

## CALLIANASSIDAE (DECAPODA, THALASSINIDEA) IN THE ANDAMAN SEA, THAILAND

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## ABSTRACT

The Callianassidae collected by Phuket Marine Biological Center (PMBC), BIOSHELF program (1996–1998) is here reported on. The collection is composed of the genus *Calliax* including two species, *C. andamanica* sp. nov., and *C. sp.*, *Gourretia* including two new species, *G. phuketensis* sp. nov., and *G. aungtonyae* sp. nov., two new genera, *Lipkecallianassa* gen. nov. (type species *R. abyssa* sp. nov.), *Michaelcallianassa* gen. nov. (type species *M. indica* sp. nov.), and *Callianassa*, including 12 new species, *C. anoploura*, *C. malaccaensis*, *C. stenomastaxa*, *C. brachytelson*, *C. amplimaxilla*, *C. matzi*, *C. chakratongae*, *C. brevirostris*, *C. nieli*, *C. propriopedis*, *C. contipes* and *C. nigroculata* sp. nov., and one named species, *C. tonkinae* Grebenjuk, and another four species that remain un-named. As a result seventeen new species and another five species including two new genera are described.

## INTRODUCTION

A workshop on the Biodiversity of Crustacea in the Andaman Sea, was held at Phuket Marine Biological Center (PMBC), Phuket, Thailand from 29 November to 20 December, 1998. Prior to this report the Callianassidae of the Andaman Sea were known from only two recorded species: *Callianassa lignicola* Alcock and Anderson, 1899 from the Andaman Sea, 185–244 m and *Neocallichirus ranongensis* (Sakai, 1983) from a muddy mangrove swamp at Hatsuakhao, Ranong Province, Thailand.

The occurrence of *Callianassa tonkinae* Grebenjuk, 1975 in Thai waters is confirmed, but *Callianassa lignicola* was not found, and *C. lignicola* and *Neocallichirus ranongensis* are not included here. The BIOSHELF collection yielded an astonishing 17 new species, including two new genera, all of which are in small size, being about 10 mm in total length.

Other than the family Callianassidae, these species are also recorded: *Callianassa coecigena* Alcock and Anderson, 1894 (= *Callianidea coecigena*), Callianideidae, from off Ceylon, Bay of Bengal, 365–690 m; *Iconaxiopsis laccadivensis* Alcock and Anderson, 1894 (= *Eiconaxius laccadivensis*), Axiidae, from the Arabian Sea near

Laccadive and Travancore, 648–1269 m; *Iconaxiopsis andamanensis* Alcock, 1901 (= *Eiconaxius andamanensis*) from west coast of Andaman Islands, 428–522 m; and *Wolffogebia phuketensis* Sakai, 1982, Upogebiidae, from Phuket, Thailand

## MATERIALS AND METHODS

The samples described in this paper were collected by the vessel R/V *Chakratong Tongyai* from the shelf area off the western coast of Thailand. The older material in the collection at the Phuket Marine Biological Center (PMBC) as well as the material collected by some field trips in the reef areas of the surrounding islands of Phuket were also added for the present works.

Most of the Andaman specimens examined in this paper are in small size, and unfortunately damaged heavily, lacking maxilliped 3, chelipeds, pereopods, and pleopods, but the condition of the carapace, the rostrum, the antennule, the antenna, the eyestalks, but the condition of the tail-fan is good enough to allow for species discrimination and description. As a result two new genera and 22 species, including 17 new species, are described.

**Abbreviations.** The following abbreviations are used in this paper: Abd = abdomen; Mxp 3 = maxilliped 3; P = pereopod; Plp = pleopod; CL = Carapace length; TL = Total length; PMBC = Phuket Marine Biological Center, Phuket, Thailand; SM = Smith McIntyre Grab; OS = Ockelmann sledge; m = meter; PB = Phang Nga Bay; BC = box corer.

### Key to the Callianassidae of the Andaman Sea

1. Carapace lacking dorsal oval.....2  
— Carapace with dorsal oval.....5
2. P/1 merus unarmed.....3  
— P/1 merus with a sharp ventroproximal spine.....4
3. Cervical groove located in posterior two thirds. Mxp 3 propodus and dactylus broadened ..... *Calliax andamanica* sp. nov.  
— Cervical groove located in posterior third. Antennular peduncle much longer than antennal peduncle..... *Calliax* sp.
4. Rostrum sharply triangular, and Mxp 3 merus with mesiodistal spine.....*Gourretia phuketensis* sp. nov.  
— Rostrum short, triangular, and Mxp 3 merus without mesiodistal spine.....*Gourretia aungtonyae* sp. nov.
5. Abdominal somites 3–5 laterally ornamented..... *Michaelcallianassa indica* sp. nov.  
— Abdominal somites 3–5 without ornamentation.....6
6. Mxp 3 merus with mesiodistal tooth. P/4 lengthened, overreaching P/2.....*Lipkecallianassa abyssa* sp. nov.  
— Mxp 3 merus without mesiodistal tooth. P/4 overreaching about P/2.....7
7. Antennular peduncle about as long as or longer than antennal peduncle.....8  
— Antennular peduncle shorter than antennal peduncle.....9
8. Antennular peduncle about as long as antennal peduncle.....13  
— Antennular peduncle longer than antennal peduncle.....20
9. Telson wider than long. P/3 propodus rounded; eyestalk attached to rostrum.....*Callianassa* sp. 1  
— Telson as long as or longer than wide.....10
10. Uropodal exopod distally truncate. Eyestalk detached from rostrum.....11  
— Uropodal exopod distally rounded. Eyestalk attached to rostrum.....12
11. Abdominal somite 6 elongate, 1.5 times as long as wide, Mxp 3 ischium–merus broadened, ovate; merus distomesial angle largely rounded, P/3 propodus oval, armed with projecting ventrodistal corner, with heeled ventroproximal angle.....*Callianassa anoploura* sp. nov.  
— Abdominal somite 6 rectangular, 1.2 times as long as wide. Maxilliped 3 ischium–merus rectangular, about 1.3 times as long as wide, merus with slanting distal margin. P/3 propodus ovate, ventrodistal angle not projecting, ventroproximal angle largely rounded..... *Callianassa malaccaensis* sp. nov.
12. Mxp 3 ischium–merus narrow, incurved on mesiodistal margin. P/3 propodus subsquare. .... *Callianassa stenomastaxa* sp. nov.  
— Mxp 3 merus with truncate distal margin.....*Callianassa* sp. 2
13. Eyestalks descending distally from rostrum.....14  
— Eyestalks attached to rostrum.....18
14. Abdominal somite 6 elongate, twice as long as wide. Uropodal exopod elongate, distally truncate. Mxp 3 ischium–merus elongate, merus with largely rounded mesiodistal angle.....*Callianassa brachytelson* sp. nov.  
— Abdominal somite 6 slightly longer than or as long as wide.....15

15. Mxp 3 ischium–merus broadened, ovate. Uropodal exopod distally wide.....*Callianassa amplimaxilla* sp. nov.
- Mxp 3 ischium–merus narrow.....16
16. Mxp 3 ischium–merus truncate distally. Uropodal exopod elongate, distally rounded..... *Callianassa tonkinae*
- Mxp 3 ischium–merus largely rounded at mesiodistal angle.....17
17. P/3 propodus bean-shaped, concave on ventral margin.....*Callianassa matzi* sp. nov.
- P/3 propodus bean shaped, straight on ventral margin .....*Callianassa chakratongae* sp. nov.
18. Uropodal exopod distally truncate.....19
- Uropodal exopod distally rounded.....21
19. Telson rectangular. Mxp 3 ischium–merus broadly rounded. P/3 propodus ovate.....*Callianassa brevirostris* sp. nov.
- Telson trapezoid. Mxp 3 ischium–merus rectangular.....*Callianassa nieli* sp. nov.
20. Telson subsquare. P/3 propodus subsquare ..... *Callianassa propriopedis* sp. nov.
- Telson subsquare. P/3 propodus narrow..... *Callianassa contipes* sp. nov.
21. Uropodal exopod lengthened, and rounded distally. Mxp 3 ischium–merus rectangular, and merus rounded at mesiodistal angle.....*Callianassa nigroculata* sp. nov.
- Uropodal exopod long, and subtruncate distally. Mxp 3 ischium–merus narrow, and largely incurved at mesiodistal angle .....*Callianassa* sp. 4

## SYSTEMATICS

### Subfamily Eucalliicinae Manning and Felder, 1991

#### Family Callianassidae Dana, 1852

Eucalliicinae Manning and Felder, 1991: 781.– Sakai, 1999c: 108.

Callianassidae Dana, 1852: 14, 14. Sakai, 1999c:7.

#### Diagnosis

Carapace compressed, with or without dorsal oval. Linea thalassinica complete. Maxilla 2 scaphognathite without an elongate, posteriorly-directed seta. P/1 chelate, unequal. P/2 chelate; P/3 propodus non-lobed or lobed. P/4 simple; P/5 subchelate. Plp 1 uniramous, two or three-articled; Plp 2 biramous, without appendix interna, smaller than Plp 3–5 in shape; Plp 3–5 with appendices internae.

#### Remarks

The species of the present collection are classified into three subfamilies, Callianassinae Dana, 1852, Eucalliicinae Manning and Felder, 1991, and Gourretiinae Sakai, 1999.

#### Genus *Calliax* De Saint Laurent, 1973

*Calliax* De Saint Laurent, 1973:514.– Sakai, 1999c: 109.

#### Type species

*Callianassa lobata* De Gaillande and Lagardere, 1966.

#### Remarks

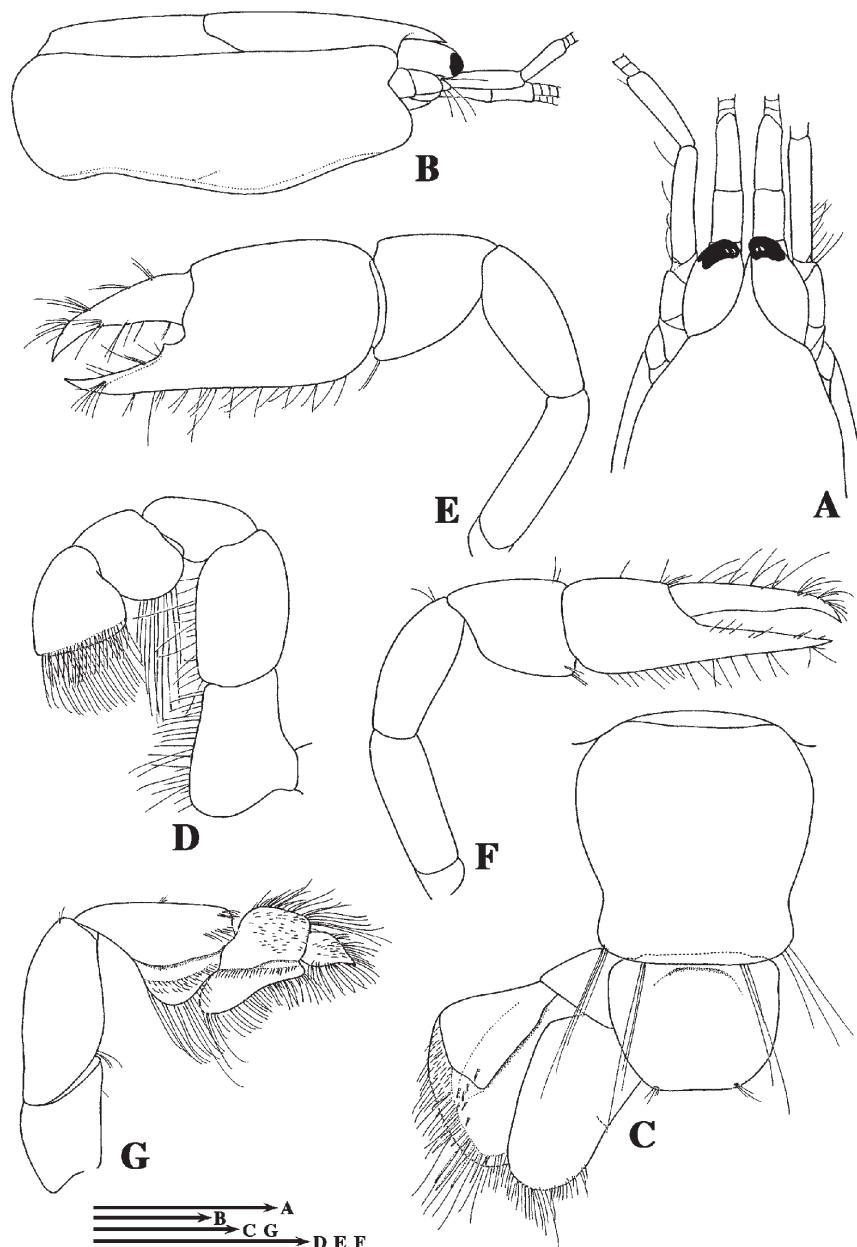
Two species of *Calliax* are present defined in the PMBC collection, one of which is *C. andamanica* sp. nov. and the other is *Calliax* sp.

*Calliax andamanica* sp. nov.  
(Fig. 1A–G; 2A–D)

**Material examined**

**Holotype:** PMBC 15373, 1 female (CL 3.5, Abd 10.0, abdomen separated from carapace, lacking

P/1, P/2 on right side, P/3 on left side, P/4 on left side, and P/5 on left side), BIOBHSELF St. A1, 09°30'N, 097°57'E, BC, 43 m, coll. S. Bussarawit and C. Aungtonya, 18.04.1996.



**Figure 1** *Calliax andamanica* sp. nov.

A–D, G, PMBC 15373, holotype, male (CL 3.5, Abd 10.0), 09°30'N, 097°57'E, 43 m; E, F, PMBC 15374, juvenile, male (TL/CL, 7.0/1.6), 07°45'N, 098°15'E, 59 m, mud.

A, anterior part of carapace with eyestalks, antennular and antennal peduncles, dorsal view; B, carapace, lateral view; C, abdominal somite 6 and tail fan, dorsal view; D, Mxp 3, lateral view; E, larger cheliped, lateral view; F, smaller cheliped, lateral view; G, P/3, lateral view. Scales all 1 mm.

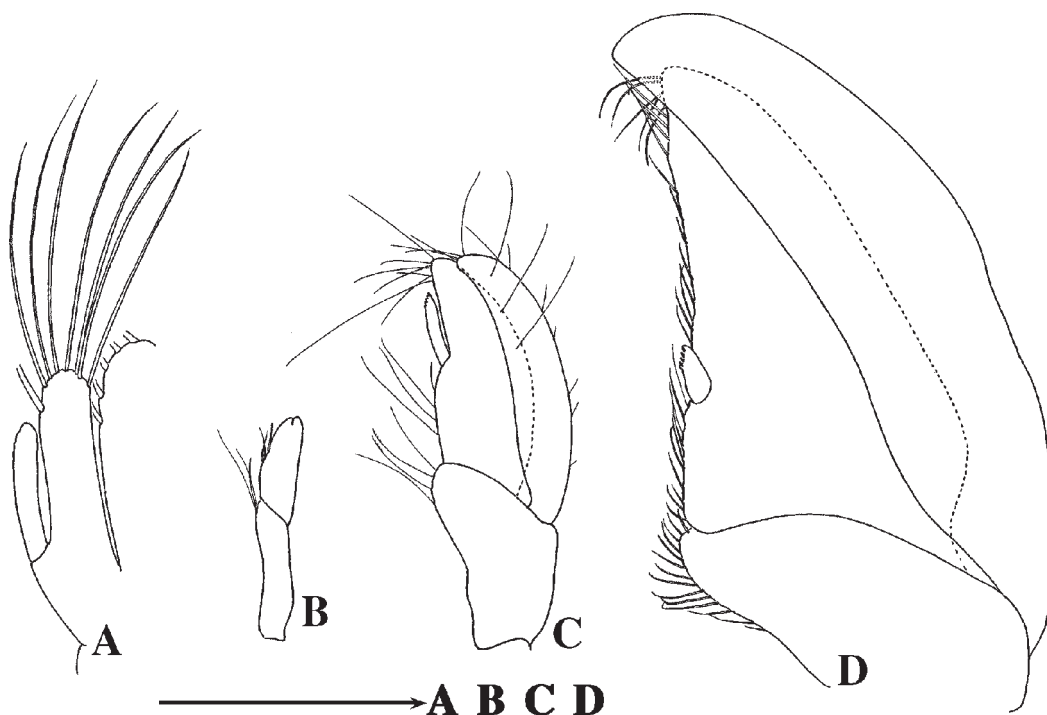
**Paratype:** PMBC 15374, 1 juvenile, male (TL/CL, 7.0/1.6), BIOSHELF St. H2, 07°45'N, 98°15'E, BC, 59 m, coll. S. Bussarawit and C. Aungtonya, 09.05.1996; PMBC 15740, 1 male (TL/CL, 17.0/3.6, abdomen separated from carapace, lacking P/1–3, P/5 on right side), BIOSHELF St. A2, 09°30'N, 097°51'E, BC, 61 m, coll. S. Bussarawit and C. Aungtonya, 18.04.1996.

**Non-type material:** PMBC 15377, 1 male (TL/CL, 10.0/2.5, lacking Mxp 3), BIOSHELF St. H1, 07°45'N, 098°17'E, OS, 31 m, coll. S. Bussarawit and C. Aungtonya, 09.05.1996; PMBC 15378, 1 cephalothorax, CL. 1.8 lacking abdomen, BIOSHELF St. H2, 07°45'N, 098°15'E, BC, 59 m, coll. S. Bussarawit and C. Aungtonya, 09.05. 96.

### Diagnosis

Small in size. Rostrum sharply projected. Antennular peduncle reaching to proximal third of antennal terminal article. Mxp 3 dactylus broadened distally. P/1 subequal, meri unarmed on ventral margin; fingers of larger cheliped shorter than palm, and those of smaller cheliped elongate, dactylus of longer than palm. P/3 propodus with roundly protruded ventroproximal angle.

Description of female holotype.— Rostrum (Fig. 1A, B) sharply triangular in dorsal view, shorter than eyestalks. Carapace smooth, dorsal oval indistinct; cervical groove located in posterior two-fifths of carapace including rostrum. Linea thalassinica entire.



**Figure 2** *Calliax andamanica* sp. nov.

A, PMBC 15740, male (TL/CL, 17.0/3.6), 09°30'N, 097°51'E, 61 m; B–D, PMBC 15373, holotype, male (CL 3.5, Abd 10.0), 09°30'N, 097°57'E, 42.5 m.

A, Appendix interna and appendix masculina on male Plp 3; B, female Plp 1; C, female Plp 2; D, female Plp 3, posterior view. Scale 1 mm.

Eyestalk (Fig. 1A, B) oval, 1.5 times as long as wide, slightly longer than distal margin of antennular basal article; dorsal surface convex; cornea pigmented, located in distal part. Antennular peduncle reaching proximal third of antennal terminal article, terminal article longer than penultimate article. Antennal peduncle with small scale; terminal article slightly shorter than penultimate article.

Mxp 3 (Fig. 1D) ischium–merus subsquare; ischium subquadrate, 1.2 times as long as wide, characteristically swollen on mesioproximal corner; merus rectangular, slightly longer than ischium, rounded on mesiodistal angle; carpus triangular, shorter than merus; propodus subquadrate, about half as long as carpus and 1.3 times wider than long, and rounded on ventral margin; dactylus broadened distally, about 1.8 times as long as propodus and terminated by setose distal margin. Exopod absent.

The gill formula is as follows:

	Maxillipeds			Pereopods				
	1	2	3	1	2	3	4	5
Exopods	1	1	-	-	-	-	-	-
Epipods	1	-	-	-	-	-	-	-
Podobranchs	-	-	-	-	-	-	-	-
Arthrobranchs	-	-	2	2	2	2	2	-
Pleurobranchs	-	-	-	-	-	-	-	-

Chelipeds missing. P/2 chelate, detached on left side, missing on right side. 3–5 missing. P/3 attached on right side (Fig. 1G), but detached on left side. Merus twice as long as wide, ventral margin slightly convex on proximal half. Carpus triangular on lateral view, slightly shorter than merus, ventral part setose along roundly convex ventral margin. Propodus with roundly protruded ventroproximal angle, lateral surface with a longitudinal row of setae at ventral third of width. Dactylus heart-shaped, two-thirds as long as propodus. P/4–5 missing.

Abdominal somites smooth, dorsally glabrous; pleurae 3–5 each with tuft of setae laterally; abdominal somite 6 as long as wide, convex in anterior two thirds on lateral margin. Plp 1 (Fig. 2B) uniramous, two-articled, distal article bilobed distally; Plp 2 (Fig. 2C) biramous, narrowly foliaceous, endopod with slender appendix interna.

Plp 3–5 (Fig. 2D) biramous, foliaceous, larger than Plp 2, each bearing stubby appendix interna.

Telson (Fig. 1C) trapezoid in dorsal view, wider than long; lateral margins convergent distally in distal half, running to rounded posterolateral corners; posterior margin almost straight, without median tooth. Dorsal surface medially weakly sulcate near proximal margin. Uropodal endopod distally ovate, much longer than telson and about 1.8 times as long as wide, dorsal surface smooth and without medial carina. Uropodal exopod about as long as wide, with broadly-rounded distal margin with setae, about as long as endopod; dorsal surface carinate medially, anterior half elevated.

Males.—Plp 1 absent. Plp 2 biramous, with appendix interna and appendix masculina (Fig. 2A).

Chelipeds.—In a juvenile male (PMBC 15374) the chelipeds are subequal. In larger cheliped (Fig. 1E) ischium three times as long as wide, unarmed; merus about as long as ischium, unarmed, dorsal and ventral margins slightly convex; carpus three-quarters as long as merus, ventral margin divergent distally. Chela 2.8 times as long as carpus; palm 1.3 times as long as wide, distal margin slightly convex without armament; fixed finger armed with proximal triangular tooth; dactylus slender, three-quarters length of palm, unarmed. Smaller cheliped (Fig. 1F) with ischium 2.5 times as long as wide, unarmed; merus about as long as ischium, dorsal margin largely convex; carpus three-quarters the length of merus. Chela slender, 2.4 times as long as carpus; dactylus 1.5 times as long as palm, unarmed.

#### Type locality

BIOSHelf St A1, BC, 18.04.1996, Andaman Sea, 09°30'N, 097°57'E, 43 m.

#### Etymology

Named after the type locality, the Andaman Sea.

#### Remarks

Most specimens are damaged, lacking pereopods, however one juvenile is intact. *Calliax andamanica* differs from *Calliax* in the form of Plps 1–2, with the male Plp 1 being absent, and female Plp 1 uniramous, two-articled, and distally bilobed. In the type species of the genus, *C. lobata* (Sakai, 1999c, fig. 27c), the male Plp 1 is



uniramous with a simple or chelate tip, and female Plp 1 is three-articled; however, the form of abdominal somite 6, the telson and the uropod are all similar to *C. lobata*. The carapace lacks the dorsal oval; mxp 3 dactylus is broadened terminally with very dense close-set, stiff setae; P/3 propodus with strongly protruding ventroproximal lobe, and Plp3 with finger-like appendix interna, similar to those of the western Atlantic species, *C. cearaensis* Rodrigues and Manning, 1992a, *C. jonesi* (Heard, 1989), *C. quadricuta* (Biffar, 1970), *C. mcilhennyi*

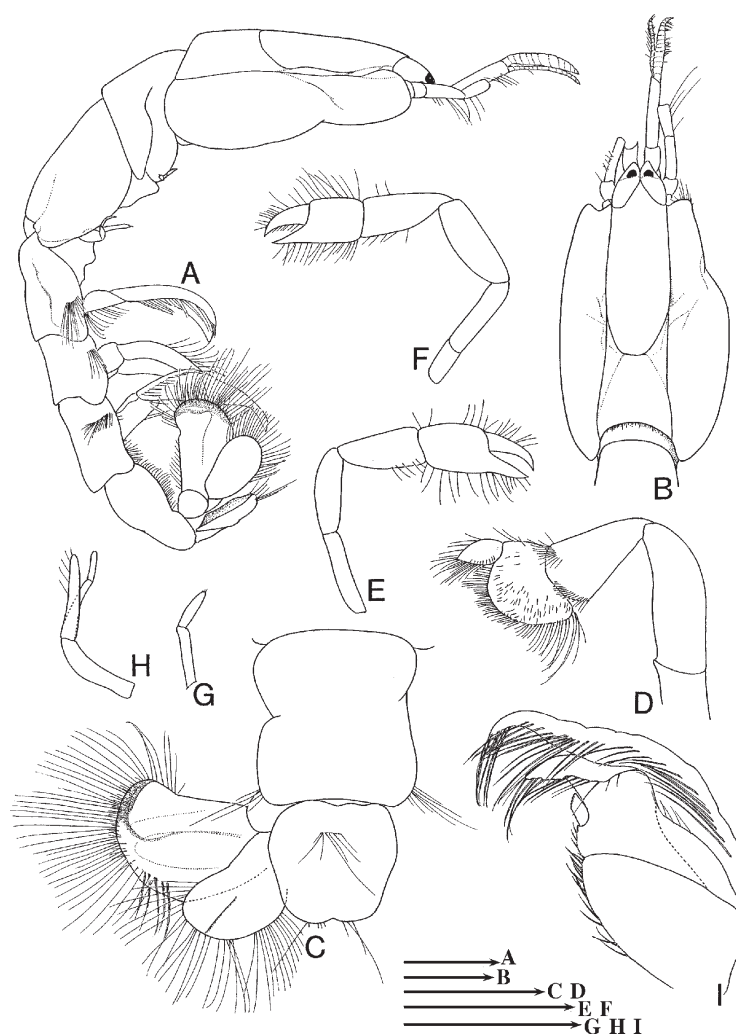
(Felder and Manning, 1994), and *C. dorijesti* Sakai, 1999.

***Calliax* sp.**

(Fig. 3A–I)

**Material examined**

PMBC 15384, 1 female (TL/CL, 11.0/2.5, wanting Mxp 3, P/1–2, P/3 on right side, P/4–5), BIOSHELF St. I2, 07°30'N, 098°29'E, BC, 59



**Figure 3** *Calliax* sp.

A–D, G–I, PMBC 15384, female (TL/CL, 11.0/2.5), 07°30'N, 098°29'E, 59 m; E–F, PMBC 18386, juvenile (TL/CL, 4.1/1.1, ), 06°46'N, 099°21'E, 38 m.

A, whole body, lateral view; B, carapace, dorsal view; C, abdominal somite 6 and tail fan; D, P/3, lateral view; E, larger cheliped, lateral view; F, smaller cheliped, lateral view; G, female Plp 1; H, female Plp 2. Scales all 1 mm.

m, coll. S. Bussarawit and C. Aungtonya, 03.05.1996; PMBC 15386, 1 juvenile (TL/CL, 4.1/1.1), BIOSHELF St. L1, 06°46'N, 099°21'E, OS, 38 m, coll. S. Bussarawit and C. Aungtonya, 06.05.1996.

### Diagnosis

Small in size. Rostrum (Fig. 3A, B) triangular, reaching middle of eyestalks. Cervical groove located at posterior third of carapace excluding rostrum. Eyestalks elongate with apical tip, overreaching distal margin of proximal antennular article. Antennal peduncle reaching midline of terminal antennular article. P/3 (Fig. 3D) propodus oval in shape, setose on lateral surface. Plp 1 (Fig. 3G) uniramous, two-articled; Plp 2 (Fig. 3H) small, biramous, endopod two-articled. Plp 3 (Fig. 3I)–5 broadened, biramous, with stubby appendices internae. Telson (Fig. 3C) subsquare, posterior margin medially concave and without median tooth. Uropodal endopod longer than telson, bearing median carina in distal half of dorsal surface; uropodal exopod broadly truncate distally. Plp 1 undeveloped; Pl 2 small, biramous.

In the juvenile specimen left cheliped has an elongate ischium without denticulation on ventral margin; merus slightly longer than ischium, unarmed; carpus about as long as merus; chela simple, and unarmed, dactylus about as long as palm. Right cheliped (Fig. 3E) slightly thicker than that on left side (Fig. 3F); ischium slender, and unarmed; merus about as long as ischium, and unarmed; carpus about as long as merus; chela with palm 1.5 times as long as wide, dactylus slightly shorter than palm. P/3 propodus oval. Plp 1 undeveloped; Plp 2 small, biramous.

### Remarks

The specimens examined are doubtfully to be placed in *Calliax*, as the carapace lacks a dorsal oval, the cervical groove is located at the posterior third of the carapace, the eyestalks are oval with distal corneae, the chelipeds are subequal and the uropodal exopod has broadly rounded distal margin. The female (PMBC 15384) is badly damaged but does show same shape of P/3 propodus as that of the other juvenile specimen (PMBC 15386). The species of *Calliax* usually have the antennular peduncle shorter than the antennal

peduncle except for *Calliax cearaensis* (Rodrigues and Manning, 1992) from Brazil, which has an antennular peduncle about as long as the antennal peduncle. The present species examined, *Calliax* sp. differs from others in the genus *Calliax* in that the antennular peduncle is much longer than the antennal peduncle, and that Plps 1–2 are simple, like that of *Callianassa*.

### Subfamily Gourretiinae Sakai, 1999

Gourretiinae Sakai, 1999b: 95.

### Type genus

*Gourretia* de Saint Laurent, 1973.

### Genera included

*Gourretia* de Saint Laurent, 1973; *Dawsonius* Manning and Felder, 1991.

### Remarks

Gourretiinae is distinguished from Ctenochelinae by the absence of the rostral carina (Sakai, 1999b: 95). In the Gourretiinae *Dawsonius* and *Gourretia* are recognised; abdominal somite 6 bears a pair of sharp lateral projections in *Dawsonius*, but does not have it in *Gourretia*.

### Genus *Gourretia* de Saint Laurent, 1973

*Gourretia* De Saint Laurent, 1973: 514.– De Saint Laurent and Le Loeuff, 1979: 78.– Le Loeuff and Intès, 1974: 26.– Poore and Griffin, 1979: 278.– Manning, 1987: 398.– Manning and Felder, 1991: 785, fig. 3.– Poore, 1994: 103.

### Type species

*Callianassa denticulata* Lutze, 1937, by original designation and monotypy. Gender feminine.

### Definition

Carapace lacking dorsal oval, rostrum obsolete or triangular, rostral carina absent. Cardiac prominence with a mid-pit present or not. Linea thalassinica entire. Eyestalks contiguous with one



another; cornea subterminally spotted. Mxp 3 with or without exopod; ischium–merus pediform, merus rectangular, with or without distomesial tooth, and with crista dentata on mesial surface; carpus triangular, ventral margin swollen distally, propodus subsquare, dactylus digitiform.

P/1 unequal; larger cheliped with a proximal meral hook, fingers shorter than palm, without comb of fine teeth; and smaller cheliped with propodus tapering, and chela elongate. P/3 propodus various in form, subquadrate, higher than long or rectangular, longer than high, not typical in a heeled shape.

Abdominal somite 1 without pleura; abdominal somite 6 without a pair of sharp lateral projections. Plp 1 uniramous. Male Plp 2 biramous, foliaceous with appendix interna and appendix masculina. Female Plp 2 biramous and foliaceous with appendix interna. Plp 3–5 biramous and foliaceous with digitiform appendices internae, larger than Plp 2 in size.

Telson rectangular, longer than wide, triangular swelling on proximal lateral margin. Uropodal endopod oval, and uropodal exopod with or without a marginal notch or incision.

### Remarks

The type species of *Gourretia* is *Callianassa subterranea* var. *minor* Gourret, 1887 (De Saint Laurent 1973). As the name *minor* Gourret, 1887, is a junior homonym of *Callianassa minor* Fischer, 1866, it cannot be used. The valid name for the type of *Gourretia* is *C. denticulata* Lutze, 1937, but the true type none the less remains *minor* Gourret (Sakai, 1999c: 128; commented by Holthuis)

The form. of P/3 propodus and the presence of the notch on the lateral margin of uropodal exopod are not stable in *Gourretia*. The type species of *Gourretia*, *G. denticulata* (Lutze, 1937) from the Mediterranean sea, shows P/3 propodus wider than long, and with a short, rounded dorsal and a truncat ventral margins as it is in *G. manihinae* Sakai, 1984 from Tanzania, East Africa, *G. lahouensis* Le Loeuff and Intès, 1974 and *G. barracuda* Le Loeuff and Intès, 1974 from Ivory Coast, however, *G. latispina* (Dawson, 1967) from the northern Gulf of Mexico shows P/3

propodus converse distally with the straight dorsal and ventral margins. The uropodal exopod is not armed with a marginal notch in *G. denticulata*, *G. latispina*, *G. barracuda*, *G. lahouensis* and *G. manihinae*, but with it in *G. coolibah*, and *G. crosnieri*.

### Species included

*G. denticulata* (Lutze, 1937) (= *Gourretia minor* (Gourret, 1887)); *G. latispina* (Dawson, 1967); *G. barracuda* Le Loeuff and Intès, 1974; *G. lahouensis* Le Loeuff and Intès, 1974; *G. coolibah* Poore and Griffin, 1979; *G. sp. de Saint Laurent* and Le Loeuff, 1979; *G. crosnieri* Ngoc-Ho, 1991; *G. manihinae* Sakai, 1984.

### *Gourretia phuketensis* sp. nov.

(Figs 4A–H, 5A–H)

### Material examined

**Holotype:** PMBC 15387, 1 male (TL/CL, 14.0/3.8, lacking larger cheliped on left side, P/5), BIOSHELF St. E1, 08°30'N, 098°06'E, BC, 42 m, coll. S. Bussarawit and C. Aungtonya, 22.04.1996.

**Non-type material:** PMBC 15388, 1 female without carapace, BIOSHELF St. L1, 06°46'N, 099°21'E, OS, 38.0 m, coll. S. Bussarawit and C. Aungtonya, 06.05.1996.

### Diagnosis

Small in size. Rostrum triangular in dorsal view. Maxilla 2 scaphognathite anteriorly with a few elongate setae and posteriorly with row of short marginal setae and posteromesial process, but without posterior long whip. Mxp 3 merus with mesiodistal tooth. Cheliped unequal. P/3 propodus rectangular. Uropodal exopod without marginal notch or incision.

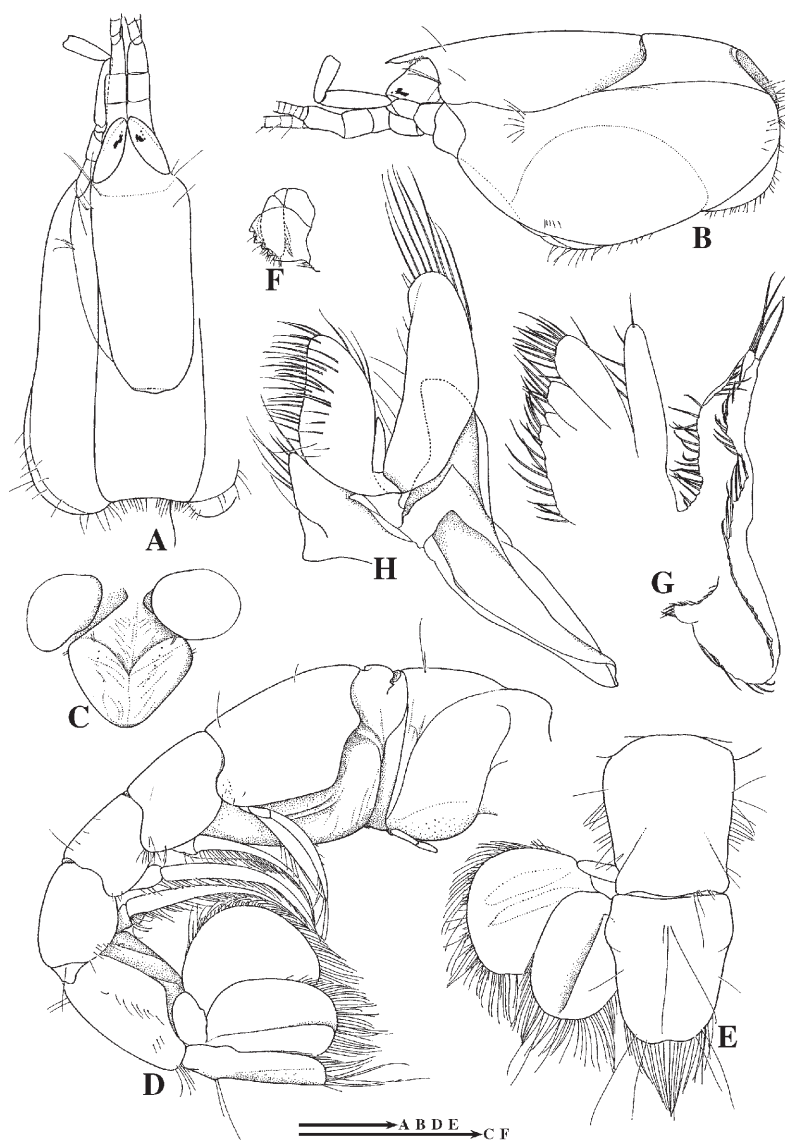
### Description

**Male holotype.**—Rostrum (Fig. 4A, B) triangular in dorsal view and fails to reach the distal margin of eyestalks; lateral margin setose proximally. Carapace smooth, armed with transverse row of setae on branchial region, simple on midposterior margin and narrowly ridged on posterolateral margin; dorsal oval not present, linea thalassinica

complete, and cervical groove located about at posterior third. Abdominal somite 7 episternal plate (Fig. 4C) slightly elevated in posteromedian part, without a median slit, single pair of condyles.

Eyestalks (Fig. 4A, B) an elongate-triangular, with rounded tip, dorsal surface descending forward, leaving space from rostrum; cornea located medially in distal half, spotted with blackish

pigments. Antennular peduncle slightly shorter than antennal peduncle; proximal article much overreaching eyestalk; terminal article as long as penultimate article; rami of flagellum 1.6 times as long as peduncle. Antennal peduncle with a minute triangular scaphocerite; terminal article two-thirds as long as penultimate article.



**Figure 4** *Gourretia phuketensis* sp. nov.

A–H, PMBC 15387, holotype, male (TL/CL, 14.0/3.8), 08°30'N, 098°06'E, 42 m.

A, carapace, dorsal view; B, same, lateral view; C, Abdominal somite 7 episternal plate; D, abdominal somite 6 and tail fan, dorsal view; E, abdominal somite 6 and tail fan, dorsal view; F, mandible, lateral view; G, Maxilla 2, lateral view; H, Mxp 1, lateral view. Scales all 1 mm.

Mandible (Fig. 4F) with 6 teeth on cutting edge; palp 3-articled. Maxilla 2 (Fig. 4G) scaphognathite anteriorly narrowed with few elongate setae and posteriorly with row of short marginal setae and posteromesial process. Mxp 1 (Fig. 4H) with broadened epipod. Mxp 2 (Fig. 5A) with rudimentary arthrobranch. Mxp 3 (Fig. 5B) pediform, with articulated exopod; ischium subsquare, about twice as long as wide, with crista dentata on mesial surface; merus subsquare, 1.8 times as long as wide, armed with 1 sharp tooth on mesial margin; carpus 1.8 times as long as wide, largely triangular on ventral margins, about as long as merus; propodus broadened proximally on ventral margin, about as long as wide and shorter than carpus; dactylus small log-shaped, shorter than propodus. Gill formula is shown as follows (r = rudimentary),

**Table 1** Branchial formula in *Gourretia phuketensis* sp. nov.

	Maxillipeds			Pereopods				
	1	2	3	1	2	3	4	5
Exopods	1	1	-	-	-	-	-	-
Epipods	1	-	-	-	-	-	-	-
Podobranchs	-	r	-	-	-	-	-	-
Arthrobranchs	-	-	2	2	2	2	2	-
Pleurobranchs	-	-	-	-	-	-	-	-

(r = rudiment)

Smaller cheliped on right side (Fig. 5C) elongate; ischium three times as long as high, unarmed; merus swollen medially, about as long as ischium, ventral margin with 1 spine proximally; carpus 0.7 times as long as merus; chela elongate, about four times as long as high, distal margin declining to prehensile margin of fixed finger; fixed finger with unarmed prehensile margin; dactylus shorter than palm, prehensile margin unarmed and incurved distally. Larger cheliped on left side missing.

P/2 (Fig. 5D) chelate, merus about three times as long as high; carpus about two-thirds the length of merus; chela distinctly longer than carpus, dactylus slender and more longer than slender fixed finger. P/3 (Fig. 5E) simple; merus rectangular, about three times as long as wide; carpus triangular,

1.5 times as long as wide, and two-thirds the length of merus; propodus rectangular, ventral margin almost straight, dorsal margin largely convex, about two times as long as wide, exterior surface armed with row of small tufts of short setae along ventral margin; dactylus digitiform, terminating in corneous tip. P/4 (Fig. 5F) simple; merus three times as long as wide; carpus divergent in height distally, slightly shorter than merus; propodus rectangular, slightly shorter than carpus, exterior surface setose; dactylus digitiform, two-thirds the length of propodus. P/5 missing.

Abdominal somites (Fig. 4D) smooth, dorsally glabrous; somite 1 marked with a convex anterodorsal dorm; somite 2 longer than somite 1, pleuron 2 roundly overlapping pleuron 3 posterolaterally, and with scanty setae posterolaterally; pleura 3–4 roundly protruded posterolaterally, and with scant setae posterolaterally respectively, pleuron 5 not protruded posterolaterally; abdominal somite 6 longer than wide, and convex laterally in posterior part.

Plp 1 uniramous, two-articled; Plp 2 (Fig. 5G) biramous, elongate, and foliaceous; endopod with appendix interna and masculina. Plp 3 (Fig. 5H) – 5 biramous, foliaceous, and more elongate than in Plp 2, endopod with digitiform appendices internae.

Telson (Fig. 4E) rectangular in dorsal view, longer than wide; lateral margins largely convex proximally, slightly convergent distally to a broadly rounded posterior corner; posterior margin slightly concave medially, without a median spine; dorsal surface convex, with a transverse row of setae medially in proximal quarter. Uropodal endopod oval, 1.5 times as long as wide, and slightly shorter than telson, dorsal surface with distinct median longitudinal carina; uropodal exopod broadened, slightly longer than wide, without a median carina; marginal notch absent.

**Female:** Plp 1 two-articled, distal article elongate, tapering distally. Plp 2 biramous, endopod with appendix interna.

#### Type locality

Andaman Sea, off Phuket Island, Thailand, BIOSHELF St. E1, BC, 08°30'N, 098°06'E, 42 m,

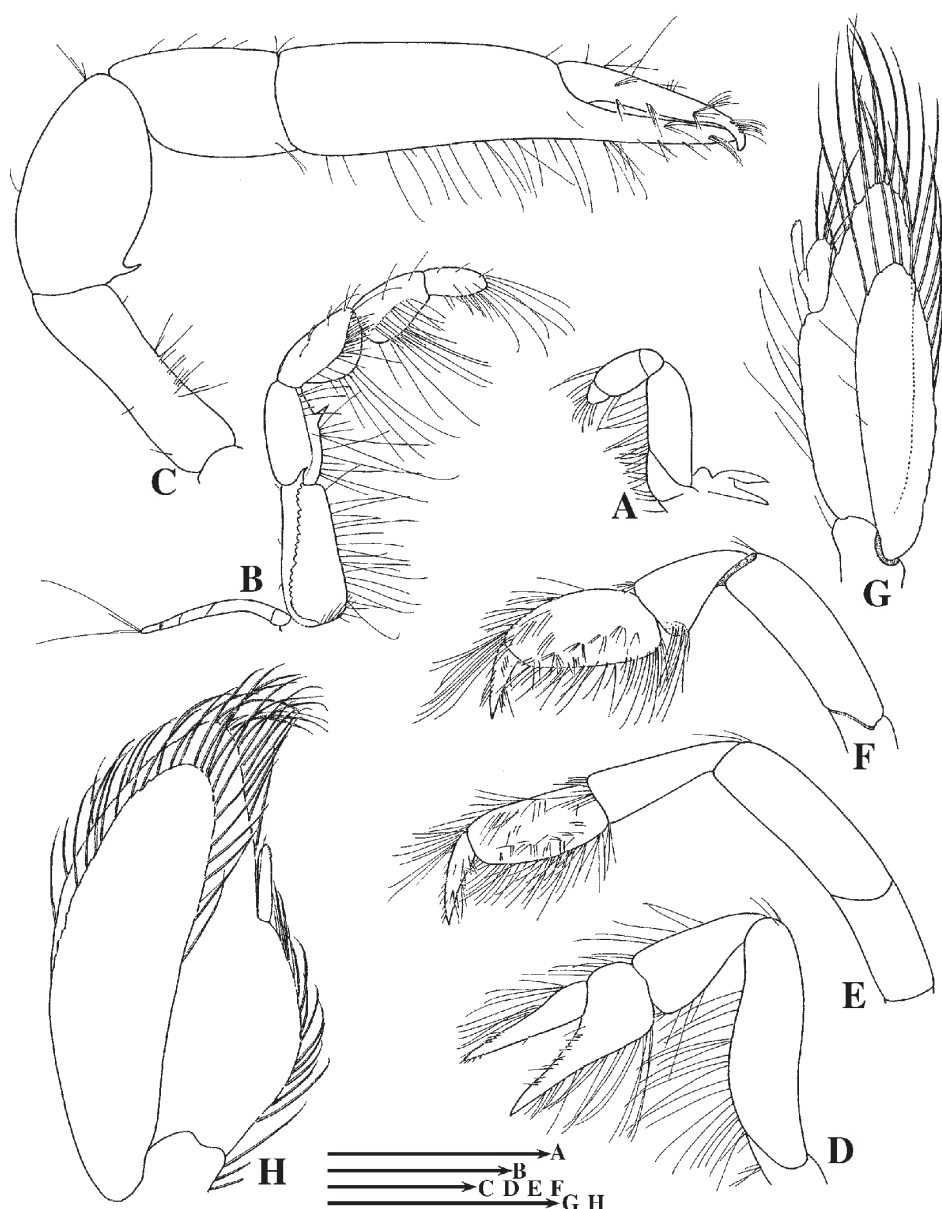
**Etymology**

Derived from the survey location, Phuket, and the suffix, *-ensis*, meaning belonging to.

**Remarks**

*Gourretia phuketensis* is aberrant in P/3 having a rectangular propodus, as in *G. lahouensis* Le

Loeuff and Intès, 1974 from the Ivory Coast, however the dorsal margin of P/3 in *G. phuketensis* is more weakly rounded than in *G. lahouensis*. *G. phuketensis* bears a Mxp 3 mesiodistal tooth as in *G. denticulata* (Lutze, 1937) from the Mediterranean, *G. latispina* (Dawson, 1967) from the northern Gulf of Mexico, *G. manihinae* Sakai,



**Figure 5** *Gourretia phuketensis* sp. nov.

A–H, PMBC 15387, holotype male.

A, Mxp 2, lateral view; B, Mxp 3, mesial view; C, smaller cheliped, lateral view; D, P/2, lateral view; E, P/3, lateral view; F, P/4, lateral view; G, Plp 2, posterior view; H, Plp 3, posterior view. Scales all 1 mm.

1984, and *G. barracuda* Le Loeuff and Intès, 1974 from Ivory Coast. The uropodal exopod is not armed with a marginal notch as in *G. denticulata*, *G. barracuda*, *G. lahouensis* and *G. manihinae*. Male Plp 1 differs from that of other species in being uniramous, two-articled, with the distal article W-shaped at the tip.

***Gourretia aungtonya* sp. nov.**

(Figs 6A–H; 7A–F; 8A–G)

**Material examined**

**Holotype:** PMBC 15389, 1 male (TL/CL, 11.0/2.9, damaged, lacking P/2 on right side, P/3 on right side, P/4 on right side, P/5), BIOSHELF St. C1, 09°00'N, 098°03'E, BC, 40 m, coll. S. Bussarawit and C. Aungtonya 20.04.1996.

**Paratype:** PMBC 15390, 1 ovig. female (TL/CL, 15.0/3.6), BIOSHELF St. I20m, 07°30'N, 099°01'E, BC, 21 m, coll. S. Bussarawit and C. Aungtonya 03.05.1996.

**Diagnosis**

Small in size. Rostrum triangular. Antennular peduncle longer than antennal peduncle. Mxp 3 merus without mesiodistal tooth. P/1 unequal, meri with a ventroproximal tooth, dactyli unarmed on cutting edges. Uropodal exopod with marginal notch.

**Description**

**Male holotype.**— Rostrum (Fig. 6A, B, C) short, wide and triangular in dorsal view, attached to eyestalks. Carapace smooth, laterally compressed, armed with a transverse row of setae on branchial region, terminated by simple midposterior margin, and narrowly ridged on a posterolateral margin; linea thalassinica complete, and cervical groove located in posterior thirds of carapace.

Eyes (Fig. 6B, C) oval, contiguous one another, largely convex on lateral margins, not reaching to distal margin of antennular proximal article; cornea largely spotted near tip. Antennal peduncle with terminal article longer than penultimate. Maxilla 2 (Fig. 7A) scaphognathite without an elongate posteriorly-directed seta. Mxp 2 (Fig. 7B) with rudimentary podobranch. Mxp 3 (Fig. 7C, D) pediform; ischium rectangular; merus

also rectangular, unarmed on distal margin; exopod two-articled.

P/1 chelate, unequal. Larger cheliped on left side (Fig. 7E) with ischium elongate; ventral margin with row of scant small spines, dorsal margin smooth. Merus ovate, about twice as long as wide; ventral margin with a proximal small teeth, exterior surface longitudinally carinate. Carpus slightly broader than long. Chela elongate, 2.5 times as long as wide; dactylus crossed by fixed finger proximally; cutting edges of dactylus and fixed finger unarmed. Smaller cheliped on right side (Fig. 7F) with ischium three times as long as wide; dorsal margin smooth, ventral margin with row of denticles. Merus ovate, about twice as long as wide and as long as ischium; dorsal margin largely concave and unarmed, ventral margin with a proximal small tooth, exterior surface longitudinally carinate medially. Carpus about half as long as merus and slightly longer than wide. Chela elongate, about 3.5 times as long as carpus, unarmed; dactylus about two-thirds the length of palm. P/2 chelate. P/3 propodus (Fig. 8A) rectangular. P/4 (Fig. 8B) coxa flattened, and immobile; propodus rectangular; dactylus digitiform. P/5 missing.

Male Plp 1 absent. Male Plp 2 (Fig. 8C, D) biramous, foliaceous, narrow; endopod larger than exopod, bearing articulated appendix interna, Plp 3–5 (Fig. 8E), larger than Plp 2, foliaceous, broadened; endopods with digitiform appendices internae.

Abdominal somite 1 (Fig. 6A, D, F) longer than somite 2: small anterodorsal dorm present. Abdominal somite 7 shows episternal plate (Fig. 6E) with a median slit, anterior margin triangular and with a pair of depressed posterior condyle. Telson (Fig. 6G) subtriangular, distal margin ovate. Uropodal endopod (Fig. 6H) ovate, and with a longitudinal median carina extending laterally to a weak marginal concavity; uropodal exopod with a weak median suture, and with a marginal notch.

**Female.**— Plp 1 (Fig. 8F) uniramous, two-articled, distal article slender and tapering. Plp 2 (Fig. 8G) biramous, slender and elongate, endopod two-articled.

**Type locality**

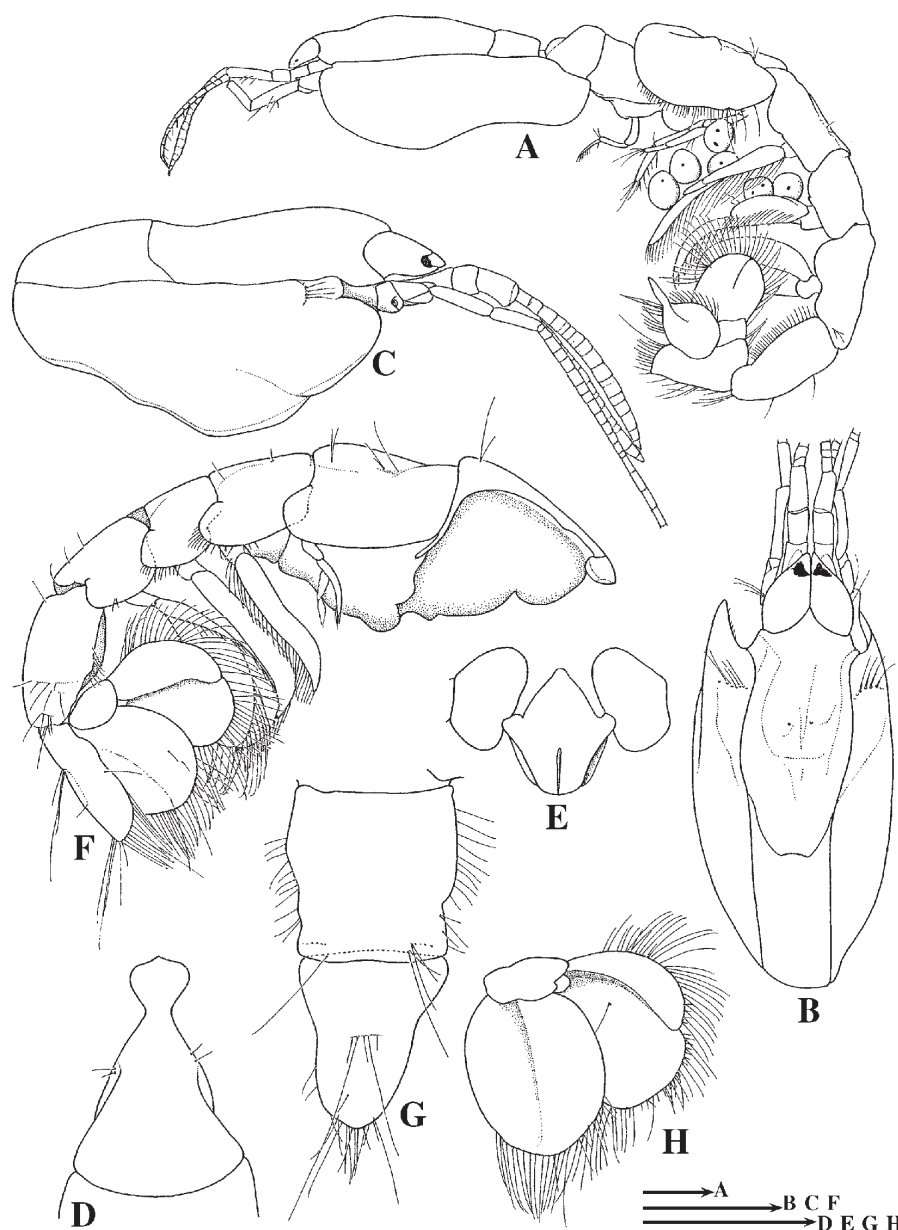
Andaman Sea, 09°00'N, 98°03'E, 40 m.



**Etymology**

The epithet is dedicated to Ms. Charatsee Aungtonya, a marine biologist at the Reference Collection of Phuket Marine Biological Center

(PMBC) for the material collected and brought me in by the projects of Biodiversity of marine flora and fauna of the Andaman Sea Shelf (BIOSHSELF).



**Figure 6** *Gourretia aungtonyae* sp. nov.

A, PMBC 15390, ovig. female (TL/CL, 15.0/3.6), 07°30'N, 099°01'E, 21 m; B–G, PMBC 15389, holotype, male (TL/CL, 11.0/2.9), 09°00'N, 098°03'E, 40 m.

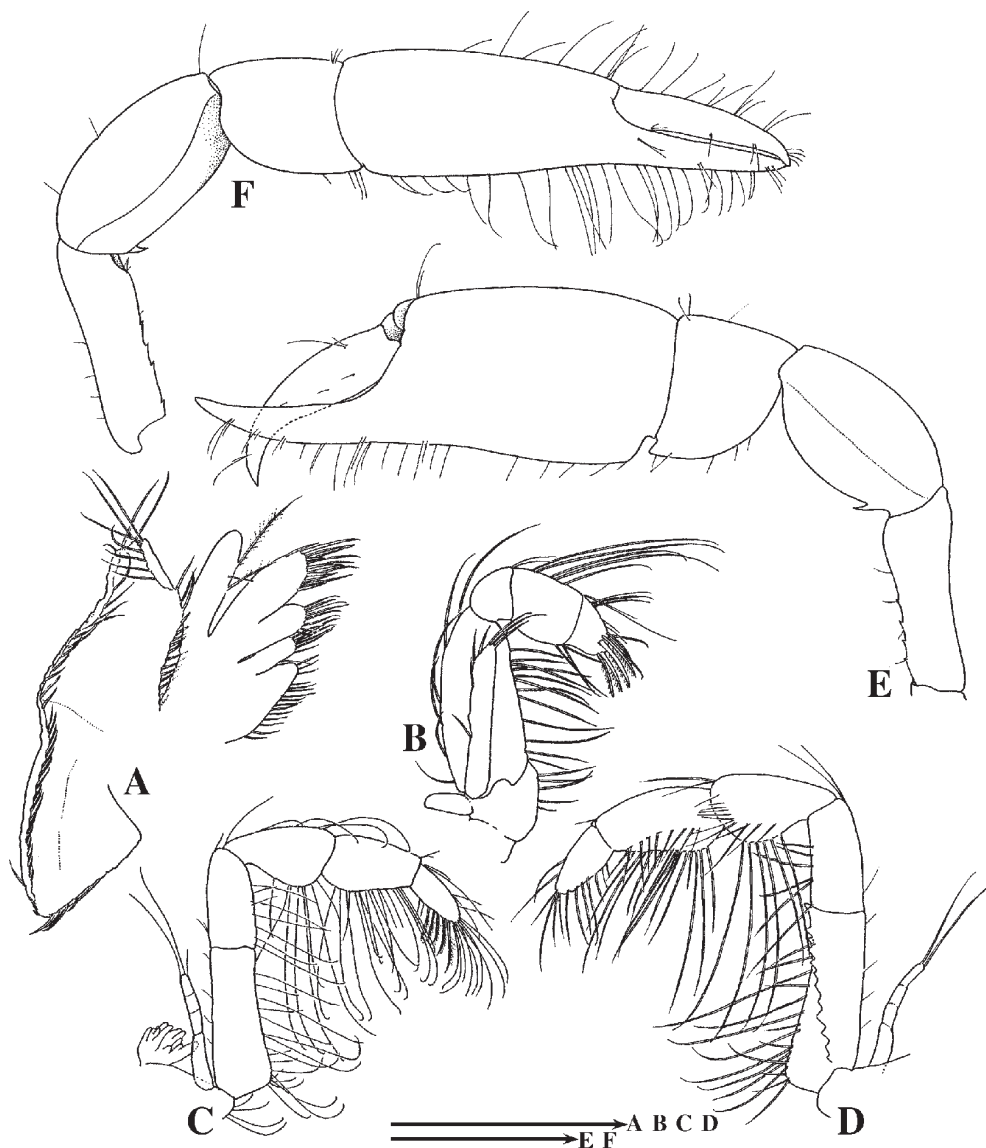
A, whole body, lateral view; B, carapace, dorsal view; C, same, lateral view; D, abdominal somite 1, dorsal view; E, Abdominal somite 7 episternal plate; F, abdomen and tail fan, lateral view; G, abdominal somite 6 and telson, dorsal view; H, uropod, dorsal view. Scales all 1 mm.



### Remarks

This species is seemingly immature as the form of Plp 1 and Plp 2 appendix interna are not yet developed enough to show their characters. It is, however, defined as a new species of *Gourretia*, because Mxp 3 is armed with the exopod, P/1 merus is provided with a ventroproximal tooth, P/3 propodus is rectangular, and the uropodal exopod has a lateral notch.

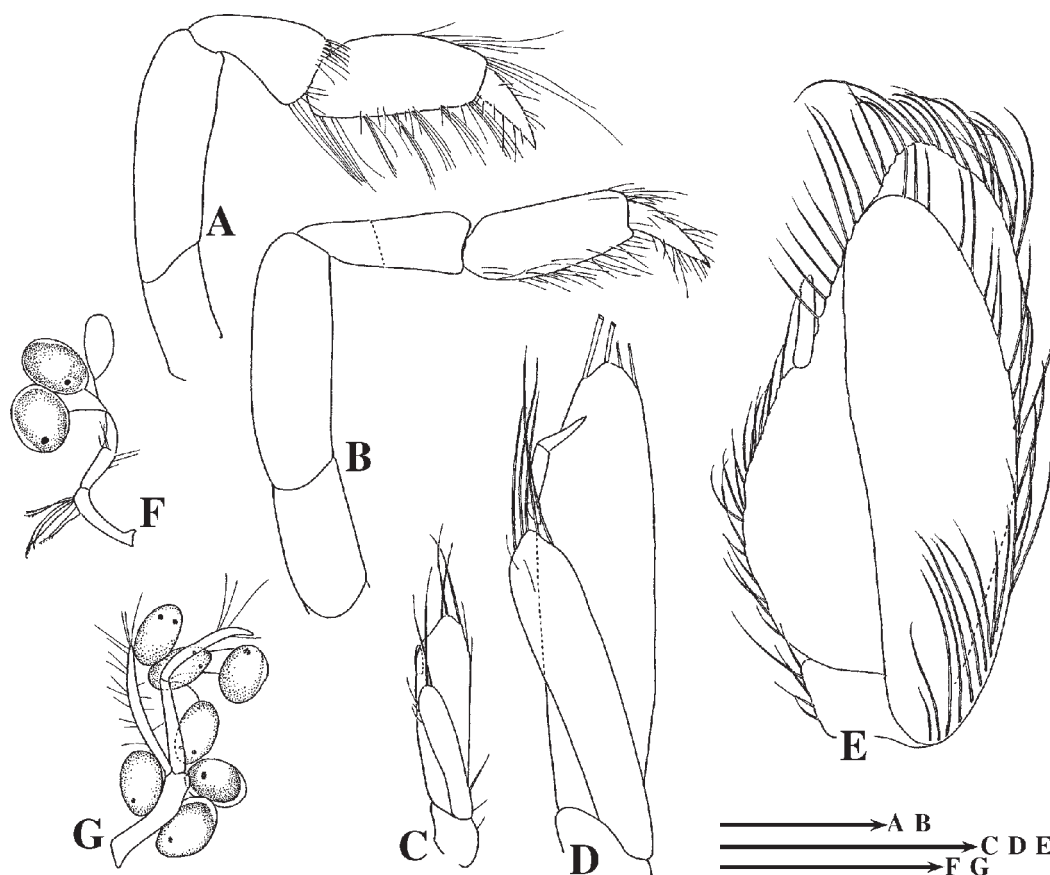
*Gourretia aungtonyae* is closely related to *G. crosnieri* Ngoc-Ho, 1991 from New Caledonia, because Mxp 3 merus lacks a mesiodistal tooth, and the uropodal exopod is marked with marginal incision. In *G. crosnieri* the rostrum reaches the middle of eyestalks, and the P/3 propodus is 1.8 times as long as high, with its ventral margin straight with a protruding ventroposterior angle whereas in the *G. aungtonyae* the rostrum only



**Figure 7** *Gourretia aungtonyae* sp. nov.

A–F, PMBC 15389, holotype, male (TL/CL, 11.0/2.9).

A, maxilla 2, lateral view; B, Mxp 2, lateral view; C, Mxp 3, lateral view; D, same, mesial view; E, larger cheliped, lateral view; F, smaller cheliped, lateral view. Scales all 1 mm.



**Figure 8** *Gourretia aungtonyae* sp. nov.

A–E, PMBC 15389, holotype, male (TL/CL, 11.0/2.9); F–G, PMBC 15390, ovig. female (TL/CL, 15.0/3.6).

A, P/3, lateral view; B, P/4, lateral view; C, male Plp 2, posterior view; D, same, enlarged; E, male Plp 3, posterior view; F, female Plp 1, G, female Plp 2. Scales all 1 mm.

reaches to the proximal quarter of eyestalks, and P/3 propodus is rectangular in shape and more than twice as long as high.

In *Gourretia*, the male pleopod 1 usually has a uniramous appendage, and Plp 2 is armed with an appendix interna and appendix masculina, however Plp 1-2 in *G. aungtonyae* is aberrant, because Plp 1 is absent, and Plp 2 (Fig. 8C, D) is armed with articulated appendix interna, but without appendix masculina. It is uncertain whether the absence of male Plp 1 has resulted from damage.

#### Subfamily Callianassinae Dana, 1852

Callianassinae Balss, 1957: 1582; Sakai, 1999c: 10.

#### Type genus

*Callianassa* Leach, 1814.

#### Genera included

*Callianassa* Leach, 1814 (= *Trypaea* Dana, 1852; *Cheramus* Bate, 1888; *Scallasis* Bate, 1888; *Biffarius* Manning and Felder, 1991; *Neotrypaea* Manning and Felder, 1991; *Notiax* Manning and Felder, 1991; *Gilvossius* Manning and Felder, 1992; *Poti* Rodrigues and Manning, 1992); *Podocallichirus* Sakai, 1999; *Callichirus* Stimpson, 1866; *Lepidophthalmus* Holmes, 1904; *Glypturus* Stimpson, 1866 (= *Corallianassa* Manning, 1987; *Corallichirus* Manning, 1992); *Neocallichirus* Sakai, 1988 (= *Sergio* Manning and Lemaitre, 1994); *Lipkecallianassa* gen. nov.; *Michaelcallianassa* gen. nov.

### Remarks

Six genera have been admitted by Sakai (1999c), however another two genera are added in this paper. Poore (1994: 87, 101) commented that 'Pleopods offer numerous characters for an understanding of the phylogeny of the Thalassinidea.' Poore (1994) used the digitiform or stubby appendices internae on Plp 3–5 as the basis for the generic-level scheme in his callianassid key. Manning and Felder (1991: 767, 780) included plp 3–5 with stubby appendices internae as part of their definition of the Callianassinae Dana, 1852. These taxa were subject to a cladistic analysis by Tudge *et al.* (2000: 129) and followed by Tamaki and Miyabe (2000: 182). Tudge *et al.* (2000: 136) upheld the subfamily Cheramiinae. In the type species of 'Callianassa group', the intermediate forms are observed on Mxp 3 merus, P/3 propodus, the uropod, the telson, and Plp 3–5 appendices internae in the present examination, so that all of the genera *Trypaea* Dana, 1852a, *Cheramus* Bate, 1888, *Scallasis* Bate, 1888, *Biffarius* Manning and Felder, 1991, *Neotrypaea* Manning and Felder, 1991, *Notiax* Manning and Felder, 1991, *Poti* Rodrigues and Manning, 1992b, *Gilvossius* Manning and Felder, 1992 and *Nihonotrypaea* Manning and Tamaki, 1998 (Fig. 15D–F) are regarded as a synonym of *Callianassa* (Sakai, 1999: 11, 129). It is observed that the shape of pleopods are narrow in *Callianassa anoploura*, *C. malaccaensis*, *C. brachytelson*, *C. tonkinae*, *C. mazi*, *C. chakratongae*, *C. nieli*, *C. propriopedis*, *C. contipes*, *C. nigroculata* spp. nov. as in *Callianassa marginata*, however the shape of appendices internae varies from digitiform to stubby. Regarding the shape of Mxp 3 ischium–merus, the broadened Mxp 3 is found in *Callianassa brachytelson*, and *C. brevirostris* sp. nov., each of which is held by the slender form of pleopods as in *C. marginata*, and in *C. stenomastaxa* sp. nov. the pleopods are broadened, nevertheless the Mxp 3 ischium–merus is narrow. I agree that in callianassid species, the pleopods do have phylogenetic meaning, however the forms of appendices internae on pleopods 3–5, the shape of Mxp 3 ischium–merus cannot be applied to the definition of taxa.

### *Lipkecallianassa* gen. nov.

### Description

Carapace with dorsal oval, with linea thalassinica. Antennular peduncle shorter than antennal peduncle. Mxp 3 ischium–merus paralleled laterally, merus forming a mesiodistal tooth, propodus rectangular. P/3 propodus rectangular. P/4 lengthened, overreaching P/2.

### Remarks

*Lipkecallianassa* is characterised by the lengthened P/4, but shows a similarity to the genus *Callianassa* in that the carapace bears a dorsal oval, though it is difficult to examine the exact shape due to damage; the linea thalassinica is present, scaphognathite of maxilla 2 lacks a posterior whip and Mxp 3 propodus is rectangular, not swollen as in *Podocallichirus*, *Callichirus*, *Lepidophthalmus*, *Glypturus* and *Neocallichirus*. The characters of the larger cheliped and Plps 1–5 can hardly be observed except one Plp 3 on the left side, which is provided with a fused appendix interna as in *Michaelcallianassa indica* sp. nov.

### Type species

*Lipkecallianassa abyssa* sp. nov., by present designation and monotypy.

### Etymology

The name is in dedication to Prof. Dr. Lipke B. Holthuis of Nationaal Natuurhistorisch Museum in Leiden, who has produced important works on Thalassinidea, plus the generic name *Callianassa*. Gender is feminine.

*Lipkecallianassa abyssa* sp. nov.  
(Figs 9A–D; 10A–H)

### Material examined

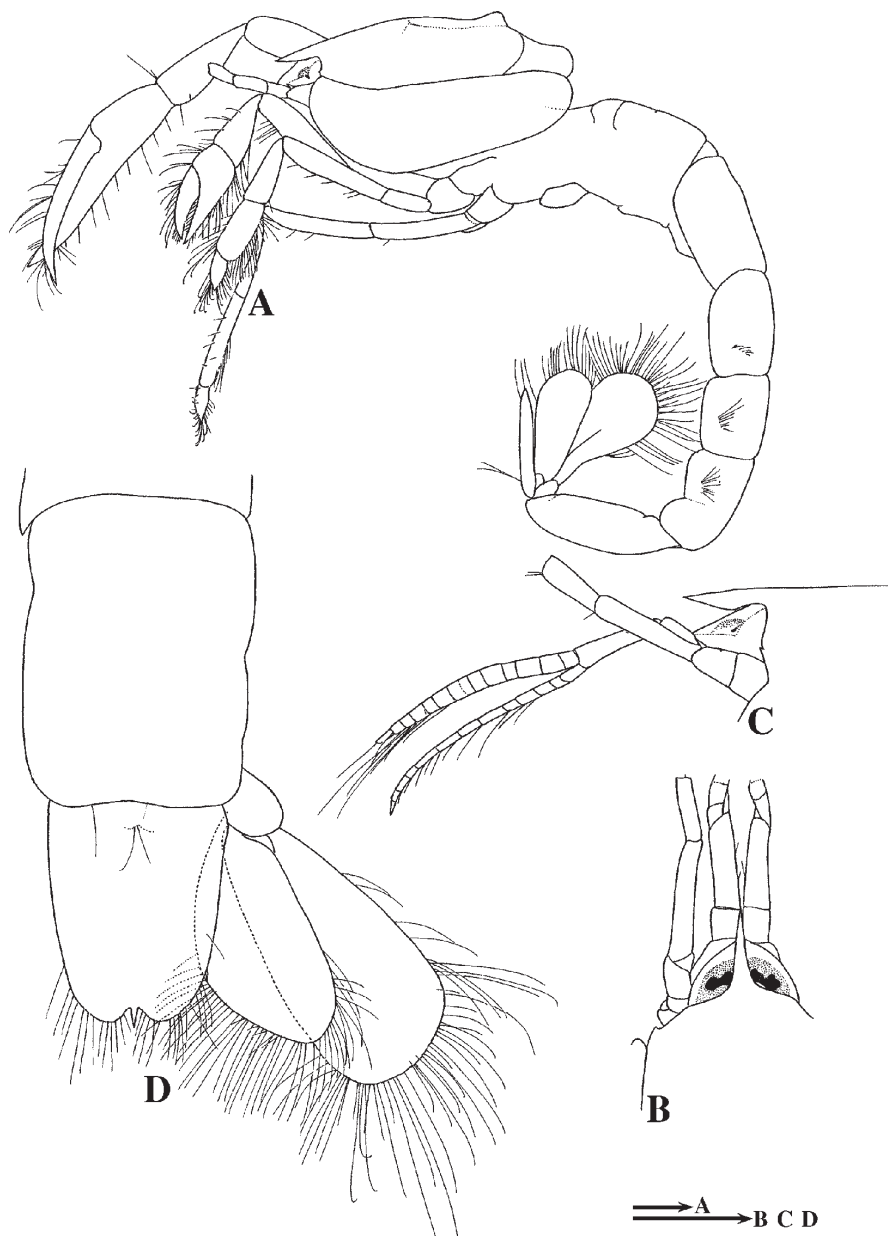
**Holotype.**—PMBC 15391, 1 male (TL/CL, ca. 15.0/3.0, carapace posteriorly broken, lost of larger cheliped, P/3 and Plp 3–5 except Plp 3 on left side), BIOSHELF St. H8, 07°45'N, 097°20'E, G, 493 m, coll. S. Bussarawit, 10.04.1997.

**Diagnosis**

Small in size. Rostrum sharply protruded. Mxp 3 merus forming a mesiodistal tooth. Smaller cheliped with fingers slender, and longer than palp. Abdominal somite 6 rectangular in dorsal view, 1.4 times as long as wide. Telson longer than wide, posterior margin concave with a median tooth.

Diagnosis of female holotype.—Rostrum (Fig. 9A, B, C) narrow and sharply protruded forward, extending to distal margin of antennular penultimate article. Carapace damage so that dorsal oval and cervical groove not discernible. Linea thalassinica entire.

Eyestalks short, semicircular on lateral



**Figure 9** *Lipkecallianassa abyssa* sp. nov.

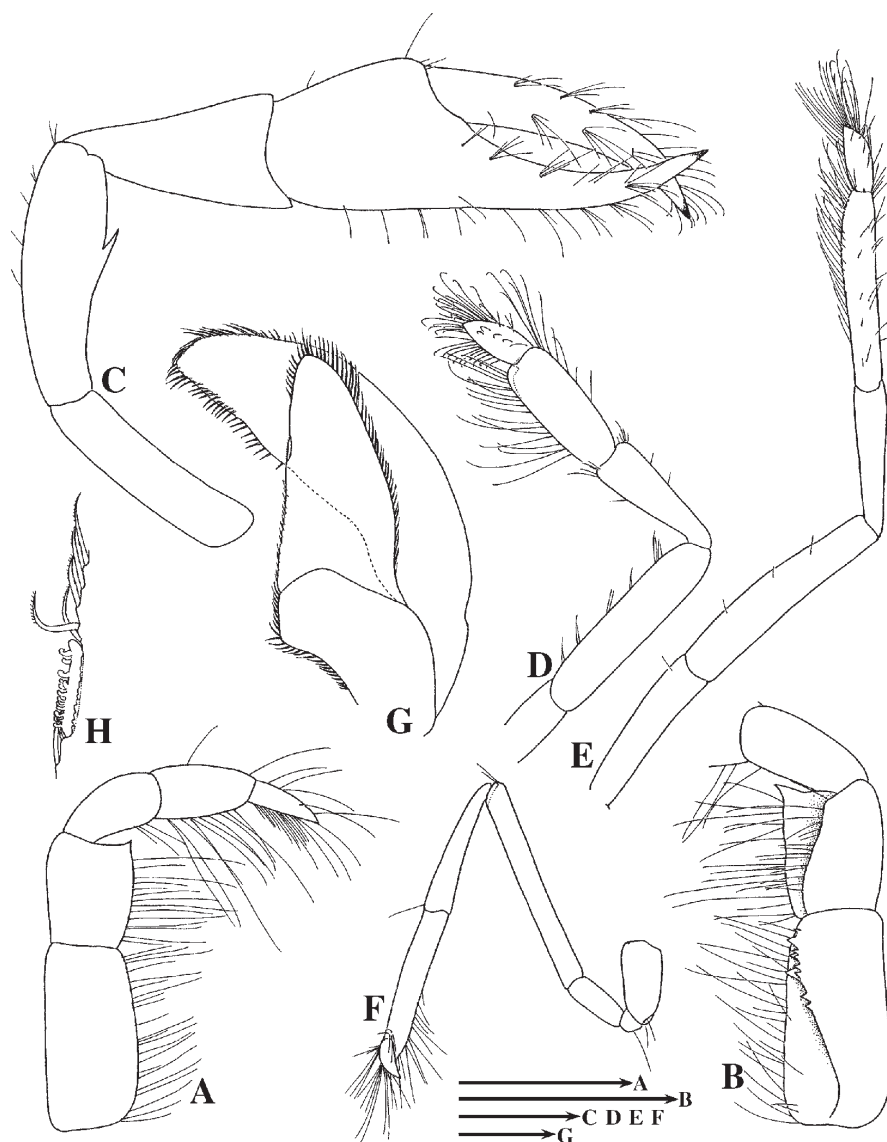
A–D, PMBC 15391, holotype, male (TL/CL, ca. 15.0/3.0), 07°45'N, 097°20'E, 493 m.

A, whole body, lateral view; B, anterior part of carapace, dorsal view; C, same, lateral view; D, abdominal somite 6 and tail fan, dorsal view. Scales all 1 mm.

margins, slightly longer than wide; dorsal surface convex; cornea located in the middle part.

Antennular peduncle reaching proximal third of antennal terminal article, terminal article three times as long as penultimate article. Antennal peduncle with a small scale; terminal article slightly longer than half of penultimate article.

Maxilla 2 scaphognathite without long posterior setae. Mxp 3 (Fig. 10A, B) ischium–merus subsquare; ischium subsquare, about twice as long as wide, mesial surface obliquely carinate with a row of irregularly arranged denticles; merus subsquare, two-thirds length of ischium, characteristically angular with a tooth distal margin



**Figure 10** *Lipkecallianassa abyssa* sp. nov.

A–F, PMBC 15391, holotype, male (TL/CL, ca. 15.0/3.0), 07°45'N, 097°20'E, 493 m.

A, Mxp 3, lateral view; B, same, mesial view; C, smaller cheliped, lateral view; D, P/3, lateral view; E, P/4, lateral view; F, P/5, lateral view; G, Plp 3 on left side, anterior view; H, fused appendix interna on Plp 3. Scales all 1 mm.

at distomesial corner, mesial surface medially carinate with setae; carpus subsquare, about as long as merus; propodus subsquare, slightly less than twice as long as carpus; dactylus about three-quarters length of carpus. Exopod absent. The gill formula is uncertain as most of branchial region is broken

Larger cheliped missing. Smaller cheliped (Fig. 10C) with ischium unarmed, elongate, four times as long as wide. Merus elongate, longer than ischium, three times as long as wide, ventral margin bear a sharp anteriorly-directed spine medially. Carpus slender, broadened distally, about twice as long as wide. Chela half as long as carpus, dactylus and fixed finger elongate, 1.8 times as long as palm respectively, smooth on cutting edge, distally crossed. P/2 (Fig. 9A) chelate, missing on right side; chela 1.5 times as long as carpus, dactylus about twice as long as palm. P/3 attached on right side (Fig. 10D), but missing on right side. Merus 2.5 times as long as ischium, unarmed. Carpus elongate in a triangular, two-thirds length of merus, unarmed. Propodus subsquare, about as long as carpus. Dactylus articulated with propodus in normal position, short lanceolate in shape, half as long as propodus. P/4 on right side missing, that (Fig. 9A, 10E) on left side long, overreaching P/2; merus as long as ischium, carpus 0.7 times as long as merus, unarmed, propodus 1.2 times as long as carpus, abundant setae on distal part of ventral margin. Dactylus lanceolate, setose on distal ventral and dorsal margins. P/5 missing on left side, but present on right side (Fig. 10F); merus elongate, more than three times as long as ischium, unarmed, carpus two-thirds length of merus, unarmed, propodus about as long as carpus, ventrodiscal corner protruded and forming a subchela with dactylus.

Abdominal somites smooth, glabrous dorsally; abdominal somite 6 (Fig. 9D) 1.4 times as long as wide in dorsal view. Plp 1 on right side missing, that on left side of small, two-articled appendage. Plp 2–5 missing except Plp 3 on left side (Fig. 10G, H), bearing a fused appendix interna on mesial margins of endopods.

Telson (Fig. 9D) oval in dorsal view, longer than broad at proximal part, convergent posteriorly on lateral margin to rounded posterior margin;

posterior margin medially concave with a median tooth. Dorsal surface convex and bear a few long setae medially near proximal margin. Uropodal endopod showing an elongate triangle in shape, longer than telson and about twice as long as wide, dorsal surface smooth. Uropodal exopod elongate with a broadly-rounded distal margin with setae, much longer than endopod and about 2.2 times as long as wide; dorsal surface with a median carinate proximally.

#### Type locality

Andaman Sea, 07°545.179'N, 97°19.907'E, 493.0 m.

#### Etymology

Derived from the Greek, abyssos, the deep sea, alluding to the depth of collection.

#### Remarks

The abdominal tail-fan is similar to that of *Callianassa marginata* Rathbun, 1901, because the rostrum shows an acute spine, P/3 propodus unilobed, lacking the ventroposterior lobe, the telson is concave on the posterior margin, with a median tooth; the uropodal exopod elongate, and distally ovate, however the rostrum is more acute than in *C. marginata* and overreaching the eyestalk as in *Podocallichirus madagascarensis* (Lenz and Richters, 1881) (Sakai, 1999c: fig. 10a), and the uropodal exopod is more elongated and with a truncate distal margin.

#### *Michaelcallianassa* gen. nov.

#### Definition

Carapace with dorsal oval; rostrum spinous, linea thalassinica complete. Abdominal somite 1 with an anterodorsal dome, and laterally with a row of specialised setae and pits.

Eyestalks flattened, dorsoventrally, contiguous; cornea dorsal. Antennular peduncle slightly longer than antennal peduncle. Maxilla 2 scaphognathite without posteriorly elongate seta. Mxp 3 propodus broadened and dactylus digitiform. Chelipeds unequal. P/3 propodus distinctly protruded on posterior. Abdominal terga 3–5 with



a pair of longitudinal, anteriorly convergent grooves, laterally with strong pattern of rounded integumental patches, terga 4–5 with a transverse row of setae. Male Plp 1 simple, two-articled; male Plp 2 simple, two-articled, without appendix interna. Female Plp 1 uniramous, three-articled, distal article small; female Plp 2 uniramous, three-articled, with small appendix interna. Plp 3–5 in males and females, biramous, foliaceous and appendices internae fused with endopods. Telson wider than long, lateral margins proximally with triangular swelling, and posterior margin largely concave, and without marginal setae. Uropodal endopod broadly triangular.

#### Remarks

Although *Michaelcallianassa* gen. nov. appears similar to the Callianideidae H. Milne Edwards, 1837 in bearing abdominal somite 1 with the anterodorsal dorm and laterally a row of specialised setae and pits on abdominal somite 1, it is here placed in the Callianassidae on the basis of the morphology of maxilla 2 scaphognathite which lacks a posteriorly directed whip, and Plp 2 being smaller than Plp 3–5.

*Michaelcallianassa* seems similar to the genus *Callichirus* Stimpson, 1866 both with abdominal terga 3–5 ornamented with a strong pattern of rounded lateral integumental patches. However, in *Callichirus major* (Say, 1818), both male and female Plp 2 are biramous, and Plp 3–5 has stubby, embedded appendices internae (Manning and Felder, 1991, fig. 6); in *Michaelcallianassa* both male and female Plp 2 are uniramous, bearing a small appendix interna, and Plp 3–5 bear fused appendices masculinae. *Michaelcallianassa* is also characteristic in abdominal somites 3–5 bearing a pair of longitudinal, anteriorly convergent grooves on terga, and somites 4–5 medially with a single transverse row of setae.

#### Type species

*Michaelcallianassa indica* sp. nov., by present designation and monotypy.

#### Etymology

The generic name is dedicated to Dr. Michael Türkay of Forschungsinstitut Senckenberg, Frankfurt am Main, a carcinologist *par excellence*,

and my generous colleague since the 1975, and added the generic name *Callianassa*. The gender is feminine.

#### *Michaelcallianassa indica* sp. nov.

(Figs 11A–C; 12A–D; 13A–G; 14A–J)

#### Material examined

**Holotype:** SMF 25807, male (TL/CL, 43.0/9.5), St. PG-01 KG: Persian Gulf, 29°29.897'N 49°54.108'E, 32 m depth, box corer, R.V. 'Akademik', 03.12.1991.

**Paratypes:** PMBC 15392, 1 male (TL/CL 17.0/3.6), 1 female (TL/CL, 11.5/3.0 with chelipeds), BIOSHELF St. K1, 07°00'N, 099°16'E, BC, 43 m, coll. S. Bussarawit and C. Aungtonya, 06.05.1996; PMBC 15393, 1 male (TL/CL, 28.0/5.5, cheliped detached), BIOSHELF St. A1, 09°30'N, 097°57'E, BC, 43 m, coll. S. Bussarawit and C. Aungtonya., 18.04.1996; PMBC 15394, 1 male (TL/CL, 30.0/6.0), BIOSHELF St. PB4, 07°52'N, 098°41'E, BC, 32 m, coll. S. Bussarawit, 22.04.1997; PMBC 15395, 1 male (TL/CL, 22.0/4.9), 2 females (TL/CL, 29.0/5.3–31.0/5.8); BIOSHELF St. PB3, 07°51'N, 098°32'E, BC, 22.0 m, coll. S. Bussarawit, 23.04.97; PMBC 15396, 1 female (TL/CL, ca. 32.0/6.0), BIOSHELF St. PB1, 07° 59'N, 098° 29'E, TD, 14 m, coll. S. Bussarawit, 23.04.1997; PMBC 15397, 1 female (TL/CL, 40.0/7.5, without cheliped), BIOSHELF St. PB2, 08° 00'N, 098° 39'E, BC, 17 m, coll. S. Bussarawit, 22.04.1997.

**Non-type material:** PMBC 15398, 1 female (TL/CL, 32.0/6.3), BIOSHELF St. PB1, 08° 00'N, 098° 29'E, BC, 19 m, coll. S. Bussarawit, 23.04. 97; PMBC 15399, 2 females (TL/CL, 13.0/3.1 – 14.0/3.6), BIOSHELF St. II, 07° 30'N, 098° 57'E, BC, 38 m, coll. S. Bussarawit and C. Aungtonya, 03.05.1996; PMBC 15400, 1 female (TL/CL, 10.5, 2.7), no larger cheliped, carapace separated from abdomen, BIOSHELF St. C2, 09° 00'N, 097° 53'E, BC, 65 m, coll. S. Bussarawit and C. Aungtonya, 20.04.1996; PMBC 15401, Juvenile (TL/CL, 6.0/1.6), BIOSHELF St. PB1, 08° 00'N, 098° 29'E, BC, 19 m, coll. S. Bussarawit, 23.04.1997; PMBC 15402, 2 males (TL/CL, 18.0/4.0, 22.0/4.5), 1 ovig. female (TL/CL, 25.0/5.0), BIOSHELF St.

PB3, 07° 51'N, 098° 32'E, BC, 22 m, coll. S. Bussarawit, 23.04.1997; PMBC 15404, 1 male (TL/CL, 23.5/4.7), BIOSHELF St. PB7, 07° 45'N, 098° 41'E, BC, 29 m, coll. S. Bussarawit, 22.04.1997; PMBC 15407, 1 male (TL/CL, 11.0/2.5), BIOSHELF St. PB6, 07° 45'N, 098° 32'E, BC, 30 m, coll. S. Bussarawit and C. Aungtonya, 22.04.1997; PMBC 15408, 10 juveniles. (TL/CL, ca. 12.0/2.4), BIOSHELF St. A1, 09° 30'N, 097° 57'E, BC, 43 m, Coll. S. Bussarawit and C. Aungtonya, 18.04.1996; PMBC 15409, 2 males (TL/CL, 18.0/3.6–21.0/4.6), 1 female (TL/CL, 14.0/3.0), BIOSHELF St. PB3, 07° 51'N, 098° 32'E, BC, 22 m, coll. S. Bussarawit, 23.04.1997; PMBC 15410, 1 male (TL/CL, 14.0/3.0), BIOSHELF St. H1, 07° 45'N, 098° 16'E, BC, 32 m, coll. S. Bussarawit and C. Aungtonya, 09.05.1996; PMBC 15411, 2 males, (TL/CL, 13.0/2.9 – 25.0/5.2), 4 females (TL/CL, 19.0/4.0 – 29.0/6.0), BIOSHELF St. PB4, 07° 52'N, 098° 41'E, BC, 32 m, coll. S. Bussarawit, 22.04.1997; PMBC 15412, 3 females (TL/CL, 20.5/4.5 – 27.0/6.0), 3 juveniles. (TL/CL, ca. 12.0/2.5 ), BIOSHELF St. PB4, 07° 52'N, 098° 41'E, BC, 32 m, coll. S. Bussarawit, 22.04.1997; PMBC 15413, 9 males (TL/CL, 9.2/2.3 – 25.0/5.3), 4 females (TL/CL, 16.0/3.0 – 31.0/6.4), BIOSHELF St. PB4, 07° 52'N, 098° 41'E, BC, 32 m, coll. S. Bussarawit, 22.04.1997; PMBC 15414, 4 females (TL/CL, 22.0/4.6 – 32.0/6.0), BIOSHELF St. PB1, 08° 00'N, 098° 29'E, BC, 19 m, coll. S. Bussarawit, 23.04.1997; PMBC 15415, 2 males (TL/CL, 11.0/2.8–18.0/3.8), 6 females (TL/CL, 14.0/3.2–25.0/6.0), BIOSHELF St. PB3, 07° 51'N, 098° 32'E, BC, 22 m, coll. S. Bussarawit, 23.04.1997; PMBC 15416, 1 male, (CL 3.6, missing posterior to abdominal somite 3), BIOSHELF St. PB1, 07° 59'N, 098° 29'E–07° 59'N, 098° 29'E, TD, 14 m, coll. S. Bussarawit, 23.04.1997; PMBC 15417, 1 Juvenile male (TL/CL, 15.0/2.8), BIOSHELF St. PB2, 08° 00'N, 098° 39'E, BC, 17 m, coll. S. Bussarawit, 22.04.1997; PMBC 15418, 1 male (TL/CL, 8.0/1.8), BIOSHELF St. J1, 07° 15'N, 099° 04'E–07° 15'N, 099° 04'E, OS, 39 m, coll. S. Bussarawit and C. Aungtonya, 23.02.1998; PMBC 15419, 1 male (TL/CL, 15.0/3.0), BIOSHELF St. H1, 07° 45'N, 098° 16'E, 07° 44'N, 098° 17'E, OS, 31 m, coll. S. Bussarawit and C. Aungtonya, 09.05.1996; PMBC 15433, 1 female (TL/CL, 16.0/

4.2), BIOSHELF St. PB7, 07° 45'N, 098° 41'E, BC, 29 m, coll. S. Bussarawit, 22.04.1997; PMBC 15447, 1 female (TL/CL, 14.0/3.6), BIOSHELF St. J1, 07° 16'N, 099° 03'E, BC, 42 m, coll. S. Bussarawit and C. Aungtonya, 04.05.1996; PMBC 15452, 10 juveniles (TL/CL, 7.0/1.2 – 15.0/3.0), BIOSHELF St. E 20 m, 08° 30'N, 098° 12'E, BC, 21 m, muddy Coll. S. Bussarawit and C. Aungtonya, 22.04.1996; PMBC 15456, CL 2.5, TL 10.5 mm, BIOSHELF St. E20 m, 08° 30'N, 098° 12'E, BC, 21 m, muddy coll. S. Bussarawit and C. Aungtonya, 22.04.96.

### Diagnosis

Chelipeds unequal. Rostrum sharply triangular. Cervical groove located about in posterior quarter. Abdominal terga 3–5 with a pair of longitudinal, anteriorly convergent grooves, with a strong pattern of rounded integumental patches; terga 4–5 with a transverse row of setae. Telson wider than long, lateral margins proximally with triangular swelling, posterior margin largely concave. Antennule peduncle longer than antennal peduncle. Mxp 3 propodus broadened and dactylus digitiform. Cheliped unequal; in smaller cheliped dactylus and fixed finger elongate. P/3 propodus distinctly protruded on posterior margin; dactylus trilobed on upper margin. Uropodal endopod broadly triangular.

### Description

**Male holotype.**—Rostrum (Fig. 12A, B, C) sharply triangular, detached between rostrum and eyestalk. Carapace smooth, cardiac region medially opaquely calcified in alcohol material; posterolateral margin with a narrow ridge; cervical groove located about in posterior quarter; linea thalassinica complete, being medially connected by a weakly calcified grooves between anterior and posterior halves.

Eyestalks an elongate triangle with an sharp distomedian tip; dorsal surface slightly convex; cornea located in distal third, with scarce blackish pigments.

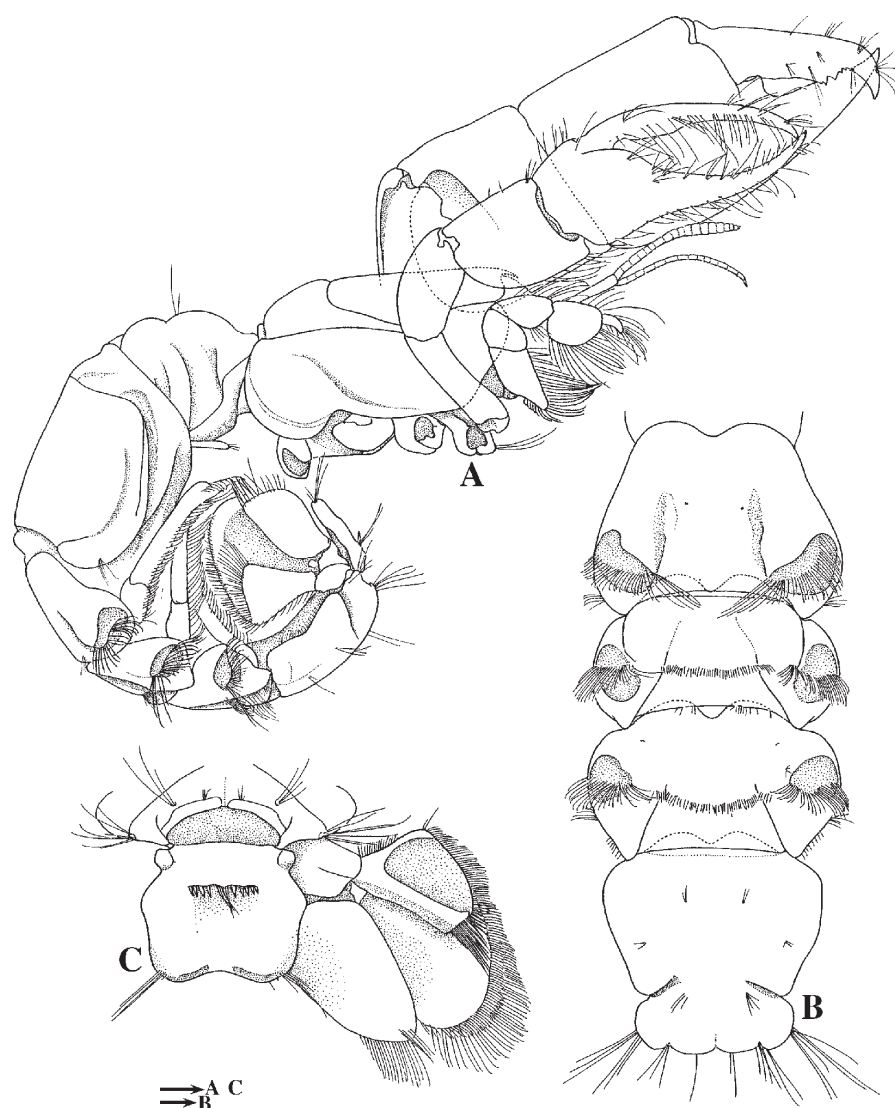
Antennular peduncle (Fig. 12A, B, C) longer than antennal peduncle; proximal article much extended to eyestalk; terminal article longer than penultimate one; rami of flagella subequal in length to peduncle. Antennal peduncle with rudimentary

scale; terminal article about as long as penultimate article.

Maxilla 2 with scaphognathite lacking posteriorly-directed whip. Mxp 3 (Fig. 13A) without exopod; length of endopodal merus–ischium 2.5 times the width; ischium subsquare, 1.8 times as long as wide, internal surface defined with crista dentata bearing a curved row of sharp denticles; merus subtriangular, slightly broader than long, slanting on distal margin; carpus convergent

distally and twice as long as wide, one third longer than merus; propodus broadened on ventral margin, showing an oval shape, about as long as wide and shorter than carpus; dactylus small, digitiform, half as long as propodus.

Branchial formula including exopods and epipods as tabulated; Mxp 2 with a rudimentary arthrobranch, Mxp 3 to P/4 with a pair of arthrobranches.



**Figure 11** *Michaelcallianassa indica* sp. nov.

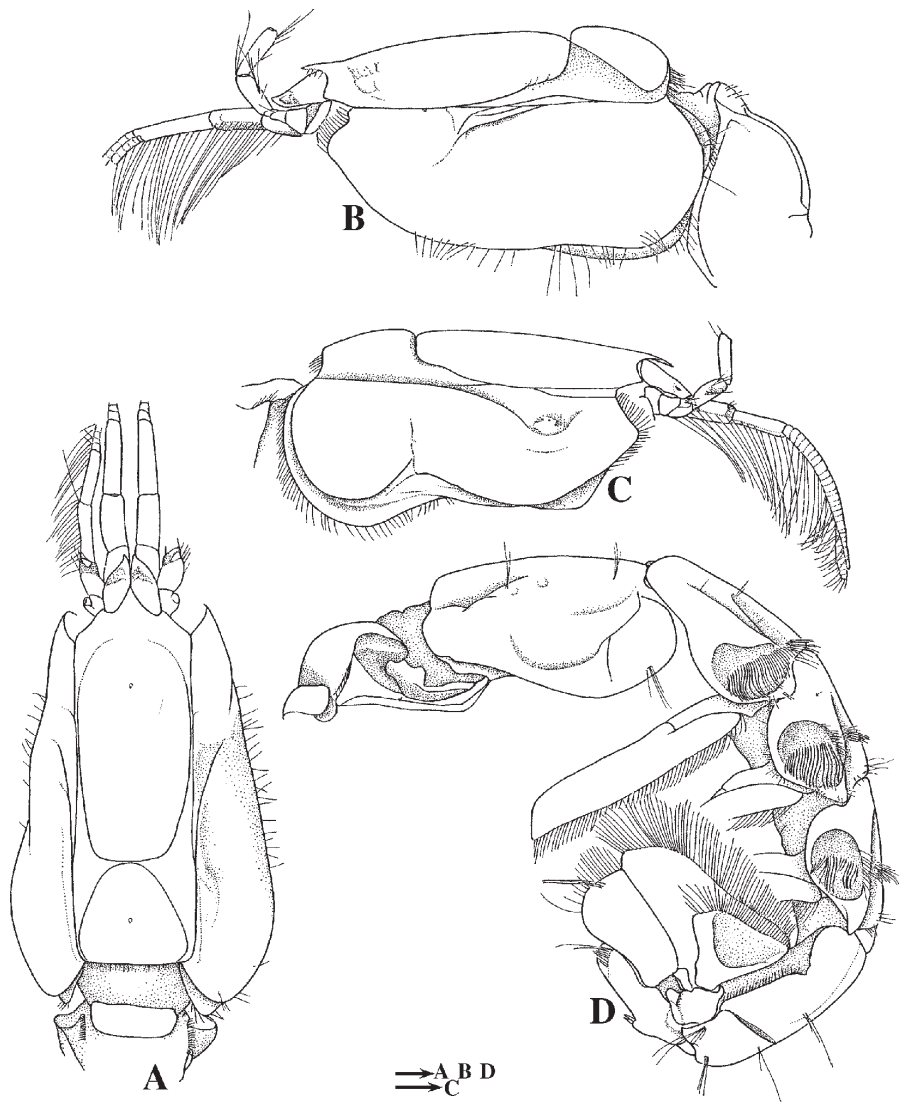
A–C, SMF 25807, male (TL/CL, 43.0/9.5), Persian Gulf, 29°29.897'N 49°54.108'E, 32 m.

A, whole body, lateral view; B, Abdominal somites 3–6, dorsal view; C, tail fan, dorsal view. Scales all 1 mm.

	Maxillipeds			Pereopods				
	1	2	3	1	2	3	4	5
Exopods	1	1	-	-	-	-	-	-
Epipods	1	-	-	-	-	-	-	-
Podobranchs	-	-	-	-	-	-	-	-
Arthrobranchs	-	r	2	2	2	2	2	-
Pleurobranchs	-	-	-	-	-	-	-	-

(r = rudiment)

P/1 unequal. Left larger cheliped with ischium three times as long as high, dorsal margin slightly sinuous and unarmed, and ventral margin slightly convex medially but unarmed. Merus slightly longer than ischium, and about twice as long as high, dorsal margin slightly convex, ventral margin lacking distinct enlarged lobe, armed with inconspicuous, interspaced denticles; exterior surface medially carinate and concave along the



**Figure 12** *Michaelcallianassa indica* sp. nov.  
Fig. A–B, D. SMF 25807, male (TL/CL, 43.0/9.5), Persian Gulf, 29°29.897'N 49°54.108'E, 32 m; C, PMBC 15397, paratype, female (TL/CL, 40.0/7.5), Andaman Sea, 08°00'N, 098°39'E, 17 m. A, carapace, dorsal view; B, same, lateral view, C, same, D, abdomen and tail fan, lateral view. Scales all 1 mm.

ventral half except proximal part. Carpus 0.8 times as long as high, also 0.8 times as long as merus, slightly shorter than palm; dorsal margin almost straight, and proximoventral margin broadly rounded and smooth in outline. Chela heavy, about 1.8 times as long as high; ventral margin with smooth keel extending to the base of fixed finger, distal margin largely convex with triangular proximal tooth in the lower half, continuous to a prehensile margin of fixed finger; fixed finger with prehensile margin armed with row of low denticles; dactylus slightly shorter than palm, prehensile margin sinuate with a row of denticles medially.

Right smaller cheliped with ischium 2.5 times as long as high, unarmed on both lateral margins. Merus about as long as ischium, about 1.8 times as long as high, dorsal margin slightly convex, ventral margin almost straight, smooth without an enlarged lobe; exterior surface medially swollen; carpus 0.8 times as long as high, slightly shorter than merus, twice as long as palm; dorsal margin almost straight, proximoventral margin broadly rounded and extended to distoventral corner. Chela largely gapes between slender dactylus and fixed finger; palm half as long as high, distal margin largely descending toward the tip of fixed finger; fixed finger reduced in breadth toward the tip, largely concave and unarmed on cutting edge; dactylus more than three times as long as palm, slender and unarmed on cutting edge.

P/2 (Fig. 14A) chelate. Ischium about as long as high, and strongly protruding in distroventral part; merus about three times as long as high. Carpus shorter than merus. Chela slightly shorter than carpus, beset with dense setae on ventral and dorsal margins; dactylus four times as long as dorsal margin of palm; tips of dactylus and fixed finger corneous.

P/3 (Fig. 14B) hammer-shaped. Ischium broadened, square; merus broadened, and about twice as long as high; carpus shorter and narrower than merus, broadest subdistally, more than twice as long as high. Propodus subquadrate, ventral margin roundly swollen posteriorly in height, dorsal margin protruded and one-third the length of carpus, exterior surface scattered with small tufts of short setae on dorsal halves and pitted on ventral half. Dactylus tear-shaped, dorsal margin trilobed

and ventral margin convex; external surface densely setose, terminating in corneous tip.

P/4 (Fig. 14C) subchelate. Ischium rectangular; merus twice as long as ischium, unarmed; carpus shorter than merus, gradually divergent in breadth; propodus 0.6 times as long as carpus, lateral surface setose, distoventral corner projecting forward to form a subchela with dactylus; dactylus teardrop-shaped, setose on lateral margin.

P/5 (Fig. 14D) subchelate. merus elongate; carpus shorter than merus, dorsal margin largely swollen; propodus shorter than carpus, distoventral corner projecting to form a chela with dactylus, lateral surface beset distally with dense setae; dactylus hooked toward external side of fixed finger, tip deflected.

Abdominal somites glabrous dorsally; abdominal somite 1 (Fig. 12D) with well-calcified anterodorsal dome, and laterally with a row of specialised setae and pits; somite 2 smooth and glabrous dorsally; abdominal terga 3–5 (Figs 11A–B, 12D) with a pair of longitudinal, anteriorly convergent grooves, and laterally with a strong pattern of rounded integumental patches, and terga 4–5 with a transverse row of setae; abdominal somite 6 about as long as wide, and convex laterally in posterior third.

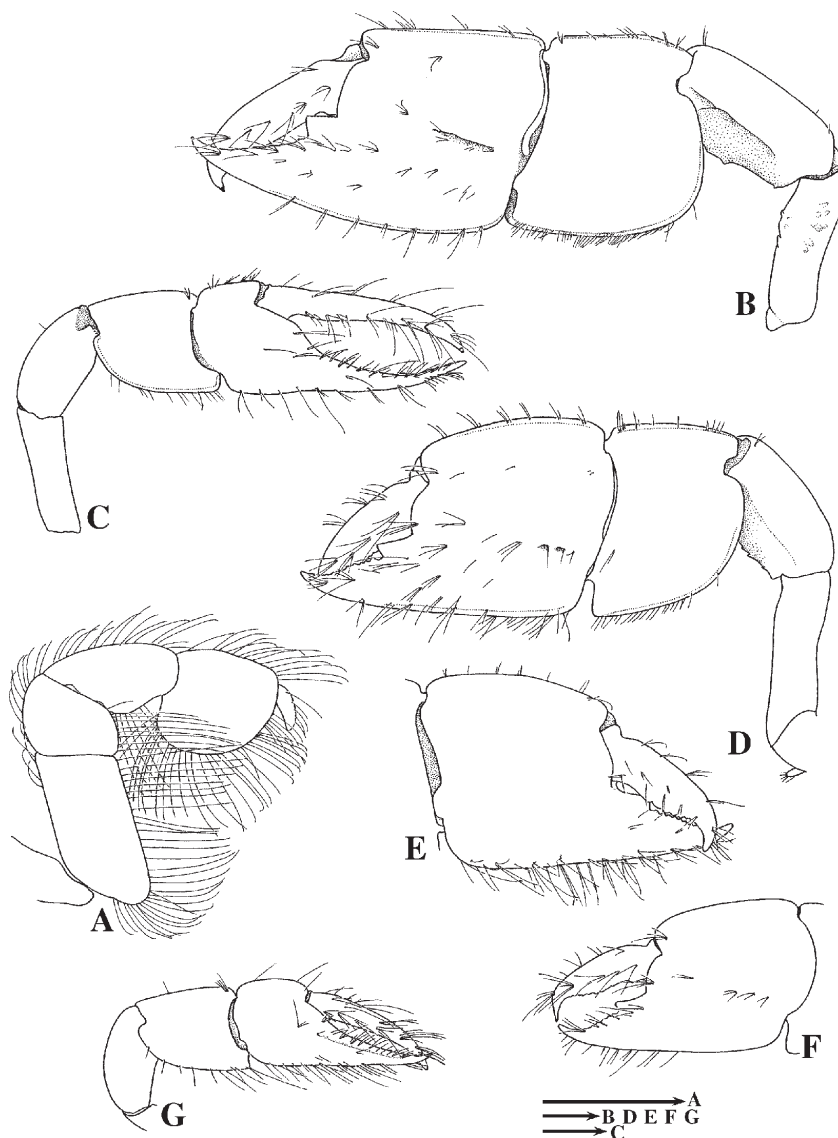
Male Plp 1 (Fig. 14E) uniramous, biarticulate; distal article W-shaped distally and with long distal setae. Male Plp 2 (Fig. 14F) uniramous, biarticulate, terminal article about as long as proximal, and terminated by rounded margin. Plp 3 (Fig. 14I)–5 biramous, foliaceous, and endopod bearing small, fused, narrow appendices internae (Fig. 14J) on mesial margins of endopods.

Telson (Fig. 11C) rectangular in dorsal view, wider than long; lateral margins largely concave proximally, then protruding to triangular point, directed to a broadly rounded posterior angles; posterior margin largely concave; dorsal surface convex with a transverse row of setae and strong spines medially. Uropodal endopod longer than telson, broadly triangular, 1.5 times as long as wide; posterior margin slightly convex; dorsal surface; uropodal exopod broadened and fan-shaped, 1.5 times as long as wide; dorsal surface longitudinally carinate with a distinct anterodorsal plate.



**Female specimens.**— Female almost similar to male. Mxp 3 (Fig. 13A) as in males. Larger cheliped (Fig. 13D, E, F) also similar to male one (Fig. 11A, 13B), and smaller cheliped (Fig. 13G) with dactylus only twice as long as palm is similar

to that of male (Figs 11A, 13C). Female Plp 1 (Fig. 14G) uniramous, three-articled; distal article short and sigmoid-shaped. Female Plp 2 (Fig. 14H) uniramous, three-articled; distal article longer than second, bearing a small appendix interna distally.



**Figure 13** *Michaelcallianassa indica* sp. nov.

A, D, E. PMBC 15396, paratype, female (TL/CL, ca. 32.0/6.0), 07° 59' N, 098° 29' E, 14 m; B–C, PMBC 15395, paratype, male (TL/CL 22.0/4.9), 07° 51' N, 098° 32' E, 22 m, F–G, PMBC 15395, females (TL/CL, 29.0/5.3).

A, Mxp 3, lateral view; B, male larger cheliped, lateral view; C, male smaller cheliped, lateral view; D, female larger cheliped, lateral view; E, same, mesial view; F, female larger cheliped, lateral view; G, female smaller cheliped, lateral view. Scales all 1 mm.



**Type locality**

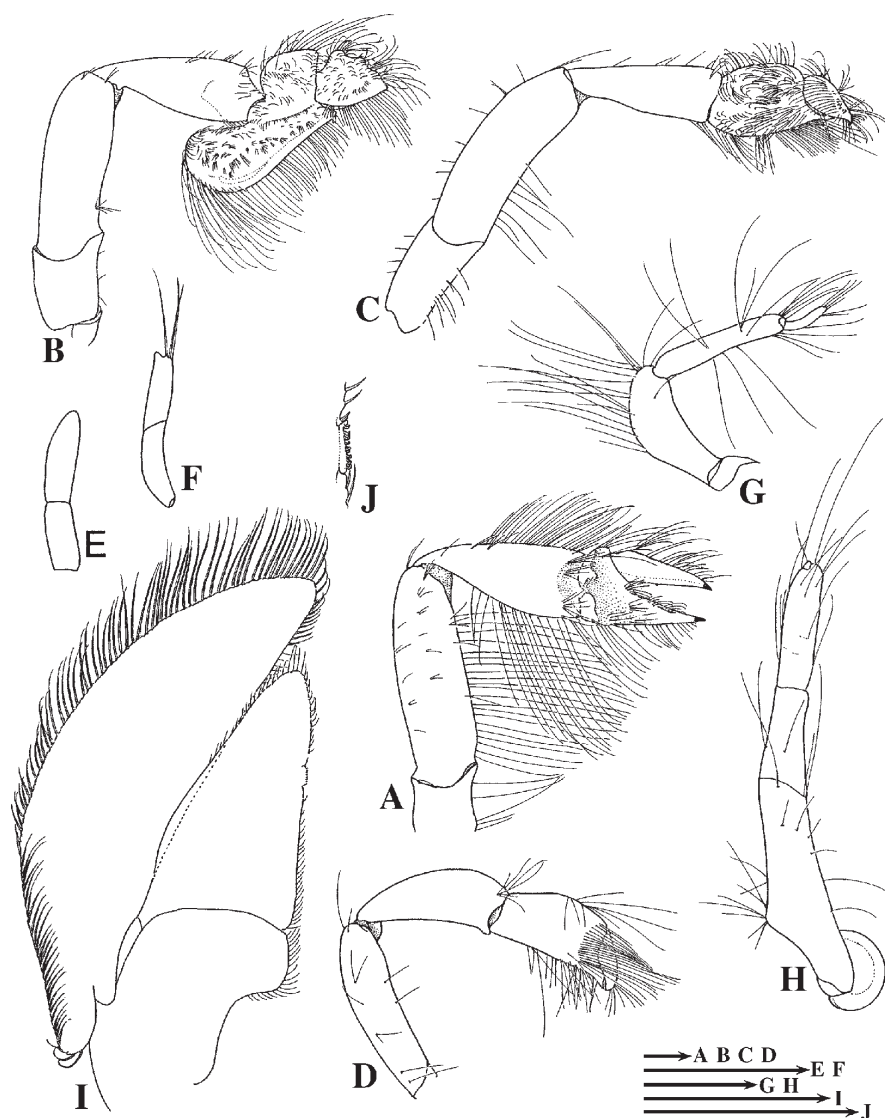
‘Akademik’ St. PG-01 KG, Persian Gulf, 29°29.897'N 49°54.108'E, 32 m depth.

**Etymology**

The epithet is derived from distribution of this species, seemingly across the northern Indian Ocean from the Andaman Sea to the Persian Gulf.

**Remarks**

The male holotype comes not from the Andaman Sea, but from the Arabian Gulf, because from there the best material has been collected. From this fact the present new species *Michaelcallianassa indica* sp. nov. seems to be widely distributed from the Arabian Sea to the Andaman Sea as the present specimens examined are brought



**Figure 14** *Michaelcallianassa indica* sp. nov.

A–D, SMF 25807, male (TL/CL, 43.0/9.5); E–F, PMBC 15394, paratype, male (TL/CL, 30.0/6.0); G–I, PMBC 15396, paratype, female (TL/CL, ca. 32.0/6.0).

A, P/2, lateral view; B, P/3, lateral view; C, P/4, lateral view; D, P/5, lateral view; E, male Plp 1, posterior view; F, male Plp 2, anterior view; G, female Plp 1 on left side, lateral view; H, female Plp 2 on left side, lateral view; I, Plp 3, posterior view. Scales all 1 mm.

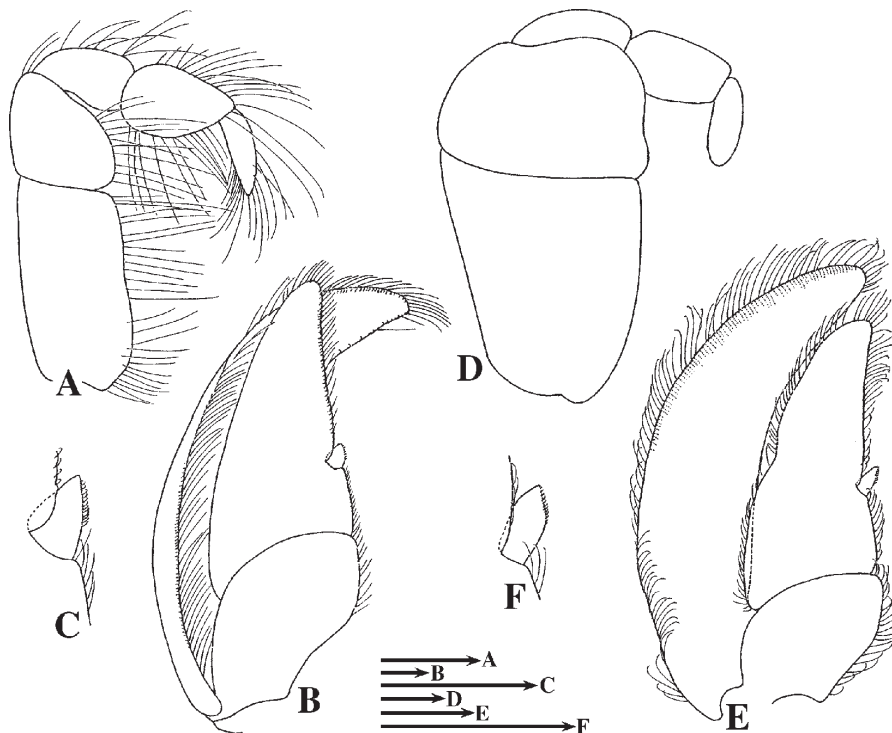
from the Persian Gulf and the Andaman Sea. The morphology is very characteristic in that the appendix interna is fused to the endopod (Fig. 14I, J), but similar to *Callichirus major* (Say, 1818) from North Carolina, U.S. to Brazil along the Atlantic coasts by the forms of Mxp 3 propodus and dactylus, P/2–5 propodi and dactyli, however chelipeds, Plp 1–2 (Fig. 14E–H) and the tail-fan are different from one another; it is also similar to *Neocallichirus guassutingus* (Rodrigues, 1971) from Brazil by the shape of Mxp 3, and P/2–3, the telson and uropods, and other characteristics, however different from one another.

**Genus *Callianassa* Leach, 1814**

*Callianassa* Leach, 1814: 386, 400.– Sakai, 1999c: 11.

**Definition**

Carapace with dorsal oval; rostral spine present or not. Eyestalks usually dorsoventrally flattened, contiguous, cornea dorsal, subterminal, disc-shaped or flattened. Antennular peduncle longer and stronger than antennal peduncle, or vice versa. Mxp 3 ischium–merus broadened (fig. 15D) and sub-pediform (fig. 15A), sub-operculiform, merus convex, or truncate distally, sometimes with a spine, propodus narrow, and dactylus narrow, digitiform, and exopod often absent. P1 unequal; male larger cheliped with or without meral hook, carpus very expanded compared with merus. Male Plp 1 present or absent; if present, uniramous, and two-articled, and male Plp 2 also present or absent; if present, vestigial, biramous, and lacks appendix interna; female Plp 1 absent or present; if present



**Figure 15** Mxp 3 and Plp 3 in *Callianassa subterranea* (Montagu, 1808) and *Callianassa japonica* (Ortmann, 1891)

A–C, SMF 25800, male (TL/CL 29.0/7.0), Canary Island, F.S. Valdivia; D–F, SMF 25800, male (TL/CL 48.0/11.0), Jadani, Tsuda, Tokushima-city, Tokushima-Ken, Shikoku, Japan, 29.04.1990, K. Sakai.

A, Mxp 3, lateral view; B, Plp 3, anterior view; C, appendix interna on Plp 3; D, Mxp 3, lateral view; E, Plp 3, anterior view; F, appendix interna on Plp 3. Scales all 1 mm.

uniramous, two or three-articled. Plp 2 present or absent; if present, biramous, without appendix interna. Plp 3–5 biramous, (fig. 15B,E) foliaceous, bearing appendices internae (fig. 15C,F). Uropodal endopod not much longer than telson, truncate or rounded distally.

#### Type species

*Cancer Astacus subterraneus* Montagu, 1808, by monotypy. Gender feminine.

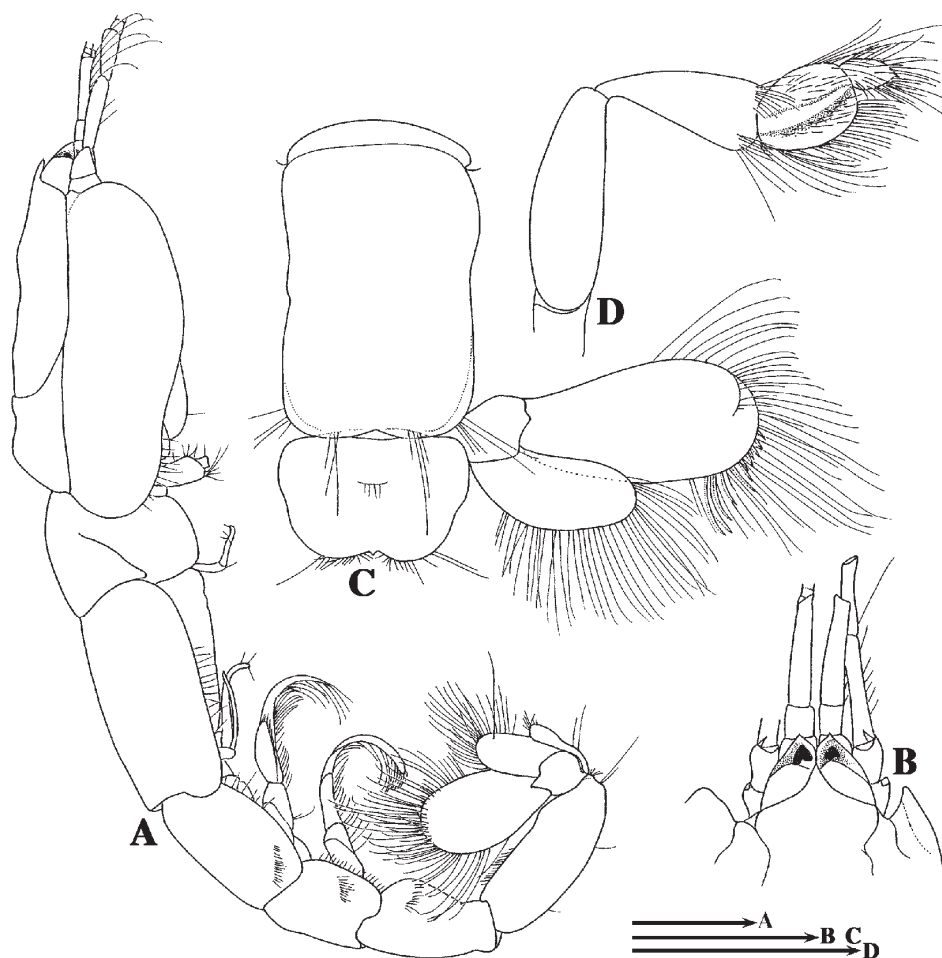
#### Material examined

PMBC 15459, 1 female (TL/CL, 18.0/4.0, lacking Mxp 3, P/1–2, P/3 on left side, P/4–5), BIOSHELF St. E2, 08°30'N, 98°00'E, BC, 63 m, coll. S. Bussarawit and C. Aungtonya, 22.04.1996.

#### Diagnosis

Small in size. Rostrum (Fig. 16A, B) triangular with a pointed tip in dorsal view, reaching the middle of eyestalks. Carapace smooth, dorsal oval present; cervical groove located in the posterior two-fifths of carapace including rostrum. Linea thalassinica entire. Eyestalks (Fig. 16A, B)

#### *Callianassa* sp.1 (Fig. 16A–D)



**Figure 16** *Callianassa* sp.1

A–D, PMBC 15459, holotype, female (TL/CL, 18.0/4.0), 08°30'N, 098°00'E, 63 m.

A, whole body, lateral view; B, anterior part of carapace with eyestalks, antennal and antennular peduncles, dorsal view; C, abdominal somite 6 and tail fan, dorsal view; D, P/3, lateral view. Scales all 1 mm.

subtriangular with a pointed tips in dorsal view, 1.5 times as long as wide, strongly descending from the level of rostrum and reaching to the distal margin of antennular basal article; dorsal surface convex in its proximal half, distally with pigmented cornea located in the middle of distal half. Antennular peduncle reaching to level of middle of antennal terminal article; distal article about one-third the length of penultimate article. Antennal peduncle with scale; terminal article three-quarters length missing. P/1–2 missing. P/3 (Fig. 16D) present on right side, merus elongate, three times as long as wide. Carpus three-quarters as long as merus, divergent in breadth distally. Propodus rounded and setose on lateral margin, two-thirds as long as carpus, dorsal and ventral margins convex entirely, proximoventral angle not projecting, lateral surface concave on median line. Dactylus heart-shaped with pointed tip. P/4–5 missing.

Abdominal somites smooth, glabrous dorsally; pleurae 3–5 each with tuft of long setae laterally; abdominal somite 6 rectangular in dorsal view, about 1.5 times as long as wide, lateral margins almost parallel on both sides. Plp 1 uniramous, three articulated, distal article deflexed. Plp 2 biramous, slender. Plp 3–5 biramous, foliaceous, each bearing appendices internae on mesial margins of endopods.

Telson (Fig. 16C) trapezoid, half as long as abdominal somite 6, two-thirds wider than long, lateral margins weakly convex in proximal half, distally converging posteriorly to rounded posterolateral angles, posterior margin largely concave with median tooth; dorsal surface provided with a transverse row of setae at proximal third. Uropodal endopod much longer than telson and about twice as long as wide, and rounded distally. Uropodal exopod rectangular, much longer than endopod, about twice as long as wide, dorsal surface medially sulcate and rounded distally.

### Remarks

The present species is very characteristic in the shape of the broadened telson. However it is heavily damaged without Mxp 3, P/1, and P/3, so this material is treated as a species unqualified for its species name.

### *Callianassa anoploura* sp. nov.

(Fig. 17A–H)

### Material examined

**Holotype:** PMBC 15460, 1 ovig female (TL/CL, 18.0/4.0, lacking P/1–5), BIOSHELF St. A2, 09°30'N, 097°51'E, BC, 61 m, coll. S. Bussarawit and C. Aungtonya, 18.04.1996.

**Paratype:** PMBC 15461, 1 male (TL/CL, 9.5/2.0, lacking Mxp 3 on left side, P/1, P/2 on right side, P/4), BIOSHELF St. RN3, 07°30'N, 098°17'E, BC, 72 m, coll. S. Bussarawit and C. Aungtonya, 08.05.1996.

### Diagnosis

Small in size. Rostrum sharply pointed, spaced from eyestalks descending distally. Antennal peduncle overreaching antennular peduncle by half of distal article. Mxp 3 ischium–merus wide, ovate. P/3 propodus short but wide, ventral margin distally projected as triangular distoventral corner and heeled proximally on ventroposterior angle. Abdominal somite 6 rectangular, about 1.5 times as long as wide. Plp 3–5 with narrow appendices internae projecting. Telson with largely rounded posterior margin with median tooth. Uropodal exopod rectangular, with truncate distal margin.

### Description

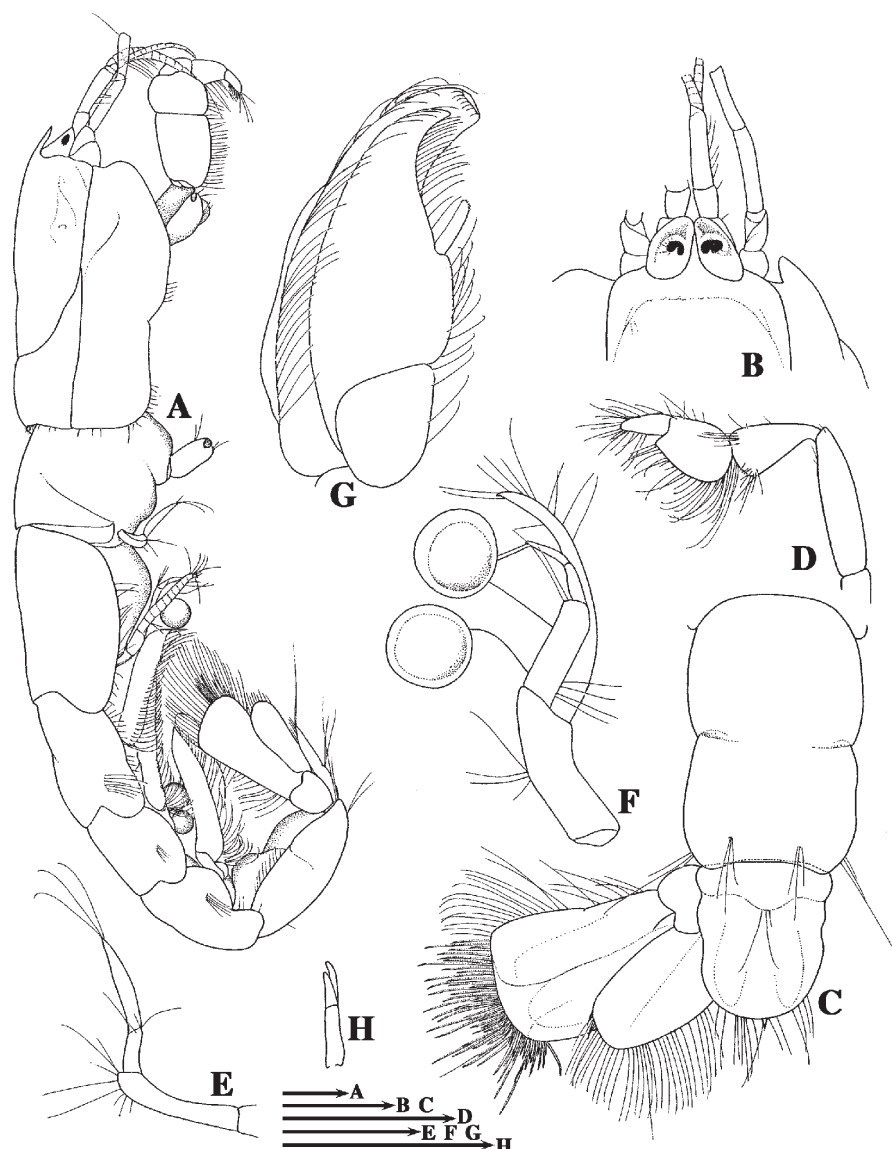
**Female holotype.**—Rostrum (Fig. 17A, B) sharply pointed in dorsal view, failing to reach the tip of eyestalks. Carapace smooth, dorsal oval present; cervical groove located in the posterior quarter of the carapace including rostrum. Linea thalassinica entire.

Eyestalks (Fig. 17A, B) subtriangular with rounded tips in dorsal view, 1.5 times as long as wide, descending from the level of rostrum and reaching to the distal margin of antennular basal article; dorsal surface convex with pigmented cornea, and distal to cornea concave. Antennular peduncle reaching to level of middle of antennal terminal article; distal article about twice as long as penultimate article. Antennal peduncle without a scale; terminal article three-quarters the length of penultimate article.

Mxp 3 ischium–merus wide, ovate; ischium longer than wide, merus less than half as long as

ischium, about three-quarters as long as wide, with largely rounded distomesial angle. Carpus shorter than merus, propodus about as long as carpus, dactylus two-thirds the length of propodus, provided with a row of bristles on ventral margin. P/1–5 missing.

Abdominal somites smooth, glabrous dorsally; pleurae 3–5 each with tuft of long setae laterally; abdominal somite 6 rectangular, about 1.5 times as long as wide, lateral margins parallel and concave halfway on both sides.



**Figure 17** *Callianassa anoploura* sp. nov.

A–C, E–G, PMBC 15460, holotype, ovig female (TL/CL, 18.0/4.0), 09°30'N, 097°51'E, 61 m; D, H, PMBC 15461, paratype, male (TL/CL, 9.5/2.0), 07°30'N, 098°17'E, 72 m.

A, whole body, lateral view; B, anterior part of carapace with eyestalks and antennular and antennal peduncle, dorsal view; C, abdominal somite 6 and tail fan, dorsal view; D, P/3, lateral view; E, female Plp 1; F, female Plp 2; G, female Plp 3; H, male Plp 2. Scales all 1 mm.



Plp 1 (Fig. 17E) uniramous, three articulated. Plp 2 (Fig. 17F) biramous, slender. Plp 3 (Fig. 17G) – 5 biramous, foliaceous, bearing narrow appendices internae projecting on mesial margins of endopods.

Telson (Fig. 17C) less than two-thirds the length of abdominal somite 6, obviously longer than wide, lateral margins weakly swollen twice in proximal half, and running straight to rounded posterolateral angles, posterior margin largely rounded with median tooth; dorsal surface weakly elevated in proximal quarter and provided with transverse row of setae. Uropodal endopod much longer than telson, about twice as long as wide; dorsal surface slightly carinate medially, and obtusely truncated distally. Uropodal exopod rectangular, much longer than endopod, and about 1.5 times as long as wide, and dorsal surface medially sulcate and truncate distally.

**Male paratype.**– P/3 propodus (Fig. 17D) short but broadened, ventral margin distally projected as a triangular ventrodistal angle and heeled proximally on ventroproximal corner. Plp 1 absent; Plp 2 small, biramous (Fig. 17H).

#### Type locality

Andaman Sea, off Phuket Island, Thailand, BIOSHELF St. A2, 09°30'N, 097°51'E, BC, 61 m.

#### Etymology

The name is a combination of Greek, *anoplos*, unarmed and *oura*, tail.

#### Remarks

*Callianassa anoploura* is similar to *C. oblonga* Le Loeuff and Intès, 1974 from the Ivory Coast, and *C. acutirostella* Sakai, 1988 from Western Australia in the form of the sharp rostrum; however it differs in: Mxp 3 ischium–merus is oval as in *C. acutirostella*, but in *C. oblonga* Mxp 3 merus is armed with the truncate distal margin; in the present species the telson is longer than wide and unarmed with a median tooth on the posterior margin, while in *C. acutirostella* the telson is trapeziform with a median posterior tooth as in *C. oblonga*. *C. anoploura* is also similar to *C. profunda* Biffar, 1973 in the uropodal exopod being rectangular, with a truncate distal margin, however in *C. anoploura* the abdominal somite 6 is extremely

longer than in *C. profunda*. P/3 propodus is specific as it is protruded triangularly at the ventrodistal corner, and the ventroposterior angle is highly heeled.

#### *Callianassa malaccaensis* sp. nov.

(Figs 18A–D; 19A–K)

#### Material examined

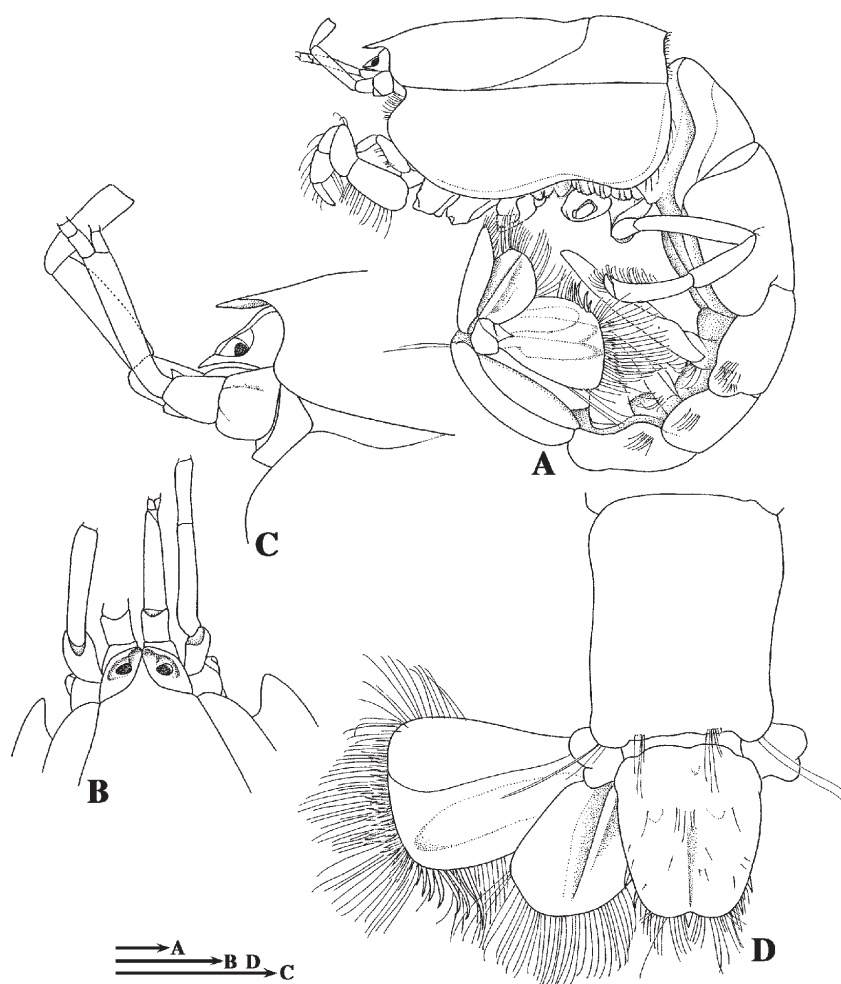
**Holotype:** PMBC 15462, 1 male (TL/CL, 22.0/5.0, lacking P/1, P/3–5), BIOSHELF St. L1, 06°45'N, 099°21'E, BC, 38 m, coll. S. Bussarawit and C. Aungtonya, 06.05.1996.

**Paratype:** PMBC 15463, 1 ovig. female (TL/CL, 28.0/6.2, lacking Mxp 3, P/1–5), BIOSHELF St. H2, 07°45'N, 098°15'E, BC, 59 m, coll. S. Bussarawit and C. Aungtonya, 09.05.1996; PMBC 15464, 1 female (TL/CL, 23.0/6.0, lacking Mxp 3 on right side, P/1–5, detached P/3 on right side), BIOSHELF St. H2, 07°45'N, 098°15'E, BC, 59 m, coll. S. Bussarawit and C. Aungtonya, 09.05.96; PMBC 15465, 1 male (TL/CL, 13.0/3.2), BIOSHELF St. E2, 08°30'N, 098°00'E, BC, 63 m, coll. S. Bussarawit and C. Aungtonya, 22.04.1996; PMBC 15466, 1 female (TL/CL, 21.0/4.6, lacking P/4–5), St. J2, 07°15'N, 098°50'E, BC, 62 m, coll. S. Bussarawit and C. Aungtonya, 04.05.1996; PMBC 15467, 1 female (TL/CL, 15.0/4.1), with both chelipeds, BIOSHELF St. G1, 08°00'N, 098°14'E, BC, 42 m, coll. S. Bussarawit and C. Aungtonya, 24.04.1996; PMBC 15468, 1 female (TL/CL, 21.0/5.0, lacking P/1, P/2 on right, and P/3 on left), BIOSHELF St. C2, 09°00'N, 097°53'E, BC, 65 m, coll. S. Bussarawit and C. Aungtonya, 20.04.1996; PMBC 15469, 1 female (TL/CL, 21.0/4.8) attached with smaller cheliped, BIOSHELF St. I2, 07°30'N, 098°29'E, BC, 59 m, coll. S. Bussarawit and C. Aungtonya, 03.05.1996.

**Non-type material:** PMBC 15470, 1 male (TL/CL, 15.0/3.8), BIOSHELF St. H2, 07°45'N, 098°15'E, BC, 59 m, coll. S. Bussarawit and C. Aungtonya, 09.05.1996; PMBC 15471, 1 male (TL/CL, 11.5/3.0, lacking Mxp 3, P/1–5), BIOSHELF St. A2, 09°30'N, 097°51'E, BC3, 61 m, coll. S. Bussarawit and C. Aungtonya, 18.04.1996; PMBC 15472, 1 female (TL/CL, 20.0/4.0), BIOSHELF St. H2, 07°45'N, 098°15'E, BC,

59 m, coll. S. Bussarawit and C. Aungtonya, 09.05.1996; PMBC 15473, 1 female (TL/CL, 16.0/4.2), St. I2, 07°30'N, 098°29'E, BC, 59 m, coll. S. Bussarawit and C. Aungtonya, 03.05.1996; PMBC 15474, 2 males (TL/CL, 17.0/4.2, 17.0/4.5), 1 female (TL/CL, 19.0/4.6), detached cheliped (same one found in sp. 5-II, 45b) BIOSHELF St. A2, 09°30'N, 097°51'E, BC, 61 m, coll. S. Bussarawit and C. Aungtonya, 18.04.96; PMBC 15475, 1 male (TL/CL, 15.0/3.2), BIOSHELF St. E2, 08°30'N, 098°00'E, BC, 63 m, coll. S. Bussarawit and C.

Aungtonya, 22.04.96; PMBC 15476, 1 male (TL/CL, 15.0/4.0), 2 females (TL/CL, 16.0/4.0, 18.0/4.3), BIOSHELF St. H2, 07°45'N, 098°15'E, BC, 59 m, coll. S. Bussarawit and C. Aungtonya, 09.05.1996; PMBC 15477, 1 male (TL/CL, 9.0/1.7), BIOSHELF St. J3, 07°15'N, 098°34'E, BC, 79 m, coll. S. Bussarawit and C. Aungtonya, 04.05.1996; PMBC 15478, 1 male (TL/CL, 20.0/5.6), BIOSHELF St. L3, 06°45'N, 098°45'E, BC, 83 m, coll. S. Bussarawit and C. Aungtonya, 05.05.1996; PMBC 15479, 1 male (TL/CL, 26.0/



**Figure 18** *Callianassa malaccaensis* sp. nov.

A–D, PMBC 15462, holotype, male (TL/CL, 22.0/5.0), 06°45'N, 099°21'E, 38 m.

A, whole body, lateral view; B, anterior part of carapace with eyestalks, antennular and antennal peduncles, dorsal view; C, same, lateral view; D, abdominal somite 6 and tail fan, dorsal view. Scales all 1 mm.

6.3), BIOSHELF St. K3, 07°00'N, 098°41'E, BC, 83 m, coll. S. Bussarawit and C. Aungtonya, 05.05.1996; PMBC 15480, 1 male (TL/CL, 8.0/1.8), BIOSHELF St. D3, 08°45'N, 097°43'E, OS, 80m, coll. S. Bussarawit and C. Aungtonya, 19.02.1998; PMBC 15481, 1 female (TL/CL, 16.0/3.5, lacking Mxp 3 on right side, P/1–3, P/4 on left side, P/5), BIOSHELF St. G1, 08°00'N, 098°14'E, BC, 42m, coll. S. Bussarawit and C. Aungtonya, 24.04.1996; PMBC 15482, 1 male (TL/CL, 6.5/1.5), 1 female (TL/CL, 19.0/4.5), BIOSHELF St. H1, 07°45'N, 098°16'E, BC, 32 m, coll. S. Bussarawit and C. Aungtonya, 09.05.1996; PMBC 15483, 1 female (TL/CL, 18.0/4.7), BIOSHELF St. G2, BC4, 08°00'N, 098°10'E, 63 m, coll. S. Bussarawit and C. Aungtonya, 23.04.1996; PMBC 15484, 1 female (TL/CL, 19.0/4.0, lacking Mxp 3, larger cheliped, P/2–5), with smaller cheliped, BIOSHELF St. E2, 08°30'N, 098°00'E, BC, 63 m, coll. S. Bussarawit and C. Aungtonya, 22.04.1996; PMBC 15485, 1 female (TL/CL, 21.0/4.1), with smaller cheliped, BIOSHELF St. E2, 08°30'N, 098°00'E, BC, 63 m, coll. S. Bussarawit and C. Aungtonya, 22.04.1996; PMBC 15486, 3 males (TL/CL, 6.0/1.5 – 9.0/2.3), BIOSHELF St. J1, 07°15'N, 099°04'E, OS, 39 m, coll. S. Bussarawit and C. Aungtonya, 23.02.1998.

### Diagnosis

Small in size. Rostrum sharply pointed, separated from dorsal margin of eyestalks slanting downward distally. Antennular peduncle reaching proximal quarter of distal antennal article. P/1 unequal; meri with a single median marginal tooth; fingers unarmed. P/3 propodus oval, ventral margin largely rounded at ventroproximal angle, and transferred distally to dactylus at same level with dactylus. Abdominal somite 6 rectangular, 1.2 times as long as wide. Telson converging posteriorly on lateral margins, posterior margin slightly concave with a middle tooth. Uropodal exopod broadened distally with truncate distal margin.

### Description

**Female holotype.**— Rostrum (Fig. 18A, B, C) narrowly triangular in dorsal view, not reaching tip of the eyestalks. Carapace smooth, dorsal oval

distinct; cervical groove located in the posterior part of less than one-quarter of the carapace including rostrum. Linea thalassinica entire. Eyestalk (Fig. 18A–C) subquadrate in dorsal view, declining distally from rostrum; dorsal surface medially depressed; cornea partly pigmented. Antennular peduncle shorter than antennal peduncle, proximal article overreaching eyestalks, and terminal article three times as long as penultimate. Antennal peduncle with a rudimentary dorsal scale, terminal article two-thirds the length of penultimate. Mpd 3 (Fig. 19A) ischium–merus subsquare, about 1.3 times as long as wide, setose on mesial margin; ischium twice as long as wide, and with crista dentata on internal surface. Merus slanting on its distal margin; propodus longer than carpus, and 1.5 times as long as wide, convex proximally on ventral margin; and dactylus slender, and 0.7 times as long as propodus. Exopod absent. P/1 missing.

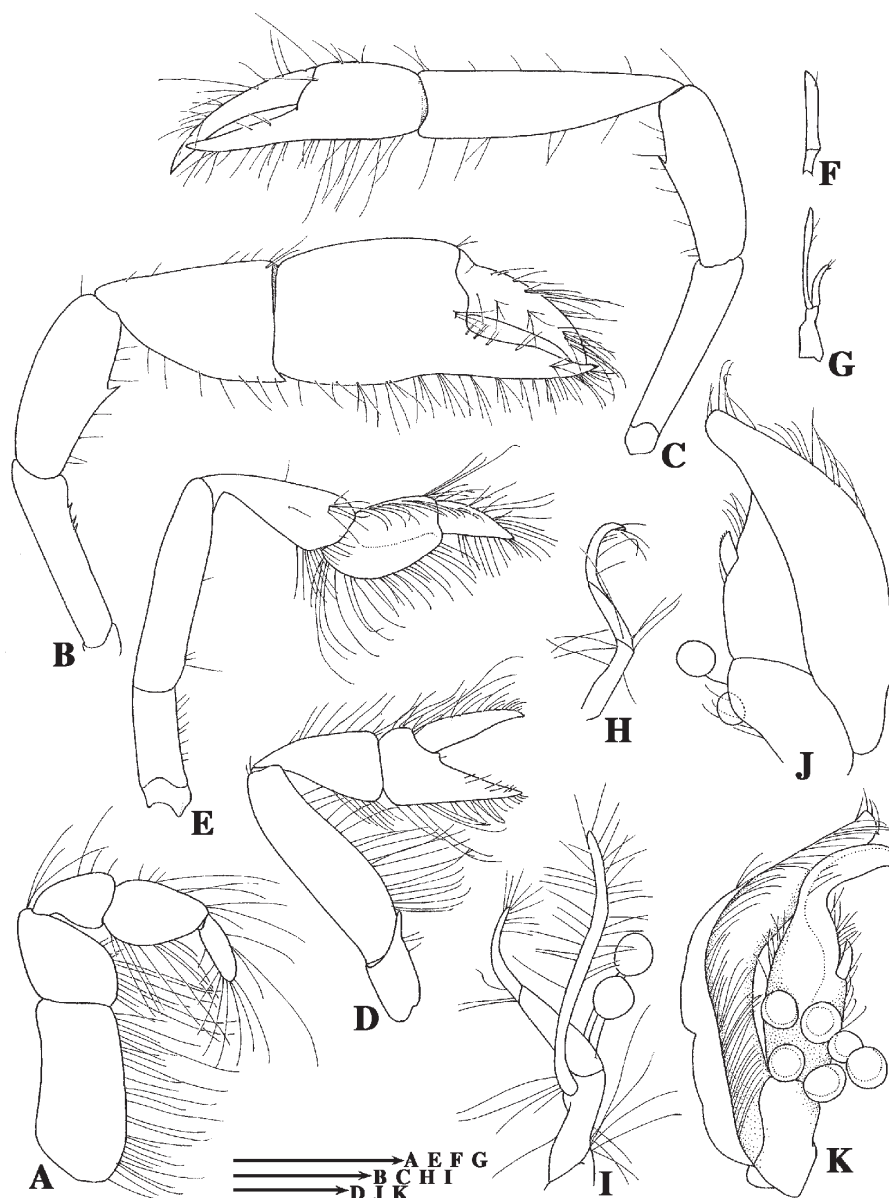
Branchial formula including exopods is tabulated as follows:

	Maxillipeds			Pereopods				
	1	2	3	1	2	3	4	5
Exopods	1	1	-	-	-	-	-	-
Epipods	1	-	-	-	-	-	-	-
Podobranchs	-	-	-	-	-	-	-	-
Arthrobranchs	-	-	2	2	2	2	2	-
Pleurobranchs	-	-	-	-	-	-	-	-

P/2 (Fig. 19D) chelate, ischium subsquare, unarmed; merus three times as long as high, and with row of setae on ventral margin; carpus triangular, half as long as merus, armed with row of setae on dorsal and ventral margins; chela slightly longer than carpus, setose on dorsal and ventral margins, palm half as long as wide, fixed finger unarmed, and dactylus three times as long as dorsal margin of palm. P/3 (Fig. 19E) simple, ischium rectangular, merus twice as long as ischium, unarmed, carpus triangular, three-quarters as long as of merus; propodus oval, ventral margin largely rounded at ventroproximal angle, and transferred distally to dactylus at same level with dactylus; dactylus slender in digitiform, about as long as dorsal margin of palm. P/5 chelate, propodus

forming wide fixed finger ventrodistally, interior surface with dense setae, dactylus more elongate than fixed finger, hooked towards external side of fixed finger.

Abdominal somites smooth, glabrous dorsally; somites 3–5 each with a tuft of setae laterally; abdominal somite 6 rectangular in dorsal view, 1.2 times as long as wide, and almost parallel on lateral margins.



**Figure 19** *Callianassa malaccaensis* sp. nov.

A, D–G, PMBC 15462, holotype, male (TL/CL, 22.0/5.0); B–C, PMBC 15465, male (TL/CL, 13.0/3.2), 08°30'N, 098°00'E, 63 m; H–K, PMBC 15463, ovig. female (TL/CL, 28.0/6.2), 07°45'N, 098°15'E, 59 m. A, Mxp 3, lateral view; B, male larger cheliped, lateral view; C, male smaller cheliped, lateral view; D, P/2, lateral view; E, P/3, lateral view; F, male Plp 1; G, male Plp 2; H, female Plp 1; I, female Plp 2; J, Plp 3 posterior view; K, same, anterior view. Scales all 1 mm.

Plp 1 (Fig. 19F) uniramous, two articulated; Plp 2 (Fig. 19G) slender and biramous. Plp 3–5 biramous, narrow, foliaceous, endopod with an horn-shaped appendices internae.

Telson (Fig. 18D) subquadrate, 1.2 times longer than wide; lateral margin gradually convergent posteriorly to a broadly rounded corners, and provided with two spines; posterior margin convex medially, setose, with median tooth. Dorsal surface weakly elevated, medially with transverse row of setae, and posterior of it a shallow mid-dorsal depression extends to posterior margin. Uropodal endopod slightly longer than telson, wide, 1.4 times as long as wide, rounded on posterior margin; dorsal surface convex, with a low longitudinal carina. Uropodal exopod much longer than endopod, wide, less than 1.5 times as long as wide, distal margin truncate, densely setose; dorsal surface depressed in anterior half.

**Male paratype** (PMBC 15465).— P/1 unequal in size and dissimilar in shape. In male larger cheliped (Fig. 19B) ischium with row of three denticles, dorsal margin unarmed; merus subsquare, distinctly shorter than ischium, about twice as long as wide, ventral margin with an acute simple spine, external surface swollen medially; carpus subtriangular, proximo-ventral margin regularly divergent to distoventral angle, about 1.5 times as long as wide. Chela about 1.8 times as long as carpus; palm subsquare, longer than wide, cutting edge smooth and slightly convex medially; dactylus slightly longer than palm, cutting edge unarmed and largely concave. Smaller cheliped in males (Fig. 19C) slender; ischium narrow, ventral and dorsal margins unarmed; merus about as long as ischium, dorsal margin smooth and ventral margin with a small anteriorly-directed spine at distal third. Carpus slender, 1.5 times as long as merus; chela slender, about as long as carpus; palm 1.5 times as long as wide, two-fifths length of carpus. Dactylus unarmed, and 1.8 times as long as palm and much longer than fixed finger.

**Female paratype** (PMBC 15463).— Plp 1 (Fig. 19H) absent; Plp 2 (Fig. 19I) small, biramous. Plp 3–5 (Fig. 19J, K) with triangular appendices internae.

### Type locality

Strait of Malacca, 06°45'N, 099°21'E, 38 m.

### Remarks

*Callianassa malaccaensis* is most similar to *Callianassa orientalis* (Bate, 1888) from the Arafura Sea in the form of the elongate penultimate antennal article (Bate, 1888, Pl. 1, fig. 2c); Mxp 3 (Bate, 1888, Pl. 1, fig. 2i), Plp 4 with a horn-shaped appendix interna (Bate, 1888, Pl. 1, fig. 2s), and the tail-fan (Sakai, 1999c, fig. 5c). In *C. malaccaensis* the antennular peduncle extends to the proximal quarter of antennal distal margin and the uropodal exopod is wide with a truncate distal margin. However in *C. orientalis* the antennular peduncle extends to about the middle of the penultimate antennular article, and the uropodal exopod broadened but with a rounded distal margin.

### *Callianassa stenomastaxa* sp. nov.

(Fig. 20A–G)

### Material examined

**Holotype:** PMBC 15487, 1 ovig. female (TL/CL, 14.0/3.6, lacking P/1, P/4 on right side, P/5 on right side), BIOSHELF St. PB1, 08°00'N, 098°29'E, BC, 19 m, coll. S. Bussarawit, 23.04.1997.

### Diagnosis

Small in size. Rostrum sharply pointed. Mxp 3 ischium–merus narrow, merus with incurved mesiodistal margin. Smaller cheliped with merus unarmed, fingers of chela long, crossed distally. P/3 propodus subsquare, with heeled ventral margin. Abdominal somite 6 subsquare. Telson with concave posterior margin lacking median tooth.

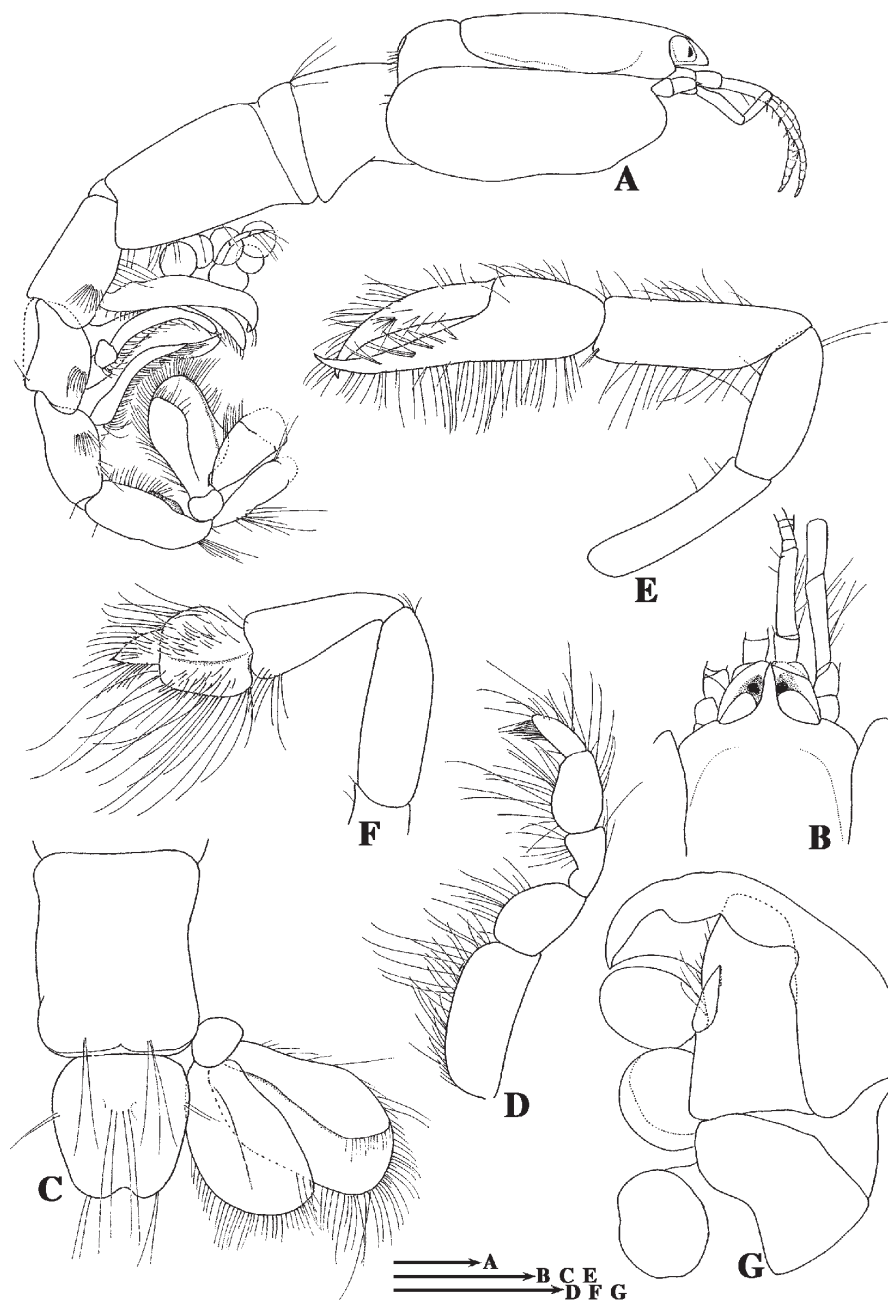
### Description

**Ovigerous female holotype.**— Rostrum (Fig. 20B) sharply pointed in dorsal view, almost reaching the distal margin of eyestalks. Carapace smooth, dorsal oval present; cervical groove located in the posterior quarter of carapace excluding rostrum. Linea thalassinica entire. Eyestalk (Fig. 20A, B) subtriangular, attached to



rostrum on dorsal surface, slightly overreaching distal end of antennular basal article, terminated by obtuse tip; dorsal surface convex in proximal

part, cornea located at middle part. Antennular peduncle reaching to middle of antennal terminal article, terminal article three times as long as



**Figure 20** *Callianassa stenomastaxa* sp. nov.

A–G, PMBC 15487, holotype, ovig. female (TL/CL, 14.0/3.6), 08° 00'N, 098° 29'E, 19 m.

A, whole body, lateral view; B, anterior part of carapace with eyestalks, antennular and antennal peduncle, dorsal view; C, abdominal somite 6 and tail fan, dorsal view; D, Mxp 3, lateral view; E, detached smaller cheliped, lateral view; F, P/3, lateral view; G, Plp 3. Scales all 1 mm.

penultimate article. Antennal peduncle without dorsal scale; terminal article two-thirds as long as penultimate. Mxp 3 (Fig. 20D) without exopod; endopodal ischium–merus subsquare, ischium twice as long as wide; merus more than half as long as ischium, largely convex on distomesial angle; propodus longer than carpus, broadly rounded on ventral margin; dactylus about two-thirds as long as propodus, armed with tuft of bristles on distoventral margin.

P/1 missing. Detached smaller cheliped (Fig. 20E) probably belonging to this specimen; ischium narrow, unarmed on ventral and dorsal margins; merus subsquare, slightly shorter than ischium, more than twice as long as wide; carpus elongate, subtriangular, proximoventral margin divergent at proximal part, three-quarters as long as merus, three times as long as wide, chela 1.5 times as long as carpus; palm subsquare, 1.5 times as long as wide, distal margin running downward to cutting edge of fixed finger; fixed finger slender, 1.5 times as long as palm; dactylus also slender, 1.5 times as long as palm, crossed by fixed finger distally, prehensile margin unarmed. P/2 chelate. P/3 (Fig. 20F) simple, ischium unarmed; merus rectangular, three times as long as wide; carpus widest distally, slightly shorter than merus, more than twice as long as high; propodus subsquare, as long as wide, lateral surface setose and carinate medially, dorsal margin rounded, while ventral margin heeled with a straight line; dactylus about half as long as propodus, and setose. P/4 subchelate, and P/5 chelate.

Abdominal somites smooth, glabrous dorsally; pleurae 3–5 each with a tuft of setae laterally; abdominal somite 6 subsquare, slightly longer than wide, and parallel on lateral margins. Plp 1 uniramous, three-articled. Plp 2 biramous, slender. Plp 3–5 biramous, broadened, endopods bearing slender appendices internae (Fig. 20G), exopods much longer than endopods.

Telson (Fig. 20C) subquadrate, slightly longer than wide; lateral margin slightly convergent posteriorly to broadly rounded posterior corner; posterior margin concave at middle part and without median tooth. Dorsal surface weakly elevated, with a transverse row of setae at anterior

third. Uropodal endopod subquadrate, longer than telson and 1.5 times as long as wide; dorsal surface carinate medially. Uropodal exopod subsquare, 1.8 times as long as wide, dorsal surface carinate medially, and terminated by rounded margin.

#### Type locality

Andaman Sea, off Phuket Island, Thailand, BIOSHELF St. PB1, 08°00'N, 098°29'E, BC, 19 m.

#### Etymology

A combination of the Greek, *stenos*, narrow and *mastax*, mouth.

#### Remarks

*Callianassa stenomastaxa* is most similar to *Callianassa diaphora* Le Loeuff and Intès, 1974 and *C. marchali* Le Loeuff and Intès, 1974 from Ivory Coast in the form of Mxp 3 ischium–merus being narrow, the merus with an incurved mesiodistal margin, P/3 propodus short, and subsquare in form, the smaller cheliped with the merus unarmed on its ventral margin, fingers slender, leaving a space when they are closed, longer than the palp. It differs in the rostrum being sharply pointed, and the telson with a concave posterior margin, while in *C. diaphora* and *C. marchali* the rostrum is short and the telson bears a convex posterior margin.

#### *Callianassa* sp. 2

#### Material examined

PMBC 15488, 1 female (TL/CL, 12.0/2.9), BIOSHELF St. A2, 09°30'N, 097°51'E, BC, 61 m, coll. S. Bussarawit and C. Aungtonya, 18.04.1996.

#### Remarks

This incomplete present specimen is heavily damaged, lacking Mxp 3 and all pereopods. It is, however, closely related to *C. rectangularis* Ngoc-Ho, 1991; in *Callianassa* sp. 2 the rostrum is sharply pointed, the antennal peduncle is slightly longer than antennular peduncle, the telson is subsquare, with a median tooth on the posterior margin, and abdominal somite 6 is subquadrate;

in contrast the uropod exopod of *C. rectangularis* is broadly rounded while in the present specimen it is armed with the truncate distal margin.

***Callianassa brachytelson* sp. nov.**  
(Fig. 21A–E)

**Material examined**

**Holotype:** PMBC 15489, 1 male (TL/CL, 12.0/3.0, lacking P/1, P/2 on left side, P/3, P/4 on left side), BIOSHELF St. H3, 07°45'N, 097°58'E, BC, 70 m, coll. S. Bussarawit and C. Aungtonya, 09.05.1996.

**Non-type material:** PMBC 15490, 1 male (TL/CL, 9.0/2.0, no pereopods except left P/2), BIOSHELF St. G3, 08°00'N, 097°54'E, BC, 76 m, coll. S. Bussarawit and C. Aungtonya, 23.04.1996.

**Diagnosis**

Small in size. Rostrum sharply pointed, spaced ventrally from slanting dorsal surfaces of eyestalks. Antennular peduncle scarcely longer than antennal peduncle. Mxp 3 merus with largely rounded mesiodistal angle. Abdominal somite 6 rectangular, 1.5 times as long as wide. Uropodal exopod elongate with truncate distal margin.

**Description**

**Male holotype.**—Rostrum (Fig 21A, B) sharply pointed in dorsal view, slightly overreaching eyestalks. Carapace smooth, dorsal oval distinct; cervical groove located in posterior fifth of carapace excluding rostrum. Linea thalassinica entire.

Eyestalks (Fig. 21B) subsquare, slightly longer than wide, not extending to basal antennular article; dorsal surface convex, cornea pigmented, located at middle part. Antennular peduncle scarcely longer than antennal peduncle, terminal article three times as long as penultimate article. Antennal peduncle without scale; terminal article two-thirds as long as penultimate article. Mxp 3 (Fig. 21D) ischium—merus broadened; ischium rectangular, about 1.5 times as long as wide, and merus broader than long, largely rounded on mesiodistal margin; carpus small, about as long as merus; propodus elongate,

slightly longer than carpus; dactylus digitiform, half as long as propodus. P/1–5 missing.

Abdominal somites smooth, dorsally glabrous; pleurae 3–5 each with some setae laterally; abdominal somite 6 rectangular, 1.5 times as long as wide, lateral margins parallel.

Plp 1–2 on right and left sides absent or missing. Plp 3–5 on left side missing, and Plp 3–5 present as biramous, slender appendage, each bearing digital appendices internae (Fig. 21E) projecting on mesial margins of endopods.

Telson (Fig. 21C) less than half the length of abdominal somite 6, subsquare in form, slightly broader than long; lateral margin parallel, and posterior margin slightly convex with median tooth medially. Dorsal surface weakly elevated, with transverse row of setae at proximal third. Uropodal endopod ovate, much longer than telson, twice as long as wide; dorsal surface slightly carinate medially. Uropodal exopod subsquare, much longer than endopod, about twice as long as wide, distal margin truncate; dorsal surface carinate medially.

**Type locality**

Andaman Sea, off Phuket Island, Thailand, BIOSHELF St. H3, 07°45'N, 097°58'E, BC, 70 m.

**Etymology**

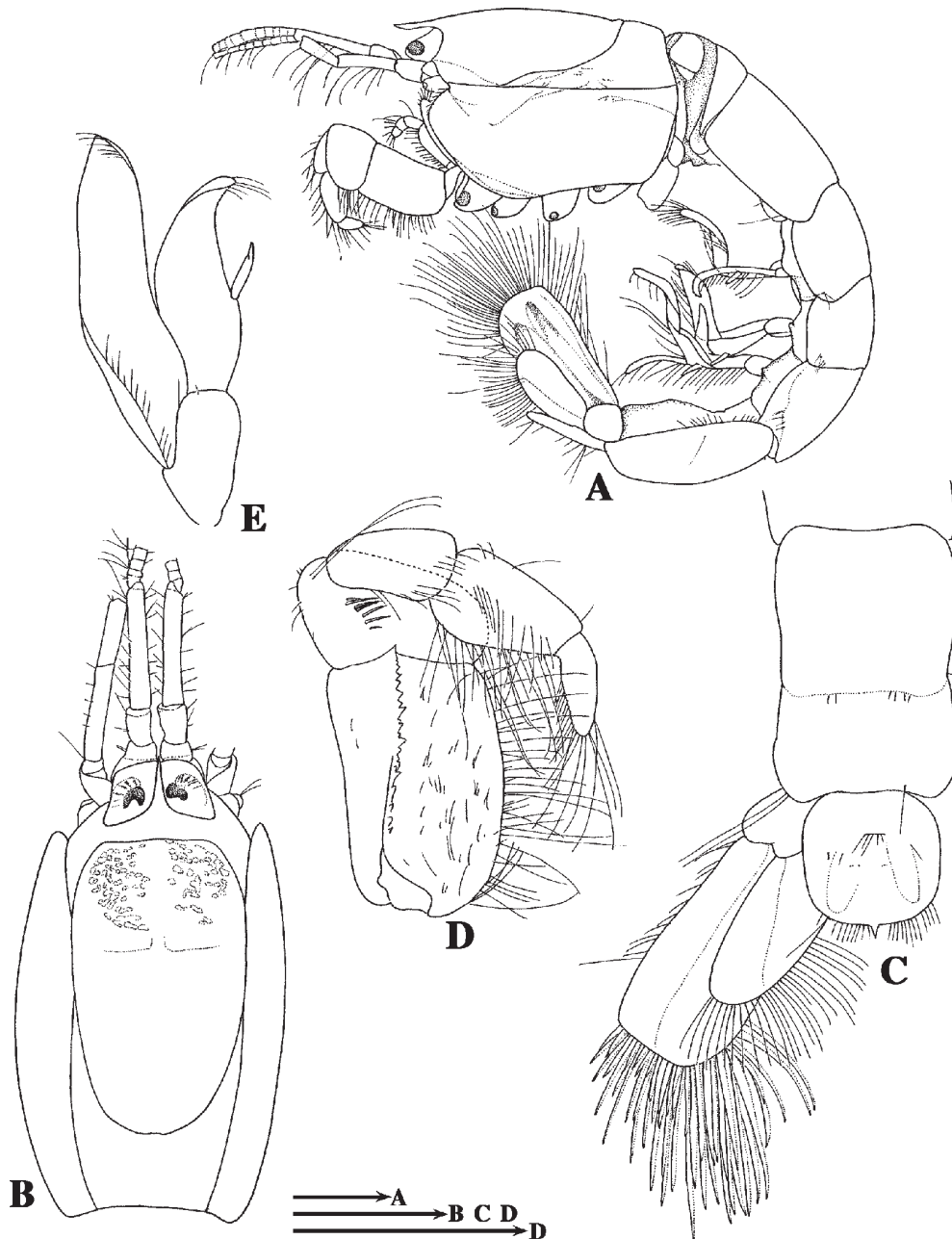
A combination of the Greek, *brachys*, short, and *telson*.

**Remarks**

*Callianassa brachytelson* related with *C. marginata* Rathbun, 1901 in bearing a sharp rostrum, elongate abdominal somite 6, slender Plp 3–5 with digital appendices internae, and an elongate uropodal endopod and exopod, however differs; in *C. brachytelson* the Mxp 3 merus is largely rounded on the mesiodistal margin, the telson is almost square with paralleled lateral margins, and the uropodal exopod is provided with a truncate distal margin, while in *C. marginata* the Mxp 3 merus is truncate on its distal margin, the telson is almost square, but slightly convergent distally on lateral margins, and the uropodal exopod is distally rounded. In *C. propinqua* de Man, 1905 abdominal somite 6 is elongate, and Plps 3–5 are

narrow, and with the digital appendices internae as in *C. brachytelson* and *C. marginata*, however *C. propinqua* differs from *C. brachytelson* and *C.*

*marginata* because in the anterior one Mxp 3 bears a tooth on the distal margin of merus.



**Figure 21** *Callianassa brachytelson* sp. nov.

A–E, PMBC 15489, holotype, male (TL/CL, 12.0/3.0), 07°45'N, 097°58'E, 70 m.

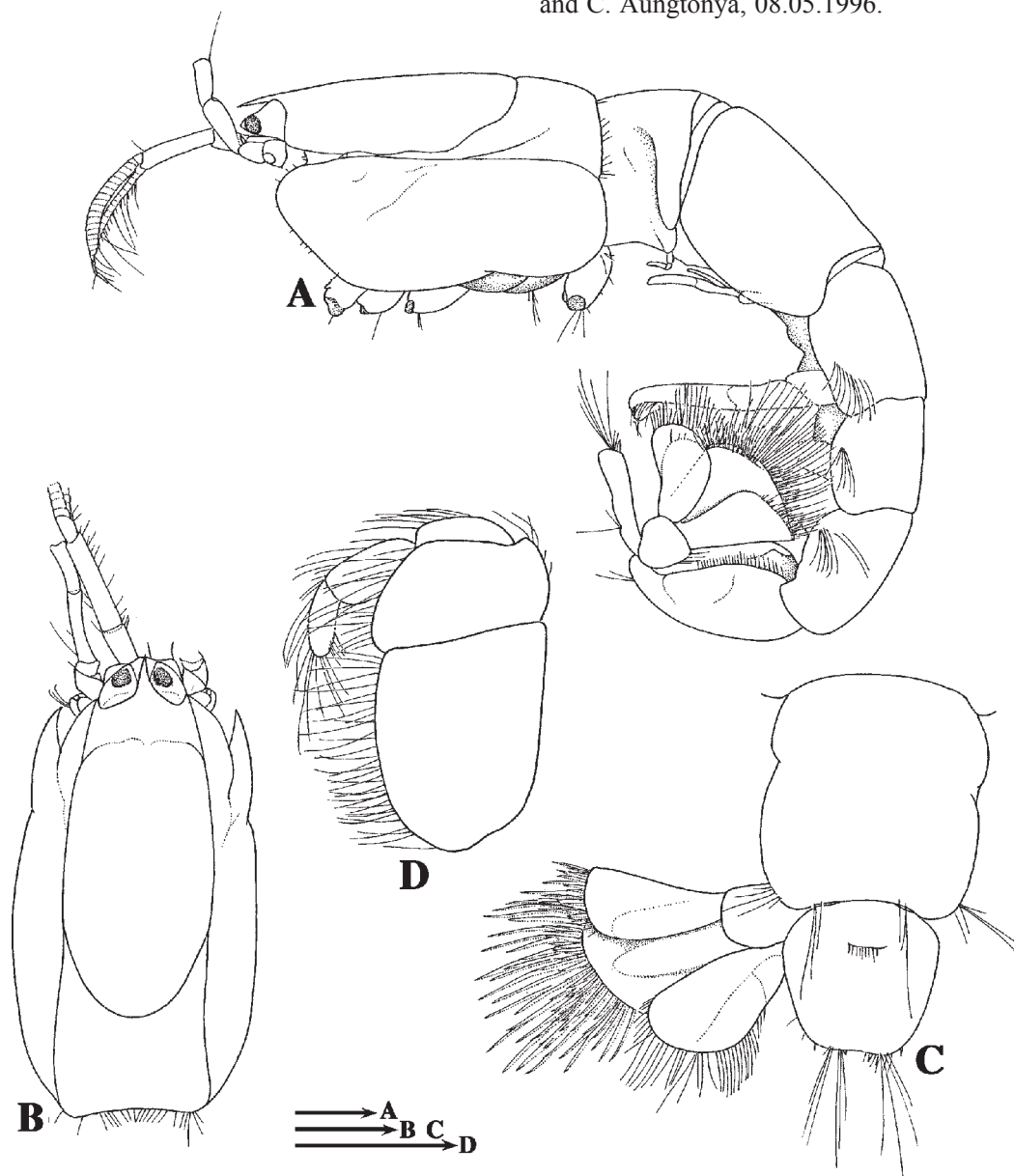
A, whole body, lateral view; B, carapace, dorsal view; C, abdominal somite 6 and tail fan, dorsal view; D, Mxp 3, mesial view; E, Plp 3. Scales all 1 mm.

***Callianassa amplimaxilla* sp. nov.**

(Figs 22A–D, 23A–D)

**Material examined****Holotype:** PMBC 15491, 1 female (TL/CL, 19.0/4.2, lacking Mxp 3 on right side, P/1–5), Mxp 3

present, no chelipeds, BIOSHELF St. C1, 09°00'N, 098°03'E, BC, 40 m, coll. S. Bussarawit and C. Aungtonya, 20.04.1996.

**Paratype:** PMBC 15492, 1 female (TL/CL, 17.0/4.5, lacking Mxp 3, P/1–5), BIOSHELF St. RY3, 07°36'N, 098°25'E, BC, 49 m, coll. S. Bussarawit and C. Aungtonya, 08.05.1996.**Figure 22** *Callianassa amplimaxilla* sp. nov.

A–C, PMBC 15492, paratype, female (TL/CL, 17.0/4.5), 07°36'N, 098°25'E, 49 m.; D, PMBC 15491, holotype, female (TL/CL, 19.0/4.2), 09°00'N, 098°03'E, 40 m.

A, whole body, lateral view; B, carapace, dorsal view; C, abdominal somite 6 and tail fan, dorsal view; D, Mxp 3, lateral view. Scales all 1 mm.



**Non-type material:** PMBC 15493, 1 male (TL/CL, 18.0/4.1, lacking Mxp 3, P/1–5), BIOSHELF St. G1, 08°00'N, 098°14'E, BC, 42 m, coll. S. Bussarawit and C. Aungtonya, 24.04.1996; PMBC 15494, 2 damaged specimens, BIOSHELF St. B2, 09°15'N, 097°54'E, 09°15'N, 097°52'E, OS, 60 m, coll. S. Bussarawit and C. Aungtonya, 17.02.1998.

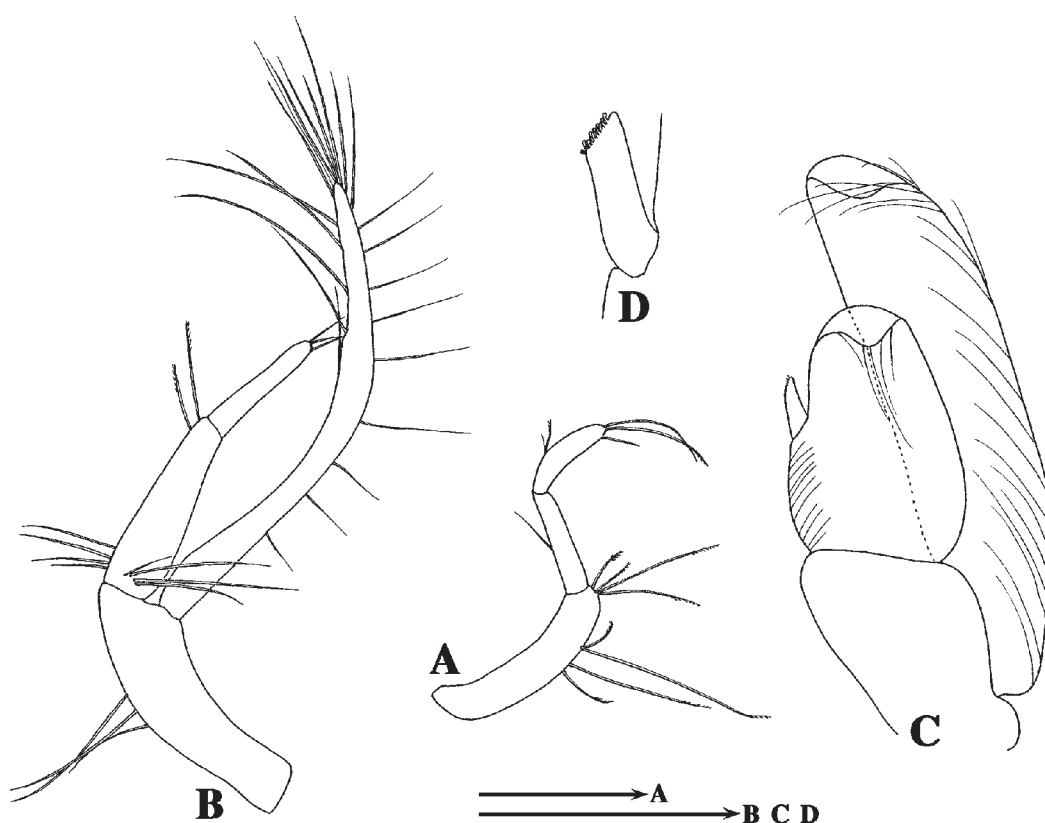
### Diagnosis

Small in size. Rostrum sharply pointed, spaced from slanting eyestalk. Antennular and antennal peduncles subequal. Mxp 3 ischium–merus broadened, merus with truncate distal margin. Abdominal somite 6 subsquare, about as long as wide. Telson subsquare, slightly convergent posteriorly on lateral margins, posterior margin unarmed. Uropodal exopod broadened, and largely rounded on distal margin.

### Description

**Female holotype.**—Rostrum (Fig. 22A, B) sharply pointed in dorsal view, slightly overreaching eyestalks. Carapace smooth, dorsal oval distinct; cervical groove located in posterior quarter of carapace excluding rostrum. Linea thalassinica entire.

Eyestalks (Fig. 22B) triangular, slightly longer than wide, not extending to basal antennular article; dorsal surface convex, cornea pigmented, located at middle part. Antennular peduncle scarcely longer than antennal peduncle, terminal article slightly more than twice as long as penultimate article. Antennal peduncle without scale; terminal article two-thirds length of penultimate article. Mxp 3 (Fig. 22D) ischium–merus broadened; ischium longer than wide, and merus half the length of ischium, slightly less than half as long as wide,



**Figure 23** *Callianassa amplimaxilla* sp. nov.

A–D, PMBC 15491, holotype, female (TL/CL, 19.0/4.2), 09°00'N, 098°03'E, 40 m.

A, female Plp 1; B, female Plp 2; C, female Plp 3; D, appendix interna on Plp 3. Scales all 1 mm.

with truncate distal margin. Carpus about as long as merus, propodus about as long as carpus, twice as long as wide, dactylus two-thirds as long as propodus, rounded at tip. P/1–5 missing.

Abdominal somites smooth, glabrous dorsally; pleurae 3–5 each with tuft of long setae laterally; abdominal somite 6 subsquare, about as long as wide, lateral margins parallel. Plp 1 (Fig. 23A) on left side shows normal form, being uniramous, three-articled, but right side shows a dwarf form consisting of two simple articles. Plp 2 (Fig. 23B) on left side normal, being biramous, slender, but on right side damaged, leaving the proximal part. Plp 3 (Fig. 23C, D) –5 biramous, foliaceous, bearing triangular appendices internae on mesial margins of endopods.

Telson (Fig. 22C) subsquare, two-thirds the length of abdominal somite 6, slightly broader than long, lateral margin convergent posteriorly, posterior margin almost straight, without a median tooth. Dorsal surface weakly elevated, with a transverse row of setae at proximal third. Uropodal endopod divergent distally with largely rounded distal margin, much longer than telson and slightly less than twice as long as wide; dorsal surface slightly carinate medially. Uropodal exopod divergent in triangular, slightly longer than endopod, about as long as wide, truncate at distal margin; dorsal surface divided into two parts by a strong median carina.

**Male** (PMBC 15493).– Plp 1 small, slender, and two-articled. Plp 2 absent.

#### Type locality

Andaman Sea, off Phuket Island, Thailand, BIOSHELF St. RY3, 07°36'N, 098°25'E, BC, 49 m.

#### Etymology

A combination of Latin, *ample*, wider and *maxilla*, jaw.

#### Remarks

*Callianassa amplimaxilla* is related to *C. acutirostella* Sakai, 1988 from Western Australia in having a broadened Mxp 3 and the antennular peduncle almost as long as the antennal peduncle.

*C. acutirostella* differs from *C. amplimaxilla* in having distally rounded eyestalks, and a subsquare telson, while in the Australian species the eyestalks are protruded distally, and the telson is much wider than long.

#### *Callianassa tonkinae* Grebenjuk, 1975 (Figs 24A–C, 25A–G)

*Callianassa (Scallasis) tonkinae* Grebenjuk, 1975: 302, fig. 3.

*Callianassa caledonica* Ngoc-Ho, 1991: 285, fig. 2 (new synonymy).

#### Material examined

PMBC 15495, 1 female (TL/CL, 17.0/4.5, lacking Mxp 3, P/1–5), and detached larger cheliped, BIOSHELF St. C2, 09°00'N, 097°53'E, BC, 65 m, coll. S. Bussarawit and C. Aungtonya, 20.04.1996; PMBC 15496, 1 juvenile male (TL/CL, 8.0/1.7, lacking P/1, P/2 on right side, P/3 on right side, P/4, P/5 on right side), BIOSHELF St. H3, 07°45'N, 097°58'E, BC, 70 m, coll. S. Bussarawit and C. Aungtonya, 09.05.1996.

#### Diagnosis

Small in size. Rostrum sharply pointed, spaced distally from slanting eyestalks. Antennal and antennular peduncle subequal in length. Mxp 3 ischium–merus narrow, merus with concave distal margin. Abdominal somite 6 subsquare, slightly longer than wide. Plp 3 narrow, with thumb-like appendices internae. Telson subsquare, slightly convergent posteriorly on lateral margins, with median tooth on concave posterior margin.

#### Description

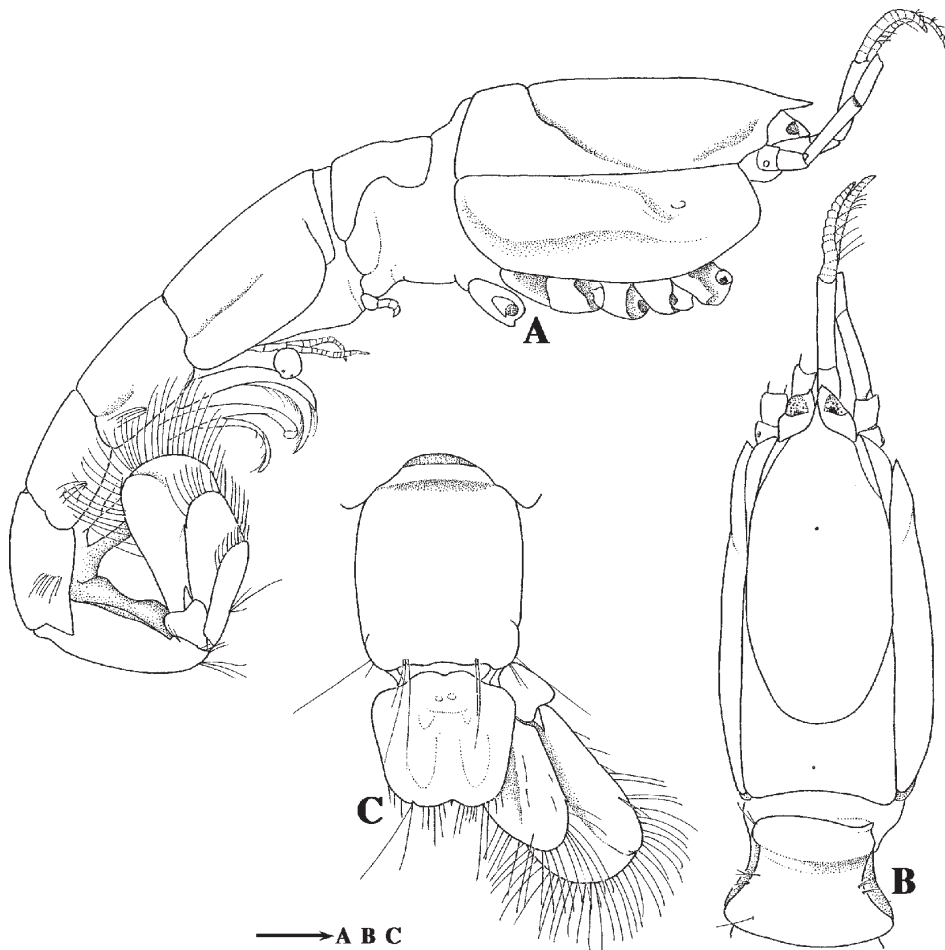
Rostrum (Fig. 24A, B) triangular in dorsal view, slightly overreaching eyestalks. Carapace smooth, dorsal oval distinct; cervical groove located in posterior fifth of carapace including rostrum. Linea thalassinica entire.

Eyestalk (Fig. 24A, B) subtriangular, slightly longer than wide, slightly overreaching antennular basal article; dorsal surface convex, cornea pigmented, located distal to middle part. Antennular

peduncle scarcely shorter than antennal peduncle, terminal article three times as long as penultimate article. Antennal peduncle with small scale; terminal article 2.5 times as long as penultimate article. Mxp 3 (Fig. 25A) narrow, ischium rectangular, twice as long as wide, merus half as long as ischium, and broadly truncate on distal margin, carpus small, propodus longer than carpus, twice as long as wide, dactylus narrow, and three-quarters as long as propodus.

Detached larger cheliped (Fig. 25B–D) on left side found in sample; ischium slender, dorsal margin sigmoid-shaped and unarmed, ventral margin with

row of four anteriorly-directed denticles; merus about as long as ischium, about 1.8 times as long as high, dorsal margin slightly arcuate, ventral margin denticulate and with sharp distally-pointed tooth proximally, exterior surface transversely carinate proximally; carpus slightly longer than merus and about as long as palm, dorsal margin almost straight, proximo-ventral margin regularly rounded, smooth and carinate in outline; chela broadened, about 1.8 times as long as high, dorsal margin of palm smooth, distal margin convex with a small protuberance at its lower end,; fixed finger with prehensile margin armed with low triangular



**Figure 24** *Callianassa tonkinae* Grebenjuk, 1975

A–C, PMBC 15495, ovig. female (TL/CL, 17.0/4.5), 09°00'N, 097°53'E, 65 m

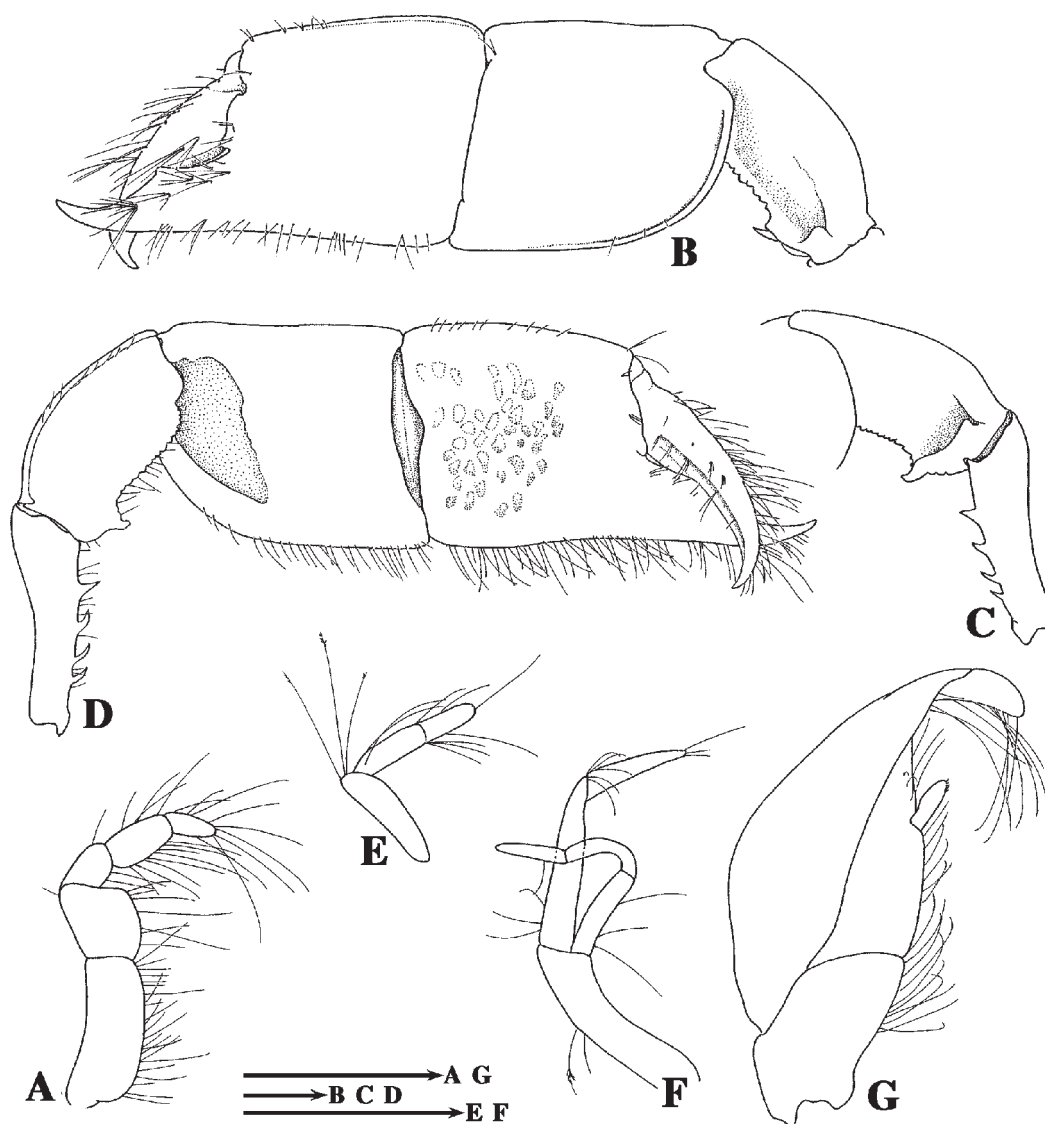
A, whole body, lateral view; B, carapace, dorsal view; C, abdominal somite 6 and tail fan, dorsal view. Scale 1 mm.

tooth medially; dactylus about as long as palm, prehensile margin sinuous and unarmed. Smaller cheliped missing. P/2–5 missing.

Abdominal somites smooth, glabrous dorsally; pleurae 3–5 each with tuft of setae laterally; abdominal somite 6 subsquare, slightly longer than wide, with paralleled lateral margins. Plp 1 (Fig. 25E) uniramous, three-articled; distally article

foliaceous. Plp 2 (Fig. 25F) biramous, slender. Plp 3 (Fig. 25G) –5 biramous, bearing appendices internae on endopod mesial margins.

Telson (Fig. 24C) subquadrate, slightly wider than long; lateral margin slightly convergent posteriorly, extending to broadly rounded corner; posterior margin concave medially, setose, and with median tooth. Dorsal surface weakly elevated,



**Figure 25** *Callianassa tonkinae* Grebenjuk, 1975

A, PMBC 15496, male (TL/CL, 8.0/1.7), 07°45'N, 097°58'E, 70 m;

B–G, PMBC 15495, ovig. female (TL/CL, 17.0/4.5), 09°00'N, 097°53'E, 65 m.

A, Mxp 3, lateral view; B, detached larger cheliped, lateral view; C, ischium and merus of the same cheliped, lateral view; D, detached larger cheliped, mesial view; E, Plp 1; F, Plp 2; G, Plp 3, posterior view. Scales all 1 mm.

medially with transverse row of setae. Uropodal endopod triangular, longer than telson and 1.5 times as long as wide, provided with spinule on anterior margin; dorsal surface carinate medially. Uropodal exopod broadened, much longer than endopod, and 1.5 times as long as wide, setose and truncate at distal margin; dorsal surface carinate medially.

**Juvenile male.**—Plp 1 absent, and Plp 2 developed as a small, two-articled, uniramous appendage.

#### Type locality

Gulf of Tonkin, South China Sea (Greibenjuk, 1975).

#### Remarks

*C. caledonica* Ngoc-Ho, 1991 is a synonym of the present species because the telson is trapezoid, and provided with a median tooth on the concave posterior margin; Mxp 3 is narrow, and its merus is concave on the distal margin; P/3 propodus shows an elongate triangular; and the uropodal exopod is elongate and with the rounded distal margin. The larger and smaller chelipeds in females were illustrated by Ngoc Ho (1991; fig. 2j, k), however only the larger cheliped in males was figured by Grebenjuk (1975, fig. 8), which is similar to the detached larger cheliped found together with the female specimen (PMBC 15495). The male larger cheliped shown by Grebenjuk is armed with the merus bearing a hook-like ventroproximal tooth and with the chela showing a proximal concavity at the base of the fixed finger, but that of the female shown by Ngoc-Ho is with the merus a simple triangular ventroproximal tooth, and the chela without the proximal concavity at the base of the fixed finger. In comparison with those characters, the present larger cheliped is probably attributed to the male, though it differs in not having a proximal concavity at the base of the fixed finger. However the present species is judged to be *C. tonkinae* by the characters other than this proximal concavity. *C. caledonica* Ngoc-Ho, 1991 was synonymised in error by Sakai (1999: 37) as *C. amboinae* (Bate, 1888).

*Callianassa matzi* sp. nov.  
(Figs 26A–C; 27A–I)

#### Material examined

**Holotype:** PMBC 15497, 1 male (TL/CL 12.0/3.0, lacking Mxp 3 on left side, P/1 on left side, P/2–5), St. G1, 08°00'N, 098°14'E, BC, 42 m, coll. S. Bussarawit and C. Aungtonya, 24. 04.1996.

**Paratypes:** PMBC 15498, 1 female (TL/CL, 15.0/4.0), BIOSHELF St. L2, 06°46'N, 099°04'E, BC, 59 m, coll. S. Bussarawit and C. Aungtonya, 05.05.1996; PMBC 15499, 1 male (TL/CL, 8.0/1.8, lacking Mxp 3, P/1 on left side, P/3 on right side, P/5, Plp 1–2), 1 female (TL/CL, 12.0/2.4, lacking P/1, P/5 on left side), BIOSHELF St. G2, 08°00'N, 098°10'E, BC, 63 m, coll. S. Bussarawit and C. Aungtonya, 23.04.1996; PMBC 15500, 1 female (TL/CL, 14.0/3.1, lacking P/4 on left side, detached P/1–2), BIOSHELF St. K1, 07°00'N, 099°16'E, BC, 43 m, coll. S. Bussarawit and C. Aungtonya, 06.05.1996; PMBC 15501, 11 males (TL/CL, 4.5/1.3 – 11.5/2.5), 4 females (TL/CL, 8.0/2.0–12.0/2.8), BIOSHELF St. B2, 09°15'N, 097°54'E–09°15'N, 097°52'E, OS, 58 m, coll. S. Bussarawit and C. Aungtonya, 17.02.1998; PMBC 15502, 1 larger male (TL/CL, 11.0/3.0, lacking Mxp 3, P/1 on left side, P/2–5, bearing P/1 dwarf on right side), BIOSHELF St. J1, 07°15'N, 099°03'E, BC, 43 m, coll. S. Bussarawit and C. Aungtonya, 04.05.1996.

**Non-type material:** PMBC 15503, 1 female (TL/CL, 8.0/2.0), BIOSHELF St. C3, 09°00'N, 097°43'E, BC, 79 m, coll. S. Bussarawit and C. Aungtonya, 20. 04.1996; PMBC 15504, 1 female (TL/CL, 14.0/3.3), BIOSHELF St. H2, 07°45'N, 098°15'E, BC, 59 m, coll. S. Bussarawit and C. Aungtonya, 09.05.1996; PMBC 15505, 4 males (TL/CL, 7.0/1.7–9.0/2.0), 1 female (TL/CL, 13.5/3.4), BIOSHELF St. J2, 07°15'N, 098°50'E, BC, 62 m, coll. S. Bussarawit and C. Aungtonya, 04.05.1996; PMBC 15506, 1 male (TL/CL, 6.0/1.2), 1 female (TL/CL, 14.0/4.3), BIOSHELF St. I2, 07°30'N, 098°29'E, BC, 59 m, coll. S. Bussarawit and C. Aungtonya, 03.05.1996; PMBC 15507, 2 males (TL/CL, 10.0/2.8, 12.0/3.0), 3 females (TL/CL, 12.0/3.0–13.0/3.0), no chelipeds, detached cheliped, BIOSHELF St. G1, 08°00'N, 098°14'E, BC, 42 m, coll. S. Bussarawit and C. Aungtonya, 24.04.1996; PMBC 15508, 1 males (TL/CL, 10.5/2.7), BIOSHELF St. I 20 m,



07°30'N, 099°01'E, BC, 21 m, coll. S. Bussarawit and C. Aungtonya, 03.05.1996 (no place in the list); PMBC 15509, 1 male (TL/CL, 11.0/2.7), BIOSHELF St. I1, 07°30'N, 098°57'E, BC, 38 m, coll. S. Bussarawit and C. Aungtonya, 03.05.1996; PMBC 15510, 1 male (TL/CL, 9.5/2.0), BIOSHELF St. RY3, 07°36'N, 098°25'E, BC, 49 m, coll. S. Bussarawit and C. Aungtonya, 08.05.96; PMBC 15511, 2 males (TL/CL, 8.5/2.0; 11.0/2.5), BIOSHELF St. B2, 09°15'N, 097°54'E–09°15'N, 097°52'E, OS, 58 m, coll. S. Bussarawit and C. Aungtonya, 17.02.1998; PMBC 15512, 2 males (TL/CL, 9.0/2.7; 7.0/1.9), BIOSHELF St. B2, 09°15'N, 097°54'E, 09°15'N, 097°52'E, OS, 58 m, coll. S. Bussarawit and C. Aungtonya, 17.02.1998; PMBC 15513, 1 male (TL/CL, 7.0/1.9), BIOSHELF St. B1 09°14'N, 098°00'E–09°14'N, 098°00'E, OS, 45.0 m, coll. S. Bussarawit and C. Aungtonya, 17.02.1998; PMBC 15514, 1 female (TL/CL, 13.0/2.8), no chelipeds, BIOSHELF St. C2, 09°00'N, 097°53'E, BC, 65 m, coll. S. Bussarawit and C. Aungtonya, 20.04.1996; PMBC 15515, 1 male (TL/CL, 9.0/2.2), BIOSHELF St. E1, 08°30'N, 098°06'E, BC, 42 m, coll. S. Bussarawit and C. Aungtonya, 22.04.1996; PMBC 15517, 9 males (TL/CL, 10.0/2.5 – 12.0/3.3), 2 ovig. females (12.0/3.0, 12.0/3.0), 2 females (TL/CL, 11.0/2.8, 12.0/3.0), BIOSHELF St. H1, 07°45'N, 098°16'E–07°44'N, 098°17'E, OS, 31 m, coll. S. Bussarawit and C. Aungtonya, 09.05.1996; PMBC 15518, 2 males (TL/CL, 12.0/2.7; 12.0/2.9), 1 female (12.5/3.0), BIOSHELF St. G1, 08°00'N, 098°14'E–07°59'N, 098°14'E, OS, 43 m, coll. S. Bussarawit and C. Aungtonya, 24.04.1996; PMBC 15519, 2 males (TL/CL, 7.5/1.6 – 8.0/1.7), 11 females (TL/CL, 8.0/1.6 – 15.5/3.4), BIOSHELF St. C2, 09°00'N, 097°53'E, 09°01'N, 097°53'E, OS, 64 m, coll. S. Bussarawit and C. Aungtonya, 20.04.1996; PMBC 15520, 2 males (TL/CL, 7.0/1.7 – 9.0/2.5), BIOSHELF St. E3, 08°30'N, 097°46'E–08°31'N, 097°46'E, OS, 81 m, coll. S. Bussarawit and C. Aungtonya, 22.04.1996; PMBC 15521, 4 males (TL/CL, 8.0/1.8 – 13.0/3.0), 3 females (TL/CL, 11.0/2.4 – 13.0/3.1), BIOSHELF St. K1, 07°00'N, 099°15'E–07°00'N, 099°14'E, OS, 45 m, coll. S. Bussarawit and C. Aungtonya, 06.05.1996; PMBC 15525, 1 male (TL/CL, 6.0/1.3), BIOSHELF St. L1, 06°46'N, 099°21'E–06°46'N, 099°21'E, OS,

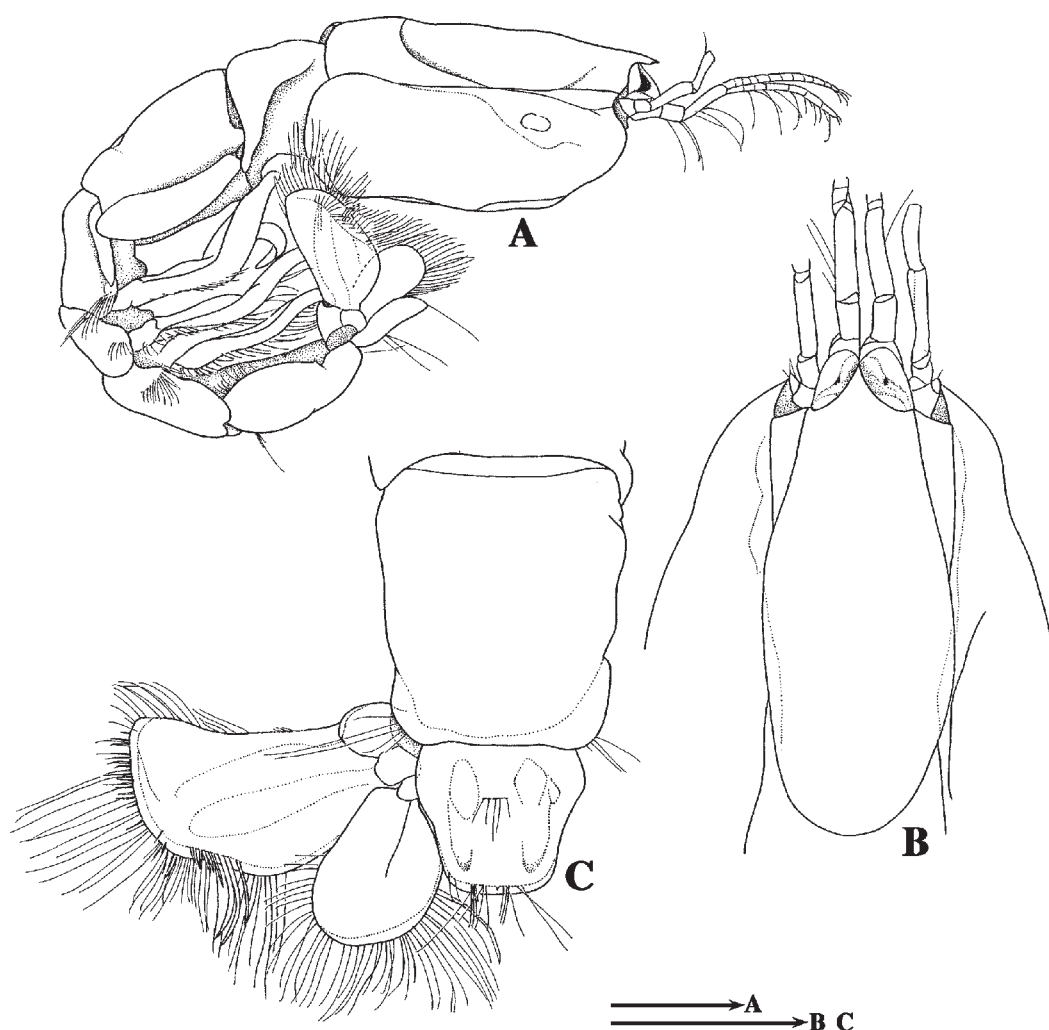
38.0 m, coll. S. Bussarawit and C. Aungtonya, 06.05.1996; PMBC 15547, 1 male (TL/CL, 11.5/5.0), BIOSHELF St. L1, 06°46'N, 099°21'E–06°46'N, 099°21'E, OS, 38 m, coll. S. Bussarawit and C. Aungtonya, 06.05.1996; PMBC 15548, 2 males (TL/CL, 7.3/2.2 – 14.0/3.0), 1 female (TL/CL, 10.0/2.9), BIOSHELF St. E 20 m, 08°30'N, 098°12'E, BC, 21 m, muddy coll. S. Bussarawit and C. Aungtonya, 22.04.1996; PMBC 15553, 1 male (TL/CL, 8.0/3.0, lacking Mxp 3, P/1–5), BIOSHELF St. RN1, 07°30'N, 098°22'E, BC, 63 m, coll. S. Bussarawit and C. Aungtonya, 08.05.1996; PMBC 15565, 1 female (TL/CL, 14.0/3.0), BIOSHELF St. J1, 07°15'N, 099°03'E, BC, 43 m, coll. S. Bussarawit and C. Aungtonya, 04.05.1996; PMBC 15566, 2 males (TL/CL, 17.0/4.0, lacking Mxp 3 on left side, P/1–5; TL/CL, 10.0/3.0, lacking Mxp 3, P/1–5), BIOSHELF St. G1, 08°00'N, 098°14'E, BC, 42 m, coll. S. Bussarawit and C. Aungtonya, 24.04.1996; PMBC 15585, 1 male (TL/CL, 10.5/2.6), BIOSHELF St. I2, 07°30'N, 098°29'E, BC, 59 m, coll. S. Bussarawit and C. Aungtonya, 03.05.1996; PMBC 15606, 1 male (TL/CL, 10.0/1.5), 1 ovig. female (TL/CL, 12.0/3.0), BIOSHELF St. K 20 m, 07°00'N, 099°24'E, BC, 21 m, mud with shell fragments, coll. S. Bussarawit and C. Aungtonya, 06.05.1996; PMBC 15607, 2 males (TL/CL, 9.2/2.0; 10.0/2.3), 1 female (TL/CL, 10.0/24.0), BIOSHELF St. J3, 07°15'N, 098°34'E, BC, 79 m, coll. S. Bussarawit and C. Aungtonya, 04.05.1996; PMBC 15608, 1 female (TL/CL, 10.0/2.0), BIOSHELF St. J2, 07°15'N, 098°50'E, BC, 62 m, coll. S. Bussarawit and C. Aungtonya, 04.05.1996; PMBC 15609, 1 males (TL/CL, 15.0/3.2), BIOSHELF St. E2, 08°30'N, 098°00'E, BC, 63m, coll. S. Bussarawit and C. Aungtonya, 22.04.1996; PMBC 15610, 2 males (TL/CL, 8.2/1.7–10.0/2.4), 1 ovig. female (TL/CL, 11.0/2.5), BIOSHELF St. C2, 09°00'N, 097°53'E, BC, 65 m, coll. S. Bussarawit and C. Aungtonya, 20.04.1996; PMBC 15611, 7 males (TL/CL, 6.0/1.3 – 10.0/2.4), 1 female (TL/CL, 12.5/2.7), BIOSHELF St. G2, 07°59'N, 098°08'E–07°59'N, 098°07'E, OS, 72m, coll. S. Bussarawit and C. Aungtonya, 20.02.1998; PMBC 15612, 21 males (TL/CL, 6.0/1.4 – 11.0/2.7), 5 females (TL/CL, 7.5/2.0–13.0/3.6), BIOSHELF St. J1, 07°15'N, 099°04'E–07°15'N, 099°04'E, OS,

39 m, coll. S. Bussarawit and C. Aungtonya, 23.02.1998; PMBC 15613, 13 male (TL/CL, 6.5/1.7 – 11.5/2.6), 7 females (TL/CL, 8.0/1.9–13.0/3.0), BIOSHELF St. K1, 07°00'N, 099°16'E–07°00'N, 099°15'E, OS, 41m, coll. S. Bussarawit and C. Aungtonya, 24.02.1998; PMBC 15614, 3 males (TL/CL, 8.5/2.0 – 10.0/2.7), 1 female (TL/CL, 11.0/2.5), BIOSHELF St. L2, 06°43'N, 099°03'E–06°43'N, 099°04'E, OS, 61 m, coll. S. Bussarawit and C. Aungtonya, 25.02.1998; PMBC 15615, 1 male (TL/CL, 7.0/1.6), BIOSHELF St. K20 m, 07°00'N, 099°24'E–07°00'N, 099°24'E, 22 m, mud with shell fragments, coll. S. Bussarawit and C. Aungtonya, 06.05.1996; PMBC 15616, 4 males (TL/CL, 5.0/1.3 – 10.0/2.6), BIOSHELF St. L2, 06°44'N, 099°05'E–06°44'N, 099°05'E, OS, 56 m, coll. S. Bussarawit and C. Aungtonya, 05.05.1996; PMBC 15617, 1 male (TL/CL, 12.0/3.0), BIOSHELF St. L3, 06°46'N, 098°45'E–06°46'N, 098°45'E, OS, 83 m, coll. S. Bussarawit and C. Aungtonya, 05.05.1996; PMBC 15619, 1 male (TL/CL, 8.0/2.0), BIOSHELF St. L2, 06°43'N, 099°03'E–06°43'N, 099°04'E, OS, 60 m, coll. S. Bussarawit and C. Aungtonya, 25.02.1998; PMBC 15620, 1 male (TL/CL, 13.0/3.5), 1 ovig. female (TL/CL, 12.0/3.0), BIOSHELF St. G1, 07°59'N, 098°14'E–07°59'N, 098°14'E, TD, 43 m, coll. S. Bussarawit and C. Aungtonya, 24.04.1996; PMBC 15621, 35 males (TL/CL, 7.0/1.8 – 11.5/2.9), 4 ovig. females (TL/CL, 14.0/3.0 – 11.0/2.7), 19 females (TL/CL, 8.0/1.9–12.0/3.0), BIOSHELF St. I1, 07°30'N, 098°57'E–07°30'N, 098°57'E, OS, 38 m, coll. S. Bussarawit and C. Aungtonya, 03.05.1996; PMBC 15622, 1 ovig. female (TL/CL, 10.0/2.7), BIOSHELF St. K3, 07°00'N, 098°41'E, BC, 83 m, coll. S. Bussarawit and C. Aungtonya, 05.05.1996; PMBC 15623, 21 males (TL/CL, 7.0/1.7 – 10.0/2.8), BIOSHELF St. J1, 07°15'N, 099°04'E–07°15'N, 099°04'E, OS, 39m, coll. S. Bussarawit and C. Aungtonya, 23.02.1998; PMBC 15624, 5 males (TL/CL, 8.0/2.0 – 11.0/3.0), BIOSHELF St. J3 M, 07°15'N, 098°36'E–07°16'N, 098°36'E, OS, 77 m, coll. S. Bussarawit and C. Aungtonya, 23.02.1998; PMBC 15625, 2 males (TL/CL, 7.0/1.6; 9.0/2.0), 1 female (TL/CL, 12.0/2.0), BIOSHELF St. I3, 07°35'N, 098°14'E–07°34'N, 098°14'E, OS, 73 m, coll. S. Bussarawit and C. Aungtonya, 22.02.1998; PMBC

15626, 4 males (TL/CL, 7.0/2.0 – 8.0/1.7), 1 female (TL/CL, 8.0/1.9), BIOSHELF St. I2, 07°30'N, 098°30'E–07°30'N, 098°30'E, OS, 59m, coll. S. Bussarawit and C. Aungtonya, 22.02.1998; PMBC 15627, 6 males (6.0/1.4 – 7.0/1.7), BIOSHELF St. J1, 07°15'N, 099°04'E–07°15'N, 099°04'E, OS, 39 m, coll. S. Bussarawit and C. Aungtonya, 23.02.1998; PMBC 15628, 1 male (TL/CL, 9.5/2.0), BIOSHELF St. K2–K3, 07°02'N, 098°50'E–07°01'N, 098°50'E, OS, 75 m, coll. S. Bussarawit and C. Aungtonya, 24.02.1998; PMBC 15629, 43 males (TL/CL, 4.5/0.9 – 14.0/3.0), 8 females (TL/CL, 9.0/2.3 – 11.0/2.9), BIOSHELF St. I1, 07°30'N, 098°55'E–07°30'N, 098°56'E, OS, 42 m, coll. S. Bussarawit and C. Aungtonya, 22.02.1998; PMBC 15630, 2 males (TL/CL, 8.5/2.4; 11.0/2.7), 1 female (TL/CL, 12.0/2.9), St. K1, 07°00'N, 099°16'E–07°00'N, 099°15'E, OS, 41m, coll. S. Bussarawit and C. Aungtonya, 24.02.1998, ; PMBC15631, 17 males (TL/CL, 6.0/1.9 – 10.0/2.5), 3 females (TL/CL, 10.0/2.3 – 10.0/2.3), BIOSHELF St. K2, 07°00'N, 099°04'E–06°59'N, 099°04'E, OS, 53 m, coll. S. Bussarawit and C. Aungtonya, 24.04.1998; PMBC 15632, 11 males (TL/CL, 6.0/1.5 – 14.0/2.5), 1 ovig. female (TL/CL, 12.0/2.8), BIOSHELF St. L1, 06°46'N, 099°21'E–06°46'N, 099°21'E, OS, 38 m, coll. S. Bussarawit and C. Aungtonya, 06.05.1996; PMBC 15633, 2 males (TL/CL, 10.0/2.4 – 11.0/2.4), 2 females (TL/CL, 11.0/2.5 – 12.0/2.7), BIOSHELF St. H1, 07°45'N, 098°16'E–07°44'N, 098°17'E, OS, 31 m, coll. S. Bussarawit and C. Aungtonya, 09.05.1996; PMBC 15634, 24 males (TL/CL, 6.0/1.5 – 12.0/2.7), 1 ovig. female (TL/CL, 11.0/2.7), 7 females (TL/CL, 9.0/2.2 – 11.0/2.6), BIOSHELF St. J2, 07°15'N, 098°51'E–07°15'N, 098°51'E, OS, 61m, coll. S. Bussarawit and C. Aungtonya, 04.05.1996; PMBC 15635, 1 male (TL/CL, 8.0/1.7), BIOSHELF St. C3, 09°00'N, 097°43'E–08°59'N, 097°43'E, OS, 80 m, coll. S. Bussarawit and C. Aungtonya, 20.04.1996; PMBC 15698, 3 males (TL/CL, ca. 8.0/2.0), 1 female (TL/CL, 10.0/2.2), detached larger cheliped, 2 detached smaller chelipeds, BIOSHELF St. J1, 07°15'N, 099°03'E, BC, 43 m, coll. S. Bussarawit and C. Aungtonya, 04.05.1996; PMBC 15699, 3 males (TL/CL, 9.0/2.2 – 11.0/2.5), 1 female (TL/CL, 12.0/2.8), BIOSHELF St.

J2, 07°15'N, 098°51'E–07°15'N, 098°51'E, OS, 63m, coll. S. Bussarawit and C. Aungtonya, 23.02.1998; PMBC 15700, 2 males (TL/CL, 9.0/2.1–10.0/2.3), 3 females (TL/CL, 10.0/2.5–12.0/3.3), BIOSHELF St. L1, 06°45'N, 099°21'E, BC, 38 m, coll. S. Bussarawit and C. Aungtonya, 06.05.1996; PMBC 15701, 2 males (TL/CL, 11.0/2.8–12.0/3.2), BIOSHELF St. E1, 08°30'N, 098°06'E, BC, 42 m, coll. S. Bussarawit and C. Aungtonya, 22.04.1996; PMBC 15702, 1 male

(TL/CL, 9.5/2.1), BIOSHELF St. K 20 m, 07°00'N, 099°24'E, BC, 21 m, mud with shell fragments, coll. S. Bussarawit and C. Aungtonya, 06.05.1996; PMBC 15703, 1 female (TL/CL, 12.0/2.7), BIOSHELF St. G2, 08°00'N, 098°10'E, BC, 63 m, coll. S. Bussarawit and C. Aungtonya, 23.04.1996; PMBC 15704, 1 male (TL/CL, 8.0/2.0), 1 juvenile (TL/CL, 7.0/1.4), BIOSHELF St. I2, 07°30'N, 098°29'E, OS, 60 m, coll. S. Bussarawit and C. Aungtonya, 03.05.1996.



**Figure 26** *Callianassa matzi* sp. nov.

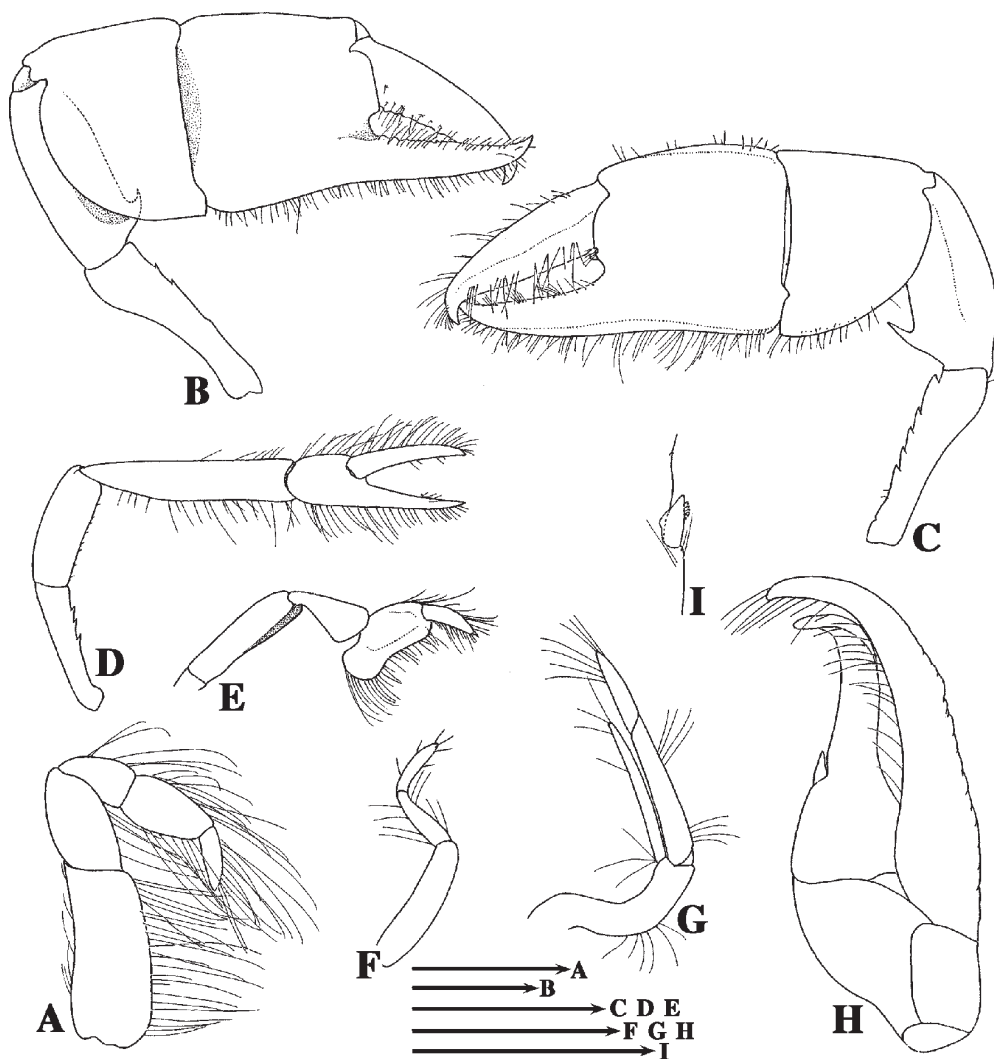
A–C, PMBC 15502, paratype, male, 07°15'N, 099°03'E, 43 m.

A, whole body, lateral view; B, anterior part of carapace with eyestalks, antennular and antennal peduncles, dorsal view; C, abdominal somite 6 and tail fan, dorsal view. Scales all 1 mm.

**Diagnosis**

Small in size. Rostrum triangular and narrowly pointed distally in dorsal view, reaching about middle of eyestalks. Eyestalks contiguous, almost reaching distal end of antennular basal article; dorsal surface strongly declined, distinctly spaced from rostrum; cornea pigmented medially. Antennular

peduncle almost as long as antennal peduncle, terminal article twice the length of penultimate. Larger cheliped with merus unarmed on dorsal margin. P/3 simple, merus rectangular, more than three times as long as high; carpus triangular, and divergent distally, 1.8 times as long as high; propodus wide, paddle shape, characteristically



**Figure 27** *Callianassa matzi* sp. nov.

A–B, PMBC 15497, holotype, male (TL/CL, 12.0/3.0), 08°00'N, 098°14'E, 42 m; C–E, PMBC 15698, male, 07°15'N, 099°03'E, 43 m; F–I, PMBC 15498, female (TL/CL, 15.0/4.0), 06°46'N, 099°04'E, 59 m. A, Mxp 3, lateral view; B, male larger cheliped, lateral view; C, detached larger cheliped, lateral view; D, detached smaller cheliped, lateral view; E, P/3, lateral view; F, female Plp 1; G, female Plp 2; H, female Plp 3; I, appendix interna on Plp 3. Scales all 1 mm.

concave on ventral margin, and with rounded postventral protrusion, fringed with long marginal setae; dactylus slender, and densely setose on external surface. P/4 subchelate. P/5 subchelate. Plp 3–5 slender, biramous, with stubby appendices internae. Telson trapezoid, slightly broader than long; lateral margins parallel in proximal third, and then convergent to posterolateral angles; posterior margin setose, slightly concave medially, with a median spinule. Uropodal exopod elongate rhomboidal in shape, about 1.8–2.0 times as long as wide.

### Description

**Male holotype.**—Rostrum (Fig. 26A, B) triangular and distally acute in dorsal view, reaching about to middle of eyestalks. Carapace smooth, dorsal oval distinct; cervical groove located in the posterior quarter of carapace excluding rostrum. Linea thalassinica entire. Eyestalks contiguous, slightly short of distal end of antennular basal article; dorsal surface concave in its distal half, strongly declined, and spaced distinctly from rostrum; cornea pigmented medially. Antennular peduncle almost as long as antennal peduncle, terminal article twice as long as penultimate article. Antennal peduncle with rudimentary scale; terminal article two-thirds the length of penultimate article. Mxp 3 (Fig. 27A) with ischium—merus narrow, about 3.5 times as long as wide, setose on mesial margin; ischium three times as long as wide, and with crista dentata on interior surface, merus subsquare, and 1.8 times as long as wide, largely rounded on mesiodistal angle; propodus 1.8 times as long as wide, convex on flexor margin; dactylus digitiform, shorter than propodus; exopod absent.

Larger cheliped (Fig. 27B, C) massive; ischium slender, dorsal margin unarmed, ventral margin with three denticles; merus as long as ischium, slightly more than twice as long as high, dorsal margin slightly arcuate, ventral margin bearing slender, anteriorly-directed proximal lobe, exterior surface medially carinate; carpus higher than long, slightly shorter than palm, dorsal margin almost straight, proximo-ventral margin evenly rounded; chela massive, about twice as long as high, palm roundly gaped at proximal part of fixed finger, scarcely setose on dorsal margin, but setose on ventral margin; fixed finger minutely serrated with

setae on prehensile margin; dactylus about as long as palm, setose on prehensile margin, distally incurved at tip. Smaller cheliped missing. P/2–5 missing. Branchial formula including exopods is tabulated as follows:

	Maxillipeds			Pereopods				
	1	2	3	1	2	3	4	5
Exopods	1	1	-	-	-	-	-	-
Epipods	1	-	-	-	-	-	-	-
Podobranchs	-	-	-	-	-	-	-	-
Arthrobranchs	-	-	2	2	2	2	2	-
Pleurobranchs	-	-	-	-	-	-	-	-

Abdominal somite 2 longer than somite 6; somites 3–5 each with a tuft of setae laterally; somite 6 slightly longer than wide. Male Plp 1 slender, two-articled; Plp 2 absent. Plp 3–5 biramous, slender, and endopods with stubby appendices internae.

Telson (Fig. 26C) trapezoid, slightly broader than long; lateral margins parallel in proximal third, and then convergent to posterolateral angles; posterior margin setose, slightly concave medially with a median spinule. Dorsal surface weakly elevated, medially with transverse row of setae. Uropodal endopod much longer than telson, 1.5 times as long as wide, largely rounded on posterior margin; dorsal surface convex and with a longitudinal median carina in its proximal half. Uropodal exopod shows an elongate rhomboidal form, about twice as long as wide, lateral margin largely concave.

Detached smaller cheliped (Fig. 27D).—Ischium slender, and armed with three denticles on ventral margin; merus slightly shorter than ischium, unarmed, carpus slender, and twice as long as merus, chela shorter than carpus, with slender dactylus twice as long as palm.

**Female.**—Plp 1 uniramous, three articulated; Plp 2 biramous and slender; Plp 3 (Fig. 27H, I) –5 narrow, biramous, and with triangular appendices internae.

### Etymology

The epithet is dedicated to Dr. Matz Berggren, who gave me the opportunity to examine this interesting material from the Andaman Sea.



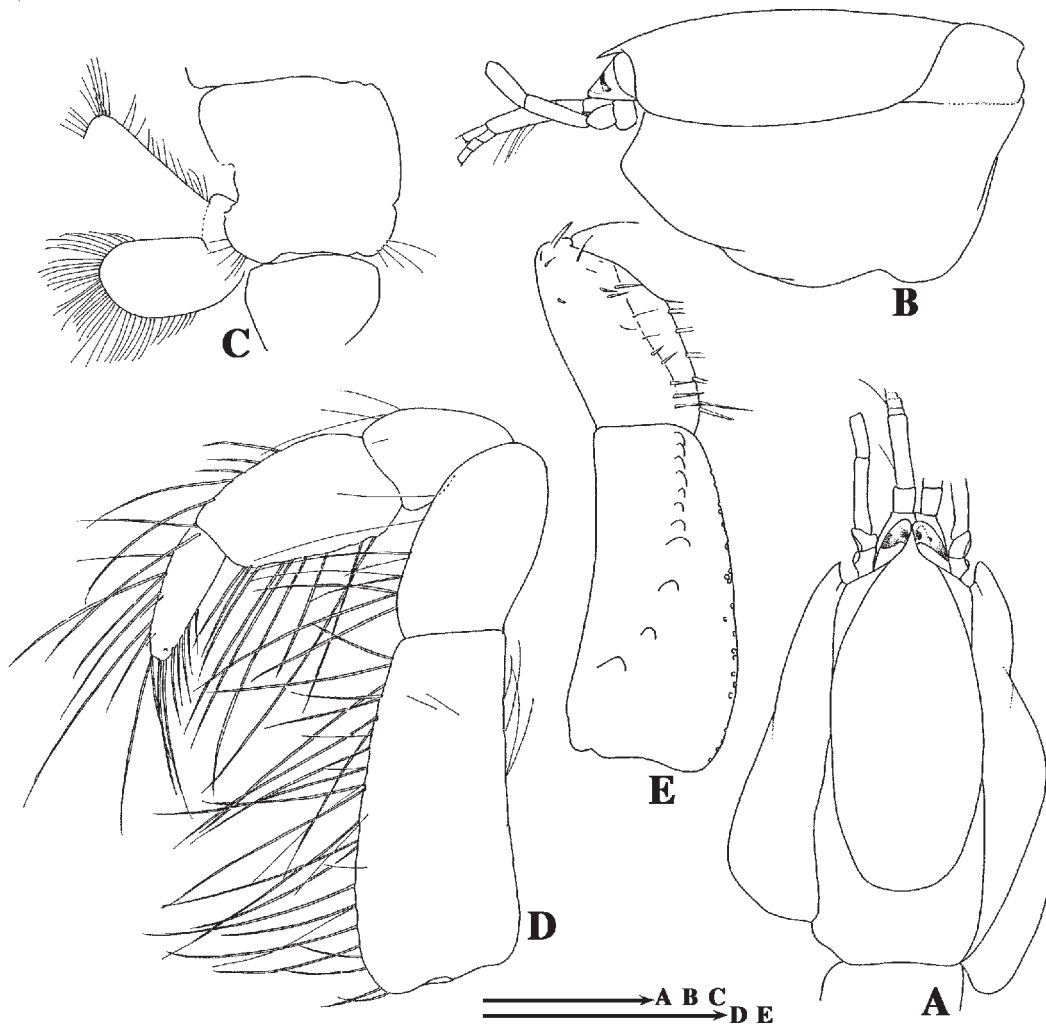
**Type locality**

Andaman Sea, off Phuket, Thailand, BIOSHELF St. G1, 08°00'N, 098°14'E, BC, 42 m.

**Remarks**

*Callianassa matzi* is closely related to *C. jocularis* de Man, 1905 from New Caledonia, northern Queensland, Great Barrier Reef, Australia, and Indonesia in having a kidney-shaped P/3 propodus (Fig. 27E). In *C. jocularis* the merus of male larger cheliped bears a proximal spine on the dorsal margin; Mxp 3 ischium–merus distally

bears an oblique mesial margin connected with the carpus; the uropodal exopod shows a rhomboidal form, about 1.5 times as long as wide (de Man, 1928b: 132), while in *C. matzi* the merus of the larger cheliped is not armed with a proximal spine on the dorsal margin, Mxp 3 ischium–merus is largely convex on the mesiodistal angle, and the uropodal exopod shows an elongate rhomboidal form, about 1.8 times as long as wide. Many specimens were collected during the survey, in which the closely-related species, *C. chakratong* sp. nov. was also collected.



**Figure 28** *Callianassa chakratongae* sp. nov.

A–E, PMBC 15705, holotype, female, 09°00'N, 097°53'E, 65 m.

A, carapace, dorsal view; B, same, lateral view; C, abdominal somite 6 and tail-fan; D, Mxp 3, lateral view; E, Mxp 3, mesial view. Scales all 1 mm.

***Callianassa chakratongae* sp. nov.**  
(Figs 28A–D, 29A–G)

**Material examined**

**Holotype:** PMBC 15705, female (TL/CL, 11.0/2.4, lacking P/2 on right side, and P/3 on left side, Plp 5, tail-fan broken), BIOSHELF St. C2, 09°00'N, 097°53'E, BC, 65 m, coll. S. Bussarawit and C. Aungtonya, 20.04.1996, with chelipeds, P/3 rounded.

**Diagnosis**

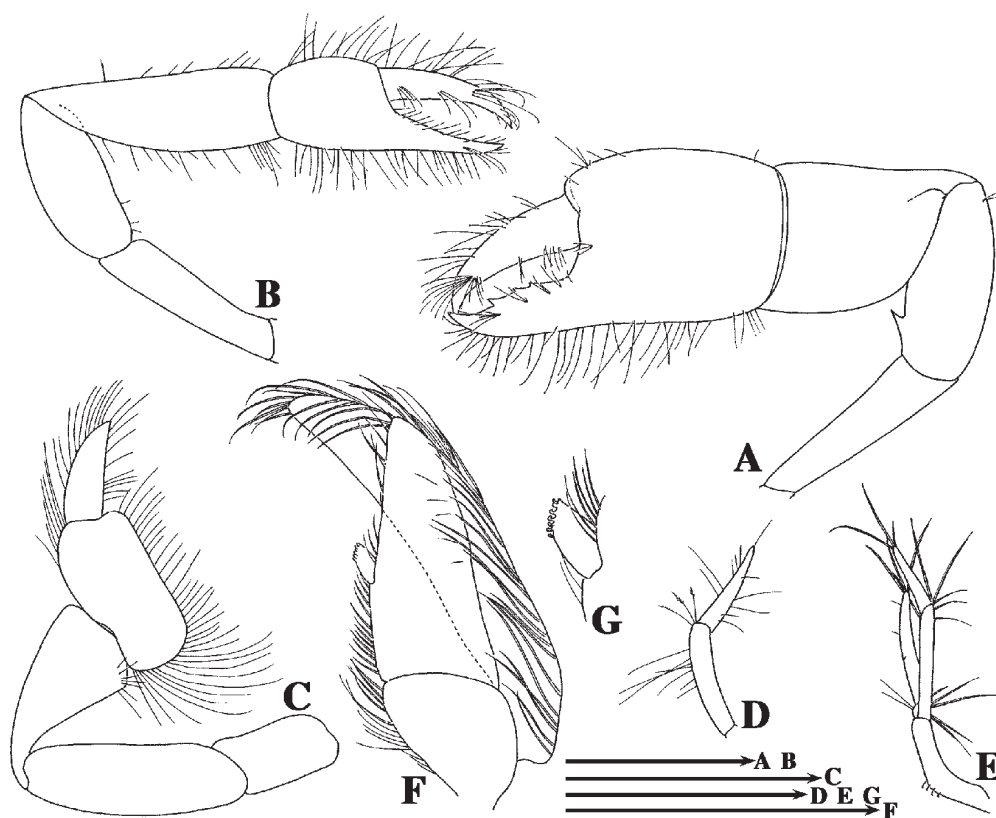
Small in size. Rostrum narrow, triangular. Antennular and antennal peduncles almost in same length. Mxp 3 narrow, its merus largely incurved on mesiodistal angle. P/1 ischium unarmed on ventral margin; larger cheliped palm unarmed distally, fixed finger armed with some denticles.

P/3 propodus bean-shaped. Plp 3–5 narrow, foliaceous, with stubby appendices internae.

**Description**

**Female holotype.** – Rostrum (Fig. 28A, B) narrow, triangular in dorsal view, reaching about middle of eyestalks. Eyestalks contiguous, almost reaching distal end of antennular basal article; dorsal surface strongly declined, spaced from rostrum with an obvious distance; cornea pigmented medially. Antennular peduncle almost as long as antennal peduncle, terminal article twice as long as of penultimate article.

Larger cheliped (Fig. 29A) with ischium slender, three times as long as wide, unarmed on dorsal and ventral margins. Merus slightly longer than ischium, and slightly longer than twice as long as wide, ventral margin bearing triangular tooth at



**Figure 29** *Callianassa chakratongae* sp. nov.

A–G, PMBC 15705, holotype, female, 09°00'N, 097°53'E, 65 m.

A, larger cheliped, lateral view; B, smaller cheliped, lateral view; C, P/3, lateral view; D, Plp 1; E, Plp 2; F, Plp 3, anterior view; G, appendix interna on Plp 3. Scales all 1 mm.

proximal quarter. Carpus about as long as merus, slightly longer than wide, and largely rounded on ventroproximal corner. Chela about twice the length of carpus; palm 1.2 times as long as wide, dorsal margin largely convex, and distal margin directly connected with cutting edge of fixed finger without a gap. Fixed finger with three denticles on cutting margin. Dactylus unarmed on cutting edge. Smaller cheliped (Fig. 29B) with elongate ischium; merus slightly shorter than ischium, and twice as long as wide, unarmed on both margins; carpus elongate, 1.5 times as long as merus. Chela about as long as carpus; palm half as long as carpus, unarmed. P/3 simple, merus rectangular, about three times as long as high; carpus triangular, and divergent distally, 1.8 times as long as high; propodus wide, paddle-shaped, and straight with setae on ventral margin; dactylus sickle-shaped. P/4 subchelate. P/5 subchelate. Plp 1 (Fig. 29D) slender, two-articled; Plp 2 (Fig. 29E) slender, biramous; Plp 3–5 (Fig. 29F, G) –5 slender, biramous, with stubby appendices internae.

Telson (Fig. 28C) trapezoid, damaged. Uropodal endopod ovate; uropodal exopod anterior margin straight.

### Etymology

Named after the vessel R.V. *Chakratong Tongyai*, the vessel from which the present interesting material was collected us present interested material in the Andaman Sea.

### Remarks

The single female specimen is recognised as a distinct species. *Callianassa chakratongae* is closely related to the previous new species, *C. matzi* in having P/1 ischium unarmed on the cutting edge; the palm of the larger cheliped without a gap at the proximal part of the fixed finger; P/3 propodus truncate on the ventral margin, abdominal somite 6 is subsquare, about as long as wide; and the uropodal exopod shows a straight anterior margin; and Plp 3 appendix interna in a stubby form. In *C. matzi* the P/1 ischium is usually armed with a few denticles on the ventral margin; the palm of the larger cheliped has a gap at the proximal part of the fixed finger; P/3 propodus is usually

concave medially on the ventral margin; abdominal somite 6 is rectangular, slightly longer than wide; the uropodal exopod with a concave anterior margin; Plp 3 appendix interna shaped in triangular.

### *Callianassa brevirostris* sp. nov.

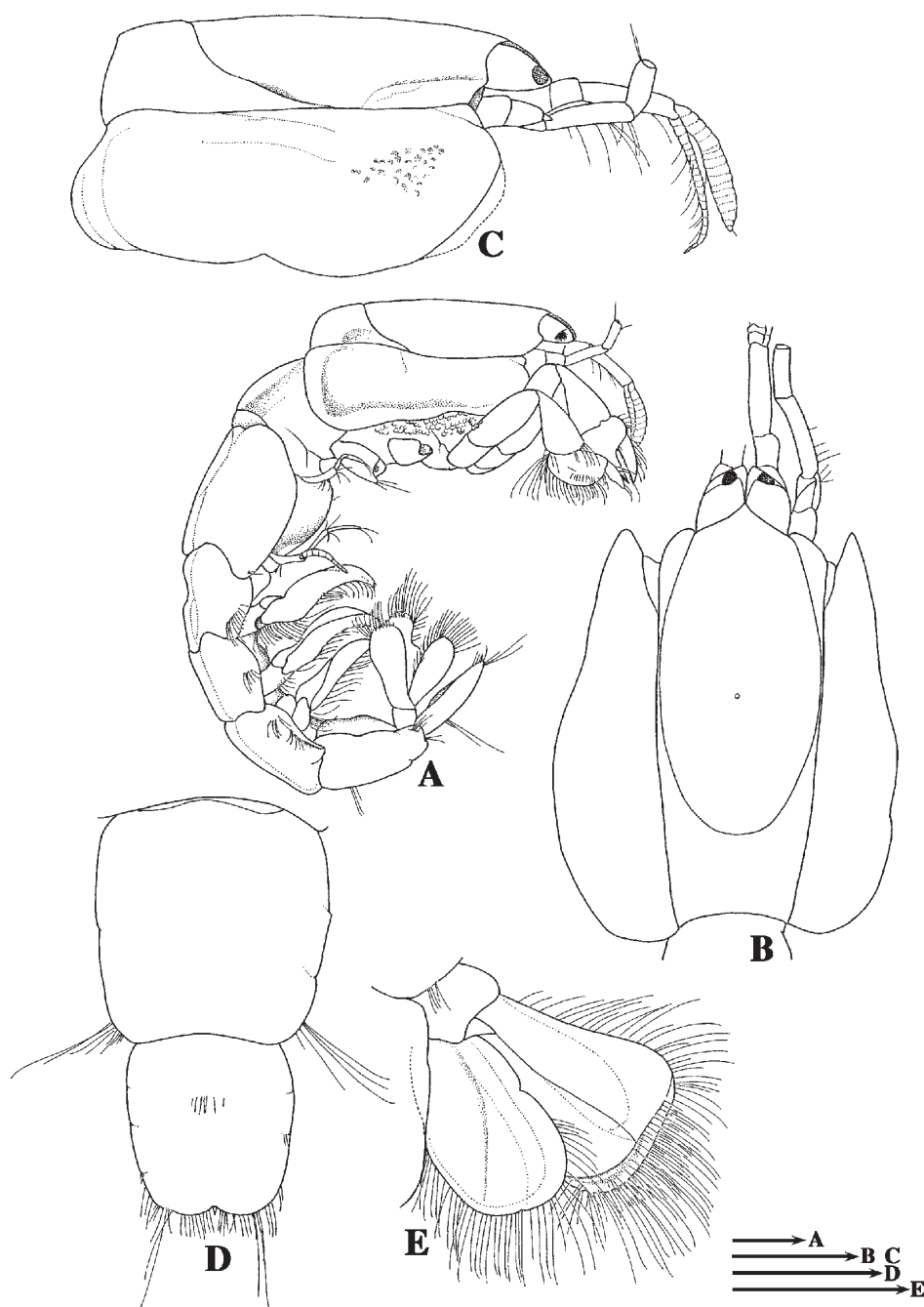
(Figs 30A–E; 31A–I)

### Material examined

**Holotype:** PMBC 15706, 1 female (TL/CL, 14.0/3.0, lacking smaller cheliped on right side, P/2 on right side, P/4–5), BIOSHELF St. PB5, 07°52'N, 098°48'E, BC, 21m, coll. S. Bussarawit and C. Aungtonya, 22.04.1997.

**Paratypes:** PMBC 15708, 2 females, BIOSHELF St. PB7, 07°45'N, 098°41'E, BC, 29 m, coll. S. Bussarawit, 22.04. 1997.

**Non-type material:** PMBC 15709, 1 male (TL/CL, 15.0/3.5), BIOSHELF St. RY2, 07°39'N, 098°23'E, BC, 45 m, coll. S. Bussarawit and C. Aungtonya, 08.05.1996; PMBC 15710, 1 female (TL/CL, 11.0/2.5), BIOSHELF St. I2, 07°30'N, 098°29'E, BC, 59 m, coll. S. Bussarawit and C. Aungtonya, 03.05.1996; PMBC 15711, 1 female (TL/CL, 23.0/3.8), 1 male (TL/CL, 15.0/3.0), no chelipeds, BIOSHELF St. C1, 09°00'N, 098°03'E, BC, 60.7 m, coll. S. Bussarawit and C. Aungtonya, 20.04.1996; PMBC 15713, 1 male (TL/CL, 9.0/2.0), BIOSHELF St. PB5, 07°52'N, 098°48'E, BC, 21 m, coll. S. Bussarawit, 22.04. 1997; PMBC 15714, 1 female (damaged), 1 detached cheliped, BIOSHELF St. PB7, 07°45'N, 098°41'E, BC, 29 m, coll. S. Bussarawit, 22.04. 1997; PMBC 15715, 1 ovig. female (TL/CL, 16.0/3.7), St. RN1, 07°30'N, 098°22'E, BC, 63 m, coll. S. Bussarawit and C. Aungtonya, 08.05.1996; PMBC 15715, 1 female (TL/CL, 13.0/3.0), BIO-SHELF St. RN1, 07°30'N, 098°22'E, BC, 63 m, coll. S. Bussarawit and C. Aungtonya, 08.05.1996; PMBC 15717, 2 females (TL/CL, 13.0/2.8, 14.5/3.0), St. K 20m, 07°00'N, 099°24'E, BC, 21 m, mud with shell fragments, coll. S. Bussarawit and C. Aungtonya, 06.05.1996; PMBC 15718, 1 male (TL/CL, 9.2/2.0), 1 female (TL/CL, 9.0/1.7), BIOSHELF St. I3 07°35'N, 098°14'E–07°35'N, 098°13'E, OS, 73 m, coll. S. Bussarawit, 22.02.1998; PMBC



**Figure 30** *Callianassa brevirostris* sp. nov.

A, D–E, PMBC 15706, holotype, female (TL/CL, 14.0/3.0), male, 07°52'N, 098°48'E, 21 m. B–C, PMBC 15707, paratypes male (TL/CL, 15.0/3.6), St. K. 07°00'N, 099°24'E, 20 m.

A, whole body, lateral view; B, carapace, dorsal view; C, same, lateral view; D, abdominal somite 6 and telson, dorsal view; E, uropod, dorsal view. Scales all 1 mm.

15719, 2 females (TL/CL, 13.0/2.7; 15.0/3.4), BIOSHELF St. PB7, 07°45'N, 098°41'E, BC, 29 m, coll. S. Bussarawit, 22.04.1997; PMBC 15721, 1 male (TL/CL, 10.0/2.4), BIOSHELF St. K 20 m, 07°00'N, 099°24'E, BC, 21 m, mud with shell fragments, coll. S. Bussarawit and C. Aungtonya, 06.05.1996; PMBC 15722, 1 male (TL/CL, 17.0/3.0), 1 female (TL/CL, 17.0/3.3), BIOSHELF St. PB2, 08°00'N, 098°39'E, BC, 17 m, coll. S. Bussarawit, 22.04.1997.

### Diagnosis

Small in size. Rostrum triangular in dorsal view. Antennular peduncle about as long as antennal peduncle. Mxp 3 ischium and merus operculiform. Larger cheliped with ischium bearing a few denticles on ventral margin. Dactylus of smaller cheliped slender, 1.5 times as long as palm. P/3 propodus oval in a paddle shape. Plp 3–5 narrow, and with thumb-like appendices internae. Abdominal somite 6 subsquare. Telson slightly longer than wide, and posterior margin slightly concave medially, and with a median tooth.

### Description

**Female holotype.**— Rostrum (Fig. 30A, B, C) triangular in dorsal view, slightly overreaching eyestalks. Carapace smooth, dorsal oval distinct; cervical groove located in posterior fifth of carapace including rostrum. *Linea thalassinica* entire.

Eyestalk (Fig. 30B, C) subtriangular, slightly longer than wide, slightly overreaching distal end of antennular basal article, with obtusely angular tip distomesially; dorsal surface convex, descending forward in distal quarter bearing pigmented cornea at its middle part. Antennular peduncle scarcely longer than antennal peduncle, terminal article about half as long as penultimate article. Antennal peduncle without dorsal scale; terminal article less than half as long as penultimate article. Mxp 3 (Fig. 31A, B) without exopod; endopodal ischium–merus operculiform, about 1.7 times as long as wide, setose on mesial margin; ischium with crista dentata on internal surface; merus largely rounded on distomesial angle; terminal three articles slender, with long setae on flexor margins.

Branchial formula including exopods as follows:

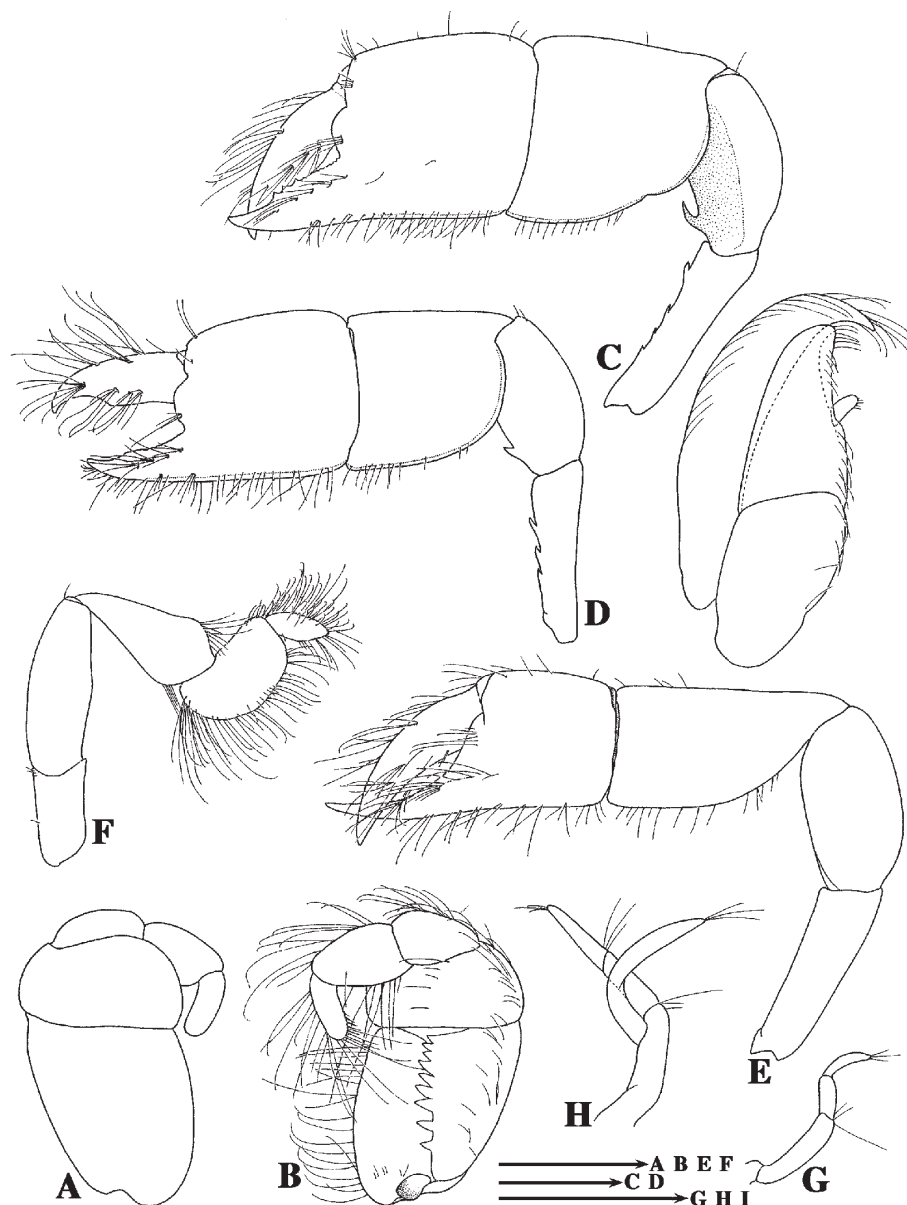
	Maxillipeds			Pereopods				
	1	2	3	1	2	3	4	5
Exopods1	1	-	-	-	-	-	-	-
Epipods	1	-	-	-	-	-	-	-
Podobranchs	-	-	-	-	-	-	-	-
Arthrobranchs	-	-	2	2	2	2	2	-
Pleurobranchs	-	-	-	-	-	-	-	-

P/1 unequal in size and dissimilar in shape. Larger cheliped (Fig. 31C) massive; ischium slender, dorsal margin unarmed, ventral margin with row of four anteriorly-directed denticles; merus slightly shorter than ischium, about 1.8 times as long as high, dorsal margin slightly arcuate, ventral margin bearing a sharp distally-pointed tooth proximally, exterior surface medially swollen; carpus about as high as long, and about two-fifths as long as palm, dorsal margin almost straight, proximo-ventral margin regularly rounded, smooth and carinate in outline; chela broadened, about 1.8 times as long as high, dorsal margin of palm smooth, distal margin largely convex and unarmed on lateral surface, with tubercle on mesial surface; ventral margin with smooth keel extending to base of fixed finger; fixed finger with prehensile margin armed with row of fine denticles on proximal half and three triangular denticles medially, smooth in distal half; dactylus about as long as palm, prehensile margin sinuous and unarmed. Smaller cheliped missing. P/2 chelate, ischium unarmed; merus more than twice as long as ischium, with more closely set setae on ventral margin; carpus 0.7 times as long as merus, and with a row of setae on dorsal and ventral margins; chela slightly longer than carpus, and with long setae on dorsal and ventral margins, and dactylus longer than palm, and with elongate fingers on dorsal margin. P/3 (Fig. 31F) simple, ischium unarmed; merus rectangular, 1.8 times as long as ischium, more than 2.7 times high; carpus broadest distally, slightly longer than merus, and twice the height; propodus oval in a paddle shape, ventral margin rounded with long marginal setae; dactylus small in length, external surface densely setose. P/4 and P/5 missing.



Abdominal somites smooth, glabrous dorsally; pleurae 3–5 each with tuft of setae laterally; abdominal somite 6 with parallel lateral margins.

Plp 1 (Fig. 31G) uniramous, three articulated. Plp 2 (Fig. 31H) biramous, slender. Plp 3 (Fig. 31I) –5 biramous, each bearing thumb-like appendices



**Figure 31** *Callianassa brevirostris* sp. nov.

A–B, E, PMBC 15707, paratype, female (TL/CL, ca. 15.0/3.0), cheliped detached, 07°00'N, 099°24'E, 21 m; C, F–H, PMBC 15706, holotype, 1 female (TL/CL, 14.0/3.0), with larger cheliped, 07°52'N, 098°48'E, 21 m; D, PMBC 15708, detached cheliped, 07°45'N, 098°41'E, 29 m.

A, Mxp 3, lateral view; B, same, mesial view; C, female larger cheliped, lateral view; D, detached larger cheliped, lateral view; E, detached larger cheliped, lateral view; F, P/3, lateral view; G, female Plp 1; H, female Plp 2; I, Plp 3, anterior view. Scales all 1 mm.

internae on mesial margins of endopods.

Telson (Fig. 30D) subquadrate, slightly longer than wide; lateral margin slightly convergent posteriorly to broadly rounded corner, with three pairs of short setal rows; posterior margin concave medially, setose, with a median tooth. Dorsal surface weakly elevated, medially with transverse row of setae. Uropodal endopod (Fig. 30E) subquadrate, longer than telson, 1.3 times as long as wide, weakly emarginate medially on posterior margin; dorsal surface convex on lateral half, bordered by faint median longitudinal carina. Uropodal exopod broadened, less than 1.5 times as long as wide, setose on distal margin; dorsal surface convex on lateral half.

**Male paratype.**— Detached larger cheliped (Fig. 31D)(PMBC 15707). Palm with distal margin unarmed on mesial surface. Detached smaller cheliped (Fig. 31E) more slender in chela and less massive than larger cheliped; ischium narrow, unarmed on ventral and dorsal margins; merus subsquare, slightly shorter than ischium, about 1.8 times as long as high, external surface swollen medially; carpus elongate in subtriangular form, proximo-ventral margin regularly divergent to distal angle, 1.3 times as long as merus, and twice as long as high; chela 1.3 times as long as carpus; palm subsquare, longer than high; distal margin largely descending downward to tip of fixed finger; fixed finger distinctly shorter than dactylus, prehensile margin concave and unarmed; dactylus 1.3 times as long as palm, crossed by fixed finger, prehensile margin sinuous and unarmed. Male Plp 1 uniramous, two-articled. Male Plp 2 absent.

#### Type locality

Andaman Sea, off Phuket, Thailand BIOSHELF St. PB5, 07°52'N, 098°48'E, BC, 21 m.

#### Etymology

Derived from the Latin, *brevis*, short and *rostrum*, beak.

#### Remarks

*Callianassa brevirostris* is closely related to *C. poorei* Sakai, 1999a from Tasmania in having a triangular rostrum, the antennular peduncle about as long as the antennal peduncle, the telson longer

than wide, Mxp 3 ischium—merus is broadly rounded, and the uropodal exopod being broadly truncate distally. In *C. poorei* the cornea occupies most of the eyestalk, while in the present species it is located only at the distal part.

#### *Callianassa nieli* sp. nov.

(Fig. 32A–F)

#### Material examined

**Holotype:** PMBC 15723, 1 female (TL/CL, 12.0/2.6, lacking P/1–5), detached smaller cheliped, St. RY1, 07°36'N, 098°19'E, BC, 55 m, coll. S. Bussarawit and C. Aungtonya, 08.05. 1996.

**Non-type material:** PMBC 15724, 1 male (TL/CL, 8.0/1.7, no Mxp 3, P/1–5), BIOSHELF St. RY3, 07°36'N, 098°25'E, BC, 49 m, coll. S. Bussarawit and C. Aungtonya, 08.05.1996; PMBC 15725, 2 males (TL/CL, 7.0/1.6 – 8.0/1.9, no Mxp 3, no P/1–5), BIOSHELF St. I3, 07°35'N, 098°14'E–07°34'N, 098°13'E, OS, 73 m, coll. S. Bussarawit, 02.12.1998.

#### Diagnosis

Small in size. Rostrum triangular. Antennular and antennal peduncles almost same in length. Mxp 3 ischium—merus narrow, merus largely rounded on distomesial angle. Plp 3–5 narrow, with finger-shaped appendices internae. Telson trapezoid in shape, bearing median spine on posterior margin.

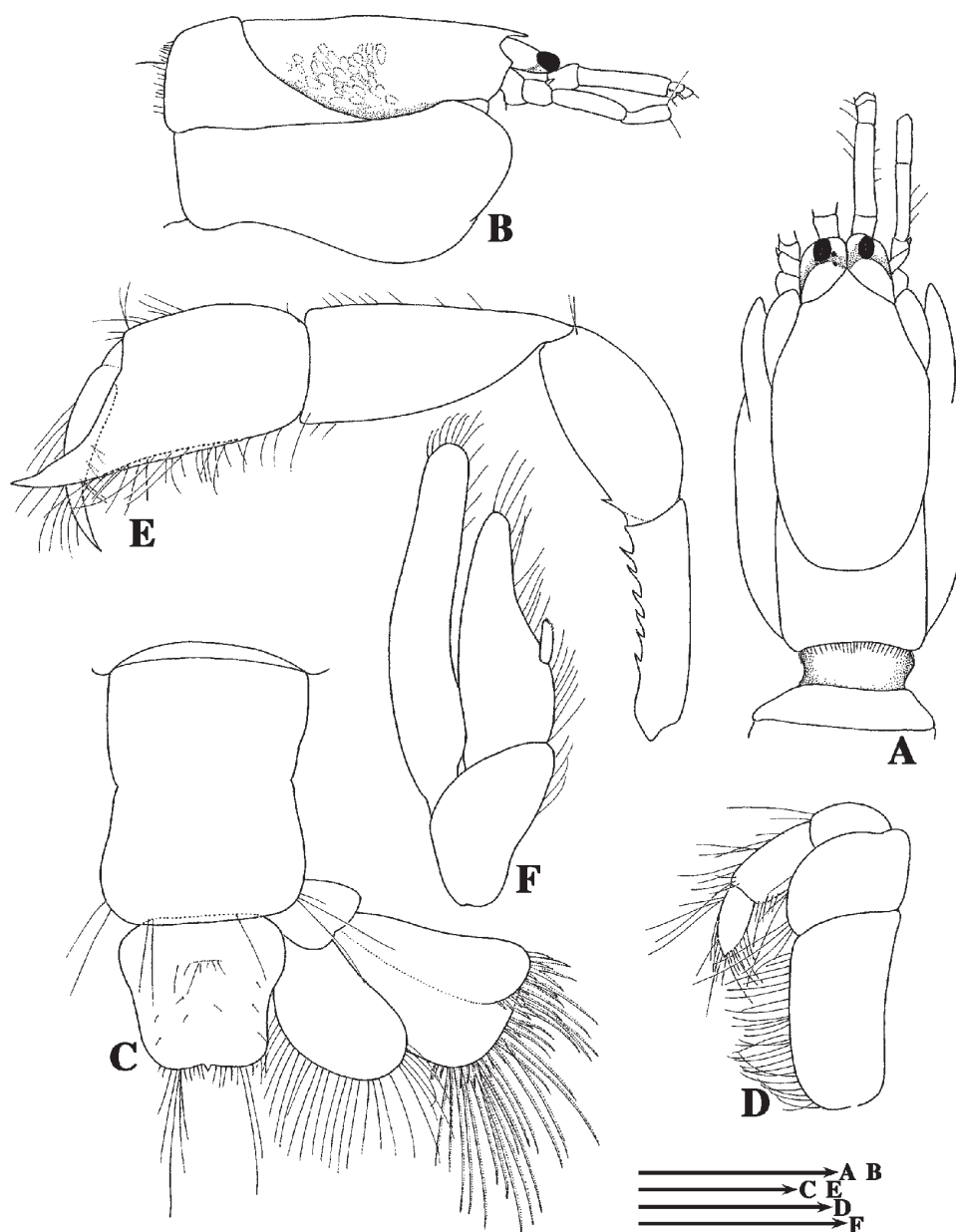
#### Description

**Female holotype.**— Rostrum (Fig. 32A, B) triangular in dorsal view, reaching middle of eyestalks. Carapace smooth, dorsal oval present; cervical groove located at posterior fifth of carapace including rostrum. Linea thalassinica entire.

Eyestalks (Fig. 32A, B) subsquare in dorsal view, slightly longer than wide, distally descending downward, slightly separated from rostrum in lateral view, and slightly overreaching antennular basal article; dorsal surface proximally convex, distal to rounded cornea located at distal part. Antennular peduncle about as long as antennal peduncle; distal article about one third length of penultimate article. Antennal peduncle with a small

scale; terminal article two-thirds the length of penultimate. Mxp 3 (Fig. 32D) ischium–merus subsquare; ischium about twice as long as wide, and merus shorter than half the length of ischium, and about two-thirds as long as wide; distomesial

angle largely rounded; carpus about as long as merus, propodus slightly longer than carpus, and dactylus two-thirds the length of propodus. P/1–5 missing.



**Figure 32** *Callianassa nieli* sp. nov.

A–D, F, PMBC 15723, holotype, female (TL/CL, 12.0/2.6), 07°36'N, 098°19'E, 55 m.

A, carapace, dorsal view; B, same, lateral view; C, abdominal somite 6 and tail fan, dorsal view; D, Mxp 3, lateral view; E, detached smaller cheliped; F, Plp 3, posterior view. Scales all 1 mm.

Abdominal somites smooth, glabrous dorsally; pleurae 3–5 each with a tuft of long setae laterally; abdominal somite 6 rectangular, about 1.2 times as long as wide, lateral margin slightly concave midway on both sides. Plp 1 uniramous, three articulated, small in form. Plp 2 biramous, filiform in form. Plp 3 (Fig. 32F) –5 biramous, foliaceous, each bearing finger-shaped appendices internae.

Telson (Fig. 32C) about three-fifths length of abdominal somite 6, slightly broader than long, lateral margins convex in proximal half, convergent posteriorly to rounded posterolateral angles, posterior margin slightly concave with a median tooth; dorsal surface weakly elevated with transverse row of setae at proximal third. Uropodal endopod longer than telson and rounded distally. Uropodal exopod subsquare, much longer than endopod, and about 1.5 times as long as wide, and dorsal surface medially sulcate and largely truncate distally.

Smaller cheliped.—Detached smaller cheliped (Fig. 32E) with ischium slender, four times as long as wide, dorsal margin smooth, and ventral margin with a row of six denticles. Merus about as long as ischium, and twice as long as wide. Carpus 1.4 times as long as merus, and more than twice as long as wide, proximo-ventral margin divergent distally. Chela longer than carpus; palm 1.3 times as long as wide, dorsal margin largely convex, and distal margin declined directly to cutting margin of fixed finger; fixed finger unarmed. Dactylus slenderly curved in a crescent shaped, longer than fixed finger, and unarmed on cutting margin.

#### Type locality

BIOSHSELF St. RY1, BC, 07°36'N, 098°19'E, 55 m.

#### Etymology

The named for Dr. Niel L. Bruce, NIWA, Wellington, New Zealand, who is a carcinologist *par excellence*.

#### Remarks

*Callianassa nieli* is related to *C. orientalis* (Bate, 1888) which was collected in the comparatively shallow water (28 fathoms, 51.2 m) at the entrance of Torres Strait (9°59'S,

139°42'E), off the southern coast of New Guinea (Bate, 1888: 32) in such characters as the triangular rostrum; rectangular abdominal somite 6; a narrow Plp 3 with a projected appendix interna, and the uropodal exopod distally (Bate, 1888, pl. 1 fig. 2c, s; de Man, 1928, pl. 1, fig 2; Sakai, 1999, figs. 5a–c). However, in *C. orientalis* the antennal peduncle overreaches the antennular peduncle by the distal part of the penultimate article, and Mxp 3 ischium–merus is narrow with a truncate distal margin, and while in *C. nieli* the antennal peduncle is nearly as long as the antennular peduncle.

#### *Callianassa* sp. 3

(Fig. 33A–C)

#### Material examined

PMBC 15726, 1 female (TL/CL, 13.0/2.5), BIOSHELF St. A2, 09°30'N, 097°51'E, BC, 61 m, coll. S. Bussarawit and C. Aungtonya, 08.04.1996.

#### Diagnosis

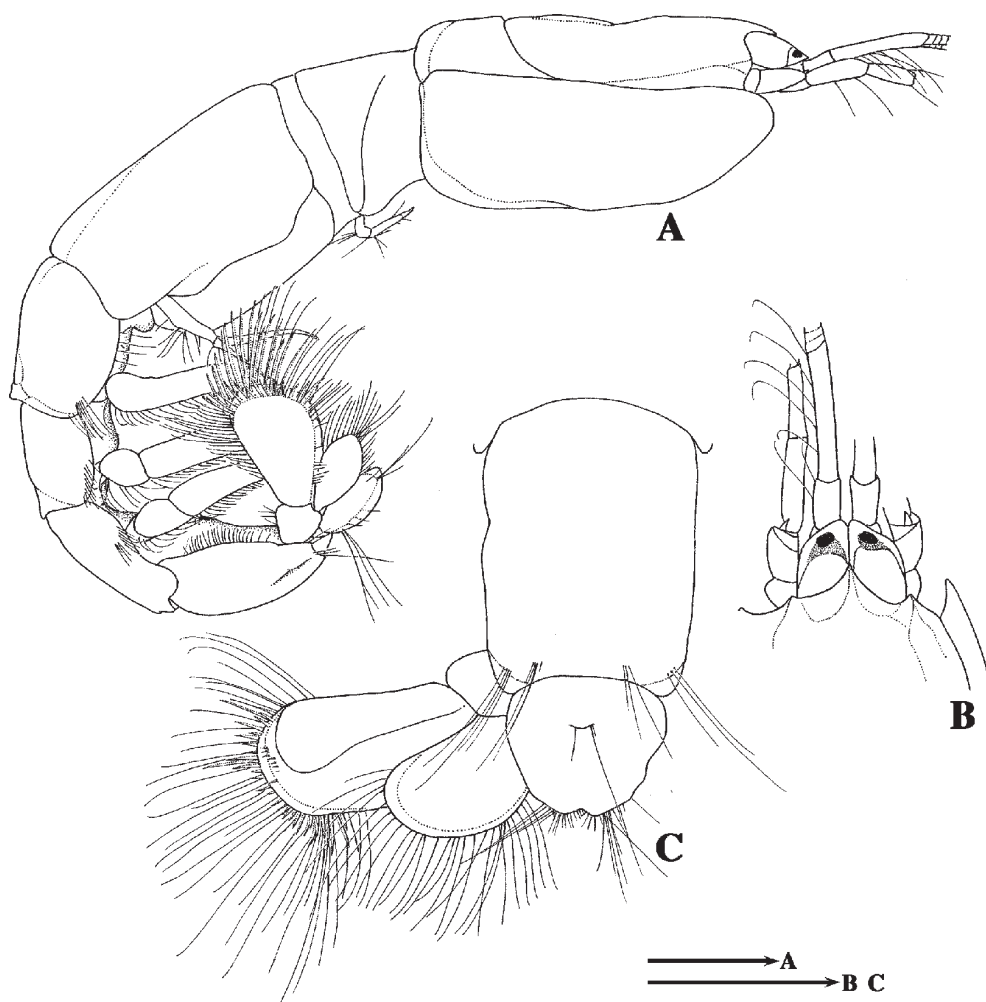
Small in size. Rostrum (Fig. 33A, B) triangular and pointed at tip, reaching the middle of eyestalks. Carapace smooth, dorsal oval present; cervical groove located in posterior fifth of carapace including rostrum. Linea thalassinica entire. Eyestalks (Fig. 33A, B) subtriangular with an obtuse tip in dorsal view, about as long as wide, gently descending distally from rostrum and overreaching the distal margin of antennular basal article; proximal half of dorsal surface concave, pigmented cornea located in the middle of distal half. Antennular peduncle about as long as antennal peduncle; distal article about 2.8 times as long as penultimate article. Antennal peduncle with scale; terminal article shorter than penultimate. Mxp 3 missing. P/1–5 also missing.

Abdominal somites smooth, glabrous dorsally; pleurae 3–5 each with a tuft of long setae laterally; abdominal somite 6 rectangular in dorsal view, about 1.3 times as long as wide, lateral margins almost parallel on both sides. Plp 1 uniramous, three articulated. Plp 2 biramous, slender. Plp 3–5 biramous, foliaceous, each bearing appendices internae on mesial margins of endopods.

Telson (Fig. 33C) trapezoid, half length of abdominal somite 6, distinctly broader than long, lateral margins convergent posteriorly to broadly rounded posterolateral angles, and posterior margin medially concave, W-shaped, setose, without a median tooth; dorsal surface convex with transverse row of setae at proximal third. Uropodal endopod much longer than telson and about 1.5 times as long as wide, and rounded distally. Uropodal exopod subsquare, much longer than endopod, and about twice as long as wide, and dorsal surface elevated in anterior half by median groove and rounded distally.

#### Remarks

This species is similar to *C. marginata* Rathbun, 1901 in bearing the subsquare telson with a posterior median tooth, and slender Plp 3–5, however differs from it; in *C. niele* the merus of Mxp 3 is distally rounded, the uropodal exopod is truncate distally, and thick finger-shaped appendices internae on Plp 3–5. In *C. marginata*, the merus of Mxp 3 is distally truncate, the uropodal exopod is elongate with a rounded distal margin, and appendix internae is narrow and digitiform.



**Figure 33** *Callianassa* sp. 3.

A–C, PMBC 15726, female (TL/CL, 13.0/2.5), 09°30'N, 097°51'E, 61 m.

A, whole body, lateral view; B, anterior part of carapace with eyestalks and antennular and antennal peduncles, dorsal view; C, abdominal somite 6 and tail fan, dorsal view. Scales all 1 mm.



***Callianassa propriopedis* sp. nov.**  
(Fig. 34A–F)

**Material examined**

**Holotype:** PMBC 15727, 1 ovig. female (TL/CL, 11.0/2.7, lacking P/1, P2–3), BIOSHELF St. PB 2, 08°00'N, 098°39'E, BC, 17 m, coll. S. Bussarawit, 22.04.1997.

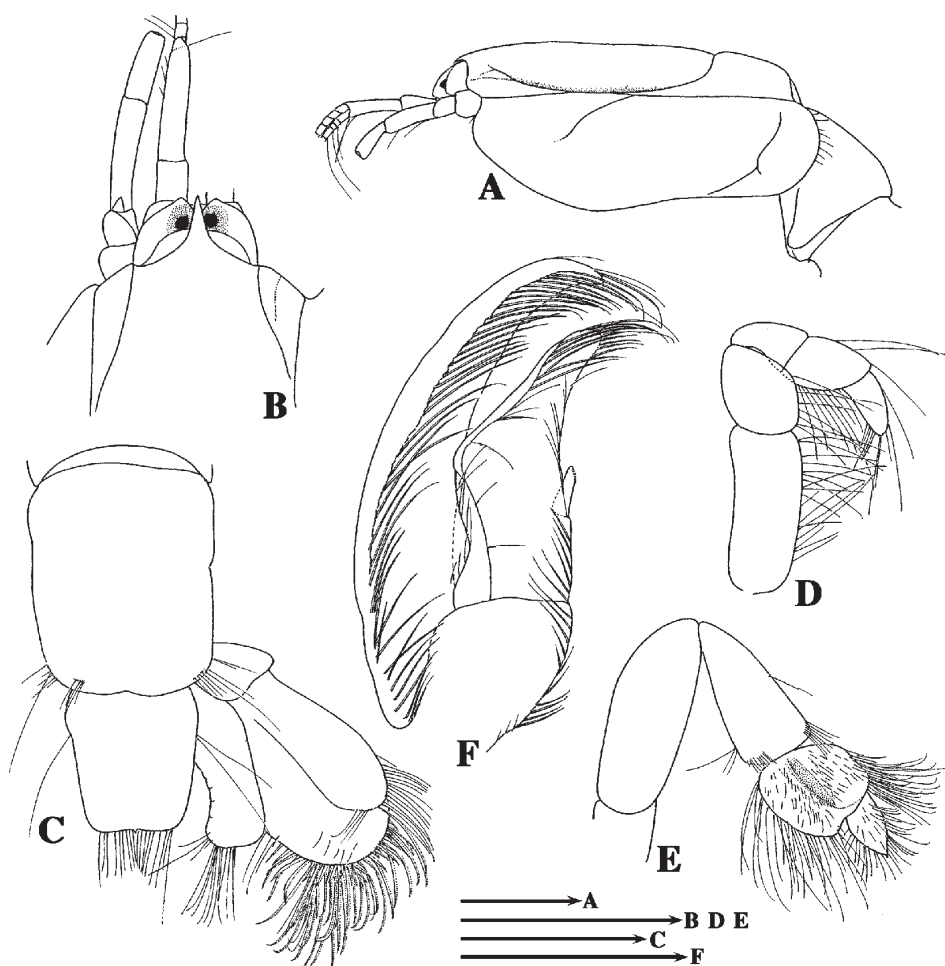
**Paratype:** PMBC 15728, 1 male (TL/CL, 7.0/1.3, lacking Mxp 3, P/1–2, P/3 on left side, P/5), BIOSHELF St. PB 2, 08°00'N, 098°39'E, BC, 17 m, coll. S. Bussarawit, 22.04.1997.

**Diagnosis**

Small in size. Rostrum narrowly triangular. Antennular and antennal peduncles almost in same length. Mxp 3 narrow. P/3 propodus rounded, lateral surface setose and with a median carina. Abdominal somite 6 subsquare. Plp 3–5 foliaceous, with finger-shaped appendices internae.

**Description**

**Ovigerous female holotype.**— Rostrum (Fig. 34A, B) sharply pointed in dorsal view, almost reaching to tip of eyestalks. Carapace smooth,



**Figure 34** *Callianassa propriopedis* sp. nov.

A–E, PMBC 15727, holotype, ovig. female (TL/CL, 11.0/2.7), 08°00'N, 098°39'E, 17.0 m.

A, carapace, lateral view; B, anterior part of carapace with eyestalks and antennular and antennal peduncles, dorsal view; C, abdominal somite 6 and tail fan, dorsal view; D, Mxp 3, lateral view; E, P/3, lateral view; F, Plp 3, posterior view. Scales all 1 mm.

dorsal oval present; cervical groove located in the posterior quarter of carapace including rostrum. Linea thalassinica entire. Eyestalks (Fig. 34A, B) subtriangular with weakly pointed tips in dorsal view, slightly longer than wide, distally descending downward, closely attached to rostrum in lateral view, and slightly overreaching antennular basal article; dorsal surface proximally convex, rounded cornea located at central part. Antennular peduncle about as long as antennal peduncle; distal article about half the length of penultimate article. Antennal peduncle with obtuse scale; terminal article three times as long as penultimate. Mxp 3 (Fig. 34D) with ischium–merus elongate, and rectangular; ischium more than twice as long as wide, merus half the length of ischium, about as long as wide; distomesial angle largely rounded; carpus shorter than merus, propodus about as long as carpus, dactylus three-quarters as long as propodus, provided with row of bristles on ventral margin. P/1 missing. P/2 chelate. P/3 with merus 2.5 times as long as wide, unarmed; carpus slightly shorter than merus, divergent distally; propodus subsquare, about as long as wide, setose, distoventral corner obtusely protruded, lateral surface with a median carina; dactylus two-thirds the length of propodus, setose. P/4 subchelate. P/5 missing.

Abdominal somites smooth, dorsally glabrous; pleurae 3–5 each with a tuft of long setae laterally; abdominal somite 6 subsquare, about 1.2 times as long as wide, lateral margins parallel on both sides. Plp 1 uniramous, two-articled. Plp 2 biramous, slender. Plp 3 (Fig. 34F) –5 biramous, foliaceous, each bearing finger-shaped appendix interna.

Telson (Fig. 34C) about two-thirds length of abdominal somite 6, slightly longer than wide, lateral margins weakly convex proximally, and convergent posteriorly to a posterolateral angle, and posterior margin almost straight and with a median tooth; dorsal surface weakly elevated in proximal quarter, provided with a transverse row of setae. Uropodal endopod slightly longer than telson and obtusely truncated distally. Uropodal exopod subsquare, much longer than endopod, and about 1.5 times as long as wide, dorsal surface medially sulcate and largely rounded distally.

### Type locality

BIOSHelf St. PB 2, 08°00'N, 098°39'E, BC, 17 m.

### Etymology

The name is a combination of Latin, *proprius*, characteristic and *pes*, foot.

### Remarks

*Callianassa propriopedis* is similar to *C. oblonga* Le Loeuff and Intès, 1974 from the Ivory coast in having a pointed rostrum, the antennular peduncle is about as long as the antennal peduncle, P/3 propodus in lateral view, and narrow Mxp 3, however *C. propriopedis* differs from *C. oblonga* in the eyestalks is not descending distally, attached to the rostrum, and the merus of Mxp 3 is rounded on the distal margin, while in *C. oblonga*, the eyestalks are descending distally, separated from the rostrum, and the merus of Mxp 3 distally truncate.

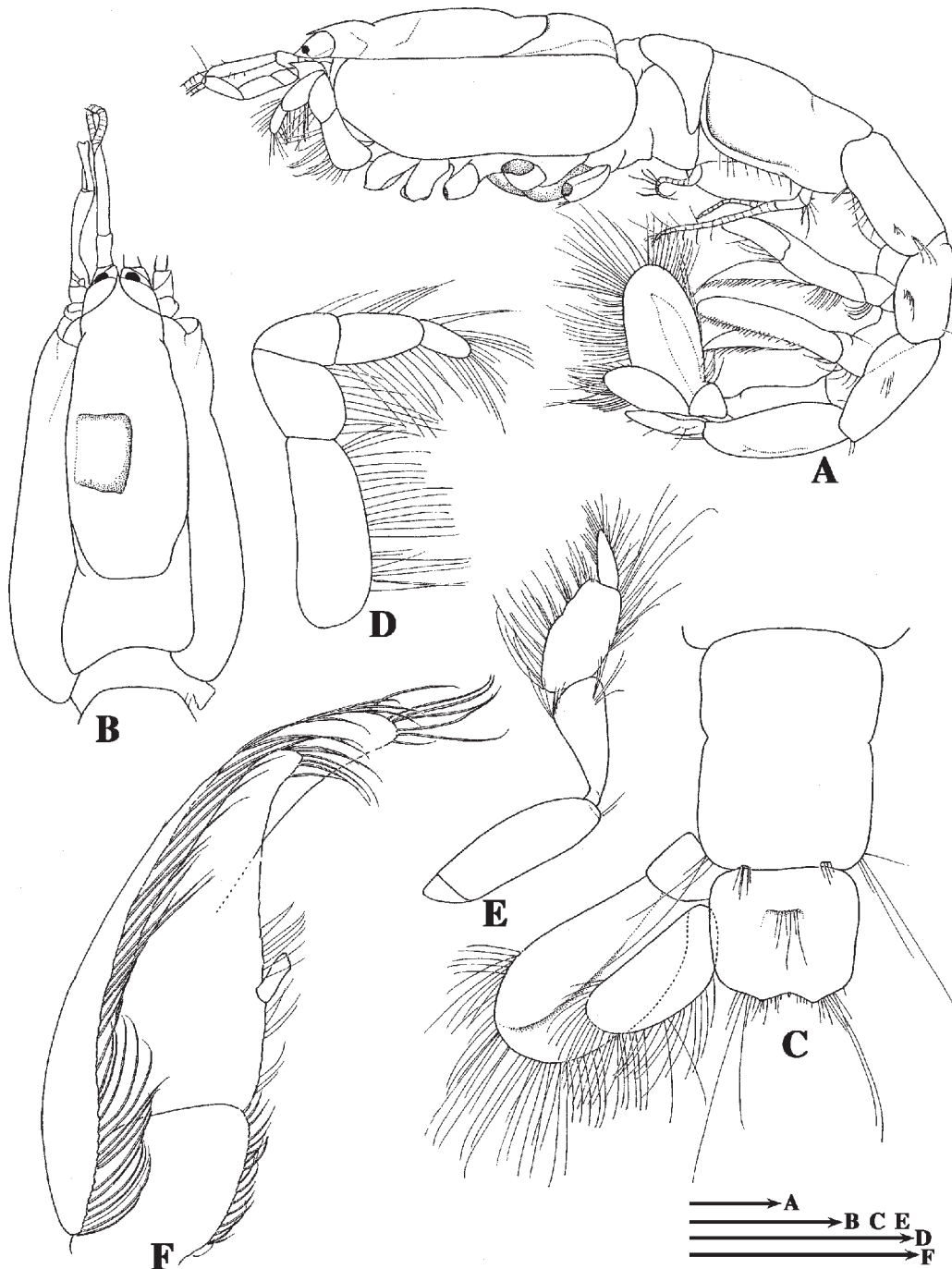
*Callianassa contipes* sp. nov.  
(Fig. 35A–E)

### Material examined

**Holotype:** PMBC 15729, 1 female (TL/CL, 13.0/3.3, lacking P/1–5), BIOSHELF St. II, 07°30'N, 098°57'E, BC, 38 m, coll. S. Bussarawit and C. Aungtonya, 03.05.1996.

**Paratype:** PMBC 15730, 1 ovig. female (TL/CL, 12.0/3.5, lacking P/1, P/4 on right side, P/5), 2 females (TL/CL, 12.5/3.0, lacking Mxp 3, P/1–5; TL/CL 14.0/3.3 lacking Mxp 3, P1–3, P/4 on left side, P/5 on right side), BIOSHELF St. I 20 m, 07°30'N, 099°01'E, BC, 21 m, coll. S. Bussarawit and C. Aungtonya, 03.05.1996.

**Non-type material:** PMBC 15731, 1 female (TL/CL, 11.0/2.5), BIOSHELF St. H1, 07°46'N, 098°16'E, 07°44'N, 098°17'E, OS, 31 m, coll. S. Bussarawit and C. Aungtonya, 09.05.1996; PMBC 15732, 1 female (TL/CL, 11.0/2.3), BIOSHELF St. I 20 m, 07°30'N, 099°01'E, BC, 21 m, coll. S. Bussarawit and C. Aungtonya, 03.05.1996.



**Figure 35** *Callianassa contipes* sp. nov.

A–D, F, PMBC 15729, holotype, female (TL/CL, 13.0/3.3), 07°30'N, 098°57'E, 38, mud; E, PMBC 15730, paratype, ovig. female (TL/CL, 12.0/3.5) P/3 figured, 07°30'N, 099°01'E, 21 m.

A, whole body, lateral view; B, carapace, dorsal view; C, abdominal somite 6 and tail fan, dorsal view; D, Mxp 3, lateral view; E, P/3, lateral view; F, Plp 3, anterior view. Scales all 1 mm.

### Diagnosis

Small in size. Rostrum triangular. Antennular peduncle about as long as antennal one. Mxp 3 narrow. P/3 propodus oval. Abdominal somite 6 rectangular; Plp 3–5 narrow, with thumb-like appendices internae. Telson subsquare, posterior margin concave medially, and with small median tooth.

### Description

**Female holotype.**— Rostrum (Fig. 35A, B) triangular in dorsal view, shorter than eyestalks. Carapace smooth, dorsal oval distinct; cervical groove located in posterior part less than one-quarter the length of carapace including rostrum. Linea thalassinica extending entirely. Eyestalk (Fig. 35A, B) subtriangular, slightly longer than wide, slightly overreaching the antennular basal article; dorsal surface convex; pigmented cornea rounded, located distal to its middle part. Antennular peduncle scarcely shorter than antennal peduncle, terminal article 2.6 times as long as penultimate. Antennal peduncle with small scale; terminal article half as long as penultimate. Mxp 3 (Fig. 35D) ischium–merus elongate; ischium subquadrate, 2.2 times as long as wide, and merus less than half as long as ischium, distal margin obliquely truncate; carpus about as long as merus; propodus subquadrate, about as long as carpus; dactylus about two-thirds the length of carpus, tip rounded.

P/1–5 missing.

Abdominal somites smooth, glabrous dorsally; pleurae 3–5 each with a tuft of setae laterally; abdominal somite 6 1.3 times as long as wide, and parallel on lateral margins. Plp 1 uniramous, two-articled. Plp 2 biramous, slender. Plp 3 (Fig. 35F) –5 biramous, each bearing a thumb-like appendix interna on mesial margin of endopod.

Telson (Fig. 35C) subquadrate, slightly broader than long; lateral margin slightly convergent posteriorly, extending to a broadly rounded corner; posterior margin setose and with a median concavity with a median tooth. Dorsal surface weakly elevated, medially with transverse row of setae. Uropodal endopod oval, distinctly longer than telson and more than twice as long as wide, dorsal surface faintly carinate medially.

Uropodal exopod elongate with a rounded distal margin, much longer than endopod, and 1.8 times as long as wide; dorsal surface carinate medially. **Female paratype.**— P/3 (Fig. 35G) propodus oval, posteroventral corner weakly protruding, dactylus slender.

### Type locality

BIOSHelf St. 11, 07°30'N, 098°57'E, BC, 38 m.

### Etymology

Derived from the Latin, *contus* or *contipes* meaning a long pole.

### Remarks

*Callianassa contipes* is closely related to *C. pygmaea* de Man, 1928 and *C. pugnatrix* de Man, 1905 in having a slender P/3 propodus, Mxp 3 merus distally obliquely truncate, and the antennular peduncle as long as the antennal peduncle, *C. contipes* differs from those two species in having a slender distally oval uropodal exopod, and a longer abdominal somite 6.

*Callianassa nigroculata* sp. nov.  
(Figs 36A–D, 37A–H)

### Material examined

**Holotype:** PMBC 15733, 1 ovig. female (TL/CL, 10.0/2.0, lacking P/4, P/5 on right side), BIOSHELF St. RY2–RN2, 07°30'N, 098°22'E–07°36'N, 098°25'N, TD, 43–74 m, coll. S. Bussarawit and C. Aungtonya, 08.05.1996.

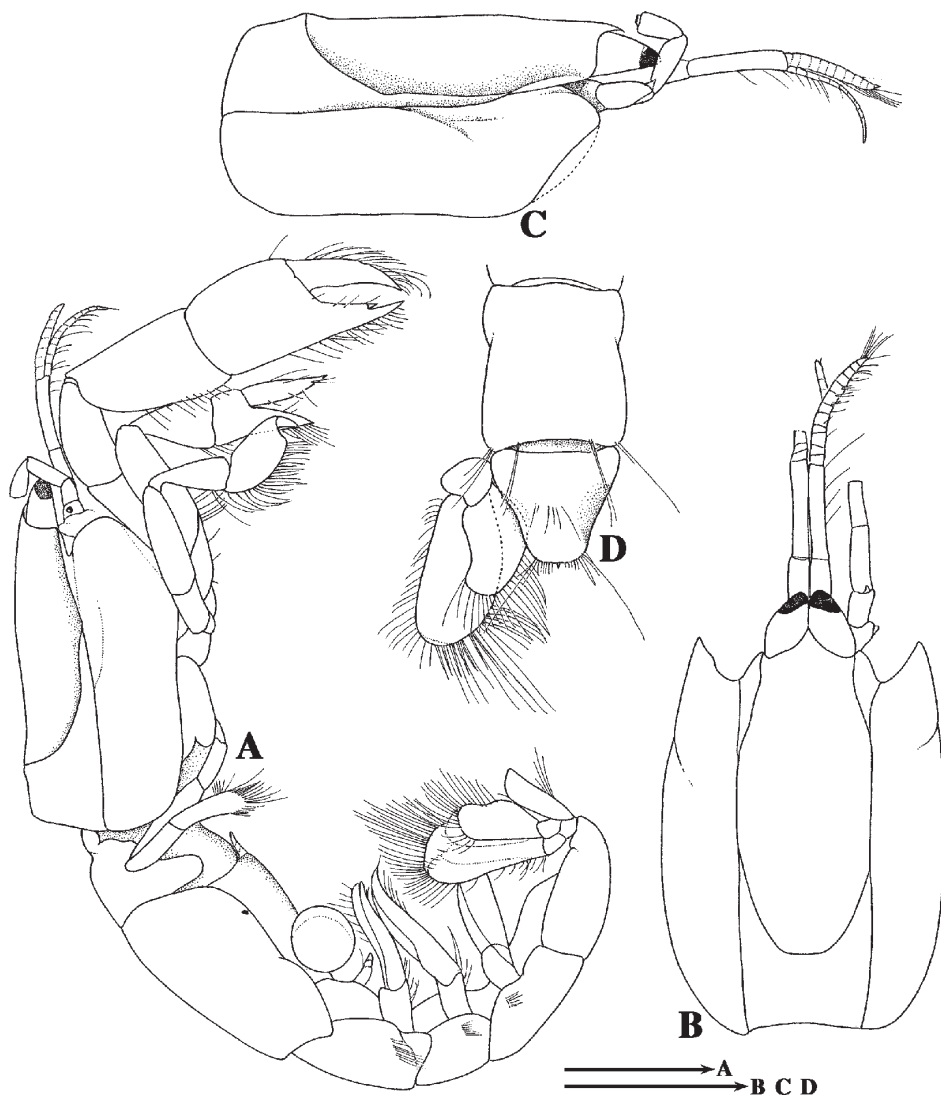
**Paratype:** PMBC 15734, 1 male (TL/CL, 8.0/1.7, lacking P/1 larger on right side, P/2, P/3 on right side, P/4, P/5 on right side), BIOSHELF St. RN3, 07°30'N, 098°17'E, 07°30'N, 098°17'E, OS, 72 m, coll. S. Bussarawit and C. Aungtonya, 08.05.1996; PMBC 15735, 1 female (TL/CL, 12.5/2.4, no lacking pereopods), BIOSHELF St. J3, 07°15'N, 098°34'E, BC, 79 m, coll. S. Bussarawit and C. Aungtonya, 04.05.96.

**Non-type material:** PMBC 15736, 1 female (TL/CL, 12.0/2.6, lacking Mxp 3, P/1–2, P/3–4 on right sides, P/4–5, Plp 3 on left side, Plp 4, and Plp 5 on

left side), BIOSHELF St. I2, 07°30'N, 098°29'E–07°30'N, 098°29'E, OS, 60 m, coll. S. Bussarawit and C. Aungtonya, 03.05.1996; PMBC 15737, 1 ovig. female (TL/CL, 10.0/2.6, without Mxp 3, P/1–5, Plp 1–2), BIOSHELF St. I2, 07°30'N, 098°29'E–07°30'N, 098°29'E, OS, 60 m, coll. S. Bussarawit and C. Aungtonya, 03.05.1996.

### Diagnosis

Small in size. Rostrum triangular in dorsal view. Antennular peduncle slightly longer than antennal peduncle. P/1 unequal, meri unarmed. Mxp 3 ischium–merus narrow, and rounded at mesiodistal corner. P/3 propodus oval. Telson trapezoid in form. Uropodal exopod elongate, distal margin rounded.



**Figure 36** *Callianassa nigroculata* sp. nov.

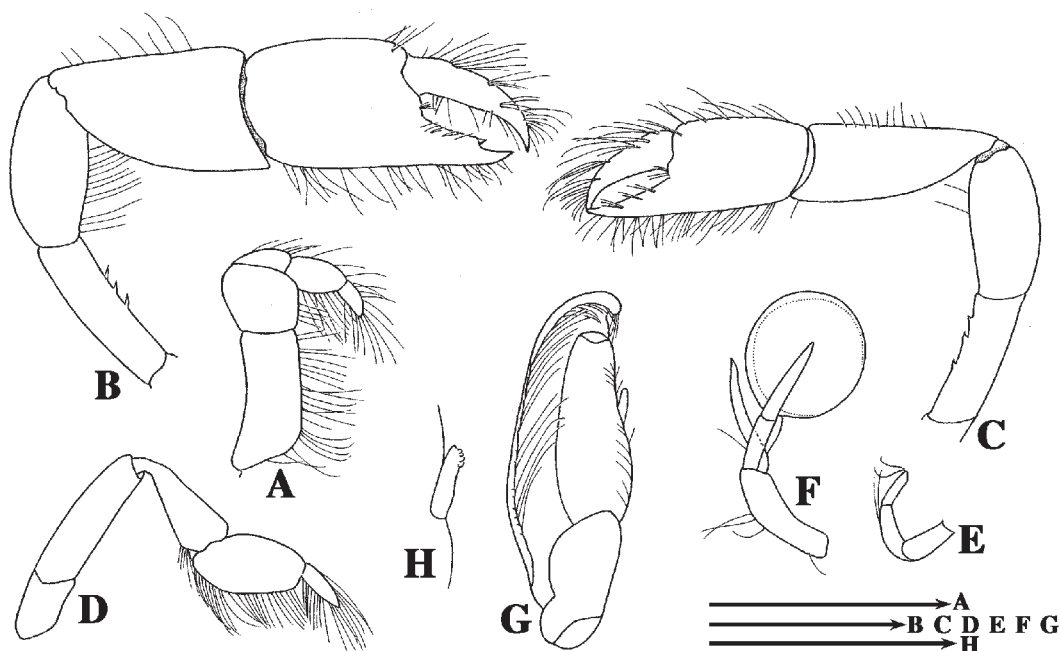
A–D, PMBC 15733, holotype, ovig. female (TL/CL, 10.0/2.0), Andaman Sea;  
A, whole body, lateral view; B, carapace, dorsal view; C, same, lateral view; D, abdominal somite 6 and tail fan, dorsal view. Scales all 1 mm.



### Description

**Ovigerous holotype female.**—Rostrum (Fig. 36A, B, C) triangular in dorsal view, not reaching middle of eyestalks. Carapace smooth, dorsal oval present; cervical groove located in the posterior fifths of carapace excluding rostrum. Linea thalassinica entire. Eyestalks oval in dorsal view, 1.5 times as long as wide, dorsal surface descending distally, not much separated from rostrum, overreaching distal margin of antennular basal article; cornea darkly pigmented and located distally. Antennular peduncle overreaching antennal peduncle by distal part of terminal article; distal article more than twice as long as penultimate article. Antennal peduncle without a scale; terminal article two-thirds the length of penultimate. Mxp 3 (Fig. 37A) ischium–merus narrow; ischium 2.3 times as long as wide, and merus half as long as ischium, slightly broader than long, rounded at mesiodistal angle; carpus slightly shorter than merus, propodus subsquare, about twice as long as wide, dactylus half the length of propodus.

Chelipeds unequal. In right larger cheliped (Fig. 37B) ischium slender, and armed with three sharp spines on ventral margin; carpus spindle-shaped, longer than merus, about 1.5 times as long as wide, longer than merus, unarmed, descending distally on ventral margin. Chela 1.5 times as long as carpus; palm 1.2 times as long as wide, distal margin unarmed, descending to fixed finger; fixed finger with subterminal spine on cutting margin; dactylus slender, unarmed, about as long as palm. Left smaller cheliped (Fig. 37C) ischium slender, with three spines on ventral margin; merus about as long as ischium, unarmed; carpus 1.3 times as long as merus, descending distally on ventral margin. Chela 1.3 times as long as carpus, unarmed; dactylus 0.8 times as long as palm. P/2 chelate. P/3 (Fig. 37D) with propodus oval in lateral view, as it is wide and heeled on ventral margin and convex on dorsal margin, not lobed at ventroposterior and ventrodistal angles. P/4 missing. P/5 present on right side, but missing on left side



**Figure 37** *Callianassa nigroculata* sp. nov.

A, PMBC 15734, female (TL/CL, 8.0/1.7), 07°30'N, 098°17'E, 72 m;

B–H, PMBC 15733 holotype, ovig. female (TL/CL, 10.0/2.0), Andaman Sea;

A, Mxp 3, lateral view; B, larger cheliped, lateral view; C, smaller cheliped; D, P/3, lateral view; E, Plp 1; F, Plp 2; G, Plp 3, anterior view; H, appendix interna on Plp 3. Scales all 1 mm.

Abdominal somites smooth, glabrous dorsally; pleurae 3–5 each with a tuft of long setae laterally; abdominal somite 6 rectangular in dorsal view, about 1.1 times as long as wide, lateral margins almost parallel on both sides. Plp 1 (Fig. 37E) uniramous, two-articled. Plp 2 (Fig. 37F) biramous, slender. Plp 3 (Fig. 37G–H) –5 biramous, foliaceous, each bearing thumb-like appendix interna on mesial margins of endopods.

Telson (Fig. 36D) trapezoid, 0.8 times as long as abdominal somite 6, slightly broader than long, lateral margins convex proximally, and distal part of it convergent posteriorly to posterior margin, posterior margin narrow with a median tooth; dorsal surface provided with transverse row of setae medially. Uropodal endopod longer than telson and about 1.5 times as long as wide; lateral margin largely concave. Uropodal exopod subsquare, much longer than endopod, and about twice as long as wide; distal margin rounded.

#### Type locality

Andaman Sea, off Phuket, Thailand, 07°30'N, 098°22'E–07°36'N, 08°25'N, 43–74 m.

#### Etymology

A combination of the Latin, *nigrus*, blackening and *oculus*, eye.

#### Remarks

*Callianassa nigroculata* is characterised in having the eyestalks with a black pigmented cornea distally, and similar to *C. sibogae* de Man, 1905 from Indonesia (7°46'S, 114°30'E), 330 m, in the form of the rostrum and Mxp 3. *C. nigroculata* differs from *C. sibogae* in *C. sibogae* the antennal peduncle overreaching the antennular peduncle by the distal article; P/1 meri each with a sharp middle spine on ventral margin, and P/3 propodus is non-lobed at the ventrodistal and ventroproximal angles, while in *C. nigroculata* the antennal peduncle is shorter than the antennular peduncle, P/1 meri are unarmed each on ventral margin, and P/3 propodus is oval.

*Callianassa tenuipes* sp. nov.  
(Fig. 38A–D)

#### Material examined

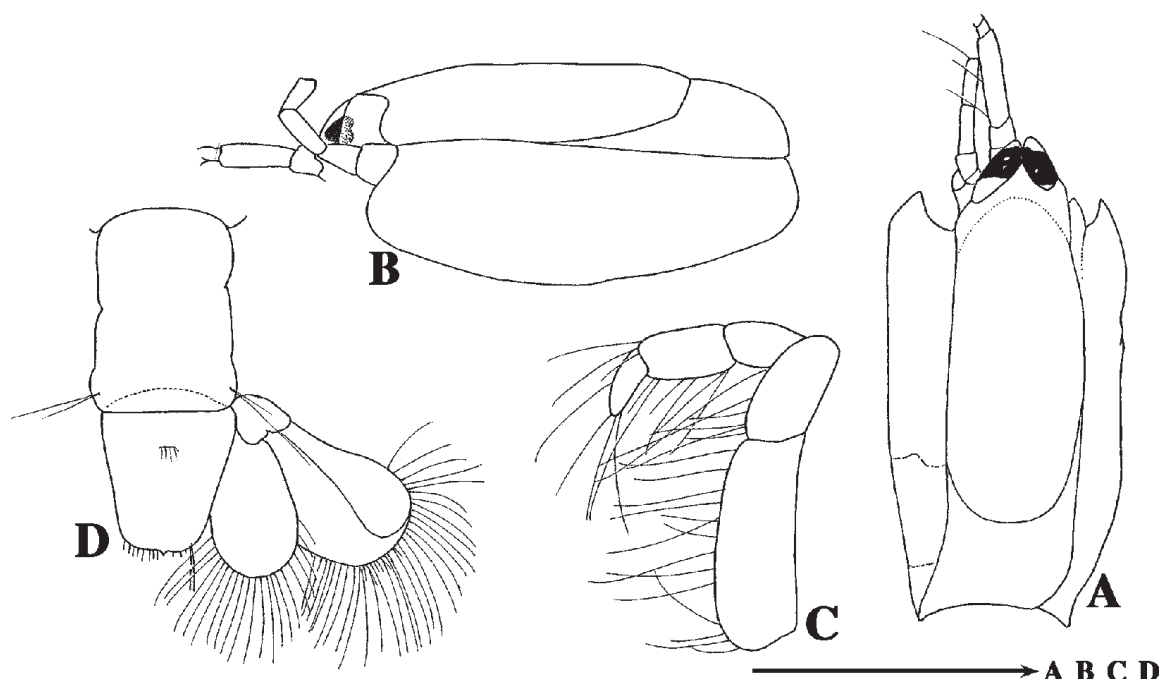
PMBC 15738, 1 male (TL/CL, 6.0/1.5, lacking Mxp 3 on left side, P/1, P/2 on left side, P3–5, Plp 1–2), BIOSHELF St. K1, 07°00'N, 099°16'E–07°00'N, 099°15'E, OS, 41 m, coll. S. Bussarawit and C. Aungtonya, 24.02.1998; PMBC 15739, 1 male (TL/CL, 6.0/1.6, lacking Mxp 3 on right side, P/1, P/2 on right side, P/3–5, Plp 1–2), BIOSHELF St. J2, 07°15'N, 098°51'E–07°15'N, 098°51'E, OS, 61 m, coll. S. Bussarawit and C. Aungtonya, 04.05.1996.

#### Diagnosis

Small in size. Rostrum (Fig. 38A, B) triangular with a pointed tip in dorsal view, reaching the middle of eyestalks. Carapace smooth, dorsal oval present; cervical groove located in the posterior fifths of carapace including rostrum. Linea thalassinica entire. Eyestalks subtriangular with an obtuse tips in dorsal view, twice as long as wide, descending from the level of rostrum and overreaching distal margin of antennular basal article; dorsal surface convex in its proximal half, and distal to it pigmented cornea mostly located in distal half. Antennular peduncle overreaching antennal peduncle; distal article about 2.5 times as long as penultimate. Antennal peduncle without a scale; terminal article slightly shorter than penultimate. Mxp 3 (Fig. 38C) ischium–merus slender; ischium 2.3 times as long as wide, and merus half the length of ischium, 1.5 times as long as wide, distomesial angle largely rounded. Carpus slightly shorter than merus, and carpus subsquare, about twice as long as wide, dactylus one third the length of propodus. P/1–5 missing.

Abdominal somites smooth, glabrous dorsally; pleurae 3–5 each with a tuft of long setae laterally; abdominal somite 6 rectangular in dorsal view, about 1.5 times as long as wide, lateral margins almost parallel on both sides. Plp 1 showing a pair of thick protrusions in an unusual form. Plp 2 absent. Plp 3–5 biramous, foliaceous, each bearing appendix interna.

Telson (Fig. 38C) trapezoid, 0.8 times as long as abdominal somite 6, slightly longer than wide, lateral margins weakly convex proximally, and distal of it convergent posteriorly to posterolateral angles, and posterior margin almost straight with



**Figure 38** *Callianassa tenuipes* sp. nov.

A–D, PMBC 15738, male (TL/CL, 6.0/1.5), Andaman Sea.

A, carapace, dorsal view; B, same, lateral view; C, abdominal somite 6 and tail fan, dorsal view; D, Mxp 3, lateral view. Scale 1 mm.

median tooth; dorsal surface provided with transverse row of setae at proximal third. Uropodal endopod slightly longer than telson and about 1.5 times as long as wide, and rounded distally. Uropodal exopod subsquare, much longer than endopod, and about 1.6 times as long as wide, and dorsal surface medially sulcate and largely convex distally.

#### Remarks

This species is similar to *Callianassa joculatrix* de Man, 1905 from the Bay of Labuan Tring, Indonesia, 84°5'S 116°5'E, 18–27 m in the form of Mxp 3. However in *Callianassa joculatrix* the abdominal somite 6 is subsquare, and the eyestalks are armed with discoloured cornea, while in contrast *Callianassa* sp. the abdominal somite is rectangular and longer than wide, and the eyestalks are provided with distal black cornea as in the previous new species, *Callianassa nigroculata*.

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