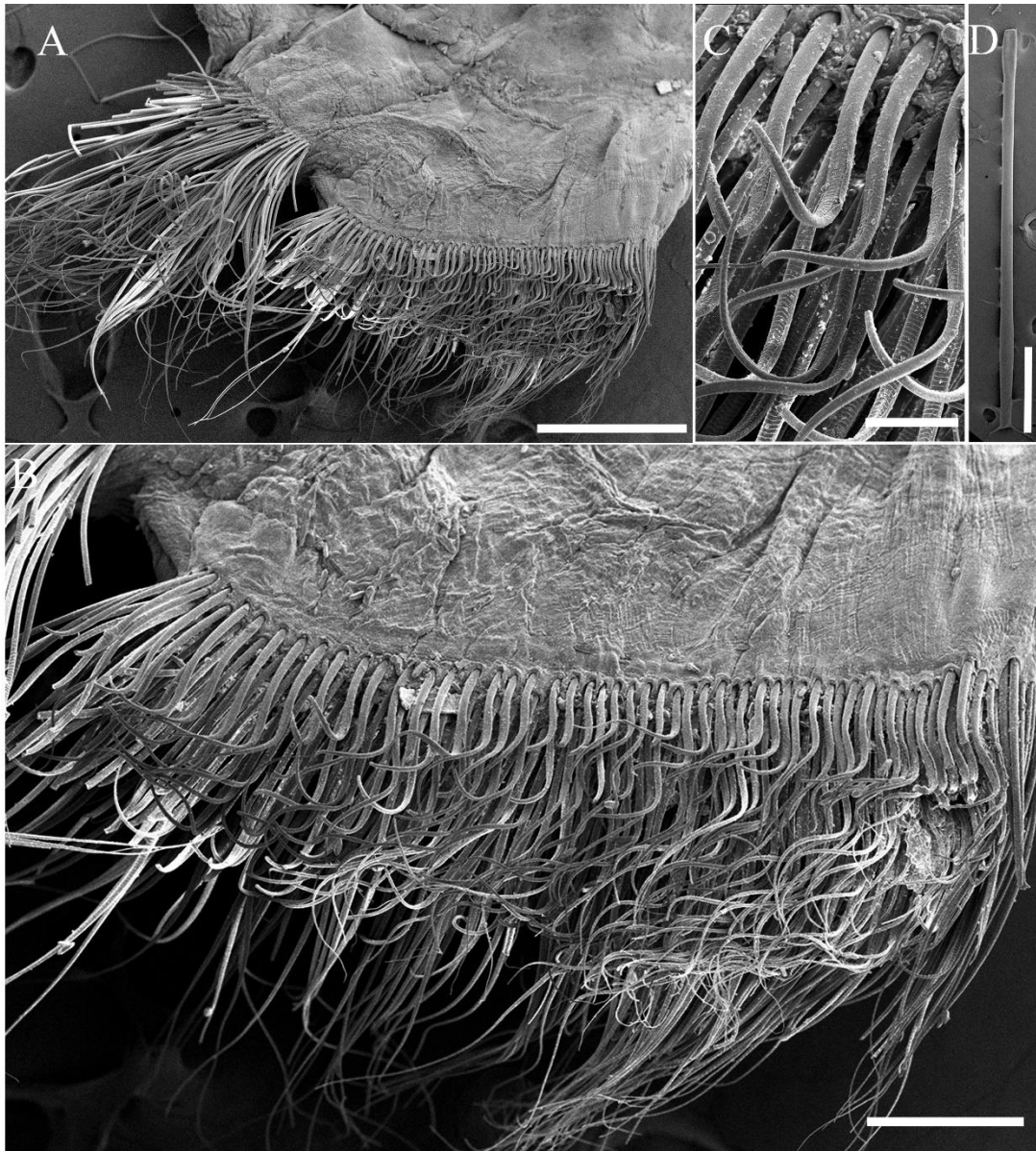


Fig. 6

