



***Sundathelphusa tuerkayi*, a new species of gecarcinucid freshwater crab (Crustacea: Brachyura) from Lombok Island, Indonesia**

Peter K. L. Ng¹ and Arthur Anker²

¹ Lee Kong Chian Natural History Museum, Faculty of Science, National University of Singapore, 2 Conservatory Drive, Singapore 117377, Republic of Singapore.

PKLN E-mail: peterng@nus.edu.sg

² Programa de Capacitação Institucional, Museu Paraense Emílio Goeldi, Campus de Pesquisa, Avenida Perimetral, 1901, Terra Firme. 66077-830 Belém, Pará, Brazil.

AA E-mail: arthuranker7@yahoo.com

ZOOBANK <http://zoobank.org/urn:lsid:zoobank.org:pub:FD4CC845-78D2-497A-8BD8-569F73910201>

ABSTRACT

A new species of the freshwater crab genus *Sundathelphusa* Bott, 1969 is described from the Indonesian island of Lombok. *Sundathelphusa tuerkayi*, new species, appears to be most closely related to *Sundathelphusa aruana* (Roux, 1911), which is known for certain only from the Aru Islands, but differs from it and all other congeners by a unique combination of morphological characters. The new crab hosts a small ectosymbiotic temnocephalid flatworm, possibly belonging to the genus *Temnosewellia* Damborenea and Cannon, 2001 (Platyhelminthes: Temnocephalida).

KEY WORDS

Crabs, Gecarcinucidae, South-East Asia, temnocephalid worm, symbiosis.

CORRESPONDING AUTHOR

Peter K. L. Ng
peterng@nus.edu.sg

SUBMITTED 8 July 2016

ACCEPTED 19 October 2016

PUBLISHED 8 December 2016

Guest Editor

Célio Magalhães

DOI 10.1590/2358-2936e2016026

INTRODUCTION

The Indonesian island of Lombok is inhabited by three known species of true freshwater crabs, all belonging to the family Gecarcinucidae: *Sundathelphusa aruana* (Roux, 1911), *Parathelphusa lombokensis* Bott, 1970, and *Parathelphusa quadrata* Ng, 1997 (Bott, 1970; Ng, 1997), the latter two species being endemic to the island. *Sundathelphusa aruana*, first described from the Aru Islands to the west of West Papua, was first reported from Lombok by Bott (1970).

A re-examination of Bott's (1970) specimens from Lombok, as well as fresh material collected in 2014, leads the authors to conclude that the taxon reported as "*Sundathelphusa aruana*" actually represents a different species, here recognised as new to science. The description of this new species and comparisons with its closest congener *S. aruana* form the basis of the present paper.

MATERIAL AND METHODS

The material examined is deposited in the Naturhistorisches Museum Basel, Basel, Switzerland (NMB); Senckenberg Naturmuseum, Frankfurt-am-Main, Germany (SMF); and Zoological Reference Collection of the Lee Kong Chian Natural History Museum, National University of Singapore, Singapore (ZRC). Measurements, in mm, are provided only for adult crabs and are of the maximum carapace width and length, respectively. The terminology used follows that of Ng (1988).

TAXONOMY

Family Gecarcinucidae Rathbun, 1904

Genus *Sundathelphusa* Bott, 1969

Sundathelphusa tuerkayi, new species

(Figs. 1, 2A, 3–5)

Sundathelphusa aruana — Bott, 1970: 75 (part) (not *Potamon* (*Geotelphusa*) *aruanus* Roux, 1911)

Material examined. Indonesia, Nusa Tenggara Barat, Lombok Island. Holotype: male (34.7 × 26.5 mm) (SMF 1799a), Sembalun, 1185 m, coll. J. Elbert, 7

March 1909–18 May 1910. Paratypes: 3 males (28.5 × 21.7 mm, 29.3 × 22.6 mm, 30.3 × 23.6 mm), 3 females (22.7 × 18.2 mm, 26.3 × 20.9 mm, 32.4 × 25.0 mm) 1 juvenile female (19.5 × 15.4 mm) (SMF 1799b), same data as holotype; 1 male (23.1 × 17.8 mm), 1 female (38.0 × 29.4 mm) (SMF 1800), Praya, 680 m above sea level, same data as holotype; 2 males (12.7 × 10.1 mm, 25.4 × 20.5 mm) (ZRC 2014.0849), 1 female (29.0 × 23.0 mm) (ZRC 2014.0850), 1 female (25.1 × 20.2 mm) (ZRC 2014.0851), 1 juvenile male, 1 juvenile female (ZRC 2014.0852), 1 female (26.6 × 22.2 mm) (ZRC 2014.0853), 1 male (24.0 × 18.9 mm) (ZRC 2014.0854), north of Suranadi, Sesaot village, ~500 m above sea level, small stream, under vegetation near stream bank, coll. F. Muhammad, L.S. Pratama and A. Anker, 17 May 2014; 1 juvenile male, 1 male (17.3 × 14.0 mm), 3 young females (largest 12.8 × 10.4 mm) (ZRC 2014.0855), Lombok Barat, ~200 m above sea level, pool near small waterfall, coll. D.L. Rahayu and A. Anker, 17 May 2014.

Comparative material. *Sundathelphusa aruana* (Roux, 1911): paralectotype male (27.9 × 21.5 mm) (NMB 695a), Indonesia, West Papua, Aru Islands, Kobroor, Manumbai.

Diagnosis. Carapace transversely ovate, inflated (Figs. 1A, C, 2A, 3A); antero- and posterolateral regions covered with distinct short, oblique striae (Figs. 1A, 2A); epigastric cristae raised, rounded, not sharp; postorbital cristae rounded, posterior to epigastric cristae (Figs. 1A, 2A); external orbital tooth low, broadly triangular, outer margin almost straight, ca. three times longer than inner margin (Figs. 1A, 2A); epibranchial tooth very low (Figs. 1A, 2A); ambulatory legs moderately long and slender (Fig. 1A); G1 terminal segment straight, subconical, tapering to subtruncate tip, outer margin lined with setae (Fig. 4A–C).

Description of male holotype. Carapace transversely ovate, inflated, broader than long, widest at anterior half, dorsal surface distinctly convex longitudinally and transversely, smooth or with scattered pits, regions visible; antero- and posterolateral regions covered with distinct short oblique striae; cervical groove shallow but prominent; H-shaped gastric groove deep (Figs. 1A, 2A). Epigastric cristae distinct, raised, rounded,

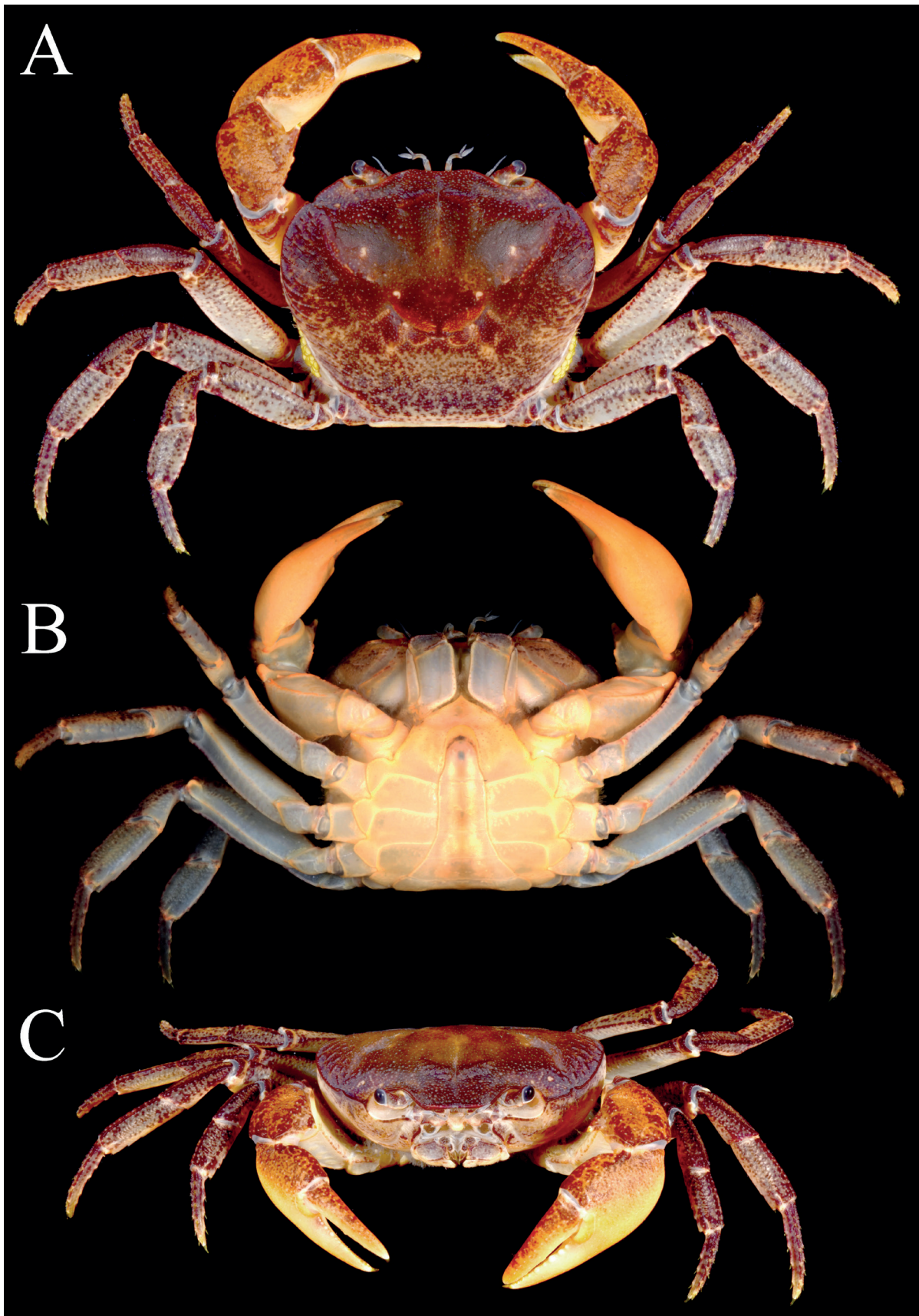


Figure 1. *Sundathelphusa tuerkayi*, new species, colour in life, paratype, male (24.0 × 18.9 mm) (ZRC 2014.0854), Lombok, Indonesia. A, dorsal view (note bright yellow-greenish eggs of symbiotic temnocephalid flatworm on left and right branchiostegia, see also Fig. 6); B, ventral view; C, frontal view.

separated by distinct median furrow; postorbital cristae distinct but rounded, posterior to epigastric cristae, gradually joining anterolateral margin (Figs. 1A, 2A, 3A). Front relatively short, margin sinuous, deflexed, divided into two low rounded lobes (Figs. 2A, 3A). External orbital tooth low, broadly triangular, tip reaching level of frontal margin; outer margin almost straight, about three times longer than inner margin; epibranchial tooth low, separated from external orbital tooth by shallow U-shaped notch; anterolateral margin strongly convex, cristate, surface with low striae; posterolateral margin convex, surface with oblique striae, converging towards gently convex posterior margin of carapace (Figs. 1A, 2A). Frontal median triangle incomplete, lateral margins cristate, dorsal margin low, not confluent with lateral margins; orbit ovate, large; supraorbital margin smooth, confluent with frontal margin; infraorbital margin concave, cristate; suborbital region almost smooth; sub-branchial and pterygostomial regions almost smooth, covered with scattered low striae (Figs. 1A, C, 2A, 3A, C). Posterior margin of epistome with prominent triangular median lobe; lateral lobes low, margins sinuous (Fig. 3A). Eyes well developed, cornea pigmented, occupying almost entire orbit (Figs. 2A, 3A).

Ischium of third maxilliped relatively long, rectangular, much longer than broad, with distinct oblique submedian sulcus, surfaces pitted; merus quadrate, antero-external angle rounded; tip of exopod reaching midpoint of outer margin of merus, with long flagellum (Fig. 3D).

Chelipeds asymmetrical, not noticeably elongated; basis-ischium with low tubercle; merus margins with low uneven granules, dorsal margin with very low rounded subdistal tooth; carpus armed with strong tooth on inner distal angle, with several low tubercles basally (Figs. 2A, 3C). Major chela swollen, surfaces pitted; fingers longer than palm, strongly curved, widely gaping when closed; cutting edges weakly dentate (Figs. 2A, 3C). Minor chela with surfaces pitted, slender; fingers almost straight, distinctly longer than palm; cutting edges with numerous low teeth (Fig. 3C).

Ambulatory legs moderately long, slender; second leg longest; surfaces of articles pitted; dorsal margins of meri subcristate, uneven, weakly serrate, without subdistal tooth or spine, posterior margins smooth; carpus and propodus with dorsal margins uneven to

weakly serrate; outer surface of propodus with low subdorsal ridge; dactylus quadrate in cross-section, margins lined with strong pectinate spines (Figs. 2A, 3F).

Thoracic sternum relatively broad; surfaces distinctly pitted; sternites 1–3 completely fused, sternites 2 and 3 separated by short low, median ridge; sternites 3 and 4 separated by deep transverse groove becoming obscure laterally (Fig. 3B). Sternoabdominal cavity reaching to level of anterior margin of cheliped coxae, anterior to suture between thoracic sternites 3 and 4 (Fig. 3B). Male abdominal locking tubercle large, rounded, positioned on anterior third of sternite 5.

Male abdomen broadly T-shaped; somite 1 short, very broad, reaching to coxae of fourth ambulatory legs; somite 2 broad, transversely subrectangular; somites 3–5 trapezoidal, progressively narrower; somite 6 subquadrate, longer than broad, with concave lateral margins; telson triangular (Fig. 3B, E).

G1 moderately stout, subterminal segment gradually tapering towards terminal segment, separated from latter by distinct suture; terminal segment straight, subconical, tapering to subtruncate tip, outer margin lined with setae (Fig. 4A–C). G2 longer than G1; flagellum long, about three-quarters length of basal segment (Fig. 4D).

Female. Female chelipeds subequal, not inflated; abdomen rounded, covering entire thoracic sternum, somites and telson freely articulating. Vulvae large, round, on submedian part of somite 6; without distinct operculum (Fig. 5).

Variation. The carapaces of smaller specimens tend to be less inflated, with the branchial regions less swollen (Fig. 1A, C). Large male and female specimens have these regions prominently swollen (Figs. 2A, 3A). The chelipeds of large males also have more inflated chelae with long curved fingers that gape even when closed (Fig. 3C). Smaller males have smaller chelae with straighter fingers (Fig. 1C). The lateral margins of male abdominal somite 6 also varies, with those of large males distinctly concave (Fig. 3E), versus almost straight in smaller males (Fig. 1B).

Colour in life. Dorsal surface of carapace is reddish-brown, colour on anterior half more uniform, that on

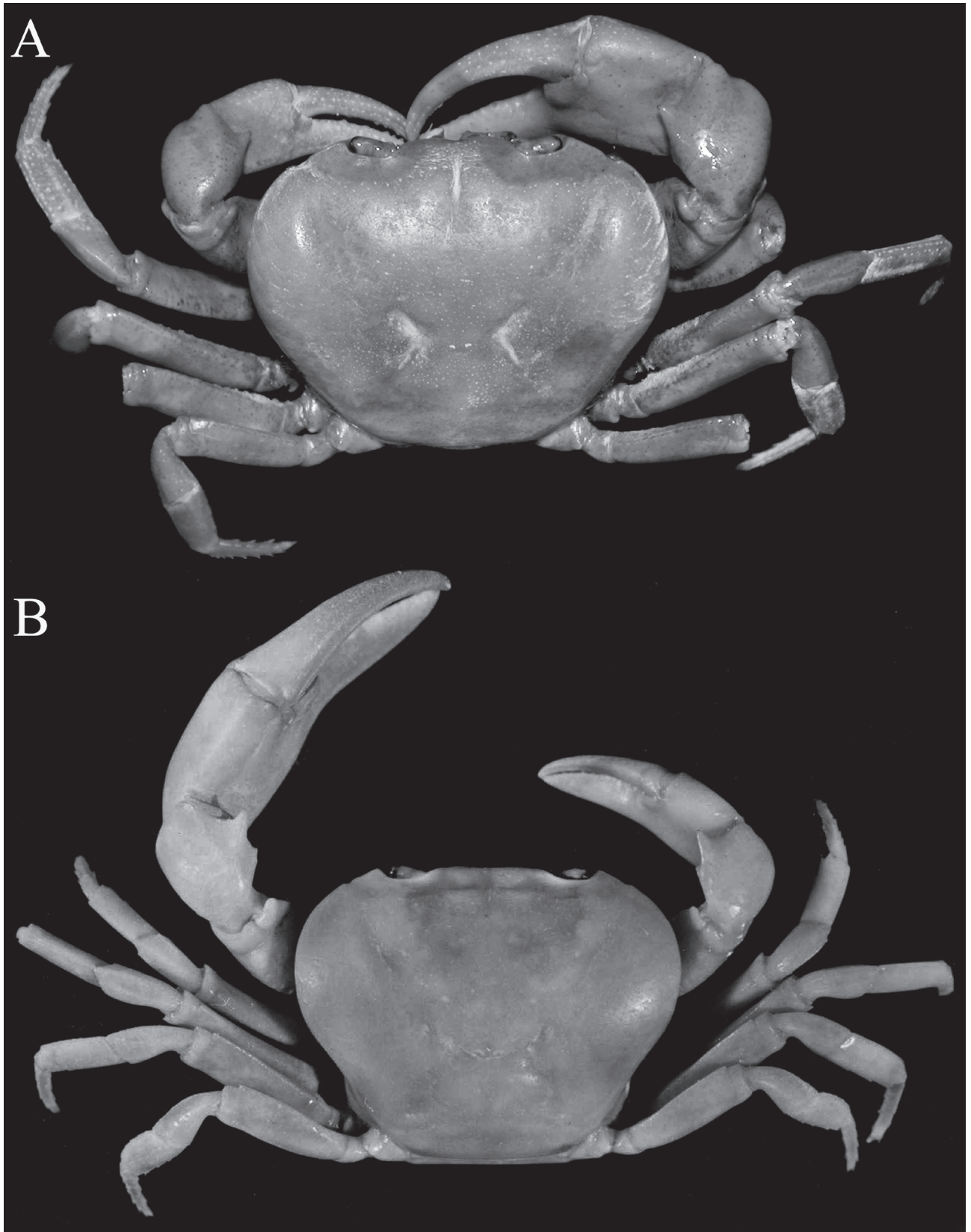


Figure 2. A, *Sundathelphusa tuerkayi*, new species, holotype, male (34.7 × 26.5 mm) (SMF 1799a), Lombok, Indonesia. B, *Sundathelphusa aruana* (Roux, 1911), paralectotype, male (27.9 × 21.5 mm) (NMB 695a), Aru Islands, Indonesia.

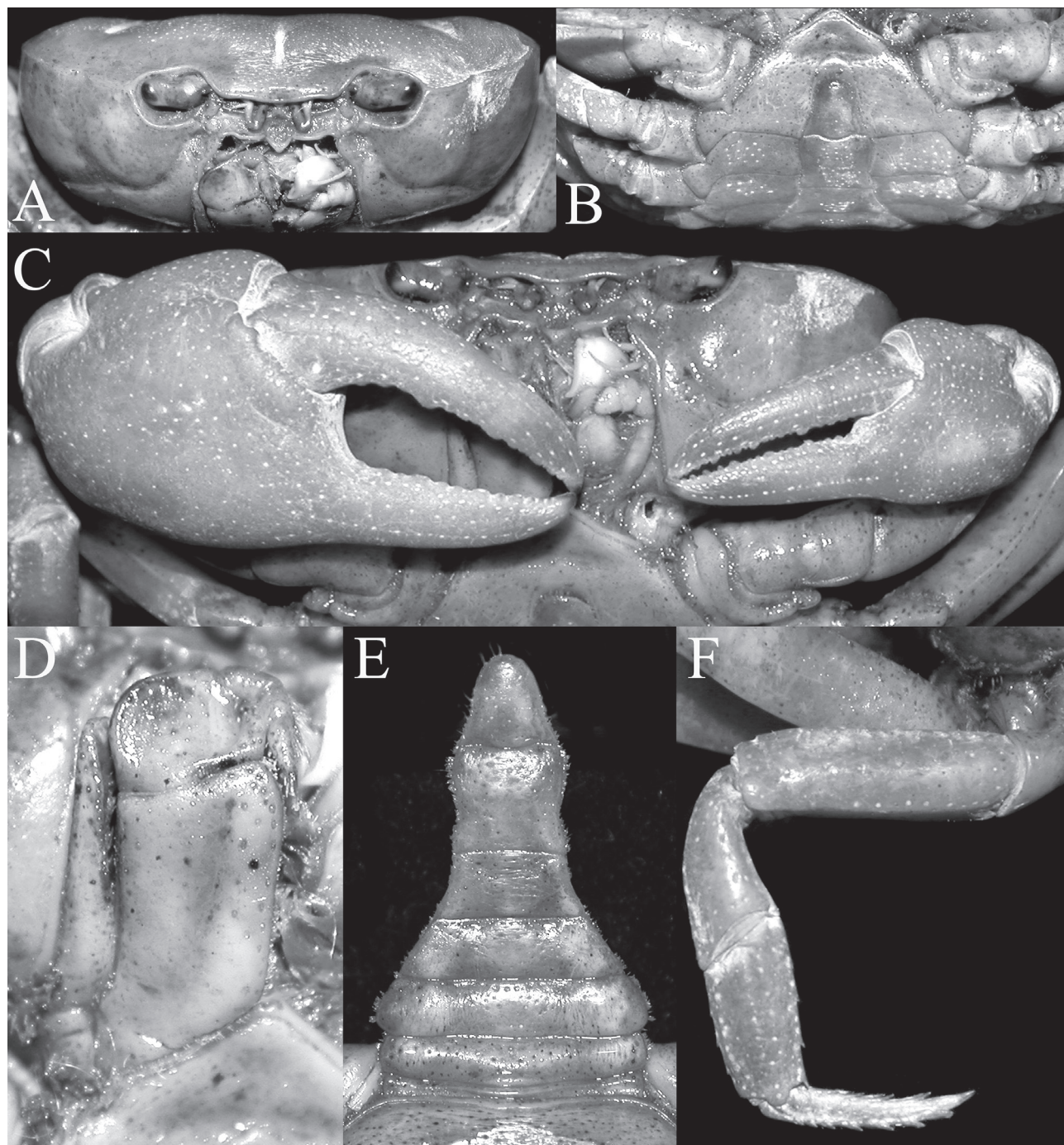


Figure 3. *Sundathelphusa tuerkayi*, new species, holotype, male (34.7 × 26.5 mm) (SMF 1799a), Lombok, Indonesia. A, frontal view; B, anterior thoracic sternum and abdomen; C, chelipeds; D, right third maxilliped; E, abdomen; F, right fourth ambulatory leg.

posterior half more mottled and reticulate with uneven cream patches; dorsal surfaces of chelipeds orange-brown with patches of reddish-brown; ventral surface of chela palm and fixed finger yellow; dorsal surface of ambulatory legs cream with reddish-brown specks and

patches; ventral surfaces pale yellow to cream (Fig. 1).

Etymology. The new species is named after our late friend and colleague, Michael Türkay, for his numerous contributions on taxonomy of decapod crustaceans. He

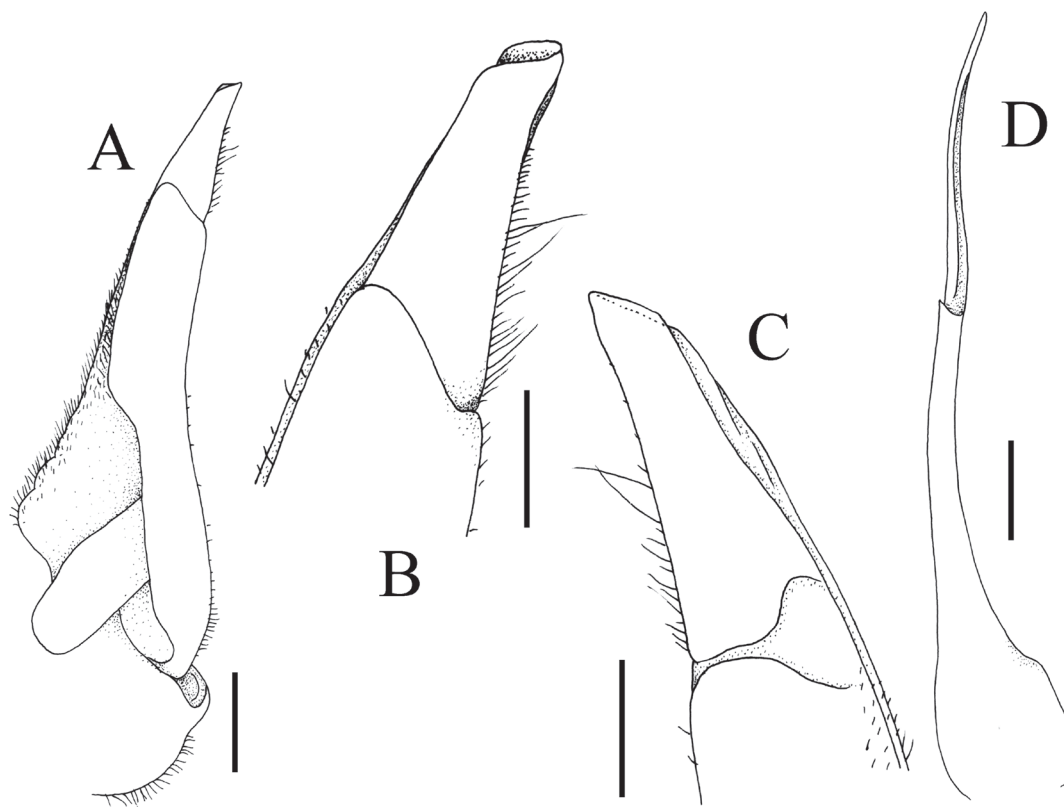


Figure 4. *Sundathelphusa tuerkayi*, new species, holotype, male (34.7 × 26.5 mm) (SMF 1799a), Lombok, Indonesia. A, ventral view of left G1; B, ventral view of terminal segment of left G1; C, dorsal view of terminal segment of left G1; D, ventral view of left G2. Scales: A, D = 1.0 mm; B, C = 0.5 mm.



Figure 5. *Sundathelphusa tuerkayi*, new species, paratype, female (38.0 × 29.4 mm) (SMF 1800), Lombok, Indonesia; thoracic sternum showing vulvae.

was a wonderful host and always facilitated our visits to SMF with great enthusiasm – he will be sorely missed.

Distribution. The new species appears to be endemic to Lombok Island in central Indonesia, where it is presently known from Sembalun, Praya, Suranadi and

Lombok Barat, at altitudes ranging from about 200 m to just over 1000 m.

Biological notes. All crabs collected near Suranadi were found in the dense vegetation fringing banks of a small stream, about two metres wide (with some

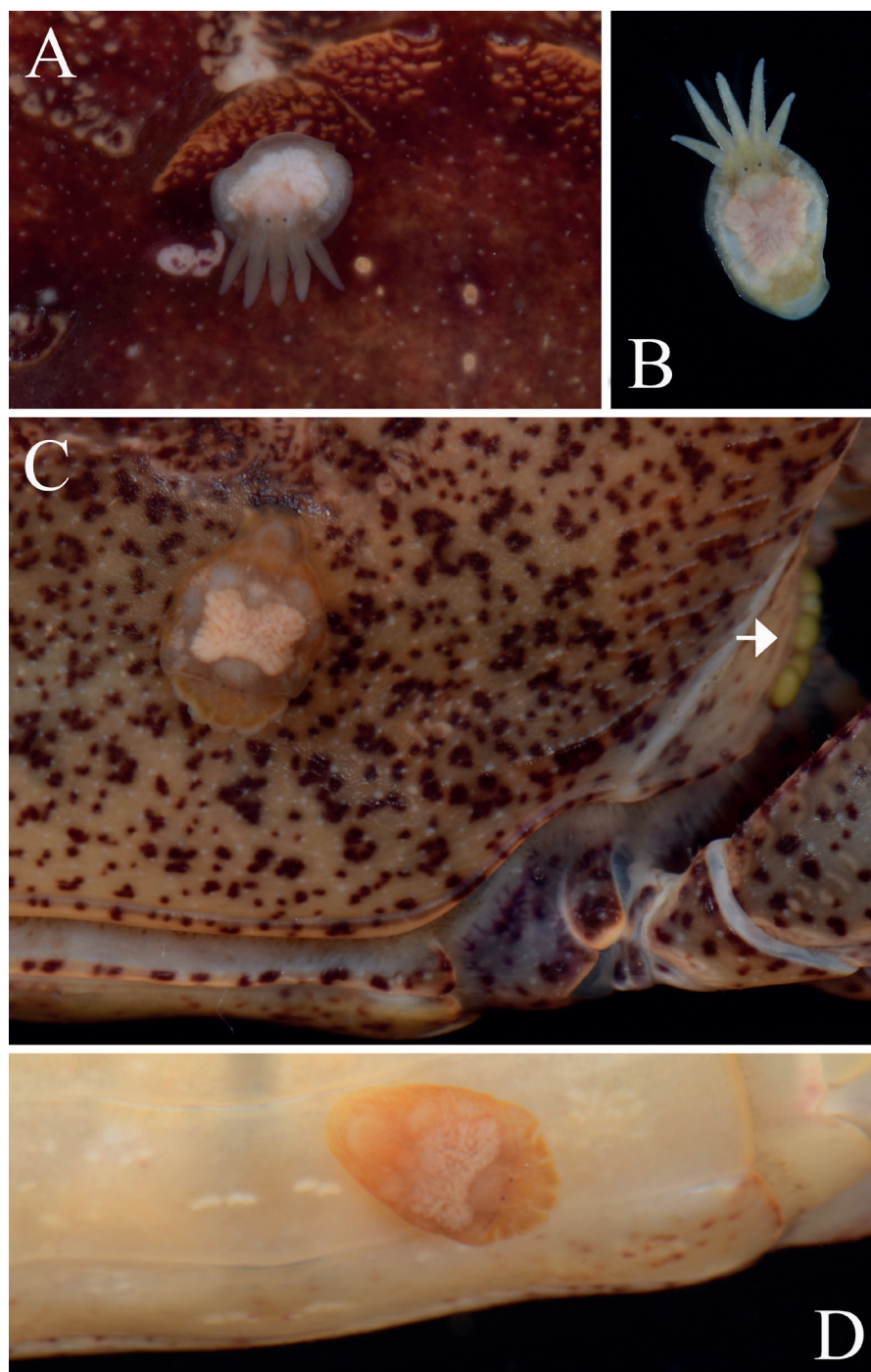


Figure 6. Symbiotic flatworm (Temnocephalida, possibly species of *Temnosewellia* Damborenea and Cannon, 2001) associated with *Sundathelphusa tuerkayi*, new species, in Lombok, Indonesia. A, flatworm *in situ* on carapace, with tentacles extended; B, flatworm *in vitro*; C, flatworm *in situ* on carapace, with tentacles retracted, arrow pointing to eggs attached to right branchiostegium (see also Fig. 1A); D, flatworm *in situ* on abdomen, with tentacles retracted.

wider pool-like areas), with a weak to moderately strong current. Crabs from Lombok Barat were found hiding under rocks in a fairly large pool under a waterfall, about 0.2–0.5 deep. An ectosymbiotic temnocephalid flatworm, possibly belonging to the genus *Temnosewellia* Damborenea and Cannon, 2001 (Platyhelminthes: Temnocephalida) characterised by the presence of five cephalic tentacles (Fig. 6), was found on at least three crab specimens. The flatworm attaches its conspicuously yellow-greenish eggs symmetrically to the posterior branchiostegal region of the cephalothorax, just above the coxae of the second and third ambulatory legs (Figs. 1A, 6C). The taxonomy and biology of this flatworm remain to be studied.

Remarks. Roux (1911: p. 91) described *Potamon* (*Geotelphusa*) *aruanus* based on numerous specimens from three localities in Kobroor in the Aru Islands: Seltoutti, Manoumbai and Sungei Kololobo. Bott (1970: p. 75) selected a male from Manoumbai as lectotype and a paralectotype male from Kololobo (Fig. 2B) was examined for the present study (see also Chia and Ng, 2006). Comparisons of *S. aruana* with the material from Lombok herein described as *S. tuerkayi*, new species, makes it clear that two species are involved.

The external orbital tooth of *S. tuerkayi*, new species, is relatively wider (Figs. 1A, 2A) (this tooth being distinctly narrower in *S. aruana*, Fig. 2B; Chia and Ng, 2006: fig. 42A); the antero- and posterolateral regions of the carapace are distinctly more rugose with the striae more prominent (Figs. 1A, 2A, 3A) (their surfaces being smoother and the striae rather low in *S. aruana*, Fig. 2B; Chia and Ng, 2006: fig. 42A); the epigastric cristae are situated distinctly anterior to the postorbital cristae (Figs. 1A, 2A, 3A) (the epigastric and postorbital cristae are more or less at the same level in *S. aruana*, Fig. 2B; Chia and Ng, 2006: fig. 42A); the meri of ambulatory legs are relatively longer and more slender (Figs. 1A, 3F) (they are relatively shorter and stouter in *S. aruana*, Fig. 2B); the dactyli of ambulatory legs are relatively longer (Figs. 1A, 2A, 3F) (they are relatively shorter in *S. aruana*, Fig. 2B; Chia and Ng, 2006: fig. 42A); the G1 is proportionately more slender, with the distal part of the subterminal segment noticeably narrower (Fig. 4A) (the G1 is proportionately stouter, with the distal part of the

subterminal segment wider in *S. aruana*, cf. Chia and Ng, 2006: fig. 43A, B); and finally, the terminal segment of the G1 is stouter, with the tip truncate (Fig. 4A–C) (the terminal segment being evenly conical, more slender and with a sharp tip in *S. aruana*, cf. Chia and Ng, 2006: fig. 43A–D). These differences are consistent in the good series of male specimens examined and are also valid for females when non-sexual characters are involved.

With regard to the other species of *Sundathelphusa* occurring in central Indonesia, *S. tuerkayi*, new species, differs from *Sundathelphusa cassiope* (De Man, 1902) from Sulawesi in having a relatively lower epibranchial tooth; the lower postorbital cristae; the relatively longer, more slender ambulatory legs; and the proportionately longer male abdominal somite 6; however, their G1 structures are superficially similar (De Man, 1902: pl. 20, fig. 18; Chia and Ng, 2006: figs. 39A, 40); from *Sundathelphusa minahassae* (Schenkel, 1902), also from Sulawesi, by a more transversely ovate carapace, with the striae on the dorsal surfaces being less prominent; the relatively longer ambulatory legs; and a more curved G1 (cf. Chia and Ng, 2006: figs. 39B, 41); and from *Sundathelphusa rubra* (Schenkel, 1902) from Sulawesi by the anterior parts of the carapace less prominently swollen; longer ambulatory legs; and in possessing a much longer G1 terminal segment, which is very short in *S. rubra* (cf. Chia and Ng, 2006: figs. 42B, 44).

ACKNOWLEDGMENTS

We thank Dwi Listyo Rahayu, Muhammad Firdaus, Idham Sumarto Pratama and other staff of the Indonesia Institute of Sciences (LIPI) in Pamenang, Lombok, Indonesia, for their kind assistance in the field and in the laboratory.

REFERENCES

- Bott, R. 1969. Die Flusskrabben aus Asien und ihre Klassifikation (Crustacea, Decapoda). *Senckenbergiana biologica*, 50(5/6): 359–366.
- Bott, R. 1970. Die Süßwasserkrabben von Europa, Asien, Australien und ihre Stammesgeschichte. Eine Revision der Potamoidea und Parathelphusoidea (Crustacea, Decapoda). *Abhandlungen der Senckenbergischen Naturforschenden Gesellschaft*, 526: 1–338, pls. 1–58.
- Chia, O.K.S. and Ng, P.K.L. 2006. The freshwater crabs of Sulawesi, with descriptions of two new genera and four new species (Crustacea: Decapoda: Brachyura: Parathelphusidae). *Raffles Bulletin of Zoology*, 54(2): 381–428.

- Damborenea, C. and Cannon, L.R.G. 2001. On neotropical *Temnocephala* (Platyhelminthes). *Journal of Natural History*, 35(8): 1103–1118.
- Man, J.G. de. 1902. Die von Herrn Professor Kükenthal in Indischen Archipel gesammelten Dekapoden und Stomatopoden. In: W. Kükenthal (ed.), *Ergebnisse einer zoologischen Forschungsreise in den Molukken und Borneo. Abhandlungen der Senckenbergischen Naturforschenden Gesellschaft*, 25: 467–929, pls. 19–27.
- Ng, P.K.L. 1988. The freshwater crabs of Peninsular Malaysia and Singapore. Singapore, Department of Zoology, National University of Singapore, Shinglee Press, pp. i–viii, 1–156, plates 1–4.
- Ng, P.K.L. 1997. On a new genus and four new species of freshwater crabs (Crustacea: Decapoda: Brachyura: Parathelphusidae) from Borneo and Java. *Raffles Bulletin of Zoology*, 45(1): 105–121.
- Rathbun, M.J. 1904. Les crabes d'eau douce (Potamonidae). *Nouvelles Archives du Muséum d'Histoire Naturelle, Paris* (4)6: 225–312.
- Roux, J. 1911. Nouvelles espèces de décapodes d'eau douce provenant de Papouasie. *Notes from the Leyden Museum*, 33: 81–106.
- Schenkel, E. 1902. Beitrag zur Kenntnis der Dekapodenfauna von Celebes. *Verhandlungen der Naturforschenden Gesellschaft in Basel*, 13: 485–585, plates 7–13.