

Two New Records of Spionid Polychaetes (Polychaeta: Spionidae) in Korean Fauna

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ABSTRACT

Two new records of spionid polychaetes, *Prionospio pulchra* Imajima, 1990 and *Scoelepis (Scoelepis) sagittaria* Imajima, 1992, collected from Korean waters are reported here with detailed descriptions and illustrations. *Prionospio pulchra* can be distinguished from its relatives by remarkably long and apinnate branchiae, the first chaetiger with notopodial chaetae, and the presence of ventral sabre chaetae. *Scoelepis (Scoelepis) sagittaria* is characterized by a sagittate prostomium, an occipital tentacle, and bi- or tridentate hooded hooks. In this paper, photographs of scanning electron microscopy for characteristic features of each species are presented. Keys to *Prionospio* and *Scoelepis* species from Korean waters are also provided.

Keywords: Polychaeta, Spionidae, *Prionospio*, *Scoelepis*, taxonomy, Korea

INTRODUCTION

The family Spionidae Grube, 1850 is one of the largest taxa of polychaetous annelids commonly found in intertidal or subtidal zone (Blake and Kudenov, 1978; Meißner and Götting, 2015). They have generally elongate body with a pair of palps on anterior end and dorsal branchiae separated or fused to the postchaetal lamellae in various degrees (Fauchoald, 1977; Blake, 1996). Currently, this family has more than 40 genera (Meißner et al., 2014).

Among them, *Prionospio* Malmgren, 1867 is a large genus of spionids containing 113 species recorded (Paterson et al., 2016). Members of this genus are characterized by various forms of branchiae that begin from the second chaetiger and only present at the anterior region of the body (Blake and Kudenov, 1978; Wilson, 1990). Despite species abundance of this genus, only six species (*P. multibranchiata* Berkeley, 1927; *P. krusadensis* Fauvel, 1929; *P. japonicus* Okuda, 1935; *P. saccifera* Mackie and Hartley, 1990; *P. membranacea* Imajima, 1990; and *P. paradisea* Imajima, 1990) have been recorded from Korean waters (Paik, 1989; Jung et al., 1998; Yokoyama and Choi, 2010).

The genus *Scoelepis* Blainville, 1828 is also a widespread group with 86 species recorded (Rocha and Paiva, 2012;

Sikorski and Pavlova, 2015). This genus is taxonomically defined by a distally pointed prostomium, the branchiae beginning from the second chaetiger, and a cushion-like pygidium without cirri (Zhou et al., 2009; Surugiu, 2016). In Korean waters, taxonomic knowledge on *Scoelepis* species is insufficient. Only two species, *Scoelepis (Parascoelepis) yamaguchii* Imajima (1959) and *Scoelepis (Scoelepis) kudenovi* Hartmann-Schröder, 1981, were reported in this region (Paik, 1982, 1989; Choi and Yoon, 2016).

In this study, two spionid polychaetes, *Prionospio pulchra* Imajima, 1990 and *Scoelepis (Scoelepis) sagittaria* Imajima, 1992, are newly recorded from Korean waters. We provided their detailed descriptions and illustrations. We also provided keys to *Scoelepis* and *Prionospio* species from Korean waters.

MATERIALS AND METHODS

Samples were collected from sandy mud habitats of intertidal or subtidal zone in Korean waters. Specimens were extracted using sieves with pore size of 500 µm. After extraction, they were initially fixed with 5% formaldehyde-seawater solution and then transferred to 85% ethanol. Characteristics of these

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specimens were observed with appendages dissected in a petri dish using dissection forceps, surgical knives, and needles under stereomicroscope (SMZ1500; Olympus, Tokyo, Japan). Dissected specimens were mounted onto temporary slides using glycerol or permanent slides using polyvinyl lactophenol solution. Drawings were made with a stereomicroscope and light microscope (LABOPHOT-2; Nikon, Tokyo, Japan) with aids of drawing tubes. Specimens for scanning electron microscopy (SEM) were dehydrated with a t-BuOH freeze dryer (VFD-21S; Vacuum Device, Ibaraki, Japan). They were mounted on stubs and coated with gold-palladium. Observations were conducted using a scanning electron microscope (SU3500; Hitachi, Tokyo, Japan). These examined materials are deposited at Chosun University and the National Institute of Biological Resources (NIBR) in Korea.

SYSTEMATIC ACCOUNTS

Order Spinoida Grube, 1850

Family Spionidae Grube, 1850

Genus *Prionospio* Malmgren, 1867

**Prionospio pulchra* Imajima, 1990 (Figs. 1, 3A–C)

Prionospio (Minuspio) pulchra Imajima, 1990: 68, figs. 6–7.
Prionospio pulchra: Moreira et al., 2000: 233, figs. 2–4.

Material examined. Korea: 12 specimens, Gyeongsangnam-do: Namhae-gun, Changseon-myeon, Danghang-ri (128°0'54"E, 34°53'58"N), 31 Jul 2014; 3 specimens, Tongyeong-si, Yongnam-myeon, Samhwa-ri (128°26'8"E, 34°53'18"N), 20 Oct 2017; 3 specimens, Goseong-gun, Goseong-eup, Sinwol-ri (128°20'13"E, 34°56'49"N), 20 Oct 2017. All specimens incomplete and collected from sandy mud of subtidal zones.

Description. Body slender, about 10 mm in length and about 0.2 mm in width. Colorless in alcohol.

Prostomium subtriangular with 5 marginal peaks, rounded anteriorly, and tapering posteriorly. Eyes 2 pair, bar or crescent shape; posterior pair larger than anterior pair. Caruncle reaching to base of chaetiger 1. Peristomium separated from prostomium, but fused to chaetiger 1, with well-developed lateral wings (Fig. 1A, B).

Branchiae apinnate and slender, remarkably long, and about 10 pairs beginning from chaetiger 2; longest pairs on chaetiger 2–5 (Figs. 1B–D, 3A).

First chaetiger with neuropodial lamellae but without notopodial postchaetal lamellae; neuropodial lamellae distinctly small (Fig. 1C).

Notopodial lamellae separated from branchiae, subtriangular on anterior chaetigers (except chaetiger 1), and becoming rudimentary on posterior chaetigers. Neuropodial postchaetal lamellae smaller than notopodial lamellae, rounded on anterior chaetigers, and becoming rudimentary on posterior chaetigers (Fig. 1C–E).

Anterior chaetigers with capillaries only, arranged in 3 longitudinal rows. Hooded hooks with 3 pairs of small teeth above main fang; notopodial hooded hooks beginning from posterior chaetigers 28–30 and up to 3 per fascicle; neuropodial hooded hooks beginning from chaetiger 14 and up to 7 per fascicle. Ventral sabre chaetae beginning from chaetiger 11 (Figs. 1F–H, 3B, C).

Remarks. The specimens examined in the present study agree well with the original description of *Prionospio pulchra* Imajima, 1990 based on the following features: (1) presence of remarkably long and apinnate branchiae; (2) having notopodial chaetae at the first chaetiger; (3) presence of ventral sabre chaetae from chaetiger 11 (Imajima, 1990).

Wilson (1990) originally described *Prionospio tatura* Wilson, 1990 from Australian waters. This species shows remarkably long and apinnate branchiae. The first chaetiger has notopodial chaetae and the ventral sabre chaetae begin from chaetigers 9–12, which are significant features of *P. pulchra* (Imajima, 1990; Wilson, 1990). However, *P. pulchra* clearly differs from Australian species in morphological features of the branchiae and hooded hooks: the longest pairs of branchiae are present on chaetigers 2–5 (vs. on chaetiger 2 only in *P. tatura*); three pairs of small teeth above main fang of hooded hooks (vs. four pairs in *P. tatura*) (Imajima, 1990; Wilson, 1990).

In Korean waters, *P. pulchra* resembles *P. multibranchiata* Berkeley, 1927 in having about ten pairs of branchiae (Imajima, 1990; Jung et al., 1998). However, these two species clearly differ from each other in the development of branchiae: the longest pair extend over 6–8 segments in *P. pulchra* vs. 2–3 segments in *P. multibranchiata* (Imajima, 1990; Parapar et al., 1995; Jung et al., 1998).

Habitat. Japanese materials were collected from the intertidal zone to 67 m depth. In Korean waters, materials were collected from the intertidal zone.

Distribution. Australia, Japan, Korea, Spain.

Key to the species of the genus *Prionospio* from Korea

1. Branchiae apinnate only 2
- Branchiae either pinnate or both apinnate and pinnate 4
2. Branchiae 4 pairs *P. japonicus*
- Branchiae more than 4 pairs 3
3. Branchiae longest pair extend over 2–3 segments

Korean name: *긴아가미예쁜얼굴갯지렁이 (신칭)

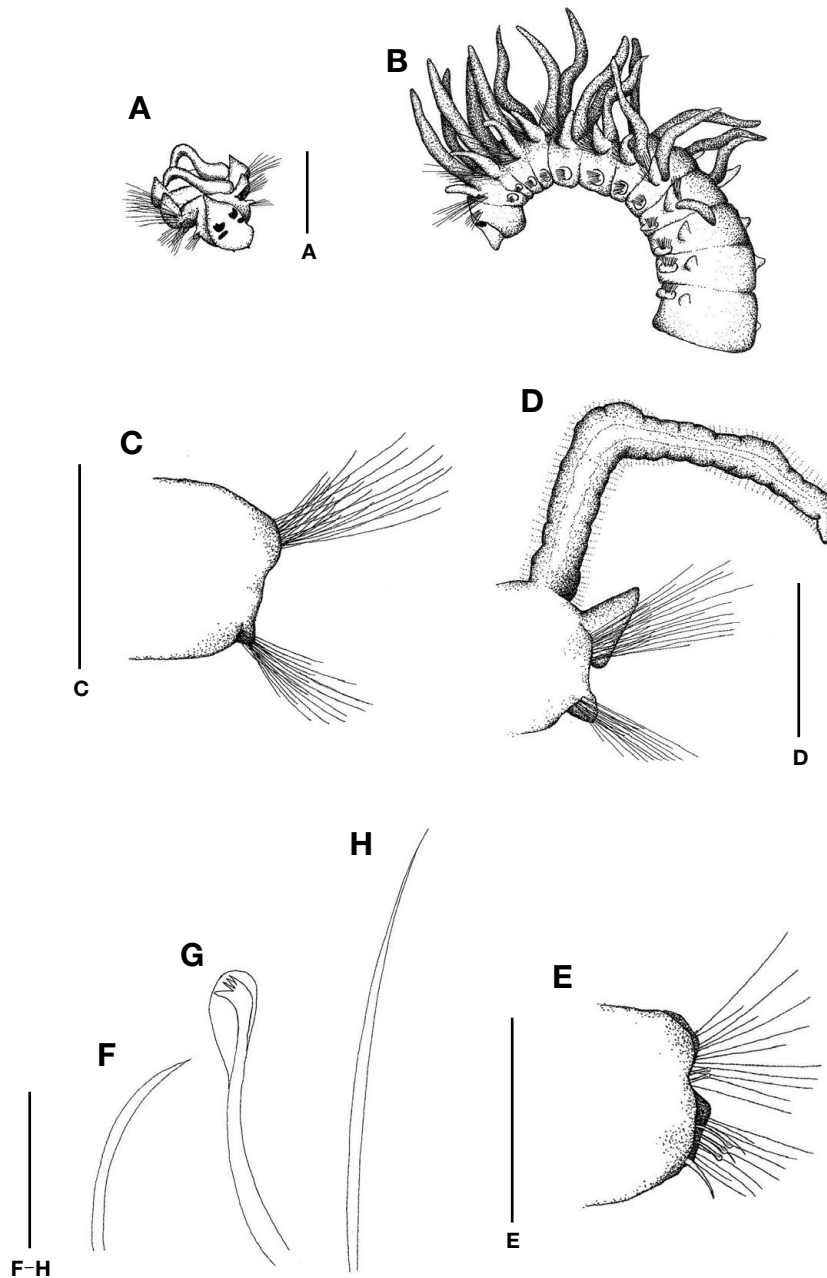


Fig. 1. *Prionospio pulchra* Imajima, 1990. A, Dorsal view of prostomium and three chaetigers; B, Lateral view of anterior end; C, Anterior view of chaetiger 1; D, Anterior view of chaetiger 2; E, Anterior view of posterior chaetiger; F, Ventral sabre chaeta; G, Lateral view of neuropodial hooded hook; H, Notopodial capillary chaeta. Scale bars: A=0.5 mm, B=1.0 mm, C-E=0.3 mm, F-H=0.03 mm.

- | | | |
|---------------------------------------------------------|----------------------------------------------------------|---------------------|
| <i>P. multibranchiata</i> | – Both first and fourth pairs of branchiae pinnate | 6 |
| – Branchiae longest pair extend over 6–8 segments | 6. Caruncle extending to base of chaetiger 1 | |
| <i>P. pulchra</i> | <i>P. membranacea</i> | |
| 4. Branchiae pinnate only | – Caruncle extending to base of chaetiger 2 | <i>P. paradisea</i> |
| – Branchiae both apinnate and pinnate | | |
| 5. Only first pair of branchiae pinnate | | |
| <i>P. saccifera</i> | | |

Genus *Scoletepis* Blainville, 1828

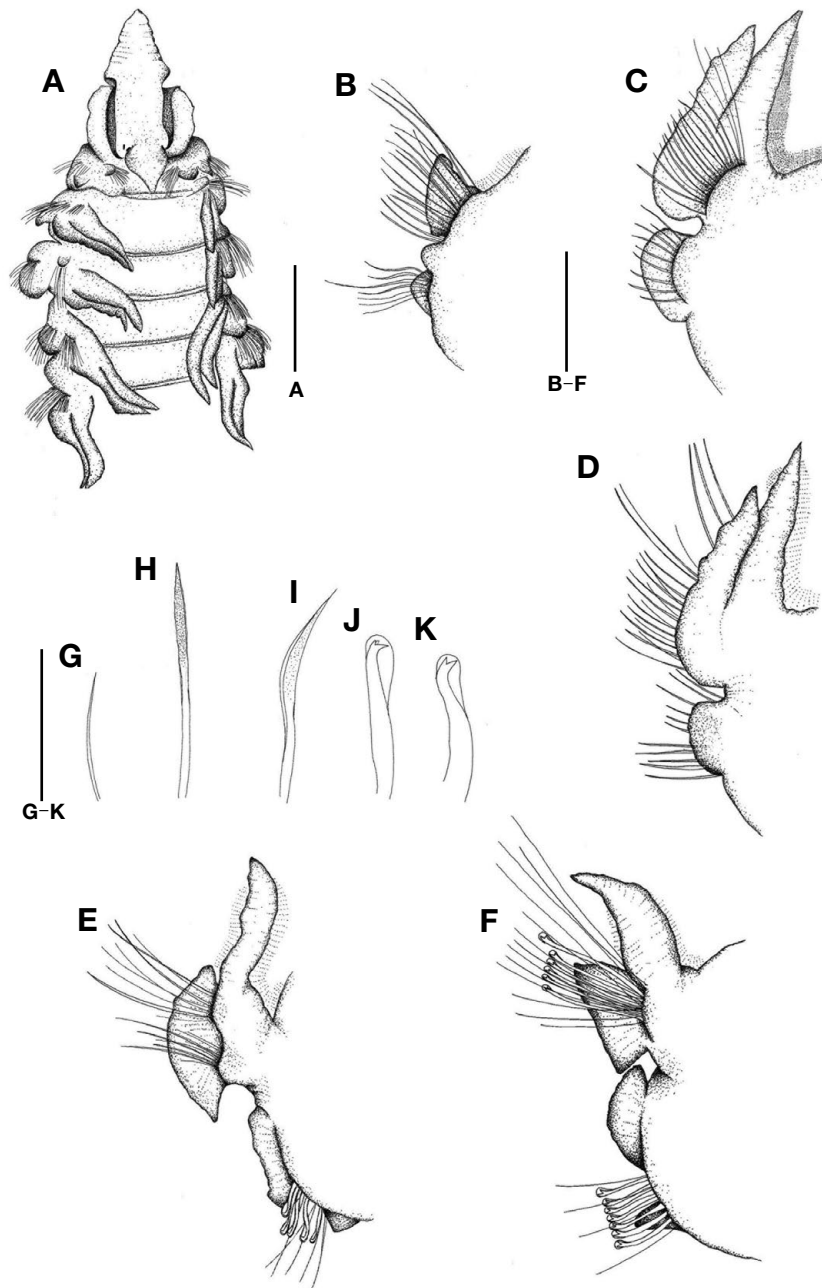


Fig. 2. *Scoelepis (Scoelepis) sagittaria* Imajima, 1992. A, Anterior dorsal view; B, Anterior view of first chaetiger; C, Anterior view of chaetiger 2; D, Posterior view of chaetiger 2; E, Anterior view of chaetiger 40; F, Anterior view of posterior chaetiger; G, Notopodial chaeta in anterior row of posterior chaetiger; H, Notopodial chaeta in posterior row of posterior chaetiger; I, Neuropodial limbate chaeta in posterior row of chaetiger 5; J, Notopodial hooded hook in posterior chaetiger; K, Neuropodial hooded hook in posterior chaetiger 40. Scale bars: A=1.0 mm, B-F=0.3 mm, G-K=0.02 mm.

****Scoelepis (Scoelepis) sagittaria* Imajima, 1992**

(Figs. 2, 3D-F)

Scoelepis (Scoelepis) sagittaria Imajima, 1992: 13, figs. 8-10.

Material examined. Korea: 30 specimens, Jeollanam-do: Yeosu-si, Samsan-myeon, Deokchon-ri (127°18'16"E, 34°1'11"N), 27 May 2017; 2 specimens, Wando-gun, Cheongsan-myeon, Dongchon-ri, (127°18'27"E, 34°1'21"N), 27 Jun

Korean name: *화살촉뿔적얼굴갯지렁이 (신칭)

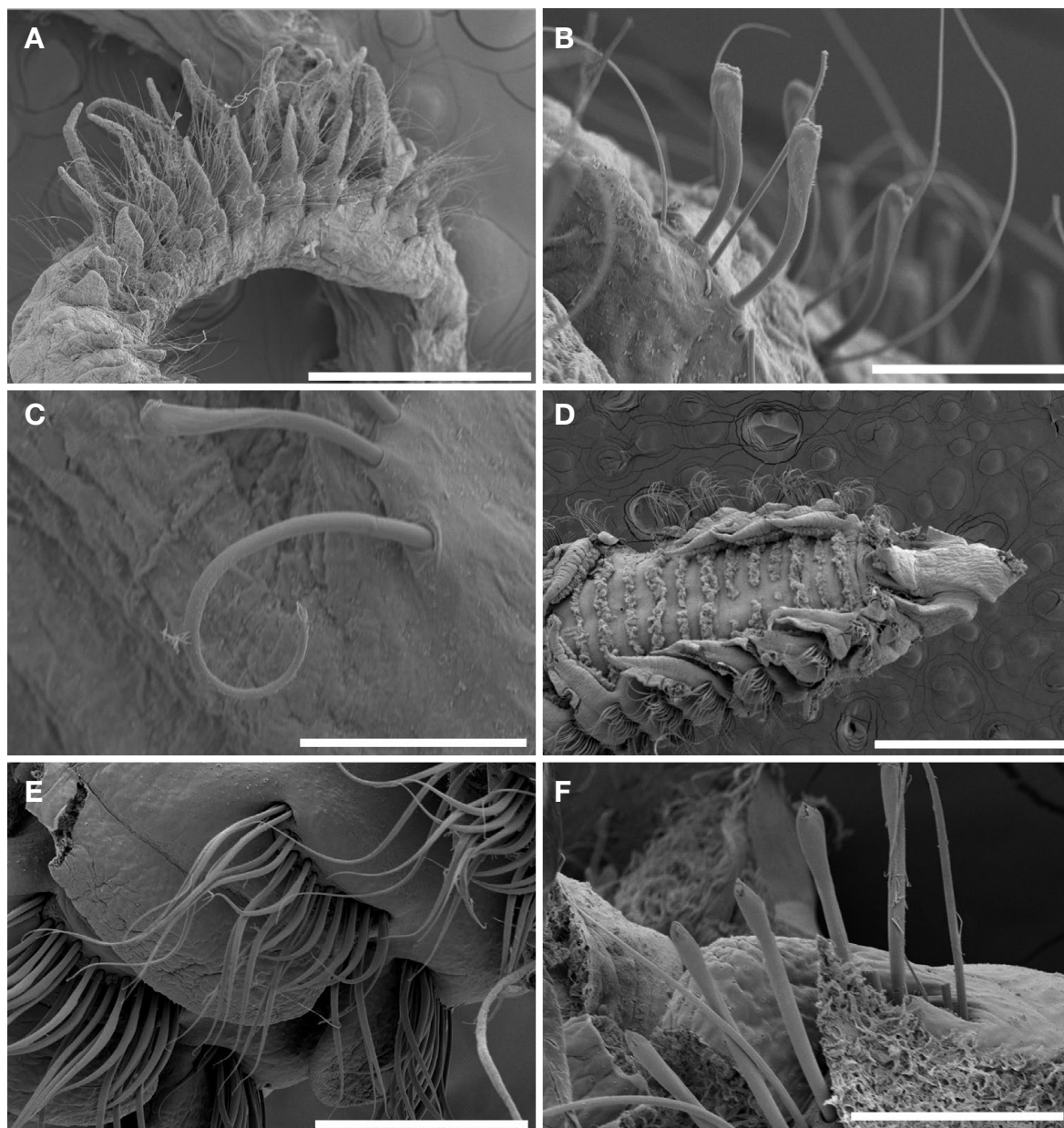


Fig. 3. Scanning electron microscopy photographs of *Prionospio pulchra*. A, Lateral view of anterior end; B, Lateral view of neuropodial hooded hooks; C, Ventral sabre chaeta. *Scolelepis (Scolelepis) sagittaria*. D, Anterior dorsal view; E, Capillary chaetae; F, Neuropodial hooded hooks. Scale bars: A=0.4 mm, B, C=0.3 mm, D=1.0 mm, E=0.2 mm, F=0.1 mm.

2017. All specimens incomplete and collected from sandy mud of subtidal zones.

Description. Body flattened, about 10.0 mm in length and about 1.0 mm in width.

Prostomium sagittate, elongate, and pointed anteriorly; eyes 2 pairs, present on posterior region. Occipital tentacle present. Peristomium separated from prostomium and forming lateral wings (Fig. 2A).

Branchiae elongate and tapered into pointed tip with pig-

mented glands, beginning from chaetiger 2 to posterior end; branchiae longer than notopodial lamellae (Figs. 2C, D, 3D).

First chaetiger reduced, without branchiae (Fig. 2B).

Notopodial lamellae elongated and almost fused to branchiae on anterior chaetigers; tips of lamellae separated from branchiae. Notopodial lamellae basally fused to branchiae on posterior chaetigers. Neuropodial lamellae divided into interrampal lamellae and ventral lamellae on posterior chaetigers; interrampal lamellae flattened and ventral neuropodial

lamellae conical (Fig. 2C–F).

Anterior chaetigers with broadly limbate and heavily granulated capillaries, arranged in 2 rows. Neuropodial hooded hooks bi- or tridentate, beginning from chaetiger 32, and up to 10 per fascicle. Notopodial hooded hooks tridentate with 2 small apical teeth, present on posterior chaetigers, and up to 6 per fascicle (Figs. 2G–K, 3E, F).

Remarks. Imajima (1992) originally described *Scoelelepis* (*Scoelelepis*) *sagittaria* Imajima, 1992 from Japanese waters based on the following features: (1) having sagittate prostomium; (2) presence of occipital tentacle; (3) having notopodial chaetae at the first chaetiger; (4) having branchiae partially fused to the notopodial lamellae; (5) presence of tridentate notopodial hooded hooks and presence of bi- or tridentate neuropodial hooded hooks. In this respect, Korean materials of *Scoelelepis* agree well with the original description of *S. (S.) sagittaria* (Imajima, 1992). However, the Korean materials of *S. (S.) sagittaria* have a minor difference from the Japanese materials in the number of notopodial hooded hooks as follows: the notopodial hooded hooks are up to six per fascicle in Korean materials vs. up to four per fascicle in Japanese materials (Imajima, 1992).

In Korean waters, *S. (S.) sagittaria* resembles *S. (S.) kudenovi* in having the notopodial chaetae on the first chaetiger and the branchiae almost fused to the notopodial lamellae on the anterior chaetigers. However, the former is easily distinguishable from the latter by the sagittate prostomium (vs. conical in *S. (S.) kudenovi*), the presence of the occipital tentacle (vs. absent in *S. (S.) kudenovi*), and the tridentate notopodial hooded hooks (vs. bidentate in *S. (S.) kudenovi*) (Imajima, 1992; Choi and Yoon, 2016).

Habitat. Japanese materials were collected from the intertidal zone to 50 m depth. In Korean waters, materials were collected from the subtidal zone to 20 m depth.

Distribution. Japan, Korea.

Key to the species of *Scoelelepis* Blainville, 1828 from Korea

1. Hooded hooks with 0–2 apical teeth, with straight shaft 2
- Hooded hooks multidentate with curved shaft *S. (Parascoelelepis) yamaguchii*
2. Prostomium sagittate; occipital tentacle present *S. (Scoelelepis) sagittaria*
- Prostomium conical; occipital tentacle absent *S. (Scoelelepis) kudenovi*

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REFERENCES

- Blake JA, 1996. Family Spionidae Grube, 1850, including a review of the genera and species from California and a revision of the genus *Polydora* Bosc, 1802. In: Taxonomic atlas of the benthic fauna of the Santa Maria Basin and Western Santa Barbara, Part 3 (Eds., Blake JA, Hilbig B, Scott PV). Santa Barbara Museum of Natural History, Santa Barbara, CA, pp. 81–223.
- Blake JA, Kudenov JD, 1978. The Spionidae (Polychaeta) from Southeastern Australia and adjacent areas with a revision of the genera. *Memoirs of the National Museum of Victoria*, 39:171–280.
- Choi HK, Yoon SM, 2016. *Scoelelepis* (*Scoelelepis*) *kudenovi* (Polychaeta: Spionidae) new to Korea. *Journal of Species Research*, 5:355–358. <https://doi.org/10.12651/JSR.2016.5.3.355>
- Fauchald K, 1977. The Polychaete worms. Definitions and keys to the orders, families and genera. *Nature History Museum of Los Angeles County Science Service*, 28:1–290.
- Imajima M, 1990. Spionidae (Annelida, Polychaeta) from Japan. III. The genus *Prionospio* (*Minuspio*). *Bulletin of the National Science Museum, Series A (Zoology)*, 16:61–78.
- Imajima M, 1992. Spionidae (Annelida, Polychaeta) from Japan. VIII. The genus *Scoelelepis*. *Bulletin of the National Science Museum, Series A (Zoology)*, 18:1–34.
- Jung RH, Choi BM, Hong JS, 1998. Five species of the genus *Prionospio* (Polychaeta: Spionidae) in Kwangyang Bay, Korea. *Fisheries and Aquatic Sciences*, 1:216–226.
- Meißner K, Bick A, Guggolz T, Götting M, 2014. Spionidae (Polychaeta: Canalipalpata: Spionida) from seamounts in the NE Atlantic. *Zootaxa*, 3786:201–245. <https://doi.org/10.11646/zootaxa.3786.3.1>
- Meißner K, Götting M, 2015. Spionidae (Annelida: ‘Polychaeta’: Canalipalpata) from Lizard Island, Great Barrier Reef, Australia: the genera *Malacoceros*, *Scoelelepis*, *Spio*, *Microspio*, and *Spiophanes*. *Zootaxa*, 4019:378–413. <https://doi.org/10.11646/zootaxa.4019.1.15>
- Moreira J, Parapar J, Troncoso JS, 2000. On the presence of *Prionospio pulchra* (Polychaeta: Spionidae) in the Atlantic Ocean. *Cahiers de Biologie Marine*, 41:233–239.
- Paik EI, 1982. Taxonomic studies on polychaetous annelids in Korea. *Research Bulletin of the Hyosung Women’s University*, 24:745–913.
- Paik EI, 1989. Illustrated encyclopedia of fauna and flora of Korea. Vol. 31. Ministry of Education Press, Seoul, pp. 452–468.
- Parapar J, Besteiro C, Urgorri V, 1995. Consideraciones a la taxonomía y autoecología de algunas especies de anélidos poliquetos ibéricos. *Thalassas*, 11:105–125.
- Paterson GLJ, Neal L, Altamira I, Soto EH, Smith CR, Menot

- L, Billett DSM, Cunha MR, Marchais-Laguionie C, Glover AG, 2016. New *Prionospio* and *Aurospio* species from the Deep Sea (Annelida: Polychaeta). *Zootaxa*, 4092:1-32. <https://doi.org/10.11646/zootaxa.4092.1.1>
- Rocha MB, Paiva PC, 2012. *Scoelepis* (Polychaeta: Spionidae) from the Brazilian coast with a diagnosis of the genus. *Zoologia*, 29:385-393.
- Sikorski AV, Pavlova LV, 2015. New species of *Scoelepis* (Polychaeta, Spionidae) from the Norwegian coast and Barents Sea with a brief review of the genus. *Fauna Norvegica*, 35:9-19. <https://doi.org/10.5324/fn.v35i0.1666>
- Surugiu V, 2016. On the taxonomic status of the European *Scoelepis* (*Scoelepis*) *squamata* (Polychaeta: Spionidae), with description of a new species from southern Europe. *Zootaxa*, 4161:151-176. <https://doi.org/10.11646/zootaxa.4161.2.1>
- Wilson RS, 1990. *Prionospio* and *Paraprionospio* (Polychaeta: Spionidae) from southern Australia. *Memoirs of the Museum of Victoria*, 50:243-274.
- Yokoyama H, Choi JW, 2010. New records of three *Paraprionospio* species (Polychaeta: Spionidae) from Korean waters. *Ocean Science Journal*, 45:55-61. <https://doi.org/10.1007/s12601-010-0005-4>
- Zhou J, Ji W, Li X, 2009. A new species of *Scoelepis* (Polychaeta: Spionidae) from sandy beaches in China, with a review of Chinese *Scoelepis* species. *Zootaxa*, 2236:37-49.

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