A New Species of *Polyodontes* (Annelida: Acoetidae) from Western Japan

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Acoetid polychaetes were collected from shallow waters off Kochi Prefecture and Wakayama Prefecture, Japan. The specimens could be assigned to the genus *Polyodontes* Blainville, 1828, but are different from all the known species of the genus by the following characters: ommatophores with short neck; palps with minute papillae; parapodia without branchiae; the acicular neurochaetae always lacking aristae and having hairs only on a small area of their subdistal end; and antennae with brown dots. They are herein morphologically described as a new species and a partial 658-bp COI sequence as a DNA barcode is provided for future taxonomic studies.

**Key Words:** Kuroshio coastal region, marine invertebrates, North West Pacific, taxonomy.

**Introduction**

Acoetids are long-bodied scaleworms, constituting one of the seven families in the suborder Aphroditiformia Levin sen, 1883 (Norlinder et al. 2012). They are ambush predators, waiting for prey in a tube constructed by fibers from spinning glands located in their parapodia (Hutchings 2000). Acoetid polychaetes are widely distributed in the world, but never common in benthos samples (Palmero et al. 2008).

*Polyodontes* Blainville, 1828 is one of the eight acoetid genera recognized by Pettibone (1989). Members of the genus are widely distributed in warm temperate to tropical waters in depth ranging from the low intertidal to moderate depths (Pettibone 1989; Barnich and Steene 2003). The genus can be discriminated from other acoetids by the following features: ommatophores are present; lateral prostomial antennae are attached ventrally on the ommatophores; and upper type ‘a’ neurochaetae are spinous but not plumose either distally or subdistally. In Japan, two species of *Polyodontes* have been recorded: *P. atromarginatus* Horst, 1917 from northern Japan (Takahashi 1942) and *P. maxillosus* (Ranzani, 1817) from Okinawa Prefecture (Nishi et al. 2008). Imajima (2001) mentioned specimens of another *Polyodontes* species from Nagoya (Aichi Prefecture), but their morphology and taxonomic identity have never been published.

In this study, a new acoetid species, collected in Kochi and Wakayama prefectures, Northwest Pacific, is described and a partial cytochrome c oxidase subunit I (COI) sequence is provided as a DNA barcode.

**Materials and Methods**

A living specimen was hand-collected by turning a rock during SCUBA diving, 12 m deep, off the coast of Otsuki, Japan (32°46.41′N, 132°43.98′E) in 2017. The specimen was photographed with an Olympus Tough TG-5 digital camera, then fixed in 70% ethanol. The fixed specimen was observed under a Nikon SMZ1500 dissecting microscope and an Olympus BX51 compound light microscope, and then photographed with a Nikon D5200 digital camera. The specimen has been deposited in the collection of the National Museum of Nature and Science, Tsukuba (NSMT). In addition to the newly collected individual, one specimen, which was collected from Hatakejima, Japan in 1966 and then fixed by 10% seawater formalin, stored in NSMT was also investigated.

DNA extraction and sequencing of part of the COI were carried out following the methodology described by Jimi and Fujiwara (2016). The newly obtained sequence has been deposited in the DNA Data Bank of Japan (DDBJ).

**Taxonomy**

*Polyodontes kuroshio* sp. nov.

[New Japanese name: kurobuchi-bouseki-urokomushi] (Figs 1, 2)

**Material examined.** Holotype, NSMT-Pol H-764, sex unknown, 85 mm long, 7 mm wide (in segment 8) for 92
segments (complete specimen), off Otsuki (32°46.41′N, 132°43.98′E), Kochi, Shikoku Island, Japan, Northwest Pacific, 11 October 2017, 12 m deep, rocky substrate, Naoto Jimi collector. Paratype, NSMT-Pol P-765, sex unknown, 190 mm long, 8 mm wide (in segment 8) for 134 segments (not complete specimen), Hatakejima (33°41.60′N, 135°22.00′E), Wakayama, Japan, Northwest Pacific, 2 August 1966, intertidal zone, sandy beach, Fujio Uchinomi col-

Fig. 1. *Polyodontes kuroshio* sp. nov., NMST-Pol H-764 (holotype), live specimen. A, dorsal view; B, ventral view.
Fig. 2. *Polyodontes kuroshio* sp. nov., NSMT-Pol H-764 (holotype). A, prostomium, dorsal view; B, left parapodium, segment 2, posterior view; C, left parapodium, segment 3, posterior view; D, left parapodium, segment 8, posterior view; E, left parapodium, segment 9, posterior view; F, upper type ‘a’ neurochaeta (finely spinous), segment 9; G, middle acicular chaeta, segment 60; H, lower curved neurochaeta (with long spines), segment 9; I, upper type ‘b’ neurochaeta (bipinnate, with widely spaced spines), segment 9. Scale bars: A, 1 mm; B–E, 200 µm; F–I, 100 µm.
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**Description based on holotype.** Body dorsoventrally flattened. Colour in life: main body dorsally cream white, midventrally with longitudinal yellow line from midbody to posterior end; parapodia and dorsal cirri distally with yellow pigment (Fig. 1A, B). Elytrophores 48 pairs in number, present on segments 2, 4, 5, 7, 9, 11, 13, 15, 17, 19, 21, 23, 24, 25, 26, 28, thereafter on alternate segments to 92. Elytra smooth, oval; transparent with white and yellow oval spots (in life), bordered by a circle of black pigment (incomplete in anterior two to three elytra) (Fig. 1A); lateral pouch on elytra present from segment 23 backwards (Fig. 1A). Prostomium bilobed, with globular ommatophores with distal lenses and short necks. Median antenna with short oval ceratophore, inserted at middle of prostomium; ceratophore with lateral papillae; style smooth, as long as orommatophores, white with brown dots (Fig. 2A). Pair of sessile eyes present lateral to ceratophore. Lateral antennae inserted on ventrally below ommatophores and tips extending slightly beyond; styles smooth, white with brown dots. Palps long, with minute papillae, cream white with some brown dots (Fig. 2A). Tentacularophores lateral to prostomium, each with papillae on inner dorsolateral side and a few capillary chaetae. Styles of dorsal and ventral tentacular cirri smooth, of equal lengths, white with brown dots (Fig. 2A).

**Segment 2** (Fig. 2B): with biramous parapodia, first pair of epytohores and many sensory papillae present on dorsal side. Notopodium with rounded acicular lobe and bundle of long, finely spinous capillary notochaetae. Neupodionum wide, subconical, with bifid prechaetic acicular lobe, post-chaetic lobe, and free anterovenral bract. Neurochaetae enlarged basally, tapering to capillary tip, with numerous rows of spines; spines shorter in upper type ‘a’ neurochaetae [as defined by Pettibone (1989)] and longer in lower neurochaetae.

**Segment 3** (Fig. 2C) with first pair of tapering, smooth dorsal cirri and some sensory papillae on dorsal side. Notopodium as in segment 2, notochaetae shorter. Neupodionum truncate with small anterodorsal and prominent anterovenral bract. Neurochaetae in three groups [as defined by Pettibone (1989)]: anterodorsal bract with upper type ‘a’ neurochaetae, finely spinous, tapering to capillary tip; middle acicular neurochaetae with hooked tip, without aristae or subdistal hairs; anterovenral bract with lower curved neurochaetae, with longer spines and tapering to capillary tip.

**Segments 4 to 8** (Fig. 2D) with small notopodia and few, short, capillary notochaetae; neuropodia similar to those in segment 3; dorsal sensory papillae absent.

**Beginning with segment 9 backwards** (Fig. 2E), all parapodia similar in shape, without dorsal sensory papillae. Notopodium wide, flattened, with notocircum, few short capillary notochaetae and spinning glands (white dotted). Neupodionum truncate, with slightly bilobed acicular lobe and smaller anterodorsal and prominent anterovenral bract. Neurochaetae in three groups: i) upper ones in anterodorsal bract of two types: type ‘a’ neurochaetae, finely spinous, tapering to capillary tip (Fig. 2F) and type ‘b’ neurochaetae, much shorter, bipinnate, with widely spaced spines (Fig. 2I); ii) middle acicular neurochaetae with hooked tip and subdistal hairs (Fig. 2G); iii) lower ones in anterovenral bract, curved, with longer spines and tapering to capillary tip (Fig. 2H).

**Girrig자의 segments** with long, smooth, tapering dorsal cirri, about 1.4 times length of ventral cirri (Fig. 2C, D). Ventral cirri short, tapering, smooth, attached on middle part of parapodia (Fig. 2B–D). On segment 2, ventral cirri elongate (reaching to tip of notochaetae) and projecting from base of neuropodia (Fig. 2B). Parapodia without branchiae. Pygidium cylindrical in shape, achaetous with two conical anal cirri, similar to dorsal cirri. Pharynx with 15 pairs of papillae and 2 pairs of jaws; papillae conical, middorsal one much longer than others.

**Etymology.** This species is named after the Biological Institute on Kuroshio. The holotype from Sukumo was collected by the first author who received funding by the institution. The specific name is a non-declensional noun.

**Distribution.** This species is known from off Otsuki (Kochi Prefecture) and Hatakejima island (Wakayama Prefecture), Japan, Northwest Pacific.

**Sequence.** Partial COI gene, 658 bp (DDBJ No. LC492096), determined from the holotype.

**Remarks.** The morphological features of *Polyodontes kuroshio* sp. nov. resemble those of *Polyodontes oculeus* (Treadwell, 1901), originally described from the Caribbean Sea, in having ommatophores with short neck, palps with minute papillae, and parapodia without branchiae (Pettibone 1989). The new species can be distinguished from *P. oculeus* by the following features: i) the acicular neurochaetae always lack aristae and possess hair only on a small area of their subdistal end, while in *P. oculeus* acicular chaetae may have aristae and possess hairs distributed broadly on their subdistal part; and ii) the median and lateral antennae are sporadically covered with brown dots in life and after preservation, while those of *P. oculeus* do not possess any dots. *Polyodontes tidemani* Pflugfelder, 1932 is the only species that lacks aristae in the genus. However, the new species can be discriminated by the following features: i) palps have minute papillae, while those of *P. tidemani* have long papillae; ii) absence of branchiae in all parapodia, while *P. tidemani* with inflated branchiae from segment 13 backwards.

In Japan, *P. atromarginatus* and *P. maxillosus* were reported in previous studies (Takahashi 1941; Nishi et al. 2008). The new species is distinct from *P. atromarginatus* and *P. maxillosus* by its ommatophores with the short neck and by the absence of aristae on the acicular neurochaetae.

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