

Three new species of Sabellariidae (Polychaeta) from Japan

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Abstract A new species, *Lygdamis japonicus* (Sabellariidae, Polychaeta) is described from Amakusa, west Kyushu and Yakushima Island and is characterized by having a small median organ (often not well developed). Two new species of *Idanthyrsus*, *I. okinawaensis* and *I. boninensis*, are described, based on specimens from Okinawa and Ogasawara Islands. *Idanthyrsus okinawaensis* is solitary, associated with living coral and sometimes found on branching coral colonies. *Idanthyrsus boninensis* is gregarious on rocky shores and rarely solitary in the intertidal zone. Both new *Idanthyrsus* species are closely related to *I. okudai* Kirtley, 1994 formerly known from Japan, and the three species can be separable based on the distribution of the thecal bands and denticles of the inner and outer paleae. *Idanthyrsus okudai* is redescribed based on the specimens from the Izu Peninsula and Yakushima Island. In addition a character key to Japanese Sabellariidae including 9 species of 4 genera is given.

Key words: Sabellariidae, Polychaeta, *Lygdamis japonicus* n. sp., *Idanthyrsus okinawaensis* n. sp., *I. boninensis* n. sp.

Sabellariid polychaetes are well known to build tough polychaete reefs (Kirtley, 1994; Pandolf and Robertson, 1998). Usually the members of this family are colonial and aggregate on rocky shores, whereas the rest are solitary. In Japanese waters, seven species of Sabellariidae have been hitherto recorded; *Neosabellaria uschakovi* Moore, *Sabellaria ishikawai* Okuda, ?*Lygdamis giardi* (McIntosh), *L. nesiotetes* (Chamberlin), *L. curvatus* Johansson, *Idanthyrsus armatus* Kinberg (= *I. macropaleus* (Schmarda, 1861)), and *I. okudai* Kirtley (Johansson, 1922; Okuda, 1938a, b, 1940; Imajima and Hartman, 1964; Uchida, 1990, 1994; Kirtley, 1994). We examined Japanese *Lygdamis* and 3 species of *Idanthyrsus* from the temperate region and the Ogasawara and Ryukyu (Okinawa) Islands. *Lygdamis giardi* recorded from Osaka Bay towards the Kii Peninsula, is possibly not identified with that species because of the lack of a developed median organ on the head part; Okuda (1938a, b) did not describe median organ (characterizing the genus *Lygdamis*) on dorsal side, although he noted one in other Japanese congeners. Recently Kirtley (1994)

noted that the shape and coloration pattern of the median organ have significant diagnostic importance (p. 116, regarding diagnosis of the genus *Lygdamis*). The median organ of the head part is distinctly located dorsally or ventrally, or is indistinct in the subfamily Lygdamiinae (Lechapt and Kirtley, 1996); only the genus *Mariansabellaria* Kirtley 1994 has an indistinct median organ. Here we newly observed the *Lygdamis* has also an indistinct median organ. As all the previous species of the *Lygdamis* has the distinct one, thus the species has treated here to be described as new species.

The genus *Idanthyrsus* has been recorded from Shimoda, Kushimoto, Okinawa, Ogasawara Islands, and other locations in Japan (Okuda, 1938b; Uchida, 1990, 1994). A species from Okinawa, *I. okudai* Kirtley, identified at first glance, was associated with living coral in the subtidal zone (Nishi, 1992). One specimen noted as the gregarious *Idanthyrsus pennatus* was recorded from the Bonin (Ogasawara) Islands (Asakura *et al.*, 1990). Comparisons of them, with *I. okudai* Kirtley, recently collected in the temperate region,

resulted in the Okinawan and Ogasawara specimens being described below as new species.

In the course of this study since 1995, the second author, Dr. David W. Kirtley, unfortunately died on June, 1997. He provided some of the scanning electron micrographs and figures for the study, and later the first author (E. N.) added and revised them and completed the descriptions.

Materials and Methods

Material was collected by hand and fixed with neutralized formaldehyde, in field or in the laboratory, later preserved in 70% ethanol. From some specimens, some paleae and setigers were dissected using a knife and transferred to alcohol series, 80, 90, 95, 99, 100% ethanol, air-dried, coated with palladium and Pt, finally viewed on scanning electron microscope (Hitachi SEM S-800).

Worms were deposited in the Natural History Museum and Institute, Chiba (CBM).

Systematics

Family Sabellariidae Johnston

Subfamily Lygdaminae Kirtley

Genus *Lygdamis* Kinberg

Lygdamis japonicus n. sp.

(Figs. 1–3)

Lygdamis giardi; Okuda, 1938b: 237, figs, 1, 2 a–b, 3a–b. Imajima & Hartman, 1964: 324.

Material examined. Holotype, CBM-ZW-389, Sankaku-seto, Yatsushiro-kai, mud and rubbles, Amakusa, West Kyushu, 1975, collected by T. Kikuchi. One paratype, -ZW-688 same data as holotype, and three paratypes, -ZW-268, 270, 689, off Yakushima-island, T 096-5, St 7, mud and rubbles, June 2 1996, by ORI dredge, 80–100 m deep, collected by T. Komai.

Description. Anterior end of opercular stalk completely divided into bilaterally symmetrical lobes. Anterior ends of lobes narrowing and sloping posteriorly toward dorsal midline (Figs. 1, 2A). External diameter of body of worms, 6–10 mm, body length of specimens 40–100 mm. Opercular paleae pale yellow-gold to brown; of two kinds: outer paleae 10–20 in number, with thin, elongate, fusiform shafts; outer paleae of

anterior part with flat blades with smooth, straight parallel margins tapering gently to narrow, mucronate tips (Fig. 3A), paleae of posterior part with flat blades with vertical pores (Fig. 3B). Inner paleae dark brown colored; 10–20 in number; straight, with flat smooth blades tapering slowly to slightly asymmetrical, blunted tips (Fig. 3C). Series of 10–20 conical palpi along anterior of each lobe. Sharply falcate dorsal nuchal hooks, 2 to 3 pairs, strongly bent to sharp tips (Fig. 2B), tips recurved inward toward midline of dorsum; only distal part of curved tip exposed from fleshy, rounded papillae with 1–3 conical cirri, each side, extending from anterior margin; small (sometimes indistinct) developed median organ (median cirrus, 'lobe perioral' of Caullery, 1944) (Fig. 2C) arising from ventral midline between opercular lobes; with pigment spots along ventral side and pigmented, tapered, conical or blunt, discoidal, tips. With 8–15 transverse rows of simple (not branched), ciliated, fusciform, feeding tentacles ('buccal cirri' of Day, 1967: 675, 'gill filaments' of Johansson, 1922: 2; Fig. 2E) on ventral margins of each side of peduncle. Pair of large, grooved, prehensile prostomial tentacles arise from anterior margin of upper lip of stoma (Fig. 2D). Stoma concealed by paired lateral lips. Large U-shaped building-organ with conical lobes on lateral margins; with conical cirrus with, or without, small bundle of short capillary setae; inferior cirri of 2nd setigerous segment with bundle of finely serrated, or bipennate, capillary setae, and one, or more, smaller achaetous, superior conical or triangular cirri ('lappets'; 'languettes' of Bhaud, 1975: 70), and paired dorsal branchiae. Four parathoracic segments with tiny cirri on distal dorsal margin of setigerous notopodial sheaves; 8–14 paired, stout setae with lanceolate (oar-shaped) distal tips and spinous, capillary companion setae with curved tips in transverse row on each notopodial sheave. Neuro-podial setae of similar, but of smaller size and fewer in number. With dorsal branchiae on parathoracic segments. Abdominal segments with neurosetal bundles and sub-adjacent, small conical cirri; uncinigerous notopodial tori, wide in first few segments, but more narrow and elongate posteriorly



Fig. 1. Whole view of *Lygdamis japonicus* n. sp. holotype. Scale shows 5 mm.

(Fig. 2A). Dorsal branchiae well developed on first few (4–6) abdominal segments but diminished in size and imperceptible on posterior segments. Cauda similar in shape and proportions to those in other sabellariids.

Remarks. The median organ is small or indistinct on ventral side is the principal diagnostic feature that distinguishes the new species from all other species of the genus. *Idanthyrsus* and *Lygdamis*, have ocelli (eyespots) around the feeding apparatus. In *Lygdamis*, the ocelli (eyespots) extends up the median stalk (also called “median organ” by some authors, see Kirtley, 1994) in two longitudinal lines on both sides of the ventral

midline (Kirtley, 1994). In *L. japonicus*, the ocelli are located on the posterior side of the ventral midline of the prostomium (cephalon) (Fig. 2C).

Lygdamis japonicus has much pigmentation on the head region (Fig. 2A–C). This pigmentation pattern is possibly faint in preserved specimens. The specimens from Amakusa (CBM-ZW-389) have been preserved for over 30 years and lack any pigmentation on the body. However, this pigmentation probably reflects subtle differences in the number and kinds of dermal mucous gland pores and associated ciliary tufts. We think that the color patterns on the epidermis of the anterior

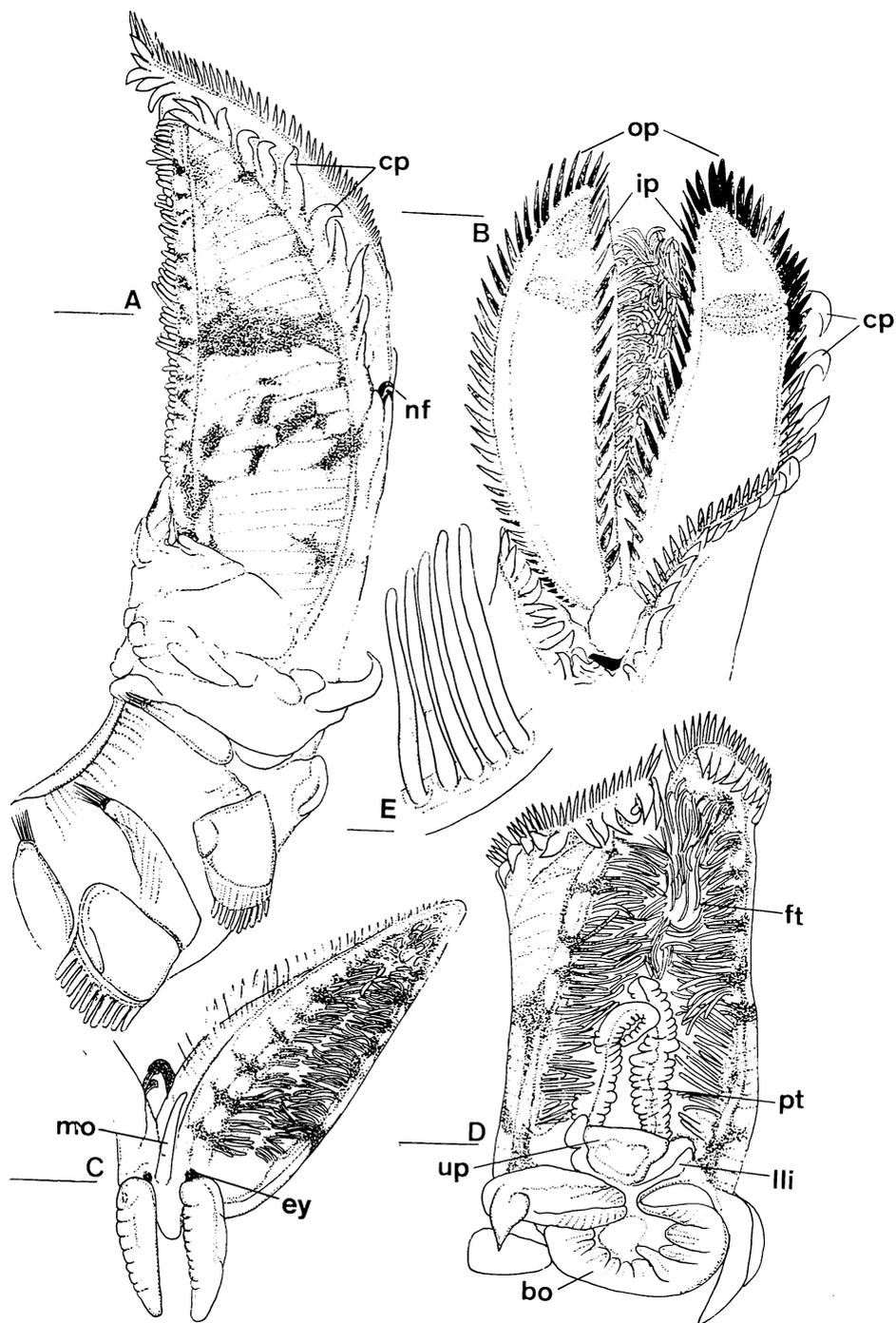


Fig. 2. Head and thorax part of *Lygdamis japonicus*. A, lateral view; B, dorsal view; C, D, ventral view, C showing inner part of ventral structure including median organ and eyes; E, feeding tentacles. Scales show 1 mm (A), 0.5 mm (B, C, D), and 0.25 mm (E).

or ends may be of taxonomic usefulness if they are studied carefully.

Genus *Idanthysus* Kinberg, 1867

Genus *Idanthysus* Kinberg, 1868 (Type

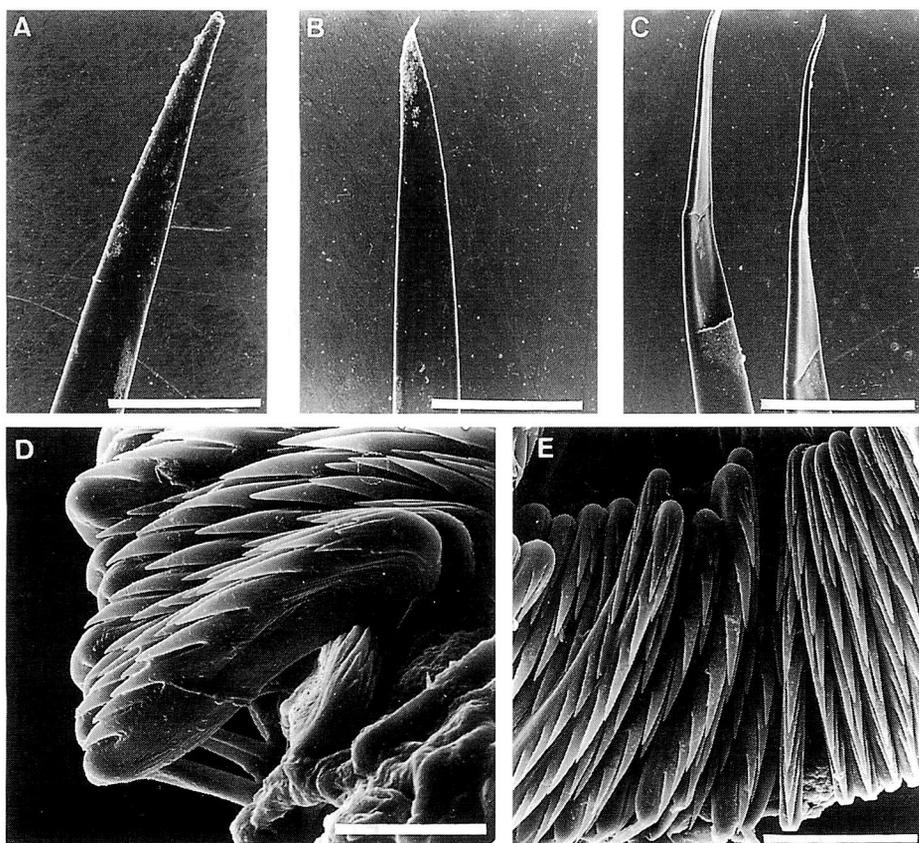


Fig. 3. SEM photos of *Lygdamis japonicus*. A, inner paleae; B, upper and ventral outer paleae; C, lower dorsal outer paleae; D, E, uncini. Scales show 0.3 mm (A), 0.2 mm (B, C), 0.02 mm (D, E).

species *Idanthyrus macropaleus* (Schmarda, 1861, as *Pallasia*)=*Idanthyrus armatus*, Kinberg).

***Idanthyrus boninensis* n. sp.**

(Figs. 4–6)

Material examined. Type series, holotype CBM-ZW-40, Tsurihama, Chichijima, Ogasawara Island, associated with living *Acropora* sp. colony, June 27, 1995, collected by E. Nishi, 2 to 3m depth; paratypes-ZW-114, 115, 681, 682, 683, 684, 685, 686, 687, 690, 691, 692. Nishinoura, Chichijima, subtidal. on rock, May 23, 1989, collected by W. Sato-Okoshi; Other specimens, -ZW-40, 116, Tsurihama, Chichijima, Ogasawara, 1–2 m depth, June 27, 1995, collected by E. Nishi; -ZW-117, Tsurihama, Chichijima, Ogasawara, 1–2 m depth, June 27, 1995, collected by E. Nishi on SEM stab, collected by E. Nishi.

Description. Ten to 30 mm long, 2–5 mm

wide. Anterior end of opercular stalk completely divided into symmetrical halves. Anterior ends of lobes sloped posteriorly toward dorsal midline. Paleae of opercular crown translucent with internal transverse striations, brown to faintly golden-brown. Paleae of two kinds; outer series with hemithecae arising from flattened surface of blade and terminating in pointed distal ends, distal ends frequently damaged; blades nearly straight, or gently curved toward distal end, proximal end of shaft straight, not smooth (Figs. 4A, B, 5A, B). Paleae of inner row straight spines, tapering to pointed tips, with cylindrical shafts; outline of transverse thecal margins clearly present in preserved specimen and weakly recognized in dried specimens coated for scanning electron microscopical observation (Fig. 4C). A pair of nuchal hooks dark-brown, tips of hooks bending inward toward midline of dorsum,

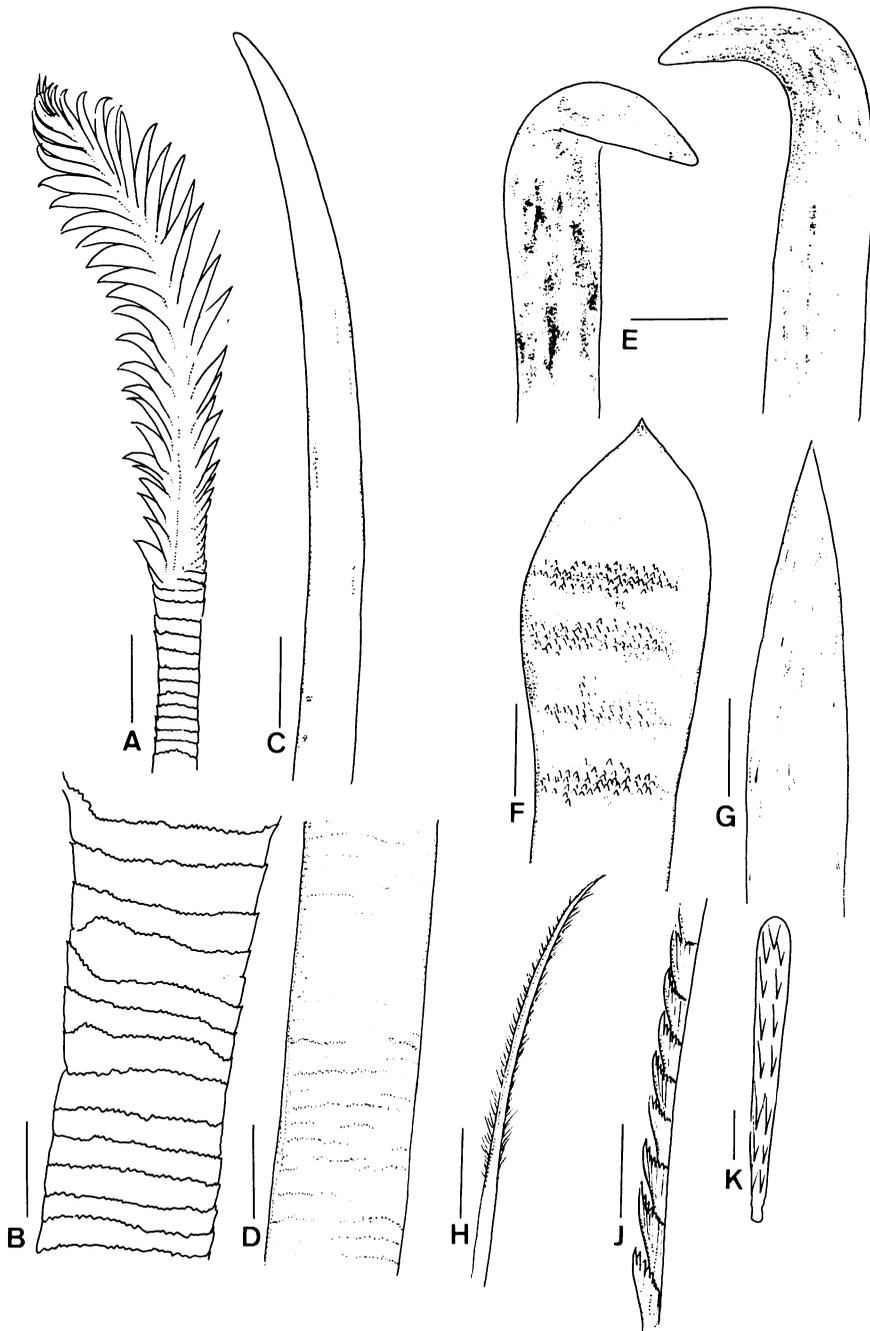


Fig. 4. Paleae, hooks, and uncini of *Idanthysrus boninensis* n. sp. A, B, outer paleae; C, D, inner paleae; E, nucal hooks; F, G, parathoracic setae; H, thoracic setae; J, abdominal neurosetae; K, uncini. Scales show 0.05 mm (A, C, E), 0.03 mm (B, D, F, G), and 0.01 mm (H, J, K).

without marginal knife-edged limbations (Fig. 5E). With series of 6 to 10 rows of compound filamentous feeding tentacles on either side of ventral margin of opercular

stalk. Second setigerous segment with inferior fascicle of bipinnate and capillary setae and flattened conical cirrus, with 2 superior achaetous conical cirri along lateral margin,

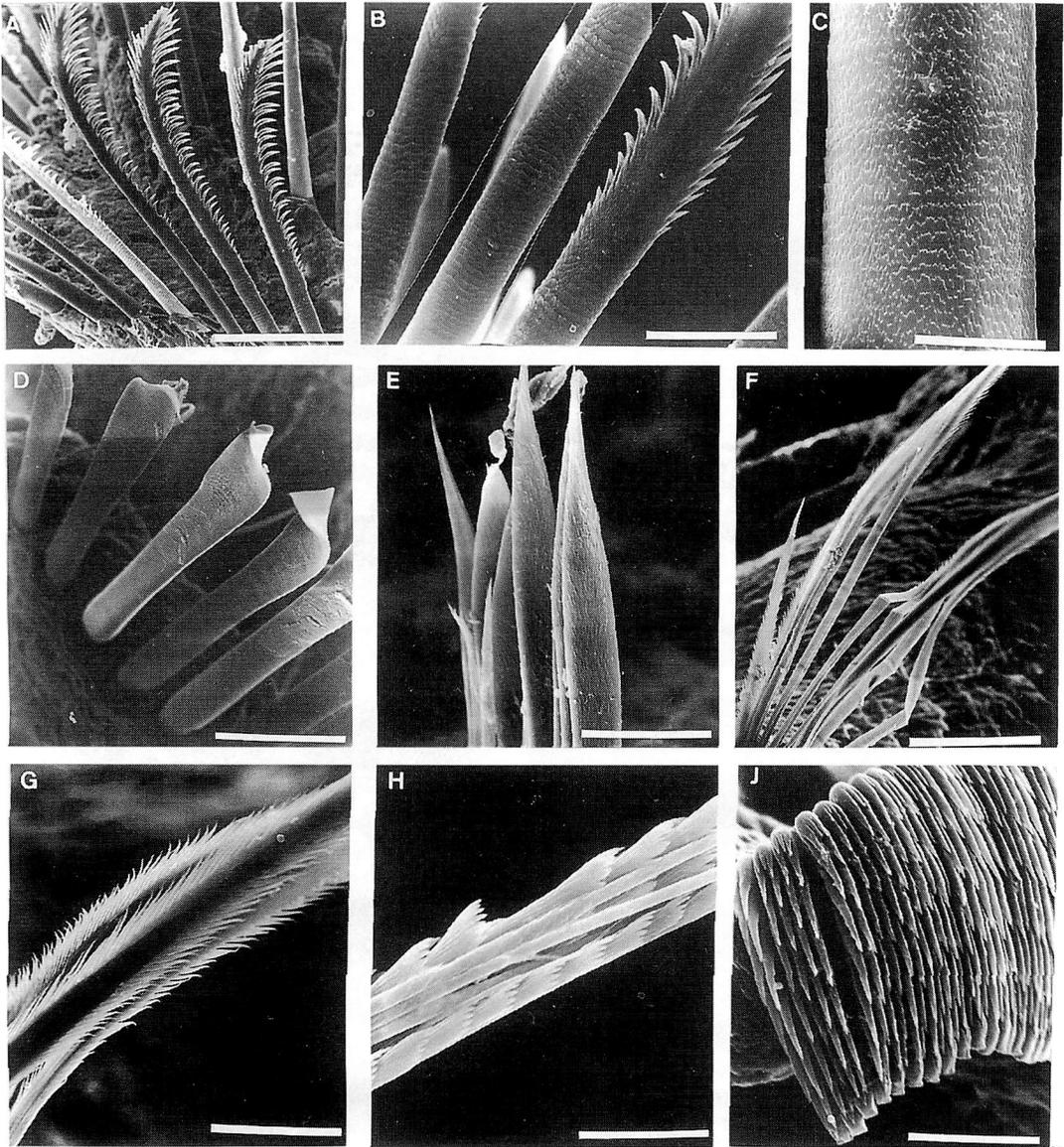


Fig. 5. SEM photos of *Idanthysus boninensis*. A, B, outer paleae; C, inner paleae, close-up view; D, E, parathoracic setae; F, G, thoracic setae (G, close-up view); H, abdominal neurosetae; J, uncini. Scales are 0.3 mm (A), 0.05 mm (B, F), 0.03 mm (C), 0.1 mm (D), 0.08 mm (E), 0.02 mm (H), and 0.025 mm (J).

with dorsal branchiae. Three parathoracic segments with sheaves of oar-shaped (Fig. 5 D, E) and companion spine-like setae in 2 or 3 rows on each of neuropodia and 8 to 12 on each of notopodia (Figs. 4H, 5H). Abdominal segments 30 to 50 in number, with bundle of long capillary and finely serrate neurosetae (Figs. 4J, 5H) and elongate conical ventral cirri. Notopodia with uncinigerous tori. Uncini (as many as 200 per notopodial torus)

with 7 or 8 rows (viewed from side) in 4 rows in distal end, triple or double rows in middle to proximal part, ending in single longitudinal row of tiny, sharp denticles (Figs. 4K, 5J). Dorsal branchiae well-developed on anterior body segments, diminishing in size toward posterior end of abdominal segments. Cauda reflected on ventrum.

Remarks. Asakura *et al.* (1990) recorded *I. pennatus* (= *I. boninensis* n. sp.) as a colonial

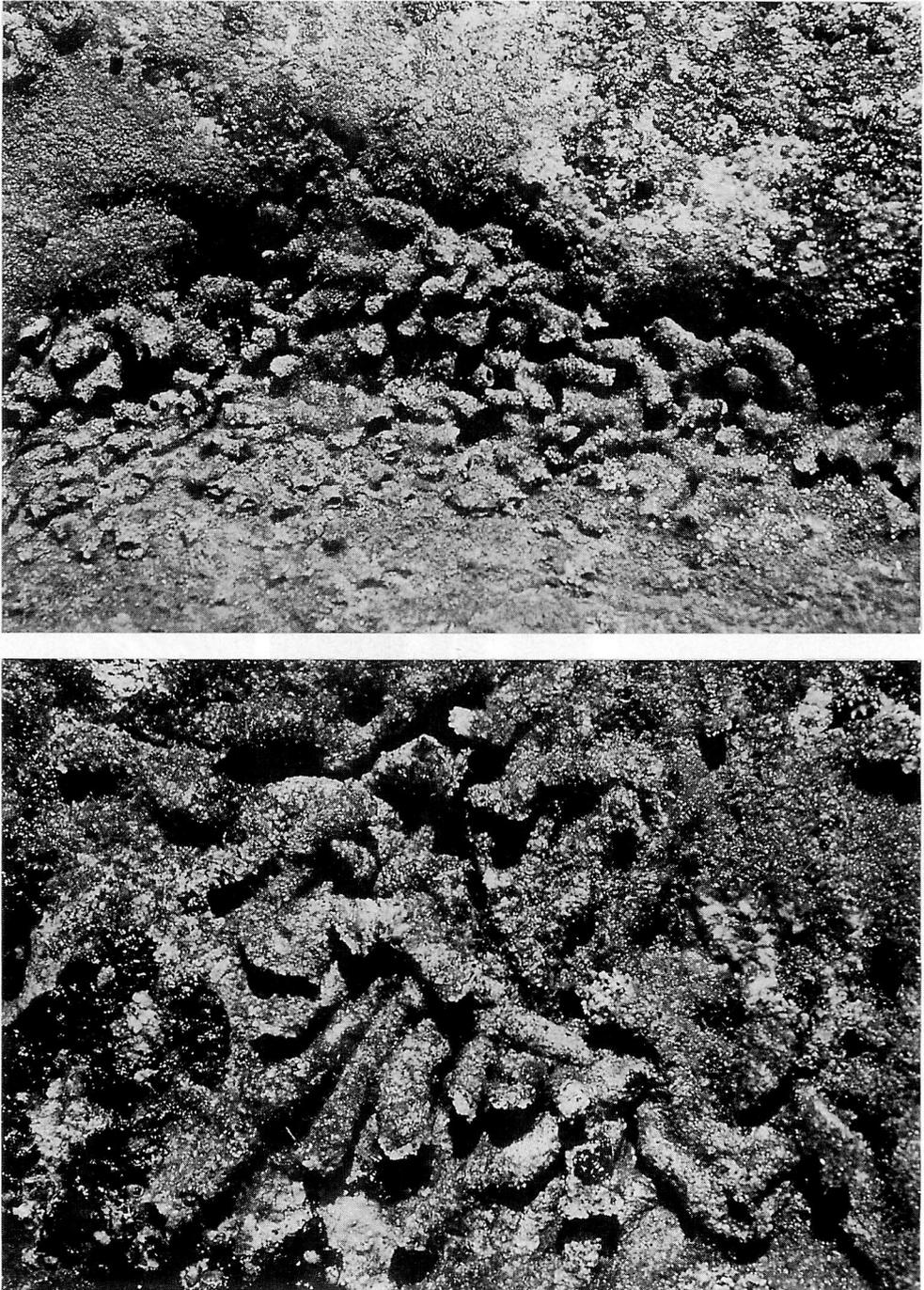


Fig. 6. Intertidal belt of *Idanthysrus boninensis* at Hahajima, Ogasawara Islands (photo by Dr. Sato-Okoshi Waka).

and belt-forming species below the middle intertidal zone (Asakura *et al.*, 1990, Figs. 12, 16, 19, 24, 25; see Fig. 6). The species is rarely

found solitary on intertidal and subtidal rocks (CBM-ZW-116 and 117) and on living coral (CBM-ZW-40). This is the first record of

the genus as an associate of living corals.

***Idanthyrus okinawaensis* n. sp.**

(Figs. 7–9)

Material examined. Holotype, CBM-ZW-48, Zampa Cape, Okinawa, on living coral *Porites* 1 May 1995, collected by E. Nishi, scuba diving, 3 to 4 m depth; paratypes, CBM-ZW-137, on SEM stab, Sesoko Island, Okinawa, associated with living *Porites* sp. colony, June 23, 1992, collected by E. Nishi, scuba diving, 1 to 2 m depth.

Description. Holotype body length of 12 mm exclusive of cauda, diameter ca. 2 mm

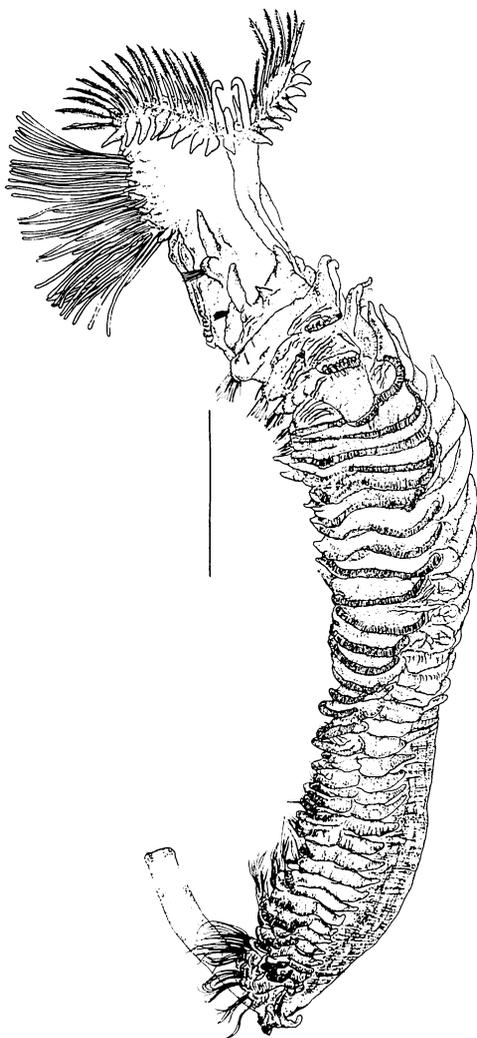


Fig. 7. Whole view of *Idanthyrus okinawaensis* (CBM-ZW-137). Scale shows 2 mm.

(Fig. 7). Paratype 10 to 13 mm in body length exclusive of cauda, diameter 2 mm. Anterior end of left opercular stalk (peduncle) absent; right one complete. Inner series of 13 flattened, straight spines, with distally finely denticulate thecae; tapered to slightly blunted tips; outer row of 18 paleae with almost alternate lateral denticles, progressively, longer and more closely appressed to the blade toward distal tip; blades bent outward beyond margin of operculum. Subulate palpi along external margin of anterior end of stalk proportionately smaller than those usually present in *I. macropaleus*. Antero-ventral junction of stalk with flattened longitudinal ridge terminating in conical "palpode" with smaller lateral raised ridges on either side of median ridge at angle of about 30° from plane of midline. Two pairs of small, sharp tipped, lightly pigmented, nuchal hooks; tips directed inward; on antero-dorsal margin of each side of stalk; posterior hook of each pair located farther back than anterior one; hooks slightly bent more than 90° from longitudinal axis of shaft; without marginal limbations; without fleshy pad or cirri around hooks at points of emergence, as in *I. macropaleus* and some other species.

Remarks. The species is solitary on the living coral *Porites* sp. in subtidal areas and on dead coral colonies. This species is characterized by thecal bands on the inner paleae, which lack in *I. boninensis*.

***Idanthyrus okudai* Kirtley, 1994**

(Fig. 10)

Idanthyrus okudai Kirtley, 1994: 106, fig. 6, 13

Idanthyrus pennatus: Okuda, 1938b: 245, figs. 6, 7; Okuda, 1940: 12; Uchida, 1990: 57.

Material examined. CBM-ZW-269 Futo, Izu Peninsula, Pacific side of central Honshu, 15 October, 1996, sandy bottom, underside of rocks, without tube, 10–15 m deep, leg. by E. Nishi; -ZW-390 Kurio, Yakushima-island, subtidal, rocky shore, 1996, by hand, leg. by K. Mori.

Description. Outer paleae (19–32) with curving, widely palmate outline; denticles on convex margin very short on proximal 2/3 of length of blade; distal denticles almost straight; concave margin with small, recurved

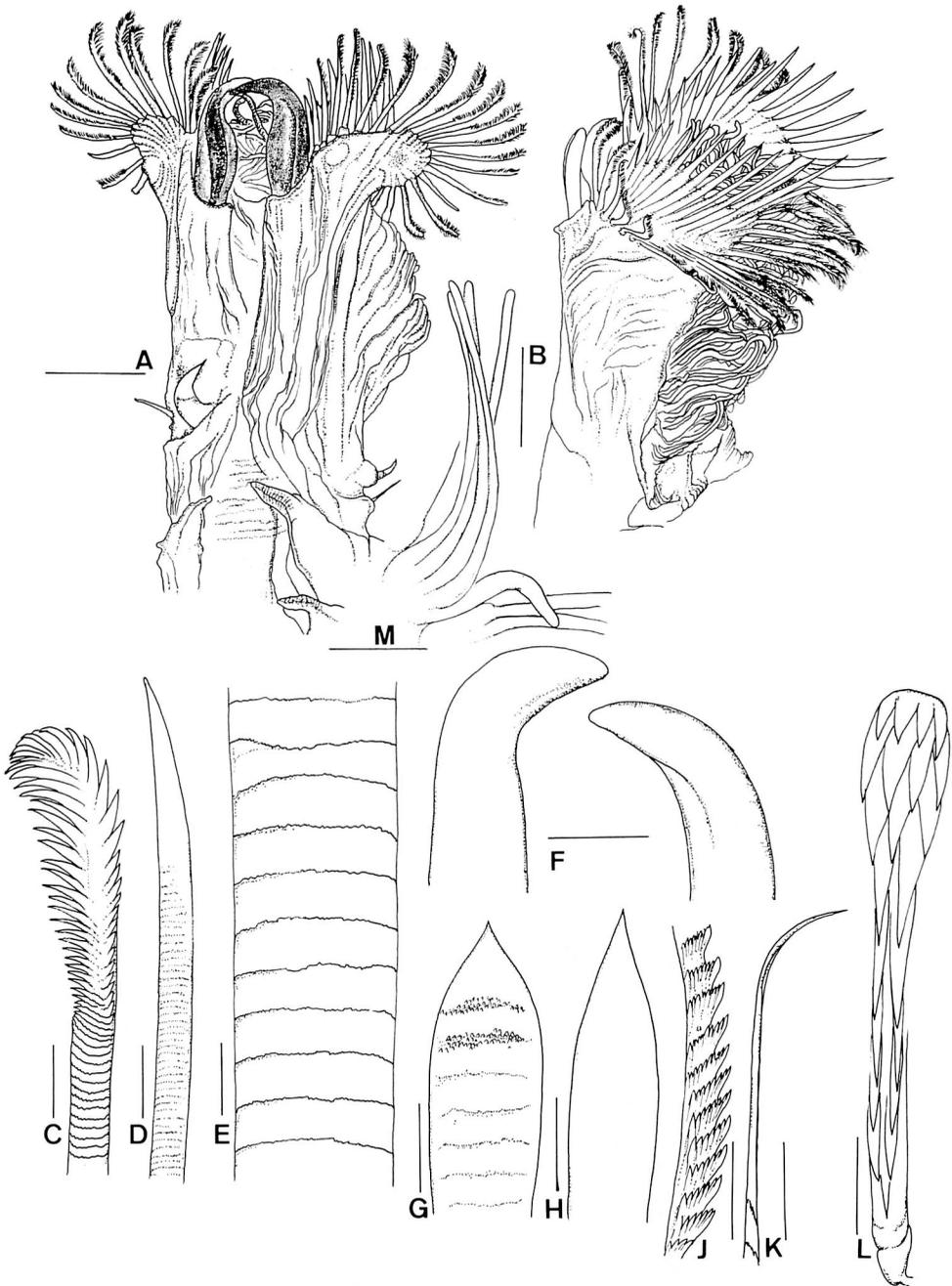


Fig. 8. *Idanthyrus okinawaensis* n. sp. A, dorsal view of head; B, lateral view of head (left side); C, outer paleae; D, inner paleae; E, close-up view of inner paleae; F, nuchal hooks; G, H, parathoracic setae; J, K, abdominal neurosetae (J middle part, K top part); L, uncini. Scales are 1 mm (A, B), 0.1 mm (C, D), 0.03 mm (E, G, H), 0.05 mm (F), and 0.02 mm (J, K, L).

denticles, becoming progressively longer and larger through proximal 5/6 of length; distal 1/6 becoming straighter, and smaller toward tip (Fig. 10A, B, D). Inner paleae (14–18) with

very constricted distal end; with straight transverse annulate lines through middle part of blade; distal tip slender, smooth (Fig. 10C, E). Nuchal hooks without marginal lim-

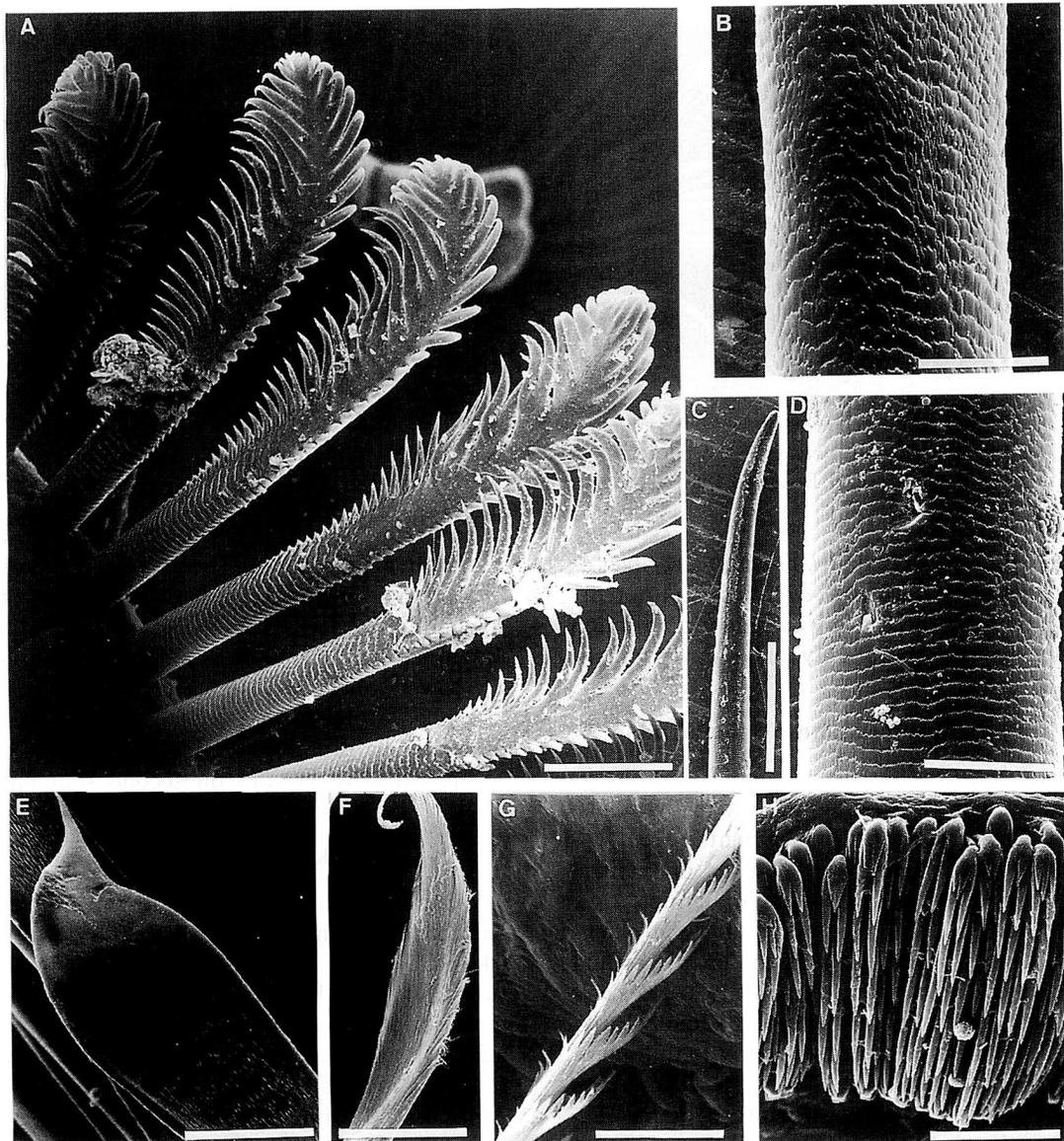


Fig. 9. SEM photos of *Idanthysrus okinawaensis*. A, outer palea row; B, close-up view of basal part of shaft of outer paleae; C, inner palea; D, close-up view of inner paleae; E, F, parathoracic paleae; G, abdominal neurosetae; H, uncini. Scales are 0.08 mm (A, C), 0.02 mm (B, D), 0.03 mm (E, F), 0.01 mm (G), and 0.02 mm (H).

bations.

Remarks. *Idanthysrus okudai* could be differentiated from other species of the genus, from the inner paleae with a diameter strongly constricted through 1/4 of the blade, and conspicuous transverse thecal bands across the middle section of the blade (Kirtley, 1994). Okuda (1938A, 1940) and Asakura *et al.* (1990) originally identified this species

as *I. pennatus* (Peters), but *I. pennatus* lacks transverse thecal bands across the blade of the inner paleae. *Idanthysrus okudai* closely resembles other Japanese species, but can be distinguished by the transverse thecae of the inner paleae being much more crowded together.

From Bonin Islands, Johansson (1922) recorded two Sabellariidae, *Lygdamis curvatus*

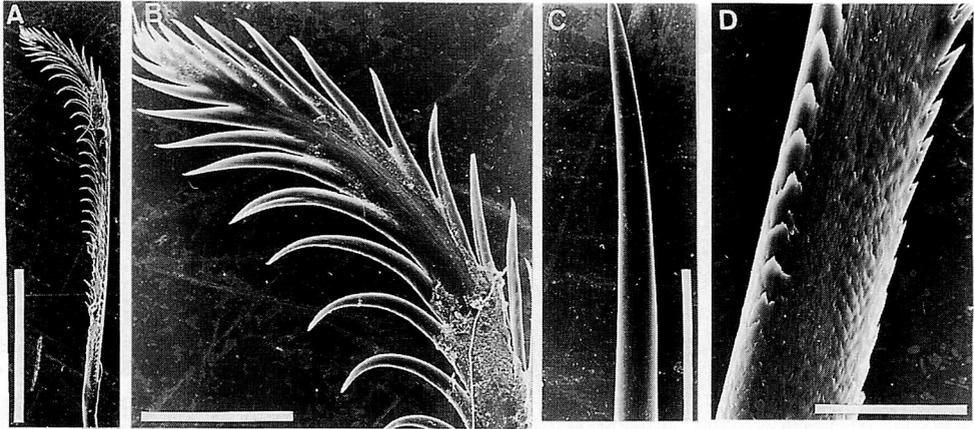


Fig. 10. *Idanthysus okudai*. SEM photos of outer paleae (A, B, D) and inner paleae (C). Scales are 0.2 mm (A), 0.03 mm (B, D, E), and 0.1 mm (C).

(Johansson, 1922) and *I. okudai* (described as *I. pennatus*). *Lygdamis curvatus* was not obtained from the Ogasawara Islands, although the species is probably endemic to the Islands.

A key to the Japanese Sabellariidae

- 1a Four parathoracic segments.....2 (genus *Lygdamis*)
- 1b Three parathoracic segments3
- 2a Outer paleae straight, eyes on ventral side, median organ often indistinct.....*Lygdamis japonicus*
- 2b Outer paleae bent at the end, eyes and median organ on dorsal side. *L. nesiotis*
- 2C Outer paleae with stout rounded tips, inner paleae stout, tapering to dull point.....*L. curvatus*
- 3a Opercular paleae in two rows (genus *Idanthysus*)4
- 3b Opercular paleae in three rows (genus *Neosabellaria* or *Sabellaria*)5
- 4a Outer paleae stout and straight with a small number of coarse lateral spines.....*I. macropaleus*
- 4b Outer paleae bent at tip, shaft surfaces of outer and inner paleae marked by straight transverse lines at intervals about equal to shaft radius *I. okudai*
- 4c Outer paleae bent at tip, inner paleae shafts marked by fairly straight transverse lines at intervals about 0.04 of shaft radius*I. okinawaensis*
- 4d Outer paleae bent at tip, inner paleae

- with very irregular transverse lines, at average intervals about 0.06 of shaft radius*I. boninensis*
- 5a Inner paleae spoon shaped, deeply hollowed and less elongate than middle palea*N. uschakovi*
- 5b Inner paleae more elongate than middle paleae. No bristles on second segment*S. ishikawai*

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日本産カンムリゴカイ科多毛類 (多毛綱) の3新種について

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九州天草半島と屋久島からハナカンムリゴカイ属 (多毛綱, カンムリゴカイ科) の1新種 *Lygdamis japonicus* n. sp. (標準和名ハナカンムリゴカイ) を記載した。この種は頭部底辺部の中央に位置する中央突起が短いことで同属の他種から区別される。沖縄本島からナガオカンムリゴカイ属の1新種 *Idanthysus okinawaensis* n. sp. (ウチナーカンムリゴカイ, 新称) と、小笠原諸島から同属の1新種 *I. boninensis* n. sp. (オガサワラナガオカンムリゴカイ, 新称) を記載した。前者は生きたイシサンゴの群体に単体で棲み、後者は潮干帯から潮下帯にかけて特徴的な带状群帯を形成するが、希に石の下などに単体で見つかることもある。これらの種はナガオカンムリゴカイ *Idanthysus okudai* Kirtley と酷似するが、内外の頭部剛毛片の筋状キューティクルの分布状態によって区別される。日本産カンムリゴカイ科多毛類9種の検索表を添付した。