*RAFFLES BULLETIN OF ZOOLOGY* **62**: 490–495
Date of publication: 4 July 2014
http://zoobank.org/urn:lsid:zoobank.org:pub:7D042598-2C67-4035-A1A0-86EF4E6D9AA5

# A new species of *Scolelepis* (Polychaeta: Spionidae) from Chinese seas

Jin Zhou

**Abstract.** A new species of *Scolelepis* (Polychaeta: Spionidae), *S.* (*S.*) *angulata,* new species, is described based on material collected from intertidal flats and subtidal waters in the South China Sea and the Yellow Sea, China. *Scolelepis* (*S.*) *angulata*, new species, is characterised by having a prostomium with short lateral angles, notochaetae on setiger 1, and bidentate hooded hooks. This species inhabits intertidal zones and shallow subtidal waters characterised by sandy mud.

**Key words.** *Scolelepis*, new species, taxonomy, Chinese seas

## INTRODUCTION

Members of the genus *Scolelepis* (Polychaeta: Spionidae) are characterised by having a pointed prostomium and branchiae occurring from setiger 2 that are fused with postchaetal lamellae. Previous regional taxonomic studies on *Scolelepis* have revealed that this group exhibits relative high species diversity (e.g., Okuda, 1935; Pettibone, 1963; Imajima & Hartman, 1964; Foster, 1971; Blake & Kudenov, 1978; Maciolek, 1987; Imajima, 1959, 1992; Blake, 1996; Eibye-Jacobsen, 1997; Eibye-Jacobsen & Soares, 2000; Delgado-Blas, 2006; Williams, 2007; Zhou et al., 2009; Delgado-Blas et al., 2010; Rocha & de Paiva, 2012).

In China, despite the fact that *Scolelepis* is a rarely encountered spionid group in most coastal waters, it represents one of the more thoroughly studied genera. Wu & Chen (1964) described a new species, *S.* (*S.*) *globosa*, based on material from the intertidal zone around Zhoushan archipelago in the East China Sea. Yang & Sun (1988) reported *S.* (*S.*) *squamata* (Müller, 1806) from the intertidal zone of Yellow Sea, China. Wu et al. (1990) recorded *S.* (*S.*) *lefebvrei* (Gravier, 1905) in the Daya Bay, South China Sea. Paxton & Chou (2000) recorded two species of this genus (*Scolelepis* ? *indica* and *Scolelepis* sp., respectively) in a faunal report of polychaetes from the South China Sea. More recently, Zhou et al. (2009) reported a total of five *Scolelepis* species from Chinese seas based on material collected during the past several decades and deposited in the Marine Biological Museum, Chinese Academy of Sciences (MBMCAS). Zhou et al. (2009) presented a key to the five species considered present in Chinese waters at that time: *S.* (*S.*) *daphoinos* Zhou et al., 2009, which had formerly been identified as *S.* (*S.*) *squamata* (Müller, 1806), *S.* (*S.*) *globosa* Wu & Chen, 1964, *S.* (*S.*) *lefebvrei* (Gravier, 1905), *S.* (*S.*) *lingulata* Imajima, 1992, and *S.* (*S.*) *variegata* Imajima, 1992.

In recent years, we carried out intensive samplings for macrobenthos from tidal flats and shallow subtidal waters along the coastline of Chinese seas and a considerable number of polychaete specimens were collected by the East China Sea Fishery Research Institute (ECSFRI), Chinese Academy of Fishery Sciences. From these materials, we found a new species of the genus *Scolelepis* from the South China Sea and the Yellow Sea, China, which is herein described.

## MATERIAL AND METHODS

Material examined in this study was collected from two small areas in the tidal flats and shallow subtidal waters of the Yellow Sea, China and the South China Sea, respectively (Fig. 1). Sediments of both sampling areas were composed mainly of sandy mud, part of which were covered by an invasive sea grass *Spartina alterniflora* (Fig. 2).

Sediments were obtained by hand using a quantitative frame (area of 0.0625 $m^2$ and depth of 30 cm) as a guide. The sediment obtained was then sieved using fine mesh sieves, the smallest mesh size being 0.5 mm. All material was initially fixed in formalin/seawater, later washed with fresh water, and preserved in 75% alcohol.

Type and non–type material have been deposited in ECSFRI, Chinese Academy of Fishery Sciences. Morphology was examined using light microscopy and scanning electron microscopy (SEM). Drawings were made using a camera lucida attachment on an Olympus SZX 16 zoom microscope or Olympus BX 43 compound microscope. The resulting images were processed using Adobe Photoshop. Specimens are herein recorded as complete (c), anterior fragments (af), posterior fragments (pf) or fragments (f). Measurements were undertaken using the affiliated software (Leica application suite, Version 3.8.0) of a Leica M205 FA compound microscope.

East China Sea Fisheries Research Institute, Chinese Academy of Fishery Sciences, Shanghai 200090, P. R. China. Email: zhouj@ecsf.ac.cn


ISSN 2345-7600 (electronic) | ISSN 0217-2445 (print)

## TAXONOMY

### Family Spionidae Grube, 1850

### Genus *Scolelepis* De Blainville, 1828

### *Scolelepis* (*S.*) *angulata*, new species
(Figs. 3–4)

**Type material.** Holotype: ECSFRI 100196 (1 c), 32°59.469'N, 120°53.014' E, 9 May 2012, coll. Jin Zhou. Paratypes: ECSFRI 100125 (1 af), 32°59.236' N, 120°53.656' E, 8 November 2011, coll. Jin Zhou; ECSFRI 100126 (1 af), 32°57.004' N, 120°53.021' E, 4 November 2011, coll. Jin Zhou; ECSFRI 100127 (1 af+3 f), 32°39.251' N, 120°32.046' E, 16 November 2011, coll. Jin Zhou; ECSFRI 100146 (2 af+2 f), 32°56.642' N, 120°53.617' E, 24 May 2012, coll. Zengling Ma; ECSFRI 100149 (1 af), 32°58.405' N, 120°53.756' E, 22 May 2012, coll. Zengling Ma; ECSFRI 100151 (1 af+12 f), 32°57.988' N, 120°55.228' E, 22 May 2012, coll. Zengling Ma; ECSFRI 100158 (1 af+3 f), 32°38.037' N, 120°58.112' E, 27 May 2012, coll. Yuange Chen; ECSFRI 100169 (1 af+1 pf), 32°38.758' N, 120°31.232' E, 27 May 2012, coll. Yuange Chen; ECSFRI 100131 (1 f), 32°56.588' N, 120°53.672' E, 25 May 2012, coll. Yuange Chen; ECSFRI 101029 (1 af), 32°38.108' N, 121°04.539' E, 7 August 2012, coll. Jin Zhou; ECSFRI 101030 (1 af), 32°59.128' N, 120°53.076'E, 8 August 2012, coll. Jin Zhou; ECSFRI 101031 (1 af), 32°58.472' N, 120°53.169' E, 8 August 2012, coll. Jin Zhou; ECSFRI 101032 (1 af+2 f), 32°57.964' N, 120°56.004' E, 8 August 2012, coll. Jin Zhou; ECSFRI 101033 (3 af+6 f+1 pf), 32°57.938' N, 120°55.242' E, 8 August 2012, coll. Jin Zhou; ECSFRI 101034 (1af), 32°57.966' N, 120°55.119' E, 8 August 2012, coll. Jin Zhou; ECSFRI 101041 (3 af+2 f), 32°37.232' N, 120°34.102' E, 14 October 2012, coll. Jin Zhou; ECSFRI 101042 (2 af), 32°37.698' N, 120°33.762' E, 14 October 2012, coll. Jin Zhou; ECSFRI 101069 (2 af), 20°01.128' N, 107°42.006' E, 4 March 2012, coll. Wei Tian; ECSFRI 101070 (3 af+4 f), 20°01.962' N, 107°42.539' E, 4 March 2012, coll. Wei Tian; ECSFRI 101071 (1 af), 20°04.576' N, 107°42.378' E, 7.5 m, sandy mud, 8 March 2012, coll. Wei Tian; ECSFRI 101093 (2 af+2 f), 20°01.389′ N, 107°42.908' E, 24 October 2012, coll. Wei Tian; ECSFRI 101096 (3 af), 20°03.567' N, 107°43.855' E, 26 October 2012, coll. Wei Tian; ECSFRI 102026 (2af), 32°56.117′ N, 120°55.605′ E, 14 October 2013, coll. Jin Zhou; ECSFRI 102027 (2af), 32°56.135' N, 120°55.680' E, 14 October 2013, coll. Jin Zhou; ECSFRI 102028 (4af), 32°58.002' N, 120°55.356' E, 14 October 2013, coll. Junxiang Liu.

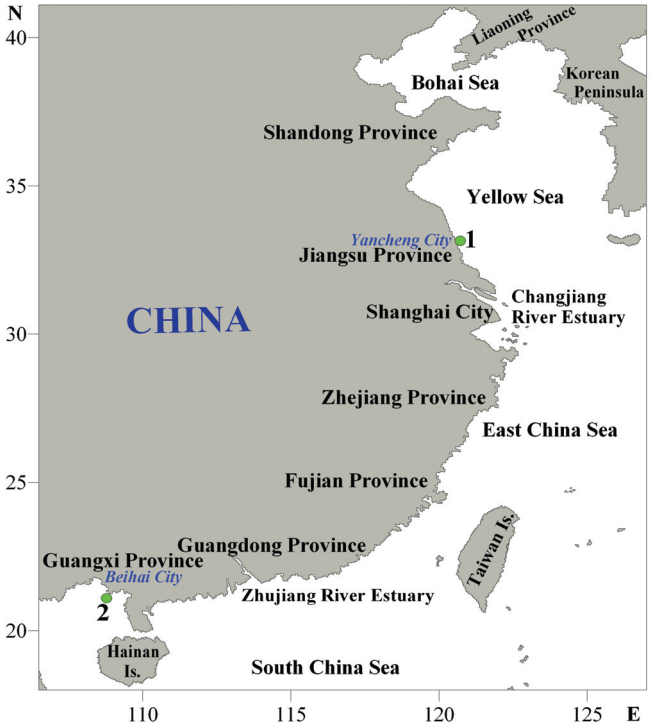


Fig. 1. Sampling sites of *SScolelepis* (*S.*) *angulata*, new species. 1, off the city of Yancheng, Yellow Sea, China; 2, off the city of Beihai, South China Sea. Is. = Island.

Fig. 2. Typical habitat of *Scolelepis* (*S.*) *angulata*, new species, in Chinese coastal waters.

**Description of holotype (ECSFRI 100196).** Specimen complete, 0.76 mm wide and 12.0 mm long for 74 setigers. Color in alcohol yellowish. Body wide anteriorly, tapering posteriorly. Prostomium anteriorly inflated, with distinct medial point. A horizontal gap present on prostomium (near anterior margin of setiger 1), leaving posterior caruncle as a triangular structure. Posterior caruncle dark coloured, compared to the anterior region of prostomium. Caruncle extending posteriorly to anterior margin of setiger 2. Occipital tentacle absent. Peristomium long, distinct from setiger 1, forming well-developed lateral wings (Fig. 3A, B). Proboscis not observed. Palps missing.

Parapodia of setiger 1 well developed, notopodial postchaetal lamellae triangular and neuropodial postchaetal lamellae rectangular, with capillary chaetae in both rami (Fig. 3D). Branchiae present from setiger 2, continuing posteriorly to setiger 46. Branchiae fused with notopodial postchaetal lamellae along about 80% of length; degree of fusion decreasing in posterior setigers. Notopodial postchaetal lamellae long, narrow in anterior setigers (Fig. 3E, F), becoming round in posterior setigers (Fig. 3G). Neuropodial postchaetal lamellae oval on setigers 2–3, rounded on following setigers; becoming low and round from around setiger 30 to posterior setigers. Notch present from setiger 29, dividing neuropodial lamellae into two lobes from setiger 34. On following setigers lamellae divided into square interramal lobe and small low, rounded ventral lobe (Fig. 3H). Neuropodial prechaetal lamellae thick and round, from setiger 2 to posterior setigers; smaller than corresponding neuropodial postchaetal lamellae.

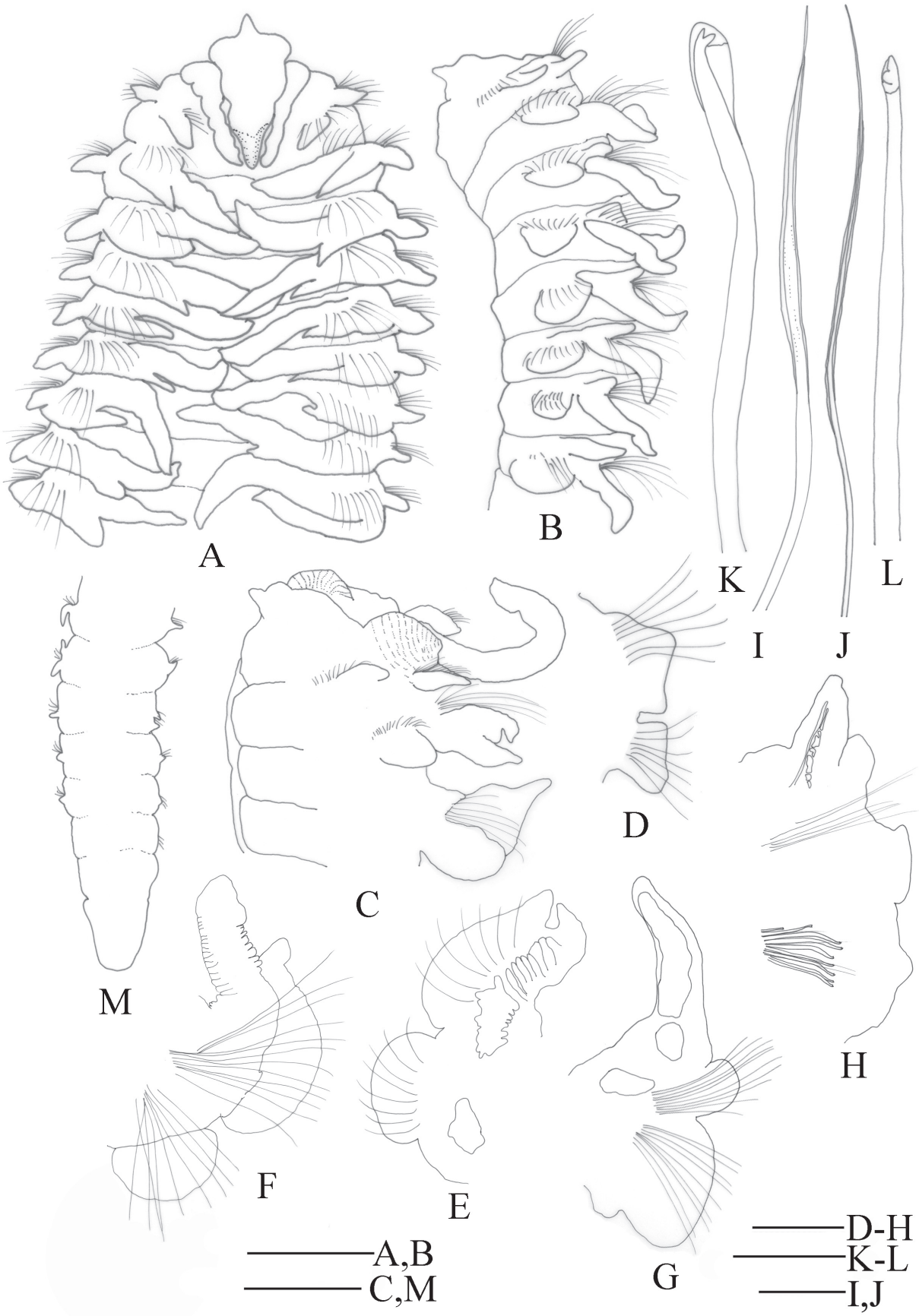


Fig. 3. *Scolelepis* (*S.*) *angulata*, new species, Paratype, ECSFRI 100196: A, anterior end, dorsal view; B, anterior end, lateral view; C, anterior end, lateral view; ECSFRI 100169: D, parapodia of setiger 1, anterior view; E, parapodia of setiger 2, anterior view; F, parapodia of setiger 3, anterior view; G, parapodia of setiger 4, anterior view; H, parapodia of setiger 49, anterior view; I, notopodial seta from anterior row of setiger 4; J, notopodial seta from posterior row of setiger 4; K, neuropodial hooded hook from setiger 48, lateral view; L, neuropodial hooded hook from setiger 48, anterior lateral view; M, pygidium, dorsal view. Scale bars: A, B = 600 μm; C, M = 120 μm; D–H = 250 μm; I, J: 60 μm; K, L = 100 μm.

All anterior chaetae sheathed capillaries, arranged in two rows on both rami; anterior row thick, granulated, with obvious sheaths, posterior row thin with narrow sheaths (Fig. 3I, J). Neuropodial hooded hooks from setiger 48, bidentate, with open hoods (Fig. 3K, L), 6–12 in a series, accompanied by capillaries. Notopodial hooded hooks absent.

Pygidium cushion-like, without lateral anal cirri (Fig. 3M).

**Variability.** Paratypes 6.7–12.9 mm long (mean length: 10.2±1.8, n=29) and 0.4–0.9 mm wide. Prostomium anteriorly inflated, with clear medial point in all examined materials (Fig. 4A). Part of proboscis observed in some paratypes (Fig. 3C). Palps observed in some paratypes, usually reaching no farther than setiger 3. Palps slender, with basal sheath, cilia not observed at bases of sheaths (Fig. 4B, C). Eyes absent. Branchiae fused with notopodial postchaetal lamellae along about 80% of length in anterior and middle regions of body (Fig. 4D). Number of branchiae 42–50. All specimens with neuropodial lamellae rounded on anterior setigers, developing notch around setigers 29–36 (Fig. 4E). Notch becoming deeper, dividing lamellae into separate lobes around setigers

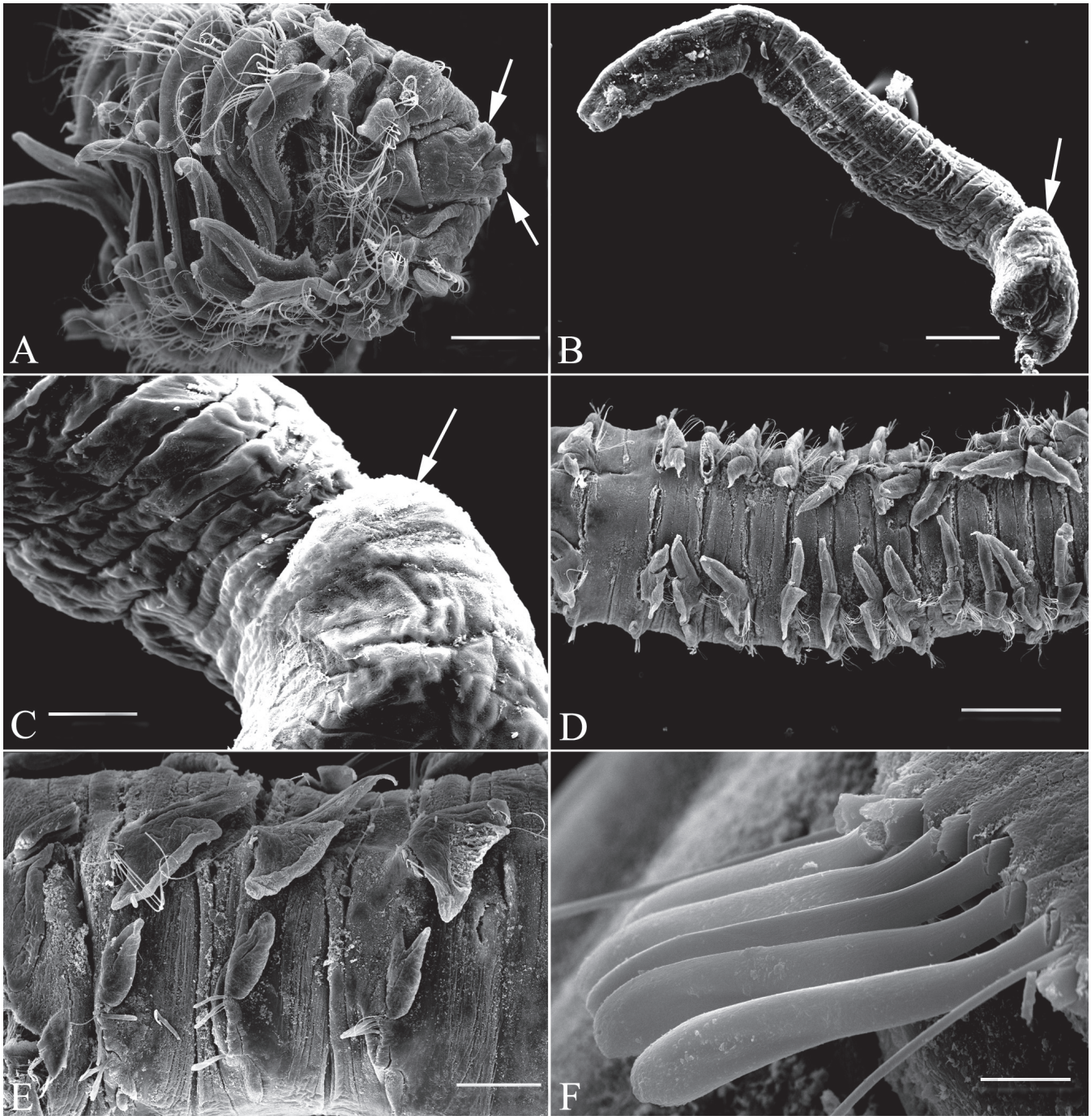


Fig. 4. *Scolelepis* (*S.*) *angulata*, new species. A, anterior end, dorsal view (Paratype, ECSFRI 100126), arrow indicates short lateral angles; B, overall view of palp, ventral-lateral view, arrow indicates sheath of palp (Paratype, ECSFRI 102026); C, basal part of palp, ventral-lateral view (Paratype, ECSFRI 102026); D, branchiae in middle region of body, dorsal view, arrow indicates sheath of palp (Paratype, ECSFRI 100126); E, parapodia of setigers 45–47, lateral view (Paratype, ECSFRI 100126); F, hooded hooks of setiger 55, lateral view (Paratype, ECSFRI 100126). Scale bars: A = 200 μm; B, =150μm; C = 15 μm; D = 800 μm; E = 400 μm; F = 15 μm.

35–38. Neuropodial hooded hooks present from setigers 32–48, numbering 5–14 in a series (Fig. 4F). Notopodial hooded hooks absent in all type specimens. All specimens have only bidentate hooded hooks.

**Etymology.** From the Latin word *angulus*, referring to the prostomium with short lateral angles.

**Remarks.** *Scolelepis* (*S.*) *angulata*, new species, differs from its allied species in the presence of short lateral angles of prostomium, notochaetae on setiger 1, and bidentate hooded hooks. In the genus *Scolelepis*, only *S.* (*S.*) *occipitalis* Blake & Kudenov, 1978 is known to have a similar kind of prostomium. However, the new species differs from the latter species by lacking the posteriorly flattened, irregularly shaped occipital process, by having notochaetae on setiger 1, and the presence of bidentate hooded hooks rather than quadridentate hooded hooks. Neuropodial hooded hooks begin to occur from setigers 32–48.

Williams (2007) suggested that palp ciliation patterns, which can be classified into four morphological types, are of taxonomic importance within this genus. To date, a total of nine *Scolelepis* species were described with taxonomic information of palp ciliation patterns using SEM observations. Cilia are commonly located on the ventral surface from the middle part of the palp to the sheath. However, cilia were not found in *Scolelepis* (*S.*) *angulata*, new species, in this study, suggesting that not all *Scolelepis* species have cilia on the surface of the palps or that palp ciliation patterns in this new species need to be re-evaluated. The overall morphology of the palp of the new species also differs from the four *Scolelepis* species recorded in Williams (2007), the muscles of the palp in the new species were generally in horizontal arrangement (Fig. 4B, C) while those in the latter were longitudinally aligned.

*Scolelepis* (*S.*) *angulata*, new species, was found in the South China Sea and the Yellow Sea, China and therefore could be considered as a subtropical or warm temperate species. However, it was not found in the tidal flats or shallow subtidal waters in the East China Sea (located between the South China Sea and the Yellow Sea, China). This was probably due to the critical selection of sediment types by this species. The new species inhabits intertidal zones and shallow subtidal waters characterised by sandy mud (approximate mean grain size: 0.4 mm), while most sediments in the East China Sea were mud (most of intertidal flats in the Zhejiang Province) or coarse sand (most of intertidal flats in the southern Fujian Province).

**Distribution.** Intertidal flats and shallow subtidal waters in the South China Sea and the Yellow Sea, China on sandy mud bottoms.

## ACKNOWLEDGEMENTS

This study was funded by the grants from the National Natural Science Foundation (NO. 40906084), the Special Research Fund for the National Non-profit Institute (East China Sea Fisheries Research Institute, 2013M07) and the Key Laboratory of Marine Bio-resources Sustainable Utilization (LMB) South China Sea Institute of Oceanology, Chinese Academy of Sciences (LMB111007). We are grateful to Nancy J. Maciolek and Victor Hugo Delgado-Blas for their critical revisions and valuable comments of the manuscript and to Jason D. Williams for providing useful information on the observation of ciliary pattern of palps of this new species. We thank Jixing Sui and Xuwen Wu for their help during the SEM observation. Thanks are also due to Zengling Ma, Yuange Chen, Wei Tian, Tao Chen and Junxiang Liu for help in the collection of samples.

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