

**THE GLYCERIDAE AND GONIADIDAE (ANNELIDA: POLYCHAETA) OF
THE BIOSHELF PROJECT, ANDAMAN SEA, THAILAND****Markus Böggemann¹ and Danny Eibye-Jacobsen²**¹*University of Osnabrück, Osnabrück 49069, Germany (mboeggem@sng.uni-frankfurt.de)*²*Zoological Museum, Copenhagen 2100, Denmark (dejacobsen@zmuc.ku.dk)***ABSTRACT**

A total of 243 specimens of Glyceridae and 186 specimens of Goniadidae were collected during the Thai–Danish BIOSHELF Project in the Andaman Sea portion of Thai national waters in 1996 and 1997. Eleven species of Glyceridae were found, of which *Glycera macrobranchia* (Moore, 1911), *G. onomichiensis* Izuka, 1912, *G. posterobranchia* Hoagland, 1920 and *Hemipodia simplex* (Grube, 1857) are newly reported for the Indian Ocean; *Glycera brevicirris* Grube, 1870, *G. lapidum* Quatrefages, 1866 and *G. sphyrabrancha* Schmarda, 1861 are new reports for the Andaman Sea; *G. oxycephala* Ehlers, 1887 is new for Thailand. Twelve species of Goniadidae (ten named) were found, of which *Goniadides carolinae* Day, 1973 (sensu Gilbert 1984) and *Ophioglycera lyra* Granados-Barba and Solís-Weiss, 1997 are newly reported for the Indian Ocean. *Glycinde anuwati* n. sp., *Goniada apisiti* n. sp., *Goniada hexadentes* n. sp. and *Goniada amacrognatha* n. sp. are newly described. The last-mentioned species is unique among goniadids in lacking macrognaths on the proboscis. Scanning electron micrographs of the proboscival papillae and other proboscival organs are presented for ten species of goniadids. Keys are provided to the Glyceridae and Goniadidae that are known from the Andaman Sea.

INTRODUCTION

There is very little information in the literature on the Glyceridae and Goniadidae of the Andaman Sea. Prior to the Thai–Danish BIOSHELF Project local workers have had to rely on species lists, descriptions and illustrations provided in papers based on material from neighbouring regions in South and Southeast Asia (e.g., Day 1973a; Fauvel 1932, 1933, 1939, 1953; Gallardo 1968; Grube 1874, 1878; Hartman 1974; Hoagland 1920; Michaelsen 1892, Silva 1965; Southern 1921). A notable exception is the species list published by Phasuk (1992) on material collected during the Fifth Thai–Danish Expedition along the Andaman Sea coast of Thailand. This list provides no details, apart from a tabulation of the stations at which each species was collected, but much of Phasuk's original material is available for study at the Marine Biodiversity Unit of the Phuket Marine Biological Center (PMBC).

The Glyceridae and Goniadidae are slender, cylindrical polychaetes that can reach considerable sizes (probably up to 1 m long). They are widely distributed endopsammal benthic organisms and occur from intertidal to abyssal depths. The body is elongated, tapering at both ends and consists of numerous segments. Both families are easily recognized by their long, muscular, eversible proboscis and the pointed, usually annulated prostomium. The anteriormost annulus of the prostomium bears four appendages and the posteriormost annulus one pair of nuchal organs; in some species of the goniadids a subdistal and/or basal pair of subdermal eyes is present, whereas the glycerids have no eyes. The characteristic reddish colour and the four dark jaws with ailerons, arranged in a cross and situated terminally on the proboscis, separate the glycerids from the closely related goniadids with their more iridescent integument and a proboscis that bears a terminal ring of macro- and micrognaths and in several

genera also a lateral row of chevrons on each side (macrognaths may be absent, see *Goniada amacrognatha* n. sp.).

Glycerids and goniadids are generally considered to be carnivorous (Fauchald and Jumars 1979). Glycerids capture their prey with the four jaws situated at the end of the eversible proboscis, killing it by the injection of venom (Ockelmann and Vahl 1970; Manaranche, Thieffry and Israel 1980), whereas goniadids use their macro- and micrognaths to grasp their prey; chevrons, when present, probably aid in retention of the prey during swallowing. Most species form semi-permanent burrow systems in soft substrates (Ockelmann and Vahl 1970; Mattson 1981), but some species have been encountered living under rocks or crawling on algae (Fauchald and Jumars 1979).

The family Glyceridae was formally established by Grube (1850) as *Glycera*, including the two genera *Glycera* and *Goniada*. Kinberg (1865) pointed out the distinguishing characters between glycerids and goniadids and established the separate family Goniadidae (as Goniadea). The independence of these two families was controversial for a long time (Ehlers 1868; Fauvel 1923), until Hartman (1950) underlined the clear differences between them.

MATERIALS AND METHODS

Material was fixed in 10% formalin diluted with seawater and later transferred to 80% ethanol. Observations, drawings and measurements were made using a Leica MS 5 and a Leica MZ APO stereo microscope and a Zeiss Axioskop compound microscope. For SEM observations specimens were dehydrated via a graded ethanol and acetone series, critical-point dried using CO₂, mounted on aluminium stubs and subsequently sputter-coated with gold. Observations were performed with a JEOL JSM-840 scanning electron microscope.

The lists of examined material provided for each species include only specimens from BIOSHELF stations; the number of specimens from any given station and information on where they have been deposited follows in parentheses.

Other, non-BIOSHELF specimens that have been studied are listed in the Remarks sections as appropriate. The descriptions given below are based on the material from the BIOSHELF Project, *i.e.*, specimens from Thailand, unless otherwise stated. A more detailed list of the BIOSHELF stations is provided in Aungtonya and Eibye-Jacobsen (2002).

The following abbreviations are used for institutions: BMNH (Natural History Museum, London), HZM (Zoologisches Museum und Institut, Hamburg), MNHN (Muséum National d'Histoire Naturelle, Paris), MPUW (Muzeum Przyrodnicze, University of Wrocław Poland), PMBC (Phuket Marine Biological Center, Phuket, Thailand), SMF (Senckenberg Museum, Frankfurt), SMNH (Swedish Museum of Natural History, Stockholm), USNM (United States National Museum, Smithsonian Institution, Washington, DC), ZMB (Zoologisches Museum, Humboldt University, Berlin), ZMUC (Zoological Museum, Copenhagen) and ZSI (Zoological Survey of India, Calcutta).

SYSTEMATIC SECTION

Glyceridae Grube, 1850

Type genus: *Glycera* Savigny, 1818: 314, by original designation.

Diagnosis: Body with numerous segments, elongate, tapering at both ends. Segments bi- or triannulate. Prostomium conical, mostly pointed, distinctly annulated; anteriormost annulus with four appendages, anterior pair situated termino-laterally and posterior pair more dorso-laterally; posteriormost annulus with one pair of nuchal organs; eyes absent. Proboscis long, cylindrical to club-shaped, muscular, densely covered with numerous papillae bearing specialized structures on their posterior sides; tip of everted proboscis with four dark, hook-like curved jaws, each with a rod-like, more or less triangular or deeply incised supportive aileron. First two parapodia usually uniramous, consisting of neuropodia, ventral cirri and compound chaetae only; following parapodia uni- or biramous with dorsal and ventral cirri;

largest parapodia in mid-body region; in biramous parapodia notopodia and neuropodia indistinctly separated from each other; each parapodium with two prechaetal and one or two postchaetal lobes. Branchiae present or absent, blister-like to simple digitiform or branched, retractile in some species; located on different parts of parapodia. Noto- and neuropodia each with a single acicula; notopodia with simple capillaries, neuropodia usually with spinigerous compound chaetae only. Pygidium with a pair of slender anal cirri.

Remarks: The Glyceridae have recently been revised (Böggemann and Fiege 2001; Böggemann in press). For this reason, very few figures are provided of glycerids in the present paper. The ultrastructure of the proboscoidal papillae in five species of *Glycera* has recently been described by Böggemann, Fiege and Purschke (2000).

Recognized genera: *Glycera* Savigny, 1818; *Glycerella* Arwidsson, 1899; *Hemipodia* Kinberg, 1865.

Key to the species of Glyceridae

1. Median parapodia biramous with two prechaetal and one or two postchaetal lobes; ailerons with more or less triangular or deeply incised bases; notopodia with simple capillaries; branchiae present or absent (*Glycera*) 2
 - All parapodia uniramous, with one prechaetal and one postchaetal lobe; ailerons rod-like; notopodia absent; branchiae absent *Hemipodia simplex* (Grube, 1857)
2. Proboscoidal papillae without terminal fingernail structure 3
 - Proboscoidal papillae with terminal fingernail structure 9
3. One postchaetal lobe on all parapodia 4
 - Two postchaetal lobes, at least on parapodia of mid-body 6
4. In mid-body prechaetal lobes of about same length, or notopodial lobes longer; proboscoidal papillae and ailerons variable; branchiae present or absent 5
 - In mid-body notopodial prechaetal lobes distinctly shorter than neuropodial lobes; digitiform proboscoidal papillae with undulating ridge; ailerons with slight dent in pointed triangular bases; branchiae absent *Glycera lapidum* Quatrefages, 1866
5. Digitiform proboscoidal papillae without ridges; ailerons with deeply incised bases; simple digitiform branchiae present *Glycera sphyrabrancha* Schmarda, 1861
 - Conical proboscoidal papillae with 5–20 ridges; ailerons with slightly arched bases; branchiae absent *Glycera oxycephala* Ehlers, 1887
6. Ailerons with deeply incised bases; both postchaetal lobes short, rounded; branchiae absent; proboscoidal papillae with over 5 transverse ridges or without transverse ridges 7
 - Ailerons with interramal plate; parapodia of mid-body with slender triangular notopodial and distinctly shorter, rounded neuropodial postchaetal lobes; retractile branchiae present on anterior side of parapodia; conical proboscoidal papillae with 3 transverse ridges 8
7. Digitiform proboscoidal papillae with 6–20 transverse ridges *Glycera brevicirris* Grube, 1870
 - Digitiform proboscoidal papillae with longitudinal ridge only *Glycera tessellata* Grube, 1863 **

8. Branchiae simple, digitiform, retractile; ailerons with triangular bases; all biramous parapodia with two postchaetal lobes *Glycera nicobarica* Grube, 1868
 – Branchiae with 1–6 retractile, digitiform rami; ailerons with rounded triangular bases; in anterior parapodia only one, medially inserted, slender triangular postchaetal lobe
 *Glycera macintoshi* Grube, 1877 **
9. Parapodia of mid-body with two slender triangular postchaetal lobes of about same length; proboscoidal papillae with long stalk and some longitudinal ridges on nail 10
 – Parapodia of mid-body with slender triangular notopodial and shorter, more or less rounded neuropodial postchaetal lobes; proboscoidal papillae with stalk of variable length 11
10. Branchiae absent *Glycera onomichiensis* Izuka, 1912
 – Branchiae present, with 1–5 digitiform rami *Glycera cinnamomea* Grube, 1874
11. Median and posterior chaetigers with more or less rounded neuropodial postchaetal lobes; simple digitiform branchiae, situated termino-dorsally on parapodia; proboscoidal papillae of variable length; ailerons variable 12
 – Posterior chaetigers with slender, triangular neuropodial postchaetal lobes, as long as notopodial lobes; simple digitiform branchiae, situated medio-dorsally on parapodia; proboscoidal papillae with medium-length stalk; ailerons with pointed triangular bases
 *Glycera posterobranchia* Hoagland, 1920
12. All biramous parapodia with two postchaetal lobes; proboscoidal papillae of variable length; ailerons variable 13
 – Anterior parapodia with only one, medially inserted, slender triangular postchaetal lobe; proboscoidal papillae with short stalk; ailerons with triangular bases *Glycera macrobranchia* Moore, 1911
13. Proboscoidal papillae with long stalk 14
 – Proboscoidal papillae with medium-length or short stalk 15
14. Stalk without ridges; prostomium consisting of 9–11 rings; ailerons with pointed triangular bases *Glycera alba* (O.F. Müller, 1776)
 – Stalk with numerous transverse ridges; prostomium consisting of 16–21 rings; ailerons with triangular bases *Glycera natalensis* Day, 1957 *
15. Proboscoidal papillae with medium-length stalk; prostomium consisting of 19–28 rings; ailerons with pointed triangular bases *Glycera africana* Arwidsson, 1899 *
 – Proboscoidal papillae with short stalk; prostomium consisting of 12–15 rings; ailerons with triangular bases *Glycera tridactyla* Schmarda, 1861 **

* Species recorded from intertidal zone on Andaman coast of Thailand, but not in the BIOSHELF material; will be published separately.

** Species not found in BIOSHELF material, but known from neighbouring regions.

Glycera Savigny, 1818

Type species: *Glycera unicornis* Savigny, 1818: 315, by monotypy.

***Glycera alba* (O.F. Müller, 1776)**

Fig. 1A

Nereis alba O.F. Müller, 1776: 217.

Glycera alba. – Fauvel 1932: 126; ?1939: 341; ?1953: 292, fig. 149i–m. – Wesenberg-Lund 1949: 299. – Phasuk 1992: 82.

Glycera tessellata. – Phasuk 1992: 82, part. – [Not Grube, 1863: 41, pl. 4, figs. 4, 4a.]

Material examined: st. A-1/BC, 9°30' N, 97°57' E, 43 m (1, PMBC 18287); st. C-1/BC, 9°00' N, 98°03' E, 40 m (1, PMBC 18288); st. C-1/OS, 9°01' N, 98°03' E, 39 m (1, PMBC 18289); st. C-3/OS, 9°00' N, 97°43' E, 80 m (1, PMBC 18290); st. E-1/BC, 8°30' N, 98°06' E, 42 m (1, PMBC 18291); st. E-1/OS, 8°30' N, 98°06' E, 41 m (1, ZMUC-POL-1017); st. E-2/BC, 8°30' N, 98°00' E, 63 m (1, PMBC 18292); st. E-2/OS, 8°31' N, 98°00' E, 60 m (2, PMBC 18293); st. H-1/OS, 7°45' N, 98°16' E, 31 m (16, ZMUC-POL-1018); st. I-1/OS, 7°30' N, 98°57' E, 38 m (3, PMBC 18294); st. I-3/BC, 7°30' N, 98°10' E, 79 m (2, PMBC 18295); st. J-2/OS, 7°15' N, 98°51' E, 61 m (7, SMF 10396); st. K-20m/OS, 7°00' N, 99°24' E, 22 m (24, ZMUC-POL-1019; 1 on SEM-stub, ZMUC-POL-

1021); st. K-3/OS, 6°59' N, 98°42' E, 82 m (fragment, PMBC 18296); st. L-1/BC, 6°45' N, 99°21' E, 38 m (1, PMBC 18297); st. L-3/BC, 6°45' N, 98°45' E, 83 m (1, ZMUC-POL-1022); st. RN-3/BC, 7°30' N, 98°17' E, 72 m (1, PMBC 18298); st. RY-2/BC, 7°39' N, 98°23' E, 45 m (1, PMBC 18299); st. PB-4/BC, 7°52' N, 98°41' E, 32 m (1, PMBC 18300); st. PB-7/BC, 7°45' N, 98°41' E, 29 m (1, PMBC 18301).

Description: Body up to 25 mm long with up to 84 segments. Mid-body segments biannulate. Conical prostomium consisting of about 9–11 rings. Proboscis with three types of papillae: 1. numerous papillae with terminal fingernail structure with long stalk and some longitudinal ridges on nail (Fig. 1A); 2. less numerous digitiform papillae with straight, median longitudinal ridge; 3. isolated, broader, oval to globular papillae without ridges. Ailerons with pointed triangular base. First two parapodia uniramous, following parapodia biramous. Parapodia of mid-body with two slender triangular to digitiform prechaetal lobes of about same length. Two shorter postchaetal lobes: slender triangular notopodial and shorter, more or less rounded neuropodial lobe. Dorsal cirri from 3rd parapodium, conical to oval, inserted on body wall slightly above parapodial base. Ventral cirri slender, triangular to digitiform, about as long as neuropodial postchaetal lobe; in posterior parapodia slender and elongated; in last parapodia about as long as neuropodial prechaetal

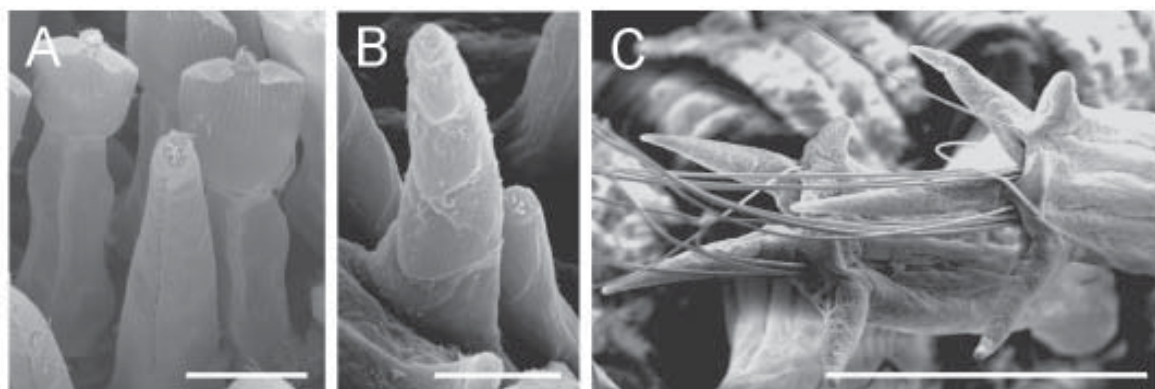


Figure 1 A. *Glycera alba*, proboscis papillae. B. *Glycera nicobarica*, proboscis papilla. C. *Glycera sphyrabrancha*, 2 parapodia from posterior region of body, posterior view. – SEM micrographs. ZMUC-POL-1021 (A), ZMUC-POL-1030 (B) and ZMUC-POL-1044 (C). Scales = 10 μ m (A, B) and 0.5 mm (C).

lobe; situated medio-ventrally on parapodia. Branchiae non-retractile, simple, digitiform; from about parapodium 17–23 to near posterior end; situated termino-dorsally on parapodia; best developed in mid-body region, about as long as prechaetal lobes.

Remarks: Branchiae may be absent or not fully developed in juvenile specimens. Specimens from the Andaman Sea show no morphological differences, including details of the proboscoidal papillae, from European animals (Fiege and Böggemann 1997; Böggemann in press). Animals from the BIOSHELF Project were compared to specimens reported by Wesenberg-Lund (1949) from the Persian Gulf (N of Bushire, N of Qais, Strait of Hormus, Gulf of Oman) and are considered to be identical.

Glycera alba has previously been reported from the Andaman Sea (Phasuk 1992). The identity of one of these samples (st. 1035, PMBC 12646) was confirmed during this study. Furthermore, one of the 6 lots reported as *G. tessellata* by Phasuk (st. 1007, PMBC 12545) consisted of one specimen of *G. alba*; thus, among other characters, the proboscoidal papillae bear a terminal nail.

Distribution: Norwegian Sea, North Sea, Atlantic coasts of Europe, Mediterranean Sea, Black Sea, Indian Ocean around Madagascar, Andaman Sea, E and S China Sea; NW Pacific coasts; 9–199 m.

Glycera brevicirris Grube, 1870

Glycera brevicirris Grube, 1870: 61.

Glycera lancadivae. – Michaelsen 1892: 12, figs. 11–13. – Silva 1965: 549, fig. 8. – [Not Schmarda, 1861: 95, textfigs. a–c, k (= nomen dubium).]

Glycera edwardsi Gravier, 1902: pl. 10, figs. 160–162; 1904: 473; 1906: 139, textfigs. 293–298, pl. 10, figs. 160–162.

Glycera tessellata. – ?Fauvel 1932: 124; ?1953: 291, fig. 152a–c. – Wesenberg-Lund 1949: 298. – ?Gallardo 1968: 70, pl. 21, figs. 1–6. – [Not Grube, 1863: 41, pl. 4, figs. 4, 4a.]

Glycera chirori. – ?Phasuk 1992: 82, part. – [Not Izuka, 1912: 245, pl. 2, fig. 8, pl. 24, fig. 13 (= *G. nicobarica* Grube, 1868).]

Material examined: st. L-2/BC, 6°46' N, 99°04' E, 59 m (1, PMBC 18302); st. L-2/OS, 6°44' N, 99°05' E, 56 m (1, PMBC 18303); st. L-3/OS, 6°46' N, 98°45' E, 83 m (1, PMBC 18304); st. RY-1/BC, 7°36' N, 98°19' E, 55 m (2, ZMUC-POL-1023); st. PB-1/BC, 8°00' N, 98°29' E, 19 m (1, ZMUC-POL-1024); st. PB-6/BC, 7°45' N, 98°32' E, 30 m (1, PMBC 18305).

Description: Body up to 64 mm long with up to 143 segments. Mid-body segments biannulate. Conical prostomium consisting of about 12–13 rings. Proboscis with two types of papillae: 1. numerous digitiform papillae with about 6–20 ridges; ridges U-shaped basally and V-shaped apically; 2. isolated, slightly shorter and broader, conical papillae with more or less straight, median longitudinal ridge. Ailerons with deeply incised base. First two parapodia uniramous, following parapodia biramous. Parapodia of mid-body with two slender triangular to digitiform prechaetal lobes: neuropodial lobe usually slightly longer and broader than notopodial lobe. Two shorter, rounded, postchaetal lobes. Dorsal cirri from 3rd parapodium, conical to oval, inserted on body wall slightly above parapodial base. Ventral cirri slender triangular to digitiform, about as long as postchaetal lobes; in posterior parapodia slender and elongated; in last parapodia about as long as neuropodial prechaetal lobe; situated medio-ventrally on parapodia. Branchiae absent.

Remarks: Regarding the report of *Glycera chirori* Izuka, 1912 from the Andaman Sea (Phasuk 1992), see Remarks under *G. nicobarica* Grube, 1868.

Distribution: NW and NE Atlantic, Gulf of Mexico, Caribbean Sea, Red Sea, Indian Ocean, Andaman Sea, Indo-Pacific, Central Pacific Basin, E Pacific coasts; intertidal to 1118 m. New record for the Andaman Sea.

Glycera cinnamomea Grube, 1874

Glycera cinnamomea Grube, 1874: 327.

Glycera prashadi Fauvel, 1932: 126, pl. 5, figs. 1–8; 1939: 341; 1953: 294, fig. 150a–h. – Wesenberg-Lund 1949: 299.

Glycera manorae Fauvel, 1932: 130, pl. 5, figs. 9–17; 1953: 298, fig. 154a–i.

Glycera cirrata. – Fauvel 1932: 129, textfig. 18a–e; 1953: 297, fig. 153a–e. – [Not Grube, 1857: 176 (= *G. americana* Leidy, 1855 + *G. brevicirris* Grube, 1870).]

Glycera subaenea. – ?Monro 1937: 284. – [Not Grube, 1878: 184, pl. 8, fig. 8 (= *G. macintoshi* Grube, 1877 + *G. onomichiensis* Izuka, 1912).]

Material examined: st. C-2/OS, 9°00' N, 97°53' E, 64 m (1, ZMUC-POL-1025); st. E-1/BC, 8°30' N, 98°06' E, 42 m (2 fragments, PMBC 18306); st. J-2/OS, 7°15' N, 98°51' E, 61 m (4 fragments, PMBC 18307); st. J-3/BC, 7°15' N, 98°34' E, 79 m (1, ZMUC-POL-1026); st. PB-3/BC, 7°51' N, 98°32' E, 22 m (1, PMBC 18308).

Description: Body at least 103 mm long with at least 207 segments. Mid-body segments biannulate. Conical prostomium consisting of about 10–12 rings. Proboscis with three types of papillae: 1. numerous papillae with terminal fingernail structure with long stalk and some longitudinal ridges on nail; 2. less numerous digitiform papillae with straight, median longitudinal ridge; 3. isolated, broader, oval to globular papillae without ridges. Ailerons with pointed triangular base. First two parapodia uniramous, following parapodia biramous. Parapodia of mid-body with two slender triangular to digitiform prechaetal lobes of about same length. Two shorter, slender triangular postchaetal lobes of about same length. Dorsal cirri from 3rd parapodium, conical to oval, inserted on body wall slightly above parapodial base. Ventral cirri slender triangular to digitiform, slightly shorter than postchaetal lobes; in posterior parapodia slender and elongated; in last parapodia about as long as neuropodial prechaetal lobe; situated medio-

ventrally on parapodia. Branchiae non-retractile, with 1–5 digitiform rami; from about parapodium 21–32 to near posterior end; situated dorsally on parapodial bases; best developed in mid-body region, about as long as prechaetal lobes.

Remarks: This species (as *Glycera prashadi* Fauvel, 1932) has previously been reported from the Andaman Sea (Phasuk 1992). However, this report was based on a specimen (st. 1024, PMBC 13618) that, despite being over 25 mm long, shows no signs of having gills; it is here referred to *G. onomichiensis* Izuka, 1912.

Distribution: Indian Ocean, Red Sea, Persian Gulf, Andaman Sea, E and S China Sea, Indo-Pacific; intertidal to 1427 m.

Glycera lapidum Quatrefages, 1866

Glycera lapidum Quatrefages, 1866: 187.

Material examined: st. A-4/BC, 9°30' N, 97°28' E, 116 m (1, ZMUC-POL-1027); st. G-5/BC, 8°00' N, 97°48' E, 233 m (1, PMBC 18309).

Description: Body at least 10 mm long with at least 56 segments. Mid-body segments more or less distinctly triannulate. Conical prostomium consisting of about 10–12 rings. Proboscis with two types of papillae: 1. numerous digitiform papillae with undulating ridge; 2. isolated, shorter and broader, conical to oval papillae without ridges. Ailerons with slight dent in pointed triangular base. First two parapodia uniramous, following parapodia biramous. Parapodia of mid-body with two slender triangular to digitiform prechaetal lobes: neuropodial lobe usually more than twice as long as notopodial lobe. One shorter, rounded postchaetal lobe. Dorsal cirri from 3rd parapodium, oval to globular; inserted on body wall far above parapodial base, most clearly on anterior part of body. Ventral cirri slender triangular to digitiform, about as long as postchaetal lobe; in posterior parapodia slender and elongated; in last parapodia about as long as neuropodial prechaetal lobe; situated near parapodial base. Branchiae absent.

Remarks: The specimens found in the BIOSHELF material were both juveniles, but they display the characteristic morphology of the proboscicial papillae and the parapodial lobes.

Distribution: Mainly in temperate zones, sometimes in tropical seas; intertidal to 3947 m. New record for the Andaman Sea.

Glycera macrobranchia Moore, 1911

Glycera alba macrobranchia Moore, 1911: 301.
Glycera macrobranchia. – Böttgermann and Fiege 2001: 43.

Material examined: st. G-1/BC, 8°00' N, 98°14' E, 42 m (1, ZMUC-POL-1028); st. L-1/TD, 6°45' N, 99°21' E, 38 m (fragment, PMBC 18310).

Description: Body at least 40 mm long with at least 99 segments. Mid-body segments biannulate. Conical prostomium consisting of about 13 rings. Proboscis with three types of papillae: 1. numerous papillae with terminal fingernail structure with short stalk and some longitudinal ridges on nail; 2. less numerous conical papillae with straight, median, longitudinal ridge; 3. isolated, broader, oval to globular papillae without ridges. Ailerons with triangular base. First two parapodia uniramous, following parapodia biramous. Parapodia of mid-body with two slender triangular to digitiform prechaetal lobes of about same length. Parapodia on anterior chaetigers with only one, medially inserted, slender triangular lobe; following parapodia with slender triangular notopodial and shorter, rounded neuropodial lobe. Dorsal cirri from 3rd parapodium, conical to oval, inserted on body wall slightly above parapodial base. Ventral cirri slender triangular to digitiform, usually slightly shorter than notopodial postchaetal lobe; in posterior parapodia slender and elongated; in last parapodia about as long as neuropodial prechaetal lobe; situated medio-ventrally on parapodia. Branchiae non-retractile, simple, digitiform; from about parapodium 23 to near posterior end; situated termino-dorsally on parapodia; best developed in mid-body region, extending far beyond prechaetal lobes.

Distribution: NW and NE coasts of Pacific Ocean, Andaman Sea; intertidal to 73 m. New record for the Indian Ocean.

Glycera nicobarica Grube, 1868

Fig. 1B

Glycera nicobarica Grube, 1868: 24, pl. 3, figs. 1, 1a–b. – Gallardo 1968: 69, pl. 18, figs. 1–7.
Glycera decipiens Marenzeller, 1879: 140, pl. 6, figs. 3, 3a. – Day 1973a: 345, fig. 3a–e.
Glycera chirori Izuka, 1912: 245, pl. 2, fig. 8, pl. 24, fig. 13. – Phasuk 1992: 82, part.
Glycera rouxii. – ?Fauvel 1932: 128; ?1933: 43; ?1939: 341; ?1953: 297, fig. 149a–d. – ?Monro 1937: 284. – Wesenberg-Lund 1949: 300. – [Not Audouin and Milne Edwards, 1833: 264 (= *G. unicornis* Savigny, 1818).]
Glycera gigantea. – ?Phasuk 1992: 82, part. – [Not Quatrefages, 1866: 183 (= *G. fallax* Quatrefages, 1850).]
Glycera tessellata. – Phasuk 1992: 82, part. – [Not Grube, 1863: 41, pl. 4, figs. 4, 4a.]

Material examined: st. A-1/BC, 9°30' N, 97°57' E, 43 m (1, PMBC 18311); st. C-1/BC, 9°00' N, 98°03' E, 40 m (1, PMBC 18312); st. C-2/BC, 9°00' N, 97°53' E, 65 m (2, ZMUC-POL-1029; 1 on SEM-stub, ZMUC-POL-1030); st. C-2/OS, 9°00' N, 97°53' E, 64 m (7, PMBC 18313); st. C-3/BC, 9°00' N, 97°43' E, 79 m (2, PMBC 18314); st. E-20m/BC, 8°30' N, 98°12' E, 21 m (1, PMBC 18315); st. E-20m/OS, 8°30' N, 98°12' E, 20 m (1, PMBC 18316); st. E-1/BC, 8°30' N, 98°06' E, 42 m (5, SMF 10397); st. E-2/BC, 8°30' N, 98°00' E, 63 m (1, PMBC 18317); st. E-3/OS, 8°30' N, 97°46' E, 81 m (1, PMBC 18318); st. G-1/BC, 8°00' N, 98°14' E, 42 m (7, ZMUC-POL-1031); st. G-1/OS, 8°00' N, 98°14' E, 43 m (1, PMBC 18319); st. G-2/BC, 8°00' N, 98°10' E, 63 m (4, PMBC 18320); st. G-2/OS, 8°00' N, 98°10' E, 63 m (2, PMBC 18321); st. H-1/OS, 7°45' N, 98°16' E, 31 m (11, ZMUC-POL-1032); st. H-2/BC, 7°45' N, 98°15' E, 59 m (4, PMBC 18322); st. H-2/OS, 7°45' N, 98°15' E, 56 m (3, PMBC 18323); st. I-20m/BC, 7°30' N, 99°01' E, 21 m (2, PMBC 18324); st. I-20m/OS, 7°30' N, 99°01' E, 21 m (5, PMBC 18325); st. I-1/BC, 7°30' N, 98°57' E,

38 m (1, PMBC 18326); st. I-1/OS, 7°30' N, 98°57' E, 38 m (16, ZMUC-POL-1033; 1 on SEM-stub, ZMUC-POL-1034); st. I-2/BC, 7°30' N, 98°30' E, 59 m (1, PMBC 18327); st. I-2/OS, 7°30' N, 98°29' E, 60 m (3, PMBC 18328); st. J-1/BC, 7°15' N, 99°03' E, 43 m (5, ZMUC-POL-1035); st. J-2/BC, 7°15' N, 98°50' E, 62 m (1, PMBC 18329); st. J-2/OS, 7°15' N, 98°51' E, 61 m (20, PMBC 18330); st. J-3/OS, 7°15' N, 98°36' E, 79 m (1, PMBC 18331); st. K-20m/BC, 7°00' N, 99°24' E, 21 m (2, ZMUC-POL-1036); st. K-1/BC, 7°00' N, 99°16' E, 43 m (1, PMBC 18332); st. K-2/BC, 7°00' N, 98°59' E, 63 m (1, PMBC 18333); st. L-1/BC, 6°45' N, 99°21' E, 38 m (7, ZMUC-POL-1037); st. L-2/OS, 6°44' N, 99°05' E, 56 m (13, PMBC 18334); st. RN-1/OS, 7°30' N, 98°22' E, 64 m (1, SMF 10398); st. RN-3/BC, 7°30' N, 98°17' E, 72 m (1, PMBC 18335); st. PB-1/BC, 8°00' N, 98°29' E, 19 m (3, PMBC 18336); st. PB-1/OS, 8°00' N, 98°29' E, 17 m (1, PMBC 18337); st. PB-3/BC, 7°51' N, 98°32' E, 22 m (1, PMBC 18338); st. PB-7/BC, 7°45' N, 98°41' E, 29 m (1, ZMUC-POL-1038); st. PB-8/BC, 7°45' N, 98°52' E, 19 m (fragment, PMBC 18339).

Description: Body at least 58 mm long with at least 166 segments. Mid-body segments biannulate, in smaller specimens sometimes triannulate. Conical prostomium consisting of about 9–11 rings. Proboscis with two types of papillae: 1. numerous conical papillae with 3 U-shaped ridges (Fig. 1B); 2. isolated, broader, oval to globular papillae without ridges. Ailerons with triangular base. First two parapodia uniramous, following parapodia biramous. Parapodia of mid-body with two slender triangular to digitiform prechaetal lobes of about same length. Two shorter postchaetal lobes: slender triangular notopodial and shorter, rounded neuropodial postchaetal lobe. Dorsal cirri from 2nd parapodium, conical to oval, inserted on body wall slightly above parapodial base. Ventral cirri slender triangular to digitiform, about as long as neuropodial postchaetal lobe; in posterior parapodia slender and elongated; in last parapodia about as long as neuropodial prechaetal lobe; situated termino-ventrally on parapodia. Branchiae retractile, simple, digitiform; from about

parapodium 18–30 to near posterior end; situated medially on anterior side of parapodia; best developed in mid-body region, extending beyond prechaetal lobes.

Remarks: Phasuk (1992) reported *Glycera chirori* Izuka, 1912 from the Andaman Sea. Two of the original 6 lots were available for study; one of them (st. 1116, PMBC 13609) contains a typical specimen of *G. nicobarica*, whereas the other one (st. 1010, PMBC 13610) contains a poorly preserved specimen of *Glycera*, possibly *G. brevicirris* Grube, 1870, as the ailerons are deeply incised, without an interramal plate.

Phasuk (1992) also reported *Glycera gigantea* Quatrefages, 1866 from the Andaman Sea; 4 of the original 6 lots were studied and two of these (st. 1020, PMBC 12597 and st. 1027, PMBC 12599) each contain one juvenile specimen in which the dorsal postchaetal lobe is elongate and conical rather than short and rounded as in *G. gigantea* (= *G. fallax* Quatrefages, 1850). These specimens are here referred with doubt to *G. nicobarica*. One of the other lots contains a specimen of *G. onomichiensis* Izuka, 1912 (*q.v.*) and the final lot (st. 1006, PMBC 13612) contains a polynoid polychaete, obviously the result of a sorting error.

Among the 6 lots of *Glycera tessellata* Grube, 1863 reported from the Andaman Sea by Phasuk (1992), one of them (st. 1023, PMBC 12542) contains a specimen of *G. nicobarica*.

Distribution: Indian Ocean, Andaman Sea, Indo-Pacific, E and S China Sea, Japan; intertidal to 143 m.

Glycera onomichiensis Izuka, 1912

Glycera onomichiensis Izuka, 1912: 244, pl. 24, figs. 10–12. – Fauvel 1933: 44. – Gallardo 1968: 69, pl. 19, figs. 6–9, pl. 20, figs. 1–2.

Glycera gigantea. – Phasuk 1992: 82, part. – [Not Quatrefages, 1866: 183 (= *G. fallax* Quatrefages, 1850).]

Glycera prashadi. – Phasuk 1992: 82. – [Not Fauvel, 1932: 126, pl. 5, figs. 1–8 (= *G. cinnamomea* Grube, 1874).]

Material examined: st. E-20m/OS, 8°30' N, 98°12' E, 20 m (1, PMBC 18340); st. E-1/BC, 8°30' N, 98°06' E, 42 m (1, ZMUC-POL-1039); st. G-3/BC, 8°00' N, 97°54' E, 76 m (1, PMBC 18341); st. H-1/OS, 7°45' N, 98°16' E, 31 m (1, PMBC 18342); st. H-3/BC, 7°45' N, 97°58' E, 70 m (1, ZMUC-POL-1040); st. K-4/BC, 7°00' N, 98°21' E, 105 m (1, PMBC 18343).

Description: Body at least 33 mm long with at least 100 segments. Mid-body segments biannulate. Conical prostomium consisting of about 11–13 rings. Proboscis with three types of papillae: 1. numerous papillae with terminal fingernail structure with long stalk and some longitudinal ridges on nail; 2. less numerous digitiform papillae with straight, median, longitudinal ridge; 3. isolated, broader, oval to globular papillae without ridges. Ailerons with pointed triangular base. First two parapodia uniramous, following parapodia biramous. Parapodia of mid-body with two slender triangular to digitiform prechaetal lobes of about same length; notopodial lobe usually slightly broader than neuropodial lobe. Two shorter, slender triangular postchaetal lobes of about same length. Dorsal cirri from 3rd parapodium, conical to oval, inserted on body wall slightly above parapodial base. Ventral cirri slender triangular to digitiform, slightly shorter than postchaetal lobes; in posterior parapodia slender and elongated; in last parapodia about as long as neuropodial prechaetal lobe; situated medio-ventrally on parapodia. Branchiae absent.

Remarks: *Glycera prashadi* Fauvel, 1932 was reported from the Andaman Sea by Phasuk (1992); however, the specimen in question (st. 1024, PMBC 13618) is rather large, over 25 mm long, but shows no signs of gills and is here referred to *G. onomichiensis*.

Phasuk (1992) also reported *Glycera gigantea* Quatrefages, 1866 from the Andaman Sea; of the original 6 lots four were available for study and one of these (st. 1006, PMBC 12598) contains one specimen of *G. onomichiensis*.

Distribution: W Pacific, Andaman Sea; intertidal to 301 m. New record for the Indian Ocean.

***Glycera oxycephala* Ehlers, 1887**

Glycera oxycephala Ehlers, 1887: 121, pl. 41, figs. 7–11.

Glycera capitata var. *benguellana* Augener, 1931: 303, fig. 9a–b. – Mohammad 1973: 29.

Glycera lancadivae. – Fauvel 1932: 125; 1953: 291, figs. 147g–h. – Wesenberg-Lund 1949: 298. – [Not Schmarda, 1861: 95, textfigs. a–c, k (= nomen dubium).]

Glycera ? capitata. – Gallardo 1968: 68, pl. 19, figs. 1–5. – [Not Örsted, 1842: 123.]

Glycera tessellata. – Phasuk 1992: 82, part. – [Not Grube, 1863: 41, pl. 4, figs. 4, 4a.]

Material examined: st. A-4/BC, 9°30' N, 97°28' E, 116 m (1, PMBC 18344); st. E-20m/OS, 8°30' N, 98°12' E, 20 m (4, ZMUC-POL-1041); st. E-4/BC, 8°30' N, 97°33' E, 74 m (1, PMBC 18345).

Description: Body at least 40 mm long with at least 96 segments. Anterior segments biannulate; mid-body segments triannulate. Long, conical prostomium consisting of about 20–28 rings. Proboscis with two types of papillae: 1. numerous conical papillae with 5–20 ridges; 2. isolated, broader, oval to globular papillae with 4–11 ridges; ridges U-shaped basally and V-shaped apically. Ailerons with slightly arched base. In largest specimen only first two parapodia reduced, otherwise up to 13 parapodia uniramous; following parapodia biramous. Parapodia of mid-body with two slender triangular to digitiform prechaetal lobes of about same length or sometimes with neuropodial lobe slightly longer and broader than notopodial lobe. One shorter, rounded postchaetal lobe. Dorsal cirri from 3rd parapodium, oval to globular, inserted near parapodial base. Ventral cirri slender triangular to digitiform, about as long as postchaetal lobe; in posterior parapodia slender and elongated; in last parapodia about as long as neuropodial prechaetal lobe; situated near parapodial base. Branchiae absent.

Remarks: The number of anterior uniramous parapodia with only compound chaetae and one acicula seems to be more or less dependent on the size of the specimens.

Phasuk (1992) reported *Glycera tessellata* Grube, 1863 from the Andaman Sea. Material from 5 of the 6 stations involved was available for study and the lots from three of them contain specimens of *G. oxycephala* (st. 1006, PMBC 12544; st. 1008, PMBC 12543 and PMBC 13617; st. 1019, PMBC 12541). In contrast to *G. tessellata*, these animals have ailerons with interramal plates, conical proboscoidal papillae with numerous transverse ridges, only one large, rounded postchaetal lobe on the parapodia and, most significantly, a very elongate prostomium.

Distribution: In temperate zones and tropical seas; intertidal to 2951 m. New record for Thailand.

Glycera posterobranchia Hoagland, 1920

Glycera posterobranchia Hoagland, 1920: 620, pl. 51, figs. 3–8. – Gallardo 1968: 70, pl. 20, figs. 3–9.

Glycera alba. – Gallardo 1968: 68, pl. 17, figs. 1–5. – [Not O.F. Müller, 1776: 217.]

Material examined: st. G-2/OS, 8°00' N, 98°10' E, 63 m (2, PMBC 18346); st. L-2/OS, 6°44' N, 99°05' E, 56 m (1, PMBC 18347); st. PB-2/BC, 8°00' N, 98°39' E, 17 m (1, ZMUC-POL-1042).

Description: Body at least 34 mm long with at least 124 segments. Mid-body segments biannulate. Conical prostomium consisting of about 10 rings. Proboscis with three types of papillae: 1. numerous papillae with terminal fingernail structure with medium-length stalk and some longitudinal ridges on nail; 2. less numerous, slightly shorter conical papillae with straight, median, longitudinal ridge; 3. isolated, broader, oval to globular papillae without ridges. Ailerons with pointed triangular base. First two parapodia uniramous, following parapodia biramous. Parapodia of mid-body with two slender triangular to digitiform prechaetal lobes of about same length. Two shorter postchaetal lobes; notopodial lobe slender triangular, distinctly longer than rounded neuropodial lobe; in posterior parapodia neuropodial lobe as long as notopodial lobe, both lobes slender triangular. Dorsal cirri from 3rd parapodium, conical to oval, inserted on body wall

slightly above parapodial base. Ventral cirri slender triangular to digitiform, about as long as notopodial postchaetal lobe; in posterior parapodia slender and elongated; in last parapodia about as long as neuropodial prechaetal lobe; situated termino-ventrally on parapodia. Branchiae non-retractile, simple, digitiform, from about parapodium 24 to near posterior end; situated medio-dorsally on parapodia; best developed in mid-body region, extending beyond prechaetal lobes.

Distribution: S China Sea, Vietnam, Andaman Sea; 5–196 m. New record for the Indian Ocean.

Glycera sphyrabrancha Schmarda, 1861

Fig. 1C

Glycera sphyrabrancha Schmarda, 1861: 96, pl. 30, fig. 240, textfigs. a–c.

Glycera longipinnis Grube, 1878: 182, pl. 8, fig. 9. – Fauvel 1932: 125, pl. 4, figs. 11–14; 1953: 291, fig. 148a–d.

Glycera sagittariae. – ?Fauvel 1932: 127, textfig. 17a–d; ?1953: 295, fig. 147i, 151a–d. – [Not McIntosh, 1885: 346, pl. 42, fig. 8, pl. 22A, fig. 10.]

Material examined: st. K-20m/BC, 7°00' N, 99°24' E, 21 m (2 fragments, ZMUC-POL-1043; 1 fragment on SEM-stub, ZMUC-POL-1044).

Description: Body up to 194 mm long with up to 390 segments. Mid-body segments biannulate. Conical prostomium consisting of about 11–13 rings. Proboscis with two types of papillae: 1. numerous digitiform papillae without ridges; 2. isolated shorter and broader, oval to globular papillae without ridges. Ailerons with deeply incised base. First two parapodia uniramous, following parapodia biramous. Parapodia of mid-body with two slender triangular to digitiform prechaetal lobes; neuropodial lobe usually slightly longer than notopodial lobe. One shorter, rounded postchaetal lobe. Dorsal cirri from 3rd parapodium, conical to oval, inserted on body wall slightly above parapodial base. Ventral cirri slender triangular to digitiform; in anterior parapodia about as long as postchaetal lobe; in mid-body distinctly longer and wider; in posterior parapodia slender; in last

parapodia about as long as neuropodial prechaetal lobe (Fig. 1C); situated termino-ventrally on parapodia. Branchiae non-retractile, simple; from about parapodium 14 to near posterior end, at first as a slight bulge, becoming digitiform from about parapodium 25–45; situated termino-dorsally on parapodia; best developed in mid-body region, extending far beyond prechaetal lobes.

Remarks: The above description is based on other specimens because only fragments are present in the BIOSHELF material. These fragments could be referred to *G. sphyrabrancha* on the basis of the unique morphology of the posterior parapodia.

Distribution: Mainly in tropical seas; intertidal to 250 m. New record for the Andaman Sea.

Hemipodia Kinberg, 1865

Hemipodia Kinberg, 1865: 245.

Hemipodus Quatrefages, 1866: 194.

Type species: *Glycera simplex* Grube, 1857: 177, by subsequent designation (Hartman 1950: 79).

Hemipodia simplex (Grube, 1857)

Glycera simplex Grube, 1857: 177.

Hemipodus yenourensis. – Fauvel 1933: 45. – [Not Izuka, 1912: 250, pl. 23, figs. 14–15.]

Material examined: st. E-20m/BC, 8°30' N, 98°12' E, 21 m (1, ZMUC-POL-1045).

Description: Body at least 2.6 mm long with at least 24 segments. Mid-body segments more or less distinctly triannulate. Conical prostomium consisting of about 7–8 rings. Proboscis with two types of papillae: 1. numerous digitiform papillae with more or less straight, median, longitudinal ridge; 2. isolated, broader, oval to globular papillae without ridges. Ailerons rod-like. All parapodia uniramous. Parapodia of mid-body with one slender triangular to digitiform prechaetal lobe. One short, rounded postchaetal lobe. Dorsal cirri from 3rd parapodium, conical to oval, inserted on body wall slightly above parapodial base. Ventral cirri in anterior parapodia conical, shorter than postchaetal

lobe; in posterior parapodia elongated and slender triangular to digitiform; in last parapodia about as long as prechaetal lobe; situated near parapodial base. Branchiae absent.

Remarks: The specimen from BIOSHELF st. E-20m/BC is a juvenile.

Distribution: Cold and warm temperate zones, W and E coasts of North and South America, Japan, Andaman Sea, E Australia, New Zealand; intertidal to 137 m. New record for the Indian Ocean.

Goniadidae Kinberg, 1865

Type genus: *Goniada* Audouin and Milne Edwards, 1833: 266, by original designation.

Diagnosis: Body with numerous segments, elongated, tapering at both ends. Prostomium conical, pointed, usually annulated; anteriormost annulus with four usually biarticulate appendages, anterior pair situated termino-laterally and posterior pair more dorso-laterally; posteriormost annulus with one pair of nuchal organs; pair of subdistal and/or basal subdermal eyes may be present. Proboscis long, cylindrical to club-shaped, muscular, densely covered with numerous sclerotized papillae; tip of fully everted proboscis usually with two macro- and a number of dorsal and ventral micrognaths, arranged in a more or less complete circlet; lateral rows of V-shaped chevrons may be present. Body usually divided into anterior region with uniramous parapodia and following region with biramous or subbiramous parapodia (except for the genera *Progoniada* and *Progoniadides*, which have uniramous parapodia along the entire body); a transitional middle region with gradually changing parapodia may be present; notopodia either with pre- and postchaetal lobes (biramous), limited to aciculae (subbiramous), or absent; neuropodia with one or two prechaetal and one postchaetal lobe; all parapodia with basally inserted dorsal and ventral cirri. Branchiae absent. Noto- and neuropodia each with a single acicula; notochaetae simple, capillaries or aciculars; neurochaetae compound spinigers and/or falcigers. Pygidium with a pair of slender anal cirri.

Remarks: This study is the first survey which provides scanning electron micrographs of the proboscival papillae of goniadids since Smith, Trabanino and Baerwald (1995) published their paper on *Glycinde armigera* Moore, 1911. With regard to this genus, the present results confirm their observations, including the presence of subapical, cup-like depressions containing tufts of cilia on all papillae.

Recognized genera: *Bathyglycinde* Fauchald, 1972; *Bookhoutia* Mohammad, 1973; *Glycinde* F. Müller, 1858; *Goniada* Audouin and Milne Edwards, 1833; *Goniadella* Hartman, 1950; *Goniadides* Hartmann-Schröder, 1960; *Goniadopsis* Fauvel, 1928; *Ophioglycera* Verrill, 1885; *Progoniada* Hartman, 1965; *Progoniadides* Hartmann-Schröder, 1974.

Key to the species of Goniadidae

1. Biramous parapodia present 2
 - All parapodia uniramous or subbiramous, *i.e.*, notopodium represented only by 1–2 acicular notochaetae 13
2. Proboscis with chevrons (*Goniada*) 3
 - Proboscis without chevrons 10
3. Notochaetae acicular 4
 - Notochaetae capillary 7
4. Less than 15 pairs of chevrons; at least 40 uniramous chaetigers 5
 - At least 50 pairs of chevrons; less than 40 uniramous chaetigers 6
5. 12 pairs of chevrons; 57 uniramous chaetigers *Goniada* sp. A
 - 3 pairs of chevrons; 40 uniramous chaetigers *Goniada tridens* Gallardo, 1968
6. Macrognaths present, with 6–8 teeth; 12–30 dorsal and 3–12 ventral micrognaths; 55–130 pairs of chevrons; 34–39 uniramous chaetigers *Goniada multidentata* Arwidsson, 1899
 - Macrognaths absent; 20–66 micrognaths in 2–5 rows; 50–97 pairs of chevrons; 21–23 uniramous chaetigers *Goniada amacrognatha* n. sp.
7. Prostomium with 9–10 distinct rings; usually 4 dorsal and 3 ventral micrognaths; less than 30 uniramous chaetigers 8
 - Prostomium with about 5 irregular, indistinct rings; 10–24 dorsal and 5–13 ventral micrognaths; 34–36 uniramous chaetigers *Goniada congoensis* Grube, 1877
8. Less than 11 pairs of chevrons; 22–26 uniramous chaetigers 9
 - 13–14 pairs of chevrons; 26–27 uniramous chaetigers *Goniada apisiti* n. sp.
9. 22 uniramous chaetigers; 8–10 pairs of chevrons *Goniada cf. asiatica* Hartman, 1974
 - 26 uniramous chaetigers; 6 pairs of chevrons *Goniada hexadentes* n. sp.
10. Neuropodia with one prechaetal lobe; notochaetae with hood-like tip; several different kinds of sclerotized proboscival papillae (*Glycinde*) 11
 - Neuropodia with two prechaetal lobes; notochaetae acicular; sclerotized proboscival papillae of one basic type 12

11. 24–29 uniramous chaetigers; usually 4 dorsal micrognaths ... *Glycinde* cf. *oligodon* Southern, 1921
 – 36–40 uniramous chaetigers; usually 14 dorsal micrognaths *Glycinde anuwati* n. sp.
12. Compound chaetae on anterior chaetigers falcigerous, on posterior chaetigers spinigerous; very long ventral cirri on mid-body *Goniadopsis incerta* Fauvel, 1932 *
 – All compound chaetae spinigerous; ventral cirri on mid-body not elongated
 *Ophioglycera lyra* Granados-Barba and Solís-Weiss, 1997
13. 8 uniramous chaetigers; from chaetiger 9 with 1–2 acicular notochaetae arising directly from body wall, above dorsal cirri *Goniadides carolinae* Day, 1973 sensu Gilbert, 1984
 – All parapodia uniramous *Progoniada* sp. A
- * Species recorded from intertidal zone on Andaman coast of Thailand, but not in the BIOSHELFL material; will be published separately.

Notes: *Goniada tridens* Gallardo, 1968 (type locality: Vietnam), a species which was described as having only 3 pairs of chevrons, was reported by Phasuk (1992) from 1 station in the Andaman Sea. This material was not available for study and the report cannot be confirmed, but for future reference it has been included in this key.

Goniada littorea Hartman, 1950 (type locality: California) was reported by Phasuk (1992) from the Andaman Sea. That report was based on one specimen (st. 1027, PMBC 13699) with 8–9 prostomial annuli, 15 pairs of chevrons, about 41 uniramous chaetigers and notopodia with 4–5 capillary chaetae. This is in general agreement with Hartman's description (Hartman 1950: 23–26, pl. 3, figs. 1–10), but the small size of Phasuk's specimen and the small number of notochaetae (10–12 per notopodium according to Hartman) indicate that it is a juvenile. More material is necessary before Phasuk's identification can be confirmed.

Glycinde F. Müller, 1858

Type species: *Glycinde multidens* F. Müller, 1858: 214, pl. 6, figs. 4–6, by monotypy.

Glycinde anuwati n. sp.

Figs. 2A–J, 3A–G

Material examined: st. A-3/BC, 9°30' N, 97°38' E, 82 m (1, PMBC 18259); st. C-2/OS, 9°00' N, 97°53' E, 64 m (1, ZMUC-POL-1046); st. C-3/BC, 9°00' N, 97°43' E, 79 m (1, ZMUC-POL-1047); st. C-3/OS, 9°00' N, 97°43' E, 80 m (1 paratype, SMF 10388); st. E-3/OS, 8°30' N, 97°46' E, 81 m (1, PMBC 18260); st. H-1/OS, 7°45' N, 98°16' E, 31 m (1, PMBC 18261); st. I-20m/OS, 7°30' N, 99°01' E, 21 m (2, PMBC 18262); st. I-1/OS, 7°30' N, 98°57' E, 38 m (holotype, PMBC 16664; 3 paratypes, PMBC 16693; 1 paratype, ZMUC-POL-1048; part of proboscis from paratype on SEM-stub, ZMUC-POL-1049); st. I-2/OS, 7°30' N, 98°29' E, 60 m (1 paratype, USNM

1001183); st. J-2/OS, 7°15' N, 98°51' E, 61 m (1, PMBC 18263); st. J-3/OS, 7°15' N, 98°36' E, 79 m (2, PMBC 18264); st. K-1/OS, 7°00' N, 99°15' E, 45 m (1, ZMUC-POL-1050); st. K-4/BC, 7°00' N, 98°21' E, 105 m (1, SMF 10389); st. L-1/BC, 6°45' N, 99°21' E, 38 m (1, PMBC 18265); st. L-3/OS, 6°46' N, 98°45' E, 83 m (2, PMBC 18266); st. RN-3/OS, 7°30' N, 98°17' E, 72 m (8 paratypes, ZMUC-POL-1051; 1 paratype on SEM-stub, ZMUC-POL-1052; 1 paratype on SEM-stub, ZMUC-POL-1100).

Description: Body up to 27 mm long with up to 132 segments (holotype). Segments uniannulate. Conical prostomium consisting of about 10 rings (Fig. 2A); terminal annulus with four biarticulate appendages; basal and usually subdistal annulus (2nd or 3rd) each with two small eyes. Proboscis with several different kinds of papillae (Figs. 2D, 3B–F): area I with small, stout papillae (Fig. 3C); area II with six rows of papillae: II-1 with small tridentate papillae, II-2 to II-6 with long papillae,

unidentate (II-2 and II-3) or bidentate (II-4 to II-6) (Fig. 2D), except for the dorsalmost (II-1) the papillae become larger and more curved from lateral to dorsal (Fig. 3D); area III with one row

of small, narrow papillae (Fig. 3E); area IV with one row of small papillae, each with three cusps and a distal cup of cilia which lies at the dorsalmost tip of the plate (Fig. 3F); area V with one row of

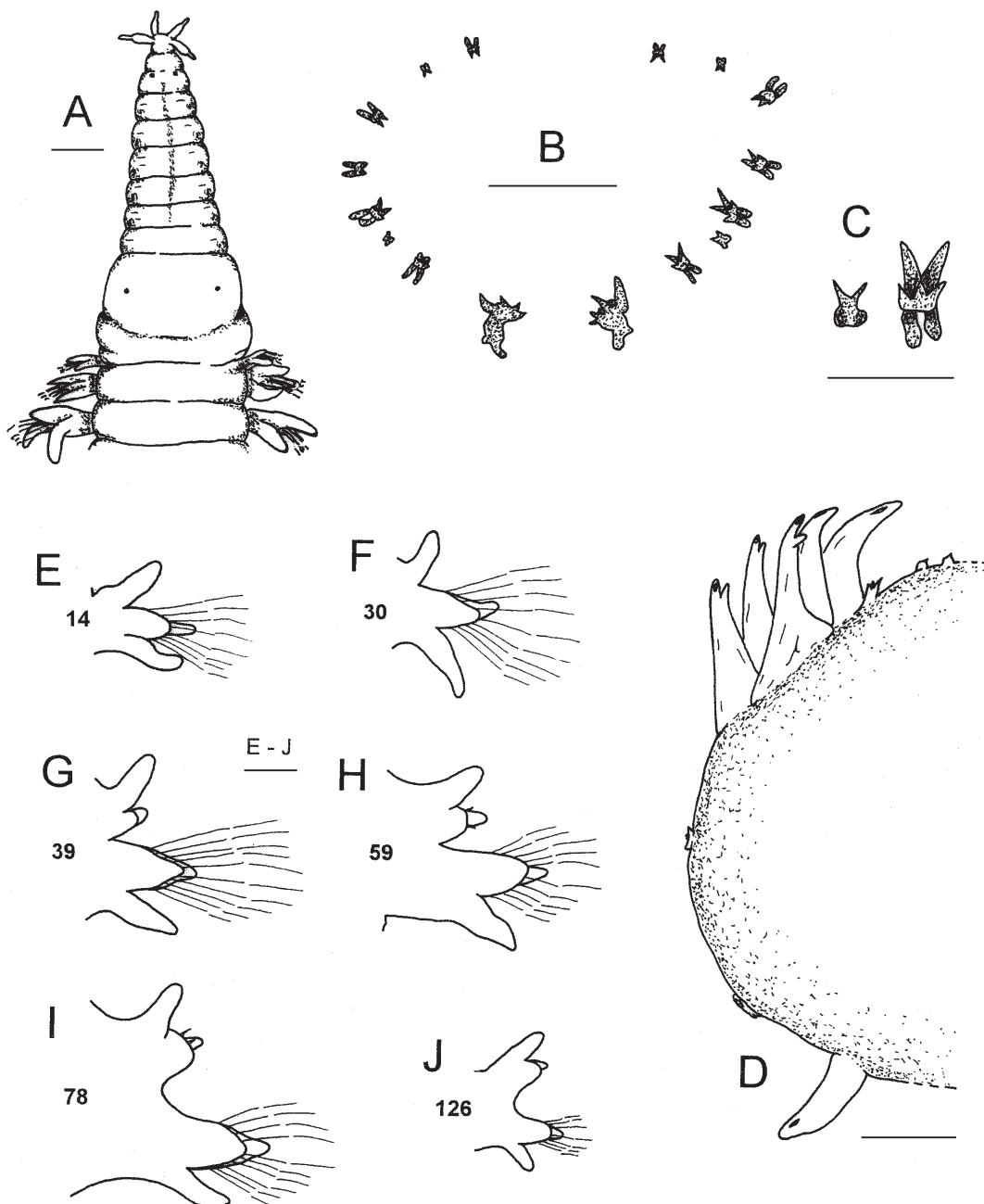


Figure 2 *Glycinde anuwati* n.sp.: A. Anterior end, dorsal view. B. Macrognaths and ring of micrognaths. C. Detail of two micrognaths. D. Cross section of proboscis, schematic. E–J. Parapodia of chaetigers 14, 30, 39, 59, 78 and 126, posterior view. – ZMUC-POL-1048. Scales = 100 μm (A, B, E–J) and 50 μm (C, D).

long, conical papillae (Fig. 3F); area VI without papillae. Macrognaths with about 4 teeth; 11–16 dorsal and 0 ventral H-shaped micrognaths (Fig. 2B–C). Chevrons not present. Parapodia with one conical to digitiform neuropodial prechaetal lobe

and one shorter, rounded to bluntly conical postchaetal lobe. 36–40 uniramous chaetigers (Fig. 2E–F), 40 on holotype, following parapodia abruptly biramous (Fig. 2G), from chaetiger 40–66 with noto- and neuropodia clearly separated

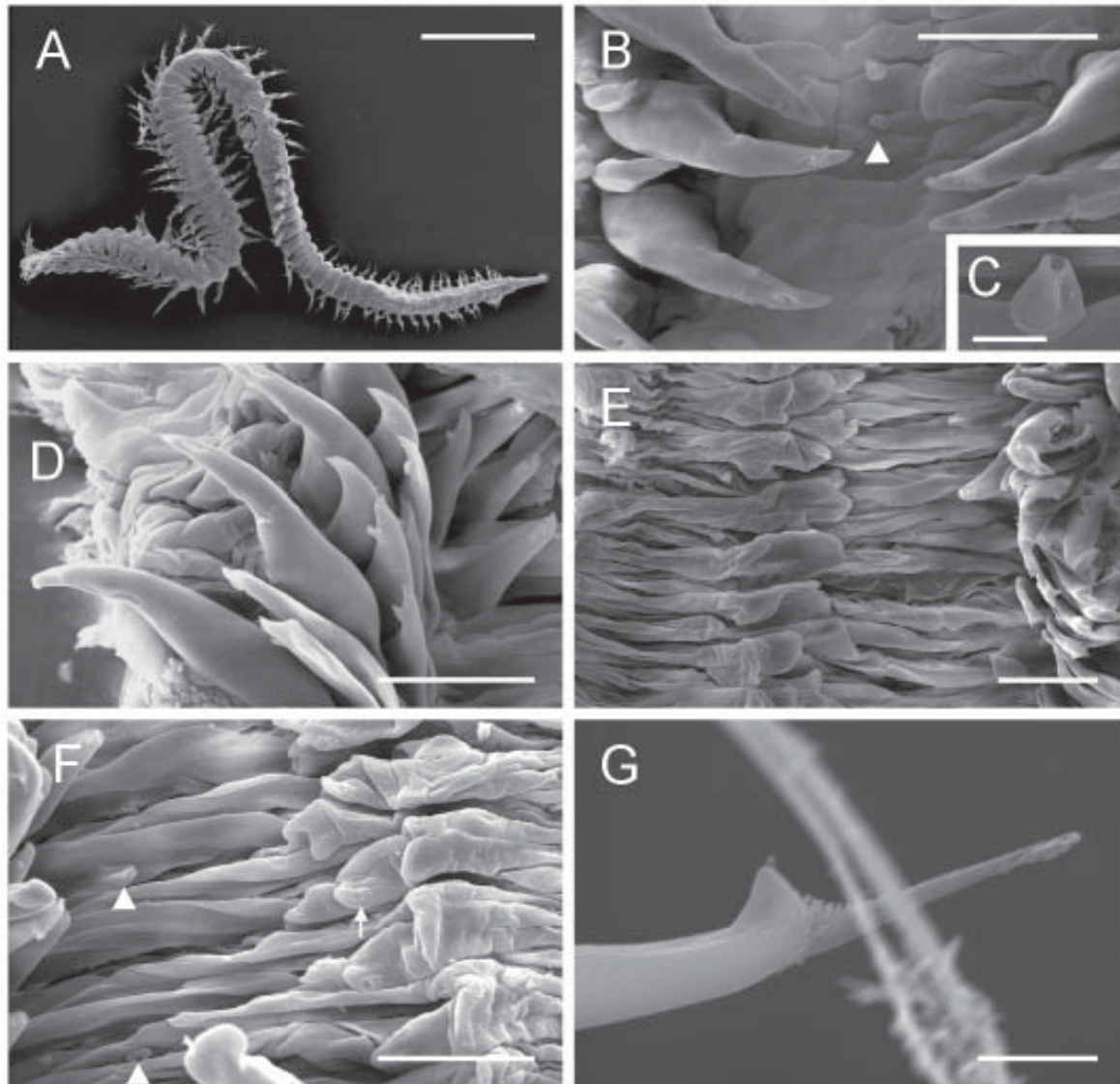


Figure 3 *Glycinde anuwati* n.sp.: A. Entire animal, dorsal view. B. Dorsal view of opened proboscis, showing papillae of area I (arrowhead) and dorsal papillae of area II. C. Close-up of papilla of area I. D. Dorsolateral view of opened proboscis, showing papillae of area II. E. Lateral view of opened proboscis, showing ventral papillae of area II (right) and papillae of area III (left of center; only 2 papillae visible). F. Ventrolateral view of opened proboscis, showing ventral papillae of area II (left edge), papillae of area III (left of center; only 2 papillae visible, arrowheads), papillae of area IV (right of center; arrow) and area V (right edge; papillae only partially present). G. Notochaeta. – SEM micrographs. ZMUC-POL-1052 (A, G) and ZMUC-POL-1049 (B–F). Scales = 1 mm (A), 50 μ m (B, D–F) and 5 μ m (C, G).

(Fig. 2H–J); notopodia with bluntly conical prechaetal lobe and shorter, rounded postchaetal lobe. Dorsal cirri thumb-shaped and flattened; in biramous parapodia longer than notopodial prechaetal lobe. Ventral cirri conical to digitiform; in anterior parapodia about as long as neuropodial

prechaetal lobe; in biramous parapodia about as long as neuropodial postchaetal lobe. Notopodium with 1–3 simple acicular chaetae with hood-like tip (Fig. 3G); neuropodia with numerous compound, spinigerous chaetae.

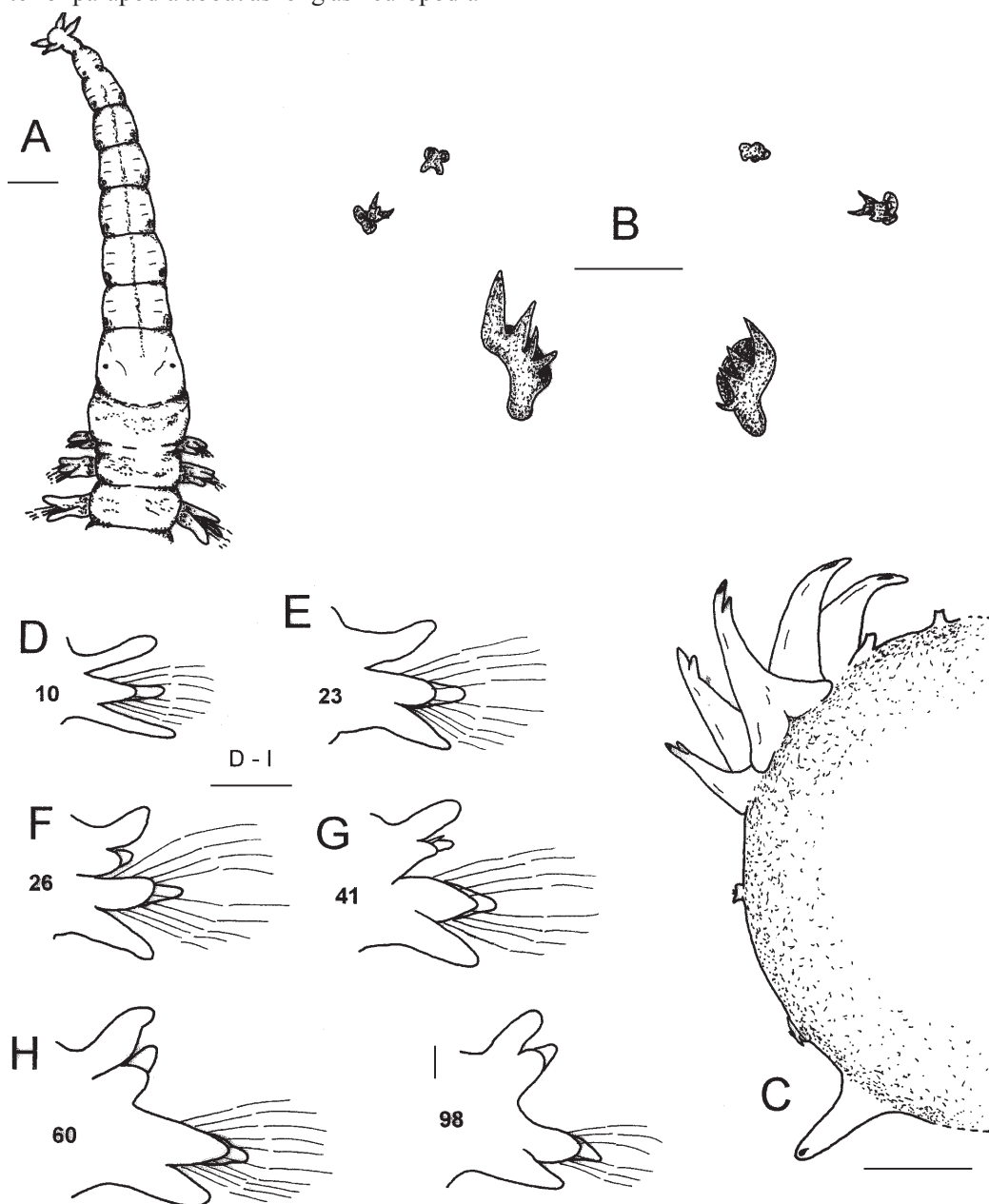


Figure 4 *Glycinde* cf. *oligodon*: A. Anterior end, dorsal view. B. Macrognaths and micrognaths. C. Cross section of proboscis, schematic. D–I. Parapodia of chaetigers 10, 23, 26, 41, 60 and 98, posterior view. – ZMUC-POL-1056 (A, D–I), ZMUC-POL-1058 (B) and ZMUC-POL-1057 (C). Scales = 100 μ m (A, D–I) and 50 μ m (B, C).

Remarks: Most specimens have 14 dorsal micrognaths, but in smaller animals as few as six micrognaths may be developed and in other specimens some micrognaths are doubled.

This species resembles *Glycinde gurjanovae* Uschakov and Wu, 1962 (type locality: Yellow Sea), but has a considerably higher number of uniramous parapodia (36–40 instead of 19–22). Only two other species of *Glycinde* are known to have such a large number of uniramous parapodia: *G. nordmanni* (Malmgren, 1866) (type locality: Bohuslän, Sweden) and *G. dorsalis* Ehlers, 1905 (type locality: Lyttleton, New Zealand). However, the former species has a larger number of micrognaths (about 22) and the posterior parapodia of the latter species bear two neuropodial postchaetal lobes.

The scanning electron micrographs of the proboscoidal papillae (Fig. 3B–F) are from a proboscis that has been removed by dissection, because none of the specimens of this species were preserved with an everted proboscis. Such preparations unfortunately lower the quality of the resulting photographs, but all our observations suggest that the arrangement and detailed morphology of the proboscoidal papillae are essentially identical in *Glycinde anuwati* n. sp. and *G. cf. oligodon* (see Fig. 5C–H, where they are seen in much greater detail).

Distribution: Known only from the Andaman Sea; 21–105 m.

Etymology: This species is named after Dr. Anuwat Nateewathana (Bangkok, Thailand) in recognition of his many contributions to our knowledge of Thailand's polychaete and cephalopod fauna.

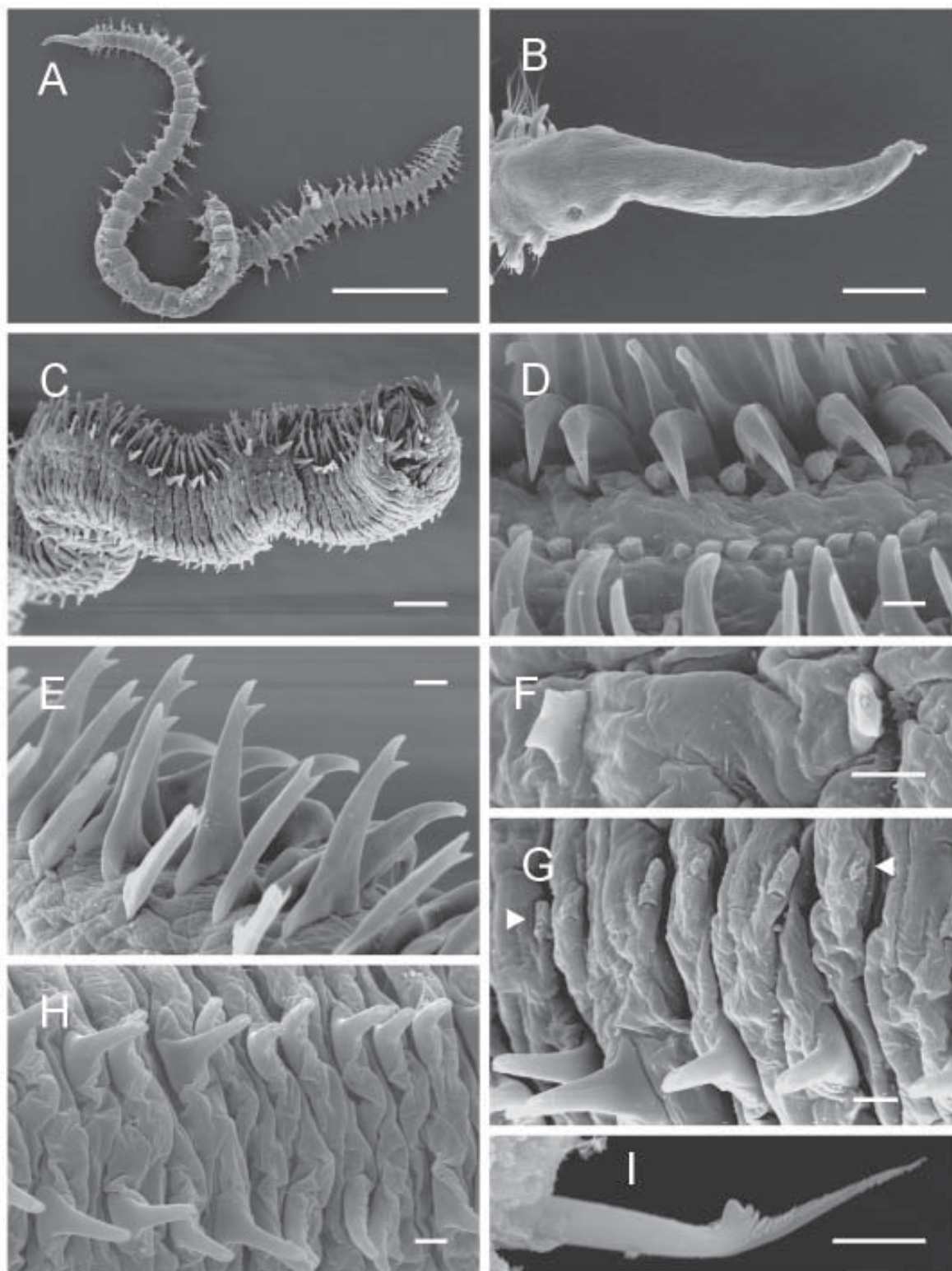
Glycinde cf. oligodon Southern, 1921

Figs. 4A–I, 5A–I

?*Glycinde oligodon* Southern, 1921: 629, textfig. 17a–c, pl. 27, fig. 18a–q. – ?Fauvel 1932: 123; ?1953: 288, fig. 147a–d.

Material examined: st. A-1/OS, 9°30' N, 97°58' E, 42 m (2, PMBC 18267); st. A-2/OS, 9°32' N, 97°50' E, 66 m (11, ZMUC-POL-1053); st. C-1/BC, 9°00' N, 98°03' E, 40 m (2, PMBC 18268); st. C-1/OS, 9°01' N, 98°03' E, 39 m (8, PMBC 18269); st. C-2/BC, 9°00' N, 97°53' E, 65 m (1, PMBC 18270); st. C-2/OS, 9°00' N, 97°53' E, 64 m (4, SMF 10383); st. E-20m/OS, 8°30' N, 98°12' E, 20 m (1, PMBC 18271); st. E-1/BC, 8°30' N, 98°06' E, 42 m (1, ZMUC-POL-1054); st. E-3/OS, 8°30' N, 97°46' E, 81 m (2, PMBC 18272); st. G-2/OS, 8°00' N, 98°10' E, 63 m (2, PMBC 18273); st. H-1/OS, 7°45' N, 98°16' E, 31 m (4, ZMUC-POL-1055); st. H-2/BC, 7°45' N, 98°15' E, 59 m (1, PMBC 18274); st. H-2/OS, 7°45' N, 98°15' E, 56 m (4, PMBC 18275); st. I-20m/OS, 7°30' N, 99°01' E, 21 m (1, PMBC 18276); st. I-1/OS, 7°30' N, 98°57' E, 38 m (1, PMBC 18277); st. I-2/BC, 7°30' N, 98°30' E, 59 m (1, PMBC 18278); st. J-2/OS, 7°15' N, 98°51' E, 61 m (1, PMBC 18279); st. J-3/OS, 7°15' N, 98°36' E, 79 m (1, ZMUC-POL-1056); st. K-20m/BC, 7°00' N, 99°24' E, 21 m (2, ZMUC-POL-1057); st. K-20m/OS, 7°00' N, 99°24' E, 22 m (13, ZMUC-POL-1058; 1 on SEM-stub, ZMUC-POL-1059; 1 on SEM-stub, ZMUC-POL-1060); st. L-3/OS, 6°46' N, 98°45' E, 83 m (4, PMBC 18280); st. RN-3/OS, 7°30' N, 98°17' E, 72 m (2, PMBC 18281); st. RY-2/BC, 7°39' N, 98°23' E, 45 m (2, SMF 10382); st. RY-3/BC, 7°36' N, 98°25' E, 49 m (1, PMBC 18282); st. PB-3/BC, 7°51' N, 98°32' E,

Figure 5 *Glycinde cf. oligodon*: A. Entire animal, dorsal view. B. Prostomium, dorsolateral view. C. Distal part of partially everted proboscis, lateral view. D. Dorsal part of everted proboscis, showing row of papillae of area I and above this papillae from rows II-1, II-2 (long, fang-shaped) and II-3 of area II. E. Proboscoidal papillae of area II. F. Two bifid proboscoidal papillae from area III. G. Proboscoidal papillae of area IV (between arrowheads) and papillae of area V (bottom). H. Ventral part of everted proboscis showing papillae of area V on both sides of area VI, which lacks papillae. I. Notochaeta. – SEM micrographs. ZMUC-POL-1059 (A, B, I) and ZMUC-POL-1060 (C–H). Scales = 1 mm (A), 100 µm (B, C), 10 µm (D–H) and 5 µm (I).



22 m (1, PMBC 18283); st. PB-5/BC, 7°52' N, 98°48' E, 21 m (1, PMBC 18284); st. PB-6/BC, 7°45' N, 98°32' E, 30 m (2, PMBC 18285); st. PB-7/BC, 7°45' N, 98°41' E, 29 m (1, PMBC 18286).

Description: Body up to 17 mm long with up to 104 segments. Segments uniannulate. Conical prostomium consisting of about 8–9 rings (Figs. 4A, 5B), elongate; terminal annulus with four biarticulate appendages; basal and usually subdistal annulus (2nd or 3rd) each with two small eyes. Proboscis with several different kinds of papillae (Fig. 4C): area I with small, stout papillae (Fig. 5D); area II with six rows of papillae: II-1 with small bidentate papillae (Fig. 5D), II-2 to II-6 with long papillae (Figs. 4C, 5D–E), unidentate (II-2 and II-3) or bidentate (II-4 to II-6), except for the dorsalmost (II-1) the papillae become larger and more curved from lateral to dorsal; area III with one row of small, narrow papillae (Fig. 5F); area IV with one row of small papillae, each with three cusps and a distal cup of cilia which lies in the middle of the plate (Fig. 5G); area V with one row of long, conical papillae (Fig. 5G–H); area VI without papillae (Fig. 5H). Macrognaths with about 4 teeth; 4 dorsal and 0 ventral H-shaped micrognaths (Fig. 4B). Chevrons not present. Parapodia with one conical to digitiform neuropodial prechaetal lobe and one shorter, rounded to bluntly conical postchaetal lobe. 24–29 (24–26 in most specimens) uniramous chaetigers (Fig. 4D–E), following parapodia abruptly biramous (Fig. 4F), from chaetiger 36–50 with noto- and neuropodia clearly separated (Fig. 4G–I); notopodia with bluntly conical prechaetal lobe and shorter, rounded postchaetal lobe. Dorsal cirri thumb-shaped and flattened; in biramous parapodia longer than notopodial prechaetal lobe. Ventral cirri conical to digitiform; in anterior parapodia about as long as neuropodial prechaetal lobe; in biramous parapodia distinctly shorter than neuropodial postchaetal lobe. Notopodia with 1–3 simple, acicular chaetae with hood-like tip (Fig. 5I); neuropodia with numerous compound, spinigerous chaetae.

Remarks: The BIOSHELF specimens were compared with the two syntypes of *Glycinde*

bonhourei Gravier, 1904 (type locality: Djibouti, Red Sea; MNHN-A122). These animals have 21–22 uniramous chaetigers, about 10 micrognaths and a prostomium that is relatively short (clearly shorter than shown in Gravier's original description).

The original description and drawings of *G. oligodon* Southern, 1921 (type locality: Chilka Lake, India) suggested that the BIOSHELF specimens might belong to this species, since both have 4 dorsal and 0 ventral micrognaths. Confirmation of this is difficult because the type material (possibly at ZSI) was not available for study. However, it should be noted that material from the Andaman Sea differs from Southern's description in several aspects: the prostomium is much more elongate; eyes usually present on the subdistal annulus of the prostomium; the subdistal, ventral indentation on the dorsal cirri is only seen on a few middle segments (*e.g.*, Fig. 4H); the number of uniramous chaetigers is greater (by implication only about 20 according to Southern).

Glycinde oligodon sensu Gallardo 1968 differs from the present material in lacking eyes (possibly due to fading) and in having a much larger number of micrognaths (12 dorsal and 2 ventral).

Distribution: India?, Andaman Sea; 20–83 m.

Goniada Audouin and Milne Edwards, 1833

Type species: *Goniada emerita* Audouin and Milne Edwards, 1833: 268, pl. 18, figs. 1–4, by monotypy.

Goniada amacrognatha n. sp.

Figs. 6A–H, 7A–J

Material examined: st. A-2/BC, 9°30' N, 97°51' E, 61 m (1, ZMUC-POL-1061); st. A-2/OS, 9°32' N, 97°50' E, 66 m (1 paratype, SMF 10387); st. C-2/OS, 9°00' N, 97°53' E, 64 m (1, PMBC 18238); st. E-3/OS, 8°30' N, 97°46' E, 81 m (1 paratype, USNM 1001184); st. G-2/OS, 8°00' N, 98°10' E, 63 m (1, PMBC 18239); st. RN-1/OS, 7°30' N, 98°22' E, 64 m (3 paratypes, ZMUC-POL-1062; 1 paratype on SEM-stub, ZMUC-POL-1063; 1 paratype + 1 fragment on SEM-stub, ZMUC-POL-1064); st. RN-3/BC, 7°30' N, 98°17' E, 72 m (holotype, PMBC 18240).

Description: Body up to 90 mm long with up to 228 segments (holotype). Segments uniannulate. Conical prostomium consisting of about 7 rings; terminal annulus with four biarticulate appendages;

basal annulus with two small eyes and usually two larger, lateral subdistal eyes, on 2nd or 3rd annulus (Figs. 6A–B, 7A). Proboscis covered with short, heart-shaped papillae (Fig. 7F). Macrognaths not

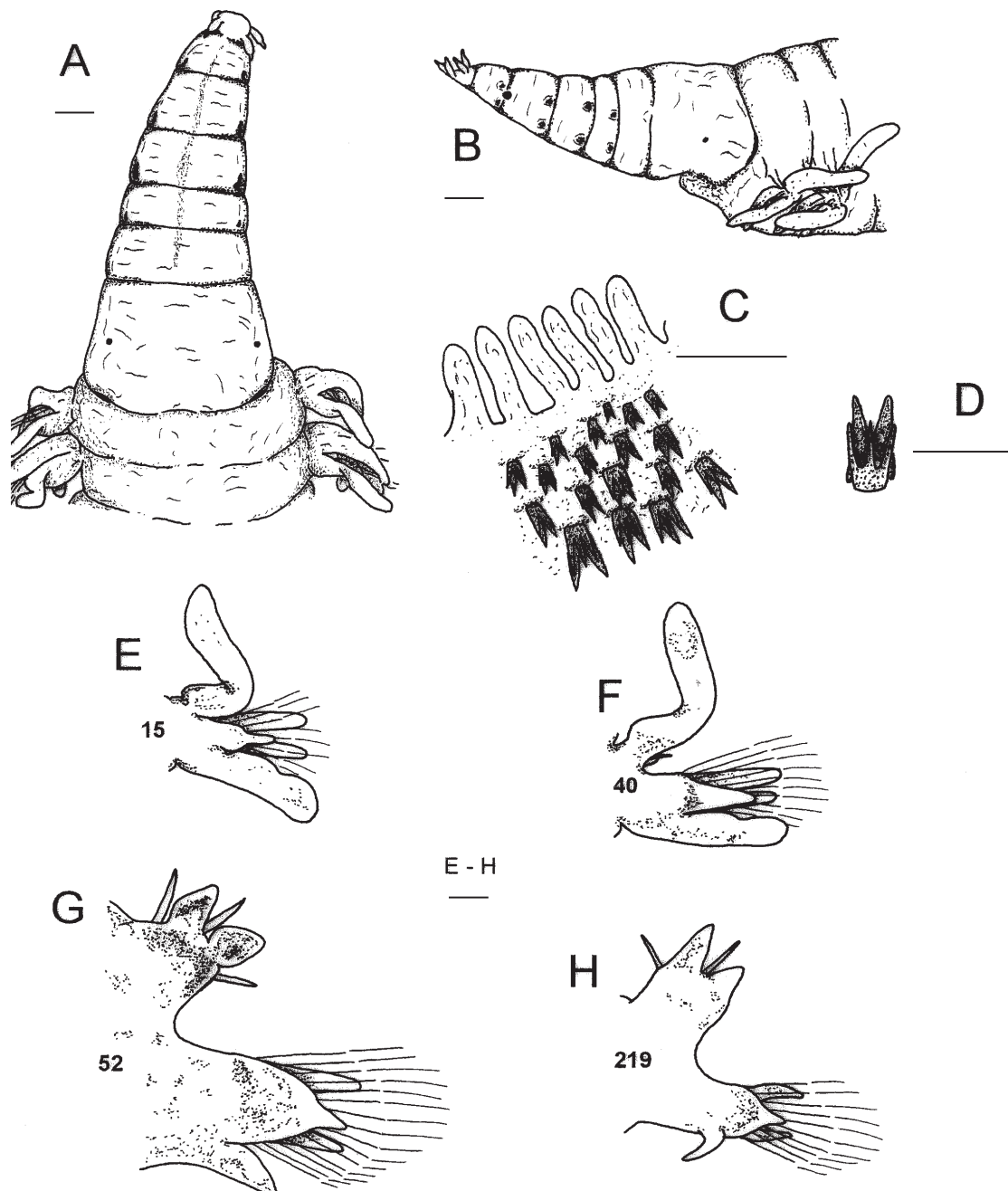


Figure 6 *Goniada amacrognatha* n.sp.: A. Anterior end, dorsal view. B. Anterior end, lateral view. C. Section of oral ring of micrognaths. D. Detail of micrognath. E–H. Parapodia of chaetigers 15, 40, 52 and 219, posterior view. – PMBC 18240 (holotype) (A, E–H) and ZMUC-POL-1062 (B–D). Scales = 100 μ m (A–C, E–H) and 50 μ m (D).

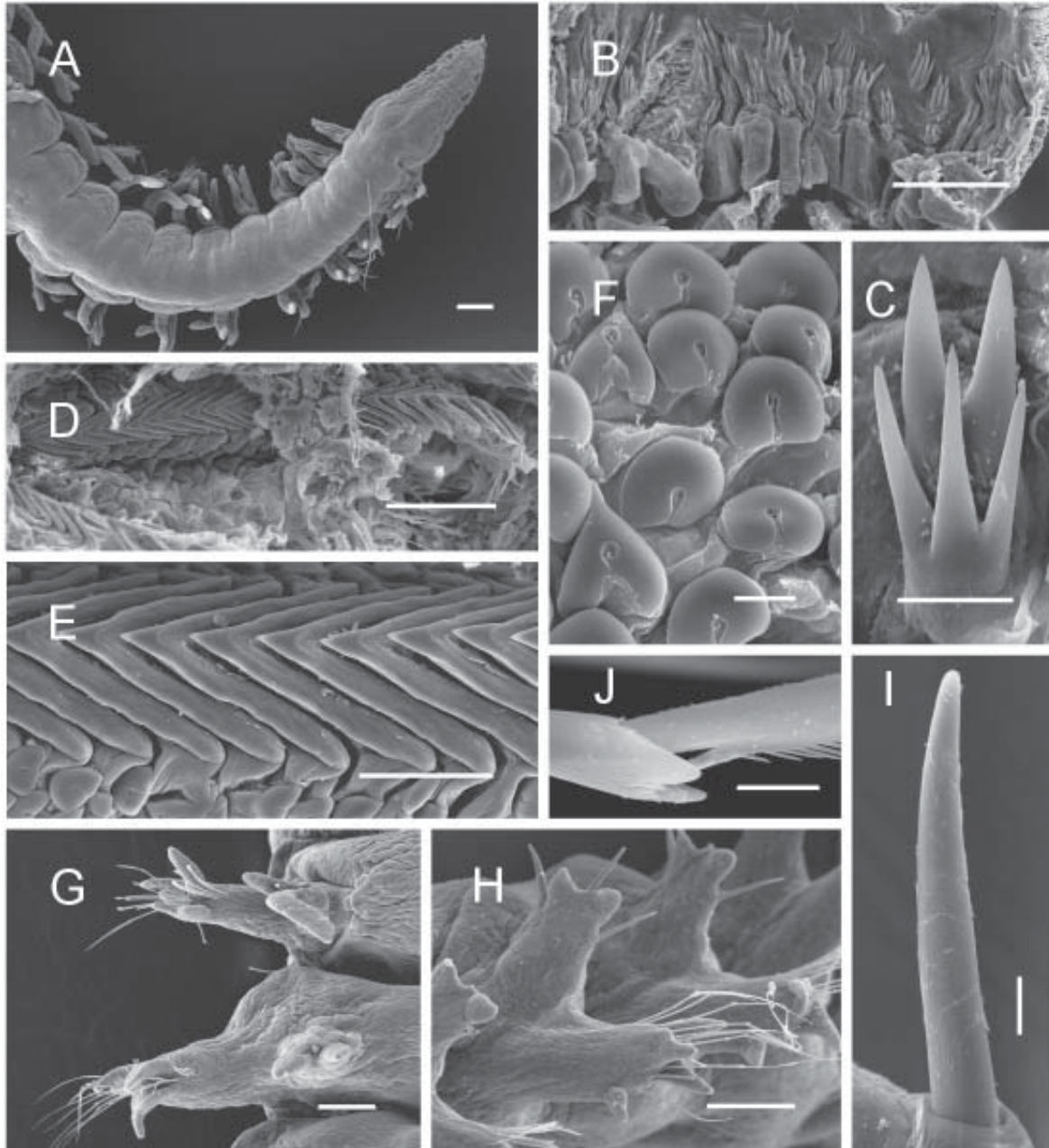


Figure 7 *Goniada amacrognatha* n.sp.: A. Anterior end, dorsal view. B. Section of oral ring of jaws, proboscis opened. C. Detail of micrognath. D. Part of row of chevrons, body wall opened. E. Detail of chevrons. F. Proboscoidal papillae ranging in shape from rounded to acutely heart-shaped. G. Last transitional biramous and first fully biramous parapodium, dorsal view. H. Fully biramous parapodium, showing characteristic arrangement of notochaetae. I. Notopodial spine. J. Compound neuropodial spiniger, end of shaft and base of distal article. – SEM micrographs. ZMUC-POL-1063 (A, C, D, F, H, I) and ZMUC-POL-1064 (B, E, G, J). Scales = 100 μm (A, B, D, G, H), 10 μm (C, F, I), 50 μm (E), and 5 μm (J).

present; 20–66 micrognaths in 2–5 rows (Figs. 6C–D, 7B–C). 50–97 chevrons on each side of proboscis (Fig. 7D–E). First segment usually only with minute cirri, especially in smaller specimens. First chaetigers with only one pre- and one postchaetal neuropodial lobe; second, lower prechaetal lobe developed from chaetiger 2–13; both prechaetal lobes digitiform and of about same length, but upper one always slightly broader than lower one (Fig. 6E–G), in last parapodia lower prechaetal lobe shorter (Fig. 6H); postchaetal lobe always distinctly shorter, at first rounded, from chaetiger 4–17 conical to digitiform, in posterior parapodia broader and more triangular. 21–23 (21 in most specimens) uniramous chaetigers (Fig. 6E); following 12–18 parapodia biramous, forming a transitional region in which notopodia increase in size (Figs. 6F, 7G); from chaetiger 34–42 with noto- and neuropodia clearly separated (Figs. 6G–H, 7G–H), from chaetiger 42 on holotype; anterior notopodia very short and conical to digitiform, posterior ones distinctly longer and conical to triangular. Dorsal cirri on anterior chaetigers broadly digitiform and distinctly longer than prechaetal lobes; on posterior, fully biramous chaetigers conical to triangular and about as long as notopodia. Ventral cirri on anterior chaetigers broadly digitiform; at first distinctly longer than prechaetal lobes (Fig. 6E), then only as long as prechaetal lobes (Fig. 6F); in posterior, fully biramous parapodia conical to digitiform and distinctly shorter. Notopodia with 1–3 (3 on most chaetigers) simple, acicular chaetae (Fig. 7I), situated above dorsal cirrus, between dorsal cirrus and notopodium and below notopodium (Figs. 6G, 7H); neuropodia with numerous compound, spinigerous chaetae (Fig. 7J).

Remarks: In juvenile specimens the chevrons are not completely developed; often a smaller number (e.g., 19 pairs) is present and sometimes chevrons appear to be completely absent.

It seems highly probable that some earlier reports of *Goniada multidentata* Arwidsson, 1899 should be referred to *G. amacrognatha* n. sp., because both species show similarities in the large number of chevrons, the type of notochaetae and the structure of the biramous parapodia. However,

in contrast to *G. multidentata*, which has 34–39 uniramous chaetigers and two macro- and numerous micrognaths, *G. amacrognatha* has only 21–23 uniramous chaetigers and macrognaths are not present (verified on all specimens). Moreover, the acicular notopodial chaetae (usually 2) of *G. multidentata* are both situated between the dorsal cirrus and the notopodium, whereas *G. amacrognatha* has 3 acicular chaetae placed one above the dorsal cirrus, one between the dorsal cirrus and the notopodium and one below the notopodium.

The presence of two large lateral, red eyes on the anterior part of the prostomium in *Goniada amacrognatha* n. sp. makes this species relatively easy to recognize. Anterior eyes are, however, absent on the holotype, which is by far the largest specimen in the type material of this species, indicating that this might be a juvenile character.

Distribution: Only known from the Andaman Sea; 61–81 m.

Etymology: The name of this species refers to the absence of macrognaths on the proboscis, which is unique among goniadids.

Goniada apisiti n. sp.

Figs. 8A–H, 9A–G

Goniada multidentata. – Phasuk 1992: 82, part. – [Not Arwidsson, 1899: 45, figs. 41–42, 63.]

Material examined: st. A-1/OS, 9°30' N, 97°58' E, 42 m (1, PMBC 18241); st. A-3/BC, 9°30' N, 97°38' E, 82 m (1 paratype, USNM 1001185); st. H-1/OS, 7°45' N, 98°16' E, 31 m (2, PMBC 18242); st. K-20m/OS, 7°00' N, 99°24' E, 22 m (holotype, PMBC 16720; 1 paratype, ZMUC-POL-1065; 1 paratype on SEM-stub, ZMUC-POL-1066); st. PB-1/OS, 8°00' N, 98°29' E, 17 m (1 paratype, SMF 10386); st. PB-2/BC, 8°00' N, 98°39' E, 17 m (1, PMBC 18243); st. PB-3/BC, 7°51' N, 98°32' E, 22 m (1, ZMUC-POL-1067; 1 spec. on SEM-stub, ZMUC-POL-1068).

Description: Body up to 17 mm long with 121 segments (holotype). Segments uniannulate;

posterior segments sometimes appear to be biannulate. Conical prostomium consisting of about 9–10 rings (Figs. 8A, 9A); terminal annulus with four biarticulate appendages; eyes absent. Proboscis covered with short, heart-shaped

papillae (Fig. 9D). Macrognaths with 3–4 teeth; 4 dorsal Y-shaped and 3 ventral H-shaped, compound micrognaths; second (*i.e.*, lateral) pair of dorsal micrognaths located over macrognaths, easily overlooked (Figs. 8B, 9B). 13–14 chevrons

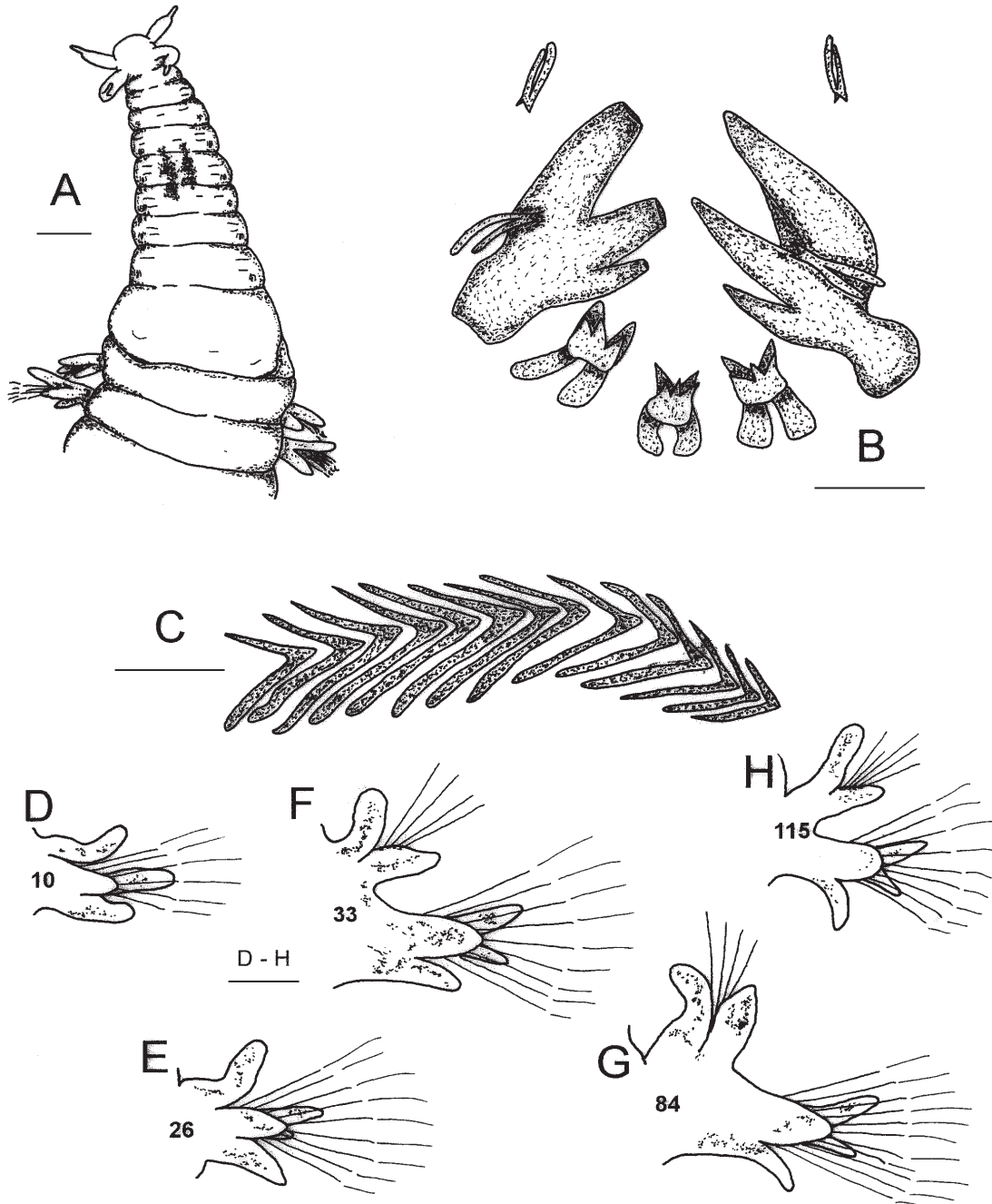


Figure 8 *Goniada apisiti* n. sp.: A. Anterior end, dorsal view. B. Macrognaths and micrognaths (left macrognath damaged). C. Chevrons. D–H. Parapodia of chaetigers 10, 26, 33, 84 and 115, posterior view. – ZMUC-POL-1065. Scales = 100 μ m (A, D–H) and 50 μ m (B, C).

on each side of proboscis (Figs. 8C, 9C). First chaetigers only with one pre- and one postchaetal neuropodial lobe (Fig. 8D); second, lower prechaetal lobe developed from chaetiger 20–21 (Fig. 8E); both prechaetal lobes conical to digitiform, upper one always longer and broader than lower one; postchaetal lobe short and rounded. 26–27 uniramous chaetigers, 27 on holotype, following parapodia abruptly biramous, with noto- and neuropodia clearly separated (Figs. 8F–H, 9E); notopodia with conical lobe. Dorsal cirri thumb-shaped and flattened; in biramous parapodia about as long as notopodia. Ventral cirri conical to digitiform; in anterior parapodia longer than postchaetal lobe, then as long as postchaetal lobe. Notopodia with a few simple, capillary chaetae (Fig. 9G); neuropodia with numerous compound, spinigerous chaetae (Fig. 9E–F).

Remarks: In one specimen only two ventral micrognaths are developed and in another one six are present, apparently the result of doubling. One specimen has only 23 uniramous chaetigers, but 3–4 atypical transitional parapodia are present. Most of the examined animals have a dark internal area in the middle of the prostomium (about annuli 5–7 from the tip; Fig. 8A).

Together with *Goniada asiatica* Hartman, 1974 (type locality: Arabian Gulf) and *G. hexadentes* n. sp., *G. apisiti* n. sp. belongs to a group of species within the genus that is characterized by having 4 dorsal and 3 ventral micrognaths, as well as simple capillary notochoetae. These species generally resemble *G. maculata* Örsted, 1843 (see remarks under *G. hexadentes* n. sp.).

Goniada apisiti was compared with the type material of *G. peruana* Hartmann-Schröder, 1962 (holotype: HZM P-14300; 3 paratypes: HZM P-14301 and HZM P-14302), described from Peru. This material is in extremely poor condition, making observations of the proboscis impossible. However, the number of uniramous chaetigers is higher than in *G. apisiti* (29) and the Peruvian animals do not have a dark internal area in the prostomium.

Among the material reported by Phasuk (1992) from the Andaman Sea as *Goniada*

multidentata Arwidsson, 1899 we found one specimen (st. 1010, PMBC 12564) of *G. apisiti*; thus, the notochoetae are capillaries, 14 pairs of chevrons are present, there are 4 dorsal and 3 ventral micrognaths and 26 uniramous chaetigers are present.

Distribution: Known only from the Andaman Sea; 17–82 m.

Etymology: This species is named after Mr. Apisit Thipaksorn (Bangkok), Nat to his friends (as in Nat King Cole), in recognition of his deep interest in polychaete systematics and ecology and his role in the successful completion of the Thai–Danida Polychaete Workshop at the Phuket Marine Biological Center in 1997.

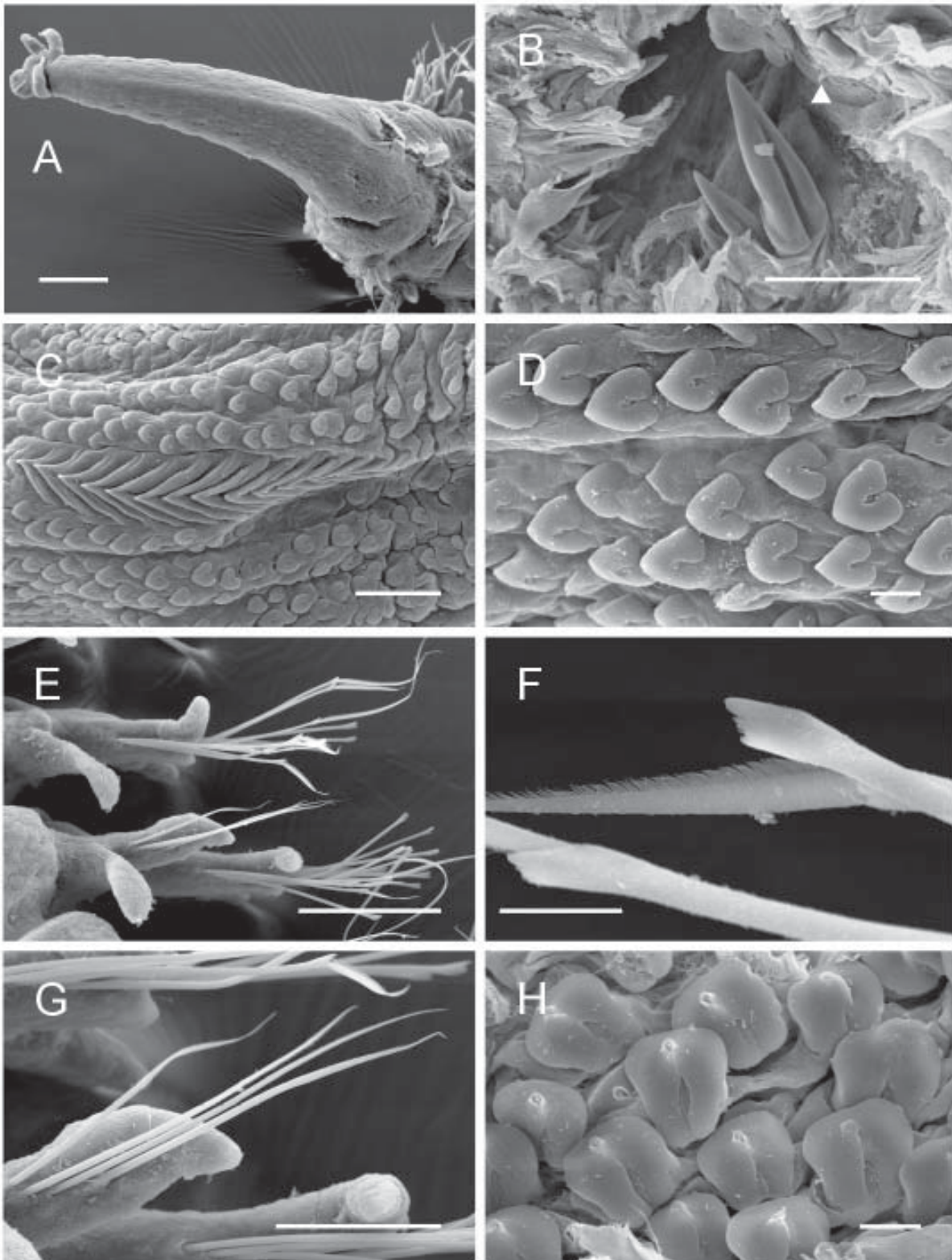
***Goniada cf. asiatica* Hartman, 1974**

Figs. 10A–G, 11A–F

?*Goniada asiatica* Hartman, 1974: 220, fig. 7a–b.
Goniada maculata. – Wesenberg-Lund 1949: 296.
– [Not Örsted, 1843: 33, pl. 1, figs. 16, 23, pl. 6, figs. 91, 95, 97, 98.]

Material examined: st. C-2/OS, 9°00' N, 97°53' E, 64 m (4, PMBC 18244); st. E-20m/OS, 8°30' N, 98°12' E, 20 m (1, PMBC 18245); st. E-3/OS, 8°30' N, 97°46' E, 81 m (2, ZMUC-POL-1069; 1 on SEM-stub, ZMUC-POL-1070); st. H-1/OS, 7°45' N, 98°16' E, 31 m (2, PMBC 18246); st. H-2/OS, 7°45' N, 98°15' E, 56 m (1, ZMUC-POL-1071); st. J-2/OS, 7°15' N, 98°51' E, 61 m (1, PMBC 18247); st. L-3/BC, 6°45' N, 98°45' E, 83 m (1, SMF 10384); st. L-3/OS, 6°46' N, 98°45' E, 83 m (2, ZMUC-POL-1072); st. RN-1/OS, 7°30' N, 98°22' E, 64 m (1 on SEM-stub, ZMUC-POL-1073).

Description: Body at least 18 mm long with at least 90 segments. Segments uniannulate; posterior segments sometimes appear to be biannulate. Conical prostomium consisting of about 9 rings (Figs. 10A, 11A); terminal annulus with four biarticulate appendages; eyes not present. Proboscis covered with short, heart-shaped papillae (Fig. 11D). Macrognaths with about 5 teeth; 4



dorsal Y-shaped and 3 ventral H-shaped, compound micrognaths; lateral pair of dorsal micrognaths located over macrognaths (Figs. 10B, 11B). 8–11 chevrons on each side of proboscis (Figs. 10C, 11C). First chaetigers with only one pre- and one postchaetal neuropodial lobe (Fig. 10D); second, lower prechaetal lobe developed from chaetiger 16–17 (Fig. 10E); both prechaetal lobes conical to digitiform, upper one always longer and broader than lower one; postchaetal lobe short and rounded. 22 uniramous chaetigers; following parapodia abruptly biramous, with noto- and neuropodia clearly separated (Figs. 10F–G, 11E); notopodia with conical lobe. Dorsal cirri thumb-shaped and flattened; in biramous parapodia about as long as notopodia. Ventral cirri conical to digitiform; in anterior parapodia longer than postchaetal lobe, then as long as postchaetal lobe. Notopodia with 4–6 simple, capillary chaetae (Fig. 11F); neuropodia with numerous compound, spinigerous chaetae.

Remarks: In one small specimen only one ventral micrognath is developed. Two of the animals each have a parasitic copepod on the ventral surface of the body.

Our specimens agree in most taxonomic features with the original description of Hartman (1974) (type locality: Arabian Gulf). However, they have two neuropodial prechaetal lobes, whereas Hartman describes only one. Examination of two specimens from the Persian Gulf (ZMUC-POL-1098 and ZMUC-POL-1099; originally reported by Wesenberg-Lund (1949) as *Goniada maculata*) revealed that they clearly belong to Hartman's species (4 dorsal and 3 ventral micrognaths; 8–9 pairs of chevrons; 21–22 uniramous chaetigers; most notopodia with 5 capillary

chaetae). Furthermore, like the animal described by Hartman, they are relatively large and epitokous. The parapodial lobe of this stage is partially enlarged, having a broader upper prechaetal lobe and a very short, reduced and rounded lower one (Fig. 10H). A larger amount of material, containing both atokous and epitokous specimens, must be studied before the identity of the Thai animals can be confirmed.

Distribution: Arabian Sea?, Persian Gulf, Andaman Sea; 20–83 m.

Goniada congoensis Grube, 1877
Figs. 12A–J, 13A–J

Goniada congoensis Grube, 1877: 532. – Arwidsson 1899: 41, figs. 34, 62.

Goniada hupferi Arwidsson, 1899: 40, figs. 31–33.

Goniada annulata Moore, 1905: 549, pl. 36, figs. 45–48. – Fauvel 1932: 121, pl. 3, figs. 9–16; 1953: 283, fig. 145a–h.

?*Goniada emerita* var. *quinquelabiata* Augener, 1906: 158.

Material examined: st. A-2/BC, 9°30' N, 97°51' E, 61 m (fragment + anterior end and fragment on SEM-stubs, ZMUC-POL-1074); st. A-2/OS, 9°32' N, 97°50' E, 66 m (2, PMBC 18248); st. C-2/OS, 9°00' N, 97°53' E, 64 m (1, ZMUC-POL-1075; 1 on SEM-stub, ZMUC-POL-1076); st. E-3/OS, 8°30' N, 97°46' E, 81 m (1, PMBC 18249); st. G-2/OS, 8°00' N, 98°10' E, 63 m (1 + 3 fragments on SEM-stubs, ZMUC-POL-1077); st. H-2/BC, 7°45' N, 98°15' E, 59 m (1, ZMUC-POL-1078); st. H-2/OS, 7°45' N, 98°15' E, 56 m (2, ZMUC-POL-1079); st. L-2/OS, 6°44' N, 99°05' E, 56 m (1, PMBC 18250).

Figure 9 *Goniada apisiti* n. sp.: A. Anterior end, dorsal view (prostomium damaged at base). B. Right macrognath and ventral micrognaths, proboscis opened (note two tips of dorsomedial micrognath, arrowhead at upper right). C. Chevrons, slightly distorted. D. Proboscidial papillae. E. Last uniramous (above) and first biramous parapodium, dorsal view. F. Compound neuropodial spiniger, end of shaft and base of distal article. G. Notopodium with four capillary chaetae, dorsal view. – *Goniada* sp. A: H. Proboscidial papillae. – SEM micrographs. ZMUC-POL-1066 (A, B, E, G), ZMUC-POL-1068 (C, D, F) and ZMUC-POL-1090 (H). Scales = 100 µm (A, E), 50 µm (B, C, G) and 10 µm (D, F, H).

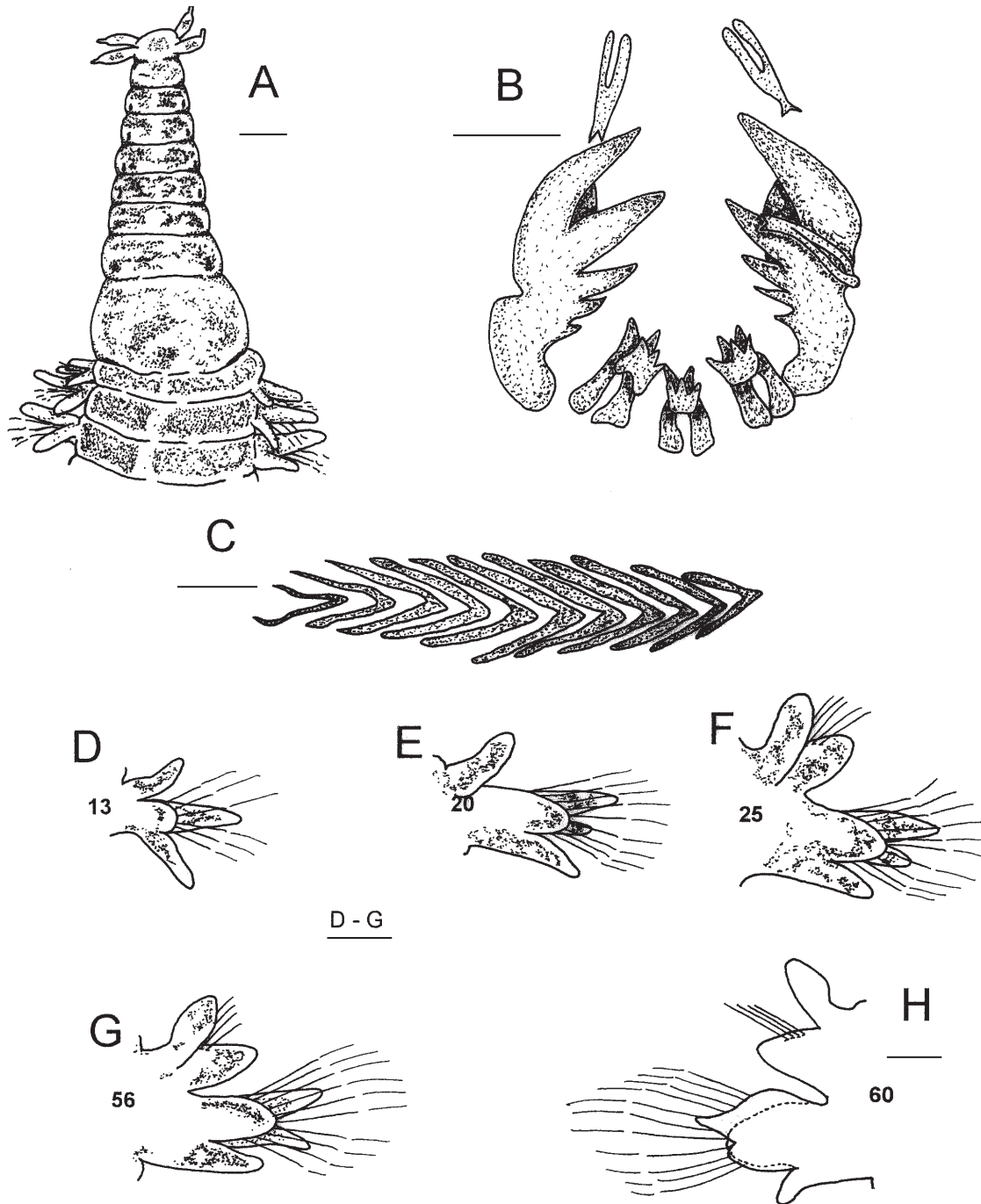


Figure 10 *Goniada cf. asiatica*: A. Anterior end, dorsal view. B. Macrognaths and micrognaths (lowermost dorsal micrognath on left side missing). C. Chevrons. D–G. Parapodia of chaetigers 13, 20, 25 and 56, posterior view. H. Parapodium of chaetiger 60, anterior view. – ZMUC-POL-1072 (A–G) and ZMUC-POL-1098 (H). Scales = 100 μ m (A, D–H) and 50 μ m (B, C).

Description: Body up to 60 mm long with up to 183 segments. Segments uniannulate. Conical prostomium consisting of about 5 irregular, indistinct rings (Figs. 12A–B, 13A; but see Remarks); terminal annulus with four biarticulate appendages; basal annulus with two small eyes. Proboscis with two types of irregularly arranged papillae (Figs. 12F; 13D–F): 1. shorter, heart-

shaped papillae (Fig. 13F) on basal $\frac{1}{3}$ of everted proboscis; 2. longer conical papillae, basally with 5 converging plates (Fig. 13E), on distal $\frac{2}{3}$ of everted proboscis. Macrognaths with 4–5 teeth (Figs. 12C, 13B); 9–24 dorsal and 5–13 ventral, usually H-shaped, compound micrognaths (Figs. 12C–D, 13B–C). 12–16 chevrons on each side of proboscis (Figs. 12E, 13G). First segment usually

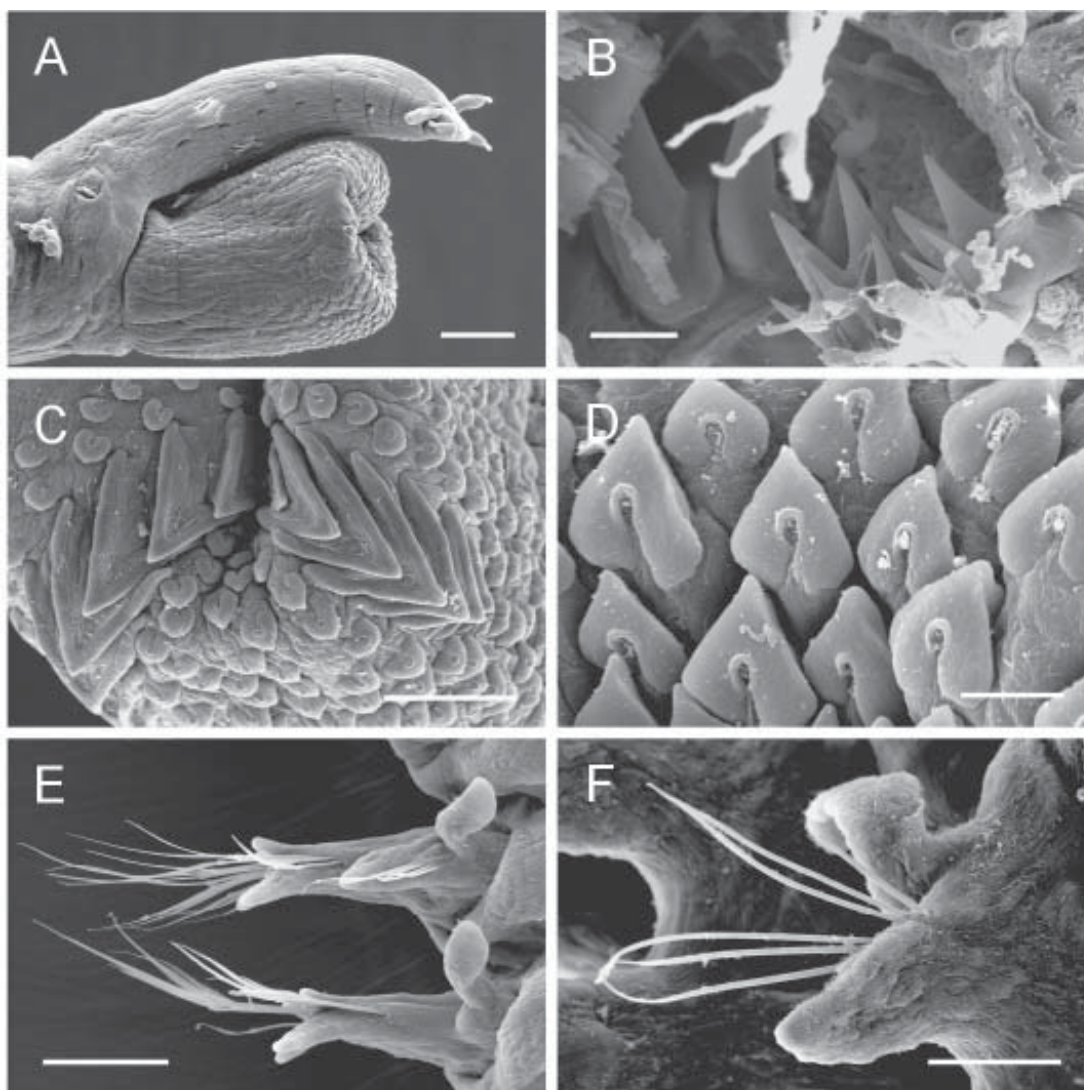


Figure 11 *Goniada cf. asiatica*: A. Anterior end with partially everted proboscis, lateral view. B. Part of the oral ring of jaws, showing section of macrognath (left) and two of the ventral micrognaths (lower right), proboscis opened. C. Opening of partially everted proboscis, showing 7 pairs of chevrons. D. Proboscis papillae. E. Last uniramous (below) and first biramous parapodium, dorsal view. F. Notopodium, anterior view. – SEM micrographs. ZMUC-POL-1073 (A, E, F) and ZMUC-POL-1070 (B–D). Scales = 100 μ m (A, E), 10 μ m (B, D) and 50 μ m (C, F).

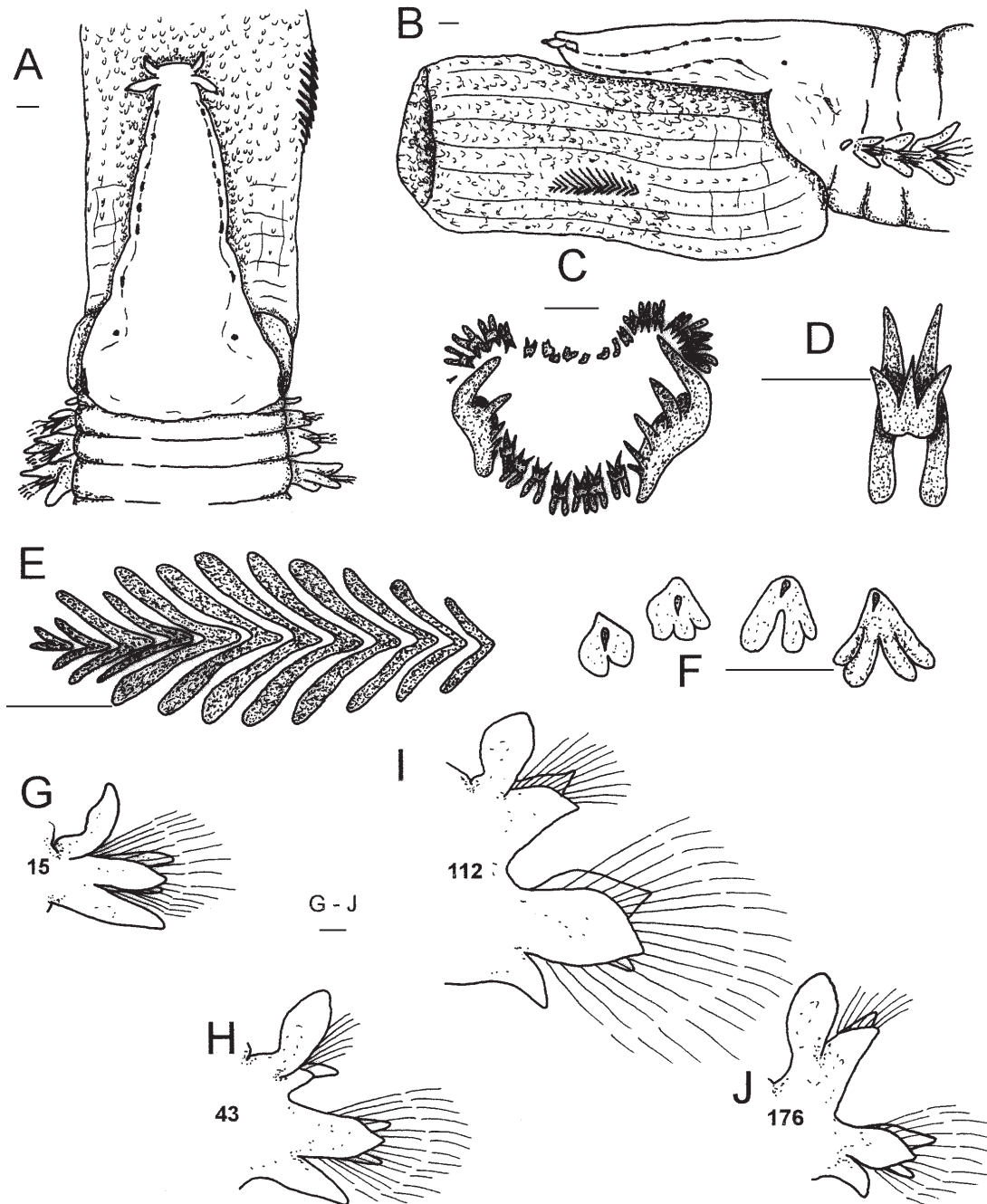


Figure 12 *Goniada congoensis*: A. Anterior end, dorsal view (proboscis partially everted, showing chevrons). B. Anterior end, lateral view (proboscis partially everted, showing chevrons). C. Macrognaths and micrognaths. D. Detail of micrognath. E. Chevrons. F. Various shapes of proboscis papillae, from low, heart-shaped (left) to raised, conical. G–J. Parapodia of chaetigers 15, 43, 112 and 176, posterior view. – ZMUC-POL-1079 (A, B, E–J) and ZMUC-POL-1074 (C, D). Scales = 100 μ m (A–C, E, G–J) and 50 μ m (D, F).

only with minute cirri (Fig. 12A–B). First chaetigers with only one pre- and one postchaetal neuropodial lobe; second, lower prechaetal lobe developed from chaetiger 3–5 (Fig. 12G); both prechaetal lobes conical to digitiform, upper one always slightly longer and broader than lower one; postchaetal lobe slender triangular, about as long as lower prechaetal lobe. 34–36 uniramous chaetigers; following parapodia abruptly biramous (Figs. 12H, 13H), from chaetiger 54–74 with noto- and neuropodia clearly separated (Figs. 12I–J, 13I); anterior notopodia with conical to digitiform prechaetal lobe and shorter, rounded postchaetal lobe; posterior notopodia with ventrally pointed postchaetal lobe (Figs. 12I–J, 13J). Dorsal cirri broadly foliaceous, basally constricted; in biramous parapodia about as long as notopodium. Ventral cirri conical to digitiform; in anterior parapodia about as long as upper neuropodial prechaetal lobe, in biramous parapodia distinctly shorter. Notopodia with 5–14 simple, capillary chaetae (Fig. 13J); neuropodia with numerous compound, spinigerous chaetae.

Remarks: The specimen illustrated on Fig. 12G–J is an epitokous female with enlarged, more triangular, biramous parapodial lobes.

With the exception of the two or three terminal and the basal ring, each of the rings of a goniadid prostomium have two depressions with cilia on each side of the prostomium (Fig. 12B). The number of depressions suggests that the prostomium of *Goniada congoensis* actually consists of ten or eleven rings.

Goniada congoensis was described from the mouth of the Congo River, West Africa. The type material (ZMB V-641) has been lost, but the original description supports the conclusion that our specimens from the Andaman Sea belong to this species.

Our material differs from other descriptions of this species (Arwidsson 1899; Moore 1905, as *G. annulata*) in having fewer chevrons, a greater range in the number of micrognaths and in the presence of eyes. However, other characters agree well with the description provided here, most notably the typically indistinct annulation of the prostomium.

Examination of the holotype of *Goniada hupferi* Arwidsson, 1899 (type locality: Liberia, West Africa; HZM V-1129) demonstrated that this species is synonymous with *G. congoensis*, as suspected by Augener (1918). Augener also suspected that *G. emerita* var. *quinquelabiata* Augener, 1906 is synonymous with *G. congoensis*.

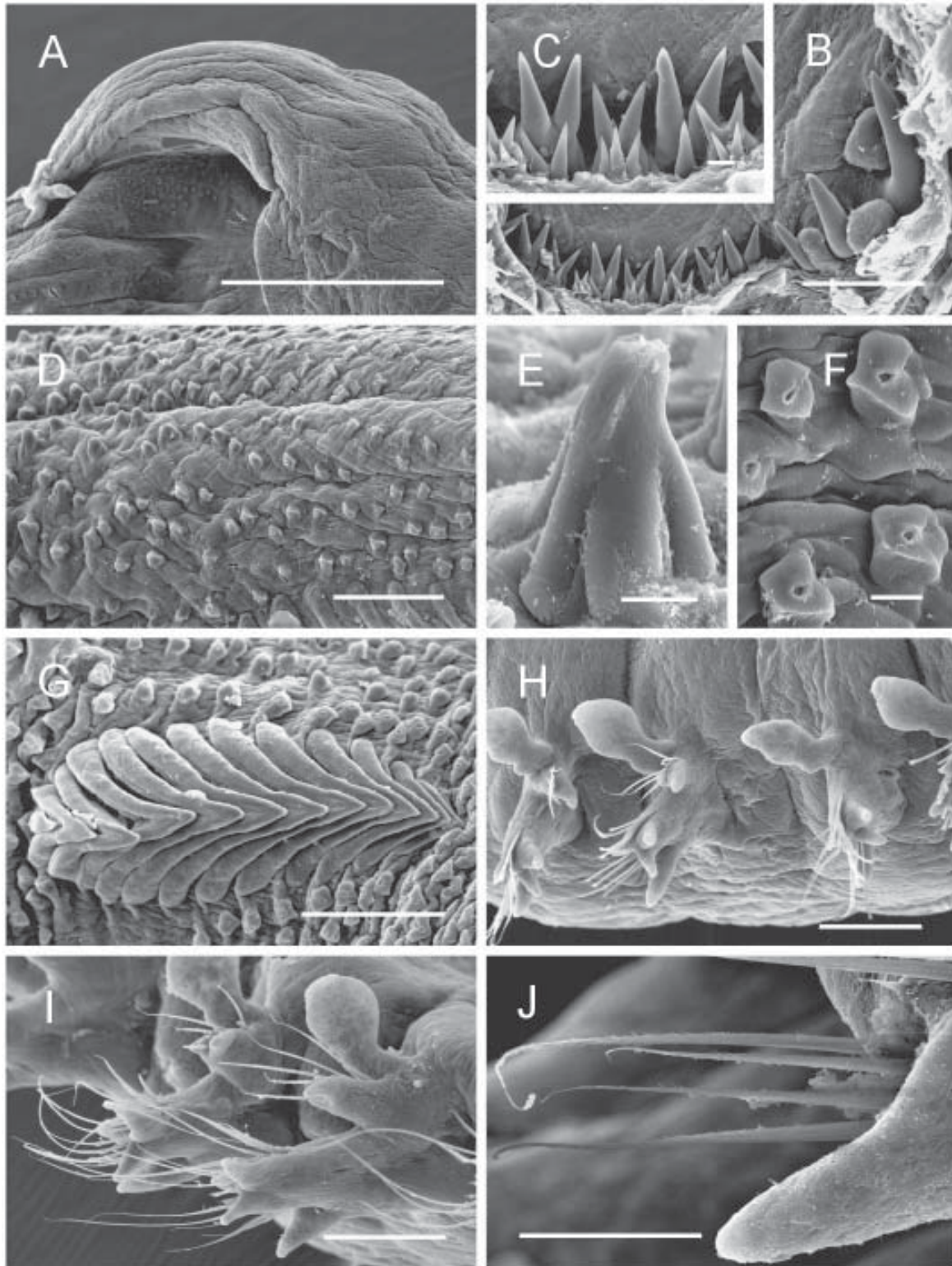
Distribution: N Atlantic, W Africa, Indian Ocean, Andaman Sea, Sea of Okhotsk, Alaska to W Mexico; 7–1430 m.

***Goniada hexadentes* n. sp.**

Figs. 14A–H, 15A–G

Material examined: st. A-2/BC, 9°30' N, 97°51' E, 61 m (1 paratype, ZMUC-POL-1080; 1 paratype on SEM-stub, ZMUC-POL-1081); st. A-2/OS, 9°32' N, 97°50' E, 66 m (1 paratype, USNM 1001188); st. C-2/OS, 9°00' N, 97°53' E, 64 m (6, ZMUC-POL-1082; 1 spec. on SEM-stub, ZMUC-POL-1083); st. E-1/BC, 8°30' N, 98°06' E, 42 m (holotype, PMBC 18251).

Description: Body at least 13 mm long with at least 80 segments (holotype, posteriorly incomplete). Segments uniannulate; posterior segments sometimes appear to be biannulate. Conical prostomium consisting of about 9–10 rings (Figs. 14A–B, 15A–B); terminal annulus with four biarticulate appendages; basal annulus usually with two small eyes. Proboscis covered with short, heart-shaped papillae (Fig. 15E). Macrognaths with about 6 teeth; 4 dorsal Y-shaped and 3 ventral H-shaped, compound micrognaths; second pair of dorsal micrognaths located over macrognaths (Figs. 14D, 15C). 6 chevrons on each side of proboscis (Figs. 14C, 15D). First chaetigers with only one pre- and one postchaetal neuropodial lobe (Fig. 14E); second, lower prechaetal lobe developed from chaetiger 20–21 (Fig. 14F); both prechaetal lobes conical to digitiform, upper one always longer and broader than lower one; postchaetal lobe short and rounded. 26 uniramous chaetigers; following parapodia abruptly biramous, with noto- and neuropodia clearly separated (Figs. 14G–H, 15F); notopodia with conical lobe. Dorsal cirri thumb-shaped and flattened, in biramous



parapodia about as long as notopodia. Ventral cirri conical to digitiform; in anterior parapodia longer than postchaetal lobe, in biramous parapodia as long as postchaetal lobe. Notopodia with a few simple, capillary chaetae (Fig. 15G); neuropodia with numerous compound, spinigerous chaetae.

Remarks: In one specimen only two ventral micrognaths are developed.

Together with *Goniada* cf. *asiatica* Hartman, 1974 and *G. apisiti* n. sp., *G. hexadentes* n. sp. belongs to a group of species in this genus that is characterized by having 4 dorsal Y-shaped and 3 ventral H-shaped micrognaths and notopodia with simple capillary chaetae. However, the number of uniramous chaetigers and the number of chevrons show great differences between them. All three species have probably often been confused with *Goniada maculata* Örsted, 1843, but examination of material in the ZMUC collection from the type locality (Hellebæk, Denmark) and other areas in Europe demonstrate that the “true” *Goniada maculata* has 38–43 uniramous chaetigers, 7–11 pairs of chevrons and the second, lower prechaetal neuropodial lobe developed from chaetiger 25–32. The European material shows the typical 4 dorsal and 3 ventral micrognaths of these species.

Distribution: Only known from the Andaman Sea; 42–66 m.

Etymology: The name of this species refers to the six chevrons which are consistently present on each side of the proboscis.

Goniada multidentata Arwidsson, 1899
Figs. 16A–G, 17A–I

Goniada multidentata Arwidsson, 1899: 45, figs. 41–42, 63. – ?Gravier 1904: 475; ?1906: 148, textfigs. 313–314, pl. 1, figs. 175–178. – Gallardo 1968: 72, pl. 22, figs. 11–12, pl. 23, figs. 1–8. – Phasuk 1992: 82, part.

Goniada multidentata var. *indica* Monro, 1937: 284, textfig. 11. – Wesenberg-Lund 1949: 297.

Material examined: st. A-2/BC, 9°30' N, 97°51' E, 61 m (2 fragments, PMBC 18252); st. E-1/TD, 8°30' N, 98°06' E, 38 m (fragment, PMBC 18253); st. H-1/OS, 7°45' N, 98°16' E, 31 m (1, SMF 10385); st. H-2/BC, 7°45' N, 98°15' E, 59 m (fragment, PMBC 18254); st. H-2/OS, 7°45' N, 98°15' E, 56 m (1, PMBC 18255); st. J-2/OS, 7°15' N, 98°51' E, 61 m (2, PMBC 18256); st. K-4/BC, 7°00' N, 98°21' E, 105 m (1, ZMUC-POL-1084; part of proboscis on SEM-stub, ZMUC-POL-1085); st. L-1/BC, 6°45' N, 99°21' E, 38 m (1, PMBC 18257); st. L-2/OS, 6°44' N, 99°05' E, 56 m (1 + 2 fragments on SEM-stubs, ZMUC-POL-1086); st. RN-3/OS, 7°30' N, 98°17' E, 72 m (2, ZMUC-POL-1087); st. PB-1/BC, 8°00' N, 98°29' E, 19 m (1, PMBC 18258); st. PB-3/BC, 7°51' N, 98°32' E, 22 m (1, ZMUC-POL-1088).

Description: Body up to 53 mm long with up to 166 segments. Segments uniannulate. Conical prostomium consisting of about 9 rings (Figs. 16A–B, 17A); terminal annulus with four biarticulate appendages; basal annulus and sometimes also subdistal annulus (2nd or 3rd) with two small eyes. Proboscis covered with short, heart-shaped, almost triangular papillae (Fig. 17B). Macrognaths with 6–8 teeth; 12–30 dorsal and 3–12 ventral, predominantly H-shaped, compound micrognaths (Figs. 16C, 17C). 55–130 chevrons on each side

Figure 13 *Goniada congoensis*: A. Anterior end, dorsolateral view. B. Ventral micrognaths and one macrognath (at right), proboscis opened. C. Close-up of five ventral micrognaths. D. Section of proboscis showing transition from low, heart-shaped (right) to high, conical papillae (a few chevrons visible at lower right). E. Close-up of high, conical proboscis papilla. F. Close-up of four low, heart-shaped proboscis papillae. G. Chevrons. H. Last uniramous (on right) and first two biramous parapodia, lateral view. I. Two biramous parapodia, anterior view. J. Notopodium with four subacicular capillary notochoetae, posterior view (emergent tip of aciculum visible at top). – SEM micrographs. ZMUC-POL-1076 (A, D–F), ZMUC-POL-1077 (B, C, G, J) and ZMUC-POL-1074 (H, I). Scales = 0.5 mm (A), 100 µm (B, D, G–I), 10 µm (C, E, F) and 50 µm (J).

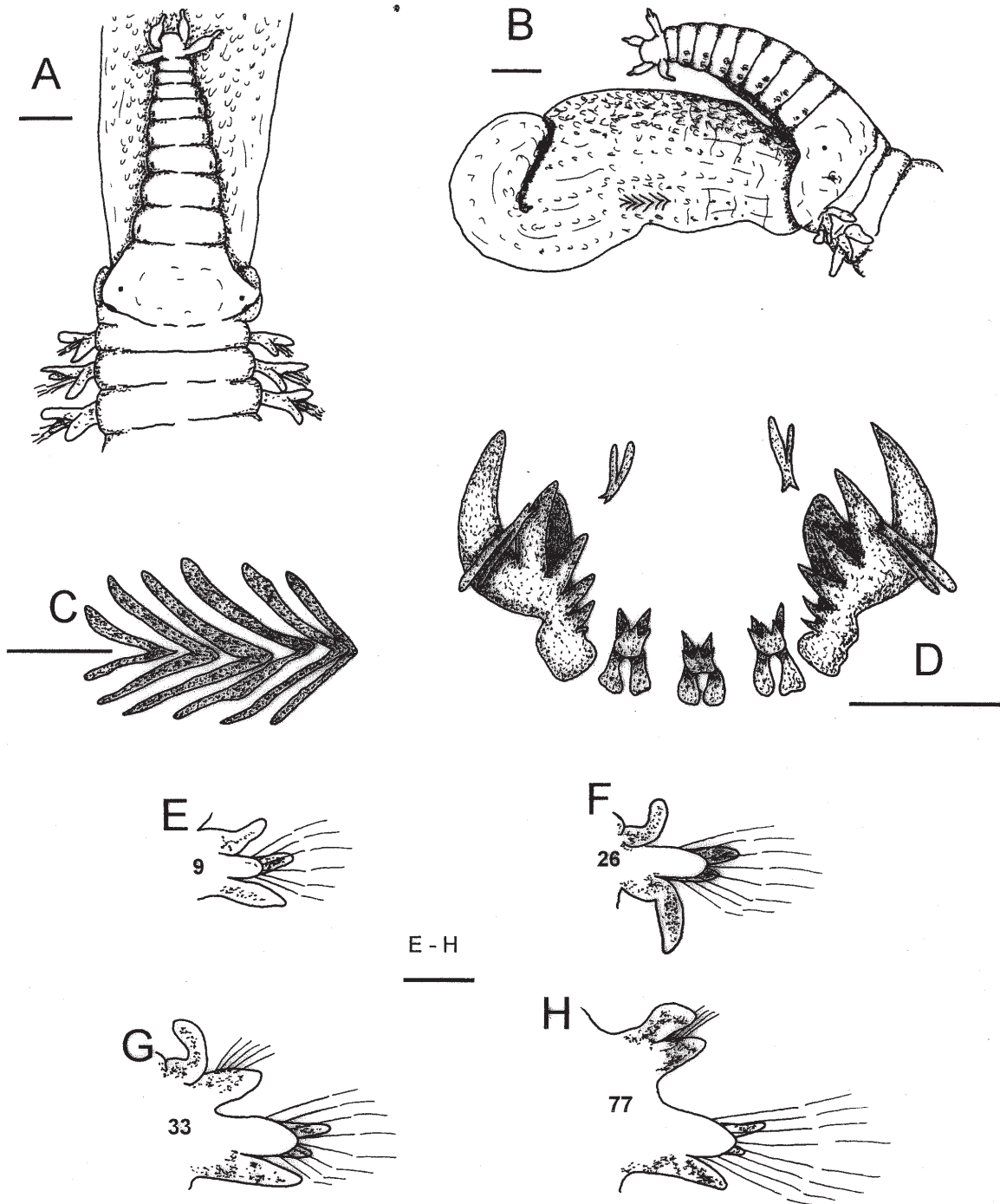


Figure 14 *Goniada hexadentes* n.sp.: A. Anterior end, dorsal view (proboscis partially everted). B. Anterior end, lateral view (proboscis partially everted, showing chevrons). C. Chevrons. D. Macrognaths and micrognaths. E–H. Parapodia of chaetigers 9, 26, 33 and 77, posterior view. – ZMUC-POL-1080 (A–C), ZMUC-POL-1082 (D) and USNM 1001188 (E–H). Scales = 100 μ m (A, B, E–H) and 50 μ m (C, D).

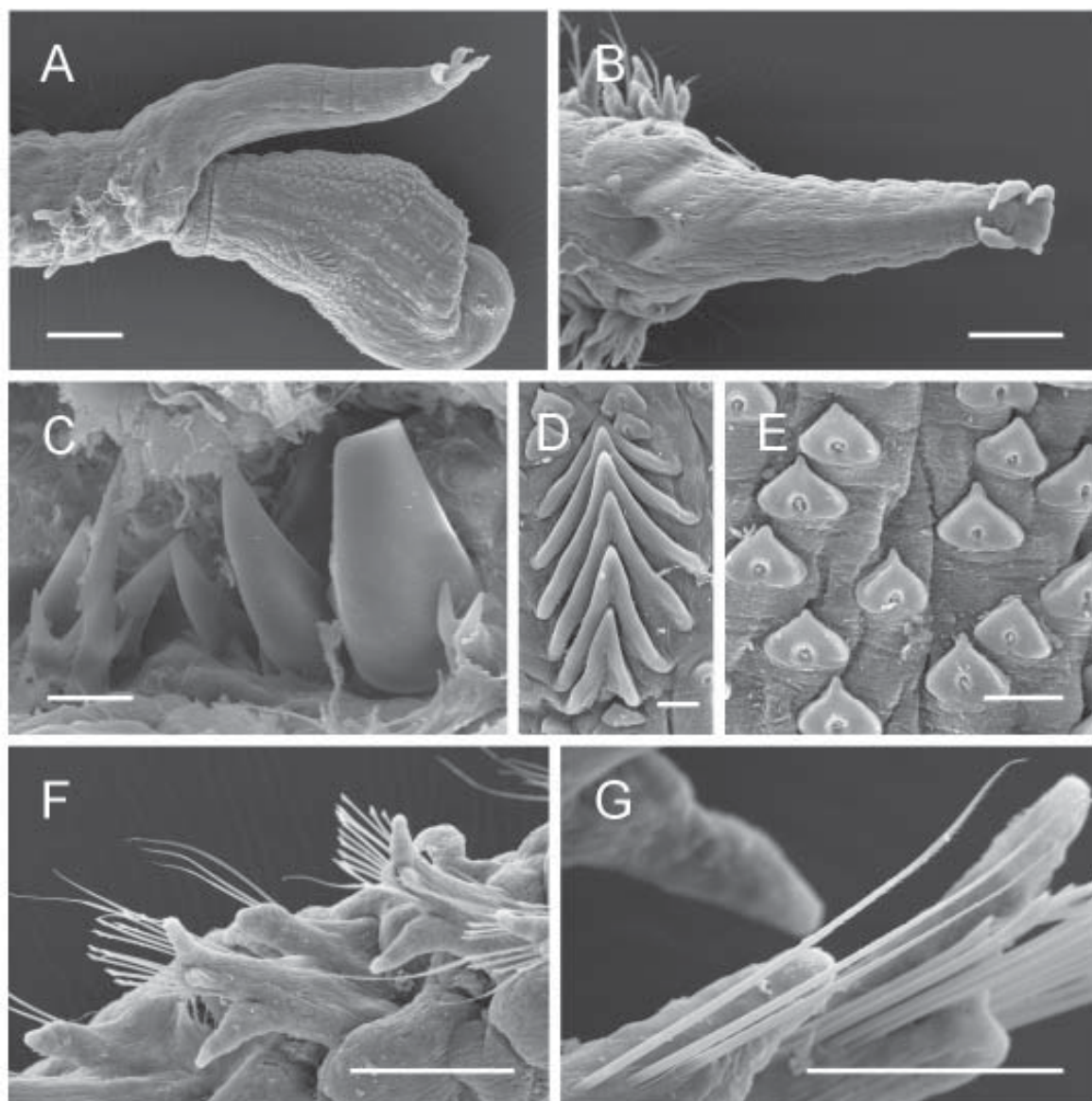


Figure 15 *Goniada hexadentes* n.sp.: A. Anterior end with partially everted proboscis, lateral view. B. Anterior end, dorsal view (base of prostomium damaged). C. Macrognath and two micrognaths (compound on left, simple on far right). D. Chevrons. E. Proboscis papillae. F. Last uniramous (right) and first two biramous parapodia (middle and left), anteroventral view. G. Notopodium with three notochaetae, dorsal view. – SEM micrographs. ZMUC-POL-1083 (A, D–F) and ZMUC-POL-1081 (B, C, G). Scales = 100 μm (A, B, F), 10 μm (C–E) and 50 μm (G).

of proboscis (Fig. 17D–E). First segment usually only with minute cirri (Fig. 16A–B). First chaetigers with only one pre- and one postchaetal neuropodial lobe; second lower prechaetal lobe developed from chaetiger 2–15 (Fig. 16D); both prechaetal lobes digitiform and of about same

length, but upper one always slightly broader than lower one, in last parapodia lower prechaetal lobe shorter; postchaetal lobe always distinctly shorter, at first rounded, from chaetiger 7–13 conical to digitiform, in posterior parapodia broader and more triangular. 34–39 uniramous chaetigers; following

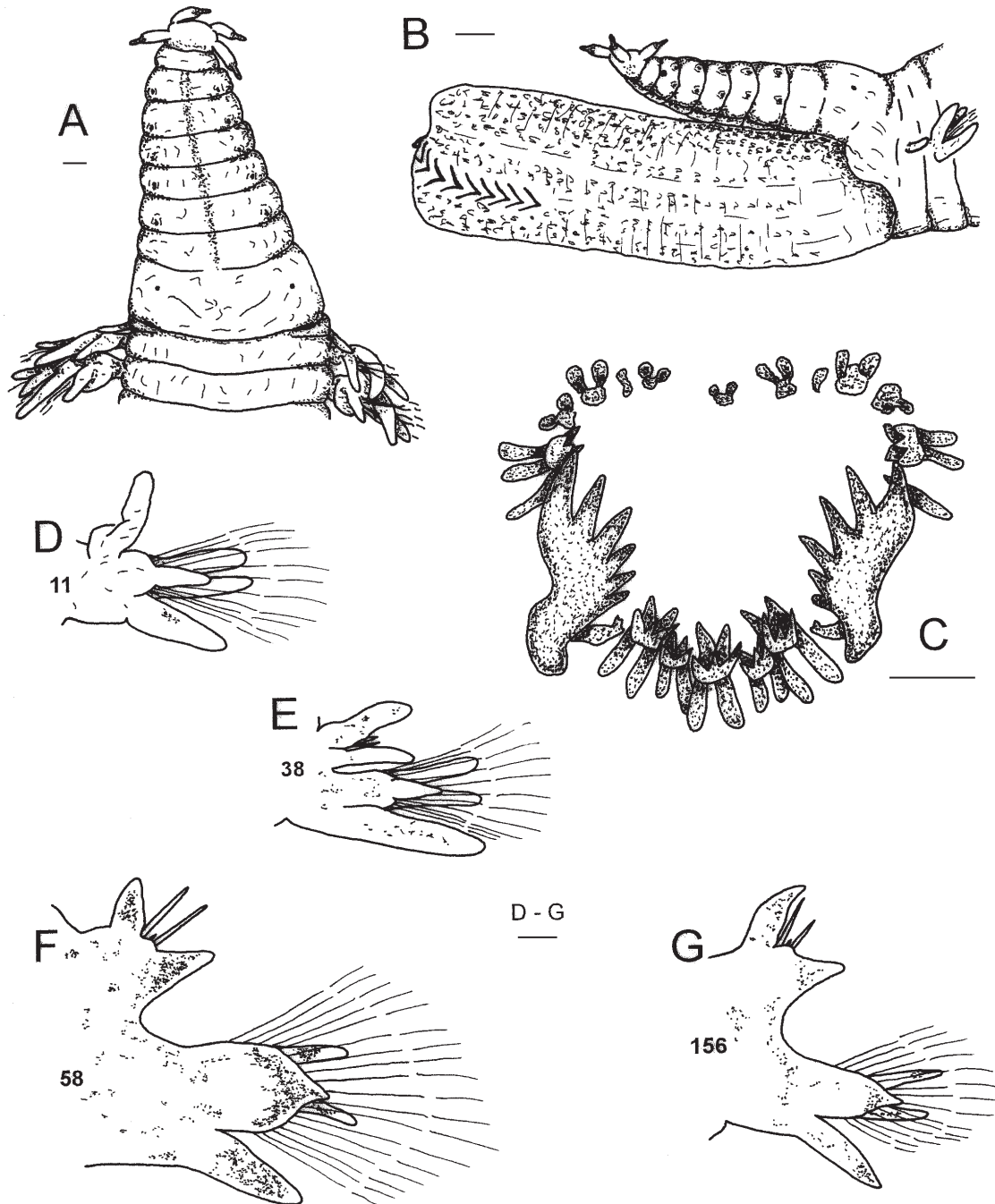


Figure 16 *Goniada multidentata*: A. Anterior end, dorsal view. B. Anterior end, lateral view (proboscis partially everted, showing first chevrons). C. Macrognaths and micrognaths. D–G. Parapodia of chaetigers 11, 38, 58 and 156, posterior view. – ZMUC-POL-1084 (A, D–G) and ZMUC-POL-1088 (B, C). Scales = 100 μm (A, B, D–G) and 50 μm (C).

parapodia abruptly biramous (Figs. 16E, 17F), from chaetiger 38–51 with noto- and neuropodia clearly separated (Figs. 16F–G, 17H); anterior notopodia with digitiform lobe, posterior notopodia with conical to triangular lobe. Dorsal cirri on anterior chaetigers broadly digitiform and shorter than postchaetal lobe; on posterior chaetigers conical and usually slightly longer than notopodium. Ventral cirri broadly digitiform; on anterior parapodia about as long as prechaetal lobe, on posterior parapodia about as long as postchaetal lobe. Notopodia with 1–2 simple, acicular chaetae, situated between dorsal cirrus and notopodium (Figs. 16F–G, 17H–I); neuropodia with numerous compound, spinigerous chaetae (Fig. 17G).

Remarks: The type specimen of *Goniada multidentata indica* Monro, 1937 (type locality: Gulf of Aden; BMNH 1937.9.2.261; animal 28 mm long with 71 segments) differs from *G. multidentata* Arwidsson, 1899 as originally described (type localities: Liberia, Fernando Po and French Congo; HZM V-1127, 1131 and 1134; largest syntype 51 mm long with 181 segments) in that it has only 55 pairs of chevrons (instead of 90), about 23 dorsal and 9 ventral micrognaths (instead of about 24 dorsal and 11 ventral micrognaths) and macrognaths with 8–9 teeth (instead of 9–10).

The largest examined specimen in the BIOSHELF material has 55 pairs of chevrons and 30 dorsal and 12 ventral micrognaths, whereas a smaller one has 125 pairs of chevrons and 16 dorsal and 6 ventral micrognaths. This suggests that during the ontogeny of this species chevrons are actually lost, whereas the number of micrognaths increases. It also gives a clear indication that *Goniada multidentata indica* is synonymous with *G. multidentata*, especially since all other taxonomic features are identical.

Goniada multidentata has previously been reported from 8 stations in the Andaman Sea (Phasuk 1992). Material from 4 of these stations was available for study and almost all specimens could be confirmed as belonging to this species (st. 1007, PMBC 12559; st. 1010, PMBC 12563; st. 1022, PMBC 12562; st. 1023, PMBC 12560 and PMBC 12561; note that st. 1023 was erroneously printed as st. 1203 in Phasuk's list).

However, one animal from st. 1010 (PMBC 12564) belongs to *G. apisiti* n. sp. (*q.v.*).

Distribution: W Africa, Arabian Sea, Indian Ocean, Andaman Sea, S Vietnam; 11–186 m.

Goniada sp. A

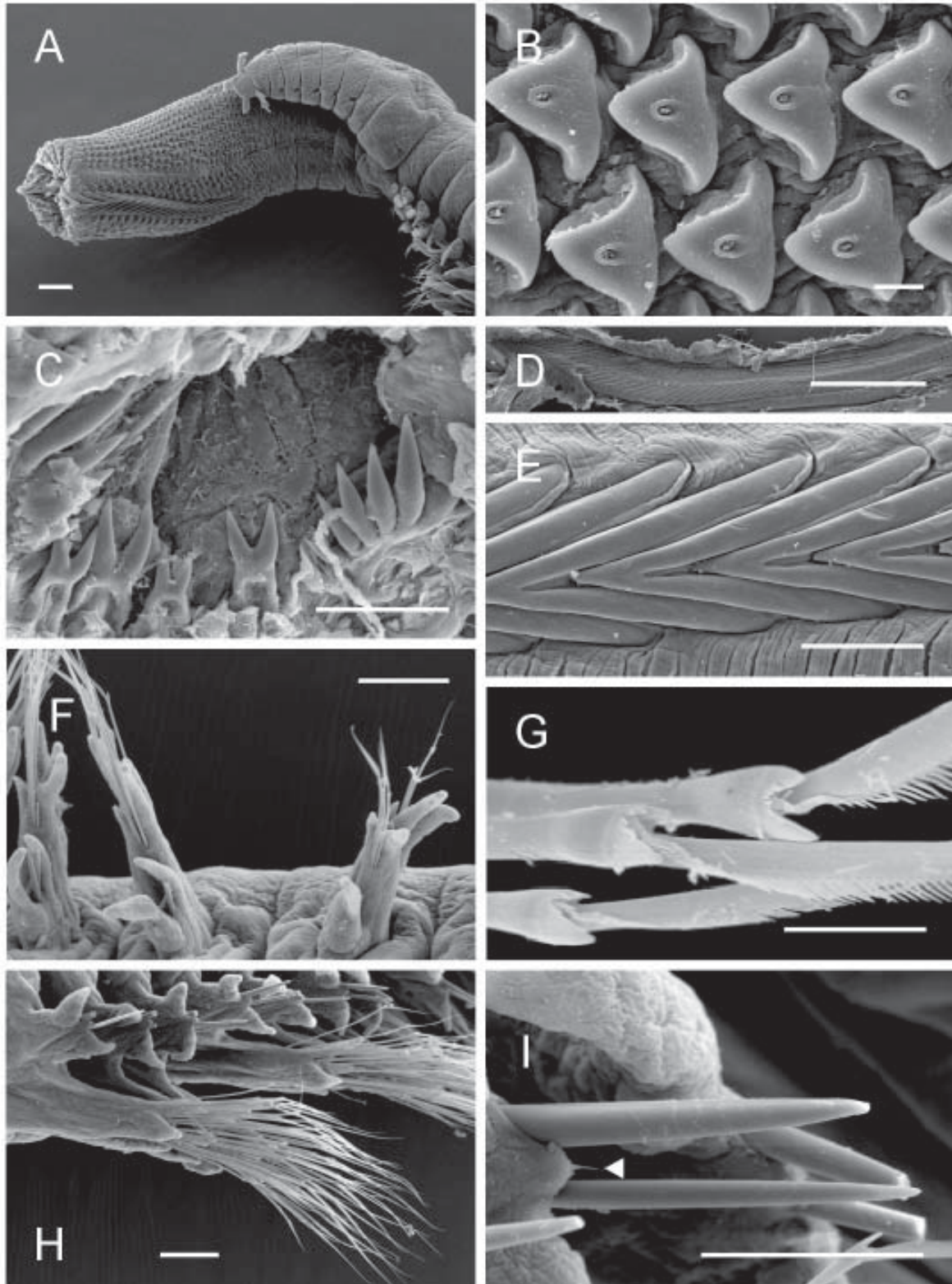
Figs. 9H, 18A–H

Goniada emerita. – ?Phasuk 1992: 82. – [Not Audouin and Milne Edwards, 1833: 268, pl. 18, figs. 1–4.]

Material examined: st. RY-2/BC, 7°39' N, 98°23' E, 45 m (1, ZMUC-POL-1089; part of proboscis on SEM-stub, ZMUC-POL-1090).

Description: Body up to 13 mm long with up to 100 segments. Segments uniannulate. Conical prostomium consisting of about 10 rings (Fig. 18A); terminal annulus with four biarticulate appendages; basal annulus with two small eyes. Proboscis covered with elongate heart-shaped, almost quadrangular papillae (Fig. 9H). Macrognaths with about 4 teeth; 6 dorsal and 3 ventral, H-shaped, compound micrognaths (Fig. 18B). 12 chevrons on each side of proboscis (Fig. 18C). First chaetigers with only one pre- and one postchaetal neuropodial lobe (Fig. 18D); second, lower prechaetal lobe developed from chaetiger 19 (Fig. 18E); both prechaetal lobes digitiform, but upper one always distinctly longer and broader than lower one; postchaetal lobe bluntly conical to triangular, always distinctly shorter. 57 uniramous chaetigers (Fig. 18F); following parapodia abruptly biramous, with noto- and neuropodia clearly separated (Fig. 18G–H); notopodia digitiform. Dorsal cirri slender conical to digitiform, slightly longer than notopodia. Ventral cirri digitiform, about as long as lower prechaetal lobe. Notopodia with 1–3 simple, acicular chaetae, situated above dorsal cirrus, between dorsal cirrus and notopodium and below notopodium (Fig. 18G); neuropodia with numerous compound, spinigerous chaetae.

Remarks: The single specimen of this species is most similar to *Goniada acicula* Hartman, 1940



(type locality: Gulf of California), *Goniada teres* Treadwell, 1931 (type locality: Montego Bay, Jamaica) and *Goniada tripartita* Monro, 1931 (type locality: W of Low Isles, Great Barrier Reef, Queensland) in the number of uniramous chaetigers and in the arrangement of their acicular notochoetae. However, all three species have a larger number of micrognaths (*Goniada acicula*: 15–17 dorsal and 13–14 ventral; *Goniada teres*: 10–15 dorsal and 5–9 ventral; *Goniada tripartita*: a total of 24 micrognaths), the tips of the acicular notochoetae of *Goniada teres* are distinctly curved and in *Goniada tripartita* only 8 pairs of chevrons are present. The specimen here might be a juvenile stage of one of these species.

Phasuk (1992: 82) reported *Goniada emerita* Audouin and Milne Edwards, 1833 from two stations in the Andaman Sea. Only one of these lots was available for study. The specimen in question (st. 1006, PMBC 12453) has 14 pairs of chevrons, 67 uniramous chaetigers, acicular notochoetae and parapodia with elongate prechaetal lobes (the number of micrognaths on the proboscis could not be determined). In these characters it agrees well with *G. emerita* as reported by Fauvel (1923: 391) and Hartman (1950: 32), but there is an important difference in the arrangement of the acicular notochoetae. According to Fauvel and Hartman each notopodium has two notochoetae, both arising between the dorsal cirrus and the notopodial lobe (similar to the configuration in *G. multidentata* Arwidsson, 1899; see Figs. 16F–G, 17H–I). The specimen reported by Phasuk is similar to *G. amacrognatha* n. sp. (Figs. 6G, 7H) and *Goniada* sp. A (Fig. 18G) in having 3 large acicular notochoetae arranged one above the dorsal cirrus, one between the dorsal cirrus and the notopodial lobe and one below the notopodial lobe. It differs from *Goniada* sp. A only in the number of uniramous

chaetigers (67 rather than 57) and may very well be conspecific with it, but more material is needed before a well-informed conclusion can be drawn.

Distribution: Andaman Sea; 45 m.

Goniadides Hartmann-Schröder, 1960

Type species: *Goniadides aciculata* Hartmann-Schröder, 1960: 116, pl. 17, figs. 160, 162–163, pl. 18, fig. 159, pl. 19, fig. 161, pl. 20, fig. 164, by monotypy.

Goniadides carolinae Day, 1973 *sensu* Gilbert 1984

Figs. 19A–F, 20A–C

?*Goniadides carolinae* Day, 1973b: 48, fig. 7a–h.
– Gilbert 1984: 17, figs. 13, 14a–f.

Material examined: st. RY-2/BC, 7°39' N, 98°23' E, 45 m (2, ZMUC-POL-1091; fragment on SEM-stub, ZMUC-POL-1092).

Description: Body at least 25 mm long with at least 110 segments. Anterior segments more or less biannulate, posterior ones uniannulate. Conical prostomium consisting of about 8 rings (Fig. 19A); terminal annulus with four long, indistinctly tetra-articulate appendages; basal annulus with two small eyes. Proboscis with several different kinds of papillae which were not further investigated due to poor state of preservation. Ring of macro- and micrognaths also greatly damaged, but about 9 dorsal and 1 ventral micrognaths appear to be present (Fig. 19B). Chevrons absent. First segment usually only with minute cirri (Fig. 19A). Parapodia with one pointed digitiform neuropodial prechaetal lobe and one shorter, rounded postchaetal lobe. 8 uniramous chaetigers (Fig.

Figure 17 *Goniada multidentata*: A. Anterior end with partially everted proboscis, dorsolateral view. B. Proboscoidal papillae. C. Macrognaths and ventral micrognaths, proboscis opened. D. Part of row of chevrons, body wall opened. E. Close-up of chevrons. F. Last uniramous (right) and first two biramous parapodia, dorsal view. G. End of shaft and base of distal article of 3 neuropodial compound spinigers. H. Biramous parapodia, posterior view. I. Two notochoetae (note emergent tip of notoaciculum between them, arrowhead). – SEM micrographs. ZMUC-POL-1086 (A–C, F–I) and ZMUC-POL-1085 (D, E). Scales = 100 µm (A, E, F, H), 10 µm (B, G), 50 µm (C, I) and 1 mm (D).

19C), following parapodia subbiramous (Figs. 19D, 20A); notopodial lobe not present. Dorsal cirri and ventral cirri pointed digitiform, of about

same length, but both distinctly shorter than postchaetal lobe. 1–2 curved acicular notochaetae (Figs. 19E, 20C) arising directly from body wall

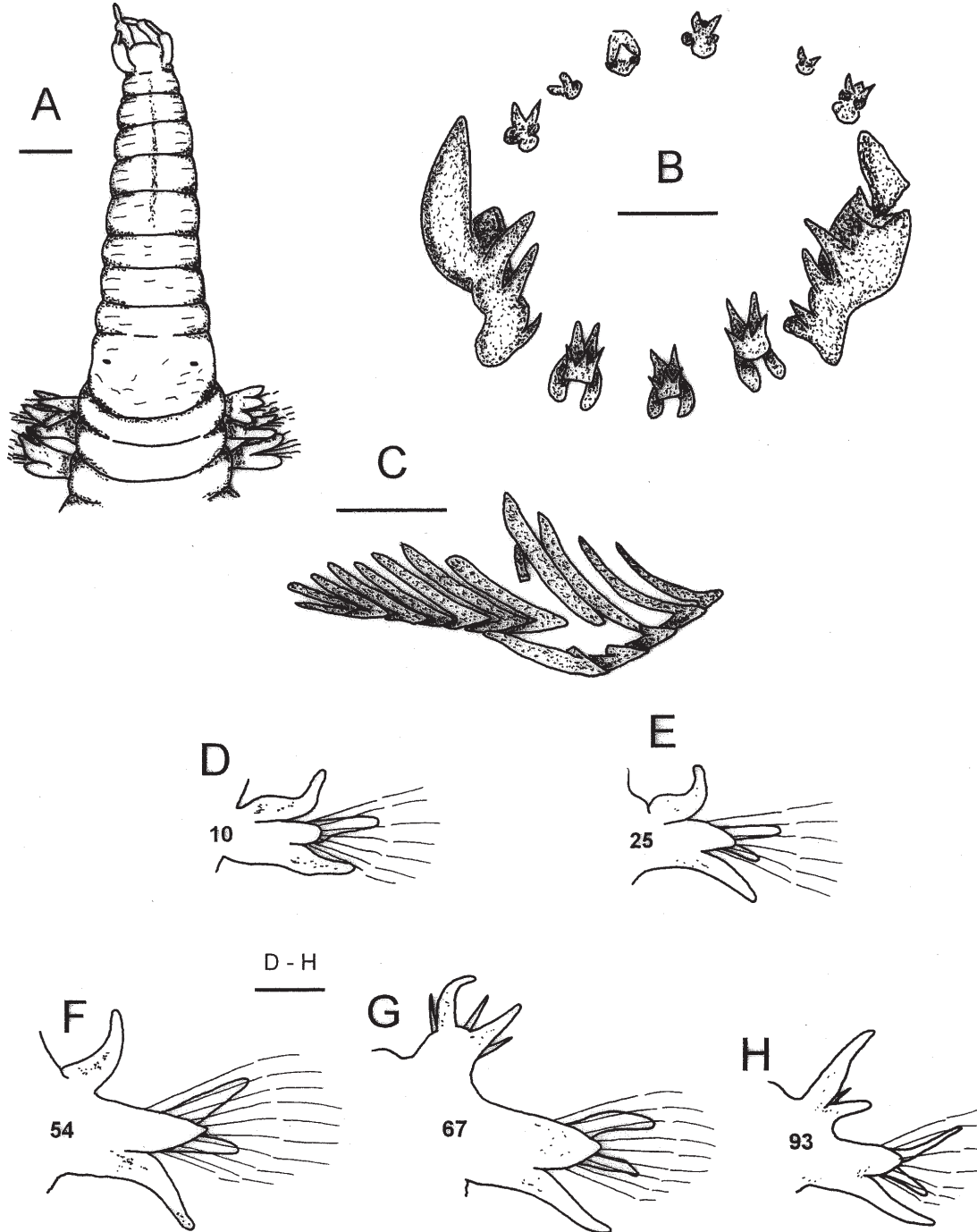


Figure 18 *Goniada* sp.: A. Anterior end, dorsal view. B. Macrognaths and micrognaths. C. Chevrons (partly damaged). D–H. Parapodia of chaetigers 10, 25, 54, 67 and 93, posterior view. – ZMUC-POL-1089. Scales = 100 μ m (A, D–H) and 50 μ m (B, C).

above dorsal cirri (Figs. 19D, 20A); neuropodia with a few compound spinigerous and falcigerous chaetae (Figs. 19F, 20B).

Remarks: The specimens differ from the original description of *Goniadides carolinae* Day, 1973 (type locality: Beaufort, North Carolina; USNM 43389) in the number of uniramous parapodia. According to Day (1973b) 18–19 uniramous chaetigers were present, but specimens from the Gulf of Mexico were reported to have 8–9 uniramous chaetigers (Gilbert 1984), as in the animals here. The cause of this discrepancy may be a printing error in Day; we have not had the opportunity to study either Day's or Gilbert's material.

The pattern of pigmentation described by Gilbert (1984, fig. 14a) was not seen on the two animals reported on here. However, our decision to refer these animals to Gilbert's species is

primarily based on the fact that all morphological characters that could be compared appear to be identical in the two, including the number and distribution of micrognaths.

Distribution: North Carolina?, Gulf of Mexico, Andaman Sea; 10–82 m. New record for the Indian Ocean.

Ophioglycera Verrill, 1885

Type species: *Ophioglycera gigantea* Verrill, 1885: 436, by monotypy (see note in Hartman 1950: 36).

Ophioglycera lyra Granados-Barba and Solís-Weiss, 1997

Figs. 21A–M, 22A–G

Ophioglycera sp. A. – Gilbert 1984: 19, figs. 15, 16a–k.

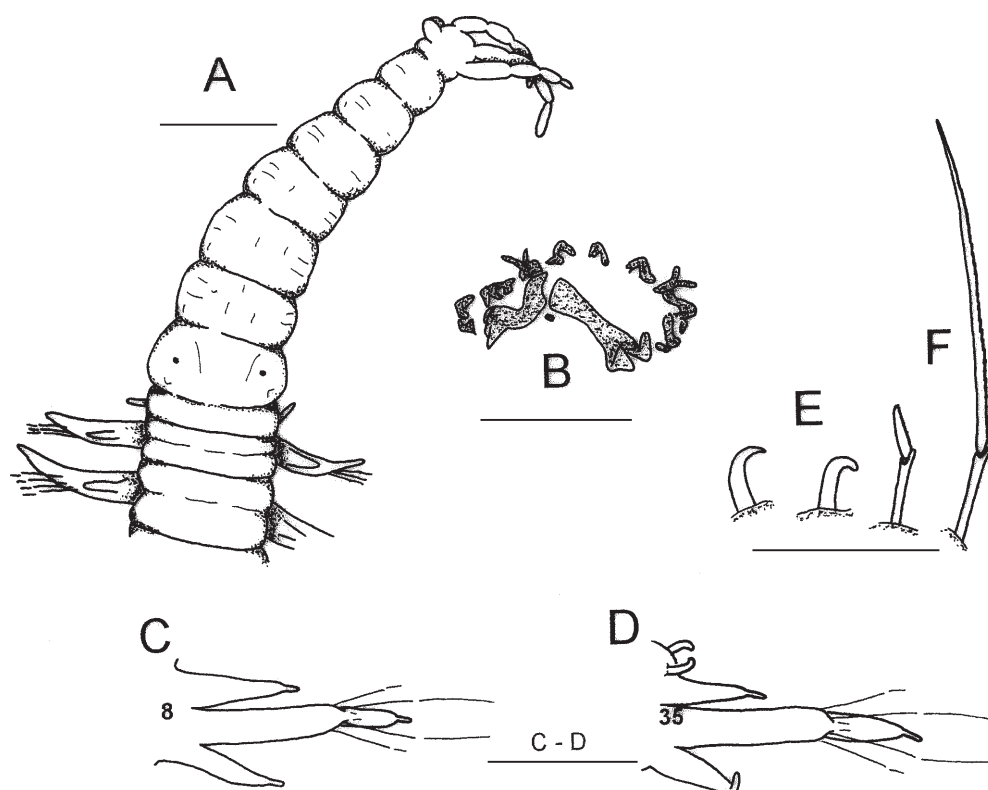


Figure 19 *Goniadides carolinae*: A. Anterior end, dorsal view. B. Macrognaths and micrognaths (greatly damaged). C. Parapodium of chaetiger 8, posterior view. D. Parapodium of chaetiger 35, posterior view. E. Two acicular notochoetae. F. Neurochaetae: compound falciger (left) and compound spiniger (right). – ZMUC-POL-1091. Scales = 100 μ m (A, C, D) and 50 μ m (B, E, F).

Ophioglycera lyra Granados-Barba and Solís-Weiss, 1997: 462, figs. 2–3.

Material examined: st. I-1/BC, 7°30' N, 98°57' E, 38 m (1, ZMUC-POL-1093; fragment on SEM-stub, ZMUC-POL-1094; part of proboscis on SEM-stub, ZMUC-POL-1095).

Description: Body up to 52 mm long with up to 192 segments. Segments uniannulate, sometimes appearing to be biannulate. Conical prostomium consisting of about 10 rings (Fig. 21A); terminal

annulus with four uniarticulate appendages; eyes absent. Proboscis with two types of irregularly arranged papillae: longer conical papillae with basally converging (?) plates and short, heart-shaped papillae (Fig. 22A). Macrognaths with 3–4 teeth; 21 dorsal and 7 ventral, predominantly H-shaped, compound micrognaths (Fig. 21B–C). Chevrons absent. First segment with only minute cirri (Fig. 22A). First chaetiger with only one pre- and one postchaetal neuropodial lobe; second, lower prechaetal lobe developed from chaetiger 2 (Fig. 21D); both prechaetal lobes digitiform, but

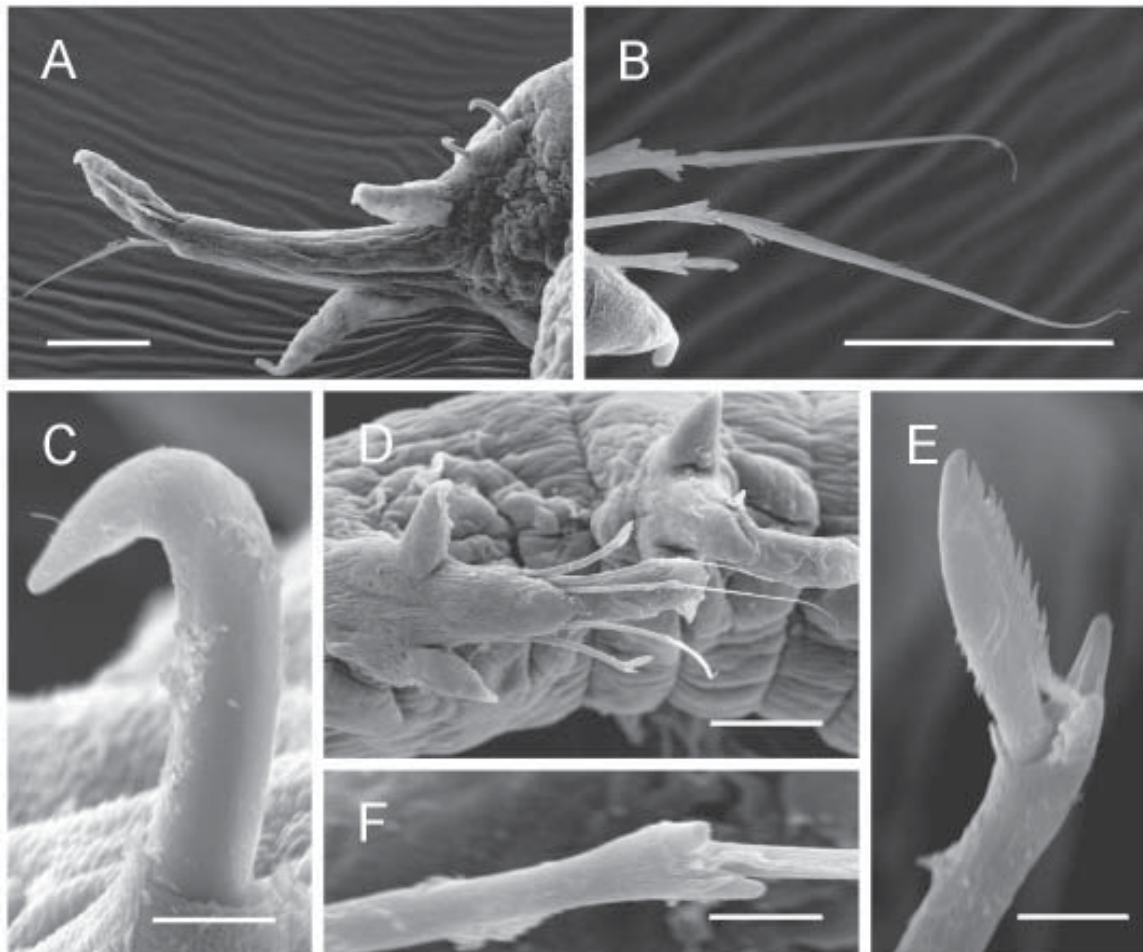


Figure 20 *Goniadides carolinae*: A. Biramous parapodium, dorso-posterior view. B. Two compound spinigerous and one compound falcigerous neurochaetae. C. Notopodial hook. – *Progoniada* sp. A: D. Parapodium with three compound spinigers and two compound falcigers, posterior view. E. Detail of lowermost compound falciger in D. F. End of shaft of compound spiniger. – SEM micrographs. ZMUC-POL-1092 (A–C) and ZMUC-POL-1097 (D–F). Scales = 50 μ m (A, B, D) and 5 μ m (C, E, F).

upper one always distinctly longer and broader than lower one; conical to triangular postchaetal lobe always distinctly shorter. 53–54 uniramous chaetigers (Fig. 21D–F), following parapodia

abruptly biramous (Fig. 21G), from chaetiger 58 with noto- and neuropodia clearly separated (Figs. 21H–J, 22B); notopodia with small conical lobe (Fig. 22D). Dorsal cirri on anterior chaetigers

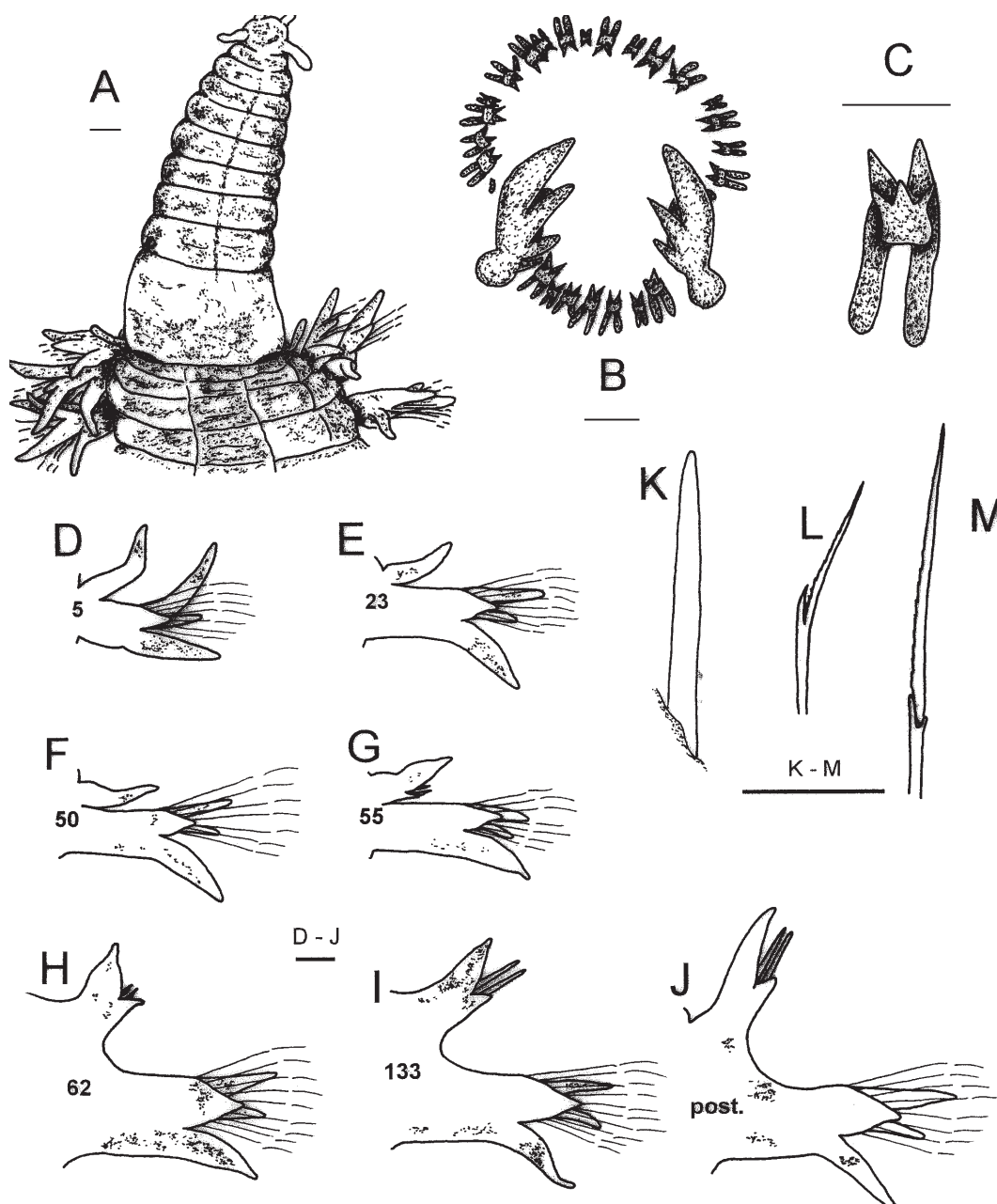


Figure 21 *Ophioglycera lyra*: A. Anterior end, dorsal view. B. Macrognaths and micrognaths. C. Detail of compound micrognath. D–J. Parapodia of chaetigers 5, 23, 50, 55, 62, 133 and of posterior chaetiger, posterior view. K. Notochaeta. L. Lyrate neurochaeta. M. Compound neuropodial spiniger. – ZMUC-POL-1093. Scales = 100 µm (A, B, D–J) and 50 µm (C, K–M).

digitiform; in biramous parapodia pointed conical and distinctly longer than notopodia; in last parapodia elongated and more digitiform. Ventral cirri broadly digitiform; in anterior parapodia about as long as upper prechaetal lobe, in posterior parapodia about as long as lower prechaetal lobe and more narrow. Notopodia with 1–2 simple, acicular chaetae,

situated between dorsal cirrus and notopodium (Figs. 21K, 22G); neuropodia with numerous compound, spinigerous chaetae (Figs. 21M, 22C) and in biramous parapodia additionally with 1–2 simple, lyrate chaetae in superior position (Figs. 21L; 22C, F).

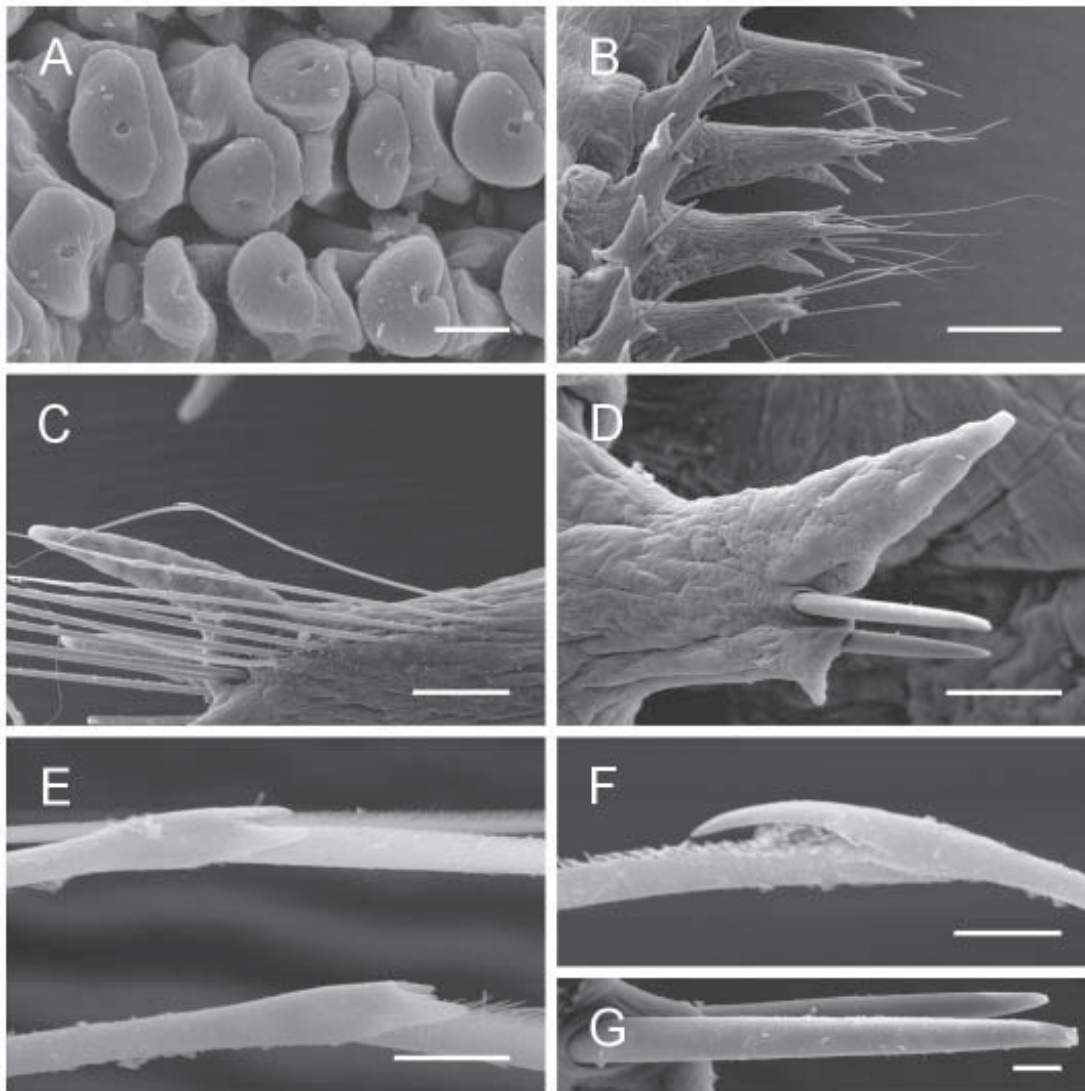


Figure 22 *Ophioglycera lyra*: A. Proboscis papillae. B. Biramous parapodia, dorso-anterior view. C. Detail of supraacicular neurochaetae showing complete lyrate chaeta (dorsalmost). D. Notopodium with two acicular notochoetae. E. Compound neuropodial spinigers, end of shafts and base of distal articles. F. Detail of lyrate chaeta showing short tine and base of long tine. G. Close-up of acicular notochoetae. – SEM micrographs. ZMUC-POL-1095 (A) and ZMUC-POL-1094 (B–G). Scales = 10 μ m (A, E, G), 0.25 mm (B), 50 μ m (C, D) and 5 μ m (F).

Remarks: A close comparison of the original description of this species (type locality: Gulf of Mexico; USNM 175433) and that given by Gilbert (1984, as *Ophioglycera* sp. A) with the BIOSHELF specimen shows complete agreement in morphological characters.

Distribution: Gulf of Mexico, Andaman Sea; 15–98 m. New report for the Indian Ocean.

Progoniada Hartman, 1965

Type species: *Progoniada regularis* Hartman, 1965: 100, pl. 16a–f, by monotypy.

Progoniada sp. A Fig. 20D–F

Material examined: st. RN-2/OS, 7°26' N, 98°18' E, 75 m (fragment, ZMUC-POL-1096; fragment on SEM-stub, ZMUC-POL-1097).

Description: Posterior fragment, 11 mm long, with 68 segments. Segments triannulate (Fig. 20D). Parapodia with one relatively elongate, conical to digitiform neuropodial prechaetal lobe and one shorter, rounded to bluntly conical postchaetal lobe; all parapodia uniramous; notopodial lobes and notochaetae absent (Fig. 20D). Dorsal cirri and ventral cirri pointed conical to digitiform; of about same length, both distinctly shorter than postchaetal lobe (Fig. 20D). All chaetae compound, uppermost and lowermost ones falcigerous (Fig. 20D–E), middle ones spinigerous (Fig. 20D, F).

Remarks: *Progoniada* is the only genus of Goniadidae in which all parapodia are uniramous and at least some of the chaetae are spinigerous; the other genus having only uniramous parapodia (*Progoniadides* Hartmann-Schröder, 1974) has only falcigerous chaetae. Two species have been described until now: *Progoniada regularis* Hartman, 1965 (type locality: off New England), with spinigerous and falcigerous chaetae and *P. simplex* Hartman, 1971 (type locality: Moçambique), with only spinigerous chaetae. The examined BIOSHELF fragment resembles *Progoniada regularis*, but without the anterior fragment confident identification is impossible.

Distribution: Andaman Sea; 75 m.

ACKNOWLEDGMENTS

The staff of the Phuket Marine Biological Center is thanked for providing excellent facilities during the Thai–Danida Polychaete Workshop, June–August 1997. We are grateful for the practical assistance provided by Apisit Thipaksorn (Bangkok) during the workshop. The following persons are thanked for loan of material: Angelika Brandt and Gisela Wegener (HZM); Christer Erséus and Karin Sindemark (SMNH); David George, Alexander Muir and Sean Davidson (BMNH); Władysław Rydzewski (MPUW); Fredrik Pleijel (MNHN). Bjarne Bisballe (ZMUC) carried out the critical point drying of specimens for SEM investigation. This paper was financially supported by the European Community – Access to Research Infrastructure initiative of the Improving Human Potential Programme (COBICE project number I 03).

REFERENCES

- Arwidsson, I. 1899. Studien über die Familien Glyceridæ und Goniadidæ. Bergens Museums Aarvog **11**: 32–63.
- Audouin, J.V. and H. Milne Edwards. 1833. Classification des annélides, et description de celles qui habitent les côtes de la France. Annales des Sciences Naturelles **29**: 195–269.

- Augener, H. 1906. Reports on the results of dredging, under the supervision of Alexander Agassiz, in the Gulf of Mexico and the Caribbean Sea and on the east coast of the United States, 1877 to 1880, by the US Coast Survey Steamer "Blake", Lieut. Commander C.D. Sigsbee, USN and Commander J.R. Bartlett, USN, Commanding. XLII. Westindische Polychaeten. Bulletin of the Museum of Comparative Zoölogy at Harvard College **43**: 91–196.
- Augener, H. 1918. Polychaeta. **In**: W. Michaelsen (ed.), Beiträge zur Kenntnis der Meeresfauna Westafrikas **2**: 67–625.
- Augener, H. 1931. Die bodensässigen Polychäten nebst einer Hirudinee der Meteor-Fahrt. Mitteilungen aus dem Zoologischen Staatsinstitut und Zoologischen Museum in Hamburg **44**: 279–313.
- Aungtonya, C. and D. Eibye-Jacobsen. 2002. Introduction to the Thai–Danish BIOSHELFB sampling project and the Polychaete Workshop held in Phuket, Thailand, June–August 1997. Phuket Marine Biological Center Special Publication **24**: 1–12.
- Böggemann, M. and D. Fiege. 2001. Description of seven new species of the genus *Glycera* Savigny, 1818 (Annelida: Polychaeta: Glyceridae). *Ophelia* **54**: 29–49.
- Böggemann, M., D. Fiege and G. Purschke. 2000. Ultrastructure of the proboscicial papillae in some *Glycera* species (Annelida: Polychaeta: Glyceridae). *Cahiers de Biologie Marine* **41**: 143–153.
- Day, J.H. 1973a. Polychaeta collected by U.D. Gaikwad at Ratnagiri, south of Bombay. *Zoological Journal of the Linnean Society* **52**: 337–361.
- Day, J.H. 1973b. New Polychaeta from Beaufort, with a key to all species recorded from North Carolina. NOAA Technical Report NMFS–CIRC **375**: 1–141.
- Ehlers, E. 1864 and 1868. Die Borstenwürmer (Annelida Chaetopoda) nach systematischen und anatomischen Untersuchungen dargestellt. Verlag von Wilhelm Engelmann, Leipzig. Erster Band, 748 pp., pls. 1–24 (pp. 1–268, pls. 1–11 published in 1864; pp. 269–748, pls. 12–24 in 1868).
- Ehlers, E. 1887. Reports on the results of dredging, under the direction of L.F. Pourtalès, during the years 1868–1870 and of Alexander Agassiz, in the Gulf of Mexico (1877–78) and in the Caribbean Sea (1878–79), in the US Coast Survey Steamer "Blake", Lieut.-Com. C.D. Sigsbee, USN and Commander J.R. Bartlett, USN, Commanding. XXI. Report on the Annelids. *Memoirs of the Museum of Comparative Zoölogy at Harvard College* **15**: 1–335.
- Fauchald, K. and P.A. Jumars. 1979. The diet of worms: a study of polychaete feeding guilds. *Oceanography and Marine Biology, An Annual Review* **17**: 193–284.
- Fauvel, P. 1923. Polychètes érrantes. *Faune de France* **5**: 1–488.
- Fauvel, P. 1932. Annelida Polychaeta of the Indian Museum, Calcutta. *Memoirs of the Indian Museum* **12**: 1–262.
- Fauvel, P. 1933. Annélides polychètes du Golf du Pei Tcheu Ly de la collection du Musée Hoang ho Pai ho. *Publications du Musée Hoang ho Pai ho de Tien Tsin* **15**: 1–67.
- Fauvel, P. 1939. Annélides polychètes de l'Indochine recueillies par M.C. Dawydoff. *Pontificia Academia Scientiarum, Commentationes, Anno III* **3**: 243–368.
- Fauvel, P. 1953. Annelida Polychaeta. The Fauna of India including Pakistan, Ceylon, Burma and Malaya. The Indian Press Ltd., Allahabad. 507 pp.
- Fiege, D. and M. Böggemann. 1997. Scanning electron microscopy of the proboscicial papillae of some European Glyceridae. *Bulletin of Marine Science* **60**: 559–563.
- Gallardo, V.A. 1968. Polychaeta from the Bay of Nha Trang, South Viet Nam. *Naga Report* **4** (3): 35–279. [erroneously dated 1967]
- Gilbert, K.M. 1984. Chapter 33: Family Goniadidae Kinberg, 1866b. **In**: J.M. Uebelacker and P.G. Johnson (eds.), *Taxonomic Guide to the Polychaetes of the Northern Gulf of Mexico* **5**. Barry A. Vittor and Associates, Inc., Metairie, Louisiana, pp. 1–19.

- Granados-Barba, A. and V. Solís-Weiss. 1997. The polychaetous annelids from oil platform areas in the southeastern Gulf of Mexico: Phyllodocidae, Glyceridae, Goniadidae, Hesionidae and Pilargidae, with description of *Ophioglycera lyra*, a new species and comments on *Goniada distorta* Moore and *Scoloplos texana* Maciolek and Holland. *Proceedings of the Biological Society of Washington* **110**: 457–470.
- Gravier, C. 1902. Contribution a l'étude des annélides polychètes de la mer Rouge. Deuxième Partie. *Nouvelles Archives du Muséum*, 4^e série **3**: 147–268. [The *Zoological Record* (1902), Vol. 38 for the year 1901: pp. 147–152, 2 figs. (not concluded); The *Zoological Record* (1903), Vol. 39 for the year 1902: complete text and plates published in 1902]
- Gravier, C. 1904. Sur les annélides polychètes de la mer Rouge (Nephtyidiens et Glycériens). *Bulletin du Muséum d'Histoire Naturelle* **10**: 472–475.
- Gravier, C. 1906. Contribution a l'étude des annélides polychètes de la mer Rouge. Troisième Partie. *Nouvelles Archives du Muséum*, 4^e série **8**: 123–236, 286–409.
- Grube, A.E. 1850. Die Familien der Anneliden. *Archiv für Naturgeschichte*, Jahrgang 16, **1**: 249–364.
- Grube, A.E. 1857. Annulata Örstediana. Enumeratio Annulorum, quae in itinere per Indiam occidentalem et Americam centralem annis 1845–1848 suscepto legit cl. A.S. Örsted, adjectis speciebus nonnullis a cl. H. Kröyero in itinere ad Americam meridionalem collectis (Fortsættelse). *Videnskabelige Meddelelser fra den naturhistoriske Forening i Kjöbenhavn* **2**: 158–186.
- Grube, A.E. 1863. Beschreibung neuer oder wenig bekannter Anneliden. *Archiv für Naturgeschichte*, Jahrgang 29, **1**: 37–69.
- Grube, A.E. 1868. Anneliden. Reise der Österreichischen Fregatte Novara um die Erde in den Jahren 1857, 1858 und 1859 unter den Befehlen des Commodore B. von Wüllerstorff-Urbair. *Zoologischer Theil* **2** (3): 1–46.
- Grube, A.E. 1870. Bemerkungen über die Familie der Glycereen. *Jahres-Bericht der Schlesischen Gesellschaft für vaterländische Cultur* **47**: 56–68.
- Grube, A.E. 1874. Descriptiones Annulorum novorum mare Ceylonicum habitantium ab honoratissimo Holdsworth collectorum. *Proceedings of the Scientific Meetings of the Zoological Society of London*, **1874**: 325–329.
- Grube, A.E. 1877. Annelidenausbeute von S.M.S. Gazelle. *Monatsbericht der Königlich Preussischer Akademie der Wissenschaften zu Berlin*, **1877**: 509–554.
- Grube, A.E. 1878. Annulata Semperiana. Beiträge zur Kenntnis der Annelidenfauna der Philippinen nach den von Herrn Prof. Semper mitgebrachten Sammlungen. *Mémoires de l'Académie Impériale des Sciences de St.-Pétersbourg* **25** (8): 1–300.
- Hartman, O. 1950. Goniadidae, Glyceridae and Nephtyidae. *Allan Hancock Pacific Expeditions* **15**: 1–181.
- Hartman, O. 1965. Deep-water benthic polychaetous annelids off New England to Bermuda and other North Atlantic areas. *Allan Hancock Foundation Publications* **28**: 1–378.
- Hartman, O. 1974. Polychaetous annelids of the Indian Ocean including an account of species collected by members of the International Indian Ocean Expeditions, 1963–'64 and a catalogue and bibliography of the species from India. *Journal of the Marine Biological Association of India* **16**: 191–252.
- Hartmann-Schröder, G. 1960. Polychaeten aus dem Roten Meer. *Kieler Meeresforschungen* **16**: 69–125.
- Hoagland, R.H. 1920. Polychaetous annelids collected by the United States Fisheries steamer "Albatross" during the Philippine Expedition of 1907–1909. *Bulletin of the United States National Museum* **100** (1): 603–635.
- Izuka, A. 1912. The Errantiate Polychæta of Japan. *Journal of the College of Science, Imperial University of Tokyo* **30** (2): 1–262.
- Kinberg, J.G.H. 1865. Annulata nova. Öfversigt af Kongliga Vetenskaps-Akademiens Förhandlingar **22**: 239–258.

- Manaranche, R., M. Thieffry and M. Israel. 1980. Effect of the venom of *Glycera convoluta* on the spontaneous quantal release of transmitter. *The Journal of Cell Biology* **85**: 446–458.
- Marenzeller, E. von. 1879. Südjapanische Anneliden. *Denkschriften der Kaiserlichen Akademie der Wissenschaften, Mathematisch-Naturwissenschaftliche Classe* **41**: 109–154.
- Mattson, S. 1981. Burrowing and feeding of *Goniada maculata* Ørsted (Polychaeta). *Sarsia* **66**: 49–51.
- McIntosh, W.C. 1885. Report on the Annelida Polychæta collected by H.M.S. Challenger during the years 1873–76. Report on the Scientific Results of the Voyage of H.M.S. Challenger during the years 1873–76 under the Command of Captain George S. Nares, R.N., F.R.S. and the late Captain Frank Tourle Thomson, R.N., *Zoology* **12**: 1–554.
- Michaelsen, W. 1892. Polychaeten von Ceylon. *Jahrbuch der Hamburgischen wissenschaftlichen Anstalten* **9** (2): 1–23.
- Mohammad, M.-B.M. 1973. New species and records of polychaete annelids from Kuwait, Arabian Gulf. *Zoological Journal of the Linnean Society* **52**: 23–44.
- Monro, C.C.A. 1937. Polychæta. *The John Murray Expedition 1933–34, Scientific Reports, Zoology* **4**: 243–321.
- Moore, J.P. 1905. New species of Polychæta from the north Pacific, chiefly from Alaskan waters. *Proceedings of the Academy of Natural Sciences of Philadelphia* **57**: 525–554.
- Moore, J.P. 1911. The polychætous annelids dredged by the U.S.S. “Albatross” off the coast of Southern California in 1904: III. Euphrosynidæ to Goniadidæ. *Proceedings of the Academy of Natural Sciences of Philadelphia* **63**: 234–318.
- Müller, F. 1858. Einiges über die Annelidenfauna der Insel Santa Catharina an der brasilianischen Küste. *Archiv für Naturgeschichte* **24**: 211–220.
- Müller, O.F. 1776. *Zoologiæ Danicæ prodromus, seu Animalium Daniæ et Norvegiæ indigenarum characteres, nomina, et synonyma imprimis popularium*. Hafniæ (Copenhagen). 274 pp.
- Ockelmann, K.W. and O. Vahl. 1970. On the biology of the polychaete *Glycera alba*, especially its burrowing and feeding. *Ophelia* **8**: 275–294.
- Ørsted, A.S. 1842. Udtog af en Beskrivelse af Grønlands Annulata dorsibranchiata. *Naturhistorisk Tidsskrift* **4**: 109–127.
- Ørsted, A.S. 1843. *Annulorum Danicorum Conspectus*. Fasc. I. Maricolæ. Hafniæ (Copenhagen). 52 pp.
- Phasuk, B. 1992. Preliminary report on the polychaetes from the Fifth Thai–Danish Expedition along the Andaman Sea coast of Thailand. *Phuket Marine Biological Center Research Bulletin* **57**: 77–87.
- Quatrefages, A. de. 1866. *Histoire naturelle des annelés marins et d’eau douce*. *Annélides et Géphyriens*. Librairie Encyclopédique de Roret, 3 vols. and Atlas with pls. 1–20.
- Savigny, J.-C. 1818. Classe Neuvième. Les Annélids (Annelides). **In**: J.B. de Lamarck (ed.), *Histoire Naturelle des Animaux sans Vertèbres* **5**, pp. 274–374.
- Schmarda, L.K. 1861. *Neue wirbellose Thiere beobachtet und gesammelt auf einer Reise um die Erde 1853 bis 1857*. 1. Band: Turbellarien, Rotatorien und Anneliden. Verlag von Wilhelm Engelmann, Leipzig. 2nd half, 164 pp., pls. 18–37.
- Silva, P.H.D.H. de. 1965. New species and records of Polychaeta from Ceylon. *Proceedings of the Zoological Society of London* **144**: 537–563.
- Smith, L.E., S. Trabanino and R.J. Baerwald. 1995. Scanning electron microscopical observations of the proboscoidal papillae of *Glycinde armigera* (Annelida: Polychaeta). *Invertebrate Biology* **114**: 46–50.
- Southern, R. 1921. Polychaeta of the Chilka Lake and also of fresh and brackish waters in other parts of India. *Memoirs of the Indian Museum* **5**: 563–659.
- Verrill, A.E. 1885. Notice of recent additions to the marine Invertebrata of the northeastern coast of America, with descriptions of new genera and species and critical remarks on others. Part V. Annelida, Echinodermata, Hydroida, Tunicata. *Proceedings of the United States National Museum* **8**: 424–448.
- Wesenberg-Lund, E. 1949. Polychaetes of the Iranian Gulf. *Danish Scientific Investigations in Iran* **4**: 247–400.