A New Record of the Genus Pista (Polychaeta: Terebellidae) from Korea: The Validity and Redescription of Pista shizugawaensis

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ABSTRACT

A terebellid polychaete identified as Pista shizugawaensis Nishi and Tanaka, 2006, whose species validity has been doubted, is newly reported from the southwest coast of Korea. Korean materials of the present study have several characteristics that agree well with the original description of P. shizugawaensis as follows: two pairs of branchiae on the 2nd and 3rd segments have tufts composed of many dichotomously branched filaments; the nephridial papillae are present on the 6th and 7th segments; the uncini on the anterior and middle thoracic segments possess only long-handled shafts while those on the posterior ones have additional short-handled shafts or lacking shafts; the notosetae are broadly or narrowly winged capillary. The authors examined the taxonomic value of the presence of lateral lobes on the 5th and 6th segments, which has been known as a key characteristic feature of P. shizugawaensis in the classification of Pista species. In the present study, several characteristics such as the shape of notosetae, uncinal shafts in the thoracic segments, and the presence of thin narrow lateral lobes on the 4th segment are suggested as the specific characteristics that help to distinguish P. shizugawaensis from its congeners. A key to Pista species from Korean waters is also provided.

Keywords: Pista shizugawaensis, Polychaeta, Terebellidae, taxonomy, Korea

INTRODUCTION

The family Terebellidae Johnston, 1846 is an easily recognizable group in shallow waters or intertidals due to the extensible tentacles used for feeding and brightly colored brachial plumes that extend from their anterior region (Fauchald and Jumars, 1979). Among them, genus Pista Malmgren, 1866 is widely distributed throughout the world and has a large number in species abundance (Leontovich and Jirkov, 2011; Nogueira et al., 2011). The taxonomy of this genus has been confused because of the original description of Pista cristata (Müller, 1776), type species of the genus, which did not provide adequate information for defining the species and the genus (Londoño-Mesa, 2012). The major characters for distinguishing the species of Pista are presently known as the morphologies of lateral lobes on anterior segments, uncini, nephridial papillae, branchiae, and notopodia (Dos Santos et al., 2010; Nogueira et al., 2011).

Presently, about 62 species and two subspecies of the genus Pista are known worldwide (Londoño-Mesa, 2012). Among them, two species, P. cristata (Müller, 1776) and P. fasciata (Grube, 1870), have been recorded from Korean waters (Paik, 1982, 1989; Kim and Paik, 1993). However, the previous reports of Pista species from Korean waters were too brief and provided limited information on the major characters of Pista. Hence, a detailed revision about Pista species from Korean waters is necessary.

In the present study, the authors deal with a newly recorded Pista species, P. shizugawaensis Nishi and Tanaka, 2006, from Korean waters. The taxonomic status of this species has been confused because of the controversy about the presence of reduced lateral lobes on the 5th and 6th segments (Leontovich and Jirkov, 2011), which was described as a key characteristic feature of P. shizugawaensis in the original
description (Nishi and Tanaka, 2006). Although Nishi and Tanaka (2006) and Leontovich and Jirkov (2011) used this feature for a key character in the *Pista* classification, we could find that it is shared by several *Pista* species from investigating previous literatures (Marenzellar, 1884; Imajima and Hartman, 1964; Hutchings and Glasby, 1988; Londoño-Mesa, 2009; Dos Santos et al., 2010; Nogueira et al., 2011).

The purpose of this study is to determine the taxonomic value of the presence of lateral lobes on the 5th and 6th segments in the classification of *Pista* species. We also aim to redescribe *P. shizugawaensis* with detailed description and illustrations. A key to *Pista* species from Korean waters is provided in this paper.

**MATERIALS AND METHODS**

Samples were collected from a mudflat in the southwestern coast of Korea. The specimens were sorted by using sieves with a pore size of 0.5 mm, fixed initially with 5% formaldehyde-seawater solution, and transferred to 85% ethyl alcohol after sorting in the laboratory. The characteristics of the whole body were observed and both notosetae and uncini were dissected in a petri dish by using dissection forceps or surgical knives and needles under the stereomicroscope (SMZ1500; Olympus, Tokyo, Japan). They were mounted on temporary slides using glycerol or permanent slides using polyvinyl lactophenol solution. Drawings were made by the stereomicroscope, and the light microscope (LABOPHOT-2; Nikon, Tokyo, Japan) with the aid of drawing tubes.

**SYSTEMATIC ACCOUNTS**

Class Polychaeta Grube, 1850  
Order Terebellida (Rouse and Fauchald, 1997)  
Family Terebellidae Johnston, 1846  
Subfamily Terebellinae Malmgren, 1866

Genus *Pista* Malmgren, 1866  
*Pista* Malmgren, 1866: 382; Fauchald, 1977: 132; Hutchings, 1977: 19; Hutchings and Glasby, 1988: 38; Dos Santos et al., 2010: 32; Nogueira et al., 2011: 3.

**Diagnosis.** Buccal tentacles numerous. Lateral lobes present on anterior thoracic segment. Branchiae composed of 1 to 3 pairs. Notopodia beginning from 4th segment, composed of 17 pairs. Notosetae broadly or narrowly winged capillary, or simple capillary with small denticles on surface. Neuropodia beginning from 5th segment. Uncini initially arranged in single rows, arranged in double rows on posterior thoracic segments, and arranged in single rows on abdominal segments; thoracic uncini with long-handled shafts.

Type species: *Pista cristata* (Müller, 1776).

**Remarks.** Nogueira et al. (2011) pointed out that this genus possesses only broadly winged capillary notosetae. However, our materials of this genus from Korean waters show broadly or narrowly winged capillary shape of notosetae. *Pista* species described by Leontovich and Jirkov (2011) also has simple capillary notosetae bearing small denticles on the surface.

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

1. Posterior thoracic segments with uncini bearing long-handled shafts and additional short handled shafts or lacking shafts  
   - Posterior thoracic segments with uncini bearing long-handled shafts only

2. Lateral lobes on peristomium well developed; branchiae arborescent, with short stalk  
   - Lateral lobes on peristomium very short; branchiae with filaments arranged in a spiral at distal tips and long stalk

*Pista shizugawaensis* Nishi and Tanaka, 2006

*Pista shizugawaensis* Nishi and Tanaka, 2006: 141, figs. 2–4.

**Material examined.** 2 specimens collected at Daecheon-ri, Aphae-eup, Shinan-gun, Jeollanam-do, Korea (34°51′56″N, 126°21′53″E), 19 Dec 2011, Choi HK.

**Description.** Body about 10.0 cm long; thoracic width about 0.4 cm at 6th setiger; abdominal width about 0.1 cm. Eyespots absent. Buccal tentacles numerous, arose from thickened glandular margin. Prostomium compact with anteriorly projecting tongue, with convoluted glandular margins. Peristomium thickened, with 2 large lateral lobes; lateral lobes distally rounded, extended anteriorly and ventrally, fused mid-ventrally (Fig. 1A–C).

Branchiae 2 pairs, composed of large ones on 2nd segment and small ones on 3rd segment; each branchia with stout, long annulated stalk and plume-shaped head bearing tufts composed of many dichotomously branched filaments; filaments arranged in irregular spiral (Fig. 1A).

Lateral lobes attached from 2nd to 6th segments; 2nd segment with flattened ventro-lateral lobes, fused mid-ventrally, and formed single small lobe; 3rd segment with wide and rounded semi-rectangular lateral lobes, more lateral in posi-

Korean name: 넓은총채유령갯지렁이(신칭)
tion than those on 2nd segment, and lobes divided into dor­
sal and ventral parts but connected across ventral part by
very narrow ridge; 4th segment with thin narrow lateral
lobes, reached to ventral pad, completely divided into dorsal
and ventral parts; 5th and 6th segments with reduced lateral
lobes composed of 2 pairs, located more ventrally than those
on 2nd to 4th segments; lateral lobes positioned between
neuropodial uncini and ventral pad; lobes on 6th segment
slightly smaller than those on 5th segment (Fig. 1A–C).

Ventral pads conspicuous on thoracic setigers, eventually
disappeared on abdominal setigers (Fig. 1B, C).
Nephridial papillae very small, present on 6th and 7th
segments, inserted below notopodia (Fig. 1A).
Notopodia globular shaped, consisted of 17 pairs from 4th
segment (Fig. 1A, B); notosetae broadly or narrowly winged
capillary, each with different length (Fig. 2A, B).
Neuropodia beginning from 5th segment (2nd setiger) and
continued to pygidium; thoracic neuropodia long, flattened

**Fig. 1. Pista shizugawaensis Nishi and Tanaka, 2006. A, Dorso-lateral view (branchiae on the opposite lateral side are omitted); B, Ventro-lateral view (tentacles are omitted); C, Ventral view. Scale bar: A–C= 1.0 mm.**
rectangular shaped, and abdominal neuropodia reduced (Fig. 1A).

Ucini (neurosetae) well chitinised, arranged in single rows from 5th to 10th thoracic segments (2nd to 7th setigers) and subsequently arranged in double rows until last thoracic segment (17th setiger), and then arranged in single rows on abdominal segments (Fig. 1A); thoracic uncini arranged in single rows possessing long handled shafts and hook-shaped crested head, with dental formula \( MF \) (main fang): \( 4:5, 5\text{--}6, 6, \alpha \) (difficult to count) (Fig. 2C, D); thoracic uncini arranged in double rows bearing similar crested head to those in single rows, with long-handled shafts from 11th to 20th segments (8th to 17th setigers) and with additional short-handled shafts or lacking shafts from 18th to 20th segments (15th to 17th setigers) (Fig. 2E, F); abdominal uncini arranged in single rows without shaft, with crested head smaller than thoracic ones (Fig. 2G).

Remarks. *Pista shizugawaensis* was first described from Shizugawa Bay in Japan by Nishi and Tanaka (2006). The original description of this species suggested the following several distinguishable characteristics: two pairs of reduced lateral lobes are located on the 5th and 6th segments; two pairs of branchiae on the 2nd and 3rd segments have tufts composed of many dichotomously branched filaments; the nephridial papillae are present on the 6th and 7th segments; the pairs of branchiae on the 2nd and 3rd segments have tufts lateral lobes are located on the 5th and 6th segments; two several distinguishable characteristics: two pairs of reduced original description of this species suggested the following than thoracic ones (Fig. 2G).

Uncini (neurosetae) well chitinised, arranged in single rows from 5th to 10th thoracic segments (2nd to 7th setigers) and subsequently arranged in double rows until last thoracic segment (17th setiger), and then arranged in single rows on abdominal segments (Fig. 1A); thoracic uncini arranged in single rows possessing long handled shafts and hook-shaped crested head, with dental formula \( MF \) (main fang): \( 4:5, 5\text{--}6, 6, \alpha \) (difficult to count) (Fig. 2C, D); thoracic uncini arranged in double rows bearing similar crested head to those in single rows, with long-handled shafts from 11th to 20th segments (8th to 17th setigers) and with additional short-handled shafts or lacking shafts from 18th to 20th segments (15th to 17th setigers) (Fig. 2E, F); abdominal uncini arranged in single rows without shaft, with crested head smaller than thoracic ones (Fig. 2G).

Discussion. Banse (1980) pointed out that *P. brevibranchiata* Moore, 1923 was characterized by the presence of lateral lobes on the 5th and 6th segments. At this point, Leontovich and Jirkov (2011) considered that *P. shizugawaensis* was a synonym of *P. brevibranchiata* based on the opinion given by Banse (1980). However, *P. shizugawaensis* differs from *P. brevibranchiata* referred by Leontovich and Jirkov (2011) in terms of the detailed shape of notosetae. *P. shizugawaensis* has broadly or narrowly winged capillary notosetae, while *P. brevibranchiata* shows capillary notosetae bearing only small denticles on the surface. Also, *P. shizugawaensis* has short-handled shafts or lacking shafts that appear additionally in the uncini on the posterior thoracic segments, but *P. brevibranchiata* has only long handled shafts (Leontovich and Jirkov, 2011). The shape of uncini on the thoracic segments is known to be an important character in *Pista* taxonomy (Dos Santos et al., 2010; Nogueira et al., 2011). Therefore, we consider that *P. shizugawaensis* is a completely distinct species from *P. brevibranchiata*, and the synonym of *P. brevibranchiata* as referred by Leontovich and Jirkov (2011) needs to be emended.

*Pista fasciata* sensu Marenzellar, 1884, which was described by Imajima and Hartman (1964) from Japanese waters, was also regarded as a synonym of *P. brevibranchiata* by Leontovich and Jirkov (2011) because Japanese specimens studied by Imajima and Hartman (1964) possess lateral lobes on the 5th and 6th segments as pointed out by Banse (1980). The authors could also find out the presence of lateral lobes on the 5th and 6th segments in the report of *P. fasciata*, which was first described from *P. cristata* sensu Marenzellar, 1884). However, *P. fasciata* differs from *P. brevibranchiata* described by Leontovich and Jirkov (2011) and *P. shizugawaensis* of the present study by the presence of the notosetae with large teeth arranged in one side of the tip (Marenzellar, 1884).
Fig. 2. *Pista shizugawaensis* Nishi and Tanaka, 2006. A, B, Noto setae from 7th segment, with long (A) and short lengths (B); C–F, Uncini (neurosetae) of thoracic segments, arranged in single row (C) and with crested head (D) on 7th segment, arranged in double rows on 11th segment (E) and 18th segment (F); G, Abdominal uncini. Scale bars: A, B = 0.2 mm, C–G = 0.05 mm.
Except for the species mentioned above, we found that other *Pista* species also show a similar feature. Six *Pista* species reported from the Caribbean Sea and the Atlantic coast of South America have lateral lobes on the 5th and 6th segments (Londoño-Mesa, 2009; Dos Santos et al., 2010; Nogueira et al., 2011): *P. alonsae* Santos et al., 2010, *P. cetrata* (Ehlers, 1887), *P. corrientis* McIntosh, 1885, *P. nonatoi* Nogueira et al., 2011, and *P. palmata* (Verrill, 1873). In spite of being poorly described, *Pista sinusa* Hutchings and Glasby, 1988 reported from Australia also shows a similar feature based on the figure (Hutchings and Glasby, 1988). However, *P. shizugawaensis* differs from these species by the presence of uncini bearing short-handled shafts or lacking shafts in the posterior thoracic segments (Hutchings and Glasby, 1988; Nishi and Tanaka, 2006). In spite of being poorly described, *Pista sinusa* Hutchings and Glasby, 1988 reported from Australia also shows a similar feature based on the figure (Hutchings and Glasby, 1988). However, *P. shizugawaensis* differs from these species by the presence of uncini bearing short-handled shafts or lacking shafts in the posterior thoracic segments (Hutchings and Glasby, 1988; Nishi and Tanaka, 2006; Dos Santos et al., 2010; Nogueira et al., 2011). Among them, only *P. cetrata* has uncini bearing short-handled shafts or lacking shafts, but *P. shizugawaensis* can be distinguished from *P. cetrata* by the presence of thin and narrow lateral lobes on the 4th segment because *P. cetrata* bears triangular and large lateral lobes (Londoño-Mesa, 2009).

Conclusively, the presence of reduced lateral lobes on the 5th and 6th segments, which was described as a key characteristic feature in the original description by Nishi and Tanaka (2006), is not a valid characteristic of *P. shizugawaensis* because it is shared by several *Pista* species. We suggest that the useful characteristics of *P. shizugawaensis* that help to distinguish it from its congeners are the morphologies of notosetae, uncini, and other lateral lobes besides those on the 5th and 6th segments.

**Distribution.** Intertidal soft bottoms of Korea and Japan.

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