

**DIOPATRA AUDOUIN AND MILNE EDWARDS (POLYCHAETA: ONUPHIDAE)
FROM THAILAND****Hannelore Paxton**

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ABSTRACT

This study recognises four species of *Diopatra* Audouin and Milne Edwards from Thailand. A key is provided. *Diopatra amboinensis* Audouin and Milne Edwards, 1833 and *D. sugokai* Izuka, 1907 are widely distributed in the Indo-Pacific region. *Diopatra claparedii* Grube, 1878, is redescribed, with *D. bulohensis* Tan and Chou, 1996 as its new junior synonym. *Diopatra neapolitana khargiana* Wesenberg-Lund, 1949 is elevated to specific rank and redescribed, with *D. bengalensis* Hartman, 1974 as its new junior synonym. *Diopatra semperi* Grube, 1878, although not known to occur in Thailand, is redescribed to clarify its confusion with *D. claparedii*.

INTRODUCTION

Species of *Diopatra* are generally well represented in warmer waters and can be expected to be common in the Indo-Pacific region. Although some of the earliest reports of the genus are from this region, none have been reported from Thailand. *Diopatra* species are notoriously difficult to identify as they are superficially very similar and lack clear diagnostic features. They can be distinguished only by combinations of characters that show various degrees of overlap and variability. This problem of species delineation led to an earlier incorrect conclusion that most described species of *Diopatra* constitute a single variable worldwide species, namely *Diopatra neapolitana* (Fauvel 1936).

The present study is based on collections of the BIOSHELF project and earlier collections near Phuket, Thailand, and has resulted in the identification of four species of *Diopatra*: *D. amboinensis* Audouin and Milne Edwards, 1833, *D. sugokai* Izuka, 1907, *D. claparedii* Grube, 1878 and *D. khargiana* Wesenberg-Lund, 1949. Although

these records are new for Thailand, all four species had previously been reported from the Indo-Pacific region. *Diopatra amboinensis* and *D. sugokai* are widely distributed in the region and have recently been redescribed (Paxton 1993, 1998). *Diopatra khargiana*, described as *D. neapolitana khargiana*, is here redescribed based on type material, and elevated to specific rank. In his 'Beiträge zur Annelidenfauna der Philippinen' Grube (1878) described *Diopatra claparedii* from Singapore and *D. luzonensis* from Manila, Philippines. In an addendum (1878: 282) he stated that there had probably been a mix-up among the *Diopatra* specimens, putting their locality data in doubt. Hence, he considered it more prudent to omit the name *D. luzonensis* and name the species for its discoverer, *D. semperi*. He changed the type locality for *D. semperi* to 'probably Singapore' and for *D. claparedii* as Manila. Neither species had been reported since its original description and although only *D. claparedii* is here reported from Thailand, both species are redescribed, based on type material, in an attempt to clarify the matter.

MATERIALS AND METHODS

Collecting data for the BIOSHELF material can be found in Aungtonya and Eibye-Jacobsen (2002); other material is listed. BIOSHELF material is deposited at PMBC unless otherwise stated. The order of species treatments is alphabetical. Descriptions are based on post-juvenile specimens with ontogenetically stabilised characteristics. All measurements and colour descriptions are based on preserved specimens unless otherwise stated. Counts and measurements are of the type specimens examined, with the range of other material in parentheses. Body width (without parapodia) is of setiger 10. Terminology follows Paxton (1986, 1998).

Abbreviations used in the text are as follows: AM, Australian Museum, Sydney; LACM, Natural History Museum of Los Angeles County; MPW, Museum of Natural History, Wrocław; PMBC, Phuket Marine Biological Center; ZISP, Zoological Institute, St. Petersburg; ZMB, Zoological Museum, Berlin; ZMUC, Zoological Museum, University of Copenhagen.

TAXONOMY**Family Onuphidae Kinberg, 1865****Subfamily Onuphinae Kinberg, 1865****Genus *Diopatra* Audouin and Milne Edwards, 1833**

Diagnosis: Prostomium with 2 frontal lips, 2 palps and 3 antennae; palps and antennae with ceratophores with 5–20 rings, with moderately long to long styles. Nuchal grooves rounded to almost circular, widely separated middorsally; peristomial cirri present.

Anterior 3–8 pairs of parapodia modified, slightly prolonged. Branchiae from setiger 4–5, filaments arranged spirally around trunk; well developed only on anterior part of body, single filaments from setiger 40–110.

Hooks of modified parapodia uni- to tridentate, pseudocompound to simple. Pectinate and simple limbate setae on unmodified parapodia, bidentate hooded subacicular hooks from setiger 10–30.

Jaws with mandibles and maxillae. Tubes robust, consisting of inner parchment-like layer and outer layer of foreign particles, often attached at right angle.

Key to the Thai species of *Diopatra*:

1. Anterior modified setigers with 2 postsetal lobes (Fig. 5C) *D. sugokai*
- Anterior modified setigers with 1 postsetal lobe (Fig. 1E) 2
2. Anterior hooks falcate (Fig. 2A) and bidentate (Fig. 2B, C); peristomial cirri 1–1.5 times length of peristomium *D. claparedii*
- Anterior hooks bidentate only; peristomial cirri 2–3 times length of peristomium 3
3. Long palps, to setiger 4–11; anterior hooks with short hoods (Fig. 1A, B); cutting plates of mandibles with 2 distal indentations (Fig. 1C) *D. amboinensis*
- Very long palps, up to setiger 21; anterior hooks with long hoods (Fig. 3D, E); cutting plates of mandibles with 1 distal indentation (Fig. 4A) *D. khargiana*

Diopatra amboinensis Audouin and Milne
Edwards, 1833
Fig. 1A–C

Material examined: *Thailand*. – Near Saensarnizan Hotel, Gulf of Thailand, intertidal, coll. Uschakov and Guyanova, 2 Dec 1957 (1, ZISP 2/6557).

Diopatra amboinensis Audouin and Milne
Edwards, 1833: 229. – Paxton 1993: 116, figs. 1–6.

Diagnosis: Prostomium with long palps (to setiger 4–11) and antennae (to setiger 9–22), ceratophores with 9–15 rings; very long peristomial cirri (2.5–3

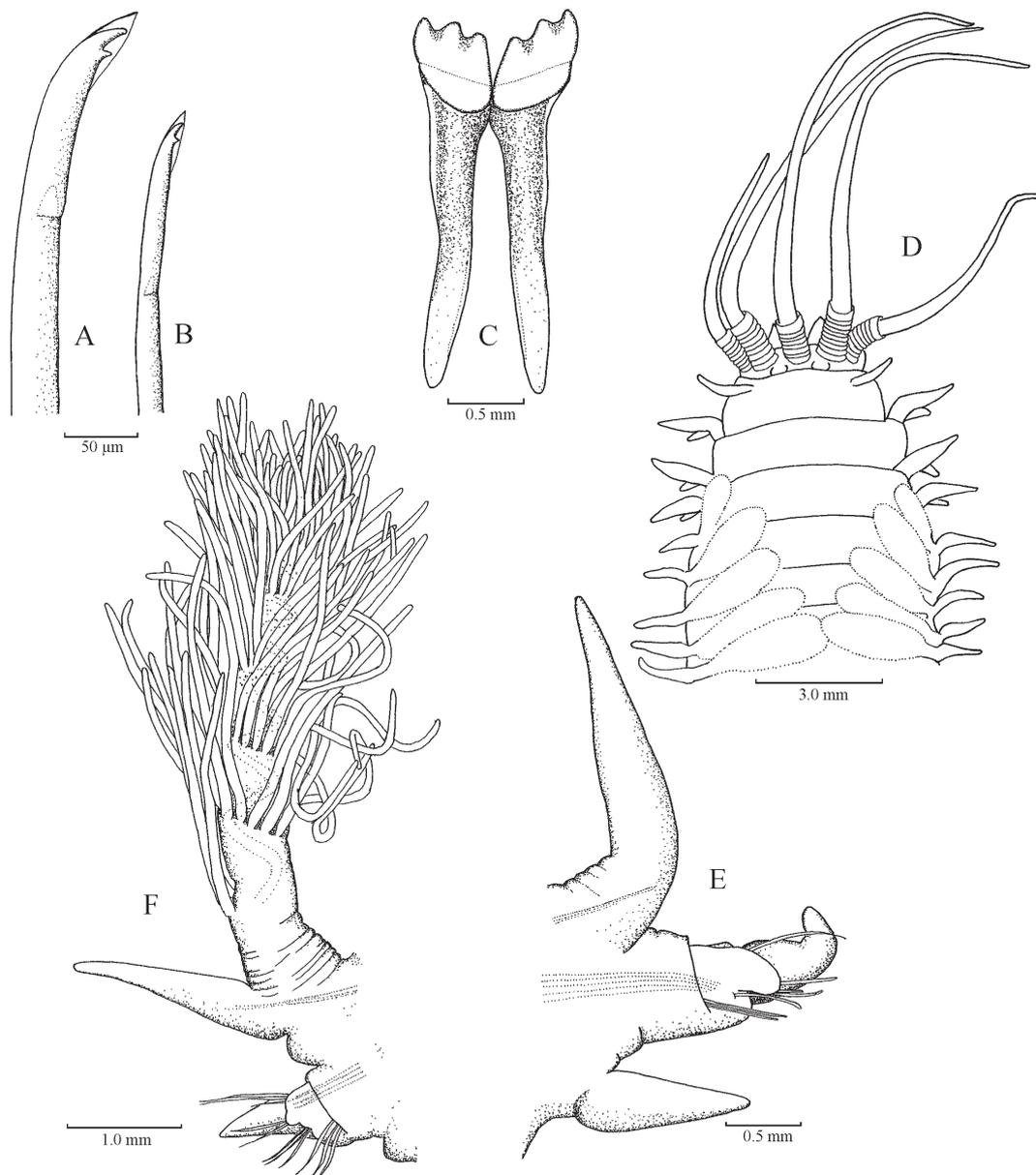


Figure 1 *Diopatra amboinensis* (from Paxton 1993: figs. 1E, F, 5A): A. Median pseudocompound hook from setiger 2. B. Slender pseudocompound hook from same. C. Mandibles, ventral view. – *Diopatra clapedii* (D: AM W.27381; E, F: PMBC 18486): D. Anterior end, dorsal view (branchiae only indicated). E. Parapodium 2, anterior view. F. Parapodium 6, anterior view.

times length of peristomium). Anterior parapodia with single postsetal lobes. Branchiae present over long part of body (single filaments from setiger 40–71). Modified parapodia (setigers 1–4) with bidentate pseudocompound hooks with short hoods (Fig. 1A, B). Limbate setae of median body region (e.g., setiger 40) with wide, strongly serrated shelves. Median region with 10–20 pectinate setae per parapodium, each with 15–20 teeth in transverse combs, edges often partly rolled inwards. Subacicular hooks from setiger 15–23. Cutting plates of mandibles with 2 distal indentations (Fig. 1C); maxilla I with medially extended falcate arch.

Remarks: The incomplete specimen measures 52 mm in length for 103 setigers, 4.0 mm in width, and is representative of the species as redescribed by Paxton (1993).

Diopatra claparedii Grube, 1878

Figs. 1D–F, 2A–H

Diopatra Claparedii Grube, 1878: 140, pl. 9, figs. 11a–b, 282. – Wiktor 1980: 275. – Hartwich 1993: 89.

Diopatra bulohensis Tan and Chou, 1996: 359, figs. 2–3. – Paxton and Chou 2000: 221. **New synonymy.**

Material examined: *Type material.* – ?Singapore, coll. Semper, date unknown (lectotype, MPW 270); Manila, Philippines, coll. Semper, date unknown (paralectotype, ZMB F.1773).

Thailand. – Nam Bor Bay, Phuket Island, mangroves, coll. T. Pimolehinda, 17 Oct 1983 (1, PMBC 18488). – Phang-nga Bay, intertidal, sea-grass bed, coll. S. Poovachiranon, 1988 (1, PMBC 18489).

?*Philippines.* – ?Manila, coll. Semper, date unknown (2 paralectotypes of *Diopatra semperi* (not Grube, 1878: 282 = *D. claparedii* Grube, 1878: 140), MPW 271).

Malaysia. – W Malaysia, Kedah state, N of Penang and Butterworth, bought at fishing shop by O. Akinfolayimi, Dec 1996 (1, AM W.27380).

Singapore. – Sungei Buloh, estuary, coll. Reef Ecology Study Team, University of Singapore, 1991 (2, AM W.27381).

Diagnosis: Prostomium with short palps and antennae, ceratophores with 6–9 rings; moderately long peristomial cirri. Anterior parapodia with single postsetal lobes. Branchiae present over very long part of body. Modified parapodia with falcate and bidentate simple to pseudocompound hooks with short hoods. Limbate setae of median body region proximally weakly serrated. Median region with 30–50 pectinate setae per parapodium, each with 20–25 teeth in funnel-like combs. Subacicular hooks from setiger 20–28. Cutting plates of mandibles with one distal indentation in smaller specimens, smooth in large ones.

Description: All specimens examined incomplete: types measuring 65 and 100 mm in length for about 100 and 156 setigers, 4.0 and 6.3 mm in width respectively; others 3.5–7.0 mm in width. Live specimens dark reddish brown (Tan and Chou 1996). Paralectotype with some brown pigment on ceratophores and prostomium, other preserved specimens ranging from colourless to the following brown pigmented areas: prostomium, ceratophores and basal part of frontal lips, styles, peristomial and dorsal cirri; dorsal part of peristomium and 25–30 anterior setigers with narrow band on anterior margin and wider median band.

Prostomium anteriorly rounded with short, subulate frontal lips (Fig. 1D). Ceratophores of palps and antennae with 6–9 proximal rings and a longer distal ring. Styles gradually tapering, ending in fine tips; paired palps reaching to setiger 2 (2–4). Antennae about equal in length, reaching setiger 8–10 (8–12). Nuchal grooves well developed, forming 3/4 circles; peristomial cirri 1.25 (1–1.5) times as long as peristomium, inserted subdistally on peristomium, almost lateral to antennae. Peristomium and anterior 5–7 setigers almost twice as long as following ones.

Anterior parapodia with lip-like presetal and subulate postsetal lobes (Fig. 1E). Presetal lobe best developed on setigers 1–4, reduced from 5–6 and absent from about setiger 8–10; postsetal lobe gradually reduced from setiger 6, still present as

small lobe by end of branchiate region. Dorsal cirri subulate to digitate, becoming posteriorly very slender; ventral cirri subulate on anterior 5 (4–5) setigers. Spiralled branchiae from setiger 4, best developed on setigers 6–10 with 14 (10–18) whorls reaching to setiger 1 when anteriorly extended. Branchial whorls closely spaced, individual filaments thin, becoming shorter towards tip of branchia, giving bush-like appearance (Fig. 1F). Branchiae present over relatively very long part of body, number of filaments gradually decreasing, single filaments from setiger 67–108, absent from setiger 91 (68–108+).

Modified parapodia (setigers 1–4) with 1–2 slender upper simple setae and falcate and bidentate hooks with short hoods. Each parapodium with 4–5 simple to weakly pseudocompound falcate (Fig. 2A) to bidentate hooks (Fig. 2B) projecting from main setal pocket, and 1–2 slender pseudo-compound bidentate hooks (Fig. 2C) from lower pocket near contraction fold.

From setiger 5 limbate setae replacing hooks. Upper limbate setae initially with narrow wings, by setiger 40 wings becoming wider and proximally weakly serrated (Fig. 2D); lower limbate setae cultriform, replaced by 2 bidentate hooded subacicular hooks from setiger 24–26 (20–28).

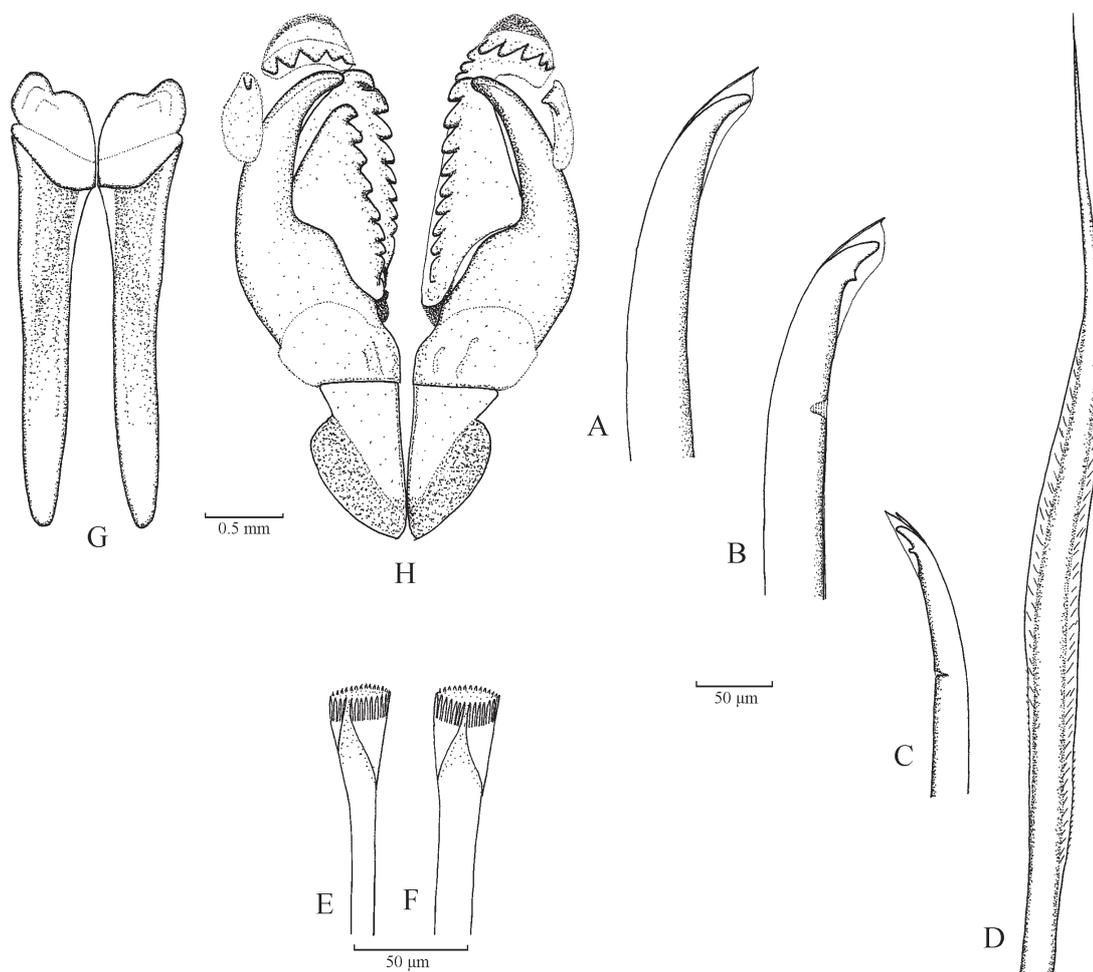


Figure 2 *Diopatra clapedii* (A–F: paralectotype ZMB F.1773; G, H: AM W.27381): A. Simple falcate hook from setiger 1. B. Weakly pseudocompound bidentate hook from same. C. Slender pseudocompound bidentate hook from same. D. Median limbate seta from setiger 40. E. Pectinate seta from setiger 40, laterofrontal view. F. Same, frontal view. G. Mandibles, ventral view. H. Maxillae, ventral view.

Pectinate setae with funnel-like combs from setiger 5/6 onwards. Number of pectinate setae increasing toward median region; setiger 6 with 1 seta, setiger 40 with 30–50 setae having 20–25 teeth per seta (Fig. 2E, F).

Mandibles (Fig. 2G) with dark shafts and high cutting plates. Cutting plates with one central indentation in small to moderate sized animals (present in specimen of 4 mm width), smooth edge in larger specimens. Maxillae (Fig. 2H) moderately sclerotised; maxillary formula (based on 2 specimens and Tan and Chou 1996): Mx I = 1 + 1 (with medially extended arch); MX II = 6–8 + 6–8; Mx III = 6–8 + 0; Mx IV = 4–6 + 6–8; Mx V = 1 + 1. Tubes typical of genus with inner parchment-like layer and outer layer of foreign particles of sand and shell fragments attached at different angles.

Remarks: The original description of *Diopatra claparedii* was based on a single specimen that was in a vial together with *Iphione muricata*, *Eunice collaris* and *Nereis singaporensis* and its type locality was given as Singapore (Grube 1878: 140–141). However, in an addendum to the main text, Grube (1878: 282) stated that he found another *Diopatra* specimen in an apparently empty worm tube that was definitely from Manila. Since this specimen agreed in all respects with *D. claparedii* (and not *D. luzonensis* Grube, 1878 which he described on page 138 from Manila) he could not doubt that after the first examination of the two species there had been a mix-up, and that the worm described as *D. luzonensis* was put together with those that Professor Semper had labelled as ‘probably from Singapore’. He reasoned that since it was by no means certain that *D. luzonensis* occurred in Manila, it was best to name that species for its discoverer as *D. semperi*, and to give the type locality for *D. claparedii* as Manila.

Grube did not designate a holotype. He stated that the single incomplete specimen, on which the description was based, measured 100 mm in length for 100 setigers and was dissected to allow examination of the jaws. This allows it to be identified as the specimen registered as no. 270 and held by the Museum of Natural History in

Wroclaw. This specimen, listed as ‘holotype’ by Wiktor (1980: 275), was examined in the present study and found to be in a very poor condition. It was dried up at some earlier point and is now in a fragile and shrunken state (measuring 65 mm in length for about 100 setigers). However, in spite of its poor condition, according to Article 74.6 of the International Code of Zoological Nomenclature (Anonymous 1999) it has to be the lectotype of *D. claparedii*.

Grube’s other specimen that he considered to be ‘definitely’ from Manila, can be identified as the type that is registered as F.1773 and held by the Zoological Museum in Berlin, listed as ‘syntypus’ by Hartwich (1993: 89). It was examined, found to be in a very good condition and agreeing well with the description, except for an abnormality in that the left parapodium 2 has two postsetal lobes and the right parapodium 2 has two dorsal cirri. It measures about 100 mm, which led Hartwich (1993) to suggest that it might be the specimen on which the description was based. However, it consists of 156 setigers, its jaws are undissected, and it has 86 pairs of branchiae as mentioned by Grube for the subsequently found specimen; it is here declared the paralectotype.

Two specimens registered as syntypes of *D. semperi* (MPW 271) were examined and found to be *D. claparedii* instead. One specimen is very large but posteriorly incomplete; it measures 105 mm for 108 setigers, and 7.0 mm in width. The other specimen consists of a tiny prostomium and 10 setigers of a width of 1.0 mm, regenerating from a body of 150 setigers of 4.5 mm width. Since these specimens were declared type specimens by Wiktor (1980: 275), they will have to remain as such and are paralectotypes of *Diopatra semperi*.

Diopatra bulohensis Tan and Chou, 1996 was described from Sungei Buloh, an estuary on northern Singapore Island. The description agrees with *D. claparedii* except for the pectinate setae which were stated to be slightly curved with 10–12 teeth in straight combs and illustrated as such. I have examined specimens of *D. bulohensis* from its type locality and found them to have the

characteristic funnel-shaped pectinate setae with 20–25 teeth. Therefore, *D. bulohensis* is herewith considered to be a junior synonym of *D. claparedii*. The occurrence of *D. claparedii* in Singapore supports the conclusion that the type locality was originally correctly stated in that the lectotype was probably from Singapore and the paralectotype from Manila.

Distribution: *Diopatra claparedii* has been collected from the South China Sea in Manila, the Philippines, Malaysia and Singapore, and from the Andaman Sea near Phuket, Thailand, and appears to be an estuarine species.

Diopatra khargiana Wesenberg-Lund, 1949
Figs. 3A–G, 4A–B

Diopatra neapolitana khargiana Wesenberg-Lund, 1949: 313, fig. 31a.

Diopatra neapolitana. – Wesenberg-Lund 1949: 311, fig. 31b. – Not Delle Chiaje, 1841.

Diopatra bengalensis Hartman, 1974: 221, fig. 8a–f. **New synonymy.**

Material examined: *Type material.* – DSII st. 8, about 2 miles SSW of Kharg, Gulf of Iran, 29°14' N, 50°19' E, 40 m, soft grey clay, coll. G. Thorson, 5 Mar 1937 (lectotype, ZMUC-POL-1012); same data (3 paralectotypes, ZMUC-POL-1132).

BIOSHELF. – st. C-2/TD, 64 m, muddy sand (2, AM W.27382); st. E-20m/OS, 20 m, sand with shell fragments (2, PMBC 18490); st. G-2/BC, 63 m, muddy sand (1, PMBC 18491); st. I-1/BC, 38 m, mud (3, PMBC 18492); st. K-2/BC, 63 m, mud (2, PMBC 18493); st. L-2/BC, 59 m, muddy sand with shell fragments (1, PMBC 18494); st. L-3/TD, 83 m, sandy mud with shell fragments (2, ZMUC-POL-1173); st. RN-3/BC, 72 m, muddy sand (1, PMBC 18495); st. PB-1/BC, 19 m, sand with shell fragments (2, PMBC 18496); st. PB-4/BC, 32 m, sand with shell fragments (2, PMBC 18497); st. PB-6/BC, 30 m, sand with shell fragments (1, PMBC 18498); st. PB-7/BC, 29 m, sand with shell fragments (1, PMBC 18499).

Thailand. – Airport Bay, Phuket Island, 20 m, coll. A. Nateewathana and J. Hylleberg, 18 Jan

1982 (1, PMBC 18500); Bang Tao Bay, Phuket Island, 20 m, coll. A. Nateewathana and J. Hylleberg, 26 Apr 1982 (1, PMBC 18501); Phangnga Bay, intertidal, sea-grass bed, coll. S. Poovachiranon, 1988 (3, PMBC 18502).

Gulf of Iran. – DSII st. 22, 28°54' N, 50°11' E, 56 m, light clay mixed with sand, coll. G. Thorson, 13 Mar 1937 (2, ZMUC-POL-1133); st. 77A, 25°57' N, 57°12' E, 29 m, tough grey clay, coll. G. Thorson, 21 Apr 1937 (1 juvenile, ZMUC-POL-1174); st. 78A, 26°03' N, 57°06' E, 70 m, tough, grey clay, coll. G. Thorson, 21 Apr 1937 (1 + 1 juvenile, ZMUC-POL-1134); st. 89, 26°25' N, 54°42' E, 49 m, clay with a little sand, coll. G. Thorson, 23 Mar 1938 (1, ZMUC-POL-1135).

Arabian Sea. – Gulf of Oman, 25°45' N, 57°07' E, 92–95 m, coll. RV *Anton Bruun*, 30 Nov 1963 (4 syntypes of *Diopatra bengalensis*, LACM-AHF Poly 1139).

Diagnosis: Prostomium with very long palps and antennae, ceratophores with 12–16 rings; very long peristomial cirri. Anterior parapodia with single postsetal lobes. Branchiae present over short part of body. Modified parapodia with bidentate, pseudocompound hooks with long hoods. Limbate setae of median region proximally weakly serrated. Median region with 20–40 pectinate setae per parapodium, each with with 20–30 teeth in weakly oblique combs. Subacicular hooks from setiger 14–18. Cutting plates of mandibles with one distal indentation.

Description: Incomplete types measuring 22–30 mm in length, 24–54 setigers, width 5.0–6.0 mm. Largest, almost complete non-type specimen measures 125 mm for 181 setigers, width 5.5 mm. Live specimens varying highly in colour, from white, bright yellow, yellowish-grey to brick-red (Wesenberg-Lund 1949). Types pale, lacking any pigmentation. More recently collected material ranging from colourless to having pale brown pigmentation on prostomium, basal part of frontal lips, ceratophoral rings, and wide dorsal band on peristomium and 10–20 anterior setigers.

Prostomium anteriorly rounded with long, subulate frontal lips. Ceratophores of palps and

antennae with 13–16 (12–16) proximal rings and a longer distal ring (Fig. 3A). Styles unusually long and slender; gradually tapering and ending in fine tips; paired palpal styles reaching to setiger 6–15 (5–21), antennae about equal in length, styles reaching to setiger 13–20 (13–35). Nuchal grooves

well developed, forming 3/4 circles; peristomial cirri unusually long, 3 (2–3) times as long as peristomium, inserted subdistally on peristomium, almost lateral to antennae. Peristomium about same length as following segments.

Anterior parapodia with rounded presetal and

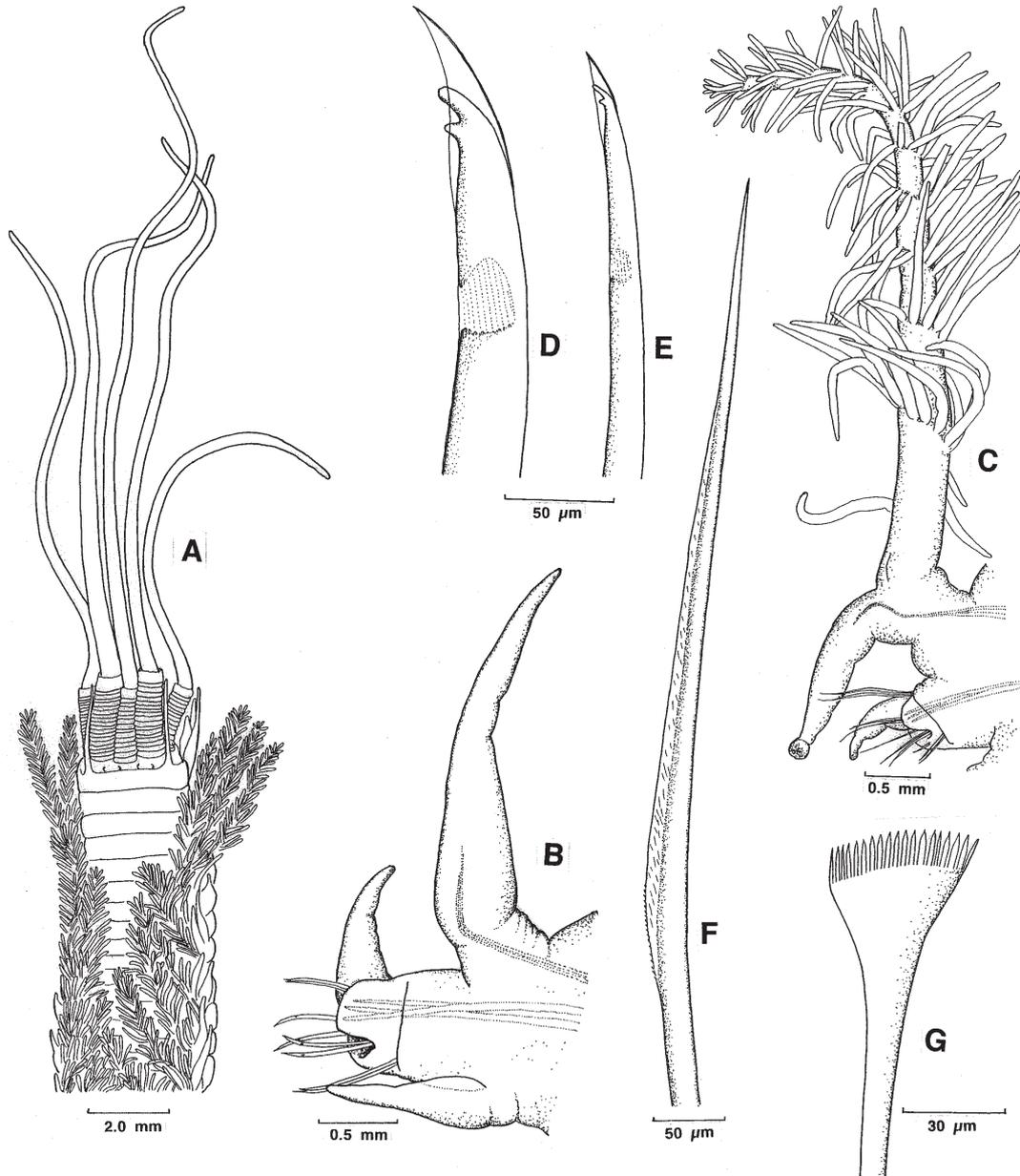


Figure 3 *Diopatra khargiana* (A: BIOSHELF st. L-3/TD, ZMUC-POL-1173; B, H, I: paralectotype ZMUC-POL-1132; C–G: lectotype ZMC-POL-1012): A. Anterior end, dorsal view. B. Parapodium 3, anterior view. C. Parapodium 5, anterior view. D. Large median pseudocompound hook from setiger 2. E. Slender pseudocompound hook from same. F. Upper limbate seta from setiger 40. G. Pectinate seta from same.

subulate postsetal lobes, ventral protrusion enclosing emergent setae in a collar-like fashion (Fig. 3B). From setiger 5 presetal lobe becoming smaller, absent by setiger 10; postsetal lobe gradually becoming smaller but still present as small lip in posterior region. Dorsal cirri subulate to digitate, long, best developed in anterior 10 setigers, becoming very slender in postbranchial region; ventral cirri subulate on anterior 4–5 setigers. Spiralled branchiae from setiger 4–5, best developed on setigers 6–10 with 13–16 (8–18) whorls touching peristomium to frontal lips when anteriorly extended. Individual filaments short, whorls far apart, giving complete branchia long, slender appearance (Fig. 3C). Branchiae present over relatively short part of body, number of filaments decreasing gradually after setiger 10, single filaments from setiger 44 (38–46), absent 1 or 2 setigers thereafter.

Modified parapodia (setigers 1–4) with 1–2 slender upper simple setae and bidentate hooks. Hooks pseudocompound with long pointed hoods. Each parapodium with 4–5 large hooks (Fig. 3D) projecting from main setal pocket, and 1–2 slender hooks (Fig. 3E) from lower pocket.

From setiger 5 limbate setae replacing hooks. Upper limbate setae initially with narrow wings, by setiger 40 wings becoming wider and proximally weakly serrated (Fig. 3F); lower limbate setae cultriform, replaced by 2 bidentate hooded subacicular hooks from setiger 15–18 (14–18). Pectinate setae from setiger 5/6 onwards, with weakly oblique combs. Number of setae and teeth per comb lower in anterior setigers; setiger 6 with 2 setae having 10–15 teeth, setiger 40 with 20–40 setae having 20–30 teeth per seta (Fig. 3G).

Mandibles (Fig. 4A) with dorsally heavily calcified shafts and high calcareous cutting plates with one distal indentation. Maxillae (Fig. 4B) moderately calcified, appearing greyish in colour. Maxillary formula (based on 4 specimens): Mx I = 1 + 1; Mx II = 8 (8–9) + 8 (7–8); Mx III = 7 (7–9) + 0; Mx IV = 8 (7–9) + 8 (9–11); Mx V = 1 + 1. Tubes of the material from the Iranian Gulf consisting of parchment-like inner layer, covered with a very thick layer of fine clay or small fragmentary or whole mussel shells (Wesenberg-

Lund 1949). The outer layer of tubes of the BIOSHELF material is made up of mud and small shell fragments.

Biology: The smallest juvenile examined is a complete specimen, measuring 90 mm for 50 setigers, 0.6 mm wide. Its anterior four pairs of parapodia are modified and have pseudocompound hooks as in adults, but other juvenile features consist of having only 5–7 ceratophoral rings, subacicular hooks from setiger 10 and branchiae on only 20 setigers.

Remarks: The type material consists of four anterior and three median fragments. The specimens are in a relatively good state of preservation, except for some internal decomposition and the terminal globular ‘knots’ on some dorsal and ventral cirri and postsetal lobes. These ‘knots’ were considered by Wesenberg-Lund (1949) as atypical for *Diopatra neapolitana* and were the justification for erecting the new subspecies *D. n. khargiana*.

Although Wesenberg-Lund (1949) stated that it was hard to believe that this feature was due to the influence of preservation, I think that the globular ‘knots’ are not a structural feature but are due to a softening of the skin and underlying layers allowing a ballooning of the terminal part and in some cases the knot to burst. Other deformations occur on the palpal and antennal styles where internal muscle strands form at times loops that have broken through the epidermis. Both deformations are here considered as collection/preservation artifacts.

Several of the specimens reported as *D. neapolitana* from the Iranian Gulf by Wesenberg-Lund (1949) have been examined in the present study and were found to agree in all other respects with the types of *D. neapolitana khargiana*, as already stated by Wesenberg-Lund. Although superficially very similar to *Diopatra neapolitana* Delle Chiaje, 1841, the material from the Iranian Gulf differs in a number of important characteristics. *Diopatra neapolitana* and a few closely related species have ventral parapodial lobes on setigers 5–15 (for description and figure see *D. aciculata*

[Paxton 1993: 144–147]) and pectinate setae with only 5–10 teeth. In the Iranian Gulf material ventral parapodial lobes are absent and pectinate setae have 20–30 teeth. Further differences are in the colour pattern, length of palpal styles, branchiae, anterior hooks, serration of limbate setae, and colour of jaws. Thus, the Iranian Gulf material does not represent *D. neapolitana* Delle Chiaje but a separate species. The available subspecific name *D. n. khargiana* is herewith elevated to specific rank and the species is redescribed as *Diopatra khargiana* Wesenberg-Lund, 1949. The largest of the four syntypes, measuring 30 mm (41 setigers) in length and 6 mm in width is herewith declared the lectotype, and the remaining three as paralectotypes.

Type material of *Diopatra bengalensis* Hartman, 1974 has been examined and found to agree with the above description. Some minor features mentioned in the original description of *D. bengalensis* that seem to differ are attributed to inaccuracies of the original description.

Many of the reports of *Diopatra neapolitana* from the Indo-Pacific region are probably referable to *D. khargiana*.

Distribution: *Diopatra khargiana* is here reported from the Gulf of Iran, Sea of Bengal and Andaman Sea, intertidal to 95 m deep, and is probably a common species of the Indo-Pacific region.

Diopatra semperi Grube, 1878
Figs. 4C–G, 5A–B

Diopatra Semperi Grube, 1878: 282 (new name for *D. luzonensis*). – Wiktor 1980: 275. – Hartwich 1993: 136.

Diopatra luzonensis Grube, 1878: 138, pl. 9, figs. 10, 10a–11.

Material examined: *Type material.* – Manila or Singapore, coll. Semper, date unknown (lectotype, ZMB F.1779). – Not ?Manila, Philippines, coll. Semper, date unknown (2 paralectotypes of *D. semperi* (= *D. claparedii* Grube, 1878: 140), MPW 271).

Diagnosis: Prostomium with short palps and antennae, ceratophores with 12–14 rings; moderately long peristomial cirri. Anterior parapodia with single postsetal lobes. Branchiae present over moderately long part of body. Modified parapodia with bidentate pseudo-compound hooks with short hoods. Limbate setae of median body region with smooth wings. Median region with 30–40 pectinate setae per parapodium, each with 20–30 teeth in weakly oblique combs. Subacicular hooks from setiger 18. Cutting plates of mandibles with median distal indentation; maxilla I with medially extended falcate arch.

Description: Complete lectotype measuring about 130 mm in length for about 175 setigers, and 5.0 mm in width. No pigmentation remaining.

Prostomium anteriorly rounded with short, subulate frontal lips. Ceratophores of palps and antennae with 12–14 proximal rings and a longer distal ring. Styles gradually tapering. Paired palps reaching to setiger 4–5; antennae about equal in length, reaching to setiger 9–11. Nuchal grooves well developed, forming 3/4 circles; peristomial cirri 1.5 times as long as peristomium, inserted subdistally on peristomium, lateral to antennae. Peristomium about same length as following segments.

Anterior parapodia with rounded presetal and subulate postsetal lobes. Presetal lobe present to setiger 5–6, postsetal lobe gradually reduced, but still cirriform at setiger 50, later knob-like, absent in posterior region. Dorsal cirri subulate, becoming posteriorly very slender; ventral cirri subulate on anterior 5 setigers. Spiralled branchiae from setiger 5, best developed on setigers 8–10 with 9–10 whorls, reaching to setiger 1 when anteriorly extended; individual filaments short (Fig. 4C). Number of filaments decreasing gradually after setiger 11, single filaments from setiger 58, absent from setiger 67.

Modified parapodia (setigers 1–4) with 1–2 slender simple setae, 2–3 large (Fig. 4D) and 2–3 slender, pseudocompound hooks (Fig. 4E) with short hoods (position of setae unclear due to interior decomposition of parapodia).

From setiger 5 limbate setae replacing hooks. Upper limbate setae initially with narrow wings, by setiger 40 wings wider and smooth (Fig. 4F); lower limbate setae cultriform, replaced by 2 bidentate hooded subacicular hooks from setiger

18. Pectinate setae with weakly oblique combs; setiger 40 with 30–40 pectinate setae with 20–30 teeth each (Fig. 4G).

Mandibles (Fig. 5A) with slender shafts and high cutting plates. Distal part of shafts darkly

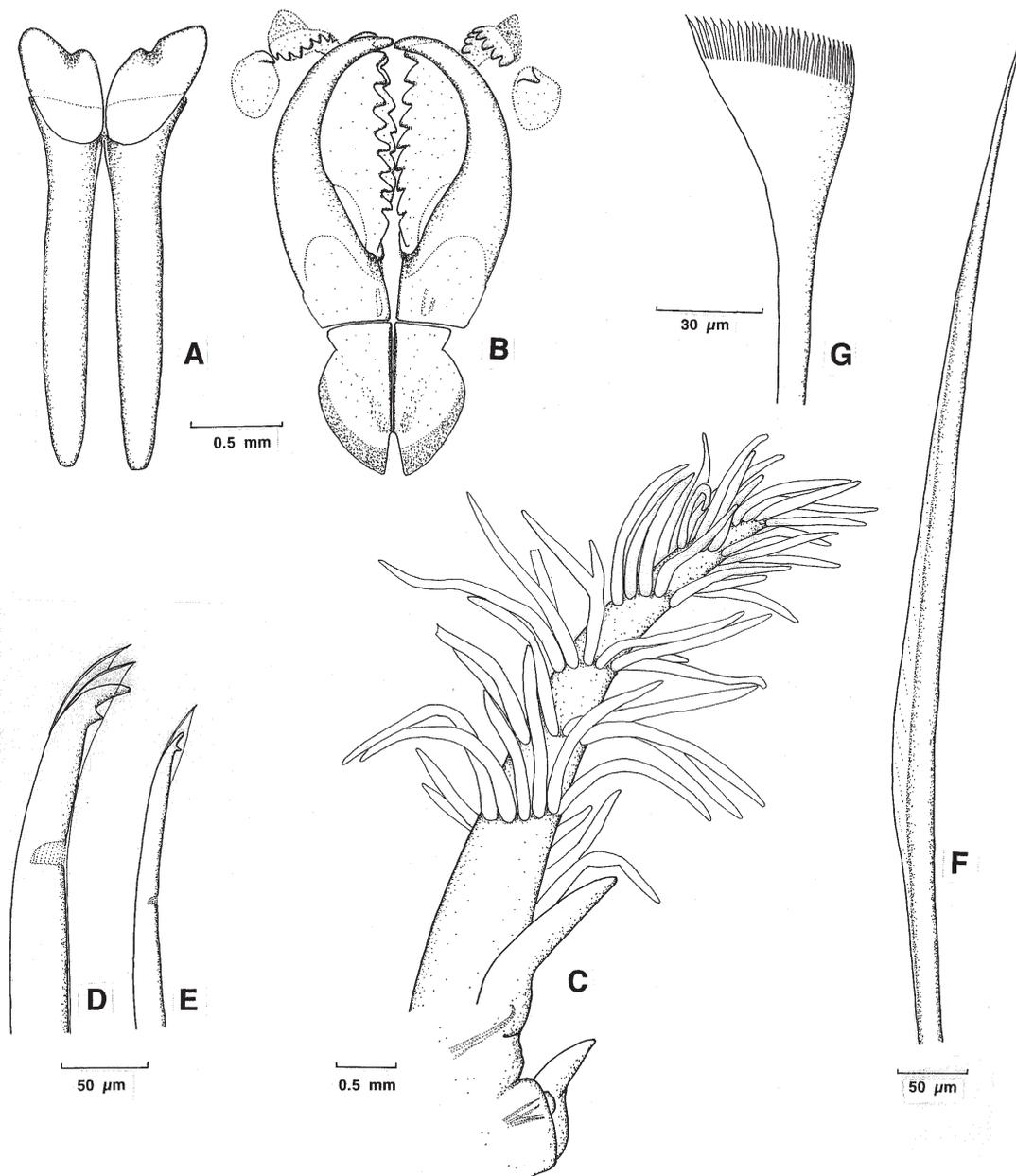


Figure 4 *Diopatra khargiana* (paralectotype ZMUC-POL-1132): A. Mandibles, ventral view; B. Maxillae, ventral view. – *Diopatra semperi* (lectotype ZMB F.1779): C. Parapodium 6, anterior view. D. Large pseudocompound hook from setiger 1. E. Slender pseudocompound hook from same. F. Upper limbate seta from setiger 40. G. Pectinate seta from same.

sclerotised, proximal part pale. Calcareous cutting plates with one central indentation each. Maxillae (Fig. 5B) moderately sclerotised; maxillary formula: Mx I = 1 + 1 (with medially extended arch); Mx II = 8 + 7; Mx III = 6 + 0; Mx IV = 6 + 7; Mx V = 1 + 1. Tube unknown.

Remarks: *Diopatra semperi* was originally described as *D. luzonensis* Grube, 1878: 138–140 from the Philippines. In an addendum to the same publication the name was changed to *D. semperi* Grube, 1878: 282 and the type locality to ‘probably’ Singapore (Grube 1878: vii). See ‘Remarks’ to *D. claparedii* above for detailed discussion.

Grube did not designate a holotype nor state how many specimens he had. He mentioned one complete specimen measuring about 133 mm for about 175 segments. Specimen F.1779, held by the Zoological Museum in Berlin, has been listed by Hartwich (1993) as a syntype, stated to consist of an anterior end and a parapodium. This syntype has been examined and found to be a complete specimen, agreeing in length, number of segments, and details of the description with the complete specimen mentioned by Grube. It appears to be the specimen drawn in figures 10, 10a, and 11 of plate IX and is herewith designated lectotype of *Diopatra semperi*. The lectotype is in reasonably good condition except for some interior decomposition.

Two specimens registered as syntypes of *D. semperi* (MPW 271) were examined and found to belong to *D. claparedii* instead. Since they were declared type specimens by Wiktor (1980: 275), they will have to remain as such and are here declared paralectotypes of *Diopatra semperi*.

Diopatra semperi resembles *D. amboinensis* as was already stated by Grube. However, it can be distinguished in having shorter peristomial cirri, having more pectinate setae in median parapodia (30–40 versus 10–20) with more teeth each (20–30 versus 15–20), and lacking the coarsely serrated proximal shelves on limbate setae.

Distribution: *Diopatra semperi* is only known from its original collection from the South China Sea. It is unclear whether the locality was Manila, Philippines or Singapore.

***Diopatra sugokai* Izuka, 1907**

Fig. 5C

Diopatra sugokai Izuka, 1907: 139, figs. 1–3. – Paxton 1998: 45, figs. 2K–L, figs 9–10, fig. 14, table I.

Material examined: *Thailand.* – Bang Tao Bay, Phuket Island, sandy beach, low tide, 15 Nov 1984 (2, PMBC 18503).

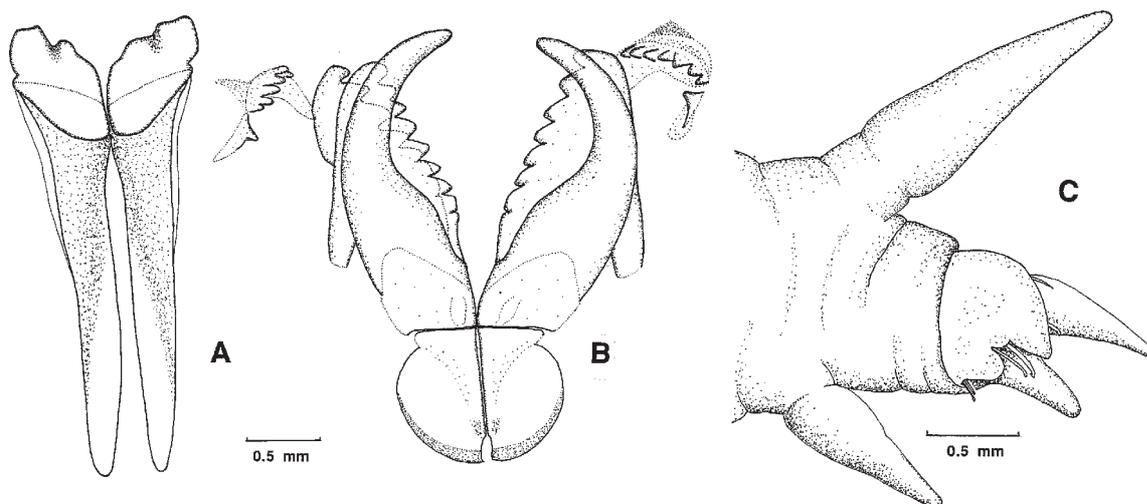


Figure 5 *Diopatra semperi* (lectotype ZMB F.1779): A. Mandibles, ventral view. B. Maxillae, ventral view. – *Diopatra sugokai* (from Paxton 1998: fig. 14A): C. Parapodium 1, anterior view.

Diagnosis: Prostomium with short palps (to setiger 2–5) and antennae (to setiger 4–12), ceratophores with 6–11 rings; moderately long peristomial cirri (1–2 times length of peristomium). Anterior parapodia (5–6 pairs) with double postsetal lobes (Fig. 4C). Branchiae present over long part of body (single filaments from setiger 40–77). Modified parapodia with bidentate simple and pseudocompound hooks with short hoods. Limbate setae of median body region (*e.g.*, setiger 40) with almost smooth wings. Median region with 10–20 pectinate setae per parapodium, each with 7–30 teeth of different width in weakly oblique combs. Subacicular hooks from setiger 14–24. Cutting plates of mandibles with median distal indentation; maxilla I with medially extended falcate arch.

Remarks: The two incomplete specimens measure 46 and 77 mm in length for 45 and 76 setigers respectively, 4.5 mm in width, and are representative of the species as redescribed by Paxton (1998).

Distribution: *Diopatra sugokai* is widely distributed in the Indo-Pacific region. It occurs in Malaysia, Thailand, China, Taiwan, Japan and probably also in Indonesia and Sri Lanka; intertidal to subtidal depths.

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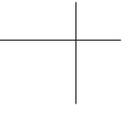
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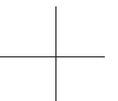
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