

**THE FAMILIES CALLIANIDEIDAE AND THALASSINIDAE,
WITH THE DESCRIPTION OF TWO NEW SUBFAMILIES ,
ONE NEW GENUS AND TWO NEW SPECIES
(DECAPODA, THALASSINIDEA)***

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ABSTRACT

In the family Callianideidae, *Thomassinia*, *Crosniera*, and *Mictaxius* defined as the Thomassiniinae, *Callianidea* and *Paracallianidea* gen. nov. as the Callianideinae, *Michelea* as the Micheleinae subfam. nov., and *Meticonaxius*, and *Marcusiaxius* as the Meticonaxiinae subfam. nov. are included. *Paracallianidea* gen. nov. is separated from *Callianidea*, and *Meticonaxius torbeni* sp. nov. from the west coast of Malay Peninsula, and *Marcusiaxius soelae* sp. nov. from the Coral Sea, eastern Australia are described. Bristly setal rows on the carapace, abdominal pleura, and pereopods 2-4 are firstly noticed in Thalassinidae not as plumose setal rows in Callianideidae.

INTRODUCTION

Thomassinia De Saint Laurent, 1979 was designated as the type of a new subfamily Thomassiniinae within the family Callianassidae Dana, 1852 by De Saint Laurent, 1979. This new subfamily is characterized by the presence of the epipods on pereopods 1-4, and a long posterior whip on the scaphognathite of maxilla 2. *Meticonaxius* De Man, 1905 was classified first by De Man (1925:53) as a member of the family Axiidae Huxley, 1879, and later it was transferred by him to the subfamily Callianideinae Kossmann, 1880 of the family Callianassidae, because there is no linea thalassinica, and pleopods 2-4 are alike; he was followed in this by Bouvier (1925:469)(Table 1).

Recently, the rows of plumose setae (= setal rows) on the carapace, abdomen, and pereopods are used as good characters in the family Callianideidae by Kensley & Heard (1991:493). These authors recognized seven genera, *Callianidea*, *Crosniera* Kensley &

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Table 1. Designation of the grade in the family Callianideidae.

Genera	Designation of original Subfamilies /Families		Bouvier, 1925 De Man, 1928	Kensley & Heard, 1991	Sakai, 1992
Callianideidae					
<i>Callianidea</i>	Thalassinidae	H. M. Edws, 1837	Callianideinae /Callianassidae	Callianideidae	Callianideinae
<i>Paracallianidea</i>	Callianideidae	Sakai, 1992	-	-	Callianideinae
<i>Crosniera</i>	Callianideidae	Kensley & Heard, 1991	-	Callianideidae	Thomassiniinae
<i>Mictaxius</i>	Callianideidae	Kensley & Heard, 1991	-	Callianideidae	Thomassiniinae
<i>Thomassinia</i>	Thomassiniinae /Callianassidae	De St. Laurent, 1979	-	Callianideidae	Thomassiniinae
<i>Michelea</i>	Callianideidae	Kensley & Heard, 1991	-	Callianideidae	Micheleinae
<i>Marcusiarius</i>	Axiidae	Rodrigues et al, 1972	-	Callianideidae	Meticonaxiinae
<i>Meticonaxius</i>	(Axiidae)	De Man, 1905	Callianideinae /Callianassidae	Callianideidae	Meticonaxiinae

Heard, 1991, *Mictaxius* Kensley & Heard, 1991, *Thomassinea*, *Michelea* Kensley & Heard, 1991, *Marcusiarius* Rodrigues & Carvalho, 1972 and *Meticonaxius*, which are divided into two ingroups (1): *Callianidea-Crosniera-Mictaxius-Thomassinia* and (2): *Michelea-Marcusiarius-Meticonaxius*.

In the present taxon, *Thomassinea*, *Crosniera*, and *Mictaxius* are included in the Thomassiniinae De Saint Laurent, 1979; *Callianidea* and *Paracallianidea* gen. nov. in the Callianideinae; *Michelea* in the Micheleinae subfam. nov.; *Meticonaxius* and *Marcusiarius* in the Meticonaxiinae subfam. nov. The family Callianideidae has characters of two families, Callianassidae and Axiidae, however it is separated from them by the presence of plumose setal rows on the carapace, abdominal somites, and pereopods. The subfamily Thomassiniinae is closely related with Callianassidae in having a linea thalassinica. Three other subfamilies, Callianideinae, Micheleinae, and Meticonaxiinae are not provided with the linea thalassinica as in Axiidae. The subfamily Callianideinae is characteristic in that the anterolateral lobe on abdominal somite 1 is absent, the scaphocerite of antenna 2 is reduced; pereopods 1 are strongly unequal, and the pleopodal respiratory filaments are branched, while the other subfamilies, Micheleinae and Meticonaxiinae, are different in that the anterolateral lobe on abdominal 1 is present, the scaphocerite of antenna 2 is large, and pereopods 1 are subequal. The subfamilies, Micheleinae and Meticonaxiinae, show more differences; in the Micheleinae the rostrum is small, the propodus of pereopod 4 is normal in form, the simple pleopodal filaments are present, and the rostrum is small, while in the Meticonaxiinae the propodi of pereopods 3-4 are expanded, the pleopodal filaments are absent, and the rostrum is conspicuous (Fig. 1).

On the other hand, the present examination reveals that the rows of setal pits are also found in *Thalassina anomala* (Herbst, 1804), namely on the carapace, abdominal somites, and propodi of pereopods 2-4 as in the Callianideidae, although the setae are not plumose as in the Callianideidae, but bristly. This character is not found in other families of the Thalassinidea, suggesting that the Thalassinidae Latreille, 1831 is similar to the Callianideidae on this point.

Kensley and Heard (1991:493) used 21 characters for their phylogenetic analysis, however in the present examination the rostral form, the form of the coxa of pereopod 4, the shape of the eye, and the status of the cervical groove are added to these 21 characters for reassessing the present taxa.

In the Callianideinae, *Paracallianidea* gen. nov. is separated from Callianidea, and in the Meticonaxiinae two new species, *Meticonaxius torbeni* sp. nov. from the western Malay Peninsula and *Marcusiaxius soelae* sp. nov. from the Coral Sea, eastern Australia are described.

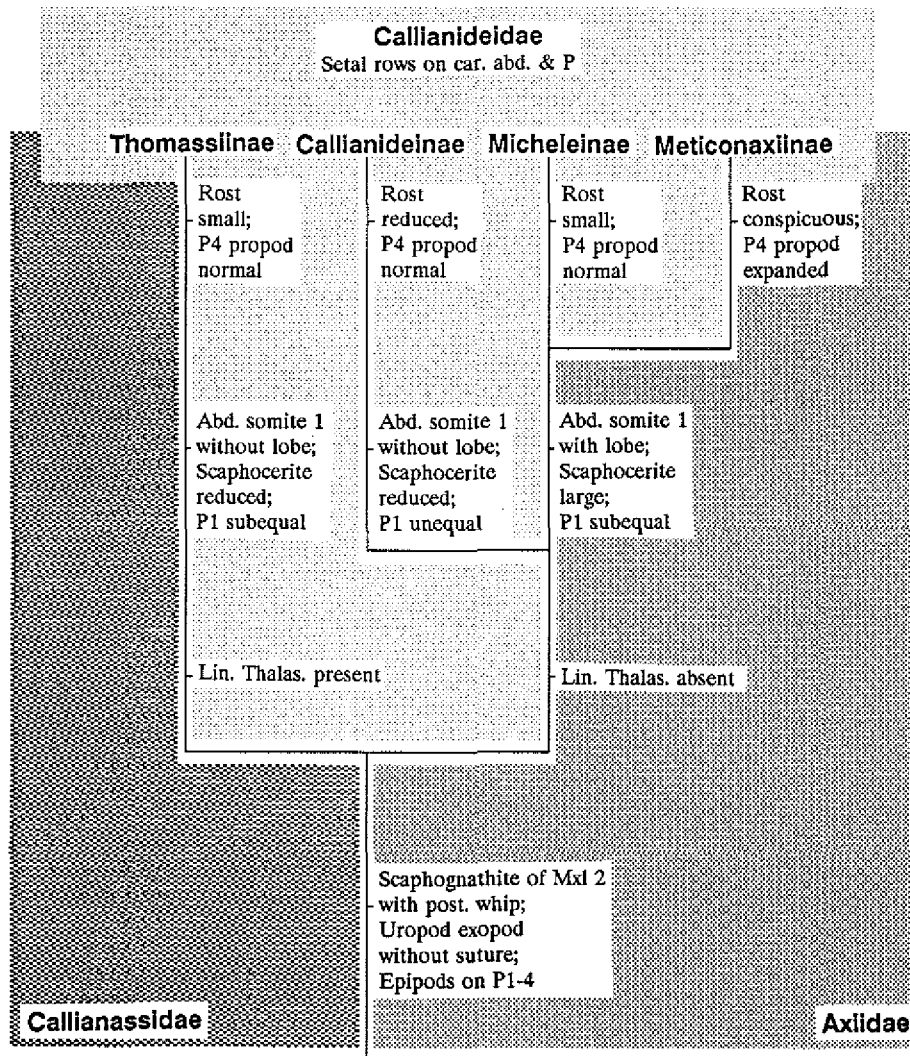


Fig. 1. Cladgram of the family Callianideidae. Three dimensions on the level of families are closely related:

Callianideidae; Axiidae; Callianassidae; abd., abdomen; car., carapce; linn. thal., linea thalassinica; P, pereopod(s); rost., rostrum.

Abbreviations are used as follows: CL, carapace length; TL, total length from rostral tip to posterior margin of telson; BLT, Shikoku University, Tokushima; NTM, Northern Territory Museum, Darwin; SMF, Senckenberg Museum, Frankfurt am Main; UMC, University Museum of Zoology, Copenhagen; ZMG, Zoologisches Institut und Museum der Universität, Göttingen.

Family Thalassinidae Latreille, 1831

Thalassinidae Latreille, 1831:377; Borradaile, 1903:541.

Diagnosis. Carapace somewhat compressed. Rostrum of fair size. Linea thalassinica entire. Two cervical grooves distinct. Anterolateral region of carapace with horizontal setal row above linea thalassinica, and another vertical setal row along anterolateral margin of branchial region. Posterior margin of carapace with posteromedian protrusion. Thoracic sternum attached to pereopod 4 with concave structure. Abdominal somite 1 with anterodorsal edge locking with posterior margin of carapace; a distinct setal pit below dorsolateral carina. Abdominal somites 2-6 with 1-3 vertical setal rows posteriorly. Eye subconical, and rounded distally. Scaphocerite of antenna 2 vestigial. Mandibular incisor with teeth. Scaphognathite of maxilla 2 posteriorly with numerous elongate setae. Exopod of maxilliped 2 well developed. Maxilliped 3 pediform, ischium with crista dentata, and exopod well developed. Pereopod 1 subchelate, subequal in both male and female; merus straight and with few teeth on ventral margin. Pereopod 2 subchelate. Propodi of pereopods 2-3 slightly broadened and flattened, and propodus of pereopod 4 elongate. Propodi of pereopods 2-4 with setal row distally on lateral articulation to dactyl. Epipods present on pereopods 1-4. Pleurobranchs absent. Pleopod 1 in male uniramous, consisting of single segment, and distally broadened; in female uniramous, consisting of two segments. Pleopods 2-5 in male and female biramous, rami slender, and lacking respiratory filaments. Pleopod 2 in male with appendix masculina, and vestigial appendix interna. Pleopods 3-5 in male and pleopods 2-5 in female without appendix interna. Uropodal exopod and endopod rod-like, exopod without transverse suture.

Type genus. *Thalassina* Latreille, 1806.

Remarks. The Thalassinidae appear to be more closely related to the Callianideidae than to other families in the Thalassinidea and share the following features: 1) In the Thalassinidae the scaphognathite of maxilla 2 has numerous posterior setae, while in the Callianideidae it has a single whip-like seta, or two setae as in *Michelea lamellosa* Kensley & Heard, 1991. 2) Epipods are present on pereopods 1-4. 3) The carapace, the abdominal somites and the propodi of pereopods 2-4 have 1-4 rows of setal pits. In Thalassinidae the setae are bristles, while in the Callianideidae they are plumose. 4) The locations of the setal pits are different in the Thalassinidae and Callianideidae. In the Thalassinidae the anterolateral region of the carapace has a horizontal setal row above the linea thalassinica (Fig. 2A-C), and another vertical row on the anterolateral margin of the branchial region; abdominal somite 1 has a large setal pit below the lateral carina (Fig. 2A-B, D), and abdominal somites 2-6 have 1-3 vertical setal rows posteriorly; and the propodi of pereopods 2-4 have a setal row distally on the articulation with the dactyl. In the Callianideidae the anterolateral region of the carapace has 1-4 setal rows; one on the postorbital/postantennal region, 1-2 rows below the lateral carina, and one just anterior to the cervical groove; abdominal somite 1 has a horizontal setal row; abdominal somites 2-6 have 1-4 setal rows; and the propodi of pereopods 2-3, or 2-4 have 0-2 setal rows (Kensley & Heard, 1991:493). 5) The propodus of pereopod 3, or propodi of pereopods 3-4 are broadened and flattened. 6) The surface of the thoracic sternum attached to pereopod 4 is concave in *Thalassina* (Fig. 2E) as in *Meticonaxius* and *Marcusiaxius*, while it is convex in *Callianidea* and *Michelea*. 7) The uropodal exopod has no transverse suture.

However, the family Thalassinidae strongly differs from the Callianideidae in the following points; 1) The carapace has a second cervical groove (De Man, 1928:6) before the posterior margin. 2) The carapace has a dorsomedian protrusion posteriorly. 3) Abdominal somite 1 has an anterior dorsal edge with an articulating and locking device with the posterior margin of the carapace. 4) The gills consist partly of trichobranchs, and partly of broad plates. 5) Pereopods 1 and 2 are subchelate. 6) No appendix interna is present on the pleopods in males and females, but a vestigial is seen on pleopod 2 of males. 7) The uropodal exopod and endopod are rod-like in shape.

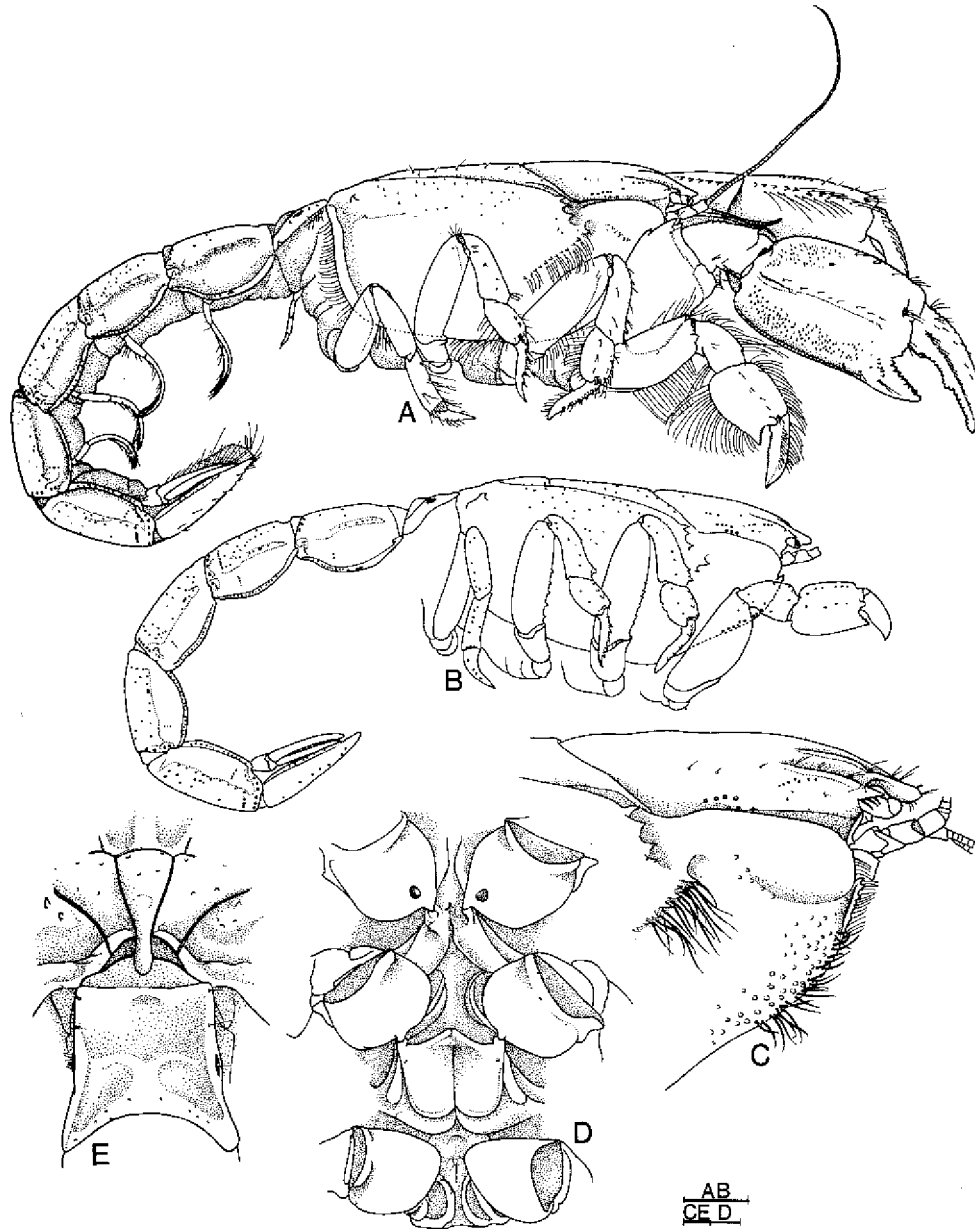


Fig. 2. *Thalassina anomala* (Herbst, 1804), UMC, ♀. A-B. body, lateral views; C, anterior part of carapace, lateral view; D, thoracic sternum to pereopods 3-5, ventral view; E, posterior part of carapace and abdominal somite 1, dorsal view. Scale; A-B 5mm, C-E 1 mm.

Genus *Thalassina* Latreille, 1806

Definition. Rostrum of good size. Linea thalassinica present. Secondary cervical groove present. Pereopods 1 and 2 subchelate. Pleopod 1 in the male uniramous, consisting of a single segment, and distally broadened; in the female it is uniramous, formed by two segments. Pleopods 2-5 in male and female biramous, rami slender, and lacking respiratory filaments. Pleopod 2 in male with appendix masculina, and vestigial appendix interna. Pleopods 3-5 in male and pleopods 2-5 in female without appendix interna.

Type species. By monotypy, *Thalassina scorpionoides* Latreille, 1806.

Thalassina anomala (Herbst, 1804)

Cancer (Astacus) anomalus Herbst, 1804:45.

Thalassina scorpionoides Latreille, 1806:51.

Thalassina maxima Hess, 1865:163.

Thalassina anomala, -Holthuis, 1991:229.

Material. UMC, 1♀, TL 92 mm, The town Malacca on the west coast or perhaps Malacca (Malay) peninsula. Cand. pham. Marius Jensen coll., 1901. ZMG 225, 1♀, TL 136 mm, CL 49 mm, locality unknown; ZMG 226 (Ex. Museum Lübeck), 1♂ TL 128, CL 47; 1♀, TL 171 mm, CL 61 mm, Nossi-Bé, Madagascar, 1870; ZMG 227, 1♂, CL 72 mm, holotype of *Thalassina maxima* Hess, Sydney, Australia, Schütte coll., 1864; ZMG 228, 1♂ TL 226 mm, CL 80 mm, Sumatra, 1854; ZMG 229, 1♀, TL 209 mm, CL 76 mm, Sumatra, 1854; SMF 4937, 1♀, TL 93 mm, CL 36 mm, west-coast, Halmahera; SMF 4938, 1♀, CL 64 mm, Patani, Halmahera; SMF 4939, 1♀, CL 50 mm, det. as *Thalassina anomala* var. *gracilis* Dana, Sugi, Colombo, ?Kabroor coll, 30.4.1908; SMF 4940, 1♀, TL 121 mm, CL 43 mm, coast near Dobo, Aru Islands, Indonesia, Wammer coll. 20. 2. 1908; SMF 4942, 1♀, TL 13.9 mm, CL 51 mm, Sumatra; SMF 5788, 1♂, TL 268 mm, CL 95 mm, East-Java, bought by R. Bott, 1971; SMF 9751 (Ex. Museum Heidelberg), 1♀, CL 83 mm, Indo-Pacific; SMF 10680, 1♂, TL 120 mm; 2♀, TL 83-145 mm, ?New Guinea; SMF 12483, 2♂, TL 154-166 mm, Zamboanga Fish Market, Mindoro, Philippines, A. Schreiber dedicated, March-Apr., 1983; SMF 17541, 1♂, TL 98 mm, Libugānen beach, Mindoro, Philippines, H. Gschwindt coll., 18. Jun. 1988.

Remarks. The female specimens from Indonesian region, Philippines, and Okinawa, Japan (Sakai, 1965, unpublished) are examined. They have no teeth on the dorsal margins of the meri of pereopods 1-4. The gill-formula of *T. anomala* is shown as

follows.

	Maxillipeds			Pereopods				
	1	2	3	1	2	3	4	5
Exopod	1	1	1	-	-	-	-	-
Epipod	1	1	1	1	1	1	1	-
Podobranch	-	1	1	1	1	-	-	-
Arthrobranch	-	2	2	2	2	2	2	-
Pleurobranch	-	-	-	-	-	-	-	-

Family Callianideidae Kossmann, 1880

Callianideidae Kossmann, 1880:80. -De Saint Laurent, 1979:1395. -Poore & Griffin, 1979:221.

Diagnosis. Carapace more or less compressed. Rostrum variable, large to reduced. Linea thalassinica complete, incomplete, or lacking. Cervical groove well demarcated to obsolete. Anterolateral region of carapace having 1-4 setal rows. Thoracic sternum attached to pereopod 4 with concave or convex structure. Pleuron on abdominal somite 1 poorly developed, with or without lateral anterodorsal lobe functioning as an articulation and locking device with posterior margin of carapace. Pleura on abdominal somites 1-6 with 1-4 setal rows. Eye variable, flattened distally to subglobose; cornea pigmented to obsolete. Scaphognathite of maxilla 2 usually with single elongate whip-like seta. Exopod of maxilliped 2 well developed or reduced. Maxilliped 3 pediform, ischium with or without crista dentata, and exopod well developed to reduced. Pereopod 1 chelate, subsimilar or strongly dissimilar. Pereopod 2 chelate. Propodi on pereopods 2-3, or 2-4 expanded, and with short vertical setal row proximally or centrally on lateral surface. Coxa of pereopod 4 normal, or convexly expanded. Epipod present on pereopods 1-4. Pleurobranchs absent. Pleopod 1 in male uniramous, consisting of one or two segments, and in female uniramous, consisting of two segments. Pleopods 2-5 in both male and female biramous, rami broad with or without respiratory filaments. Pleopod 2 in male with or without appendix masculina, and pleopods 2-5 with or without appendix interna. Pleopods 2-5 in female with appendix interna. Uropodal exopod lacking transverse suture.

Type subfamily. Callianideinae Kossmann, 1880.

Included subfamilies. Callianideinae; Meticonaxiinae subfam. nov.; Thomassiniinae; Micheleinae subfam. nov.

Remarks. The family Callianideidae is characterized that the scaphognathite of maxilla 2 has a long posterior whip, and the epipods are present on pereopods 1-4 as in the Axiidae. It is closely related to the family Callianassidae in that the eyes are flattened distally, and touched each other on the mesial margins; the coxa of pereopod 4 is expanded; and abdominal somite 1 has no anterolateral lobe for the articulation with the posterior margin of the carapace; however, there is no *linea thalassinica* as in the Axiidae. The subfamily Micheleinae is similar to the Axiidae because the *linea thalassinica* is absent; and the scaphocerite of antenna 2 is well developed; however, there is no anterolateral lobe on the pleuron of abdominal somite 1 as in the Callianassidae. The Meticonaxiinae are also similar to the Axiidae in that the pleuron of abdominal somite 1 has a anterolateral lobe for the articulating and lockcking device with the carapace; that the *linea thalassinica* is absent; and that the scaphocerite of antenna 2 is spiniform. However, the Meticonaxiidae are characteristic, because the propod of pereopod 4 is expanded.

Subfamily Callianideinae Kossmann, 1880

Callianideidae Kossmann, 1888:80.

Definition. Rostrum reduced. *Linea thalassinica* obsolete. Cervical groove shortly notched middorsally. Thoracic sternum convexly attached to pereopod 4. Pleuron on abdominal somite 1 lacking anterolateral lobe. Eyes flattened distally, touched one another on mesial margins. Scaphocerite of antenna 2 reduced to small scale. Exopod of maxilliped 3 well developed. Pereopod 1 strikingly dissimilar; merus unarmed on ventral margin. Coxa of pereopod 4 expanded. Pleopodal respiratory filaments of 2-4 segments.

Type genus. *Callianidea* H. Milne Edwards, 1837.

Genera included. *Callianidea*; *Paracallianidea* gen. nov.

Remarks. The subfamily Callianideinae is closely related to Micheleinae in that the carapace is turned up on the posterolateral margin, exposing the expanded coxa of pereopods 4-5 laterally; the pleopodal respiratory filaments are present; the linea thalassinica is absent; and the exopod of maxilliped 3 is well developed. However, the Callianideinae differ from the Micheleinae in having the first pereopods strongly dissimilar, and the merus of pereopod 1 has no ridge on the ventral margin, the scaphocerite is reduced, and the pleopodal respiratory filaments are branched, while in the Micheleinae the first pereopods are subequal, the merus has a ridge on the ventral margin, the scaphocerite is spiniform, and the pleopodal respiratory filaments are unbranched.

There are two species, *Callianidea typa* from the Indo-Pacific region, and *C. laevicauda* from the Caribbean Sea. Kensley & Heard (1991:500) mentioned that *C. typa* differs from *C. laevicauda* in lacking any sign of a linea thalassinica, and in having bifurcating pleopodal accessory respiratory filaments that are divided up to three times.

In my opinion, the differences in pleopods 1-2, the appendix interna of the male pleopod 2, the pleopodal respiratory filaments, the linea thalassinica, and the spinulation of maxilliped 3 between *C. typa* and *C. laevicauda*, are sufficient to divide *Callianidea* into two genera, *Callianidea* and *Paracallianidea* gen. nov.

Genus *Callianidea* H. Milne Edwards, 1837

Callianidea H. Milne Edwards, 1837:319; Sakai & Holthuis, 1987:93; Kensley & Heard, 1991:498.

Callianisea H. Milne Edwards, 1837:321.

Callisea Dana, 1852:510.

Diagnosis. Linea thalassinica absent. Merus of maxilliped 3 unarmed on ventral margin. Propodi of pereopods 2-4 with setal rows centrally or proximally. Pleopod 1 in the male uniramous, formed by a single slender, earpick-shaped segment, and in the female consisting of 2 segments, the distal segment being elongated, twisted with long setae on mesioproximal swelling. Pleopods 2-5 in male and female biramous, rami broad with branched, 2-4 segmented respiratory filaments. Pleopod 2 in male lacking appendix

masculina and appendix interna, and pleopods 3-5 without appendices internae. Pleopods 2-5 in female with broad appendices internae.

Type and only species. *Callianidea typa* H. Milne Edwards, 1837, by monotypy.

Remarks. *Callianisea* H. Milne Edwards, 1837, and *Callisea* Dana (1852:510) were replaced by *Callianidea*, the type species by monotypy, *Callianidea typa* H. Milne Edwards, 1837 (Sakai & Holthuis, 1987:92).

Callianidea typa H. Milne Edwards, 1834

Callianidea typa H. Milne Edwards, 1834, Atlas, pl. 25.

Callianidea typa H. Milne Edwards, 1837:320; Borradaile, 1898:1015; De Man, 1902:751; Borradaile, 1904:752; Nobili, 1906:113; Pesta, 1913:678; Balss, 1914:90; De Man, 1928:21, 31; Edmondson, 1944:38; Miyake, 1956:90.

Callianisea elongata, H. Milne Edwards, 1837:325.

Callianidea mucronata Kossmann, 1880:80.

Callianidea planocula Melin, 1939:5.

Callianidea sp. Edmondson, 1944:40.

Material. BLT 5689, ♀, TL 37 mm, Maeno-hama, Akashima Island, Okinawa, T. Hayashibara coll; BLT 5690, 1♀, TL 40 mm, under pebbles, Chichi-jima, Bonin Islands, A. Asakura coll; UMC, 1♂, TL 34 mm, Sunda Strait, Sebesi Island, 5°57'S 105°29'E, shore at ebb-tide, 31. July 1922, Danish Expedition to the Kei Islands, 1922, Th. Mortensen coll; NTM Cr. 000455, 1 ovig ♀, TL 31 mm, Karapang, E. Java, 4. June 1983, H.K. Larson coll; SMF 7936, 1♂, TL 31 mm, CL 6 mm; 1 specimen, thoracic sternum broken, CL 8 mm, Ternate, Indonesia, Kükenthal coll, 1894.

Diagnosis. Carapace compressed, and its posterolateral margin widely concave (Fig. 3A), exposing coxae of pereopods 4-5; cervical groove present in posterior part; rostrum barely developed, low, broadly rounded apically; linea thalassinica absent; anterolateral region of carapace with vertical row of setal pits on postantennal region. Thoracic sternum to pereopod 4 with convex structure (Fig. 3D). Abdominal somite 1 with pleuron poorly developed, with irregular setal row anterolaterally, and lacking anterodorsal lobe (Fig. 3C). Eyestalk (Fig. 3B) with cornea demarcated, situated distolaterally in distal fourth of eyestalk, mediolateral portion of stalk flattened. Antennular peduncle reaching distal fourth of penultimate segment of antennal peduncle. Antennal peduncle with acicle

reduced to tiny plate; segment 4 slender, and segment 5 slightly more than half length of segment 4. Incisor process of mandible with six blunt teeth (Fig. 4A), molar process smooth, broadly rounded; palp consisting of three segments. Palp of maxilla 1 (Fig. 4B) with two distal setae. Maxilla 2 (Fig. 4C) with scaphognathite narrow, and with long posterior seta. Maxilliped 1 (Fig. 4D) with exopod foliaceous. Exopod of maxilliped 2 well developed (Fig. 4E). Ischium of maxilliped 3 with crista dentata (Fig. 4F-G); and merus lacking ventral spine.

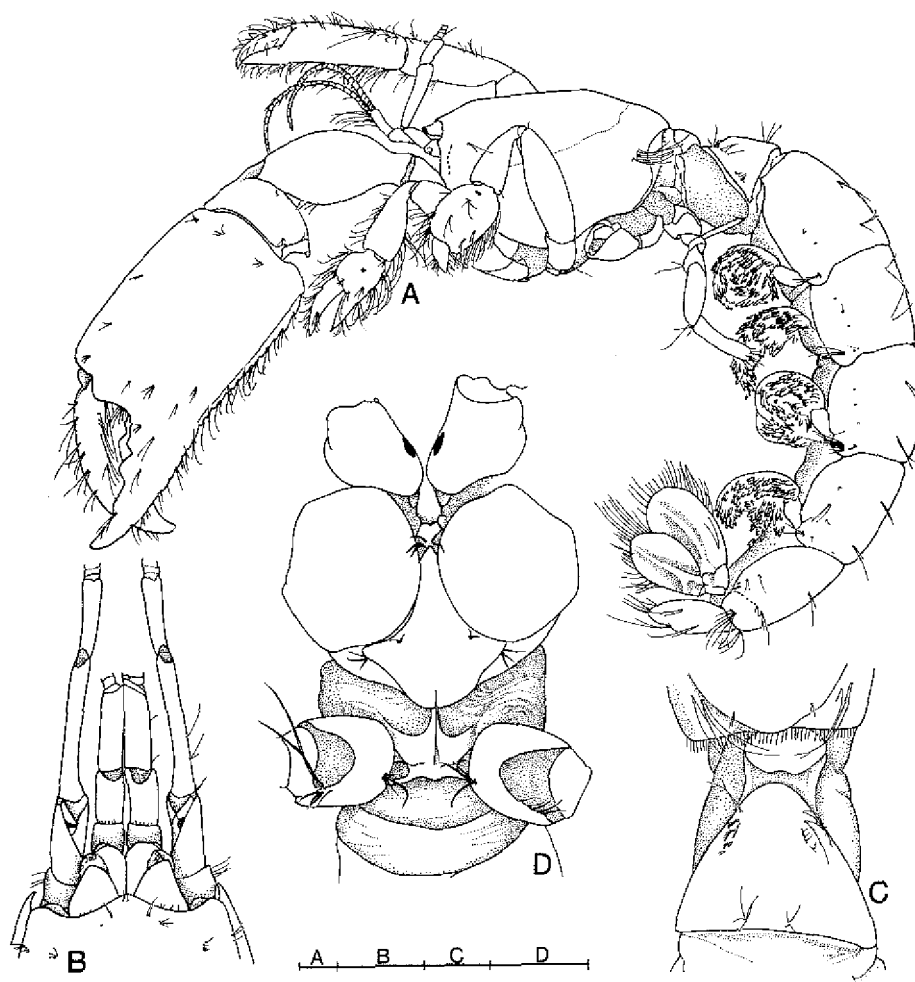


Fig. 3. *Callianidea typa* H. Milne Edwards, 1834. BLT 5689, ♀. A, body, lateral view; B, anterior part of carapace, antennular and antennal peduncles, dorsal view; C, abdominal somite 1, dorsal view; D, thoracic sternum to pereopods 3-5, ventral view. Scale: A-D 1 mm.

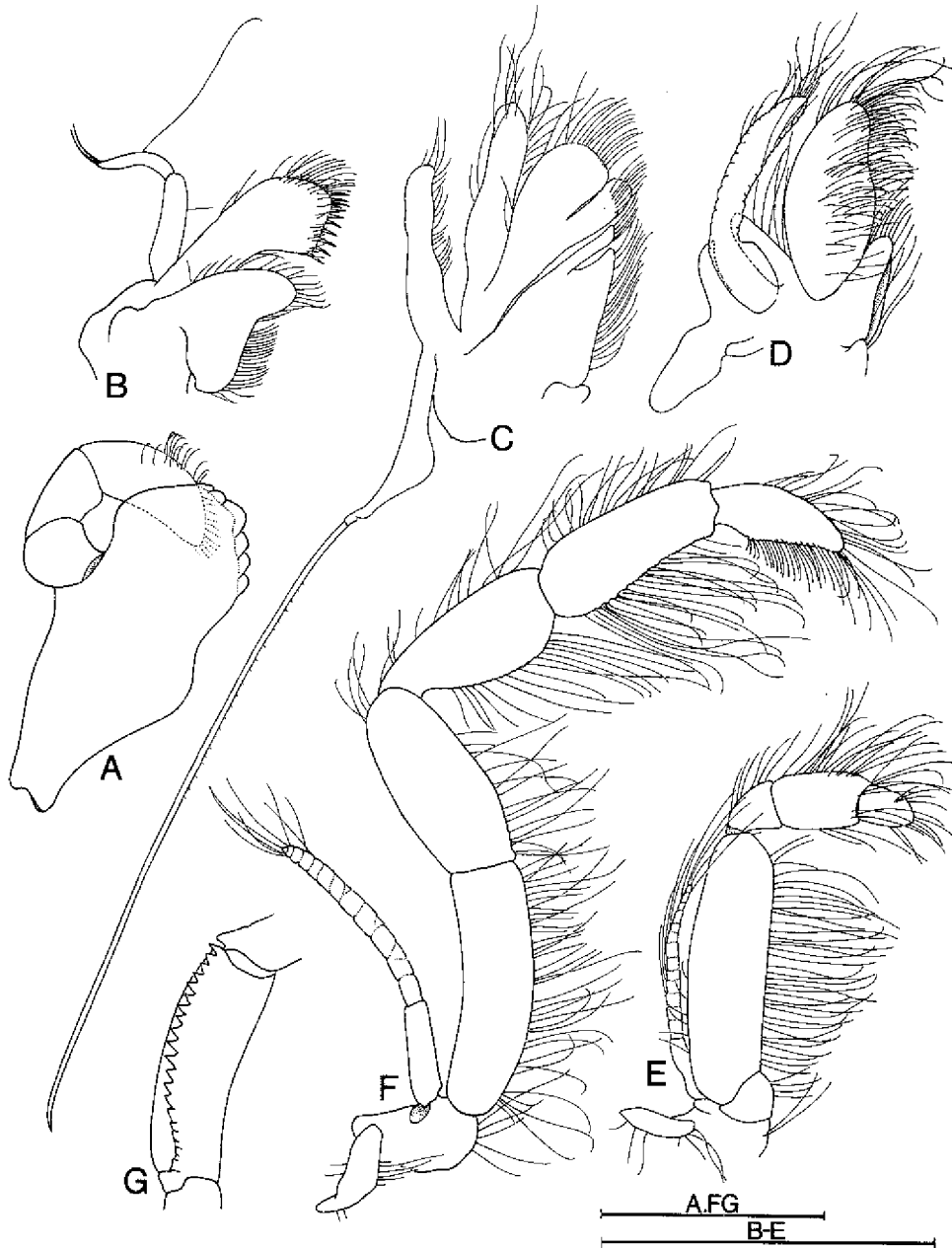


Fig. 4. *Callianidea typa* H. Milne Edwards, 1834. BLT 5689, ♀. A, mandible, lateral view; B-C, maxillae 1-2, lateral views; D-F, maxillipeds 1-3, lateral views; G, ischium of maxilliped 3, mesial view. Scale; A-G 1 mm.

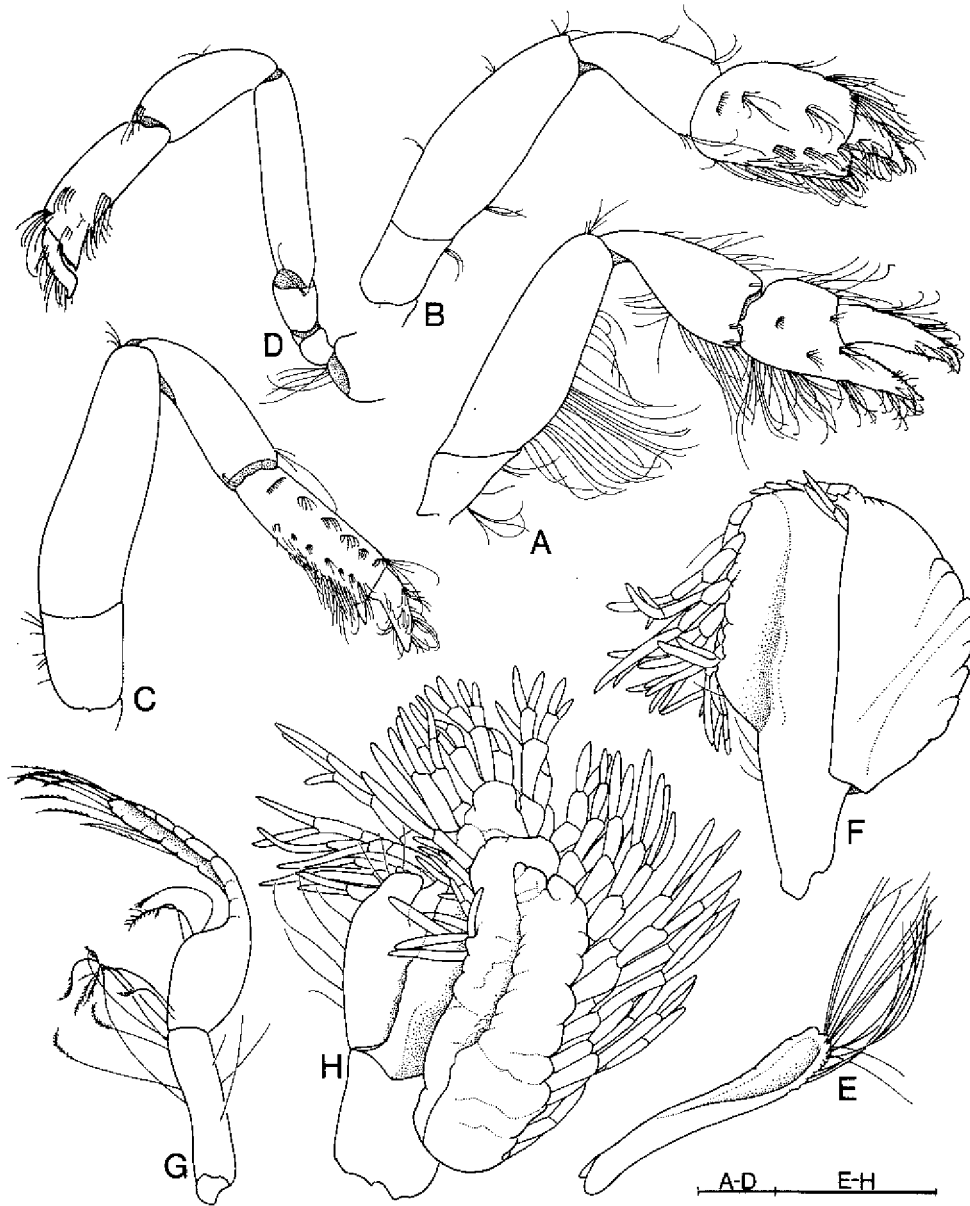


Fig. 5. *Callianidea tyra* H. Milne Edwards, 1834. A-D, pereopods 2-5, lateral views; E, right pleopod 1 in male, posterolateral view; F, right pleopod 2 in male, anterior view; G, right pleopod 1 in female, anterolateral view; H, right pleopod 2 in female, anterior view. Scale: A-H 1 mm.

First Pereopods strongly dissimilar (Fig. 3A). In the male the larger cheliped has the ischium with few tubercles on its ventral margin; the merus with 1-2 low tubercles on the ventral margin; the carpus narrow, about one third wider than long, its lateral surface provided with a transverse groove subventrally, and a few tubercles at the acute ventral angle. Palm less than three times as long as carpus on dorsal margin, ventral margin crenulate; fixed finger with four teeth on cutting edge. Dactyl strongly curved, cutting edge with two rounded teeth proximally, and apart from it one rounded tooth. In the female the larger cheliped has the ischium and merus unarmed on ventral margin. Palm twice length of carpus, fixed finger armed with six teeth in proximal half of cutting edge. Dactyl with four teeth in proximal half of cutting edge, distal tooth largest, and situated in middle part. Smaller cheliped slender, ischium and merus unarmed, carpus three times as long as wide, palm about as long as carpus, and both fingers about half as long as palm. Pereopod 2 (Fig. 5A) chelate, propodus with short setal row centrally on lateral surface. Propodus of pereopod 3 (Fig. 5B) subquadrate, one third longer than wide, broadly produced at ventrodistal angle, and with short setal row proximally on lateral surface. Propodus of pereopod 4 (Fig. 5C) with strong spine at ventrodistal angle, a plumose setal row proximally, and anterior to it four rows of simple setae on lateral surface. Pereopod 5 (Fig. 5D) subchelate, dactyl twisted.

Pleopod 1 in male (Fig. 5E) consisting of a single, earpick-shaped leaf; in the female (Fig. 5G) it has two segments, the distal elongate, twisted with long setae on the mesioproximal swelling. Pleopods 2-5 in male and female biramous, rami broad with branched, 2-4 segmented respiratory filaments. Pleopods of male (Fig. 5F) lacking both appendix masculina and appendices internae. Pleopods 2-5 in female (Fig. 5H) with broad appendices internae. Uropodal exopod with a medial carina, unarmed; endopod with a median carina, bearing a subterminal spine.

Remarks. *Callianidea mucronata* Kossmann, 1880 from the Red Sea was synonymized by De Man (1928:34) with *C. tya*. *C. planocula* Melin, 1939 from Bonin Island is possibly a synonym of *C. tya* as shown by the examination of the present material from the Bonin Islands.

Lockington (1878:302) described on *C. tya* from the Gulf of California, however, his

specimens are to be defined as *C. laevicauda* Gill, 1859, as shown by Kensley and Heard (1991:500) who recently synonymized *C. laevicauda occidentalis* Schmitt, 1939 from Socorro Island (Pacific coast of Mexico) and the Galapagos Islands with the typical West-Indian species, *C. laevicauda*.

Distribution. Tanga, Tanzania (Balss, 1914); Ethiopia (Massawa; Eritrea), Red Sea (Kossmann, 1880; Nobili, 1906); Djibouti (Obock; Djibouti), Gulf of Aden (Nobili, 1906); Goidu, Goifurfehendu Atoll, Maldive Islands (Borradaile, 1904); Indonesia (Lombok; Sawu; Adonara; Tanah Djampeah; Ternate) Indonesia (De Man, 1928); New Guinea (De Man, 1902, 1928); New Ireland (type locality, H. Milne Edwards, 1837); Funafuti, Tuvalu (Borradaile, 1898); Savaii, Western Samoa (Pesta, 1913); Tahiti, Society Islands (Edmondson, 1944); Wake Island (Edmondson, 1944); Mariana Islands (Guérin-Méneville, 1832); Bonin Islands (Melin, 1939); Yaeyama, Ryukyu Islands (Balss, 1914); Tokara Islands (Miyake, 1956); Kagoshima, Japan (Balss, 1914).

Genus *Paracallianidea* gen. nov.

Diagnosis. Linea thalassinica short, extending posteriorly from orbit. Merus of maxilliped 3 bearing spine distally on ventral margin. Propodi of pereopods 2-3 with setal row proximally. Pleopod 1 in male consisting of two segments, distal segment broadly triangular with hooks on its small medial lobe, and in female of two segments, distal segment slender-lanceolate. Pleopods 2-5 in male and female biramous, rami broad with simple, 2-4 segmented respiratory filaments. Pleopod 2 in male with rod-shaped appendix masculina and short free appendix interna.

Type and only species. *Callianidea laevicauda* Gill, 1859.

Etymology. The generic name is a combination of the suffix, "para", a meaning "near", and the generic name, *Callianidea*.

Paracallianidea laevicauda (Gill, 1859)

Callianidea laevicauda Gill, 1859:167. -Kensley & Heard, 1991:499.

Material examined. SMF 8049, 1♀, TL 45 mm, Nenguangue Bay, Santa Marta, Colombia. SMF 9755 (Ex. Museum Heidelberg), 1♂, TL 44 mm; 1♀, TL 45 mm, locality unknown.

Subfamily *Micheleinae* subfam. nov.

Definition. Carapace compressed, posterolateral margin weakly concave. Rostrum short, bluntly triangular. Linea thalassinica lacking. Cervical groove obsolete. Thoracic sternum convexly attached to pereopod 4. Pleuron of abdominal somite 1 with an anterolateral lobe. Eyes subglobose, touching one another on mesial margins. Scaphocerite of antennal 2 spiniform. Exopod of maxilliped 3 not reduced. First pereopods subequal, merus with spine in middle of ventral margin. Coxa of pereopod 4 expanded. Pleopodal respiratory filaments consisting of unbranched lamellae.

Type genus. *Michelea* Kensley & Heard, 1991, by original designation.

Remarks. The subfamily *Micheleinae* is closely related with the *Callianideinae* as mentioned in the remarks of the subfamily *Callianideinae* (p. 10).

Subfamily *Thomassiniinae* De Saint Laurent, 1979

Thomassiniinae De Saint Laurent, 1979:1396.

Definition. Rostrum variable, short or reduced. Linea thalassinica complete or incomplete. Cervical groove inconspicuous. Pleuron of abdominal somite 1 lacking anterolateral lobe. Eye variable, subglobose to flattened distally. Scaphocerite of antenna 2 reduced to small scale. Exopod of maxilliped 3 reduced. First pereopods subequal, merus lacking spine on ventral margin. Pleopodal respiratory filaments absent.

Type genus. *Thomassinia* De Saint Laurent, 1979.

Genera included. *Thomassinia* De Saint Laurent, 1979; *Crosniera* Kensley & Heard, 1991; *Mictaxius* Kensley & Heard, 1991.

Remarks. The subfamily Thomassiniinae was first established as a member of Callianassidae by De Saint Laurent (1979: 1396) as it possesses a complete or incomplete *linea thalassinica*. However, later it was transferred to the Callianideidae by Kensley and Heard (1991: 493). The Thomassiniinae are different from other subfamilies in having a *linea thalassinica*; it is included in the Callianideidae as it has setal rows on the carapace, abdomen, and pereopods.

Subfamily *Meticonaxiinae* subfam. nov.

Diagnosis. Carapace compressed, its posterolateral margin angular. Rostrum conspicuous, pointed or rounded at tip. Lineal *thalassinica* absent. Cervical groove distinct to obsolete dorsally. Anterolateral region of carapace with 1-4 setal rows. Abdominal somites 1-6 with 1-3 setal rows. Thoracic sternum articulated to pereopod 4 with concave structure. Pleuron of abdominal somite 1 possessing an anterodorsal lobe for articulation and locking purposes with posterior margin of carapace. Eyes subglobose, not touching distally. Exopod of maxilliped 3 reduced or lacking. First pereopods subequal. Propodi of pereopods 2-4 broadened, those of pereopods 2-3, or 2-4 possessing 0-2 setal rows placed proximally on lateral surface, or dorsally.

Type genus. *Meticonaxius* De Man, 1905.

Included genera. *Meticonaxius* De Man, 1905; *Marcusiarius* Rodrigues & Carvalho, 1972.

Remarks. *Meticonaxius* and *Marcusiarius* were previously classified as Axiidae (De Man, 1928:53; Barnard, 1950:499; Baiss, 1957:1579) or Callianassidae (Bouvier, 1925:469; De Man, 1928:18), however Kensley and Heard (1991:493) transferred them to Callianideidae.

Meticonaxiinae subfam. nov. differs from the other subfamilies of Callianideidae in having a conspicuous rostrum and in having the propod of pereopod 4 expanded. It is closely related to the Micheleinae because in both *Meticonaxiinae* and *Micheleinae* the pleuron of abdominal somite 1 has an anterolateral lobe; and in both the scaphocerite of antenna 2 is spiniform.

Genus *Meticonaxius* De Man, 1905

Meticonaxius De Man, 1905:592; De Man, 1925:53; Kensley & Heard, 1991:510.

Diagnosis. Carapace compressed, and its posterolateral margin angular. Rostrum triangular, widening posteriorly, unarmed on lateral margin, keeping at same level as anterior portion of carapace; median and lateral carinae entire. Anterolateral region of carapace with 2-3 setal rows. Thoracic sternum articulated to pereopod 4 with concave structure. Abdominal somites 1-5 with single setal row laterally, and somite 6 with three setal rows. Abdominal somite 1 with lateral anterodorsal lobe. Abdominal somites 2-5 densely setose in posteroventral region.

Eyestalk shorter than rostrum, rounded distally, or truncate-flattened; cornea undifferentiated to poorly differentiated, weakly to moderately well pigmented. Antennal acicle about half, or less than half the length of the peduncular segment 4. Ischium of maxilliped 3 with crista dentata, merus with spine on ventral margin; exopod reduced. Pereopod 1 chelate, and symmetrical. Pereopod 2 chelate, propodus with short setal row proximally. Propodi of pereopods 3 and 4 broadened; that of pereopod 3 with 1-2 setal rows proximally on lateral surface, and that of pereopod 4 with 1-2 setal rows dorsally, or proximally on lateral surface. Pereopods 2-4 lacking pleurobranchs. Pleopod 1 in male uniramous, consisting of two segments, distal segment plow-shaped. In female pleopod 1 slender, uniramous, and three segmented. Pleopods 2-5 in male and female biramous, rami broad, with appendix interna, but without respiratory filaments; pleopod 2 in male possessing appendix masculina. Uropodal exopod broadened distally, occasionally produced distolaterally, and without transverse suture; uropodal endopod smaller than exopod, somewhat produced distolaterally. Telson longer than wide, lacking non-articulating dorsal spines (modified after Kensley & Heard, 1991).

Remarks. The number of setal rows on the anterolateral region of the carapace is variable; in *Meticonaxius monodon* De Man, 1905 (the type-species) and *M. microps* (Bouvier, 1905), there are two rows just anterior to the cervical groove and ventral to the lateral carina, while in *M. bouvieri* Kensley and Heard, 1991 and *M. longispina* (Stebbing, 1920) there are three rows anterior to the cervical groove, ventral to the lateral carina,

and on the postorbital/postantennal region, or its posterior part.

***Meticonaxius soelae* sp. nov.**

Material. Holotype, 1♀ TL 63 mm, CL 17 mm, Coral Sea, E. Australia, 17°59.4'S, 147°64'E, 298-300 m, FRV "Soela" (CSIRO), Cruise 0186, St. No. 69, 20, Jan. 86.

Diagnosis. Carapace (Fig. 5A, D) compressed, and ventrolateral margin angular. Rostrum (Fig. 6B-C) triangular, acute apically; median and lateral carinae entire. Anterolateral region of carapace with two subvertical setal rows, and horizontal setal row below lateral carina; cervical groove dorsally well demarcated, and obsolete laterally. Carapace with short rounded longitudinal ridge on posterior margin. Thoracic sternum attached to pereopod 4 with concave structure (Fig. 7B). Abdominal somite 1 (Fig. 6E) with horizontal setal row dorsolaterally, abdominal somites 2-5 with vertical setal row, less compact setae posteriorly, and abdominal somite 6 with three rows.

Eyestalk slightly convex on dorsal surface, thin marginally, and truncate distally; cornea transparent in alcohol specimen. Antennal acicle reaching midlength of peduncular segment 4. Maxilliped 1 (Fig. 7C) with the palp narrow. Exopod of maxilliped 2 (Fig. 7D) short; podobranch rudimentary lacking gill-filaments. Ischium of maxilliped 3 (Fig. 7E) with crista dentata (Fig. 7F), merus with subdistal spine on ventral margin; exopod very reduced. Pereopods 1 (Fig. 8A-B) subequal, the right slightly longer than the left, ischium and merus without spines, fingers shorter than palm, cutting edge of fixed finger finely denticulate proximally by distinguishable tubercles, and armed with strongly acute triangular tooth distal to midlength. Propodus of pereopod 2 (Fig. 8C) with short setal row proximally on lateral surface. Coxa of pereopod 3 (Fig. 8D) with female genital opening; and propodus with two subparallel setal rows proximally on lateral surface. Propodus of pereopod 4 (Fig. 8E) with setal row on dorsal margin, and another short row proximally on lateral surface. Pereopod 5 (Fig. 8F) subchelate, fixed finger armed with denticles on cutting edge (Fig. 8G), dactyl short, incurved.

Pleopod 1 in females (Fig. 8H-I) formed by three segments; distal segment jointed, and provided with short mesial lobe with distal hooks; pleopod 2 (Fig. 8J) biramous, rami broad; endopod on the left side with elongate two-articulated appendix masculina and

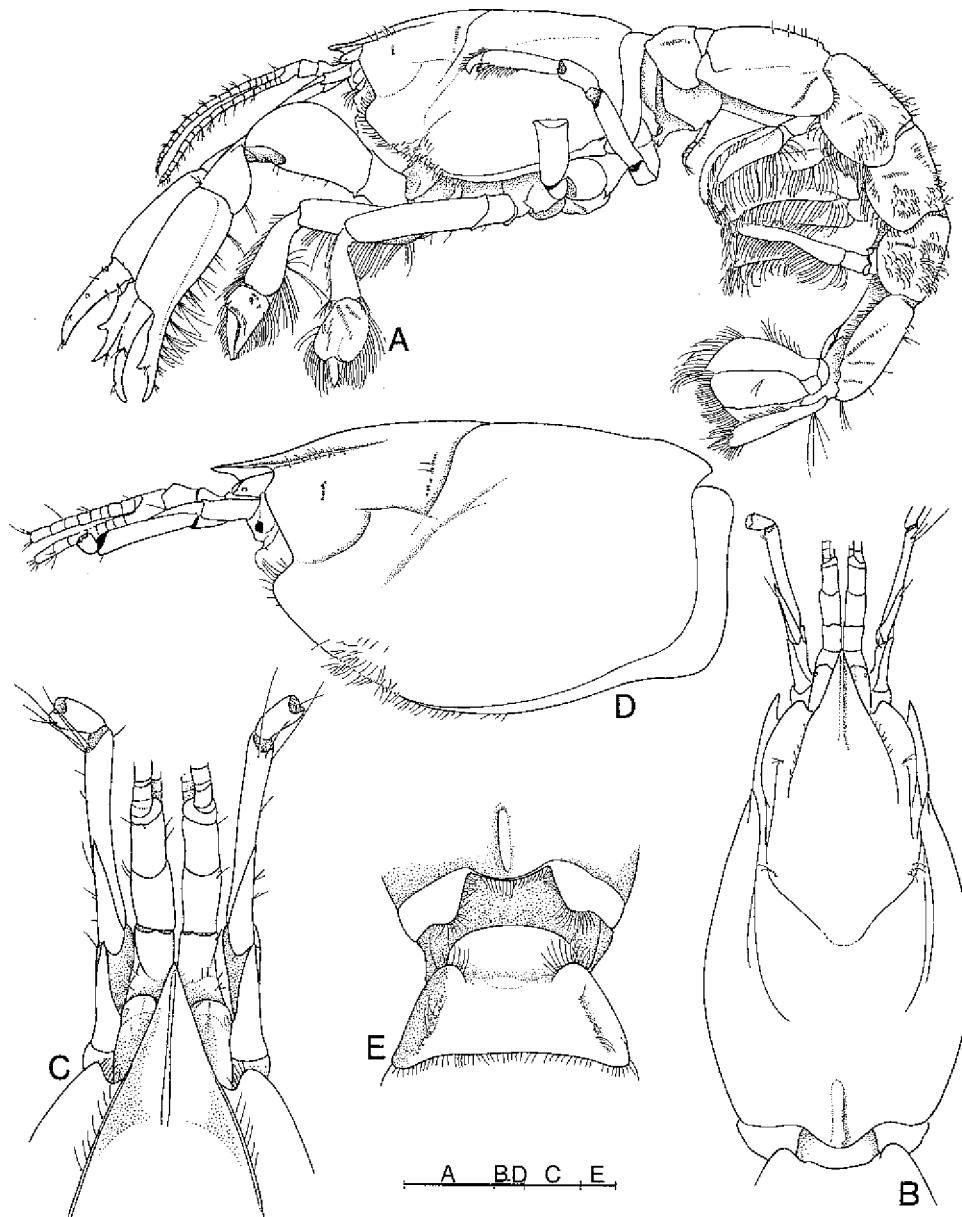


Fig. 6. *Meticonaxius soelae* sp. nov. Holotype, FRV "Soela" Cruise 0186, ♀. A, body, lateral view; B, carapace, dorsal view; C, anterior part of carapace, dorsal view; D, carapace, lateral view; E, abdominal somite 1, dorsal view. Scale; A 5 mm, B-E 1 mm.

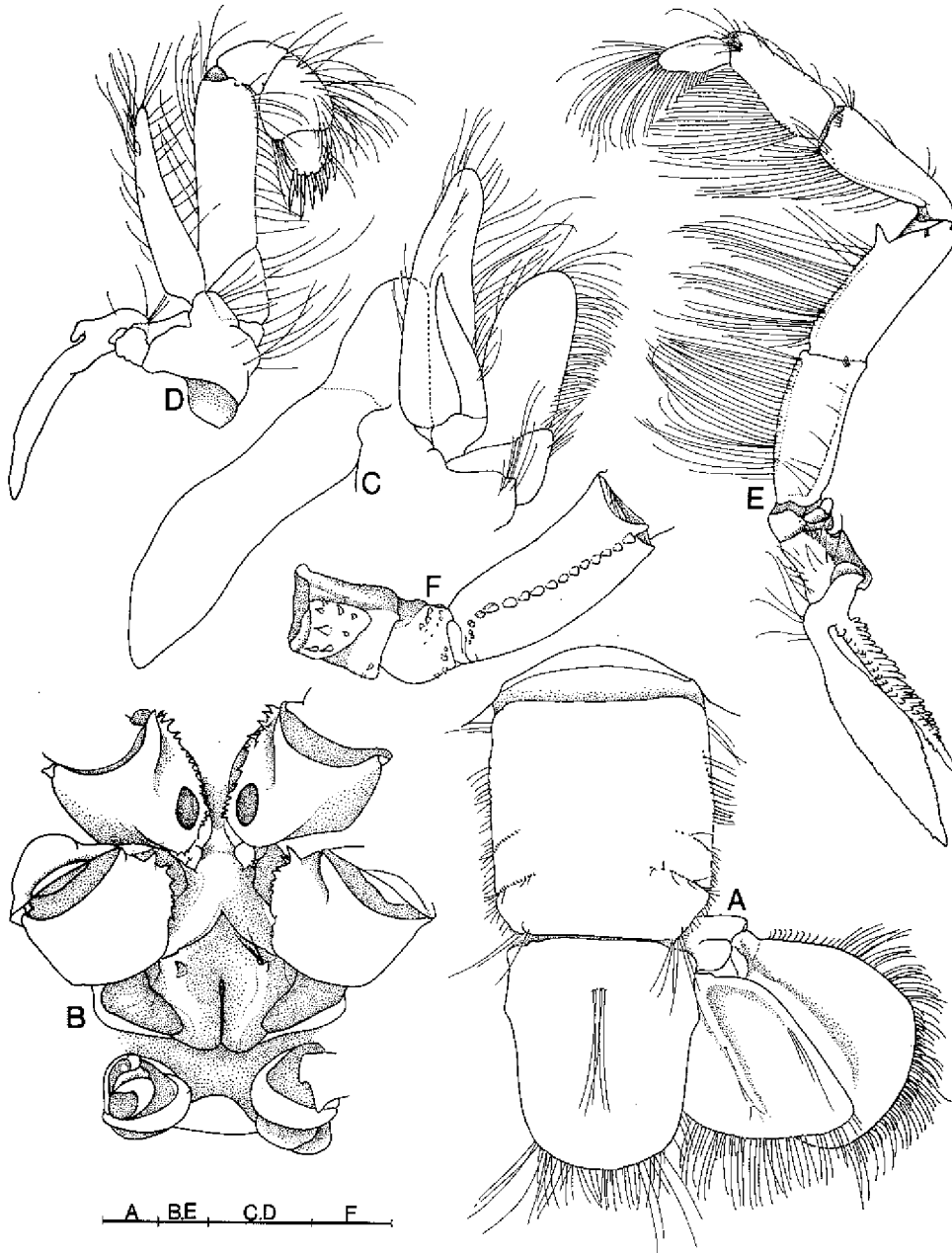


Fig. 7. *Meticonaxius soelae* sp. nov. Holotype, FRV "Soela" Cruise 0186, ♀. A, abdominal somite 6 and tail fan; B, thoracic sternum to pereopods 3-5, ventral view; C-E, maxillipeds 1-3, lateral views; F, ischium of maxilliped 3, mesial view. Scale: A-F 1mm.

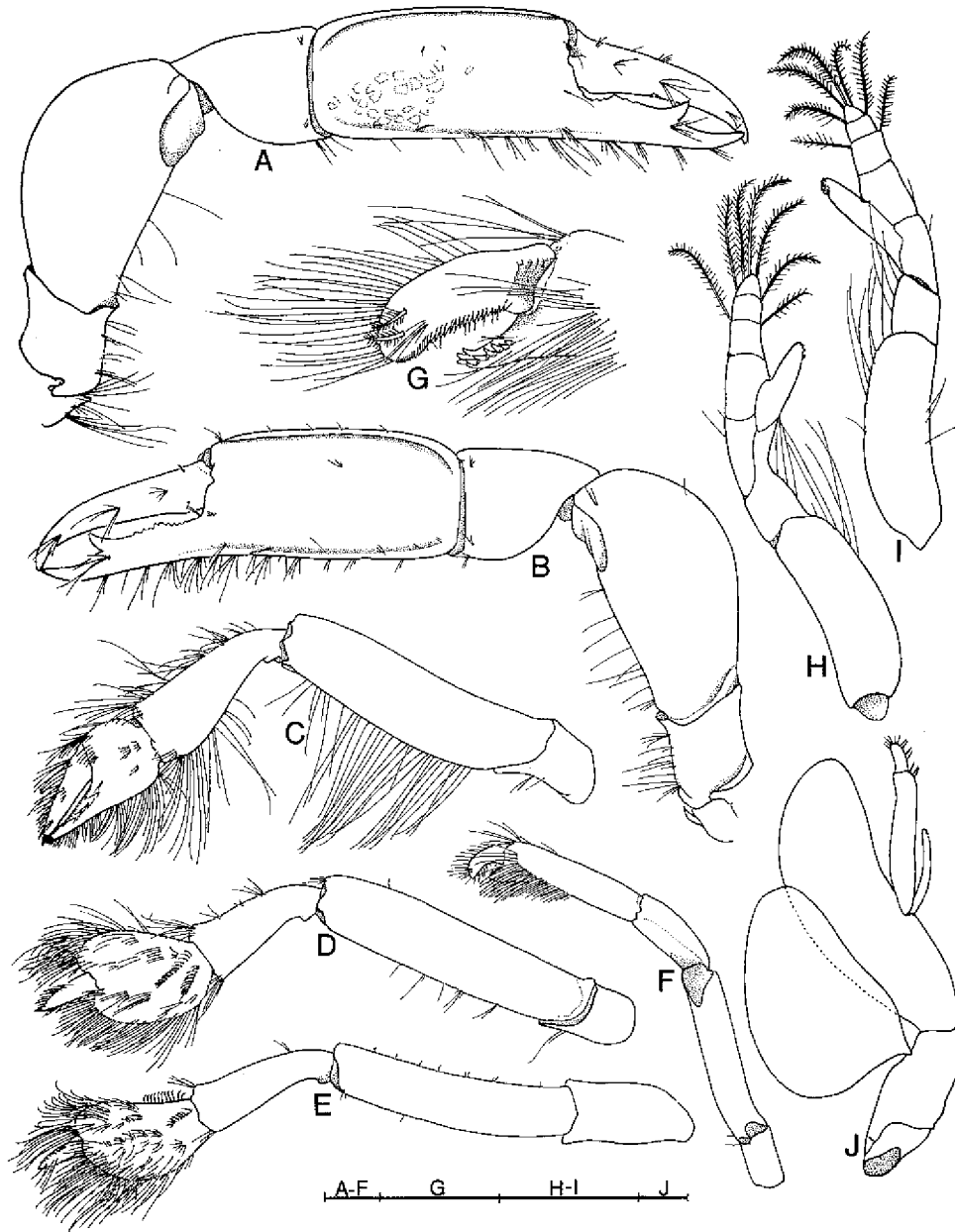


Fig. 8. *Meticonaxius soetae* sp. nov. Holotype, FRV "Soela" Cruise 0186, ♀. A, left pereopod 1, lateral view; B, right pereopod 1, lateral view; C-F, pereopods 2-5, lateral views; G, distal part of propod and dactyl in pereopod 5, lateral view; H, left pleopod 1, anterior view; I, same, posterior view; J, left pleopod 2, anterior view. Scale; A-J 1 mm.

short simple appendix interna with distal hooks, while on the right side only with appendix interna. Examination of additional material is necessary to show whether this asymmetry is an abnormality. Pleopods 3-5 biramous, rami broad with appendix interna. Uropodal exopod largely rounded distolaterally, and uropodal endopod slightly longer than wide, slightly produced distolaterally. Telson (Fig. 7A) longer than uropod, posterior margin evenly convex, unarmed, and lateral margin convex in posterior two thirds.

	Maxillipeds			Pereopods				
	1	2	3	1	2	3	4	5
Exopod	1	1	r	-	-	-	-	-
Epipod	1	1	1	1	1	1	1	-
Podobranch	-	-	1	1	1	1	-	-
Arthrobranch	-	-	2	2	2	2	2	-
Pleurobranch	-	-	-	-	1	1	1	-

Etymology. The species is named for the research vessel, "Soela", occurring a cruise of which the present specimen was collected.

Remarks. The present species is closely related to *Meticonaxius monodon* De Man, 1905, from off the north-east point of Java. In *M. monodon* the posterior margin of the telson is truncate; in pereopod 1, the merus possesses a tooth on the ventral margin; abdominal somites 3-5 have dense setae.

Genus *Marcusiaxius* Rodrigues & Carvalho, 1972

Marcusiaxius Rodrigues & Carvalho, 1972:357; Kensley & Heard, 1991:506.

Diagnosis. Carapace compressed, and posterolateral margin angular; rostrum distinct, and middorsally with flattened triangular area at the same level as anterior portion of carapace; anterodorsal submarginal pile of dense setae present. Anterolateral region of carapace with three setal rows. Cervical groove obsolete. Thoracic sternum articulated to pereopod 4 with a concave structure. Abdominal somite 1 with lateral anterodorsal

lobe, and setal row dorsolaterally; somite 2 with two setal rows; somites 3-5 with subvertical setal row; abdominal somite 6 with three setal rows. Abdominal somites 3-5 with dense patches of setae.

Eyestalk shorter than rostrum, subacute apically; cornea small, discrete, and located subapically. Antennal acicle half or less than half length of antennal peduncular segment 4. Maxilliped 3 with merus lacking ventral spine; exopod reduced, or absent. Pereopods 1 chelate, and symmetrical. Propodus of pereopod 2 with short setal row proximally on lateral surface. Propodus of pereopod 3 with two subparallel setal rows proximally on lateral surface. Propodus of pereopod 4 with setal row dorsally on lateral surface. Pleopod 1 in male uniramous, of two segments, distal segment plow-shaped; pleopod 2 possessing appendix masculina considerably longer than appendix interna; pleopods 2-5 biramous, rami broad, with appendix interna, but without respiratory filaments. Pleopod 1 in female slender, uniramous, three-segmented; pleopod 2-5 biramous, rami foliaceous, with appendix interna, but without respiratory filaments. Uropodal exopod strongly produced distolaterally, and without transverse suture; uropodal endopod slightly produced distolaterally. Telson wider than long, lacking non-articulating dorsal spines (modified from Kensley & Heard, 1991).

Marcusiarius torbeni sp. nov.

Material. Holotype 1♀ TL 52 mm, CL 14 mm, ZMC 77, west coast of Malay Peninsula, 9°13'22"N 97°50'11"E, St. 1171, 70 m, mud with many large shells, triangular dredge 45 cm., 7. March 1966, 5th Thai-Danish Expedition 1966.

Diagnosis. Carapace (Fig. 9A) compressed. Rostrum (Fig. 9B-C) broad, flattened, obtuse apically, median carina widening in posterior half; lateral carina entire. Anterolateral region of carapace with four setal rows; three subvertical setal rows in postorbital region, in middle region, anterior to cervical groove, and horizontal setal row just below lateral carina. Cervical groove obsolete. Thoracic sternum articulating with pereopod 4 (Fig. 10C) with a medially concave structure. Abdominal somite 1 (Fig. 9E) with horizontal setal row dorsolaterally, abdominal somite 2 with two setal rows ventrolaterally and posterolaterally; abdominal somites 3-5 with a subvertical median setal row each, abdominal somite 6 with three setal rows; pleura 3-5 dorsolaterally with dense setae.

Eyestalk triangular, flattened on lateral surface; cornea small, and discrete subapically. Antennal acicle (Fig. 9D) less than half length of peduncular segment 4. Palp of maxilliped 1 (Fig. 10D) small. Maxilliped 2 (Fig. 10E) with exopod short. Exopod of maxilliped 3 (Fig. 10F) rudimentary, ischium with crista dentata, and merus unarmed. Pereopods 1 (Fig. 11A-B) symmetrical; merus with reduced median tooth on ventral margin; fingers shorter than palm; fixed finger of right leg broken apically, that of left leg with obtuse tooth in proximal third of cutting edge; dactyl entire on cutting edge. Propodus of pereopod 2 (Fig. 11C) with short setal row proximally on lateral surface.

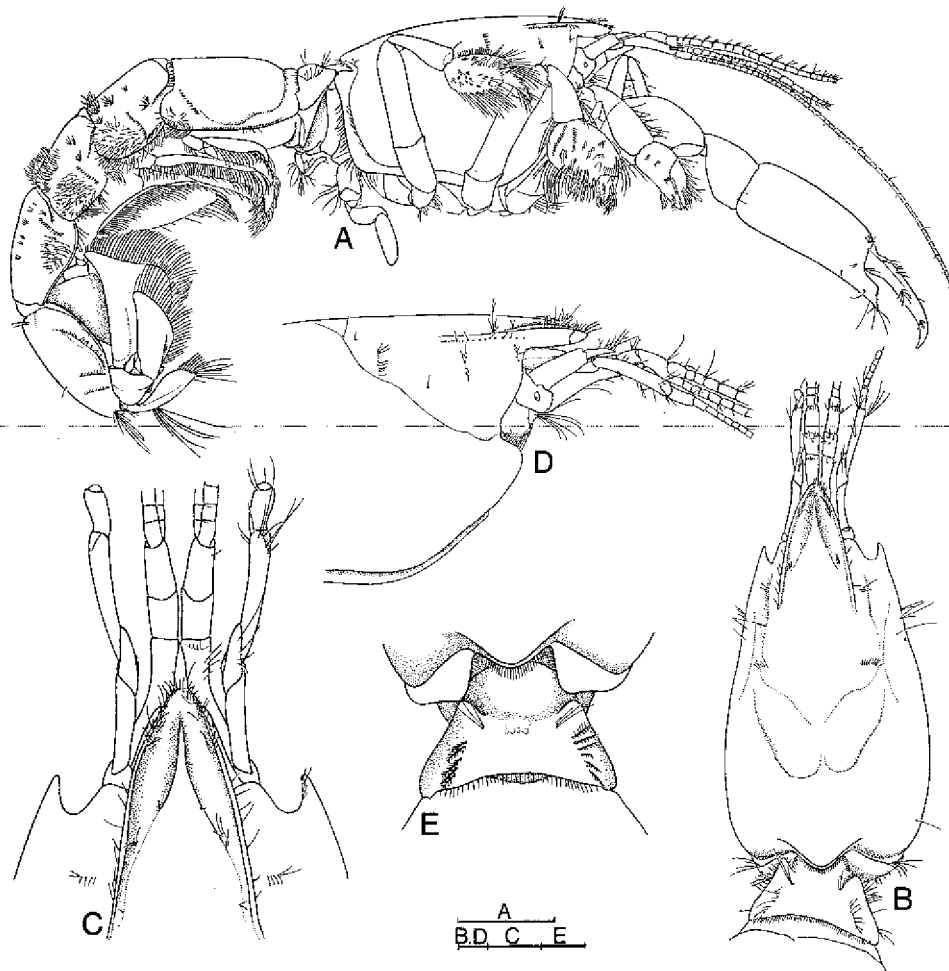


Fig. 9. *Marcusiarius torbeni* sp. nov. Holotype, ZMC 77, ♀. A, body, lateral view; B, carapace, dorsal view; C, anterior part of carapace, dorsal view; D, same, lateral view; E, abdominal somite 1, dorsal view. Scale; A 5 mm, B-E 1 mm.

Propodus of pereopod 3 (Fig. 11D) with two subparallel setal rows on lateral surface. Propodus of pereopod 4 (Fig. 11E) with setal row dorsally on lateral surface. Pereopod 5 (Fig. 11F) subchelate, dactyl short, incurved. Pleopod 1 (Fig. 11G) uniramous, consisting of three segments; distal segment jointed. Pleopods 2-5 biramous; rami broad, possessing appendix interna (Fig. 11H).

Uropodal exopod (Fig. 10B) distally strongly produced, uropodal endopod twice wider than long, and distolaterally produced. Telson (Fig. 10A) one fourth wider than long, posterior margin broadly convex.

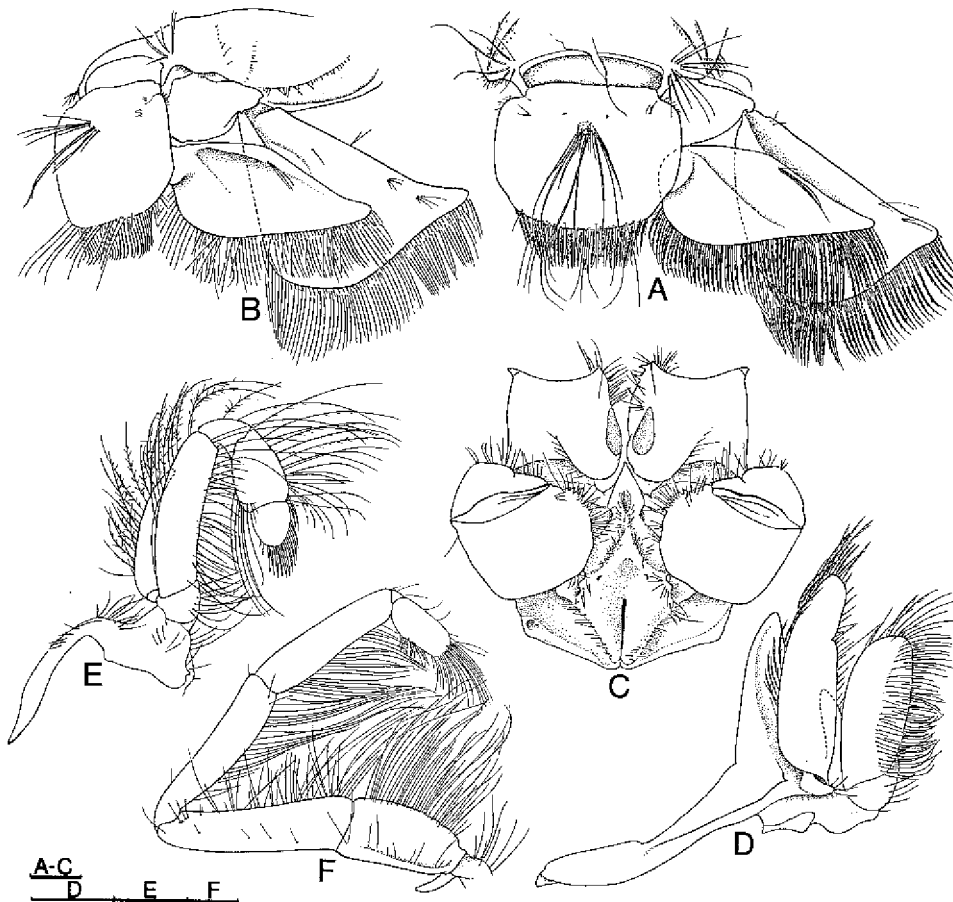


Fig. 10. *Marcusiarius torbeni* sp. nov. Holotype, ZMC 77, ♀. A, telson and tail fan, dorsal view; B, same, lateral view; C, thoracic sternum to pereopods 3-4, ventral view; D-F, maxillipeds 1-3, lateral views. Scale; A-C 3mm; D-F 1 mm.

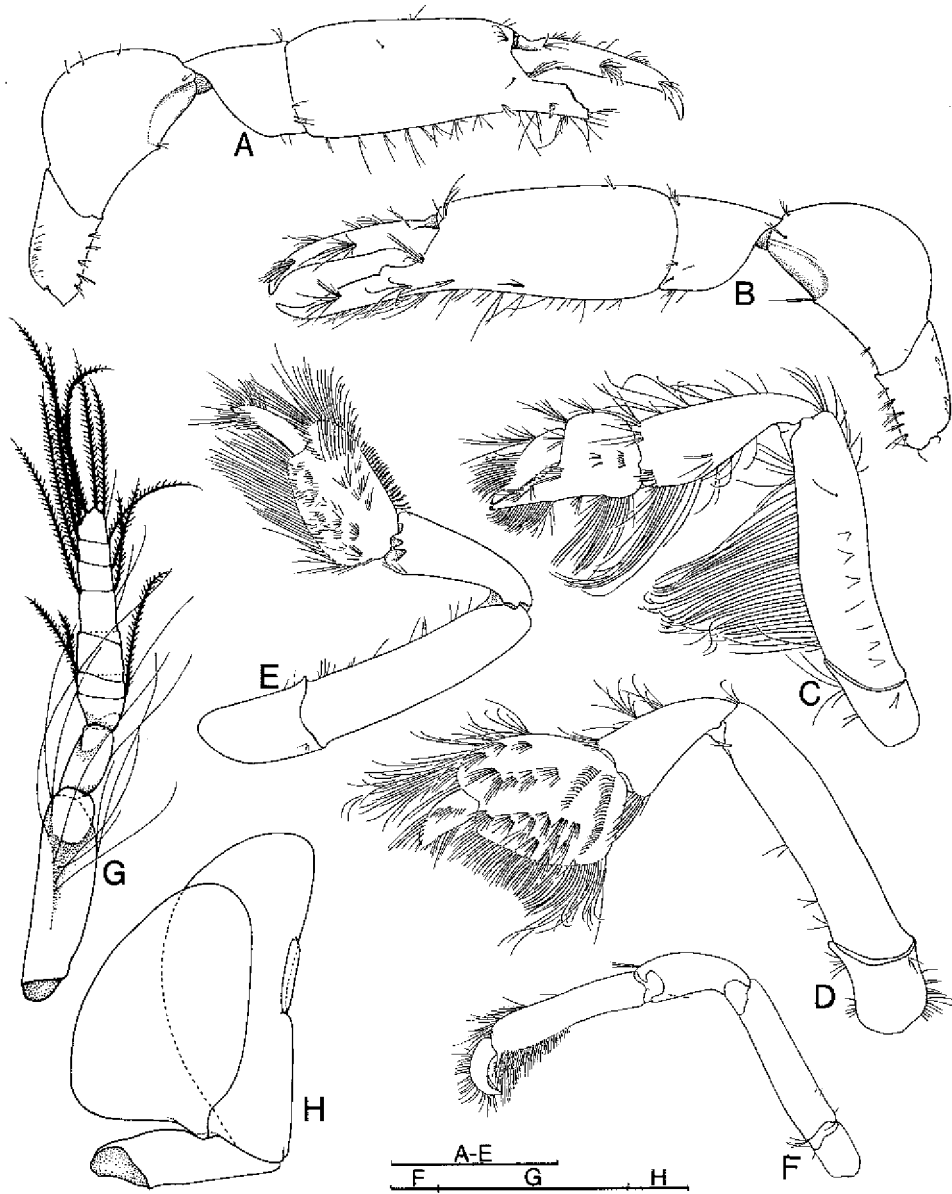


Fig. 11. *Marcusiarius torbent* sp. nov. Holotype, ZMC 77, ♀. A, right pereopod 1, lateral view; B, left pereopod 1, lateral view; C-F, pereopods 2-5, lateral views; G, left pleopod 1, anterior view; H, left pleopod 2, anterior view. Scale; A-E 5mm; F-H 1 mm.

	Maxillipeds			Pereopods				
	1	2	3	1	2	3	4	5
Exopod	1	1	r	-	-	-	-	-
Epipod	1	1	1	1	1	1	1	-
Podobranch	-	-	1	1	1	1	-	-
Arthrobranch	-	-	2	2	2	2	2	-
Pleurobranch	-	-	-	-	-	-	-	-

Etymology. The species is named for Torben Wolff, the Zoological Museum of Copenhagen, Denmark, respected marine zoologist.

Remarks. The present species is the first *Marcusiarius* record from the Pacific Ocean. He is different from both *Marcusiarius colpos* Kensley & Heart, 1991 and *M. lemoscastroi* Rodrigues & Carvalho, 1972 from the Atlantic Ocean. *M. soetae* is more closely related to *M. lemoscastroi* than to *M. colpos*; in *M. soetae* maxilliped 3 is provided with a very short exopod; maxilliped 2 with a short exopod, while in *M. lemoscastroi* maxilliped 3 lacks the exopod, and maxilliped 2 has a short exopod, and in *M. colpos* maxilliped 3 with the exopod overreaching distal meral margin, and maxilliped 2 with well-developed exopod. The other characteristics of three species in *Marcusiarius* are tabulated as follows.

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	<i>M. torbeni</i>	<i>M. colpos</i>	<i>M. lemoscastroi</i>
Rostrum	median carina widening in posterior half.	barely demarked.	widening in whole length.
Carapace	four setal rows in anterolateral region.	three setal rows	same as in <i>M. colpos</i> .
Pereopod 1	merus with reduced tooth at midlength of ventral margin.	with small proximal and large distal teeth.	strong tooth at midlength.
Telson	1/4 wider than midlength.	1/3 wider than midlength.	almost twice wider than length.
Distribution	West Malay Peninsula 70 m.	Gulf of Mexico, 13-175 m.	Brazil-Venezuela, 15-18 m.

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