

Cyonomid crabs from southwestern Indonesia and redescription of *Cyonomus andamanicus* Alcock, 1905

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Abstract. *Cyonomus java*, new species, is described from off southwestern Java, Indonesia, based on a specimen collected by a joint Indonesian-Singaporean expedition to southwestern Indonesia. The new species is the sixth member of the *Cyonomus delli* Griffin & Brown, 1976, species-group and is unique in the genus for having an articulated rather than fused telson and abdominal somite 6. The new species most closely resembles *C. cognatus* Ahyong & Ng, 2017, from East Asia and *C. andamanicus* Alcock, 1905, a poorly known species from the Andaman Sea. *Cyonomus andamanicus* is redescribed based on the holotype, which remains the only known specimen of the species.

Key words. Decapoda, deep-water, Indian Ocean, taxonomy, new species

INTRODUCTION

The deep-water crabs of the genus *Cyonomus* A. Milne-Edwards, 1880 (Cyonomidae Bouvier, 1898) have received steady taxonomic attention in the past three decades, significantly expanding the known fauna in the Atlantic (e.g., Tavares, 1991, 1993, 1994; Campos Jr., 1997; Lemaitre & Bermudez, 2000) and Indo-West Pacific (e.g., Ahyong & Brown, 2003; Ahyong, 2008, Ahyong & Ng, 2009, 2011, 2017; Ahyong, 2014, 2019). Forty-three species are currently known worldwide (Ahyong, 2019). Among species groups within *Cyonomus*, the *C. delli* group currently includes *C. cubensis* Chace, 1940, from the western Atlantic as well as four Indo-West Pacific species, *C. andamanicus* Alcock, 1905, *C. cognatus* Ahyong & Ng, 2017, *C. delli* Griffin & Brown, 1976, and *C. diogenes* Ahyong & Ng, 2009 (Ahyong & Ng, 2017; Ahyong, 2019), and is characterised by the combination of short, stout, relatively broad immovable eyestalks; a small, triangular rostrum that is distinctly shorter than the eyestalks; a relatively swollen carapace with finely granulate surfaces and rounded anterolateral margins; and partial to full demarcation between abdominal somite 6 and the telson (but unreported in *C. andamanicus*). The last

feature is of special note because, although plesiomorphic, the clearly demarcated abdominal somite 6 and telson is also a feature of *Cyonomoides* Tavares, 1993 (type species *C. guinotae* Tavares, 1991), contrasting with the indistinguishably fused telson and somite 6 in *Cyonomus*. Tavares (1993) also referred two species now in the *C. delli* group (*C. delli* and *C. cubensis*) to *Cyonomoides*, with a fourth species, *Cyonomoides fitoi* Lemaitre & Bermudez, 2000, subsequently added. Ahyong & Ng (2017) and Ahyong (2019) returned *C. delli* and *C. cubensis* to *Cyonomus* given their dissimilarity to *Cyonomoides guinotae* in other features, such as the short, stout eyestalks and swollen carapace (in contrast to the elongated and slender eyestalks, and less uninflated carapace).

Separating species of the *C. delli* group is difficult because diagnostic distinctions are primarily morphometric (Ahyong, 2019). More significantly, however, the first described member of the *C. delli* group, *C. andamanicus* Alcock, 1905, from the Andaman Sea, is also the most poorly known, and potentially threatens the stability of the taxonomy of other Indo-West Pacific members of the group. Here, we report on the cyonomids collected by the joint Indonesian-Singaporean SJADES 2018 Expedition to southwestern Indonesia, including a new species of the *C. delli* group from off West Java, and redescribe the poorly known *C. andamanicus* from the Andaman Sea based on the holotype.

MATERIAL AND METHODS

Measurements and terminology follow Ahyong (2019). Carapace length (cl) is measured along the dorsal midline and includes the rostrum. Postrostral carapace length (pcl) excludes the rostrum. Carapace width (cw) is the greatest width across the branchial regions. Antennular peduncle

Accepted by: Jose Christopher E. Mendoza

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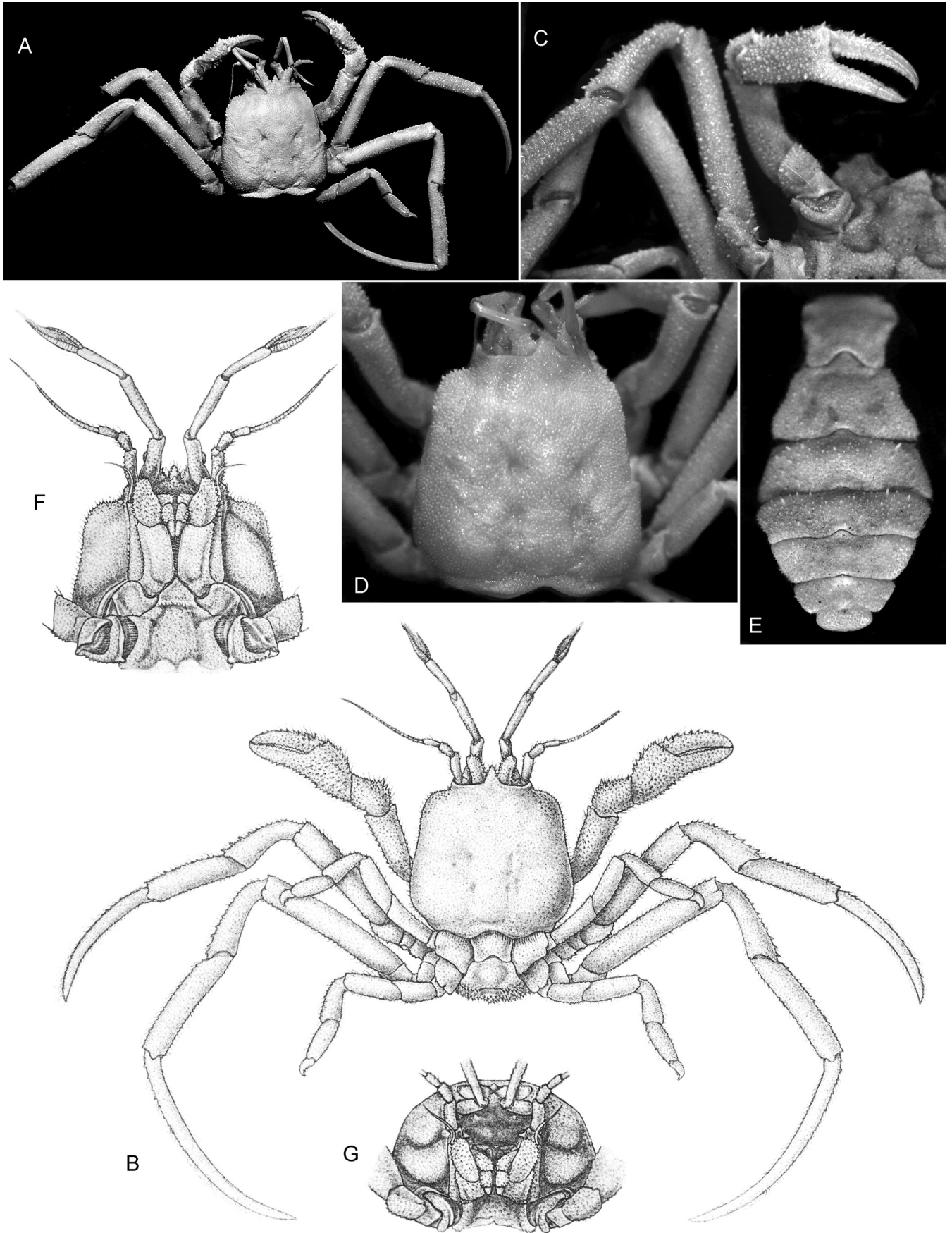


Fig. 1. *Cynomomus andamanicus* Alcock, 1905, male holotype (cl 8.7 mm, pcl 7.6 mm, cw 8.8 mm), Andaman Sea, ZSI 4963/10: A, B, dorsal habitus; C, right cheliped and pereopods 2 and 3, anteroventral view; D, carapace, left oblique view; E, abdomen; F, anterior cephalothorax, ventral view; G, cephalothorax, anterior view. (B, F, G from Alcock et al., 1907: pl. 79, 2, 2a, b).

length is the extended length of all three articles combined. Specimens are deposited in the collections of the Museum Zoologicum Bogoriense, Research Center for Biology, Indonesian Institute of Sciences, Cibinung, Java (MZB); Lee Kong Chian Museum of Natural History, National University of Singapore (ZRC); and the Zoological Survey of India, Kolkata (ZSI).

SYSTEMATICS

Family Cymonomidae Bouvier, 1898

Cymonomus A. Milne-Edwards, 1880

Cymonomus andamanicus Alcock, 1905

(Figs. 1, 2)

Cymonomus andamanicus Alcock, 1905: 568–569, pl. 18 figs. 1, 1a, 1b. — Alcock et al., 1907: pl. 79, 2, 2a, b. — Dell, 1971: 61, 62. — Griffin & Brown, 1976: 252. — Ahyong & Brown, 2003: 1372, 1373. — Ng et al., 2008: 32. — Ahyong & Ng, 2009: 237. — Dev Roy & Nandi, 2012: tab. 1. — Dev Roy, 2015: 78. — Ahyong & Ng, 2017: 1, 4, 6, 7. — Trivedi et al., 2018: 33. — Ahyong, 2019: 34, 50.

Cymonomus andamanica — Balss, 1922: 117.

Cymonomus granulatus andamanica — Balss, 1922: 118.

Material examined. Holotype: ZSI 4963/10, male (cl 8.7 mm, pcl 7.6 mm, cw 8.8 mm), Andaman basin, 11°26'30"N, 92°53'45"E, 378 fm (692 m), bottom green mud with Foraminifera, RIMSS INVESTIGATOR, stn 322, 20 November 1903.

Description of holotype. Carapace quadrate, lateral margins gently divergent posteriorly; regions weakly indicated; lower pterygostomial region swollen; surfaces sparsely setose. Anterolateral spine short, conical; with 1 or 2 small anteriorly directed spines on lateral margin behind anterolateral spine. Dorsal and lateral surfaces entirely covered with minute granules, granules becoming larger and more elongate anterolaterally. Fronto-orbital margin (excluding rostrum and outerorbital processes) advanced slightly beyond anterolateral margins; 0.66× anterior carapace width; outer orbital processes, pointed, directed anteriorly, triangular in lateral view, situated below plane of rostrum, laterally with acute granules, small spines, reaching midlength of rostrum. Rostrum small, about half-length of eyestalks; 0.15× pcl; triangular, apex acute, margins straight, coarsely granulate laterally and dorsally. Eyestalks distinctly divergent, ~30° to median axis, flattened, stout, width at midlength exceeding one-third length, fused to carapace below rostral base but demarcated from frontal margin; reaching anteriorly slightly beyond midlength of antennular peduncle article 1; dorsal surface minutely granulate, lateral and mesial margins weakly spinulate; cornea apparently vestigial, not pigmented.

Epistome surface granulate, small tubercle at base of rostrum and tubercle mesial to base of antennule; curved spine mesial to base of antenna. Antennular peduncle 0.88× pcl; articles 1 and 2 minutely granulate, article 3 smooth. Antennal articles

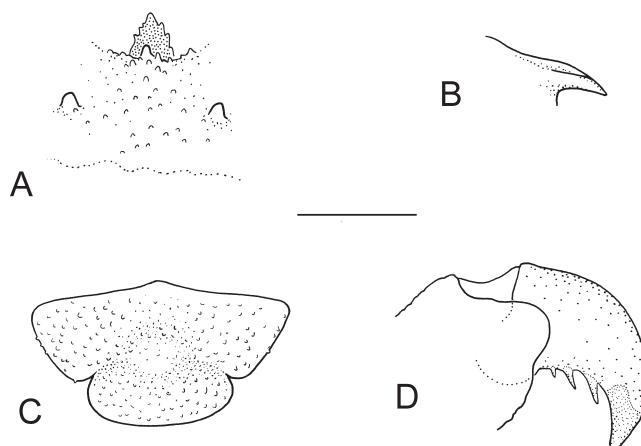


Fig. 2. *Cymonomus andamanicus* Alcock, 1905, male holotype (cl 8.7 mm, pcl 7.6 mm, cw 8.8 mm), Andaman Sea, ZSI 4963/10: A, anterior epistome, ventral view; B, right epistomial spine mesial to base of antenna; C, pleotelson; D, right pereopod 5 dactylus. Scale: A, C = 1.0; B, D = 0.5 mm.

1–4 irregularly granulate or minutely spinular; article 5 minutely granulate. Maxilliped 3 ischiobasis subquadrate, granulate and minutely spinular distally; longitudinal sublateral groove; ischium and basis demarcated by faint groove. Merus shorter than ischium; length twice width, tapering distally to rounded apex; surface and margins spinulate. Dactylus, propodus and carpus sparsely spinulate. Carpo-meral articulation at merus mid-length. Exopod surface sparsely granulate; apex reaching to carpo-meral articulation.

Chelipeds (pereopods 1) equal in size and ornamentation, sparsely setose. Merus finely granulate, scattered small spines. Carpus finely granulate, dorsal margin with few short spines. Propodus palm surfaces coarsely granulate, dorsal and ventral margins irregularly spinulate. Dactylus longer than dorsal palm length; proximal dorsal two-thirds with spines and granules; outer surface with faint longitudinal carina; occlusal surfaces of dactylus and pollex crenulate, without gape when fingers closed. Pereopods 2 and 3 sparsely setose; all articles finely granulate; propodus, carpus and merus with serrated granules and scattered spinules on extensor margins. Pereopod 3 longest; merus 1.03× pcl. Dactylus broadly curved, few granules or small spines proximally, with longitudinal rib, though less distinct proximally; setose. Pereopod 3 dactylus about as long as combined length of propodus and carpus. Pereopods 4 and 5 minutely granulate, sparsely setose; longer than pereopod 3; dactylus markedly shorter than propodus, length 1.5× height, falcate, apex corneous apex, flexor margin with 3 obliquely inclined corneous spines. Pereopod 5 merus, when folded against carapace, reaching anterior one-third of carapace.

Thoracic sternite 3 pentagonal, width 1.5× length; margins divergent posteriorly, anteriorly divergent at acute angle; surface granulate. Margins of sternites 4 and 5 granulate.

Abdomen with margins and surface finely granulate or minutely spinulate. Pleotelson with somite 6 and telson immovably fused, demarcation indicated by lateral notch in margin and as faint, partial groove on lateral surface;

telson broadly rounded, width $2.4\times$ length. Gonopods not preserved in holotype.

Remarks. The male holotype of *Cyonomus andamanicus* Alcock, 1905, collected from off the Andaman Islands remains the only known specimen of the species to date. Apart from references to original account and figures of the holotype (Alcock, 1905; Alcock et al., 1907), all subsequent published records of *C. andamanicus* (Sakai, 1965, 1976; Nagai, 1994; Ho et al., 2004; Poore et al., 2008; Ah Yong et al., 2009) are based on other species (Ah Yong & Ng, 2017; Ah Yong, 2019). Although well-documented by the standards of its day, the holotype of *C. andamanicus* has not been re-studied since it was first described, and information on the form and segmentation of the abdomen is completely lacking in the original account and figures. Therefore, taxonomic decisions supporting other species in the *C. delli* group have relied entirely on the incomplete original description and figures of the holotype of *C. andamanicus*. Unfortunately, the holotype of *C. andamanicus* is now in poor condition, being significantly disarticulated, with damage to the carapace and posterior pereopods, and loss of the maxillipeds 3 and gonopods (Fig. 1A, C–E). Nevertheless, what remains of the holotype of *C. andamanicus* permits clarification of ambiguities or errors in the original accounts (Alcock, 1905: pl. 18; Alcock et al., 1907: pl. 79, 2, 2a, b). Our redescription is based on restudy of the holotype, apart from details of maxilliped 3, which are based on Alcock's figures. Most significantly, the telson and abdominal somite 6 of *C. andamanicus* are confirmed to be demarcated, albeit weakly (Figs. 1E, 2C), enabling a more complete taxonomic characterisation of the species and of the *C. delli* group overall. A distinct notch on either side of the pleotelson marks the lateral marginal separation between the telson and abdominal somite 6 but the demarcation on the pleotelson surface is less obvious. Whereas the telson and abdominal somite 6 are clearly demarcated by a distinct, complete groove in *C. cubensis* (both sexes), *C. delli* (both sexes), *C. diogenes* (males only), and *C. java*, new species (male only known), the demarcation in male *C. andamanicus* is obscure, being indicated only by a partial, shallow, indistinct groove present laterally, similar to that of male *C. cognatus* (see Ah Yong & Ng, 2017: fig. 2I, J). The anterolateral spines on the carapace, described and figured as absent by Alcock (1905) and Alcock et al. (1907) proved to be present in *C. andamanicus* (Fig. 1D), as also in *C. delli* and *C. cognatus*, invalidating the value of the feature for distinguishing these species (Griffin & Brown, 1976; Ah Yong & Ng, 2017). Identification of the presence and position of the anterolateral spines also allowed accurate determination of the fronto-orbital width as $0.66\times$ anterior carapace width.

Cyonomus andamanicus is morphologically nearest to *C. cognatus*, sharing similar walking leg and antennular morphometrics. The two species, however, are distinguished by subtle differences in carapace shape (lateral margins distinctly divergent posteriorly in *C. andamanicus* versus subparallel in *C. cognatus*), rostral form (margins straight in *C. andamanicus* versus concave in *C. cognatus*), greater fronto-orbital width ($0.67\times$ anterior carapace width in *C.*

andamanicus versus 0.62 or less in *C. cognatus*), and the position of the maxilliped 3 palp articulation on the merus (at midlength in *C. andamanicus* versus distal to midlength in *C. cognatus*). *Cyonomus java*, new species, from Indonesia, and *C. delli* from Australia, can be separated from *C. andamanicus* by the same features as indicated for *C. cognatus* (see the account of *C. java*, below, for further distinctions). *Cyonomus delli* is further distinguished from *C. andamanicus* by the well-defined (versus indistinct) demarcation between the telson and abdominal somite 6 and the divergence of the anterior margins of thoracic sternite 3 (acute in *C. andamanicus* versus obtuse in *C. delli*). Similarly, *C. cubensis* and *C. delli* also differ from *C. andamanicus* in the subparallel rather than posteriorly divergent lateral margins of the carapace and the strongly convex male telson. *Cyonomus diogenes* from the South China Sea resembles *C. andamanicus* in the divergent carapace margins and maxilliped 3 palp position but is readily separated by the proportionally longer walking legs in males (pereopod 3 merus length about $1.4\times$ pcl versus 1.1 or less in *C. andamanicus*), and clearly demarcated telson and abdominal somite 6.

Distribution. Presently known only from the type locality.

Cyonomus chani Ah Yong & Ng, 2017

(Fig. 3A)

Cyonomus sp. 4 — Nagai, 1994: 53, pl. 1, fig. 9.

Cyonomus andamanicus — Ho et al., 2004: 647, fig. 1H. — Ah Yong et al., 2009: 179–180 (part), fig. 135–136. [Not *C. andamanicus* Alcock, 1905]

Cyonomus soela — Takeda et al., 2005: 108–109, fig. 2. [Not *C. soela* Ah Yong & Brown, 2003]

Cyonomus chani Ah Yong & Ng, 2017: 2–4, fig. 1, 7A.

Material examined. ZRC 2019.1093, 1 ovigerous female (cl 9.9 mm, pcl 9.1 mm, cw 10.0 mm), eastern Indian Ocean, south of Cilacap, Java, Indonesia, $8^{\circ}10.065\text{--}09.802\text{'S}$, $108^{\circ}37.439\text{--}37.145\text{'E}$, 970–1,013 m, mud with pieces of wood, SJADES 2018 Expedition, stn CP44, 31 March 2018.

Remarks. The present specimen agrees well with *C. chani*, previously reported from the South China Sea, Taiwan and southern Japan, and represents a significant southward range extension into the eastern Indian Ocean. The key morphometric traits of the SJADES specimen are consistent with those reported by Ah Yong & Ng (2017) for *C. chani*: pereopod 3 merus $0.95\times$ pcl (reported range $0.91\text{--}1.02\times$ pcl) and antennular peduncle $0.91\times$ pcl (reported range $0.80\text{--}0.90\times$ pcl).

Distribution. Southern Japan, Taiwan, the northern South China Sea and now from southwestern Indonesia; 650–1,134 m (Ah Yong & Ng, 2017).

Cyonomus java, new species

(Figs. 3B, 4)

Material examined. Holotype: MZB Cru 5024, male (cl 8.2 mm, pcl 7.5 mm, cw 7.6 mm), eastern Indian Ocean, south

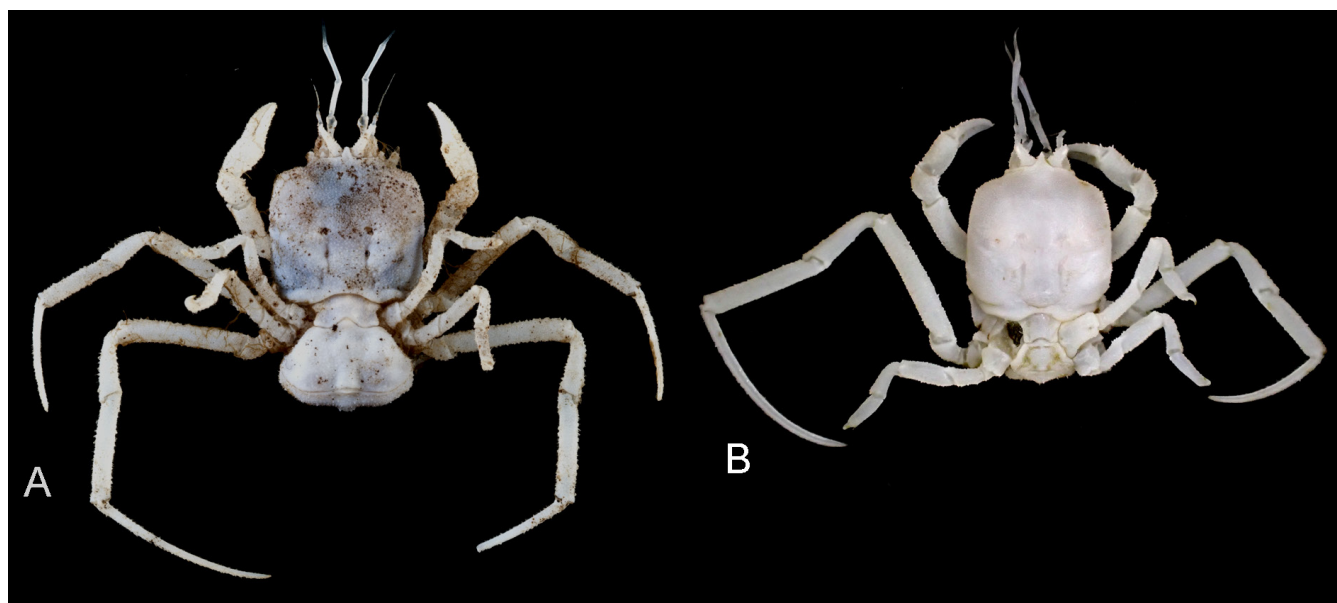


Fig. 3. Colour in life. A, *Cymonomus chani* Ahyong & Ng, 2017, ovigerous female (cl 9.9 mm, pcl 9.1 mm, cw 10.0 mm), Java, stn CP44, ZRC 2019.1093. B, *Cymonomus java*, new species, male holotype (cl 8.2 mm, pcl 7.5 mm, cw 7.6 mm), Java, CP35, MZB Cru 5024. Photographs: T.-Y. Chan.

of Java, Indonesia, 07°47.677'S, 107°41.904'E, 603–686 m, SJADES 2018 Expedition, stn CP35, 29 March 2018.

Description of holotype. Carapace quadrate, lateral margins subparallel; regions weakly indicated; lower pterygostomian region swollen; surfaces sparsely setose. Anterolateral spine short, conical, minute. Dorsal and lateral surfaces entirely covered with minute granules, granules becoming larger and more elongate anterolaterally. Fronto-orbital margin (excluding rostrum and outer orbital processes) advanced slightly beyond anterolateral margins; $0.60\times$ anterior carapace width; outer orbital processes, pointed, directed anteriorly, triangular in lateral view, situated below plane of rostrum, laterally with acute granules, small spines, reaching midlength of rostrum. Rostrum small, about half-length of eyestalks; $0.09\times$ pcl; triangular, apex acute, margins slightly concave, coarsely granulate laterally and dorsally. Eyestalks distinctly divergent, $\sim 42^\circ$ to median axis, flattened, stout, width at midlength exceeding one-third length, fused to carapace below rostral base but demarcated from frontal margin; not reaching anteriorly beyond midlength of antennular peduncle article 1; dorsal surface minutely granulate, lateral and mesial margins weakly spinulate; cornea apparently vestigial, not pigmented.

Epistome surface granulate, small tubercle at base of rostrum and tubercle mesial to base of antennule; curved spine mesial to base of antenna. Antennular peduncle $0.88\times$ pcl (male); articles 1 and 2 minutely granulate, article 3 smooth. Antennal articles 1–4 irregularly granulate or minutely spinular; article 5 minutely granulate. Maxilliped 3 ischiobasis subquadrate, granulate and minutely spinular distally; longitudinal sublateral groove; ischium and basis demarcated by faint groove. Merus shorter than ischium; length twice width, tapering distally to rounded apex; surface and margins spinulate. Dactylus, propodus and carpus sparsely spinulate. Carpo-meral articulation distal to

merus mid-length. Exopod surface sparsely granulate; apex reaching to or slightly beyond carpo-meral articulation but not reaching beyond end of endopod merus.

Chelipeds (pereopods 1) equal in size and ornamentation, sparsely setose. Merus finely granulate, with scattered small spines. Carpus finely granulate, dorsal margin with few short spines. Propodus palm surfaces with fine granules and few scattered acute granules, dorsal and ventral margins irregularly spinulate. Dactylus longer than dorsal palm length; proximal dorsal three-fourths with spines and granules; outer surface with faint longitudinal carina; occlusal surfaces of dactylus and pollex crenulate, without gape when fingers closed. Pereopods 2 and 3 sparsely setose; all articles finely granulate; carpus and merus with serrated granules and scattered spinules on extensor margins. Pereopod 3 longest; merus $1.02\times$ pcl (male). Dactylus broadly curved, few granules or small spines proximally, with weak longitudinal rib, indicated on distal half; setose. Pereopod 3 dactylus about as long as combined length of propodus and carpus. Pereopods 4 and 5 minutely granulate, sparsely setose; longer than pereopod 3 merus; dactylus markedly shorter than propodus, length $1.5\times$ height, falcate, apex corneous apex, flexor margin with 4 obliquely inclined corneous spines. Pereopod 5 merus, when folded against carapace, reaching anterior one-third of carapace.

Thoracic sternite 3 pentagonal, width $1.5\times$ length; margins divergent posteriorly, anteriorly divergent at obtuse angle; surface granulate. Margins of sternites 4 and 5 granulate. Abdomen with margins and surface finely granulate or minutely spinulate. Somite 6 and telson fully demarcated, articulating; telson broadly rounded, width $2.4\times$ length. Gonopod 1 with 3 articles; distal article cannulate, forming copulatory tube, with long distal setae. Gonopod 2 with articles fused, distomesial margin slightly hollowed, apex acute.

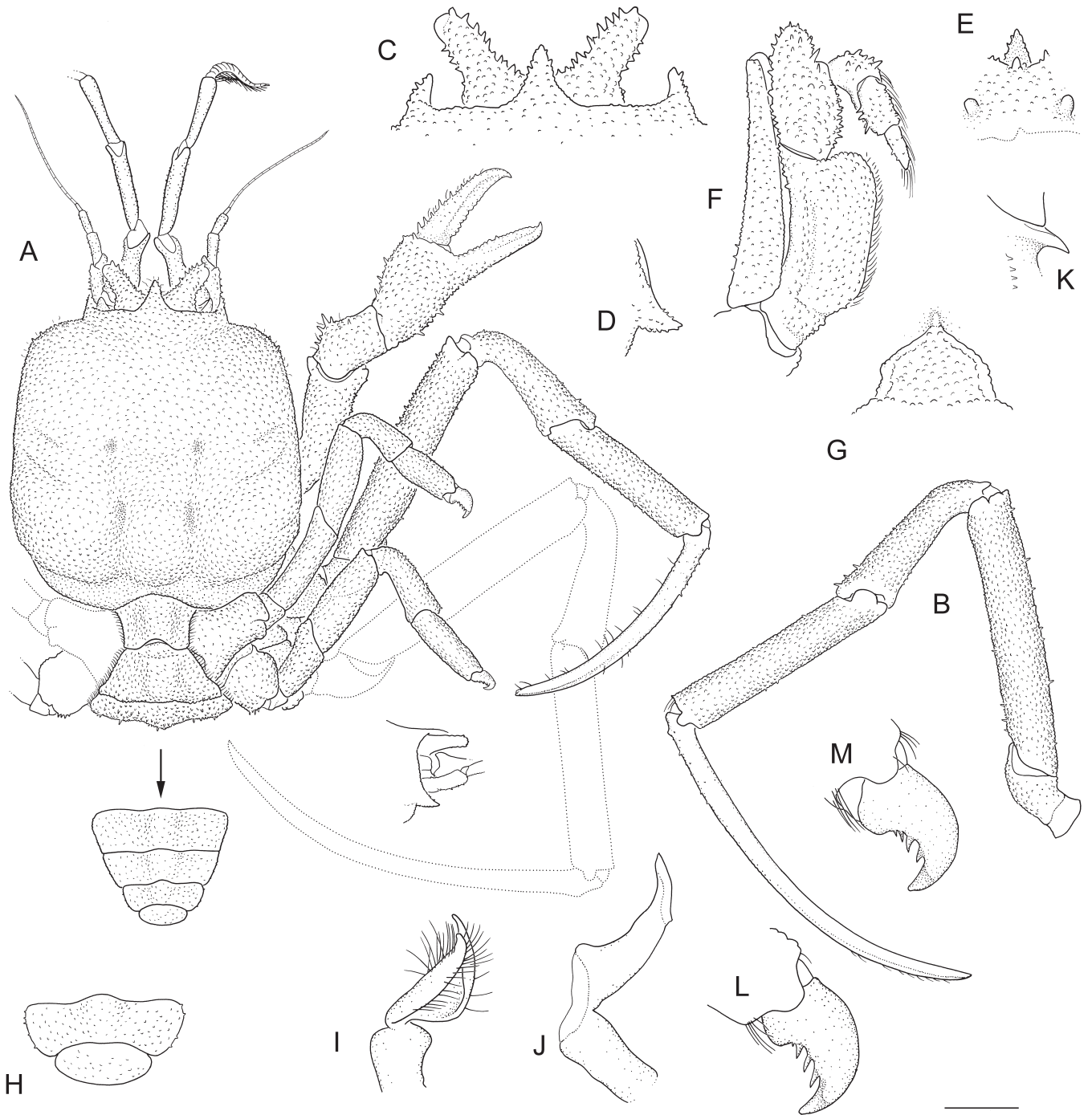


Fig. 4. *Cymonomus java*, new species, male holotype (cl 8.2 mm, pcl 7.5 mm, cw 7.6 mm), Java, CP35, MZB Cru 5024. A, dorsal habitus; B, left pereopod 3, dorsal view; C, fronto-orbital region; D, right outer-orbital process, lateral view; E, anterior epistome, ventral view; F, right maxilliped 3; G, thoracic sternite 3; H, abdominal somite 6 and telson; I, right G1, abdominal view; J, right G2, abdominal view; K, right epistomial spine mesial to base of antenna; L, pereopod 4 dactylus; M, pereopod 5 dactylus. Scale: A, B = 2.0 mm; D–J = 1.0 mm; K–M = 0.5 mm.

Etymology. The name refers to the known geographical distribution of the species; used as a noun in apposition.

Remarks. *Cymonomus java*, new species, is the sixth member of the *C. delli* group and morphologically closest to *C. cognatus* (Japan, Taiwan, South China Sea) and *C. andamanicus* (Andaman Sea). Females of *C. java* and *C. andamanicus* are presently unknown but males of the three species agree in almost all respects, sharing similar antennular and walking leg proportions, carapace shape,

frontal ornamentation, and telson shape, but differ in the stouter pereopod 4 and 5 dactyli (length about 1.5× height in *C. java* and *C. andamanicus* versus about twice height in *C. cognatus*). *Cymonomus java*, however, is readily distinguished from *C. andamanicus* and *C. cognatus* by the articulation of the telson and abdominal somite 6. In *C. cognatus* and *C. andamanicus*, the male telson and abdominal somite 6 are immovably fused (although with an indistinct demarcation), but fully demarcated and articulated in *C. java*. In addition, the COI sequence of *C. java* is

divergent from that of *C. cognatus* from the South China Sea by 4.3–4.4% (uncorrected p-distance) (Ahyong, in prep.). Significantly, the free telson and abdominal somite 6 of *C. java* is unique in *Cyonomus*. All other species of *Cyonomus* have a fused abdominal somite 6 and telson, even if the demarcation is indicated by a transverse groove as in other species of the *C. delli* group, or only partially indicated by lateral incisions as in *C. karenae* Ahyong, 2019. Although *C. java* and *C. andamanicus* are known only from their respective holotypes, thus preventing evaluation of variation in the telson-abdominal somite 6 demarcation, the pleotelson condition in *C. delli*, for which a good of both sexes is available, is constant (Ahyong, 2019).

In addition to *C. java*, two other members of the *C. delli* group are recorded from the Indian Ocean: *C. andamanicus* from the Andaman Sea, and *C. delli* from southern and southwestern Australia. Apart from the articulated (versus fused) abdominal somite 6 and telson, differences between males of *C. java*, *C. delli*, and *C. andamanicus* are minor. The new species is further distinguished from *C. delli* in the proportionally shorter and stouter pereopod 4 and 5 dactyli (length about 1.5× height in *C. java* versus about twice height in *C. delli*). *Cyonomus java* is distinguished from *C. andamanicus* by the subparallel versus posteriorly divergent lateral margins of the carapace, narrower fronto-orbital width (0.56× anterior carapace width versus 0.66), and position of the articulation of the maxilliped 3 palp, being distal to, instead of at the midlength of the merus (in *C. andamanicus*).

Despite the telson being articulated, the demarcation in male *C. java* superficially resembles the well-defined groove present in the pleotelson in *C. cubensis*, *C. delli*, and *C. diogenes*, and could be misinterpreted without close examination or direct manipulation of the structure. The new species further differs from *C. cubensis* in having distinctly more robust, rather than slender, pereopods 4 and 5 (see Fig. 1A, B; Chace, 1940: fig. 6A) and proportionally shorter male telson (width about 2.4× length versus 1.7 in *C. cubensis*). From *C. diogenes*, *C. java* is also separated by the proportionally shorter walking legs in males (pereopod 2 merus 1.1 versus 1.4× pcl), the subparallel rather than divergent lateral margins of the carapace, and position of the articulation of the maxilliped 3 palp distal to, instead of at the midlength of the merus.

Distribution. Presently known only from the type locality.

ACKNOWLEDGEMENTS

SJADES 2018 was a joint Indonesian-Singapore expedition to southern Java funded by the National University of Singapore and the Research Center for Oceanography, Indonesian Institute of Sciences (LIPI); and supported by their respective Ministries of Foreign Affairs under the RISING 50 program to promote bilateral co-operation. Thanks also go to Bertrand Richer de Forges and Chan Tin-Yam for their invaluable help in the trawling work and other support, and

to Tomoyuki Komai and Marcos Tavares for constructive reviews of the manuscript. The authors are grateful to the Indonesian chief scientist on the SJADES Expedition, Dwi Listyo Rahayu, for sharing the interesting material from this cruise with them.

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