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Cyclodorippidae of the SJADES 2018 biodiversity cruise in Indonesia (Crustacea: Decapoda: Brachyura)

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Abstract. The cyclodorippid crabs collected by SJADES 2018, the joint Indonesian–Singaporean expedition to southwestern Java and the Sunda Strait in Indonesia, are reported. Two species were collected, of which one is new to science. The new species, of the genus *Ketamia* Tavares, 1992, is most similar to *K. proxima* Tavares, 1993, from Madagascar, and is the fourth species of the genus to be recorded from Indonesian waters; a key to the species of *Ketamia* is provided. The second species, *Tymolus glaucommus* (Alcock, 1894), is reported for the first time since its description from the Andaman Sea more than a century ago. *Tymolus glaucommus*, long thought by many to be a junior synonym of *T. uncifer* (Ortmann, 1892) (type locality: Japan), is regarded here as a valid species that closely resembles, and may prove to be, a senior synonym of *T. brucei* Tavares, 1991, described from northwestern Australia.

Key words. Cyclodorippoidea, *Ketamia rising*, new species, *Tymolus glaucommus*, Indonesia, Eastern Indian Ocean, taxonomy, deep-sea

INTRODUCTION

The joint Indonesian–Singaporean South Java Deep-Sea Biodiversity Expedition (SJADES) 2018 surveyed deep-water habitats off the Indian Ocean coast of western to central Java as well as the Sunda Strait, in Indonesia, at depths of 92–2,355 m, resulting in a diverse collection of marine invertebrates and fishes, including decapod Crustacea. Among the typically deep-water decapod groups, cyclodorippoid crabs are ubiquitous but usually rare and encountered in low numbers. Accordingly, the cyclodorippoids collected by the SJADES expedition are few, representing two families, Cymonomidae and Cyclodorippidae. The SJADES cymonomids were reported by Ahyong et al. (2020), and included a significant range extension for *Cymonomus chani* Ahyong & Ng, 2017, and a species new to science, *C. java* Ahyong, Mitra & Ng, 2020. Here, we report on the Cyclodorippidae, represented by two species, of which one is new to science, and the other, the first report of the species after more than a century since it was formally described.

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MATERIAL AND METHODS

Measurements and terminology follow Ahyong et al. (2009) and Ahyong (2019). Carapace length (cl) includes the rostrum. Carapace width (cw) is the greatest width across the branchial regions. Antennular peduncle length is the extended length of all three articles combined. Specimens are deposited in the collections of the Museum Zoologicum Bogoriense, Indonesian Institute of Sciences, Cibinong (MZB), and Lee Kong Chian Natural History Museum, National University of Singapore (ZRC).

SYSTEMATICS

Cyclodorippoidea Ortmann, 1892

Cyclodorippidae Ortmann, 1892

Ketamia rising, new species
(Figs. 1, 2)

Type material. HOLOTYPE: MZB, male (cl 2.9 mm, cw 3.0 mm), Sunda Strait (between Tabuan Island and Sumatra), 05°44.68′S 104°51.15′E – 05°44.92′S, 104°52.06′E, 379–409 m, coarse sand, gravel, rubble, & sunken wood; beam trawl, K/R *Baruna Jaya VIII*, SJADES 2018 stn CP07, 25 March 2018.

Diagnosis. Carapace dorsal surface finely granular; widest at anterior to mid-length; rounded, sub-elliptical outline; anterolateral spine short but distinct, placed slightly forwards of widest point of carapace; lateral margins with few, scattered, soft, fine setae. Thoracic sternum finely granular.

Endostome reaching anteriorly beyond end of antennular article 1. Outer surface of cheliped palm without longitudinal row of tubercles.

Description. Carapace sub-elliptical, about long as wide; lateral margins finely granular, sparsely setose, asymmetrically convex, widest anterior to midlength; dorsal surface sparsely and finely granular, regions weakly indicated; lower pterygostomian region granular and minutely spinose, sparsely setose. Anterolateral spine short, conical, located at anterior ¼ of lateral margin slightly forwards of widest point of carapace. Fronto-orbital margin about 0.8× maximum carapace width, weakly granular, with shallow, obtuse median sinus; outer orbital spine bluntly pointed, directed anteriorly; eyes not extending laterally beyond outer orbital spines, stalks with few granules anteriorly, otherwise smooth; cornea pigmented. Endostome anterior margin extending beyond antennular article 1.

Antennular peduncle 0.53cl; article 1 with distal spinule and granules, otherwise smooth; articles 2 and 3 smooth. Antennal peduncle article 1 granular and minutely spinular; remaining articles smooth.

Maxilliped 3 outer surface minutely and sparsely granular; ischiobasis subquadrate, shallow longitudinal sublateral groove extending onto merus; ischium and basis demarcated by row of granules. Merus shorter than ischium; length less than twice width; lateroexternal margin curved, mesial margin straight, margins tapering distally to rounded apex. Dactylus, propodus, and carpus unarmed. Exopod slightly exceeding ischium distally, flagellum absent.

Chelipeds (pereopod 1) robust, equal in size and ornamentation, sparsely setose. Merus finely granulate, unarmed. Carpus finely granulate, dorsal margin with distinct spine flanked by acute granules. Propodus palm surfaces finely and evenly granulate, granules longest on dorsal and ventral margins. Dactylus longer than dorsal palm length; proximal three-fourths granular; occlusal surfaces of dactylus and pollex crenulate, without gape when fingers closed.

Pereopods 2 and 3 similar, latter longer, with scattered setae; propodus, carpus, and merus with scattered granules along flexor and extensor margins, otherwise smooth; dactylus smooth, ovate in cross-section, almost straight on pereopod 2, broadly curved on pereopod 3. Pereopod 3 merus 0.67cl; dactylus as long as merus, three-fourths combined length of carpus and propodus.

Pereopods 4 and 5 minutely granulate, sparsely setose; dactylus sickle-shaped, unarmed, forming gape with propodus. Pereopod 5 merus, when folded against carapace, slightly overreaching anterolateral spine of carapace.

Thoracic sternum with surface finely granular.

Pleon of 5 free segments, somite 1 quadrate; somite 2 wider than somite 1, trapezoid, margins granulate; somites 3 and 4 shorter than but as wide as somite 2, lateral margins rounded, granular; somites 5, 6 and telson indistinguishably fused forming pleotelson, trianguloid, margins weakly sinuous, apex rounded, length 1.7× width, as long as combined length of somites 1–4.

Gonopod 1 distal article cannulate, forming copulatory tube, setose. Gonopod 2 with articles fused, distomesial margin slightly hollowed, produced into slender, flattened process with acute apex, proximally twisted.

Colour in life. Pale off-white overall, with light brown mottling on mid-branchial surfaces of the carapace; corneas of the eyes dark brown (Fig. 1).

Etymology. The new species name derives from "RISING50", a celebration of the 50 years of bilateral relations between the Republic of Indonesia (RI) and Singapore (SING) in 2017. The SJADES 2018 Expedition was envisioned under the RISING50 programme as a scientific collaboration between the two countries, reflecting their strong ties, with enthusiastic support from their respective governments. Used here as a noun in apposition.

Remarks. *Ketamia rising*, new species, is morphologically closest to *K. proxima* Tavares, 1993, from Madagascar, sharing similarly finely granular carapace and thoracic sternal surfaces, and a finely granular outer surface of the cheliped palm. The two species are distinguished by the carapace shape (widest anterior to the midlength in *K. rising*, with an asymmetrically curved lateral margin [Fig. 1A, B, 2A], versus widest near the midlength in *K. proxima*, with a symmetrically curved lateral margin [cf. Tavares, 1993: fig. 19a]) and by the anterior extent of the endostome (not reaching the end of antennular article 1 in *K. proxima* [cf. Tavares, 1993: fig. 19a], versus reaching beyond the apex in *K. rising* [Fig. 2C]). From *K. depressa* (Ihle, 1916), *K. rising* is readily distinguished by the evenly and finely granular outer surface of the cheliped palm (Fig. 2B) (versus having a longitudinal row of enlarged granules in *K. depressa* [cf. Tavares, 1993: fig. 16b]). *Ketamia rising* can be distinguished from *K. limatula* by the granular (Fig. 2E) rather than smooth [cf. Tavares, 1993: fig. 18c] thoracic sternal surface, and from *K. handokoi* Tavares, 1993, by the much more anteriorly produced endostome, which, in the latter, does not extend anteriorly beyond the frontal margin of the carapace (cf. Tavares, 1993: fig. 17a). *Ketamia rising* can be distinguished from *K. nagaii* Takeda & Komatsu, 2020, recently described from Japan, by the granular (versus smooth carapace) surface and unarmed (versus spinous) outer orbital margin (Takeda & Komatsu, 2020).

The carapace of *K. rising*, new species, has a more rounded outline than the subquadrate form of *K. depressa*, *K. proxima*, and *K. limatula*, and in this respect more closely resembles *K. handokoi*, particularly that of a small male (cl 3.4 mm, cw 3.6 mm), apparently nearly mature, from Taiwan tentatively identified as such by Ho et al. (2004: figs. 1F, 2) and Ahyong et al. (2009: figs. 129, 130). Little has been documented about allometric changes in *Ketamia* but Ho et al. (2004) noted of their specimen that pleonal somites 5 and

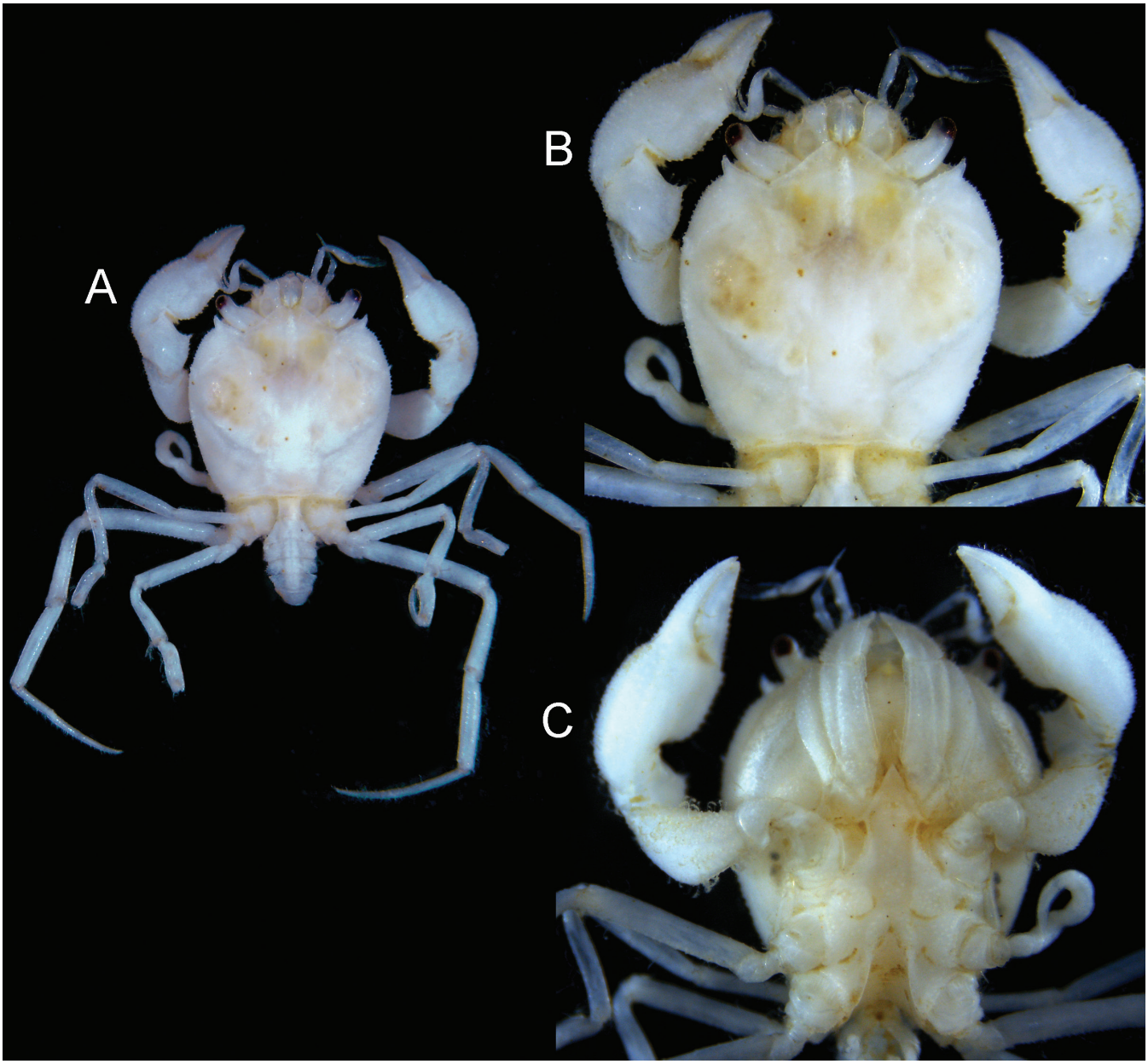

Fig. 1. *Ketamia rising*, new species, male holotype, cl 2.9 mm, cw 3.0 mm, SJADES 2018, station CP07, MZB (ex. ZRC 2018.1111); newly preserved colouration (in EtOH). A, dorsal habitus; B, carapace and cheliped (dorsal view); C, thoracic sternum, mouthparts, and chelipeds (ventral view).

6, although immovably fused, are demarcated by a suture, which is not evident in larger specimens of *K. handokoi* (cl 10 mm, cw 10 mm; Tavares, 2000: fig. 1). In *K. rising*, even at cl 2.9 mm, no suture is evident between pleonal somites 5 and 6. The single known specimen of *K. rising* appears to be an adult given the well-developed gonopods. Apart from *K. proxima* Tavares, 1993, from Madagascar, all other species of *Ketamia* occur in Indonesian waters, although *K. depressa*, *K. limatula*, and *K. handokoi* also occur more widely (Tavares, 1993, 1997).

Distribution. Presently known only from the type locality, Sunda Strait, Indonesia.

Key to species of *Ketamia*

1. Endostome not exceeding frontal margin of carapace..... .....*K. handokoi*
– Endostome anteriorly clearly exceeding frontal margin of carapace 2
2. Carapace lateral margins with about 10 long (about 0.15 cw), thick, well-spaced, laterally directed setae in addition to short scattered soft, fine setae. Thoracic sternum smooth, not granulose..... *K. limatula*
– Carapace lateral margins glabrous or with scattered, soft, fine setae. Thoracic sternum granulose.....3
3. Cheliped palm outer surface with longitudinal row of 6–10 tubercles.....*K. depressa*
– Cheliped palm outer surface without longitudinal row of tubercles.....4

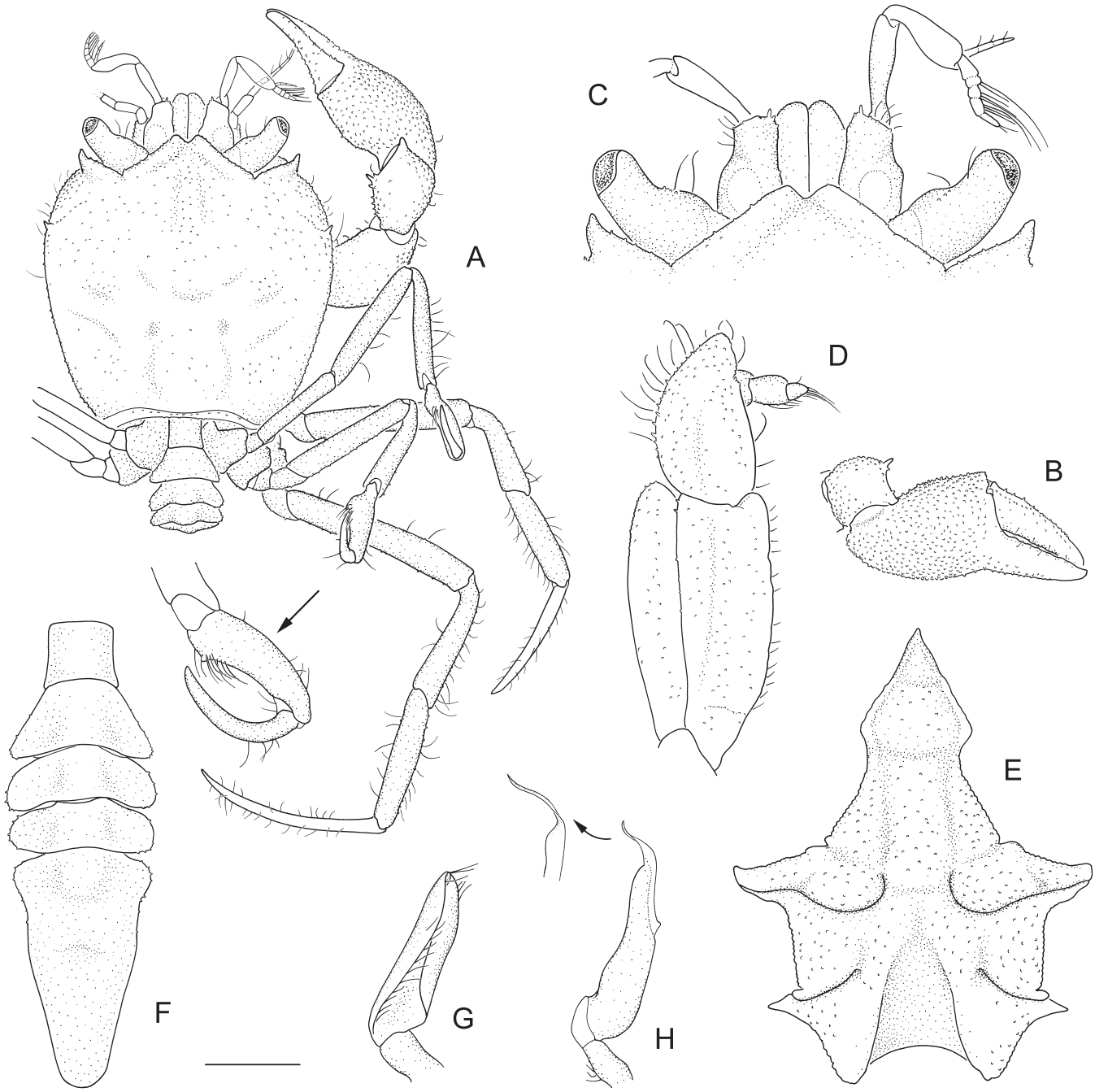

Fig. 2. *Ketamia rising*, new species, male holotype, cl 2.9 mm, cw 3.0 mm, SJADES 2018, station CP07, MZB (ex. ZRC 2018.1111). A, dorsal habitus; B, right chela, outer surface; C, anterior cephalothorax, dorsal view; D, right maxilliped 3; E, thoracic sternum; F, pleon; G, right G1, pleonal view; H, right G2, pleonal view. Scale: A, B = 1.0 mm; C–H = 0.5 mm.

4. Carapace dorsal surface smooth, without granules; outer orbital margin spinose.....*K. nagaii*
– Carapace dorsal surface granulate; outer orbital margin granular, without spines.....5
5. Carapace outline subquadrate, widest slightly posterior to midlength; anterolateral spine minute or obsolete. Endostome not reaching anteriorly to end of antennular article 1 .... *K. proxima*
– Carapace outline subovate; lateral margins widest anterior to midlength; anterolateral spine prominent. Endostome reaching anteriorly beyond end of antennular article 1 ....*K. rising*, new species

***Tymolus glaucommus* (Alcock, 1894)**
(Figs. 3, 4)

Cymonomops glaucomma Alcock, 1894: 406, 407. — Alcock & Anderson, 1895: pl. 14 fig. 9 [type locality: Andaman Sea, 11°25′05″N, 92°47′06″E]. — Alcock, 1896: 287, 288. — Bouvier, 1898: 13. — Grant, 1905: 317. — Spiridonov & Türkay, 2007: 7.

Tymolus glaucomma. — Tavares, 1991: 446. — Tan & Huang, 2000: 139.

Tymolus glaucommus. — Ng et al., 2008: 31. — Trivedi et al., 2018: 33.

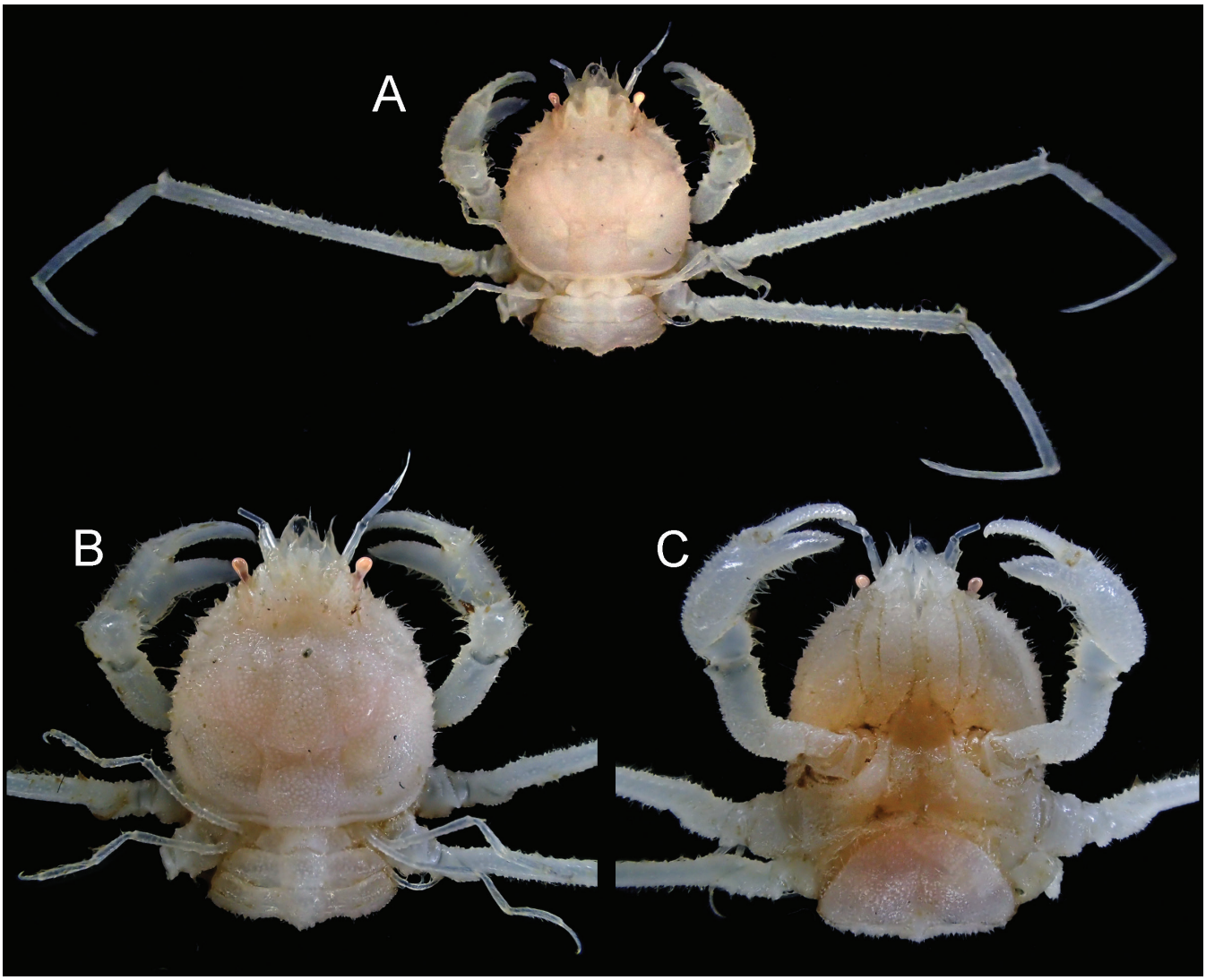

Fig. 3. *Tymolus glaucommus* (Alcock, 1894), ovigerous female, cl 6.1 mm, cw 6.1 mm, SJADES 2018, station CP48, ZRC 2018.1154; colour in life. A, dorsal habitus; B, carapace, chelipeds, P4, and P5 (dorsal view); C, thoracic sternum, pleon, mouthparts, and chelipeds (ventral view).

Material examined. ZRC 2018.1154, 1 ovigerous female (cl 6.1 mm, cw 6.1 mm), south of Tanjung Gedeh, western Java, 07°51.12–51.72′S, 107°46.25–46.38′E, 689–637 m, mud, beam trawl, K/R *Baruna Jaya VIII*, SJADES 2018 stn CP48, 1 April 2018.

Colour in life. Off-white overall, with tinges of pink on the surfaces of the carapace, thoracic sternum and pleon; cornea of eyes bright pink (Fig. 3).

Remarks. *Tymolus glaucommus* (Alcock, 1894), described from the Andaman Sea, is variously regarded as valid (Tan & Huang, 2000; Ng et al., 2008; Trivedi et al., 2018) or as a junior synonym of *T. uncifer* (Ortmann, 1892) (type locality: Japan) (Doflein, 1904; Tavares, 1991), a species in which the pereopod 2 merus is shorter than the combined length of the dactylus, propodus, and carpus. Alcock (1894: 407), however, described the merus of the walking legs of *T. glaucommus* as "forming more than half" their length. Similarly, Alcock & Anderson's (1895: pl. 14 fig. 9, 9a) figures show the pereopod 2 with a combined dactylus, propodus, and carpus length to be shorter than the merus, which is in turn about 2.5 cl, compared to < 2.0 cl in *T. uncifer* sensu stricto (based on Tavares, 1991; Ahyong et al., 2009). Based on type account and figures, *Tymolus glaucommus* is herein regarded as a valid species separate from *T. uncifer*. *Tymolus uncifer* appears to be restricted to East Asia (Spiridonov & Türkay, 2007). Previous records from East Africa (Doflein, 1904) are referable to *T. globifer* Spiridonov & Türkay, 2007, and those from Indonesia (Ihle, 1916) are probably referable to either *T. glaucommus* or *T. brucei* Tavares, 1991 (type locality: off northwestern Australia, 18°52.2′S, 116°11.1′E).

We tentatively assign the SJADES specimen to *T. glaucommus* (Alcock, 1894) given its close morphological correspondence to published accounts (e.g., Alcock, 1894, 1896; Alcock & Anderson, 1895: pl. 14 fig. 9, 9a) and proximity to the Andaman Sea type locality. The rostrum and frontal ornamentation of the SJADES specimen (Figs. 3A, B, 4A) agree closely with the holotype figure of *T. glaucommus*. Notably, of the walking legs in the SJADES specimen, the

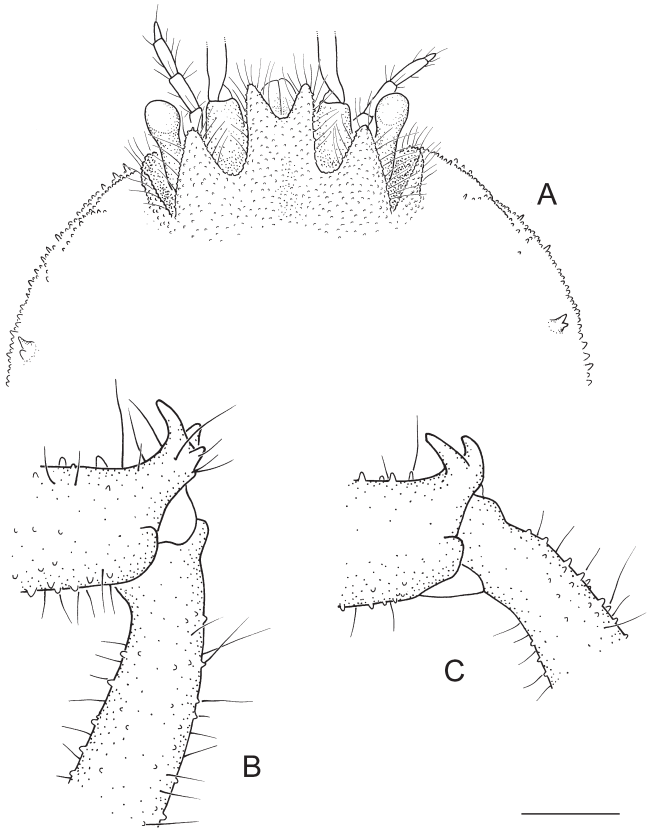

Fig. 4. *Tymolus glaucommus* (Alcock, 1894), ovigerous female, cl 6.1 mm, cw 6.1 mm, SJADES 2018 station CP48, ZRC 2018.1154. A, anterior cephalothorax; B, right pereopod 2, merus-carpus articulation; C, right pereopod 3, merus-carpus articulation. Scale = 1.0 mm.

pereopod 2 merus (Fig. 3A) is longer than combined length of the corresponding dactylus, propodus, and carpus, and the main distal meral spine (trifid and bifid on the pereopods 2 and 3, respectively; Fig. 4B, C) is prominent and recurved as figured in the holotype of *T. glaucommus*. The only observed departures in the SJADES specimen, however, are in the presence of a small compound tubercle on the dorsolateral branchial surface of the carapace (Fig. 4A) (neither mentioned nor figured in the type account of *T. glaucommus*) and in the proportionally shorter pereopod 2 merus, at 1.8 cl versus 2.5 cl in the holotype of *T. glaucommus* (based on Alcock & Anderson, 1895: pl. 14 fig. 9). Given that the branchial tubercle could be easily overlooked, its presence or absence in the type material of *T. glaucommus* requires confirmation. The proportionally shorter pereopod 2 merus of the SJADES specimen might be an artefact of individual and/or allometric variation, as observed in *T. brucei* (see Ahyong & Ng, 2011).

Consideration of other regional species raises questions about the status of *T. brucei* Tavares, 1991 (described from the eastern Indian Ocean off Western Australia), with respect to *T. glaucommus*, as noted by Spiridonov & Türkay (2007). *Tymolus brucei* is currently accorded a wide geographical range from northwestern Australia to Indonesia, Vietnam, the Philippines, China, and Taiwan (Tavares, 1991, 1993; Chen & Sun, 2002; Ho et al., 2004; Ahyong & Ng, 2011) that warrants review. Nevertheless, *Tymolus glaucommus* and *T. brucei*, as currently understood, share key diagnostic features in the similar frontal and orbital structure, and the pereopod 2 merus being longer than the combined length of the dactylus, propodus, and carpus. The pereopod 2 merus is also of comparable length in both species: 2.5 cl in the female holotype of *T. glaucommus*; 2.2–2.8 cl (males) and 2.3–2.7 cl (females) in *T. brucei* (based on the holotype and Philippine specimens reported by Ahyong & Ng, 2011). These similarities and the close geographical proximity of the respective type localities suggest that *T. glaucommus* could be a senior synonym of *T. brucei*. The two species, however, apparently differ in the form of the distal spines on the extensor margin of the pereopods 2 and 3 merus, being recurved in *T. glaucommus* (Fig. 2B, C) rather than low and bluntly angular in the type and Philippine material of *T. brucei* (cf. Tavares, 1991: fig. 8B). Furthermore, both flexor and extensor margins of pereopods 2 and 3 are lined with distinct spinules in *T. glaucommus* (Fig. 3B; cf. Alcock & Anderson, 1895: pl. 14 fig. 9), whereas in *T. brucei* these are replaced by small, low granules (cf. Tavares, 1991: figs. 8B, 10C). Until the type and other material of *T. glaucommus* can be studied and the significance of such differences better evaluated, we retain the current taxonomic status of both species.

Distribution. Andaman Sea, and now from off Java, Indonesia; 637–741 m.

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