



Lumbrineris lanai n. sp., a new species of polychaete (Annelida: Eunicida: Lumbrineridae) from the Robinson Crusoe Island, Juan Fernandez Archipelago, off the coast of Chile

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ABSTRACT

We describe a new species of the genus *Lumbrineris* de Blainville, 1828 with material collected in nine different locations around the Robinson Crusoe Island, Juan Fernández Archipelago (Lat. 33° 36' and 33° 46' S and Long. 80° 47' and 78° 47' W) from sandy bottoms, between 4–10 m depth. One hundred seventy-nine specimens were examined. The new species is characterized because M2 have three big teeth and a small distal bump; M3 and M4 are unidentate; composite multidentate hooded hooks reach up to chaetiger 23, with blades of varying lengths, and yellow aciculae. We consider *Lumbrineris lanai* n. sp. as the only valid species of Lumbrineridae recorded so far in Robinson Crusoe Island. This work contributes to the knowledge of the Chilean insular polychaete fauna and the Lumbrineridae family worldwide.

Keywords: Annelids, Eunicemorphs, Lumbrinerid worm, Chilean biodiversity, Polychaeta taxonomy

INTRODUCTION

Lumbrineris de Blainville, 1828, with approximately 140 nominal species, is one of the most diverse genera in the family Lumbrineridae Schmarda, 1861. In the most recent revision of *Lumbrineris* de Blainville, 1828, Carrera-Parra (2006b) established that the genus is characterized, among other characteristics, by the presence of composite hooks in the anterior parapodia, simple hooks in the posterior parapodia, five pairs of maxillae and connecting

plates between maxilla 1 (M1) and maxilla 2 (M2) (Carrera-Parra 2006b, 2021).

Augener (1922) identified the polychaetes collected during the Swedish Pacific Expedition, 1916–1917, led by Carl Scottsberg on Robinson Crusoe Island (= Masatierra), mainly in Cumberland Bay, at depths up to 45 m. In this material, Augener recorded only one species of Lumbrineridae, which he referred to as *Lumbriconeris magalhaensis* Kinberg, 1865. However, several characters noted by Augener differ from the characters of *L. magalhaensis*, for instance, the number of teeth in maxilla 2 that Augener reported to be three, in contrast to four that were stated by Kinberg (1865) and later confirmed in type material revisions by Hartman (1949), Orensanz (1990) and Carrera-Parra (2006b). In recent sampling at Robinson Crusoe Island, numerous specimens

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of a lumbrinerid species in line with Augener's description were collected. We consider this as a new species to science, since only a few species of *Lumbrineris* have three teeth in maxilla 2, as we described. We included a table showing relevant species characteristics, including *L. magalhaensis* Kinberg, and their most important differences. We consider that, in Robinson Crusoe Island, the family Lumbrineridae is represented, up to now, by a single species of *Lumbrineris* to be described, thus, the Augener's *Lumbriconereis magalhaensis* does not comprise Kinberg's species, but is a synonym of this new species.

METHODS

STUDY AREA

The Juan Fernández Archipelago is located in the Pacific Ocean, west of the coast of central

Chile, approximately 650 km in front of the port of Valparaíso. It consists of three main islands: Robinson Crusoe (= Masatierra) ($33^{\circ}37'S$, $78^{\circ}51'W$), Santa Clara ($33^{\circ}42'S$, $79^{\circ}01'W$), and Alejandro Selkirk ($33^{\circ}45'S$, $80^{\circ}45'W$) (Rozbaczylo and Castilla 1987). The Juan Fernández Archipelago considered one of the world's biodiversity hotspots (Mittermeier et al., 2004; Vargas et al., 2014) and was declared a Biosphere Reserve in 1977. Specimens of the new species were extracted from benthic samples collected from 2008 to 2012 in nine localities around Robinson Crusoe Island: Bahía Padre, Puerto Inglés, Puerto Francés, El Palillo, Punta Pangal, Punta Lobería, Sal Si Puedes, Bahía Tres Puntas, and Bahía Villagra (Figure 1). Sample collection used SCUBA diving in sandy bottoms and depths from four to 10 m.

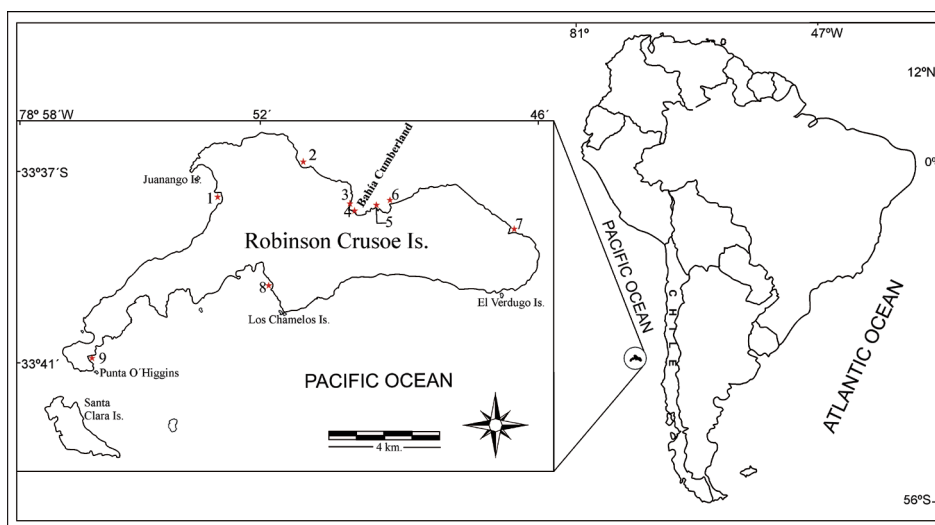


Figure 1. Map of Robinson Crusoe Island, Juan Fernández Archipelago. Stars correspond to the sampling localities of *Lumbrineris lanai* n. sp. (1: Bahía Tres Puntas, 2: Puerto Inglés, 3: Sal Si Puedes, 4: El Palillo, 5: Punta Lobería, 6: Punta Pangal, 7: Puerto Francés, 8: Bahía Villagra, 9: Bahía Padre).

METHODOLOGY

Specimens were fixed in the field with 10% formalin; and later, in the laboratory, they were transferred to 70% ethanol for preservation. The specimens were examined according to the protocol described by Carrera-Parra (2006a). Likewise, the maxillary apparatus terminology is based on Carrera-Parra (2006a). Illustrations were made using a *camera lucida*. Specimens were observed and photographed with a stereomicroscope and

a trinocular microscope with a high-resolution digital camera. Type specimens are deposited in the Museo Nacional de Historia Natural, Santiago (MNHNCL ANN). Additional non-type specimens are deposited in the collection of the “Sala de Colecciones Biológicas”, Universidad Católica del Norte (SCBUCN), Coquimbo, in the “Colección de Flora y Fauna Profesor Patricio Sánchez Reyes” Departamento de Ecología, Facultad de Ciencias Biológicas, Pontificia Universidad Católica de

Chile, Santiago (SSUC), and in the reference collection of Faunamar Ltda., Santiago.

NOMENCLATURE

The electronic edition of this article conforms to the requirements of the amended International Code of Zoological Nomenclature. Hence, the new name contained herein is available under that code from the electronic edition of this article (ICZN, 1999, 2008). This published work and its nomenclatural acts were registered in ZooBank (LSID:zoobank.org:act:123C3669-2F8F-4368-9B7A-066F7465E435).

RESULTS

SYSTEMATICS

Phylum Annelida Lamarck, 1802

Class Polychaeta Grube, 1850

Subclass Errantia Audouin and H Milne Edwards, 1832

Order Eunicida Dales, 1962

Family Lumbrineridae Schmarda, 1861

Genus *Lumbrineris* de Blainville, 1828

Type species *Lumbrineris latreilli* Audouin and Milne-Edwards, 1834.

Diagnosis. Prostomium without antennae, without eyes; parapodia with dorsal cirrus slightly developed; without branchiae; with limbate setae, and simple and composite multidentate hooded hooks; pygidium with anal cirri; maxillary apparatus with five pairs of maxillae, carriers as long as M1, joined along the entire base of M1; M1 forceps-like without inner accessory teeth, with attachment lamella; M2 as long as M1, with ligament, with attachment lamella well developed along 2/3 of lateral edge; with wide connecting plates slightly developed; M3 completely pigmented, with attachment lamella well developed along the entire lateral edge; M4 completely pigmented, with attachment lamella well developed; M5 free, reduced just to attachment lamella, lateral to M4 and M3. Mandibles fused up to 3/4 of its length (Carrera-Parra 2006b).

LUMBRINERIS LANAI N. SP.

Figures 2A–N, 3A–I.

Lumbriconereis magalhaensis: Augener, 1922: 197–199, textFigures 8a–b [non Kinberg, 1865].

DIAGNOSIS. Prostomium longer than wide; maxillary carriers slightly shorter than M1; M2 almost as long as M1; M2 with three big teeth and a rounded distal bump; M3 and M4 unidentate. Anterior parapodia slightly shorter than posterior ones; rounded prechaetal lobe, and digitiform postchaetal. Composite hooded hooks up to chaetiger 23, with 5–6 teeth, and blades of variable size. Simple hooded hooks with 6–7 teeth. Pygidium with four short digitiform cirri.

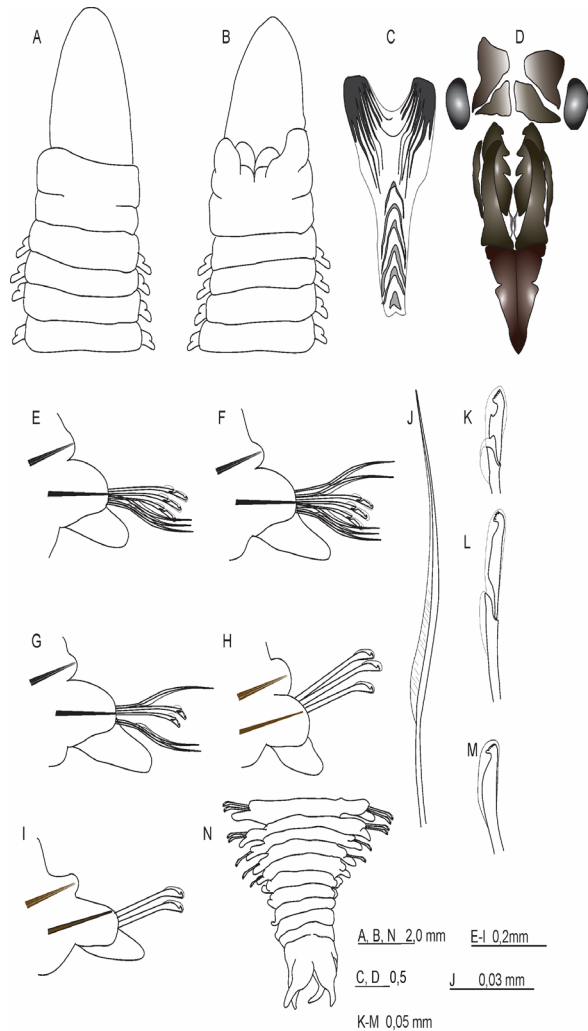


Figure 2. *Lumbrineris lanai* n. sp. A) Anterior end (holotype) dorsal view; B) same, ventral view; C) jaws, details; D) complex maxillary; E) third chaetiger, anterior view; F) sixth chaetiger, anterior view; G) 23th chaetiger, anterior view; H) 58th chaetiger, anterior view; I) 189th chaetiger, anterior view; J) limbate chaetae; K) compound hooded hook from chaetiger 1; L) compound hooded hooks from middle chaetigers; M) simple hooded hook; N) posterior end dorsal view.

TYPE MATERIAL: Juan Fernández Archipelago, Robinson Crusoe Island (33°37'S, 78°51'W): Holotype (MNHNCL ANN-15046) (Figures 3a-b), Punta Pangal (33°37'30" S, 78°49'20" W), 4–10 m depth, (08/01/2012), coll. A. Palma. Paratypes: (MNHNCL ANN-15047),

three specimens (Figures 3d-e), Punta Pangal, 4–10 m depth, (08/01/2012), coll. A. Palma; (MNHNCL ANN-15048), four specimens (Figure 3c), (MNHNCL ANN-15049); one specimen (MNHNCL ANN-15050) (Figure 3i); one specimen (01/11/2008) (MNHNCL ANN-15051).

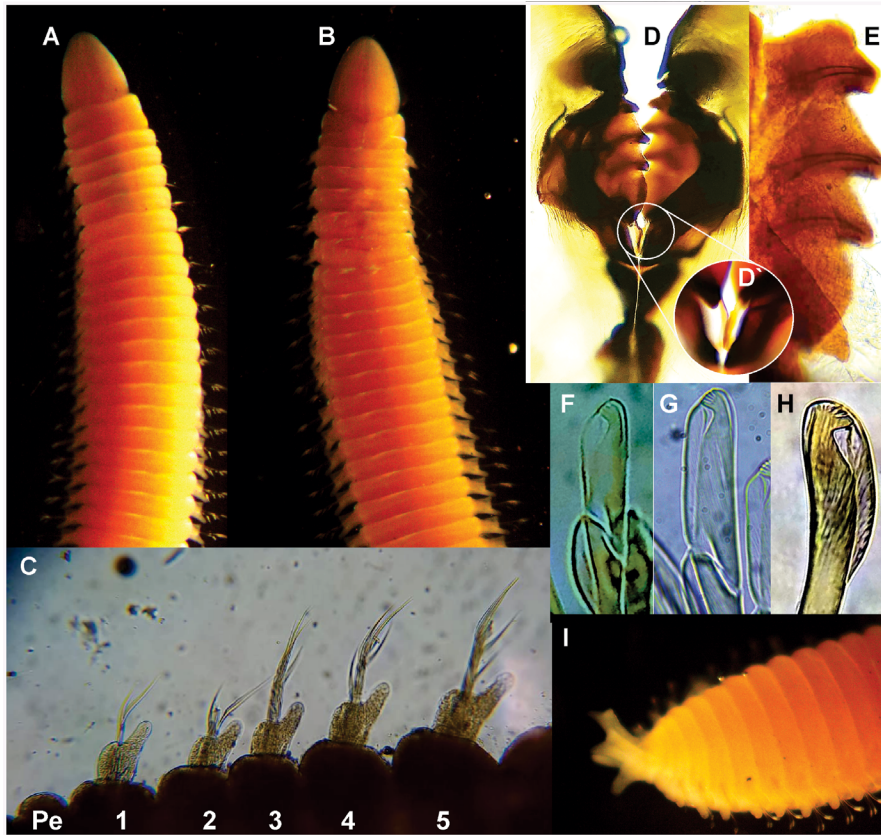


Figure 3. *Lumbrineris lanai* n. sp. A) Anterior end (holotype) dorsal view; B) same, ventral view; C) first five parapodia, in dorsal view; D) maxillary complex (paratype MNHNCL ANN-15051); D') connecting plates detail; E) M2 left; F) compound hooded hook from chaetiger 1; G) compound hooded hooks from middle chaetigers; H) simple hooded hook; I) posterior end (paratype MNHNCL ANN-15050), dorsal view.

NON-TYPE MATERIAL: Juan Fernández Archipelago, Robinson Crusoe Island (33°37' S, 78°51' W): Punta Pangal (33°37'30" S, 78°49'20" W), 4–10 m depth, coll. A. Palma; 20 specimens (01/11/2008); 41 specimens (03/11/2008), 4 m depth; 7 specimens (17/01/2011); 4 specimens (09/01/2012). Puerto Inglés (33°36'29" S, 78°51'27" W), 2–10 m depth: 6 specimens (28/03/2010); 3 specimens (15/01/2011). Puerto Francés: 6 specimens (19/01/2011). El Palillo (33°38' S, 78°48'40" W) 5–9 m depth: 7 specimens (02/07/2010). Sal Si Puedes (33°37' S, 78°51' W),

4–10 m depth, five specimens (02/07/2010); 1 specimen (21/01/2011); 4 specimens (08/01/2012). Punta Loberia 1–5 m depth: 11 specimens (28/03/2010); 5 specimens (20/01/2011); 18 specimens (02/07/2010); 12 specimens (10/01/2012). Bahía Padre; 7 specimens (04/11/2008), 9 m depth. Bahía Tres Puntas (33°37'41" S, 78°53'20" W), 3–12 m depth, 2 specimens (17/11/2008). Bahía Villagra 1 specimen (09/12/2008), 10 m depth.

DESCRIPTION: Holotype: complete specimen with 304 chaetigers, 43.0 mm long and 2.0 mm wide, parapods included. Prostomium sub-conical,

slightly longer than wide (Figures 2a-b, 3a-b), with a pair of nuchal organs, with well-developed buccal lips ventrally (Figures 2B, 3B). The peristomium is about half as long as the prostomium, with two rings; in dorsal view, the anterior ring is slightly longer than the posterior one, (Figures 2a, 3a). In ventral view, the anterior ring is twice as long as the posterior one (Figure 2b). Jaws are barely divided posteriorly, with the anterior end pigmented with a broad and concave notch (Figure 2C). Maxillary apparatus with five pairs of maxillae (Figure 2c); maxillary carriers slightly shorter than M1, and with anterior end constricted. M1 forceps-like with attachment lamella well developed. M2 almost as long as M1, with wide connecting plates poorly sclerotized, with three robust teeth and a rounded distal bump (Figures 2d, 3e). M3 and M4 unidentate. M5 free, prominent, lateral to M4 and M3 (Figure 2d). All parapodia well developed, the first four smaller than the following ones (Figures 2e, 3c); parapodia of the most posterior chaetigers (Figure 2N) longer than those of anterior (Figure 2f), middle (Figures 2g, 2h) and middle-posterior region (Figure 2i). Dorsal cirri inconspicuous in all parapodia, like a papilla; with up to three thin notoacaculae. Rounded prechaetal lobe throughout the body (Figures 2e-i). Postchaetal lobe well developed from first parapodium and digitiform throughout the body (Figures 2a, b; 2e-i; 3c). With composite multidentate hooded hooks in chaetigers 1–23; chaetigers 1–3 with 1–2 hooded hooks, subsequent with three compounds hooded hooks with a long blade (Figures 2l, 3g), with 5–6 teeth of similar size (Figure 3g), except composite hooded hooks from chaetiger 1 with a blade shorter than those from subsequent chaetigers (Figures 2k; 3f). Simple multidentate hooded hooks from chaetiger 24, with short hood and seven teeth, proximal tooth bigger and not crenulated (Figures 2m, 3h); 2–3 dorsal and 2–3 ventral limbate chaetae in chaetigers 1–23 (Figure 2j). Chaetigers 24–48 with up to 2 limbate chaetae and up to 3 simple hooded hooks; subsequent chaetigers only with three simple hooded hooks, and more posterior ones with 1–2 simple hooded hooks. Yellow, aristate aciculae, up to three in anterior parapodia, and one in posterior parapodia. Sexual products not observed.

Variations: The specimen's range in size from $L = 10.0\text{--}49.0$ mm and $W = 0.7\text{--}3.0$ mm. The last composite multidentate hooded hooks vary from chaetigers 19 to 22, and the first simple multidentate hooded hooks, vary from chaetigers 20 to 23. A paratype (MNHNCL ANN-15050) with anal dorsal cirri bilobed (Figure 3l).

DISTRIBUTION: It is only known from the type locality, Robinson Crusoe Island, Juan Fernandez Archipelago, Chile, in sandy bottoms from 4–10 m depth.

ETYMOLOGY: This species is being named as a tribute to the late Dr. Paulo da Cunha Lana, a Brazilian polychaetologist who contributed to the knowledge of the polychaete fauna of South America.

DISCUSSION

Lumbrineris lanai n. sp. belongs to the species-reduced group with three robust teeth in M2, which also includes the species *Lumbrineris oculata* Ehlers, 1908, from South Africa; *Lumbrineris nishii* Carrera Parra, 2006, from Japan; *Lumbrineris jan* Martin, Estefa and Gil, 2022, from the Gulf of Mexico, and *Lumbrineris vanhoeffeni* Michaelsen, 1898, from Greenland. *Lumbrineris lanai* n. sp. differs from *L. oculata* mainly for the three teeth in the M2 left plate and four in the right one; in addition to M4 bidentate. It differs from *L. nishii*, because the latter has smaller first ten parapodia, and the first five are barely visible in dorsal view; as well as it has compound hooded hooks up to chaetiger 29, with a long blade, with up to 8 teeth of similar size; it has black aciculae; maxillary carriers shorter than M1, anterior end constricted; and M3 is arcuate. *Lumbrineris lanai* n. sp. differs from *L. jan*, because the latter has a globular prostomium, as long as broad, instead of conical; all parapodia are well developed; the prechaetal lobe is elongated, gradually increasing to become longer than the postchaetal lobe in the last third of the body; composite multidentate hooded hooks are present up to chaetiger 19, with short blade (up to 5 length/wide ratio); simple multidentate hooded hooks with proximal tooth bigger than in *L. lanai*, and with a short hood. Finally, *L. vanhoeffeni* differs from *L. lanai* n. sp. because all of its parapodia are short; composite multidentate hooded hooks

are present up to chaetiger 11 (Oug, 1998); the maxillary carriers are slightly shorter than M1 and constricted in the middle region; M2 is almost as long as M1, with three teeth in the left plate and four in the right one (Carrera-Parra, 2006b).

Augener (1922) studied a small collection of littoral polychaetes collected during the Swedish Expedition 1916–1917 to Juan Fernández and Easter Island (leader Prof. C. Scottsberg) brought together by their zoologist, Mr. K. Bäckström and sent to him for determination by Prof. T. Odhner in Stockholm. The only lumbrinerid species present in the collection was identified by Augener as Kinberg's species *Lumbriconeris magalhaensis* Kinberg, 1865. The specimens had been collected in the Robinson Crusoe Island ("Masatierra"), at 30–45 m depth, calcareous algae, in 28/3/1917; likewise, at 30–40 m depth, sand with calcareous algae, in 1/4/1917; likewise, at 30–35 m depth, sand with calcareous algae, in 11/4/1917; likewise, in Cumberland Bay, at 20–35 m depth, clay, in 2/6/1916. Augener (1922) pointed out that this species is one of the more common worm forms there. It was represented in large numbers,

e.g., with 14 specimens from Cumberland Bay. All individuals were small, and almost all had incomplete posterior ends. In his description of the specimens, Augener pointed out several characteristics that differ from *L. magalhaensis*, but, even so, he considered that his specimens should be assigned to *L. magalhaensis*. Among the differences noted by Augener are: prostomium, slightly longer than wide "but never semi-circular"; capillary chaetae until chaetigers 40–45; compound hooded hooks from the first chaetigers with five teeth; M2 "has three teeth, a fourth one is at least not clear here"; and M3 "has only one tooth". However, Hartman (1949) and, subsequently, Orensanz (1990) examined the type material and corrected the mistake by Kinberg, because M3 has two teeth, not one (see differences between *L. lanai* n. sp. and *L. magalhaensis* in Table 1). Considering these facts and what was pointed out in the most recent review of the genus *Lumbrineris* (Carrera-Parra 2006b), we infer that what Augener observed would not correspond to Kinberg's species, *L. magalhaensis*, but to the *Lumbrineris lanai* n. sp. that we described.

Table 1. Comparison between the *Lumbrineris* species with three teeth on M2 and *L. magalhaensis* Kinberg, 1865 (CHH: compound hooded hooks; SHH: simple hooded hooks; M1: maxilla 1; M2: maxilla 2; M3: maxilla 3; M4: maxilla 4. Round. = Rounded; Aur. = Auricular; Dig. = Digitiform; Elong. = elongated; Ant. = Anterior; Post. = Posterior; Par. = Parapod).

	<i>L. magalhaensis</i>	<i>L. imajimai</i>	<i>L. jan</i>	<i>L. nishii</i>	<i>L. oculata</i>	<i>L. vanhoeffeni</i>	<i>L. lanai</i> n. sp.
CHH between chaetigers	1–11	1–14	1–19	1–29	1–20	1–11	1–23
No. of teeth of CHH	7	6	5	8	5	?	5–6
Blade length-width ratio	3.5:1	4.5:1	4:1	9:1	?	?	6.5:1 Except chaetiger 1 3:1
Acicula color/number on anterior notopodia	Yellow/3	Yellow/3	Yellow/3	Black/4	Yellow/3	Yellow/4	Yellow/3
Prostomium length/width	Similar, rounded	Similar, conical	Similar	Similar	Conical, slightly longer than wide	Longer than wide	Longer than wide
Nº of teeth of SHH	8	7	6	6	7	?	7
Maxillary carriers/M1	Short	Short	Short	Short	Short?	Slightly shorter	Same length
M1:M2/No. of teeth M2	as long as /4	as long as /3	as long as /3	as long as /3	?/3 in left plate and 4 in the right one	as long as /3 in left plate and 4 in the right one	Almost as long as /3
M3	bidentate	unidentate	unidentate	unidentate	unidentate	unidentate	unidentate
M4	unidentate	unidentate	unidentate	unidentate	bidentate	unidentate	unidentate
Prechaetal Lobe. ant./post.	Round.	Dig./Dig elong. Similar to postchaetal lobe	Elong.	Auri. Round.	Round.	Round.	Round.
Postchaetal Lobe. ant./post.	Dig.	Auri./Dig.	Dig.	Auri. Dig.	Dig.	Auri.	Dig.
Type locality	Strait of Magellan, Chile	Shimoda, Japan.	Gulf of Mexico	Japan	South Africa	Greenland	Juan Fernández, Chile

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AUTHOR CONTRIBUTIONS

ODD: Conceptualization; Investigation; Writing – Original Draft; Writing – Review and Editing.

NR: Data Curation; Methodology; Writing – Review and Editing.

PG: Methodology; Writing – Original Draft.

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