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Taxonomic Studies of Polychaetous Annelids from Japan
(日本産環形動物多毛類の分類学的研究)

A Ph.D. thesis

submitted

by

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to

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Disclaimer

Under Article 8.3 of the International Code of Zoological Nomenclature (International Commission on Zoological Nomenclature 1999), all of the names and nomenclatural acts in this thesis are not available.

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Chapter I. General introduction

In my Ph.D. course during the period of 2016–2019, I engaged myself in a series of taxonomic studies of polychaetes that I collected in Japanese waters. Part of my Ph.D. study has been published in nine papers (Jimi et al. 2017a–d, 2018a–d, 2019; Jimi and Kajihara 2018), while others remain unpublished. These polychaetes represent eight out of about 92 families currently recognized within this group of annelids. In this chapter, I provide *i*) a brief overview of polychaetes, *ii*) the history of taxonomic research on polychaetes in Japan, and *iii*) a critical review of Japanese polychaete systematics, which led my Ph.D. research to focus on the eight families that are dealt with in this thesis.

I-1. Polychaetes—a non-monophyletic assemblage

There seems to be a general agreement among most, if not all, modern systematists as to the hierarchy of taxonomic classification in that it should be consistent with the phylogenetic relationship—namely, each taxon should be comprised of the last common ancestor and all of its descendants, i.e., a monophyletic group (e.g., Vertebrata). During the history of systematic research, a number of animal taxa—such as Invertebrata (Metazoa excluding Vertebrata), Pisces (Vertebrata excluding Tetrapoda), Reptilia (Amniota excluding Aves and Mammalia), and Turbellaria (Platyhelminthes excluding the Trematoda, Monogenea, and Cestoda)—have turned out to be non-monophyletic. Polychaeta (including fireworms, lugworms, etc.) is one of such non-monophyletic taxa, formerly constituted the phylum Annelida as one of the three classes along with Oligochaeta (earthworms) and Hirudinea (leeches) in a classification scheme that had been accepted up until 1990's (e.g. Rouse and Fauchald 1997). The taxon concept of Polychaeta has become vague as recent phylogenetic studies indicated that it contains members that were formerly included in other phyla (i.e. Sipuncula, Echiura, Pogonophora, Vestimentifera); earthworms and leeches, together forming Clitellata, turned out to constitute one of the subclades within Polychaeta, which became nearly (but not completely) equivalent to Annelida (Struck et al. 2011, 2015; Weigert 2014; Andrade 2015). Given the non-monophyletic status of the taxon, few specialists now accept Polychaeta as a formal taxon. The vernacular name "polychaetes" usually means annelids except oligochaetes and hirudineans; whether or not sipunculans and echiurans are also "polychaetes" is in a gray zone and more or less a matter of each researcher's choice, but pogonophorans and vestimentiferans seem mostly to be regarded as "polychaetes" in the family Siboglinidae.

In general, polychaetes have a segmented body, chitinous chaetae, and trochophore larva except for some families (Rouse and Pleijel 2001). Based on recent phylogenomic analyses, they are closely related to Nemertea and Mollusca within the Lophotrochozoa (e.g. Laumer et al. 2015). In the anterior end of body, polychaetes mostly have a prostomium that contains some sensory organs (e.g. eyes and antennae). Behind the prostomium is a peristomium, where the mouth opens on the ventral side. In each body segment behind peristomium, there is a parapodium on each side, which is mostly associated with bundles of chaetae. The shape of chaetae often differs between species and thus serves as a useful taxonomic feature (Rouse and Pleijel 2001). There can be multiple types of chaetae in one species; for example, a single individual in the family Poecilochaetidae usually possesses seven or eight different types of chaetae (Imajima 2001b). Polychaetes are highly diverse in terms of body shape (e.g. cylindrical, flat, spherical), as the result of adaptation to various environments, including under rocks as epibenthos, in muddy and sandy sediments as endobenthos, in water column as pelagic, and in/on other animals as symbionts (Fauchald 1977). Polychaetes are found in terrestrial, freshwater, and marine environments. They are distributed in every ocean from the Arctic to Antarctic regions, vertically ranging from the intertidal to hadal zones. Due to their diverse habitat range, the sampling methods should also be diverse, variously utilizing SCUBA diving, plankton nets, dredging, light traps, and ROVs, etc. (Rouse and Pleijel 2001). Both sexual and asexual modes of reproduction are found in polychaetes. There are some types of asexual/sexual reproduction (Schroeder and Hermans 1975). In polychaetes, the eggs usually develop with spiral cleavage. They usually have a planktonic larva (trochophore larva) except some species that do direct development (Schroeder and Hermans 1975). There are a number of species that do not show typical polychaete features delineated above. For example, the zombie worm *Osedax japonicus* Fujikura, Fujiwara and Kawato, 2006 has neither a segmented body, nor the mouth and anus (Fujikura et al. 2006).

Polychaetes have been utilized by humans as food (McNeill 1954), fishing bait (Saito 2014), and indicators in environmental assessments (Dean 2008). Some species of polychaetes are pests for bivalve aquaculture because they can decrease the commercial value of scallops and oysters by boring and/or settling on the shells

(Fitridge et al. 2012; Sato-Okoshi et al. 2015). Invasive polychaete species in some families are known. The tube-forming serpulids *Hydroides elegans* (Haswell, 1833) has been regarded as one of the worst 100 species of invasive species (Lowe et al. 2000).

The earliest valid species of polychaetes were named by Linnaeus (1758), who established two genera *Nereis* and *Serpula*, in which five and 14 species of annelids were described, respectively. Quatrefages (1866) divided polychaetes into two groups, Errantia and Sedentaria, which were mostly placed at the rank of subclass or order in the higher taxonomic schemes proposed by later systematists (Fauvel 1923, 1927; Day 1967; Hartman 1967, 1969). Errant polychaetes are either active swimmers or crawlers, whereas sedentary polychaetes are tube-dwellers or burrowers. Dales (1962) rejected the concept of Errantia and Sedentaria and classified polychaetes into 14 orders. Some new orders were established by subsequent authors (Fauchald 1977; Pettibone 1982; Hartmann-Schröder 1996). Rouse and Pleijel (1997) divided Polychaeta into Scolecida and Palpata based on cladistic analyses; this classification had prevailed until it was challenged by molecular analyses in the 2010's. Fauchald's (1977) publication, known as the "pink book" among polychaetologists due to the color of the book cover, is one of the most valuable contributions to the polychaete systematics; in it, all of the then-existed families were revised and keys to all of the then-existed genera were provided. Another important contribution (Rouse and Pleijel 2001), known as the "black book", has been familiarized by many researchers as a first-step guidance to the polychaete taxonomy.

As non-monophyly of Polychaeta became evident by molecular analyses, taxonomic schemes in some orders turned out to be at variance with the phylogeny (Weigert and Bleidorn 2016). The names Errantia and Sedentaria have been revived in recent phylogenomic papers (Struck et al. 2011, 2015; Weigert et al. 2014), although the constituents are different from Quatrefages' traditional scheme. In the contemporary sense, Errantia consists of species that usually have compound setae and developed parapodia, while Sedentaria consists of species that usually have only simple setae and poorly developed parapodia. The phylum Annelida is currently regarded as comprised of *i*) some 'basal' clades including Sipuncula, Amphinomidae, Chaetopteridae, Magelonidae, and Oweniidae, plus *ii*) a derived clade comprised of Errantia and Sedentaria, the latter containing Echiura, Oligochaeta, and Hirudinea (Weigert and Bleidorn 2016).

About 12,000 species in 92 families of polychaetes are now known in the world (Read and Fauchald 2018; Tanaka 2018), but Appeltans et al. (2012) estimated that over 6000 species remain undescribed. Clearly, further taxonomic studies are necessary to fully understand the actual biodiversity of polychaetes.

I-2. History of polychaete taxonomic study in Japan

Marenzeller (1879) reported polychaetes for the first-time taxonomic work from Japanese waters. McIntosh (1885) reported Japanese polychaetes based on material obtained during the *Challenger* expedition. Moore (1903) and Moore and Busch (1904) reported many species from Japan that were collected during the cruises of the research vessel *Albatross*. Izuka (1912) published a review of errant polychaetes from Japan that contained many new species. The Swedish zoologist Bock visited Japan in 1914 and brought a large collection of natural history specimens, including polychaetes, back to Sweden. Bock's polychaete collection has been examined by Hessle (1917, 1925), Johansson (1922, 1927), Gustafson (1930), and Jägersten (1937); these papers deepened our knowledge of Japanese polychaetes in the families Amphinomidae, Hesionidae, Myzostomidae, Terebellidae, and Serpulidae. Fauvel (1936) summarized then-known Japanese polychaetes, many of which were identified as species originally described from European waters, i.e. *Hartmothoe imbricata* (Linnaeus, 1767), *Chloeia flava* (Pallas, 1766), these were regarded as cosmopolitans. Okuda (e.g. 1934, 1935) published more than 30 articles based on specimens collected in several regions of Japan, mainly dealing with sedentary polychaetes. Imajima and Hartman (1964a, b) and Imajima (1996, 2001b, 2007, 2015) formed the basis of the Japanese polychaete taxonomy; Imajima (1996, 2001b, 2007, 2015) provided taxonomic revisions for 32 families. He also published regional studies about Sagami Bay (Imajima 1997a, 2003, 2006), Suruga Bay (Imajima 1997b), off Nansei Islands (Imajima 2005), off Tohoku (Imajima 2009), and off Bonin Islands (Imajima 2011). These studies covered both Errantia and Sedentaria, describing a number of new species. Recent contributions to the Japanese polychaete systematics include publications by Hayashi (e.g. Maekawa and Hayashi 1999, Onuphidae), Kato (e.g., Kato and Pleijel 2002, Phyllodocidae), Kobayashi (e.g. Kobayashi et al. 2015, Siboglinidae), Miura (e.g. Miura 1977, Eunicidae; e.g. Miura and Laubier 1989, Chrysopetalidae; e.g. Miura et al. 1997, Siboglinidae), Nishi (e.g. Nishi and Kirtley 1999, Sabellariidae; e.g. Nishi 2001, Chaetopteridae; e.g. Nishi et al. 2007, Serpulidae; e.g. Nishi et al. 2014, Pectinaridae; e.g. Nishi et al. 2017, Sabellidae), Sato (e.g. Sato and Nakashima 2003, Nereididae), Sato-Okoshi (e.g. Sato-Okoshi 1999, Spionidae), Tomioka (e.g. Tomioka 2017, Capitellidae), Uchida (e.g. Uchida 1978, Serpulidae; Uchida 2004, Hesionidae), and Yokoyama (e.g. Yokoyama 2007, Spionidae).

I-3. *Status quo* and problematic taxa

Kanso (2018) published a list of Japanese polychaetes that consisted of 1194 species, which account for about 10% of the world diversity. However, Kanso's (2018) species enumeration was almost entirely based on Kanso (1991), the latter only covered taxonomic papers that had been published until 1987. While Kanso (2018) incorporated some major publications since 1991 such as Imajima (2015), most of the papers published since 1988 onward are not considered. Therefore, I complied a more complete list of Japanese polychaetes (Appendix Table 1), which ended up with about 1600 species. My list considered taxonomic and biogeographic papers published in the period of 1879–2018 (see Appendix References); papers pertaining to ecology and environmental assessments were excluded; the targeted geographical area was the Japanese exclusive economic zone (EEZ).

I counted the number of species that were (A) newly described and (B) newly recorded from the Japanese EEZ. For each family, I calculated an index that represents the ratio of the number of species found in Japan to that in the world, hereafter referred to as the Japanese species ratio (JSR), which is given by the equation:

$$JSR = (A + B) / C$$

where C is the number of species known in the world, obtained from the WoRMS website (http://www.marinespecies.org/) (Appendix Table 3). The JSR index shows a higher value when *i*) the family contains more cosmopolitan species distributed worldwide, *ii*) the world distribution of the family is uneven and biased towards East Asia including Japanese waters, and *iii*) taxonomic studies in Japan have been advanced, yielding a greater number of species known from the Japanese EEZ. Except for pelagic taxa such as Lopadorrhynchidae and Alciopidae which include true cosmopolitan species (Rouse and Pleijel 2001), the first possibility is unlikely because there are quite few, true cosmopolitans in other, non-pelagic families (Hutchings and Kupriyanova 2018). The second possibility is also unlikely because there is no polychaete family that contains species with biased distribution in a global scale, much less only in East Asia or Japan (Rouse and Pleijel 2001). For these reasons, I think it is justifiable to some extent to regard the JSR index as an indicator of the advancement of taxonomic studies in this country.

Upon compilation of the list and calculation of the JSR index, I found there were two issues in the Japanese polychaete taxonomy, namely *i*) neglected families, and *ii*) unrecorded families/genera.

The average JSR index value over all the families was 16.2%, whereas the values for Cirratulidae, Flabelligeridae, and Polynoidae were below the average. These results can be interpreted that taxonomy of these families in Japan might be behind from other families. In this thesis, I tackled these families in Chapters II (Acoetidae), VI (Cirratulidae), VII (Flabelligeridae), and IX (Polynoidae).

During the list compilation, I noticed there were some families and genera that had not been recorded from Japan. This situation occurred from some causes: the families/genera's habitats are hard environment for investigation (e.g. deep sea); the families/genera are rare; the families/genera are symbiotic taxa and have special hosts. I tried to find these families and genera from Japan by several methods (e.g. attending to research cruise using ROV investigation). Chapters III (Amphinomidae), IV (Asteriomyzostomidae), V (Chrysopetalidae), VII (Flabelligeridae), and VIII (Hesionidae) are addressed for this issue of unrecorded taxa.

Chapter II. Acoetidae

This chapter deals with an undescribed species of *Polyodontes* from Kouchi, Japan.

II-1. A new species of *Polyodontes* from Kouchi, Japan

Acoetid polychaete was collected from Kouchi Prefecture, Japan by SCUBA diving. The specimen can be discriminated from other *Polyodontes* species by following features *i*) ommatophores with short neck, *ii*) palps with minute papillae, *iii*) parapodia without branchiae, *iv*) acicular chaetae without aristae and with hair only small area around subdistal area, *v*) median and laterall antenna with brown pigmentation. In this study, I describe morphological features of the undescribed species with DNA barcode for future taxonomic studies.

II-2. Introduction

Acoetidae is long scale worms that one of the Aphroditiformia family (Norlinder et al. 2012). They make a nest by yarn made in own parapodia and live in the nest and wait coming prey at the nest.

Polyodontes Blainville, 1828 is one of the genera in family Acoetidae, consists of 15 species and is distributed in shallow water of tropical area (Pettibone 1989; Barnich and Steene 2003). The genus can be discriminated from other congeners by following features: *i*) having ommatophores, *ii*) lateral prostominal antenna attached ventrally on ommatophores, and *iii*) neurosetae being not plumose either distally or subdistally. In Japan, there are two species records; *Polyodontes atromarginatus* Horst, 1917 and *P. maxillosus* (Ranzani, 1817) (Takahashi 1942; Nishi et al. 2008).

In this study, I report morphological features of an undescribed acoetid polychaetes collected from Kouchi Prefecture, with DNA barcode.

II-3. Materials and methods

A fresh specimen was collected by SCUBA diving from off the coast of Sukumo, Japan (32°46.415′N, 132°43.9883′E). The specimen was fixed in 70% ethanol. The fixed specimen was observed with a Nikon SMZ1500 dissecting microscope and an OLYMPUS BX51 compound light microscope, and then photographed with a Nikon D5200 digital camera.

DNA extraction and sequencing of part of the cytochrome c oxidase subunit I (COI) were carried out following the method of Jimi and Fujiwara (2016). The newly obtained sequence has been deposited in the DNA Data Bank of Japan (DDBJ).

II-4. *Polyodontes* sp.

New Japanese name: kurobuchi-bouseki-urokomushi

II-4-1. Material examined

One specimen, 85 mm long, 7 mm wide (in chaetiger 7), 92 segments, sex unknown, Kouchi, 12 m depth, 11 October 2017, collected by NJ.

II-4-2. Description

Body 85 mm long, 7 mm wide (in chaetiger 7), with 92 segments, flat. Living colour white (Fig. II-1). 48 pairs of elytrophores, on segments 2, 4, 5, 7, 9, 11, 13, 15, 17, 19, 21, 23, 24, 25, 26, 28, 30, 32, 34, 36, 38, 40, 42, 44, 46, 48, 50, 52, 54, 56, 58, 60, 62, 64, 66, 68, 70, 72, 74, 76, 78, 80, 82, 84, 86, 88, 90, 92. Elytra oval, transparent with black pigmentation concentrated along medial and posterior borders (pigmentation absent in some of anterior erytrophores), lateral pouch present from 23rd segment's erytora and following ones (Figs II-1A, II-2A). Prostomium bilobed, with globular ommatophores and short necks. Median antenna with short oval ceratophore, inserted at middle of prostomium, with lateral papillae on ceratophore; style as long as ommatophores, whitish with brown pigmentation (Fig. II-2A, B). Eyes present, two pairs. Anterior pair are ommatophore, posterior pair are sessile eye. Lateral antenna inserted ventral side of ommatophores, extending slightly beyond ommatophores, whitish with brown pigmentation. Palps long, white with some brown pigmentation, with minute papillae (Fig. II-2B, C). Tentacular cirri with tentaculophores lateral to prostomium; tentaculophores with lateral papillae and few chaetae. Dorsal and ventral tentacular cirri of equal lengths, whitish with brown pigmentation as palps (Fig. II-2A, B).

Parapodia until segment 8 biramous, without branchiae. Parapodia in segment 9 and following ones subbiramous without notochaeta, without branchiae. Yarn from parapodia (Fig. II-2C). Notochaetae capillary shape. Neurochaetae three types: distally spinous capillary chaeta, present on upper bundle, not plumose in distally or subdistally

(Fig. II-3A); acicular chaeta, present on middle bundle, hooked tips with subdistal hairs, without aristae, getting longer in posterior segments (Fig. II-3B); curved spinous chaeta (Fig. II-3C). Acicula present. Cirrigerous segments (Fig. II-4A, B) with long smooth dorsal cirri, about 1.4 times length of ventral cirri. Ventral cirri short, tapered, smooth, attached on middle part of parapodia (Figs II-4A, B). On segment 2, ventral cirri elongated (reaching to tip of notochaetae) and projected from base of neuropodia. Pygidium cylindrical in shape, achaetous; anal cirri conical. Pharynx with 13 pairs of papillae and 2 pairs of jaws; papillae conial.

II-4-3. Distribution

This species is only known from type locality.

II-4-4. Sequence

COI gene, 569 bp, determined from holotype.

II-4-5. Remarks

Morphological features of the specimen in this study resemble *Polyodontes oculeus* (Treadwell, 1901) in having ommatophores with short neck, palps with minute papillae, parapodia without branchiae (Pettibone 1989). *Polyodontes oculeus* was originally described from the Caribbean Sea that is very far from Japan. The undescribed species can be discriminated *P. oculeus* by following features: *i*) acicular chaetae without aristae and hair only small area around subdistal area, while *P. oculeus* with or without aristae and hair distribute broad area around subdistal area; *ii*) median and laterall antenna with brown pigmentation, while *P. oculeus* without pigmentation.

In Japan, *P. atromarginatus* and *P. maxillosus* were reported in previous studies (Takahashi 1942; Nishi et al. 2008). The undescribed species has morphological features that are useful to descriminate it from the other two Japanese congeners: short neck of ommatophores and aciculate neurochaetae without aristate.

Chapter III. Amphinomidae

This chapter deals with one *Benthoscolex* species described in Jimi et al. (2018c) and one *Archinome* species not recorded from Japanese waters.

III-1. A rare, deep-sea polychaete genus *Benthoscolex* from the Sea of Kumano, Japan

I, together with my colleagues, described the amphinomid polychaete *Benthoscolex seisuiae* as a new species based on material dredged from depths of 487–596 m in the Sea of Kumano. The species is distinguishable from its congeners by the following features: *i*) palps 1.8 times as long as lateral antennae; *ii*) branchiae do not reach to the tip of the notochaetae. This was the first record of *Benthoscolex* from Japan. A partial mitochondrial COI gene sequence from the holotype of *B. seisuiae* was provided for reliable species identification in the future.

III-1-1. Introduction

Marine annelids in the family Amphinomidae are commonly known as fireworms, characterized by having defensive, dorsally-oriented, calcareous chaetae that are thought to be used to inject a venomous substance into predators (Verdes et al. 2018). The family consists of approximately 180 nominal species in 22 genera (Borda et al. 2012; Barroso et al. 2017; Sun and Li 2017), mostly distributed in shallow and tropical waters (Barroso et al. 2017).

One genus, *Benthoscolex* Horst, 1912, is rare and known mainly from deep-sea substrates. Previous collection records of the genus are limited to low latitude areas (Horst 1912; Monro 1937; Hartman 1942; Fauvel 1953; Salazar-Vallejo 1999; Wehe and Fiege 2002). The genus consists of two species: *B. coecus* Horst, 1912 and *B. cubanus* Hartman, 1942. Previous studies have reported *B. coecus* from the Red Sea to the SW Pacific Ocean (Horst 1912; Monro 1937; Fauvel 1953; Wehe and Fiege 2002) and *B. cubanus* from the Caribbean Sea (Hartman 1942). The main diagnostic features of the genus are *i*) caruncle consisting of three ridges and *ii*) branchiae are absent at least in the first five chaetigers. In Japan, several amphinomids have been reported from the deep sea (e.g., Imajima 2001a, 2005, 2006, 2011), but there is no record of *Benthoscolex* species from Japanese waters.

During the research cruise No. 1722 by TR/V *Seisui-maru*, I collected three specimens of *Benthoscolex*. I described the specimens as a new species and provided a COI sequence as a DNA barcode of the species (Jimi et al. 2018c). This was the first report of *Benthoscolex* from Japan.

III-1-2. Materials and methods

Fresh specimens were collected by beam trawl from the Sea of Kumano, Japan (34°00.992′ N, 136°27.720′ E to 33°55.258′ N, 136°26.650′ E) from 487–596 m depth. The live specimens were fixed in 70% ethanol. These fixed specimens were observed with a Nikon SMZ1500 dissecting microscope and OLYMPUS BX51 compound microscope, and photographed with a Nikon D5200 digital camera. All of the material has been deposited in NSMT.

DNA extraction and sequencing for a partial region of COI gene were carried out following the method of Jimi and Fujiwara (2016). The newly obtained sequence data has been deposited in the DDBJ.

III-1-3. ***Benthoscolex seisuiae*** Jimi, Kimura, Ogawa and Kajiahra, 2018

New Japanese name: Seisui-mitsu-one-umikemushi

III-1-3-1. Material examined

Holotype: NSMT-Pol H-676, 21 mm long, 5 mm wide (without chaetae, at widest chaetiger), 29 chaetigers, female, the Sea of Kumano, 487–596 m depth, 8 November 2017, collected by NJ (left parapodium of chaetiger 15 was dissected for DNA extraction). Paratypes: NSMT-Pol P-677, two specimens, 19–28 mm long, 4–7 mm wide (without chaetae, at widest chaetiger), 29 chaetigers, female, collection data is the same as that of the holotype.

III-1-3-2. Description

Body flat, tapered in anterior and posterior regions, whitish both in life and after fixation; pair of brown longitudinal lines on ventral middle line; no pigmentation on dorsal surface (Fig. III-1A). Body surface smooth.

Prostomium triangular; eyes absent. Pairs of lateral antennae and palps present, conical, smooth; palps 1.8 times as long as lateral antennae. Median antenna present, conical, as long as lateral antennae (Figs III-1B, III-2A). Caruncle consists of three longitudinal ridges, without ornamentation, extends to chaetigers 1–2 (depending on fixation), unattached in posterior part (Fig. III-2A). Mouth composed of chaetigers 1–2. Pharynx eversible with black pigmentation.

Parapodia biramous, notopodia and neuropodia clearly separated (Fig. III-2B). Dorsal and ventral cirri occur singly on notopodium and neuropodium, conical, whitish, arising from body wall, present in all chaetigers. Branchiae present on chaetiger 6 or 7 and succeeding posterior chaetigers: anterior ones simple, conical lobes; gradually increasing in number and size posteriorly (Fig. III-1B, C), branched from base; filaments digitiform, 8–10 filaments per branchia in middle body chaetigers, 15–18 filaments per branchia in posterior chaetigers; branchiae in posterior chaetigers differ in size between specimens, but never reaching to tip of notochaetae (Fig. III-1D).

Notochaetae contain three types: *i*) harpoon chaetae, with serrations limited to one side (Fig. III-2C); *ii*) bifurcate chaetae with weakly serrated or non-serrated short tip (Fig. III-2D); *iii*) bifurcate chaetae, with long serrated tip (Fig. III-2E). Neurochaetae contain two types: *i*) bifurcate chaetae, with weakly serrated or non-serrated short tip (Fig. III-2F); *ii*) bifurcate chaetae, with long serrated tip (Fig. III-2G). Neurochaetae longer than notochaetae.

Anus opening dorsally on terminal chaetiger; anal papilla absent (Fig. III-1D).

III-1-3-3. Etymology

The species is named after the TR/V *Seisui-maru*. The type specimens from the Sea of Kumano were collected by beam trawl gear of the ship. The specific name is a noun in the genitive case.

III-1-3-4. Confirmed distribution

Only known from the type locality, the Sea of Kumano, Japan, 487–596 m depth.

III-1-3-5. Remarks

Benthoscolex seisuiae can be discriminated from *B. coecus* and *B. cubanus* by the following features: *i*) palps 1.8 times as long as lateral antennae (vs. same length as lateral antennae in *B. cubanus*; 2.0 times as long as lateral antennae in *B. coecus*), and *ii*) branchiae do not reach to tip of notochaetae (vs. extending beyond tip of notochaetae in *B. coecus*; they also do not reach to tip of notochaetae in *B. cubanus*). In addition, the tip of the bifurcate neurochaetae is reportedly serrated in *B. cubanus*, whereas it is only weakly serrated, or not serrated at all, in *B. seisuiae*, although chaetal serration is known to be variable in *Eurythoe* (Barroso and Paiva 2007).

Benthoscolex cubanus is reported to be endocommensal in the body cavity of the bathyal irregular sea urchin *Heterobrissus hystrix* (A. Agassiz, 1880) (Hartman 1942; Emson et al. 1993). *Benthoscolex seisuiae* was collected by a beam trawl and found free living as *B. caecus* reported in previous study. In the same haul, 49 specimens representing five species of irregular sea urchins—*Brisaster latifrons* (A. Agassiz, 1898) (n = 13, NSMT E-10723–10724), *Brissopsis luzonica* (Gray, 1851) (n = 6, NSMT E-10721–10722), *Brissopsis* sp. (n = 1, NSMT E-10727), *Lovenia gregalis* Alcock, 1893 (n = 22, NSMT E-10719–10720), *Schizaster* sp. (n = 7, NSMT E-10725–10726)—were present and some were broken in the net. However, examination of body cavity in all but one specimen (used for species identification and photography, Fig. III-3) for each species revealed no commensal *Benthoscolex* worms (A. Ogawa pers. obs.); *Brissopsis* sp. was not examined because it was represented by only one specimen. Therefore, whether *B. seisuiae* is also endocommensal in sea urchins or not cannot be ascertained at the moment. Future studies are required to confirm the present observations of a free-living lifestyle in *B. seisuiae*.

III-2. A new record of hydrothermal-vent-endemic *Archinome jasoni* from the NW Pacific

The hydrothermal-vent-endemic annelid *Archinome jasoni* Borda, Kudenov, Chevaldonne, Blake, Desbruyeres, Fabri, Hourdez, Pleijel, Shank, Wilson, Schulze and Rouse, 2013 has been known from the Atlantic, Indian, and SW Pacific Oceans. In this chapter, I report *A. jasoni* from Okinawa Trough, Japan, which represents the first record of the species and genus from the NW Pacific.

III-2-1. Introduction

The amphinomid annelid genus *Archinome* Kudenova, 1991 consists of five species, all of which have been known from deep-sea hydrothermal-vent and methane seep areas (Borda et al. 2013). Members of the genus are distributed worldwide, and one species, *Archinome jasoni* Borda, Kudenov, Chevaldonne, Blake, Desbruyeres, Fabri, Hourdez, Pleijel, Shank, Wilson, Schulze and Rouse, 2013, is originally described from Sauth West Pacific Lau Basin and known to have a wide distribution from hydrothermal vents of the Atlantic, Indian, to SW Pacific Oceans (Borda et al. 2013). Dr. Chong Chen collected specimens of *Archinome* in Okinawa Trough, NW Pacific in the research cruise KR15-16. Based on morphological and molecular examinations, I identify the specimens as *A. jasoni*.

III-2-2. Materials and methods

Worms were collected by a suction sampler installed on the ROV *Hyper-Dolphin* and ROV *Kaiko Mk-IV* from hydrothermal vents in Okinawa Trough (Fig. III-4); collection data are given in Table III-1. Live specimens were fixed in either 70% or 99.5% ethanol. Preserved specimens were observed with a Nikon SMZ1500 stereomicroscope and an OLYMPUS BX51 compound microscope. DNA extraction and sequencing were carried out following the method of Jimi and Fujiwara (2016). Newly obtained sequences have been deposited in the DDBJ.

III-2-3. *Archinome jasoni* Borda, Kudenov, Chevaldonne, Blake, Desbruyeres, Fabri, Hourdez, Pleijel, Shank, Wilson, Schulze and Rouse, 2013

New Japanese name: nessui-umikemushi

III-2-3-1. Material examined

JAMSTEC, 7 specimens, sex unknown, 7–13 mm long, 3–5 mm wide, 22 chaetigers, Okinawa Trough, 1559 m depth, 13 November 2015, collected by Dr. Chong Chen.

III-2-3-2. Description

Body short, fusiform, 7–13 mm long, 3–5 mm wide, with mid-ventral groove, 22 chaetigers, metallic blue in life (Fig. III-5A), whitish after fixation (Fig. III-5B). Body surface smooth.

Prostomium triangular; two pairs of eyes visible when alive (Dr. Chong Chen personal communication) but not seen in ethanol. Pairs of antennae and palps present, conical; frontal antenna as long as palp. One median antenna present, arising from anterior part of caruncle, conical, very short. Caruncle narrow, elongated and trilobed, fused to body in chaetiger 2; posterior part of caruncle unattached. Segmental lobes large, laterally bursiform. Parapodia biramous; noto- and neuropodia well separated. Two dorsal cirri occur on notopodium and single ventral cirrus occur on neuropodium, conical, whitish in ethanol. Branchiae present in chaetiger 3 and succeeding posterior chaetigers, branched from base. Noto- and neurochaetae bifurcate. Anus on dorsal posterior chaetigers. Pygidium with unpaired median cirrus.

III-2-3-3. Sequences

447 bp,16SrRNA (16S); 832 bp, 28SrRNA (28S), determined from one of the specimens.

III-2-3-6. Remarks

Archinome jasoni has been known from the Atlantic, Indian, and SW Pacific Oceans (Borda et al. 2013). Morphological features and sequences of specimen in this study are consistent with original description of *A. jasoni*. My study represents the first record of the species and genus from the NW Pacific. Some hydrothermal-vent species have a similar distributional pattern (SW to NW Pacific) (Bachraty et al. 2009). This distributional pattern indicates *A. jasoni* has a long period of planktonic larval phase in the life history. Borda et al. (2009) also indicates presence of long distance dispersal capacity of larvae in *A. levinae*.

Chapter IV. Asteriomyzostomidae

This chapter deals with three *Asteriomyzostomum* species described in Jimi et al. (2017b) and estimates phylogenetic position of the family Asteriomyzostomidae.

IV-1. Rare endoparasitic *Asteriomyzostomum* from Japan, including three species redescriptions and their phylogenetic position within Myzostomida

The rare myzostomid genus *Asteriomyzostomum* Jägersten, 1940 consists of two species, both parasitizing sea stars. The phylogenetic position of this genus among Myzostomida has not been previously shown using molecular data. In this study, three species of *Asteriomyzostomum* were collected from the Kumano Sea, Japan, and provide redescription of *A. jinshou* Jimi et al., 2017b, *A. monroeae* Jimi et al., 2017b, and *A. hercules* Jimi et al., 2017b. Specimens of the genus *Asteromyzostomum* were also collected from the Kumano Sea and briefly reported as *Asteromyzostomum* sp. A molecular phylogeny based on four gene markers (COI, 16S, 18SrRNA (18S), Histon H3 (H3)) suggests that the three families Asteriomyzostomidae, Asteromyzostomidae, and Protomyzostomidae comprise a clade. The resulting topology of the tree indicates that a host change from Crinozoa (sea lilies and feather stars) to Asterozoa (asteroids and ophiuroids) occurred only once in the evolutionary history of Myzostomida.

IV-2. Introduction

Myzostomids are obligate symbiotic annelids that mostly associate with echinoderms (Grygier 2000) and consist of seven families, 13 genera, and about 170 species that occur from the shallow to deep sea (Summers et al. 2014; Rouse et al. 2016). While few examples of non-echinoderm hosts are known (Bo et al. 2013; Eeckhaut and Lanterbecq 2014; Terrana and Eeckhaut 2017), they mainly associate with crinoids, but six species are known from asteroids (Summers et al. 2014). Due most likely to their long history as parasites, myzostomids have evolved highly specialized anatomy: the flattened, disc-shaped body shows incomplete segmentation and parenchymatous, acoelomic grade, with indistinct head and few (typically five pairs) parapodia (Grygier 2000). These features obscured the phylogenetic position of Myzostomida among metazoans (Eeckhaut and Lanterbecq 2005), until recent analyses with expanded sequence data made its annelid affinity almost unquestionable (Bleidorn et al. 2007; Struck 2011; Hartmann et al. 2012; Weigert et al. 2014; Andrade et al. 2015). However, the relationship of Myzostomida to other annelids still remains unclear (Summers and Rouse 2014; Andrade et al. 2015).

Asteriomyzostomum Jägersten, 1940 is a monotypic genus in the family Asteriomyzostomidae, whose members are endoparasitic within asteroid-host bodies. Two species are known in the genus: the first species, *Asteriomyzostomum asteriae* (Marenzeller, 1895), is reported from two species of the asteriid starfish, *Sclerasterias neglecta* (Perrier, 1891) and *Sclerasterias richardi* (Perrier, 1882), in the Mediterranean (Marenzeller 1895); and the second species, *Asteriomyzostomum fisheri* (Wheeler, 1905), has been recorded from the goniasterid cushion star *Ceramaster leptoceraumus* (Fisher, 1905) in the Pacific (Wheeler 1905). Several features characterize the genus: the body is wider than long, flattened, and not fungus-like in shape; the anus is situated on the dorsal surface of the body; the hosts are asteroids; and members do not form cyst or gall (Grygier 2000). The genus resembles *Asteromyzostomum* (Asteromyzostomidae), which also associates with asteroids but *Asteriomyzostomum* can be discriminated from *Asteromyzostomum* in that 1) posterior margin is smooth, 2) parapodia are arranged along an oval-shaped contour, and 3) male genital openings are situated laterally (Grygier 2000).

While molecular phylogeny within Myzostomida has been conducted in the last couple of decades (Lanterbecq et al. 2006, 2010; Summers and Rouse 2014), *Asteriomyzostomum* (and thus Asteriomyzostomidae) has not been represented in any of these analyses. Morphologically, Asteriomyzostomidae was regarded to be most closely related to Asteromyzostomidae (Grygier 2000), and the latter has been shown as a sister taxon to Protomyzostomidae parasitizing ophiuroids, in a recent molecular study (Summers and Rouse 2014). Placing *Asteriomyzostomum* in a molecular phylogenetic context is thus indispensable to understanding the evolution of the host relationships in Myzostomida, especially if the Crinoidea–Asteroidea host change has occurred only once (in the case of *Asteromyzostomum–Asteriomyzostomum–Protomyzostomum* monophyly) or independently twice or more (*Asteromyzostomum–Asteriomyzostomum–Protomyzostomum* non-monophyly).

In Japan, about 30 myzostomid species have been reported (Grygier 1990; Grygier and Nomura 1998; Summer et al. 2014; Rouse et al. 2016), but no representative of *Asteriomyzostomum* has been recorded. During a deep-sea faunal survey in the Kumano Sea by Mr. Takeya Moritaki, some endoparasites were collected from sea stars.

I reported these endoparasites as new species of *Asteriomyzostomum* and infer the phylogenetic position of Asteriomyzostomidae among Myzostomida (Jimi et al. 2017b). An additional species of the genus *Asteromyzostomum* was also collected from the Kumano Sea and is briefly reported in this study.

IV-3. Materials and methods

Endoparasites were obtained from deep-sea asteroids (Figs IV-1A, IV-2A, IV-3A) that were collected at two sites in the Kumano Sea, off central Japan, western North Pacific by dredging: Cape Miki, at depths of 196–291 m and 270–341 m, and off Minami-Ise, at 140–360 m depth. All specimens were removed from asteroids, then fixed and preserved in 99.5% ethanol. Preserved specimens were observed under stereomicroscopes MZ 16F (LEICA, Germany) and E600 (Nikon, Japan). All of the material has been deposited in NSMT.

DNA extraction and sequencing followed the methods of Jimi and Fujiwara (2016). Additional sequences of other myzostomid species were obtained from GenBank (Table IV-1). All sequences were aligned using MAFFT ver. 7.205 under the E-INS-i strategy (Katoh and Standley 2013). Alignment-ambiguous positions were removed using trimAL under the gappyout strategy (Capella-Gutiérrez 2009). The sequences of the four genes, COI, 16S, 18S, H3, were concatenated by using Kakusan (Tanabe 2007), which recommended a GTR+G evolutionary model for each of the genes. A phylogenetic tree was constructed using maximum likelihood (ML) method in the program RAxML-VI-HPC (Stamatakis 2006). The robustness of the ML tree was evaluated by 1,000 bootstrap pseudo-replicates (-f option). Bayesian analysis was conducted using MrBayes 3.2.2 (Rambaut et al. 2007), with Markov chains of 10 million generations. Model choice for each partition was also based on the Kakusan results. Run convergence was analyzed using Tracer v1.6 (Huelsenbeck and Ronquist 2001); the first 1 million generations trees were discarded as burn-in.

The traits of life style and the host group were mapped onto the topology of the maximum-likelihood tree. Character transformations were estimated by Mesquite 3.2 with Mk1 likelihood model (Maddison and Maddison 2017). Life style of myzostomids were classified into three groups: 1) internal, 2) external, and 3) internal and external. Hosts of myzostomids were classified into four groups: 1) stalked crinoid, 2) brittle star, 3) sea star, and 4) feather star crinoid.

IV-4. Systematics

IV-4-1. *Asteriomyzostomum hercules* Jimi, Moritaki and Kajihara, 2017

Japanese name: kanmuri-hitode-suikuchimushi

IV-4-1-1. Material examined

Holotype, NSMT-An 512, off Cape Miki, Mie, preserved in 99.5% ethanol, body length 11.3 mm, body width 15.3 mm, 17 December 2015, 196–341 m depth. GenBank (CO1- No. LC314716, 16S- No. LC314709, H3- No. LC314721, 18S- No. LC314713).

Paratypes (24 specimens, collection data same as holotype): NSMT-An 513, three individuals, preserved in 99.5% ethanol, body lengths 5.9–11.4 mm, body widths 11.0–14.7 mm; NSMT-An 514, 21 individuals, preserved in 70% ethanol, body lengths 5.9–13.2 mm, body widths 9.6–19.0 mm.

Type-host: *Coronaster volsellatus* (Sladen, 1889) (Asteroidea: Asteriidae) (Fig. IV-1A).

Host: only known from *Coronaster volsellatus* (Sladen, 1889) (Asteroidea: Asteriidae).

Site of infection: cardiac stomach. Prevalence: moderately high (although without quantitative data); when infected, 1–2 endoparasites were found per one host.

IV-4-1-2. Description

Body oval-shaped, length 5.9–11.4 mm, width 11.0–15.3 mm. In life, body color proximal to parapodia reddish, while peripherally orange outside parapodia (Fig. IV-1B); color faded in preservative (Fig. IV-1C). Body margin wavy, without cirri. Dorsal surface smooth, with anus opening at two-thirds of body length from anterior end (Fig. IV-1D). Mouth small, opening ventrally at one-third of body length from anterior end. Parapodia five pairs, no cirri, having one hook per parapodium, located at one-fourth of body length from lateral margin. Lateral organs four pairs, located ventrally, alternating with parapodia. Unpaired ninth posteromedial organ present. Penes in one pair, located at lateral base of median parapodia.

IV-4-1-3. Etymology

Herculēs is the Roman adaptation of the Greek divine *Heracles*, the son of *Zeus*. In Greek mythology, Hercules is supposed to have endured in the stomach of a sea monster for a long time. That the species lives in the cardiac stomach of the host sea star alludes to this mythology.

IV-4-1-4. Distribution

Off Cape Miki, Mie, Japan. 196–341 m depth.

IV-4-1-5. Remarks

Asteriomyzostomum hercules resembles *A. asteriae*, *A. monroeae*, and *A. jinshou* by having the unpaired ninth posteromedial organ. However, *A. hercules* is unique in the genus by 1) having penes that are located submarginally (at one-fourth the body length from the lateral margin), and 2) the body that is red proximally to the parapodia but peripherally orange.

IV-4-2. *Asteriomyzostomum jinshou* Jimi, Moritaki and Kajihara, 2017

Japanese name: udenagagokaku-hitode-suikuchimushi

IV-4-2-1. Material examined

Holotype, NSMT-An 515, off Minami-Ise, Mie, preserved in 99.5% ethanol, body length 11.3 mm, body width 15.3 mm, 10 November 2015, 200–320 m depth. GenBank (CO1- No. LC314718, 16S- No. LC314710, H3- No. LC314722, 18S- No. LC314714). Paratypes (4 specimens): NSMT-An 516, one individual, off Miki Cape, Mie, preserved in 70% ethanol, body length 3.0 mm, body width 4.0 mm, 24 December 2015, 265–374 m depth; NSMT-An 517, two individuals, off Miki Cape, Mie, preserved in 70% ethanol, body lengths 3.0–3.4 mm, body widths 4.5–5.0 mm, 17 March 2016, 280–300 m depth; NSMT-An 518, one individual, off Minami-Ise, Mie, preserved in 70% ethanol, body length 5.0 mm, body width 7.0 mm, 19 April 2016, 150–360 m depth. Type-host: *Mediaster brachiatus* Goto, 1914 (Asteroidea: Goniasteridae) (Fig. IV-2A). Host: only known from *Mediaster brachiatus* Goto, 1914 (Asteroidea: Goniasteridae). Site of infection: rectal sac. Prevalence: 12/280 (4.3%).

IV-4-2-2. Description

Body oval-shaped, length 3.0–11.3 mm, width 4.0–15.3 mm. In life, body color proximal to parapodia reddish, while peripherally milky-white outside parapodia (Fig. IV-2B); color faded in preservative (Fig. IV-2C). Body margin not wavy (except in one paratype specimen, NSMT-An 516) with no cirri. Dorsal surface smooth, with anus opening at seven-eighths of body length from anterior end (Fig. IV-2D). Mouth small, opening ventrally at one-fifth of body length from anterior end. Parapodia five pairs, no cirri, having one hook per parapodium, located at one-fourteenth of body length from lateral margin. Lateral organs in four pairs, located ventrally, alternating with parapodia. Unpaired ninth posteromedial organ present. Penes one pair, located at lateral margin of body.

IV-4-2-3. Etymology

The specific name is a noun in apposition, named after the fishing vessel Jinshou-maru, which was used while collecting the specimens.

IV-4-2-4. Distribution

Off Minami-Ise, Mie, Japan. 200–320 m depth.

IV-4-2-5. Remarks

Asteriomyzostomum jinshou resembles *A. asteriae, A. monroeae*, and *A. hercules* by having the unpaired ninth posteromedial organ. However, *A. jinshou* is unique in the genus by *i*) having penes that are located laterally and *ii*) the pink body color in life.

IV-4-3. *Asteriomyzostomum monroeae* Jimi, Moritaki and Kajihara, 2017

Japanese name: hime-hitode-suikuchimushi

IV-4-3-1. Material examined

Holotype, NSMT-An 519, off Minami-Ise, Mie, preserved in 99.5% ethanol, body length 2.7 mm, body width 3.1 mm, 11 December 2015, 140–200 m, GenBank (CO1- No. LC314717, 16S- No. LC314708, H3- No. LC314720, 18S- No. LC314712). Paratypes (3 specimens, off Minami Ise: NSMT-An 520, two individuals, preserved in 70% ethanol, body length 3.0–3.5 mm, body width 3.9–4.2 mm, 11 March 2016, 140–200 m; NSMT-An 521, one individual, preserved in 70% ethanol, body length 3.0 mm, body width 4.0 mm, 26 November 2015, 140–230 m.

Type-host: *Henricia* sp. (Fig. IV-3A). Host: only known from *Henricia* sp. (Asteroidea: Echinasteridae). Site of infection: pyloric caecum. Prevalence: 7/27 (25.9%).

IV-4-3-2. Description

Body oval-shaped, length 2.7–3.5 mm, width 3.1–4.2 mm. In life, body color proximal to parapodia reddish pink, while peripherally whitish outside parapodia (Fig. IV-3B); color faded in preservative (Fig. IV-3C). Body margin wavy, without cirri. Dorsal surface smooth, with anus opening at two-third of body length from anterior end (Fig. IV-3D). Mouth large, protruded (Fig. IV-3B, C), opening ventrally at one-tenth to two-seventh of body length from anterior end. Parapodia five pairs, no cirri, having one hook per parapodium, located at one-fourth of body length from lateral margin. Lateral organs in four pairs, located ventrally, alternating with parapodia. Unpaired ninth posteromedial organ present. Penes one pair, located at lateral margins.

IV-4-3-3. Etymology

The specific epithet is a noun in the genitive case, named after the American actress Marilyn Monroe. The protruded mouth in the new species is reminiscent of her puckered lips.

IV-4-3-4. Distribution

Type-locality: off Minami-Ise, Mie, Japan. 230–300 m depth.

IV-4-3-5. Remarks

This species resembles *A. asteriae*, *A. hercules*, and *A. jinshou* by having unpaired ninth posteromedial organ. This species is unique in the genus by having a big (size is about 1/6 of body width) and protrunded mouth.

IV-4-4. *Asteromyzostomum* sp.

IV-4-4-1. Taxonomic summary of additional species

ICHUM-5380, three specimens, off Cape Miki, Mie, preserved in 99.5% ethanol, 12 November 2016, 285–436 m, GenBank (CO1- No. LC314719, 16S- No. LC314711, 18S- No. LC314715). Host: known from *Lophaster asiaticus* (Asteroidea: Solasteridae). Site of infection: Ambulacral groove. Prevalence: 2/4 (50 %).

IV-4-4-2. Distribution

Off Cape Miki, Mie, Japan. 285–436 m depth.

IV-5. Phylogenetic analysis

In the resulting tree, Asteriomyzostomidae and Asteromyzostomidae are reciprocally monophyletic, although they comprise a poorly supported clade (56% bootstrap support [BS], 0.98 posterior probabilities [PP]). Protomyzostomidae is sister to the Asteriomyzostomidae–Asteromyzostomidae clade, with high support value (100% BS, 1.00 PP) (Fig. IV-4). In the Asteriomyzostomidae clade (99% BS, 1.00 PP), *Asteriomyzostomum monroeae* is sister to the *A. hercules*–*A. jinshou* clade (96% BS, 1.00 PP).

IV-6. Tracing ancestral host group/life-style character of myzostomids

Host group (Fig. IV-5A): the ancestral-state reconstruction showed that the host group of the last common ancestor of Protomyzostomidae, Asteriomyzostomidae, and Asteromyzostomidae was likely to be sea stars with 65% probability. The reconstruction analysis also indicated that the host animals for the last common ancestor of the entire myzostomids would be staked crinoids with 83% probability.

Life style (Fig. IV-5B): the ancestral state of the life style among the Asteromyzostomidae–Asteromyzostomidae clade was likely to be endoparasitic (97%). The analysis indicated that the last common ancestor of the all living myzostomids would also be endoparasitic (96%).

IV-7. Discussion

The present phylogenetic analysis corroborates the previous, morphology-based study (Grygier 2000), which indicated that Asteriomyzostomidae would be most closely related to Asteromyzostomidae (both groups parasitize asteroids), because the body is laterally expanded, gut diverticula are reduced to one or two pairs, and these genera associate with asteroids (Grygier 2000). However, because the support value for the monophyly of Asteriomyzostomidae and Asteromyzostomidae was not so high (56% BS), this relation should be scrutinized with expanded taxon sampling and gene markers in future studies. Regardless of the robustness of the Asteriomyzostomidae–Asteromyzostomidae monophyly, my analysis firmly showed that the three families Protomyzostomidae, Asteriomyzostomidae, and Asteromyzostomidae form a clade (100% BS; 1.00 PP). My ancestral-state reconstruction analysis suggests that the Crinoidea–Asteroidea host change has occurred probably only once at the last common ancestor of this clade, of which the host would be sea stars (65% probability) or brittle stars (5%), rather than crinoids (stalked crinoids with 22% probability; feather stars with 8% probability) (Fig. IV-5A). The life-style reconstruction analysis (Fig. IV-5B) indicates that shifts between endo- and ectoparasitism seem to have occurred independently more than once in the evolutionary history of Myzosotmida. My analysis corroborates Summers and Rouse's (Summers and Rouse 2014) results that the last common ancestor of the crown-group myzostomids would also be internal style.

Chapter V. Chrysopetalidae

This chapter deals with one chrysopetalid genus and species described in Jimi et al. (2019) and estimates phylogenetic position of the genus in Chrysopetalidae.

V-1. Polychaete meets octopus: symbiotic relationship between *Spathochaeta octopodis* and *Octopus* sp. (Mollusca: Octopodidae)

Marine annelids in the subfamily Calamyzinae (family Chrysopetalidae) are either symbiotic or free-living forms that have been mainly reported from deep-sea chemosynthetic systems. Symbiotic calamyzines mainly live in the mantle cavity of bivalves in hydrothermal vents or methane seeps, but one species is also found to be inserted into the epidermis of polychaetes. I, together with my colleagues, found a single specimen of calamyzine polychaete on the body surface of *Octopus* sp. collected in the Sea of Kumano (Japan), which represented the first known record of symbiotic association between polychaetes and octopuses. The specimen is to be described as a new species in new genus, *Spathochaeta octopodis*. *Spathochaeta* gen. nov. can be discriminated from other genera in Calamyzinae by the presence of spatula-shaped notochaetae and dorsal chaetal lobes. Also provided are the phylogenetic position of *S. octopodis* gen. et sp. nov. within Chrysopetalidae based on four gene markers (COI, 16S, 18S, H3).

V-2. Introduction

Polychaetes show great biodiversity in marine ecosystems, many of them being involved in symbiotic relations (Martin and Britayev 1998; Rouse and Pleijel 2001). Hosts of symbiotic polychaetes occur among sponges, cnidarians, molluscs, annelids, crustaceans, echinoderms, and tunicates (Martin and Britayev 1998). The molluscan hosts include bivalves, gastropods, limpets, chitons, and squids (Martin and Britayev 1998; Aguado et al. 2013; Martin et al. 2012, 2015, 2017), but no octopuses (Cheng 1967; Hochberg 1983). Ectoparasites on octopuses so far known are leeches (e.g. *Stibarobdella moorei* (Oka, 1910)) and copepods (e.g. *Octopicola* spp.) (Cavaleiro et al. 2013; López-Peraza et al. 2017), but no polychaetes.

Marine annelids in the subfamily Calamyzinae (family Chrysopetalidae) comprise three free-living and five symbiotic genera (Aguado et al. 2013; Watson et al. 2016). The symbiotic calamyzines are either endoparasites in molluscs or ectoparasites on polychaetes. Except *Calamyzas amphictenicla* Arwidsson, 1932, which lives on ampharetid polychaetes, all the other calamyzines are known from chemosynthetic ecosystems, such as methane seeps and whale carcasses (Arwidsson 1932; Aguado et al. 2013; Watson et al. 2016). My collegue Mr. Takeya Moritaki found a chrysopetalid polychaete from an octopus that was collected from the Kumano Sea. I described an undescribed genus and species of Calamyzinae, which represents the first record of a symbiotic relationship between polychaetes and octopuses (Jimi et al. in press).

V-3. Materials and methods

A single specimen of calamyzine annelid was found by Mr. Takeya Moritaki, on the body surface of a specimen of *Octopus* sp. (Fig. V-1A, B) collected in the Kumano Sea, at 150 m depth, off Owase, central Japan, western North Pacific (around 34°06'N, 136°20'E), during an operation of the offshore fishing trawler Jinsho-maru XVIII on 19 November 2017. The octopus, about 3 cm in mantle length and 2.5 cm in mantle width, was hiding in an empty shell when it was collected. The shell, containing the octopus, was then placed in a seawater tank in Toba Aquarium. The presence of the calamyzine was first noticed on 20 November 2017, when the octopus was pulled out of the shell. The octopus, with the calamyzine attaching on the body surface, was then restored into the shell and kept placed in the tank. Three days later, the calamyzine was confirmed to be still attaching on the octopus body surface. It was then removed from the octopus, fixed in 10% formalin/sea water and preserved in 70% ethanol. One parapodium was previously removed and fixed in 99.5% ethanol for DNA extraction. The preserved calamyzine specimen was observed under stereomicroscopes MZ 16F (LEICA, Germany) and E600 (Nikon, Japan). The specimen was not dissected to keep its integrity as holotype. The holotype is deposited in NSMT.

DNA extraction and sequencing followed the methods of Jimi and Fujiwara (2016). Additional sequences of other chrysopetalids were obtained from GenBank (Table V-1). Alignment, as well as maximum-likelihood and Bayesian phylogenetic tree construction followed the procedures of Jimi et al. (2017b). Newly obtained sequences have been deposited in DDBJ (Table V-1). Calculation of pairwise genetic distance calculating followed the methods of Jimi et al. (2016).

V-4. Results

V-4-1. *Spathochaeta* Jimi, Moritaki and Kajiahra, 2019

Japanese name: tako-yadori-gokai-zoku

V-4-1-1. Type species

Spathochaeta octopodis

V-4-1-2. Diagnosis

Body flat. Prostomium with pair of small lateral antennae; median antenna absent. Parapodia biramous with dorsal chaetal lobe. Notopodia with simple spatular chaetae. Neuropodia with spinigerous compound chaetae.

V-4-1-3. Etymology

The genus name, feminine in gender, derives from the Latin *spatha* (spatula) and *chaeta* (mane, hair), referring to the spatula-shaped notopodial chaetae, which are characteristic for the genus.

V-4-1-4. Remarks

Within Calamyzinae, notopodia having notochaetae are found not only in *Spathochaeta* but also in *Boundemos* Watson, Carvajal, Sergeeva, Pleijel, and Rouse, 2016; *Microspina* Watson, Carvajal, Sergeeva, Pleijel, and Rouse, 2016; and *Vigtorniella* Kiseleva, 1996 (Kiseleva 1996; Aguado et al. 2013; Watson et al. 2016). *Spathochaeta* differs from these three genera in having dorsal chaetal lobes and simple spatular chaetae on notopodia. The molecular analysis indicated the new genus is sister to *Calamyzas* Arwidsson, 1932 (see “Molecular analysis” part below). *Calamyzas* can be discriminated from *Spathochaeta* by the following features: *i*) absence of dorsal lobe; *ii*) absence of notochaeta; *iii*) having only one type chaeta (compound chaeta) (Aguado et al. 2013).

V-4-2. *Spathochaeta octopodis* Jimi, Moritaki and Kajihara, 2019

Japanese name: tako-yadori-gokai

V-4-2-1. Material examined

Holotype: NSMT-Pol H-654.

V-4-2-2. Sequences

Sequences were determined from the holotype (NSMT-Pol H-654): COI, 491 bp, LC381959; 16S, 491 bp, LC381961; H3, 372 bp, LC381960.

V-4-2-3. Description

Body flat, elongated, tapered in posterior region, 8.5 mm long, 2 mm wide, 59 chaetigers, whitish in life and after preserved in ethanol (Figs V-1, V-2). Prostomium rounded, with a pair of lateral antennae; a pair of palps present on ventral side; other appendages absent; eyes absent (Figs V-2A, V-3A). Antennae very short, digitate; palps short, rectangular (Fig. V-3A). Mouth present in chaetigers 1–2. Jaws not examined. A pair of pores opening on ventral side of each of chaetigers 4–59 (Figs V-2B, V-4A). Parapodia biramous; acicula present in noto- and neuropodia (Fig. V-4B). Notopodia with dorsal cirrus, conical, as long as prostomium width, whitish, and dorsal chaetal lobe, round, fan-shaped, thin, whitish, translucent, present above dorsal cirrus in chaetigers 2–59, reaching to $^3/_4$ of dorsal cirrus (Fig. V-4C). Neuropodia without neuropodial lobe, with ventral cirrus conical, as long as width of prostomium, whitish (Fig. V-4D). Notochaeta simple, spatula-shaped, with shallow groove in its basal to middle portion; tip rounded (Fig. V-3B); about 40 chaetae per parapodium; reaching to half of dorsal chaetal lobe (Fig. V-4C). Neurochaetae compound, blade serrated on only one side, shaft with shallow groove in its basal to distal portion (Fig. V-3C), about 35 chaetae per parapodium (Fig. V-4D). Pygidium without cirrus.

Eggs present throughout the body, about 60 μm in diameter.

V-4-2-4. Etymology

The specific name is a noun in the genitive case of the Latin *octopus*, indicating the host organism of the new species.

V-4-2-5. Habitat

Spathochaeta octopodis was collected from the external body surface of *Octopus* sp. (Fig. V-1). My observation that the living specimen of *S. octopodis* kept attaching on the octopus' body surface for three days strongly supports symbiotic relation between the species and the octopus, instead of an accidental attachment. When alive, the worm was observed to move around from the mantle to web of the host octopus. However, further findings and observations on the behavior of the species are required to confirm the postulated symbiotic association. The octopus was collected from off Owase, the Kumano Sea, off central Japan, western North Pacific, 150 m depth.

V-4-3. Molecular analyses

In the resulting phylogenetic tree, *Spathochaeta* is grouped within the Calamyzinae with a 100% bootstrap support [BS] and 1.00 posterior probabilities [PP]. *Spathochaeta* is sister to *Calamyzas* with high support (81% BS; 1.00 PP) (Fig. V-5). Pairwise genetic distance of COI sequences in terms of K2P between *Spathochaeta octopodis* and *Calamyzas amphictenicla* was 0.247.

V-5. Discussion

In this study, I found symbiotic association of polychaete with octopus, which is supported by behavior on the octopus and phylogenetic position that showed *Spathochaeta* was contained in Calamyzinae that maily consists of symbiotic members. However, I should continue to investigate ecology of the genus for understanding actual relationship with octopuses.

Spathochaeta was sister to *Calamyzas* and the *Spathochaeta–Calamyzas* clade was sister to *Microspina*. Because the known hosts of *Calamyzas* are exclusively ampharetid annelids (Arwidsson 1932; Aguado et al. 2013), this relationship suggests a common ancestor for *Spathochaeta–Calamyzas* clade being likely a generalistic symbiont with a host range including Cephalopoda and Annelida, which would not be surprising taking into account that there are symbiotic polychaetes with a wide host range. For instance, *Arctonoe vittata* (Grube, 1855) (Polynoidae) is known to live in association with annelids, molluscs, and echinoderms (Hanley 1989; Britayev 1991; Park et al. 2016).

All known calamyzines except *Calamyzas* live near methane seeps or thermal vents (Aguado et al. 2013; Watson et al. 2016), where most animals (including the host for the symbiotic species) depend on chemosynthetic bacteria while *S. octopodis* was collected from the body surface of an octopus living in a non-chemosynthetic environment. According to the topology of my molecular phylogenetic trees, I suggest that the last common ancestor of Calamyzinae living in a chemosynthetic environment, while a migration into non-chemosynthetic environments happened in a lineage leading to the *Spathochaeta–Calamyzas* clade. However, the nodal supports for the basal topology of Calamyzinae in my trees is very poor. Therefore, more information (either from different species and additional gene markers) is necessary to correctly infer the evolutionary history of the host changes in the Calamyzinae.

Chapter VI. Cirratulidae

This chapter deals with twelve species of *Cirriformia* from Japan.

VI-1. Evaluation of "*Cirriformia tentaculata*" (Annelida: Cirratulidae) from Japan as a pollution indicator in marine environments: Is this truly a single species?

"*Cirriformia tentaculata*" is considered to be distributed throughout Japanese waters and is used as an indicator species of organic pollution in coastal regions. However, previous studies indicated that "*C. tentaculata*" from Japan contained cryptic or sibling species. For solving this taxonomic problem, I collected *Cirriformia* from throughout Japan and conducted taxonomic analyses. Molecular phylogenetic analyses showed that the *Cirriformia* worms I collected divided into twelve phylotypes. I conducted detailed morphological analyses of each phylotype and found morphological differences between each of them. Ten species turned out to be new to science and the remaining two accorded with the original description of *C. tentaculata*. Physio-chemical characteristics of their habitats were not identical between each species, which suggested that the so-called "*C. tentaculata*" in Japanese waters is not adequate for the pollutant indicator.

VI-2. Introduction

Marine invertebrates are used as environmental indicators, because each species selects suitable physio-chemical environments (Kikuchi 1975; Pearson and Rosenberg 1978; Diaz and Rosenberg 1995). Environmental measurements at a certain occasion reflect the temporary environment conditions, while emergence of indicator species reflect long-term conditions including seasonal change (Kikuchi 1975).

Polychaetes are commonly used as indicator species (Kitamori 1975; Pearson and Rosenberg 1978; Diaz and Rosenberg 1995), because polychaetes inhabit all over the world's marine environments and one of the most dominant taxa within marine benthos (Reish 1979; Rouse and Pleijel 2001; Dean 2008). Polychaetes as indicator species have been investigated in Japan (Kitamori 1975; Kikuchi 1975, 1979; Furota 1985, 1986a, 1986b; The Metropolitan Region Govermments Comittee on the Water Quality 1999, 2000) and were used in marine environmental researches by governments and private company (Sonoda et al. 2002; International EMECS Center 2004; Ando and Kawai 2007; Yokohama City 2010; Koichi et al. 2011; Toshiba Coporation 2013). The most famous indicator species of polychaetes is *Capitella capitata* (Fabricius, 1780) that is an indicator of marine pollution caused by organic enrichment and many reports about using the species as pollution indicator species were published in the world (Reish 1957; Bellan 1967; Reish 1972; Rosenberg 1972; Wade et al. 1972; Kitamori 1975; Kikuchi 1979). A cirratulid polychaete, *Cirriformia tentaculata* (Montagu, 1808), is also used as an indicator species of marine pollution caused by organic enrichment (Pearson and Rosenberg 1978; Furota 1986a; Dean 2008). The species is considered to be cosmopolitan and used in the world as pollution indicator species. It is no exception in Japan (International EMECS Center 2004; Dean 2008; Yokohama City 2010; Koichi et al. 2011; Toshiba Coporation 2013). However, these indicator species are problematic in taxonomy. They may contain many cryptic or sibling species worldwide (George 1967; Petersen 1999; Carr et al. 2011; Nygren 2014). If so, each species may have different physiological tolerance, which leads to habitat segregation (Kikuchi 1979). For accurate environmental assessment, such indicator species have to be re-examined in taxonomy and in ecology including habitat conditions.

The cirratulid genus *Cirriformia* Hartman, 1936 is characterized from other cirattulid genera by following features: *i*) presence of many tentacles in dorsal after second chaetiger and branchia occurring singly (Fig. VI-1A); *ii*) a branchia arises close to notopodia and does not shift to dorsal in middle body segments; *iii*) dorso-lateral branchial bulges are not formed; *iv*) chaetae include capillaries and acicular spines (Magalhães et al. 2014). This genus currently consists of 25 species that live in soft sediments from intertidal to deep-sea environments worldwide (Fig. VI-1B).

Cirriformia tentaculata is known as common species of the genus *Cirriformia* from throughout Japan (Yamanishi and Sato 2007). *Cirriformia comosa* (Marenzeller, 1879), originally described from Japan but is considered as a junior synonym of *C. tentaculata* (Imajima and Hartman 1964b). A previous study had indicated that *C. tentaculata* from Japan was *C. comosa* without morphological observation (Petersen 1999). Additionally, previous study indicated that *C. tentaculata* from Japan contains several morpho-types (Yamada 2009a). If *C. tentaculata* from Japan contains multiple species and each species shows different physiological tolerance, quality of environmental assessment would be doubtful using *C. tentaculata* as an indicator species.

In this study, I conducted taxonomic revision of “*Cirriformia tentaculata*” from Japan and compare habitat conditions of each species.

VI-3. Materials and methods

VI-3-1. Materials

Sampling locations are shown in Table. VI-1, and Figures VI-1C, VI-1D, and VI-2. All the specimens were fixed and preserved in 70 % ethanol.

VI-3-2. Environmental measurements

Sediments were collected from each sampling site. Ignition loss (IL), grain size and Oxidation-Reduction Potential (ORP) were measured according to the Ministry of the Environment Government of Japan (2012) protocol. Water temperature, pH, salinity, Dissolved Oxygen (DO), Total Dissolved Solid (TDS), ORP were measured at each sampling site using a Horiba U-51 (Horiba, Japan).

VI-3-3. Morphological observations

Preserved specimens were observed under an MZ 16F stereoscopic microscope (Leica, Germany), twelve of which were treated for SEM. The specimens for SEM observations were washed in filtered artificial seawater and post-fixed with 2 % OsO_4/artifical seawater for 2 h. After six-time washes with deionized water (DW), these specimens were incubated with 0.2 % aqueous tannic acid (pH 6.8) for 30 min for conductive staining. The specimens were washed again with DW, treated with 1 % OsO_4/DW for 30 min, and then washed with DW. The specimens were dehydrated in a graded ethanol series, dried in a JCPD-5 (JEOL, Japan) critical point dryer using liquid CO_2, and coated with osmium in a POC-03 (Meiwafosis, Japan) for 5 s. SEM observations were conducted using a JSM-6700F instrument (JEOL). Methyl green staining was conducted according to Tomioka et al. (2014).

VI-3-4. DNA extraction, amplification, sequencing, and phylogenetic analysis

The total genomic DNA was extracted from 221 specimens using a DNeasy Blood and Tissue Kit (Qiagen, USA) according to the manufacturer’s protocol. Partial COI sequences were amplified by the polymerase chain reaction (PCR) with the primers polyLCO (5′-GAYTATWTTCAACAAATCATAAAGATATTGG-3′) and polyHCO

(5′-TAMACTTCWGGGTGACCAAARAATCA-3′) (Carr et al. 2011). The reaction mixture consisting of 0.25 µl TaKaRa Ex Taq (Takara, Japan), 5 µl of 10 × Ex Taq Buffer (Takara), 4.0 µl dNTP mixture (Takara), 5 µl of each primer pair (10 µM), 0.75 µl of extracted DNA, and 35 µl of distilled water was prepared. The PCR protocol consisted of an initial denaturation step at 94 °C for 1 min, followed by 35 cycles of 30-s denaturation at 94°C, 60-s annealing at 55°C, and 1-min extension at 72°C, with a final extension at 72°C for 10 min. To confirm successful amplifications, PCR products were visualized using 1.2 % Agarose S (Nippon Gene, Japan) gel electrophoresis. Successful PCR products were purified by an Wizard SV Gel and PCR Clean-Up System (Promega, USA) according to the manufacturer's protocol. The DNA sequencing reaction of the PCR products was performed using a BigDye Terminator v3.1 Cycle Sequencing Kit (Applied Biosystems, USA). Direct sequencing was performed using a 3130xl Genetic Analyzer (Applied Biosystems). The 1 µM primers were used for sequencing reactions.

Additional COI sequences from *Cirriformia tentaculata*, *C. capixabensis* and *Timarete caribous* were also obtained from GenBank (KM192162.1, KM192163.1, KM192176.1, KM192177.1, KP794930.1, KR916809.1) (Magalhães et al. 2014; Weidhase et al. 2015). All sequences were aligned using Mafft ver. 7.205 under the E-INS-i strategy (Katoh and Standley 2013). Alignment-ambiguous positions were removed using Se-Al 2.0 (Rambaut 1996). A phylogenetic tree was constructed using the maximum likelihood (ML) method. The ML tree was obtained using MEGA 5.2.2 (Tamura et al. 2011). As recommended in the MEGA 5.22, the general time-reversible model with sites following a gamma distribution (GTR+G+I) use for ML tree. Bootstrap analysis was conducted with 1,000 replicates. Pairwise genetic distances were calculated using MEGA5.22 on the basis of the COI sequences using the uncorrected *p*-distance and Kimura's two-parameter (K2P) model (Kimura 1980).

VI-4. Results

VI-4-1. Morphological analysis

Morphological observations of notochaeta, neurochaeta, tentacles, branchia and methyl green staining pattern showed that *Cirriformia* collected from Japanese waters were divided into 12 groups. Ten of them are undescribed species and two of them are involved in the definition of *C. tentaculata*.

VI-4-2. Phylogenetic analysis

The final length of the aligned COI sequence was 509 bp. The maximum likelihood (ML) tree obtained in this study (Fig. VI-3) showed that *Cirriformia* from Japanese waters was divided into 12 clades and each clade were monophyletic (Bootstrap (BS) value = 100 %). The genetic distances of the sequences among each *Cirriformia* clade are shown in Table VI-2. Interspecific K2P distances ranged from 0 to 0.023 and Intraspecific from 0.094 to 0.264.

VI-4-3. Description

VI-4-3-1. *Cirriformia* sp. A

New Japanese name: Okinawa-mizuhikigokai
(Figs VI-4–6)

VI-4-3-1-1. Material examined

Senagajima: one of unknown sex, body length 20 mm, body width 1 mm, 49 chaetigers, 20 October 2014, coll. N. Jimi.

VI-4-3-1-2. Description

Body length 20 mm and width 1 mm, 169 chaetigers, and colour in life orange. Color in alcohol pale yellow (Fig. VI-4A). Some specimen pigmented in anterior ventral zone. Body elongated, dorsally inflated, ventral surface not grooved. No eyes. Prostomium conical and pigmented (Fig. VI-5). Paired nuchal organs located. Peristomium with annulations. Deeply grooved in junction between peristomium and first chaetiger. Branchia start from first chaetiger, one pair per segment. Branchia arising from notopodial ridge, do not shift in mid-dorsal section as *Timarete* species, remain in laterally. Notopodia and neuropodia separated. Two groups of dorsal tentacles arising from chaetigers 4–5. 16–19 tentacles per group. Dorsal tentacles organized in two rows each. Notopodia and neuropodia has capillary chaeta and spine. Notochaeta: 1–7 capillary chaetae per fascicle and 2–3 spines (Fig. VI-6A) from chaetiger 29. Neurochaeta: 1–5 capillary chaetae per fascicle and 2–3 spines (Fig. VI-6B) from chaetiger 16. Pygidium simple, with terminal anus.

VI-4-3-1-3. Methyl Green staining pattern

The edge of dorsal region of chaetigers 1–3 was notably stained. Segment after tentacles were stained forming complete rings around segments, inter-segmental grooves not staining (Fig. VI-4B, C).

VI-4-3-1-4. Distribution and habitat

Only known from tidal flats of Senaga Island, Ryukyu Islands.

VI-4-3-1-5. Remarks

This species resembles to *Cirriformia chicoi* Magalhaes, Seixas, Paiva and Elias, 2014 and *C. melanacantha* (Grube, 1872) in dorsal tentacles arising from chaetigers 4–5. This species can be discriminated by branchia start from chaetiger 1, whereas *C. chicoi* start from peristomium. Also, *Cirriformia melanacantha* does not have hooks in notopodia.

VI-4-3-2. *Cirriformia* sp. B

New Japanese name: iwa-mizuhikigokai
(Figs VI-7–9)

VI-4-3-2-1. Material examined

Torinosu: one of unknown sex, body length 31 mm, body width 1 mm, 166 chaetigers, 27 June 2014, coll. N. Jimi. Toyohama: one of unknown sex, body length 18 mm, body width 1 mm, 144 chaetigers, 03 June 2014, coll. N. Jimi.

VI-4-3-2-2. Description

Body length 17–31 mm and width 1.0 mm, 144–166 chaetigers, and colour in life orange. Color in alcohol pale yellow (Fig. VI-7A). Some specimen pigmented in anterior ventral zone. Body elongated, dorsally inflated, ventral surface not grooved. No eyes. Prostomium conical (Fig. VI-8). Paired nuchal organs located. Peristomium with annulations. Deeply grooved in junction between peristomium and first chaetiger. Branchia start from chaetiger 1, one pair per segment. Branchia arising from notopodial ridge, do not shift in mid-dorsal section as *Timarete* species, remain in laterally.

Notopodia and neuropodia separated. Two groups of dorsal tentacles arising from chaetigers 5–6, 10–17 tentacles per group. Dorsal tentacles organized in two rows each. Notopodia and neuropodia have capillary chaeta and spine. Notochaeta: 2–7 capillary chaetae per fascicle and 3–6 spines (Fig. VI-9A) from chaetigers 43–46. Neurochaeta: 3–10 capillary chaetae per fascicle and 2–5 spines (Fig. VI-9B) from chaetigers 28–35. Pygidium simple, with terminal anus.

VI-4-3-2-3. Methyl Green staining pattern

The margin of prostomium was notably stained. Segment after tentacles were stained forming complete rings around segments, inter-segmental grooves not staining (Fig VI-7B, C).

VI-4-3-2-4. Distribution and habitat

Known from a chink in a rock collected from shallow area (~ 3 m) of Pacific Ocean side of Japan.

VI-4-3-2-5. Remarks

This species resembles to *Cirriformia moorei* Blake, 1996, *C. pygdia* (Treadwell, 1936) and *C. capixabensis* Magalhaes, Seixas, Paiva and Elias, 2014 in dorsal tentacles arising from chaetigers 5–6. The species can be discriminated by spine of neuropodia start from chaetigers 28–35, whereas *C. moorei* start from about chaetiger 85. *Cirriformia capixabensis* have many neuropodial spines (5–6), whereas *Cirriformia saxicola* has few spines (2–5). Also, *C. pygdia* does not have hooks in notopodia.

VI-4-3-3. *Cirriformia* sp. C

New Japanese name: doro-mizuhikigokai

(Figs VI-10–12)

VI-4-3-3-1. Material examined

Asadokoro: one of unknown sex, body length 32 mm, body width 1 mm, 205 chaetigers, 10 June 2014, coll. N. Jimi. Higatakouen: two of unknown sex, body length 42–52 mm, body width 2 mm, 235–308 chaetigers, 28 June 2014, coll. N. Jimi. Honjyou: one of unknown sex, body length 87 mm, body width 2 mm, 288 chaetigers, 24 June 2014, coll.

N. Jimi. Issiki: one of unknown sex, body length 32 mm, body width 2 mm, 109 chaetigers, 03 June 2014, coll. N. Jimi. Siokawa: one of unknown sex, body length 116 mm, body width 7 mm, 338 chaetigers, 02 June 2014, coll. N. Jimi. Souzugawa: one of unknown sex, body length 68 mm, body width 2 mm, 300 chaetigers, 18 June 2014, coll. N. Jimi.

VI-4-3-3-2. Description

Body length 32–116 mm and width 1–7 mm, 109–338 chaetigers, and colour in life orange. Color in alcohol pale yellow (Fig. VI-10A). Some specimen pigmented in anterior ventral zone. Body elongated, dorsally inflated, ventral surface not grooved. No eyes. Prostomium rounded (Fig. VI-11). Paired nuchal organs located. Peristomium with annulations. Deeply grooved in junction between peristomium and first chaetiger. Branchia start from peristomium, one pair per segment, few. Branchia arising from notopodial ridge, in posterior segments, inserted at discrete distance from notopodial ridge. However, branchia does not shift in mid-dorsal section as *Timarete* species, remain in laterally. Notopodia and neuropodia separated. Two groups of dorsal tentacles arising from chaetigers 5–6 (< 42 mm length) or 6–7. (> 42 mm length), 4–10 tentacles per group. Dorsal tentacles organized in two rows each. Notopodia and neuropodia has capillary chaeta and spine. Notochaeta: 3–12 capillary chaetae per fascicle and 2–4 spines (Fig. VI-12A) from chaetigers 110–235. Neurochaeta: 3–8 capillary chaetae per fascicle and 3–7 spines (Fig. VI-12B) from chaetigers 31–48. Pygidium simple, with terminal anus.

VI-4-3-3-3. Methyl Green staining pattern

The margin of prostomium and edge of dorsal area of chaetiger 2–4 were notably stained. Segment after tentacles were stained forming complete rings around segments, inter-segmental grooves not staining (Fig VI-10B, C).

VI-4-3-3-4. Distribution and habitat

Known from tidal flats in the area of Pacific Ocean side of Japan.

VI-4-3-3-5. Remarks

This species has dorsal tentacles in chaetigers 5–6 or 6–7 and branchia starting from peristomium. *Cirriformia chehocensis* (Grube, 1877) is not described chaetiger number of starting branchia in original description, but dorsal tentacles arise from one segment (5 or 6). This character helps discrimination *C. chehocensis* from *C.* sp. C.

This species resembles to *C.* sp. D in dorsal tentacles in chaetigers 5–6 or 6–7 and branchia starting from peristomium. This species can be discriminated from *C.* sp. D by neuropodial spine start from more posterior chaetigers (110–235) and shape of prostomium (rounded *vs.* conical).

VI-4-3-4. *Cirriformia* sp. D

New Japanese name: higata-mizuhikigokai
(Figs VI-13–15)

VI-4-3-4-1. Material examined

Hinode-huto: one of unknown sex, body length 45 mm, body width 2 mm, 229 chaetigers, 23 September 2014, coll. N. Jimi and T. Yamakita. Hinoshima: one of unknown sex, body length 51 mm, body width 2 mm, 253 chaetigers, 21 June 2014, coll. N. Jimi. Hukaumi: one of unknown sex, body length 31 mm, body width 1 mm, 215 chaetigers, 21 June 2014, coll. N. Jimi. Hukue: one of unknown sex, body length 68 mm, body width 2 mm, 215 chaetigers, 02 June 2014, coll. N. Jimi. Issiki: one of unknown sex, body length 62 mm, body width 2 mm, 225 chaetigers, 03 June 2014, coll. N. Jimi. Kiire: one of unknown sex, body length 47 mm, body width 1 mm, 186 chaetigers, 23 June 2014, coll. N. Jimi. Kousien-hama: one of unknown sex, body length 52 mm, body width 2 mm, 222 chaetigers, 01 July 2014, coll. N. Jimi. Kumoi-gawa: one of unknown sex, body length 40 mm, body width 1 mm, 247 chaetigers, 02 July 2014, coll. N. Jimi. Wajiro: one of unknown sex, body length 24 mm, body width 1 mm, 215 chaetigers, 26 June 2014, coll. N. Jimi. Yabe-gawa: one of unknown sex, body length 64 mm, Body width 3 mm, 281 chaetigers, 20 June 2014, coll. N. Jimi.

VI-4-3-4-2. Description

Body length 24–68 mm and width 1–3 mm, 186–281 chaetigers, and colour in life orange. Color in alcohol pale yellow (Fig. VI-13A). Some specimen pigmented in anterior ventral zone. Body elongated, dorsally inflated, ventral surface not grooved. No eyes. Prostomium conical (Fig. VI-14). Paired nuchal organs located. Peristomium with annulations. Deeply grooved in junction between peristomium and first chaetiger. Branchia start from peristomium, one pair per segment. Branchia arising from notopodial ridge, do not shift in mid-dorsal section as *Timarete* species, remain in laterally. Notopodia and neuropodia separated. Two groups of dorsal tentacles arising from chaetigers 5–6 (< 45 mm length) or 6–7 (> 45 mm length), 8–24 tentacles per group. Dorsal tentacles organized in two rows each. Notopodia and neuropodia has capillary chaeta and spine. Notochaeta: 5–12 capillary chaetae per fascicle and 2–4 spines (Fig. VI-15A) from chaetigers 52–114. Neurochaeta: 2–11 capillary chaetae per fascicle and 2–6 spines (Fig. VI-15B) from chaetigers 23–48. Pygidium simple, with terminal anus.

VI-4-3-4-3. Methyl Green staining pattern

The margin of prostomium and edge of dorsal area of chaetiger 2–4 were notably stained. Segment after tentacles were stained forming complete rings around segments, inter-segmental grooves not staining (Fig. VI-13B, C).

VI-4-3-4-4. Distribution and habitat

Known from tidal flats and shallow area (~ 2 m) around Japan.

VI-4-3-4-5. Remarks

See remarks of *Cirriformia* sp. C.

VI-4-3-5. *Cirriformia* sp. E

New Japanese name: Ogasawara-mizuhikigokai

(Figs VI-16–18)

VI-4-3-5-1. Material examined

Oomura: three of unknown sex, body length 36–56 mm, body width 1 mm, 210–244 chaetigers, 28 March 2015, coll. N. Jimi.

VI-4-3-5-2. Description

Body length 36–56 mm and width 1 mm, 210–244 chaetigers, and colour in life orange.

Color in alcohol pale yellow (Fig. VI-16A). No pigmented in anterior ventral zone. Body elongated, dorsally inflated, ventral surface not grooved. No eyes. Prostomium conical (Fig. VI-17). Paired nuchal organs located. Peristomium with annulations. Deeply grooved in junction between peristomium and first chaetiger. Branchia start from chaetiger 1, one pair per segment. Branchia arising from notopodial ridge, branchia do not shift in mid-dorsal section as *Timarete* species, remain in laterally. Notopodia and neuropodia separated, developed. Two groups of dorsal tentacles arising from chaetigers 5–6 (36 mm length) or 6–7 (> 36 mm length), 13–21 tentacles per group. Dorsal tentacles organized in two rows each. Notopodia and neuropodia has capillary chaeta and spine. Notochaeta: 2–10 capillary chaetae per fascicle and 2–3 spines (Fig. VI-18A) from chaetigers 21–22. Neurochaeta: 2–7 capillary chaetae per fascicle and 3–4 spines (Fig. VI-18B) from chaetigers 38–42. Pygidium simple, with terminal anus.

VI-4-3-5-3. Methyl Green staining pattern

The edge of dorsal area of chaetigers 1–4 was notably stained. Segment after tentacles were stained forming complete rings around segments, inter-segmental grooves not staining (Fig. VI-16B, C).

VI-4-3-5-4. Distribution and habitat

Only known from among the attaching organisms of quay of Chichijima Island.

VI-4-3-5-5. Remarks

This species resembles to *Cirriformia tentaculata* var. A, *Cirriformia* cf. *tentaculata* var. B, *Cirriformia tentaculata* (Montagu, 1808), in dorsal tentacles arising from chaetigers 5–6 or 6–7 and first branchia arising from chaetiger 1. The species can be discriminated from the three species by flattend and elongated body and developed parapodia.

VI-4-3-6. *Cirriformia* sp. F

New Japanese name: akiyo-mizuhikigokai

(Figs VI-19–21)

VI-4-3-6-1. Material examined

Hinoshima: one of unknown sex, body length 56 mm, body width 2 mm, 264 chaetigers, 21 June 2014, coll. N. Jimi.

VI-4-3-6-2. Description

Body length 56 mm and width 2 mm, 264 chaetigers, and colour in life orange. Color in alcohol pale yellow (Fig. VI-19A). No pigmented in anterior ventral zone. Body elongated, dorsally inflated, ventral surface not grooved. No eyes. Prostomium conical (Fig. VI-20). Paired nuchal organs located. Peristomium with annulations. Deeply grooved in junction between peristomium and first chaetiger. Branchia start from chaetiger 1, one pair per segment. Branchia arising from notopodial ridge, branchia do not shift in mid-dorsal section as *Timarete* species, remain in laterally. Notopodia and neuropodia separated. Two groups of dorsal tentacles arising from chaetigers 7–8, 10–11 tentacles per group. Dorsal tentacles organized in two rows each. Notopodia and neuropodia has capillary chaeta and spine. Notochaeta: 4–11 capillary chaetae per fascicle and 2–4 spines (Fig. VI-21A) from chaetiger 60. Neurochaeta: 2–10 capillary chaetae per fascicle and 2–5 spines (Fig. VI-21B) from chaetiger 32. Pygidium simple, with terminal anus.

VI-4-3-6-3. Methyl Green staining pattern

The margin of prostomium and edge of dorsal area of chaetigers 1–6 were notably stained. Segment after tentacles were stained forming complete rings around segments, inter-segmental grooves not staining (Fig. VI-19B, C).

VI-4-3-6-4. Distribution and habitat

Only known from tidal flats of Hinoshima, Kumamoto prefecture. This species was collected with *Cirriformia* sp. D.

VI-4-3-6-5. Remarks

This species resembles to *Cirriformia tortugaensis* (Augener, 1922), *C*. sp. G, *C*. sp. H in dorsal tentacles arising from chaetigers 7–8. Dorsal tentacles of *C*. *tortugaensis* arise from three segments (6–8), whereas dorsal tentacles of *C*. sp. F arise from two segments. *Cirriformia* sp. G have ventral grooved formed by projection of neuropodia, whereas ventral surface of *C*. sp. F and sp. H are flatted. The edge of dorsal area before tentacles of *C*. sp. H is not notably staining, whereas *C*. sp. F and sp. G are notably stained.

VI-4-3-7. *Cirriformia* sp. G

New Japanese name: hukaba-mizuhikigokai
(Figs VI-22–24)

VI-4-3-7-1. Material examined

Tateyama: one of unknown sex, body length 102 mm, body width 3 mm, 308 chaetigers, 12 December 2014, coll. Ochanomizu University Marine Coastal Research Center, Toshiaki Shitamitsu, Hayate Tanaka, Naoto Jimi.

VI-4-3-7-2. Description

Body length 102 mm and width 3 mm, 308 chaetigers, and colour in life orange. Color in alcohol pale yellow (Fig. VI-22A). Some specimen pigmented in anterior ventral zone. Body elongated, soft, dorsally inflated, ventral marginal area has groove in the whole body. No eyes. Prostomium conical (Fig. VI-23). Paired nuchal organs located. Peristomium with annulations. Deeply grooved in junction between peristomium and first chaetiger. Branchia start from chaetiger 1, one pair per segment. Branchia arising from notopodial ridge, in posterior segments, inserted at discrete distance from notopodial ridge. However, branchia does not shift in mid-dorsal section as *Timarete* species, remain in laterally. Notopodia and neuropodia separated. Two groups of dorsal tentacles arising from chaetigers 7–8, 22–30 tentacles per group. Dorsal tentacles organized in two rows each. Notopodia and neuropodia has capillary chaeta and spine. Notochaeta: 3–15 capillary chaetae per fascicle and 2–5 spines (Fig. VI-24A) from chaetiger 61. Neurochaeta: 2–16 capillary chaetae per fascicle and 3–5 spines (Fig. VI-24B) from chaetiger 43. Pygidium simple, with terminal anus.

VI-4-3-7-3. Methyl Green staining pattern

The edge of dorsal area of chaetigers 2–6 was notably stained. Segment after tentacles were stained forming complete rings around segments, inter-segmental grooves not staining (Fig VI-22B, C).

VI-4-3-7-4. Distribution and habitat

Only known from muddy bottom of continental shelf, Tokyo Bay (53–74 m).

VI-4-3-7-5. Remarks

See remarks of *Cirriformia* sp. F.

VI-4-3-8. *Cirriformia* sp. H

New Japanese name: ezo-mizuhikigokai

(Figs VI-25–27)

VI-4-3-8-1. Material examined

Denshinhama: one of unknown sex, body length 76–87 mm, body width 2–3 mm, 265 chaetigers, 22 October 2014, coll. N. Jimi. Huuren-ko: one of unknown sex, body length 44–122 mm, body width 1–3 mm, 249–301 chaetigers, 26 October 2014, coll. N. Jimi. Muroran-suishi-ura: one of unknown sex, body length 89–97 mm, body width 3–4 mm, 303 chaetigers, 23 October 2014, coll. N. Jimi. Uenhirari: one of unknown sex, body length 46–54 mm, body width 2 mm, 230 chaetigers, 28 October 2014, coll. N. Jimi.

VI-4-3-8-2. Description

Body length 46–122 mm and width 1–4 mm, 230–303 chaetigers, and colour in life orange. Color in alcohol pale yellow (Fig. VI-25A). Some specimen pigmented in anterior ventral zone. Body elongated, dorsally inflated, ventral surface not grooved. No eyes. Prostomium conical (Fig. VI-26). Paired nuchal organs located. Peristomium with annulations. Deeply grooved in junction between peristomium and first chaetiger. Branchia start from peristomium, one pair per segment. Branchia arising from notopodial ridge, branchia do not shift in mid-dorsal section as *Timarete* species, remain in laterally. Notopodia and neuropodia separated. Two groups of dorsal tentacles arising from chaetigers 6–7 (< 89 mm length) or 7–8 (> 89 mm length), 9–35 tentacles per group. Dorsal tentacles organized in two rows each. Notopodia and neuropodia has capillary chaeta and spine. Notochaeta: 2–16 capillary chaetae per fascicle and 2–5 spines (Fig. VI-27A) from chaetigers 52–80. Neurochaeta: 2–12 capillary chaetae per fascicle and 2–7 spines (Fig. VI-27B) from chaetigers 29–54. Pygidium simple, with terminal anus.

VI-4-3-8-3. Methyl Green staining pattern

The margin of prostomium was notably stained. Segment after tentacles were stained forming complete rings around segments, inter-segmental grooves not staining (Figs. VI-25B, C).

VI-4-3-8-4. Distribution and habitat

Known from shallow water area of rocky beach around Hokkaido (~ 3 m).

VI-4-3-8-5. Remarks

See remarks of *Cirriformia* sp. F.

VI-4-3-9. *Cirriformia* sp. I

New Japanese name: iso-mizuhikigokai
(Figs VI-28–30)

VI-4-3-9-1. Material examined

Ganagaraana: one of unknown sex, body length 64 mm, body width 3 mm, 281 chaetigers, 08 June 2014, coll. N. Jimi. Hime: one of unknown sex, body length 133 mm, body width 5 mm, 385 chaetigers, 05 June 2014, coll. N. Jimi. Isotake: one of unknown sex, body length 92 mm, body width 4 mm, 315 chaetigers, 19 June 2014, coll. N. Jimi. Izumozaki: one of unknown sex, body length 149 mm, body width 4 mm, 413 chaetigers, 07 June 2014, coll. N. Jimi. Koiunoura: three of unknown sex, body length 66–101 mm, body width 3 mm, 232–340 chaetigers, 26 June 2014, coll. N. Jimi. Kochi-rinkai-ura: two of unknown sex, body length 101 mm, body width 3 mm, 332–372 chaetigers, 18 June 2014, coll. N. Jimi. Motoshima: two of unknown sex, body length 12–35 mm, body width 1 mm, 168–201 chaetigers, 28 June 2014, coll. N. Jimi. Nagamatsu: one of unknown sex, body length 136 mm, body width 6 mm, 464 chaetigers, 01 July 2014, coll. N. Jimi. Nitinan: one of unknown sex, body length 180 mm, body width 3 mm, 429 chaetigers, 24 June 2014, coll. N. Jimi.

VI-4-3-9-2. Description

Body length 12–180 mm and width 1–6 mm, 168–413 chaetigers, and colour in life orange. Color in alcohol pale yellow (Fig. VI-28A). Some specimen pigmented in anterior ventral zone. Body elongated, dorsally inflated, ventral surface not grooved. No eyes. Prostomium conical (Fig. VI-29). Paired nuchal organs located. Peristomium with annulations. Deeply grooved in junction between peristomium and first chaetiger. Branchia start from peristomium, one pair per segment. Branchia arising from notopodial ridge, in posterior segments, inserted at discrete distance from notopodial ridge. However, branchia do not shift in mid-dorsal section as *Timarete* species, remain in laterally. Notopodia and neuropodia separated. Two groups of dorsal tentacles arising from chaetigers 6–7 (< 50 mm length) or 8–9 (> 50 mm length), 9–49 tentacles per group. Dorsal tentacles organized in two rows each. Notopodia and neuropodia has capillary chaeta and spine. Notochaeta: 10–21 capillary chaetae per fascicle and 3–8 spines (Fig. VI-30A) from chaetigers 35–79. Neurochaeta: 10–14 capillary chaetae per fascicle and 3–6 spines (Fig. VI-30B) from chaetigers 17–69. Pygidium simple, with terminal anus.

VI-4-3-9-3. Methyl Green staining pattern

The top of prostomium and edge of dorsal area of chaetiger 4–7 were notably stained. Segment after tentacles were stained forming complete rings around segments, inter-segmental grooves not staining (Fig. VI-28B, C).

VI-4-3-9-4. Distribution and habitat

Known from shallow water area of rocky beach (~ 3 m) around Japan.

VI-4-3-9-5. Remarks

This species resembles to *Cirriformia* sp. J in dorsal tentacles arising from chaetigers 8–9. This species can be discriminated from *C.* sp. J by methyl green staining pattern of prostomium and dorsal area of chaetigers 4–7. No other species of *Cirriformia* have dorsal tentacles arising from 8–9.

VI-4-3-10. *Cirriformia* sp. J

New Japanese name: ushiro-mizuhikogokai
(Figs VI-31–33)

VI-4-3-10-1. Material examined

Asamushi: six of unknown sex, body length 39–90 mm, body width 1–5 mm, 282–341 chaetigers, 10 June 2014, coll. N. Jimi.

VI-4-3-10-2. Description

Body length 39–90 mm and width 1–5 mm, 282–341 chaetigers, and colour in life orange. Color in alcohol pale yellow (Fig. VI-31A). Some specimen pigmented in anterior ventral zone. Body elongated, dorsally inflated, ventral surface not grooved. No eyes. Prostomium conical (Fig. VI-32). Paired nuchal organs located. Peristomium with annulations. Deeply grooved in junction between peristomium and first chaetiger. Branchia start from peristomium, one pair per segment. Branchia arising from notopodial ridge, in posterior segments, inserted at discrete distance from notopodial ridge. However, branchia does not shift in mid-dorsal section as *Timarete* species, remain in laterally. Two groups of dorsal tentacles arising from chaetigers 7–8 (< 5.9 mm length) or 8–9 (> 5.9 mm length), 23–44 tentacles per group. Dorsal tentacles organized in two rows each. Notopodia and neuropodia has capillary chaeta and spine. Notochaeta: 2–9 capillary chaetae per fascicle and 3–4 spines (Fig. VI-33A) from chaetigers 49–70. Neurochaeta: 2–11 capillary chaetae per fascicle and 3–4 spines (Fig. VI-33B) from chaetigers 29–50. Pygidium simple, with terminal anus.

VI-4-3-10-3. Methyl Green staining pattern

The margin of prostomium was notably stained. Segment after tentacles were stained forming complete rings around segments, inter-segmental grooves not staining (Fig. VI-31B, C).

VI-4-3-10-4. Distribution and habitat

Only known from shallow water area of rocky beach, Asamushi, Aomori prefecture.

VI-4-3-10-5. Remarks

See remarks of *Cirriformia* sp. I.

VI-4-3-11. *Cirriformia* cf. *tentaculata* var. A

(Figs VI-34–36)

VI-4-3-11-1. Material examined

Ganagaraana: one of unknown sex, body length 42 mm, body width 2 mm, 184 chaetigers, 08 June 2014, coll. N Jimi. Izumozaki: one of unknown sex, body length 135 mm, body width 5 mm, 340 chaetigers, 07 June 2014, coll. N. Jimi. Koiunoura: one of unknown sex, body length 36 mm, body width 2 mm, 194 chaetigers, 26 June 2014, coll. N. Jimi. Koura: one of unknown sex, body length 112 mm, body width 3 mm, 289 chaetigers, 06 June 2014, coll. N. Jimi. Mase: one of unknown sex, body length 113 mm, body width 3 mm, 278 chaetigers, 07 June 2014, coll. N. Jimi. Sasuhama: two of unknown sex, body length 97–131 mm, body width 3–4 mm, 238–307 chaetigers, 11 June 2014, coll. N. Jimi. Toyohama-tonnel: one of unknown sex, body length 39 mm, body width 3 mm, 219 chaetigers, 21 October 2014, coll. N. Jimi.

VI-4-3-11-2. Description

Body length 36–135 mm and width 2–5 mm, 184–340 chaetigers, and colour in life orange. Color in alcohol pale yellow (Fig. VI-34A). Some specimen pigmented in anterior ventral zone. Body elongated, dorsally inflated, ventral surface not grooved. No eyes. Prostomium conical (Fig. VI-35). Paired nuchal organs located. Peristomium with annulations. Deeply grooved in junction between peristomium and first chaetiger. Branchia start from chaetiger 1, one pair per segment. Branchia arising from notopodial ridge, in posterior segments, inserted at discrete distance from notopodial ridge. However, branchia does not shift in mid-dorsal section as *Timarete* species, remain in laterally. Two groups of dorsal tentacles arising from chaetigers 5–6 (< 42 mm length) or 6–7 (> 42 mm length), 17–42 tentacles per group. Dorsal tentacles organized in two rows each. Notopodia and neuropodia has capillary chaeta and spine. Notochaeta: 2–16 capillary chaetae per fascicle and 3–5 spines (Fig. VI-36A) from chaetigers 34–59. Neurochaeta: 2–19 capillary chaetae per fascicle and 3–6 spines (Fig. VI-36B) from chaetigers 21–39. Pygidium simple, with terminal anus.

VI-4-3-11-3. Methyl Green staining pattern

The edge of dorsal area of chaetigers 1–4 was notably stained. Segment after tentacles were stained forming complete rings around segments, inter-segmental grooves not staining (Fig. VI-34B, C).

VI-4-3-11-4. Distribution and habitat

Known from shallow water area of rocky beach (~ 4 m) around Japan.

VI-4-3-11-5. Remarks

Morphological features of this species resembles *C*. cf. *tentaculata* var. B. This species can be discriminated from *C*. cf. *tentaculata* var. B by neuropodial spine start from posterior segments (23–33), whereas neuropodial spine of *C*. cf. *tentaculata* var. B starts from chaetigers 14–28. In original description of *C*. *tentaculata* contained few information that could not discriminate *C*. *tentaculata* from *C*. cf. *tentaculata* var. A and B. For resolving this taxonomic problem, redescription of *C*. *tentaculata* is needed.

VI-4-3-12. *Cirriformia* cf. *tentaculata* var. B

(Figs VI-37–39)

VI-4-3-12-1. Material examined

Isotake: one of unknown sex, body length 44 mm, body width 2 mm, 219 chaetigers, 19 June 2014, coll. N. Jimi. Koura: one of unknown sex, body length 69 mm, body width 3 mm, 210 chaetigers, 06 June 2014, coll. N. Jimi. Mase: one of unknown sex, body length 22 mm, body width 1 mm, 171 chaetigers, 07 June 2014, coll. N. Jimi. Motoshima: one of unknown sex, body length 31 mm, body width 2 mm, 209 chaetigers, 28 June 2014, coll. N. Jimi. Toyohama: one of unknown sex, body length 81 mm, body width 3 mm, 283 chaetigers, 03 June 2014, coll. N. Jimi.

VI-4-3-12-2. Description

Body length 22–81 mm and width 2–3 mm, 171–283 chaetigers, and colour in life orange. Color in alcohol pale yellow (Fig. VI-37A). Some specimen pigmented in anterior ventral zone. Body elongated, dorsally inflated, ventral surface not grooved. No eyes. Prostomium conical (Fig. VI-38). Branchia start from chaetiger 1, one pair per segment. Branchia arising from notopodial ridge, in posterior segments, inserted at discrete distance from notopodial ridge. However, branchia does not shift in mid-dorsal section as *Timarete* species, remain in laterally. Two groups of dorsal tentacles arising from chaetigers 4–5 (< 22 mm), 5–6 (< 69 mm length), 6–7 (> 69 mm length), 8–19 tentacles per group. Dorsal tentacles organized in two rows each. Notopodia and neuropodia has capillary chaeta and spine. Notochaeta: 1–12 capillary chaetae per fascicle and 2–4 spines (Fig. VI-39A) from chaetigers 52–114. Neurochaeta: 1–14 capillary chaetae per fascicle and 2–5 spines (Fig. VI-39B) from chaetigers 23–48. Pygidium simple, with terminal anus.

VI-4-3-12-3. Methyl Green staining pattern

The edge of dorsal area of chaetigers 1–4 was notably stained. Segment after tentacles were stained forming complete rings around segments, inter-segmental grooves not staining (Fig. VI-37B, C).

VI-4-3-12-4. Distribution and habitat

Known from shallow area of rocky beach (~ 2 m depth) around Japan.

VI-4-3-12-5. Remarks

See remarks of *Cirriformia* cf. *tentaculata* var. A.

VI-4-4. Comparison of each species habitat

The data of habitat information are showed in Table VI-3.
ORP, grain size, salinity, and pH showed significantly difference by ANOVA between some species. (Fig. VI-40). After ANOVA, I conduct Tukey's test. It showed significantly difference between sp. C - sp. I, var. A, var. B in pH and sp.C - sp.D, sp. I, var. A, var. B in ORP (Fig. VI-41).

VI-5. Discussion

I obtained 12 *Cirriformia* species that can be discriminated by morphological and phylogenetic analyses in Japanese waters. Ten of them are new species that are described in this study. Morphological features of the other two species are indistinguishable from that of *C. tentaculata* (Montagu, 1808), because *C. tentaculata* original description is lacking taxonomic information for diagnosing species (e.g. tentacle site, start chaetiger of spine). However, the two species are distinguishable by morphologically and phylogenetically. Detailed observations of the type specimen of *C. tentaculata* will clarify if one of the two "*C. tentaculata* like species" is truly *C.*

tentaculata or not.

Cirriformia comosa was originally described from three sites (Yokohama, Kochi, and Nagasaki) in Japan and have been considered to be a junior synonym of *C. tentaculata* (Marenzeller 1879; Imajima and Hartman 1964b). Previous study indicated that *C. tentaculata* from Japan is *C. comosa* without morphological observation (Petersen 1999). I could not conclude which species is *C. comosa* and *C. comosa* is truly junior synonym of *C. tentaculata* without observation of the type specimen of *C. comosa* because limited information is available from the original descriptions of *C. comosa* and *C. tentaculata* (Montagu 1808; Marenzeller 1879).

Previous study indicated that *C*irriformia *tentaculata* from Japan has some morphological difference based on color and start chaetiger of spine in some references and considered that Japanese *C. tentaculata* contained some species (Yamada 2009a). My results are consistent with previous study, which indicates *C. tentaculata* from Japan contains multiple species morphologically and phylogenetically (Yamada 2009a). 12 species were collected from Hokkaido to Okinawa (see Fig. VI-2 and Table VI-1) that is indicated that previous studies which reported *C. tentaculata* (= *Cirriformia* cf. *comosa*) from all over Japan confused these species as one species (e.g. Yamanishi and Sato (2007)). Some species distributions overlap in 13 sites, it is indicated that there is some kind of species delimitation system among the species. In the future study, I need to investigate how species delimitation is maintained. In the previous study, no record of *Cirriformia* was reported around Okinawa and Ogasawara islands (Okuda 1940; Nishi and Kei 2000). This is the first report of *Cirriformia* from Okinawa and Ogasawara Islands.

This study also confirmed significant differences between four species habitats (see Fig. VI-41) especially ORP of sediment that are related to pollution caused by organic enrichment (Muto and Kim 1986; The Metropolitan Region Govermments Comittee on the Water Quality 1999). It indicates that *Cirriformia* in Japanese waters are not suitable for using as the grouped indicator species, because it is contained the species that do not live in pollution site (i.e. sp I, var. A, var. B). However, this study obtained the environmental information that is got from one time measurement. Indicator species are considered to reflect the seasonal change of environmental conditions (Kikuchi 1975). More continuous measurements are needed to evaluate the possibility of *Cirriformia* species to be indicator species.

Chapter VII. Flabelligeridae

This chapter deals with eight species of *Diplocirrus* and one species of *Lamispina* from Japan.

VII-1. Remarkable biodiversity of flabelligerids in Japan: seven species of *Diplocirrus* from Japanese waters

Seven new species of *Diplocirrus* were described from Japan. These species are distinguished from all the known species of *Diplocirrus* by the following features: length of the cephalic cage, length of lateral papillae, presence of gonopodial lobe, adhering pattern of sediment particles, length of caruncle, length and morphological feature of branchiae, articles and morphological features of neurochaetae, and swollen area along the body.

VII-1-1. Introduction

The genus *Diplocirrus* Haase, 1915 is a member of the Flabelligeridae, consisting of 16 named and three undescribed species (Salazar-Vallejo and Buzhinskaja 2011; Teixeira et al. 2015). The members of the genus can be found in muddy sand sediments from intertidal to deep sea environments around the world. Recently, Salazar-Vallejo and Buzhinskaja (2011) reviewed all species of the genus and synonymized *Diversibranchius* Buzhinskaja, 1994 and *Bradiella* Rullier, 1965 with *Diplocirrus*. This genus is distinguished from other flabelligerids by the clavate or subcylindrical body, two types of branchiae, abundant body papillae, multiarticulated capillary notochaetae and neurochaetae, and presence of gonopodial lobes or gonopores (Salazar-Vallejo and Buzhinskaja 2011).

In the West Pacific region, three species of *Diplocirrus* have been reported: *D. branchiatus* (Rullier, 1965) (Australia), *D. erythroporus* Gallardo, 1968 (Vietnam, Australia, the Yellow Sea), and *D. nicolaji* (Buzhinskaja, 1994) (Russia, Japan). *Diplocirrus nicolaji* is the sole named species of *Diplocirrus* from Japanese waters. While the species has only been recorded from shallow (0–10 m depth) depths (Jimi et al. 2016), there is no data of *Diplocirrus* species diversity over 10 m depth around Japan, except Imajima's (1992) report of unidentified *Diplocirrus* sp. from 17–45 m depth, Sarufutsu, northern Hokkaido.

During a survey of Japanese polychaete fauna, I obtained specimens of

Diplocirrus from subtidal zones (2–362 m depth). Morphological observation of these specimens revealed that they represent seven species. I described them as new species, providing partial sequences of COI gene from each species for DNA barcoding (Jimi et al. 2017).

VII-1-2. Material and methods

Worms were collected from nine sites in Japanese waters (Table VII-1). All the specimens were anesthetized by menthol, fixed and preserved by 70% ethanol, and deposited in the NSMT, Japan. The preserved specimens were observed by a stereoscopic microscope (Nikon SMZ1500 or OLYMPUS BX51); photographs were taken with a digital camera (Nikon D5200).

DNA extraction and sequencing were conducted in accordance with the methods of Jimi and Fujiwara (2016). The newly obtained COI sequences were deposited in the DDBJ (accession nos. LC314563–LC314567).

VII-1-3. Results

VII-1-3-1. *Diplocirrus asamushiensis* Jimi, Fujiwara and Kajiahra, 2017

Japanese name: Asamushi-konbou-habouki

VII-1-3-1-1. Type materials

Holotype: NSMT-Pol H-633, Asamushi, 2–5 m depth, collected by NJ, COI sequence DDBJ accession no. LC314563. Paratypes: NSMT-Pol P-634, Asamushi, 2–5 m depth, collected by NJ, one complete specimen (28 mm long, 1.8 mm wide, 39 chaetigers) and two incomplete specimens (14–20 mm long, 1.6–1.7 mm wide, 15–27 chaetigers).

VII-1-3-1-2. Description

Holotype incomplete, 18 mm long, 1.8 mm wide (in chaetiger 10), 24 chaetigers. Body with first 13 chaetigers swollen, thereafter cylindrical (Fig. VII-1A). Tunic whitish in ethanol with sediment particles on base of papillae only (Fig. VII-1B). Digitate papillae abundant, white to brown, longer than wide, short, in median chaetigers about $^{3}/_{20}$ as long as notochaetae and as long as lateral papillae in chaetal lobe, arranged in 10–12 transverse rows per segment. Cephalic hood transparent, with papillae near 1st chaetiger.

Gonopodial lobes not seen. Gonopores in chaetigers 3–9, pale brown (Fig. VII-1B). Posterior region tapered, anal part lost in holotype (no anal cirri in paratypes).

Two types of branchiae present: dorsal branchiae 1.5 mm long, thick, with one lobe in internal side, not lamellate (Fig. VII-1C); ventral branchiae 2 mm long, thin, smooth, not lamellate (Fig. VII-1D). Palps 3 mm long, grooved. Upper and lateral lips well developed. Caruncle projected, not separating dorsal branchiae (Fig. VII-1E). Eyes absent. Nephridial lobes present.

Parapodia poorly developed, chaetae emerging from body wall; lateral papillae in chaetal lobes as long as other body papillae. Cephalic cage poorly developed (1st notochaeta 0.2 mm in length). Notochaetae 4–7 per bundle, multiarticulate (Fig. VII-1F) with 34–37 articles in chaetiger 24; tip smooth. Neurochaetae 2–3 per bundle, multiarticulate (Fig. VII-1G) with 7–9 articles in chaetiger 24, rounded projection poorly developed; subdistal article 5–6 times longer than wide; tip falcate.

VII-1-3-1-3. Distribution

Only known from the type locality (Asamushi); 2–5 m depth.

VII-1-3-1-4. Etymology

This species is named after the type locality (Asamushi). The specific name is an adjective.

VII-1-3-1-5. Remarks

Diplocirrus asamushiensis resembles *D. nicolaji* and *D. mamoi* in the following features: *i*) the body papillae are abundant and short, *ii*) sediment particles are attached only on the base of papillae, *iii*) the cephalic cage is poorly developed, and *iv*) the number of the neurochaetal articles is less than 22 in median chaetigers. These three species are discriminated by the three features: branchial forms, caruncle length, and number of neurochaetal articles. Both of the two types of branchiae in *D. asamushiensis* and *D. mamoi* are smooth, whereas they are lamellate in *D. nicolaji*. The dorsal branchiae of *D. asamushiensis* are shorter than the ventral ones, whereas they are as long as ventral ones in *D. mamoi.* The number of the median neurochaetal articles in *D. asamushiensis* ranges from seven to nine, whereas it is 5–6 in *D. mamoi* Subdistal article of *D. asamushiensis* is 5–6 times longer than wide, whereas it in *D. mamoi* is 8–9 times longer than wide.

VII-1-3-2. *Diplocirrus imajimai* Jimi, Fujiwara and Kajihara, 2017

New Japanese name: Imajima-konbou-habouki

VII-1-3-2-1. Type material

Holotype: NSMT-Pol H-635, off Otsuchi St. 2, 215 m depth, collected by NJ, COI sequence could not be determined.

VII-1-3-2-2. Description

Holotype incomplete, 11 mm long, 1 mm wide (in chaetiger 10), 18 chaetigers. Body with first 9 chaetigers swollen, thereafter cylindrical (Fig. VII-2A). Tunic whitish in ethanol without sediment particles (Fig. VII-2B). Digitate papillae abundant, longer than wide, short, in median chaetigers about $^{1}/_{25}$ as long as notochaetae and $^{1}/_{4}$ as long as lateral papillae in chaetal lobe, arranged in 4–5 transverse rows per segment. Cephalic hood transparent, without papillae. Gonopodial lobe and gonopores absent. Posterior region tapered; anal part lost in holotype.

Two types of branchiae present: dorsal branchiae 0.8 mm long, thick, with one lobe in internal side, not lamellate (Fig. VII-2C); ventral branchiae 0.9 mm long, thick, smooth, not lamellate (Fig. VII-2D). Palps 1.0 mm long, grooved. Upper and lateral lips well developed. Caruncle poorly projected, not separating dorsal branchiae. Eyes absent. Nephridial lobes present, whitish (Fig. VII-2E).

Parapodia poorly developed, chaetae emerging from body wall; notopodia with no lateral papillae on anterior side and 1–3 lateral papillae on posterior side; neuropodia with no lateral papillae on anterior side and 1–2 lateral papillae on posterior side. Cephalic cage developed (1st notochaeta 1.2 mm in length). Notochaetae 5–8 per bundle, multiarticulate (Fig. VII-2F) with 15–19 articles in chaetiger 19; tip capillary. Neurochaetae 4–6 per bundle, multiarticulate (Fig. VII-2G) with 12–15 articles in chaetiger 19, rounded projection poorly developed; subdistal article 3–4 times longer than wide; tip slightly falcate.

VII-1-3-2-3. Distribution

Only known from type locality, off Otsuchi, 215 m depth.

VII-1-3-2-4. Etymology

This species is named after Dr. Minoru Imajima in recognition of his great taxonomic works about Japanese polychaetes. The specific name is a noun in the genitive case.

VII-1-3-2-5. Remarks

Diplocirrus imajimai resembles *D. capensis* Day, 1961 in the following features: *i*) body papillae are short, longer than wide, and abundant, *ii*) body is not covered with sediment particles, and *iii*) gonopores are absent. The cephalic cage of *D. imajimai* is well developed (longer than body wide), whereas it is poorly developed in *D. capensis* (chaetiger 1 shorter than following ones). *Diplocirrus capensis* has black eyes, whereas *D. imajimai* does not have eyes.

VII-1-3-3. ***Diplocirrus mamoi*** Jimi, Fujiwara and Kajihara, 2017

Japanese name: Mamo-konbou-habouki

VII-1-3-3-1. Type materials

Holotype: NSMT-Pol H-636, off Moroiso, 77–78 m depth, collected by Mr. Hisanori Kohtsuka, COI sequence DDBJ accession no. LC314564. Paratypes: NSMT-Pol P-637, off Moroiso, 77–78 m depth, collected by Mr. Hisanori Kohtsuka, eight incomplete specimens (11–26 mm long, 1.0–1.5 mm wide, 15–43 chaetigers).

VII-1-3-3-2. Description

Holotype incomplete, 16 mm long, 1.5 mm wide (in chaetiger 10), 28 chaetigers. Body with first 16 chaetigers swollen, thereafter cylindrical (Fig. VII-3A). Tunic whitish in ethanol with sediment particles only on base of papillae (Fig. VII-3B). Digitate papillae abundant, longer than wide, short, in median chaetigers about $^1/_7$ as long as notochaetae and as long as lateral papillae in chaetal lobe, arranged in 11–13 transverse rows per segment. Cephalic hood transparent, with papillae near 1st chaetiger. Gonopodial lobes not seen. Gonopores present in chaetigers 3–13, pale brown (Fig. VII-3B). Posterior region tapered, anal part lost in holotype.

Two types of branchiae present: dorsal branchiae 1 mm long, thick, with one lobe in internal side, not lamellate (Fig. VII-3C); ventral branchiae 1 mm long, thin, smooth, not lamellate (Fig. VII-3D). Palps 2 mm long, grooved. Upper and lateral lips well developed. Caruncle projected, not separating dorsal branchiae (Fig. VII-3E). Eyes absent. Nephridial lobes present.

Parapodia poorly developed, chaetae emerge from body wall; lateral papillae in chaetal lobes as long as other body papillae. Cephalic cage poorly developed (1st notochaeta 0.3 mm). Notochaetae 4–6 per bundle, multiarticulate (Fig. VII-3F) with 17–21 articles in chaetiger 28; tip tapered. Neurochaetae 2–3 per bundle, multiarticulate (Fig. VII-3G) with 5–6 articles in chaetiger 28, rounded projection poorly developed; subdistal article 8–9 times longer than wide; tip falcate.

VII-1-3-3-3. Distribution

Only known from type locality (off Moroiso); 77–78 m depth.

VII-1-3-3-4. Etymology

The species is named after Mr. Mamoru Sekifuji, the Captain of the research boat Rinkai-maru at Misaki Marine Biological Station, who helped during the collection of the type specimens and contributed to elucidate the invertebrate fauna in Sagami Bay. The specific name is a noun in the genitive case.

VII-1-3-3-5. Remarks

Diplocirrus mamoi resembles *D. nicolaji* and *D. asamushiensis* in the following features: *i*) body papillae are abundant and short, *ii*) sediment particles are attached only on the base of papillae, *iii*) cephalic cage is poorly developed, and *iv*) neurochaetal articles are less than 22 in median chaetigers. These three species are discriminated by the three features: branchial forms, caruncle length and number of neurochaetal articles. Both of the two types of branchiae in *D. mamoi* and *D. asamushiensis* are smooth, whereas they are lamellate in *D. nicolaji*. The dorsal branchiae of *D. mamoi* are as long as ventral ones, whereas they are shorter than the ventral ones in *D. asamushiensis*. The number of the median neurochaetal articles in *D. mamoi* ranges from five to six, whereas it is 7–9 in *D. asamushiensis* sp. nov. Subdistal article of *D. mamoi* is 8–9 times longer than wide, whereas it in *D. asamushiensis* is 5–6 times longer than wide.

VII-1-3-4. *Diplocirrus ohtsukai* Jimi, Fujiwara and Kajihara, 2017

Japanese name: Ohtsuka-konbou-habouki

VII-1-3-4-1. Type materials

Holotype: NSMT-Pol H-638, Hibiki-nada, 62 m depth, collected by NJ, COI sequence DDBJ accession no. LC314565. Paratypes: NSMT-Pol P-639, Hibiki-nada, 62 m depth, six incomplete specimens (5–24 mm long, 1.5–2.0 mm wide, 10–21 chaetigers).

VII-1-3-4-2. Description

Holotype incomplete, 16 mm long, 3 mm wide (in chaetiger 10), 19 chaetigers. Body with first 13 chaetigers swollen, cylindrical (Fig. VII-4A). Tunic whitish in ethanol with fine sediment particles on body wall and papillae (Fig. VII-4B); particles present on whole body wall except cephalic hood. Digitate papillae in whole body abundant, longer than wide, short, in median chaetigers about $^{1}/_{25}$ as long as notochaetae and half as long as lateral papillae in chaetal lobe, arranged in 14–15 transverse rows per segment. Cephalic hood transparent, with papillae near 1st chaetiger. Gonopodial lobes not seen. Gonopores present in chaetigers 3–12, white (Fig. VII-4B). Posterior region tapered; anal part lost in holotype.

Two types of branchiae present: dorsal branchiae 3 mm long, thick, with single lobe in internal side, not lamellate (Fig. VII-4C); ventral branchiae 7 mm long, thin, smooth, not lamellate (Fig. VII-4D). Palps 8 mm long, grooved. Upper and lateral lips well developed. Caruncle projected, not separating dorsal branchiae (Fig. VII-4E). Eyes absent. Nephridial lobes present.

Parapodia poorly developed, chaetae emerging from body wall; notopodia with 3–5 lateral papillae on anterior side and no lateral papillae on posterior side; neuropodia with 5–7 lateral papillae on anterior side and 2 lateral papillae on posterior side. Cephalic cage developed (1st notochaeta 2.0 mm in length). Notochaetae 7–9 per bundle, multiarticulate (Fig. VII-4F) with 51–59 articles in chaetiger 20; tip tapered. Neurochaetae 4–5 per bundle, multiarticulate (Fig. VII-4G) with 8–13 articles in chaetiger 20, rounded projection poorly developed; subdistal article 3–4 times longer than wide; tip slightly falcate.

VII-1-3-4-3. Distribution

Only known from type locality (Hibiki-nada, 62 m depth).

VII-1-3-4-4. Etymology

This species is named after Prof. Susumu Ohtsuka who organized the research cruise of the TR/V *Toyoshio-maru* at the type locality, Hibiki-nada. The specific name is a noun in the genitive case.

VII-1-3-4-5. Remarks

Diplocirrus ohtsukai resembles *D. salazarvallejoi* Teixeira, Rizzo and Santos, 2015 (originally described from Brazil) in the following features: *i*) body papillae are short and abundant, *ii*) body is covered with sand particles, *iii*) lateral papillae are short, *iv*) anterior chaetigers are swollen, and *v*) gonopores are present. The two species can be discriminated by *i*) size of the cephalic cage and *ii*) position of the swollen area in the body. The cephalic cage of *D. ohtsukai* sp. nov. is well developed ($^{2}/_{3}$ of body width), whereas that of *D. salazarvallejoi* is not ($^{1}/_{4}$ of body width). The swollen area in *D. ohtsukai* is along first 12–13 chaetigers, whereas it is along 8 chaetigers in *D. salazarvallejoi*.

VII-1-3-5. *Diplocirrus seisuiae* Jimi, Fujiwara and Kajihara, 2017

Japanese name: Seisui-konbou-habouki

VII-1-3-5-1. Type materials

Holotype: NSMT-Pol H-640, Kumano-nada, 339–362 m depth, collected by NJ, COI sequence DDBJ accession no. LC314566. Paratypes: NSMT-Pol P-641, Kumano-nada, 339–362 m depth, collected by NJ, four specimens are incomplete (6–15 mm long, 0.8–1 mm wide, 14–25chaetigers); NSMT-Pol P-642, off Jyogashima, 230–398 m depth, collected by Dr. Masaatsu Tanaka, three incomplete specimens (6–10 mm long, 1–2 mm wide, 12–23 chaetigers).

VII-1-3-5-2. Description

Holotype incomplete, 23 mm long, 2 mm wide (in chaetiger 10), 20 chaetigers. Body with first 15 chaetigers swollen, thereafter cylindrical (Fig. VII-5A). Tunic whitish in ethanol with sediment particles on whole body wall (except cephalic hood) and papillae (Fig. VII-5B). Anterior part of body (chaetigers 1–3) with a rusty color. Digitate papillae abundant, longer than wide, short, in median chaetigers about $^{1}/_{6}$ as long as notochaetae and 1/5 as long as lateral papillae in chaetal lobe, arranged in 7–8 transverse rows per segment. Cephalic hood transparent, without papillae. Gonopodial lobe and gonopores absent. Posterior region tapered; anal part lost in holotype.

Two types of branchiae present: dorsal branchiae, 1.0 mm long, thick, with one lobe in internal side, not lamellate (Fig. VII-5C); ventral branchiae, 1.6 mm long, thin, smooth, small lamellae on dorsal side of base (Fig. VII-5D). Palps 2.0 mm long, grooved. Upper and lateral lips well developed. Caruncle poorly projected, not separating dorsal branchiae (Fig. VII-5E). Eyes absent. Nephridial lobes present.

Parapodia poorly developed, chaetae emerging from body wall; notopodia with no lateral papillae on anterior side and 3–5 lateral papillae on posterior side; neuropodia with 1 lateral papilla on anterior side and 1 lateral papilla on posterior side. Cephalic cage developed (1st notochaeta 2.0 mm long). Notochaetae 2–7 per bundle, multiarticulate (Fig. VII-5F, G) with 41–45 articles in chaetiger 20; tip tapered. Neurochaetae 5–6 per bundle, multiarticulate (Fig. VII-5H) with 17–21 articles in chaetiger 20, rounded projection poorly developed; subdistal article 2–3 times longer than wide; tip falcate.

VII-1-3-5-3. Distribution

Western Pacific Ocean, Honshu (off Kanagawa prefecture to off Mie prefecture), Japan, 230–398 m depth.

VII-1-3-5-4. Etymology

The species is named after the TR/V *Seisui-maru*. The type specimens from Kumano-nada were collected by the gear of the ship. The specific name is a noun in the genitive case.

VII-1-3-5-5. Remarks

Diplocirrus seisuiae resembles *D. incognitus* Darbyshire and Mackie, 2009 in the following features: *i*) body papillae are short and abundant, *ii*) body is covered with sediment particles, *iii*) lateral papillae are long, *iv*) anterior chaetigers are swollen, and *v*) gonopores are absent. *D. seisuiae* differs from *D. incognitus* by the lateral papillae in the chaetal lobe. The lateral papillae in *D. seisuiae* are almost as long as notochaetae ($^{5}/_{6}$

as long as notochaetae), whereas they are shorter ($^{1}/_{3}$ as long as notochaetae) in *D. incognitus*. In *D. seisuiae*, the anterior part of the body (chaetigers 1–3) is covered with rusty pigments, whereas it is whitish in *D. incognitus*.

VII-1-3-6. *Diplocirrus tohokuensis* Jimi, Fujiwara and Kajihara, 2017

Japanese name: Tohoku-konbou-habouki

VII-1-3-6-1. Type materials

Holotype: NSMT-Pol H-643, off Otsuchi St. 1, 225 m depth, collected by NJ, COI sequence could not be determined. Paratype: NSMT-Pol P-644, off Ohakozaki, 99–102 m depth, one incomplete specimen (13 mm long, 1 mm wide, 35 chaetigers).

VII-1-3-6-2. Description

Holotype complete, 21 mm long, 1.2 mm wide (in chaetiger 10), 43 chaetigers. Body with first 15 chaetigers swollen, thereafter cylindrical (Fig. VII-6A). Tunic whitish in ethanol with sediment particles on body wall and papillae (Fig. VII-6B); particles present on whole body wall except cephalic hood. Digitate papillae abundant, longer than wide, short, in median chaetigers about $^{1}/_{20}$ as long as notochaetae and 1/4 as long as lateral papillae in chaetal lobe, arranged in 5–7 transverse rows per segment. Cephalic hood transparent, without papillae. Gonopodial lobe and gonopores absent. Posterior region tapered, anus without cirri.

Two types of branchiae present: dorsal branchiae 0.5 mm long, thick, with one lobe on internal side, not lamellate (Fig. VII-6C); ventral branchiae 1.7 mm long, thin, smooth, not lamellate (Fig. VII-6D). Palps 0.7 mm long, grooved. Upper and lateral lips well developed. Caruncle poorly developed, not separating dorsal branchiae (Fig. VII-6E). Eyes absent. Nephridial lobes present on branchial plate, whitish.

Parapodia poorly developed, chaetae emerging from body wall; notopodia with 1 lateral papilla on anterior side and 3–5 lateral papillae on posterior side; neuropodia with 1–2 lateral papillae on anterior side and 1–2 lateral papillae on posterior side. Cephalic cage poorly developed (1st notochaeta 0.4 mm long). Notochaetae 5–7 per bundle, multiarticulate (Fig. VII-6F) with 43–46 articles in chaetiger 27; tip tapered. Neurochaetae 4–6 per bundle, multiarticulate (Fig. VII-6G) with 17–21 articles in chaetiger 27, rounded projection poorly developed; subdistal article 2 times longer than wide; tip slightly falcate.

VII-1-3-6-3. Distribution

Off Tohoku, Japan; 99–225 m depth.

VII-1-3-6-4. Etymology

The specific name is an adjective, after the type locality (Tohoku).

VII-1-3-6-5. Remarks

Diplocirrus tohokuensis resembles *D. glaucus* (Malmgren, 1867) and *D. toyoshioae* in the following features: *i*) body papillae are short and abundant, *ii*) body is covered with sediment particles, *iii*) anterior chaetigers are swollen, and *iv*) gonopores are absent. These three species can be discriminated by *i*) cephalic cage, *ii*) neurochaeta, and *iii*) color of the anterior chaetigers. The cephalic cage in *D. tohokuensis* is not well developed ($^1/_3$ as long as body width), whereas in *D. glaucus* and *D. toyoshioae* are longer (as long as body width). The neurochaetal round projection is poorly developed in each article of *D. tohokuensis* and *D. glaucus*, whereas they are well developed in *D. toyoshioae*. The anterior chaetigers of *D. tohokuensis* and *D. toyoshioae* are whitish, whereas these possess rusty pigments in *D. glaucus*.

VII-1-3-7. *Diplocirrus toyoshioae* Jimi, Fujiwara and Kajihara, 2017

New Japanese name: Toyoshio-konbou-habouki

VII-1-3-7-1. Type materials

Holotype: NSMT-Pol H-645, Hibiki-nada, 62 m depth, collected by NJ, COI sequence DDBJ accession no. LC314567. Paratypes: NSMT-Pol P-646, Hibiki-nada, 62 m depth, collected by NJ, four incomplete specimens (9–14 mm long, 1 mm wide, 20–28 chaetigers); NSMT-Pol P-647, Hibiki-nada, 62 m depth, collected by NJ, 40 incomplete specimens (2–18 mm long, 0.8–1.2 mm wide, 11–24 chaetigers).

VII-1-3-7-2. Description

Holotype incomplete, 12 mm long, 1 mm wide (in chaetiger 10), 33 chaetigers. Body with first 10 chaetigers swollen, thereafter cylindrical (Fig. VII-7A). Tunic whitish in ethanol with sediment particles on body wall and around base of papillae (Fig. VII-7B); particles attached on whole body wall except cephalic hood. Digitate papillae abundant, longer than wide, short, in median chaetigers about $^1/_5$ as long as notochaetae and half as long as lateral papillae in chaetal lobe, arranged in 6–8 transverse rows per segment. Cephalic hood transparent. Gonopodial lobes and gonopores absent. Posterior region tapered, anal portion lost in holotype.

Two types of branchiae present: dorsal branchiae, 1.2 mm long, thick, with two lobes on internal side, not lamellate (Fig. VII-7C); ventral branchiae, 1.3 mm long, thin, smooth, not lamellate (Fig. VII-7D). Palps 1 mm long, grooved. Upper and lateral lips well developed. Caruncle projected, not separating dorsal branchiae (Fig. VII-7E). Eyes absent. Nephridial lobe present.

Parapodia poorly developed, with chaetae emerging from body wall; notopodia with 3–4 lateral papillae arranged in single row on anterior side and no lateral papillae on posterior side; neuropodia with no lateral papillae and anterior side and 2–3 lateral papillae on posterior side. Cephalic cage developed (1st notochaeta 1.0 mm long). Notochaetae 3–5 per bundle, multiarticulate (Fig. VII-7F) with 11–12 articles in chaetiger 34; tip tapered. Neurochaetae 4–5 per bundle, multiarticulate with 12–18 articles in chaetiger 34, rounded projection well developed (Fig. VII-7G); subdistal article 3–4 times longer than wide; tip slightly falcate.

VII-1-3-7-3. Etymology

This species is named after the TR/V *Toyoshio-maru*. The type specimens from Hibiki-nada were collected by the gear of TR/V *Toyoshio-maru*. The specific name is a noun in the genitive case.

VII-1-3-7-4. Distribution

Only known from the type locality (Hibiki-nada), 62 m depth.

VII-1-3-7-5. Remarks

Diplocirrus toyoshioae resembles *D. glaucus* (Malmgren, 1867) and *D. tohokuensis* in the following features: *i*) body papillae are short and abundant, *ii*) body is covered with sediment particles, *iii*) anterior chaetigers are swollen, and *iv*) gonopores are absent. These three species can be discriminated by *i*) cephalic cage, *ii*) neurochaeta, and *iii*) color of the anterior chaetigers. The cephalic cage in *D. toyoshioae* and *D. glaucus* are longer (as long as body width), whereas in *D. tohokuensis* is not well developed ($^1/_3$ as long as body width). The neurochaetal round projection is well developed in each article of *D. toyoshioae*, whereas they are poorly developed in *D. tohokuensis* and *D. glaucus*. The anterior chaetigers of *D. toyoshioae* and *D. tohokuensis* are whitish, whereas these possess rusty pigments in *D. glaucus*.

VII-1-3-8. *Diplocirrus nicolaji* (Buzhinskaja, 1994)

Japanese name: bouzu-habouki

VII-1-3-8-1. Synonymy

Diversibranchius nicolaji Buzhinskaja 1994, 231, figs 2–7; Darbyshire and Mackie 2009, 97, table 1.

Flabelligeridae from Japan: Rouse and Pleijel 2001, pl. 11, fig. f.

Diplocirrus nicolaji: Salazar-Vallejo and Buzhinskaja 2011, 31–33, fig. 9; Jimi *et al.* 2016, 1–8, figs 2–3; Okanishi *et al.* 2016, 17, fig. 5B.

VII-1-3-8-2. Material examined

NSMT-Pol 113221, Iorigawa, Miyazaki Prefecture, intertidal flat, collected by Dr. Shinri Tomioka.

VII-1-3-8-3. Diagnosis

Anterior body swollen; sediment particles covering only base of papillae; gonopores present on chaetigers 2 to 23–48; papillae not long. Cephalic cage poorly developed; median neurochaeta with about 10 articles, tip markedly falcate. Two types of branchiae, both with lamellae.

VII-1-3-8-4. Distribution

Oshoro (Hokkaido Prefecture) to Iorigawa (Miyazaki Prefecture), Japan and Russia. Intertidal of tidal flat to subtidal (~ 10 m depth) of mud sand bottom.

VII-2. *Lamispina ammophila* (Annelida: Flabelligeridae), from Shimoda, Japan

I, together with my supervisor, described a new species of flabelligerid polychaete, *Lamispina ammophila* from off the coast of Shimoda, Japan. The species can be discriminated from the other congeners by the following features: *i*) dorsal region of body being adhered to by sediment particles, *ii*) lamispines without accessory tooth, present from chaetiger 4 and succeeding chaetigers, and *iii*) cephalic cage 1.5–2.0 times as long as body width. A partial COI gene sequence from the paratype is provided as a DNA barcode for the new species.

VII-2-1. Introduction

Lamispina Salazar-Vallejo, 2014 is one of the 25 genera in the polychaete family Flabelligeridae, consisting of nine species reported from intertidal to deep sea sediment in subtropical to cold-temperature waters (Salazar-Vallejo 2014). The genus was proposed so that it accommodates species formerly placed in *Pherusa* Oken, 1807 having special neurochaetae (Grube 1877; Haswell 1892; Annenkova-Chlopina 1924; Støp-Bowitz 1948; Hartmann-Schröder 1965; Salazar-Vallejo 2014). Members in *Lamispina* possess special neurochaetae, called "lamispines", in which their distal area is thin and broad. This is one of the main features that distinguishes them from other flabelligerids.

Around Japan, a sole species of the genus, *L. schmidtii* (Annenkova-Chlopina, 1924), has been known from the Japan Sea and Okhotsk Sea (Annenkova-Chlopina 1924; Salazar-Vallejo 2014). During the 8th Japanese Association for Marine Biology (JAMBIO) Coastal Organism Joint Survey held at Shimoda, the first author found some specimens of *Lamispina*. I described the specimens as a new species and provided COI sequences as a DNA barcode of the species (Jimi and Kajihara 2017).

VII-2-2. Materials and methods

Fresh specimens were collected by dredging from off the coast of Shimoda, Japan (34°39.217′N, 138°57.106′E to 34°39.071′N, 138°56.977′E). The specimens were fixed in 70% ethanol. After preservation, these specimens were observed with a Nikon SMZ1500 dissecting microscope and an OLYMPUS BX51 compound light microscope, and then photographed with a Nikon D5200 digital camera. All the material has been deposited in NSMT.

DNA extraction and sequencing of part of the COI were carried out following the method of Jimi and Fujiwara (2016). The newly obtained sequence has been deposited in DDBJ.

VII-2-3. *Lamispina ammophila* Jimi and Kajiahara, 2018

Japanese name: suna-sasanoha-habouki

VII-2-3-1. Material examined

Holotype: NMST-Pol H-663, anterior fragment, 4 mm long, 1 mm wide (widest chaetiger), 17 chaetigers, sex unknown, off Shimoda, 45–46 m depth, 13 November 2015, collected by NJ; although the last two chaetigers were removed for observation and DNA extraction, any gene sequences could not be determined from those chaetigers. Paratypes: NSMT-Pol P-664, 10 specimens, anterior fragments, 2–6 mm long, 1 mm wide (widest chaetiger), 8–20 chaetigers, sex unknown, off Shimoda, 45–46 m depth, 13 November 2015, collected by NJ; the last two chaetigers and palps of one specimen were removed for DNA extraction.

VII-2-3-2. Sequence.

C363891, COI gene, 651 bp, determined from the paratype (NSMT-Pol P-664).

VII-2-3-3. Description

Holotype 4 mm long, 1 mm wide (widest chaetiger), 17 chaetigers (not complete). Body cylindrical, tapered in posterior region, greenish in life, yellowish after fixation (Fig. VII-8A). Dorsal body surface with sparse sand particles (Fig. VII-8B), ventral side without sand particles (Fig. VII-8A). Body papillae long, thin, digitate, sediment particles attached on base, 1/2 times as long as parapodial papillae. Gonopodial lobes not seen. Gonopores not seen.

Prostomium low cone, red eyes present, caruncle developed, lateral lip expanded, dorsal and ventral lips not well developed (Fig. VII-8C). Palps short, thick, digitate, as long as branchiae (Fig. VII-8D). Branchiae arranged in a continuous dorsal series, eight in number, digitate, microcilia present on surface (Fig. VII-8E). Nephridial lobes present.

Cephalic cage well developed, 1.5–2.0 times as long as body width (widest chaetiger). Chaetigers 1–3 comprise cephalic cage, cephalic cage consisting of about 4 notochaetae and 8 neurochaetae (some chaetae broken). Chaetal transition from cephalic cage to body chaetae abrupt (Fig. VII-8A).

Parapodia poorly developed. Noto- and neuropodial low lobes, 1/3–3/4 times as long as neurochaetae, 2–4 times as long as body papillae, 5–7 internal papillae, 4–6 postchaetal papillae; 4–5 chaetae per notopodia, 3–4 chaetae per neuropodia. Notochaetae multiarticulated capillaries, brownish, with articles medium-sized basally, long medially and distally (Fig. VII-9A). Neurochaetae multiarticulated capillaries in chaetigers 1–3, brownish; anchylosed lamispines present in chaetiger 4 and succeeding posterior chaetigers, brownish, without accessory tooth, with articles medium-sized basally, slightly long medially (Fig. VII-9B, C).

Posterior end unknown.

VII-2-3-4. Etymology

The specific name “ammophila” derives from ancient Greek ᾰ̓́μμος ámmos (sand) + φῐ́λος phílos (loving, friendly), referring to the new species having sand particles on its body.

VII-2-3-5. Distribution

Only known from the type locality, Shimoda, Japan. 45–46 m depth.

VII-2-3-6. Remarks

Lamispina ammophila is different from the other known species by the following features: *i*) sediment particles are adhered only to the dorsal region of the body, *ii*) lamispines are present in chaetiger 4 and backward, lacking accessory tooth, and *iii*) the cephalic cage is 1.5–2.0 times as long as the body width. The species resembles *L. amoureuxi* Salazar-Vallejo, 2014 in having sediment particles and lamispines without accessory tooth. While lamispines in *L. ammophila* emerge from chaetiger 4 and backward, they occur from chaetiger 2 in *L. amoureuxi*. The cephalic cage is 1.5–2.0 times as long as body width in *L. ammophila*, it is as long as body in *L. amoureuxi*. The species also resembles *L. gymnopapillata* (Hartmann-Schröder, 1965) in that lamispines occur from chaetiger 4, but it differs from the latter in that sand particles adhere dorsally in *L. ammophila*, whereas *L. gymnopapillata* does not carry sand particles.

Chapter VIII. Hesionidae

This chapter deals with one species of *Elisesione*, one species of *Hesione* and two species of *Leocratides* from Japan.

VIII-1. Description of *Elisesione imajimai* from Japan and a redescription of *E. problematica* (Wesenberg-Lund, 1950) and its confirmation within Hesionini

I, together with my colleagues, described *Elisesione imajimai* Jimi, Eibye-Jacobsen and Salazar-Vallejo, 2018 based on specimens collected in Sagami Bay, Japan, 150–250 m depth. This new species resembles *E. problematica* (Wesenberg-Lund, 1950) from Iceland, but differs from the latter because in *E. imajimai* the ventral cirri surpass the tips of the neurochaetal lobes, reaching to the medial part of the neurochaetal bundle; the palps are 1/2–4/5 as long as the antennae; the aciculae are pale brownish; and the dorsal integument shows 9–10 transverse wrinkles per segment, whereas in *E. problematica* the ventral cirri hardly reach the tips of the neurochaetal lobes; the palps are as long as the antennae; the aciculae are black; and there are 15 transverse wrinkles per segment. In this subchapter VIII-1, I provide redescriptions of *E. imajimai* and *E. problematica* and also a revised key to identify species in the genus. A phylogenetic analysis based upon four genes (COI, 16S, 18S, 28S) confirmed its position within Hesionini.

VIII-1-1. Introduction

Elisesione Salazar-Vallejo, 2016 was recently proposed as a replacement name for *Wesenbergia* Hartman, 1955 because the latter is a junior homonym of a hymenopterid genus. *Elisesione* includes two valid species: *E. mezianei* Salazar-Vallejo, 2016 and *E. problematica* (Wesenberg-Lund, 1950), the type species. This genus is distinguished from other hesionid genera by having the following features: 21 segments, 16 chaetigers, eight pairs of tentacular cirri, two pairs of cephalic appendages (simple palps and antennae), bidentate neurochaetae, and pharynx without marginal papillae (Pleijel 1998; Salazar-Vallejo 2016). The species are distributed in shallow water (*E. mezianei*: 27–37 m depth) to deeper waters (*E. problematica*: 550 m depth) in widely separated localities in the central Pacific (Wallis Island) and the North Atlantic (Iceland).

In Japan, another species of *Elisesione* was reported as *Wesenbergia problematica* by Imajima (2003, 2007) based on specimens collected in Sagami Bay by the late Emperor Showa. Emperor Showa collected a large amount of marine organisms, and the polychaetes were reported by the late Dr. Minoru Imajima (Imajima 1997, 2003). Salazar-Vallejo (2016) described the second species of *Elisesione* and indicated that the Japanese specimens differed from *E. problematica* because they have palps half as long as the antennae, parapodia with the dorsal cirrophores twice longer than wide, acicular lobes single, and neurochaetal blades that are 7–9 times longer than wide, and provided with guards.

In this contribution, after having studied Imajima's specimens and an additional living specimen, I described them as a new species, *E. imajimai*, and redescribed *E. problematica* based on the type specimen (Jimi et al. 2018a). I also evaluated the phylogenetic position of *Elisesione* among Hesionidae and confirm its position within Hesionini (Pleijel 1998).

VIII-1-2. Materials and methods

Worms that were used for the new species description were dredged at two sampling stations in Sagami Bay: St. 1 was sampled by Emperor Showa, 35°07.0′ N, 139°34.3′ E to 35°07.3′ N, 139°34.2′ E, 150–250 m depth, on 3 June 1960. The water depth indicated by Imajima (2003, 2007; 150–320 m depth) differs from that on the label accompanying the specimens. St. 2 was sampled by one of us (NJ), 35°07′ N, 139°34′ E to 35°06′ N, 139°34′ E, 150–201 m depth, on 16 February 2017.

Specimens from Station 1 were preserved in ethanol and stored at the Showa Memorial Institute, NSMT; collections were transferred to Tsukuba from Tokyo in 2012 and the acronym remains unaltered). The fixative was not indicated, but it was probably formalin. The specimen from Sagami Bay St. 2 was fixed and preserved in 70% ethanol, and has also been deposited in NSMT.

The holotype of *E. problematica* that is deposited in the collections of the Zoological Museum, Natural History Museum of Denmark (ZMUC), Copenhagen was used for redescription.

The specimens were observed with stereo microscopes and photographs were made with digital cameras. Measurement data for *E. imajimai* are in Table VIII-1.

DNA extraction, sequencing, alignment, and removing ambiguous positions for *E. imajimai* were carried out following the method detailed elsewhere (Jimi and Fujiwara 2016). Additional sequences of other hesionid species are obtained from

GenBank (Table VIII-2). The sequences of the four genes, COI, 16S, 18S, 28S, were concatenated by using Kakusan (Tanabe 2007), which recommended a GTR + G evolutionary model for each gene. A phylogenetic tree was constructed using the maximum likelihood (ML) method with RAxML-VI-HPC (Stamatakis 2006). The robustness of the ML tree was evaluated by 1000 bootstrap pseudo-replicates (-f option). Newly obtained sequences have been deposited in the DDBJ (No. LC361352–LC361354). These sequences are available from GenBank.

VIII-1-3. Results

VIII-1-3-1. *Elisesione imajimai* Jimi, Eibye-Jacobsen and Salazar-Vallejo, 2018

Japanese name: noumen-otohime-gokai

VIII-1-3-1-1. Synonymy

Wesenbergia problematica: Imajima 2003: 138–139, fig. 81; Imajima 2007: 450, fig. 143.

Elisesione problematica sensu Imajima 200: Salazar-Vallejo 2016: 5.

VIII-1-3-1-2. Material examined

Holotype (NSMT-Pol H-665), sex unknown, Sagami Bay St. 2 (150–201 m depth, 35°07′ N, 139°34′ E to 35°06′ N, 139°34′ E). Paratype (NMST-Pol R:604-1), Sagami St. 1 (150–250 m depth, 35°07.0′ N, 139°34.3′ E to 35°07.3′ N, 139°34.2′ E), 30 mm long, 3 mm wide, mature female; paratype (NSMT-Pol R: 604-2), Sagami St. 1, 34 mm long, 4 mm wide, sex unknown.

VIII-1-3-1-3. Sequences

Partial sequence of the COI gene, 629 bp; 18S gene, 1713 bp; 28S gene, 982 bp, extracted from holotype specimen deposited in DDBJ (No. LC361352–LC361354). 16S gene could not be determined.

VIII-1-3-1-4. Description

Holotype 25 mm long, 3 mm wide (by chaetiger 7, without parapodia), with 16 chaetigers (right parapodium of chaetiger 5 removed, kept in 2.0 ml plastic tube with holotype; right parapodia of chaetigers 5–7 and 11 removed from paratypes by Dr. Minoru Imajima, kept in glass vial with type specimens).

Body cylindrical, tapered in posterior region (Fig. VIII-1A, B), dorsally pinkish and ventrally whitish in life, whitish in ethanol, dorsal integument annulated, with 9–10 transverse wrinkles per segment (Fig. VIII-1A, B). Reddish brown transverse bands and longitudinal marginal lines present along each segment in living specimen over a pale brown background (Fig. VIII-1A, B). Transverse bands irregular, straight, homogeneous on chaetiger 1, across last segment and pygidium, other segments with transverse bands straight across their anterior margin, posterior margin of band projected posteriorly into irregular semicircular areas. Tentacular cirri, dorsal cirri and parapodial lobes whitish. Pigmentation of paratypes unknown (specimens in ethanol for over 50 years).

Prostomium wider than long, median line with a shallow depression, lateral margins rounded, slightly wider medially (Fig. VIII-1C). Antennae digitate. Palps simple, blunt, shorter than antennae ($^{1}/_{2}$–$^{4}/_{5}$ times as long as antennae), positioned at same level, slightly external to antennae (Fig. VIII-1C). Eyes present, two pairs, pinkish in living specimen, anterior eyes with pigmented areas transverse half-moon shaped, in posterior ones vertical (Fig. VIII-1C).

Tentacular cirri long, thick, longest one reaches chaetiger 3 in paratype. Lateral cushions low, barely projected dorsally, slightly projected laterally, undivided (Fig. VIII-1A, B).

Parapodia with chaetal lobes cylindrical, truncate, longer than wide (Fig. VIII-2A); dorsal cirri thick, cirrophores cylindrical, smooth, 1.5–2 times longer than wide (Fig. VIII-2B), cirrostyle basally cylindrical, smooth, annulated medially and distally, shorter than body width without parapodia. Ventral cirri basally smooth, rugose medially and distally, surpassing neurochaetal lobe, reaching up to half length of neurochaetal bundle (Fig. VIII-2C).

Acicula pale brownish, tapered; acicular lobe single, blunt, rounded (Fig. VIII-2D). About 35 neurochaetae per bundle (Fig. VIII-2E), shaft and blade pale brownish, blades 7–10 times longer than wide, with subdistal tooth $^{1}/_{3}$–$^{1}/_{2}$ times as long as apical tooth, guard approaching apical tooth (Fig. VIII-2F).

Posterior region barely thinner than median region. Cirri of prepygydial segment broken; pygidium smooth, depressed; anus dorso-terminal, open, with two pairs of lateral anal cirri (Fig. VIII-1B) and about 8 anal papillae.

Pharynx dissected in paratype, smooth; dorsal papilla not seen, terminal papillae absent (Fig. VIII-1D).

Paratype with oocytes in coelom, visible along chaetigers 6–14, each oocyte 300–500 μm in diameter, whitish in ethanol, about 150 oocytes per segment.

VIII-1-3-1-5. Etymology

This species is named in honour of Dr. Minoru Imajima, in recognition of his great contributions to polychaete taxonomy in Japan.

VIII-1-3-1-6. Distribution

Only known from the type locality (Sagami Bay, Japan), 150–250 m depth.

VIII-1-3-1-7. Remarks

Elisesione imajimai resembles *E. problematica* (Wesenberg-Lund, 1950, see below) because they have single acicular lobes and dorsal cirrophores that are about twice longer than wide. They differ in the length of the ventral cirri, size of palps, colour of aciculae, and the number of dorsal transverse wrinkles per segment.

In *E. imajimai* the ventral cirri surpass the neurochaetal lobe tip, the palps are $^1/_2$–$^4/_5$ times as long as the antennae, the aciculae are pale brownish, and the dorsal integument has 9–10 transverse wrinkles per segment, whereas in *E. problematica* the ventral cirri hardly reach the tip of the neurochaetal lobe, the palps are as long as the antennae, the aciculae are black, and there are 13–15 transverse wrinkles per segment (Wesenberg-Lund 1950).

Furthermore, the neurochaetal blades of *E. imajimai* are 7–10 times longer than wide, whereas in *E. problematica* they are larger (8–12 times longer than wide). This feature was used in the discrimination of the two species in Salazar-Vallejo (2016), but the range difference cannot be regarded as diagnostic because of the small number of specimens currently known, and especially because of the few chaetae remaining in the holotype of *E. problematica*.

On the other hand, the finding of very large oocytes in the new species deserves two additional comments about some interesting features. First, egg size is to some degree related to dispersal potential. Strathmann (1977:373) simplified the mathematical models of Richard Vance, proposed a few years before, by indicating that "an increase in egg size is associated with … a decrease in the duration of the period between fertilization and metamorphosis." Second, large eggs usually undergo lecitotrophic development. Wray and Raff (1991:48) and Giangrande et al. (1994:310) correlated egg size and developmental mode in echinoids, and indicated that species having eggs of about 300-500 µm have lecitotrophic larvae, whereas those having eggs about 600–1000 µm have highly derived lecitotrophic larvae. Schroeder and Hermans (1975) also indicated that if polychaete eggs are larger than 180 µm in diameter, the young develop directly into juveniles without an intervening stage. These larvae/juveniles usually spend a short period in the water column. These two features could explain why the known species ranges are so restricted, confined in most instances to single localities.

VIII-1-3-2. *Elisesione problematica* (Wesenberg-Lund, 1950)

VIII-1-3-2-1. Synonymy

Hesionella problematica Wesenberg-Lund, 1950: 14–15, fig. 15.
Wesenbergia problematica: Hartman 1955: 41.
Wesenbergia problemaica: Pleijel 1998: 112–113, fig. 9.
Elisesione problematica: Salazar-Vallejo 2016: 3–5.

VIII-1-3-2-2. Material examined

Holotype (ZMUC-POL-480), sex unknown. Southwest off Iceland (555 m depth, 64°18′ N, 27°00′ W).

VIII-1-3-2-2. Description

Holotype about 50 mm long, 8 mm wide, 16 chaetigers. Body cylindrical, tapered in posterior region (Fig. VIII-3A, B), brownish in ethanol, dorsal integument annulated, with 13–15 transverse wrinkles per segment (Fig. VIII-3A, B, C). Tentacular cirri, dorsal cirri and parapodial lobes whitish. Pigmentation of holotype unknown (specimens in ethanol for over 55 years before description; now darker).

Prostomium wider than long, median line with a shallow depression, lateral margins rounded, wider medially (Fig. VIII-3C). Eyes not seen. Palps and antennae present, damaged; palps ventral, slightly more lateral than antennae; left antenna present, tip damaged; right antenna missing (in the original illustration, palps and antennae tapered, of similar length). Tentacular cirri long, thick. Lateral cushions low, slightly projected laterally, divided in 2–3 parts (Fig. VIII-3A, C).

Parapodia with chaetal lobes cylindrical, truncate, longer than wide (Fig. VIII-4A); dorsal cirrophores cylindrical, smooth, about $^4/_5$ times as long as wide (Fig. VIII-4B). Ventral cirrophore cylindrical, smooth, as long as wide (Fig. VIII-4C). Ventral cirri smooth, not reaching tip of neurochaetal lobe (as indicated in original illustration).

Acicula black, tapered; acicular lobe single, blunt, digitate. About 25 neurochaetae per bundle (Fig. VIII-4D), shaft and blade pale brownish, blade 8–12 times as long as wide, with subdistal tooth as long as apical tooth, guard approaching apical tooth (Fig. VIII-4E).

Posterior region tapered into a blunt cone; body wall macerated (Fig. VIII-3B). Cirri of prepygydial segment broken; pygidium smooth, depressed; anus dorso-terminal, open, with two pairs of lateral anal cirri.

Pharynx smooth, partially everted, basal ring barely exposed, dorsal papilla not exposed, terminal papillae absent (Fig. VIII-3A, C).

VIII-1-3-2-3. Distribution

Only known from the type locality, southwest off Iceland, 555 m depth.

VIII-1-3-3. Phylogenetic analysis

In the resulting tree, *Elisesione*, *Hesione*, and *Leocrates* comprise monophyletic, with high support value (86% bootstrap support [BS]). *Elisesione* and *Leocrates* comprise a poorly supported clade (52% BS) (Fig. VIII-5).

In a previous morphological study, *Elisesione*, *Hesione*, and *Leocrates* were monophyletic and regarded as tribe Hesionini (Pleijel 1998). My results based on four genes also supported the tribe as monophyletic. In Pleijel's paper (Pleijel 1998), *Elisesione* is sister to *Hesione*; this is not in agreement with my results. However, the BS value of the clade is poor (52% BS); hence, additional study is needed to clarify the position of *Elisesione* in the clade Hesionini.

VIII-2. *Leocratides* from the Pacific Coast of Middle Honshu, Japan, with a description of *Leocratides kimuraorum*

I, together with my colleagues, described the new species of hesionid polychaete *Leocratides kimuraorum* based on material collected from the Kumano Sea and Sagami Bay (middle Honshu, Japan), as well as museum specimens collected from Sagami Bay, Suruga Bay, and Shirahama. *Leocratides kimuraorum* Jimi et al., 2017b is the third species in this genus and can be discriminated from the two congeners, *L. filamentosus* Ehlers, 1908 and *L. ehlersi* (Horst, 1921), by *i*) the length of the antennae, which are as long as palps, *ii*) the presence of pharyngeal terminal papillae, and *iii*) the absence of a papillose peristomial membrane. *Leocratides filamentosus*, originally described from off Western Sumatra, Indonesia, was also collected from Sagami Bay, and represents a new record of this species for Japanese waters. Partial COI gene sequences from the holotype of *L. kimuraorum* and newly collected specimen of *L. filamentosus* are provided for reliable species identification in the future.

VIII-2-1. Introduction

The hesionid polychaete genus *Leocratides* Ehlers, 1908 consists of two species, *L. filamentosus* Ehlers, 1908 and *L. ehlersi* (Horst, 1921), both of which were originally found among hexactinellid sponges from sublittoral substrates in Indonesian waters. The name-bearing types of the first species, *L. filamentosus*, were collected from *Aphrocallistes beatrix* Gray, 1858, off Nias Island at 677 m depth (Ehlers 1908). *Leocratides filamentosus* has also been reported from Japan (Imajima and Hartman 1964; Imajima 2003, 2005, 2006, 2007), New Caledonia (Rullier 1972), and Egypt (as *L. filamentosa* [sic]; Belal and Ghobashy 2012). The second species, originally described as *Leocrates ehlersi* and later combined with *Leocratides* by Fauvel (1932), was found among a species of *Aphrocallistes* Gray, 1858, collected at 274 m depth in Saleh Bay, north coast of Sumbawa, Indonesia (Horst 1921, 1924; Pettibone 1970). Besides the records for the type locality, *L. ehlersi* has also been reported from Sagami Bay of Japan (as *Leocratides ehlersi*; Hessle 1925), the Andaman Sea (Fauvel 1932, 1953), the Arabian Sea (Parulekar 1971), and the Red Sea (Fishelson and Rullier 1969; Amoureux et al. 1978).

The taxonomy within *Leocratides* is contentious. When Horst (1921) described *L. ehlersi*, he diagnosed the two *Leocratides* species as having one (in *L.*

filamentosus) or two (in *L. ehlersi*) dorsal jaw plates. Based on examination of the two syntypes of *L. filamentosus*, however, Augener (1926) argued that *L. ehlersi* should be treated as a junior synonym of the former which has actually two dorsal jaw plates, instead of one. Later, Pettibone (1970) redescribed the syntypes of both species in detail and also concluded that they were synonymous. In contrast, also having examined the syntypes of the two, Pleijel (1998) restored *L. ehlersi* as a distinct species, concluding that the pharyngeal terminal papillae and the papillose peristomial membrane are both present in *L. filamentosus*, but are absent in *L. ehlersi*. In this study, we follow the taxonomy of Pleijel (1998), treating *L. filamentosus* and *L. ehlersi* as two distinct species.

While several authors have recorded *Leocratides* species from Japanese waters, the taxonomic identity of the Japanese taxon (or taxa) requires further scrutiny. Hessle (1925) reported six specimens of hesionids under the name "*Leocrates ehlersi*" from Sagami Bay (from 150 m to 600 m depths). Subsequently, Imajima and Hartman (1964a) emended that record to "*Leocratides filamentosus*" without any explanation. Imajima (2003, 2005, 2006, 2007) also identified a number of hesionid specimens as *L. filamentosus*; these were collected from the Pacific coast of middle Honshu (around Sagami Bay and Suruga Bay) and South West Japan (off the Tokara Islands and the Amami Islands), collected at 74 m to 297 m depth. Okanishi et al. (2016) reported "*Leocratides* sp." near Shirahama (from 164–169 m depth). As to the Japanese *Leocratides* species, however, the diagnostic characters mentioned earlier were neither explicitly mentioned by Hessle (1925) and Okanishi et al. (2016) nor clearly illustrated by Imajima (2003, 2005, 2006, 2007), making their taxonomic identity blurred.

NJ obtained specimens of *Leocratides* during a research cruise onboard the training and research vessel (TRV) *Seisui-maru* (Mie University) off the Shima Peninsula. Another specimen of *Leocratides* was also collected by Dr. Masaatsu Tanaka in Sagami Bay. A close examination in the laboratory revealed that these specimens are morphologically consistent with the description and illustration of "*L. filamentosus*" by Imajima (2003, 2007) and also the illustration of "*Leocrates ehlersi*" by Hessle (1925), whereas they do not correspond with the original descriptions of *L. filamentosus* and *L. ehlersi* (Ehlers 1908; Horst 1921). I described these specimens along with some of the voucher material examined in Imajima (2003, 2007) and Okanishi et al. (2016) as the third member of *Leocratides*, providing barcode sequence of the holotype for the new species to facilitate future reliable identification (Jimi et al. 2018).

In addition to the species, I also found a number of specimens of *Leocratides filamentosus* in the sense of Ehlers (1908) but not Imajima (2003, 2007) from Sagami Bay. In this section, I give a redescription of *L. filamentosus* based on these specimens as representing a truly new record for Japanese waters.

VIII-2-2. Materials and methods

Fresh specimens were newly collected from Sagami Bay and off the Shima Peninsula, Japan (Table VIII-1). Some of the live specimens were photographed onboard with a digital camera (Nikon D60), then fixed in 10% formalin-seawater or 70% ethanol. After preservation, these specimens were observed with a microscope (Nikon SMZ1500 and OLYMPUS BX51) and photographed with a digital camera (Nikon D5200). All the material has been deposited in NSMT. Additionally, a part of *Leocratides* specimens examined in Imajima's (2003, 2007) and Okanishi *et al*. (2016) were also examined.

DNA extraction, and sequencing for partial sequences of COI were carried out following the method of Jimi and Fujiwara (2016). Newly obtained sequences have been deposited in DDBJ.

VIII-2-3. Results

VIII-2-3-1. *Leocratides kimuraorum* Jimi, Tanaka and Kajihara, 2017

Japanese name: Kimura-hanakago-otohime-gokai (previously called "oni-otohime-gokai"; Imajima 2007)

VIII-2-3-2. Synonymy

?*Leocrates ehlersi* (*non* Horst, 1921); Hessle 1925: 14–15, fig. 3.

Leocratides filamentosus (*non* Ehlers, 1908); Imajima and Hartman 1964: 82–83; Imajima 2003: 136–138, fig. 80 (in part); Imajima 2007: 444, fig. 138 (in part).

Leocratides sp.; Okanishi *et al*. 2016: 14.

VIII-2-3-3. Material examined

Holotype: NMST-Pol H-622, 29 mm long, 5 mm wide, sex unknown, off Shima Peninsula, St. 1, 103–104 m depth, 12 October 2016, collected by NJ (right parapodium of chaetiger 5 was removed for observation; it is preserved in 70% ethanol in a 2.0 ml plastic tube, which is contained in the same glass vial together with the rest of the body). Paratypes (14 specimens): NSMT-Pol P-623–624, five specimens, 11–19 mm long, 2 mm wide, sex unknown, off Shima Peninsula, St. 1 (NSMT-Pol P-623, three specimens) and St. 2 (NSMT-Pol P-624, one specimen), 12 October 2016, collected by NJ; NSMT-Pol P-625, one specimen, 25 mm long, 4 mm wide, male (sperm present in each segment's gonads), Sagami Bay St. 2, 104–111 m depth, 27 April 2016, collected by MT; NSMT-Pol P-626, three specimens examined by Okanishi *et al.* (2016), 6–16 mm long, 2 mm wide, sex unknown, off Shirahama, 164–169 m depth, 27 May 2015, collected by NJ; NSMT-Pol.R: 176, two specimens examined by Imajima (2003, 2007), 21–24 mm long, 3 mm wide, sex unknown, Sagami Bay, 110–120 m depth, 14 March 1954, collected by the late Emperor Showa; NSMT-Pol.R: 968, one specimen examined by Imajima (2003, 2007), 21 mm long, 3 mm, sex unknown, Sagami Bay, 85–90 m depth, 24 January 1965, collected by the late Emperor Showa; NSMT-Pol P-627: one specimen examined by Imajima (2007), 16 mm long, 3 mm wide, sex unknown, Suruga Bay, 92 m depth, 4 October 1995, collected by the late Dr. Minoru Imajima (MI); NSMT-Pol P-628: one specimen examined by Imajima (2007), 24 mm long, 3 mm wide, sex unknown, Suruga Bay, 86–91 m depth, 8 February 1978, collected by MI.

VIII-2-3-4. Sequence

DDBJ No. LC258082, COI gene, 630 bp, determined from the holotype.

VIII-2-3-5. Description

Holotype 29 mm long, 5 mm wide in chaetiger 7 (not including parapodia), 21 segments, 16 chaetigers. Body cylindrical, tapered in posterior region (Fig. VIII-6A, B), transparent in life (Fig. VIII-6A) and whitish in ethanol; dorsal integument annulated, with 15–17 transverse wrinkles per segment. Dorsum with numerous, thin, transverse discontinuous brown lines, extended into lateral cushions, varying in length, decreasing in size laterally (Fig. VIII-6A, C); ventrally, black spots of different size and shape arranged along mid-ventral groove, in chaetal lobe regions, two larger spots better developed along chaetigers 4–15 (Fig. VIII-6B). Dorsal transverse lines and ventral black spots faded in some paratype specimens (NSMT-Pol.R: 176, 968).
Prostomium rectangular, slightly wider than long, mid-dorsally with shallow depression,

square in shape from dorsal view (Fig. VIII-6D). Median antenna cirriform, smooth, tapered, inserted in central part of prostomium, extended beyond anterior prostomial margin, 1.1 times longer (and thinner) than lateral antenna, surpassing palpophores. Lateral antennae tapered, smooth, on anterior edge of prostomium. Palps bi-articulated, 0.9–1 times longer than lateral antennae, palpophore two times longer than palpostyle, bent laterally, pointed to body sides, external to antennae (Fig. VIII-6D). Eyes brownish, two pairs, on mid-lateral part of prostomium; anterior pair slightly larger and more separated than posterior one (Fig. VIII-6D). Facial tubercle present mid-ventrally on prostomium; cushion-shaped appendage present between palps and tentacular cirri on each side (Fig. VIII-6E); papillose peristomial membrane absent.

Tentacular cirri eight pairs, long, thick; longest one reaching chaetiger 10. Lateral cushions low, barely projected dorsally, slightly projected laterally, undivided, with 17–18 longitudinal wrinkles per side (Fig. VIII-6C).

Parapodia uniform throughout; with chaetal lobes tapered, truncate, as long as wide (Fig. VIII-7A); dorsal cirri with cirrophores, latter being cylindrical, smooth, about twice longer than wide (Fig. VIII-7B); cirrostyle very long, whip-like, smooth basally, annulated medially and distally, longer than body width (including parapodia). Ventral cirri basally smooth, rugose medially and distally, surpassing chaetal lobe, reaching up to half length of neurochaetal bundle (Fig. VIII-7C).

Neuropodial acicula black, tapered; acicular lobe single, thick, digitate, tapered into a small mucro (Fig. VIII-7D). Neurochaetae about 20 per bundle (Fig. VIII-7E); handle greenish; blade pale brownish, bidentate, 5 times longer than wide; with subdistal tooth short, blunt, 0.4 times longer than apical tooth; guard tooth absent (Fig. VIII-7F).

Cirri of prepygidial segment broken; pygidium smooth, depressed, with paired cirri; anus located dorso-terminally, with about 10 anal papillae.

Pharynx dissected in holotype, about 20 low cushion-like terminal papillae present (Fig. VIII-6F); dorsal jaw two plates, ventral jaw one plate.

VIII-2-3-7. Etymology

The specific name is a noun in the genitive plural, after a Japanese marine ecologist Dr. Taeko Kimura and a malacologist Mr. Shoichi Kimura, who organized the cruise of the TRV *Seisui-maru* of Mie University, during which a part of the type specimens, including the holotype, of the new species were collected.

VIII-2-3-8. Distribution

Pacific coast of middle Honshu, Japan: 85–169 m depth, collected with hexactinellid sponges.

VIII-2-3-9. Remarks

My specimens undoubtedly belong to *Leocratides* because their body consists of 21 segments, the anterior cirri are in eight pairs, the neurochaetae are bidentate, the palps are bi-articulated, the parapodia are uniramous, and the jaws are present, all agreeing with the generic diagnosis provided by previous researchers (Pettibone 1970; Pleijel 1998; Rizzo and Salazar-Vallejo 2014; Salazar-Vallejo 2016).

Leocratides kimuraorum differs from *L. filamentosus* in the lateral antennae because they are as long as palps in *L. kimuraorum* but shorter than palps in *L. filamentosus*, and there is no papillose peristomial membrane in *L. kimuraorum* whereas it is present in *L. filamentosus*. It can also be distinguished from *L. ehlersi* by the pharyngeal terminal papillae (present in *L. kimuraorum vs*. absent in *L. ehlersi*) (Horst 1921; Pleijel 1998).

Because I was not able to examine Hessle's (1925) voucher material from Misaki, identified as "*Leocrates ehlersi*", its taxonomic identity remains uncertain, inasmuch as the morphological features illustrated in his figure (Hessle 1925: fig. 3) apply both to *L. ehlersi* and *L. kimuraorum*

I examined some of Imajima's (2003, 2007) voucher material from Sagami and Suruga Bays and noticed that his descriptions contain several errors. For instance, Imajima (2003, 2007) noted that there were two to five transverse wrinkles on the dorsal integument in each segment, whereas there are actually 15–17 wrinkles per segment. When it comes to the pharyngeal terminal papillae, Imajima (2003, 2007) stated that these were absent, although the papillae are in fact present in his voucher specimens. Therefore, I can confidently regard his material as belonging to *L. kimuraorum*

VIII-2-3-2. *Leocratides filamentosus* Ehlers, 1908

Japanese name: hanakago-otohime-gokai

VIII-2-3-2-1. Synonymy

Leocratides filamentosus Ehlers, 1908: 63, pl. 6, figs 8–12; Pettibone 1970: 230–231, figs 27–28; Pleijel 1998: 112.

?*Leocratdes filamentosus*; Rullier 1972: 58; Imajima 2005: 82; 2006: 351; Belal and Ghobashy 2012: 178 (as *L. filamentosa* [sic]).

VIII-2-3-2-2. Material examined

Nine specimens: NMST-Pol 113219, one specimen, sex unknown, Sagami Bay, St.1, 213–255 m depth, 29 June 2011, collected by MT (right parapodium of chaetiger 10 removed for observation; preserved in 70% ethanol in a 2.0 ml plastic tube, kept in the same vial together with the rest of the body); NSMT-Pol 113220, eight specimens, one female and others of unknown sex, Sagami Bay, St. 3, 292–375 m depth, 15 February 2017, collected by NJ, MT, HK.

VIII-2-3-2-3. Sequence

DDBJ No. LC258083, COI gene, 592 bp, determined from a specimen of NSMT-Pol 113220.

VIII-2-3-2-4. Description

14–30 mm long, 2–4 mm wide in chaetiger 7 (not including parapodia), 21 segments, 16 chaetigers; right parapodium of chaetiger 10 removed for observation. Body cylindrical, tapered in posterior region, transparent in live (Fig. VIII-8A, B), whitish in ethanol; dorsal integument annulated, with 12–17 transverse wrinkles per segment. Brown lines on dorsal surface absent (Fig. VIII-8A, C); ventrally with black spots of varying size and shape arranged along median groove, in some places roughly on two rows, in chaetigers 5–16; some spots being particularly larger than others, arranged laterally in pair along line between parapodia in each segment, especially prominent in chaetigers 7–11 (Fig. VIII-8B). Prostomium rectangular, longer than wide, mid-dorsally with shallow depression, square in shape from dorsal view (Fig. VIII-8D). Median antenna conical, smooth, in central part of prostomium, not reaching anterior prostomial margin, 1.3 times longer than lateral antennae. Lateral antennae conical, smooth, on anterior edge of prostomium. Palps bi-articulated, 1.2 times longer than lateral antennae, palpophore four times longer than palpostyle, ventral to antennae (Fig. VIII-8D). Eyes brownish, two pairs, on mid-lateral part of prostomium, anterior pair slightly larger and more separated than posterior one (Fig. VIII-8D). Facial tubercle present mid-ventrally on prostomium; papillose peristomial membrane present (Fig. VIII-8E).

Tentacular cirri eight pairs, long, thick; longest one reaching chaetiger 6. Lateral cushions low, barely projected dorsally, slightly projected laterally, undivided, with 7–8 longitudinal wrinkles per one lateral cushion (Fig. VIII-8C).

Parapodia uniform throughout; chaetal lobes cylindrical, truncate, as long as wide (Fig. VIII-9A); dorsal cirri with cirrophores cylindrical, smooth, 1.3 times longer than wide (Fig. VIII-9B); cirrostyle whip-like, smooth, annulated, longer than body width (without parapodia). Ventral cirri basally rugose, surpassing chaetal lobe, reaching up to half length of neurochaetal bundle (Fig. VIII-9C).

Neuropodial acicula black, tapered; acicular lobe single, wider basally, tip digitate, long (Fig. VIII-9D). Neurochaetae about 20 per bundle (Fig. VIII-9E); handle greenish; blade yellowish, bidentate, six times longer than wide; with subdistal tooth 0.5 times longer than apical tooth; guard absent (Fig. VIII-9F).

Cirri of prepygidial segment broken; pygidium smooth, depressed, with paired cirri; anus dorso-terminal, with about eight anal papillae.

Pharynx dissected, about 20 terminal low cushion-like terminal papillae present (Fig. VIII-8F); dorsal jaw two plates, ventral jaw one plates.

VIII-2-3-2-5. Confirmed distribution

From Sagami Bay, Japan to Indonesia, 213–677 m depth, in hexactinellid sponges.

VIII-2-3-2-6. Remarks

Imajima (2003, 2007) reported "*Leocratides filamentosus*" from Japanese waters. However, as indicated above Imajima's (2003, 2007) specimens from Sagami and Suruga Bays actually belong to *L. kimuraorum* Imajima (2005, 2006) also reported "*L. filamentosus*" from off Izu-Oshima Island, Sagami Bay, and several other localities off the Nansei Islands, southwestern Japan, but neither morphological accounts nor the basis of his identifications were provided. I searched unregistered polychaete collection in NSMT for the voucher specimens that substantiate Imajima's (2005, 2006) records of his "*L. filamentosus*" from Izu-Oshima Island, Sagami Bay, and the Nansei Islands, but were not able to locate them. This makes the validity of these records of "*L.*

filamentosus" rather obscure. Thus, I conclude that there has been no reliable distributional records of *L. filamentosus* from Japanese waters and this study represents the first record of the species for Japan.

Out of the type locality and Japanese waters, Rullier (1972) and Belal and Ghobashy (2012) also reported "*Leocratides filamentosus*" from extremely shallow depths (up to 8 m depth) in New Caledonia and Lake Timsah of the Suez Canal, Egypt, respectively. However, these studies provided only a brief account or an inadequate illustration and I consider these records are doubtful.

VIII-2-4. Discussion

An ecological association of *Leocratides* with hexactinellid sponges has been indicated because the two previously known species, *L. filamentosus* and *L. ehlersi*, were both found among *Aphrocallistes* hexactinellids (*e.g.*, Pettibone 1970). My specimens of *L. kimuraorum* were also found among sediments which contained fragments of hexactinellid sponges, indicating that *Leocratides* species are generally associated with hexactinellids. Because dredging inevitably disturbs natural habitat, future studies aiming to observe specimens *in-situ* using a remotely operated vehicle, could reveal the ecology of *Leocratides* and the interaction between the worms and the host hexactinellid sponges.

In this study, I found that the bathymetric distributions of *L. kimuraorum* and *L. filamentosus* seem to be clearly separated. In Sagami Bay, the two species were obtained almost sympatrically, but *L. kimuraorum* occurred in shallow waters, around 100–150 m depth, while *L. filamentosus* tended to occur in deeper waters, more than 200 m depth (Table VIII-2). Recent studies focused on cryptic diversity of polychaetes indicate that depth may play an important role in speciation (Nygren et al. 2005, 2010; Schüller 2011; Nygren 2014; Oug et al. 2017); this scenario may be true for *Leocratides*. Further efforts combining the records of *Leocrates* species from various localities are required to reveal the nature of species distribution.

VIII-3. Designation of a neotype and redescription of *Hesione reticulata* von Marenzeller, 1879 from Japan

The hesionid polychaete *Hesione reticulata* von Marenzeller, 1879 was described from Enoshima Island, Japan and has been recorded also from the Red Sea. Depending on researchers, it has been regarded as either a distinct species or synonymous with older established ones. The type specimen has been lost. In order to clarify its taxonomic status, I, together with my colleagues, redescribed *H. reticulata*. A neotype was proposed based on recent material collected near the type locality. The diagnostic features include the presence of several dorsal, discontinuous longitudinal bands, interrupted by pale segmental spots; prostomium with tiny antennae; a tuberculated dorsal integument; acicular lobes double; and neurochaetal blades with guards approaching the distal tooth. The dorsal color pattern in life enables a clear distinction from similar species such as *H. intertexta* Grube, 1878 amongst others. Mitochondrial COI barcoding sequences are deposited in the DNA Data Bank of Japan. A key to *Hesione* species from Japan was also included.

VIII-3-1. Introduction

The hesionid polychaete *Hesione reticulata* von Marenzeller, 1879 is in need of redescription, in particular incorporating observations of the living pigmentation. This is because delimitation of the species from similar forms, such as *H. splendida* Savigny *in* Lamarck, 1818, *H. pantherina* Risso, 1826, and *H. intertexta* Grube, 1878, involves the color pattern on the dorsal surface, which unfortunately disappears immediately after fixation. Neither the original description (Marenzeller 1879) nor subsequent redescriptions (Izuka 1912; Imajima and Hartman 1964a; Imajima 1997) furnished any illustration that depicts the dorsal color pattern with sufficient quality. Text descriptions on the color pattern, such as “white transverse spots merging to reticulations” (Imajima and Hartman 1964a), can refer to a variety of different states, and thus were insufficient to delineate the species and to separate similar forms. Although some color images have been published (Uchida 1992, 2000), their resolution is insufficient for reliable identification. The holotype specimen of *H. reticulata* was collected by the German naturalist Carl Koerbl on the east coast of Enoshima Island, Kanagawa, during his visit to Japan during 1875–1876. The type material was supposedly deposited in the Natural History Museum in Vienna by Richard von Drasche-Wartinberg (Sato and Sattmann

2009), but is not likely to be extant (Sattmann pers. comm. 2016 email to SISV).

Dorsal pigmentation of *Hesione* species can be roughly separated into three patterns: 1) bright grayish in *H. splendida* Savigny *in* Lamarck, 1818, 2) transverse bands as in *H. genetta* Grube, 1867 and *H. picta* Müller, 1858, but in the former there are also round spots along body, and 3) longitudinal lines such as in *H. intertexta* Grube, 1878, *H. pantherina* Risso, 1826, *H. reticulata* von Marenzeller, 1879, and *H. steenstrupi* de Quatrefages, 1866. For *H. eugeniae* Kinberg, 1866, no pigmentation was given in the description. There are three conditions for the size of neurochaetal guards in comparison with blade's teeth (Chamberlin 1919:190, Monro 1926:312, 1931:10): approaching the subapical tooth (*H. pantherina, H. genetta*), approaching the apical tooth (*H. intertexta, H. reticulata*), and surpassing the apical tooth (*H. eugeniae*).

Due to the uncertainties pertaining to some characters in *H. reticulata*, the taxonomic status of the species has been doubted by some researchers. Augener (1913) and Hessle (1925) regarded it as synonymous with *H. splendida* (type locality: Red Sea); Fauvel (1937: 59) synonymized it with *H. pantherina* (type locality: Mediterranean Sea); Wu et al. (1975: 75) viewed it as conspecific with *H. intertexta* (type locality: Philippines). Grube (1880: 227) and Hartman (1959:185) regarded *H. reticulata* as a distinct species, and von Marenzeller even identified his own species from the Red Sea (Stagl et al. 1996:34). There has been no clarification about the morphological features of *H. reticulata* and, by extension, its taxonomic status, and so species delineations are ill-defined.

Hesione reticulata is redescribed as a distinct species in this study. I designated a neotype as there was no existing type material, and, moreover, there were apparently two different species occurring in Kanagawa Prefecture, which closely resemble each other (Jimi et al. 2017c). Uchida (2009) reported "*Hesione* cf. *ehlersi*" and *H. reticulata* from Kanagawa, but von Marenzeller's (1879) original description applies equally well to both of these forms. Uchida (2009: 36) separated these two species in his keys because of differences in pigmentation and chaetotaxy. For *H. reticulata*, he indicated yellow dorsal cirrophores, no middorsal reddish brown line, and long blade neurochaetae in chaetigers 1–3, and for *H.* cf. *ehlersi* pale cirrophores, a middorsal reddish brown line present, and long blade neurochaetae present in chaetigers 1–7. These differences deserve further evaluation because I have noted that, for example, the pigmentation of dorsal cirrophores fades even after being anesthetized, and the presence of long bladed neurochaetae might be size-dependent.

Photographs of the dorsal color pattern in the living state are also provided, as well as of other morphological characters, and the COI barcoding sequence on the basis of freshly-collected material from a place near to the type locality.

VIII-3-2. Material and methods

Four specimens were collected at 1 m depth by hand in Zaimokuza (35°18′02.9″N, 139°33′02.9″E), Kanagawa Prefecture, Japan. Two specimens were fixed in a 10% formalin sea water solution, later washed and preserved in 70% ethanol (NSMT-Pol N-620, NSMT-Pol 113205), the other two specimens were fixed and preserved in 70% ethanol (NSMT-Pol 113206, NSMT-Pol 113207). All specimens were anesthetized with menthol before fixation.

Live and preserved specimens were examined under stereoscopic microscopes (Leica MZ 16F and OLYMPUS BX51); photographs were taken with a digital camera (Nikon D5200). Morphology of chaetae and parapodial features were described from chaetigers 7–9. Neurochaetal blade length was measured from the level of the articulation membrane attachment to chaetal tip; the width was measured at the widest part and expressed as a length:width ratio or by indicating how many times the length corresponds to the width.

Tissue from the dorsal cirri was used for DNA extraction from the two specimens, NSMT-Pol N-620 and NSMT-Pol 113205. Methods for DNA extraction, PCR amplification, and sequencing followed those of Jimi et al. (2016). Newly obtained sequences were deposited in DDBJ (accession nos. LC169753, LC169754). The neotype and other specimens from the neotype locality, referred to here as paraneotypes (term not regulated by the ICZN 1999) were deposited in NSMT, Japan.

VIII-3-3. Systematics

VIII-3-3-1. *Hesione reticulata* von Marenzeller, 1879

Japanese name: otohime-gokai

VIII-3-3-2. Synonymy

Hesione reticulata von Marenzeller, 1879: 129–131, pl. 3, fig. 4; Izuka 1912: 192–194, pl. 2, fig. 7; Imajima and Hartman 1964: 80; Uchida 2009: 36–37, fig. 1.

Hesione splendida Hessle 1925: 13–15 (*non* Savigny *in* Lamarck, 1818; *partim*, smallest specimen with transverse white bands belongs elsewhere).

Hesione pantherina Fauvel 1937: 59–60 (*non* Risso, 1826).

Hesione intertexta Wu et al. 1975: 75, pl. 2, figs 7–8.

VIII-3-3-3. Type material

Neotype NSMT-Pol N-620, and three paraneotypes NSMT-Pol 113205, NSMT-Pol 113206, NSMT-Pol 113207, Zaimokuza (35°18'02.9" N, 139°33'02.9" E), rocky bottom, 1 m depth, 19 Mar. 2016, N. Jimi and H. Tanaka, coll. Paraneotypes (NSMT-Pol 113205–113207) 40–47 mm long, 4 mm wide.

VIII-3-3-4. Neotype locality

Zaimokuza (35°18'02.9" N, 139°33'02.9" E), rocky bottom, 1 m depth.

VIII-3-3-5. Description

Neotype (NSMT-Pol N-620) complete. Body cylindrical, medially swollen (Fig. VIII-10A), damaged, 43 mm long, 4 mm wide in chaetigers 8–9 (not including parapodia), 16 chaetigers (chaetae and parapodia of 2nd left, 8th right, and 9th right chaetigers removed for observation; dorsal cirri of 3rd and 7th chaetigers removed for DNA extraction).

Dorsal pigmentation pattern consisting of longitudinal, brownish, subcontinuous, irregular lines; no reddish brown longitudinal broken line on median line; single, irregularly-shaped spot (formed by absence of brown pigment, through which basement pale tan to wheat body color seen) on each chaetiger except 2nd, arranged mid-dorsally (larger anteriorly; reduced medially and posteriorly); and additional row of similar but smaller spots on lateral cushion on each side; silvery-white spots absent. Cirrophores yellow; cirrostyles yellow to whitish; parapodial lobes whitish (Fig. VIII-10B–E). After six months in ethanol, pigmentation limited to dorsal, pale brown, discontinuous longitudinal bands (Fig. VIII-11A).

Integument smooth, annulated, giving impression of being tuberculated, especially along posterior region; longitudinal ridges absent in lateral cushions.

Prostomium heart-shaped, wider than long (Fig. VIII-10B, E); anterior margin truncated; lateral margins rounded in anterior body, but expanded posteriorly; posterior margin cleft, as long as 1/6 prostomial length; longitudinal furrow shallow; dark transverse line present on prostomial anterior margin. Antennae digitate, twice longer than wide. Eyes blackish, on center of prostomium; anterior and posterior eyes in trapezoidal arrangement; anterior eyes slightly more separated than posterior eyes; anterior eyes ovoid (appearing longer than wide), posterior eyes rounded.

Tentacular cirri tapered, longest complete anterior cirri reaching chaetiger 5. Lateral cushions slightly projected, entire, with smooth surface.

Parapodia with dorsal cirrophore twice longer than wide, articulated (Fig. VIII-12A, E). Cirrostyle basally cylindrical, medially and distally articulated as long as body width including parapodia (Fig. VIII-12A, F). Neuropodia with parallel sides, cylindrical (Fig. VIII-12A). Acicular lobe double; upper tine twice larger than lower one, digitate (Fig. VIII-12B); lower tine of 8th chaetiger of NSMT-Pol N-620 and 9th chaetiger of NSMT-Pol 113205 adheres or overlaps upper tine and difficult to observe (Fig. VIII-12C), it can be clearly confirmed on other four parapodia examined. One acicula present, blackish. Neurochaetae 19–28 per bundle, blade size decreasing ventrally (Fig. VIII-12C); neurochaetal blades bidentate, 3–4 times longer than wide, subdistal tooth shorter and wider than distal one; guard reaching apical tooth (Fig. VIII-12D). Ventral cirrophore three times wider than long; cirrostyle articulated, reaching chaetal lobe tip.

Prepygidial segment with two cirri, three times as long as body width of previous chaetiger (chaetiger 16). Pygidium smooth, trapezoidal, as long as wide, cylindrical (Fig. VIII-10D); anus with two anal cirri; anal cirri tapered.

Venter without pigmentation, with longitudinal midventral depression.

Pharynx divided into three rings, with relative lengths 1.5:1.5:1; basal ring with similar pigmentation as anterior end (Fig. VIII-10E); dorsal papilla pale, longer than wide (length: width is 1.5:1).

Oocytes not visible.

VIII-3-3-6. Inner anatomy observed in paraneotypes (NSMT-Pol 113205–113207)

Pharynx and esophagus thick, muscular, yellowish, continuing into darker, shorter stomach; enteric caeca extending anteriorly along two or three chaetigers (Fig. VIII-11B). Stomach contents included gastropod (Fig. VIII-11C) and amphipod remains as prey items.

VIII-3-3-7. Remarks

The nomenclatural status of *Hesione reticulata* Marenzeller, 1879 has been unclear due to several reasons: there is no type material, some diagnostic features were not clarified in the original description, and some authors (Imajima 2007) have regarded it as a junior synonym of other species within the genus (e.g. *H. splendida*). Consequently, in order to comply with the International Code of Zoological Nomenclature (ICZN 1999, Art. 75.3) I am herein proposing a neotype.

The above description and illustrations will clarify the taxonomic status of *H. reticulata* (Art.75.3.1), and its diagnostic and differential features have been included in the description and illustrations (Arts 75.3.2, 75.3.3), and will be contrasted below. My enquiries on the existence of type material of *H. reticulata* to Dr. Helmut Sattmann, Curator of Marine Invertebrates, in the Naturhistorisches Museum, Vienna, where Emil von Marenzeller used to work and produced all of his publications, indicate that type material is absent (Art. 75.3.4), probably destroyed or never deposited. The original collector was Carl Koerbl (Marenzeller 1879: 131) and some of his specimens were donated to the Vienna Museum by Richard von Drasche-Wartinberg (Sato and Sattmann 2009), but there is no type material available there.

The neotype fits the original description and because it was recently collected, it even matches the general pigmentation pattern which is not long-lasting in ethanol. Further, as happens in some other species of *Hesione*, they are simultaneous hermaphrodites (Bergmann 1902, 1903), so that differences in pigmentation pattern among different specimens cannot be attributed to sex. If *Hesione reticulata* has male and female, there are no record of color variation about it. (Art. 75.3.5). The morphology of my material does not contradict Marenzeller's (1879) original description of *H. reticulata*, nor the general features subsequently described by Izuka (1912: 192), Imajima and Hartman (1964: 80), and Uchida (2009: 36–37).

The specimen used for original description was collected in the east coast of Enoshima (35°18'07"N, 139°29'00"E), and the neotype was found in Zaimokuza (35°18'02.9" N, 139°33'02.9"E), nearly four kilometers away, such that I am confident these two localities belong to the same ecological unit (Art. 75.3.6). The neotype of *H. reticulata* has been deposited in the National Science Museum, Tokyo, which holds the most important polychaete collection in Japan, and has a very important tradition in the scientific study of polychaetes from Japan and elsewhere (Art. 75.3.7).

Another taxonomic relevance of my study lies in the identification of the dorsal color pattern in the living state as a clear distinguishing feature between *H. reticulata*, *H. intertexta*, and *H.* cf. *ehlersi sensu* Uchida (2009). The color pattern agrees with Marenzeller's (1879) description of the holotype which had, over a reddish-brown background, irregular spots fused into wide bands along some anterior segments continuing to the end of the body. Marenzeller (1879) mostly relied on this complex reticulated pigmentation pattern for justifying the establishment of *H. reticulata.*

Ngamniyom et al. (2014) and Lee and Ong (2015) characterized the two western Pacific species, *H.* cf. *picta* and *H. intertexta*. The former has wide dorsal transverse bands, by which *H.* cf. *picta* can be separated from *H. intertexta* and *H. reticulata,* because the latter two have dorsal, longitudinal, discontinuous dark bands with paler spots mid-dorsally and along dorsal surface of lateral cushions. Furthermore, *H. intertexta* and *H. reticulata* also have tiny antennae and neurochaetal blades with guards approaching distal tooth. Based on these shared characteristics, Wu et al. (1975) viewed *H. reticulata* as a junior synonym of *H. intertexta*. My observation, however, clearly shows that they differ in pigmentation pattern: in *H. reticulata* the paler spots are smaller, and the mid-dorsal ones tend to be round, whereas in *H. intertexta* they are longer than wide and markedly larger.

Uchida (2009) described *H.* cf. *ehlersi,* a species with similar morphological features to *H. reticulata*. Indeed, von Marenzeller's original description of *H. reticulata* could apply to both species. As Uchida (2009) stated, dorsal pigmentation in life is useful for discrimination of the two species; *H.* cf. *ehlersi* has a reddish brown longitudinal broken line on the median line, whereas *H. reticulata* lacks this line. Further study is needed to resolve the taxonomic position of *H.* cf. *ehlersi*.

The vivid images of the dorsal color pattern in *H. reticulata*, along with the COI barcoding sequence provided in this paper, will contribute to future taxonomic revision of the genus *Hesione*.

Hesione reticulata was regarded as a distinct species by Hartman (1959: 185) and it can be distinguished from its former synonyms *H. intertexta*, *H. splendida* as indicated by Augener (1913) and Hessle (1925), or from *H. pantherina* as suggested by Fauvel (1937) as follows: from *H. splendida*, *H. reticulata* can be separated by the dorsal pigmentation; it is brownish in *H. reticulata*, but pearly gray in *H. splendida* (Savigny, 1822), whereas from *H. pantherina*, *H. reticulata* can be distinguished because the guard tooth in *H. reticulata* reaches the apical tooth, whereas those in *H. pantherina* do not (Monro 1926).

One of the important discoveries in my observation of the specimens of *H. reticulata* is that the acicular lobe in this species is doubled, comprised of the upper and lower tines, a character state that separates *Hesione* species in two groups, each with approximately the same number of species (SISV pers. obs.). Marenzeller (1879, fig. 4) illustrated a parapodium excised from the middle part of the body in the holotype specimen, indicating that there was a single, thick, finger-shaped acicular lobe, unlike the doubled lobe that I observed in this study. Izuka (1912) and Imajima and Hartman (1964) also described the acicular lobe as a single lobe. In two of the six parapodia examined (left one on the 2nd, right one on the 8th, and right one on the 9th chaetigers from NSMT-Pol N-620; right one on the 9th chaetiger from NSMT-Pol 113205; and left ones on the 3rd and 9th chaetigers from NSMT-Pol 113207), the lower tine adhered to or overlapped the upper tine. It appeared as if it were a single parapodial lobe, but a careful observation showed that it actually represents a doubled lobe. The reason the acicular lobe was described as 'single' in the previous studies may be that the lower tine in their material was deformed in preservation to lie above or below the upper tine, or to contact closely to the upper tine. The original illustration (Marenzeller 1879, fig. 4) clearly indicates that the acicular lobe was placed under the chaetal bundles on the glass slide. This must have made the acicular lobe difficult to be observed, which would also explain why the adjacent upper and lower tines were hardly detected. This feature further adds to the distinction between *H. reticulata* and *H. intertexta*: the acicular lobe in *H. reticulata* is double whereas it is single in *H. intertexta*.

The record of *H. reticulata* by Imajima (1997: 171) might not belong to the same species because his material was collected from 230–250 m depth in Suruga Bay. Other specimens recorded as *H. reticulata* by Imajima (2003: 132–134), collected in shallow water, were characterized as having acicular lobe single ("a superior conical papilla), and are needed more investigation for identification.

VIII-3-3-8. Distribution

Hesione reticulata has so far been recorded only from Japan: Kanagawa (von

Marenzeller 1879; Izuka 1912; this study), Shizuoka and Wakayama (Izuka 1912), and the middle of Honshu to Kyushu (Uchida 2009).

Chapter IX. Polynoidae

This chapter deals with one species of *Bathykermadeca* from the deepest known whale-fall environment, Japan.

IX-1. An annelid species from the deepest known whale-fall environment: *Bathykermadeca thanatos*

I, together with my colleagues, described a new species of polynoid annelids, *Bathykermadeca thanatos* Jimi, Fujiwara and Kajihara, 2018 based on specimens collected from sunken whale bones in the Nansei-Shoto Trench in the Philippine Sea at 4974 m depth. The cetacean-carcass community at the site exceeds the deepest record reported to date. This new species can be distinguished from other members of the genus by the following features: *i*) there is only one type of neurochaetae, *ii*) the teeth lack serration and grow inwardly, *iii*) median antenna extends beyond the tip of frontal filament, *iv*) nephridial papillae are present in segments 12–15, and *v*) there are about 50 notochaetae in each parapodium.

IX-2. Introduction

Owing to low food supply in the deep sea, cetacean carcasses sunken on the bottom can function as oases, providing nutritional and habitational bases for a unique biocoenosis known as the whale-fall community (Smith et al. 2015). Some of the community members show remarkable adaptions; the mouthless annelids in the genus *Osedax* gain nutrition by dissolving whale bones with their root structure (Miyamoto et al. 2017). Other members are chemosynthetic-environment specialists; the macellicephaline annelid *Bathykurila guaymasensis* Pettibone, 1989 also occurs in hydrothermal vents (Glover et al. 2005). Clarifying the biodiversity of the whale-fall communities is the first step toward understanding of their unique ecology and morphology.

Macellicephalinae is one of the subfamilies in the family Polynoidae with its members restricted to the deep sea and anchialine caves (Gonzalez et al. 2017) and consists of 18 genera (Neal et al. 2012). The subfamily can be discriminated from other polynoids by the following features: median antenna present, lateral antenna present, notochaetae present, notopodia and neuropodia with projecting acicular lobe (Neal et al. 2012). In the subfamily, genera are differentiated by the form of the cirrophores on the cirrigerous segments; the number of segments; the numbers and arrangement of elytral pairs and pharyngeal papillae; and the form of the posterior end (Neal et al. 2012).

One of the macellicephaline genera, *Bathykermadeca* is composed of two species, *B. hadalis* (Kirkegaard, 1956) and *B. turnerae* Pettibone, 1985 (Kirkegaard 1956; Pettibone 1976, 1985). To my knowledge, there are only four collection reports of *Bathykermadeca* (Kirkegaard 1956; Levenstein 1978, 1982; Pettibone 1985), and thus more assessments were necessary for grasping the actual biodiversity of this genus. Previous studies were mostly based on preserved, dredged material, with the exception of Pettibone (1985). Pettibone's (1985) material was obtained by the manned submersible *Alvin*, but she failed to provide information about the *in situ* microhabitat of *Bathykermadeca turnerae*. In any case, no member of *Bathykermadeca* has ever been recorded from whale-fall community.

During observation of whale bones that were deployed for studying whale-fall communities in the Nansei-Shoto Trench, three polynoids were found among the deployed setups. This experimental whale-fall represents the deepest record for whale-fall communities to date. I describe a new species of *Bathykermadeca* found among the whale-fall community in the Nansei-Shoto Trench and report the results of an *in situ* observations by a remotely operated vehicle (ROV) (Jimi et al. 2018b).

IX-3. Material and methods

Three worms were collected on 14 January 2012 using a suction sampler installed on the ROV *Kaiko* from whale vertebrae experimentally deployed (Fig. IX-1A) at 4974 m depth in the Nansei-Shoto Trench (north-west Pacific Ocean), southeast off Miyakojima Island, Japan (23°54.5608′N, 126°21.7362′E). Specimens were fixed in a 10% formalin–seawater solution, later washed and preserved in 70% ethanol. Fresh specimens were photographed using an Olympus E-5 digital SLR camera on the R/V *Kairei*. Preserved specimens were examined under stereomicroscopes (Nikon SMZ1500 and OLYMPUS BX51); and photographs of the fixed specimens were taken with a Nikon D5200 digital camera mounted on the microscopes at the laboratory. The specimens for SEM observations were washed in deionized water and dehydrated in a graded ethanol series, dried in a critical-point dryer (HITACHI HCP-2) using liquid CO_2, and coated with gold in an ion sputter (HITACHI E-1045). Observations were conducted using a SEM instrument (HITACHI S-3000N).

Type specimens were deposited in NSMT and Japan Agency for Marine-Earth

Science and Technology (JAMSTEC), Japan. For comparison, type specimens of other congeners deposited in the Zoological Museum, Natural History Museum of Denmark (ZMUC), Copenhagen, and the United States National Museum of Natural History (USNM), Washington, D.C., were also examined.

IX-4. Results

IX-4-1. Systematics

IX-4-2. *Bathykermadeca thanatos* Jimi, Fujiwara and Kajihara, 2018

Japanese name: geikotsu-shinigami-urokomushi.

IX-4-3. Material examined

Holotype (NSMT-Pol H-682): 47 mm long, 4 mm wide, sex unknown, 20 chaetigers, complete; obtained from whale bones sunken off the Sakishima Islands (about 150 km away from the islands), at 4974 m depth; collected by YF. Two paratypes (NSMT-Pol P-683; JAMSTEC No. 1120033073): 28–29 mm long, 10 mm wide, sex unknown, 16–20 chaetigers, one (NSMT-Pol P-683) is complete, another (JAMSTEC No. 1120033073) is incomplete (head dissected for morphological study); obtained together with the holotype.

IX-4-4. Comparative material examined

ZMUC POL-1669 (holotype), USNM 51977 (paratype) of *B. hadalis* (Kirkegaard, 1956). USNM 96245 (holotype) of *B. turnerae* Pettibone, 1985.

IX-4-5. Description

Holotype (NSMT-Pol H-682) complete. Body 47 mm long, 4 mm wide, with 21 segments, flat. Living colour white, with dorsal transverse red bands on each segment (Fig. IX-2A). Nine pairs of elytrophores, on segments 2, 4, 5, 7, 9, 11, 13, 15, 17. Dorsal tubercles on cirrigerous segments inconspicuous. Elytra white (all elytrae dropped off while collecting, but preserved in same glass vial) (Figs IX-1B, IX-1C, IX-2A). Prostomium posteriorly red in live specimens, pinkish in ethanol, deeply bilobed, about as wide as long, with frontal filaments. Median antenna with short cylindrical ceratophore, inserted at median notch of prostomium; style about 250 μm, as long as width of prostomium, 2/7 as long as tentacular cirri (Fig. IX-2B). Eyes absent. Two pairs of rounded areas remain in center of the prostomium. Palps as long as tentacular cirri, whitish, smooth. Tentacular cirri with tentaculophores lateral to prostomium; tentaculophores achaetous but with acicula, latter slightly emerging from dorsal side of tentaculophore. Dorsal and ventral tentacular cirri of equal lengths, whitish.

Parapodia biramous, notopodia shoter than neuropodia (Fig. IX-3A). Notochaetae numerous (about 30 chaetae in each parapodium), short to long, with two rows of spines along one side, tapering to blunt tips; stouter than neurochaetae (Figs IX-3B, IX-4A, IX-4B). Neurochaetae of one type, numerous, short to long, with two rows of spines along one side (Figs IX-3C, IX-4C, IX-4D), tips pointed; one black robust acicula in each ramum, not penetrating epidermis; acicular lobe present, digitate (Fig. IX-3A). Cirrigerous segments (Fig. IX-2A) with long smooth dorsal cirri, about 1.5 times length of notochaetae. Ventral cirri short, tapered, smooth, attached on middle part of parapodia (Figs IX-2C, IX-3A). On segment 2, ventral cirri elongated (reaching to half of notochaetae) and projected from base of neuropodia. Parapodia in posterior segments (17–21) modified and compressed. Segment 19 without dorsal cirri. Pygidium cylindrical in shape, achaetous; anal cirri conical, extending behind tip of neuropodia in segment 20 (Fig. IX-2C). Nephridial papillae present on segments 12–15, elongated. Anus situated dorsally on segment 19.

Pharynx dissected in one of paratypes (JAMSTEC No. 1120033073), with 7 pairs of papilllae and 2 pairs of jaws; papillae rectangle in shape; each jaw with main fang; jaws growing inwardly, with smooth margins (Fig. IX-2D).

IX-4-6. Etymology

In Greek mythology, Thanatos is the god of death, who comes beside dying people to take their souls away. The habitat of this new species living on and around whale carcass evokes this mythology.

IX-4-7. Distribution

Only known on and around whalebones, south-east off Miyakojima Island, the Nansei-Shoto Trench, at 4974 m depth.

IX-4-8. Remarks

Bathykermadeca thanatos can be distinguished from other members of the genus by the following features: *i*) there is only one type of neurochaetae, *ii*) the teeth lack serration and grow inwardly, *iii*) median antenna extend beyond the tip of frontal filament, *iv*) the nephridial papillae are present in segments 12–15, and *v*) there are about 50 notochaetae in each parapodium (Table IX-1). The last character, the number of notochaetae, was not mentioned in previous descriptions for *B. hadalis* and *B. turneae* (Kirkegaard 1956; Pettibone 1976, 1985), but newly confirmed in this study. *Bathykermadeca thanatos* most resembles *B. hadalis*; however, the nephridial papillae of *B. hadalis* are present in segments 12–17, 3–6 (mostly 5) notochaetae are present in each parapodium, and the teeth of jaws grow outward (Kirkegaard 1956; Pettibone 1976). *Bathykermadeca turnerae* differs from the new species by having two types of neurochaetae, serrated teeth, and median antenna that does not extend beyond the tip of the frontal filaments.

Bathykermadeca thanatos represents the first member of the genus recorded from whale-fall community. At the site, specimens of *B. thanatos* were found on and around the bones (Fig. IX-1C), but none was found swimming. Jamieson (2015) reported some deep-sea polynoids that have a potential to swim temporally. If *B. thanatos* can also swim, it is likely to be an opportunistic predator, living in the surrounding benthos, feeding on the other community members that live on whale falls. At the moment, however, whether *B. thanatos* sp. nov. is opportunistic or specialist to whale-fall community remains uncertain. Further research based on *in-situ* observation using ROVs, not only around whale-bone carcasses but also in other environments, would clarify the natural behavior and habitat of the species.

X. Summary

During my Ph.D. course I conducted taxonomic studies of polychaetes belonging to Acoetidae (Jimi et al. in prep.), Amphinomidae (Jimi et al. 2018c; Jimi et al. in prep), Asteriomyzostomidae (Jimi et al. 2017b), Chrysopetalidae (Jimi et al. 2019), Cirratulidae (Jimi et al. in prep.), Flabelligeridae (Jimi et al. 2017a; Jimi and Kajihara 2018), Hesionidae (Jimi et al. 2017c, d, 2018a), and Polynoidae (Jimi et al. 2018b). In these papers I established one new genus (*Spathochaeta*) and 16 new species (*Asteriomyzostomum herculeus*, *A. jinshou*, *A. monroae*, *Bathykermadeca thanatos*, *Benthoscolex seisuiae*, *Diplocirrus asamushiensis*, *D. imajimai*, *D. mamoi*, *D. ohtsukai*, *D. seisuiae*, *D. tohokuensis*, *D. toyoshioae*, *Elisesione imajimai*, *Lamispina ammophila*, *Leocratides kimuraorum*, *Spathochaeta octopodis*); I designated a neotype for *Hesione reticulata*, whose taxonomic identity had been confused; I also gave redescriptions for *Elisesione problematica*, and *Leocratides filamentosus*. In addition, in this thesis I gave descriptions for 11 unnamed species (10 in *Cirriformia* and one in *Polyodontes*), which are to be formally described as new to science in papers that are under preparation; also, I redescribed the amphinomid *Archinome jasoni* as the first record for the Northwest Pacific.

By these studies, the family Asteriomyzostomidae and the genera *Archinome*, *Benthoscolex*, and *Lamispina* were recorded for the first time from Japan. Also, the JSR indeces increased for Acoetidae (11.7% to 13.1%), Cirratulidae (6.4% to 9.1%), Flabelligeridae (7.4% to 10.9%), and Polynoidae (15.0% to 15.1%). Still, a number of undescribed and unrecorded polychaete taxa in Japanese waters await formal descriptions. My ultimate goal is a complete understanding of polychaete diversity in Japan. Toward this goal, I wish to continue my research on all of my life.

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Figures

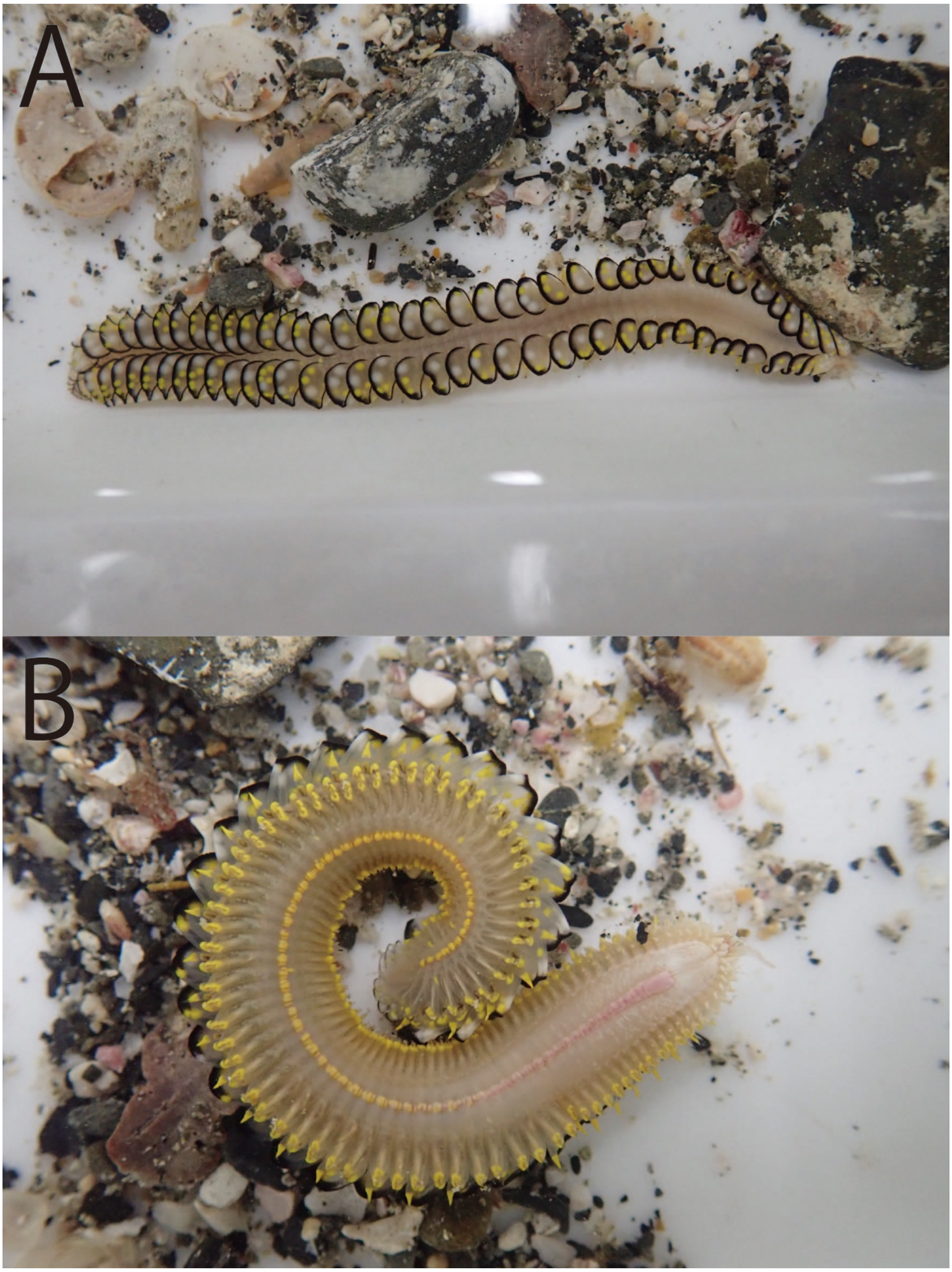


Figure II-1. A live specimen of *Polyodontes* sp. A, dorsal view; B, ventral view.

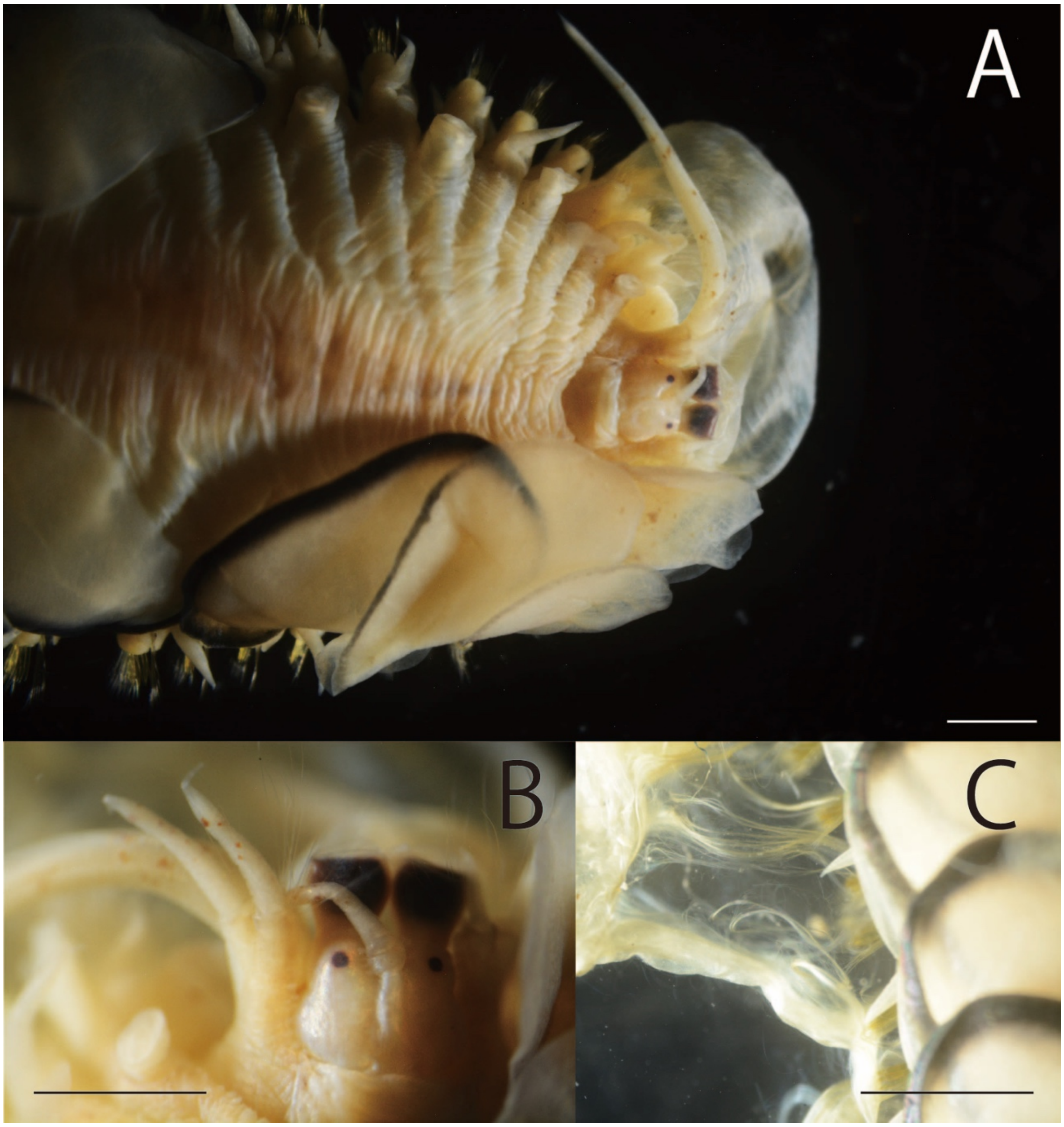


Figure II-2. *Polyodontes* sp. A, anterior end, dorsal view; B, prostomium, dorsal view; C, yarn from parapodia. Scale bar: 1 mm.

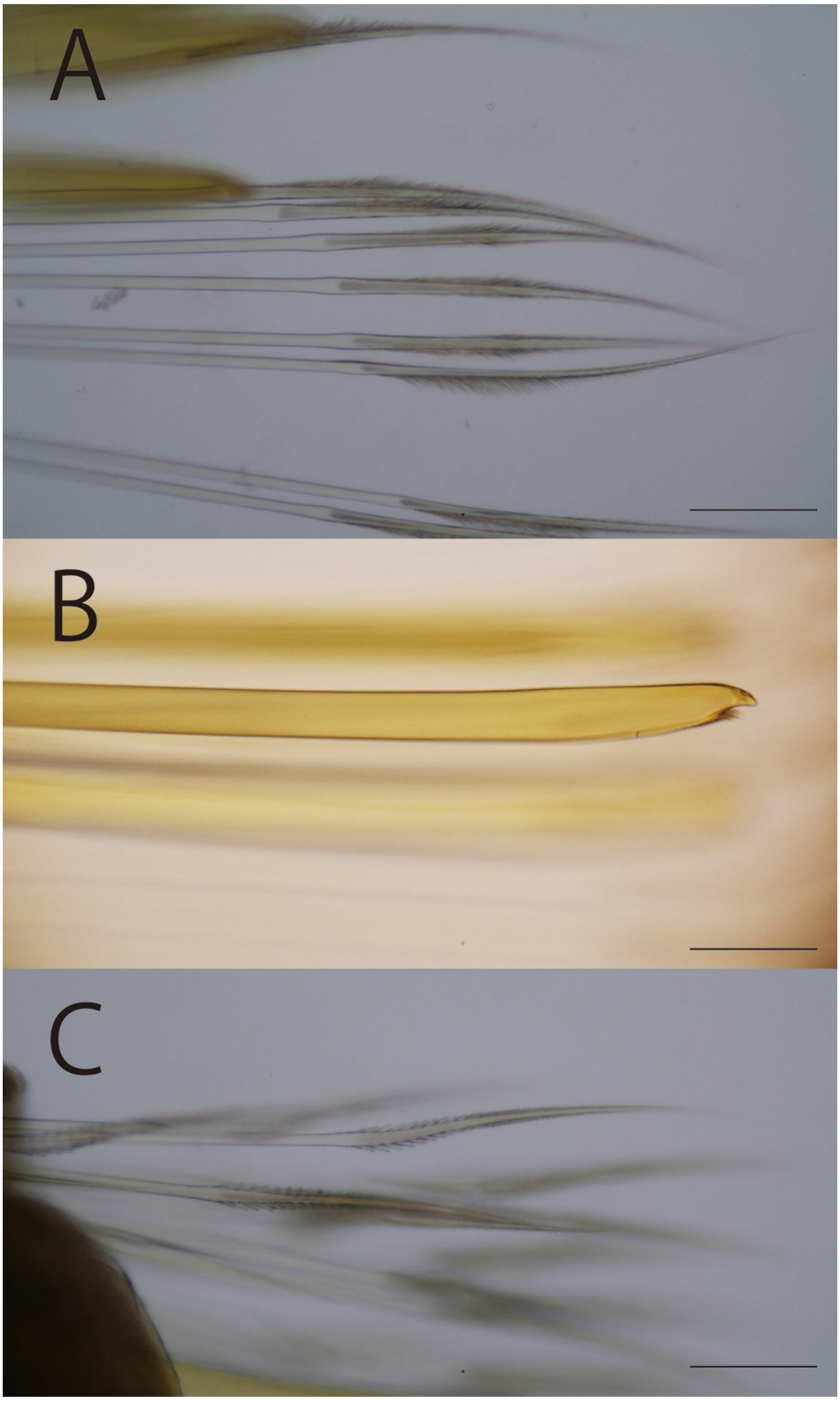


Figure II-3. *Polyodontes* sp. A, distally spinous capillary chaeta; B, acicular chaeta; C, curved spinous chaeta. A, C: chaetiger 10; B, chaetiger 61. Scale bar: 100 μm.

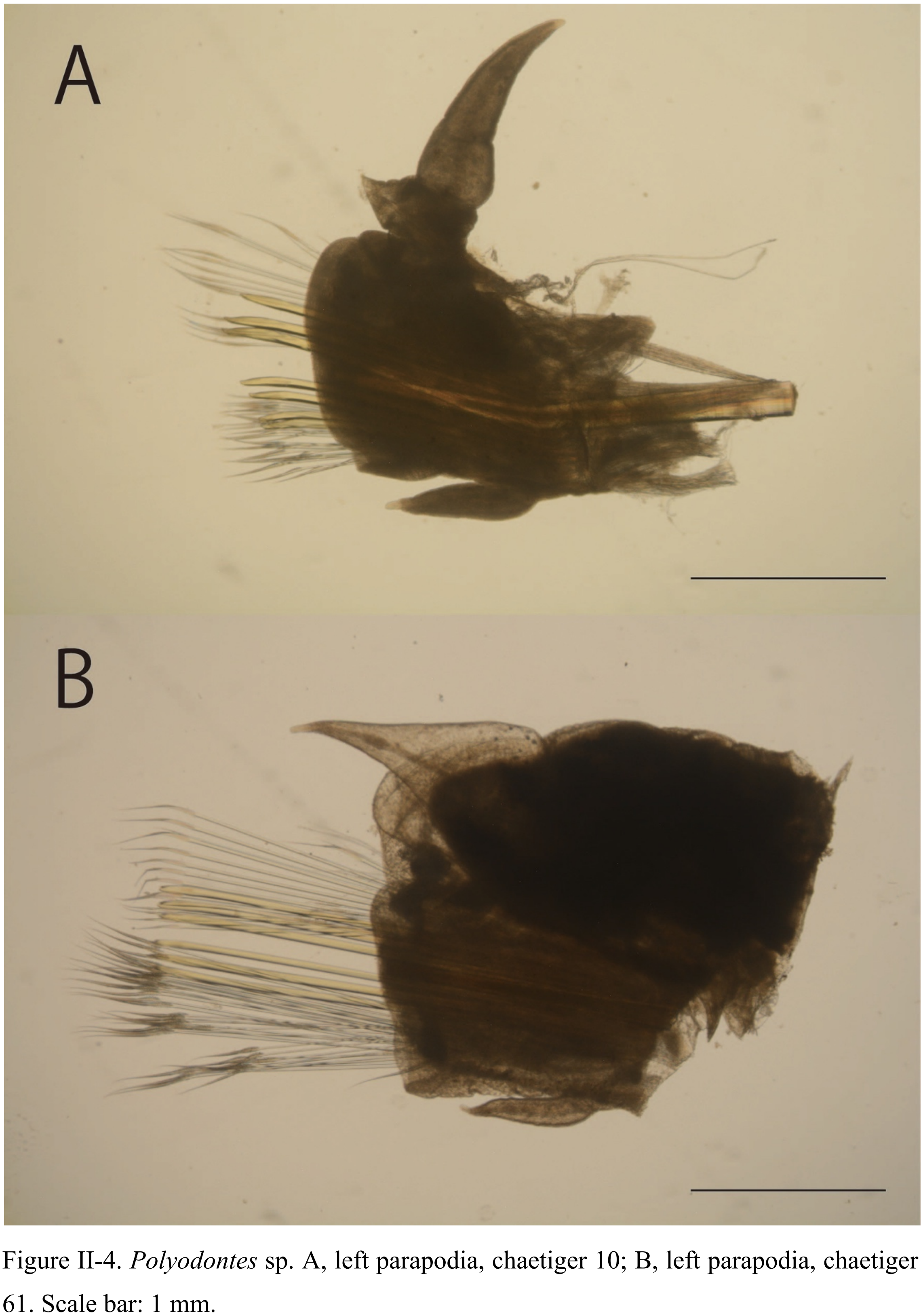


Figure II-4. *Polyodontes* sp. A, left parapodia, chaetiger 10; B, left parapodia, chaetiger 61. Scale bar: 1 mm.

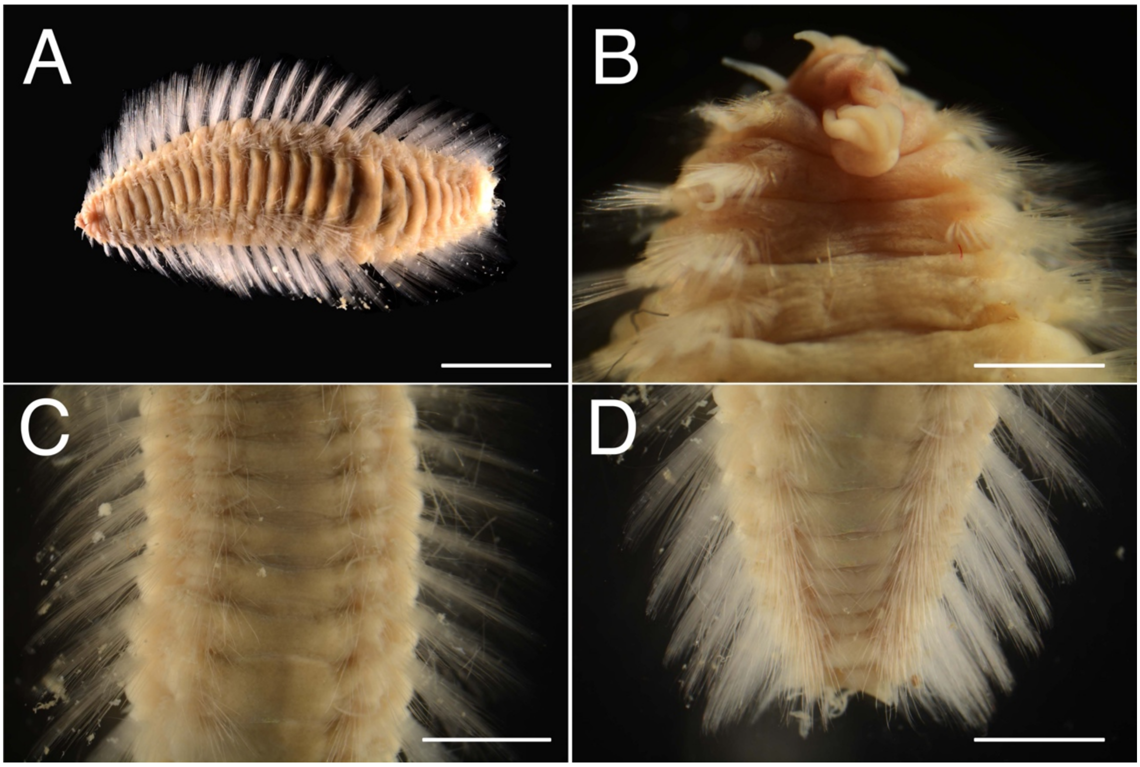


Figure III-1. *Benthoscolex seisuiae*, holotype. A, whole body, dorsal view; B, anterior end, dorsal view; C, median body, dorsal view; D, posterior end, dorsal view. Scale bars: A, 5 mm; B, 1mm; C–D, 3 mm.

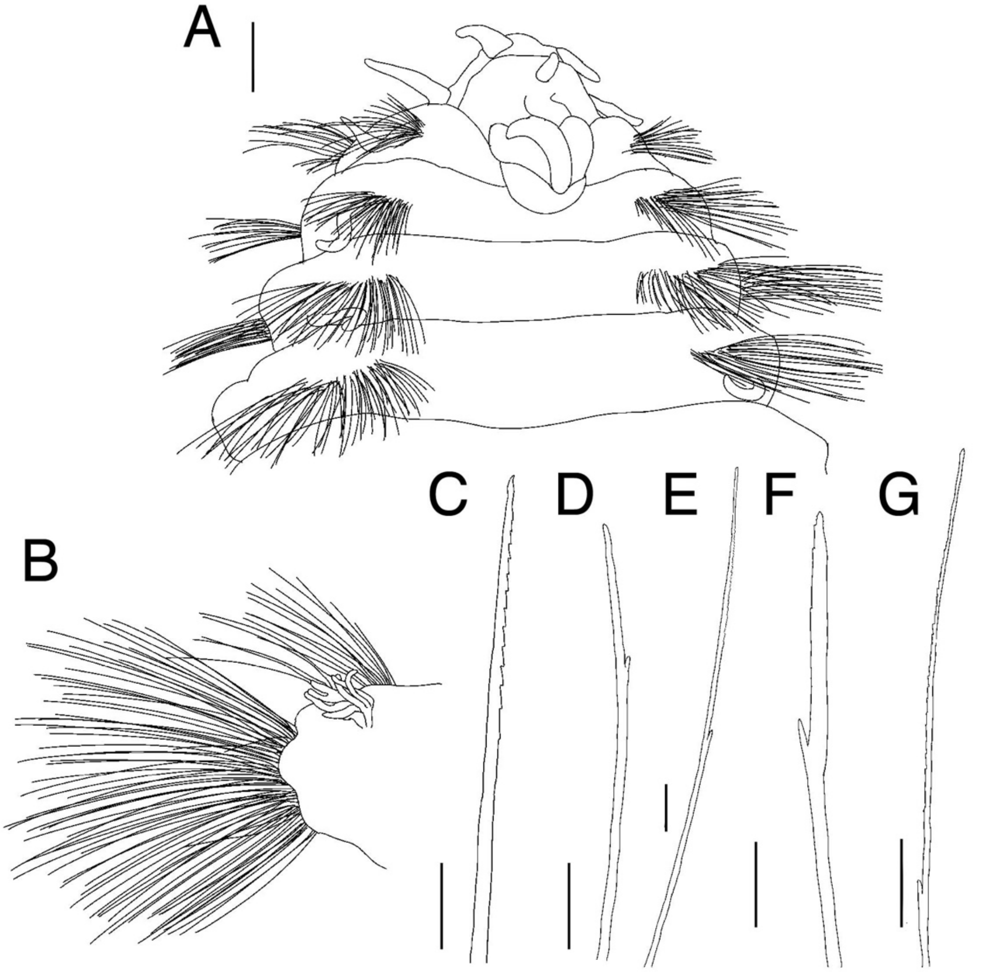


Figure III-2. *Benthoscolex seisuiae*, holotype. A, anterior end, dorsal view; B, left parapodium of chaetiger 15, posterior view; C, harpoon notochaeta; D, bifurcate chaeta with short tip; E, bifurcate notochaeta with long tip; F, bifurcate neurochaeta with short tip; G, bifurcate neurochaeta with long tip. Scale bars: A–B, 1 mm; C–G, 100 µm.

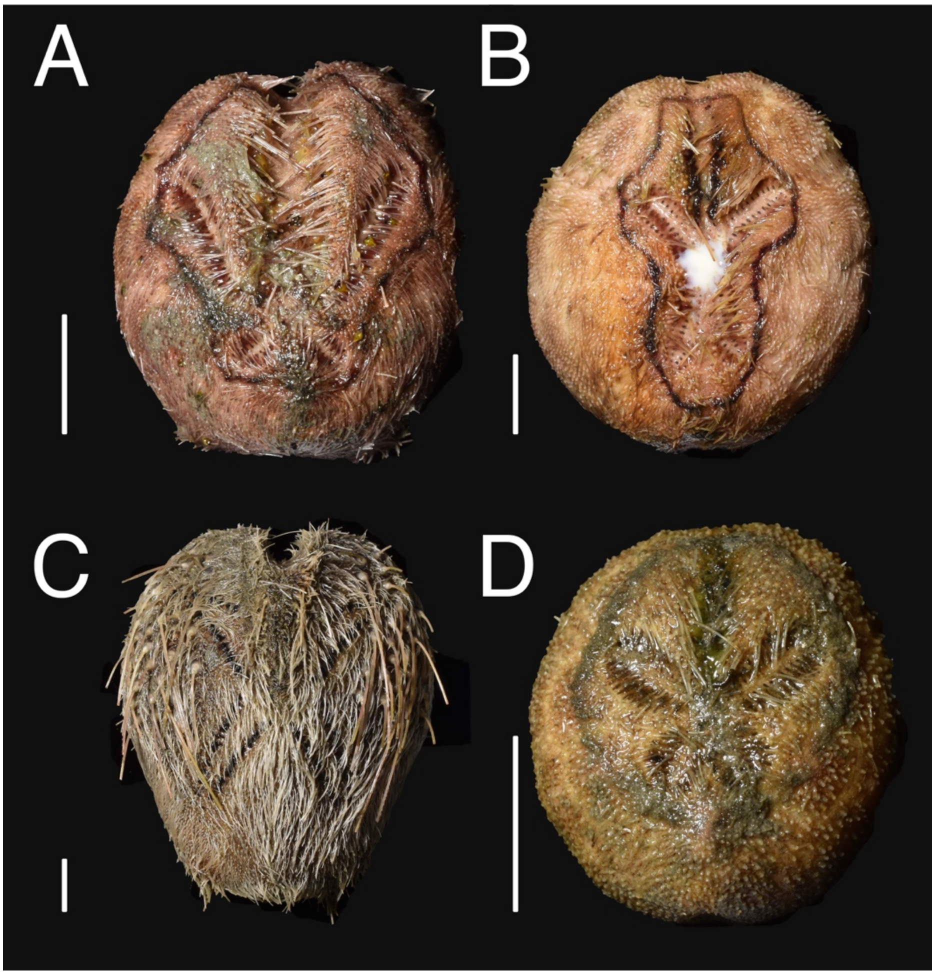


Figure III-3. Four of the five irregular sea urchin species that were contained in the same haul with *Benthoscolex seisuiae*. A, *Brisaster latifrons* (A. Agassiz, 1898); B, *Brissopsis luzonica* (Gray, 1851); C, *Lovenia gregalis* Alcock, 1893; D, *Schizaster* sp. Scale bars: 1 cm.

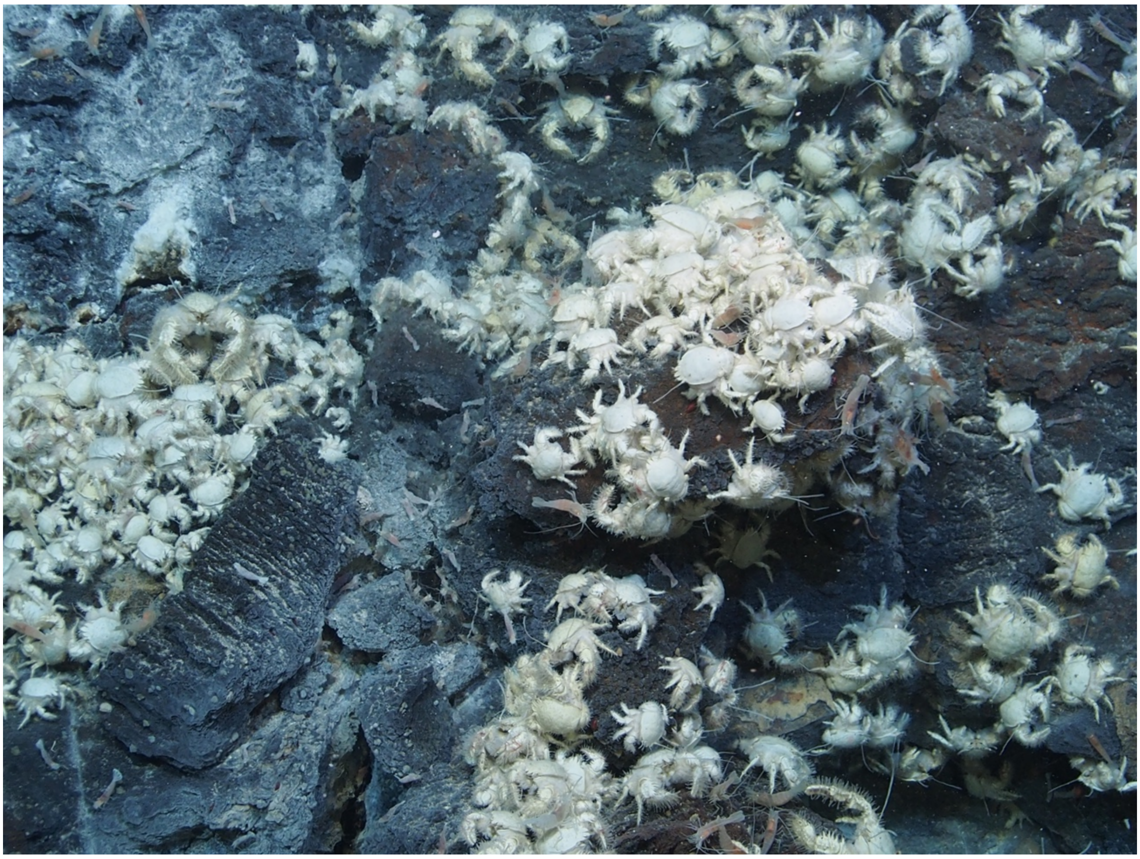


Figure III-4. *In situ* observation of the hydrothermal-vent community.

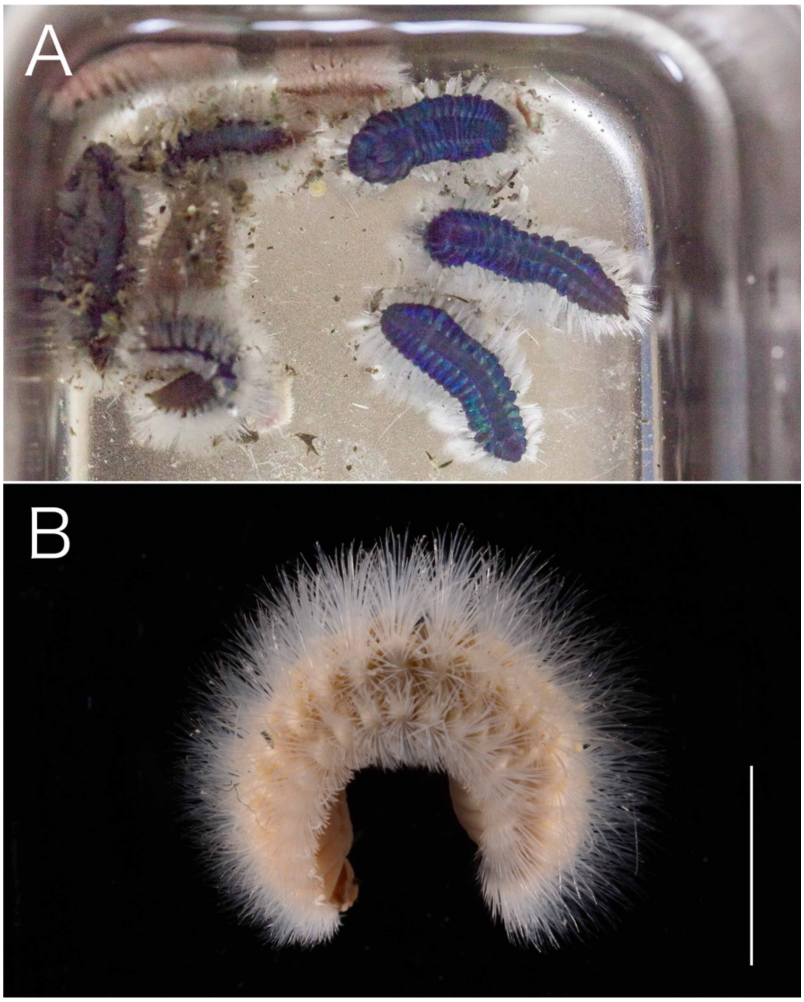


Figure III-5. *Archinome jasoni*. A, live specimens; B, preserved specimen, lateral view. Scale bar: B, 5 mm.

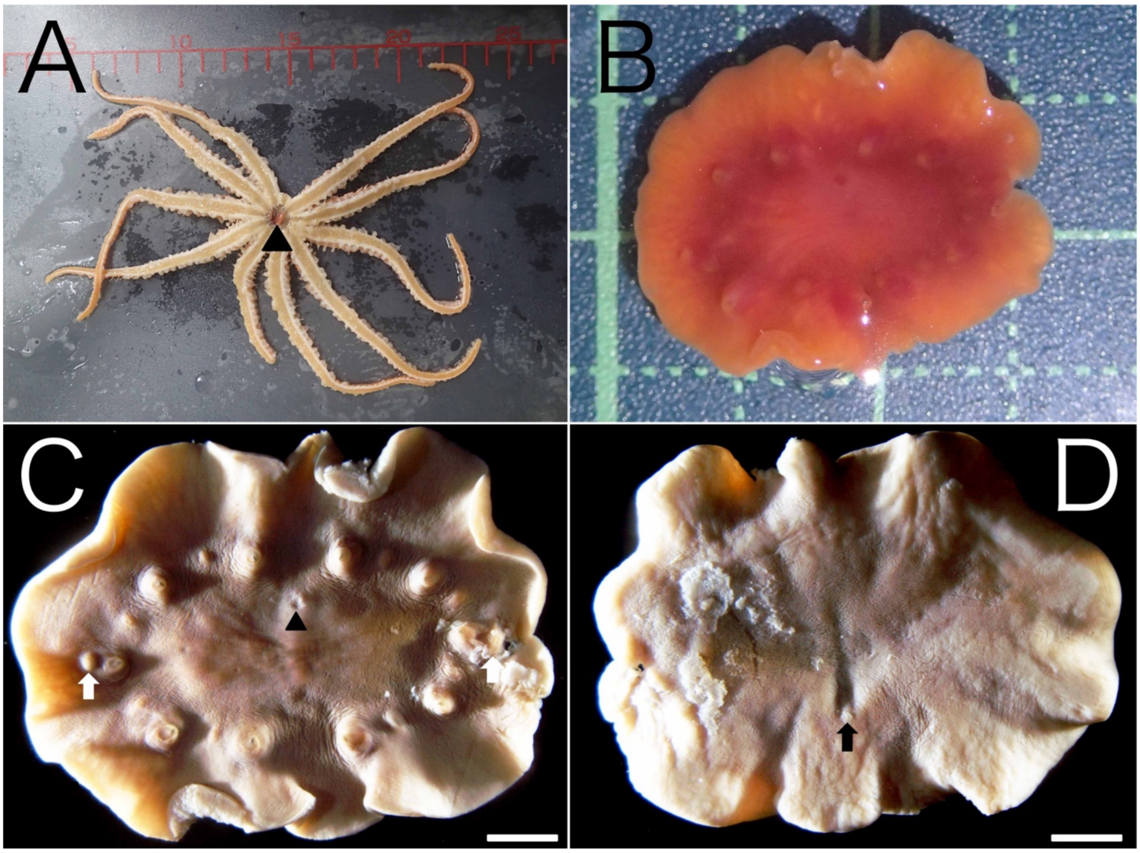


Figure IV-1. *Asteriomyzostomum hercules* and a host. A, *Coronaster volsellatus* (Sladen, 1889), type host of the species, ventral view, arrowhead indicates *A. hercules* in the host; B, Live specimen of *A. hercules*, dorsal view; C, Preserved specimen of *A. hercules*, ventral view, arrowhead showing mouth; arrow indicates penis; D, Preserved specimen of *A. hercules*, dorsal view; arrow indicates anus. Scale bars: C–D, 2 mm.

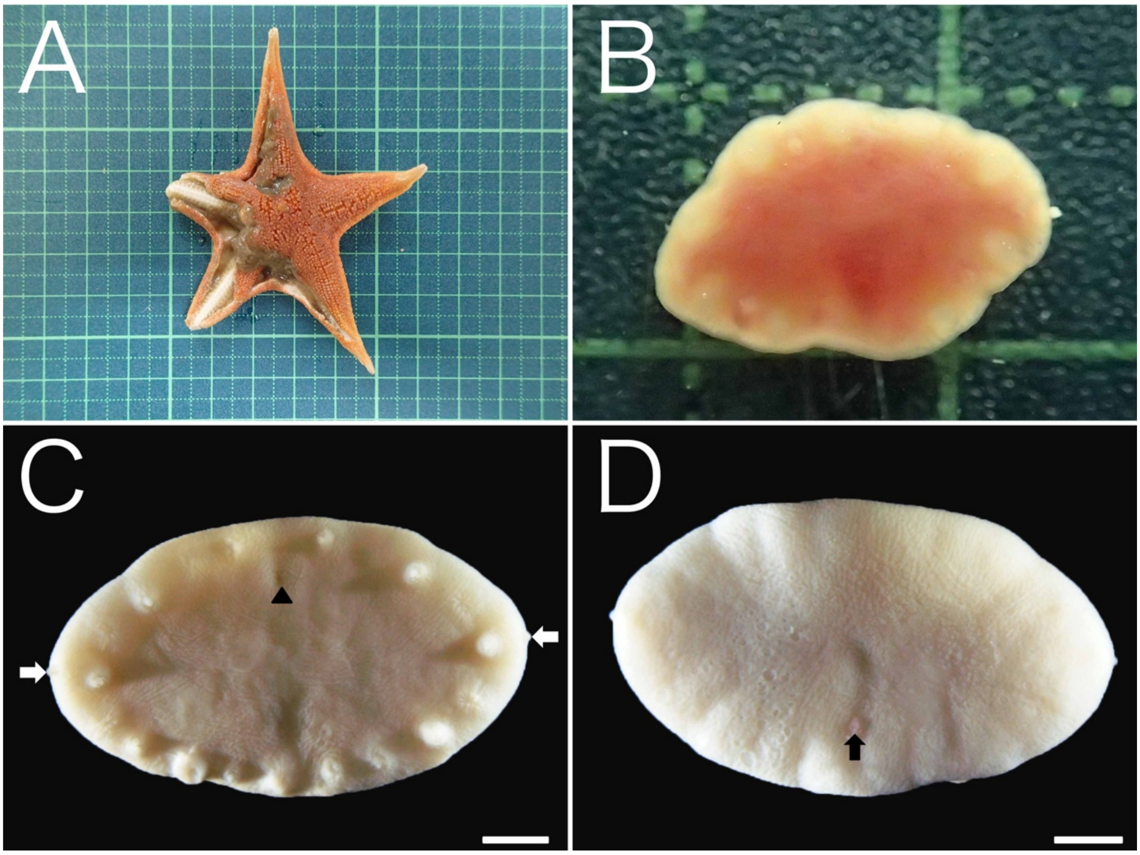


Figure IV-2. *Asteriomyzostomum jinshou* and a host. A, *Mediaster brachiatus* Goto, 1914, type host of the species, dorsal view; B, Live specimen of *A. jinshou*, ventral view. C, Preserved specimen of *A. jinshou*, ventral view; arrowhead indicates mouth; arrow shows penis; D, Preserved specimen of *A. jinshou*, dorsal view; arrow showing anus. Scale bars: C–D, 1 mm.

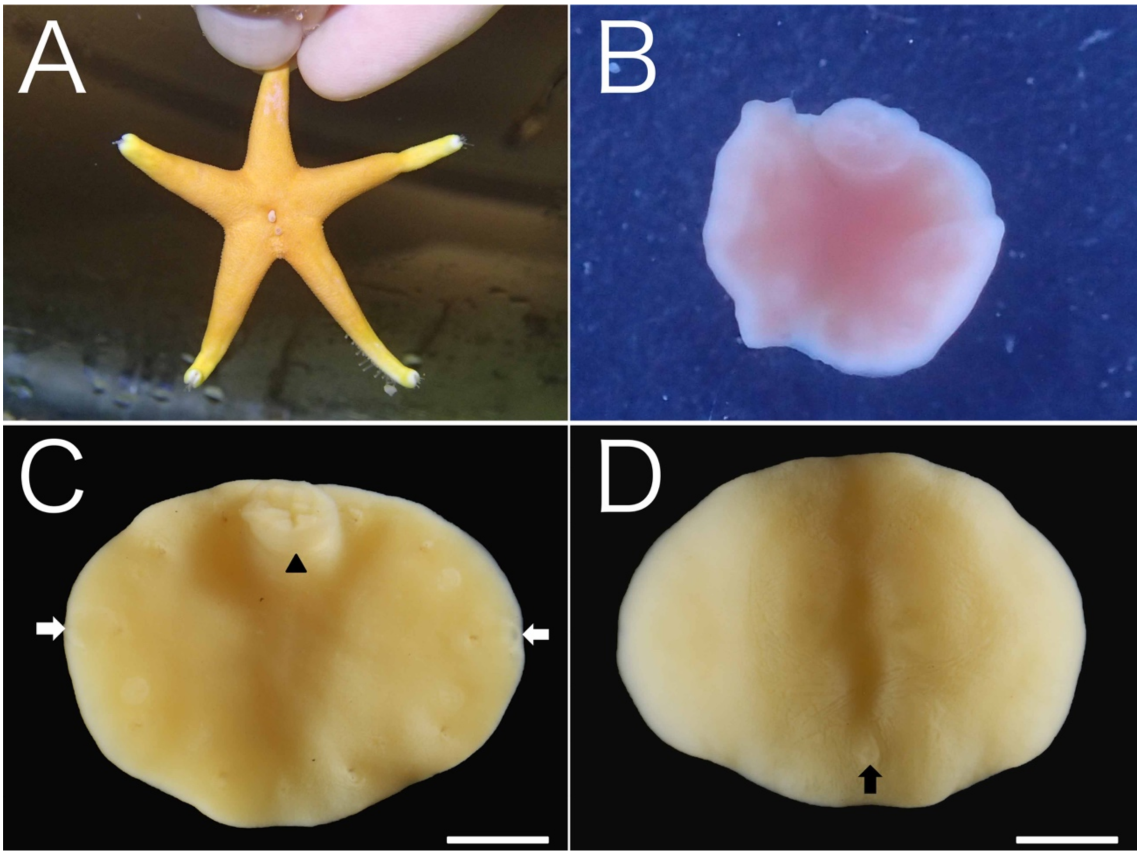


Figure IV-3. *Asteriomyzostomum monroeae* and a host. A, *Henricia* sp., type host of the species, ventral view; B, Live specimen of *A*. *monroeae*, ventral view; C, Preserved specimen of *A*. *monroeae*, ventral view; arrowhead showing mouth; arrow indicating penis; D, Preserved specimen of *A*. *monroeae*, dorsal view; arrow indicating anus. Scale bars: C–D, 1 mm.

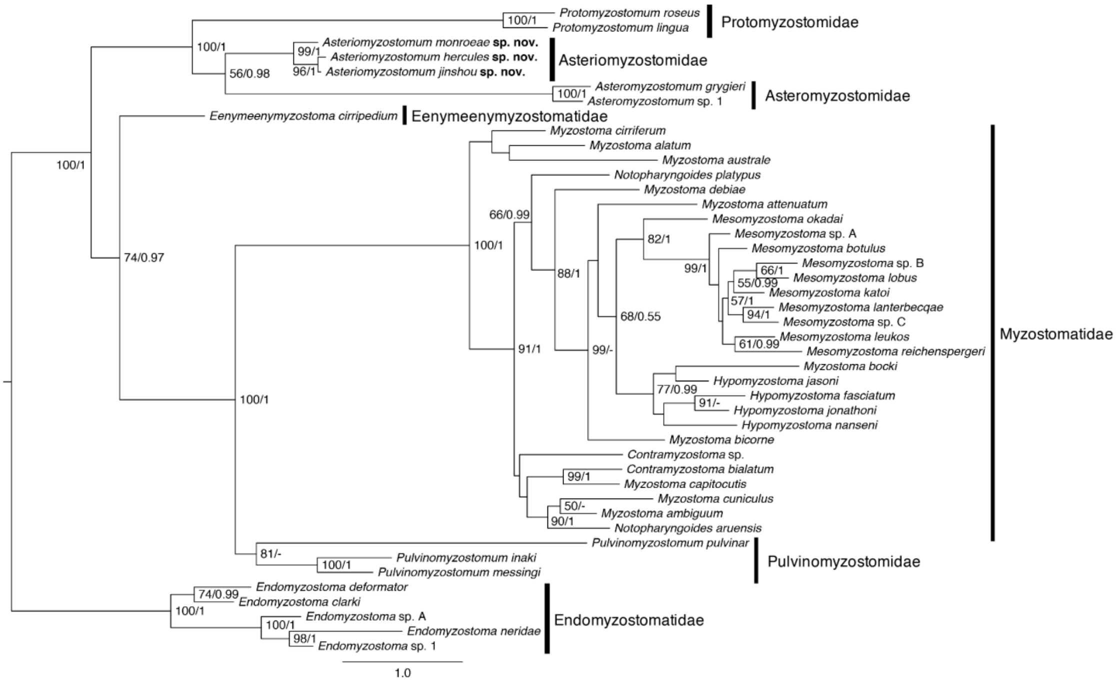


Figure IV-4. Maximum-likelihood (ML) phylogenetic tree of Myzostomida based on COI, 16S, 18S, H3 sequences. *Endomyzostoma* spp. were used as an ‘outgroup’ for the rest of myzostomids. Nodal support values (bootstrap support [BS] value) higher than 50% are indicated on each branch. Posterior probability value was also indicated, a hyphen is given for nodes not recovered in Bayesian analysis.

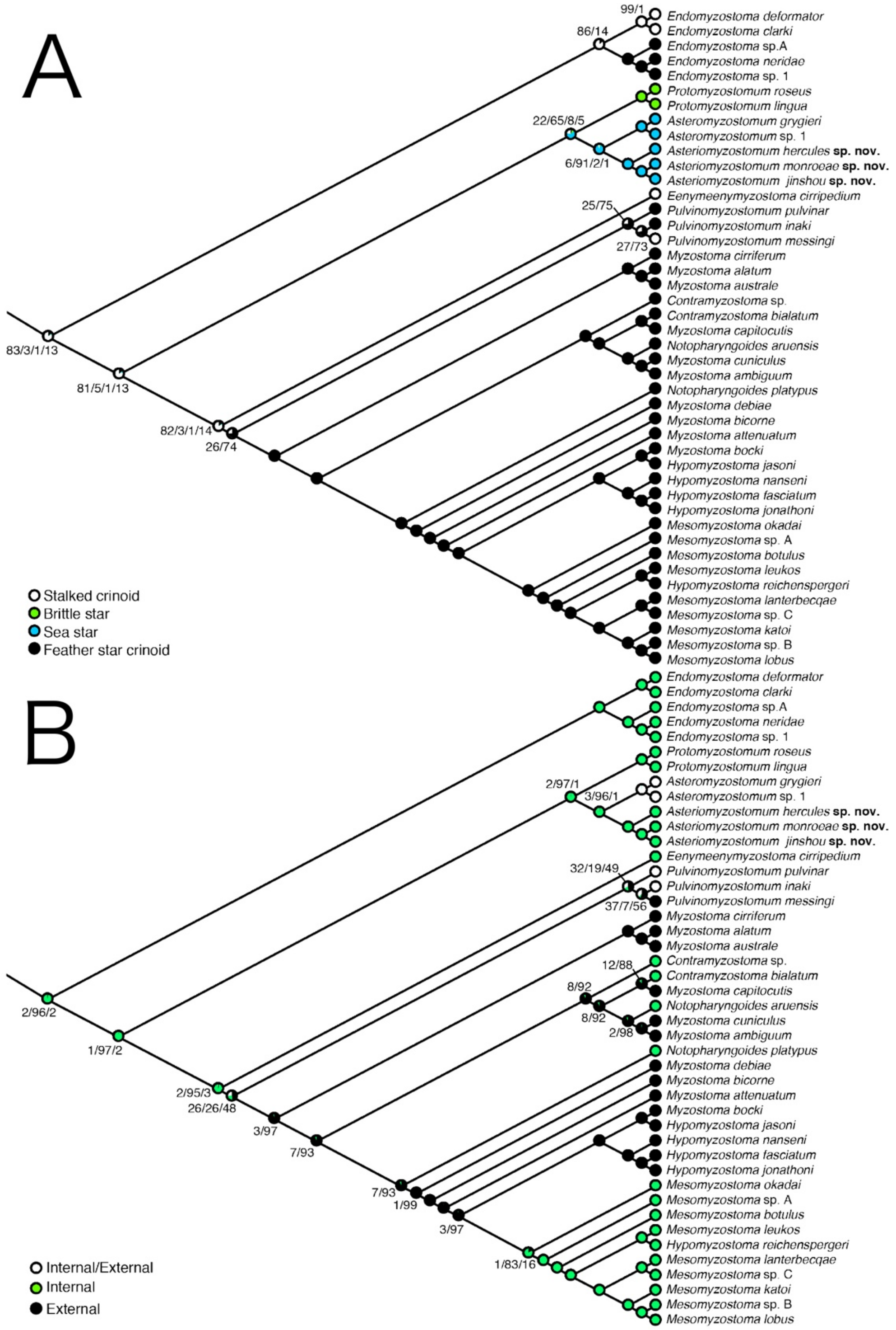


Figure IV-5. Ancestral-state reconstructions of Myzostomida based on the topology of the ML tree (see Fig. 4). Traits were mapped as pie charts at nodes that indicate the proportion of each trait, reconstructed by the Mk1 model in Mesquite: A, general host type; B, life style. Nodal values also denote probabilities of each trait.

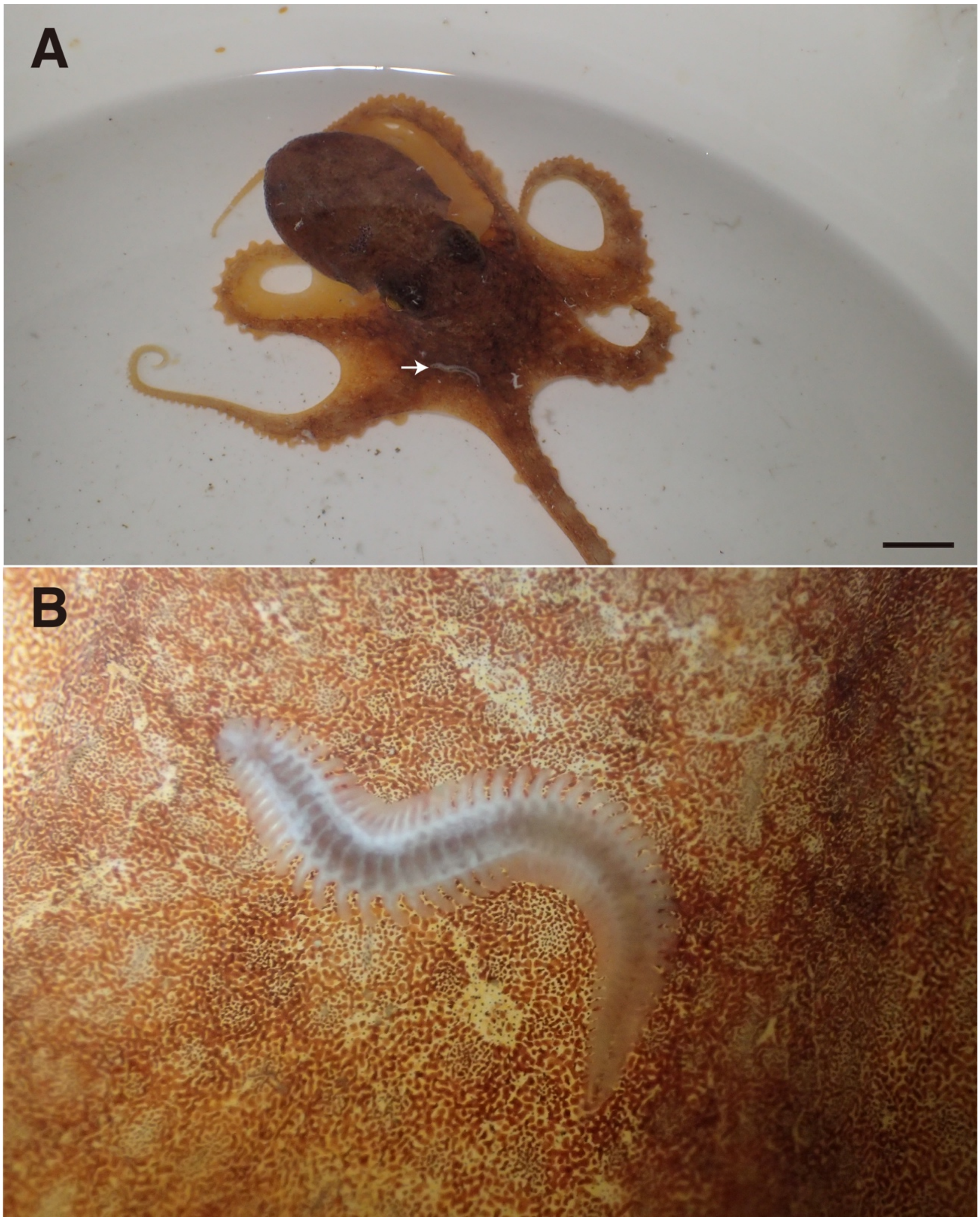


Figure V-1. Live specimen of *Spathochaeta octopodis* on *Octopus* sp. A, full view of the octopus, white arrow indicates the worm; B, enlarged view of the worm on the octpus web. Scale bar: A, 1 cm.

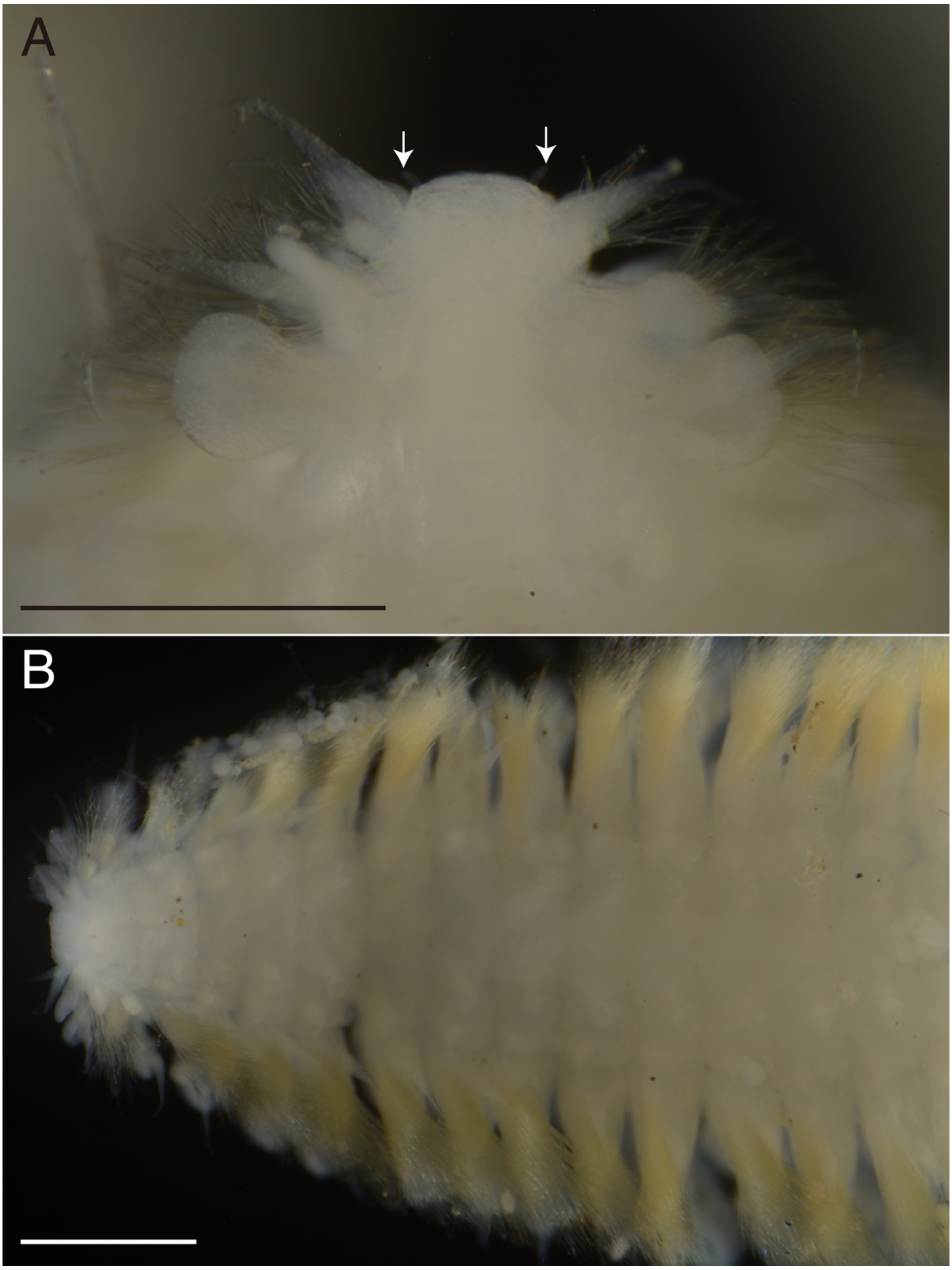


Figure V-2. *Spathochaeta octopodis* A, anterior end, dorsal view: white arrows indicate lateral antenna; B, anterior end, ventral view. Scale bars: 500 µm.

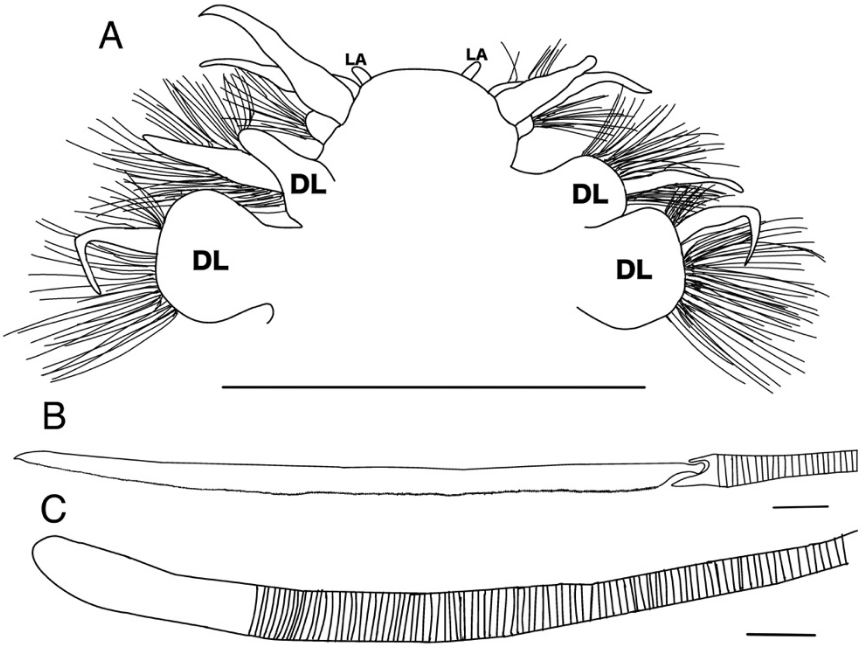


Figure V-3. Drawing of *Spathochaeta octopodis*. A, anterior end, LA, lateral antenna, DL, dorsal lobe; B, notochaeta from chaetiger 35; C, neurochaeta from chaetiger 35. Scale bars: A, 500 μm; B–C, 1 μm.

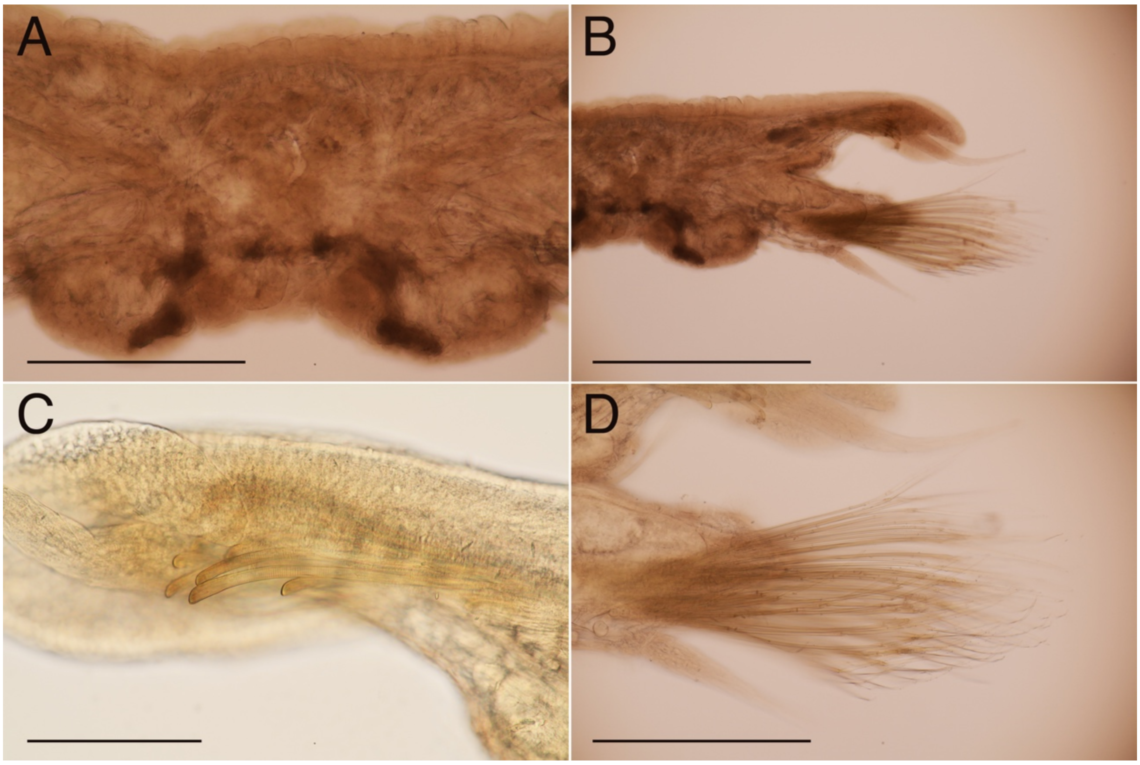
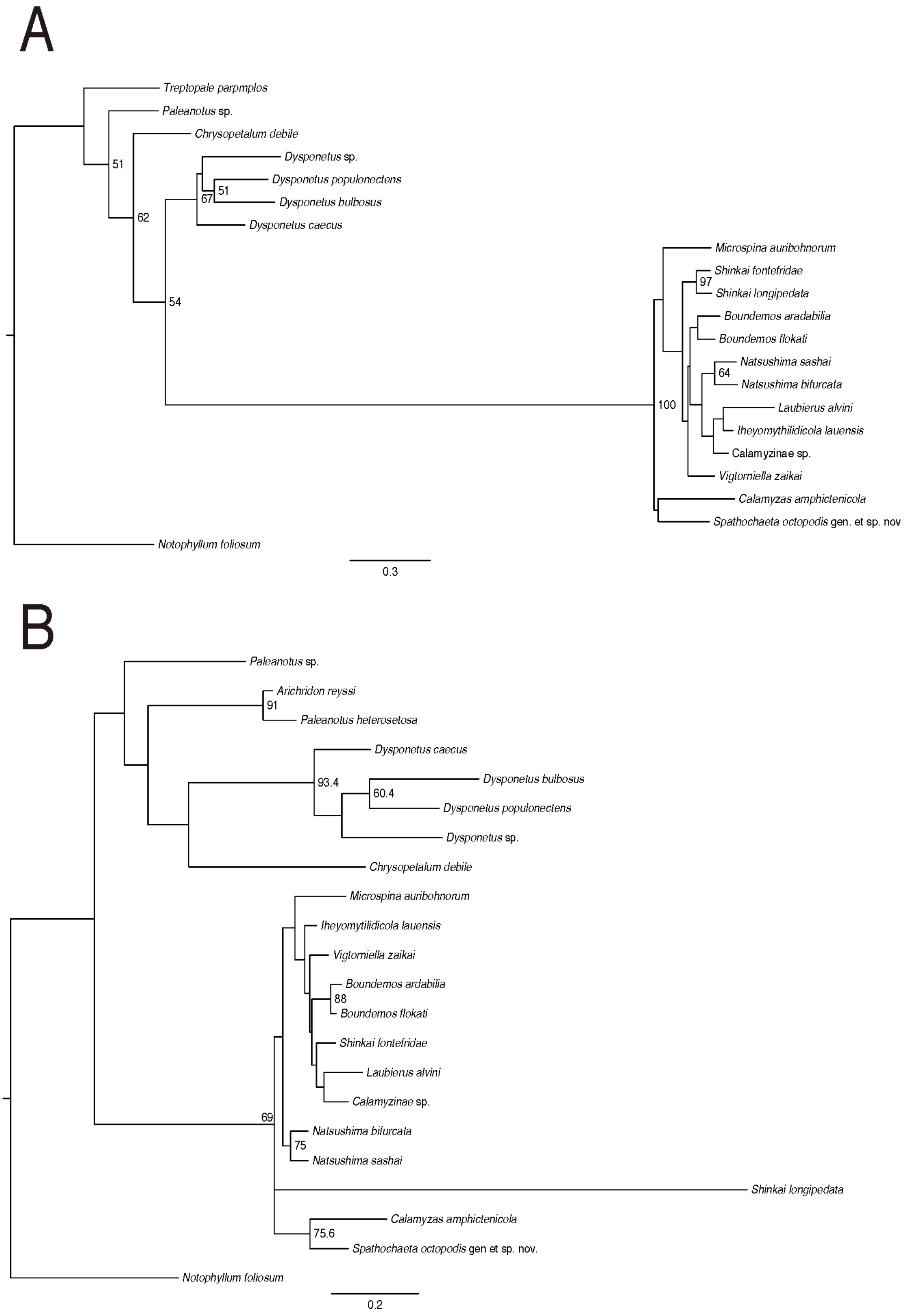


Figure V-4. *Spathochaeta octopodis*, chaetiger 35, posterior view. A, transversal section of the body; B, parapodia; C, notochaetae; D, neuropodia. Scale bars: A, 500 µm; B, 250 µm; C, 100 µm; D, 250 µm.


A
Treptopale parpmplos
Paleanotus sp.
Chrysopetalum debile
Dysponetus sp.
Dysponetus populonectens
Dysponetus bulbosus
Dysponetus caecus
51
51
67
62
54
Microspina auribohnorum
Shinkai fontefridae
97
Shinkai longipedata
Boundemos aradabilia
Boundemos flokati
Natsushima sashai
64
Natsushima bifurcata
100
Laubierus alvini
Iheyomythilidicola lauensis
Calamyzinae sp.
Vigtorniella zaikai
Calamyzas amphictenicola
Spathochaeta octopodis gen. et sp. nov
Notophyllum foliosum
0.3
B
Paleanotus sp.
Arichridon reyssi
91
Paleanotus heterosetosa
Dysponetus caecus
93.4
Dysponetus bulbosus
60.4
Dysponetus populonectens
Dysponetus sp.
Chrysopetalum debile
Microspina auribohnorum
Iheyomytilidicola lauensis
Vigtorniella zaikai
Boundemos ardabilia
88
Boundemos flokati
Shinkai fontefridae
Laubierus alvini
Calamyzinae sp.
69
Natsushima bifurcata
75
Natsushima sashai
Shinkai longipedata
Calamyzas amphictenicola
75.6
Spathochaeta octopodis gen et sp. nov.
Notophyllum foliosum
0.2

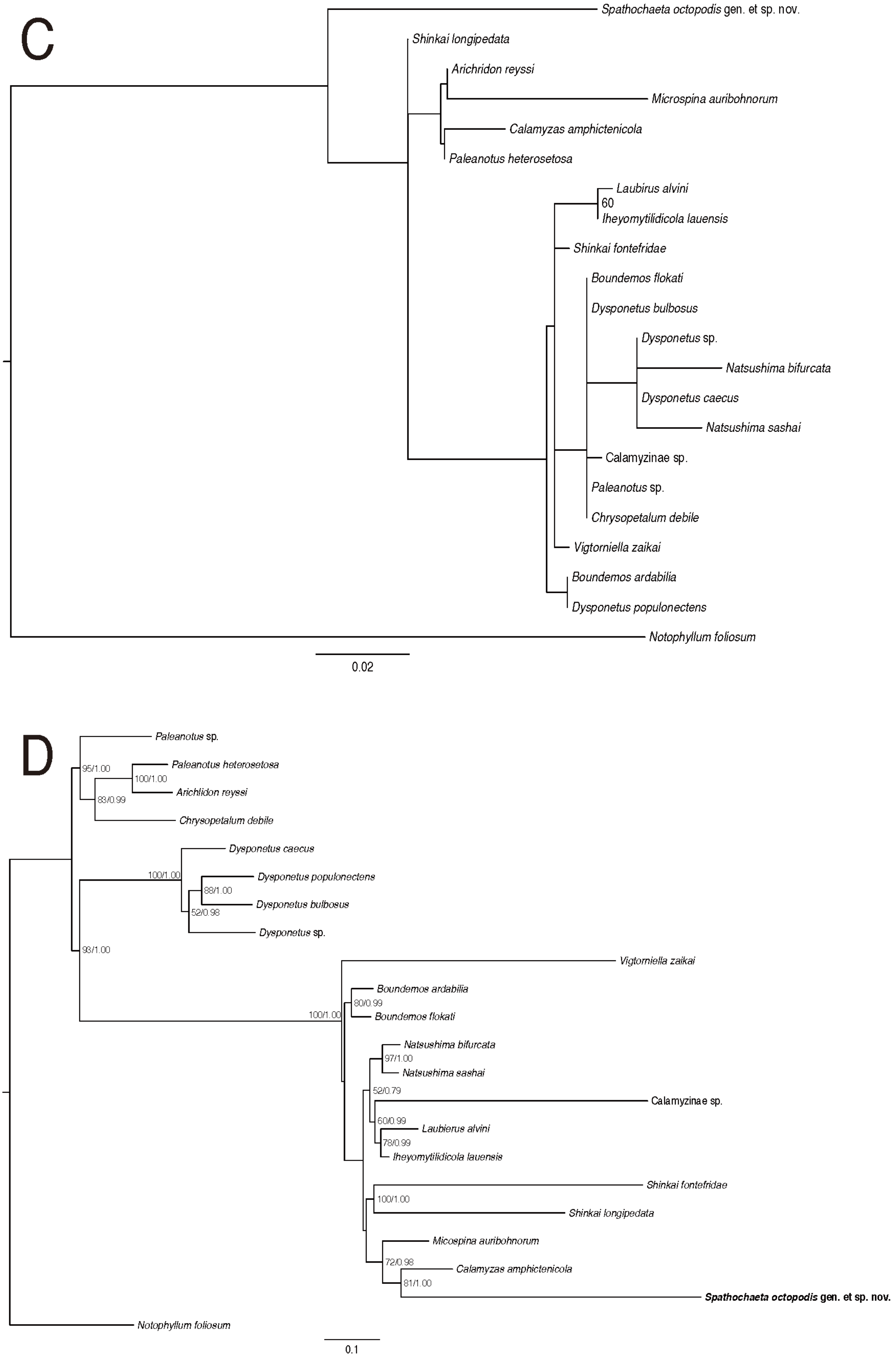


Figure V-5. Maximum-likelihood (ML) phylogenetic tree of Chrysopetalidae based on

COI, 16S, 18S, H3 sequences. *Notophyllum foliosum* was used as ‘outgroup’. Nodal supports (bootstrap support [BS] value) higher than 50% are indicated on each branch. Posterior probabilities are also indicated. A, COI tree; B, 16S tree; C, H3 tree; D, concatenated tree.

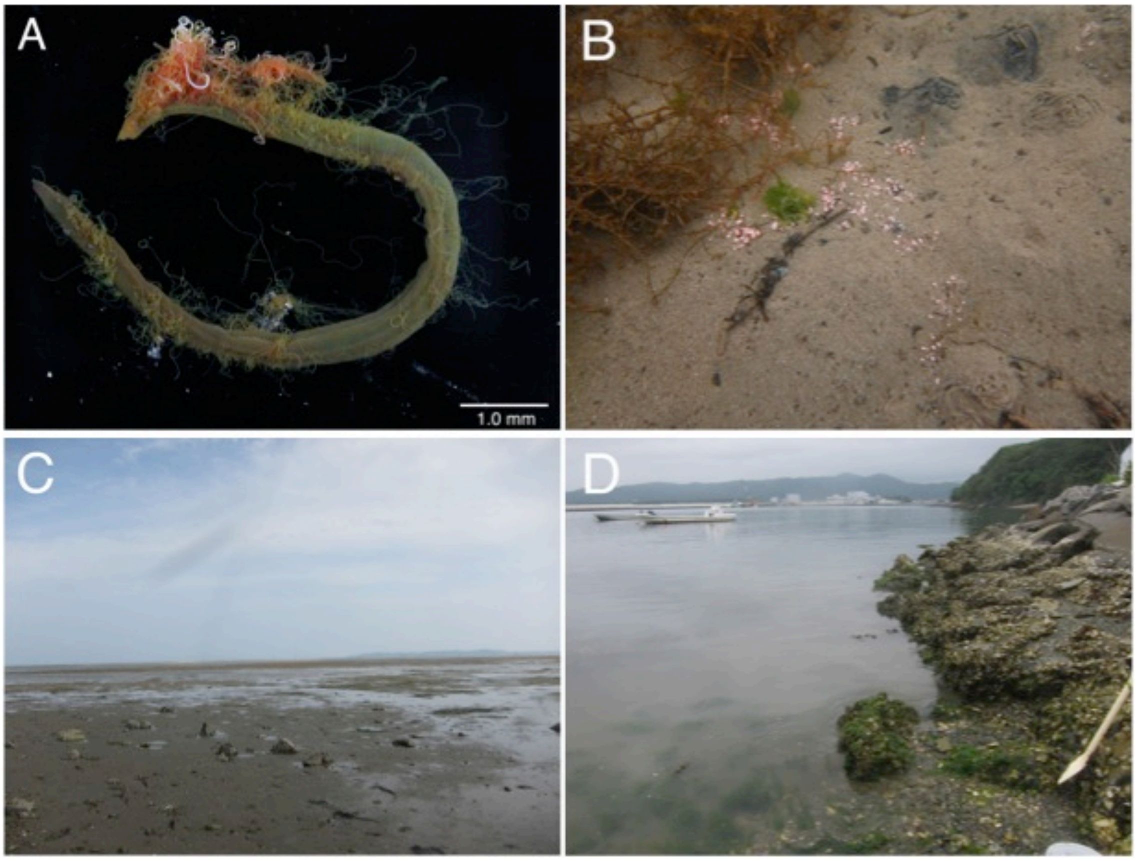


Figure VI-1. Live specimen of *Cirriformia* spp. and landscapes of collection sites. A, whole body of *Cirriformia* sp. G; B, live specimens branchiae of *Cirriformia* spp. emergent from sediment at Mase; C, Sampling site representing tidal flat (Issiki); D, Sampling site representing rocky shore (Sasu).

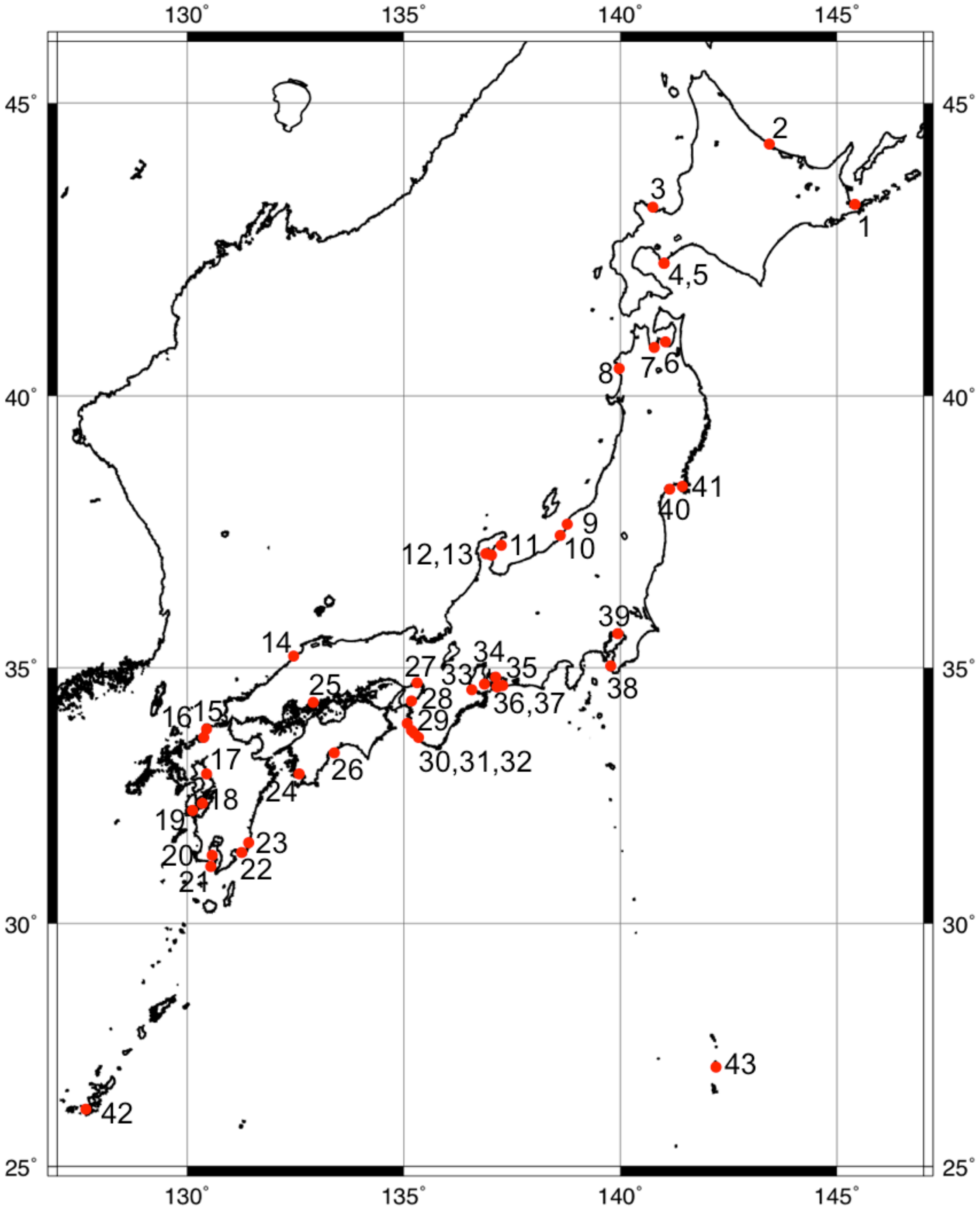


Figure VI-2. Sampling locations of *Cirriformia* spp. and *Timarete* sp. in the present study. Number of sampling site showed in Table. VI-1.

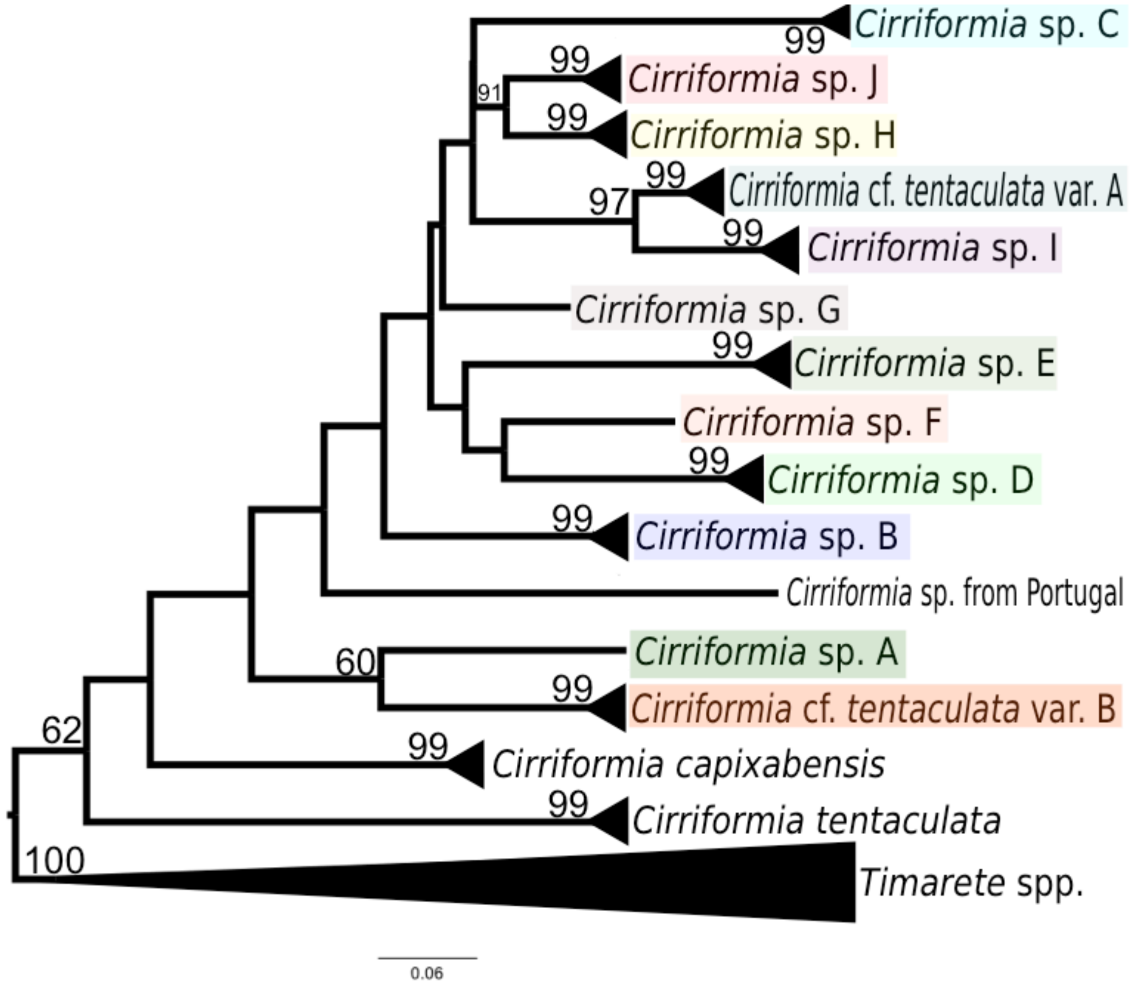


Figure VI-3. Maximum-likelihood (ML) tree based on mitochondrial COI sequence. *Timarete* spp. were used as outgroup. Nodal support values (bootstrap support) higher than 50% are indicated above the branches.

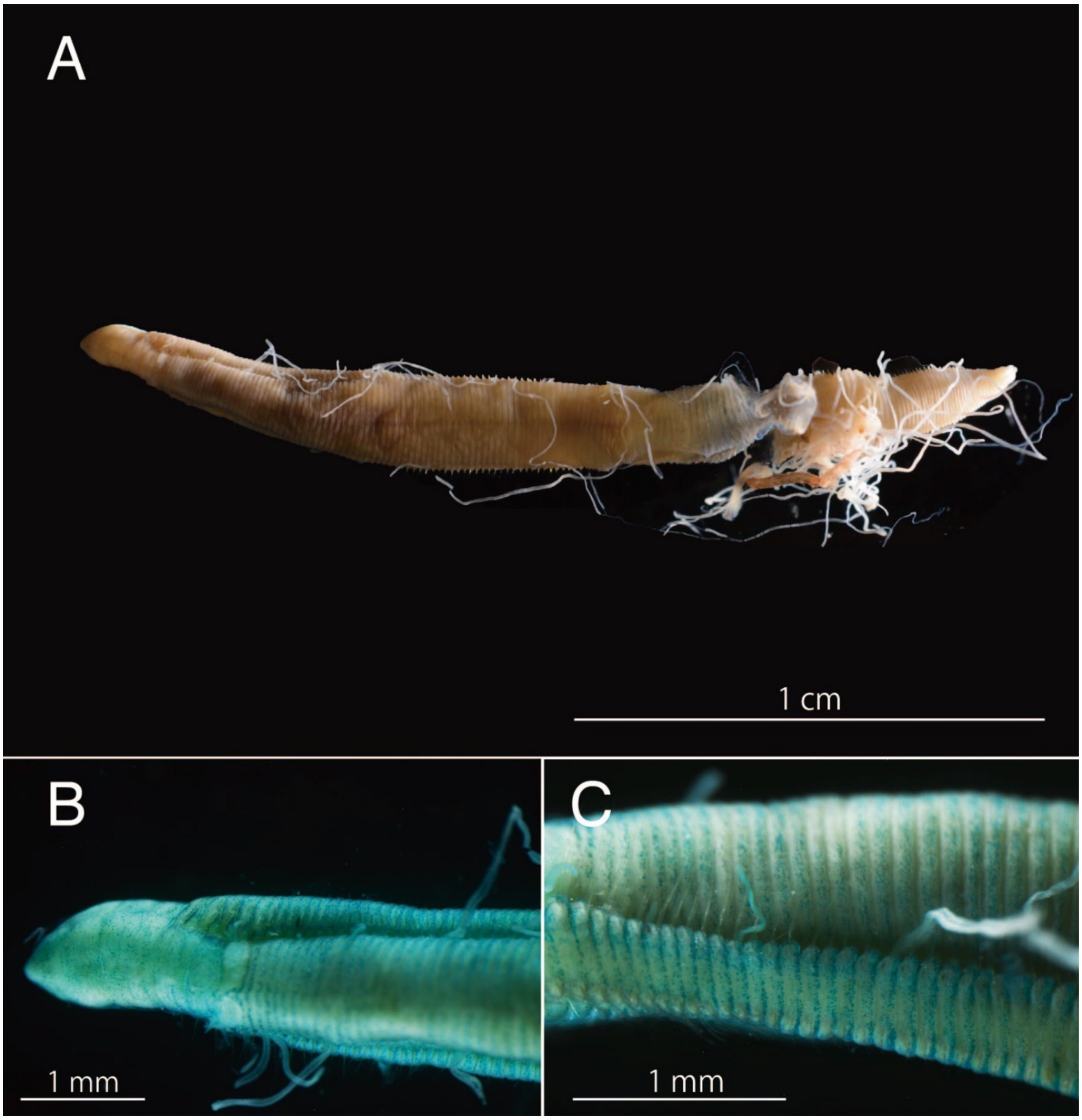


Figure VI-4. Stereoscopic micrographs of *Cirriformia* sp. A. A, whole body of preserved specimen; B ,MGST pattern of prostomium; C, MGST pattern of lateral body, left side is anterior side of body.

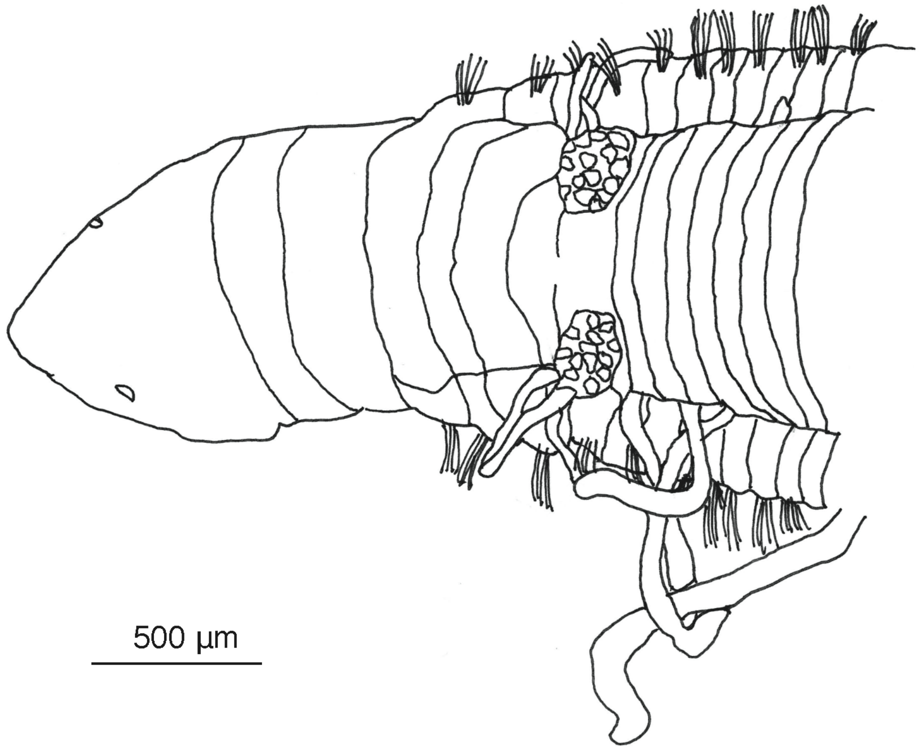


Fig. VI-5. Anterior part of *Cirriformia* sp. A.

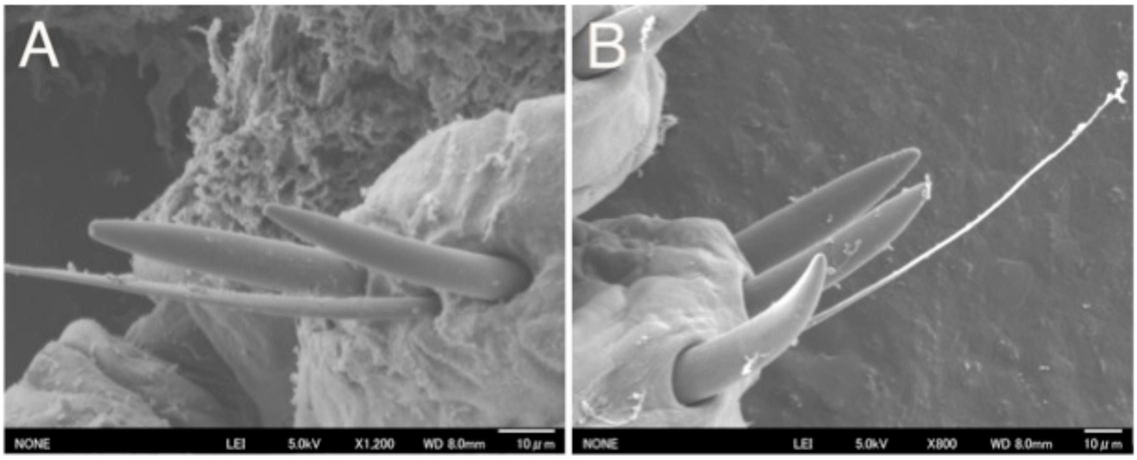


Figure VI-6. Scanning electron micrographs of *Cirriformia* sp. A. A, neuropodial spines; B, notopodial spines.

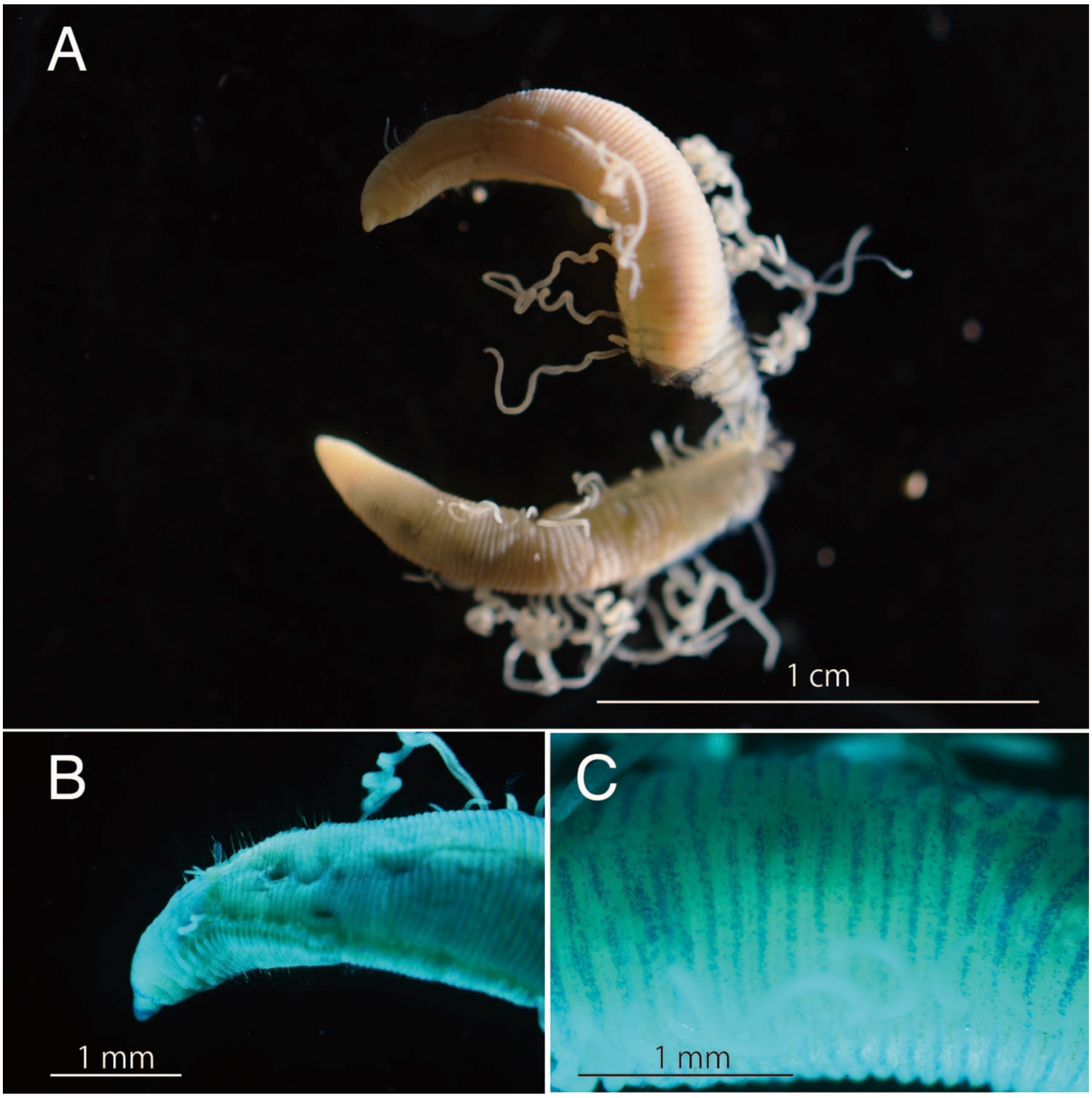


Figure VI-7. Stereoscopic micrographs of *Cirriformia* sp. B. A, whole body of preserved specimen; B, MGST pattern of prostomium; C, MGST pattern of lateral body, left side is anterior side of body.

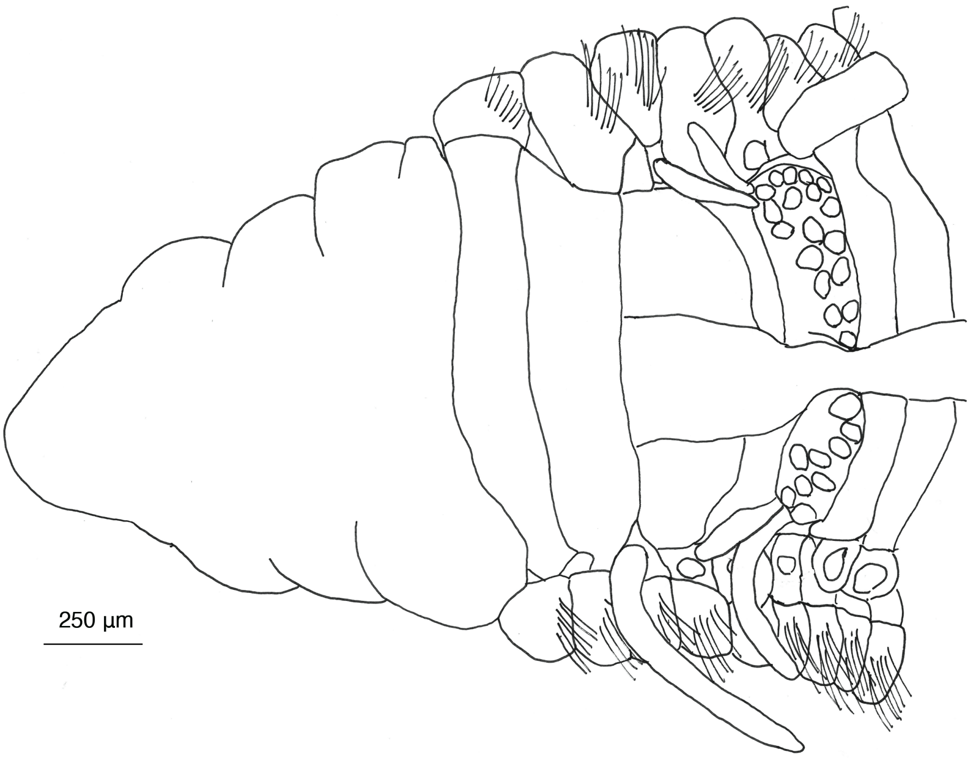


Figure VI-8. Anterior part of *Cirriformia* sp. B.

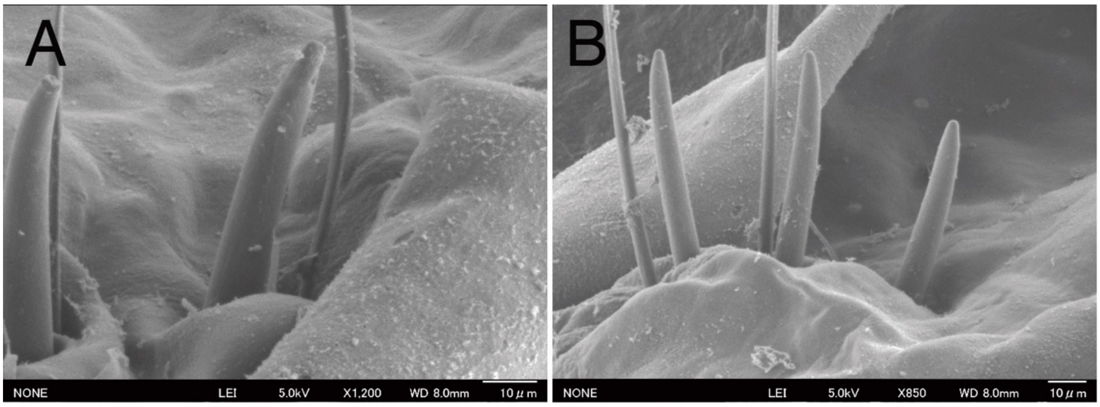


Figure VI-9. Scanning electron micrographs of *Cirriformia* sp. B. A, neuropodial spines; B, notopodial spines.

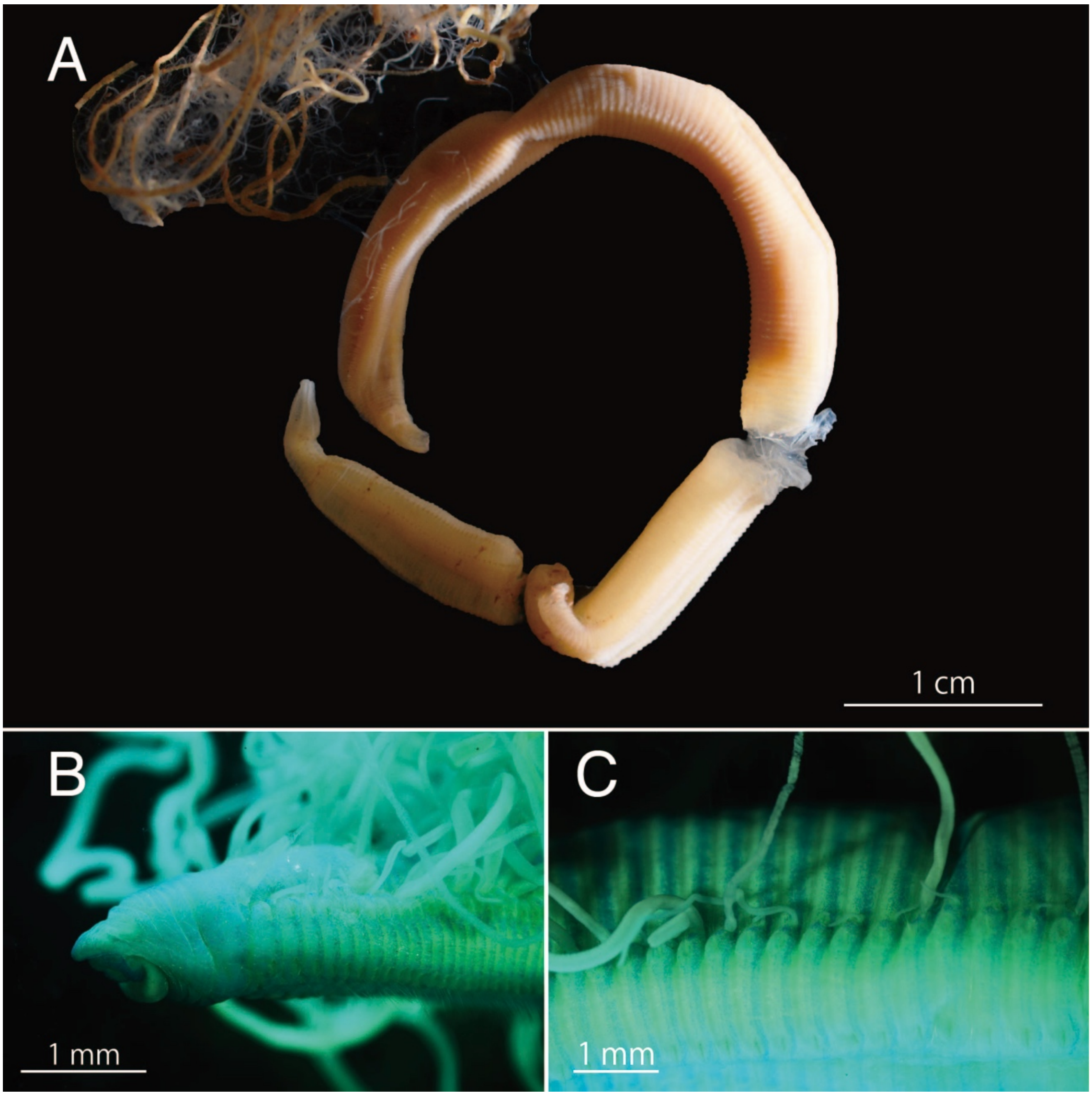


Figure VI-10. Stereoscopic micrographs of *Cirriformia* sp. C. A, whole body of preserved specimen; B, MGST pattern of prostomium; C, MGST pattern of lateral body, left side is anterior side of body.

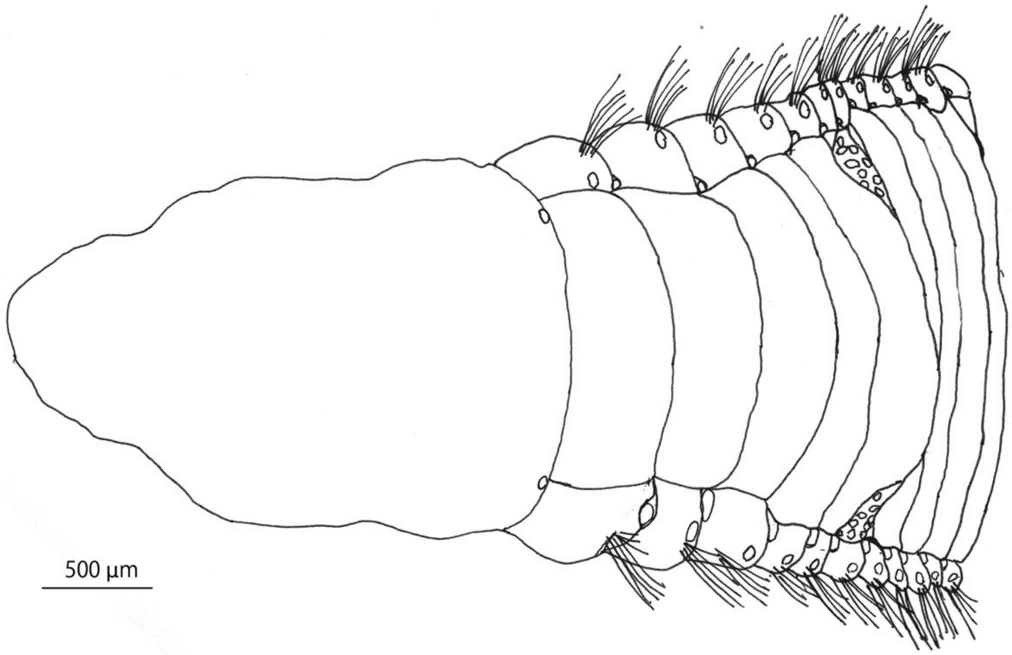


Figure VI-11. Anterior part of *Cirriformia* sp. C.

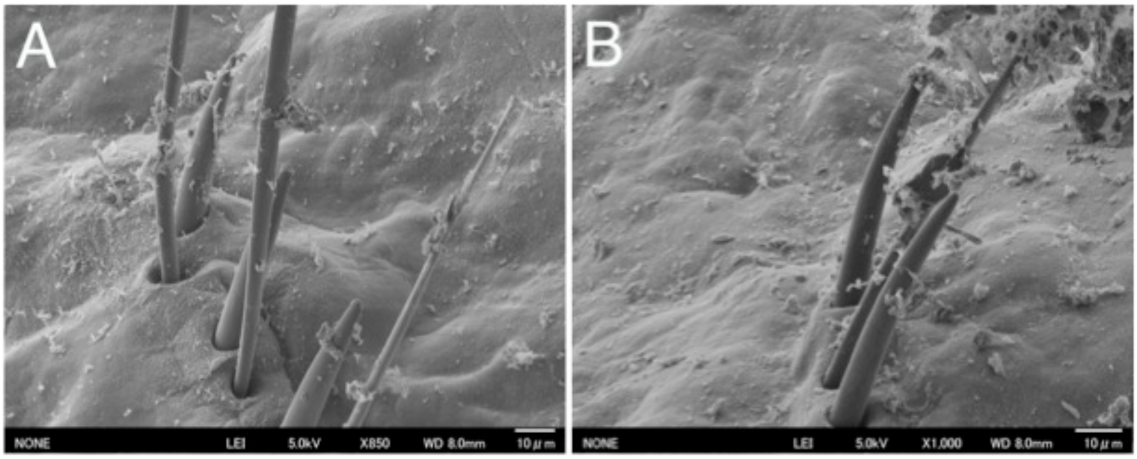


Figure VI-12. Scanning electron micrographs of *Cirriformia* sp. C. A, neuropodial spines; B, notopodial spines.

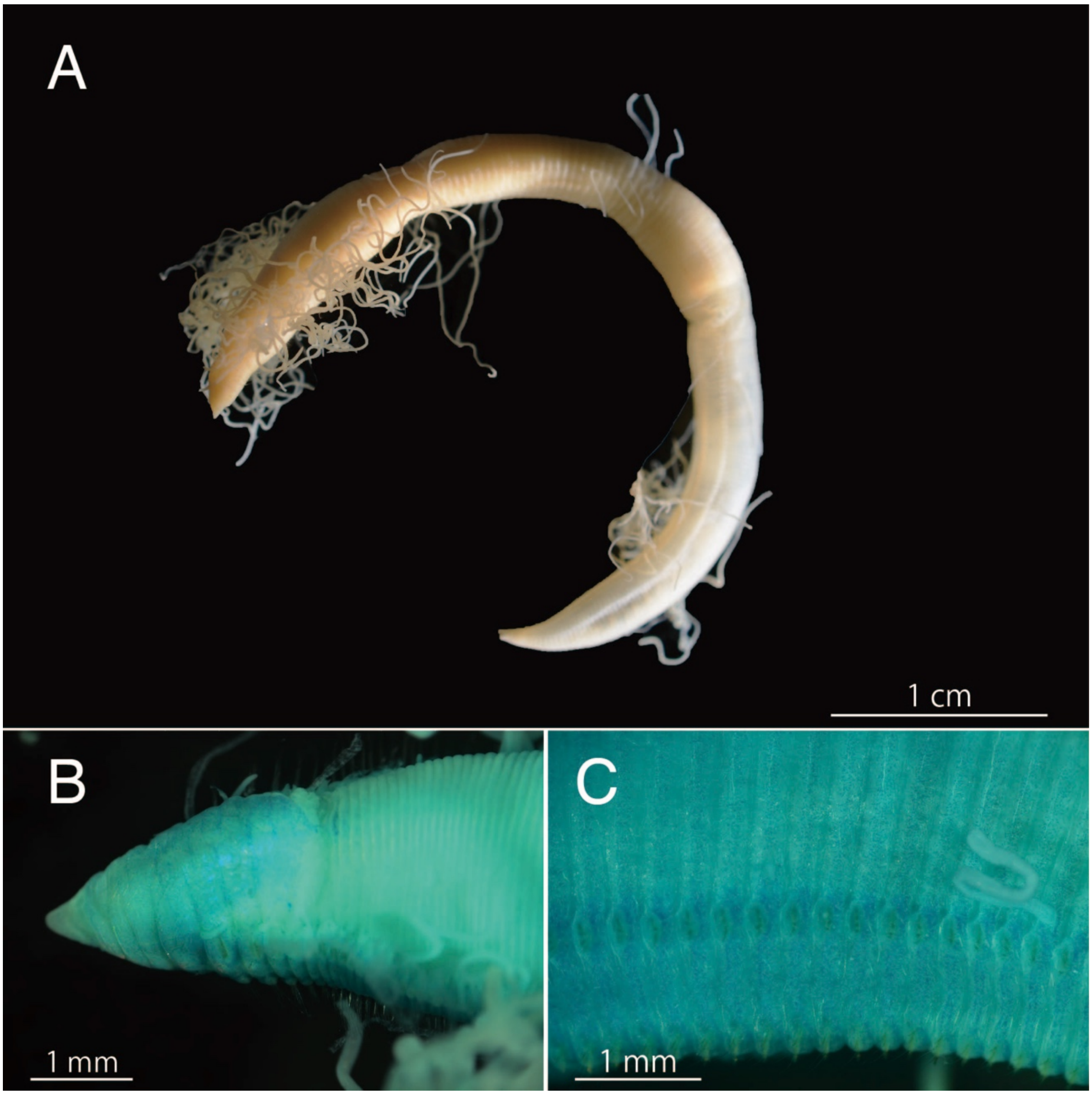


Figure VI-13. Stereoscopic micrographs of *Cirriformia* sp. D. A, whole body of preserved specimen; B, MGST pattern of prostomium; C, MGST pattern of lateral body, left side is anterior side of body.

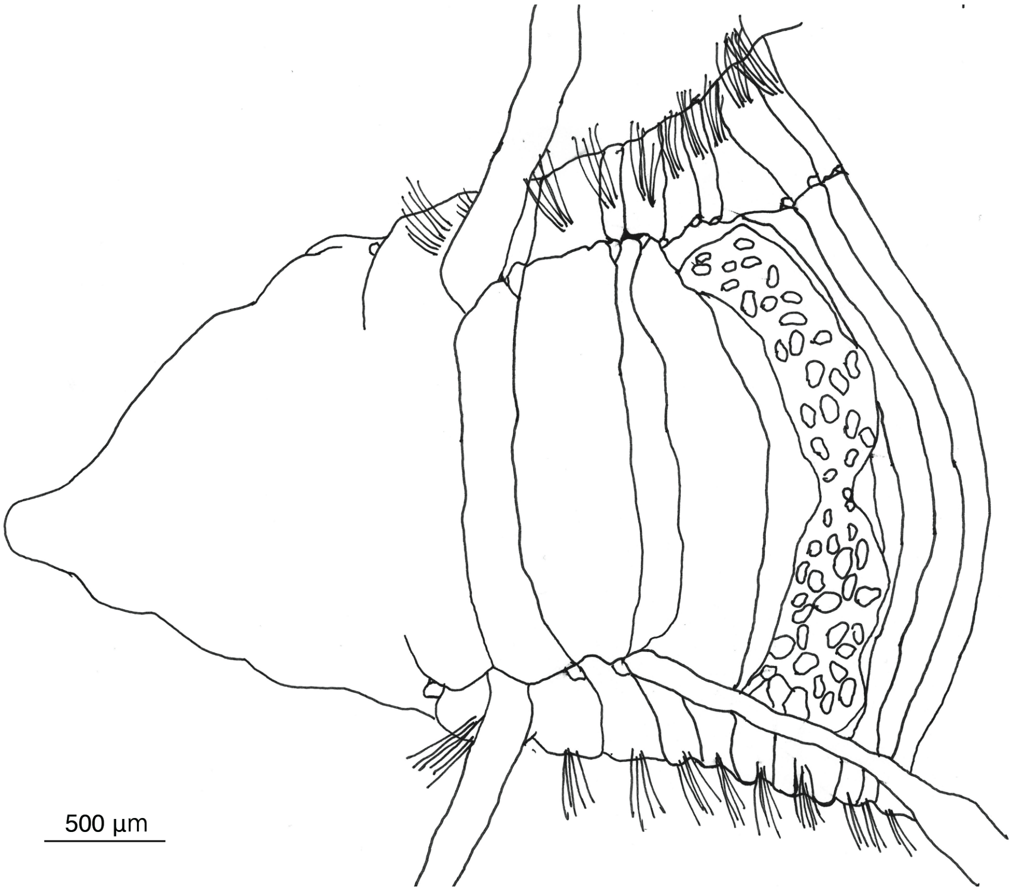


Figure VI-14. Anterior part of *Cirriformia* sp. D.

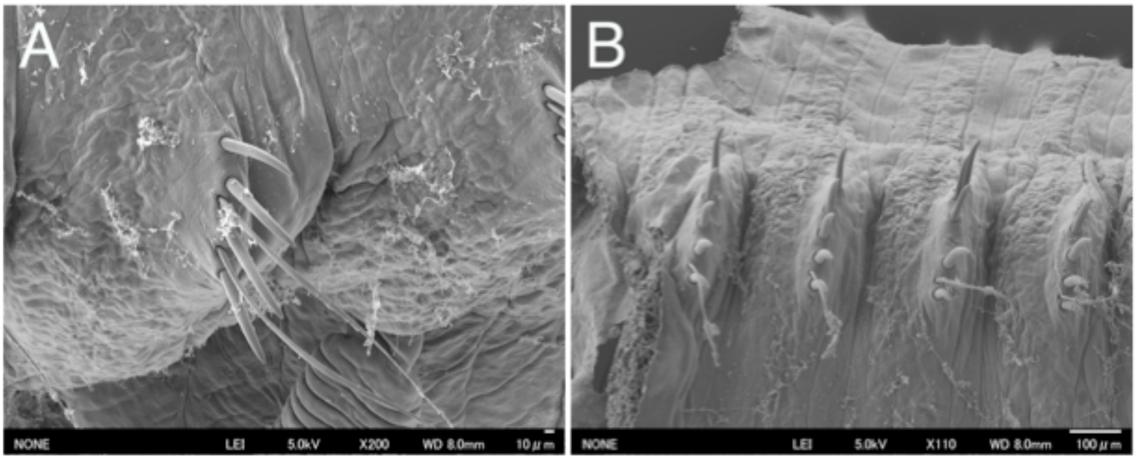


Figure VI-15. Scanning electron micrographs of *Cirriformia* sp. D. A, neuropodial spines; B, notopodial spines.

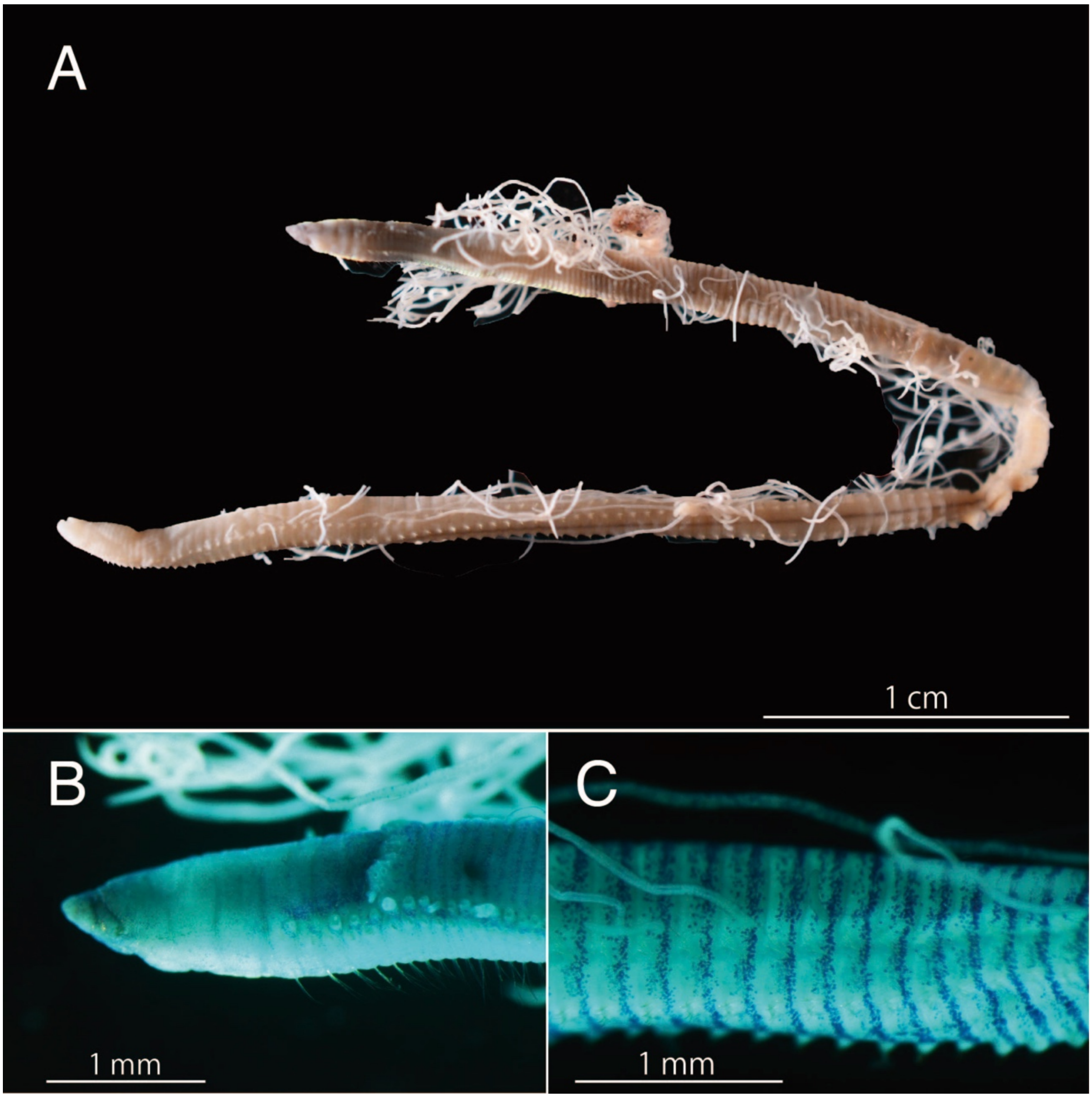


Figure VI-16. Stereoscopic micrographs of *Cirriformia* sp. E. A, whole body of preserved specimen; B, MGST pattern of prostomium; C, MGST pattern of lateral body, left side is anterior side of body.

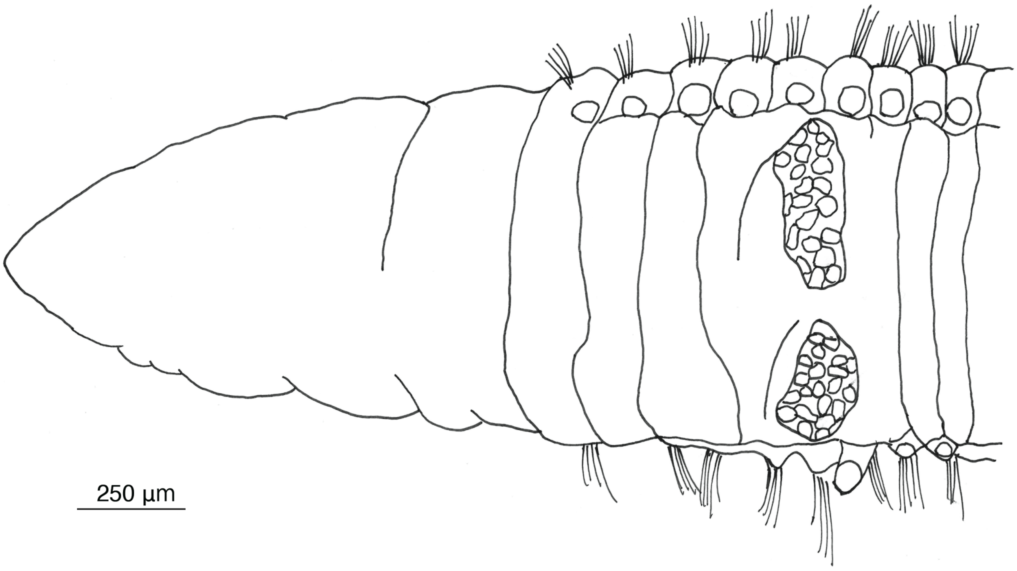


Figure VI-17. Anterior part of *Cirriformia* sp. E.

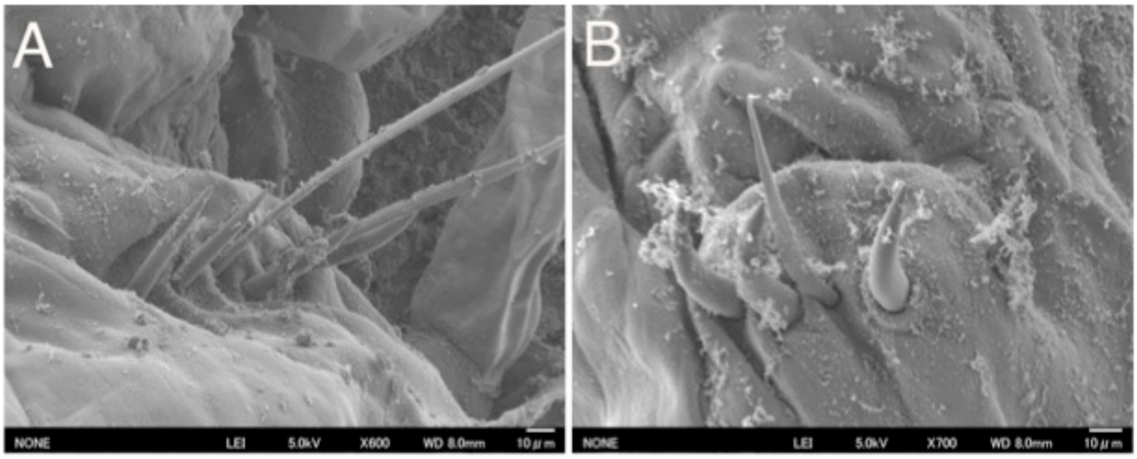


Figure VI-18. Scanning electron micrographs of *Cirriformia* sp. E. A, neuropodial spines; B, notopodial spines.

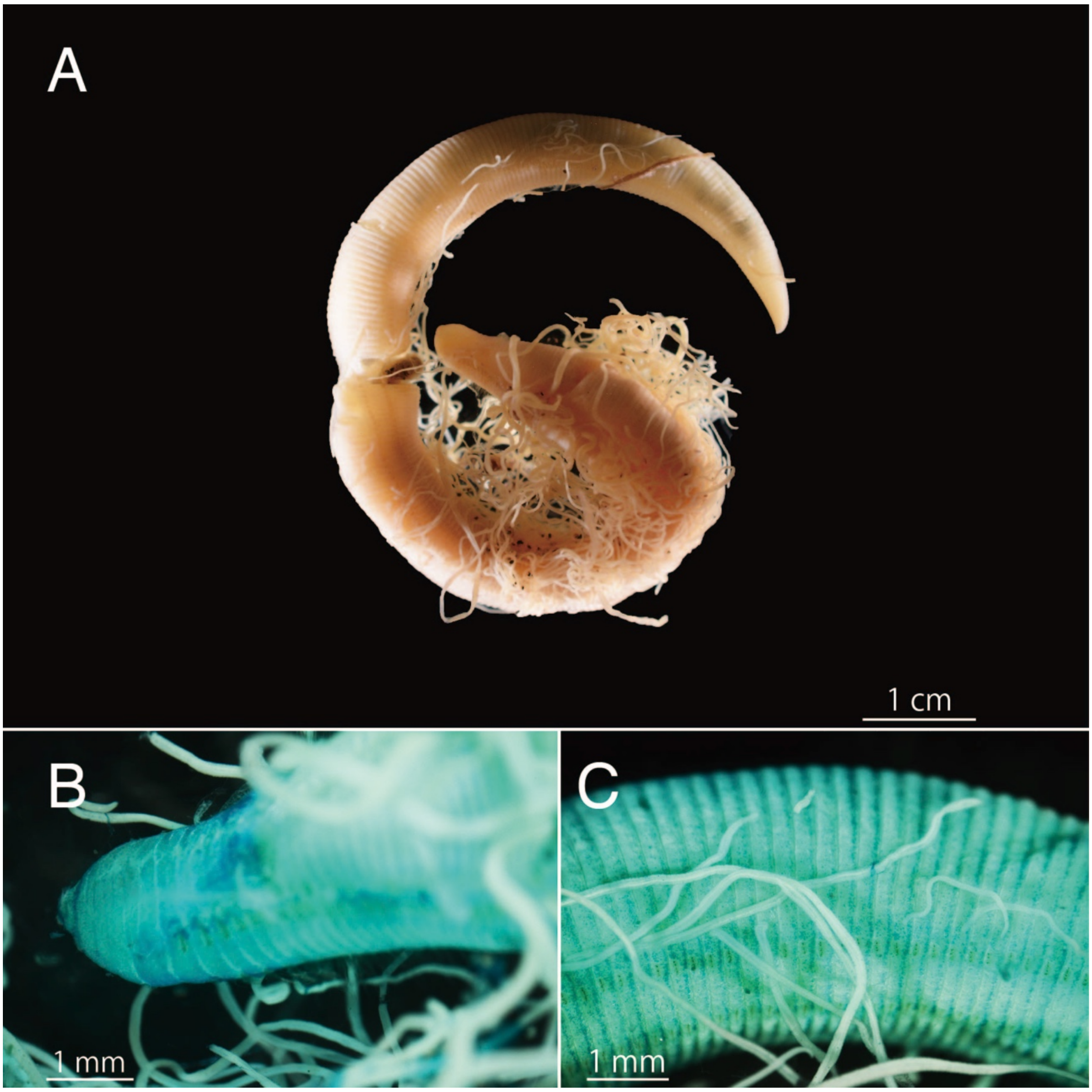


Figure VI-19. Stereoscopic micrographs of *Cirriformia* sp. F. A, whole body of preserved specimen; B, MGST pattern of prostomium; C, MGST pattern of lateral body, left side is anterior side of body.

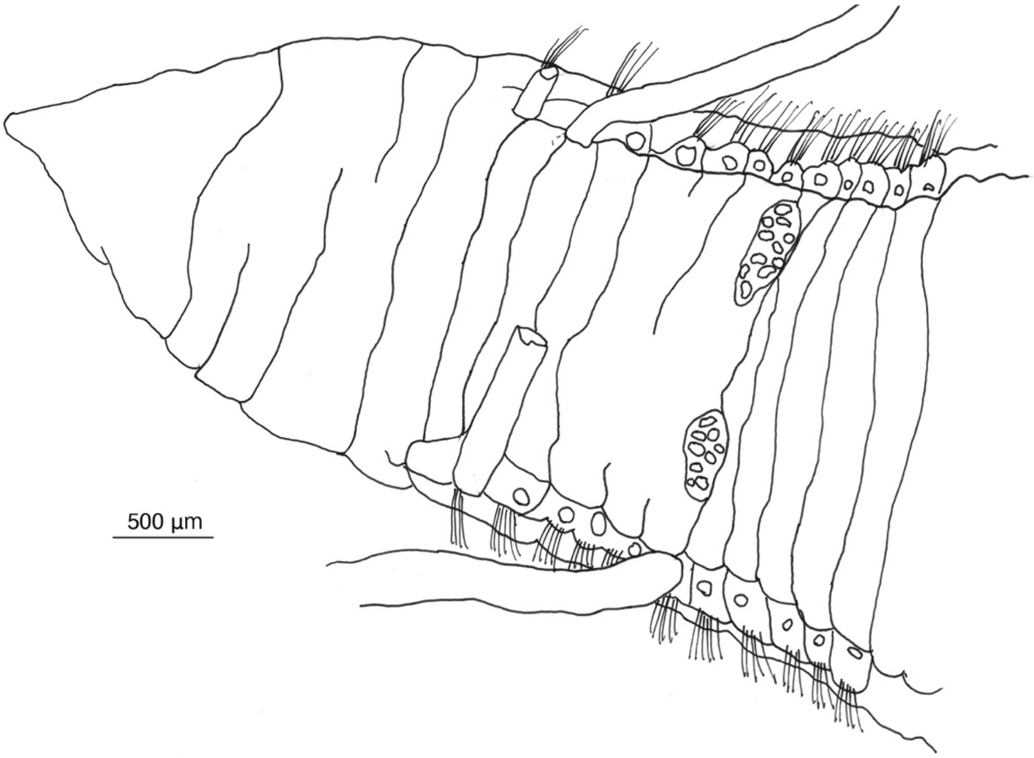


Figure VI-20. Anterior part of *Cirriformia* sp. F.

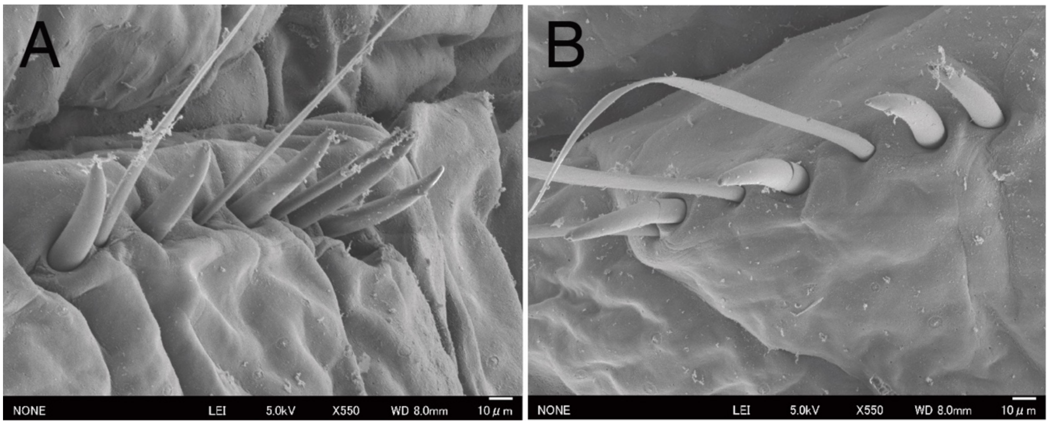


Figure VI-21. Scanning electron micrographs of *Cirriformia* sp. F. A, neuropodial spines; B, notopodial spines.

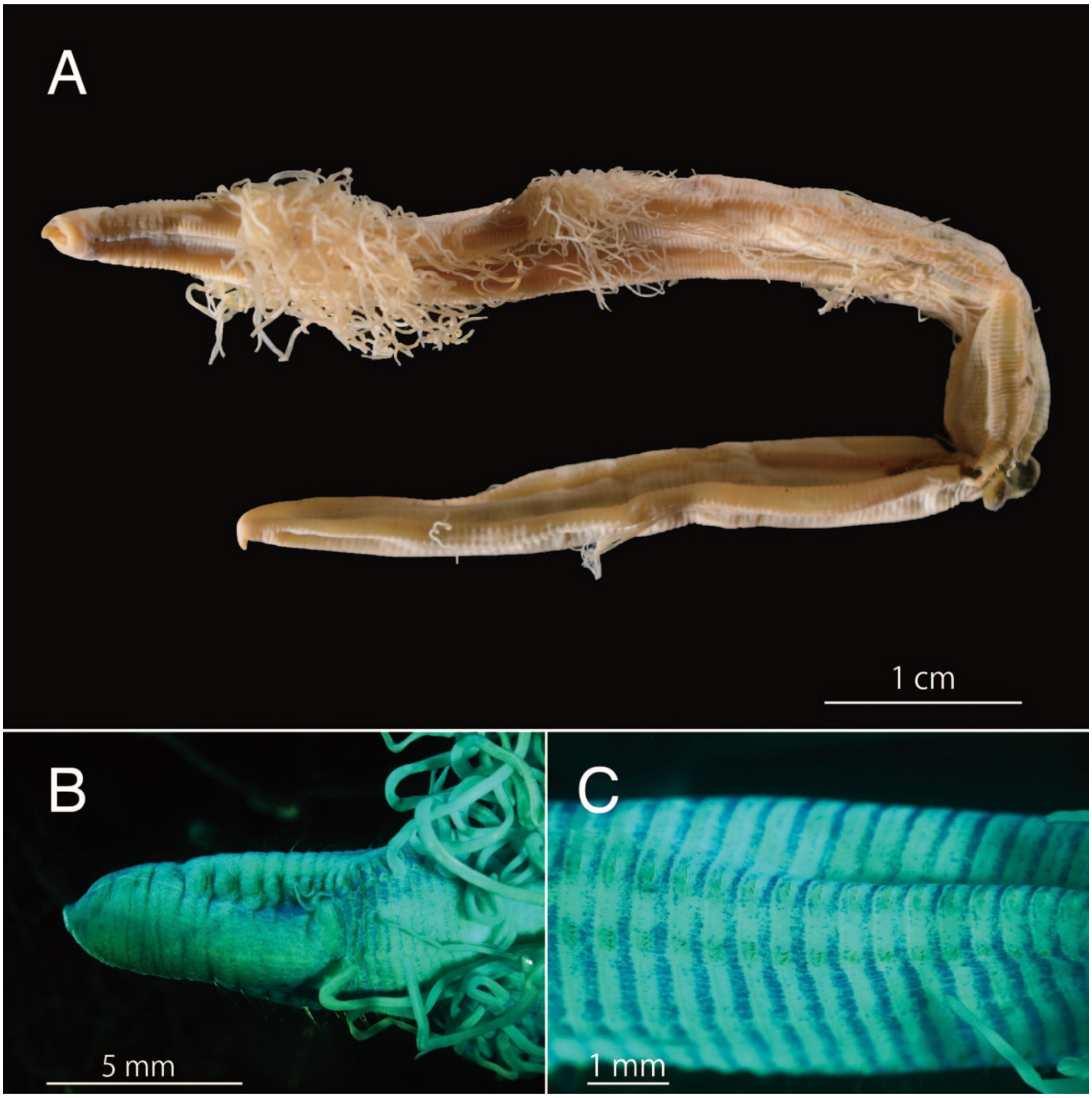


Figure VI-22. Stereoscopic micrographs of *Cirriformia* sp. G. A, whole body of preserved specimen; B, MGST pattern of prostomium; C, MGST pattern of lateral body, left side is anterior side of body.

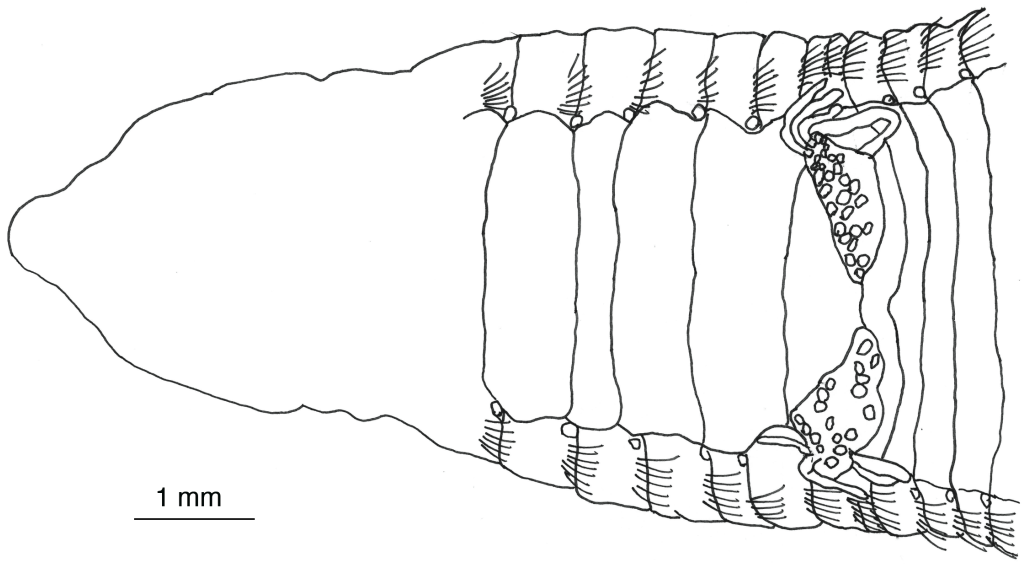


Figure VI-23. Anterior part of *Cirriformia* sp. G.

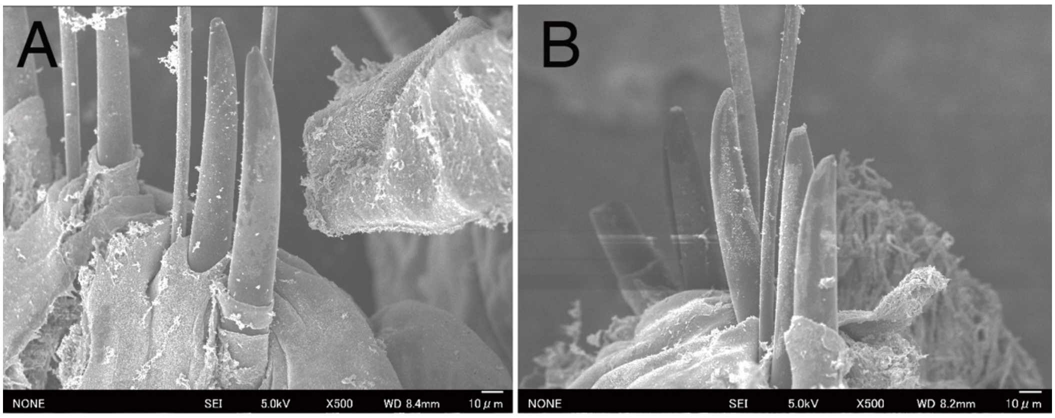


Figure VI-24. Scanning electron micrographs of *Cirriformia* sp. G. A, neuropodial spines; B, notopodial spines.

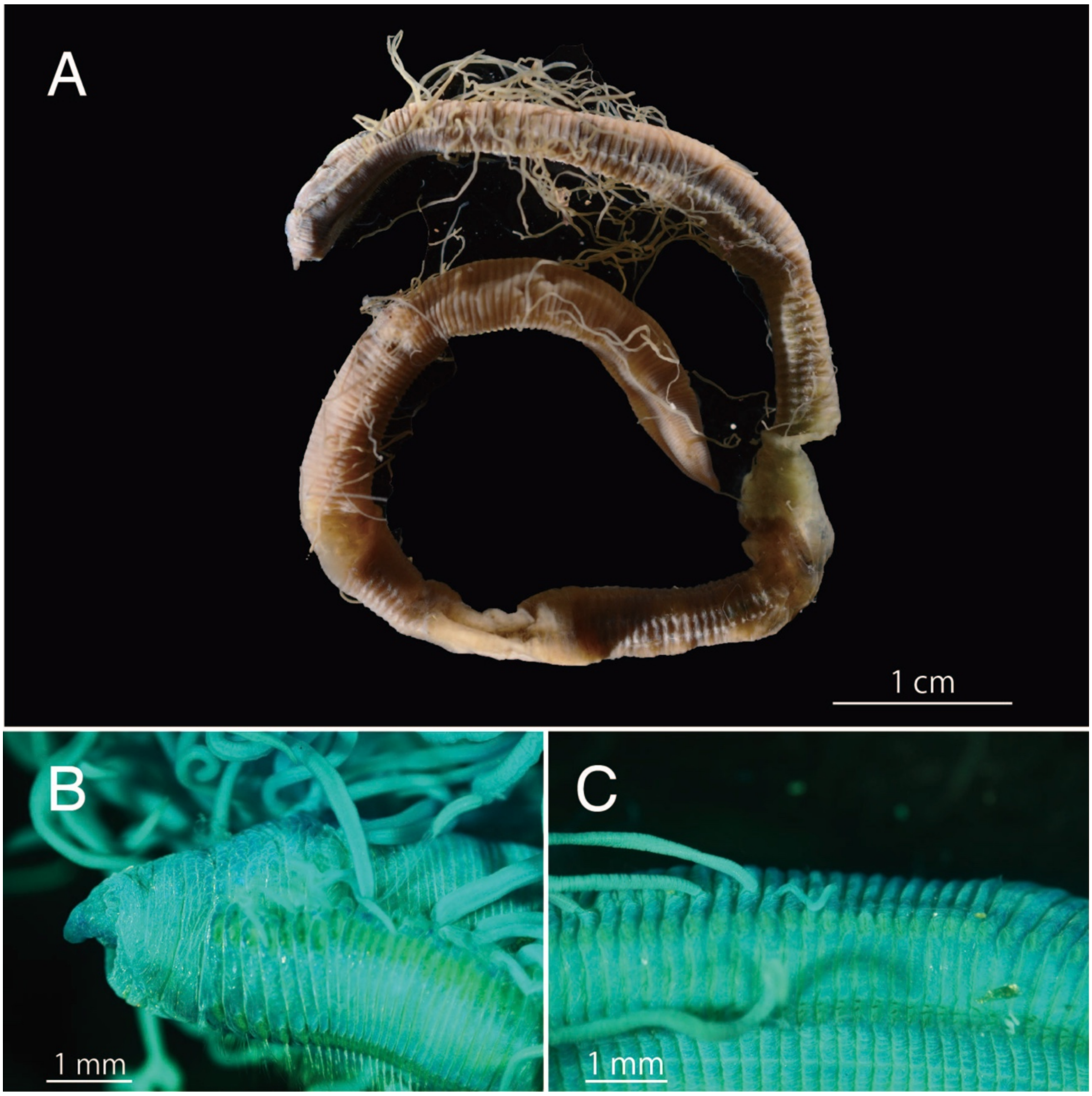


Figure VI-25. Stereoscopic micrographs of *Cirriformia* sp. H. A, whole body of preserved specimen; B, MGST pattern of prostomium; C, MGST pattern of lateral body, left side is anterior side of body.

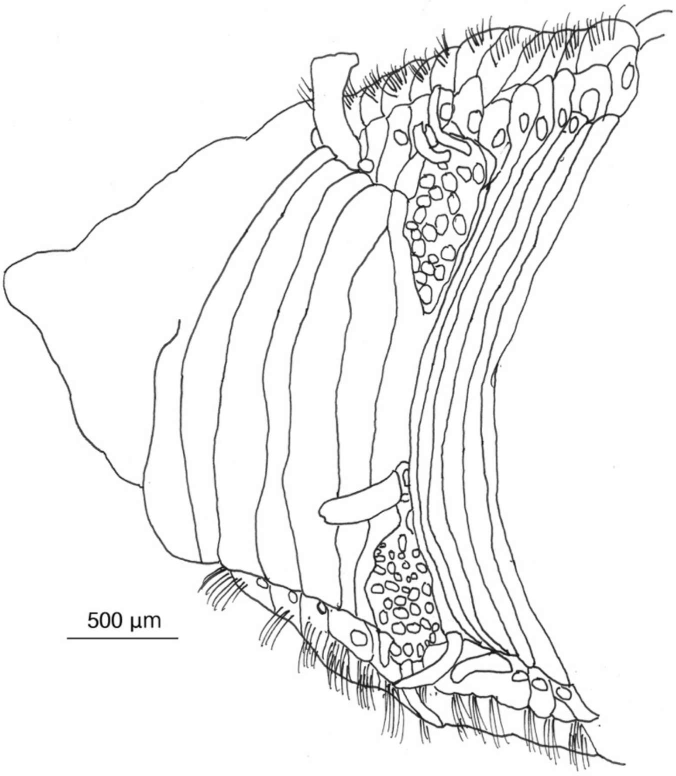


Figure VI-26. Anterior part of *Cirriformia* sp. H.

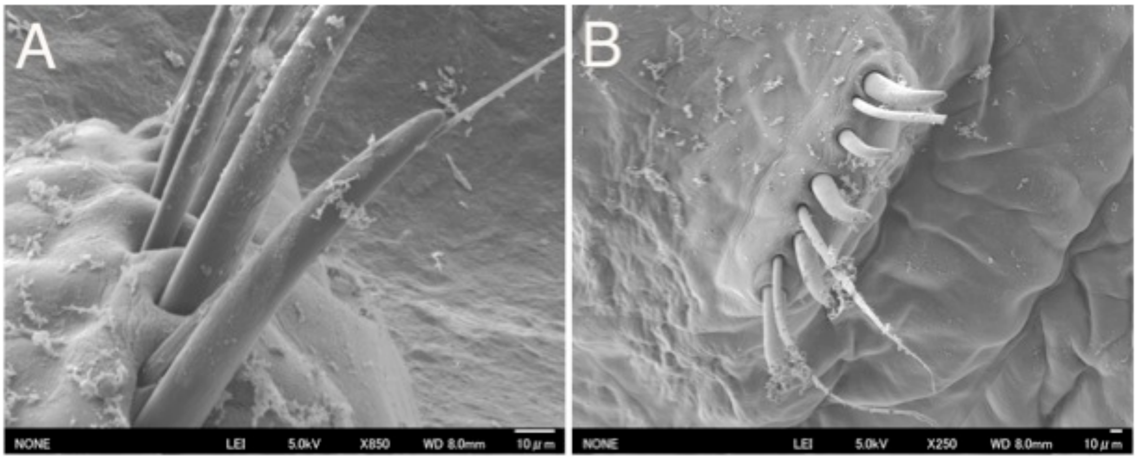


Figure VI-27. Scanning electron micrographs of *Cirriformia* sp. H. A, neuropodial spines; B, notopodial spines.

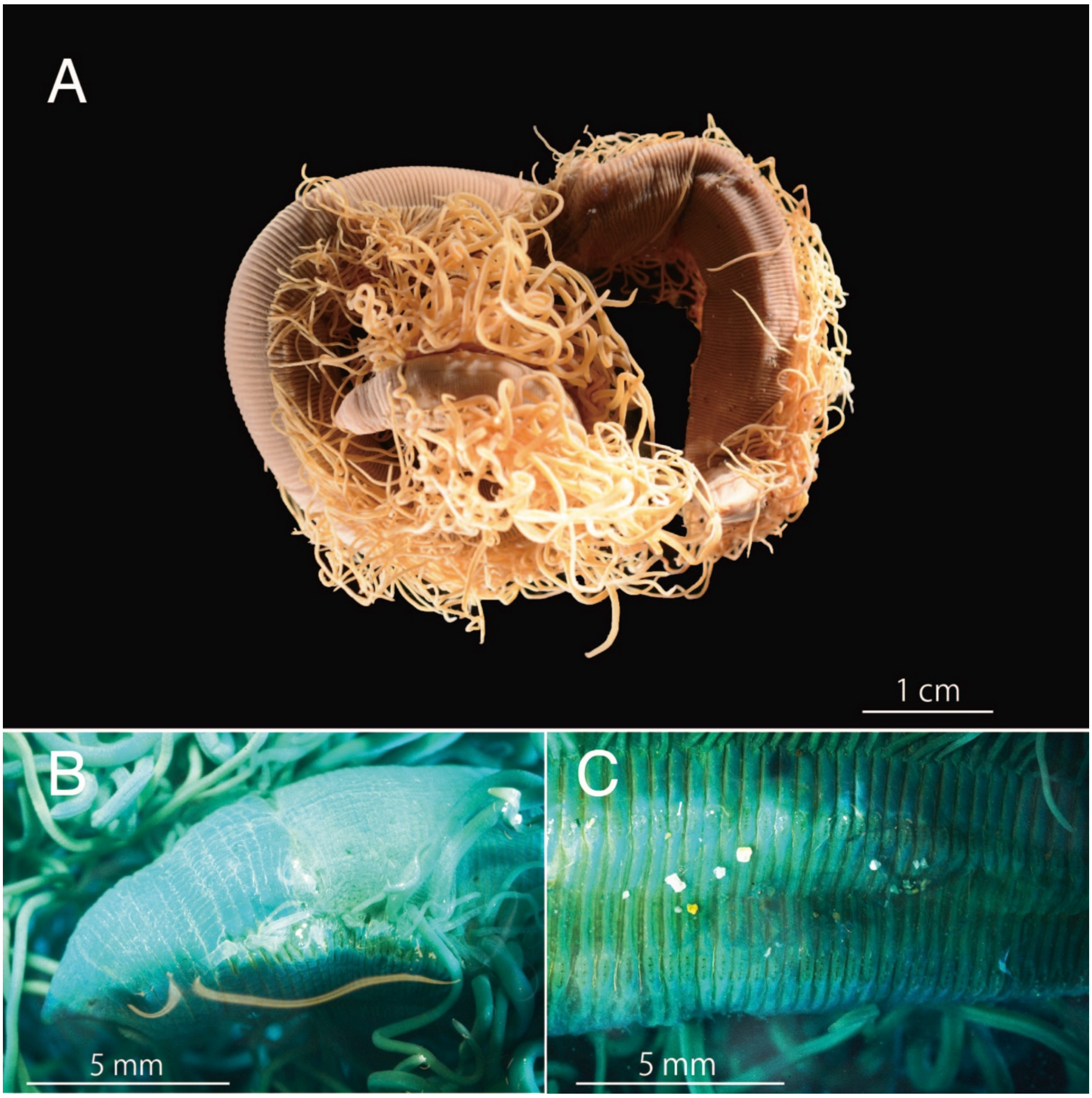


Figure VI-28. Stereoscopic micrographs of *Cirriformia* sp. I. A, whole body of preserved specimen; B, MGST pattern of prostomium; C, MGST pattern of lateral body, left side is anterior side of body.

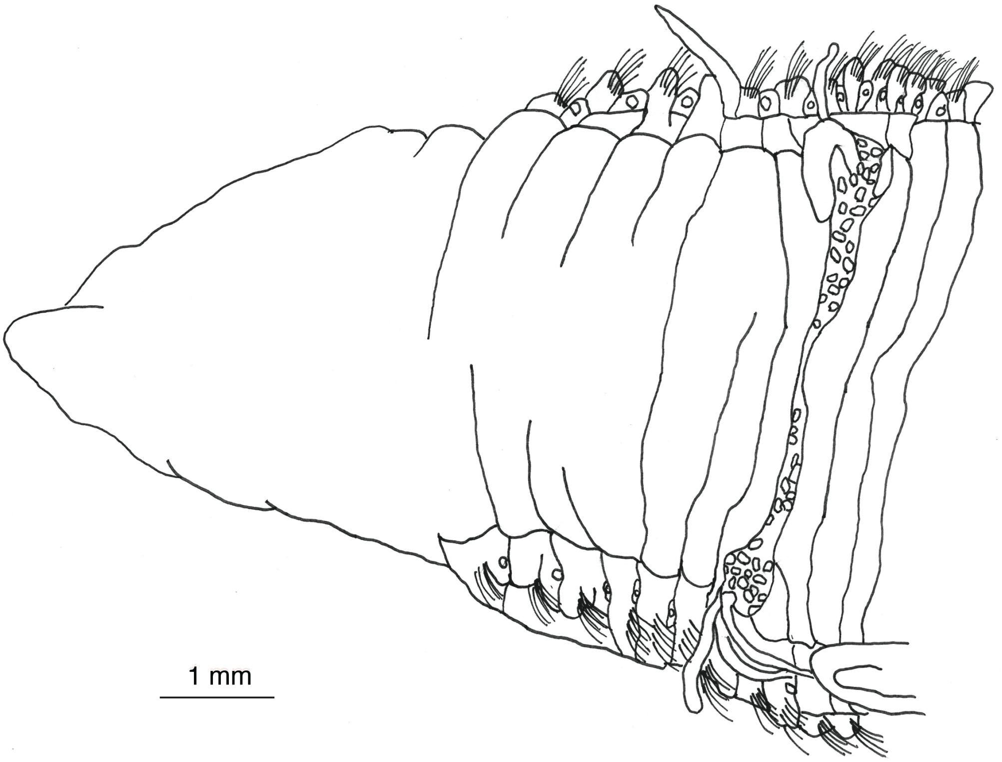


Figure VI-29. Anterior part of *Cirriformia* sp. I.

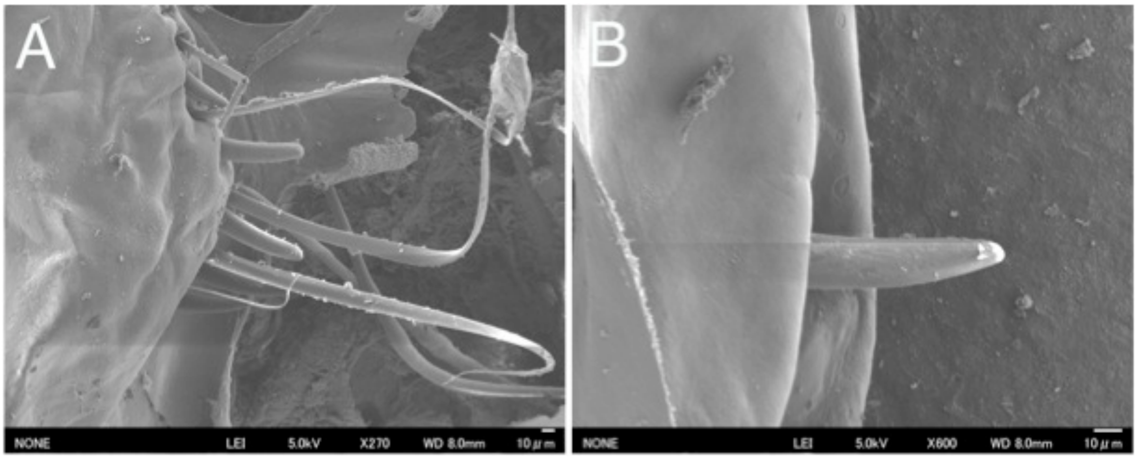


Figure VI-30. Scanning electron micrographs of *Cirriformia* sp. I. A, neuropodial spines; B, notopodial spines.

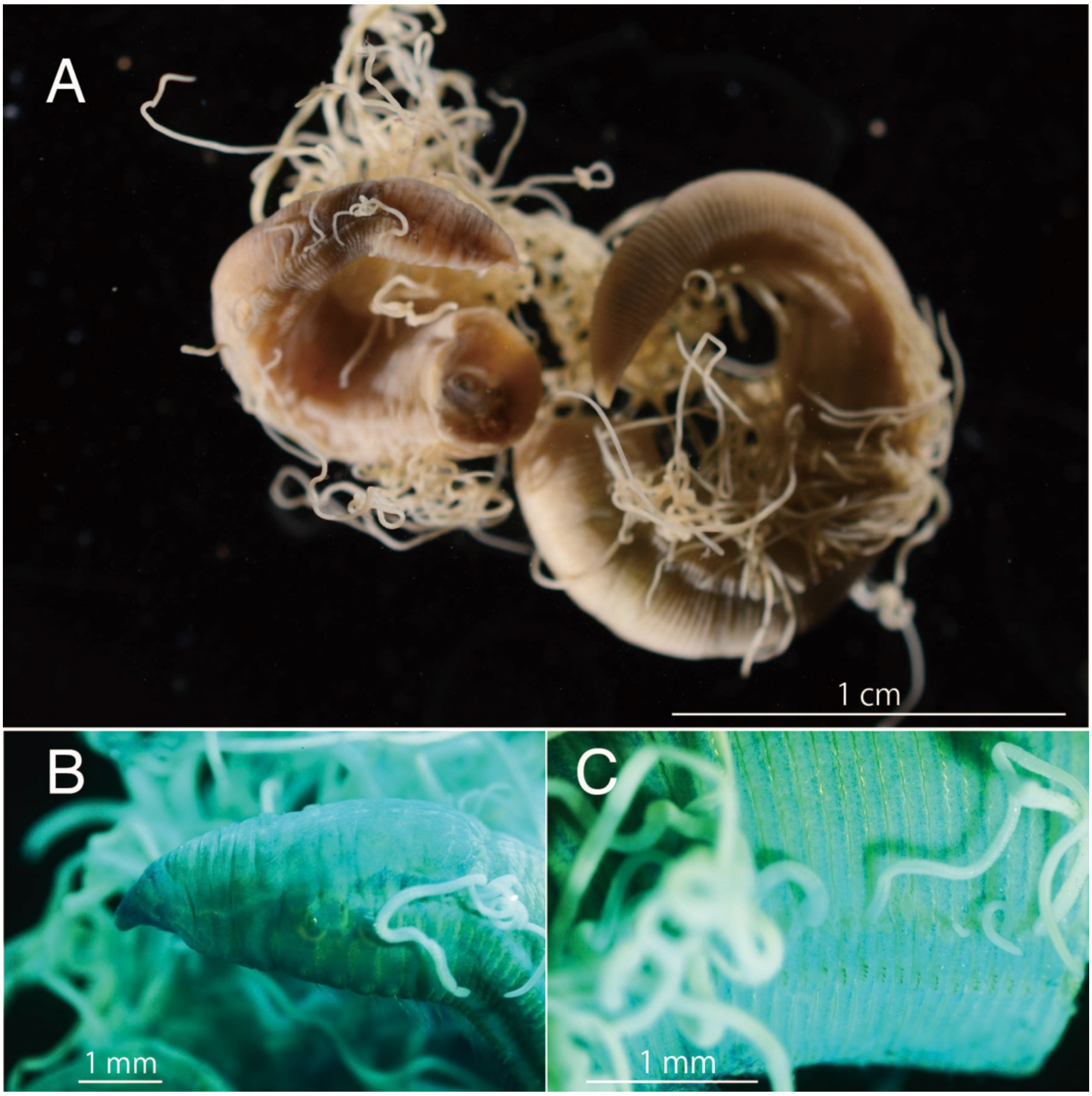


Figure VI-31. Stereoscopic micrographs of *Cirriformia* sp. J. A, whole body of preserved specimen; B, MGST pattern of prostomium; C, MGST pattern of lateral body, left side is anterior side of body.

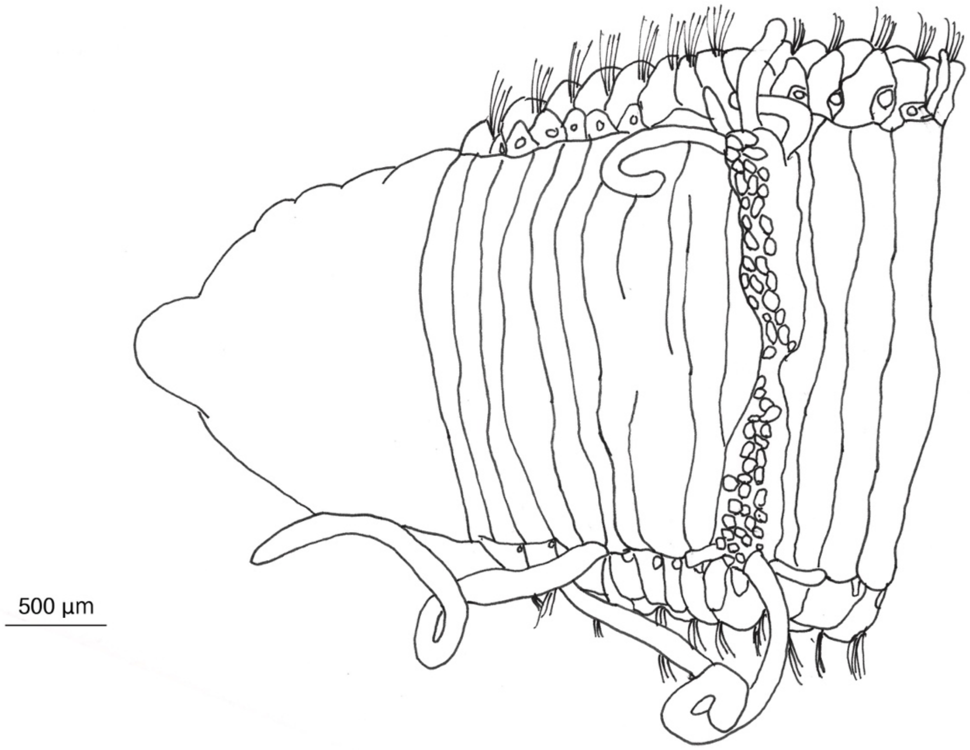


Figure VI-32. Anterior part of *Cirriformia* sp. J.

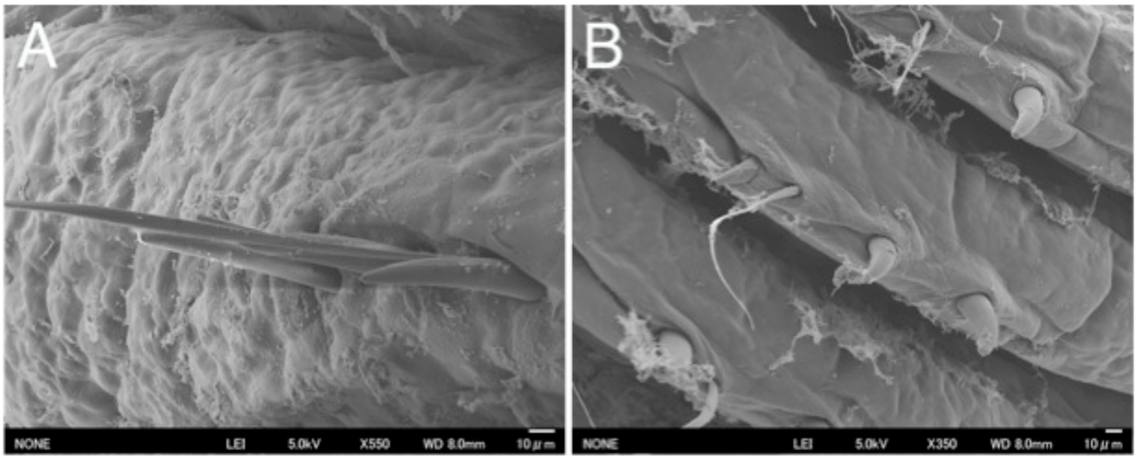


Figure VI-33. Scanning electron micrographs of *Cirriformia* sp. J. A, neuropodial spines; B, notopodial spines.

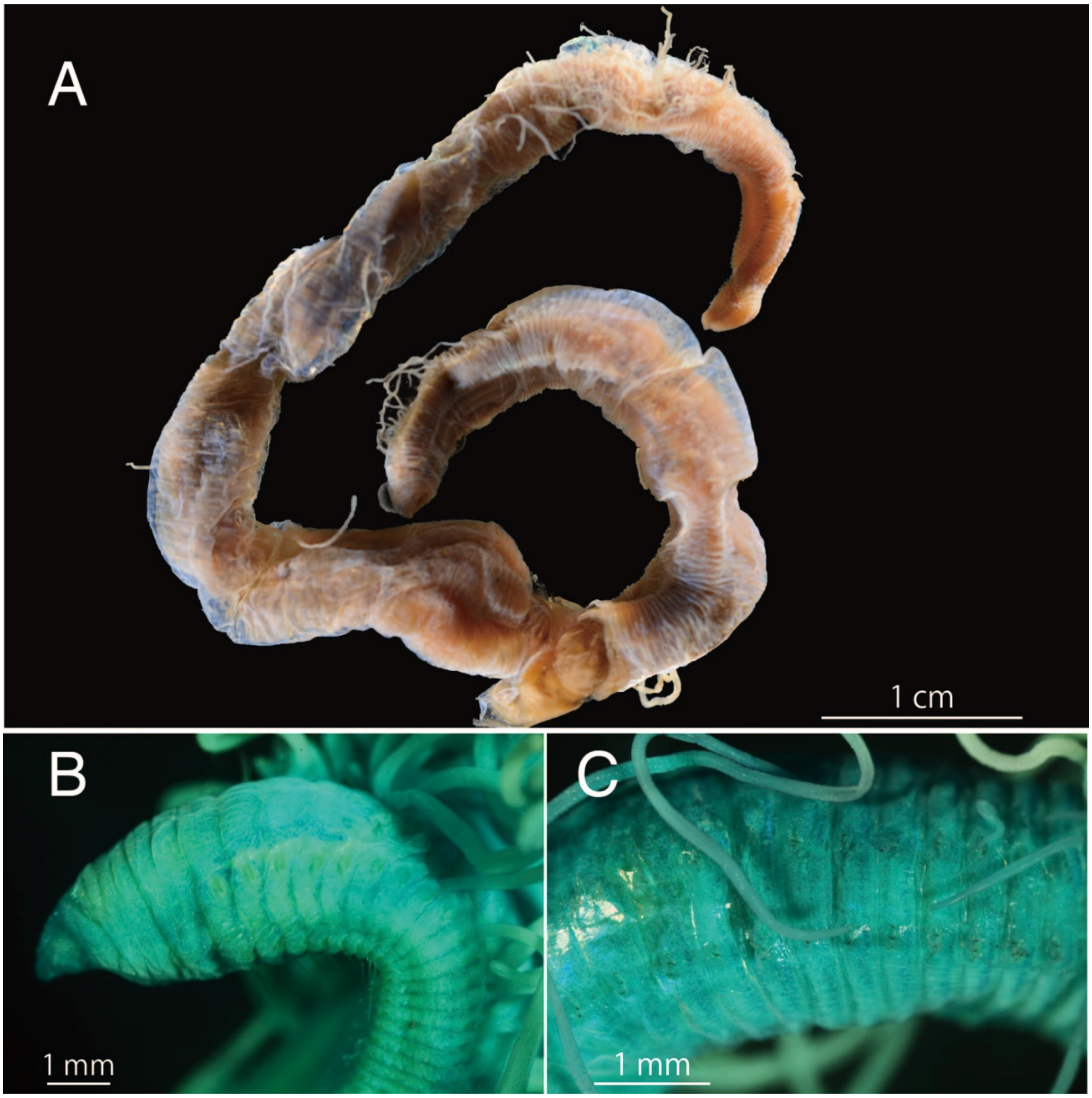


Figure VI-34. Stereoscopic micrographs of *Cirriformia* cf. *tentaculata* var. A. A, whole body of preserved specimen; B, MGST pattern of prostomium; C, MGST pattern of lateral body, left side is anterior side of body.

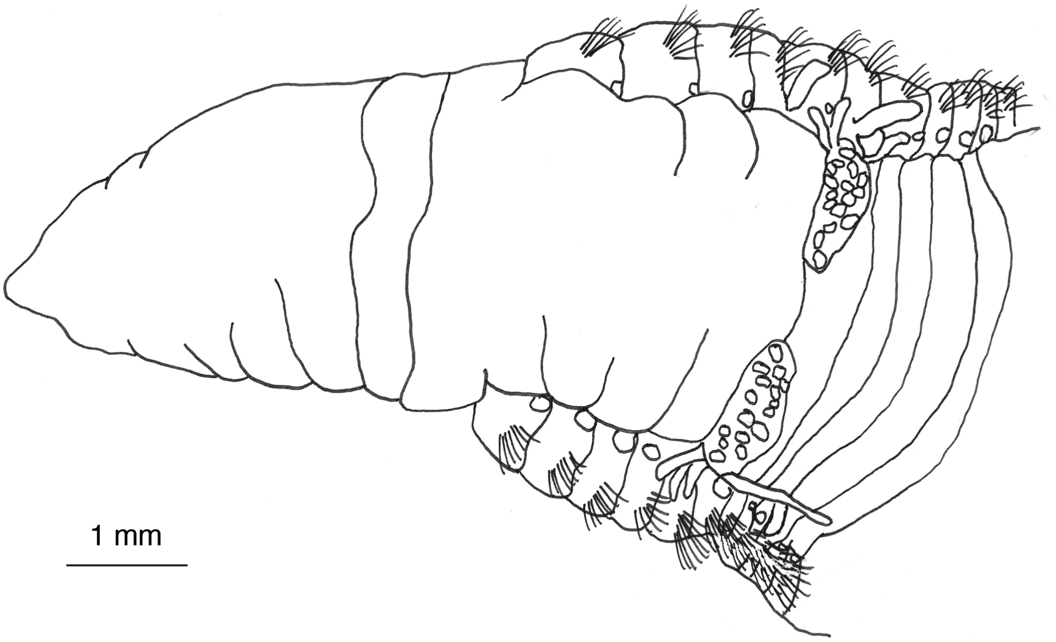


Figure VI-35. Anterior part of *Cirriformia* cf. *tentaculata* var. A.

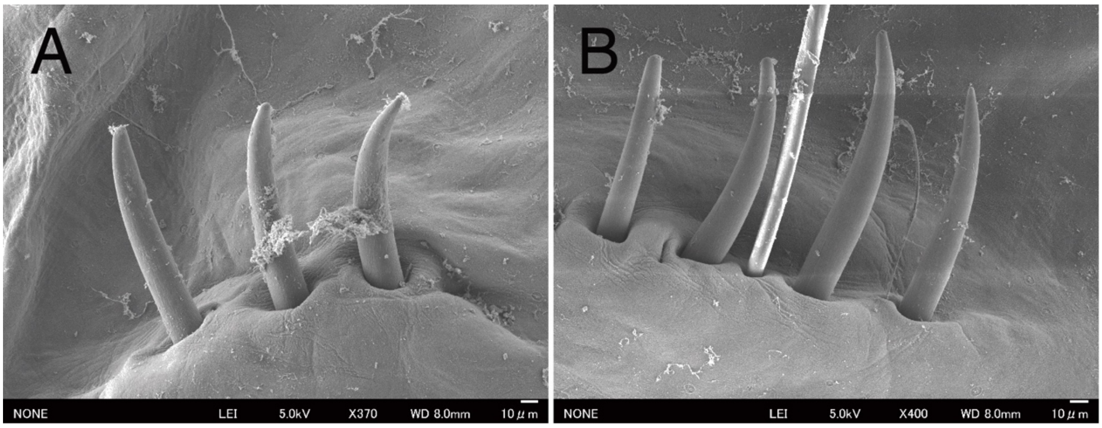


Figure VI-36. Scanning electron micrographs of *Cirriformia* cf. *tentaculata* var. A. A, Neuropodial spines; B, Notopodial spines.

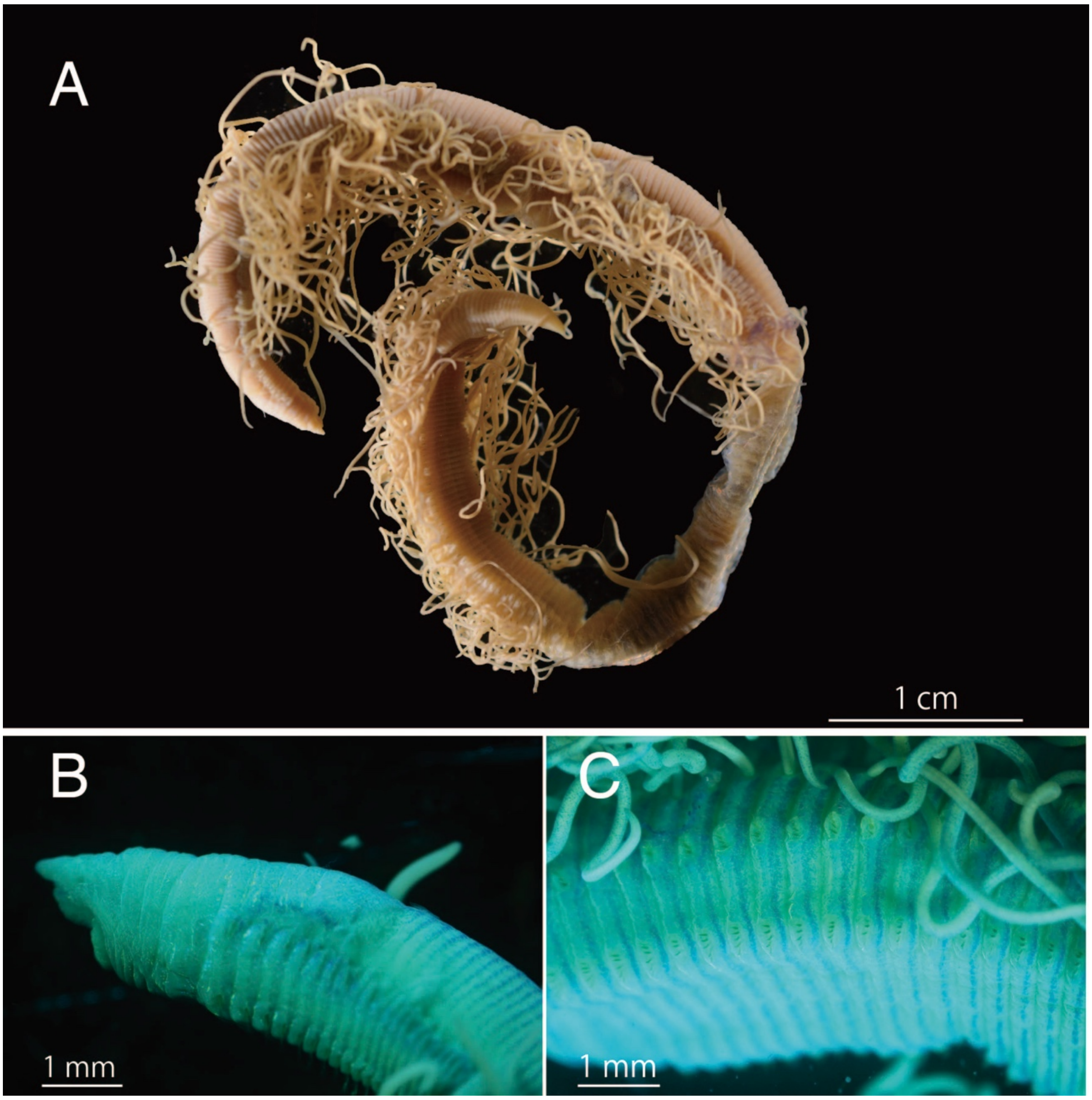


Figure VI-37. Stereoscopic micrographs of *Cirriformia* cf. *tentaculata* var. B. A, whole body of preserved specimen; B, MGST pattern of prostomium; C, MGST pattern of lateral body, left side is anterior side of body.

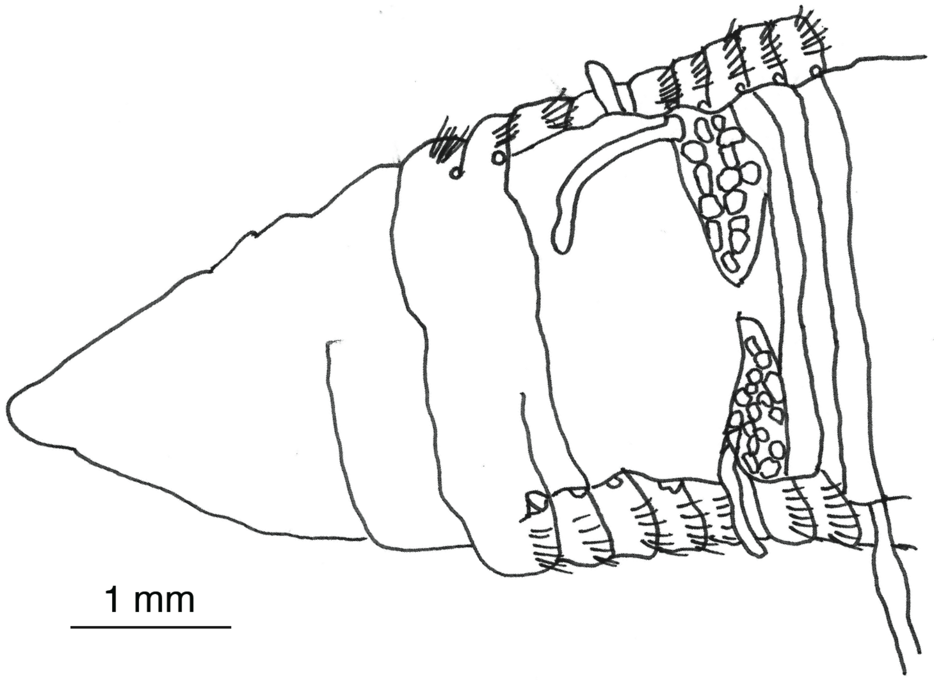


Figure VI-38. Anterior part of *Cirriformia* cf. *tentaculata* var. B.

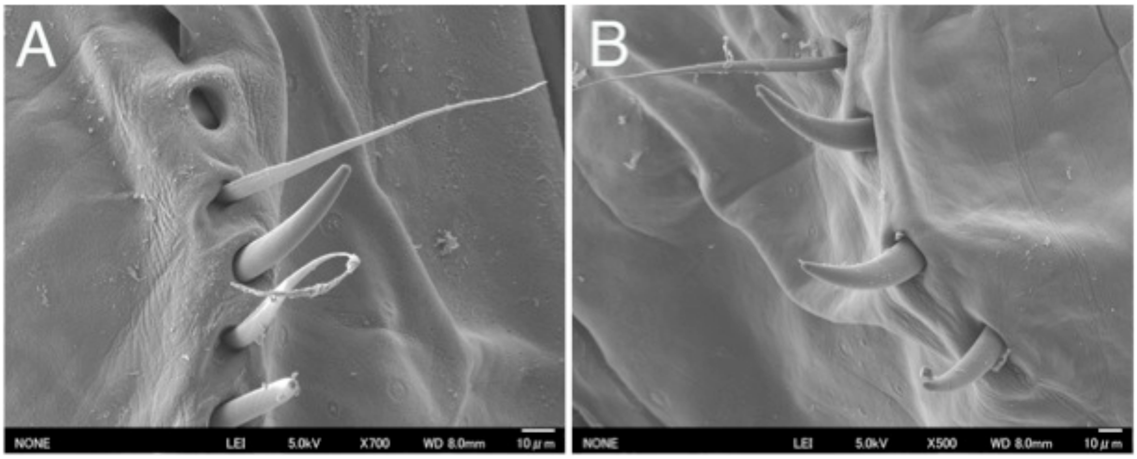


Figure VI-39. Scanning electron micrographs of *Cirriformia* cf. *tentaculata* var. B. A, neuropodial spines; B, notopodial spines.

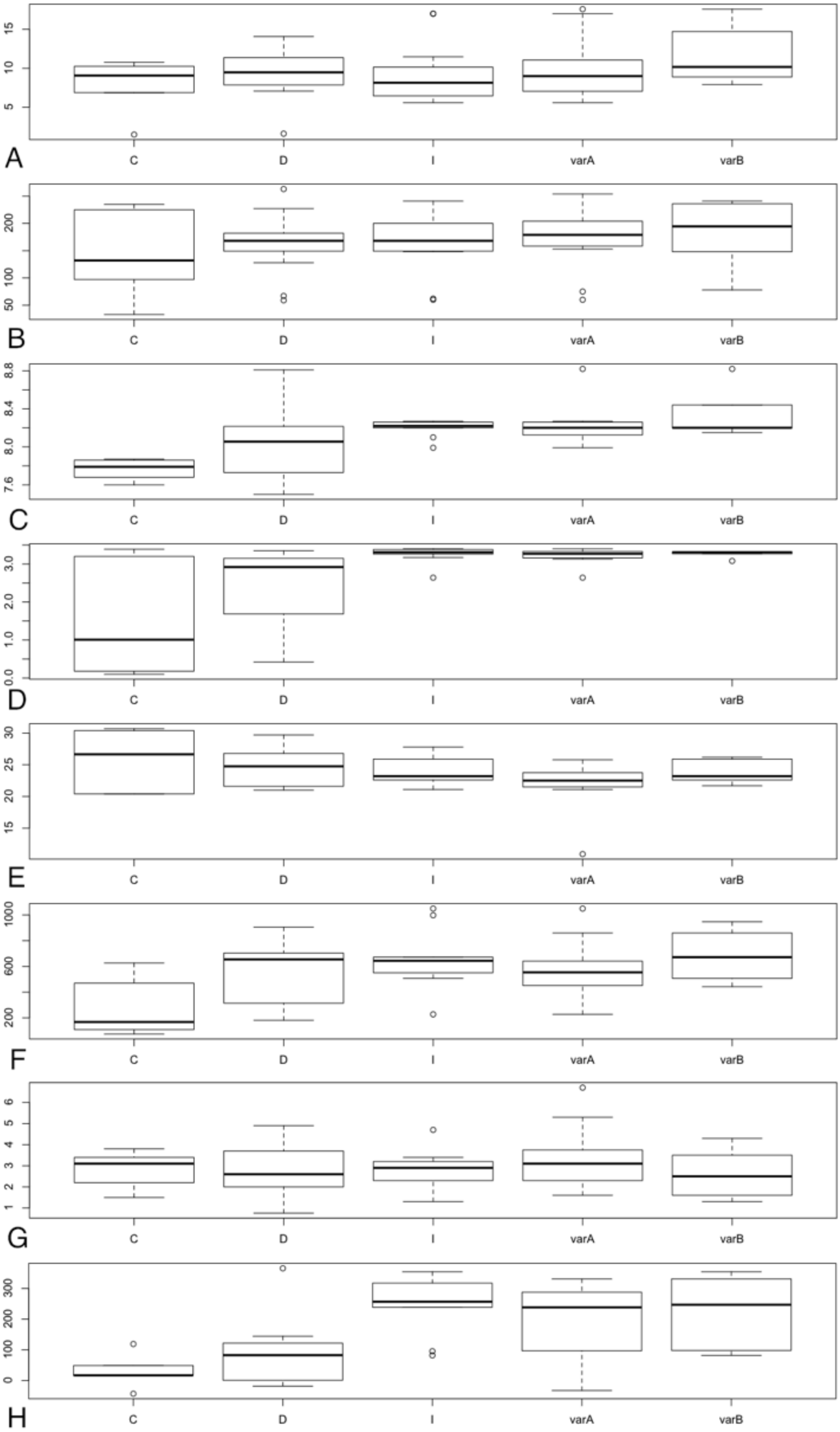
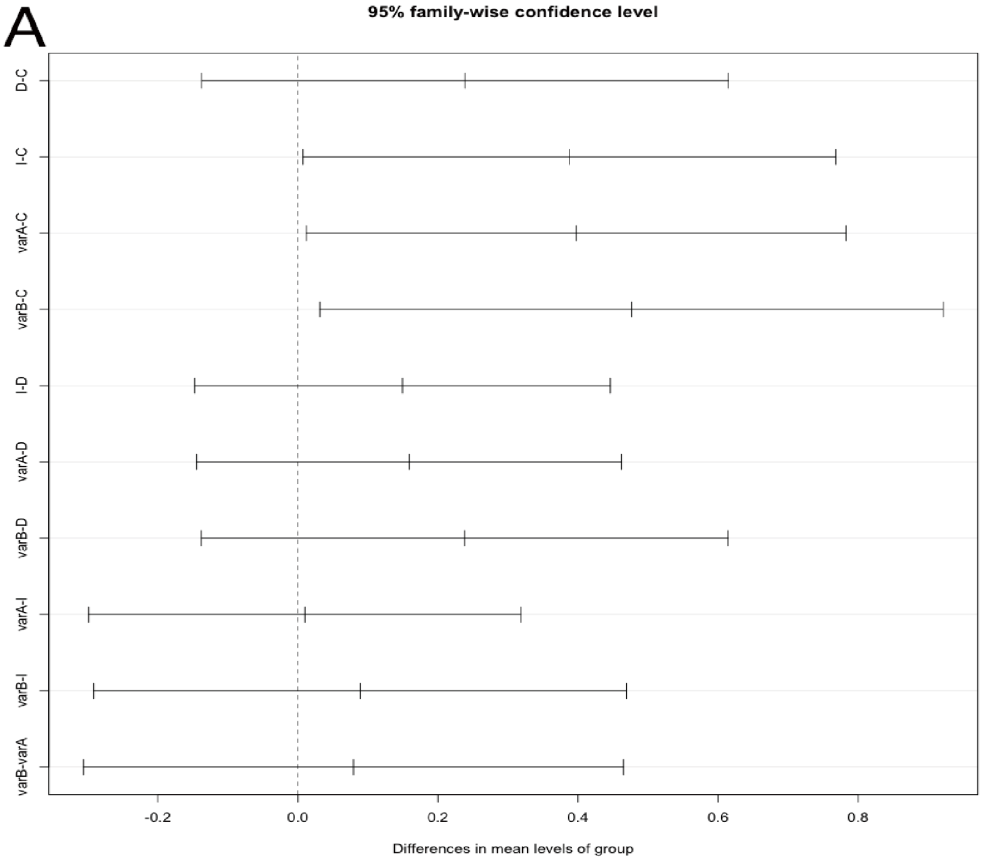

A
5
10
15
B
50
100
200
C
7.6
8.0
8.4
8.8
D
0.0
1.0
2.0
3.0
E
15
20
25
30
F
200
600
1000
G
1
2
3
4
5
6
H
0
100
200
300
C
D
I
varA
varB

Figure VI-40. Box plot of environmental information of *Cirriformia* sp. C, sp. D, sp. I, var. A, and var. B distribution. (A)~(D) showed water information and (E)~(H) showed sediment information. (A) DO (mg/L); (B) ORP (mV); (C) pH; (D) Salinity (%); (E) Temperature (°C); (F) Grain size (μm); (G) IL (%); (H) ORP (mV).


A
95% family-wise confidence level
D-C
I-C
varA-C
varB-C
I-D
varA-D
varB-D
varA-I
varB-I
varB-varA
-0.2
0.0
0.2
0.4
0.6
0.8
Differences in mean levels of group

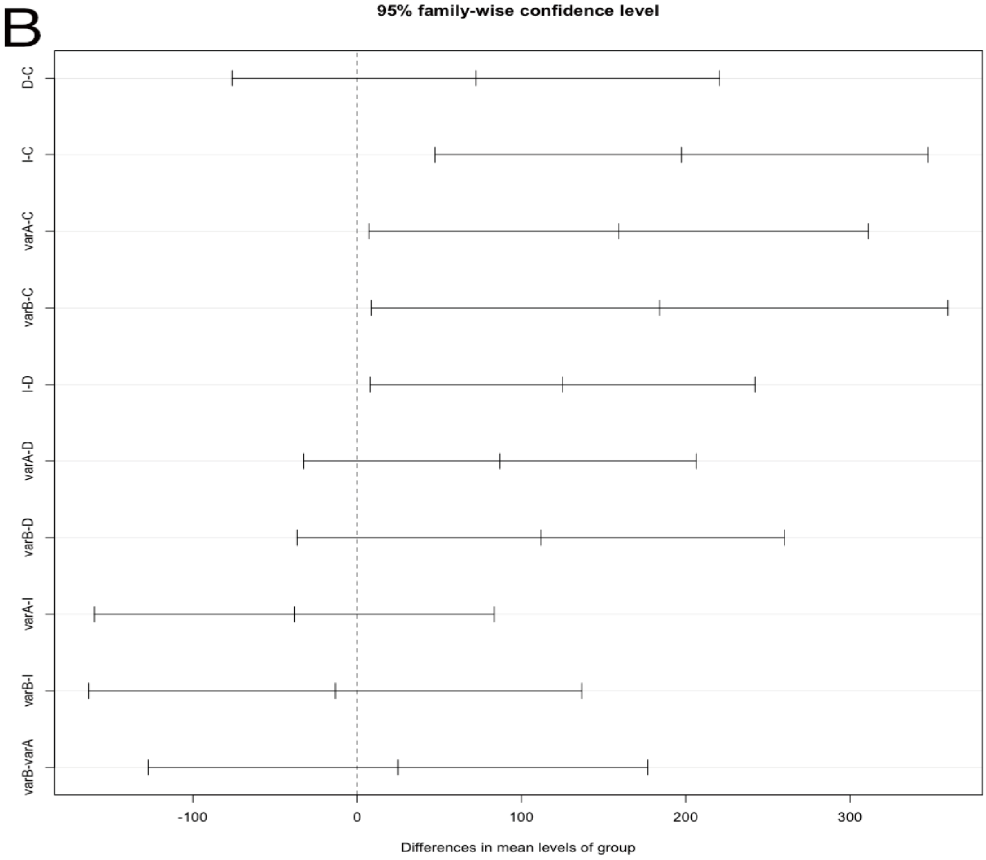

B
95% family-wise confidence level
D-C
I-C
varA-C
varB-C
I-D
varA-D
varB-D
varA-I
varB-I
varB-varA
-100
0
100
200
300
Differences in mean levels of group

Figure VI-41. Result of Tukey's test of pH (A) and ORP (B) between five species.

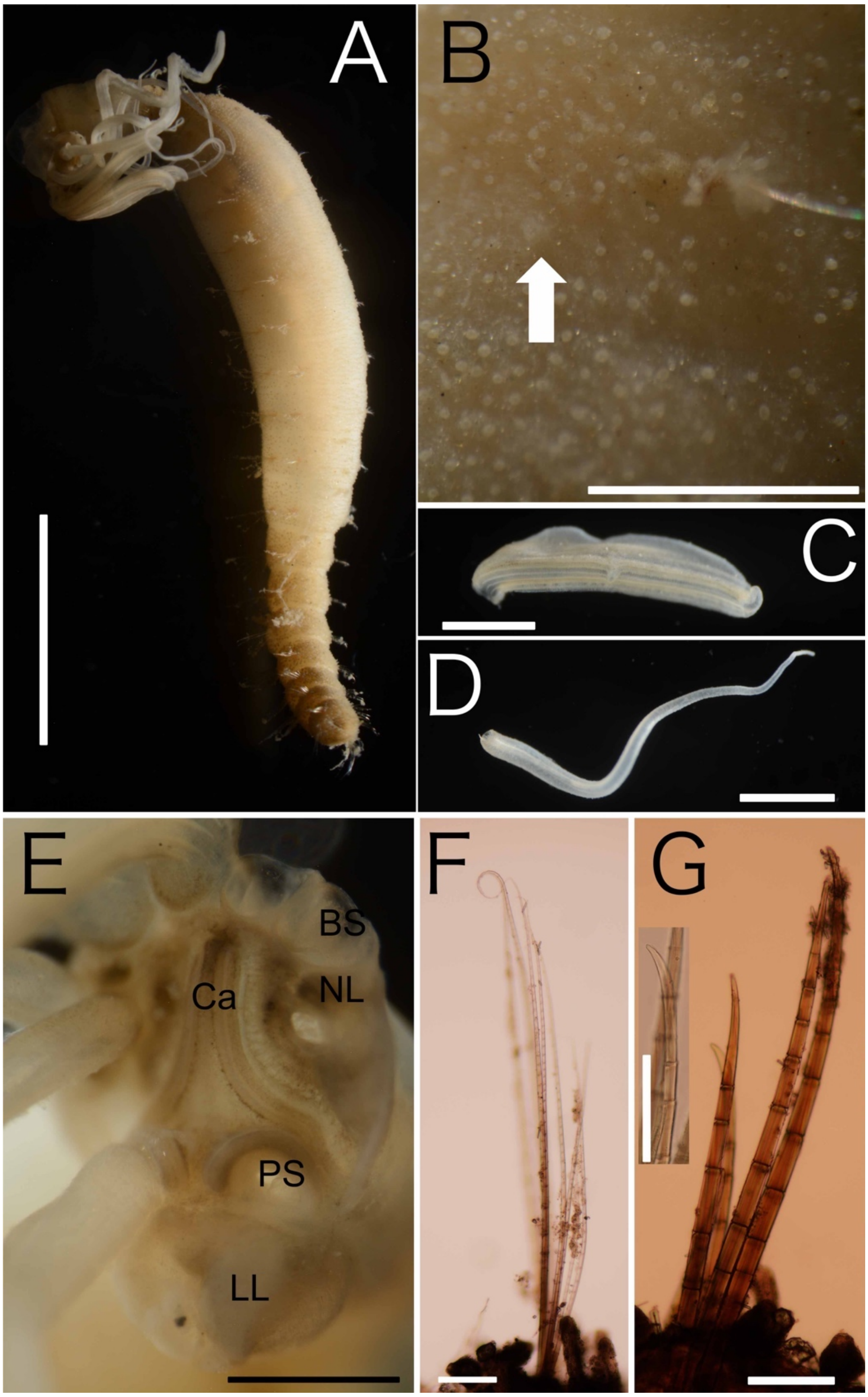


Figure VII-1. *Diplocirrus asamushiensis* Holotype. A, anterior end, lateral view; B, body wall, ventral view; arrow indicates gonopore; C, dorsal branchia; D, ventral branchia; E, prostomium; F, notochaetae, chaetiger 25; G, neurochaetae, chaetiger 25. Abbreviations: BS, branchial scar; Ca, caruncle; LL, lateral lip; NL, nephridial lobe; PS, palp scar. Scale bars: A, 5 mm; B, 250 µm; C–E, 500 µm; F–G, 100 µm.

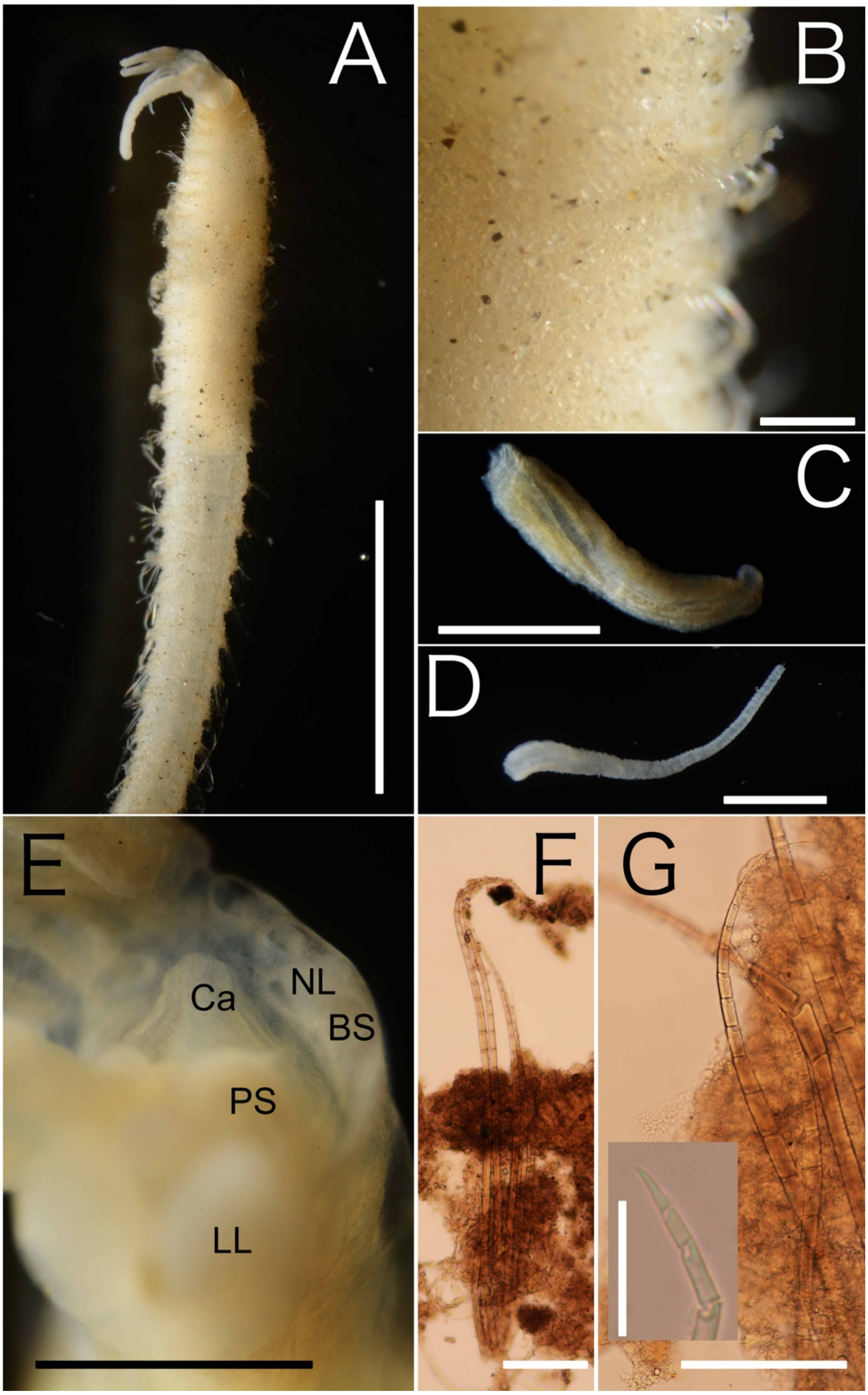


Figure VII-2. *Diplocirrus imajimai* Holotype. A, anterior end, lateral view; B, body wall, ventral view; C, dorsal branchia; D, ventral branchia; E, prostomium; F, notochaetae, chaetiger 19; G, neurochaetae, chaetiger 19 (insert: chaetal tip). Abbreviation: PS, palp scar. Scale bars: A, 2 mm; B–E, 500 µm; F–G, 100 µm; G (insert), 10 µm.

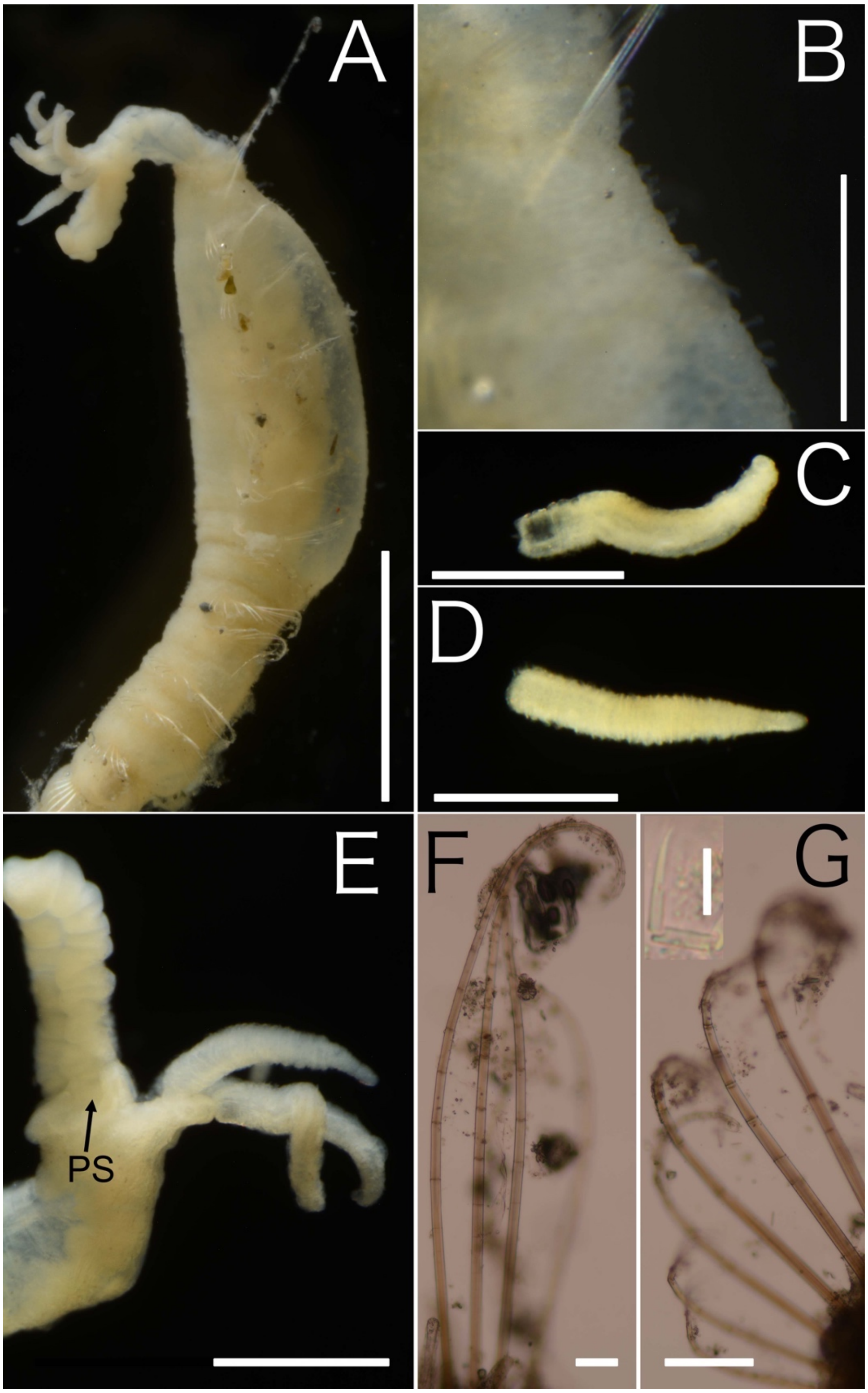


Figure VII-3. *Diplocirrus mamoi* Holotype. A, anterior end, lateral view; B, body wall, ventral view; arrow indicates gonopore; C, dorsal branchia; D, ventral branchia; E, prostomium; F, notochaetae, chaetiger 29; G, neurochaetae, chaetiger 29. Abbreviations: BS, branchial scar; Ca, caruncle; LL, lateral lip; NL, nephridial lobe; PS, palp scar. Scale bars: A, 5 mm; B–E, 500 µm; F, 50 µm; G, 100 µm.

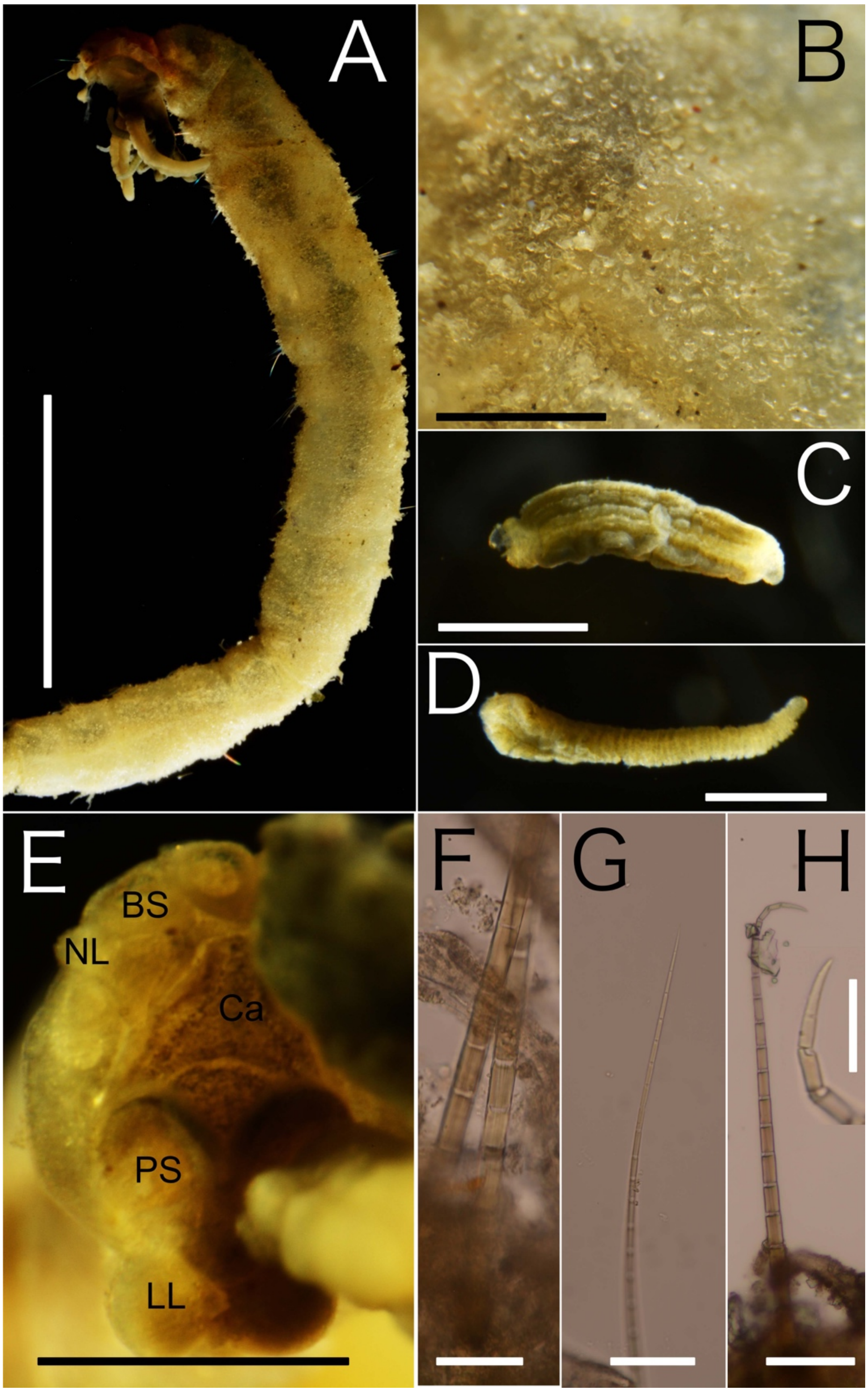


Figure VII-4. *Diplocirrus ohtsukai*, Holotype. A, whole body, ventrolateral view; B, body wall, ventral view; arrow indicates gonopore; C, dorsal branchia; D, ventral branchia; E, prostomium; F, notochaetae, chaetiger 20; G, neurochaetae, chaetiger 20 (insert: chaetal tip). Abbreviations: BS, branchial scar; Ca, caruncle; LL, lateral lip; NL, nephridial lobe; PS, palp scar. Scale bars: A, 5 mm; B–E, 500 µm; F–G, 100 µm.

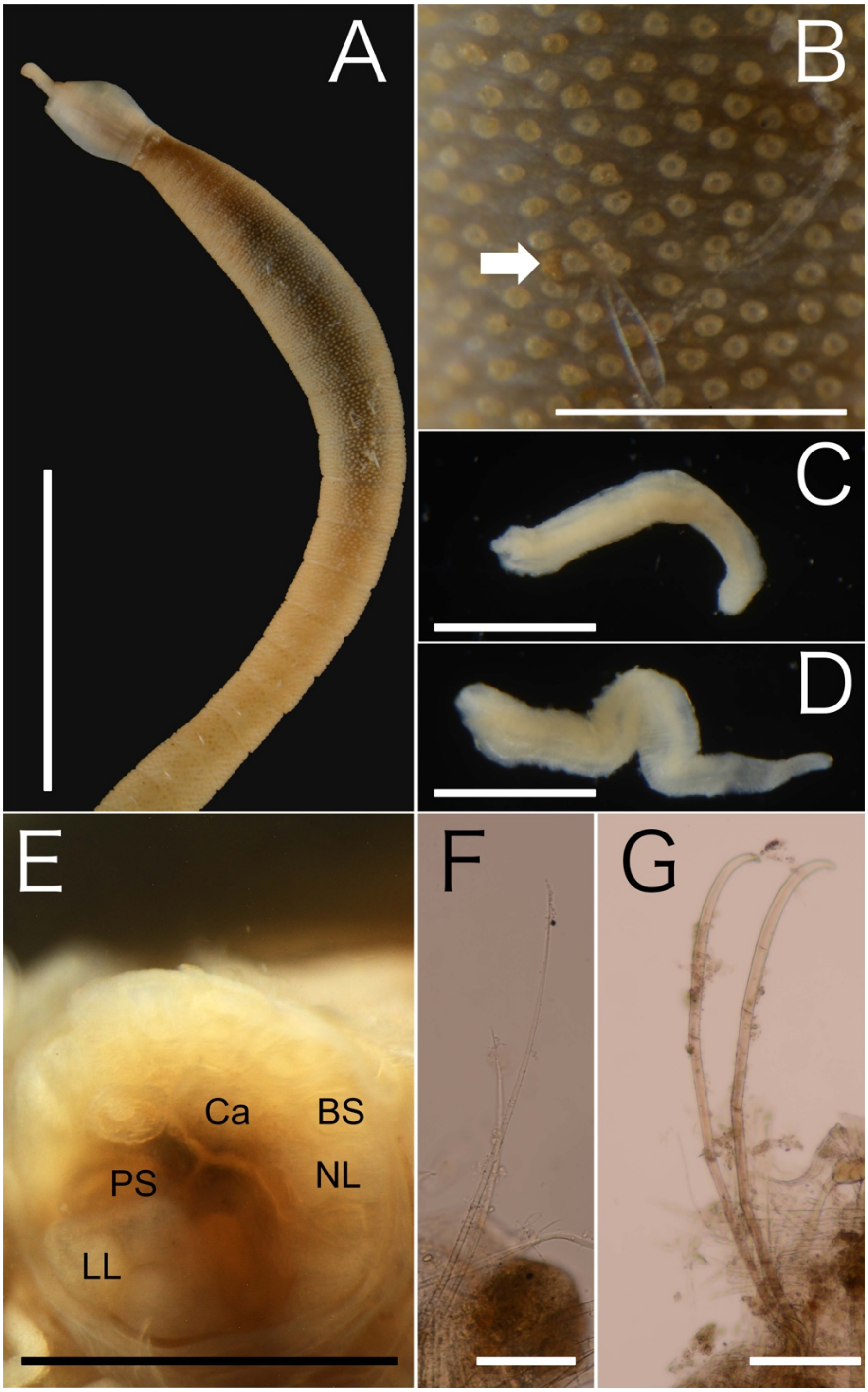


Figure VII-5. *Diplocirrus seisuiae* Holotype (NSMT-Pol H-640). A, anterior end, ventral view; B, body wall, ventral view; C, dorsal branchia; D, ventral branchia; E, prostomium; F, base of notochaetae, chaetiger 21; G, tip of notochaeta, chaetiger 21; H, neurochaetae, chaetiger 21 (insert: chaetal tip). Abbreviations: BS, branchial scar; Ca, caruncle; LL, lateral lip; NL, nephridial lobe; PS, palp scar. Scale bars: A, 5 mm; B–E, 500 µm; F–H, 100 µm; H (insert), 20 µm.

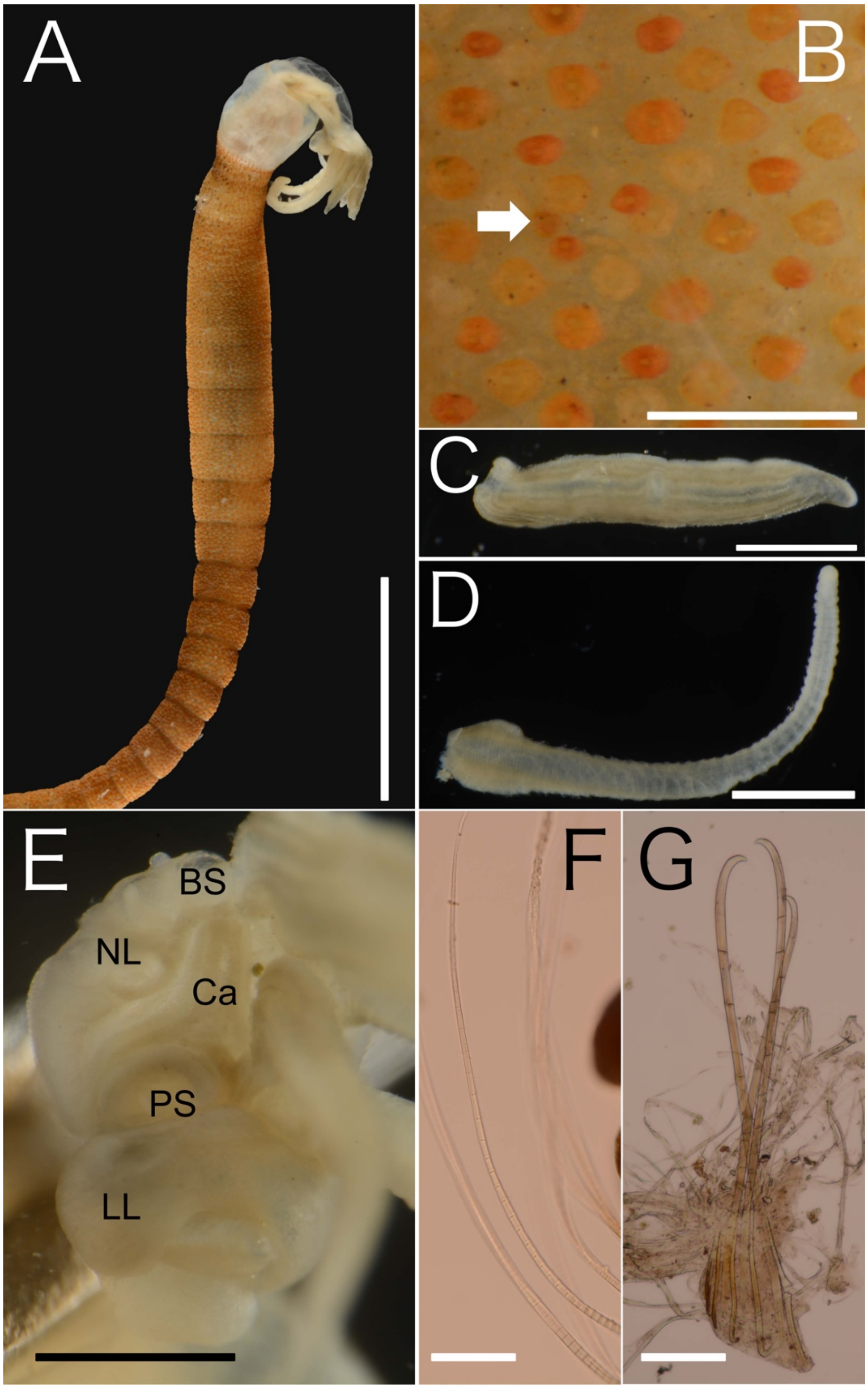


Figure VII-6. *Diplocirrus tohokuensis* Holotype. A, anterior end, ventral view; B, body wall, ventral view; C, dorsal branchia; D, ventral branchia; E, prostomium, F, notochaetae, chaetiger 27; G, neurochaetae, chaetiger 27 (insert: chaetal tip). Abbreviations: BS, branchial scar; Ca, caruncle; LL, lateral lip; NL, nephridial lobe; PS, palp scar. Scale bars: A, 5 mm; B–E, 500 µm; F–G, 100 µm; G (insert), 20 µm.

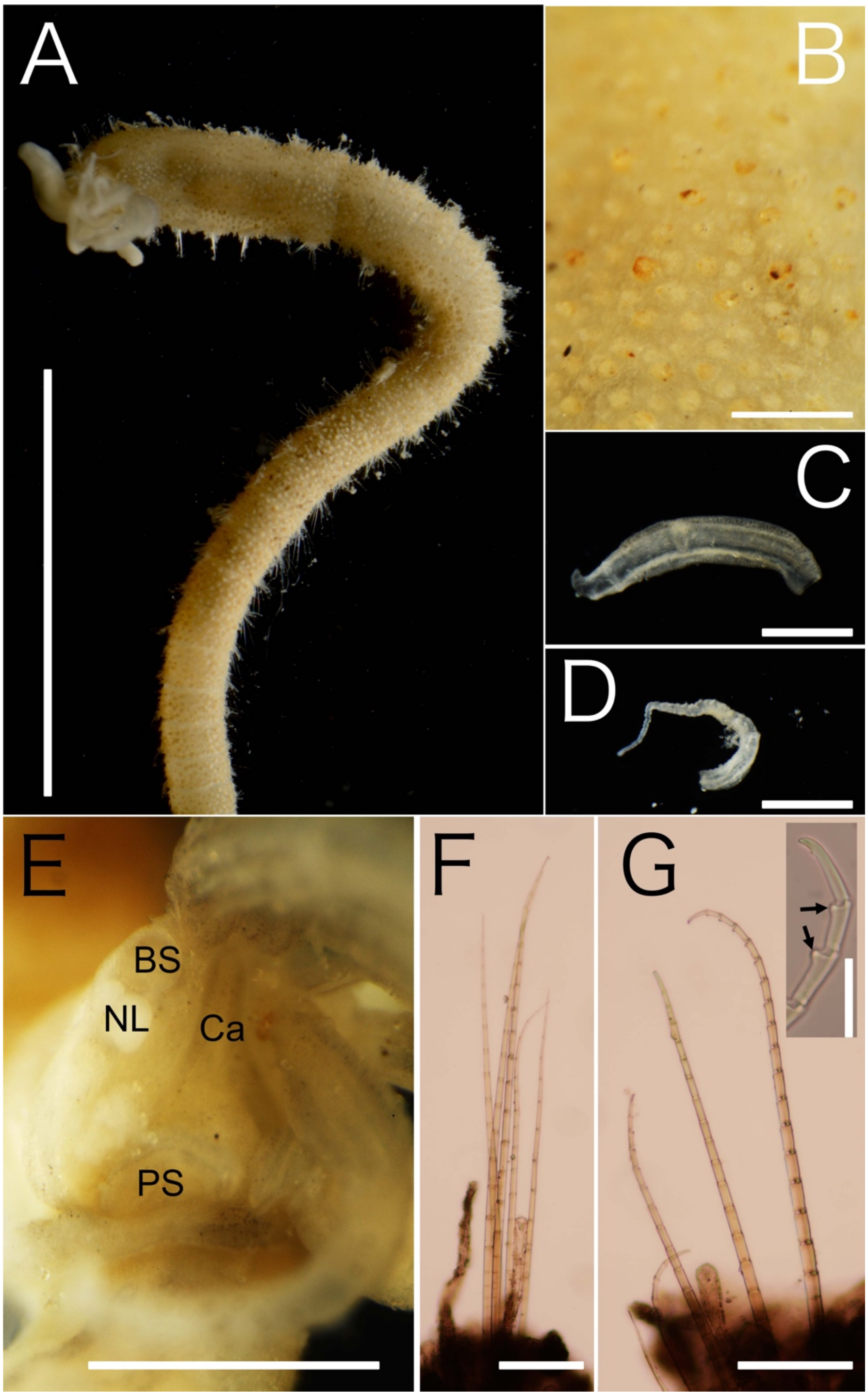


Figure VII-7. *Diplocirrus toyoshioae* Holotype. A, anterior end, dorsal view; B, body wall, ventral view; C, dorsal branchia; D, ventral branchia; E, prostomium; F, notochaetae, chaetiger 35; G, neurochaetae, chaetiger 35 (insert: chaetal tip). Arrow indicates rounded projections. Abbreviations: BS, branchial scar; Ca, caruncle; NL, nephridial lobe; PS, palp scar. Scale bars: A, 5 mm; B, 250 µm; C–E, 500 µm; F–G, 100 µm; G (insert), 20 µm.

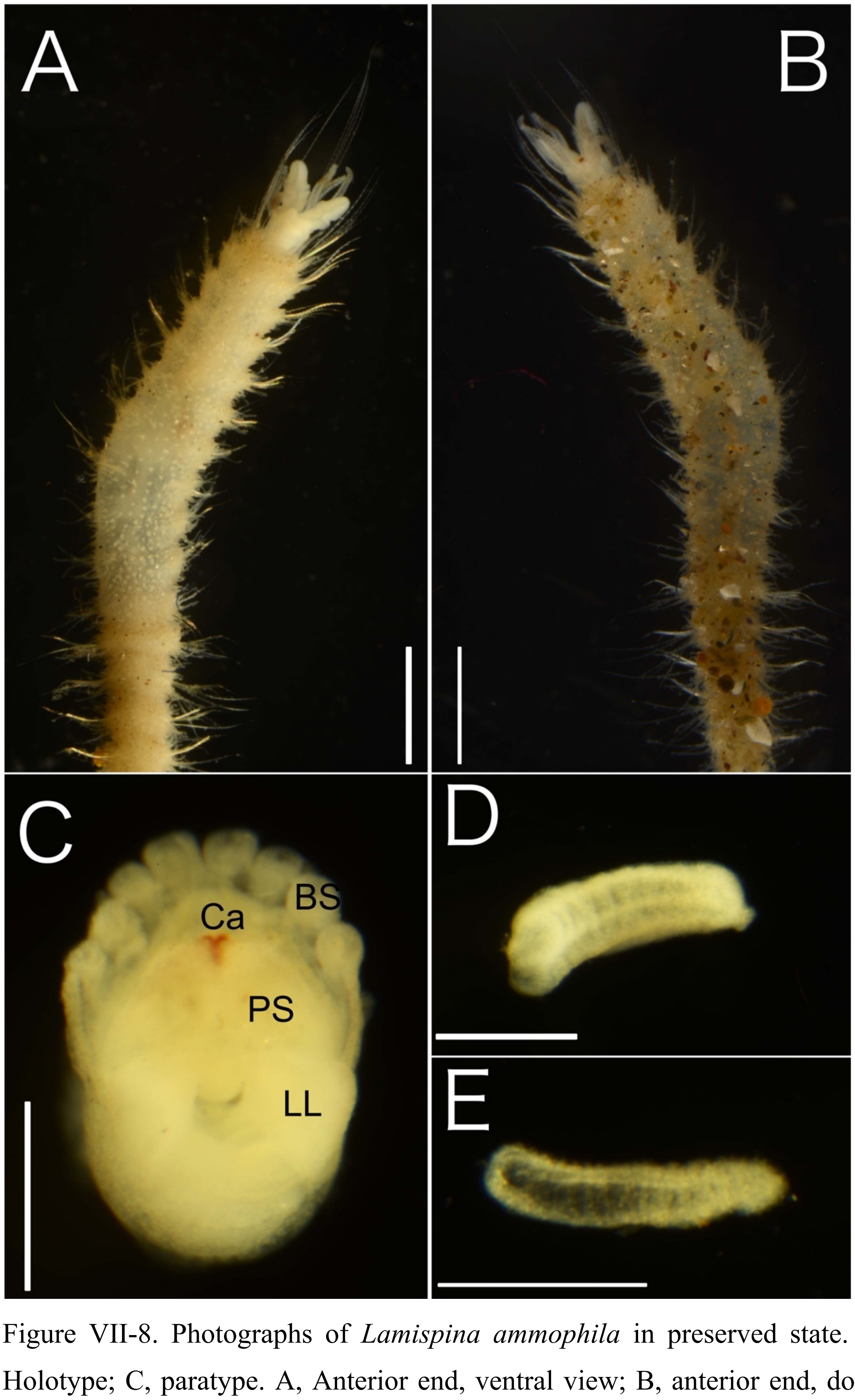


Figure VII-8. Photographs of *Lamispina ammophila* in preserved state. A, B, D, E, Holotype; C, paratype. A, Anterior end, ventral view; B, anterior end, dorsal view; C, prostomium (BS, branchial scar; Ca, caruncle; LL, lateral lip; PS, palp scar); D, palp; E, branchia. Scale bars: A–B, 1 mm; C–E, 250 µm.

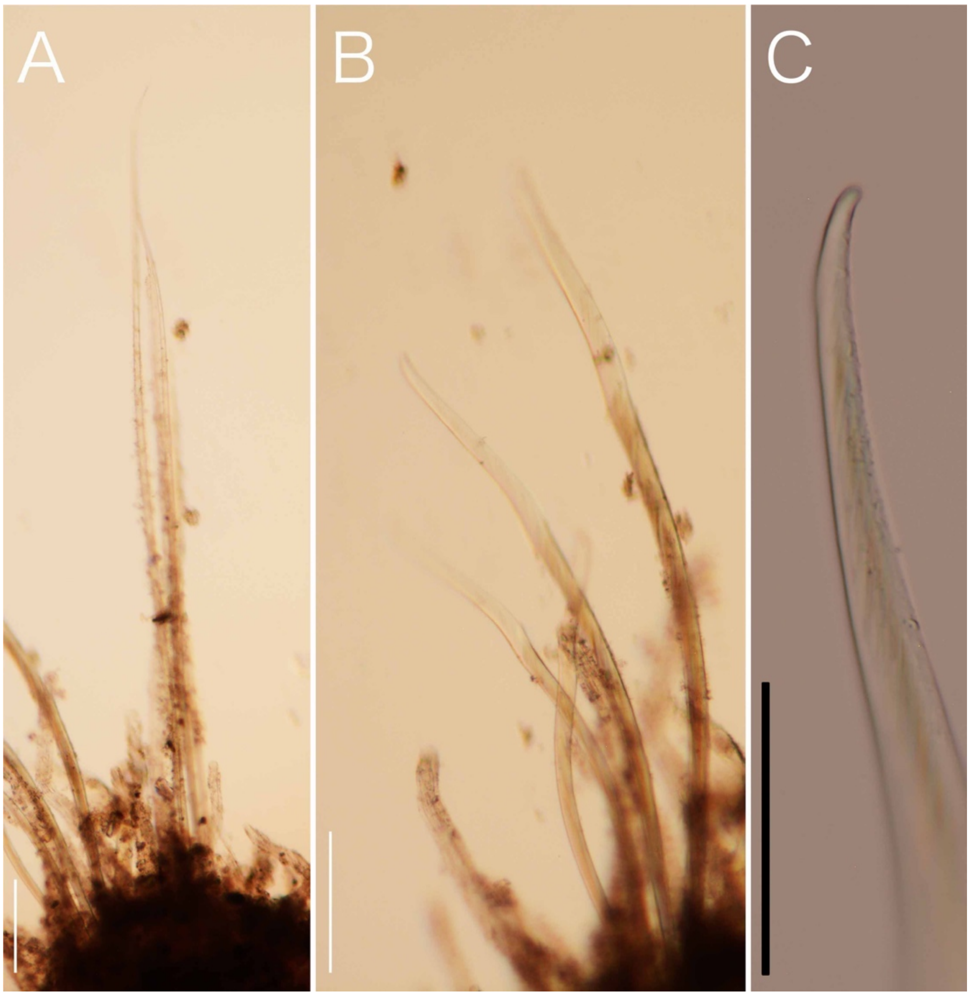


Figure VII-9. Photomicrographs of chaetae (chaetiger 17) in *Lamispina ammophila* sp. nov., holotype, NSMT-Pol H-663. A, Notochaetae; B, neurochaetae; C, tip of neurochaeta. Scale bars: A–B, 100 µm; C, 50 µm.

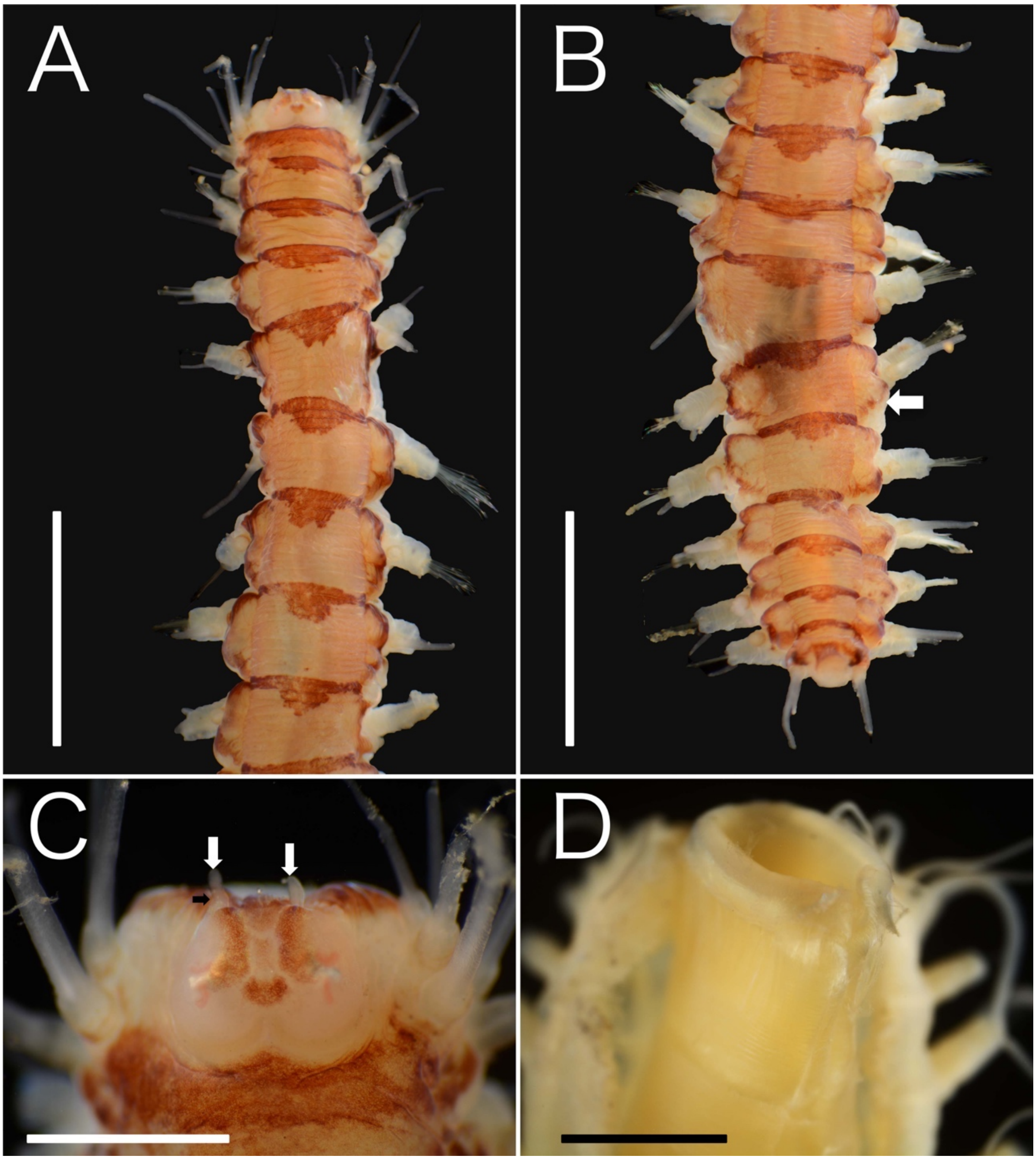


Figure VIII-1. *Elisesione imajimai*, A–C, holotype; D, paratype. A, anterior end, dorsal view; B, posterior end, dorsal view (arrow points to a lateral cushion); C, prostomium, dorsal view (white arrows point to tips of antennae, black arrow points to left palp); D, pharynx, ventral view. Scale bars: A–B, 5 mm; C, 3 mm; D, 2 mm.

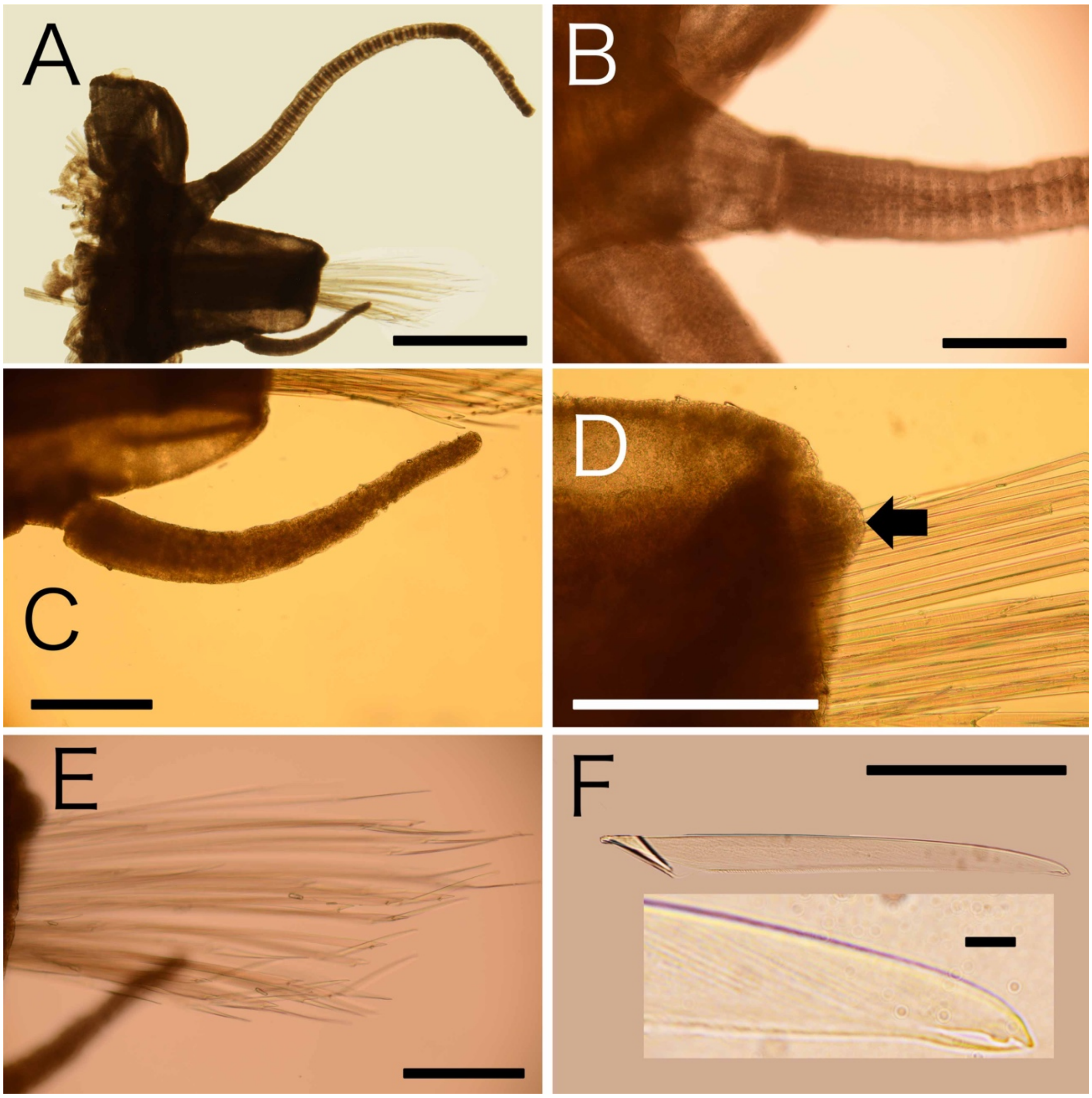


Figure VIII-2. Parapodial features of *Elisesione imajimai*, A–F, paratype, chaetiger 5, right parapodium, posterior view. A, parapodium; B, dorsal cirrophore; C, ventral cirrus; D, acicular lobe (arrow points to tip of acicular lobe); E, neurochaetal bundle; F, blade of ventral neurochaeta (insert: tip of blade). Scale bars: A, 1 mm; B–E, 300 µm; F, 100 µm; F (inset), 5 µm.

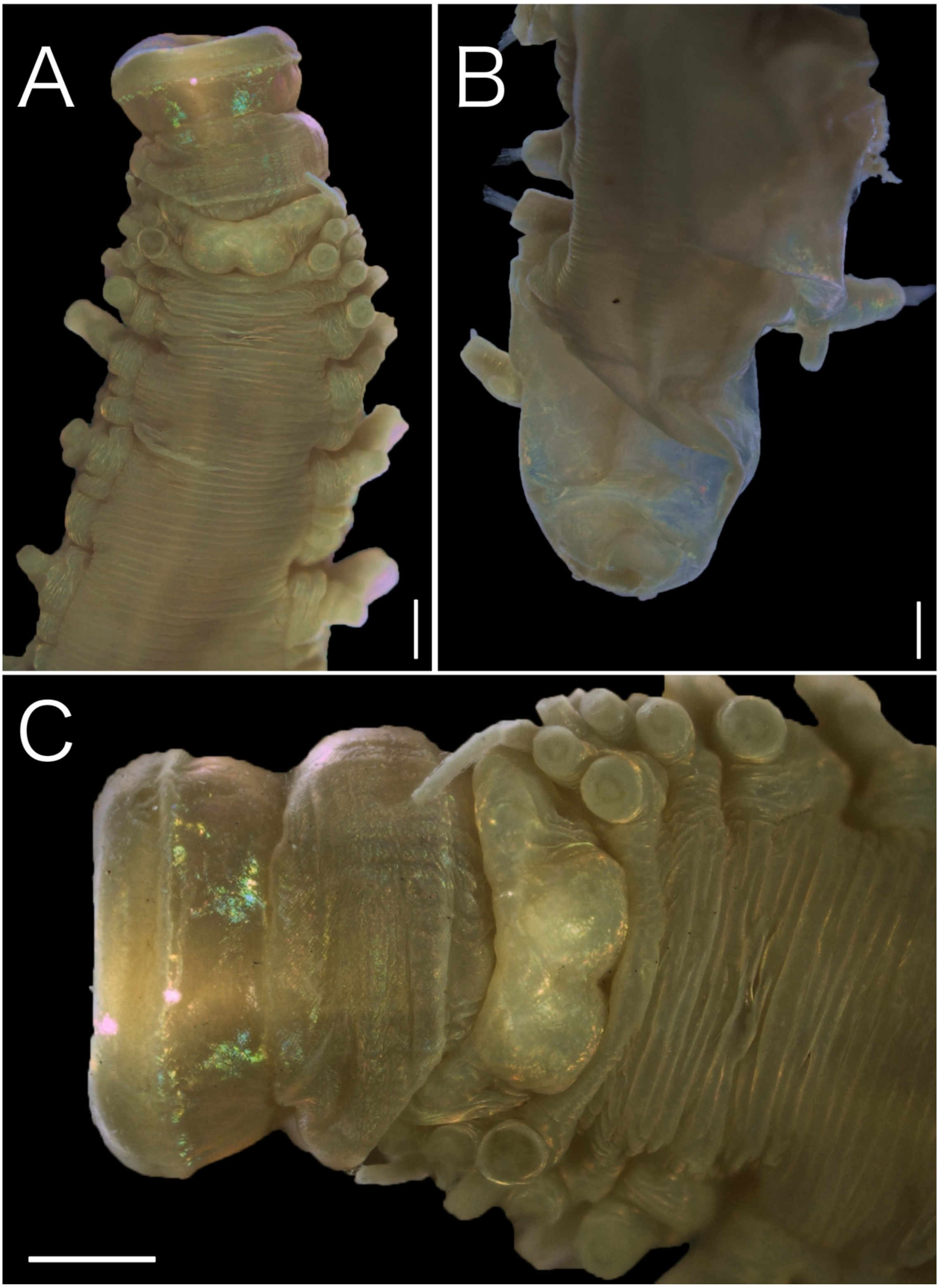


Figure VIII-3. *Elisesione problematica* (Wesenberg-Lund, 1950), holotype. A, anterior end, dorsal view; B, posterior end, dorsal view; C, head, dorsal view. Scale bars: A–C, 1 mm.

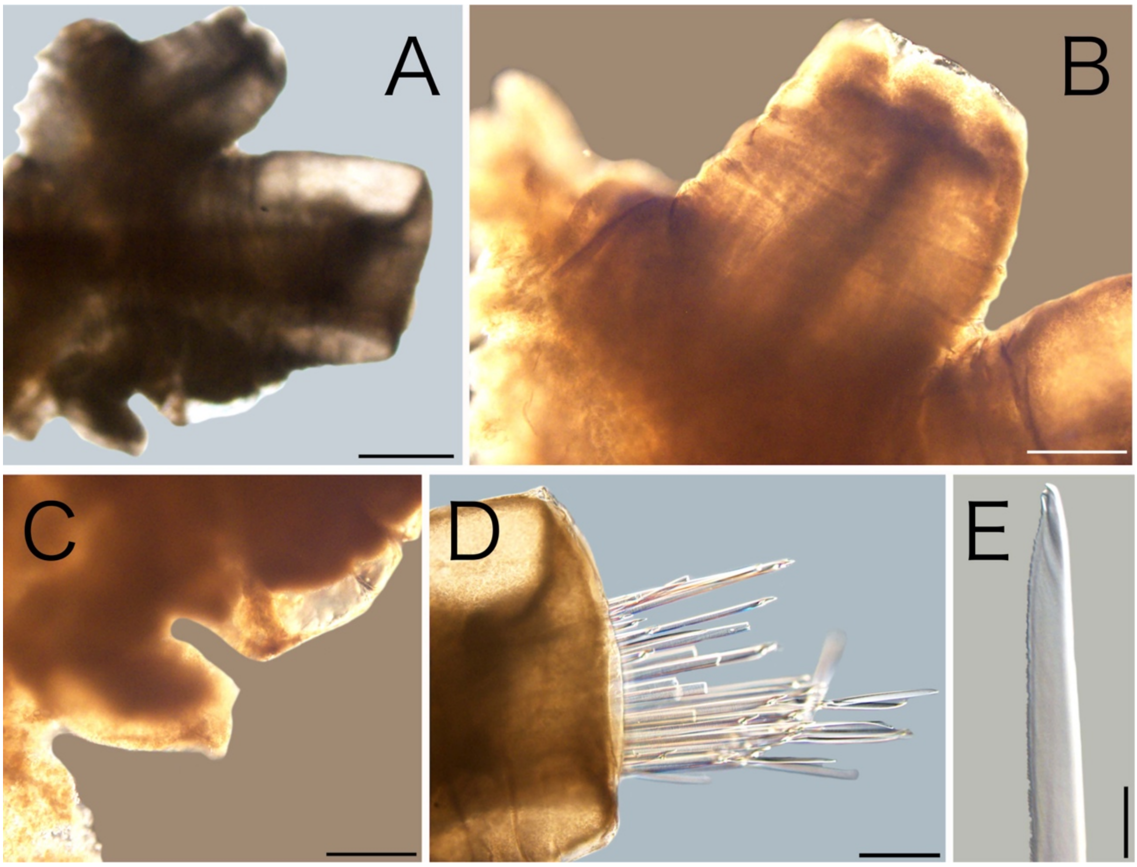


Figure VIII-4. *Elisesione problematica* (Wesenberg-Lund, 1950), holotype. A, chaetiger 5, right parapodium, posterior view (chaetae omitted); B, same, dorsal cirrophore; C, same, ventral cirrophore; D, same, neurochaetae; E, same, tip of ventral neurochaetal blade. Scale bars: A, 0.5 mm; B–D, 0.2 mm; E, 20 µm.

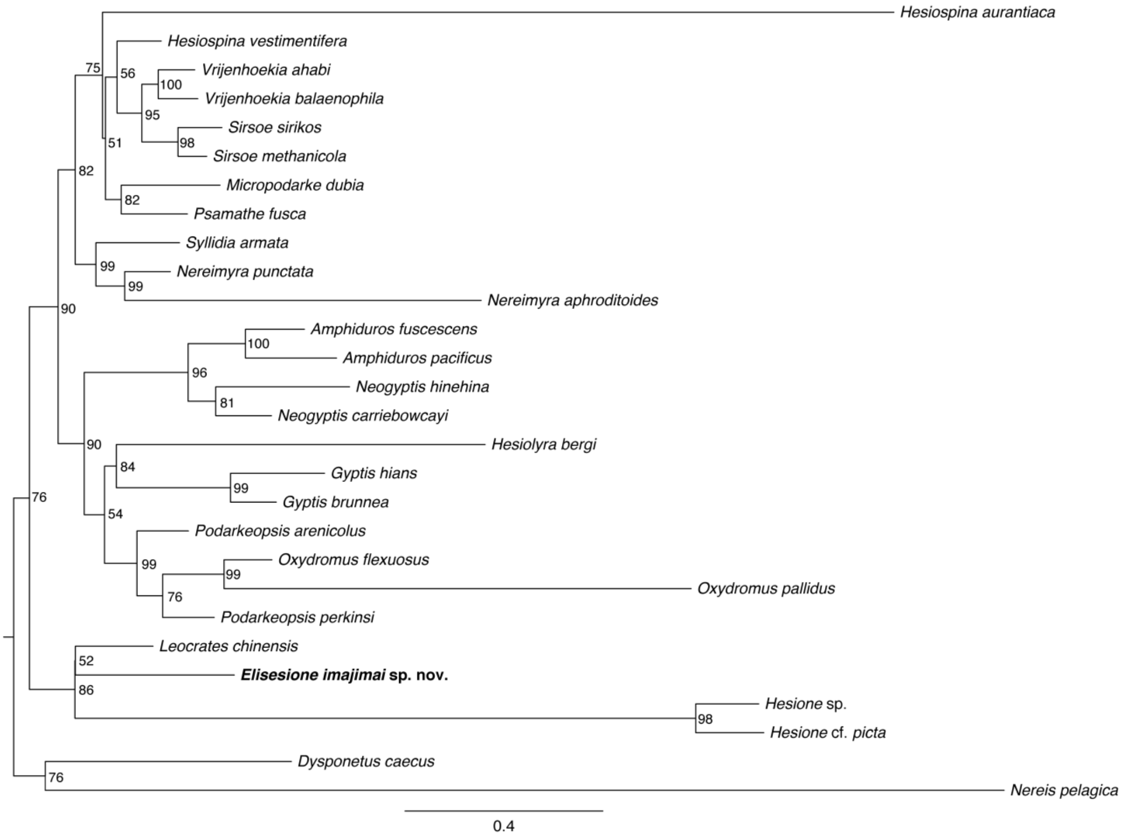


Figure VIII-5. Maximum-likelihood (ML) phylogenetic tree of Hesionidae based on COI, 16S, 18S and 28S sequences. *Dysponetus caecus* and *Nereis pelagica* were used as an ‘outgroup’. Nodal support values (bootstrap support [BS] value) are indicated on each branch.

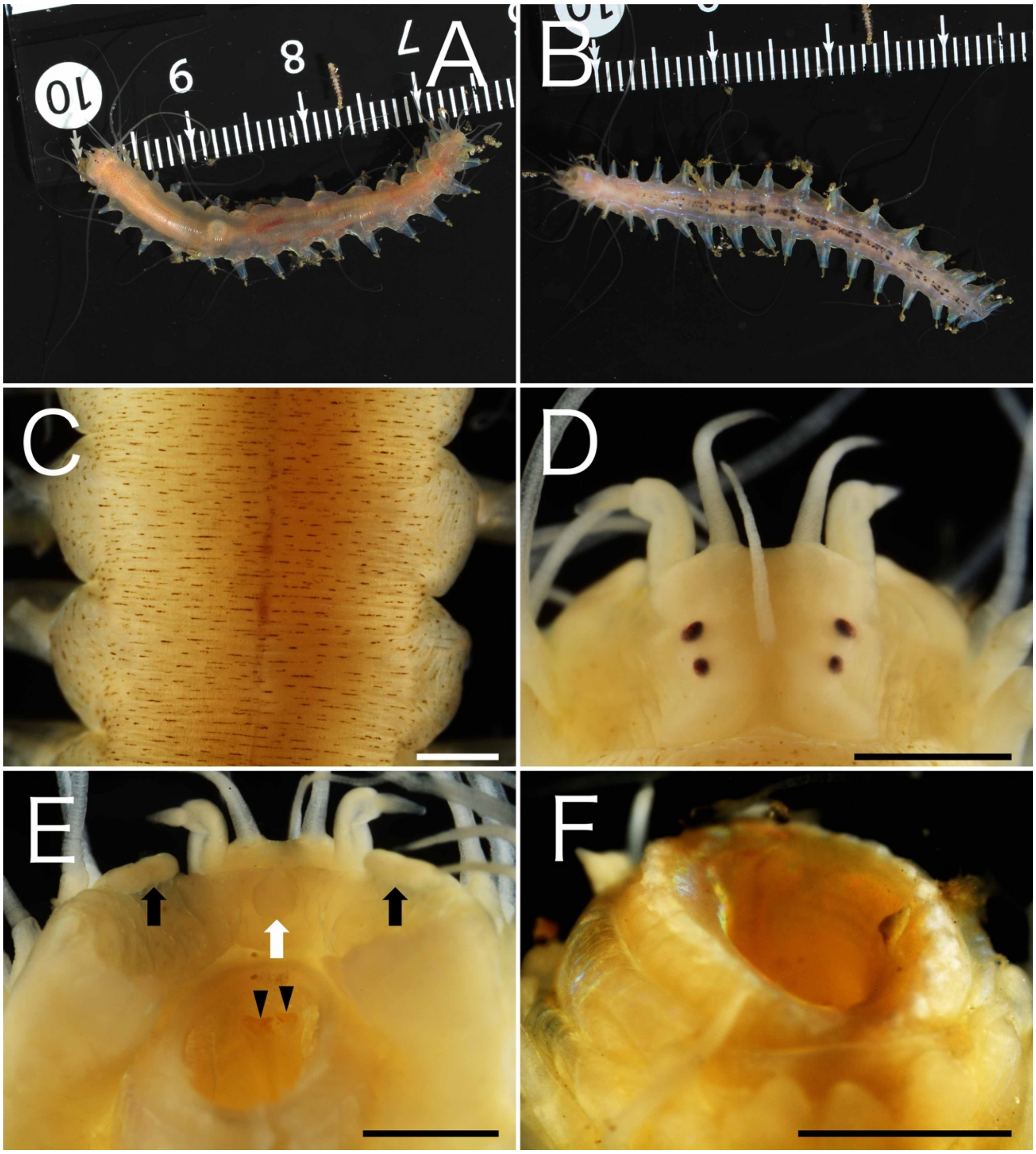


Figure VIII-6. *Leocratides kimuraorum*, holotype. A, Live specimen, dorsal view; B, same, ventral view; C, integument and lateral cushions in chaetigers 4–5, dorsal view; D, prostomium, dorsal view; E, pharynx and peristomium, ventral view, showing facial tubercle (white arrow), cushion-shaped appendages (black arrows), and dorsal jaw plates (arrowheads); F, pharynx with terminal papillae, ventral view. Scale of the ruler: A–B, 1 mm. Scale bars: C–F, 1 mm.

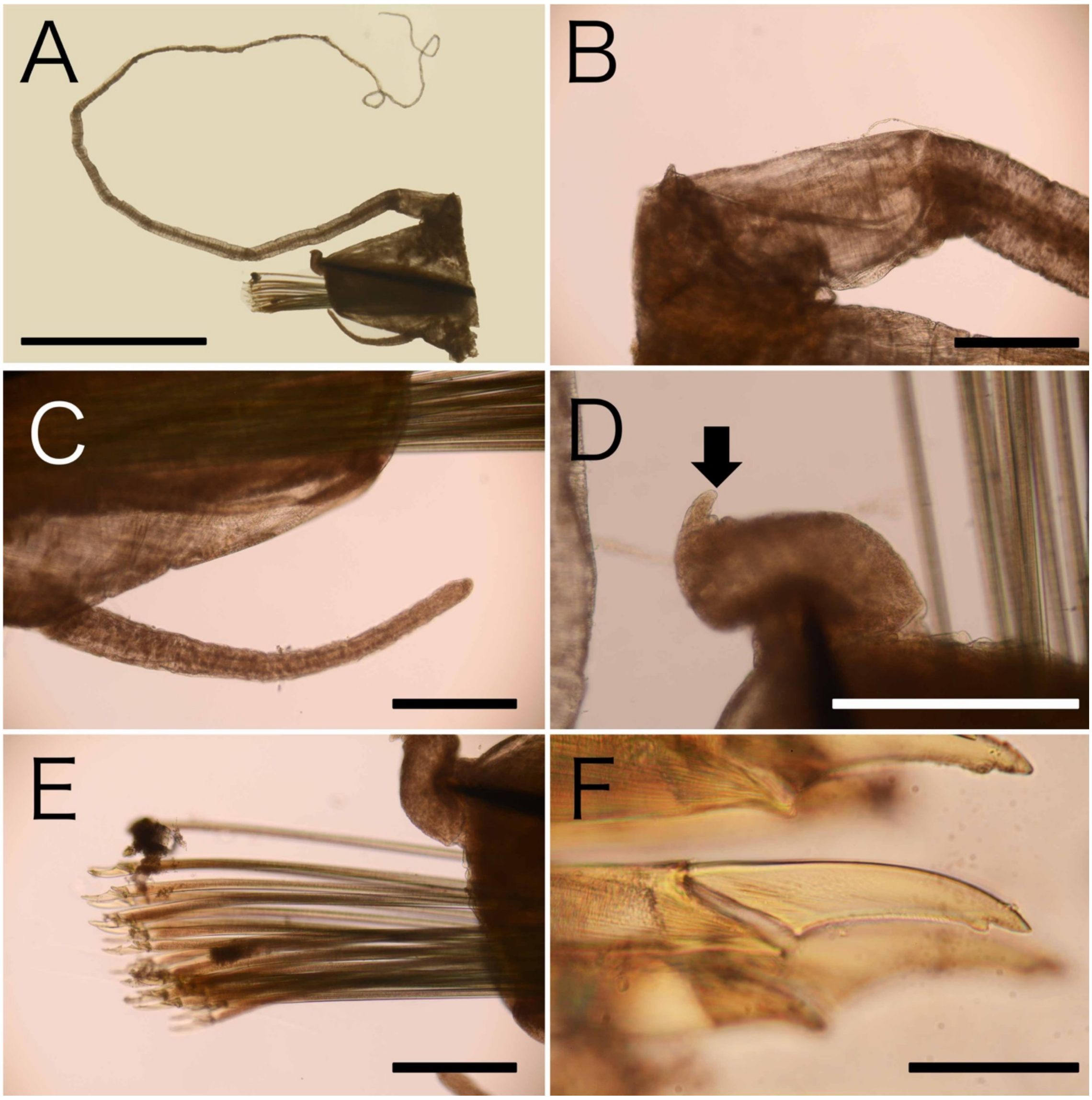


Figure VIII-7. *Leocratides kimuraorum*, right parapodium of chaetiger 5, holotype. A, General appearance of parapodium, anterior view; B, cirrophore; C, ventral cirrus; D, acicular lobe, arrow indicating its tip, the base side of photo is the parapodial tip; E, bundle of neurochaetae; F, blade of neurochaeta. Scale bars: A, 2 mm; B–E, 300 μm; F, 50 μm.

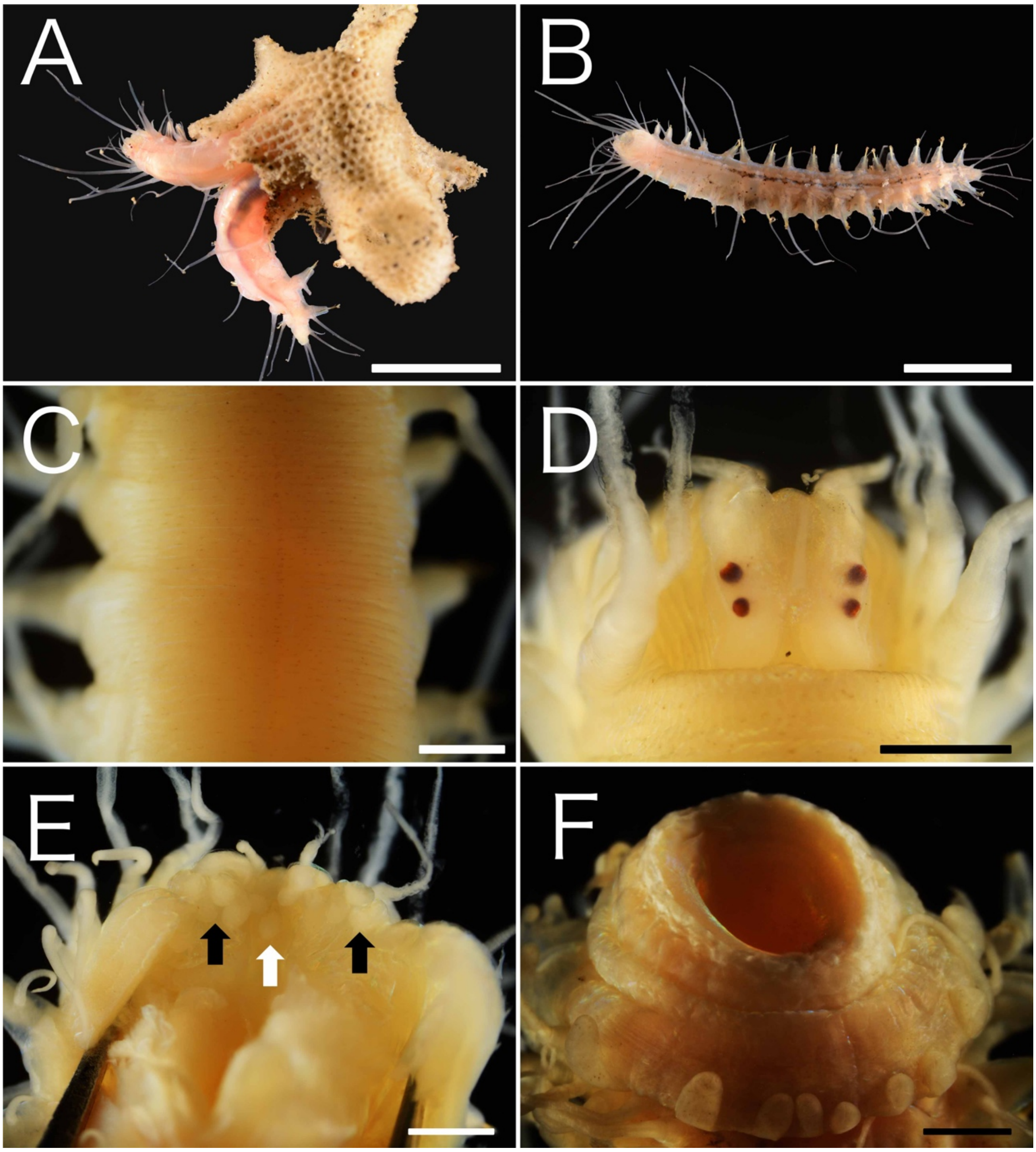


Figure VIII-8. *Leocratides filamentosus* Ehlers, 1908. A, Live specimen inside a fragment of an *Aphrocallistes* sp. hexactinellid sponge, dorsal view; B, same specimen, ventral view; C, integument and lateral cushions in chaetigers 2–4, dorsal view; D, prostomium, dorsal view; E, pharynx and peristomium, ventral view, showing facial tubercle (white arrow) and papillose peristomial membrane (black arrows); F, pharynx with terminal papillae, ventral view. Scale bars: A–B, 10 mm; C–F, 1 mm.

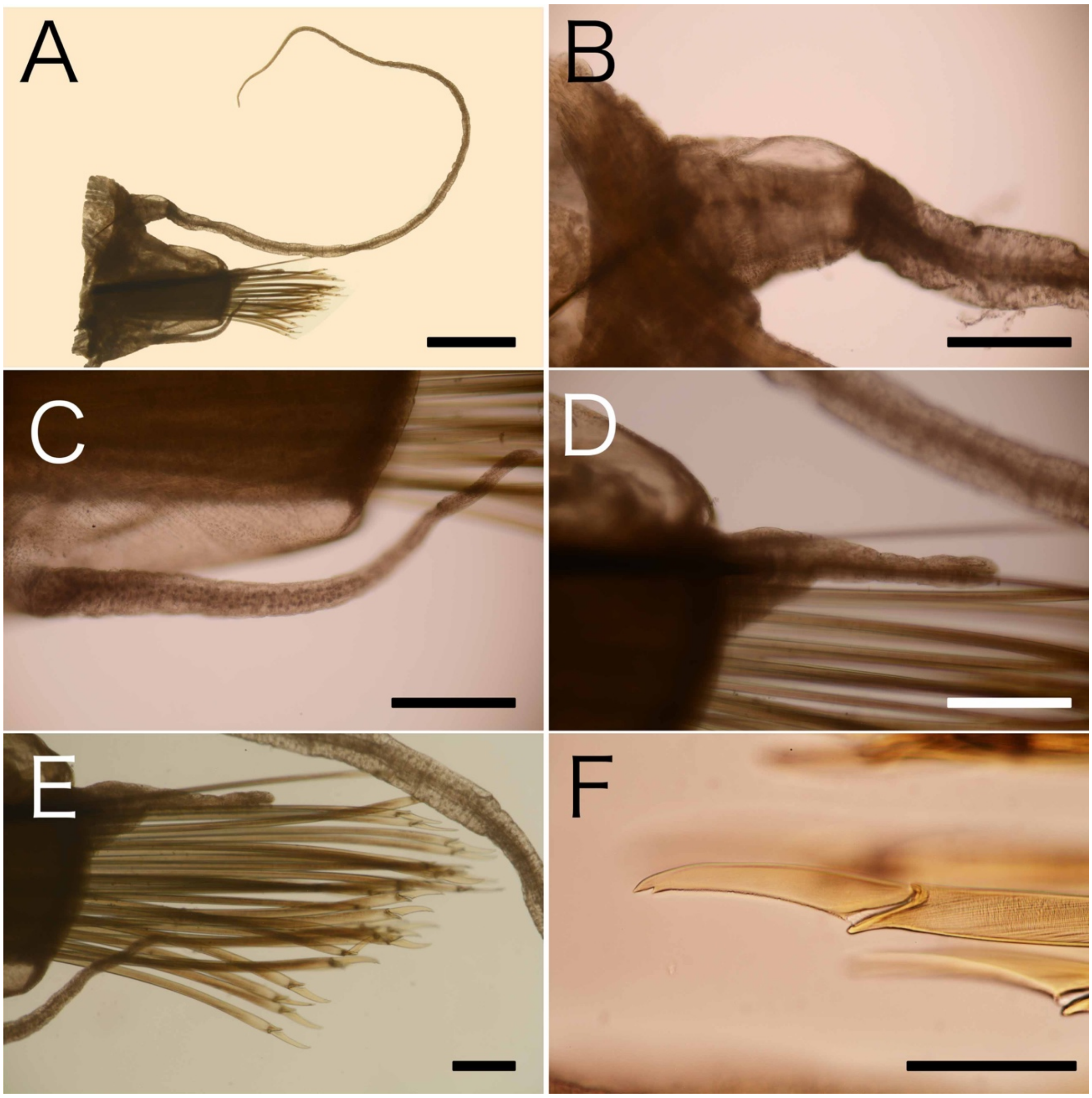


Figure VIII-9. *Leocratides filamentosus* Ehlers, 1908. Right parapodium of chaetiger 10, NSMT-Pol 113219. A, General appearance of parapodium, posterior view; B, cirrophore; C, ventral cirrus; D, acicular lobe; E, bundle of neurochaetae; F, blade of neurochaeta. Scale bars: A, 1 mm; B–E, 300 µm; F, 100 µm.

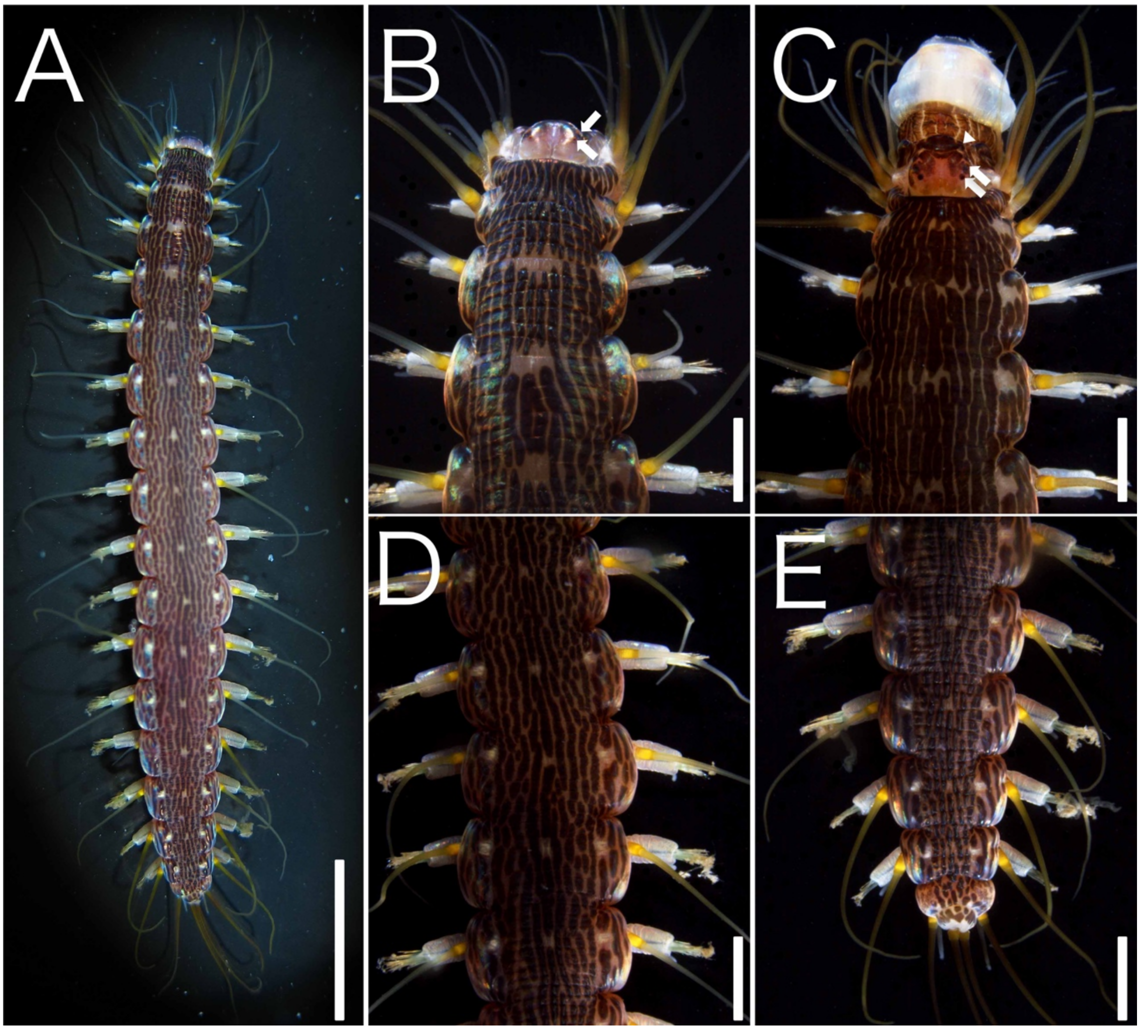


Figure VIII-10. *Hesione reticulata* Marenzeller, 1879, anesthetized living specimens. A, dorsal view; B, anterior end, dorsal view (upper arrow points to antenna, lower arrow to posterior eye); C, medial part; D, posterior end, dorsal view; E, anterior end, dorsal view. Scale bars: A, 3.2 mm; B–D, 1.1 mm; E, 0.7 mm.

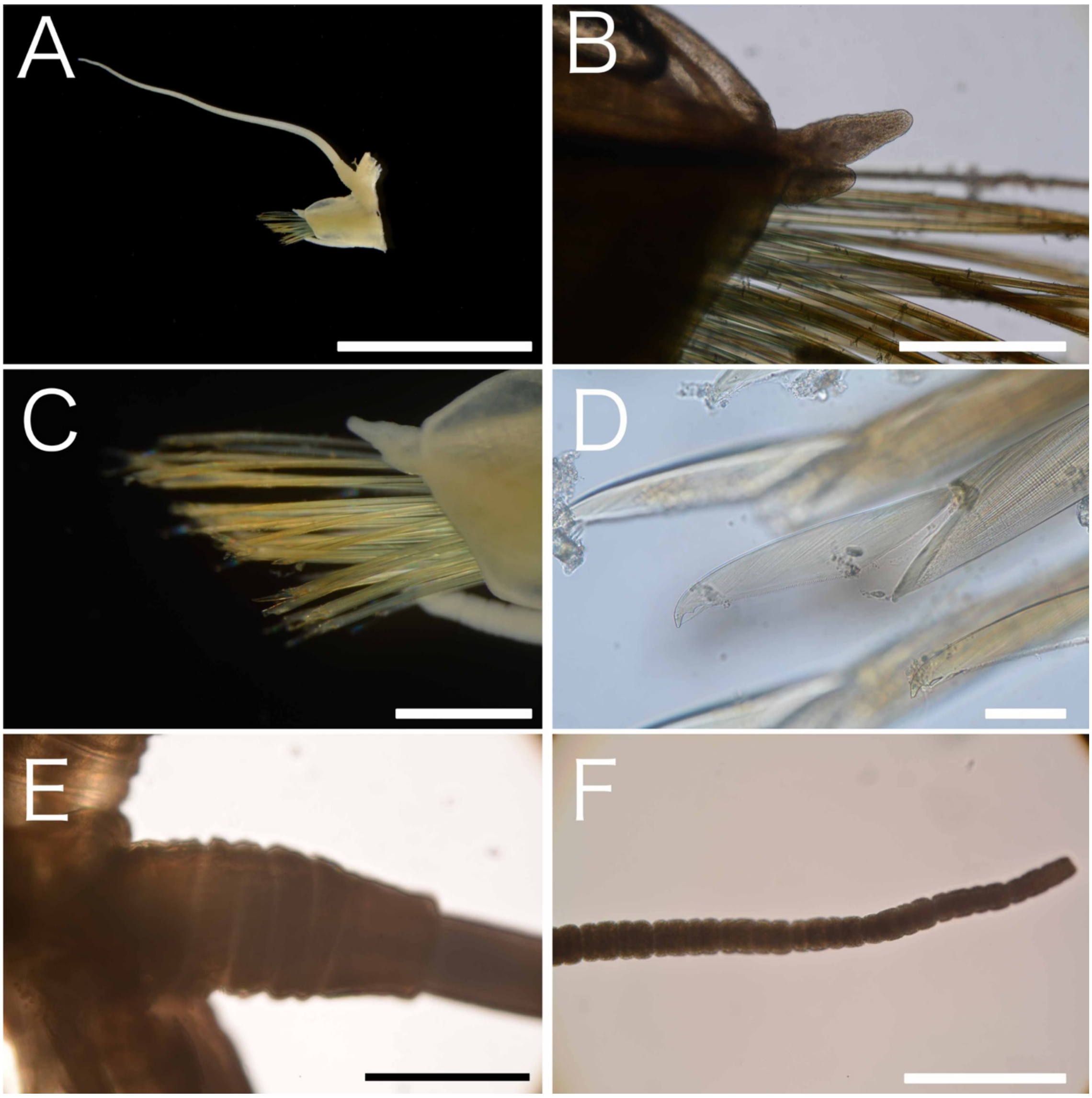


Figure VIII-11. *Hesione reticulata* Marenzeller, 1879. A, chaetiger 8, right parapodium, anterior view; B, chaetiger 9, right parapodium, anterior view, close-up of acicular lobe; C, chaetiger 8, right parapodium, anterior view, close-up of acicular lobe (arrow points to lower tine) and neurochaetal bundle; D, same, tip of neurochaetae (inset: blade tip); E, same, close-up of dorsal cirrophore; F, same, close-up of cirrostyle distal region. Scale bars: A, 0.78 mm; B, 0.15 mm; C, 0.17 mm; D, 25 µm; E–F, 0.13 mm.

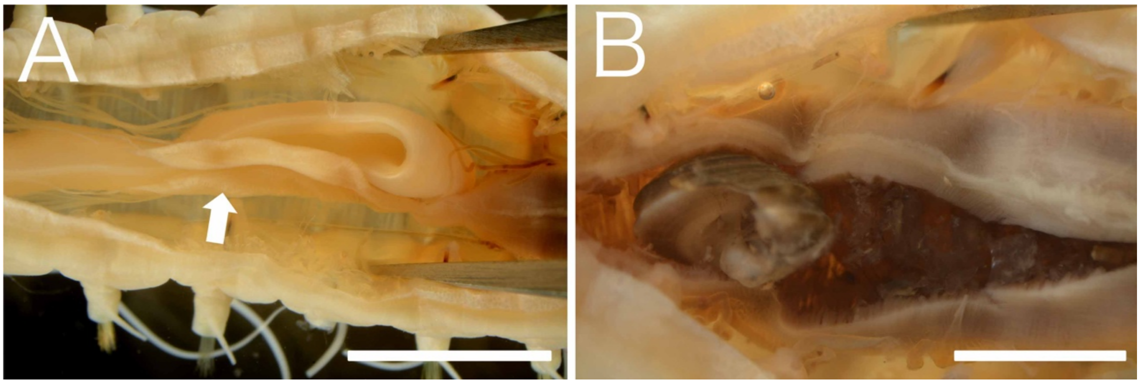


Figure VIII-12. *Hesione reticulata* Marenzeller, 1879. A, anterior end, dorsal view, six months after fixation; B, medial part, ventral view after longitudinal dissection (*: enteric caecum, Ph: pharynx, St: stomach), C, Same, close up after dissecting stomach, with a gastropod prey (St W: stomach wall). Scale bars: A, 1.5 mm; B, 1.2 mm; C, 0.6 mm.

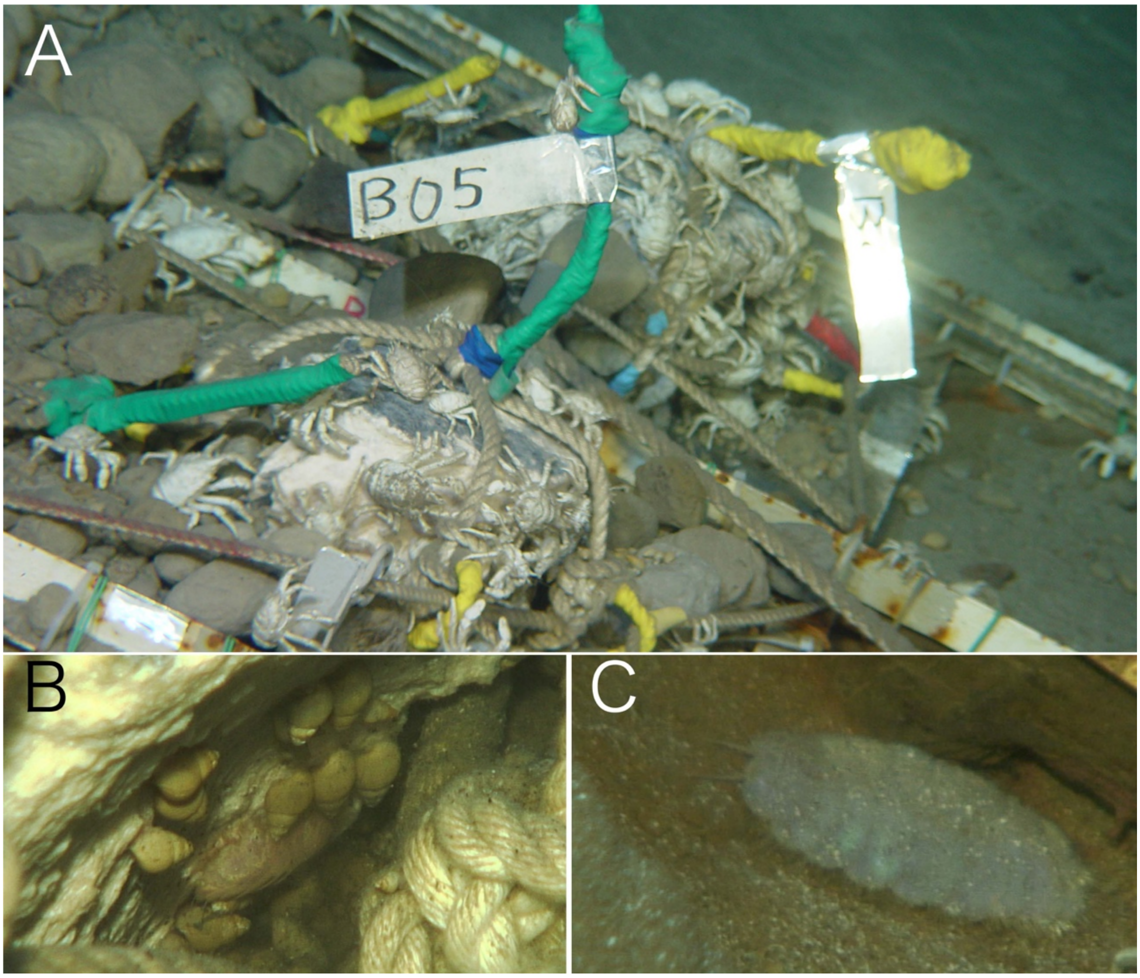


Figure IX-1. *In situ* observation of a whale-fall community at a depth of 4974 m in the Nansei-Shoto Trench. A, two whale vertebrae colonized by benthic invertebrates; B, *Bathykermadeca thanatos*, posterior view; C, same, dorsal view.

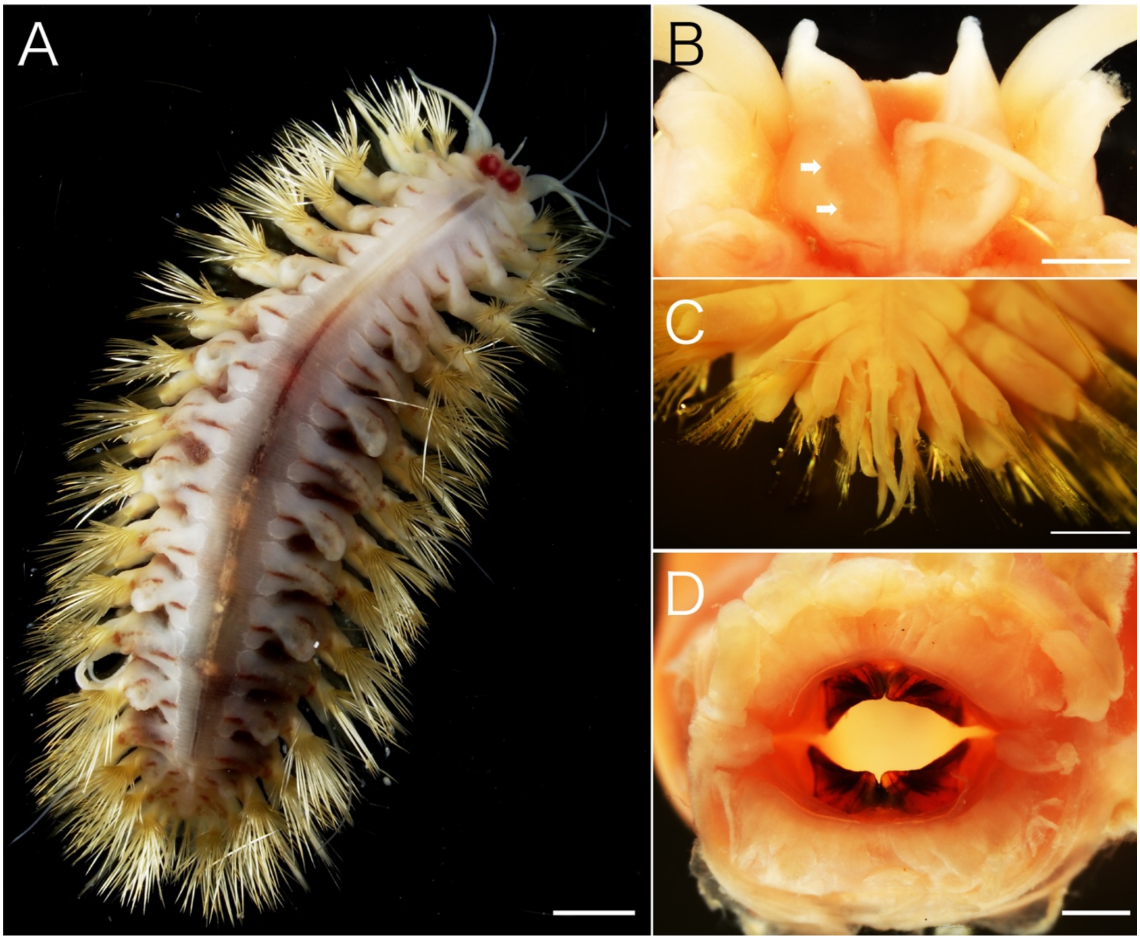


Figure IX-2. *Bathykermadeca thanatos*. A–B, holotype; C–D, paratype. A, live specimen, dorsal view, all erytrae were removed; B, fixed specimen, prostomium, dorsal view,white arrows indicating the possible ocular area; C, fixed specimen, posterior end, ventral view; D, fixed specimen, everter pharynx with papillae and jaws, anterior view. Scale bars: A, 5 mm; B–D, 1 mm.

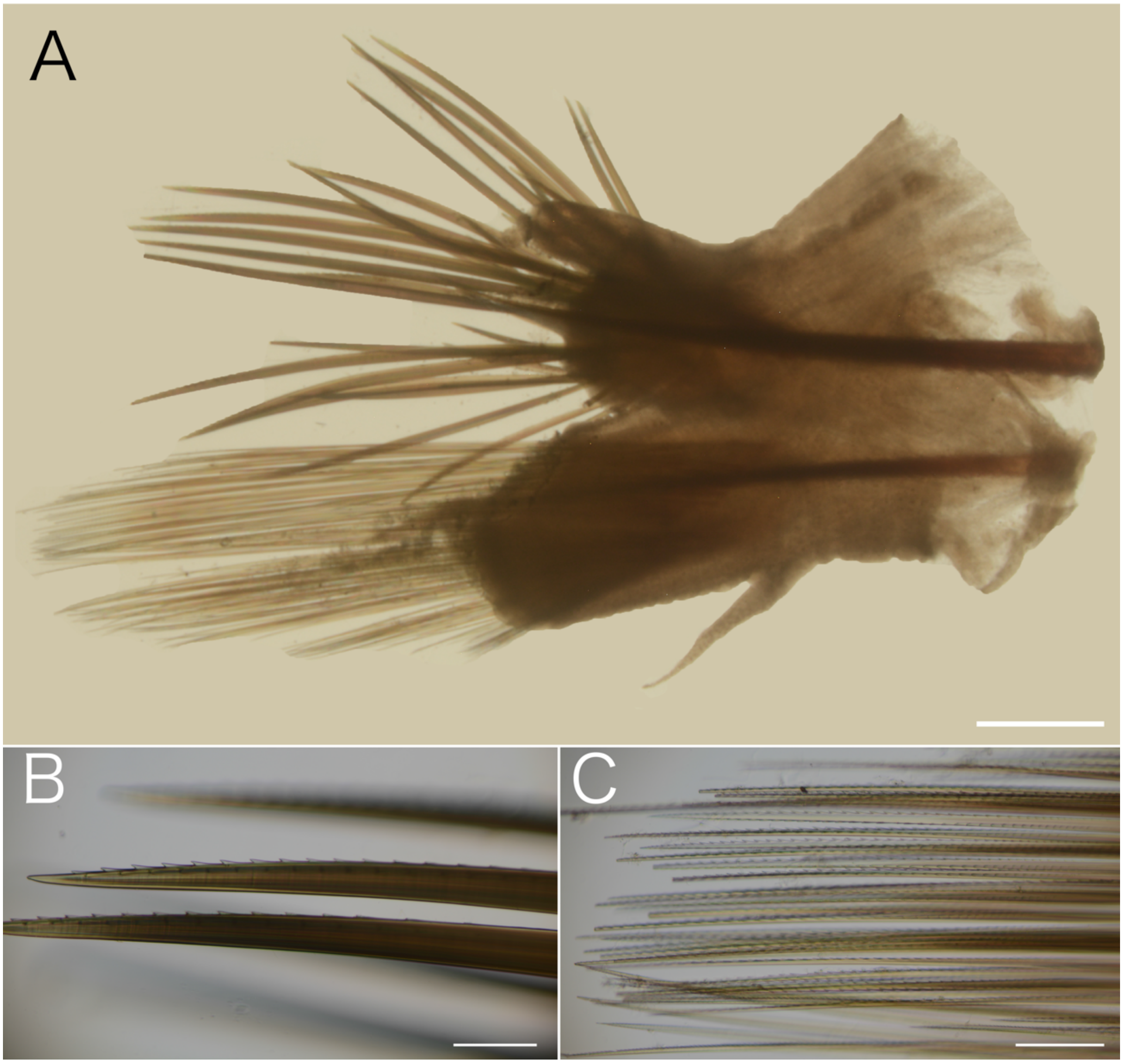


Figure IX-3. *Bathykermadeca thanatos*, left parapodium of segment 3, holotype. A, general appearance of parapodium, posterior view; B, notochaetae; C, neurochaetae, middle part of bundle. Scale bars: A, 1 mm; B–C, 200 µm.

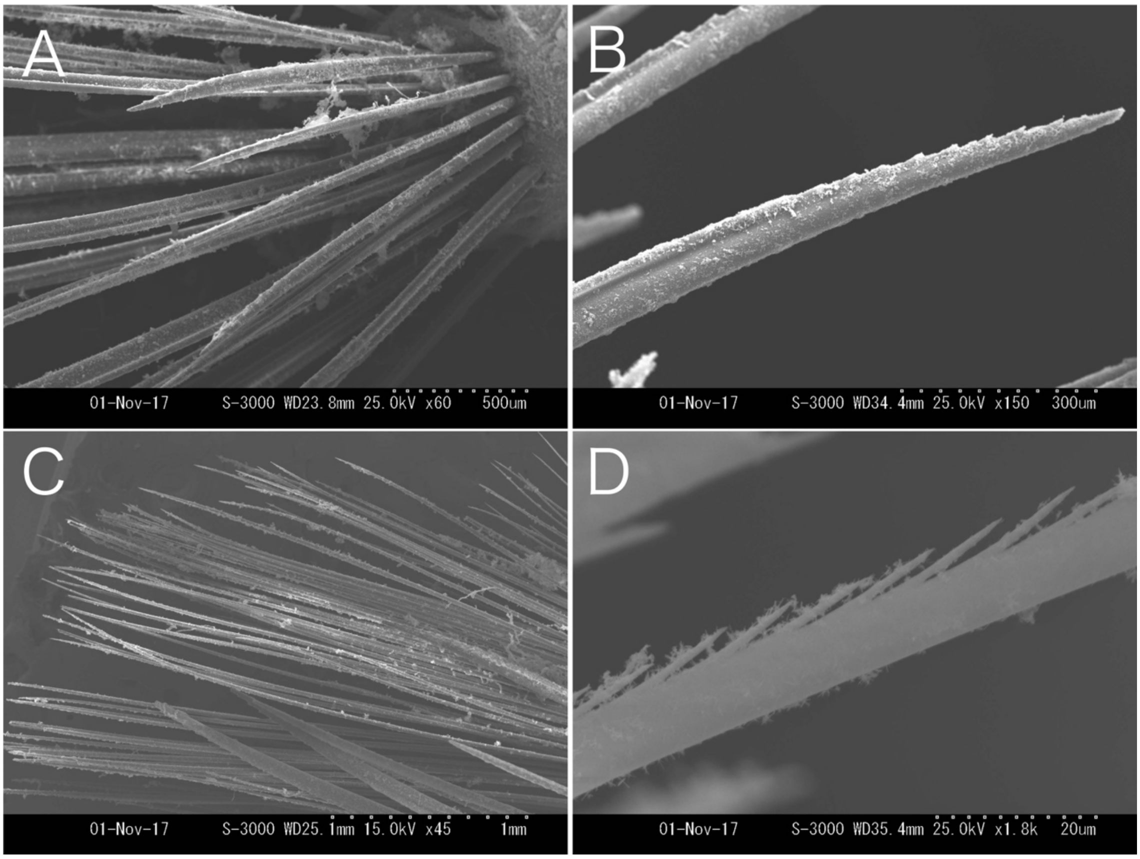


Figure IX-4. *Bathykermadeca thanatos*, left parapodium of segment 3, holotype. A, notochaetae; B, tip of notochaeta; C, neurochaetae; D, middle part of neurochaeta.

Tables.

Table III-1. Collection data of *Archinome jasoni* in this study.

Dive No.	Latitude	Longitude	Depth (m)	Collection date
Noho site st. 1	27°31.025′N	126°58.866′E	1565	01 Aug. 2015
Noho site st. 2	27°31.0134′N	126°58.9595′E	1559	13 Nov. 2015
Sakai field	26°33.4207′N	126°15.5114′E	1486	13 Nov. 2015

Table. IV-1. List of myzostomid species included in the phylogenetic analysis, together with accession numbers in GenBank.

Taxon	COI	16S	18S	H3	Collection site	Reference
Asteriomyzostomidae						
Asteriomyzostomum hercules	LC314716	LC314709	LC314721	LC314721	Off Mie prefecture, Japan	This study
Asteriomyzostomum jinshou	LC314718	LC314710	LC314714	LC314722	Off Mie prefecture, Japan	This study
Asteriomyzostomum monroeae	LC314717	LC314708	LC314712	LC314720	Off Mie prefecture, Japan	This study
Asteromyzostomidae						
Asteromyzostomum grygieri	KM014170	–	KM014252	KM014295	Elephant Island, Antarctica	Summers and Rouse (2014)
Asteromyzostomum sp.	LC314719	LC314711	LC314715	–	Off Mie prefecture, Japan	This study
Eenymeenymyzostomatidae						
Eenymeenymyzostoma cirripedium	DQ238191	DQ238162	DQ238127	–	Suruga Bay, Japan	Summers and Rouse (2014)
Endomyzostomatidae						
Endomyzostoma clarki	DQ238188	DQ238159	AF260588	–	Japan Sea	Lanterbecq et al. (2006)
Endomyzostoma deformator	DQ238190	DQ238161	DQ238126	–	Philippines	Lanterbecq et al. (2006)
Endomyzostoma neridae	KM014169	KM014214	KM014251	KM014294	Dili, Banda Sea, East Timor	Summers and Rouse (2014)
Endomyzostoma sp. 1	DQ238193	DQ238164	DQ238129	–	Madagascar	Lanterbecq et al. (2006)
Endomyzostoma sp. A	KM014168	KM014213	KM014250	KM014293	South Orkneys, Antarctica	Summers and Rouse (2014)
Myzostomatidae						
Contramyzostoma bialatum	–	KM014219	KM014257	KM014299	Papua New Guinea	Summers and Rouse (2014)
Contramyzostoma sp.	DQ238187	KM014220	AF260586	KM014300	Papua New Guinea	Summers and Rouse (2014)
Hypomyzostoma jonathoni	DQ238197	DQ238168	DQ238133	–	Coral Sea, Australia	Summers and Rouse (2014)

Hypomyzostoma nanseni	KM014183	–	KM014267	–	Raja Ampat, Indonesia	Summers and Rouse (2014)
Hypomyzostoma fasciatum	DQ238195	DQ238166	DQ238131	–	Coral Sea, Australia	Lanterbecq et al. (2006)
Mesomyzostoma. katoi	KM014175	KM014221	KM014258	KM014301	Papua New Guinea	Summers and Rouse (2014)
Mesomyzostoma lanterbecqae	KM014177	KM014223	KM014260	–	Papua New Guinea	Summers and Rouse (2014)
Mesomyzostoma reichenspergeri	DQ238182	DQ238152	DQ238116	KM014302	Coral Sea, Australia	Lanterbecq et al. (2006)
Mesomyzostoma lobus	–	DQ238157	DQ238122	–	Coral Sea, Australia	Lanterbecq et al. (2006) Rouse et al. (2016)
Mesomyzostoma okadai	DQ238186	DQ238156	DQ238120	–	Japan Sea, Japan	Lanterbecq et al. (2006) Rouse et al. (2016)
Mesomyzostoma botulus	DQ238183	DQ238153	DQ238117	–	Coral Sea, Australia	Lanterbecq et al. (2006) Rouse et al. (2016)
Mesomyzostoma leukos	DQ238184	DQ238154	DQ238118	–	Coral Sea, Australia	Lanterbecq et al. (2006) Rouse et al. (2016)
Mesomyzostoma sp. A	KM014176	KM014222	KM014259	KM014303	Papua New Guinea	Summers and Rouse (2014) Rouse et al. (2016)
Mesomyzostoma sp. B	KM014178	–	KM014261	–	Raja Ampat, Indonesia	Summers and Rouse (2014) Rouse et al. (2016)
Mesomyzostoma sp. C	KM014179	KM014224	KM014262	KM014304	Raja Ampat, Indonesia	Summers and Rouse (2014) Rouse et al. (2016)
Myzostoma alatum	DQ238200	DQ238171	DQ238135	–	Mediterranean Sea, France	Lanterbecq et al. (2006)
Myzostoma ambiguum	KM014184	KM014228	DQ238142	–	Papua New Guinea	Summers and Rouse (2014)

Myzostoma attenuatum	KM014182	KM014227	KM014265	KM014307	Papua New Guinea	Summers and Rouse (2014)
Myzostoma australe	KM014185	KM014229	KM014268	KM014309	Southern Australia	Summers and Rouse (2014)
Myzostoma bicorne	KM014186	KM014230	KM014269	KM014310	Coral Sea, Australia	Summers and Rouse (2014)
Myzostoma bocki	–	–	KM014266	KM014308	Pacific Ocean, New Zealand	Summers and Rouse (2014)
Myzostoma capitocutis	DQ238209	DQ238177	DQ238144	KM014311	Papua New Guinea	Lanterbecq et al. (2006)
Myzostoma cirriferum	DQ238199	DQ238170	AF260585	–	Atlantic Ocean, France	Lanterbecq et al. (2006)
Myzostoma cuniculus	DQ238203	DQ238174	DQ238138	KM014312	Coral Sea, Australia	Lanterbecq et al. (2006)
Myzostoma debiae	KM014210	–	KM014291	–	Raja Ampat, Indonesia	Summers and Rouse (2014)
Notopharyngoides aruensis	KM014180	KM014225	KM014263	–	Coral Sea, Australia	Summers and Rouse (2014)
Notopharyngoides platypus	KM014181	KM014226	KM014264	KM014305	Coral Sea, Australia	Summers and Rouse (2014)
Protomyzostomidae						
Protomyzostomum lingua	KM014171	KM014215	KM014253	KM014296	Discovery Bank, Antarctica	Summers and Rouse (2014)
Protomyzostomum roseus	KM014172	KM014216	KM014254	–	California, USA	Summers and Rouse (2014)
Pulvinomyzostomidae						
Pulvinomyzostomum inaki	KM014173	KM014217	KM014255	KM014297	Jaco Scarp, Costa Rica	Summers and Rouse (2014)
Pulvinomyzostomum messingi	KM014174	KM014218	KM014256	KM014298	Oregon	Summers and Rouse (2014)
Pulvinomyzostomum pulvinar	DQ238180	DQ238150	DQ238114	–	Mediterranean Sea, France	Lanterbecq et al. (2006)

Table V-1. List of species included in the phylogenetic analysis, together with the respective GenBank accession numbers.

Species	18S	16S	COI	H3	Reference
Arichlidon reyssi	EU555036	EU555045	EU555054	–	Wiklund et al. (2009)
Boudemos ardabilia	EU555042	EU555051	EU555052	JX078959	Wiklund et al. (2009)
Boudemos flokati	EU555043	EU555034	EU555065	–	Wiklund et al. (2009)
Calamyzas amphictenicola	JX078939	JX093563	JX078956	JX078967	Aguado et al. (2013)
Calamyzinae sp.	–	JX078951	JX078957	JX078963	Aguado et al. (2013)
Chrysopetalum debile	EU555037	EU555046	AF221567	–	Wiklund et al. (2009)
Dysponetus bulbosus	JX078946	DQ442570	JQ623501	–	Ruta et al. (2007) Aguado et al. (2013)
Dysponetus caecus	AY839568	EU555047	AF221568	–	Wiklund et al. (2009)
Dysponetus sp.	EU555038	EU555048	EU555055	–	Wiklund et al. (2009)
Iheyomytilidicola lauensis	JX078942	JX078952	JF304502	JX078966	Aguado et al. (2013)
Laubierus alvini	JX078940	JX078950	JF304494	JX078964	Aguado et al. (2013)
Micospina auribohnorum	JX078941	JX078949	JX093564	JX078965	Aguado et al. (2013)
Natsushima bifurcata	JX078943	JX078953	JF304492	JX078960	Aguado et al. (2013)
Natsushima sashai	JX078944	JX078954	JF304496	JX078961	Aguado et al. (2013)
Notophyllum foliosum	AY996079	DQ779627	AY996117	DQ779748	Eklöf et al. (2007) Rousset et al. (2007)
Paleanotus sp.	EU555041	EU555050	EU555056	–	Wiklund et al. (2009)
Paleaquor heterosetosa	EU555035	EU555044	EU555053	–	Wiklund et al. (2009)
Shinkai fontefridae	–	JX078948	JF304499	JX078962	Aguado et al. (2013)
Shinkai longipedata	JX078945	–	JF304500	–	Aguado et al. (2013)
Spathochaeta octopodis	**–**	**LC381961**	**LC381959**	**LC381960**	**Jimi et al. (2018)**
Treptopale parpmplos	–	–	JN588620	–	Wei et al. (2013)
Vigtorniella zaikai	KU057929	KU057932	–	–	Watson et al. (2016)

Table VI-1. List of sampling site and living *Cirriformia* species.

Site name, prefecture	Point	Species	Figure 1
Asadokoro, Aomori	40°56.272' N, 140°58.269' E	C, D	6
Asamushi, Aomori	40°54.179' N, 140°51.302' E	J	7
Denshinhama, Hokkaido	42°18.846' N, 140°58.097' E	H	4
Ganagaraana, Aomori	40°33.462' N, 139°55.935' E	Var A, I	8
Hachino-higata, Hiroshima	34°19.550' N, 132°53.790' E	C	25
Higata-kouen, Wakayama	33°41.512' N, 135°23.416' E	C	30
Hii, Wakayama	33°54.984' N, 135°04.938' E	*Timarete* sp.	29
Hime, Ishikawa	37°17.792' N, 137°12.415' E	I	13
Hinode-huto, Chiba	35°38.628' N, 139°56.143' E	D	39
Hinoshima, Kumamoto	32°23.628' N, 130°25.333' E	D, F	18
Honjyou, Kagoshima	31°25.650' N, 131°14.840' E	C	22
Hukaumi, Kagoshima	32°16.016' N, 130°06.713' E	D	19
Hukue, Aichi	34°38.180' N, 137°06.767' E	D	36
Huuren-ko, Hokkaido	43°18.184' N, 145°22.859' E	H	1
Isotake, Shimane	35°11.690' N, 132°26.484' E	Var B, I	14
Issiki, Aichi	34°46.035' N, 137°02.015' E	C, D	35
Izumozaki, Niigata	37°32.352' N, 138°40.785' E	Var A, I	10
Kiire, Kagoshima	31°22.700' N, 130°32.800' E	D	20
Koiunoura, Fukuoka	33°48.232' N, 130°27.013' E	Var A, I	15
Kochi-rinkai-ura, Kochi	33°26.344' N, 133°26.520' E	Var A, I	26
Koura, Ishikawa	37°07.877' N, 137°02.647' E	Var A, Var B	9
Kousien-hama, Hyogo	34°42.501' N, 135°21.141' E	D	27
Kumoi-gawa, Mie	34°37.813' N, 136°32.854' E	D	33
Mase, Niigata	37°43.092' N, 138°47.119' E	Var A, Var B	10
Matsushima, Miyagi	38°20.812' N, 141°02.744' E	D	40
Motoshima, Wakayama	33°43.929' N, 135°20.878' E	Var B, I	31
Mukouda, Ishikawa	37°08.371' N, 136°59.736' E	Var A	12
Nagamatsu, Oosaka	34°19.870' N, 135°09.708' E	I	28
Nitinan, Miyazaki	31°34.948' N, 131°24.652' E	Var A, I	23
Oomura, Tokyo	27°05.600' N, 142°11.660' E	E	43
Sasuhama, Miyagi	38°24.370' N, 141°22.134' E	Var A	41
Senaga-jima, Okinawa	26°10.670' N, 127°38.630' E	A	42
Siokawa, Aichi	34°41.104' N, 137°18.498' E	C	37
Souzu, Ehime	32°57.816' N, 132°33.103' E	C	24
Muroran-suishi-ura, Hokkaido	42°18.630' N, 140°58.003' E	H	5
Tateyama, Chiba	34º59.860' N, 139º48.310' E	G	38
Tigogamizu, Kagoshima	31°09.943' N, 130°35.382' E	Var B, I	21
Torinosu, Wakayama	33°42.114' N, 135°22.875' E	B	29
Toyohama, Aichi	34°43.026' N, 136°54.175' E	Var B, B	34
Toyohama-tonnel, Hokkaido	43°15.285' N, 140°41.150' E	Var A	3
Uenhirari, Hokkaido	44°21.861' N, 143°21.255' E	H	2
Wajiro, Fukuoka	33°41.129' N, 130°25.894' E	D	16
Yabe-gawa, Fukuoka	33°00.729' N, 130°24.564' E	D	17

Table VI-2. K2P distances of *Cirriformia* spp. CO1 region (499 bp)

	sp. A	sp. B	sp. C	sp. D	sp. E	sp. F	sp. G	sp. H	sp. I	sp. J	var. A	var.B	*tentaculata*
sp. A	0.000												
sp. B	0.230	0.021											
sp. C	0.194	0.200	0.010										
sp. D	0.249	0.199	0.217	0.017									
sp. E	0.198	0.221	0.213	0.187	0.002								
sp. F	0.221	0.176	0.180	0.167	0.186	0.000							
sp. G	0.226	0.169	0.176	0.165	0.166	0.147	0.000						
sp. H	0.221	0.161	0.154	0.180	0.211	0.154	0.134	0.014					
sp. I	0.182	0.198	0.186	0.194	0.165	0.186	0.148	0.169	0.000				
sp. J	0.202	0.174	0.160	0.198	0.197	0.166	0.116	0.094	0.148	0.008			
var. A	0.218	0.200	0.191	0.200	0.173	0.181	0.136	0.159	0.107	0.157	0.023		
var. B	0.230	0.233	0.202	0.223	0.197	0.208	0.204	0.219	0.222	0.215	0.193	0.021	
tentaculata	0.219	0.256	0.232	0.250	0.248	0.249	0.270	0.218	0.269	0.255	0.260	0.264	0.000

Table. VI-3. Environmental information of sampling site.

Sampling site	ORPmv (sed)	temp (sed)	ORPEh (sed)	temp	pH	pH mV	ORP mV	DO	TDS	Salinity %	IL
Hime	113	21.8	321.24	21.25	8.22	-124	198	11.48	31.1	3.4	3.4
Izumozaki	49	22.1	257.03	20.04	8.1	-116	168	8.15	30.9	3.38	2.3
Gangaraana	78	25.9	283.37	25.37	8.47	-139	200	16.99	28.6	3.05	N/A
Kochi-rinkai-ura	-113	21.1	95.73	23.31	8.26	-126	60	6.11	30.3	3.31	2.9
Isotake	147	22.6	354.68	22.42	8.2	-123	241	8.89	30.4	3.32	1.3
Tigogamizu	-125	23.2	82.26	23.97	8.2	-123	236	10.14	30.3	3.31	2.5
Nitinan	112	25.8	317.44	25.89	8.26	-127	177	9.48	25.1	2.64	1.8
Koinouta	31	22.6	238.68	24.41	7.99	-111	164	5.59	29.7	3.17	3.2
Motoshima	-102	25.9	103.37	27.19	8.15	-121	148	7.91	30.1	3.29	N/A
Nagamatsu	-26	27.8	178.04	26.23	8.23	-125	149	6.28	30.1	3.23	N/A
Koura	-109	23.2	98.26	23.33	8.15	-120	181	10.21	30.4	3.27	1.6
Mukouda	81	24.3	287.49	23.82	8.18	-122	187	8.78	30	3.22	5.3
Izumozaki	49	22.1	257.03	20.04	8.1	-116	168	8.15	30.9	3.38	2.3
Mase	123	21.7	331.31	22.88	8.82	-158	208	17.57	30.4	3.32	4.3
Sasuhama	-149	21.3	59.59	21.65	8.23	-124	254	11.88	29.5	3.15	6.7
Toyohama-tonnel	-248	10.9	-32.13	13.91	8.2	-121	75	5.84	31	3.34	2.3
Toyohama	42	26.2	247.16	25.12	8.44	-137	78	14.71	28.8	3.08	3.5

Torinosu	-120	25.7	85.51	26.04	8.22	-124	115	7.09	31	3.4	N/A
Siokawa	-245	30.4	-42.78	31.19	7.86	-105	97	6.88	29.9	3.2	1.5
Issiki	-188	26.2	17.16	27.83	7.87	-105	149	10.26	10.6	1.01	2.2
Souzugawa	-90	20.4	119.22	20.47	7.79	-99	225	10.77	1.28	0.1	3.8
Honjyou	-160	20.4	49.22	21.58	7.6	-88	235	8.67	2.17	0.18	3.4
Higata-kouen	-185	30.7	17.01	32.05	7.68	-95	33	1.51	30.9	3.39	3.1
Asamushi	52	17.5	263.25	16.92	8.21	-122	173	11.32	29.6	3.14	5.8
Asadokoro	-187	14.7	26.21	15.52	8.12	-117	249	11.04	16.7	1.64	3
Denshinhama	-148	14.5	65.35	17.29	7.85	-102	206	11.2	30.1	3.26	2
Suisansikenjyouura	-80	14.1	133.63	11.08	7.82	-99	143	8.24	32.6	3.5	N/A
Huuren-ko	-108	15.4	104.72	17.35	8.22	-123	120	11.36	27.7	2.92	1.9
Uenhirari	54	7.1	272.53	10.83	8.22	-121	88	11.74	31	3.31	N/A
Hinoshima	-144	23	63.4	23.46	8.23	-125	170	7.87	27.8	2.95	2.3
Hukue	-222	25.9	-16.63	26.54	8.8	-158	149	13.74	29.1	3.11	1.7
Matsushima	-105	21.6	103.38	23.26	7.97	-110	263	8.26	22.7	2.36	4.3
Yabegawa	-79	24.6	127.28	23.94	7.99	-111	151	7.41	29.8	3.19	4
Hukaumi	-106	21.5	102.45	22.29	8.12	-118	181	11.36	30.7	3.35	3.1
Kiire	-92	21	116.8	21.17	7.59	-88	227	9.56	4.81	0.42	2
Wajiro	-224	24.9	-17.93	24.67	8.18	-122	59	7.08	29.9	3.2	0.76
Kousien-hama	-218	29.7	-15.29	28.98	8.81	-160	172	14.06	25.8	2.72	3.4

Izumogawa	-141	28.6	62.48	28.91	7.5	-83	128	1.63	27.3	2.89	4.9
Hinode-huto	-59	28.5	144.55	24.85	8.2	-123	67	8.4	28.6	3.04	2.9

Table VII-1. Collection data of *Diplocirrus* spp. in this study.

Locality	Latitude	Longitude	Depth (m)	Collection date	Collected species	Collected by
Asamushi	40°54.205′ N	140°51.2966′ E	2–3	25 Jun. 2016	*Diplocirrus asamushiensis*	SCUBA diving
Hibiki-nada	34°09.670′ N to 34°09.518′ N	130°48.079′ E to 130°48.094′ E	62	25 Oct. 2015	*Diplocirrus ohtsukai*, *Diplocirrus toyoshioae*	sledge net
Off Jyogashima	35°06.9027′ N to 35°06.7231′ N	139°33.7870′ E to 139°34.0574′ E	230–398	10 Dec. 2015	*Diplocirrus seisuiae*	dredging
Kumano-nada	34°06.076′ N to 34°07.010′ N	136°36.071′ E to 136°36.050′ E	339–362	13 Oct. 2016	*Diplocirrus seisuiae*	dredging
Iorigawa	32°28.928′ N	131°40.773′ E	intertidal	27 Mar. 2017	*Diplocirrus nicolaji*	hand
Off Moroiso	35°09.079′ N to 35°09.162′ N	139°34.880′ E to 139°34.911′ E	77–78	31 Jul. 2015	*Diplocirrus mamoi*	dredging
Off Ohakozaki	39°20.8187′ N to 39°20.6188′ N	142°0.6458′ E to 142°0.689′ E	99–102	27 Jun. 2016	*Diplocirrus tohokuensis*	dredging
Off Otsuchi St. 1	37°30.0255′ N	141°34.9390′ E	225	18 May 2015	*Diplocirrus tohokuensis*	ROV *Hyper-Dolphin*
Off Otsuchi St. 2	37°29.8919′ N	141°34.4524′ E	215	18 May 2015	*Diplocirrus imajimai*	ROV *Hyper-Dolphin*

Table VIII-1. Measurements of *Elisesione imajimai* specimens.

Specimen	Body length	Body width	Antenna length (longest)	Palp length (longest)	Tentacular cirrus length (longest)
NSMT-Pol H-665	25 mm	3 mm	70 µm	40 µm	2 mm (broken)
NSMT-Pol R: 604-1	30 mm	3 mm	200 µm	100 µm	4 mm
NSMT-Pol R: 604-2	34 mm	4 mm	130 µm	100 µm	5 mm

Table VIII-2. List of hesionid and outgroup species included in the phylogenetic analysis, together with GenBank accession numbers.

Taxon	COI	16S	18S	28S
Dysponetus caecus	AF221568	EU555047	AY839568	EU555028
Nereis pelagica	–	AY340470	AY340438	AY340407
Amphiduros fuscescens	DQ442561	DQ442569	DQ442584	DQ442598
Amphiduros pacificus	JN631312	JN631324	JN631334	JN631345
Elisesione imajimai	**LC361354**	**–**	**LC361352**	**LC361353**
Gyptis brunnea	JN631313	JN631323	JN631335	JN631346
Gyptis hians	JN571824	JN571880	JN571891	JN571900
Hesiolyra bergi	GQ474434	–	AM159577	–
Hesione sp.	–	DQ442615	DQ442617	DQ442619
Hesione cf. *picta*	–	KF006978	KJ748004	KF006977
Hesiospina aurantiaca	–	JN631319	JN631329	JN631342
Hesiospina vestimentifera	JN631310	JN631320	JN631330	JN631343
Leocrates chinensis	DQ442565	DQ442575	DQ442589	DQ442605
Micropodarke dubia	JN571825	DQ442576	JN571888	JN571899
Neogyptis carriebowcayi	JN631315	JN631325	JN631338	JN631349
Neogyptis hinehina	JN631317	JN631328	JN631340	JN631350
Nereimyra aphroditoides	JF3171998	JF317211	–	JF317204
Nereimyra punctata	DQ442566	DQ442577	DQ442591	DQ442606
Oxydromus flexuosus	DQ442567	DQ442578	DQ442592	DQ442607
Oxydromus pallidus	–	DQ442579	DQ442593	DQ442608
Podarkeopsis arenicolus	JN571827	JN571879	JN571889	DQ442609
Podarkeopsis perkinsi	JN571828	JN571881	JN571892	JN571901
Psamathe fusca	DQ513294	DQ442581	DQ442595	DQ442610
Sirsoe methanicola	DQ513295	DQ442582	JN631332	DQ442611
Sirsoe sirikos	JN571829	JN571882	JN571893	JN571902
Syllidia armata	DQ442568	DQ442583	DQ442596	DQ442612
Vrijenhoekia balaenophila	DQ513296	DQ513301	JN631333	DQ513306
Vrijenhoekia ahabi	JN571876	JN571887	JN571898	JN571876

Table VIII-3. Collection data of *Leocratides* spp. in this study.

Locality	Latitude	Longitude	Depth (m)	Collection date	Collected species	Contained sponges
Sagami Bay, St. 1	35°07.132′N to 35°07.388′N	139°33.709′E to 139°33.365′E	213–255	29 June 2011	*Leocratides filamentosus*	Unknown
Sagami Bay, St. 2	35°07.5787′N to 35°07.5583′N	139°33.7096′E to 139°33.8756′E	104–111	27 April 2016	*Leocratides kimuraorum*	Hexactinellid sponge
Sagami Bay, St. 3	35°06.929′N to 35°06.631′N	139°33.814′E to 139°33.734′E	292–375	15 February 2017	*Leocratides filamentosus*	*Aphrocallistes* sp.
Off Shima Peninsula, St. 1	34°11.63′N to 34°11.66′N	136°42.56′E to 136°42.69′E	103–104	12 October 2016	*Leocratides kimuraorum*	Demosponge and hexactinellid sponge
Off Shima Peninsula, St. 2	34°11.81′N to 34°11.82′N	136°41.80′E to 136°41.95′E	107	12 October 2016	*Leocratides kimuraorum*	Demosponge and hexactinellid sponge

Table IX-1. Morphological features of all *Bathykermadeca* species.

Species	Type of neurochaetae	Number of notochaetae[a]	Teeth	Median antenna	Segments with nephridial papillae
B. *hadalis* (Kirkegaard, 1956)	one type	3–6	without serration, growing outwardly[b]	extending beyond tip of frontal filaments	12–17
B. *turnerae* Pettibone, 1985	two types	24–35	with serration, growing inwardly	not extending beyond tip of frontal filaments	12–15
B. *thanatos* Jimi, Fujiwara and Kajihara, 2018	one type	45–55	without serration, growing inwardly	extending beyond tip of frontal filaments	12–15

[a] Counted for three parapodia from anterior, middle, and posterior portions of the body; *B. hadalis* (n = 2), *B. turnerae* (n = 1), *B. thanatos* (n = 3).

[b] Confirmed in one of paratypes (USNM 51977), not in the holotype (ZMUC POL-1669).

Appendix Table 1. List of Japanese polychaetes.

Family	Genus	Species	Authority
Alciopidae	*Alciopina*	*Alciopina paumotanus*	(Chamberlin, 1919)
	Krohnia	*Krohnia lepidota*	(Krohn, 1845)
	Naiades	*Naiades cantrainii*	Delle Chiaje, 1828
	Plotohelmis	*Plotohelmis capitata*	(Greeff, 1876)
	Rhynchonereella	*Rhynchonereella angelini*	(Kinberg, 1866)
		Rhynchonereella fulgens	Greeff, 1885
		Rhynchonereella gracilis	Costa, 1864
		Rhynchonereella petersii	(Langerhans, 1880)
	Torrea	*Torrea candida*	(Delle Chiaje, 1841)
	Vanadis	*Vanadis longissima*	(Levinsen, 1885)
		Vanadis formosa	Claparède, 1870
		Vanadis minuta	Treadwell, 1906
Iospilidae	*Phalacrophorus*	*Phalacrophorus uniformis*	Reibisch, 1895
		Phalacrophorus pictus	Greeff, 1879
Lopadorrhynchidae	*Lopadorrhynchus*	*Lopadorrhynchus brevis*	Grube, 1855
		Lopadorrhynchus krohnii	(Claparede, 1870)
		Lopadorrhynchus (Lopadorrhynchus)uncinatus	Fauvel, 1915
	Prolopadorrhynchus	*Prolopadorrhynchus nationalis*	(Reibisch, 1895)
		Prolopadorrhynchus appendiculatus	(Southern, 1909)
	Manupasia	*Maupasia coeca*	Viguier, 1886
	Pelagobia	*Pelagobia longicirrata*	Greeff, 1879
Pontodoridae	*Pontodora*	*Pontodora pelagica*	Greeff, 1879
Tomopteridae	*Tomopteris*	*Tomopteris (Johnstonella) pacifica*	(Izuka, 1914)
		Tomopteris (Johnstonella) apsteini	Rosa, 1908
		Tomopteris septentrionalis	Steenstrup, 1849
Typhloscolecidae	*Sagitella*	*Sagitella kowalewskii*	Wagner, 1872
	Travisiopsis	*Travisiopsis lobifera*	Levinsen, 1885
	Typhloscolex	*Typhloscolex muelleri*	Busch, 1851
Chrysopetalidae	*Bhawania*	*Bhawania goodei*	Webster, 1884
		Bhawania cryptocephala	Gravier, 1901
	Chrysopetalum	*Chrysopetalum occidentale*	Johnson, 1897
	Dysponetus	*Dysponetus pygmaeus*	Levinsen, 1879
	Paleanotus	*Paleanotus chrysolepis*	Schmarda, 1861
		Paleanotus bellis	Johnson, 1897
		Paleanotus debilis	(Grube, 1855)
	Nautilina	*Nautilina calyptogenicola*	Miura and Laubier, 1989
	Iheyomytilidicola	*Iheyomytilidicola tridentatus*	Miura and Hashimoto, 1996
	Natsushima	*Natsushima bifurcata*	Miura and Laubier, 1990
		Natsushima graciliceps	Miura and Hashimoto, 1996
	Shinkai	*Shinkai longipedata*	Miura and Ohta, 1991
		Shinkai sagamiensis	Miura and Laubier, 1990
		Shinkai semilonga	Miura and Hashimoto, 1996
	Thyasiridicola	*Thyasiridicola branchiatus*	Miura and Hashimoto, 1996
Eulepethidae	*Eulepethus*	*Eulepethus hamifer*	(Grube, 1875)
	Mexieulepis	*Mexieulepis amioi*	(Imajima, 1974)
	Pareulepis	*Pareulepis malayana*	(Horst, 1913)
		Pareulepis wyvillei	(McIntosh, 1885)
Glyceridae	*Glycera*	*Glycera alba*	(O. F. Müller, 1776)
		Glycera amadaiba	Imajima, 2003
		Glycera americana	Leidy, 1855
		Glycera benhami	Boggemann and Fiege, 2001
		Glycera branchiopoda	Moore, 1911
		Glycera brevicirris	Grube, 1870
		Glycera capitata	Ørsted, 1842
		Glycera cinnamomea	Grube, 1874
		Glycera gigantea	Quatrefages, 1865
		Glycera lapidum	Quatrefages, 1866
		Glycera lancadivae	Schmarda, 1861
		Glycera macrobranchia	Moore, 1911
		Glycera macintoshi	Grube, 1877
		Glycera neorobusta	Imajima, 2009
		Glycera nicobarica	Grube, 1866
		Glycera okai	Imajima, 2009
		Glycera onomichiensis	Izuka, 1912
		Glycera oxycephala	Ehlers, 1887
		Glycera pacifica	Kinberg, 1865
		Glycera prashadi	Fauvel, 1932
		Glycera pseudorobusta	Böggemann and Fiege, 2001
		Glycera robusta	Ehlers, 1868
		Glycera rouxii	Audouin and Milne-Edwards, 1833
		Glycera russa	Grube, 1870
		Glycera sagittariae	McIntosh, 1885
		Glycera semibranchiopoda	Imajima 2009
		Glycera siphonostoma	(delle Chiaje, 1825)
		Glycera tridactyla	Schmarda, 1861
		Glycera tesselata	Grube, 1863
	Glycerella	*Glycerella magellanica*	(McIntosh, 1885)
	Hemipodus	*Hemipodia yenourensis*	(Izuka, 1912)
		Hemipodia simplex	(Grube, 1857)
Goniadidae	*Glycinde*	*Glycinde nipponica*	Imajima, 1967
		Glycinde oligodon	Southern, 1921
		Glycinde picta	Berkeley, 1927
		Glycinde wireni	Arwidsson, 1899
		Glycinde salvati	Rullier, 1972
	Goniada	*Goniada antipoda*	Augener, 1927
		Goniada annulata	Moore, 1905
		Goniada brunnea	Treadwell, 1906
		Goniada brunnea goronba	Imajima, 2003
		Goniada echinulata	Grube, 1870
		Goniada emerita	Audouin and Milne-Edwards, 1833
		Goniada japonica	Izuka, 1912
		Goniada maculata	Moore, 1903
		Goniada sagamiana	Imajima, 2003
		Goniada tripartita	Monro, 1931
		Goniada vorax	(Kinberg, 1865)
	Goniadella	*Goniadella gracilis*	(Verrill, 1873)
	Ophioglycera	*Ophioglycera foliacea*	(Moore, 1903)
Hesionidae	*Amphiduros*	*Amphiduros fuscescens*	(Marenzeller, 1875)
	Elisesione	*Elisesione imajimai*	Jimi, Eybie-Jacobsen, and Salazar-Vallejo, 2018
		Gyptis lobatus	(Hessle, 1925)
		Gyptis pacificus	Hessle, 1925
	Hesione	*Hesione genetta*	Grube, 1867
		Hesione horsti	Salazar-Vaelljo, 2018

		Hesione intertexta	Grube, 1878
		Hesione reticulata	Marenzeller, 1879
		Hesione uchidai	Salazar-Vaelljo, 2018
	Hesionides	*Hesionides arenaria*	Friedrich, 1936
		Hesionides incisa	Yamanishi, 1984
		Hesionides indooceanica	Westeide and Rao, 1977
		Hesiondes minima serrata	Yamanishi, 1984
		Hesionides unilamellata japonica	Yamanishi, 1984
	Hesiospina	*Hesiospina aurantiaca*	(M, Sars, 1862)
	Heteropodarke	*Heteropodarke kiiensis*	Uchida, 2004
	Ichthyohesione	*Ichthyohesione gorgasiae*	Uchida, 2004
	Leoclatides	*Leoclatides kimuraorum*	Jimi, Tanaka, and Kajihara, 2017
		Leocratides filamentosus	Ehlers, 1908
	Leocrates	*Leocrates auritus*	Hessle, 1925
		Leocrates chinesis	Kinberg, 1866
		Leocrates giardi	Gravier, 1900
	Micropthalmus	*Microphthalmus hartmanae pacificus*	Yamanishi, 1984
		Microphthalmus itoi	Uchida, 2004
	Micropodarke	*Micropodarke dubia*	(Hessle, 1925)
	Oxydromus	*Oxydromus berrisfordi*	(Day, 1960)
		Oxydromus brevipodius	(Uchida, 2004)
		Oxydromus bunbuku	(Uchida, 2004)
		Oxydromus constrictus	(Uchida, 2004)
		Oxydromus fauveli	(Uchida, 2004)
		Oxydromus longifundus	(Uchida, 2004)
		Oxydromus okudai	(Uchida, 2004)
		Oxydromus parapallidus	(Uchida, 2004)
		Oxydromus angustifrons	(Grube, 1878)
		Oxydromus pugettensis	(Johnson, 1901)
	Parahesiocaeca	*Parahesiocaeca japonica*	Uchida, 2004
	Podarkeopsis	*Podarkeopsis brevipalpa*	(Hartmann-Schroder, 1959)
		Podarkeopsis capensis	(Day, 1963)
		Podarkeopsis glabra	(Hartman, 1961)
	Synsyllidia	*Synsyllidia alternata*	Uchida, 2004
	Uncopodarke	*Uncopodarke intermedia*	Uchida, 2004
Nephtyidae	*Aglaophamus*	*Aglaophamus amakusaensis*	Imajima and Takeda, 1985
		Aglaophamus gippslandicus bisectus	Imajima and Takeda, 1985
		Aglaophamus japonicus	Imajima and Takeda, 1985
		Aglaophamus jeffreysii	(McIntosh, 1885)
		Aglaophamus lobatus	Imajima and Takeda, 1985
		Aglaophamus malmgreni	(Theel, 1879)
		Aglaophamus sinensis	(Fauvel, 1932)
		Aglaophamus verrilli	(McIntosh, 1885)
	Dentinephtys	*Dentinephtys glabra*	(Hartman, 1950)
	Inermonephtys	*Inermonephtys japonica*	Imajima and Takeda, 1985
	Micronephtys	*Micronephtys abranchiata*	(Ehlers, 1913)
		Micronephtys sphaerocirrata orientalis	Lee and Jae, 1983
	Nephtys	*Nephtys brachycephala*	Moore, 1903
		Nephtys caeca	(Fabricius, 1780)
		Nephtys californiensis	Hartman, 1938
		Nephtys ciliata	(Muller, 1776)
		Nephtys discors	Ehlers, 1868
		Nephtys longisetosa	Oersted, 1843
		Nephtys neopolybranchia	Imajima and Takeda, 1987
		Nephtys oligobranchia	Southern, 1921
		Nephtys paradoxa	Malm, 1874
		Nephtys polybranchia	Southern, 1921
		Nephtys punctata	Hartman, 1938
		Nephtys serrata	Imajima and Takeda, 1987
		Nephtys sukumoensis	Kitamori, 1960
Nereididae	*Tambalagamia*	*Tambalagamia fauveli*	Pillai, 1961
	Alitta	*Alitta dyamusi*	(Izuka, 1912)
	Ceratocephale	*Ceratocephale borealis*	Wesenberg-Lund, 1950
		Ceratocephale loveni	Malmgren, 1867
		Ceratocephale wakasaensis	Hayashi and Hanaoka, 2000
	Ceratonereis	*Ceratonereis japonica*	Imajima, 1972
		Ceratonereis marmorata	Horst, 1924
		Ceratonereis mirabilis	Kinberg, 1866
	Composetia	*Composetia costae*	(Grube, 1840)
		Composetia hircinicola	(Eisig, 1870)
		Composetia moorei	Imajima, 1972
	Cheilonereis	*Cheilonereis cyclurus*	(Harrington, 1897)
	Hediste	*Hediste atoka*	Sato and Nakashima, 2003
		Hediste diadoroma	Sato and Nakashima, 2003
		Hediste japonica	(Izuka, 1908)
	Leonnates	*Leonnates nipponicus*	Imajima, 1972
		Leonnates persicus	Wesenberg-Lund, 1949
	Namanereis	*Namanereis littoralis species group*	
	Namalycastis	*Namalycastis hawaiiensis*	(Johnson, 1903)
		Namalycastis rhodochorde	Glasby, Miura,Nishi, and Junardi, 2007
	Neanthes	*Neanthes caudata*	(Delle Chiaje, 1828)
		Neanthes pachychaeta	(Fauvel, 1918)
		Neanthes succinea	(Frey and Leuckart, 1847)
		Neanthes unifasciata	(Willey, 1905)
	Nectoneanthes	*Nectoneanthes oxypoda*	(Marenzeller, 1879)
		Nectoneanthes uchiwa	Sato, 2013
	Nereis	*Nereis abyssa*	Imajima, 2009
		Nereis dayana	Sun and Shen in Sun, Wu and Shen, 1978
		Nereis denhamensis	Augener, 1913
		Nereis falcaria	(Willey, 1905)
		Nereis heterocirrata	Treadwell, 1931
		Nereis izukai	Okuda, 1939
		Nereis jacksoni	Kinberg, 1866
		Nereis multignatha	Imajima and Hartman, 1964
		Nereis neoneanthes	Hartman, 1948
		Nereis nichollsi	Kott, 1951
		Nereis pelagica	Linnaeus, 1758
		Nereis sinensis	Wu, Sun and Yang, 1981
		Nereis surugaense	Imajima, 1972
		Nereis vexillosa	Grube, 1851
		Nereis zonata	Malmgren, 1867
	Nicon	*Nicon japonicus*	Imajima, 1972
		Nicon moniloceras	(Hatman, 1940)
		Nicon sinica	Wu and Sun, 1979
	Perinereis	*Perinereis linea*	(Treadwell, 1936)
		Perinereis floridana	(Ehlers, 1868)

		Perinereis euiini	Park and Kim, 2017
		Perinereis neocaledonica	Pruvot, 1930
		Perinereis mictodonta	(Marenzeller, 1879)
		Perinereis wilsoni	(Grube, 1857)
		Perinereis suluana	(Horst, 1924)
		Perinereis vancaurica tetradentata	Imajima, 1972
	Platynereis	*Platynereis australis*	(Schmarda, 1861)
		Platynereis abnormis	(Horst, 1924)
		Platynereis bicanaliculata	(Baird, 1863)
		Platynereis dumerilii	(Audouin and Milne Edwards, 1833)
	Pseudonereis	*Pseudonereis gallapagensis*	Kinberg, 1866
		Pseudonereis anomala	Augener, 1913
		Pseudonereis variegata	(Grube, 1856)
	Rullierinereis	*Rullierinereis misakiensis*	(Imajima and Hayashi, 1969)
		Rullierinereis imajimai	Tanaka and Sato, 2018
	Websterinereis	*Websterinereis foli*	(Fauvel, 1930)
		Websterinereis punctata	(Wesenberg-Lund, 1949)
	Simplisetia	*Simplisetia erythraeensis*	Fauvel, 1918
	Tylorrhynchus	*Tylorrhynchus osawai*	(Izuka, 1903)
Paralacydoniidae	*Paralacydonia*	*Paralacydonia paradoxa*	Fauvel, 1913
Phyllodocidae	*Eteone*	*Eteone japanensis*	McIntosh, 1901
		Eteone longa	(Fabricius, 1780)
		Eteone ornata	Saint-Joseph, 1888
		Eteone vitiazi	Uschakov, 1972
	Clavadove	*Clavadoce annenkovae*	(Uschakov, 1950)
	Eulalia	*Eulalia bilineata*	(Johnston, 1840)
		Eulalia austrophylloformis	Uschakov, 1972
		Eulalia gemina	Kato, Pleijel, and Mawatari, 2001
		Eulalia gravieri	Uschakov, 1972
		Eulalia microphylloides	Hartmann-Schroder, 1979
		Eulalia ornata	Saint-Joseph, 1888
		Eulalia pacifica	(Imajima, 1964)
		Eulalia viridis	(Linnaeus, 1767)
		Eulalia viridis japonensis	Imajima and Hartman, 1964
		Eulalia pacifica	(Imajima, 1964)
		Eulalia tenax	(Grube, 1878)
	Eumida	*Eumida albopicta*	(Marenzeller, 1879)
		Eumida notoensis	(Imajima, 1967)
		Eumida nuchala	(Uschakov, 1972)
		Eumida sanguinea	(Oersted, 1843)
	Hesionura	*Hesionura japonica*	Yamanishi, 1980
		Hesionura australiensis	Hatmann-Schroder and Parker, 1990
	Lugia	*Lugia abyssicola*	Uschakov, 1972
	Mysta	*Mysta ctena*	Kato, Pleijel, and Mawatari, 2001
		Mysta ornata	(Grube, 1878)
	Mystides	*Mystides japonica*	Imajima, 2003
		Mystides triangulifera	(Augener, 1913)
	Nereiphylla	*Nereiphylla castanea*	(Marenzeller, 1879)
		Nereiphylla cassa	Imajima, 2003
		Nereiphylla hela	Kato and Mawatari, 1999
	Notophyllum	*Notophyllum imajimai*	Kato and Pleijel, 2002
		Notophyllum imbricatum	Moore, 1903
		Notophyllum japonicum	(Marenzeller, 1879)
		Notophyllum multicirris	(Grube, 1878)
		Notophyllum sagamianum	Izuka, 1912
		Notophyllum splendens	(Schmarda, 1861)
	Phyllodoce	*Phyllodoce japonica*	Imajima, 1967
		Phyllodoce foliosopapillata	Willey, 1905
		Phyllodoce australis	Day, 1975
		Phyllodoce citrina	Malmgren, 1865
		Phyllodoce elongata	Imajima, 1967
		Phyllodoce groenlandica	(Oersted, 1843)
		Phyllodoce koreana	(Lee and Jae, 1985)
		Phyllodoce lineata tosaensis	Imajima, 2001
		Phyllodoce longifrons	Ben-Eliahu, 1972
		Phyllodoce longipes	Kinberg, 1866
		Phyllodoce macrolepidota	Schmarda, 1861
		Phyllodoce maculata	(Linnaeus, 1767)
		Phyllodoce madeirensis	Langerhans, 1880
		Phyllodoce malmgreni	Gravier, 1900
		Phyllodoce papillosa	Uschakov and Wu, 1959
		Phyllodoce pulla	Treadwell, 1926
		Phyllodoce violacea	Treadwell, 1926
	Paranaitis	*Paranaitis caeca*	(Moore, 1903)
		Paranatis polynoides	(Moore, 1909)
		Paranatis serrata	Imajima, 2003
		Paranaitis uschakovi	Eibye-Jacobsen, 1991
	Protomystides	*Protomystides hatsushimaensis*	Miura, 1988
		Protomystides longiantennata	(Hartmann-Schroder, 1981)
		Protomystides orientalis	Uschakov, 1972
	Pseudomystides	*Pseudomystides rarica*	(Uschakov, 1958)
	Pterocirrus	*Pterocirrus macroceros*	(Grube, 1860)
		Pterocirrus macroceros orientalis	(Imajima and Hartman, 1964)
		Pterocirrus imajimai	Uschakov, 1972
		Pterocirrus notoensis	Imajima, 1967
	Sige	*Sige falsa*	(Day, 1960)
		Sige dogieli	(Uschakov, 1953)
	Sphaerodoce	*Sphaerodoce quadraticeps*	(Grube, 1878)
Pilargidae	*Ancistrosyllis*	*Ancistrosyllis groenlandica*	McIntosh, 1879
		Ancistrosyllis matsunagaensis	(Kitamori, 1960)
	Cabira	*Cabira pilargiformis japonica*	Imajima, 1987
	Litocorsa	*Litocorsa dentata*	Imajima, 1987
	Pilargis	*Pilargis berkeleyae*	Monro, 1933
	Sigambra	*Sigambra bassi*	(Hartman, 1947)
		Sigambra bidentata	Britayev and Saphronova, 1981
		Sigambra hanaokai	(Kitamori, 1960)
	Synelmis	*Synelmis albini*	(Langerhans, 1881)
		Synelmis dineti	Katzmann, Laubier and Ramos, 1974
	Pseudexogone	*Pseudexogone imajimai*	Salazar-Valljo, Bailey-Brock, and Dreyer, 2007
	Pisione	*Pisione africana*	Day, 1963
		Pisione brevicirra platycauda	Yamanishi, 1998
		Pisione bulbifera	Yamanishi, 1998

		Pisione crassa	Yamanishi, 1976
		Pisione gopalai vannifera	Yamanishi, 1998
		Pisione mista	Yamanishi, 1998
		Pisione papillata	Yamanishi, 1976
		Pisione papuensis brevis	Yamanishi, 1998
		Pisione parva	De Wilde and Govaere, 1995
		Pisione paucisetosa	Yamanishi, 1998
		Pisione subulata	Yamanishi, 1992
		Pisione umbraculifera	Yamanishi, 1998
		Pisione vestigialis	Yamanishi, 1998
	Pisionella	*Pisionella hancocki*	Hartman, 1939
	Pisionidens	*Pisionidens maturata*	Yamanishi, 1976
Acoetidae	*Acoetes*	*Acoetes jogasimae*	(Izuka, 1912)
	Euarche	*Euarche tubifex*	Ehlers, 1887
	Eupanthalis	*Eupanthalis aena*	(Moore, 1903)
		Eupanthalis edriophthalma	(Potts, 1910)
	Eupolyodontes	*Eupolyodontes gulo*	(Grube, 1855)
	Polyodontes	*Polyodontes atromarginatus*	Horst, 1917
		Polyodontes maxillosus	(Ranzani, 1817)
Aphroditidae	*Aphrodita*	*Aphrodita aculeata*	Linnaeus, 1758
		Aphrodita aphroditoides	(McIntosh, 1885)
		Aphrodita australis	Baird, 1865
		Aphrodita daiyumaruae	Imajima, 2005
		Aphrodita goolmarris	Hutchings and McRae, 1993
		Aphrodita japonica	Marenzeller, 1879
		Aphrodita macroculata	Imajima, 2001
		Aphrodita negligens	Moore, 1905
		Aphrodita nipponensis	Imajima, 2003
		Aphrodita sibogae	(Horst, 1916)
		Aphrodita talpa	Quatrefages, 1866
		Aphrodita tosaensis	Imajima, 2001
		Aphrodita watasei	Izuka, 1912
	Aphrogenia	*Aphrogenia nigropunctata*	Horst, 1916
		Aphrogenia alba	Kinberg, 1855
	Heteraphrodita	*Heteraphrodita intermedia*	(McIntosh, 1885)
	Laetmonice	*Laetmonice japonica*	McIntosh, 1885
		Laetmonice benthaliana	McIntosh, 1885
		Laetmonice dolichoceras	(Haswell, 1883)
		Laetmonice hystrix	(Savigny in Lamarck, 1818)
		Laetmonice pellucidae	Moore, 1903
		Laetmonice producta	Grube, 1876
	Palmyra	*Palmyra aurifera*	Savigny in Lamarck, 1818
	Pontogenia	*Pontogenia dentata*	Imajima, 2003
		Pontogenia macleari	(Haswell, 1883)
		Pontogenia mcintoshi	Monro, 1924
		Pontogenia sagamiana	Imajima, 2003
		Pontogenia nuda	Horst, 1917
Polynoidae	*Arctonoella*	*Arctonoella sinagawaensis*	(Izuka, 1912)
	Arctonoe	*Arctonoe vittata*	(Grube, 1855)
	Australaugeneria	*Australaugeneria michaelseni*	Pettibone, 1969
		Australaugeneria rutilans	(Grube, 1878)
	Australonoe	*Australonoe japonica*	Imajima, 2011
	Bylgides	*Bylgides macrolepida*	(Moore, 1905)
	Gastrolepidia	*Gastrolepidia clavigera*	Schmarda, 1861
	Medioantenna	*Medioantenna clavata*	Imajima, 1997
	Paradyte	*Paradyte crinoidicola*	(Potts, 1910)
		Paradyte levis	Marenzeller, 1902
	Showascalisetosus	*Showascalisetosus shimizui*	Imajima, 1997
	Lepidonotopodium	*Lepidonotopodium okinawae*	Sui and Li, 2017
	Admetellla	*Admetella longipedata*	(McIntosh, 1885)
	Bathyedithia	*Bathyedithia berkeleyi*	(Levenstein, 1971)
	Bathyeliasona	*Bathyeliasona kirkegaardi*	(Uschakov, 1971)
	Bathykermadeca	*Bathykermadeca hadalis*	(Kirkegaard, 1956)
	Bathymariana	*Bathymariana zebra*	Levenstein, 1978
	Branchipolynoe	*Branchipolynoe pettiboneae*	Miura and Hashimoto, 1991
	Opisthotrochopodus	*Opisthotrochopodus japonicus*	Miura and Hashimoto, 1991
	Cervilia	*Cervilia japonica*	Frickhinger, 1916
	Enipo	*Enipo torelli*	(Malmgren, 1866)
	Eunoe	*Eunoe barbata*	Moore, 1910
		Eunoe depressa	Moore, 1905
		Eunoe hozawai	Okuda, 1939
		Eunoe oerstedi	Malmgren, 1865
		Eunoe shirikishinai	Imajima and Hartman, 1964
		Eunoe spinosa	Imajima, 1997
		Eunoe subfumida	(Grube, 1878)
		Eunoe yedoensis	McIntosh, 1885
	Gattyana	*Gattyana ciliata*	Moore, 1902
	Harmothoe	*Harmothoe aspera*	(Hansen, 1878)
		Harmothoe cylindrica	Imajima, 1997
		Harmothoe dictyophora	(Grube, 1878)
		Harmothoe extenuata	(Grube, 1840)
		Harmothoe forcipata	(Marenzeller, 1902)
		Harmothoe glomerosa	Imajima, 1997
		Harmothoe grandispina	Annenkova, 1937
		Harmothoe holothuricola	Izuka, 1912
		Harmothoe imbricata	(Linneaus, 1767)
		Harmothoe impar	(Johnston, 1839)
		Harmothoe praeclara	(Haswell, 1883)
		Harmothoe sexdentata	(Marenzeller, 1902)
		Harmothoe spinifera	(Ehlers, 1864)
		Harmothoe waahli	(Kinberg, 1855)
		Harmothoe yendoi	Izuka, 1912
		Harmothoe lagiscoides serrata	(Day, 1963)
	Hesperonoe	*Hesperonoe japonensis*	Hong, Lee, and Sato, 2017
	Hololepidella	*Hololeppidella boninensis*	Nishi and Tachikawa, 1998
		Hololepidella comatula	Uchida, 1975
		Hololepidella commensalis	Willey, 1905
		Hololepidella nigropunctata	(Horst, 1915)
	Lagisca	*Lagisca lamellifera*	(Marenzeller, 1879)
		Lagisca nigra	(Frickhinger, 1916)
		Lagisca yokohamiensis	McIntosh, 1885
	Leucia	*Leucia flaccida*	(Potts, 1910)
	Macellicephala	*Macellicephala affinis*	Fauvel,1914
		Macellicephala mirabilis	McIntosh, 1885
		Macellicephala zenkevitchi	Uschakov, 1955
	Macellicephaloides	*Macellicephaloides grandicirra*	Uschakov, 1955
		Macellicephaloides verrucosa	Uschakov, 1955
		Macellicephaloides villosa	Levenstein, 1982

		Macellicephaloides vitiazi	Uschakov, 1955
		Macellicephaloides uschakovi	Levenstein, 1971
	Malmgreniella	*Malmgreniella phillipensis*	Knox and Cameron, 1971
	Paralepidonotus	*Paralepidonotus ampulliferus*	(Grube, 1878)
	Polynoella	*Polynoella levisetosa*	McIntosh, 1885
	Pottsiscalisetosus	*Pottsiscalisetosus praelongus*	(Marenzeller, 1902)
	Subadyte	*Subadyte papillifera*	(Horst, 1915)
	Hyperhalosydna	*Hyperhalosydna striata*	(Kinberg, 1855)
	Lepidasthenia	*Lepidasthenia grimaldi*	(Marenzeller, 1892)
		Lepidasthenia interrupta	(Marenzeller, 1902)
		Lepidasthenia izukai	Imajima and Hartman, 1964
		Lepidasthenia magnacornuta	(Moore, 1903)
		Lepidasthenia mossambica	Day, 1962
		Lepidasthenia ocellata	(McIntosh, 1885)
		Lepidasthenia ohshimai	Okuda, 1936
	Showapolynoe	*Showapolynoe microsetosa*	(Izuka, 1912)
	Gauduchaudius	*Gaudichaudius cimex*	(Quatrefages, 1866)
	Alentiana	*Alentiana aurantiaca*	(Verrill, 1885)
	Euphione	*Euphione branchifera*	(Moore, 1903)
		Euphione chitoniformis	(Moore, 1903)
		Euphione elisabethae	McIntosh, 1885
	Halosydna	*Halosydna brevisetosa*	Kinberg, 1855
	Hermadion	*Hermadion nipponicus*	Imajima and Hartman, 1964
	Hermenia	*Hermenia acantholepis*	(Grube, 1876)
	Hermilepidonotus	*Hermilepidonotus robustus*	(Moore, 1905)
		Hermilepidonotus helotypus	(Grube, 1877)
	Heteralentia	*Heteralentia ptycholepis*	(Grube, 1878)
	Hololepida	*Hololepida japonica*	Imajima, 1997
	Lepidastheniella	*Lepidastheniella nishii*	Barnich and Fiege, 2004
	Lepidonotus	*Lepidonotus albopustulatus*	Horst, 1915
		Lepidonotus caelorus	Moore, 1903
		Lepidonotus carinulatus	(Grube, 1870)
		Lepidonotus dentatus	Okuda and Yamada, 1954
		Lepidonotus elongatus	Marenzeller, 1902
		Lepidonotus glaber	Imajima, 1997
		Lepidonotus glaucus	(Peters, 1854)
		Lepidonotus hupferi	Augener, 1918
		Lepidonotus sagamianus	(Izuka, 1912)
		Lepidonotus specklus	Imajima, 2011
		Lepidonotus spiculus	(Treadwell, 1906)
		Lepidonotus squamatus	(Linnaeus, 1767)
		Lepidonotus takunanae	Imajima, 2011
		Lepidonotus tenuisetosus	(Gravier, 1902)
		Lepidonotus yorkianus	Augener, 1922
	Nonparahalosydna	*Nonparahalosydna pleiolepis*	(Marenzeller, 1879)
	Parahalosydona	*Parahalosydna krassini*	(Annenkova, 1952)
	Thormora	*Thormora jukesii*	Baird, 1865
	Weberia	*Weberia abyssicola*	Imajima, 2009
Iphionidae	*Iphione*	*Iphione muricata*	(Savigny, 1818)
		Iphione ovata	Kinberg, 1856
		Iphione treadwelli	Pettibone, 1986
	Iphionella	*Iphionella philippinensis*	Pettibone, 1986
Sigalionidae	*Euthalenessa*	*Euthalenessa digitata*	(McIntosh, 1885)
		Euthalenessa festiva	(Grube, 1875)
	Ehlersileanira	*Ehlersileanira incisa*	(Grube, 1877)
	Heteropelogenia	*Heteropelogenia japonica*	Imajima, 2006
	Horstileanira	*Horstileanira crosslandi*	Pettibone, 1970
	Mustaquimsthenelais	*Mustaquimsthenelais dendropapillata*	Wehe, 2007
	Neoleanira	*Neoleanira areolata*	(McIntosh, 1885)
	Neopsammolyce	*Neopsammolyce occidentalis*	(McIntosh, 1885)
	Pottsipelogenia	*Pottsipelogenia malayana*	Horst, 1913
		Pottsipelogenia gracilis	(Potts, 1910)
	Sigalion	*Sigalion lituus*	Imajima, 2005
		Sigalion amboinensis	Horst, 1917
		Sigalion edwardsi	Kinberg, 1856
		Sigalion orientalis	Imajima, 2009
		Sigalion papillosum	Imajima, 1967
		Sigalion shimodaensis	Imajima, 2006
		Sigalion spinosus	(Hartman, 1939)
		Sigalion squamosus	Delle Chiaje, 1830
		Sigalion tanseimaruae	Imajima, 2006
	Sthenelais	*Sthenelais boa*	(Johnson, 1833)
		Sthenelais fusca	Johnson, 1897
		Sthenelais brachiata	Imajima, 2003
		Sthenelais helenae	Kinberg, 1855
		Sthenelais mitsuii	(Okuda, 1938)
	Sthenelanella	*Sthenelanella uniformis*	Moore, 1910
		Sthenelanella corallicola	Thomassin, 1972
		Sthenelanella ehlersi	(Horst, 1916)
		Sthenelanella japonica	Imajima, 2003
	Leanira	*Leanira coeca*	Horst, 1917
	Labioleanira	*Labioleanira yhleni*	(Malmgren, 1867)
	Labiosthenolepis	*Labiosthenolepis andamanensis*	Aungtonya, 2007
		Labiosthenolepis laevis	(McIntosh, 1885)
		Labiosthenolepis sibogae	(Host, 1917)
	Sthenolepis	*Sthenolepis japonica*	(McIntosh, 1885)
		Sthenolepis izuensis	(Takahashi, 1938)
	Thalenessa	*Thalenessa digitata*	McIntosh, 1885
	Pelogenia	*Pelogenia zeylanica*	(Willey, 1905)
		Pelogenia antipoda	(Schmarda, 1861)
	Willeysthenelais	*Willeysthenelais diplocirrus*	(Grube, 1875)
		Willeysthenelais heterochela	(Host, 1917)
		Willeysthenelais horsti	Pettibone, 1971
		Willeysthenelais suluensis	Pettibone, 1971
Pholoidae	*Imajimapholoe*	*Imajimapholoe parva*	(Imajima and Hartman, 1964)
	Pholoe	*Pholoe polymorpha*	(Hartmann-Schroder, 1962)
	Pholoides	*Pholoides dorsipapillatus*	(Marenzeller, 1893)
Sphaerodoridae	*Ephesiella*	*Ephesiella brevicapitis*	(Moore, 1909)
		Ephesiella gallardi	Fauchald, 1974
		Ephesiella oculata	Imajima, 2003
	Sphaerodoropsis	*Sphaerodoropsis biserialis*	(Berkeley and Berkeley, 1944)
		Sphaerodoropsis minuta	(Webster and Benedict, 1887)
		Sphaerodoropsis sphaerulifer	Moore, 1909
	Sphaerodorum	*Sphaerodorum gracilis*	(Rathke, 1843)
Syllidae	*Alluaudella*	*Alluaudella madagascariensis*	Gravier, 1905
	Autolytus	*Autolytus convolutus*	Cognetti, 1953
		Autolytus magnus	Berkeley, 1923
		Autolytus nipponensis	Imajima and Hartman, 1964

	Autolytus tsugarus	Imajima, 1966
	Autolytus tuberculatus	(Schmarda, 1861)
	Autolytus usujiriensis	Zachs, 1933
Epigamia	*Epigamia alternata*	(Imajima and Hartman, 1964)
	Epigamia usaensis	(Imajima, 1966)
	Epigamia noroi	(Imajima and Hartman, 1964)
Imajimaea	*Imajimaea japonensis*	(Imajima and Hartman, 1964)
Myrianida	*Myrianida pachycera*	(Augener, 1913)
	Myrianida dentalius	(Imajima, 1966)
	Myrianida irregularis	(Imajima and Hartman, 1964)
	Myrianida pentadentatus	(Imajima, 1966)
	Myrianida spinoculatus	(Imajima, 1966)
Paraprocera	*Paraprocera tamanus*	(Imajima, 1966)
Procerea	*Procerea boreata*	(Imajima, 1966)
	Procerea cornuta	Agassiz, 1863
	Procerea kiiensis	(Imajima, 1966)
	Procerea longicirrata	(Imajima, 1966)
	Procerea misakiensis	(Imajima, 1966)
	Procerea longilappeta	(Imajima, 1966)
	Procerea mukaishimensis	(Imajima, 1966)
	Procerea okadai	(Imajima, 1966)
	Procerea prismatica	(Fabricius, 1780)
	Procerea setoensis	(Imajima, 1966)
	Procerea vulgaria	(Imajima, 1966)
Virchowia	*Virchowia japonica*	(Imajima and Hartman, 1964)
Amblyosyllis	*Amblyosyllis speciosa*	Izuka, 1912
Brevicirrosyllis	*Brevicirrosyllis weismanni*	(Langerhans, 1879)
Diplosyllis	*Diplosyllis japonica*	(Imajima and Hartman, 1964)
Eusyllis	*Eusyllis assimilis*	Marenzeller, 1875
	Eusyllis blomstrandi	Malmgren, 1867
	Eusyllis habei	Imajima, 1966
	Eusyllis inflata	(Marenzeller, 1879)
	Eusyllis irregulata	Imajima, 1966
	Eusyllis japonica	Imajima and Hartman, 1964
	Eusyllis lamelligera	Marion and Bobretzky, 1875
	Eusyllis longicirrata	Imajima, 1966
Nudisyllis	*Nudisyllis tinihekea*	Knox and Cameron, 1970
Odontosyllis	*Odontosyllis cucullata*	(McIntosh, 1908)
	Odontosyllis detecta	Augener, 1913
	Odontosyllis fulgurans	Imajima, 1966
	Odontosyllis globulicirrata	Hartmann-Schroder, 1981
	Odontosyllis hyalina	Grube, 1878
	Odontosyllis maculata	Uschakov, 1950
	Odontosyllis rubrofasciata	Grube, 1878
	Odontosyllis setoensis	Imajima, 1966
	Odontosyllis trilineata	Imajima,2003
	Odontosyllis undecimdonta	Imajima and Hartman, 1964
Paraehlersia	*Paraehlersia ehlersiaformis*	(Augener, 1913)
	Paraehlersia ferrugina	(Langerhans, 1881)
Pinosyllis	*Pinosyllis magnifica*	Moore, 1906
Opistodonta	*Opisthodonta uraga*	Imajima, 1966
	Opisthodonta morena	Hartmann-Schroder, 1960
Streptospinigera	*Streptospinigera alternocirrus*	Ohwada, 1988
Syllides	*Syllides japonica*	Imajima, 1966

	Syllides papillosa	Hartmann-Schroder, 1960
Salvatoria	*Salvatoria clavata*	(Claparede, 1863)
Exogone	*Exogone breviantennata*	Hartmann-Schroder, 1959
	Exogone exilis	Imajima, 2003
	Exogone gemmifera	Pagenstecher, 1862
	Exogone uniformis	Hartman, 1961
Eurysyllis	*Eurysyllis japonicum*	Imajima, 2003
	Eurysyllis pacificus	(Hartman, 1954)
Erinaceusyllis	*Erinaceusyllis erinaceus*	Claparede, 1863
Sphaerosyllis	*Sphaerosyllis hirsuta*	Ehlers, 1897
Alcyonosyllis	*Alcyonosyllis exiliformis*	(Imajima, 2003)
	Alcyonosyllis bisetosa	Hartmann-Schroder, 1960
	Alcyonosyllis glasbyi	San Martin and Nishi, 2003
Branchiosyllis	*Branchiosyllis exilis*	(Gravier, 1900)
Haplosyllis	*Haplosyllis anthogorgicola*	Utinomi, 1956
	Haplosyllis crassicirrata	Aguado, San Martin, and Nishi, 2006
	Haplosyllis ohma	(Imajima and Hartman, 1964)
	Haplosyllis spongicola	(Grube, 1855)
	Haplosyllis spongicola tentaculata	(Marion, 1879)
	Haplosyllis spongiphila	(Verrill, 1885)
Opisthosyllis	*Opisthosyllis brunnea*	Langerhans, 1879
	Opisthosyllis australis	Augener, 1913
	Opisthosylis corallicora	Hartmann-Schroder, 1965
	Opisthosyllis japonica	Imajima, 1966
	Opisthosyllis longicirrata	Monro, 1939
	Opisthosyllis viridis	Langerhans, 1879
Parasphaerosyllis	*Parasphaerosyllis ezoensis*	Imajima and Hartman, 1964
	Parasphaerosyllis indica	Monro, 1937
	Parasphaerosyllis setoensis	Imajima, 1966
Syllis	*Syllis amica*	Quatrefages, 1865
	Syllis armillaris	(Muller, 1771)
	Syllis exiliformis	Imajima, 2003
	Syllis fasciata	(Malmgren, 1867)
	Syllis gracilis	Grube, 1840
	Syllis marugani	Aguado, San Martin, and Nishi, 2006
	Syllis multiannulata	Aguado, San Martin, and Nishi, 2008
	Syllis ramosa	McIntosh, 1879
	Syllis pectinans	Haswell, 1920
	Syllis pilosa	Aguado, San Martin, and Nishi, 2008
	Syllis pigmentata	(Chamberlin, 1919)
	Syllis rubicunda	Aguado, San Martin, and Nishi, 2008
	Syllis japonica	Imajima, 1966
	Syllis cornuta	(Rathke, 1843)
	Syllis rosea	(Langerhans, 1879)
Trypanosyllis	*Trypanosyllis(Trypanedenta)gemmipara*	Johnson, 1901
	Trypanosyllis(Trypanedenta)taeniaformis	(Haswell, 1886)
Trypanobia	*Trypanobia asterobia*	(Okada, 1933)
	Trypanobia depressa	(Augener, 1913)
	Trypanobia foliosa	Imajima, 2003

	Trypanosyllis	*Trypanosyllis(Trypanosyllis)coeliaca nipponica*	Imajima and Hartman, 1964
	Typosyllis	*Typosyllis aciculata*	Treadwell,1945
		Typosyllis aciculata orientalis	Imajima and Hartman, 1964
		Typosyllis adamanteus kurilensis	Chlebovitsch, 1959
		Typosyllis alternata	(Moore, 1908)
		Typosyllis armillaris	(Muller, 1771)
		Typosyllis cornuta	(Rathke, 1843)
		Typosyllis ehlersioides	Marenzeller, 1890
		Typosyllis hyalina	(Grube, 1863)
		Typosyllis lunaris	Imajima, 1966
		Typosyllis maculata	Imajima, 1966
		Typosyllis monilata	Imajima, 1966
		Typosyllis nipponica	Imajima, 1966
		Typosyllis okadai	(Fauvel, 1934)
		Typosyllis prolifera	(Krohn, 1852)
		Typosyllis regulata	Imajima, 1966
		Typosyllis rosea	(Langerhans, 1879)
		Typosyllis setoensis	Imajima, 1966
		Typosyllis variegata	(Grube, 1860)
		Typosyllis ehlersioides	Marenzeller, 1890
Amphinomidae	*Anphinome*	*Anphinome rostrata*	(Pallas, 1766)
	Chloeia	*Chloeia flava*	(Pallas, 1766)
		Chloeia fusca	McIntosh, 1885
	Eurythoe	*Eurythoe complanata*	(Pallas, 1766)
	Hipponoa	*Hipponoa gaudichaudi*	Audouin and Milne-Edwards, 1833
	Notopygos	*Notopygos gardineri*	Potts, 1909
		Notopygos variabilis	Potts, 1909
		Notopygos gigas	Horst, 1911
		Notopygos mitsukurii	Izuka, 1910
		Notopygos sibogae	Horst, 1911
	Paramphinome	*Paramphinome grandis*	Gustafson, 1930
	Pareurythoe	*Pareurythoe japonica*	Gustafson, 1930
		Pareurythoe hirsuta	Wesenberg-Lund, 1949
		Pareurythoe parvecarunculata	(Horst, 1912)
		Pareurythoe pitipanaensis	De Silva, 1965
	Pherecardia	*Pherecardia striata*	Kinberg, 1857
		Pherecardia maculata	Imajima, 2003
	Pseudeurythoe	*Pseudeurythoe hirsuta*	Wesenberg-Lund, 1949
		Pseudeurythoe oculifera	(Augener, 1913)
		Pseudeurythoe oligobranchia	Wu, Shen and Chen, 1975
Euphrosinidae	*Euphrosine*	*Euphrosine foliosa*	Audouin and Milne-Edwards, 1833
		Euphrosine borealis	Orsted, 1843
		Euphrosine digitalis	Imajima, 2009
		Euphrosine longesetosa	Horst, 1903
		Euphrosine mucosa	Horst, 1903
		Euphrosine myrtosa	Savigny in Lamarck, 1818
		Euphrosine orientalis	Gustafson, 1930
		Euphrosine polyclada	Imajima, 2003
		Euphrosine pseudonotialis	Imajima, 2009
		Euphrosine ramosa	Imajima, 2003
		Euphrosine sibogae	Horst, 1903
		Euphrosine superba	Marenzeller, 1879
		Euphrosine tosaensis	Imajima, 2001
Spintheridae	*Spinther*	*Spinther ericinus*	Yamamoto and Imajima, 1985
		Spinther japonicus	Imajima and Hartman, 1964
		Spinther sagamiensis	Imajima, 2003
Oenonidae	*Arabella*	*Arabella iricolor*	(Montagu, 1904)
		Arabella geniculata japonica	Okuda, 1939
		Arabella mutans	(Chamberlin, 1919)
		Arabella zonata	(Moore, 1903)
	Drilonereis	*Drilonereis falcata japonica*	Imajima, 1964
		Drilonereis filum	(Claparede, 1868)
		Drilonereis robustus	(Moore, 1903)
	Notocirrus	*Notocirrus japonicus*	(Okuda, 1939)
	Halla	*Halla okudai*	Imajima, 1967
	Oenone	*Oenone fulgida*	(Savigny, 1818)
	Dorvillea	*Dorvillea matsushimaensis*	(Okuda, 1950)
		Dorvillea rubrovittata	(Grube, 1855)
		Dorvillea similis	(Crossland, 1924)
	Papilliodorvillea	*Papilliodorvillea australiensis*	(McIntosh, 1885)
		Papilliodorvillea gardineri	(Grossland, 1924)
	Protodorvillea	*Protodorvillea kefersteini*	Pettibone, 1961
		Protodorvillea gracilis	(Hartman, 1938)
	Schistomeringos	*Schistomeringos anoculata*	Jumars, 1974
		Schistomeringos caeca	(Webster and Benedict, 1884)
		Schistomeringos japonica	(Annenkova, 1937)
		Schistomeringos rudolphi	(delle Chiaje, 1828)
	Iphitime	*Iphitime doderleinii*	Marenzeller, 1902
	Ophryotrocha	*Ophryotrocha kagoshimaensis*	Miura, 1997
		Ophryotrocha japonica	Paxton and Akesson, 2010
		Ophryotrocha labronica	Bacci and La Greca, 1961
		Ophryotrocha labronica pacifica	Paxton and Akesson, 2007
		Ophryotroch notoglandulata	Pfannenstiel, 1972
		Ophryotrocha wubaolingi	Miura, 1997
Eunicidae	*Eunice*	*Eunice afra*	Peters, 1854
		Eunice afra paupera	Grube, 1878
		Eunice aequabilis	Grube, 1878
		Eunice alata	Miura, 1977
		Eunice annulicirrata	Miura, 1986
		Eunice annulicornis	Johnston, 1865
		Eunice antennata	(Lamarck,1818)
		Eunice aphroditois	(Pallas, 1788)
		Eunice australis	Quatrefages, 1866
		Eunice congesta	Marenzeller, 1879
		Eunice curticirrus	Knox,1960
		Eunice dilatata	Grube, 1877
		Eunice fauveli	Gravier, 1900
		Eunice fauchaldi	Miura, 1986
		Eunice flavopicta	Izuka, 1912
		Eunice gracilicirrata	(Treadwell, 1922)
		Eunice indica	Kinberg, 1865
		Eunice japonica	Fauchald, 1992
		Eunice kobiensis	McIntosh, 1885
		Eunice laticeps	Ehlers, 1868
		Eunice longicirrus	Grube, 1869
		Eunice masudai	Miura, 1986

		Eunice medicina	Moore, 1903
		Eunice microprion	Marenzeller, 1879
		Eunice mindanavensis	McIntosh, 1885
		Eunice misakiensis	(Miura, 1987)
		Eunice mucronata	Moore, 1903
		Eunice northioidea brevibranchiata	Miura, 1986
		Eunice northioidea	Moore, 1903
		Eunice ovalifera	Fauvel, 1936
		Eunice palauensis	Okuda, 1937
		Eunice petersi	Fauchald, 1992
		Eunice profunda	Miura, 1987
		Eunice pusilla	Imajima, 2011
		Eunice quinquifida	Moore, 1903
		Eunice tanseiae	Miura, 1986
		Eunice torresiensis	McIntosh, 1885
		Eunice tibiana	(Pourtales, 1863)
		Eunice unibranchiata	Imajima, 2006
		Eunice vittata	(delle Chiaje, 1828)
		Eunice yamamotoi	Miura, 1986
	Nicidion	*Nicidion cariboea*	(Grube, 1865)
		Nicidion cincta	Kinberg, 1865
	Euniphysa	*Euniphysa spinea*	(Miura, 1977)
	Lysidice	*Lysidice ninetta*	Audouin and Milne-Edwards, 1833
	Marphysa	*Marphysa bifurcata*	Kott, 1951
		Marphysa bellii	(Audouin and Milne Edwards, 1834)
		Marphysa conferta	Moore, 1911
		Marphysa depressa	(Schmarda, 1861)
		Marphysa kinbergi	McIntosh,1910
		Marphysa macintoshi	Crossland, 1903
		Marphysa monrtenseni	Monro, 1928
		Marphysa sanguinea	(Montagu, 1815)
		Marphysa stragulum	(Grube, 1878)
		Marphysa tamurai	Okuda, 1934
	Nematonereis	*Nematonereis hebes*	Verrill,1900
		Nematonereis unicornis	(Grube, 1840)
	Palola	*Palola siciliensis*	(Grube,1840)
	Paucibranchia	*Paucibranchia disjuncta*	(Hartman, 1961)
Hartmaniellidae	*Hartmaniella*	*Hartmaniella erecta*	Imajima, 1977
Lumbrineridae	*Augeneria*	*Augeneria bidens*	(Ehlers,1887)
		Augeneria polytentaculata	Imajima and Higuchi, 1975
	Eranno	*Eranno abyssicola*	(Uschakov, 1950)
		Eranno bifurcata	(McIntosh, 1885)
		Eranno bifrons	Kinberg,1865
		Eranno tosaensis	Imajima, 2001
	Lumbrinerides	*Lumbrinerides acutus japonicus*	Imajima, 1985
		Lumbrinerides dayi	Perkins, 1979
		Lumbrinerides kristiani	Miura, 2017
		Lumbrinerides shimodaensis	Imajima, 1985
		Lumbrinerides tamaii	Miura, 2017
		Lumbrinerides yoshioi	Miura, 2017
	Lumbrineriopsis	*Lumbrineriopsis tsushimaensis*	Imajima and Higuchi, 1975
		Lumbrineriopsis paucidentata	Imajima, 2011
	Lumbrineris	*Lumbrineris amboinensis*	(Grube, 1877)
		Lumbrineris bifurcata	(McIntosh, 1885)
		Lumbrineris brevicirra	(Schmarda, 1861)
		Lumbrineris flbellicola	(Fage, 1936)
		Lumbrineris higuchiae	Carrera-Parra, 2006
		Lumbrineris imajimai	Carrera-Parra, 2006
		Lumbrineris inflata	Moore, 1911
		Lumbrineris japonica	(Marenzeller, 1879)
		Lumbrineris latreilli	(Audouin and Milne Edwards, 1834)
		Lumbrineris nishii	Carrera-Parra, 2006
		Lumbrineris sphaerocephala	Imajima and Higuchi, 1975
		Lumbrineris tetraura	(Schmarda, 1861)
	Ninoe	*Ninoe japonica*	Imajima and Higuchi, 1975
		Ninoe palmata	Moore, 1903
	Paraninoe	*Paraninoe hartmanae*	Levenstein, 1973
		Paraninoe simpla	Moore, 1905
	Scoletoma	*Scoletoma fragilis*	(O. F. Müller, 1776)
		Scoletoma longifolia	(Imajima and Higuchi, 1975)
		Scoletoma nipponica	(Imajima and Higuchi, 1975)
	Kuwaita	*Kuwaita heteropoda*	(Marenzeller, 1879)
Onuphidae	*Anchinothria*	*Anchinothria cirrobranchiata*	(Moore, 1903)
		Anchinothria crassisetosa	(Chamberlin, 1919)
		Anchinothria macrobranchiata	(McIntosh, 1885)
		Anchinothria tosaensis	Imajima, 1999
	Hyalinoecia	*Hyalinoecia abranchiata*	Lechapt, 1997
		Hyalinoecia acuta	Imajima, 1999
		Hyalinoecia papillata	Imajima, 1999
		Hyalinoecia tubicola	(O. F. Müller, 1776)
	Nothria	*Nothria grossa*	Imajima, 1989
		Nothria atlantica	(Hartman, 1965)
		Nothria conchylega	(M. Sars, 1835)
		Nothria itoi	Maekawa and Hayashi, 1989
		Nothria oblonga	Imajima, 1999
		Nothria otsuchiensis	Imajima, 1986
		Nothria otsuchiensis binoculata	Maekawa and Hayashi, 1989
		Nothria paxtonae	Imajima, 1999
	Diopatra	*Diopatra nishii*	Paxton, 2015
		Diopatra sugokai	Izuka, 1907
		Diopatra neapoolitana	Delle Chiaje, 1841
	Epidiopatra	*Epidiopatra rugosa*	Kucheruk, 1979
	Kinbergonuphis	*Kinbergonuphis bathyalis*	Kirkegaard, 1995
		Kinbergonuphis enoshimaensis	Imajima, 1986
		Kinbergonuphis proalopus	(Chamberlin, 1919)
	Longibranchium	*Longibrachium arariensis*	Nishi and Kato, 2009
	Onuphis	*Onuphis amakusaensis*	Maekawa and Hayashi, 1999
		Onuphi eremita oculata	Hartman, 1951
		Onuphis fuscata	Imajima, 1986
		Onuphis eremita parva	Berkeley and Berkeley, 1941
		Onuphis geophiliformis	(Moore, 1903)
		Onuphis hokkaiensis	Maekawa and Hayashi, 1999
		Onuphis holobranchiata	(Marenzeller, 1879)
		Onuphis imajimai	Maekawa and Hayashi, 1989
		Onuphis iridescens	(Johnson, 1901)

		Onuphis iriei	Maekawa and Hayashi, 1999
		Onuphis kammurijimaensis	Maekawa and Hayashi, 1989
		Onuphis longisetosa	Imajima, 1986
		Onuphis nakaoi	Maekawa and Hayashi, 1999
		Onuphis nonpectinata	Imajima, 1986
		Onuphis opalina	(Verrill, 1873)
		Onuphis rullieriana	(Amoureux, 1977)
		Onuphis shijikiensis	Maekawa and Hayashi, 1999
		Onuphis shirikishinaiensis	(Imajima, 1960)
		Onuphis taraba	Maekawa and Hayashi, 1989
		Onuphis tetradentata	Imajima, 1986
		Onuphis tosaensis	Maekawa and Hayashi, 1999
		Onuphis wakasaensis	(Maekawa and Hayashi, 1989)
	Paradiopatra	*Paradiopatra abyssalis*	(Imajima, 1999)
		Paradiopatra crassa	Imajima, 1999
		Paradiopatra glacilis	Imajima, 2009
		Paradiopatra okai	Imajima, 1999
		Paradiopatra pyricirra	Budaeva and Fauchald, 2011
		Paradiopatra simplex	Imajima, 1999
		Paradiopatra striata	(Uschakov, 1950)
		Paradiopatra unica	Imajima, 1999
		Paradiopatra yasudai	(Maekawa and Hayashi, 1989)
	Protodiopatra	*Protodiopatra willemoesii*	(McIntosh, 1885)
	Rhamphobrachium	*Rhamphobrachium(Spinigerium)brevibrachiatum*	(Ehlers,1875)
		Rhamphobrachium diversosetosum	Monro, 1937
		Rhamphobrachium(Spinigerium)hutchingsae	Paxton, 1986
	Sarsonuphis	*Sarsonuphis striata*	(Uschakov, 1950)
		Sarsonuphis yasudai	Maekawa and Hayashi, 1989
Orbiniidae	*Califia*	*Califia calida*	Hartman, 1957
	Leitoscoloplos	*Leitoscoloplos pugettensis*	(Pettibone, 1957)
		Leitoscoloplos bifurcatus	Day, 1977
	Naineris	*Naineris japonica*	Imajima, 2009
		Naineris dendritica	(Kinberg, 1867)
		Naineris laevigata	(Grube, 1855)
		Naineris quadricuspida	(Fabricius, 1780)
		Naineris uncinata	Hartman, 1957
	Phylo	*Phylo felix asiaticus*	Wu, 1962
		Phylo felix	Kinberg, 1866
		Phylo fimbriatus	(Moore, 1903)
		Phylo nudus	(Moore, 1911)
	Protoariciella	*Protoariciella australiensis*	Hartmann-Schroder, 1981
	Scoloplos	*Scoloplos armiger*	(Muller, 1776)
		Scoloplos armiger alaskensis	(Hartman, 1948)
		Scoloplos (Leodamas) robustus	(Kinberg, 1866)
		Scoloplos (Leodamas) rubra	(Webster, 1879)
		Scoloplos (Scoloplos) similis	Mackie, 1987
Paraonidae	*Aricidea*	*Aricidea(Acmira)cerrutii pacifica*	Imajima, 1973
		Aricidea (Acmira) catherinae	Laubier, 1967
		Aricidea(Acmira)eximia	Imajima, 1973
		Aricidea(Acmira)horikoshii	Imajima, 1973
		Aricidea(Acmira)simplex	Day, 1963
		Aricidea(Acmira)trilobata	Imajima, 1973
		Aricidea(Aedicira)belgicae	(Fauvel, 1936)
		Aricidea(Aedicira)foliata	Imajima, 1973
		Aricidea(Aedicira)pacifica	(Hartman, 1944)
		Aricidea(Allia)antennata	Annenkova, 1934
		Aricidea(Allia)elongata	Imajima, 1973
		Aricidea(Allia)hartleyi	Blake, 1996
		Aricidea(Allia)jeffreysii	(McIntosh, 1879)
		Aricidea(Aricidea)wassi	Pettibone, 1965
		Aricidea (Strelzovia) suecica	Eliason, 1920
	Cirrophorus	*Cirrophorus branchiatus*	Ehlers, 1908
		Cirrophorus miyakoensis	Imajima, 1973
	Levinsenia	*Levinsenia gracilis*	(Tauber, 1879)
		Levinsenia gracilis japonica	Imajima, 1973
	Paradoneis	*Paradoneis lyra*	(Southern, 1914)
		Paradoneis nipponica	Imajima, 1973
Apistobranchidae	*Apistobranchus*	*Apistobranchus ornatus*	Hartman, 1965
		Apistobranchus tullbergi	(Theel, 1879)
Heterospionidae	*Heterospio*	*Heterospio longissima*	Ehlers, 1875
Poecilochaetidae	*Poecilochaetus*	*Poecilochaetus bifurcatus*	Imajima, 1989
		Poecilochaetus clavatus	Imajima, 1989
		Poecilochaetus elongatus	Imajima, 1989
		Poecilochaetus granulatus	Imajima, 1989
		Poecilochaetus ishikariensis	Imajima, 1989
		Poecilochaetus japonicus	Kitamori, 1965
		Poecilochaetus koshikiensis	Miura, 1988
		Poecilochaetus magnus	Imajima, 1989
		Poecilochaetus tokyoensis	Imajima, 1989
		Poecilochaetus trilobatus	Imajima, 1989
		Poecilochaetus tropicus	Okuda, 1935
Spionidae	*Aonidella*	*Aonidella dayi*	Maciolek, 1983 in Lopez-Jamar 1989
		Aonidella cirrobranchiata	Day, 1961
	Aonides	*Aonides oxycephala*	(Sars, 1862)
	Apoprionospio	*Apoprionospio dayi japonica*	Imajima, 1989
	Boccardia	*Boccardia hamata*	(Webster, 1879)
		Boccardia perata	(Khlebovich, 1959)
		Boccardia polybranchia	(Haswell, 1885)
		Boccardia proboscidea	Hartman, 1940
		Boccardia ligerica	(Ferribbuere, 1898)
	Carazziella	*Carazziella spongilla*	Sato-Okoshi, 1998
		Carazziella reishi	(Woodwick, 1964)
	Dispio	*Dispio oculata*	Imajima, 1990
		Dispio uncinata	Hartman, 1951
	Dipolydora	*Dipolydora alborectalis*	(Radashevsky, 1993)
		Dipolydora armata	(Langerhans, 1880)
		Dipolydora bidentata	(Zachs, 1933)
		Dipolydora cardalia	(Berkeley, 1927)
		Dipolydora concharum	(Verrill, 1880)
		Dipolydora flava orientalis	(Imajima and Hartman, 1964)
		Dipolydora giardi	(Mensil, 1896)
		Dipolydora socialis	(Schmarda, 1861)
		Dipolydora trilobata	(Radashevsky, 1993)
	Laonice	*Laonice cirrata*	(Sars, 1851)
	Malacoceros	*Malacoceros indicus*	(Fauvel, 1928)
	Microspio	*Microspio mecznikowianus*	(Claparede, 1869)
	Paraprionospio	*Paraprionospio patiens*	Yokoyama, 2007

		Paraprionospio cordifolia	Yokoyama, 2007
		Paraprionospio coora	Wilson, 1990
		Paraprionospio oceanensis	Yokoyama, 2007
		Paraprionospio pinnata	(Ehlers, 1901)
	Polydora	*Polydora aura*	Sato-Okoshi, 1998
		Polydora brevipalpa	Zachs, 1933
		Polydora carunculata	Radashevsky, 1993
		Polydora cornuta	Bosc, 1802
		Polydora curiosa	Radashevsky, 1994
		Polydora hoplura	Claparede, 1868
		Polydora glycymerica	Radashevsky, 1993
		Polydora onagawaensis	Teramoto, Sato-Okoshi, Abe, Nishitani, and Endo
		Polydora websteri	Hartman, 1943
	Polydorella	*Polydorella dawydoffi*	Radashevsky, 1996
	Spio	*Spio filicornis*	(Muller, 1776)
Prionospio	*Aquilaspio*	*Prionospio(Aquilaspio)convexa*	Imajima, 1990
		Prionospio(Aquilaspio)grossa	Imajima, 1990
		Prionospio(Aquilaspio)krusadensis	Fauvel, 1929
		Prionospio(Aquilaspio)sexoculata	Augener, 1918
	Minuspio	*Prionospio(Minuspio)elegantula*	Imajima, 1990
		Prionospio(Minuspio)elongata	Imajima, 1990
		Prionospio(Minuspio)japonica	Okuda, 1935
		Prionospio(Minuspio)multibranchiata	Berkeley, 1927
		Prionospio(Minuspio)pulchra	Imajima, 1990
	Prionospio	*Prionospio anuncata*	Fauchald, 1972
		Prionospio bocki	Soderstrom, 1920
		Prionospio caspersi	Laubier, 1962
		Prionospio depauperata	Imajima, 1990
		Prionospio dubia	Day, 1961
		Prionospio ehlersi	Fauvel, 1928
		Prionospio lineata	Imajima, 1990
		Prionospio membranacea	Imajima, 1990
		Prionospio oshimensis	Imajima, 1990
		Prionospio paradisea	Imajima, 1990
		Prionospio tridentata	Blake and Kudenov, 1978
		Prionospio variegata	Imajima, 1990
		Prionospio aucklandica	Augener, 1923
		Prionospio pinnata	Ehlers, 1901
		Prionospio steenstrupi	Malmgren, 1867
	Pseudopolydora	*Pseudopolydora achaeta*	Radashevsky and Hsieh, 2000
		Pseudopolydora antennata	(Claparede, 1870)
		Pseudopolydora kempi japonica	Imajima and Hartman, 1964
		Pseudopolydora paucibranchiata	(Okuda, 1937)
		Pseudopolydora cf. reticulata	Radashevsky and Hsieh, 2000
		Pseudopolydora tsubaki	Simon, Sato-Okoshi, and Abe (published only online version)
		Pseudopolydora ushioni	Simon, Sato-Okoshi, and Abe (published only online version)
	Rhynchospio	*Rhynchospio foliosa*	Imajima, 1991
		Rhynchospio glutaea	(Ehlers, 1897)
		Rhynchospio tuberculata	Imajima, 1991
Scolelepis	*Parascolelepis*	*Scolelepis(Parascolelepis)geniculata*	Imajima, 1992
		Scolelepis(Parascolelepis)texana	Forster, 1971
		Scolelepis(Parascolelepis)yamaguchii	(Imajima, 1959)
	Scolelepis	*Scolelepis(Scolelepis)branchia*	Imajima, 1992
		Scolelepis(Scolelepis)kudenovi	Hartmann-Schroder, 1981
		Scolelepis(Scolelepis)lefebvrei	(Gravier, 1905)
		Scolelepis(Scolelepis)lingulata	Imajima, 1992
		Scolelepis(Scolelepis)planata	Imajima, 1992
		Scolelepis(Scolelepis)sagittaria	Imajima, 1992
		Scolelepis(Scolelepis)variegata	Imajima, 1992
	Spio	*Spio borealis*	Okuda, 1937
		Spio filicornis	(Muller, 1766)
	Spiophanes	*Spiophanes bomyx*	(Claparede, 1870)
		Spiophanes berkeleyorum	Pettibone, 1962
		Spiophanes cirrata	Sars, 1872
		Spiophanes japonicum	Imajima, 1991
		Spiophanes kroyeri	Grube, 1860
		Spiophanes wigleyi	Pettibone, 1962
	Streblospio	*Streblospio benedicti japonica*	Imajima, 1990
	Tripolydora	*Tripolydora spinosa*	Woodwick, 1964
Trochochaetidae	*Trochochaeta*	*Trochochaeta japonica*	Imajima, 1989
Chaetopteridae	*Chaetopterus*	*Chaetopterus cautus*	Marenzeller, 1879
		Chaetopterus gregarius	Nishi, Arai, and Sasanuma, 2000
		Chaetopterus pacificus	Nishi, 2004
		Chaetopterus izuensis	Nishi, 2004
		Chaetopterus jaonicus	Nishi, 2004
		Chaetopterus kagosimensis	Izuka, 1911
		Chaetopterus longipes	Crossland, 1904
		Chaetopterus luteus	Stimpson, 1855
		Chaetopterus takahashii	Izuka, 1911
	Mesochaetopterus	*Mesochaetopterus japonicus*	Fujiwara, 1934
		Mesochaetopterus minutus	Potts, 1914
		Mesochaetopterus sagittarius	Claparede, 1868
	Phyllochaetopterus	*Phyllochaetopterus aciculigerus*	Crossland, 1904
		Phyllochaetopterus arabicus	Ehrenberg, 1870
		Phyllochaetopterus awasensis	Nishi and Hsieh, 2009
		Phyllochaetopterus claparedii	McIntosh, 1885
		Phyllochaetopterus herdmani	Willey, 1905
		Phyllochaetopterus prolifica	Potts, 1914
		Phyllochaetopterus verrilli	Treadwell, 1964
		Phyllochaetopterus vitrarius	(Ehlers, 1908)
	Spiochaetopterus	*Spiochaetopterus costarum okudai*	Gitay, 1969
		Spiochaetopterus iheyanesis	Nishi, 2008
		Spiochaetopterus izuensis	Nishi, Bhaud, and Koh, 2004
		Spiochaetopterus manazuruensis	Nishi, 2003
		Spiochaetopterus okinawaensis	Nishi and Bhaud, 2000
		Spiochaetopterus sagamiensis	Nishi, Miura, and Bhaud, 1999
		Spiochaetopterus sanbanzensis	Nishi, Bhaud, and Koh, 2004
		Spiochaetopterus sesokoensis	Nishi and Bhaud, 2000
		Spiochaetopterus typicus	Sars, 1856
Magelonidae	*Magelona*	*Magelona agoensis*	kitamori, 1967
		Magelona californica	Hartman, 1944
		Magelona japonica	Okuda, 1937
		Magelona longicornis	Johnson, 1901
		Magelona pitelkai	Hartman, 1944
Cirratulidae	*Cirratulus*	*Cirratulus cirratulus*	(O. F. Müller, 1776)

		Cirratulus longicephalus	Imajima, 1964
		Cirratulus robustus	Johnson, 1901
	Cirriformia	*Cirriformia capensis*	(Schmarda, 1861)
		Cirriformia afer	(Ehlers, 1908)
		Cirriformia saxatilis	(Gravier, 1906)
		Cirriformia comosa	Marenzeller, 1879
	Chaetozone	*Chaetozone abranchiata*	(Hansen, 1878)
		Chaetozone setosa	Malmgren, 1867
		Chaetozone spinosa	Moore, 1903
	Caulleriella	*Caulleriella hamata*	(Hartman, 1948)
		Caulleriella apicula	Blake, 1996
	Aphelochaeta	*Aphelochaeta monilaris*	(Hartman, 1960)
		Aphelochaeta multifilis	(Moore, 1909)
	Dodecaceria	*Dodecaceria fistulicola*	Ehlers, 1901
		Dodecaceria concharum	Orsted, 1843
		Dodecaceria laddi	Hartman, 1954
	Kirkegaardia	*Kirkegaardia annulosa*	(Hartman, 1965)
	Protocirrineris	*Protocirrineris chrysoderma*	(Claparede, 1868)
		Protocirrineris antarctica	(Monro, 1930)
	Monticellina	*Monticellina tesselata*	(Hartman, 1960)
	Timarete	*Timarete dasylophia*	(Marenzeller, 1879)
		Timarete gibbosa	(Moore, 1903)
		Timarete japonica	Zachs, 1933
		Timarete luxuriosa	(Moore, 1904)
		Timarete punctata	(Grube, 1859)
Ctenodrilidae	*Ctenodrilus*	*Ctenodrilus serratus*	(Schmidt, 1857)
Cossuridae	*Cossura*	*Cossura coasta*	Kitamori, 1960
		Cossura duplex	Tamai, 1986
		Cossura pygodactylata	Tamai, 1986
Fauveliopsidae	*Fauveliopsis*	*Fauveliopsis challengeriae*	McIntosh, 1922
		Fauveliopsis glaba	(Hartman, 1960)
	Laubieriopsis	*Laubieriopsis hartmani*	(Levenstein, 1970)
		Laubieriopsis brevis japonica	Imajima, 2009
Acrocirridae	*Acrocirrus*	*Acrocirrus muroranensis*	Okuda, 1934
		Acrocirrus heterochaetus	Annenkova, 1934
		Acrocirrus uchidai	Okuda, 1934
		Acrocirrus validus	Marenzeller, 1879
Flabelligeridae	*Bradabyssa*	*Bradabyssa nuda*	(Annenkova-Chlopina, 1922)
		Bradabyssa ochotensis	Annenkova, 1922
		Bradabyssa sachalina	Annenkova, 1922
	Brada	*Brada inhabilis*	(Rathke, 1843)
	Diplocirrus	*Diplocirrus nicolaji*	(Buzhinskaja, 1994)
	Flabelligera	*Flabelligera affinis*	Sars, 1829
	Piromis	*Piromis suni*	Salazar-Vallejo, 2011
	Pherusa	*Pherusa moorei*	Salazar-Vallejo, 2014
		Pherusa nipponica	Salazar-Vallejo, 2014
	Stylarioides	*Stylarioides longisetosa*	(Haswell, 1892)
	Semiodera	*Semiodera nishii*	Salazar-Vallejo, 2012
	Daylithos	*Daylithos parmatus*	(Grube, 1877)
	Poeobius	*Poeobius meseres*	Heath, 1930
	Buskiella	*Buskiella vitjasi*	(Buzhinskaja, 1977)
Sternaspidae	*Petersenaspis*	*Petersenaspis capillata*	(Nonato, 1966)
		Petersenaspis palpallatoci	Sendall and Salazar-Vallejo, 2013
	Sternaspis	*Sternaspis affinis*	Stimpson, 1864
		Sternaspis costata	Marenzeller, 1879
		Sternaspis islandica	Malmgren, 1867
		Sternaspis scutata	(Ranzani, 1817)
		Sternaspis thalassemoides	Otto, 1821
Arenicolidae	*Abarenicola*	*Abarenicola pacifica*	Healy and Wells, 1959
		Abarenicola claparedi oceanica	(Healy and Wells, 1959)
	Arenicola	*Arenicola brasiliensis*	Nonato, 1958
		Arenicola cristata	Stimpson, 1856
	Branchiomaldane	*Branchiomaldane simplex*	(Berkeley and Berkeley, 1932)
Capitellidae	*Barantolla*	*Barantolla orientalis*	Yabe and Mawatari, 1998
	Capitella	*Capitella capitata*	(Fabricius, 1780)
		Capitella capitata floridana	Hartman, 1959
		Capitella giardi	(Mensil, 1897)
		Capitella jonesi	(Hartman, 1959)
		Capitella minima	Langerhans, 1880
		Capitella teleta	Blake et al., 2009
	Capitellethus	*Capitellethus cinctus*	Thomassin,1970
	Dasybranchus	*Dasybranchus glabrus*	Moore, 1909
		Dasybranchus lumbricoides	Grube, 1878
	Heteromastus	*Heteromastus filiformis*	(Claparede, 1864)
		Heteromastus tohbaiensis	Yabe and Mawatari, 1998
		Heteromastus similis	Southern, 1921
	Leiocapitella	*Leiocapitella glabra*	Hartman, 1947
	Leiochrides	*Leiochrides australis*	Augener, 1914
		Leiochrides hemipodus	Hartman, 1960
	Mediomastus	*Mediomastus californiensis*	Hartman, 1944
		Mediomastus duobalteus	Tomioka, Nishi, and Kajihara, 2014
		Mediomastus hanedaensis	Tomioka, Nishi, and Kajihara, 2014
		Mediomastus opertaculeus	Tomioka, Hiruta, and Kajihara, 2013
		Mediomastus warrenae	Green, 2002
	Mastbranchus	*Mastobranchus uru*	Tomioka, Yoshida, and Kajihara, 2017
		Mastobranchus variabilis	Ewing, 1984
	Neoheteromastus	*Neoheteromastus lineus*	Hartman, 1960
	Notomastus	*Notomastus fauveli*	Day, 1961
		Notomastus hemiopdus	Hartman, 1945
		Notomastus latericeus	Sars, 1851
		Notomastus torquatus	Hutchings and Rainer, 1979
		Notomastus variegatus	Berkeley and Berkeley, 1950
	Parheteromastus	*Parheteromastus tenuis*	Monro, 1937
	Psuedocapitella	*Psuedocapitella incerta*	Fauvel, 1913
	Scyphoproctus	*Scyphoproctus gravieri*	Okuda, 1940
Maldanidae	*Clymenura*	*Clymenura(Cephalata)aciculata*	Imajima and Shiraki, 1982
		Clymenura(Cephalata)columbiana	Berkeley, 1929
		Clymenura(Cephalata)lankesteri	(McIntosh, 1885)
		Clymenura(Cephalata)longicaudata	Imajima and Shiraki, 1982
		Clymenura(Clymenura)japonica	Imajima and Shiraki, 1982
	Axiothella	*Axiothella quadrimaculata*	Augener, 1914
		Axiothella rubrocincta	(Johnson, 1901)
	Clymenella	*Clymenella collaris*	Imajima and Shiraki, 1982

		Clymenella complanata	Hartman, 1969
		Clymenella enshuense	Imajima and Shiraki, 1982
		Clymenella koellikeri	(McIntosh, 1885)
	Euclymene	*Euclymene oerstedi*	(Claparede, 1863)
		Euclymene uncinata	Imajima and Shiraki, 1982
	Isocirrus	*Isocirrus mirabilonga*	(Moore, 1903)
		Isocirrus planiceps	(Sars, 1872)
	Maldanella	*Maldanella harai*	(Izuka, 1902)
		Maldanella niijimense	Imajima and Shiraki, 1982
	Microclymene	*Microclymene caudata*	Imajima and Shiraki, 1982
	Praxillella	*Praxillella affinis*	(Sars, 1872)
		Praxillella challengeriae	(McIntosh, 1885)
		Praxillella gracilis	(Sars, 1861)
		Praxillella pacifica	Berkeley, 1929
		Praxillella praetermissa	(Malmgren, 1866)
	Clymenopsis	*Clymenopsis cingulata*	(Ehlers, 1887)
	Lumbriclymene	*Lumbriclymene japonica*	(McIntosh, 1885)
	Notoproctus	*Notoproctus pacificus*	(Moore, 1906)
	Praxillura	*Praxillura tanseiana*	Imajima and Shiraki, 1982
	Asychis	*Asychis auritus*	Uschakov, 1950
		Asychis shaccotanus	Uchida, 1968
		Asychis tosaensis	Imajima, 2001
	Chirimia	*Chirimia biceps*	(Sars, 1861)
	Maldane	*Maldane cristata*	Treadwell, 1923
		Maldane pigmentata	(Imajima and Shiraki, 1982)
	Metasychis	*Metasychis gotoi*	(Izuka, 1902)
		Metasychis disparidentata	(Moore, 1904)
	Nicomache	*Nicomache(Loxochona)quadrispinata*	Arwidsson, 1906
		Nicomache(Nicomache)lumbricalis	(Fabricius, 1780)
		Nicomache(Nicomache)minor	(Arwidsson, 1906)
		Nicomache(Nicomache)ohtai	Miura and Hashimoto, 1991
		Nicomache(Nicomache)personata	Johnson, 1901
		Nicomache inornata	Moore, 1903
		Nicomache japonica	McIntosh, 1885
	Petaloproctus	*Petaloproctus borealis*	Arwidsson, 1906
		Petaloproctus dentatus	Imajima and Shiraki, 1982
	Rhodine	*Rhodine bitorquata*	Moore, 1923
		Rhodine loveni	Malmgren, 1865
	Armandia	*Armandia amakusaensis*	Saito, Tamaki, and Imajima, 2000
		Armandia lanceolata	Willey, 1905
		Armandia melanura	Gravier, 1905
		Armandia simodaensis	Takahashi, 1938
	Thorachophellia	*Thorachophelia arcticus*	Grube, 1866
		Thorachophelia ezoensis	(Okuda, 1936)
		Thorachophelia japonicus	(Misaka and Sato, 2003)
	Ophelia	*Ophelia limacina*	(Rathke, 1843)
	Ophelina	*Ophelina acuminata*	Oersted, 1843
		Ophelina arctica	(McIntosh, 1879)
		Ophelina aulogaster	Malmgren, 1867
		Ophelina breviata	(Ehlers, 1913)
	Polyophthalmus	*Polyophthalmus pictus*	(Dujardin, 1839)
Travisiidae	*Travisia*	*Travisia japonica*	Fujiwara, 1933
		Travisia brevis	Moore, 1903
		Travisia forbesii	Johnson, 1840
		Travisia fuscus	(Chamberlin, 1919)
		Travisia glandulosa	McIntosh, 1879
		Travisia kerguekensis intermedia	Annenkova, 1937
		Travisia profundi	Chambrelin, 1919
		Travisia pupa	Moore, 1906
Scalibregmidae	*Oncoscolex*	*Oncoscolex pacificus borealis*	Imajima and Hartman, 1964
	Hyboscolex	*Hyboscolex longiseta*	Schmarda, 1861
	Asclerochelius	*Asclerochelius beringianus*	Uschakov, 1955
	Parasclerocheilus	*Parasclerocheilus branchiatus*	Fauvel, 1928
	Pseudoscalibregma	*Pseudoscalibregma orientalis*	Imajima, 2009
	Polyphysia	*Polyphysia caulleryi*	(McIntosh, 1922)
	Scalibregma	*Scalibregma inflatum*	Rathke, 1843
Nerillidae	*Nerilla*	*Nerilla mediterranea*	Schliper, 1925
	Dinophilus	*Dinophilus gyrociliatus*	O. Schmidt, 1857
	Trilobodrilus	*Trilobodrilus itoi*	Kajihara, Ikoma, Yamasaki, and Hiruta, 2015
		Trilobodrilus nipponicus	Uchida and Okuda, 1943
Parergodrilidae	*Stygocapitella*	*Stygocapitella subterranea*	Knollner, 1934
Polygordiidae	*Polygordius*	*Polygordius ijimai*	Izuka, 1903
		Polygordius pacificus	Uchida, 1935
Protodrilidae	*Protodrilus*	*Protodrilus puniceus*	Sato-Okoshi, Okoshi, and Fujiwara (2015)
Saccocirridae	*Saccocirrus*	*Saccocirrus krusadensis*	Alikuhni, 1948
		Saccocirrus labilis	Yamanishi, 1973
		Saccocirrus uchidai	Sasaki, 1981
Oweniidae	*Myriochele*	*Myriochele danielsseni*	Hansem, 1879
		Myriochele heeri	Malmgren, 1867
		Myriochele orgae	Blake, 2000
	Galathowenia	*Glathowenia oculata*	(Zachs, 1922)
		Glathowenia scotiae	(Hartman, 1978)
	Myrioglobula	*Myrioglobula japonica*	Imajima and Morita, 1987
	Owenia	*Owenia fusiformis*	Delle Chiaje, 1842
		Owenia gomsoni	Koh and Bhaud, 2001
Alvinellidae	*Paralvinella*	*Paralvinella hessleri*	Miura and Ohta, 1991
Ampharetidae	*Amage*	*Amage auricula*	Malmgren, 1866
		Amage arienticornuta	Moore, 1923
		Amage delus	(Chamberlin, 1919)
		Amage ehlersi	Reuscher, Fiege, and Imajima, 2015
		Amage imajimai	Reuscher, 2015
		Amage longitorus	Reuscher, Fiege, and Imajima, 2015
	Amagopsis	*Amagopsis cirratus*	Kucheruk, 1976
	Ampharete	*Ampharete arctica*	Malmgren, 1866
		Ampharete acutifrons	(Grube, 1860)
		Ampharete ampullata	Imajima, Reuscher, and Fiege, 2012
		Ampharete cinnamomea	Imajima, Reuscher, and Fiege, 2012
		Ampharete cornuta	(Hilbig, 2000)
		Ampharete falcata	Eliason, 1955
		Ampharete finmarchica	(Sars, 1864)
		Ampharete gagarae	Uschakov, 1950
		Ampharete lindstroemi	Hessle, 1917

		Ampharete longipaleolata	Uschakov, 1950
		Ampharete orientalis	(Annenkova, 1929)
	Amphicteis	*Amphicteis gunneri*	(Sars, 1835)
		Amphicteis mederi	Annenkova, 1929
		Amphicteis posterobranchiata	Fauvel, 1932
		Amphicteis scaphobranchiata	Moore, 1906
		Amphicteis spinosa	Reuscher, Fiege, and Imajima, 2014
		Amphicteis taurus	Reuscher, Fiege, and Imajima, 2014
		Amphicteis uncopalea	Chambrelin, 1919
	Amphithamytha	*Amphisamytha bioculata*	(Moore, 1906)
		Amphisamytha japonica	Hessle, 1917
	Anobothrus	*Anobothrus dayi*	Imajima, Reuscher, and Fiege, 2013
		Anobothrus fimbriatus	Imajima, Reuscher, and Fiege, 2013
		Anobothrus flabelligerulus	Imajima, Reuscher, and Fiege, 2013
		Anobothrus gracilis	(Malmgren, 1866)
		Anobothrus wakatakamaruae	Imajima, 2009
	Auchenoplax	*Auchenoplax crinita*	Ehlers, 1887
	Glyphanostomum	*Glyphanostomum hessleri*	Reuscher, Fiege, and Imajima, 2015
		Glyphanostomum pallescens	(Theel, 1879)
	Hobsonia	*Hobsonia florida*	(Hartman, 1951)
	Isolda	*Isolda pulchella*	Muller in Grube, 1858
	Lysippe	*Lysippe fragilis*	(Wollebaek, 1912)
		Lysippe labiata	Malmgren, 1866
		Lysippe nipponica	Reuscher, Fiege, and Imajima, 2015
	Melinnampharete	*Melinnampharete gracilis*	Hartman, 1969
	Melinna	*Melinna cristata*	(Sars, 1851)
		Melinna elisabethae	McIntosh, 1914
		Melinna oculata	Hartman, 1969
	Melinnopsis	*Melinnopsis augeneri*	Reuscher, Fiege, and Imajima, 2015
		Melinnopsis atlantica	McIntosh, 1885
		Melinnopsis mcintoshi	Reuscher, Fiege, and Imajima, 2015
		Melinnopsis ochotica	(Uschakov, 1950)
	Melinnexis	*Melinnexis tetradentata*	Imajima, 2001
		Melinnexis arctica	Annenkova, 1931
	Neosabellides	*Neosabellides elongatus*	(Ehlers, 1913)
		Neosabellides oceanica	(Fauvel,1914)
	Orochi	*Orochi palacephalus*	Reuscher, Fiege, and Imajima, 2015
	Paramage	*Paramage scutata*	(Moore, 1923)
	Paramphicteis	*Paramphicteis angustifolia*	(Grube, 1878)
		Paramphicteis weberi	(Caullery, 1944)
	Samytha	*Samytha annenkovae*	Reuscher, Fiege, and Imajima, 2015
	Samyhella	*Samythella bathycola*	Uschakov, 1950
		Samythella pacifica	McIntosh, 1885
		Samythella neglecta	Wollebaek, 1912
	Schistocomus	*Schistocomus hiltoni*	Chambrelin, 1919
		Schistocomus sovjecticus	Annenkova, 1937
	Sosane	*Sosane brevibranchiata*	Imajima, Reuscher, and Fiege, 2013
		Sosane occidentalis	(Hartman, 1969)
		Sosane sulcata	Malmgren, 1866
		Sosane trigintaduo	Imajima, Reuscher, and Fiege, 2013
		Sosane uebelackerae	Imajima, Reuscher, and Fiege, 2013
		Sosane wireni	(Hessle, 1917)
	Tanseimaruana	*Tanseimaruana boninensis*	Imajima, Reuscher, and Fiege, 2013
	Watatsumi	*Watatsumi grubei*	Reuscher, Fiege, and Imajima, 2014
	Zatseoinia	*Zatsepinia jirkovi*	Imajima, Reuscher, and Fiege, 2013
		Zatsepinia rittichae	Jirkov, 1986
Amphictenidae	*Amphictene*	*Amphictene japonica*	(Nilsson, 1928)
	Cistenides	*Cistenides hyperborea*	Malmgren, 1866
		Cistenides grannulata	(Linneaus, 1767)
	Lagis	*Lagis bocki*	(Hessle, 1917)
		Lagis bocki naikaiensis	Kitamori, 1965
	Pectinaria	*Pectinaria aegyptia*	(Savigny, 1822)
		Pectinaria belgica	(Pallas, 1766)
		Pectinaria hiuchiensis	Kitamori, 1965
		Pectinaria okudai	(Imajima and Hartman, 1964)
	Idanthyrsus	*Idanthyrsus boninensis*	Nishi and Kirtley, 1999
		Idanthyrsus okinawaensis	Nishi and Kirtley, 1999
		Idanthyrsus okudai	Kirtley, 1994
		Idanthyrsus saxicavus	(Baird, 1863)
	Lygdamis	*Lygdamis japonicus*	Nishi and Kirtley, 1999
		Lygdamis curvatus	(Johansson, 1922)
	Phalacrostemma	*Phalacrostemma elegans*	Fauvel,1911
	Neosabellaria	*Neosabellaria cementarium*	Moore, 1906
		Neosabellaria uschakovi	Kirtley, 1994
	Sabellaria	*Sabellaria intoshi*	Fauvel, 1914
		Sabellaria ishikawai	Okuda, 1938
		Sabellaria isumiensis	Nishi, Bailey-Brock, Santos, Tachikawa, and Kupriyanova, 2010
		Sabellaria tottoriensis	Nishi, Kato, and Hayashi, 2004
Terebellidae	*Amphitrite*	*Amphitrite cirrata*	Muller, 1771
		Amphitrite edwardsii	(Quatrefages, 1865)
		Amphitrite oculata	Hessle, 1917
		Amphitrite rubra	(Risso, 1826)
	Artacama	*Artacama proboscidea*	Malmgren, 1866
	Neoamphitrite	*Neoamphitrite vigintipes*	(Marenzeller, 1884)
		Neoamphitrite ramosissima	(Marenzeller, 1884)
	Eupolymnia	*Eupolymnia congruens*	(Marenzeller, 1884)
		Eupolymnia nebulosa	(Montagu, 1818)
		Eupolymnia triloba	(Fischil, 1900)
	Lanice	*Lanice seticornis*	(McIntosh, 1885)
		Lanice socialis	(Wiley, 1905)
		Lanice conchilega	(Pallas, 1766)

	Loimia	*Loimia arborea*	Moore, 1903
		Loimia ingens	(Grube, 1878)
		Loimia medusa	(Savigny in Quatrefage, 1865)
		Loimia ochracea	(Grube, 1878)
		Loimia verrucosa	Caullery, 1944
		Loimia montagui	(Grube, 1878)
	Neoleprea	*Neoleprea japonica*	Hessle, 1917
	Nicolea	*Nicolea gracilibranchis*	(Grube, 1878)
		Nicolea sinensis	Fauvel, 1932
		Nicolea zostericola	(Oersted, 1844)
		Nicolea venustula	(Montagu, 1818)
	Phisidia	*Phisidia sagamica*	Hessle, 1917
	Pista	*Pista atypica*	Hessle, 1917
		Pista agassizi	Hilbig, 2000
		Pista brevibranchiata	Moore, 1923
		Pista cristata	(Muller, 1776)
		Pista elongata	Moore, 1909
		Pista fasciata	(Grube, 1870)
		Pista microlobata	Hessle, 1917
		Pista robustiseta	Caullery, 1915
	Reteterebella	*Reteterebella queenslandia*	Hartman, 1963
	Scionella	*Scionella japonica*	Moore, 1903
		Scionella vinogradovi	(Uschakov, 1955)
	Spiroverma	*Spiroverma ononokomachii*	Uchida, 1968
	Spinosphaera	*Spinosphaera pacifica*	Hessle, 1917
	Terebella	*Terebella ehrenbergi*	Grube, 1870
		Terebella punctata	Hessle, 1917
	Streblosoma	*Streblosoma japonica*	Hessle, 1917
		Streblosoma abranchiata	Day, 1963
		Streblosoma bairdi	(Malmgren, 1866)
Polycirridae	*Amaeana*	*Amaeana trilobata*	(Sars, 1863)
	Lysilla	*Lysilla pacifica*	Hessle, 1917
	Polycirrus	*Polycirrus medius*	Hessle, 1917
		Polycirrus nervosus	Marenzeller, 1884
Thelepelidae	*Thelepus*	*Thelepus cincinnatus*	(Fabricius, 1780)
		Thelepus japonicus	Marenzeller, 1884
		Thelepus marenzelleri	McIntosh, 1885
		Thelepus plagiostoma	(Schmarda, 1861)
		Thelepus setosus	(Quatrefages, 1866)
		Thelepus toyamaensis	Okuda, 1936
Trichobranchidae	*Octobranchus*	*Octobranchus japonicus*	Hessle, 1917
	Terebellides	*Terebellides brevis*	Imajima and Williams, 1985
		Terebellides eurystethus	Chambrelin, 1919
		Terebellides horikoshii	Imajima and Williams, 1985
		Terebellides intoshi	Caullery, 1915
		Terebellides japonica	Moore, 1903
		Terebellides kobei	Hessle, 1917
		Terebellides lineata	Imajima and Williams, 1985
		Terebellides stroemii	Sars, 1835
	Trichobranchus	*Trichobranchus bibranchiatus*	Moore, 1903
		Trichobranchus glacialis	Malmgren, 1866
Fabriciidae	*Amphicorina*	*Amphicorina ascidicola*	Yoshihara, Hiruta, Katoh, and Kajihara, 2012
		Amphicorina ezoensis	Yoshihara, Hiruta, Katoh, and Kajihara, 2012
		Amphicorina mobilis	(Rouse, 1990)
	Fabricia	*Fabricia sabella*	(Ehrenberg, 1837)
	Fabriciola	*Fabriciola rubra*	Fitzhugh, 1998
	Fabricinuda	*Fabricinuda bikinii*	(Hartmanm 1954)
Sabellidae	*Myxicola*	*Myxicola infundibulum*	(Renier, 1804)
	Pseudoaugeneriella	*Pseudoaugeneriella unirama*	Fitzhugh, 1998
	Amphiglena	*Amphiglena nishii*	Capa and Rouse, 2007
	Bispira	*Bispira porifera*	(Grube, 1878)
		Bispira crassicornis	Sars, 1851
		Bispira melanostigma	Schmarda, 1861
		Bispira wireni	(Johansson, 1922)
	Branchiomma	*Branchiomma cingulata*	(Grube, 1870)
		Branchiomma picta	(McIntosh, 1885)
		Branchiomma serratibranchis	(Grube, 1878)
	Dialychone	*Dialychone okudai*	Nishi, Tanaka, Tovar-Hernandez, and Giangrande, 2009
	Chone	*Chone duneri*	Malmgren, 1867
		Chone ecaudata	(Moore, 1923)
		Chone gracilis	Moore,1906
		Chone filicaudata	Southern,1914
		Chone infundibuliformis	Kroyer, 1856
		Chone magna	(Moore, 1923)
		Chone mollis	(Bush in Moore, 1904)
	Desdemona	*Desdeona ornata*	Banse, 1957
	Euchone	*Euchone alicaudata*	Moore and Bush, 1904
		Euchone analis	(Kroyer, 1856)
		Euchone capensis	Day, 1961
		Euchone limnicola	Reish, 1959
	Hypsicomus	*Hypsicomus lyra*	Moore and Bush, 1904
		Hypsicomus phaeotaenia	(Schmarda, 1861)
	Jasmineira	*Jasmineira filatovae*	Levenstein, 1961
		Jasmineira kikuchii	Nishi, Tanaka, Tovar-Hernandez, and Giangrande, 2009
	Laonome	*Laonome albicingillum*	Hsieh, 1995
		Laonome tridentata	Moore and Bush, 1904
	Acromegalomma	*Acromegalomma acrophthalmos*	(Grube, 1878)
		Acromegalomma quadrioculatum	(Willey, 1905)
		Acromegalomma vesiculosum	(Montagu, 1815)
	Megalomma	*Megalomma pacificum*	Johansson, 1922
	Notaulax	*Notaulax phaeotaenia*	(Schmarda, 1861)
		Notaulax yamasui	Nishi, Gil, Tanaka, and Kupriyanova, 2017
	Paradialychone	*Paradialychone cincta*	(Zachs, 1933)
		Paradialychone edomae	Nishi, Tanaka, Tovar-Hernandez, and Giangrande, 2009
		Paradialychone katsuuraensis	Nishi, Tanaka, Tovar-Hernandez, and Giangrande, 2009
	Parasabella	*Parasabella aulaconota*	(Marenzeller, 1884)
		Parasabella japonica	(Moore and Bush, 1904)
	Perkinsiana	*Perkinsiana acuminata*	(Moore and Bush, 1904)
	Potamethus	*Potamethus japonicus*	(Johansson, 1922)
	Potamilla	*Potamilla lepotochaeta*	Southern, 1921
		Potamilla paulina	(Grube, 1868)

		Potamilla torelli	Malmgren, 1866
		Potamilla saxicava	(Quatrefages, 1866)
	Pseudopotamilla	*Pseudopotamilla elegans*	(Johansson, 1922)
		Pseudopotamilla myriops	(Marenzeller, 1884)
		Pseudopotamilla occelata	Moore, 1905
		Pseudopotamilla reniformis	(Linneaus, 1788)
	Sabella	*Sabella albicans*	Johansson, 1922
		Sabella fusca	Grube, 1870
	Sabellastarte	*Sabellastarte japonica*	(Marenzeller, 1884)
		Sabellastarte spectabilis	(Grube, 1878)
		Sabellastarte zebuensis	(McIntosh, 1885)
	Spirographis	*Spirographis tricyclia*	(Schmarda, 1861)
Serpulidae	*Ficopomatus*	*Ficopomatus enigmatica*	(Fauvel, 1923)
	Apomatus	*Apomatus enosimae*	Marenzeller, 1884
		Apomatus geniculatus	(Moore and Bush, 1904)
	Filograna	*Filograna implexa*	Berkeley, 1851
	Filogranella	*Filogranella elatensis*	Ben-Eliahu and Dafni, 1979
	Filogranula	*Filogranula exilis*	Imajima, 1979
	Floriprotis	*Floriprotis sabiuraensis*	Uchida, 1978
	Josephella	*Josephella marenzelleri*	Caullery and Mensil, 1896
	Microprotula	*Microprotula ovicellata*	Uchida, 1978
	Paraprotis	*Paraprotis dendrova*	Uchida, 1978
		Paraprotis pulchra	Imajima, 1979
		Protula(Philippiprotula)bispiralis	(Savigny, 1822)
	Philippiprotula	*Protula(Philippiprotula)magnifica*	Straughan, 1967
	Protula	*Protula(Protula)tubularia*	(Montagu, 1803)
		Protula(Protula)tubularia caeca	Imajima, 1977
		Protula anomala	Day, 1955
		Protula apomatoides	Uchida, 1978
	Rhodopsis	*Rhodopsis pusilla*	Bush, 1905
		Rhodopsis simplex	(Uchida, 1978)
	Salmacina	*Salmacina dysteri*	(Huxley, 1855)
		Salmacina amphidentata	Jones, 1962
		Salmacina tribranchiata	(Moore, 1923)
	Crucigera	*Crucigera tricornis*	Gravier, 1906
		Crucigera zygophora	(Johnson, 1901)
	Dasynema	*Dasynema chrysogyrus*	(Grube, 1876)
	Ditrupa	*Ditrupa gracillima*	(O.F.Muller, 1776)
		Ditrupa arietina	(O.F.Muller, 1776)
	Hydroides	*Hydroides albiceps*	(Grube, 1870)
		Hydroides bisectus	Imajima and ten Hove, 1989
		Hydroides brachyacantha	Rioja, 1941
		Hydroides dianthus	(Verrill, 1873)
		Hydroides dirampha	Morch, 1863
		Hydroides elegans	(Haswell, 1883)
		Hydroides exaltata	(Marenzeller, 1884)
		Hydroides exeltata vesiculosus	Fauvel, 1919
		Hydroides externispina	Straughan, 1967
		Hydroides ezoensis	Okuda, 1934
		Hydroides fusca	Imajima, 1976
		Hydroides fusicola	Morch, 1863
		Hydroides helmatus	(Iroso, 1921)
		Hydroides longispinosa	Imajima, 1976
		Hydroides minax	(Grube, 1878)
		Hydroides multispinosa	Marenzeller, 1884
		Hydroides novaepommeraniae	Augener, 1925
		Hydroides tambalagamensis	Pillai, 1961
		Hydroides tuberculata	Imajima, 1976
	Janita	*Janita fimbriata*	(Delle Chiaje, 1822)
	Metavermilia	*Metavermilia acanthophora*	(Augener, 1914)
		Metavermilia gravitesta	Imajima, 1978
		Metavermilia inflata	Imajima, 1977
		Metavermilia nates	Zibrowius, 1971
		Metavermilia ogasawaraensis	Nishi, Kupriyanova, and Tachikawa, 2007
		Metavermilia ovata	Imajima, 1978
		Metavermilia spicata	Imajima, 1977
		Metavermilia truncata	Imajima, 1978
		Metavermilia yamazatoi	Imajima and ten Hove, 1989
	Omphalopomopsis	*Omphalopomopsis langerhansii*	(Marenzeller, 1884)
	Placostegus	*Placostegus tridentatus*	(Fabricius, 1780)
	Pomatoceros	*Pomatoceros auritubis*	Moore and Bush, 1904
		Pomatoceros helicoides	Marenzeller, 1884
	Pomatostegus	*Pomatostegus stellatus*	(Abildgaard, 1789)
	Protohydroides	*Protohydroides elegans*	(Haswell, 1883)
	Pseudochitinopoma	*Pseudochitinopoma pavimentata*	Nishi, 1999
	Pseudovermilia	*Pseudovermilia pacifica*	Imajima, 1978
	Semivermilia	*Semivermilia elliptica*	Imajima, 1978
	Serpula	*Serpula hartmanae*	Reish, 1968
		Serpula concharum	Langerhans, 1880
		Serpula granulosa	Marenzeller, 1884
		Serpula japonica	Imajima, 1979
		Serpula longituba	(Imajima, 1979)
		Serpula oshimae	Imajima and ten Hove, 1984
		Serpula pacificum	Uchida, 1978
		Serpula tetratropia	Imajima and ten Hove, 1984
		Serpula jukesii	Baird, 1865
		Serpula vittata	Augener, 1914
		Serpula watsoni	Willey, 1905
	Spirobranchus	*Spirobranchus decoratus*	Imajima, 1982
		Spirobranchus corrugatus	Straughan, 1967
		Spirobranchus gaymardi	(Quatrefages, 1866)
		Spirobranchus giganteus corniculatus	(Grube, 1862)
		Spirobranchus kraussi	(Baird, 1865)
		Spirobranchus latiscapus	(Marenzeller, 1884)
		Spirobranchus polytrema	(Philippi, 1884)
		Spirobranchus tetraceros	(Schmarda, 1861)
		Spirobranchus tricornis	(Morch, 1863)
	Vermiliopsis	*Vermiliopsis infundibulum/glandigera-group*	
		Vermiliopsis ctenophora	(Moore and Bush, 1904)
		Vermiliopsis pluriannulata	(Moore and Bush, 1904)
		Vermiliopsis labiata	(Costa, 1861)
Spirorbidae	*Circeis*	*Circeis spirillum*	(Linnaeus, 1758)
	Bushiella	*Bushiella arguta*	(Bush, 1904)
	Leodora	*Leodora coronata*	(Zachs, 1933)
		Leodora multiplata	Uchida, 1971
	Neodexiospira	*Neodexiospira alveolata*	(Zachs, 1933)
		Neodexiospira foraminosa	(Bush, 1904)

		Neodexiospira brasiliensis	(Grube, 1872)
		Neodexiospira pseudocorrugata	(Bush, 1905)
	Paradexiospira	*Paradexiospira (Spirobides) vitrea*	(Fabricius, 1780)
	Pileolaria	*Pileolaria berkeleyana*	(Rioja, 1942)
		Pilelolaria aurita	Rzhavsky and Nishi, 2011
		Pileolaria pacifica	(Uchida, 1971)
		Pileolaria rosepigmentata	(Uchida, 1971)
	Simplaria	*Simplaria pseudomilitaris*	(Thiriot-Quievreux, 1965)
	Spirorbella	*Spirorbella tricornigera*	Rioja, 1942
Siboglinidae	*Lamellibrachia*	*Lamellibrachia sagami*	Kobayashi, Miura, and Kojima, 2015
		Lamellibrachia satsuma	Miura, Tsukahara, Hashimoto, 1997
	Oligobranchia	*Oligobranchia mashikoi*	Imajima, 1973
	Osedax	*Osedax japonicus*	Fujikura, Fujiwara, and Kawato, 2006
Myzostomidae	*Mesomyzostoma*	*Mesomyzostoma katoi*	Okada, 1933
		Mesomyzostoma okadai	Rouse, Lanterbecq, Summers and Eeckhaut, 2015
	Myzostoma	*Myzostoma ambigum*	von Graff, 1877
		Myzostoma antennatum	von Graff, 1877
		Myzostoma brevicirrum	von Graff, 1877
		Myzostoma brevilobatum	Jagersten, 1937
		Myzostoma bocki	Jagersten, 1937
		Myzostoma chelonium	McClendon, 1906
		Myzostom chelonoidium	McClendon, 1906
		Myzostoma cirricostatum	Jagersten, 1937
		Myzostoma cornutum	von Graff, 1877
		Myzostoma elegans	von Graff, 1877
		Myzostoma holotuberculatum	Jagersten, 1940
		Myzostoma insigne	Atkins, 1927
		Myzostoma japonica	McClendon, 1906
		Myzostoma lobata	Graff, 1877
		Myzostoma longimanum	Jagersten, 1937
		Myzostoma maculatum	Jagersten, 1937
		Myzostoma nasonovi	(Fedotov, 1938)
		Myzostoma nigrescens	Graff, 1884
		Myzostoma polycyclus	Atkins, 1927
		Myzostoma smithi	McClendon, 1906
		Myzostoma tentaculatum	Jagersten, 1940
		Myzostoma terminale	Jagersten, 1937
		Myzostoma tuberculatum	Jagersten, 1937
		Myzostoma vastum	Graff, 1883
		Myzostoma wheeleri	McClendon, 1906
	Notopharyngoides	*Notopharyngoides platypus*	(Graff, 1887)
		Notopharyngoides ijimai	(Hara and Okada, 1921)
Eenymeenymyzostomidae	*Eenymeenymyzostoma*	*Eenymeenymyzostoma cirripedium*	(Graff, 1885)
Endomyzostomidae	*Endomyzostoma*	*Endomyzostoma clarki*	(McClendon, 1906)
		Endomyzostoma robustum	(Hara and Okada, 1921)
		Endomyzostoma orientale	(McClendon, 1906)
Protomyzostomidae	*Protomyzostomum*	*Protomyzostomum sagamiense*	Okada, 1922
		Protomyzostomum astrocladi	Fedotov, 1925
Incertae sedis	*Sanbongicola*	*Sanbongicola nakagawai*	Hatai and Masuda, 1973
	Magarikune	*Magarikune akkesiensis*	Minato and Suayma, 1949

Appendix Table 2. List of polychaete species originally described from Japan.

Family	Species	Type locality	Authority
Acoetidae	*Panthalis mitsukurii*	Sagami Bay	Izuka, 1904
	Panthalis jogashimae	Koto-line Mera, Sagami Bay	Izuka, 1912
	Restio aenus	Off Ose Zaki, Suruga Bay	Moore, 1903
Aphroditidae	*Aphrodita daiyumaruae*	Off Kado, Amami-Oshima	Imajima, 2005
	Aphrodita macroculata	Tosa Bay	Imajima, 2001
	Aphrodita negligens	the northwestern Pacific off Japan	Moore, 1905
	Aphrodita nipponensis	Off Johgashima	Imajima, 2003
	Aphrodita tosaensis	Tosa Bay	Imajima, 2003
	Aphrodita watasei	Namerikawa	Izuka, 1912
	Aphrodite japonica	South Japan	Marenzeller, 1879
	Laetmonice aphroditoides	south of Yedo	McIntosh, 1885
	Laetmonice japonica	south of Yedo	McIntosh, 1885
	Pontogenia dentata	Off Johgashima	Imajima, 2003
	Pontogenia sagamiana	Off Johgashima	Imajima, 2003
Polynoidae	*Australonoe japonica*	Chichi-jima, Ogasawara Islands	Imajima, 2011
	Bathymariana zebra	Ryukyu Trench	Levenstein, 1978
	Branchipolynoe pettiboneae	Kaikata Seamount, Off Chichijima Island	Miura and Hashimoto, 1991
	Cervilia japonica	Japan	Frickhinger, 1916
	Eunoe hozawai	Onagawa, Miyagi	Okuda, 1939
	Eunoe shirikishinai	Shirikishinai, Hokkaido	Imajima and Hartman, 1964
	Eunoe spinosa	SSW of Jogashima	Imajima, 1997
	Eunoa yedoensis	south of Yedo	McIntosh, 1885
	Evarne forcipata	Enoshima	Marenzeller, 1902
	Evarne nigra	Japan	Frickhinger, 1916
	Halosydna haberiana	Japan	Frickhinger, 1916
	Halosydna interrupta	Off Enoshima, Sagami Bay	Marenzeller, 1902
	Halosydna sagamiana	Japan	Frickhinger, 1916
	Harmothoe cylindrica	Kannnonzukadashi, Amadaiba, Sagami Bay	Imajima, 1997
	Harmothoe forcipata	Enoshima	Marenzeller, 1902
	Harmothoe glomerosa	Kadone, Sagami Bay	Imajima, 1997
	Harmothoe holothuricola	Uraga Channel	Izuka, 1912
	Harmothoe sexdentata	Off Enoshima, Sagami Bay	Marenzeller, 1902
	Harmothoe sinagawaensis	Shinagawa	Izuka, 1912
	Harmothoe yendoi	Shimushu Islnd	Izuka, 1912
	Hermadion nipponicus	Shirikishinai, Hokkaido	Imajima and Hartman, 1964
	Hespronoe japonensis	Sone-higata, Fukuoka	Hong, Lee, and Sato, 2017
	Hololepidella comatula	Cape Shionomisaki	Uchida, 1975
	Hololepidella boninensis	Chichi-jima, Ogasawara Islands	Nishi and Tachikawa, 1998
	Hololepida japonica	Higashiohne, Sagami Bay	Imajima, 1997
	Hylosynda carinata	Suruga Bay	Moore, 1903
	Lagisca yokohamiensis	Off Yokohama	McIntosh, 1885
	Lepidonotus branchiferus	Sagami Bay	Moore, 1903
	Lepidonotus caelorus	Sagami Bay	Moore, 1903
	Lepidonotus chitoniformis	Sagami Bay, Totomi Sea (syntype)	Moore, 1903
	Lepidonotus dentatus	Matsushima Bay	Okuda and Yamada, 1954
	Lepidonotus dofleini	Japan	Frickhinger, 1916
	Lepidonotus elongatus	Kachigama	Marenzeller, 1902
	Lepidonotus glaber	2 km off SW of Kamegisho, Sagami Bay	Imajima, 1997
	Lepidonotus obtectus	Japan	Frickhinger, 1916
	Lepidonotus sagamianus	Sagami Bay	(Izuka, 1912)
	Lepidonotus takunanae	Off Hachijojima	Imajima, 2011
	Lepidonotus specklus	Off Hahajima	Imajima, 2011
	Lepidonotus (Hylosynda) vexillarius	Totomi Sea	Moore, 1903
	Lepidasthenia izukai		Imajima and Hartman, 1964
	Lepidasthenia magnacornuta	Sagami Bay	Moore, 1903
	Lepidasthenia oshimai	Tomioka, Kumamoto	Okuda, 1936
	Lepidasthniella nishii	Off Shimoda, Honshu	Barnich and Fiege, 2004
	Lepidonotopodium okinawae	Okinawa Trough	Sui and Li, 2017
	Macellicephaloides villosa	Japan Trench	Levenstein, 1982
	Macellicephaloides uschakovi	Off Hokkaido	Levenstein, 1971
	Medioantenna clavata	Kannnonzukadashi, Amadaiba, Sagami Bay	Imajima, 1997
	Opisthotrochopodus japonicus	Kaikata Seamount, Off Chichijima Island	Miura and Hashimoto, 1991
	Polynoe longissima	Nagai; Misaki; Choshi; Kanazawa; Yenoura; Tomo Harbour; Sanbongi; Sakurajima	Izuka, 1912
	Polynoe microsetosa	Misaki, Kanagawa	Izuka, 1912
	Polynoe ocellata	Off Kobe	McIntosh, 1885
	Polynoe sagamiana	Sagami Bay	Izuka, 1912
	Polynoa semierma	Sagami Bay	Moore, 1903
	Polynoe (Laenilla) lamellifera	Enoshima	Marenzeller, 1879
	Polynoe (Lepidonotus) gymnonotus	South Japan	Marenzeller, 1879
	Polynoe (Lepidonotus) pleiolepis	Enoshima	Marenzeller, 1879
	Polynoella levisetosa	south of Yedo	McIntosh, 1885
	Scalesetosus formosus	Off Honshu	Moore, 1903
	Scalisetosus levis	Kagoshima, Nagasaki, Hongkong	Marenzeller, 1902
	Scalisetosus pacificus	Jogashima	Izuka, 1912
	Scalisetosus praelongus	Kagoshima	Marenzeller, 1902
	Showascalisetosus shimizui	Aoyamadashi, Amadaiba, Sagami Bay	Imajima, 1997
Iphionidae	*Iphione hirotai*	Eboshi iwa, Chichijima	Izuka, 1912
	Iphionella philippinensis	Off Japan (paratype?)	Pettibone, 1986
Sigalionidae	*Labiosthenolepis andamanensis*	Tanabe Bay (paratype)	Aungtonya, 2007
	Leanira areolata	south of Yedo	McIntosh, 1885
	Leanira japonica	Off Kobe	McIntosh, 1885
	Leanira izuensis	Izu Peninsula	Takahashi, 1938
	Leanira mitsuii	Susaki	Okuda, 1938
	Heteropelogeia japonica	Sagami sea	Imajima,2006
	Neoleanira areolata	south of Yedo	McIntosh, 1885
	Pisione brevicirrata platycauda	Amitori Bay, Iriomote Island	Yamanishi, 1998
	Pisione bulbifera	Amitori Bay, Iriomote Island	Yamanishi, 1998
	Pisione crassa	Senri-beach, Minabe, Wakayama	Yamanishi, 1976
	Pisione gopalai vannifera	Oura, Honjima Island, Kanagawa	Yamanishi, 1998

	Pisione mista	Sakai-ura, Chichi-jima, Ogasawara Islands	Yamanishi, 1998
	Pisione papillata	Hon-jma, Marugame, Kanagawa	Yamanishi, 1976
	Pisione papuensis brevis	Busena, Nago, Okinawa Island	Yamanishi, 1998
	Pisione paucisetosa	Miyano-hama, Chichi-jima, Ogasawara Islands	Yamanishi, 1998
	Pisionidens maturata	Seto, Wakayama	Yamanishi, 1976
	Pisionella hancocki	Off Tango-cho, Tango Peninsula, the Sea of Japan	Yamanishi, 1983
	Pisione subulata	Shijiki Bay, East China Sea	Yamanishi, 1992
	Pisione umbraculifera	Amitori Bay, Iriomote Island	Yamanishi, 1998
	Pisione vestigialis	Otsuchi-chi, Iwate	Yamanishi, 1998
	Sigalion orientalis	Off Sanriku	Imajima, 2009
	Sigalion papillosum	Mawaki, Noto Peninsula	Imajima, 1967
	Sthenelais branchiata	Kannnonzukadashi, Amadaiba, Sagami Bay	Imajima, 2003
	Sthenelanella japonica	Omuodashi, south of Izu Oshima	Imajima, 2003
	Sthenolepis izuensis	Izu Peninsula	Takahashi, 1938
Pholoidae	*Pholoe parva*	Shirikishinai, Hokkaido	Imajima and Hartman, 1964
Eulepethidae	*Japoeulepis amioi*	Miho Bay, Tottori	Imajima, 1974
Alciopidae	*Callizona japonica*	Misaki, Kanagawa	Izuka, 1914
	Vanadis grandis	Misaki, Kanagawa	Izuka, 1914
Tomopteridae	*Tomopteris pacifica*	Misaki, Kanagawa	Izuka, 1914
Glyceridae	*Glycera amadaiba*	Kannnonzukadashi, Amadaiba, Sagami Bay	Imajima, 2003
	Glycera chirori	Kasaoka, Kanazawa, Kojima Bay, Tomo Harbor, Kagoshima (syntype)	Izuka, 1912
	Glycera decipiens	Miya Bay	Marenzeller, 1879
	Glycera hasidatensis	Hashidate	Izuka, 1912
	Glycera misakiensis	Koajiro	Izuka, 1912
	Glycera neorobusta	Off Sanriku	Imajima, 2009
	Glycera okai	Off Sanriku	Imajima, 2009
	Glycera onomichiensis	Onomichi	Izuka, 1912
	Glycera opisthibranchiata	South Japan	Marenzeller, 1879
	Glycera semibranchiopoda	Off Sanriku	Imajima, 2009
	Hemipodia yenourensis	Nagahama, Yenoura	Izuka, 1912
Goniadidae	*Glycinde nipponica*	Tsukumo Bay	Imajima, 1967
	Goniada brunnea goronba	Goronba	Imajima, 2003
	Goniada distorta	Suruga Bay	Moore, 1903
	Goniada japonica	Misaki, Naruto (syntype)	Izuka, 1912
	Goniada sagamiana	Off Hayama	Imajima, 2003
	Goniada (*Leonnatus*) *foliacea*	Sagami Bay, Sendai Bay (syntype)	Moore, 1903
Hesionidae	*Amphidromus izukai*	Sagami Bay	Hessle, 1925
	Amphidromus setosus	Misaki, Kanagawa	Hessle, 1925
	Gyptis pacifica	Japan	Hessle, 1925
	Hesione reticulata	Zaimokuza, Kanagawa (neotype)	Marenzeller, 1879
	Hesionies incisa	Daguri, Shibshi-cho, Kagoshima	Yamanishi, 1984
	Hesionides minima serrata	Okinohama, Kochi	Yamanishi, 1984
	Hesionides unilamellata japonica	Senri-beach, Minabe, Wakayama	Yamanishi, 1984
	Heteropodarke kiiensis	Nachi-Katsuura, Nachi Bay	Uchida, 2004
	Heionura japonica	Senri-beach, Minabe, Wakayama	Yamanishi, 1980
	Ichthyohesione gorgasiae	Sabiura, Kushimoto	Uchida, 2004
	Kefersteinia similis	Misaki, Kanagawa	Hessle, 1925
	Kefersteinia dubia	Misaki, Kanagawa	Hessle, 1925
	Leocrates anonymus	Misaki, Kanagawa	Hessle, 1925
	Leocrates auritus	Ogasawara Island	Hessle, 1925
	Microphthalmus hartmanae pacificus	Shirahama, Wakayama	Yamanishi, 1984
	Microphthalmus itoi	Akkeshi, Hokkaido	Uchida, 2004
	Micropodarke amemiyai	Susaki	Okuda, 1938
	Ophiodromus brevipodius	Kushimoto	Uchida, 2004
	Ophiodromus bunbuku	Takegashima Marine Park Area No.2, Tokushima	Uchida, 2004
	Ophiodromus constrictus	Sabiura, Kushimoto	Uchida, 2004
	Ophiodromus fauveli	Kushimoto	Uchida, 2004
	Ophiodromus longifundus	Kuroshima	Uchida, 2004
	Ophiodromus okudai	Ohmura Bay, Nagasaki	Uchida, 2004
	Ophiodromus parapallidus	Kushimoto	Uchida, 2004
	Oxydromus lobatus	Okinose, Sagami Bay	Hessle, 1925
	Oxydromus pacificus	Okinose, Sagami Bay	Hessle, 1925
	Parahesiocaeca japonica	Kushimoto	Uchida, 2004
	Synsyllidia alternata	Kushimoto	Uchida, 2004
	Uncopodarke intermedia	Nachi-Katsuura, Nachi Bay	Uchida, 2004
Phyllodocidae	*Anaitides elongata*	Tsukumo Bay	Imajima, 1967
	Carobia castanea	Enoshima	Marenzeller, 1879
	Eulalia austrophylloformis	east of Honshu	Uschakov, 1972
	Eulalia gemina	Seto, Wakayama	Kato, Pleijel, and Mawatari, 2001
	Eulalia gravieri	east of Honshu	Uschakov, 1972
	Eulalia viridis japanensis	Shirikishinai, Hokkaido	Imajima and Hartman, 1964
	Eulalia albopicta	South Japan	Marenzeller, 1879
	Eumida caeca	Sagami Bay	Moore, 1903
	Eumida notoensis	Tsukumo Bay	(Imajima, 1967)
	Eteone japanensis	Japan Sea	McIntosh, 1901
	Eteone ornata	North Japan Sea	Grube, 1878
	Eteone vitiazi	east of Honshu	Uschakov, 1972
	Lugia abyssicola	Southeast of Hokkaido	Uschakov, 1972
	Mysta ctena	Koajiro Bay	Kato, Pleijel, and Mawatari, 2001
	Mystides japonica	Kannnonzukadashi, Amadaiba, Sagami Bay	Imajima, 2003
	Nereiphylla crassa	Kannnonzukadashi, Amadaiba, Sagami Bay	Imajima, 2003
	Nereiphylla hera	Kikonai, Hokkaido	Kato and Mawatari, 1999
	Notophyllum imajimai	Oshoro, Hokkaido	Kato and Pleijel, 2002
	Notophyllum japonicum	Souhern Japan	Marenzeller, 1879
	Notophyllum sagamianum	Yodomi, Sagami Bay	Izuka, 1912
	Paranaitis caeca	Sagami Bay	(Moore, 1903)
	Paranatis caecum	east of Honshu	Uschakov, 1972
	Paranatis serrata	south of Minamiamadaiba, Sagami Bay	Imajima, 2003
	Paranaitis uschakovi	Japan	Eibye-Jacobsen, 1991
	Protomystides hatsushimaensis	Off Hatsushima, Sagami Bay	Miura, 1988
	Protomystides orientalis	Off Miyagi	Uschakov, 1972

	Phyllodoce lineata tosaensis	Tosa Bay	Imajima, 2001
	Phyllodoce japonica	Tsukumo Bay	Imajima, 1967
	Phyllodoce pulla	Japan	Treadwell, 1926
	Phyllodoce violacea	Japan; Fiji; Suva Harbor	Treadwell, 1926
	Pterocirrus imajimai	Califronia; East of Honshu	Uschakov, 1972
	Sige macroceros orientalis	Shirikishinai, Hokkaido	Imajima and Hartman, 1964
	Sige notoensis	Noto Peninsula	Imajima, 1967
	Steggoa pacifica	Off Onagawa	Imajima, 1964
	Vitiaziphyllum nuchalum	east of Honshu	Uschakov, 1972
Syllidae	*Alcyonosyllis glasbyi*	Ohura Bay, Shimoda	San Martin and Nishi, 2003
	Amblyosyllis nigrolineata	Misaki, Kanagawa	Okada, 1934
	Amblyosyllis speciosa	Misaki, Kanagawa	Izuka, 1912
	Autosyllis japonica	Off Shirikishinai, Hokkaido	Imajima and Hartman, 1964
	Autolytus alternata	Off Shirikishinai, Hokkaido	Imajima and Hartman, 1964
	Autolytus nipponensis	Shirikishinai, Hokkaido	Imajima and Hartman, 1964
	Autolytus noroi	Off Cape Shiriyazaki	Imajima and Hartman, 1964
	Autolytus irregularis	Off Cape Shiriyazaki	Imajima and Hartman, 1964
	Autolytus japonensis	Off Cape Shiriyazaki	Imajima and Hartman, 1964
	Autolytus pupureumaculata	Seto, Wakayama	Okada, 1933
	Autolytus usujiriensis	Usujiri Bay, Hokkaido	Zachs, 1933
	Autolytus (Autolytus) irregularis	Off Senda-zaki, in Uraga Strait	Imajima, 1966
	Autolytus (Autolytus) pentadentatus	Seto, Wakayama	Imajima, 1966
	Autolytus (Autolytus) spinoculatus	Seto, Wakayama	Imajima, 1966
	Autolytus (Autolytus) tamanus	Karasu-jima near Tamano	Imajima, 1966
	Autolytus (Autolytus) tsugarus	Off Shirikishinai, Hokkaido	Imajima, 1966
	Autolytus (Regulatus) kiiensis	Seto, Wakayama	Imajima, 1966
	Autolytus (Regulatus) boreatus	Off Cape Shiriyazaki	Imajima, 1966
	Autolytus (Regulatus) misakiensis	Misaki, Kanagawa	Imajima, 1966
	Autolytus (Regulatus) misakiensis longilappetus	Onagawa, Miyagi	Imajima, 1966
	Autolytus (Regulatus) mukaishimus	Mukaishima	Imajima, 1966
	Autolytus (Regulatus) nipponensis longicirratus	Off Cape Shiriyazaki	Imajima, 1966
	Autolytus (Regulatus) okadai	Onagawa, Miyagi	Imajima, 1966
	Autolytus (Regulatus) setoensis	Seto, Wakayama	Imajima, 1966
	Autolytus (Regulatus) usaensis	Usa, Kouchi	Imajima, 1966
	Autolytus (Regulatus) vulgarius	Usa, Kouchi	Imajima, 1966
	Autolytus dentalius	Off Senda-zaki, in Uraga Strait	Imajima, 1966
	Brachysyllis japonica	Shirikishinai, Hokkaido	Imajima and Hartman, 1964
	Eurysyllis japonicum	Off SW of Jogashima	Imajima, 2003
	Eusyllis habei	Tsukumo Bay	Imajima, 1966
	Eusyllis irregulata	Off Cape Shiriyazaki	Imajima, 1966
	Eusyllis japonica	Off Shirikishinai, Hokkaido	Imajima and Hartman, 1964
	Eusyllis longicirrata	Mukaishima	Imajima, 1966
	Exogone exilis	east of Aoyamadashi, Amadaiba, Sagami Bay	Imajima,2003
	Haplosyllis anthogorgicola	Seto, Wakayama	Utinomi, 1956
	Haplosyllis crassicirrata	Yoshio, Katsuura, Boso Peninsula	Aguado, San Martin, and Nishi, 2006
	Langerhansia japonica	Uraga Strait	Imajima, 1966
	Odontosyllis fulgurans japonica	Uraga Strait	Imajima, 1966
	Odontosyllis setoensis	Seto, Wakayama	Imajima, 1966
	Odontosyllis trilineata	Kannnonzukadashi, Amadaiba, Sagami Bay	Imajima, 2003
	Odontosyllis undecimdonta	Off Shirikishinai, Hokkaido	Imajima and Hartman, 1964
	Opisthisyllis japonica	Mukaishima	Imajima, 1966
	Parasphaerosyllis ezoensis	Off Shirikishinai, Hokkaido	Imajima and Hartman, 1964
	Parasphaerosyllis setoensis	Seto, Wakayama	Imajima, 1966
	Pionosyllis uraga	Uraga Strait	Imajima, 1966
	Streptospinigera alternocirrus	Aburatsubo Bay, Misaki	Ohwada, 1988
	Syllides japonicus	Tsukumo Bay	Imajima, 1966
	Syllis exiliformis	Kamegishonishi	Imajima, 2003
	Syllis inflata	Japan	Marenzeller, 1879
	Syllis marugani	Manazuru Bay	Aguado, San Martin, and Nishi, 2006
	Syllis multiannulata	North West Pacific Ocean (Japan)	Aguado, San Martin, and Nishi, 2008
	Syllis okadai		Fauvel, 1934
	Syllis pilosa	North West Pacific Ocean (Japan)	Aguado, San Martin, and Nishi, 2008
	Syllis rubicunda	North West Pacific Ocean (Japan)	Aguado, San Martin, and Nishi, 2008
	Trypanosyllis misakiensis	Misaki, Kanagawa	Izuka, 1906
	Trypanosyllis (Trypanobia) asterobia	the coast of Misaki	Okada, 1933
	Trypanosyllis (Trypanobia) foliosa	Sagami Bay	Imajima, 2003
	Trypanosyllis (Trypanoseta) ohma	Shirikishinai, Hokkaido	Imajima and Hartman, 1964
	Trypanosyllis (Trypanosyllis) coeliaca nipponica	Off Shirikishinai, Hokkaido	Imajima and Hartman, 1964
	Typosyllis aciculata orientalis	Shirikishinai, Hokkaido	Imajima and Hartman, 1964
	Typosyllis lunaris	Seto, Wakayama	Imajima, 1966
	Typosyllis maculata	Seto, Wakayama	Imajima, 1966
	Typosyllis monilata	Misaki, Kanagawa	Imajima, 1966
	Typosyllis nipponica	Misaki, Kanagawa	Imajima, 1966
	Typosyllis okadai	Seto, Wakayama	Fauvel, 1934
	Typosyllis regulata	Seto, Wakayama	Imajima, 1966
	Typosyllis setoensis	Seto, Wakayama	Imajima, 1966
Nereididae	*Ceratocephale wakasaensis*	Wakasa Bay	Hayashi and Hanaoka, 2000
	Ceratocephale osawai	Hojo, Boso Peninsula; Sumida (syntype?)	Izuka, 1903
	Ceratonereis japonica	Koniya, Amami-Oshima	Imajima, 1972
	Hediste atoka	Shinjogawa River, Aomori	Sato and Nakashima, 2003
	Hediste diadroma	mouth of Omoigawa River, Kagoshima	Sato and Nakashima, 2003
	Leonnates nipponicus	Koniya, Amami-Oshima	Imajima, 1972
	Lycastopsis augeneri	Oshoro, Hokkaido	Okuda, 1937
	Namalycastis rhodochorde	Indonesia, Sungai Kakap	Glasby, Miura, Nishi, and Junardi, 2007
	Nereis ijimai	Off Johgashima	Izuka, 1912
	Nereis oxypoda	Yokohama	Marenzeller, 1879
	Nectoneanthes uchiwa	Hachihama, Kojima Bay, Seto	Sato, 2013

		Inland Sea	
	Nereis abyssa	Off Sanriku	Imajima, 2009
?	*Nereis arenaceodentata*		Moore, 1903
	Nereis dyamusi	Wakkanai, Kitami, Hakodate, Sakhalin	Izuka, 1912
	Nereis ezoensis	Wakkanai, Oshoro, Muroran (syntype)	Izuka, 1912
	Nereis heterocirrata	Takami, Choshi, Chiba	Treadwell, 1931
	Nereis izukai	Off Kinkasan	Okuda, 1939
	Nereis japonica	Hachi-hama, Kojima Bay, Okayama;	Izuka, 1908
	Nereis (Platynereis) kobiensis	Off Kobe	McIntosh, 1885
	Nereis mictodonta		Marenzeller, 1879
	Nereis multignatha		Imajima and Hartman, 1964
	Nereis pelagica multignatha	Fukuura-jima, Matsushima Bay	Imajima and Hartman, 1964
	Nereis pusilla	Suruga Bay	Moore, 1903
	Nereis shishidoi	Yuriage	Izuka, 1912
	Nereis surugaense	Suruga Bay	Imajima, 1972
	Nicon japonicus	Ariake Sea	Imajima, 1972
	Nicon misakiensis	Misaki, Kanagawa	Imajima and Hayashi, 1969
	Perinereis vancaurica tetradentata	Sumida River, Tokyo	Imajima, 1972
	Rullierinereis profunda	Off Miyako	Imajima, 2009
Nephtyidae	*Aglaophamus amkusaensis*	Off Tomioka, Amakusa	Imajima and Takeda, 1985
	Aglaophamus gippslandicus bisectus	Off Tanegashima	Imajima and Takeda, 1985
	Aglaophamus japonicus	Off Nii-jima	Imajima and Takeda, 1985
	Aglaophamus lobatus	Sagami Bay	Imajima and Takeda, 1985
	Inermonephtys japonica	Sagami Bay	Imajima and Takeda, 1985
	Nephtys brachycephala	Sagami Bay	Moore, 1903
	Nephtys neopolybranchia	Usujiri Bay, Hokkaido	Imajima and Takeda, 1987
	Nephtys serrata	Off Honbekkai, Nemuro Peninsula	Imajima and Takeda, 1987
	Nepthys sukumoensis	Sukumo Bay, Kouchi	Kitamori, 1960
Sphaerodoridae	*Ephesiella oculata*	Off Johghashima	Imajima, 2003
Chrysopetalidae	*Iheyomythilidicola tridentatus*	Iheya Ridge, Okinawa Trough	Miura and Hashimoto, 1996
	Nautilina calyptogenicola	Japan Trench	Miura and Laubier, 1989
	Natsushima bifurcata	Off Hatsushima, Sagami Bay	Miura and Laubier, 1990
	Natsushima graciliceps	Kagoshima Bay	Miura and Hashimoto, 1996
	Shinkai longipedata	Iheya Ridge, Okinawa Trough	Miura and Ohta, 1991
	Shinkai sagamiensis	Off Hatsushima, Sagami Bay	Miura and Laubier, 1990
	Shinkai semilonga	Minami-Ensei Knoll, Okinawa Trough	Miura and Hashimoto, 1996
	Thyasiridicola branchiatus	Off Hatsushima, Sagami Bay	Miura and Hashimoto, 1996
Pilargidae	*Ancistrosyllis hanaokai*	the Seto Inland Sea	Kitamori, 1960
	Ancistrosyllis gracilis	Okinose, Sagami Bay	Hessle, 1925
	Cabira pilargiformis japonica	Maizuru Bay	Imajima, 1987
	Pilargis matsunagaensis	Matsunaga Bay	Kitamori, 1960
	Pseudexogone imajimai	Off Tanegashima	Salazar-Vallejo, Bailey-Brock, and Dreyer, 2007
	Litocorsa dentata	Off Shimoda, Honshu	Imajima, 1987
Paralacydonidae	*Paralacydonia paradoxa japonica*	Bungo Suido, Iyo Nada, Hiroshima Bay, Hiro Bay, Kii Suido of	Kitamori, 1965
		Seto-Inland-Sea and near Akita of Japan Sea	
Euphrosinidae	*Euphrosine magnoculata*	Misaki, Kanagawa	Izuka, 1912
	Euphrosine digitalis	Off Kashima Sea	Imajima, 2009
	Euphrosine orientalis	Japan	Gustafson, 1930
	Euphrosine polyclada	west of Kamegisho, Sagami Bay	Imajima, 2003
	Euphrosine pseudonotialis	Off Kashima Sea	Imajima, 2009
	Euphrosine ramosa	SW of Jogashima	Imajima, 2003
	Euphrosine superba	Enoshima, central Japan	Marenzeller, 1879
	Euphrosine tosaensis	Tosa Bay	Imajima, 2001
Amphinomidae	*Chloeia ancora*	Japan	Frickhinger, 1916
	Notopygos mitsukurii	Off Naha, Okinawa Island	Izuka, 1910
	Paramphinome grandis	Japan	Gustafson, 1930
	Pareurythoe japonica	Japan	Gustafson, 1930
	Pherecardia maculata	Okinoyama, Sagami Sea	Imajima, 2003
Dinophilidae	*Trilobodrilus itoi*	Ishikari Beach, Hokkaido	Kajihara, Ikoma, Yamasaki, and Hiruta, 2015
	Trilobodrilus nipponicus	Akkeshi, Hokkaido	Uchida and Okuda, 1943
Hartmaniellidae	*Hartmaniella erecta*	Off Kuno-zan, Suruga Bay	Imajima, 1977
Eunicidae	*Eunice alata*	Kominato	Miura, 1977
	Eunice annulicirrata	Tsuji-shima, Amakusa	Miura, 1986
	Eunice congesta	East coast of Enoshima	Marenzeller, 1879
	Eunice fauchaldi	Off Tanabe	Miura, 1986
	Eunice flavopicta	Misaki, Ushibuka, Kumamoto	Izuka, 1912
	Eunice gracilis	Off Omae Zaki, Honshu	Moore, 1903
	Eunice kobiensis	Off Kobe	McIntosh, 1885
	Eunice masudai	Off Kushimoto	Miura, 1986
	Eunice medicina	2 miles NE of Seno Umi, Suruga Bay	Moore, 1903
	Eunice microprion	Souhern Japan	Marenzeller, 1879
	Eunice mucronata	Sagami Bay, 4.5 miles SE of Manazuru Saki	Moore, 1903
	Eunice northioidea	Off Ose Zaki, Suruga Bay	Moore, 1903
	Eunice northioidea brevibranchiata	Off Ose Zaki, Suruga Bay	Miura, 1986
	Eunice ovalifera	Mori	Fauvel, 1936
	Eunice profunda	Off Daio-saki, Kumano Nada	Miura, 1987
	Eunice pusilla	Off Hachijojima	Imajima, 2011
	Eunice quinquifida	Sagami Bay	Moore, 1903
	Eunice spinea	Kagoshima Bay	Miura, 1977
	Eunice tanseiae	Off Susami	Miura, 1986
	Eunice yamamotoi	Off Kushimoto	Miura, 1986
	Euniphysa misakiensis	Off Misaki	Miura, 1987
	Marphysa iwamushi	Fukui, Onomichi (syntype?)	Izuka, 1907
	Marphysa tamurai	vicinity of Onomichi, Hiroshima	Okuda, 1934
Lumbrineridae	*Augeneria polytentaculata*	Off Enoshima, Sagami Bay	Imajima and Higuchi, 1975
	Eranno tosaensis	Tosa Bay	Imajima, 2001
	Lumbriconereis bifurcata	South of yedo	McIntosh, 1885
	Lumbriconereis japonica	Enoshima, central Japan	Marenzeller, 1879
	Lumbriconereis heteropoda	Miya Bay	Marenzeller, 1879
	Lumbrineriopsis paucidentata	Off Mukojima	Imajima, 2011

	Lumbrineriopsis tsushimaensis	Tsushima Strait	Imajima and Higuchi, 1975
	Lumbrinerides auctus japonicus	Off Shimoda, Honshu	Imajima, 1985
	Lumbrinerides bidentatus	Off Tsushima	Imajima, 1985
	Lumbrinerides hayashii	Wakasa Bay	Imajima, 1985
	Lumbrinerides kristiani	Irago Strait	Miura, 2017
	Lumbrinerides lineatus	Off Shimoda, Honshu	Imajima, 1985
	Lumbrinerides shimodaensis	Off Shimoda, Honshu	Imajima, 1985
	Lumbrinerides tamaii	Tenryu River mouth	Miura, 2017
	Lumbrinerides yoshioi	Tomakomai, Hokkaido	Miura, 2017
	Lumbrineris abyssalis	Off Odawara, Sagami Bay	Imajima and Higuchi, 1975
	Lumbrineris ezoensis	Shakotan, Hokkaido	Uchida, 1968
	Lumbrineris heteropoda	Japan	Marenzeller, 1879
	Lumbrineris higuchiae	Off Shimoda, Honshu	Carrera-Parra, 2006
	Lumbrineris imajimai	Off Shimoda, Honshu	Carrera-Parra, 2006
	Lumbrineris longifolia	Tsukumo Bay	Imajima and Higuchi, 1975
	Lumbrineris nipponica	Amakusa, Kyushu	Imajima and Higuchi, 1975
	Lumbrineris nishii	Off Shimoda, Honshu	Carrera-Parra, 2006
	Ninoe japonica	Off Enoshima, Sagami Bay	Imajima and Higuchi, 1975
	Ninoe palmata	Sendai Bay	Moore, 1903
	Paraninoe hartmanae	Alaska, Kuril-Kamchatka, and Japan	Levenstein, 1977
Onuphidae	*Anchinothria tosaensis*	Tosa Bay	Imajima, 1999
	Diopatra bilobata	Mawaki, Noto Peninsula	Imajima, 1967
	Diopatra nishii	Yoshio, Katsuura, Boso Peninsula	Paxton, 2015
	Diopatra sugokai	Misaki, Kanagawa	Izuka, 1907
	Hyalinoecia acuta	Tosa Bay	Imajima, 1999
	Hyalinoecia papillata	Tsushima Strait	Imajima, 1999
	Kinbergonuphis enoshimaensis	Enoshima, central Japan	Imajima, 1986
	Longibrachium arariensis	Koganezaki, Arari, Shizuoka	Nishi and Kato, 2009
	Nothria abyssala	Off Sanriku	Imajima, 1989
	Nothria geophiliformis	north of Sendai Bay, Sagami Bay	Moore, 1903
	Nothria grossa	Off Sanriku	Imajima, 1989
	Nothria itoi	Wakasa Bay	Maekawa and Hayashi, 1989
	Nothria macrobranchiata	South of yedo	McIntosh, 1885
	Nothria oblonga	Off Kushimoto	Imajima, 1999
	Nothria otsuchiensis	Otsuchi Bay	Imajima, 1986
	Nothria otsuchiensis binoculata	Wakasa Bay	Mawakawa and Hayashi, 1989
	Nothria paxtonae	Off Emi, Boso Peninsula	Imajima, 1999
	Nothria shirikishinaiensis	Shirikishinai, Hokkaido	Imajima, 1960
	Nothria willemoesii	Japan	(McIntosh, 1885)
	Notonuphis abyssalis	Tosa Bay	Imajima, 1999
	Onuphis amakusaensis	Amakusa, Kyushu	Maekawa and Hayashi, 1999
	Onuphis cirrobranchiata	Sagami Bay, Suruga Bay	Moore, 1903
	Onuphis fuscata	Otsuchi Bay	Imajima, 1986
	Onuphis hokkaiensis	Off Otoshibe, Hokkaido	Maekawa and Hayashi, 1999
	Onuphis holobranchiata	Enoshima, central Japan	Marenzeller, 1879
	Onuphis imajimai	Wakasa Bay	Maekawa and Hayashi, 1989
	Onuphis iriei	southern East China Sea	Maekawa and Hayashi, 1999
	Onuphis kammurijimaensis	Wakasa Bay	Maekawa and Hayashi, 1989
	Onuphis longisetosa	Otsuchi Bay	Imajima, 1986
	Onuphis nakaoi	Otobe, Hokkaido	Maekawa and Hayashi, 1999
	Onuphis nonpectinata	Off Otsuchi	Imajima, 1986
	Onuphis shijikiensis	Shijiki Bay, East China Sea	Maekawa and Hayashi, 1999
	Onuphis taraba	Wakasa Bay	Maekawa and Hayashi, 1989
	Onuphis tetradentata	Off Otsuchi	Imajima, 1986
	Onuphis tetradentata wakasaensis	Wakasa Bay	Maekawa and Hayashi, 1989
	Onuphis tosaensis	Tosa Bay	Maekawa and Hayashi, 1999
	Paradiopatra crassa	Off Sanriku	Imajima, 1999
	Paradiopatra gracilis	Off Sanriku	Imajima, 2009
	Paradiopatra okai	Sagami Bay	Imajima, 1999
	Paradiopatra pyricirra	south-west of Japan	Budaeva and Fauchald, 2011
	Paradiopatra simplex	Suruga Bay	Imajima, 1999
	Paradiopatra unica	Kagoshima Bay	Imajima, 1999
	Paranorthia brevicornuta	Suruga Bay	Moore, 1903
	Paranorthia macrobranchiata	South of Tokyo	McIntosh, 1885
	Sarsonuphis yasudai	Wakasa Bay	Maekawa and Hayashi, 1989
Dorvilleidae	*Iphitime doederleini*	Southern Japan	Marenzeller, 1902
	Coelobranchus papillosus	Sagami Bay	Izuka, 1912
	Ophryotrocha japonica	Amakusa, Kyushu	Paxton and Akesson, 2010
	Ophryotrocha kagoshimaensis	Kagoshima Bay	Miura, 1997
	Ophryotrocha labronica pacifica	Sagami Bay	Paxton and Akesson, 2007
	Ophryotrocha notoglandulata	Misaki, Kanagawa	Pfannenstiel, 1972
	Ophryotrocha wubaolingi	Kagoshima Bay	Miura, 1997
	Staurocephalus matsushimaensis	Togu, Katsura-jima, Isozaki, Matsushima Bay	Okuda, 1950
Oenonidae	*Arabella geniculata var. japonica*	Takoshima, Onagawa Bay	Okuda, 1939
	Halla okudai	Kojima Bay, Seto Inland Sea	Imajima, 1967
	Drillonereis falcata japonica	Off Kushiro, Hokkaido	Imajima, 1964
	Laranda robusta	Suruga Bay, Sagami Bay	Moore, 1903
	Notocirrus zonata	Totomi Sea	Moore, 1903
Saccocirridae	*Saccocirrus labilis*	Kashima Islet	Yamanishi, 1973
	Saccocirrus uchidai	Uchikabuto, Oshoro, Hokkaido	Sasaki, 1981
Protodrilidae	*Protodrilus puniceus*	Off Nomamisaki, Kyushu Island	Sato-Okoshi, Okoshi, and Fujiwara, 2015
Polygordiidae	*Polygordius ijimai*	Misaki, Kanagawa	Izuka, 1903
	Polygordius pacificus	Misaki, Kanagawa	Uchida, 1935
Spintheridae	*Spinther ericinus*	Off Kushiro, Hokkaido	Yamamoto and Imajima, 1985
	Spinther japonicus	Off Shirikishinai, Hokkaido	Imajima and Hartman, 1964
	Spinther sagamiensis	east of Aoyamadashi, Amadaiba, Sagami Bay	Imajima, 2003
Siboglinidae	*Lamellibrachia sagami*	Off Hatsushima, Sagami Bay	Kobayashi, Miura, and Kojima, 2015
	Lamellibrachia satsuma	Kagoshima Bay	Miura, Tsukahara, Hashimoto, 1997
	Oligobranchia mashikoi	Tsukumo Bay	Imajima, 1973
	Osedax japonicus	Nomamisaki, Kagoshima	Fujikura, Fujiwara, Kawato, 2006
Orbiniidae	*Aricia fimbriata*	Suruga Bay; north Japan	Moore, 1903
	Naineris japonica	Off Sanriku	Imajima, 2009
Fauveliopsidae	*Fauveliopsis hartmarni*	Off Sanriku	Levenstein, 1970
	Laubieriopsis brevis japonica	Off Kinkazan, Ishinomaki	Imajima, 2009
Cirratulidae	*Cirratulus longicephalus*	Off Onagawa	Imajima, 1964
	Cirratulus comosus	Japan	Marenzeller, 1879
	Cirratulus dasylophius	Enoshima, central Japan	Marenzeller, 1879

	Cirratulus gibbosus	Sagami Bay	Moore, 1903
	Chaetozone spinosa	Sagami Bay	Moore, 1903
	Timarete japonica	Japanese Sea	Zachs, 1933
Flabelligeridae	*Pherusa moorei*	Off Honshu	Salazar-Vallejo, 2014
	Pherusa nipponica	Hota, Karaya, Uchibo	Salazar-Vallejo, 2014
	Semiodera nipponica	Ubara, Katsuura, Boso Peninsula	Salazar-Vallejo, 2012
Acrocirridae	*Acrocirrus uchidai*	Akkeshi, Hokkaido	Okuda, 1934
	Acrocirrus muroranensis	Muroran, Hokkaido	Okuda, 1934
	Acrocirrus validus	Enoshima, central Japan	Marenzeller, 1879
Magelonidae	*Magelona japonica*	Onagawa, Miyagi	Okuda, 1937
	Magelona agoensis	Ago Bay	Kitamori, 1967
Chaetopteridae	*Chaetopterus cautus*	Yokohama	Marenzeller, 1879
	Chaetopterus grerarius	Off Katsuyama-iwai, Uchibo, near the Tokyo Bay	Nishi, Arai, and Sasanuma, 2000
	Chaetopterus pacificus	Futo, Izu Peninsula	Nishi, 2001
	Chaetopterus izuensis	Futo, Izu Peninsula	Nishi, 2001
	Chaetopterus japonicus	Tateyama, Boso Peninsula	Nishi, 2001
	Chaetopterus kagosimensis	Kagoshima Bay	Izuka, 1911
	Chaetopterus takahashii	Gogoshima	Izuka, 1911
	Mesochaetopterus japonicus	Imazaike, Yoshii-mura, Iyo	Fujiwara, 1934
	Phyllochaetopterus awasensis	Awase, Okinawa	Nishi and Hsieh, 2009
	Phyllochaetopterus claparedii	Off Kobe	McIntosh, 1885
	Spiochaetopterus costarum okudai	Tomioka, Kumamoto	Gitay, 1969
	Spiochaetopterus iheyaensis	Iheya Ridge, Okinawa Trough	Nishi, 2008
	Spiochaeopterus izuensis	Futo, Izu Peninsula	Nishi, Bhaud, and Koh, 2004
	Spiochaetopterus manazuruensis	Manazuru Peninsula, Sagami Bay	Nishi, 2003
	Spiochaetopterus okinawaensis	Bise beach, Okinawa	Nishi and Bhaud, 2000
	Spiochaetopterus sagamiensis	Off Hatsushima, Sagami Bay	Nishi, Miura, and Bhaud, 1999
	Spiochaetopterus sanbanzensis	Sanbanze, Tokyo Bay	Nishi, Bhaud, and Koh, 2004
	Spiochaetopterus sesokoensis	Sesoko Island, Okinawa	Nishi and Bhaud, 2000
Cossuridae	*Cossura coasta*	the Seto Inland Sea	Kitamori, 1960
	Cossura duplex	Beppu Bay, Kyushu	Tamai, 1986
	Cossura lepida	Beppu Bay, Kyushu	Tamai, 1986
Spionidae	*Apoprionospio dayi japonica*	Off Yuragawa, Wakasa Bay	Imaima, 1989
	Carazziella spongilla	Shinji Lake, Shimane	Sato-Okoshi, 1998
	Dispio oculata	Off Yuragawa, Wakasa Bay	Imajima, 1990
	Nerinides yamaguchii	Shirikishinai, Hokkaido	Imajima, 1959
	Paraprionospio cordifolia	Off Yuragawa, Wakasa Bay	Yokoyama, 2007
	Paraprionospio oceanensis	Tosa Bay	Yokoyama, 2007
	Paraprionospio patiens	Osaka Bay	Yokoyama, 2007
	Polydora variegata	Abashiri Bay, Hokkaido	Imajima and Sato, 1984
	Polydora aura	Chikura, Chiba	Sato-Okoshi, 1998
	Polydora brevipalpa		Zachs, 1933
	Polydora onagawaensis	Onagawa, Miyagi	Teramoto, Sato-Okoshi, Abe, Nishitani, and Endo, 2013
	Polydora pauchibranchiata	Onomichi, Hiroshima	Okuda, 1937
	Polydora uncinata	Orikasa, Iwate	Sato-Okoshi, 1998
	Polydora (Carazzia) paucibranchiata	Onomichi, Hiroshima	Okuda, 1937
	Prionospio japonicus	Kukusi-ko, Zinzai-ko (syntype)	Okuda, 1935
	Prionospio bocki	Kobe	Soderstrom, 1920
	Prionospio (Aquilaspio) convexa	Off Kushimoto	Imajima, 1990
	Prionospio (Aquilaspio) grossa	Off Koyahata, Sagami Bay	Imajima, 1990
	Prionospio (Minuspio) elegantula	Off Oga Peninsula	Imajima, 1990
	Prionospio (Minuspio) elongata	Off Oga Peninsula	Imajima, 1990
	Prionospio (Minuspio) pulchra	Tokyo Bay	Imajima, 1990
	Prionospio (Prionospio) depauperata	Tsukumo Bay	Imajima, 1990
	Prionospio (Prionospio) lineata	Amakusa, Kyushu	Imajima, 1990
	Prionospio (Prionospio) membranacea	Amakusa, Kyushu	Imajima, 1990
	Prionospio (Prionospio) oshimaensis	Off Amami-Oshima	Imajima, 1990
	Prionospio (Prionospio) paradisea	Off Koyahata, Sagami Bay	Imajima, 1990
	Prionospio (Prionospio) variegata	Sagami Bay	Imajima, 1990
	Pseudopolydora kempi japonica	Akkeshi, Muroran (syntype)	Imajima and Hartman, 1964
	Pseudopolydora tsubaki	Habu Port, Izu Oshima	Simon, Sato-Okoshi, and Abe, ###
	Pseudopolydora ushioni	Uranouchi Bay, Kouchi	Simon, Sato-Okoshi, and Abe, ###
	Rynchospio foliosa	Usujiri Bay, Hokkaido	Imajima, 1991
	Rynchospio tuberculata	Off Chigasaki, Sagami Bay	Imajima, 1991
	Scolelepis (Parascolelepis) geniculata	Off Asamushi	Imajima, 1992
	Scolelepis (Scolelepis) branchia	Tokyo Bay	Imajima, 1992
	Scolelepis (Scolelepis) lingulata	Off Yuragawa, Wakasa Bay	Imajima, 1992
	Scolelepis (Scolelepis) planata	Off Zushi, Sagami Bay	Imajima, 1992
	Scolelepis (Scolelepis) sagittaria	Off Shimoda, Honshu	Imajima, 1992
	Scolelepis (Scolelepis) variegata	Mukaishima	Imajima, 1992
	Spio borealis	Muroran, Hokkaido	Okuda, 1937
	Spiophanes japonicum	Sagami Bay	Imajima, 1991
	Spiophanes urceolata	Sagami Bay	Imajima, 1991
	Spionides japonicus	Off Honshu	Moore, 1907
	Streblospio benedicti japonica	Yatsu tidelands, Chiba	Imajima, 1990
Trochochaetidae	*Trochochaeta japonica*	Off Koyahata, Sagami Bay	Imajima, 1989
Poecilochaetidae	*Poecilochaetus bifurcatus*	Off Izu-Oshima	Imajima, 1989
	Poecilochaetus branchiatus	Off Hamana-Lake	Miura, 1989
	Poecilochaetus clavatus	Off Akita	Imajima, 1989
	Poecilochaetus elongatus	Sagami Bay	Imajima, 1989
	Poecilochaetus granulatus	Suruga Bay	Imajima, 1989
	Poecilochaetus ishikariensis	Ishikari Bay	Imajima, 1989
	Poecilochaetus japonicus	Matsunaga Bay, Miyzazu Bay, Iyo Nada (syntype)	Kitamori, 1965
	Poecilochaetus koshikiensis	Off Shimo-Koshiki Island	Miura, 1988
	Poecilochaetus magnus	Ariake Sea	Imajima, 1989
	Poecilochaetus tokyoensis	Tokyo Bay	Imajima, 1989
	Poecilochaetus toyoshiomarae	Ohsaka Bay	Miura, 1989
	Poecilochaetus trilobatus	Kabira Bay, Ishigaki Island	Imajima, 1989
Spirobidae	*Pileolaria aurita*	Off Iwa, Manazuru Peninsula, Sagami Bay	Rzhavsky and Nishi, 2011
Paraonidae	*Aedicira foliata*	Off Kuno-zan, Suruga Bay	Imajima, 1973
	Aricidea cerrutii pacifica	Sea of Enshu	Imajima, 1973

	Aricidea elongata	Miyako Bay, Iwate	Imajima, 1973
	Aricidea eximia	Sea of Enshu	Imajima, 1973
	Aricidea horikoshii	Miyako Bay, Iwate	Imajima, 1973
	Aricidea neosuecica nipponica	Miyako Bay, Iwate	Imajima, 1973
	Aricidea trilobata	Off Samani, Hokkaido	Imajima, 1973
	Cirrophorus miyakoensis	Miyako Bay, Iwate	Imajima, 1973
	Paraonides nipponica	Aburatsubo Bay, Misaki	Imajima, 1973
	Paraonis gracilis japonica	Off Koyahata, Sagami Bay	Imajima, 1973
Sternaspidae	*Sternaspis costata*	Boso Peninsula, Chiba	Marenzeller, 1879
Capitellidae	*Barantolla orientalis*	Akkeshi Lake	Yabe and Mawatari, 1998
	Capitella capitata japonica	Inland Sea of Japan	Kitamori, 1960
	Heteromastus tohbaiensis	Akkeshi Lake	Yabe and Mawatari, 1998
	Mediomastus duobalteus	Haneda, Tokyo Bay	Tomioka, Nishi, and Kajihara, 2014
	Mediomastus hanedaensis	Haneda, Tokyo Bay	Tomioka, Nishi, and Kajihara, 2014
	Mediomastus opertaculeus	Abashiri Bay, Hokkaido	Tomioka, Hiruta, and Kajihara, 2013
	Mastobranchus uru	Komi, Iriomote, Yaetama Islands	Tomioka, Yoshida, and Kajiahra, 2017
	Scyphoproctus latericeus	Kakihana, Okinawa	Okuda, 1940
Opheliidae	*Armandia amakusaensis*	Tomioka, Kumamoto	Saito, Tamaki, and Imajima, 2000
	Armandia shimdaensis	In front of the Shimoda Marine Biological Station	Takahashi, 1938
	Ammotrypane gracile	Off Fukuoka	McIntosh, 1885
	Euzonus japonica	Oura Bay, Shimoda	Misaka and Sato, 2003
	Thoracophelia ezoensis	Esashi, Hokkaido	Okuda, 1936
	Thoracophelia yasudai	Kanaiwa, Ishikawa	Okuda, 1934
Travisiidae	*Travisia japonica*	Gogoshima	Fujiwara, 1933
Scalibregmatidae	*Eumenia caulleryii*	Inland Sea of Japan	McIntosh, 1922
	Pseudoscalibregma orientalis	Off Kashima Sea	Imajima, 2009
Maldanidae	*Asychis pigmentata*	Kashima Sea	Imajima and Shiraki, 1982
	Asychis shaccotanus	Shakotan, Hokkaido	Uchida, 1968
	Asychis tosaensis	Tosa Bay	Imajima, 2001
	Axiothea campanulata	Suruga Bay	Moore, 1903
	Clymene harai	Yodomi, Sagami Bay	Izuka, 1902
	Clymene mirabilonga	Suruga Bay	Moore, 1903
	Clymenella collaris	Tokyo Bay	Imajima and Shiraki, 1982
	Clymenella enshuense	Enshu-nada	Imajima and Shiraki, 1982
	Clymenura (Cephalata) aciculata	Sagami Bay	Imajima and Shiraki, 1982
	Clymenura (Cephalata) longicaudata	Komi, Iriomote, Yaetama Islands	Imajima and Shiraki, 1982
	Clymenura (Clymenura) japonica	Otsuchi Bay	Imajima and Shiraki, 1982
	Euclymene uncinata	Off Boso Peninsula	Imajima and Shiraki, 1982
	Lumbriclymene japonica		(McIntosh, 1885)
	Maldane coronata	Sagami Bay	Moore, 1903
	Maldane gotoi	Yodomi, Sagami Bay	Izuka, 1902
	Maldanella niijimense	Off Nii-jima	Imajima and Shiraki, 1982
	Microclymene caudata	Off Odawara, Sagami Bay	Imajima and Shiraki, 1982
	Nicomache ohtai	Off Hatsushima, Sagami Bay	Miura and Hashimoto, 1991
	Nicomache inornata	Suruga Bay	Moore, 1903
	Nicomache japonica	South of Yedo	McIntosh, 1885
	Petaloproctus dentatus	Off Ichiburi, Niigata	Imajima and Shiraki, 1982
	Praxilla lankesteri	South of Yedo	McIntosh, 1885
	Praxillura tanseiana	Sagami Bay	Imajima and Shiraki, 1982
Oweniidae	*Myrioglobula japonica*	Off Shimoda, Honshu	Imajima and Morita, 1987
Alvinellidae	*Paralvinella hessleri*	Izena Hole, Middle Okinawa Trough	Miura and Ohta, 1991
Ampharetidae	*Amage ehlersi*	Off Kashima-nada	Reuscher, Fiege, and Imajima, 2015
	Amage imajimai	Sagami Bay	Reuscher, 2015
	Amage longitorus	Off Shimokita Peninsula	Reuscher, Fiege, and Imajima, 2015
	Ampharete ampullata	Tomioka, Kumamoto	Imajima, Reuscher, and Fiege, 2012
	Ampharete cinnamomea	Tokyo Bay	Imajima, Reuscher, and Fiege, 2012
	Ampharete kudenovi	Off Iwate (paratype); Off Kuril-Kamchaka	Jirkov, 1994
	Amphicteis japonica	South of Yedo	McIntosh, 1885
	Amphicteis spinosa	Off Cape Toi, Miyazaki	Reuscher, Fiege, and Imajima, 2014
	Amphicteis taurus	Chishima Trench	Reuscher, Fiege, and Imajima, 2014
	Amphisamytha japonica	Sagami Bay	Hessle, 1917
	Anobothrus dayi	Yakiuchi Bay, Amami	Imajima, Reuscher, and Fiege, 2013
	Anobothrus fimbriatus	Off Erimo, Hokkaido	Imajima, Reuscher, and Fiege, 2013
	Anobothrus flabelligerulus	Off Emi, Boso Peninsula	Imajima, Reuscher, and Fiege, 2013
	Anobothrus wakatakamaruae	Off Sanriku	Imajima, 2009
	Euthamytha pacifica	Japan	McIntosh, 1885
	Glyphanostomum hesslei	Off Kushiro, Hokkaido	Reuscher, Fiege, and Imajima, 2015
	Lysippe nipponica	Nagasaki Bay	Reuscher, Fiege, and Imajima, 2015
	Melinnexis tetradentata	Tosa Bay	Imajima, 2001
	Melinnopsis augeneri	Goto-Kasayama Bank	Reuscher, Fiege, and Imajima, 2015
	Melinnopsos mcintoshi	Off Otsuchi	Reuscher, Fiege, and Imajima, 2015
	Orochi palacephalus	Off Cape Ashizuri	Reuscher, Fiege, and Imajima, 2015
	Samytha annenkovae	Sagami Bay	Reuscher, Fiege, and Imajima, 2015
	Sosane brevibranchiata	Bungo Channel	Imajima, Reuscher, and Fiege, 2013
	Sosane trigintaduo	Bungo Channel	Imajima, Reuscher, and Fiege, 2013
	Sosane uebelackerae	Sagami Bay	Imajima, Reuscher, and Fiege, 2013
	Tanseimaruana boninensis	Off Chichi-jima	Imajima, Reuscher, and Fiege, 2013
	Watatsumi grubei	Off Cape Toi, Miyazaki	Reuscher, Fiege, and Imajima, 2014
	Zatsepinia jirkovi	Off Shirahama, Boso Peninsula	Imajima, Reuscher, and Fiege, 2013
Trichobranchidae	*Terebellides brevis*	Suruga Bay	Imajima and Williams, 1985
	Terebellides horikoshii	Suruga Bay	Imajima and Williams, 1985
	Terebellides japonica	Sagami Bay	Moore, 1903
	Terebellides kobei	Kobe Bay	Hessle, 1917
	Terebellides lineata	Sagami-Nada	Imajima and Williams, 1985
	Terebellides storemii japonica	Sagami Bay	Moore, 1903
	Trichobranchus bibranchiatus	Station not given on label	Moore, 1903
	Octobranchus japonicus	Okinose; Misaki	Hessle, 1917
Terebellidae	*Amphitrite oculata*	Misaki, Kanagawa	Hessle, 1917
	Amphitrite ramosissima	Enoshima, central Japan	Marenzeller, 1884
	Amphitrite bifurcata	Sendai Bay	Moore, 1903
	Amphitrite vigintipes	Enoshima; Kagoshima	Marenzeller, 1884
	Loimia arborea	Suruga Bay	Moore, 1903
	Phisidia sagamica	Misaki; Yokosuka channel	Hessle, 1917
	Pista atypica	Okinose, Sagami Bay	Hessle, 1917
	Pista microlobata	Southern Japan	Hessle, 1917
	Pista maculata	Goto Island; Misaki	Marenzeller, 1884

	Pista shizugawaensis	Kappazawa, Shizugawa Bay, Miyagi	Nishi and Tanaka, 2006
	Polymnia congruens	Enoshima, central Japan	Marenzeller, 1884
	Polymnia nesidensis japonica	Sagami Bay; Suruga Bay; Sendai Bay	Moore, 1903
	Scionella japonica	North Japan; Suruga Bay	Moore, 1903
	Spinosphaera pacifica	Yokosuka	Hessle, 1917
	Neoleprea japonica	Misaki; Okinose; Yokosuka channel	Hessle, 1917
	Spiroverma ononokomachii	Shakotan, Hokkaido	Uchida, 1968
	Streblosoma japonica	Kobe Bay	Hessle, 1917
	Terebella punctata	Misaki, Kanagawa	Hessle, 1917
Thelepelidae	*Thelepus japonicus*	Enoshima, central Japan	Marenzeller, 1884
	Thelepus marenzelleri	Sagami-Nada	McIntosh, 1885
	Thelepus toyamaensis	Toyama Bay	Okuda, 1936
Polycirridae	*Lysilla pacifica*	Misaki, Kanagawa	Hessle, 1917
	Polycirrus medius	Misaki, Kanagawa	Hessle, 1917
	Polycirrus nervosus	Enoshima, central Japan	Marenzeller, 1884
Pectinaridae	*Cistenides okudai*	Ise Sea	Imajima and Hartman, 1964
	Lagis bocki	Kobe Bay	Hessle, 1917
	Lagis bocki naikaiensis	Hiroshima Bay, Hiro Bay, Mishima, Ushima, Wakanoura (synstype)	Kitamori, 1965
	Pectinaria hiuchiensis	Hiuchi nada	Kitamori, 1965
	Pectinaia (Amphictene) japonica	Japan	Nilsson, 1928
	Pectinaria (Cistenides) hyperborea pacifica	North Japan	Nilsson, 1928
	Pectinaria okudai		
Sabellariidae	*Sabellaria ishikawai*	Omuda, Fukuoka	Okuda, 1938
	Sabellaria isumiensis	Kohakuzaki beach, Iwata, Onjuku, Boso Peninsula	Nishi, Bailey-Brock, Santos, Tachikawa, and Kupriyanova, 2010
	Sabellaria tottoriensis	Ishiwaki, Tomari, Tohaku, Tottori	Nishi, Kato, and Hayashi, 2004
	Idanthyrsus boninensis	Tsurihama, Chichi jima	Nishi and Kirtley, 1999
	Idanthyrsus okinawaensis	Zampa Cape, Okinawa	Nishi and Kirtley, 1999
	Idanthyrsus okudai	Shimoda and Bonin Islands (described based on Okuda, 1938 description)	Kirtley, 1994
	Lygdamis japonicus	Sankaku-seto, Yatsushiro-kai	Nishi and Kirtley, 1999
	Tetreres curvata	Kopepe Bay, Chichijima	Johansson, 1922
Sabellidae	*Amphiglena nishii*	Misaki	Capa and Rouse, 2007
	Dasychone picta	Off Kobe	McIntosh, 1885
	Dasychone japonica	Off Kobe	McIntosh, 1885
	Demonax aulacornota	Nagasaki	Marenzeller, 1884
	Dialychone okudai	Aikap, Akkeshi, Hokkaido	Nishi, Tanaka, Tovar-Hernandez, and Giangrande, 2009
	Euchone alicaudata	Sagami Bay	Moore and Bush, 1904
	Hypsicomus lyra	Suruga Bay	Moore and Bush, 1904
	Jasmineira kikuchii	Ariake Sound	Nishi, Tanaka, Tovar-Hernandez, and Giangrande, 2009
	Laonome japonica	Nagasaki	Marenzeller, 1885
	Laonome tridentata	Suruga Bay	Moore and Bush, 1904
	Myxicola platychaeta	Enoshima, central Japan	Marenzeller, 1884
	Notaulax yamasui	Maeda-Misaki Cape	Nishi, Gil, Tanaka, and Kupriyanova, 2017
	Paradialychone cincta		Zachs, 1933
	Paradialychone edomae	Haneda, Tokyo Bay	Nishi, Tanaka, Tovar-Hernandez, and Giangrande, 2009
	Paradialychone katsuuraensis	Yoshio, Katsuura, Boso Peninsula	Nishi, Tanaka, Tovar-Hernandez, and Giangrande, 2009
	Potamilla japonica	Sunosaki, Sagami Bay	Johansson, 1922
	Potamilla elegans	Goto Island; Okinose; Yokosuka	Johansson, 1922
	Potamilla acuminata	Sagami Bay	Moore and Bush, 1904
	Potamilla myriops	Japan	Marenzeller, 1884
	Sabella albicans	Misaki	Johansson, 1922
	Sabella aulaconota	Nagasaki	Marenzeller, 1884
	Sabella japonica	Suruga Bay	Moore and Bush, 1904
	Sabella wireni	Okinose, Sagami Bay	Johansson, 1922
	Sabellastarte bocki	Bonin Islands	Johansson, 1922
Fabriciidae	*Amphicorina ascidicola*	Higashi-shizuni, Hokkaido	Yoshihara, Hiruta, Katoh, and Kajihara, 2012
	Amphicorina ezoensis	Setana, Hokkaido	Yoshihara, Hiruta, Katoh, and Kajihara, 2012
	Fabricia ventrilinguata	Misaki, Kanagawa; Bonin Islands	Johansson, 1922
	Fabriciola rubra	Yakata, Okinawa	Fitzhugh, 1998
	Manayunkia siaukhu		Annenkova, 1938
	Pseudoaugeneriella unirama	Yakata, Okinawa	Fitzhugh, 1998
Serpulidae	*Apomatus enosimae*	Enoshima, central Japan	Marenzeller, 1884
	Apomatus geniculata	Suruga Bay	Moore and Bush, 1904
	Apomatolos simplex	Kushimoto, Wakayama	Uchida, 1978
	Filogranula exilis	Off Sabiura	Imajima, 1979
	Floriprotis sabiuraensis	Sabiura	Uchida, 1978
	Eupomatus exaltatus	Enoshima, central Japan	Marenzeller, 1884
	Hydroides (Eupomatus) fusicola	Japan	Morch, 1863
	Hydroides bisectus	Off Sesoko Marine Station Center	Imajima and ten Hove, 1989
	Hydroides ezoensis	Akkeshi, Muroran, Oshoro (syntype)	Okuda, 1934
	Hydroides fusca	Off Tanegashima	Imajima, 1976
	Hydroides longispinosa	Koniya, Amami-Oshima	Imajima, 1976
	Hydroides multispinosa	Enoshima, central Japan	Marenzeller, 1884
	Hydroides tuberculata	Urata, Tanegashima	Imajima, 1976
	Metavermilia graviesta	Off Nii-jima	Imajima, 1978
	Metavermilia inflata	Miyanohama, Chichi-jima	Imajima, 1977
	Metavermilia ogasawaraensis	East off Mukojima, Ogasawara Islands	Nishi, Kupriyanova, and Tachikawa, 2007
	Metavermilia ovata	Off Nii-jima	Imajima, 1978
	Metavermilia spicata	Off Chichi-jima	Imajima, 1977
	Metavermilia truncata	Off Nii-jima	Imajima, 1978
	Metavermilia yamazatoi	Off Sesoko Island	Imajima and ten Hove, 1989
	Microprotula ovicellata	Sabiura	Uchida, 1978
	Omphalopoma langerhansii	Enoshima, central Japan	Marenzeller, 1884
	Paraprotis dendrova	Sabiura	Uchida, 1978
	Paraprotis pulchra	Off Shionomisaki	Imajima, 1979
	Paraprotula apomatoides	Sabiura	Uchida, 1978
	Pomatoceros auritubis	Suruga Bay	Moore and Bush, 1904
	Pomatoceros helocoides	Southern Japan	Marenzeller, 1884
	Pomatostegus latiscapus	Enoshima; Oshima	Marenzeller, 1884
	Protoserpula pacificum	Sabiura	Uchida, 1978

	Protula geniculata	Suruga Bay	Moore and Bush, 1904
	Protula tubularia caeca	Miyanohama, Chichi-jima	Imajima, 1977
	Pseudochitinopoma pavimentata	Off Tateyama	Nishi, 1999
	Pseudovermilia pacifica	Off O-shima	Imajima, 1978
	Semiserpula longituba	Kushimoto Harbour	Imajima, 1979
	Semivermilia elliptica	Off Nii-jima	Imajima, 1978
	Serpula granulosa	Enoshima; Kagoshima	Marenzeller, 1885
	Serpula japonica	Off Shionomisaki	Imajima, 1979
	Serpula (Hydroides) multispinosa	Enoshima, central Japan	Marenzeller, 1885
	Vermilia pluriannulata	Suruga Bay	Moore and Bush, 1904
	Vermilia ctenophora	Suruga Bay	Moore and Bush, 1904
	Dexiospira ainu	Muroran, Hokkaido	Uchida, 1971
	Dexiospira oshoroensis	Oshoro	Uchida, 1971
	Spirobis (Dexiospira) nipponicus	Akkeshi, Muroran (syntype)	Okuda, 1934
	Spirobis argutus	Station 3730	Bush in Moore and Bush, 1904
	Spirobis coronatus	North Japan Sea	Zachs, 1933
	Spirobis dorsatus	Station 3707	Bush in Moore and Bush, 1904
	Spirobis alveolatus	North Japan Sea	Zachs, 1933
	Spirobis bellulus	Suruga Bay	Bush in Moore and Bush, 1904
	Spirobis foraminosus	Station 3730	Bush in Moore and Bush, 1904
	Paradexiospira nakamurai	Muroran, Oshoro, Akkeshi (syntype)	Uchida, 1971
	Laeospira pacifica	Akkeshi, Hokkaido	Uchida, 1971
	Laeospira rosepigmentata	Muroran, Oshoro, Akkeshi (syntype)	Uchida, 1971
	Leodora argutus	Off Japan	Bush in Moore and Bush, 1904
	Leodora multiplata	Daikoku Island, Akkeshi, Hokkaido	Uchida, 1971
Myzostomidae	*Mesomyzostoma katoi*	Misaki, Kanagawa	Okada, 1933
	Mesomyzostoma okadai	Off Misaki, Sagami Bay	Rouse, Lanterbecq, Summers and Eeckhaut, 2015
	Myzostomum bocki	Misaki, Kanagawa	Jagersten, 1937
	Myzostomum brevilobatum	Off Japan	Jagersten, 1937
	Myzostomum cirricostatum	Goto Island	Jagersten, 1937
	Myzostomum holotuberculatum	Okinose, Sagami Bay	Jagersten, 1940
	Myzostomum longimanum	Goto Island	Jagersten, 1937
	Myzostomum maculatum	Okinoshima, Kyushu	Jagersten, 1937
	Myzostomum nasonovi	Japan	Fedotov, 1938
	Myzostomum tentaculatum	North of Nagasaki	Jagersten, 1940
	Myzostomum terminale	Okinose, Sagami Bay	Jagersten, 1937
	Myzostomum tuberculatum	Sagami, Misaki, Bonin Islands	Jagersten, 1937
	Myzostoma chelonium	Suruga and Sagami Sea	McClendon, 1906
	Myzostoma chelonodium	Suruga and Sagami Sea	McClendon, 1906
	Myzostoma clarki	Suruga and Sagami Sea	McClendon, 1906
	Myzostoma cysticolum orientale	Eastern Japan	McClendon, 1906
	Myzostoma wheeleri	Suruga and Sagami Sea	McClendon, 1906
	Myzostoma cirripedium	Sagami Bay	von Graff, 1885
	Myzostoma ijimai	Japan	Hara and Okada, 1921
	Myzostoma japonicum	eastern coast of Japan	McClendon, 1906
	Myzostoma nigrescens	Yeddo Bay	Von Graff, 1884
	Myzostoma robustum	Sagami Sea	Hara and Okada, 1921
	Myzostoma smithi	Suruga and Sagami Sea	McClendon, 1906
Protomyzostomidae	*Protomyzostomum sagamiense*	Yodomi, Sagami Bay	Okada, 1922
	Protomyzostomum astrocladi	Misaki, Kanagawa	Fedotov, 1925
Incertae sedis	*Sanbongicola nakagawai*	Tateyama, Sanbongi-machi, Miyagi Prefecture, Omori formation	Hatai and Masuda, 1973
	Magarikune akkesiensis	Akkeshi, Hokkaido	Minato and Suyama, 1949

Appendix Table 3. Number of polychaete species reported from Japan.Values in parentheses indicate those by/after my Ph.D. research. The families highligheted by a gray color are studied in this thesis.

Family	New species (A)	New record (B)	WoRMS (C)	Japanese species ratio (A + B) × 100 / C (%)
Acoetidae	3 (4)	4 (4)	60 (61)	11.7% (13.1%)
Aphroditidae	12	15	119	22.7%
Sigalionidae	25	25	234	21.4%
Pholoidae	1	2	28	10.7%
Polynoidae	60 (61)	60 (60)	800 (801)	15.0% (15.1%)
Iphionidae	2	1	14	21.4%
Eulepethidae	1	2	25	12.0%
Phyllodocidae	34	27	464	13.1%
Lopadorrhynchidae	0	4	22	18.2%
Nereididae	26	43	738	9.3%
Glyceridae	11	23	93	36.6%
Goniadidae	5	7	111	10.8%
Hesionidae	28 (30)	14 (15)	252 (254)	16.7% (17.7%)
Syllidae	62	47	1169	9.3%
Nephtyidae	9	16	153	16.3%
Iospilidae	0	2	6	33.3%
Alciopidae	2	6	49	16.3%
Tomopteridae	1	3	56	7.1%
Typhloscolecidae	0	2	17	11.8%
Amphinomidae	5 (6)	19 (20)	65 (66)	36.9% (39.3%)
Euphroshinidae	8	4	65	18.5%
Dinophilidae	2	2	17	23.5%
Parergodrilidae	0	1	4	25.0%
Nerillidae	0	1	53	1.9%
Sphaerodoridae	1	3	121	3.3%
Chrysopetalidae	8 (9)	5 (5)	90 (91)	14.4% (15.3%)
Pilargidae	5	3	102	7.8%
Eunicidae	25	33	452	12.8%
Lumbrineridae	23	11	330	10.3%
Onuphidae	43	18	349	17.5%
Dorvilleidae	8	7	202	7.4%
Oenonidae	5	6	98	11.2%
Hartmaniellidae	1	0	3	33.3%
Paralacydoniidae	1	0	2	50.0%
Cossuridae	3	0	28	10.7%
Paraonidae	10	8	170	10.6%
Apistobranchidae	0	2	8	25.0%
Longosomatidae	0	1	8	12.5%
Spionidae	39	43	593	13.8%
Chaetopteridae	15	12	76	35.5%
Trochochaetidae	1	0	14	7.1%
Poecilochaetidae	12	1	31	41.9%
Magelonidae	2	3	75	6.7%
Orbiniidae	1	14	213	7.0%
Oweniidae	2	7	55	16.4%
Polygordiidae	2	0	18	11.1%
Protodrilidae	1	0	41	2.4%
Saccocirridae	2	2	22	18.2%
Spintheridae	3	0	12	25.0%
Siboglinidae	4	0	193	2.1%
Cirratulidae	6 (16)	14 (14)	312 (328)	6.4% (9.1%)
Sternaspidae	1	7	38	21.1%
Acrocirridae	2	1	43	7.0%
Flabelligeridae	3 (11)	12 (12)	204 (211)	7.4% (10.9%)
Fauveliopsidae	2	2	22	18.2%
Opheliidae	6	5	165	6.7%
Travisiidae	1	8	34	26.5%
Scalibregmatidae	3	4	73	9.6%
Alvinellidae	1	0	14	7.1%
Ampharetidae	27	54	317	25.6%
Terebellidae	17	129	472	30.9%
Thelepelidae	3	3	57	10.5%
Polycirridae	3	1	111	3.6%
Trichobranchidae	7	5	81	14.8%
Pectinariidae	4	3	65	10.8%
Capitellidae	7	22	207	14.0%
Maldanidae	23	27	293	17.1%
Arenicolidae	0	4	35	11.4%
Sabellariidae	8	7	126	11.9%
Sabellidae	22	27	526	9.3%
Fabriciidae	5	2	86	8.1%
Seruplidae	38	42	604	13.2%
Spirobidae	11	3	253	5.5%
Myzostomatidae	13	7	164	12.2%
Asteriomyzostomidae	0(3)	0 (0)	2 (5)	0% (60.0%)
Eenymeenymyzostomidae	0	1	2	50.0%
Protomyzostomidae	2	0	5	40.0%
Incertae sedis	2	0		

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