

Rare deep-water crabs (Crustacea: Decapoda) from Indian waters, with description of one new species

Vinay P. Padate¹  orcid.org/0000-0002-2244-8338

Sherine Sonia Cubelio¹  orcid.org/0000-0002-2960-7055

Masatsune Takeda²  orcid.org/0000-0002-0028-1397

1 Centre for Marine Living Resources & Ecology, Ministry of Earth Sciences, Government of India. Atal Bhavan, LNG Terminus Road, Puthuvyppe, Kochi, 682508, India.

VPP E-mail: vinaypadate@gmail.com

SSC E-mail: sherine@cmlre.gov.in

2 Department of Zoology, National Museum of Nature and Science, Tokyo. 4-1-1 Amakubo, Tsukuba, Ibaraki, 305-0005, Japan.

MT E-mail: takeda@kahaku.go.jp

ZOOBANK: <http://zoobank.org/urn:lsid:zoobank.org:pub:19A3886E-C77F-4B16-968E-200C451F58D7>

ABSTRACT

Deep-water brachyuran crabs collected from the Indian Exclusive Economic Zone by the Fishery Oceanographic Research Vessel “Sagar Sampada” in the southeastern Arabian Sea (50 m depth), southwestern Bay of Bengal (307 m depth), and in the vicinity of the Andaman and Nicobar Archipelagos (271–535 m depth) were studied. They are referred to *Sphaerodromia kendalli* (Alcock and Anderson, 1894) and *Sphaerodromia nux* Alcock, 1900 (family Dromiidae), *Intesius brevipes* sp. nov. (family Mathildellidae), *Tunepugettia corbariae* B.Y. Lee, Richer de Forges and P.K.L. Ng, 2019 (family Epialtidae), *Cyrtomaia suhmii* Miers, 1885 (family Inachidae), *Chaceon alcocki* Ghosh and Manning, 1993 (family Geryonidae), and *Sphenomerides trapezioides* (Wood-Mason, 1891) (family Trapeziidae). *Sphaerodromia nux* and *T. corbariae* are new records from Indian waters. The first male specimen of *C. alcocki* is reported, with a description of the male first gonopod. *Intesius brevipes* sp. nov. is the fifth species of the genus, differing from the four known congeners in the form and setation of the carapace, distinctly curved and granular anterolateral margins, and shorter pereopods with much slender merus and carpus articles.

KEYWORDS

Brachyura, deep-sea, India, new species, taxonomy

Corresponding Author
Sherine Sonia Cubelio
sherine@cmlre.gov.in

SUBMITTED 18 November 2020
ACCEPTED 28 April 2021
PUBLISHED 21 July 2021

DOI 10.1590/2358-2936e2021034



All content of the journal, except where identified, is licensed under a Creative Commons attribution-type BY.

Nauplius, 29: e2021034

INTRODUCTION

The deep-water brachyuran fauna of India is moderately diverse and was substantially documented during the colonial era (Wood-Mason, 1885; 1888; Wood-Mason and Alcock, 1891; Alcock, 1894; 1895; 1896; 1898; 1899a; 1899b; 1900a; 1900b; 1901; 1905; Alcock and Anderson, 1894; 1899; Anderson, 1896; McArdle, 1900; 1901; MacGilchrist, 1905; Lloyd, 1907; Kemp and Sewell, 1912). In comparison, the recently published literature revealed few reports on the deep-water Brachyura based on the collections of the deep-sea by-catch species along the peninsular coasts of India (Kumar *et al.*, 2013; Ng and Kumar, 2015; 2016; Mendoza and Devi, 2017; Ng *et al.*, 2017a; 2018a; 2018b; Ng and Mitra, 2019; Mendoza *et al.*, 2020).

The Centre for Marine Living Resources & Ecology, Ministry of Earth Sciences, Government of India, Kochi has been conducting dedicated deep-water faunal surveys in the Indian Exclusive Economic Zone (EEZ) since the 10th Five-year plan period (2002–2007). These surveys have resulted in a collection of deep-water crustaceans which includes new species and new geographical records (see Ng *et al.*, 2019; Padate *et al.*, 2020a–c). The present study reports seven deep-water species from the Indian EEZ, including one new species; all from specimens collected between 2010–2016.

MATERIAL AND METHODS

The study area comprises the continental shelf off the southwest coast of India in the southeastern

Arabian Sea, the upper continental slope region in the southwestern Bay of Bengal, and the upper continental slopes of the eastern and western sides of the Andaman and Nicobar Islands (Fig. 1).

This study is based on the archived samples collected between 2010–2016 using an Expo model trawl net and an High-Speed Demersal Trawl II net (Crustacean Version with 30 mm cod end mesh size) on-board the FORVSS during the following cruises: no. 279 in the western Bay of Bengal, no. 280 in the Andaman Sea and southeastern Bay of Bengal, no. 321 in the southeastern Arabian Sea, and no. 334 (leg I) and no. 349 (leg II) in the southeastern Bay of Bengal.

The specimens were cleaned to remove debris, examined, and photographed with an Olympus TG-5 underwater camera. Microscopic diagnostic characters were photographed using a Leica M80 stereo-zoom microscope equipped with Leica MC170 HD microscope camera and Leica Application Suite imaging software. Photographic plates were made in Adobe® Photoshop CS5. Measurements were done with vernier callipers to an accuracy of 0.01 mm.

The morphological terminology used is from Guinot and Richer de Forges (1982), Serène (1984), Ghosh and Manning (1993), McLay (2001), Crosnier and Ng (2004), Ng *et al.* (2017b), and Lee *et al.* (2019). The measurements (in millimetres) are of the maximum carapace length (excluding posterior margin ornamentation), post-rostral carapace length and maximum carapace width (at base of lateral spine).

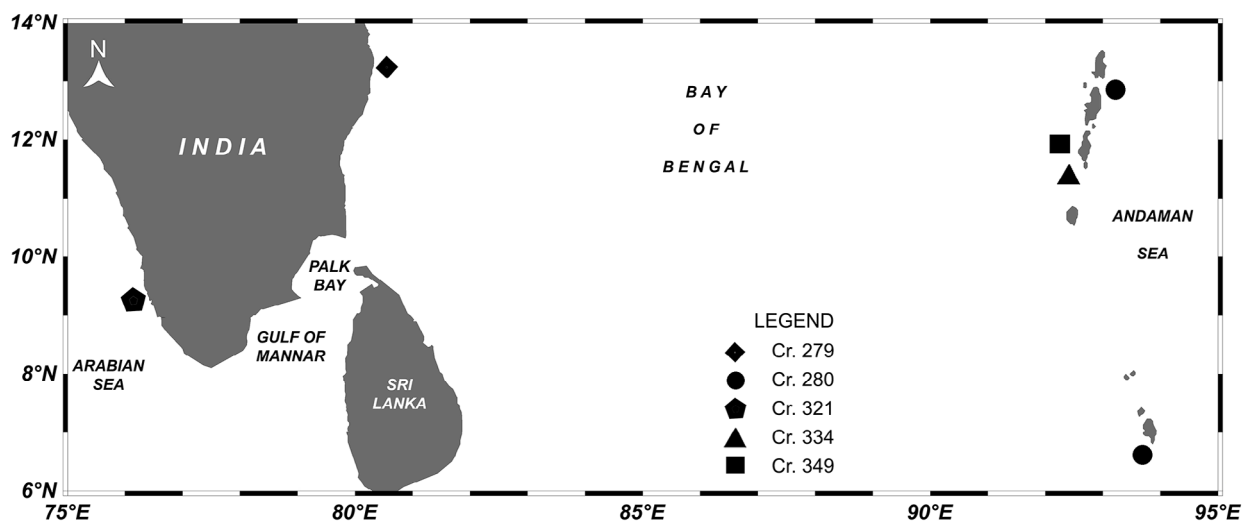


Figure 1. Map of the study area indicating the sites of sample collection in the Indian EEZ.

Material examined in this study are deposited in the Referral Centre collection of the Centre for Marine Living Resources and Ecology (CMLRE), Kochi, Kerala, India, and preserved in 70 % ethanol.

Abbreviations used in the following text are: CL = carapace length; coll. = collected by; CW = carapace width; FORVSS = Fishery Oceanographic Research Vessel “Sagar Sampada”; G1 = male first gonopod; G2 = male second gonopod; IO/SS/BRC = Indian Ocean/Sagar Sampada/Brachyura; P2 to P5 = pereopods 2 to 5 (first to fourth ambulatory legs), respectively; PCL = post-rostral carapace length; stn = station.

TAXONOMY

Infraorder Brachyura Latreille, 1802

Superfamily Dromioidea De Haan, 1833

Family Dromiidae De Haan, 1833

Genus *Sphaerodromia* Alcock, 1899

Sphaerodromia kendalli (Alcock and Anderson, 1894) (Figs. 2A–C, 3)

Dromidia kendalli Alcock and Anderson, 1894: 175 (type locality: off Nellore coast, Bay of Bengal, 14°5'55"N 80°25'20"E). — Alcock and Anderson, 1896: pl. 24, fig. 1, 1a. — Guinot and Tavares, 2003: 102, 108. — Ng *et al.*, 2008: 36 (list).

Sphaerodromia kendalli — Alcock, 1900a: 153. — Alcock, 1901: 39, 78, pl. 4, fig. 18, 18a. — Ihle, 1913: 92 (list). — Balss, 1922: 106. — Sakai, 1936: 15. — Sakai, 1976: 28, fig. 16. — McLay, 1991: 465 (discussion), table 1 (comparison). — McLay and Crosnier, 1991: 185–186 (discussion). — McLay, 1993: 125 (list), 126, 127 (key), 127, figs. 2a–i, 15a. — McLay, 2001: 821 (key), tab. 1. — Guinot and Tavares, 2003: 105. — Ng *et al.*, 2008: 36 (list). — Trivedi *et al.*, 2018: 36 (tab. 1).

Dromia (*Sphaerodromia*) *kendalli* — Alcock, 1899a: 5 (list), 16.

Material examined. 3 males (CL 37.8 mm, CW 43.4 mm; CL 38.6 mm, CW 45.4 mm; CL 43.1 mm, CW 48.6 mm) (IO/SS/BRC/00294), southwest Bay of Bengal, FORVSS stn. 27911, 13.22°N 80.51°E, 307 m, coll. Dr. R. Raghu Prakash, HSDT (CV), 29 August 2010.

Remarks. *Sphaerodromia kendalli* was originally described from a female (18 × 19 mm) from the western Bay of Bengal at 205 m depth (Alcock and Anderson, 1896, pl. 24 fig. 1, 1a). The original published account (Alcock and Anderson, 1894) and the subsequent publications (Alcock, 1900a; 1901; Sakai, 1936; 1976) provided short descriptions of the Indian and Japanese specimens. McLay's review (1993) of the family Dromiidae included a detailed re-description of the material collected from the Philippines (MUSORSTOM 3 expedition) and Indonesia (KARUBAR expedition) supplemented with illustrations of the Philippine material (McLay, 1993: figs. 2a–i, 15a).

The present specimens collected from approximately 100 km south of the type locality agree largely with the description of the type specimens as well as subsequent reports, with the exception of a slightly wider carapace, CW/CL 1.13–1.18 (Fig. 2A, B) (*vs.* 0.97 in the Indonesian male (McLay, 1993); female specimens — 1.06 (holotype) (Alcock and Anderson, 1894), 1.13 (Japan) (Balss, 1922), and 1.02 (Philippines) (McLay, 1993)), the absence of granules on the subhepatic region (Fig. 2C) (*vs.* granules present in the holotype, and the Philippine material (McLay, 1993)), the relatively longer chelipeds, 1.74 times CL (*vs.* 1.33 times CL in the holotype female (Alcock, 1901)). The above differences in the present specimens as compared to the type material could be attributed to the comparatively larger size of the present material.

Distribution. Bay of Bengal at 205–307 m depth (Alcock and Anderson, 1894; Alcock, 1900a; 1901; present study), Japan (Balss, 1922; Sakai, 1936; 1976), Philippines, Southeast Molucca Islands, Indonesia at 205–214 m depth (McLay, 1993).

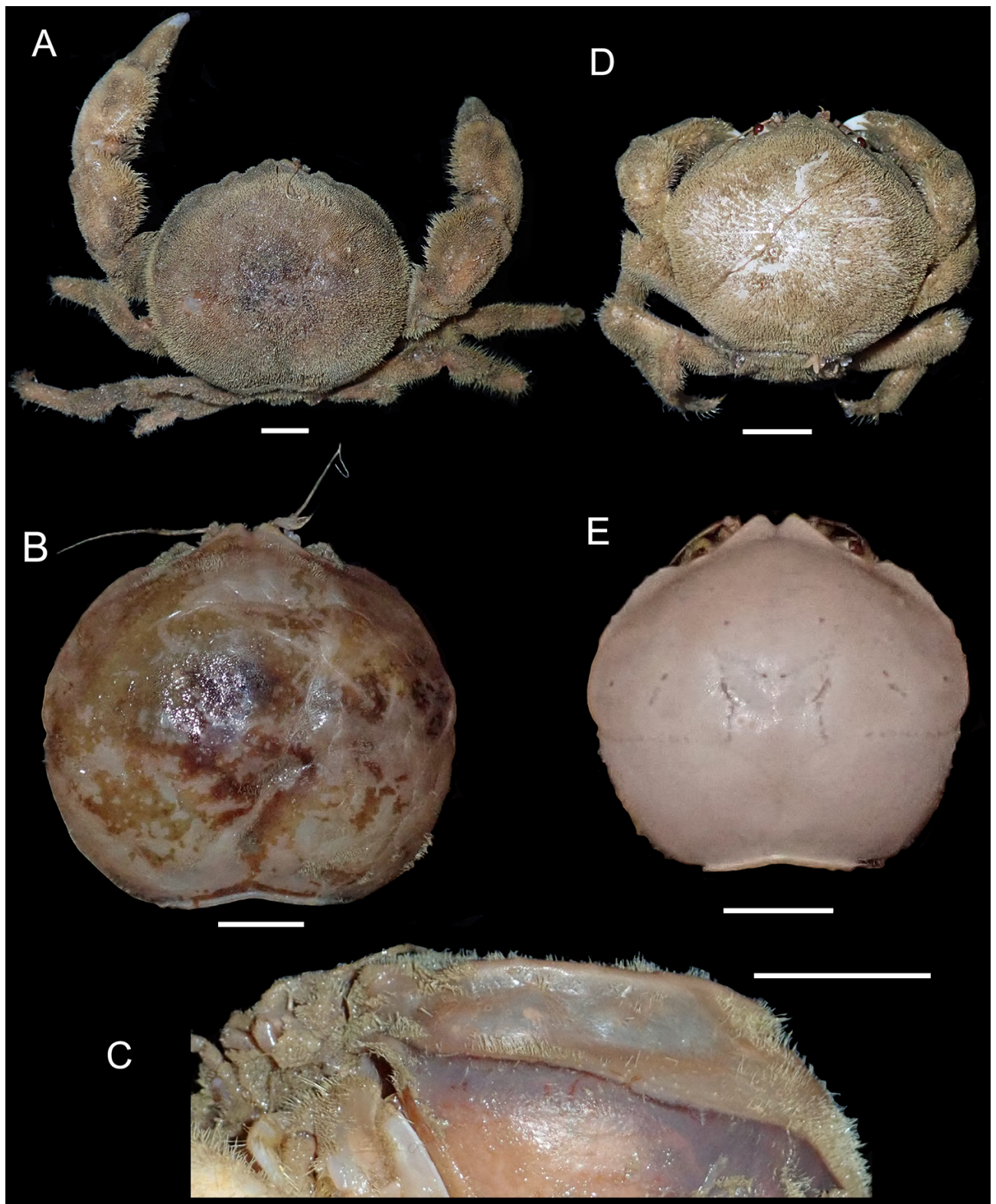


Figure 2. **A–C**, *Sphaerodromia kendalli* (Alcock and Anderson, 1894), male (CL 38.6 mm, CW 45.4 mm) (IO/SS/BRC/00294), southwest Bay of Bengal, India. **D, E**, *Sphaerodromia nux* Alcock, 1899, male (CL 29.3 mm, CW 33.1 mm) (IO/SS/BRC/00295), Bay of Bengal west of South Andaman Island, India. **A, D**, dorsal habitus; **B, E**, denuded dorsal carapace; **C**, denuded lateral carapace. Scale bars: 10 mm.

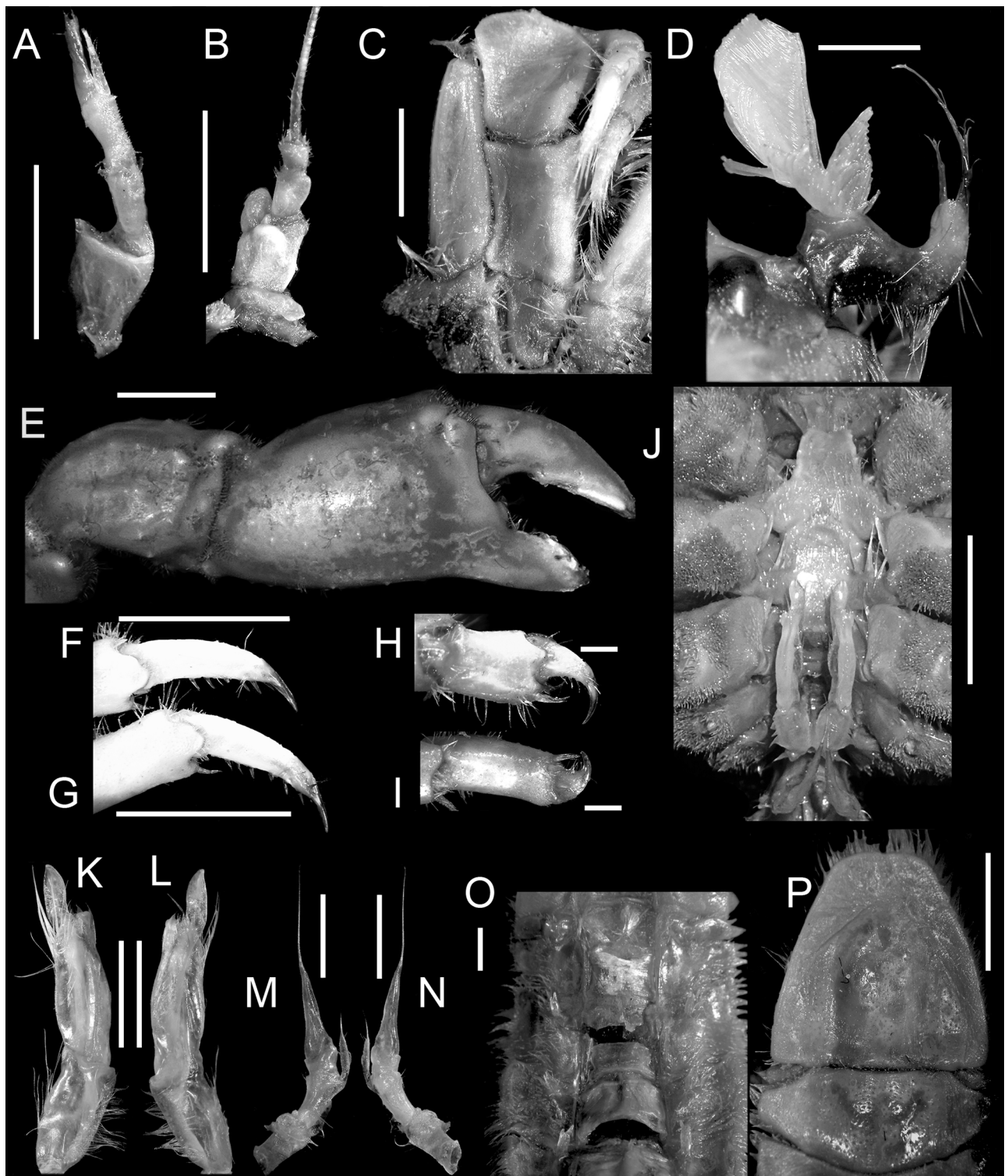


Figure 3. *Sphaerodromia kendalli* (Alcock and Anderson, 1894). **A–N, P**, male (CL 38.6 mm, CW 45.4 mm) (IO/SS/BRC/00294), southwest Bay of Bengal, India. **A**, Antennule, ventral view; **B**, antenna, ventral view; **C**, third maxilliped, ventral view; **D**, cheliped epipod and arthrobranch, lateral view; **E**, right chela and carpus, outer view; **F, G**, P2–P3 dactyli, dorsal view; **H, I**, P4–P5 subchela, dorsal view; **J**, thoracic sternum in ventral view indicating the position of the gonopods; **K, L**, G1 dorsal and ventral views; **M, N**, G2 dorsal and ventral views; **P**, male telson, ventral view. **O**, male (CL 43.1 mm, CW 48.6 mm) (IO/SS/BRC/00294), southwest Bay of Bengal, India, posterior pleonal somites 3–5 and telson in dorsal view indicating the form and position of vestigial pleopods. Scale bars: **E–G, J** = 10 mm, **A–C, K–N, P** = 5 mm, **D, O** = 2 mm, **H–I** = 1 mm.

***Sphaerodromia nux* Alcock, 1900**

(Figs. 2D, E, 4)

Sphaerodromia nux Alcock, 1900a: 154 (type locality: Gulf of Martaban). — Alcock, 1901: 40, 78, pl. 4, fig. 19. — Ihle, 1913: 92 (list). — Lewinsohn, 1984: 115, pl. 3, fig. B, pl. 4, figs. C–D. — McLay, 1991: 463, 465 (discussion), tab. 1 (comparison). — McLay and Crosnier, 1991: 186 (discussion). — McLay, 1993: 126 (list), 127 (key). — Crosnier, 1994: 347 (remarks). — McLay, 2001: 821 (key, description). — Guinot and Tavares, 2003: 107, 108, figs. 22B, 23A–B. — Ng *et al.*, 2008: 36 (list). — Trivedi *et al.*, 2018: 36 (tab. 1).

Material examined. 1 male (CL 29.3 mm, CW 33.1 mm) (IO/SS/BRC/00295), west of South Andaman Island, Bay of Bengal, FORVSS stn. 349 (leg II) 09, 11.93°N 92.28°E, 290 m, coll. Dr. Aneesh Kumar K.V., HSDT (CV), 12 April 2016.

Remarks. *Sphaerodromia nux* was originally described from supposedly juvenile specimens (1 male of undetermined size, 1 female 10 × 11 mm) from the Gulf of Martaban off Myanmar at 129 m depth (Alcock, 1900a). The original description by Alcock (1900a) described only the carapace, and a subsequent monograph by Alcock (1901) provided a short description of the third maxilliped, chelipeds, and the vestigial male pleopods on pleonal somites 3–5 supplemented with a line illustration of the dorsal habitus (Alcock, 1901: fig. 19). Lewinsohn (1984) redescribed this species from adult specimens from Madagascar, and reported differences from the type specimen in the absence of a gap between the anterior margin of the third maxillipeds and the buccal cavern. McLay (1991) provided a detailed comparison between *S. nux* and *Sphaerodromia ducoussoi* McLay, 1991, and supplemented with a table comparing the diagnostic morphological characters of all *Sphaerodromia* species. Crosnier (1994) commented that *S. nux* possessed well-developed podobranchs on the cheliped and pereopod 2, and vestigial bud-like podobranchs on pereopod 3. McLay (2001) amended Lewinsohn's redescription and added morphological details of female specimens from the Philippines. A systematic revision of the family Dromiidae by Guinot and

Tavares (2003) included illustrations of the vestigial male pleopods, P5 coxa and G2.

The present specimen agrees with the updated description by McLay (2001), except for the presence of lines of compressed granules on the P2–P3 meri (Fig. 4F–G) and a relatively higher dactylus length/propodus length of 0.90 for P2–P3. The present observation is a new record in Indian waters.

Distribution. Gulf of Martaban at 129 m depth (Alcock, 1900a; 1901), Madagascar (Guinot and Tavares, 2003), and Andaman Sea, India at 290 m depth (present study).

Superfamily Goneplacoidea MacLeay, 1838**Family Mathildellidae Karasawa and Kato, 2003****Genus *Intesius* Guinot and Richer de Forges, 1981*****Intesius brevipes* sp. nov.**

(Fig. 5)

Zoobank: urn:lsid:zoobank.org:act:8F73C88D-767D-4FFD-92E8-7BA05BD80F39

Material examined. Holotype: female (CL 34.5 mm, CW 42.2 mm) (IO/SS/BRC/00296), west of Rutland Island, Andamans, Bay of Bengal, FORVSS stn. 334 (leg 1) 11, 11.35°N 92.39°E, 535 m, coll. Dr. S. Venu, HSDT (CV), 11 January 2015.

Description of holotype (female). Carapace sub-hexagonal with edges rounded off, 1.22 times wider than long; dorsal surface moderately convex anteriorly, gently convex transversely, microscopically granular, bearing short moderately dense tomentum. Regions demarcated by broad shallow grooves; gastric regions slightly prominent, separated from cardiac region by gastro-cardiac groove, metagastric region with pair of indistinct pits; branchial regions faintly demarcated, subdivided into anterior and posterior parts by broad lateral extension of gastro-cardiac groove; cardiac region as prominent as gastrics, separated from intestinal region by shallow submedian depression (Fig. 5A).

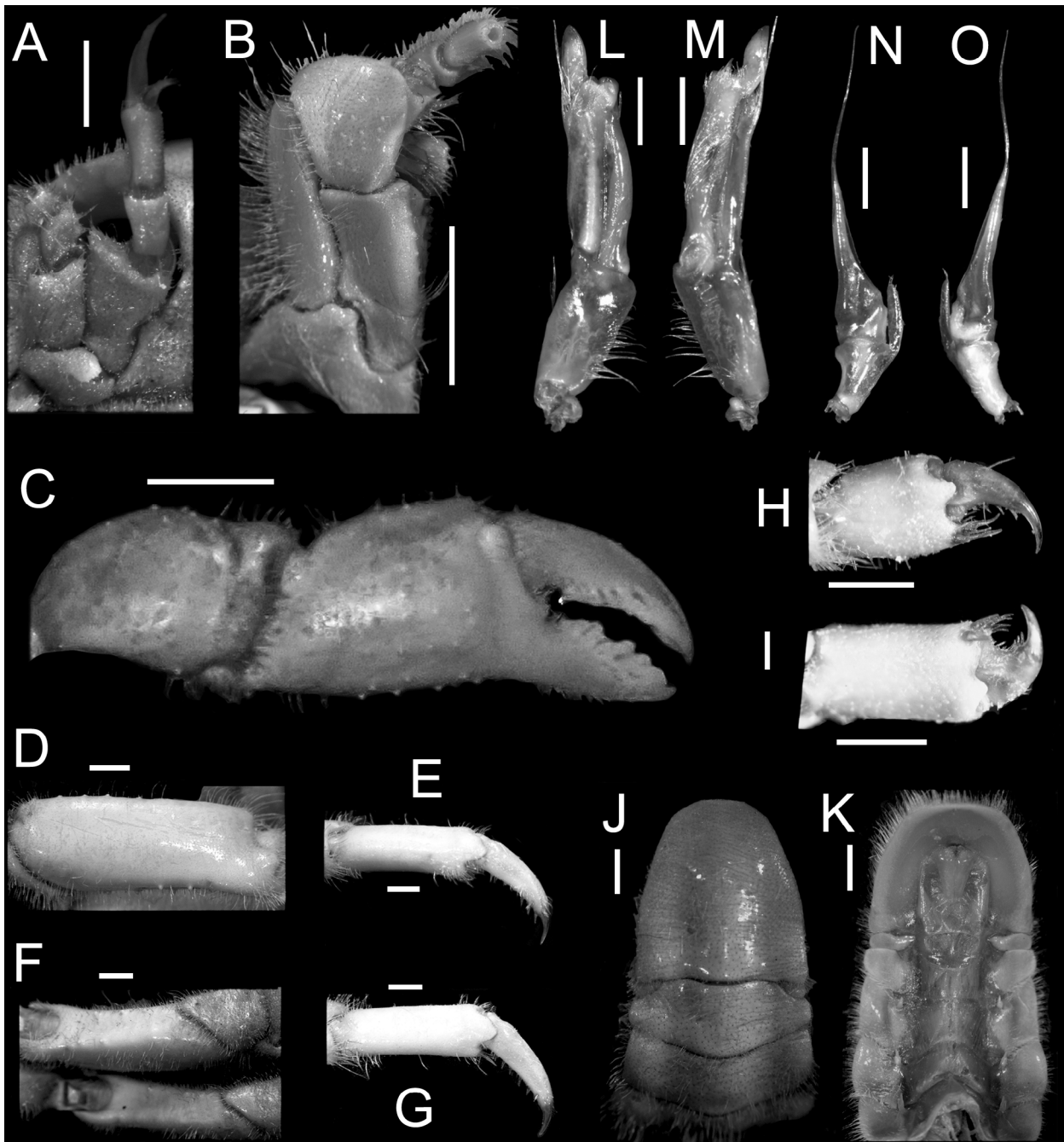


Figure 4. *Sphaerodromia nux* Alcock, 1899, male (CL 29.3 mm, CW 33.1 mm) (IO/SS/BRC/00295), Bay of Bengal west of South Andaman Island, India. **A**, Antennule and antenna; **B**, third maxilliped; **C**, right chela and carpus, outer view; **D**, P2 merus, dorsal view; **E**, P2 dactylus, dorsal view; **F**, P2–P3 meri, ventral view; **G**, P3 dactylus, dorsal view; **H**, **I**, P4–P5 subchela, dorsal view; **J**, posterior pleonal somites and telson, ventral view; **K**, pleonal somites 3–5 and telson in dorsal view indicating the form and position of vestigial pleopods; **L**, **M**, G1 dorsal and ventral views; **N**, **O**, G2 dorsal and ventral views. Scale bars: **B–C** = 5 mm, **A**, **D–O** = 2 mm.

Frontal margin narrow (0.28 times CW), gently deflexed, distinctly projecting, granular, medially notched giving it a bilobed appearance, separated from orbital margin by narrow sulcus (Fig. 5B, C). Supraorbital margin concave, distinctly granular, interrupted by 2 distinct fissures into slightly elevated inner lobe and slightly depressed outer lobe; external

orbital tooth short, minutely granular, separated from distinctly granular infraorbital margin by lateral fissure, inner infraorbital angle not extending to level of frontal margin (Fig. 5B, C).

Anterolateral margins distinctly curved, divided into 4 teeth; first tooth shortest, bearing small granules, separated from the external orbital tooth

by long granule; remaining teeth spinose — second tooth largest, bearing long granules, separated from first tooth by 2 long granules, and from third tooth by 2 short granules; third tooth subequal to second, bearing smaller granules, separated from fourth tooth

by short granules; fourth tooth spinose, bearing 1 posterior granule (Fig. 5B, C). Posterolateral margins gently convex, longer than anterolateral margins, converging posteriorly, anterior halves bearing small scattered granules (Fig. 5A, B).

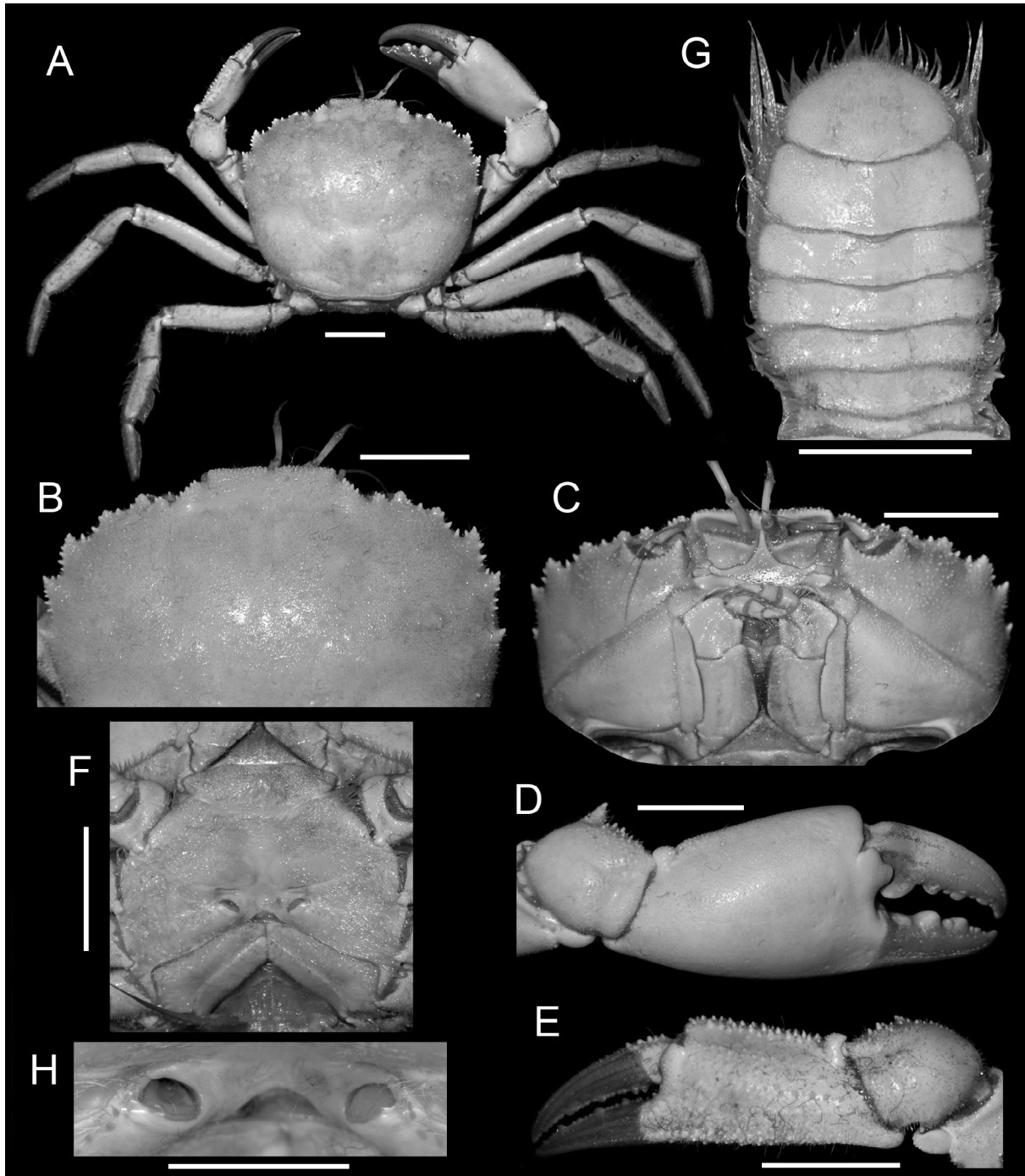


Figure 5. *Intesius brevipes* sp. nov., holotype, female (CL 34.5 mm, CW 42.2 mm) (IO/SS/BRC/00296), Bay of Bengal west of Rutland Island, Andamans, India. **A**, Dorsal habitus; **B**, dorsal carapace, anterior portion; **C**, anterior frontal view indicating the position of antennules, antennae, and third maxilliped; **D**, right chela and carpus, outer view; **E**, left chela and carpus, outer view; **F**, thoracic sternum in ventral view indicating position of gonopores; **G**, pleon and telson, ventral view; **H**, gonopores, enlarged view. Scale bars: **A–G** = 10 mm, **H** = 5 mm.

Antennules folding slightly obliquely. Basal antennal segment elongated rectangular, movable, located in orbital hiatus, flagellum long, extending to second anterolateral tooth (Fig. 5C).

Epistome small, wide, posterior margin elevated, interrupted by 3 notches (Fig. 5C). Endostomial ridges well developed posteriorly. Buccal frame subquadrate. Third maxillipeds sparsely setose, microscopically granular when denuded; ischium sub-rectangular, 1.57 times longer than wide, bearing distinct submedian longitudinal groove, cutting edge thickly setose; merus subquadrate, 0.92 times longer than wide, length 0.60 times ischial length, bearing strong oblique groove, antero-external angle slightly produced, rounded; palp articulating at antero-internally on merus; exopod slender, flagellum well developed (Fig. 5C).

Female chelipeds unequal, heterochelous, sparsely setose. Right cheliped 1.69 times CL. Merus triangular in cross-section, anterior, posterior margins and ventral surface microscopically granular, posterior margin with 4 proximal elongate granules and subdistal granular spine; carpus with distinctly granular inner margin, large granular spine at antero-internal angle, dorsal and outer surfaces microscopically granular; palm massive, microscopically granular, dorsal margin distinctly granular proximally; fingers microscopically granular, subequal to upper palm length, pollex bearing one indistinct longitudinal groove each on inner and outer margins, dactylus bearing two indistinct longitudinal grooves each on both margins, occlusal margin of dactylus with large proximal molar tooth fitting into socket on pollex, remaining margins with short dentition, distal tips curved, blunt, crossing in closed position (Fig. 5D). Left cheliped 1.32 times CL, ornamentation on merus and carpus similar to that of right cheliped, palm slender, with distinct elongate patch of granules on dorsal margin, outer surface bearing several rows of slightly smaller granules, inner surface with minute granules, ventral margin granular; fingers distinctly granular, longer than upper palm length, grooves similar to those on large cheliped, occlusal margins with short, sharp dentition, dactylus with patch of large granules on proximal one-fourth, distal tip fitting into depression on pollex in closed position (Fig. 5E).

P2–P5 slender, microscopically granular, bearing longer setae (compared to carapace), their lengths

1.55, 1.76, 1.83, and 1.49 times CL, respectively. Length/width ratios for merus, carpus, propodus and dactylus are as follows: P2 = 4.67, 2.64, 3.41, and 7.86; P3 = 5.09, 2.29, 3.86, and 8.78; P4 = 5.02, 2.10, 3.90, and 9.26; P5 = 4.73, 1.96, 2.91, and 6.60. Pereopod meri bearing large granules on anterior margins, those on P5 largest, posterior margins with dense setation, surfaces sparsely setose; carpi with short dense setation on margins, surfaces sparsely setose; propodi with long dense setation on margins, surfaces sparsely setose; dactyli lanceolate, with long dense setation on margins, distal tips corneous (Fig. 5A).

Thoracic sternum wide (width 0.56 times CW), sternites 1–3 and lateral half of sternite 4 microscopically granular, other portions smooth, covered with long silky setae; first 2 sternites completely fused, sternite 2 and 3 separated by sinuous suture, sternites 3–7 separated by medially interrupted sutures, sternite 7 and 8 separated by complete suture, midline dividing posterior half of sternite 7 and entire 8 (Fig. 5F).

Female pleon ovate, widest at somite 5 (width 0.35 times CW), with 6 free somites and telson, margins bearing dense long setation; somite 6 three times longer than wide; telson bluntly triangular, 1.45 times wider than long (Fig. 5G). Gonopores large, ovate, extending across much of sternite 6, margins elevated by sternal prominence with oblique suture anteriorly (Fig. 5H).

Color (Coloration preserved in formalin for *ca.* 5 years; recently transferred to 70 % ethanol). Light brown with slightly darker setae; large cheliped fingers dark brown on distal eight-tenths, small cheliped fingers dark brown on distal three-quarters.

Remarks. Specimens from the genus *Intesius* Guinot and Richer de Forges, 1981 are extremely rare, with only 18 specimens (including the present study). The genus is characterized by a squarish carapace with less prominent anterolateral teeth, male pleon with strongly ankylosed somites 3–5 and a mobile sixth somite (Guinot and Richer de Forges, 1981a; Davie, 1998; Crosnier and Ng, 2004). Hitherto known only from the Western Pacific region (eastern Australia, New Caledonia, Norfolk Ridge, Philippines, French Polynesia, and Mariana Islands), the present

observation is the first record of this genus from the Indian Ocean region. *Intesius brevipes* sp. nov. differs from the existing congeners in:

(1) sub-hexagonal carapace, CW/CL ratio 1.22 (Fig. 5A) (*vs.* quadrangular in *I. crosnieri*, CW/CL ratio 1.17 (Davie, 1998: figs. 1A, 2A) and *I. lucius*, CW/CL ratio 1.15–1.17 (Crosnier and Ng, 2004: figs. 3B, 7); subcircular in *I. pilosus*, CW/CL ratio 1.07–1.20 (Davie, 1998: figs. 1B, 2B); rectangular in *I. richeri*, CW/CL ratio 1.26 (Crosnier and Ng, 2004: figs. 2, 3A));

(2) relatively less dense short setation on carapace that does not conceal the edges (Fig. 5A, B), similar to *I. lucius* (Crosnier and Ng, 2004: figs. 3B, 7) (*vs.* dense setation in *I. crosnieri* (Davie, 1998: figs. 1A, 2A), *I. pilosus* (Davie, 1998: figs. 1B, 2B), and *I. richeri* (Crosnier and Ng, 2004: figs. 2, 3A));

(3) distinctly projecting, bilobed frontal margin separated from the supraorbital margin by a distinct notch (Fig. 5A–C) (*vs.* very distinctly projecting, strongly bilobed frontal margin separated from the supraorbital margin by a wider notch in *I. pilosus* (Guinot and Richer de Forges, 1981a: pl. 7, fig. 1, 1a; Davie, 1998: figs. 1B, 2B); less distinctly projecting, weakly bilobed frontal margin separated from the supraorbital margin by a narrow notch in *I. crosnieri* (Davie, 1998: figs. 1A, 2A), *I. lucius* (Crosnier and Ng, 2004: figs. 3B), and *I. richeri* (Crosnier and Ng, 2004: fig. 3A));

(4) slightly elevated inner supraorbital lobe (Fig. 5A–C) similar to *I. pilosus* (Davie, 1998: fig. 2B) (*vs.* indiscernible inner supraorbital lobe in the remaining species (Davie, 1998: fig. 2A; Crosnier and Ng, 2004: fig. 3A–B));

(5) distinctly curved anterolateral margins (Fig. 5A–C) (*vs.* moderately curved in its first part and then runs sub-parallel to longitudinal axis in *I. pilosus* (Guinot and Richer de Forges, 1981a: pl. 7, fig. 1, 1a; Davie, 1998: figs. 1B, 2B); gently convex in *I. lucius* (Crosnier and Ng, 2004: figs. 3B, 7); gently convex in its first part and then runs sub-parallel to longitudinal axis in *I. crosnieri* (Davie,

1998: figs. 1A, 2A) and *I. richeri* (Crosnier and Ng, 2004: figs. 2, 3A));

(6) more salient anterolateral teeth of carapace, particularly second and third teeth, bearing distinct granules (Fig. 5A–C), similar to *I. pilosus* (Davie, 1998: figs. 1B, 2B) (*vs.* moderately salient teeth bearing moderately large granules in *I. crosnieri* (Davie, 1998: figs. 1A, 2A) and *I. richeri* (Crosnier and Ng, 2004: figs. 2, 3A)); less developed teeth bearing short granules in *I. lucius* (Crosnier and Ng, 2004: figs. 2, 3A));

(7) palm of large chela distinctly granular proximally on dorsal margin (Fig. 5D), similar to *I. pilosus* (Davie, 1998: fig. 1B) (*vs.* finely granular dorsal margin and outer surface in *I. richeri* (Crosnier and Ng, 2004: fig. 2); sharply granular dorsal and proximal portions of outer surface in *I. crosnieri* (Davie, 1998: fig. 1A); granular dorsal and ventral margins in *I. lucius* (Crosnier and Ng, 2004: fig. 7));

(8) pereopods 2–5 bearing relatively short setae (Fig. 5A), similar to *I. lucius* (Crosnier and Ng, 2004: fig. 7) and *I. richeri* (Crosnier and Ng, 2004: fig. 2) (*vs.* long dense setae in *I. crosnieri* (Davie, 1998: fig. 1A) and *I. pilosus* (Davie, 1998: fig. 1B));

(9) relatively shorter P4–5 (pereopod length/ CL ratio 1.83 for P4, 1.49 for P5) with much more slender pereopod meri and carpi (length/width ratio 5.02 and 2.10 for P4, 4.73 and 1.96 for P5) (*vs.* longer P4–5 (pereopod length/ CL ratio 1.99–2.20 for P4, 1.78–1.97 for P5) with less slender meri (length/width ratio 3.88–4.48 for P4, 3.55–4.35 for P5) and carpi (length/width ratio 1.87–2.06 for P4, 1.48–1.83 for P5) in the remaining congeners).

Etymology. The species name is derived from the combination of Latin terms “brevis” and “pede” alluding to the relatively shorter P4–P5. Gender is masculine.

Distribution. Known only from the type locality in the southeastern Bay of Bengal, India at 535 m depth (present study).

Superfamily Majoidea Samouelle, 1819**Family Epiplatidae MacLeay, 1838****Genus *Tunepugettia* Ng, Komai and Sato, 2017*****Tunepugettia corbariae* B.Y. Lee, Richer de Forges and P.K.L. Ng, 2019**

(Fig. 6)

Tunepugettia corbariae B.Y. Lee, Richer de Forges and P.K.L. Ng, 2019: 21, figs. 10A, 11D–F, 12A–D (type locality: Ainto Bay, southeast New Britain, Solomon Sea, Papua New Guinea, MADEEP Expedition, 06°08'S 149°10'E, 430–620 m depth).

Material examined. 1 female (PCL 26.9 mm, CW 20.8 mm) (IO/SS/BRC/00297), off Middle Andaman Island, Andaman Sea, FORVSS stn. 28016, 12.83°N 93.21°E, 441 m, coll. Dr. Vinu Jacob, Expo model trawl, 17 September 2010.

Remarks. *Tunepugettia corbariae* was originally described from a male (31.4 × 21.2 mm) collected from Ainto Bay, Papua New Guinea at 430–620 m during the MADEEP Expedition (Lee *et al.*, 2019).

The present female specimen largely agrees with the original description, with exception of a relatively narrow carapace, PCL/CW ratio 1.29 (*vs.* Papuan female specimens, PCL/CW ratio 1.45–1.67 (Lee *et al.*, 2019)) and slightly less prominent protuberances on the carapace (Fig. 6A–C). The above differences in the present specimen as compared to the Papuan material could be attributed to the comparatively smaller size of the present material. The present observation is a new record in Indian waters.

Distribution. Papua New Guinea at 280–1085 m depth (Lee *et al.*, 2019) and Andaman Sea, India at 441 m depth (present study).

Family Inachidae MacLeay, 1838**Genus *Cyrtomaia* Miers, 1886*****Cyrtomaia suhmii* Miers, 1886**

(Fig. 7)

Cyrtomaia suhmii Miers, 1886: 16, pl. 3, fig. 2, 2a–c (type locality: off Tulus Islands, South China Sea, 4°33'0"N 127°6'0"E). — Rathbun, 1918: 6 (remarks). — Richer de Forges and Guinot, 1990: 525, 527 (discussion). — Richer de Forges and Ng, 2007: 56 (list). — Ng *et al.*, 2008: 111 (list). — Promdam, 2011: 7, figs. 1, 2A–F.

Cyrtomaia suhmi — Rathbun, 1893: 230 (remarks). — Griffin, 1974: 9. — Guinot and Richer de Forges, 1981b: 1096 (remarks). — Guinot and Richer de Forges, 1982: 16 (key), 21, figs. 10, 11A–B, 23B. — Guinot and Richer de Forges, 1985: 116, figs. 11B, 12A, B, 14A–C, pl. V, fig. A–D, F–I. — Griffin and Tranter, 1986a: 24 (key), 30, fig. 9e–g. — Griffin and Tranter, 1986b: 352, figs. 1, 2. — Richer de Forges and Guinot, 1988: 42–44 fig. 2B, C, pl. 2F, G. — Poore, 2004: 360 (key), 361, fig. 108g. — Richer de Forges and Ng, 2007: 62 (remarks).

Cyrtomaia suhmi var. *curviceros* Bouvier, 1915: 9–15, pl. 1.

Cyrtomaja suhmi typica — Serène and Lohavanijya, 1973: 45, 46 (key).

Cyrtomaja suhmi curvicornis — Serène and Lohavanijya, 1973: 45, 46 (key).

Cyrtomaia curviceros — Sakai, 1976: 176 (key), 181. — Guinot and Richer de Forges, 1981b: 1096 (remarks). — Guinot and Richer de Forges, 1982: 24, fig. 12A–D. — Richer de Forges and Guinot, 1988: 42, 43 (remarks), fig. 2A. — Ng *et al.*, 2001: 13, 54, 75, 81, fig. 3h. — Richer de Forges and Ng, 2007: 56 (list), 62, 63 (remarks).

Material examined. 1 male (PCL 67.1 mm, CW 78.5 mm) (IO/SS/BRC/00298), off Great Nicobar Island, Bay of Bengal, FORVSS stn. 28037, 6.64°N 93.68°E, 271 m, coll. Dr. Vinu Jacob, Expo model trawl, 24 September 2010.

Remarks. *Cyrtomaia suhmii* was originally described from a damaged male specimen (25 × 28 mm) collected from the South China Sea, Indonesia at 915 m depth during the HMS Challenger Expedition (Miers, 1886). Doflein (1904) recognized two subspecies from the “Valdivia” collections in the Nicobar Islands, Indonesia (*C. suhmi typica*) and the Western Indian Ocean (*C. suhmi platyceros*) based on the differences in the form of carapace, rostrum, female pleon as well as the carapace ornamentation and texture.

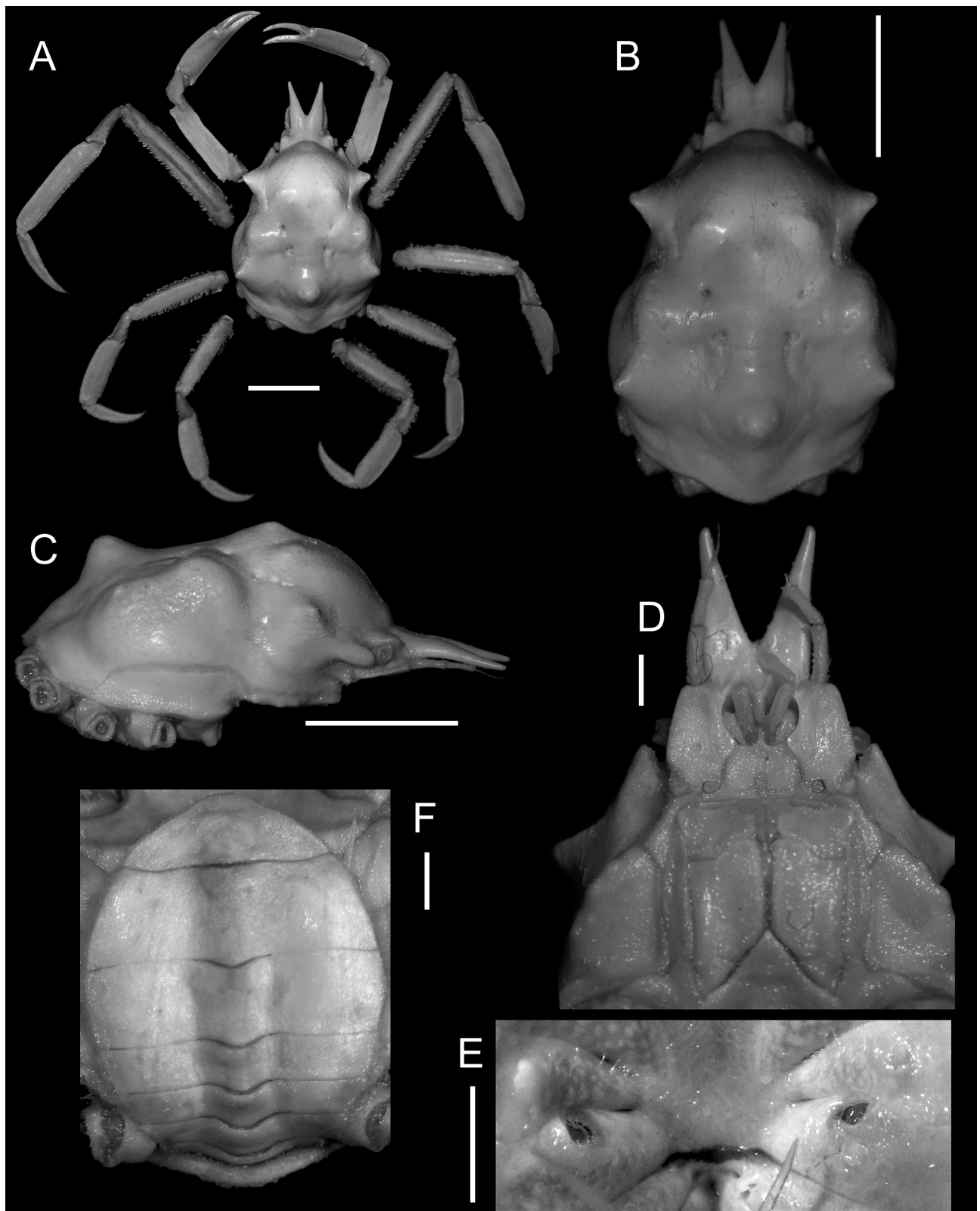


Figure 6. *Tunepugettia corbariae* B.Y. Lee, Richer de Forges and P.K.L. Ng, 2019, female (PCL 26.9 mm, CW 20.8 mm) (IO/SS/BRC/00297), Andaman Sea off Middle Andaman Island, India. **A**, Dorsal habitus; **B**, **C**, carapace dorsal and lateral views, respectively; **D**, ventral view indicating the position of antennules, antennae, and third maxilliped; **E**, gonopores and pleonal locking mechanism, enlarged; **F**, pleon and telson, ventral view. Scale bars: **A–C** = 10 mm; **D–F** = 2 mm.

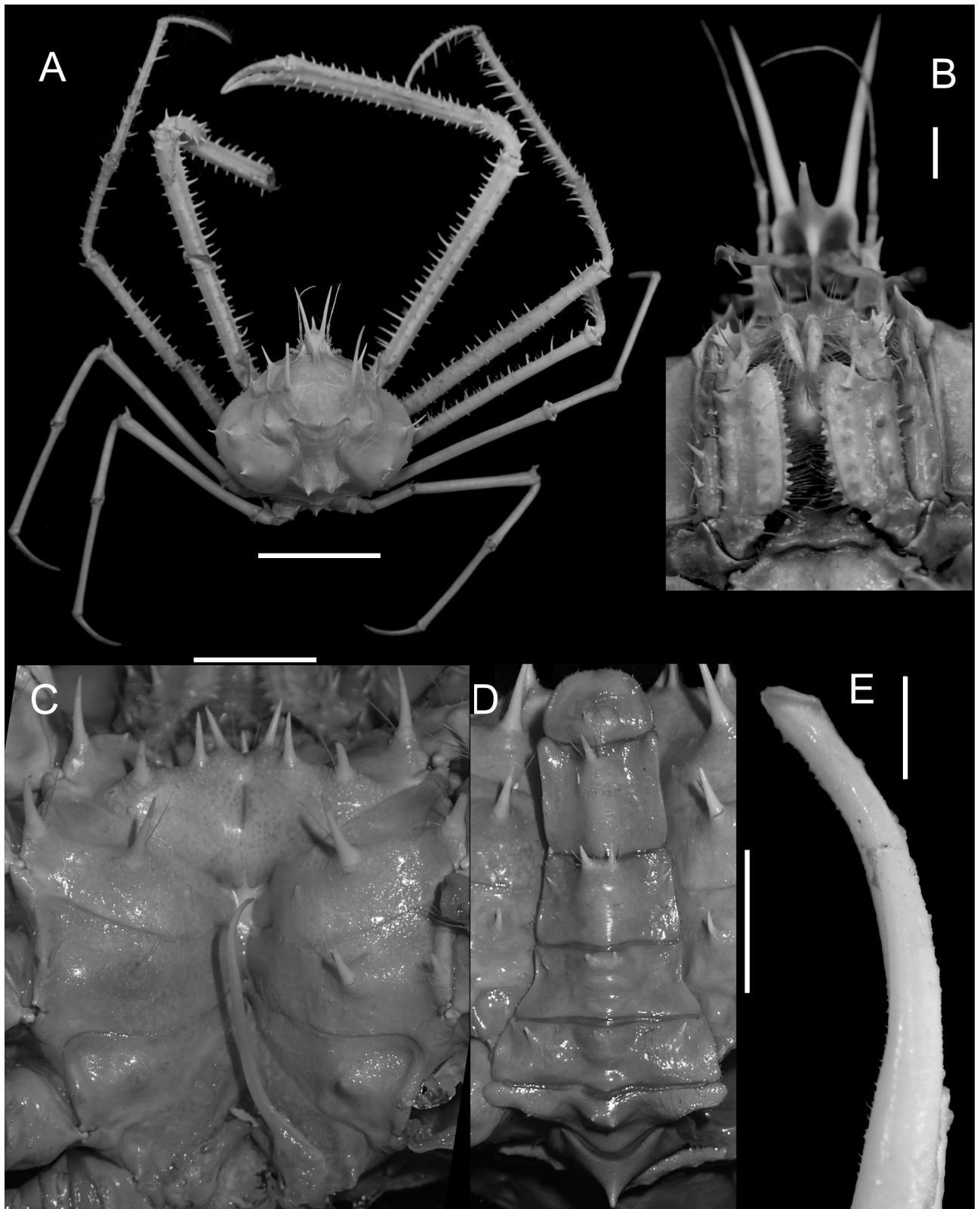


Figure 7. *Cyrtomaia suhmii* Miers, 1885, male (PCL 67.1 mm, CW 78.5 mm) (IO/SS/BRC/00298), Bay of Bengal off Great Nicobar Island, India. **A**, Dorsal habitus; **B**, ventral view indicating the position of antennules, antennae and third maxilliped; **C**, thoracic sternum in ventral view indicating G1 position; **D**, pleon and telson, ventral view; **E**, right G1, sub-ventral view. Scale bars: **A–B** = 50 mm, **C–D** = 10 mm, **E** = 1 mm.

Bouvier (1915) recognized a separate subspecies from Japan, *C. suhmi curviceros* based on arched pseudostrahl and gastric spines, and poorly developed branchial spines. Serène and Lohavanijaya (1973) provided a key to the species and subspecies of the genus *Cyrtomaia* including these subspecies. Griffin (1974) reported this species from the Andaman Sea off Thailand, along with morphological differences from the holotype with respect to the armature of the carapace and the basal antennal article. He also elaborated upon its synonymy and morphological relationships with congeners. Griffin and Brown (1976) reported a large female from Australian waters having long protogastric spines, one supraorbital spine and one mesogastric spine. Sakai (1976) elevated *C. suhmi curviceros* to a distinct species. Guinot and Richer de Forges (1982) redescribed the holotype, attempted to resolve the taxonomic status of several of its subspecies, and compared other published descriptions with the holotype. They also elevated *C. suhmi typica* to a distinct species, *C. gaillardi*. Guinot and Richer de Forges (1985) reported morphological similarities of specimens collected during the MUSORSTOM I and II expeditions in the Philippines to both *C. suhmi* and *C. curviceros* and emphasized upon reviewing the identity of *C. curviceros*. Griffin and Tranter (1986a) suggested that *C. suhmi curviceros* is an adult stage of *C. suhmi* and synonymized it with the latter. Griffin and Tranter (1986b) reported specimens from Australian waters and the Straits of Malacca having a large adult size, smooth carapace, and a short eyestalk. Richer de Forges and Guinot (1990) established a new species, *Cyrtomaia griffini*, based on the material collected off the eastern coast of Australia, also including previously published reports (Griffin and Brown, 1976; Griffin and Tranter, 1986a; 1986b). Promdam (2011) reported this species in the Andaman Sea off Thailand and corroborated *C. curviceros* to be a synonym of *C. suhmii* on the basis of both adult and juveniles resembling these taxa, respectively.

The present specimen (Fig. 7A, B, E) largely agrees with the original description by Miers (1886), the holotype specimen (see Guinot and Richer de Forges, 1982: figs. 11A–B, 23B; Richer de Forges and Guinot, 1988: fig. 2B, C), the Philippine specimens (see Guinot and Richer de Forges, 1985: figs. 11B, 12, 14A), line diagram of G1 of male specimen from Tasman Sea (see

Griffin and Tranter, 1986a: fig. 9e–g), the Western Australia specimen (Griffin and Tranter, 1986b: figs. 1, 2), and the Thailand specimen (see Promdam, 2011: figs. 1, 2D). However, it differs from the southeastern Arabian Sea specimens in Alcock's report, in the presence of spine on the "last abdominal tergum" (Fig. 7D) (*vs.* smooth tergum in the latter specimens in Alcock's report).

Distribution. Indonesia at 915 m depth (Miers, 1886), Japan, Taiwan, Andaman Sea off Thailand at 502–512 m (Griffin, 1974) and southeastern Bay of Bengal at 271 m (present study).

Superfamily Portunoidea Rafinesque, 1815

Family Geryonidae Colosi, 1923

Genus *Chaceon* Manning and Holthuis, 1989

Chaceon alcocki Ghosh and Manning, 1993

(Fig. 8)

Chaceon alcocki Ghosh and Manning, 1993: 714, figs. 1–3 (type locality: off Travancore coast, 8°37'N 75°37'30"E). — Ng *et al.*, 2008: 147 (list). — Jose *et al.*, 2019: 749, figs. 1–3.

Geryon affinis — Alcock, 1899a: 85 [not *Geryon affinis* Milne Edwards and Bouvier, 1894].

Material examined. 1 male (CL 146.4 mm, CW 161.1 mm) (IO/SS/BRC/00300), off Alleppey (Kerala), Arabian Sea, FORVSS stn. 32121, 9.25°N 76.17°E, 55 m, coll. Dr. Vinu Jacob, HSDT (CV), 13 December 2013.

Remarks. Alcock (1899a) erroneously reported a female geryonid (110.5 × 126.5 mm) from off Travancore (Kerala) coast at 410–520 m as *Geryon affinis*. Ghosh and Manning's re-examination of this specimen (1993) resulted in the establishment of a new species, *Chaceon alcocki*, characterized by short frontal and anterolateral spines, the absence of distal spines dorsally on the P2–P5 meri, and laterally compressed pereopod dactyli. Jose *et al.* (2019) reported another female specimen (146 × 156 mm) collected from a commercial trawl landing along Kerala coast, and was reportedly caught at 260–300 m depth.

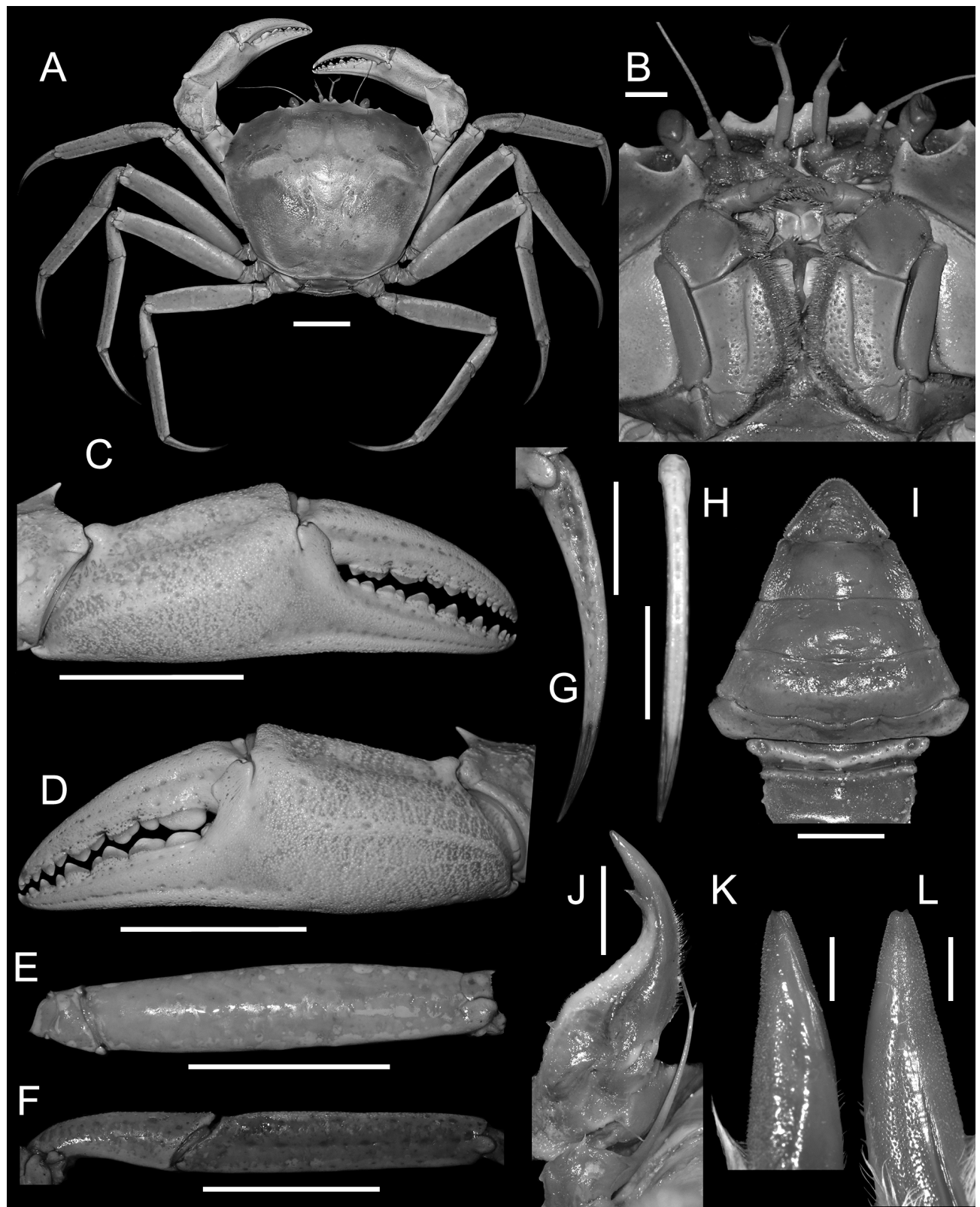


Figure 8. *Chaceon alcocki* Ghosh and Manning, 1993, male (CL 146.4 mm, CW 161.1 mm) (IO/SS/BRC/00300), southeast Arabian Sea off Alleppey (Kerala), India. **A**, Dorsal habitus; **B**, ventral view indicating the position of antennules, antennae and third maxilliped; **C**, right chela and carpus, outer view; **D**, left chela and carpus, outer view; **E**, P5 merus, dorsal view; **F**, P5 carpus and propodus, dorsal view; **G**, **H**, P5 dactylus, dorsal and lateral views; **I**, pleon and telson, ventral view; **J**, right G1 and G2 *in situ*, ventral view; **K**, **L**, right G1 distal portion, ventral and dorsal views. Scale bars: **A** = 50 mm, **B–F**, **J** = 10 mm, **G–I** = 20 mm, **K–L** = 2 mm.

The present specimen is the first male and the largest specimen reported for this species. The G1 is stout, curved, tapering distally; inner margin is covered with a row of short setae along proximal half, distal quarter with a short spinulose patch terminating sub-distally; outer margin with spinulose patch on distal one-third terminating sub-distally, followed by a small patch of long setae appearing like a spinose projection (Fig. 8J). G2 shorter than G1 in length, slender, tapering distally, with spinose process subdistally on inner margin (Fig. 8J). Among the closely related congeners, published descriptions of only two species, *Chaceon macphersoni* Manning and Holthuis, 1988 and *Chaceon goreni* Galil and Manning, 2001 were supplemented with illustrations of the gonopods. *Chaceon alcocki* differs from *C. macphersoni* and *C. goreni* in the presence of setae on both inner and outer margins (*vs.* row of setae on inner margin in *C. goreni* (see Galil and Manning, 2001: fig. 3C–E); absence of setae on either margin in *C. macphersoni* (see Manning and Holthuis, 1988: fig. 4G, H)).

Distribution. Known only from the southeastern Arabian Sea off Kerala at 50–520 m depths (Ghosh and Manning, 1993; Jose *et al.*, 2019; present study).

Superfamily Trapezioida Miers, 1886

Family Trapeziidae Miers, 1886

Genus *Sphenomerides* Rathbun, 1897

Sphenomerides trapezioides (Wood-Mason, 1891) (Fig. 9)

Sphenomerus trapezioides Wood-Mason in Wood-Mason and Alcock, 1891: 263 (type locality: between North and South Sentinel Islands, Bay of Bengal. — Wood-Mason, 1892: pl. 5, fig. 2. — Alcock, 1898: 228. — Poupin *et al.*, 2018: 108 (basonym).

Sphenomerides trapezoides [*sic*] — Serène, 1968, 89. — Serène, 1973: 207, figs. 6, 27, 28, pl. 5A–D. — Serène, 1984: 289, fig. 196, pl. 42D. — Castro *et al.*, 2004: 34 (in key), 60, pl. 4, fig. E. — Ng *et al.*, 2008: 185 (list). — Castro, 2013: 461, fig. 2F–H.

Material examined. 1 female (CL 6.9 mm, CW 9.4 mm) (IO/SS/BRC/00299), Bay of Bengal off Great Nicobar Island, FORVSS stn. 28037, 6.64°N 93.68°E, depth 271 m, coll. Dr. Vinu Jacob, Expo model trawl, 24 September 2010.

Remarks. *Sphenomerides trapezioides* was described from a male specimen (8.5 × 11 mm) collected off the west coast of the Andamans at 403–439 m depths (Wood-Mason and Alcock, 1891), and subsequently figured by Wood-Mason (1892: pl. 5 fig. 2). Alcock (1898) provided a brief description based on additional specimens from the Andaman Sea. Serène (1973) reported one male and two female specimens from the Indonesian reefs, supplemented with line illustrations of the P4 dactylus and G1, and photographs of carapace and chelipeds. Serène (1984) studied a large collection from Madagascar supported with a line illustration of the G1 and a photograph of the dorsal habitus. Castro *et al.* (2004) provided details on the synonymy, morphological diagnosis, and notes on the geographical distribution. Castro (2013: fig. 2G) reported the first evidence of *S. trapezioides* living inside a siliceous sponge, as well as the presence of mucus-gathering setae typical of the family Trapeziidae (Castro, 2013: fig. 2H).

Distribution. Bay of Bengal, off Andamans at 403–439 m depth (Wood-Mason and Alcock, 1891) and Nicobars at 271 m (present study), Andaman Sea at 238–531 m (Alcock, 1898), Haruku Island, Indonesia at 138–152 m and Madagascar at 220–362 m (Serène, 1984; Castro, 2013).

ACKNOWLEDGEMENTS

The authors are grateful to the Director, Centre for Marine Living Resources and Ecology, Kochi, for providing an opportunity to work on deep-water crustacean resources of the Indian EEZ. The authors are thankful to Shri. N. Saravanane, Scientist F, CMLRE and Project Co-ordinator of the 'Resource Exploration and Inventorization System' project. We thank the chief scientists, fishing hands and participants of the FORV "Sagar Sampada" cruise numbers 279, 280, 321, 334 (leg I) and 349

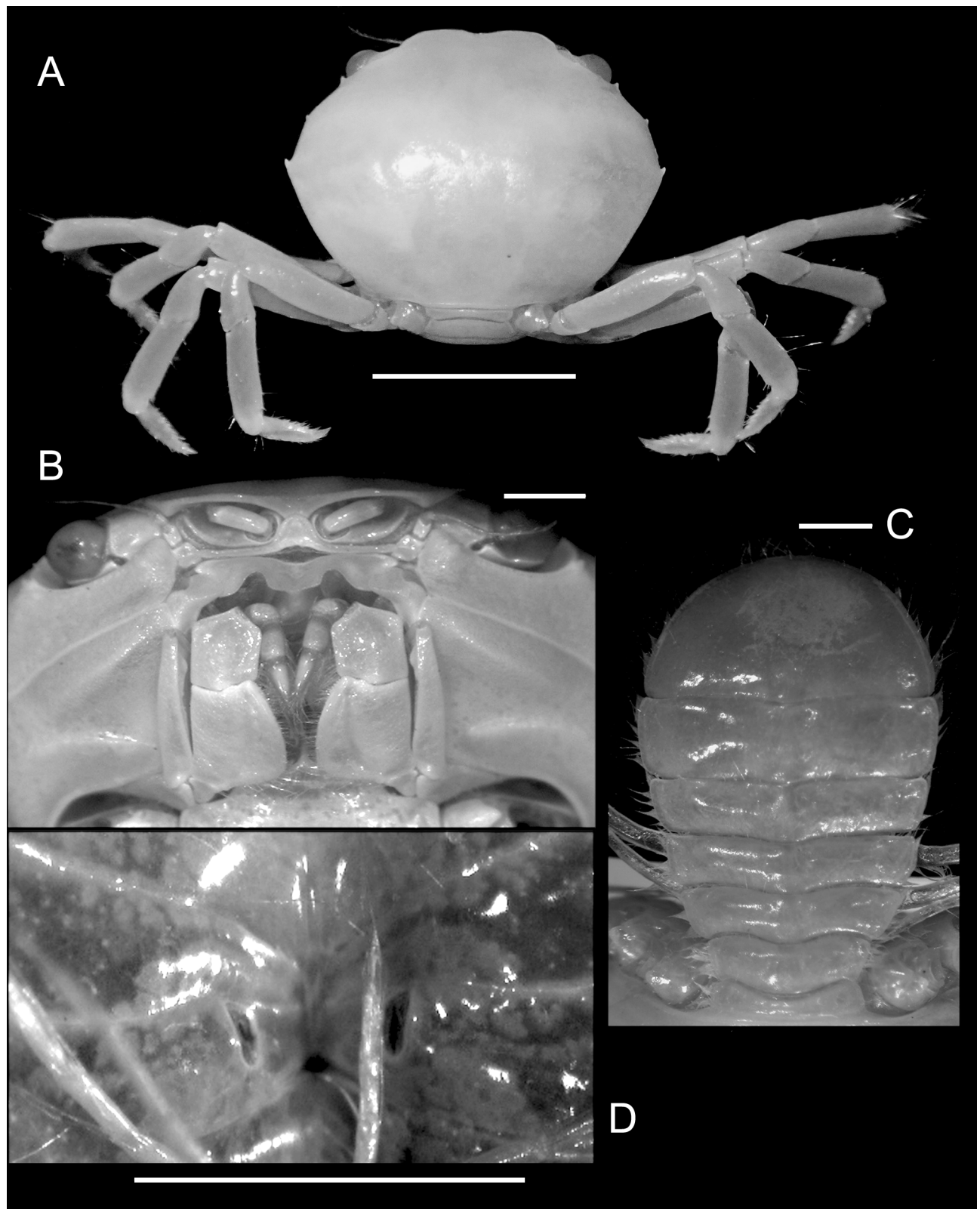


Figure 9. *Sphenomerides trapezioides* (Wood-Mason, 1891), female (CL 6.9 mm, CW 9.4 mm) (IO/SS/BRC/00299), Bay of Bengal off Great Nicobar Island, India. **A**, Dorsal habitus; **B**, ventral view indicating the position of antennules, antennae and third maxilliped; **C**, pleon and telson, ventral view; **D**, gonopores, enlarged view. Scale bars: **A** = 5 mm, **B–D** = 1 mm.

(leg II) for meticulously collecting the specimens. The authors are grateful to the VLIZ Library, Flanders Marine Institute, Ostend, Belgium and Dr. Josileen Jose, Principal Scientist, Central Marine Fisheries Research Institute, Kochi, India for sharing valuable taxonomic literature. The authors wish to express their gratitude to the Associate Editor and the two anonymous reviewers for the critical review that improved the quality of the manuscript.

REFERENCES

- Alcock, A. 1894. Natural history notes from H.M. Indian Marine Survey Steamer 'Investigator,' Commander R.F. Hoskyn, R.N., late commanding. — Series II., No. 1. On the result of deep-sea dredging during the season 1890–1891 (concluded). *The Annals and Magazine of Natural History, including Zoology, Botany, and Geology*, series 6, 13: 400–411.
- Alcock, A. 1895. Materials for a carcinological fauna of India. No. 1. The Brachyura Oxyrhyncha. *Journal of the Asiatic Society of Bengal*, 64: 157–291, pls. 3–5.
- Alcock, A. 1896. Materials for a carcinological fauna of India. No. 2. The Brachyura Oxystoma. *Journal of the Asiatic Society of Bengal*, 65: 134–296, pls. 6–8.
- Alcock, A. 1898. Materials for a carcinological fauna of India. No. 3. The Brachyura Cyclometopa. Part I. The family Xanthidae. *Journal of the Asiatic Society of Bengal*, 67: 67–233.
- Alcock, A. 1899a. An Account of the Deep-Sea Brachyura collected by the Royal Indian Marine Survey Ship Investigator. Calcutta, Trustees of the Indian Museum, p. i–iv + 1–85, index, pls. I–IV.
- Alcock, A. 1899b. Materials for a carcinological fauna of India. No. 4. The Brachyura Cyclometopa. Part II. A revision of the Cyclometopa with an account of the families Portunidae, Cancridae and Crystidae. *Journal of the Asiatic Society of Bengal*, 68: 1–104.
- Alcock, A. 1900a. Materials for a carcinological fauna of India. No. 5. The Brachyura Primigenia, or Dromiacea. *Journal of the Asiatic Society of Bengal*, 68: 123–169.
- Alcock, A. 1900b. Materials for a carcinological fauna of India. No. 6. The Brachyura Catometopa, or Grapsoidea. *Journal of the Asiatic Society of Bengal*, 69: 279–456.
- Alcock, A. 1901. Catalogue of the Indian Decapod Crustacea in the collection of the Indian Museum. Part I. Brachyura. Fasciculus 1. Introduction and Dromides or Dromiacea (Brachyura Primigenia). Calcutta, Trustees of the Indian Museum, 80p.
- Alcock, A. 1905. Natural history notes from the R.I.M.S. Ship 'Investigator,' Capt. T. H. Heming, R.N., commanding. — Series III., No. 9. On a new species of the dorippoid genus *Cyonomus* from the Andaman Sea, considered with reference to the distribution of the Dorippidae; with some remarks on the allied genus *Cyonomops*. *The Annals and Magazine of Natural History, including Zoology, Botany, and Geology*, series 7, 15: 565–577, pl. 18.
- Alcock, A. and Anderson, A.R.S. 1894. An account of a recent collection of deep-sea Crustacea from the Bay of Bengal and Laccadive Sea. Natural history notes from H.M. Royal Indian Marine Survey Steamer "Investigator", commander C.F. Oldham, R.N., commanding. — Series II, No. 14. *Journal of the Asiatic Society of Bengal*, 63: 141–185, pl. 9.
- Alcock, A. and Anderson, A.R.S. 1896. Illustrations of the zoology of the Royal Indian Marine Surveying Steamer "Investigator" under the command of Commander C.F. Oldham, R.N. Crustacea. Part IV. Published under the Authority of Captain J. Hert, R.N., C.I.E., Director of the Royal Indian Marine. Calcutta, Office of the Superintendent of Government Printing, plates XVI–XXVII. [Twelve unnumbered pages of explanation of crustacean plates XVI–XXVII]
- Alcock, A. and Anderson, A.R.S. 1899. Natural history notes from H.M. Royal Indian Marine Survey Ship 'Investigator,' Commander T.H. Heming, R.N., commanding. — Series III, no. 2. An account of the deep-sea Crustacea dredged during the surveying-season of 1897–98. *The Annals and Magazine of Natural History including Zoology, Botany, and Geology*, series 7, 3: 1–27.
- Anderson, A.R.S. 1896. Natural history notes from the H.M. Indian marine survey steamer 'Investigator,' Commander C. F. Oldham, R. N., commanding. Series II, no. 21. An account of the deep sea Crustacea collected during the season 1894–95. *Journal of the Asiatic Society of Bengal*, 65: 88–106.
- Balss, H. 1922. Ostasiatische Decapoden. III. Die Dromiaceen, Oxystomen und Parthenopiden. *Archiv für Naturgeschichte*, 88A (3): 104–140.
- Bouvier, E.L. 1915. Étude sur un *Cyrtomaia suhmi* du Musée de Marseille. *Annales du Musée d'Histoire naturelle de Marseille*, 15: 9–15, pl. 1.
- Castro, P. 2013. Brachyuran crabs (Crustacea, Brachyura: Crossotonotidae, Ethusidae, Euryplicidae, Goneplacidae, Latreilliidae, Palicidae, Tetraliidae, Trapeziidae) of the MAINBAZA, MIRIKI, and ATIMO VATAE Expeditions to the Mozambique Channel and Madagascar. In: S.T. Ahyong, T.-Y. Chan, L. Corbari and P.K.L. Ng (eds), *Tropical Deep-Sea Benthos*, volume 27. *Mémoires du Muséum national d'Histoire naturelle*, Paris, 204: 437–466.
- Castro, P.; Ng, P.K.L. and Ahyong, S.T. 2004. Phylogeny and systematics of the Trapeziidae Miers, 1886 (Crustacea: Brachyura), with the description of a new family. *Zootaxa*, 643: 1–70.
- Colosi, G. 1923. Una specie fossile de Gerionide (Decapodi brachiuri). *Bolettino della Società dei Naturalisti in Napoli*, Series 2, 15: 248–255.
- Crosnier, A. 1994. *Sphaerodromia lamellata*, espèce nouvelle de Nouvelle-Calédonie (Decapoda Brachyura, Dromiidae). *Crustaceana*, 67: 341–347.
- Crosnier, A. and Ng, P.K.L. 2004. Remarques sur le genre *Intesius* (Crustacea, Decapoda, Brachyura, Goneplacidae) et description de deux espèces nouvelles. *Zoosystema*, 26: 263–277.
- Davie, P.J.F. 1998. A new species of *Intesius* (Crustacea, Decapoda, Goneplacidae) from the deep water of French Polynesia. *Zoosystema*, 20: 221–227.
- Doflein, F. 1904. Brachyura. p. i–xiv, 1–314, 58 pls., 68 figs., 1 text pl. In: C. Chun (ed), *Wissenschaftliche Ergebnisse der deutschen Tiefsee-Expedition auf dem Dampfer "Valdivia" 1898–1899*. Volume 6. Jena, Verlag von Gustav Fischer.

- Galil, B.S. and Manning, R.B. 2001. A new geryonid crab from the Amirante Basin, western Indian Ocean (Crustacea: Decapoda: Brachyura). *Proceedings of the Biological Society of Washington*, 114: 104–108.
- Ghosh, H.C. and Manning, R.B. 1993. A new deep-sea crab of the genus *Chaceon* from India (Crustacea: Decapoda: Geryonidae). *Proceedings of the Biological Society of Washington*, 106: 714–718.
- Gordon, I. 1930. Seven new species of Brachyura from the coasts of China. *The Annals and Magazine of Natural History*, series 10, 6: 519–525.
- Griffin, D.J.G. 1974. Spider crabs (Crustacea: Brachyura: Majidae) from the International Indian Ocean Expedition, 1963–1964. *Smithsonian Contributions to Zoology*, 182: 1–35.
- Griffin, D.J.G. and Brown, D.E. 1976. Deepwater decapod crustacea from eastern Australia: brachyuran crabs. *Records of the Australian Museum*, 30: 248–271.
- Griffin, D.J.G. and Tranter, H.A. 1986a. The Decapoda Brachyura of the Siboga Expedition. Part VIII: Majidae. *Siboga Expédition*, 39 (C4): 1–335, pls. 1–22.
- Griffin, D.J.G. and Tranter, H.A. 1986b. Some majid spider crabs from the deep Indo-West Pacific. *Records of the Australian Museum*, 38: 351–371.
- Guinot, D. and Richer de Forges, B. 1981a. Crabes de profondeur, nouveaux ou rares, de Indo-Pacifique (Crustacea, Decapoda, Brachyura) (Deuxième partie). *Bulletin du Muséum national d'Histoire naturelle*, Paris, Section A (Zoologie), 4^e série, 3: 227–260.
- Guinot, D. and Richer de Forges, B. 1981b. Nouvelles récoltes des genres *Cyrtomaia* Miers et *Pleistacantha* Miers (Crustacea, Decapoda, Brachyura). *Bulletin du Muséum national d'Histoire naturelle*, Paris, 4^e série, 3: 1087–1125.
- Guinot, D. and Richer de Forges, B. 1982. Révision du genre Indo-Pacifique *Cyrtomaia* Miers, 1886: Campagnes océanographiques du Challenger, de l'Albatross, du Siboga et du Vauban (Crustacea Decapoda Brachyura). *Annales de l'Institut Océanographique*, Monaco et Paris, 58: 5–88.
- Guinot, D. and Richer de Forges, B. 1985. Crustacés Décapodes: Majidae (genres *Platymaia*, *Cyrtomaia*, *Pleistacantha*, *Sphenocarcinus* et *Naxiooides*). In: J. Forest (ed), Résultats des Campagnes MUSORSTOM I et II Philippines (1976, 1980). Tome 2. *Mémoires du Muséum national d'Histoire naturelle*, Paris, série A, Zoologie, 133: 83–178.
- Guinot, D. and Tavares, M.S. 2003. A new subfamilial arrangement for the Dromiidae de Haan, 1833, with diagnoses and descriptions of new genera and species (Crustacea, Decapoda, Brachyura). *Zoosystema*, 25: 43–129.
- Haan, W. de. 1833–1850. Crustacea. p. i–xvii, i–xxxix, ix–xvi, 1–243, pls. A–J, L–Q, 1–55, circ. Table 2. In: P.F. von Siebold (ed), Fauna Japonica sive Descriptio Animalium, Quae in Itinere per Japoniam, Jussu et Auspiciis Superiorum, qui Summum in India Batava Imperium Tenent, Suscepit, Annis 1823–1830 Collegit, Noitis, Observationibus et Adumbrationibus Illustravit. Leiden, Lugduni-Batavorum.
- Ihle, J.E.W., 1913. Die Decapoda Brachyura der Siboga-Expedition I. Dromiacea. *Siboga Expédition, Monographie 39(B)*: 1–96, pls. 1–4.
- Jose, J.; Maheswarudu, G. and Sreesanth, L. 2019. Record of *Chaceon alcocki* Ghosh & Manning, 1993 from the Arabian Sea, off Kollam, India. *Crustaceana*, 92: 749–755.
- Karasawa, H. and Kato, H. 2003. The family Goneplacidae MacLeay, 1838 (Crustacea: Decapoda: Brachyura): systematics, phylogeny, and fossil records. *Paleontological Research*, 7: 129–151.
- Kemp, S. and Sewell, R.B.S. 1912. Notes on Decapoda in the Indian Museum. III. The species obtained by R.I.M.S.S. 'Investigator' during the survey season 1910–11. *Records of the Indian Museum*, 7: 15–32.
- Kumar, B.A.; Kumar, M.S. and Galil, B.S. 2013. Calappid and leucosiid crabs (Crustacea: Decapoda: Brachyura) from Kerala, India, with the description of a new species of *Mursia* Desmarest, 1823, from the Arabian Sea and redescription of *M. bicristimana* Alcock & Anderson, 1894. *Zootaxa*, 3746: 529–551.
- Latreille, P.A. 1802. Histoire naturelle, générale et particulière des Crustacés et des Insectes. Ouvrage faisant suite à l'histoire naturelle générale et particulière, composée par Leclerc de Buffon, et rédigée par C.S. Sonnini, membre de plusieurs sociétés savantes. Familles naturelles des genres. Vol. 3. Paris F. DuFart, 467p.
- Lee, B.Y.; Richer de Forges, B. and Ng, P.K.L. 2019. Deep-sea spider crabs of the family Epialtidae MacLeay, 1838, from Papua New Guinea, with a redefinition of *Tunepugettia* Ng, Komai & Sato, 2017, and descriptions of two new genera (Crustacea: Decapoda: Brachyura: Majoidea). *Zootaxa*, 4619: 1–44.
- Lewinsohn, C. 1984. Dromiidae (Crustacea, Decapoda, Brachyura) from Madagascar and the Seychelles. *Bulletin du Muséum national d'Histoire naturelle, Section A, Zoologie, Biologie et Ecologie Animales*, Paris, 4^e série, 6: 89–129, pls. 1–4.
- Lloyd, R.E. 1907. Contributions to the fauna of the Arabian Sea, with descriptions of new fishes and Crustacea. *Records of the Indian Museum*, 1: 1–12.
- MacGilchrist, A.C. 1905. Natural history notes from the R.I.M.S. 'Investigator', Capt. T.H. Heming, R. N. (retired), commanding. - Series III., No. 6. An account of the new and some of the rarer decapod Crustacea obtained during the surveying seasons 1901–1904. *The Annals and Magazine of Natural History, including Zoology, Botany, and Geology*, series 7, 15: 233–268.
- MacLeay, W.S. 1838. On the brachyurous decapod Crustacea brought from the Cape by Dr. Smith. p. 53–71, 2 pls. In: A. Smith (ed), Illustrations of the Annulosa of South Africa; being a portion of the objects of natural history chiefly collected during an expedition into the interior of South Africa, under the direction of Dr. Andrew Smith, in the years 1834, 1835 and 1836; fitted out by "The Cape of Good Hope Association for Exploring Central Africa". London, Smith, Elder, and Co.
- Manning, R.B. and Holthuis, L.B. 1984. *Geryon fenneri*, a new deep-water crab from Florida (Crustacea: Decapoda: Geryonidae). *Proceedings of the Biological Society of Washington*, 97: 666–673.
- Manning, R.B. and Holthuis, L.B. 1988. South African species of the genus *Geryon* (Crustacea, Decapoda, Geryonidae). *Annals of the South African Museum*, 98: 77–92.

- Manning, R.B. and Holthuis, L.B. 1989. Two new genera and nine new species of geryonid crabs (Crustacea, Decapoda, Geryonidae). *Proceedings of the Biological Society of Washington*, 102: 50–77.
- McArdle, A.F. 1900. Natural history notes from the Royal Indian Marine Survey Ship 'Investigator'. - Series III., No. 4. Some results of the dredging season 1899–1900. *The Annals and Magazine of Natural History, including Zoology, Botany, and Geology*, series 7, 6: 471–478.
- McArdle, A.F. 1901. Natural history notes from the Royal Indian Marine Survey Ship 'Investigator,' Commander T. H. Heming, R. N., commanding. - Series III., No. 5. An account of the trawling operations during the surveying-season of 1900–1901. *The Annals and Magazine of Natural History, including Zoology, Botany, and Geology*, series 7, 8: 517–526.
- McLay, C.L. 1991. A small collection of deep water sponge crabs (Brachyura, Dromiidae) from French Polynesia, including a new species of *Sphaerodromia* Alcock, 1899. *Bulletin du Muséum national d'Histoire naturelle, Section A, Zoologie, Biologie et Ecologie Animales*, Paris, 4^e série, 13: 457–481.
- McLay, C.L. 1993. Crustacea Decapoda: the sponge crabs (Dromiidae) of New Caledonia and the Philippines with a review of the genera. In: A. Crosnier (ed), *Résultats des Campagnes MUSORSTOM*, Volume 10. *Mémoires du Muséum national d'Histoire naturelle*, Paris, 156: 111–251.
- McLay, C.L. 2001. Dynomenidae and Dromiidae (Decapoda, Brachyura) from Guam, Philippine Islands, Tonga and Samoa. *Zoosystema*, 23: 807–856.
- McLay, C.L. and Crosnier, A. 1991. Description of a new and unusual species of *Sphaerodromia* (Brachyura, Dromiidae) from the Seychelles Islands. *Bulletin du Muséum national d'Histoire naturelle, Section A, Zoologie, Biologie et Ecologie Animales*, Paris, 4^e série, 13: 181–188.
- Mendoza, J.C.E. and Devi, S.S. 2017. A new species of the swimming crab genus, *Laleonectes* Manning & Chace, 1990 (Crustacea: Brachyura: Portunidae), from the western Indian Ocean. *Zootaxa*, 4323: 219–228.
- Mendoza, J.C.E.; Mani, P. and Ravichandran, S. 2020. First record of the deep-water xanthid crab genus, *Pulcratis* Ng & Huang, 1997, from the Indian Ocean, with description of a new species (Crustacea: Brachyura: Xanthidae). *Nauplius*, 28, e2020010.
- Miers, E.J. 1886. Report on the Brachyura collected by H.M.S. Challenger during the years 1873–1876. p. 1–362, pls. 1–29. In: J. Murray (ed), *Zoology. Report on the Scientific Results of the Voyage of H.M.S. Challenger During the Years 1873–76 Under the Command of Captain George S. Nares, R.N., F.R.S. and the Late Captain Frank Tourle Thomson, R.N. Wyville Thomson, C. and J. Murray (series eds) Vol. 17. Edinburgh, Neill and Company.*
- Milne-Edwards, A. and Bouvier, E.-L. 1894. Crustacés décapodes provenant des campagnes du yacht l'Hirondelle (1886, 1887, 1888). I. Brachyures et Anomoures. *Résultats des Campagnes Scientifiques accomplies sur son Yacht par Albert Ier Prince Souverain de Monaco*, 7: 3–112, pls. 1–11.
- Ng, P.K.L.; Devi, S. and Kumar, A.B. 2018a. The genus *Parilia* Wood-Mason, in Wood-Mason & Alcock, 1891, with description of a new species and establishment of a new genus for *P. tuberculata* Sakai, 1961 (Crustacea, Brachyura, Leucosiidae). *Raffles Bulletin of Zoology*, 66: 300–319.
- Ng, P.K.L.; Guinot, D. and Davie P.J.F. 2008. Systema Brachyurorum: Part I. An annotated checklist of extant brachyuran crabs of the world. *The Raffles Bulletin of Zoology*, Supplement 17: 1–286.
- Ng, P.K.L.; Komai, T. and Sato, T. 2017b. On the trail of a Japanese "ghost species"—the identity of *Goniopugettia tanakae* Sakai, 1986, and the establishment of a new genus for *Pugettia sagamiensis* Gordon, 1930 (Decapoda, Brachyura, Epialtidae). *Crustacean Research*, 46: 133–152.
- Ng, P.K.L. and Kumar, A.B. 2015. The species of *Moloha* Barnard, 1946, from the western Indian Ocean, with the description of a new species from India (Crustacea: Brachyura: Homolidae). *European Journal of Taxonomy*, 166: 1–25.
- Ng, P.K.L. and Kumar, A.B. 2016. *Carcinoplax fasciata*, a new species of deep-water goneplacid crab from southwestern India (Crustacea: Decapoda: Brachyura: Goneplacoidea). *Zootaxa*, 4147: 192–200.
- Ng, P.K.L. and Mitra, S. 2019. *Carcinoplax mistio*, a new species of goneplacid crab from the Indian Ocean (Decapoda: Brachyura: Goneplacoidea). *Nauplius*, 27: e2019004.
- Ng, P.K.L.; Padate, V.P. and Saravanane, N. 2019. *Gordonopsis robusta*, a new species of deep-sea porter crab (Crustacea: Brachyura: Homolidae) from the Andaman Sea, India. *Raffles Bulletin of Zoology*, 67: 510–516.
- Ng, P.K.L.; Prema, M. and Ravichandran, S. 2018b. A new species of deep-water spider crab of the genus *Paramaya* De Haan, 1837 from the Bay of Bengal, India (Crustacea, Brachyura, Majidae). *ZooKeys*, 769: 77–88.
- Ng, P.K.L.; Ravinesh, R. and Ravichandran, S., 2017a. A new large oregoniid spider crab of the genus *Pleistacantha* Miers, 1879, from the Bay of Bengal, India (Crustacea, Brachyura, Majoidea). *Zookeys*, 716: 127–146.
- Ng, P.K.L.; Wang, C.-H.; Ho, P.-H. and Shih, H.-T. 2001. An annotated checklist of brachyuran crabs from Taiwan (Crustacea: Decapoda). *National Taiwan Museum Special Publication Series*, 11: 1–86.
- Padate, V.P.; Amritha, K.M.; Cubelio, S.S.; Saravanane, N.; Sudhakar, M. and Ng, P.K.L. 2020a. Deep-water Brachyura from the surveys of the FORV Sagar Sampada off the Andaman and Nicobar archipelagos, India. *Regional Studies in Marine Science*, 35: 101–117.
- Padate, V.P.; Cubelio, S.S. and Jayachandran, K.V. 2020b. Description of a new species of deep-water crab of the genus *Homolodromia* A. Milne-Edwards, 1880 from the northern Indian Ocean (Crustacea: Decapoda: Brachyura: Homolodromiidae). *Marine Biology Research*, 16: 209–218.
- Padate, V.P.; Lee, B.Y. and Cubelio, S.S. 2020c. Description of a new species of deep-sea spider crab from the genus *Crocodycinus* Lee, Richer de Forges & Ng, 2019, from the south-eastern Arabian Sea (Crustacea: Decapoda: Majoidea: Epialtidae). *Zootaxa*, 4816: 229–234.
- Poore, G.C.B. 2004. Marine Decapod Crustacea of Southern Australia. A Guide to Identification with Chapter on Stomatopoda by Shane Ahyong. Melbourne, CSIRO Publishing, 574p.
- Poupin, J.; Cleva, R.; Bouchard, J.-M.; Dinhut, V. and Dumas, J. 2018. The Crabs from Mayotte Island (Crustacea, Decapoda, Brachyura). *Atoll Research Bulletin*, 617: vi–109.

- Promdam, R., 2011. New records of spider crabs of the genera *Cyrtomaia* Miers, 1886, and *Platymaia* Miers, 1886 (Decapoda: Majoidea: Inachidae) from the Andaman Sea, Thailand. *Phuket Marine Biological Center Research Bulletin*, 70: 7–14.
- Rathbun, M.J. 1893. Scientific results of explorations by the U.S. Fish Commission steamer Albatross. No. XXIV. — Descriptions of new genera and species of crabs from the west coast of North America and the Sandwich Islands. *Proceedings of the United States National Museum*, 16: 223–260.
- Rathbun, M.J. 1897. A revision of the nomenclature of the Brachyura. *Proceedings of the Biological Society of Washington*, 11: 153–167.
- Rathbun, M.J. 1918. Report on the spider crabs obtained by the F.I.S. “Endeavour” on the coasts of Queensland, New South Wales, Victoria, South Australia and Tasmania. *Biological Results of the Fishing Experiments carried on by the F.I.S. “Endeavour”, 1909–14*, 5: 1–29, pls. 1–15.
- Richer De Forges, B. and Guinot, D. 1988. Description de trois espèces de *Cyrtomaia* Miers, 1886, de Nouvelle Calédonie et des îles Chesterfield (Crustacea, Decapoda, Brachyura). *Bulletin du Muséum national d’Histoire naturelle*, Paris, 4^e série, 10: 39–55.
- Richer de Forges, B. and Guinot, D. 1990. A new *Cyrtomaia*, *C. griffini*, from Australia (Crustacea: Decapoda: Brachyura). *Memoirs of the Queensland Museum*, 28: 523–530.
- Richer de Forges, B. and Ng, P.K.L. 2007. Notes on deep-sea spider crabs of the genus *Cyrtomaia* Miers, 1886, from the Philippines (Crustacea: Decapoda: Brachyura: Majidae), with description of a new species. *The Raffles Bulletin of Zoology*, Supplement 16: 55–65.
- Sakai, T. 1936. Studies on the crabs of Japan I. Dromiacea. *Science Reports of the Tokyo Bunrika Daigaku*, section B, 3 (Supplement 1): 1–66, pls. 1–9.
- Sakai, T. 1976. Crabs of Japan and the Adjacent Seas. Tokyo, Kodansha Ltd., 773 p., 251 pls.
- Serène, R. 1968. The Brachyura of the Indo Pacific Region. Prodomus for a Check List of the Non-planktonic Marine Fauna of South East Asia. *Special Publication of the Singapore National Academy of Science*, 1: 33–120.
- Serène, R. 1973. Observations sur les espèces des genres *Quadrella* Dana, 1851 et *Sphenomerides* Rathbun, 1898 (Decapoda-Brachyura). *Bulletin de la Société Zoologique de France*, 98: 191–209.
- Serène, R. 1984. Crustacés Décapodes Brachyours de l’Ocean Indien Occidental et de la Mer Rouge, Xanthoidea: Xanthidae et Trapeziidae. Avec un addendum par Crosnier, A.: Carpiliidae et Menippidae. *Faune Tropicale*, 24: 1–349, pls. 1–48.
- Serène, R. and Lohavanijaya, P. 1973. The Brachyura (Crustacea: Decapoda) collected by the Naga Expedition, including a review of the Homolidae. *Naga Report. Scientific Results of Marine Investigations of the South China Sea and the Gulf of Thailand*, 4: 1–187.
- Trivedi, J.N.; Trivedi, D.J.; Vachhrajani, K.D. and Ng, P.K.L. 2018. An annotated checklist of the marine brachyuran crabs (Crustacea: Decapoda: Brachyura) of India. *Zootaxa*, 4502: 1–83.
- Wood-Mason, J. 1885. *Lyreidus Channeri*, a remarkable new blind Brachyurous Crustacean dredged from the depths of the Bay of Bengal. *Proceedings of the Asiatic Society of Bengal*, 1885: 104.
- Wood-Mason, J. 1888. Description of a new species of the Brachyurous Genus *Lyreidus* from the Depths of the Andaman Sea. *Proceedings of the Asiatic Society of Bengal*, 1887: 376.
- Wood-Mason, J. 1892. Illustrations of the Zoology of H.M. Indian Marine Surveying Steamer Investigator, under the command of Commander A. Carpenter, R.N., D.S.O., and of Commander R. F. Hoskyn, R.N. Part I. Crustaceans. Calcutta, Published under the Authority of the Director of the Royal Indian Marine Superintendent of Government Printing, 5 pls. [Five unnumbered pages of explanation of plates]
- Wood-Mason, J. and Alcock, A. 1891. Natural History Notes from H.M. Indian Marine Survey Steamer ‘Investigator,’ Commander R. F. Hoskyn, R. N., commanding. - No. 21. Note on the results of the last season’s deep-sea dredging. *The Annals and Magazine of Natural History, including Zoology, Botany, and Geology*, series 6, 7: 258–272.