

DEEP-SEA SHRIMPS OF GENUS *Glyphocrangon* A. Milne-Edwards, 1881
(DECAPODA: CARIDEA: GLYPHOCRANGONIDAE) COLLECTED
BY THE THAI-DANISH BIOSHELF SURVEYS (1996–2000) FROM THE ANDAMAN SEA,
OFF SOUTHWESTERN THAILAND

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ABSTRACT: Faunal collections made during the Thai-Danish BIOSHELF surveys in the Andaman Sea off southwestern Thailand contain six species of the deep-water caridean shrimp genus *Glyphocrangon* A. Milne-Edwards, 1881: *G. andamanensis* Wood-Mason in Wood-Mason and Alcock, 1891b, *G. caeca* Wood-Mason in Wood-Mason and Alcock, 1891b, *G. gilesii* Wood-Mason in Wood-Mason and Alcock, 1891a, *G. hakuhoae* Takeda and Hanamura, 1994, *G. regalis* Spence Bate, 1888 and *G. smithii* Wood-Mason in Wood-Mason and Alcock, 1891b. The availability of the topotypic material enabled us to redescribe *G. caeca* and *G. gilesii* and to compare them with respective close allies. *Glyphocrangon hakuhoae* and *G. regalis* are newly recorded from the Bay of Bengal, as well as the Andaman Sea. The status of *Glyphocrangon demani* Komai, 2006, which was synonymized under *G. rudis* Komai, 2006, is briefly discussed.

Key words: *Glyphocrangon caeca*, *Glyphocrangon gilesii*, redescription, topotypic material

INTRODUCTION

The caridean shrimp family Glyphocrangonidae Smith, 1884 is monotypic, represented only by the genus *Glyphocrangon* A. Milne-Edwards, 1881, but species-rich, currently containing about 100 species worldwide (DecaNet 2024). The genus has numerous unusual apomorphic features for carideans, including a peculiar locking mechanism of the pleon, seven pairs of longitudinal carinae on the carapace, and a non-chelate first pair of pereopods (Holthuis 1971; Rice 1981a; Chace 1984; Komai 2004). All known species inhabit the deep sea at depths greater than 150 m, and a few extend to the abyssal plane (Holthuis 1971; Rice 1981b; Komai 2004). Komai (2004) reviewed species distributed in the Indo-West Pacific region and confirmed the synonymy of *Plastocrangon* Alcock, 1901 under *Glyphocrangon* (e.g., Chace 1984; Holthuis 1993), which was originally established as a subgenus of *Glyphocrangon*. On the other hand, Komai (2004) recognized two informal species groups within *Glyphocrangon*, viz., *G. spinicauda* A. Milne-Edwards, 1881 group and *G. caeca* Wood-Mason in Wood-Mason and Alcock, 1891b group

(corresponding to *Plastocrangon*), mainly for convenience. In spite of the extensive review by Komai (2004), discovery of new species is still continuing (e.g., Hendrickx 2010; Komai and Chan 2013; Komai *et al.* 2020; 2022; 2023).

Nine species of *Glyphocrangon* were originally described from the Bay of Bengal (including the Andaman Sea) and the eastern part of the Arabian Sea: *G. andamanensis* Wood-Mason in Wood-Mason and Alcock, 1891b (as a variety of *G. investigatoris*), *G. caeca*, *G. caecescens* Wood-Mason in Wood-Mason and Alcock, 1891b, *G. cerea* Alcock and Anderson, 1894, *G. gilesii* Wood-Mason in Wood-Mason and Alcock, 1891a, *G. investigatoris* Wood-Mason in Wood-Mason and Alcock, 1891a, *G. priononota* Wood-Mason in Wood-Mason and Alcock, 1891a, *G. smithii* Wood-Mason in Wood-Mason and Alcock, 1891b and *G. unguiculata* Wood-Mason in Wood-Mason and Alcock, 1891a. The material on which the descriptions were based was collected by the H.M. Marine Survey Steamer “Investigator” in the late 19th and early 20th centuries (Wood-Mason and Alcock 1891a; 1891b; Alcock and Anderson 1894; Alcock 1901; 1902). Access to the type material now preserved in the

Zoological Survey of India has become difficult (cf., Komai 2004; 2006; Komai and Chan 2017). In a comprehensive revision of species of *Glyphocrangon* from the Indo-West Pacific, Komai (2004) redescribed *G. andamanensis* (elevated to the full species status), *G. caecescens*, *G. investigatoris*, and *G. priononota* based on topotypic material preserved in museums in Europe. Later, Komai and Chan (2017) redescribed *G. smithii* based on a single topotypic ovigerous specimen from the Andaman Sea off Myanmar obtained through the courtesy of the EAF-Nansen Project (FAO). Unavailability of the type or topotypic material has prevented us to precisely assess the diagnostic features of the remaining species, i.e., *G. caeca*, *G. cerea*, *G. gilesii* and *G. unguiculata*.

This study dealt with a collection of specimens of *Glyphocrangon* collected from the Andaman Sea off southwestern Thailand by the Thai-Danish BIOSHELF Surveys in 1996–2000 (Aungtonya *et al.* 2000). The following six species were identified: *G. andamanensis*, *G. caeca*, *G. gilesii*, *G. hakuhoae* Takeda and Hanamura, 1994, *G. regalis* Spence Bate, 1888 and *G. smithii*. Topotypic material is now available for *G. caeca* and *G. gilesii*, making possible to redescribe these two species and to assess diagnostic features. Male characteristics of *G. andamanensis* and *G. smithii* are also clarified. *Glyphocrangon hakuhoae* and *G. regalis* are newly recorded from the Bay of Bengal, as well as from the Andaman Sea.

MATERIALS AND METHODS

Specimens examined in this study are deposited in the Reference Collection of the Phuket Marine Biological Center (PMBC), Thailand, and in the Natural History Museum and Institute (CBM), Chiba, Japan. All measurements provided are post-orbital carapace length, measured from the posterior margin of the orbit to the midpoint of the posterodorsal margin of the carapace. For details on outline and information on stations of BIOSHELF surveys, see Aungtonya *et al.* (2000). Specimens were initially fixed in 10% formalin solution (Aungtonya *et al.* 2000), although later transferred to 70% ethanol. Consequently no attempt of DNA extraction from specimens was made. The morphological terminology used for the structures on the carapace and pleon generally follows

Komai (2004) and Rodrigues and Cardoso (2022). A complete synonymy is provided for each species.

TAXONOMIC ACCOUNT

Family Glyphocrangonidae Smith, 1884 Genus *Glyphocrangon* A. Milne-Edwards, 1881

Glyphocrangon andamanensis Wood-Mason in Wood-Mason and Alcock, 1891b (Fig. 1)

Glyphocrangon investigatoris var. *andamanensis*
Wood-Mason in Wood-Mason and Alcock,
1891b: 356 [type locality: Andaman Sea,
338–396 m deep]; Alcock and Anderson
1894: 151; Wood-Mason and Alcock 1894:
pl. 6, fig. 2.

Glyphocrangon andamanensis – Komai 2004: 552,
figs. 83, 84, 120.

Material examined. PMBC 37663, 1 ovigerous female (cl 23.0 mm), BIOSHELF St. E7, 08°30'N 97°07'E to 08°29'N 97°04'E, 435–444 m, otter trawl, 9 Feb. 2000, coll. C. Aungtonya and V. Vongpanich.

Description. See Komai (2004: 552–554, figs. 83, 84).

Distribution. Presently known only from the Andaman Sea, at depths of 250–513 m (Komai 2004; this study).

Remarks. This species was originally described based on one ovigerous female and one young female specimen collected from the Andaman Sea at depths of 344–402 m, as a variety of *G. investigatoris*. No holotype was designated (Wood-Mason and Alcock 1891b) and these two specimens should be considered syntypes. Alcock and Anderson (1894) reported additional material from the Gulf of Mannar at depths of 256–720 m, although the number of specimens examined was not mentioned. Alcock (1901) synonymized this taxon under *G. investigatoris* without any particular comment, and subsequent authors (De Man 1920; Chace 1984) followed his opinion. After comparing specimens from the Andaman Sea and the Bay of Bengal (off Sri Lanka), Komai (2004) reinstated *G. andamanensis* as a valid species, distinct from *G. investigatoris*, and redescribed it. The ovigerous

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specimen from St. E7 examined herein agrees well with the redescription of *G. andamanensis* by Komai (2004), particularly in the following diagnostic aspects (Fig. 1): the middorsal carina on the rostrum is broken into a row of minute tubercles; the intercarinal spaces on the carapace

bear distinct, compressed tubercles, particularly numerous on the upper hepatic and branchial regions; the pleomeres are covered with numerous conspicuous tubercles; and the dorsolateral and ventrolateral carinae of the telson are faintly tuberculated.



Figure 1. *Glyphocrangon andamanensis* Wood-Mason in Wood-Mason and Alcock, 1891b, ovigerous female (cl 23.0 mm), PMBC 37663. Habitus in dorsal and lateral views (in preservative). Scale bar: 5 mm.

***Glyphocrangon caeca* Wood-Mason in
Wood-Mason and Alcock, 1891b
(Figs. 2–4)**

Glyphocrangon caeca Wood-Mason in Wood-Mason and Alcock, 1891b: 358 (type locality: Bay of Bengal west of Andaman Islands, at depth of 1010 m).

Glyphocrangon caeca – Wood-Mason and Alcock 1894: pl. 7, fig. 1.

Glyphocrangon (Plastocrangon) caeca – Alcock 1901: 135; De Man 1920: 241, pl. 20, fig. 6i.

Plastocrangon caeca – Alcock 1902: fig. 56.

Glyphocrangon caeca – Chace 1984: 10 (part); Komai 2006: 248, fig. 10.

Glyphocrangon demani Komai 2006: 253, figs. 1B, 2B, 4, 10.

Not *Glyphocrangon caeca* – Toriyama *et al.* 1990: 19, pl. 4b; Miya 1995: 193; Sakaji 2001: 211. = *Glyphocrangon humilis* Komai, 2006.

Material examined. PMBC 37664, 2 males (cl 10.1, 11.7 mm), BIOSHELF St. C12, 08°59'N 96°03'E to 08°56'N 96°01'E, 930–962 m, Agassiz trawl, 4 Feb. 2000, coll. C. Aungtonya and V. Vongpanich; PMBC 37665, 1 male (cl 11.7 mm), BIOSHELF St. U4, 07.07'N 97°03'E to 07°07'N 97°01'E, 967–964 m, Agassiz trawl, 16 Nov. 1999, coll. C. Aungtonya and V. Vongpanich.

Comparative material. Holotype of *Glyphocrangon demani*. ZMA Crust De 240165, male (cl 14.5 mm), Siboga St. 170, between Ceram and New Guinea, Indonesia, 03°37.7'S, 131°26.4'E, 924 m, 26 Aug. 1899.

Glyphocrangon rudis Komai, 2006. CBM-ZC 10455, 4 ovigerous females (cl 13.5–14.5 mm), 3 males (cl 12.1–12.5 mm), SALOMON 2, St. CP 2251, Solomon Islands, 07°27.9'S, 156°14.0'E, 1,000–1,050 m, 2 Nov. 2004.

Redescription. *Males.* Body (Fig. 2) moderately slender; integument of carapace and pleon glabrous.

Rostrum (Figs. 2, 3A, B) moderately slender, 0.8–0.9 times as long as carapace, gradually tapering distally in dorsal view; weakly descending in proximal 0.6 and upturned in distal 0.4, deepest point at midlength; armed with 2 pairs of moderately small teeth on dorsolateral ridges, anterior pair acute, posterior pair subacute; dorsal

surface with 2 rows of faveolate depressions distal to anterior pair of lateral teeth; dorsolateral ridge between lateral teeth low, rather broad, with faint longitudinal sulcus; lateral surface of rostrum not particularly erose, with slightly flared ventrolateral margin; ventral surface shallowly sulcate medially, decreasing in width proximally, flanked by sharp ventrolateral carinae; midventral carina faint.

Carapace (Figs. 2, 3C, D) 1.2 times as long as wide, maximum width across anterior ends of posterior third (antennal) carinae; major carinae relatively high, well-delimited, roughly eroded with minute to small depressions or punctations; no prominent intercarinal tubercles present except for anterior gastric region and posterior dorsolateral regions. Anterior first (submedian) carina represented by row of 4 subacute tubercles becoming larger posteriorly, posterior median carina clearly bilobed, sloping posteriorly. Anterior second (intermediate) carina represented by row of 3 low tubercles becoming larger posteriorly, none of them acuminate or dentate; posterior second carina nearly entire or divided into 3 unequal lobes, none of them acuminate or dentate. Anterior third (antennal) carina absent; posterior third carina nearly entire or divided into 2 lobes, anterior end of each lobe blunt. Anterior fourth (lateral) carina independent from branchiostegal spine, expanded into vertically compressed acute lamina, falling short of tip of antennal spine, distance between tips subequal to carapace length; posterior fourth carina blunt, surface strongly eroded. Anterior fifth (sublateral) carina distinct; posterior fifth (sublateral) carina absent. Sixth (submarginal) carina low, but clearly delimited, surface markedly eroded. Posterolateral angle not produced, partially fused with submarginal ridge adjacent to it. Postorbital region without submarginal ridge. Median part of gastric region slightly elevated in midline, with tiny anterior median tubercle and 2 irregular longitudinal rows of small tubercles. Posterior dorsolateral regions each with few tiny tubercles. Anterior, lateral and cervical grooves shallow. Antennal spine short, directed forward. Branchiostegal spine short, directed forward, reaching beyond base of antennal scaphocerite.

Pleon (Fig. 2) relatively well sculptured for *G. caeca* species group with shallow but distinct transverse grooves. First somite with high, protuberance-like median elevation, surrounding

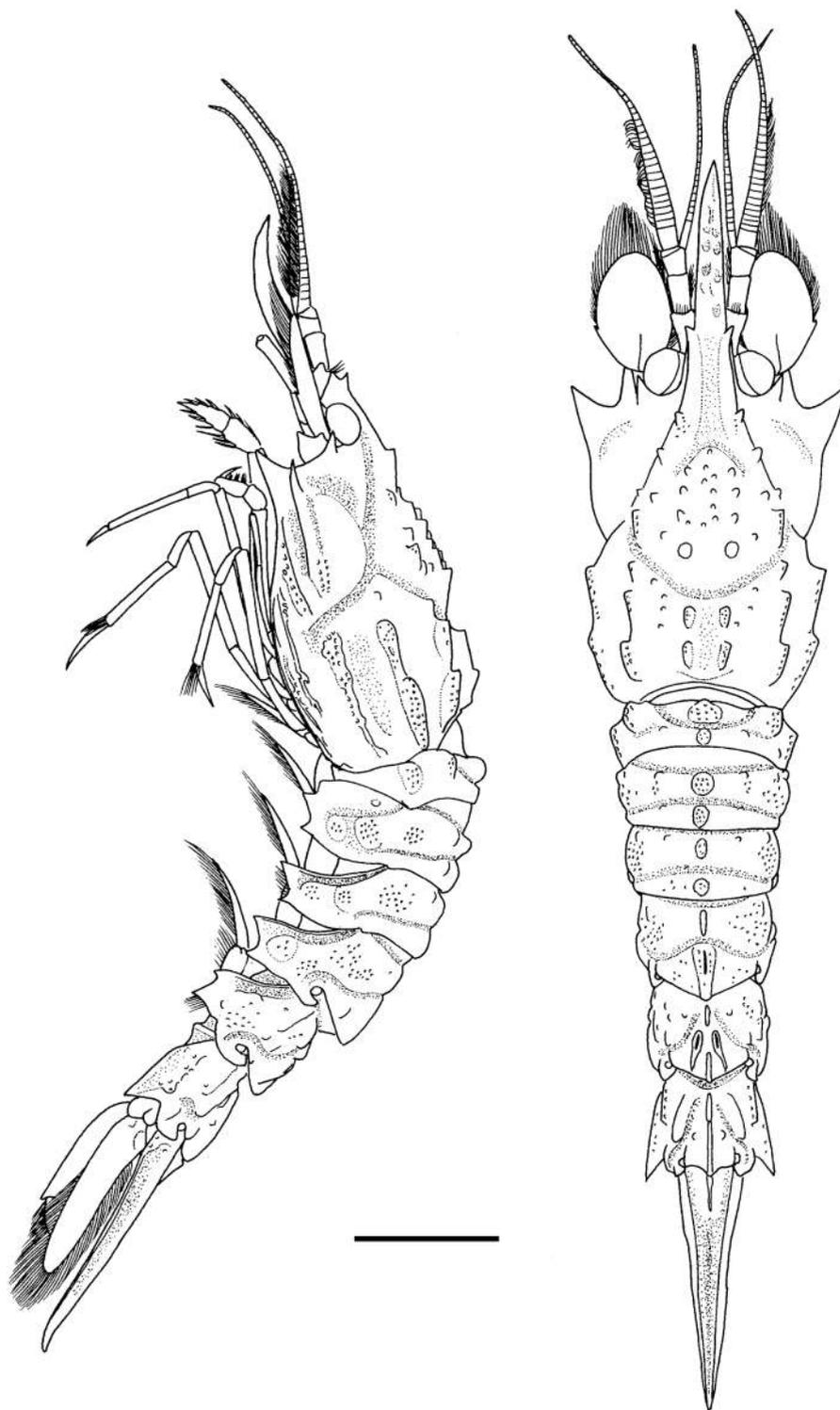
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Figure 2. *Glyphocrangon caeca* Wood-Mason in Wood-Mason and Alcock, 1891b, male (cl 10.1 mm), PMBC 37664. Habitus in dorsal and lateral views. Scale bar: 5 mm.

grooves shallow but distinct; anterior median carina not clearly delineated; posterior section of median carina lower than median elevation on anterior section of tergite, tubercle-like; dorsolateral carina blunt, not dentate; lateral carina thick, erose, entire; pleuron without tubercles; anteroventral corner weakly produced, bluntly pointed. Second somite with distinct median carina clearly divided into 2 sections, each section rounded, tubercle-like; dorsolateral carinae reduced into low, small tubercles; pleuron with anteroventral corner angular, and with 2 acute ventral teeth. Third somite with low but clearly delimited median carina, divided into 2 sections by shallow notch; dorsolateral carinae absent; pleuron with anteroventral corner produced into triangular tooth, posteroventral corner with small acute tooth. Fourth somite with low but clearly delimited middorsal carina, divided into 2 sections by shallow notch, posterior section with deep median groove and weakly produced posterior end; dorsolateral carinae absent; pleuron with anteroventral corner produced into triangular tooth, posteroventral corner with small acute tooth. Fifth somite with median and posterior submedian carinae distinct; lateral carinae also distinct; 2 pleural teeth unequal with posterior tooth larger, both acuminate. Sixth somite with moderately high, entire median carina, terminating posteriorly in moderately large blunt tooth; tergum with 1 small tubercle on either side of midline; dorsolateral carina distinct, divided into 2 sections, anterior section terminating posteriorly in blunt tubercle, posterior section not exceeding beyond posterior margin of somite; lateral carina reaching midpoint of sixth somite; pleuron shallowly depressed, lateroventral carina obsolescent, erose, extending onto posteroventral tooth; posteroventral tooth moderately strong, acuminate, weakly diverging posteriorly. Telson (Figs. 2, 3E) about 0.9 times as long as carapace; median ridge moderately high, extending to 0.2 length of telson, strongly compressed laterally, unarmed; dorsolateral and ventrolateral carinae smooth.

Cornea (Fig. 2) small, maximum diameter 0.15 carapace length, lacking dark pigmentation; eyestalk with small anteromesial process.

Antennular peduncle (Fig. 2) moderately stout, reaching distal margin of antennal scale;

thickened aesthetasc-bearing portion of outer flagellum about half-length of carapace.

Antennal scale (Figs. 2, 3F) oval, about 0.4 times as long as carapace and 1.6 times longer than wide (except for lateral tooth); lateral tooth sharp, arising at proximal 0.4; dorsal surface glabrous. Articulation between antennal scale and basicerite not particularly rotated. Carpocerite falling short of distal margin of antennal scale.

Third maxilliped (Fig. 4A) moderately stout, reaching distal 0.20 of antennal scale. Ultimate article compressed, triangular in dorsal view, with long apical and marginal spiniform setae; mesial face with scattered long spiniform setae. Penultimate article also compressed, shorter than ultimate article; Antepenultimate article with sharp dorsolateral carina; lateral face with some spiniform setae near ventral margin. Exopod not reaching distal margin of antepenultimate segment.

First pereopod (Fig. 4B) relatively slender for genus. Dactylus curved, falling slightly short of midlength of palm when flexed. Propodus with tufts of stiff setae on extensor margin. Carpus short, cup-shaped. Merus compressed, with 3 long spiniform setae on proximal 0.5 of ventral margin. Ischium with prominent ventral lamina terminating in rounded apex.

Second pereopods (Fig. 4C, D) subequal in length and similar, reaching distal margin of antennal scale. Chelae each with dactylus closed nearly perpendicular to occlusal margin of fixed finger. Carpus subdivided into 18–20 segments in left, 19 segments in right. Ischium distinctly longer than merus, with distinct proximal expansion accommodating distal part of carpus when flexed.

Third to fifth pereopods moderately slender. Third pereopod (Fig. 4E) overreaching distal margin of antennal scale by half length of dactylus. Dactylus compressed laterally, 0.4 times as long as propodus. Propodus slightly tapering distally. Carpus about 0.5 length of propodus. Merus-ischium linear.

Fourth pereopod (Fig. 4F) reaching distal 0.25 of antennal scale by tip of dactylus. Dactylus (Fig. 4G) narrow, subspatulate, 0.65 times as long as propodus, extensor surface shallowly concave, flexor surface sharply carinate on midline. Propodus with tuft of stiff setae distally, partially obscuring proximal 0.5 of dactylus. Carpus 0.5 length of propodus. Merus and ischium unarmed

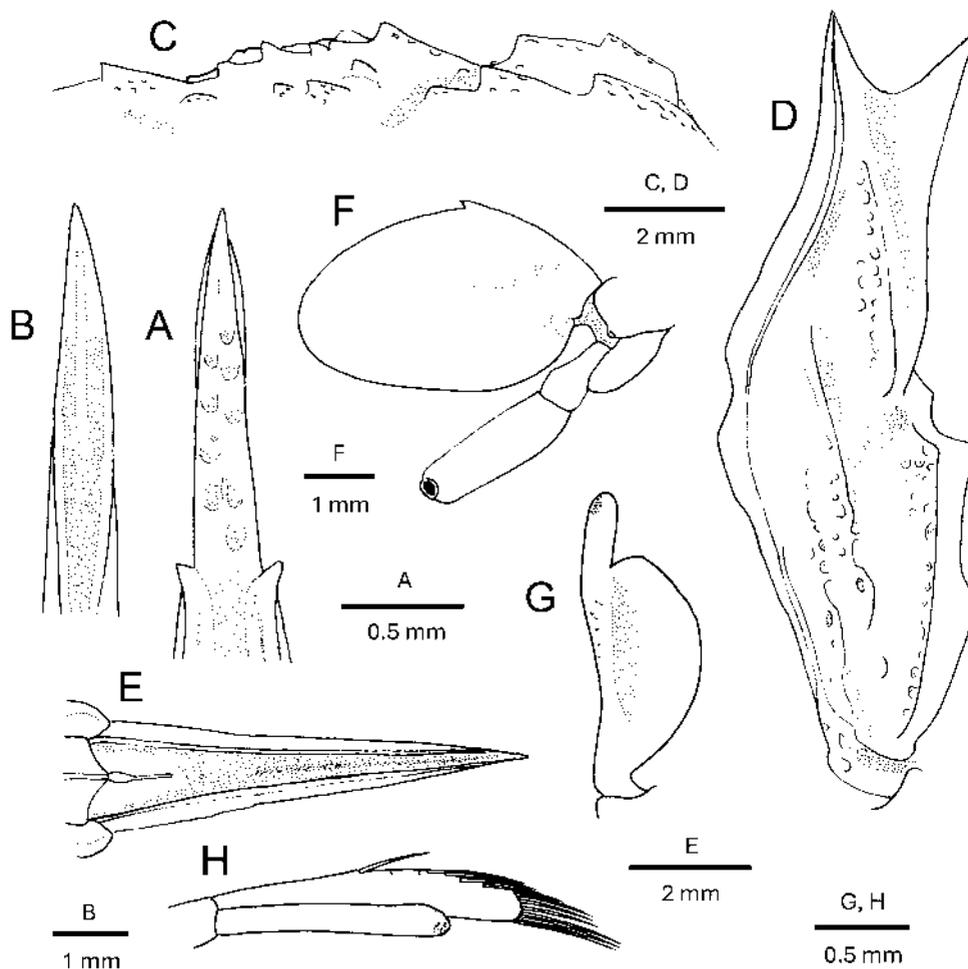


Figure 3. *Glyphocrangon caeca* Wood-Mason in Wood-Mason and Alcock, 1891b, male (cl 10.1 mm), PMBC 37664. A, distal part of rostrum, dorsal view; B, same, ventral view; C, dorsum of carapace, lateral view; D, left ventrolateral part of carapace; E, telson, dorsal view; F, left antenna, ventral view (setae omitted; flagellum broken off); G, endopod of left first pleopod, ventral view (setae omitted); H, appendix interna and masculina of left second pleopod, mesial view. Scale bar: 2 mm (C,D; E), 1 mm (B; F), 0.5 mm (A; G, H).

Fifth pereopod (Fig. 4H) similar to fourth pereopods; dactylus (Fig. 4I) 0.6 times as long as propodus, flexor surface not carinate.

Gill formula typical of *G. caeca* species group, lacking arthrobranchs on first to fourth pereopods.

First pleopod with relatively narrow endopod (Fig. 3G); appendix interna stout, located at distomesial portion of endopod. Second pleopod with appendix masculina (Fig. 3H) 1.3 times as long as appendix interna, bearing stiff setae on upper surface to terminus; appendix

interna (Fig. 3H) relatively slender. Uropod without distinguishing feature.

Distribution. Known with certainty only from the Andaman Sea, at depths of 930–1026 m (Wood-Mason in Wood-Mason and Alcock 1891b; Komai 2006; this study).

Remarks. *Glyphocrangon caeca* was originally described based on one ovigerous female and two male specimens from the Bay of Bengal, west of the

Andaman Islands (Wood-Mason and Alcock 1891). No holotype was designated, and consequently those three specimens should be considered as *syntypes*. Wood-Mason and Alcock (1894: pl. 7, fig. 1) published illustrations of the ovigerous female (habitus in the dorsal and lateral views). Subsequently, Alcock (1902a) assigned the species to the newly established subgenus *Plastocrangon* Alcock, 1901, and gave an account of it with additional material from the Bay of Bengal. Alcock (1902b) reproduced the illustration of Wood-Mason and Alcock (1894: habitus in lateral view, as *Plastocrangon*). Since then, records under the name of *G. caeca* had been reported from Indonesia (De Man 1920) and Japan (Toriyama *et al.* 1990; Miya 1995; Sakaji 2000). Chace (1984) presented a diagnosis of *G. caeca* based on accounts by Wood-Mason and Alcock (1891b; 1894), Alcock (1901) and De Man (1920). Komai (2006) reviewed the *G. caeca* species group (including two known species, *G. caeca* and *G. cerea*), but no confirmed authentic material of *G. caeca* was available to him. His diagnosis of *G. caeca* was also based on previous accounts (Wood-Mason and Alcock 1891b; Alcock 1902) and a published illustration (Wood-Mason and Alcock 1894). Six new species, assigned to the species group, were described from various Indo-West Pacific localities: *G. brevis* from Madagascar, *G. demani* Komai, 2006 from Indonesia [based on material identified with *G. caeca* by De Man (1920)], *G. humilis* Komai, 2006 [material identified with *G. caeca* by Toriyama *et al.* (1990), Miya (1995) and Sakaji (2000) from Japan was included], *G. musorstomia* Komai, 2006 from the Southwest Pacific localities, *G. parvioculus* Komai, 2006 from New Caledonia and *G. rudis* from the Solomon Sea. Komai and Chan (2008) further added a new species, *G. isos* Komai and Chan, 2008, from the Philippines, as an additional member of the *G. caeca* species group. Komai (2011) reported strong sexual dimorphism in *G. rudis*, and thus concluded that *G. demani* was established on the basis of the male of *G. rudis*: the name *G. rudis* was given priority over *G. demani*.

Because of the unavailability of the type or topotypic material, the actual diagnostic features of *G. caeca* have remained unclear for a long time. The present topotypic specimens from the Andaman Sea agree well with the accounts of *G. caeca* by Wood-Mason and Alcock (1891b; 1894) and

Alcock (1902) particularly in the following features: the presence of a row of subacute tubercles, representing the anterior first (submedian) carinae, on the carapace (Figs. 2, 3C); the presence of two rows of small tubercles along the midline of the gastric region (Fig. 2); and the second to fourth pleomeres with distinct median carinae, clearly divided into two sections on each tergite (Fig. 2). With evidence from morphological affinities and geographical distribution, the present specimens are identified with *G. caeca* with confidence. Combination of the aforementioned characteristics in addition to the smooth, glabrous tegmental surface of the carapace and pleon in females (cf. Wood-Mason and Alcock 1891b; 1894; Alcock 1892) differentiates *G. caeca* from other species in the *G. caeca* species group (Komai 2006; Komai and Chan 2008).

Examination of the specimens of *G. caeca* from the Andaman Sea available in our material has revealed that the holotype of *Glyphocrangon demani* is rather more similar to our specimens of *G. caeca* than to *G. rudis*, of which the latter has been considered to be the senior subjective synonym of *G. demani* (cf. Komai 2011). A comparison of three male specimens of *G. rudis* from Papua New Guinea (CBM-ZC 10455) clarified that the specimens of *G. rudis* differ substantially from the present specimen from the Andaman Sea and the holotype of *G. demani* in the less produced, smaller acute lamina derived from the anterior fourth carina on the carapace, and the much more conspicuous median and dorsolateral carinae on the first to fourth pleomeres (cf. Komai 2006: fig. 6). Although Komai (2011) suggested that these differences could be attributed to intraspecific variation, this does not seem to be the case. Nevertheless, the holotype of *G. demani* differs from the present topotypic specimen of *G. caeca* in the better-developed median carinae on the first to fourth pleomeres, and the better-developed dorsolateral carinae on the first to third pleomeres. At present, it is difficult to evaluate whether these differences are species-specific. Consequently, we propose provisionally transferring *G. demani* to *G. caeca* from *G. rudis*. To reach a final conclusion, additional material from the Andaman Sea and Ceram Sea would be necessary to make a more precise morphological comparison and, ideally, to run molecular analysis using at least the barcoding mitochondrial COI gene.

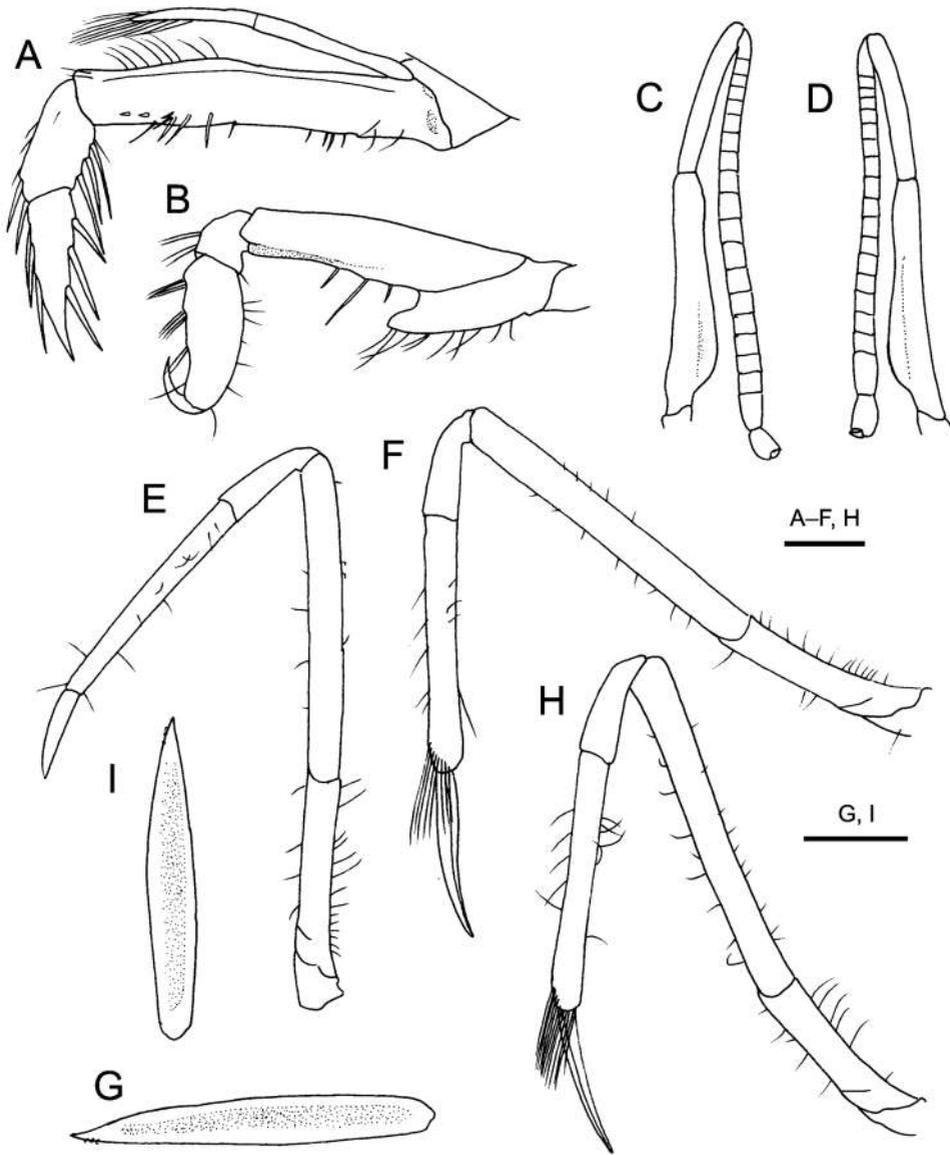
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Figure 4. *Glyphocrangon caeca* Wood-Mason in Wood-Mason and Alcock, 1891b, male (cl 10.1 mm), PMBC 37664. A, left third maxilliped, lateral view; B, left first pereopod, lateral view; C, left second pereopod, lateral view; D, right second pereopod, lateral view; E, left third pereopod, lateral view; F, left fourth pereopod, lateral view; G, same, dactylus, extensor view; H, left fifth pereopod, lateral view; I, same, dactylus, extensor view. Scale bar: 1 mm (A–F, H), 0.5 mm (G, I).

***Glyphocrangon gilesii* Wood-Mason in
Wood-Mason and Alcock, 1891a**
(Figs. 5–7)

Glyphocrangon Gilesii Wood-Mason in Wood-Mason and Alcock, 1891a: 193 [type locality: SE of Cinque Island, Andaman Sea, 900 m deep]; Wood-Mason and Alcock 1891b: 358; 1894: pl. 7, fig. 4, 4a; Alcock 1901: 132.

Glyphocrangon gilesii – Komai 2004: 420.

Not *Glyphocrangon gilesii* – Chace 1984: 11. = *Glyphocrangon proxima* Komai, 2004, *G. parva* Komai, 2004 and *G. panglao* Komai and Chan, 2008.

Not *Glyphocrangon gilesii* – Hayashi and Araki 1999: 626. = *Glyphocrangon runcinata* Komai, 2004.

Material examined. PMBC 37666, 1 male (cl 9.7 mm), BIOSHELF St. U7, 07°16'N 96°59'E to 07°15'N 96°59'E, 935 m, Triangular dredge, 13 Apr. 1997, coll. S. Bussarawit; PMBC 37667, 1 male (cl 13.9 mm), BIOSHELF St. J10, 07°15'N 97°15'E to 07°14'N 97°15'E, 689–687 m, Agassiz trawl, 19 Feb. 2000, coll. C. Aungtonya and V. Vongpanich; PMBC 37668, 2 ovigerous females (cl 11.7, 12.2 mm), 4 males (cl 12.8–14.6 mm), BIOSHELF St. L10, 06°45'N 97°23'E to 06°44'N 97°26'E, 707–651 m, Agassiz trawl, 21 Feb. 2000, coll. C. Aungtonya and V. Vongpanich.

Redescription. *Females.* Body (Fig. 5) relatively slender; integument of body and pereopods glabrous.

Rostrum (Figs. 5, 6A, B) relatively slender, 0.7–0.8 times as long as carapace, gently curved dorsally, deepest at about midlength; armed with 2 pairs of small acute teeth on raised dorsolateral ridges; median carina distinct in distal 0.3; dorsal surface without transverse septa or rugae; dorsolateral ridge between 2 lateral teeth narrow, sharply edged, without shallow sulcus; ventral surface with moderately deep median groove, flanked by distinct lateral carinae; midventral carina absent.

Carapace (Figs. 5, 6C, D) 1.4 times longer than wide, maximum width across anterior ends of posterior third (antennal) carinae; surface of carinae eroded with small depressions; no conspicuous tubercles or spines on intercarinal spaces. Major carinae relatively low. Anterior first (submedian) carina almost entire, terminating in small blunt tubercle anteriorly; posterior first (submedian)

carina also entire, terminating anteriorly in blunt point, posterior end of carina not overhanging posterodorsal margin of carapace. Anterior second (intermediate) carina divided into 2 parts, anterior part forming blunt tooth; posterior second (intermediate) carina forming broad arc in lateral view, smooth. Anterior third (antennal) carina traversing hepatic region, divided in two parts, anterior part supporting antennal tooth, posterior part short, terminating anteriorly in blunt point; posterior third (antennal) carina rather thick, nearly parallel to dorsal plane of carapace, entire, terminating anteriorly in obtuse point. Anterior fourth (lateral) carina not vertically compressed and not divided, terminating anteriorly in small subacute tooth, profile in dorsal view almost straight; posterior fourth (lateral) carina thick, parallel to posterior third (antennal) carina, terminating anteriorly in obtuse point. Anterior fifth (sublateral) carina moderately broad; posterior fifth carina rudimentary. Sixth (submarginal) carina rudimentary. Submarginal posteroventral ridge obsolete. Orbital region without submarginal groove. Median part of gastric region with tiny anterior median tubercle. Antennal spine strong, exceeding beyond branchiostegal spine, directed forward or slightly diverging in dorsal view, slightly ascending (angle about 5° against horizontal plane of carapace). Branchiostegal spine visible in dorsal view, directed forward or slightly diverging in dorsal view, slightly descending in lateral view, slightly overreaching distal margin of antennal basicerite; lateral face with 1 thin ridge not in contact with anterior fourth (lateral) carina. Posterolateral angle obtuse, not flared. Lateral and cervical grooves moderately deep. Lateromarginal groove generally shallow.

Sculpture of pleon weak for genus, with low or reduced major carinae and shallow grooves or depressions (Fig. 5); no conspicuous tubercles on surface. First pleomere with clearly delineated median carina on weakly defined median elevation, not reaching posterodorsal margin of somite, terminating anterodorsally in small, acute tooth; dorsolateral carina terminating anteriorly in blunt tooth; pleuron with produced, blunt or subacute anteroventral angle. Tergites of second and third pleomeres devoid of median carina, that of fourth pleomere with obsolete median carina in posterior two-thirds; dorsolateral carinae on second to fourth pleomeres absent; pleural lobes on second to fourth somites coarsely pitted; pleural teeth rather short,

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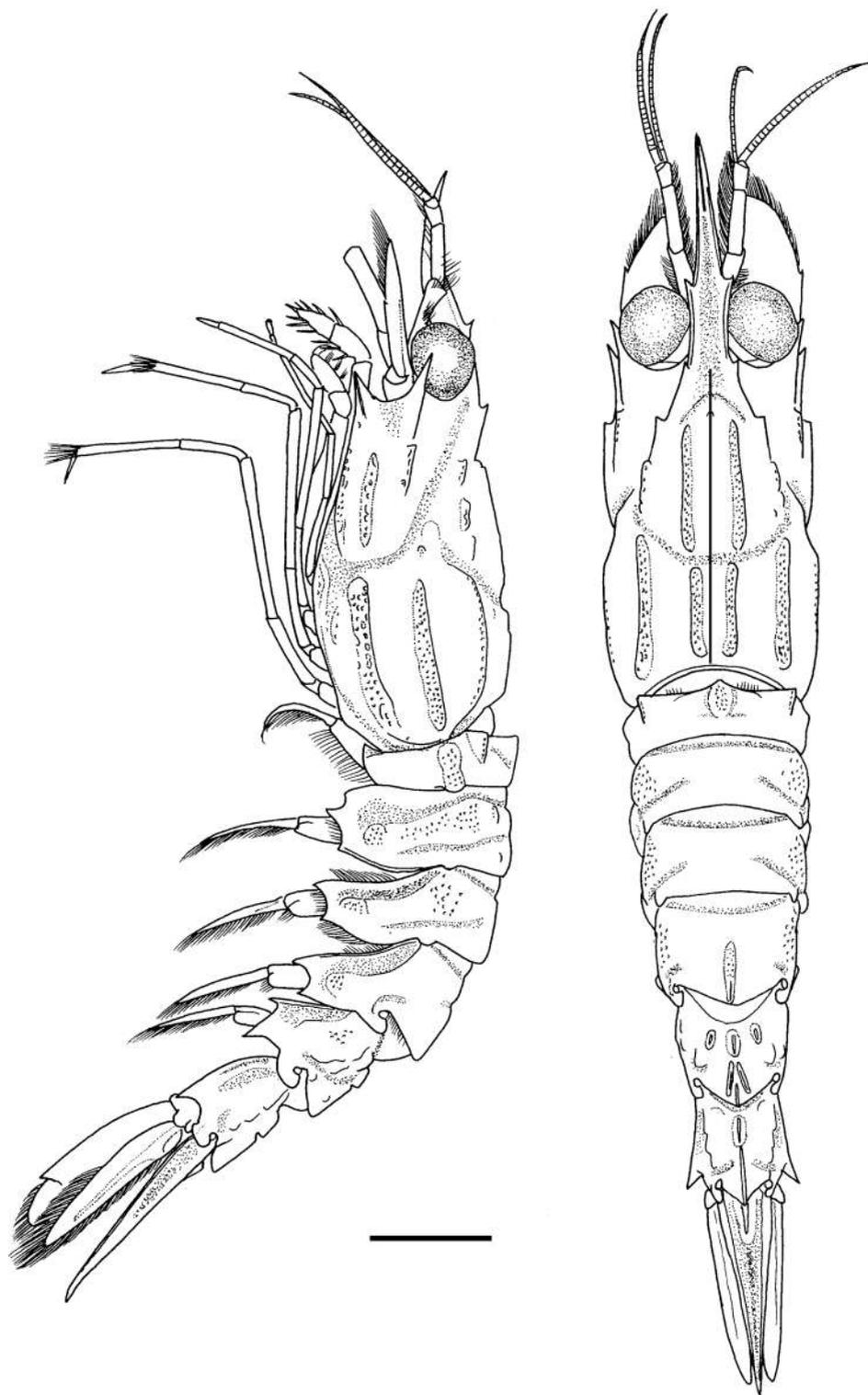


Figure 5. *Glyphocrangon gilesii* Wood-Mason in Wood-Mason and Alcock, 1891a, ovigerous female (cl 12.2 mm), PMBC 37668, habitus in dorsal and lateral views. Scale bar: 5 mm.

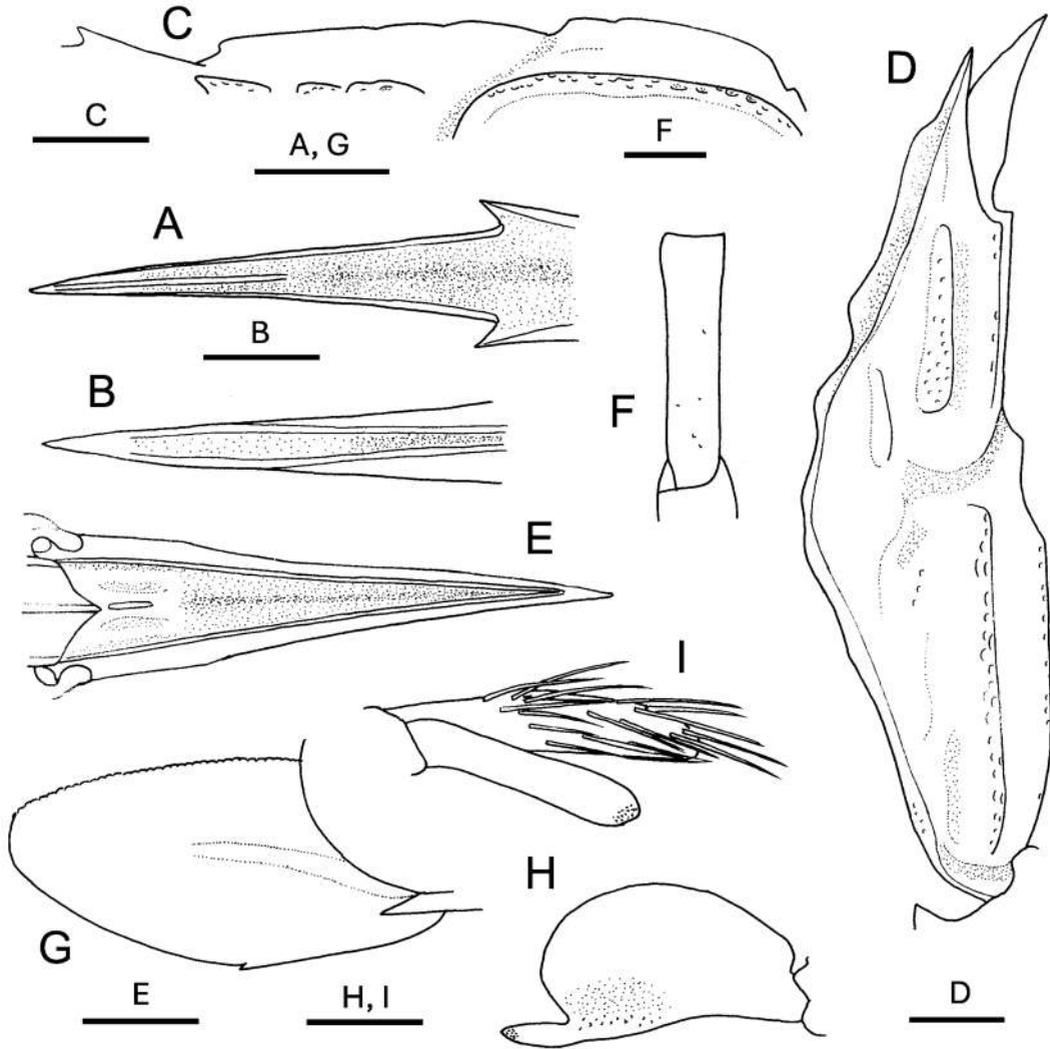


Figure 6. *Glyphocrangon gilesii* Wood-Mason in Wood-Mason and Alcock, 1891a. A–G, ovigerous female (cl 12.2 mm), PMBC 37668; H, I, male (cl 13.9 mm), PMBC 37667. A, distal part of rostrum, dorsal view; B, same, ventral view; C, dorsum of carapace, lateral view; D, left ventrolateral part of carapace; E, telson, dorsal view; F, second article of left antennular peduncle, dorsal view (setae omitted); G, left antennal scaphocerite, dorsal view (setae omitted); H, endopod of left first pleopod, ventral view (setae omitted); I, appendices interna and masculina of left second pleopod, mesial view. Scale bar: 2 mm (A, G; C; D; E), 1 mm (B; F), 0.5 mm (H, I)

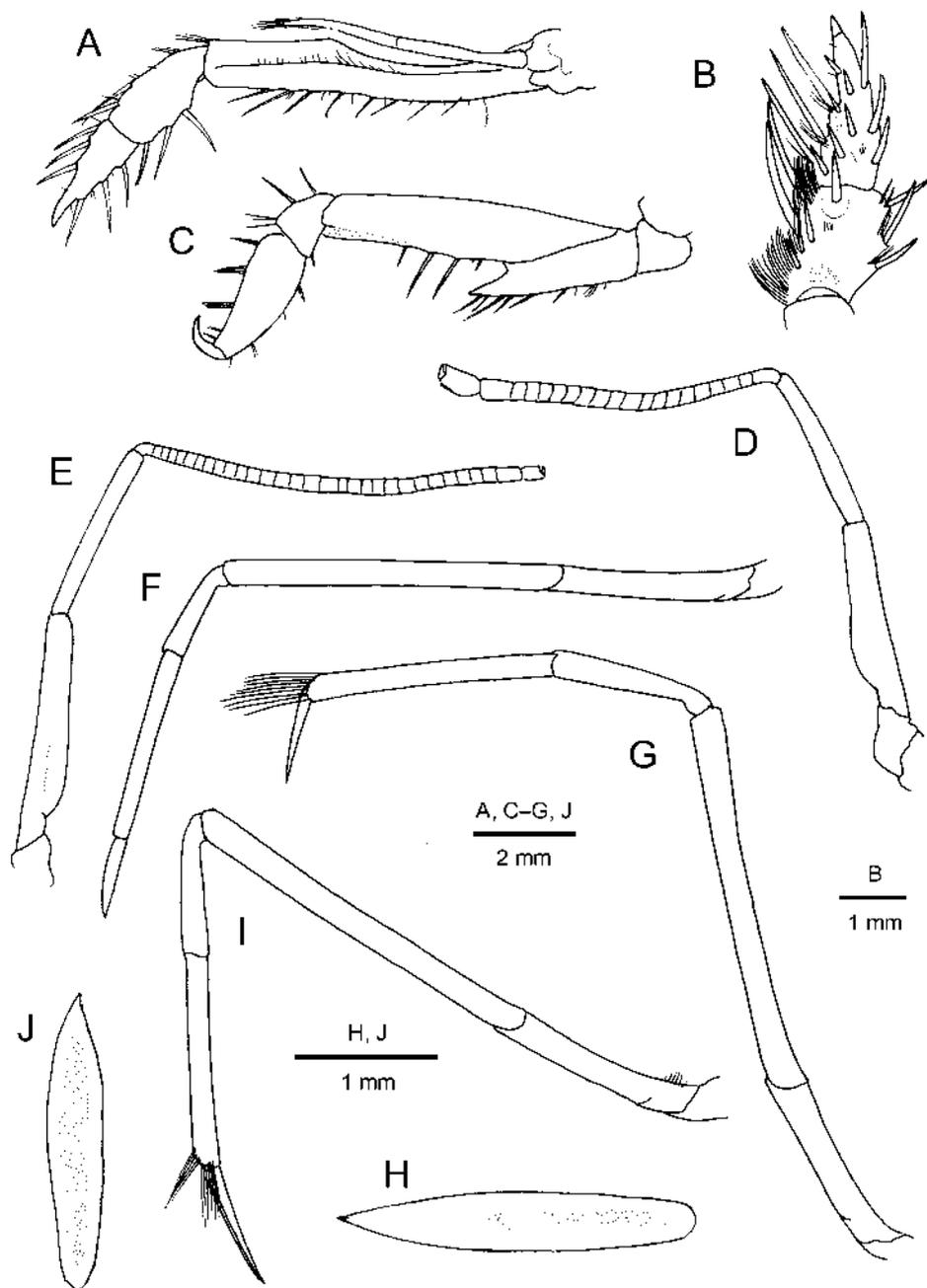
Deep-sea shrimps of genus Glyphocrangon

Figure 7. *Glyphocrangon gilesii* Wood-Mason in Wood-Mason and Alcock, 1891a, ovigerous female (cl 12.2 mm), PMBC 37668. A, left third maxilliped, lateral view; B, same, distal 2 articles, mesial view; C, left first pereopod, lateral view; D, left second pereopod, lateral view; E, right second pereopod, lateral view; F, left third pereopod, lateral view; G, left fourth pereopod, lateral view; H, same, dactylus, extensor view; I, left fifth pereopod, lateral view; J, same, dactylus, extensor view. Scale bar: 2 mm (A, C–G, J), 1 mm (B; H, J).

all acuminate. Fifth pleonal somite with anterior median carina sharply delimited, forming blunt tooth; posterior median carina low, not particularly produced; anterior submedian carina short, but distinct; posterior submedian carina also distinct, not reaching posterodorsal margin of somite, diverging posteriorly in dorsal view; pleuron with 2 unequal ventral teeth, both acuminate. Sixth pleomere with sharp median carina, divided in 2 parts by small V-shaped notch, both parts smooth marginally; anterior part terminating in small tooth, posterior part produced posterodorsally as moderately large, subacute tooth; lateral carina divided into 3 parts, all with ending in blunt points; pleuron shallowly concave; lateroventral carina obsolete; posterolateral tooth moderately strong, without carina on lateral surface. Telson (Figs. 6, 7E) about 0.7 times as long as carapace; anterior projection blunt, crest-like, without secondary tubercle; dorsolateral and ventrolateral carinae smooth, without tubercles or spines.

Cornea (Fig. 5) large, maximum width 0.2 of carapace length, darkly pigmented (preserved condition); ocular peduncle with small anteromesial process.

Antennular peduncle (Figs. 5, 6F) slender, overreaching distal margin of scaphocerite by length of third article; first article with rudimentary stylocerite; second article 3.9–4.0 times longer than wide; outer flagellum with aesthetasc-bearing portion 0.4–0.5 times as long as carapace. Antennal scaphocerite (Fig. 6G) elongate oval, about half length of carapace, 2.0–2.1 times longer than wide; dorsal surface glabrous; lateral margin weakly convex, with distinct lateral tooth arising at 0.45–0.60 of antennal scale length; carpocerite elongate, reaching distal margin of scaphocerite.

Third maxilliped (Fig. 7A, B) relatively slender, not reaching distal margin of scaphocerite. Distal 2 articles compressed; ultimate article tapering to terminal unguis clearly demarcated basally, armed with elongate spiniform setae marginally and on mesial surface; penultimate article elongate, spiniform setae on extensor and flexor margins and mesial face dorsally and distally. Antepenultimate article with distinct longitudinal carina on lateral surface; ventral margin bluntly carinate, bearing row of long spiniform setae. Exopod not reaching distal margin of antepenultimate article.

First pereopod (Fig. 7C) moderately stout. Dactylus noticeably curved, about 0.5 length of palm. Propodus tapering distally, almost glabrous, with tufts of stiff setae on extensor margin. Carpus short, cup-shaped. Merus with row of long spiniform setae on proximal half of ventral margin. Ischium with ventral lamina terminating in sharp tooth, ventral margin with row of stiff or spiniform setae.

Second pereopods (Fig. 7D, E) unequal with right slightly longer, both not reaching distal margin of scaphocerite. Right chela much smaller than left chela; dactyli obliquely folded. Ischia with ventral margin weakly expanded in proximal 0.5 to accommodate chelae when flexed. Left carpus subdivided into 19 segments, right carpus into 27–30 segments. Ischium distinctly longer than merus, with distinct proximal expansion accommodating distal part of carpus when flexed.

Posterior 3 pairs of pereopods relatively slender. Third pereopod (Fig. 7F) reaching midlength to distal margin of scaphocerite by tip of propodus. Dactylus compressed laterally, 0.4 length of propodus.

Fourth pereopod (Fig. 7G) reaching distal margin of scaphocerite by tip of dactylus. Dactylus (Fig. 6H) 0.6 times as long as propodus, narrow but subspatulate, terminating in simple, acuminate unguis; extensor surface slightly concave. Propodus with terminal tuft of stiff setae, partially obscuring dactylus. Carpus slightly widened distally, 0.7 length of propodus.

Fifth pereopod (Fig. 7I) similar to fourth pereopod, falling slightly short of distal margin of scaphocerite; dactylus (Fig. 7J) 0.4 times as long as propodus.

Egg size 1.6 x 2.3 mm.

Males. Generally similar to females except for relatively stout, longer outer antennular flagellum, and different structure of endopods of first and second pleopods, representing normal sexual differences in glyphocrangonids. First pleopod with endopod (Fig. 6H) moderately broad, bearing relatively short appendix interna located at distomesial portion of endopod. Second pleopod endopod with appendix masculina (Fig. 6I), about 1.2 times as long as appendix interna, bearing numerous stiff setae on surfaces and terminus.

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Size. Largest female cl 12.2 mm; ovigerous females cl 11.7–12.2 mm; largest male cl 14.6 mm.

Distribution. Presently known only from the Andaman Sea, at depths of 651–935 m (Wood-Mason and Alcock 1891a; Komai 2004; this study).

Remarks. *Glyphocrangon gilesii* was originally described based on a single female specimen obtained 8 miles SE of Cinque Island in the Andaman Sea at a depth of 900 m (Wood-Mason in Wood-Mason and Alcock 1891a). Wood-Mason and Alcock (1891b) reported the second specimen of this species from the same locality. Wood-Mason and Alcock (1894: pl. 7, fig. 4, 4a) presented illustrations of *G. gilesii* (habitus in the dorsal and lateral views). Alcock (1901) provided an account of *G. gilesii* along with additional specimens from the Andaman Sea. Two other records under this name are from the Philippines (Chace 1984) and Japan (Hayashi and Araki 1999). After careful comparison with the published accounts of *G. gilesii* from the Andaman Sea (Wood-Mason in Wood-Mason and Alcock 1891a; Wood-Mason and Alcock 1891b; 1894; Alcock 1901), Komai (2004) concluded that none of the specimens referred to as *G. gilesii* by Chace (1984) and by Hayashi and Araki (1999) represented the true *G. gilesii*, and described three new species: *G. parva* Komai, 2004 from the Philippines, *G. proxima* Komai, 2004 from the Philippines and Indonesia, and *G. runcinata* Komai, 2004 from the East China Sea, Japan. Later Komai and Chan (2008) clarified that part of the specimens Komai (2004) referred to as *G. parva* represented an undescribed species further named as *G. panglao* Komai and Chan, 2008. Because of the unavailability of the type or topotypic material from the Andaman Sea, the actual diagnostic features of *G. gilesii* remain to be clarified.

The topotypic specimens examined agree well with the description of *G. gilesii* by Alcock (1901) in the following diagnostic features: the tegmental surface of the carapace and pleon is smooth and glabrous, devoid of conspicuous tubercles or spines on intercarinal spaces (Fig. 5); the anterior third (antennal) carina is divided into two parts, of which the posterior part terminates anteriorly in a tooth (Fig. 5); major carinae on the second and third pleomeres and the anterior part of the fourth pleomeres are greatly reduced, sometimes

absent (Fig. 5); the antennal scaphocerite is ovate, approximately 2.0 as long as wide (Fig. 6G).

This study makes it possible to fully evaluate the diagnostic features of *G. gilesii* and to compare closely related congeners. Among the four species previously confounded with *G. gilesii*, *G. panglao* appears most similar to *G. gilesii* from which it is distinguished by the following characters: the anterior first (submedian) carina terminates anteriorly in a small acute tooth and bears a small second tooth subdistally in *G. panglao* (cf. Komai and Chan 2008: fig. 7D), whereas such acute teeth are absent in *G. gilesii* (Figs. 5, 6C); the posterior first (submedian) carina terminates in an acute tooth in *G. panglao* (cf. Komai and Chan, 2008: fig. 7D), rather than in a blunt point as in *G. gilesii* (Fig. 6C); the second and third tubercles composing the second (intermediate) carina on the carapace are acutely or subacutely pointed in *G. panglao* (cf. Komai and Chan 2008: figs. 6, 7D), rather than blunt in *G. gilesii* (Figs. 5, 6C); tips of the median and dorsolateral carinae on the first pleomere are acute in *G. panglao* (cf. Komai and Chan 2008: fig. 6), rather than blunt in *G. gilesii* (Fig. 5); in females, the median carina on the second and third pleomeres is still clearly discernible in *G. panglao* (cf. Komai and Chan 2008: fig. 6), rather than absent or obsolescent in *G. gilesii* (Fig. 5). *Glyphocrangon panglao* is presently known only from the Bohol Sea in the Philippines at depths of 613–1412 m (Komai and Chan 2008).

Glyphocrangon parva has a similar configuration of the carapace first (submedian) carina (cf. Komai 2004: fig. 12) compared to *G. panglao*. Furthermore, in *G. parva*, the major carinae and intercarinal tubercles are distinct on the first to fourth pleomeres (Komai 2004: fig. 12). As mentioned above, those somites are devoid of distinct carinae or tubercles in *G. gilesii* (Fig. 5). The carpi of the fourth and fifth pereopods are approximately 0.5 the length of propodi in *G. parva* (cf. Komai 2004: fig. 13D, F), rather than approximately 0.6 the length in *G. gilesii* (Fig. 7G, I). When ovigerous females are compared, the lateral tooth of the antennal scaphocerite is located distal to the midlength in *G. parva* (cf. Komai 2004: 13C), rather than proximal to the midlength in *G. gilesii* (Fig. 6G). *Glyphocrangon parva* is known only from the Sulu Sea, the Philippines, at a depth of 2021 m.

Glyphocrangon proxima is readily distinguished from *G. gilesii* by the more robust body in females

(Komai 2004: fig. 14 versus Fig. 5), the distinct major carinae and intercarinal tubercles on the first to fifth pleomeres (Komai 2004: fig. 14 versus Fig. 5), the less slender intermediate article of the antennular peduncle in females (3.3 times as long as wide versus 3.9–4.0 times as long) and the stouter fourth and fifth pereopods (Komai 2004: fig. 14 versus Fig. 7G, I). *Glyphocrangon proxima* has been recorded from several western Pacific localities, *i.e.*, the Philippines, northern South China Sea, northwestern Australia, Indonesia to Solomon Islands at depths of 482–980 m (Komai 2004b; 2011b; Komai and Chan 2008; 2013; Komai *et al.* 2020; Chang *et al.* 2023).

With regard to females, *Glyphocrangon runcinata* is distinguished from *G. gilesii* by the more robust body (Komai 2004: fig. 16 versus Fig. 5), usually with a produced anterior end of the posterior section of the first (submedian) carina on the carapace (Komai 2004: fig. 17B), an acutely pointed anteriormost element of the anterior second (intermediate) carina (Komai 2004: 17B) and the less slender intermediate article of the antennular peduncle (3.3 times as long as wide versus 3.9–4.0 times as long). The fourth and fifth pereopods are relatively stouter in *G. runcinata* (like in *G. proxima*) than in *G. gilesii* in both sexes (Komai 2004: figs. 16, 17D, F versus Fig. 7G, I). The former species appears to be restricted to the northern East China Sea, occurring at depths of 543–770 m (Komai 2004).

***Glyphocrangon hakuhoae* Takeda and Hanamura, 1994**

(Fig. 8)

Glyphocrangon (Plastocrangon) faxoni De Man, 1918: 298 (in part); De Man 1920: 243 (in part).

Glyphocrangon hakuhoae Takeda and Hanamura, 1994: 24, figs. 11–13 [type locality: S of Celebes, Flores Sea, Indonesia, 280 m deep]; Brand and Takeda 1996: 270 (in part), fig. 5B, C; Komai 2004: 522, figs. 67, 68, 119; Komai and Chan 2008: 47, fig. 13A1, A2; Komai *et al.* 2020: 637, fig. 1A.

Material examined. PMBC 37669, 2 ovigerous females (cl 12.1, 12.3 mm), 2 juveniles (cl 6.0, 7.2 mm), BIOSHELF St. L6, 06°45'N 98°06'E to 06°44'N 98°05'E, 303–313 m, Agassiz trawl, 23 Feb. 2000, coll. C. Aungtonya and V. Vongpanich.

Description. See Komai (2004: 522–526, figs. 67, 68).

Distribution. Previously known from Indonesia (Bali Sea, Banda Sea, Flores Sea, Timor Sea, Sunda Strait) and the Philippines (E of Luzon); 210–409 m (Komai 2004; Komai and Chan 2008; Komai *et al.* 2020). Newly recorded from the Andaman Sea.

Remarks. The present specimens agree well with previous accounts of *Glyphocrangon hakuhoae* by Takeda and Hanamura (1994) and Komai (2004), particularly in the characteristic shape of the rostrum, the configuration of the carapace carinae and the development of the median carinae on the pleon (Fig. 8).

***Glyphocrangon regalis* Spence Bate, 1888**

(Fig. 9)

Glyphocrangon regalis Spence Bate, 1888: 517 (in part), pl. 93, figs 3, 4 [type locality: Banda Sea, Indonesia, 360 m deep]; Komai 2004: 542, figs. 77, 78, 120.

Glyphocrangon regalis var. – De Man 1920: 223, pl. 18, fig. 55–55b. = *Glyphocrangon lineata* Komai, 2004.

Not *Glyphocrangon regalis* – De Man 1920: 220, pl. 18, fig. 54a–k; Chace 1984: 20; Kensley *et al.* 1987: 326, fig. 25B. = *Glyphocrangon confusa* Komai, 2004

Not *Glyphocrangon regalis* – Kensley 1977: 40, fig. 16. = *Glyphocrangon amblytes* Komai, 2004.

Material examined. PMBC 37670, 1 ovigerous female (cl 21.9 mm), 2 males (cl 13.0, 15.2 mm), BIOSHELF St. G8, 08°00'N 97°11'E to 08°00'N 97°13'E, 495–488 m, Agassiz trawl, 9 Feb. 2000, coll. C. Aungtonya and V. Vongpanich; PMBC 37671, 1 female (cl 15.5 mm), 1 male (cl 14.0 mm), BIOSHELF St. L8, 06°46'N 97°33'E to 06°44'N 97°35'E, 513–501 m, otter trawl, 22 Feb. 2000, coll. C. Aungtonya and V. Vongpanich.

Description. See Komai (2004: 542–544, figs. 77, 78).

Supplemental description. Second pereopods unequal with right longer than left; left second pereopod overreaching distal margin of scaphocerite by 0.5 length of carpus, carpus subdivided into 23 segments; right second pereopod overreaching

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distal margin of scaphocerite by 0.6 length of carpus, carpus subdivided into 30 segments. Fourth pereopod (Fig. 9E) moderately slender, overreaching distal margin of scaphocerite by 0.1 length of propodus; dactylus (Fig. 9F) subspatulate, 0.5 times as long

as propodus. Fifth pereopod (Fig. 9G) similar to fourth pereopod, falling slightly short of distal margin of scaphocerite; dactylus (Fig. 9H) 0.4 times as long as propodus. Egg size 2.3 mm x 2.8 mm.



Figure 8. *Glyphocrangon hakuhoae* Takeda and Hanamura, 1994, ovigerous female (cl 12.3 mm), PMBC 37669. Habitus in dorsal and lateral views (in preservative). Scale bar: 5 mm.

Distribution. Heretofore known with certainty only from the Banda Sea, Indonesia, at depth of 360 m (Komai 2004). The present specimens represent the rediscovery of this poorly known species, extending the geographical and bathymetric ranges to the Andaman Sea and 488–513 m deep, respectively.

Remarks. In the original description of *Glyphocrangon regalis*, Spence Bate (1888) assigned three specimens from three different locations in the Southwest Pacific to this species: one female from the Banda Sea, Indonesia (Challenger St. 194), one male specimen from the Kermadec Islands (Challenger St. 171), and one female specimen from off Fiji Islands (Challenger St. 173). As Komai (2004) noted, the female from the Banda Sea could be considered as the holotype, as Spence Bate (1888) specified it as “the type.” The holotype was redescribed by Komai (2004) to clarify the identity of the taxon. In contrast, the real identity of the other two specimens could not be established and the specimen from the Kermadec Islands was not available for examination. The female specimen from off Fiji Islands was referred to as an unidentified species of the *G. holthuisi* species complex (Komai 2004). Since its original description, *G. regalis* has been reported from a wide area in the Indo-West Pacific (De Man 1920; Chace 1984; Kensley 1977), but Komai (2004) demonstrated that none of these specimens represented *G. regalis* (see synonymy above). Although Komai (2004) suggested that the holotype of *G. juxtacleata* Chace, 1984 might represent a juvenile form of *G. regalis*, Komai *et al.* (2020) regarded *G. juxtacleata* as a distinct species based on the examination of an additional specimen from Java, Indonesia. Certainty for *G. regalis* is limited to the holotype from the Banda Sea, Indonesia.

The ovigerous female examined herein (PMBC 37670) agrees well with the holotype of *G. regalis* redescribed by Komai (2004) in every diagnostic aspect, including features such as the absence of an anterior tooth on the posterior third (lateral) carina on the carapace (Fig. 9A), the nearly entire middorsal carina on the rostrum (Fig. 9B), the possession of numerous but low, blunt intercarinal tubercles on the carapace, (Fig. 9A, C) and non-tuberculate dorsolateral and ventrolateral carinae on the telson (Fig. 9D).

The other, much smaller, specimens that we examined are different from the ovigerous specimen in the fewer intercarinal tubercles on the carapace and pleon and the more pronounced acute laminae of the anterior fourth (lateral) carinae, but such ontogenetic variation has been reported for species of *Glyphocrangon* (Komai 2004). Since the second, fourth and fifth pairs of pereopods are damaged or lost in the holotype, a brief supplemental description of those appendages is given based on the present Andaman Sea specimens. Within the *G. regalis* species complex as diagnosed by Komai (2004), *G. regalis* is similar to *G. andamanensis*, *G. investigatoris* and *G. lineata* Komai, 2004 in the absence of an acute distal tooth on the posterior third (lateral) carina on the carapace in both females and males, but it differs from the latter three species in having blunt, low, non-compressed intercarinal tubercles on the carapace (Fig. 9A), as noted by Komai (2004). From the two Indian Ocean species, *G. regalis* further differs in having a nearly entire middorsal carina on the rostrum (Fig. 9B). In *G. andamanensis* and *G. investigatoris*, the middorsal carina on the rostrum consists of a row of minute tubercles (Komai 2004: figs. 81 and 82A for *G. investigatoris*, fig. 83 for *G. andamanensis*).

***Glyphocrangon smithii* Wood-Mason in
Wood-Mason and Alcock, 1891b
(Fig. 10)**

Glyphocrangon smithii Wood-Mason in Wood-Mason and Alcock, 1891b: 357 [type locality: Bay of Bengal, near Andaman Islands, 1010 m deep]; Wood-Mason 1894: pl. 7, fig. 3, 3a; Alcock 1901: 129; Chace 1984: 6 (key, in part); Komai 2004: 583; Komai and Chan 2017: 77, figs. 3–8.

Not *Glyphocrangon smithii* – Calman 1939: 216. = *Glyphocrangon boletifera* Komai, 2004 (material from the Gulf of Aden); *Glyphocrangon amblytes* Komai, 2004 (material from the Maldives).

Not *Glyphocrangon smithii* – Monod 1973: 124, fig. 34. = *Glyphocrangon armata* Komai, 2004.

Not *Glyphocrangon smithii* – Baba *et al.* 1986: 149, 279, fig. 99; Miya 1995: 194 (in part); Takeda 1997: 250, pl. 3, fig. G; Sakaji 2001: 211, pl. 2, fig. E. = *Glyphocrangon perplexa* Komai, 2004.

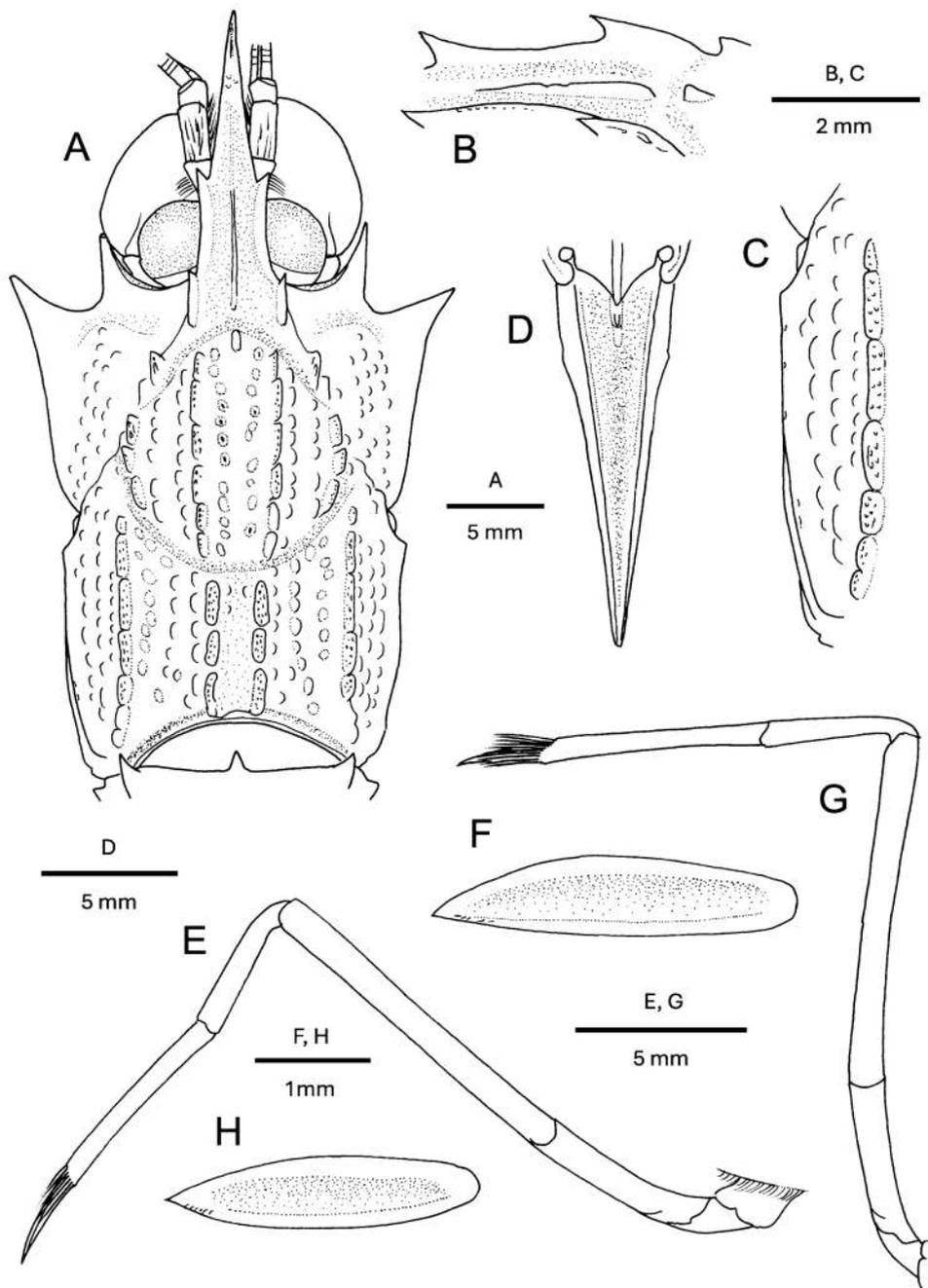
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Figure 9. *Glyphocrangon regalis* Spence Bate, 1888, ovigerous female (cl 21.9 mm), PMBC 37670. A, carapace and cephalic appendages, dorsal view (antennular flagella partially omitted); B, proximal part of rostrum, obliquely dorsal view, showing configuration of middorsal carina; C, left upper branchial region of carapace, dorsal view; D, telson, dorsal view; E, left fourth pereopod, lateral view; F, same, dactylus, extensor view; G, left fifth pereopod, lateral view; H, same, dactylus, extensor view. Scale bar: 5 mm (A; D; E, G), 2 mm (B, C), 1 mm (F, H).

Material examined. PMBC 37673, 2 males (cl 16.6, 26.8 mm), BIOSHELF St. C12, 08°59'N 96°03'E to 08°56'N 96°01'E, 930–962 m, Agassiz trawl, 4 Feb. 2000, coll. C. Aungtonya and V. Vongpanich; PMBC 37674, 1 male (cl 12.5 mm), BIOSHELF St. G8, 08°00'N 97°11'E to 08°00'N 97°13'E, 495–488 m, Agassiz trawl, 9 Feb. 2000, coll. C. Aungtonya and V. Vongpanich.

Description. See Komai and Chan (2017: 77–82, figs. 3–8).

Distribution. Known with certainty only from the Bay of Bengal, including the Andaman Sea; at depths of 338–1010 m (Komai and Chan 2017; this study).

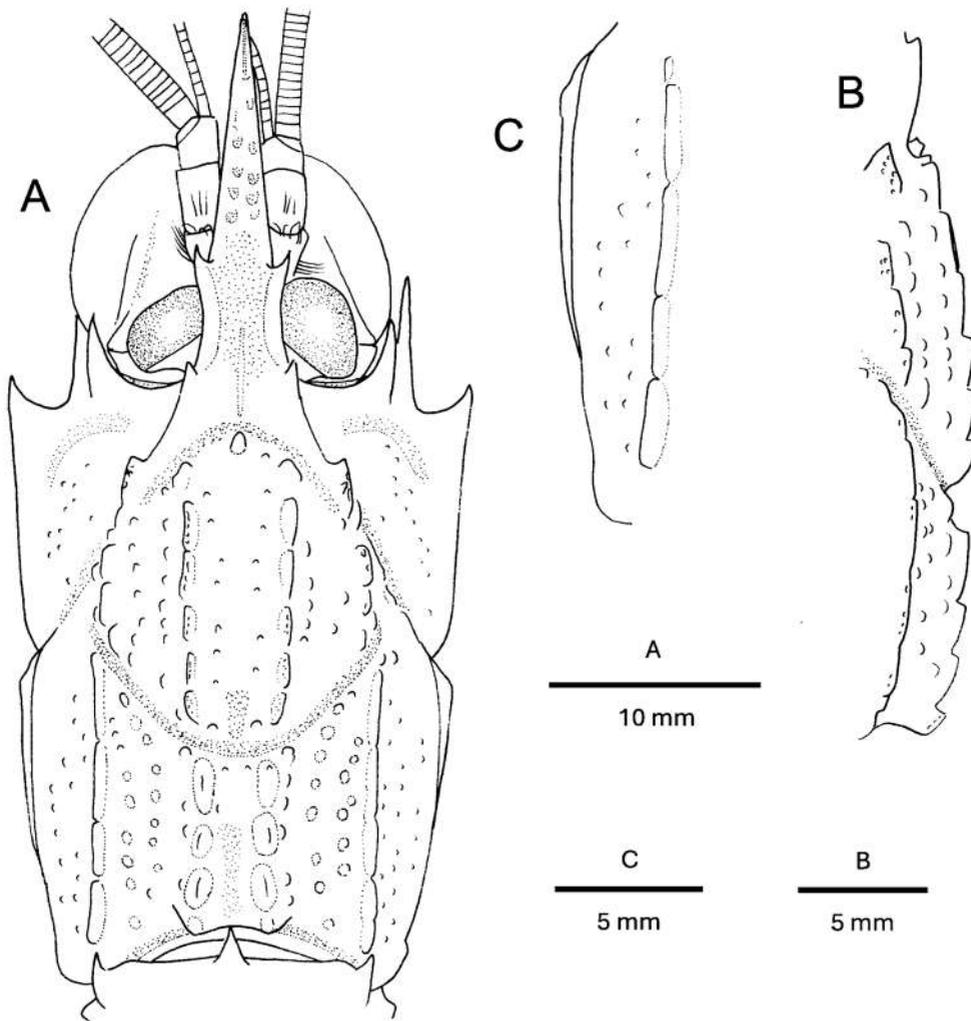


Figure 10. *Glyphocrangon smithii* Wood-Mason in Wood-Mason and Alcock, 1891b, male (cl 26.8 mm), PMBC 37672. A, carapace and cephalic appendages, dorsal view (antennular flagella partially omitted); B, dorsum of carapace, lateral view; C, left upper branchial region of carapace, dorsal view. Scale bar: 10 mm (A), 5 mm (B; C).

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Remarks. This species was recently redescribed by Komai and Chan (2017) based on a single ovigerous female specimen from the Andaman Sea. An overview of the taxonomy of the species was also presented by Komai and Chan (2017) wherein the differentiating characters between *G. smithii* and other allied congeners in the *G. regalis* species complex were clarified.

The material examined herein contains three males of greatly different size. The two smaller specimens (cl 12.5 and 16.6 mm) agree generally with the ovigerous female specimen redescribed by Komai and Chan (2017). The largest male specimen (cl 26.8 mm), representing a full grown adult, differs from the ovigerous female of Komai and Chan (2017) and from the two smaller males examined in the less pronounced major carinae on the carapace (Fig. 10A, B) and pleon, as well as the better developed outer antennular flagellum. Such ontogenic and sexual differences have been reported for the *G. regalis* species complex (Komai 2004). Furthermore, it is now clarified that the development of the anterior tooth of the posterior third (antennal) carina is also sexually dimorphic in *G. smithii* (the tooth is present in the female while completely reduced in the adult male; Fig.

10A, C). Similar sexual variation is also seen in the closely allied *G. amblytes* (cf. Komai 2004).

Komai and Chan (2017) believed that the presence of a deep longitudinal groove on the extensor surface of the dactyli of the fourth and fifth pereopods is diagnostic to *G. smithii*, but in the present specimens the groove is shallow, being similar to other species of the *G. regalis* species complex.

Because of the absence of the anterior tooth of the posterior third (antennal) carina on the carapace, males of *G. smithii* may be confused with *G. andamanensis* or *G. regalis*. Nevertheless, much weaker intercarinal tubercles on the carapace will distinguish *G. smithii* from the latter two species.

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