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A New Species of Spider Crab of the Genus *Leptomithrax* Miers, 1876 (Crustacea: Brachyura: Majidae) from New Caledonia

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Abstract. A new species of spider crab of the genus *Leptomithrax* Miers, 1876, is described from New Caledonia. *Leptomithrax lowryi* sp. nov. belongs to a group species that includes *L. bifidus* (Ortmann, 1893) and *L. sinensis* Rathbun, 1916, but differs in the structure of the carapace spines and teeth, ischium of the third maxilliped, male thoracic sternal structure, shape of the male telson and the first gonopod.

Introduction

The waters of New Caledonia have been intensively sampled during the last 40 years, and our knowledge of the decapod Crustacea has been significantly increasing (Ng & Richer de Forges, 2007; Richer de Forges *et al*., 2013). Much of its waters were designated as a marine park in 2014, the "Parc naturel de la mer de Corail", but explorations, especially of the deep sea, are still uncovering new species on a regular basis.

In the Majidae Samouelle, 1819 (sensu Ng *et al*., 2008), it is somewhat surprising that the genera *Maja* Lamarck, 1801 and *Leptomithrax* Miers, 1876 have not been reported from New Caledonia so far (cf. Ng & Richer de Forges, 2007). The main difference between these closely related genera is the position of the antennal flagellum: it is distinctly outside of the orbit in *Leptomithrax* but is inside the orbit in *Maja* (Sakai, 1976; Griffin & Tranter, 1986; Ng & Richer de Forges, 2015). *Maja* was recently revised by Ng & Richer de Forges (2015) who split it into 10 genera, with only one, *Sakaija* Ng & Richer de Forges, 2015, reported from New Caledonia (see also Ng & Richer de Forges, 2021). *Leptomithrax* needs to be revised, with Ng & Richer de Forges (2015) noting it was not monophyletic. Ng & Richer de Forges (2015) removed one doubtful species of *Leptomithrax* (*L. kiiensis* Sakai, 1969) to a new genus, *Rathbunaja*, with *Maja bisarmata* Rathbun, 1916, as the type species. Of the 15 recognized species of *Leptomithrax*, four are from northwestern Asia: *L. edwardsii* (De Haan, 1835), *L. bifidus* (Ortmann, 1893), *L. sinensis* Rathbun, 1916, and *L. eldredgei* Richer de Forges & Ng, 2015 (Sakai, 1976; Dai & Yang, 1991; Ng *et al*., 2017); six from southern Australia: *L. gaimardii* (H. Milne Edwards, 1834), *L. sternocostulatus* (H. Milne Edwards, 1851), *L. tuberculatus* Whitelegge, 1900, *L. waitei* (Whitelegge, 1900), *L. globifer* Rathbun, 1918, and *L. depressus* Richer de Forges, 1993 (Richer de Forges, 1993; Davie, 2002; Poore *et al*., 2008), and the remaining taxa are from New Zealand (Bennett, 1964). The present paper describes the first species of *Leptomithrax* from New Caledonia.

Keywords: Decapoda, Majoidea, taxonomy, new species, comparative morphology, western Pacific
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Materials and methods

Specimens examined are deposited in the Muséum national d'Histoire naturelle, Paris (MNHN); and the Zoological Reference Collection of the Lee Kong Chian Natural History Museum, National University of Singapore (ZRC). Measurements provided, in millimetres, are of the total carapace length (including spines) (cl); post-pseudorostral carapace length (base of spines to posterior carapace margin) (pcl); maximum carapace width (across tips of spines) (cw); and carapace width across base of spines (pcw). The abbreviations G1 and G2 are used for the male first and second gonopods, respectively.

Comparative material. For comparative material of *Leptomithrax*, including *L. bifidus* and *L. sinensis*, see Richer de Forges & Ng (2015), Ng & Richer de Forges (2015), and Wong *et al*. (2018).

Taxonomy

Superfamily Majoidea Samouelle, 1819

Family Majidae Samouelle, 1819

Subfamily Majinae Samouelle, 1819

Genus *Leptomithrax* Miers, 1876

Type species. *Leptomithrax longimanus* (Miers, 1876).

Leptomithrax lowryi sp. nov.

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Figs 1–5

Holotype: MNHN-IU-2022-187, male (cl 40.7 mm, pcl 34.3 mm, cw 37.0 mm, pcw 30.7 mm), station DW 5238, east of Atoll de la Surprise, New Caledonia, 18°06.5'S 163°03.4'E, 254–274 m, coll. SPANBIOS cruise, N.O. "Alis", 22 July 2021. **Paratypes**: MNHN-IU-2018-5013, 1 male (cl 35.6 mm, pcl 29.3 mm, cw 29.4 mm, pcw 24.2 mm), 1 subadult female (cl 17.1 mm, pcl 14.8 mm, cw 13.7 mm, pcw 12.1 mm) same data as holotype; MNHN-IU-2020-3639, 1 male (cl 28.0 mm, pcl 22.4 mm, cw 23.6 mm, pcw 17.7 mm), station DW 5171, south of Atoll Pelotas, New Caledonia, 19°01.4'S 163°26.8'E, 262–272 m, coll. SPANBIOS cruise, N.O. "Alis", 8 July 2021; ZRC 2022.0045, 1 male (cl 32.3 mm, pcl 31.7 mm, cw 32.2 mm, pcw 27.5 mm), station DW 5207, east of Atoll de la Surprise, New Caledonia, 18°09'S 163°05.3'E, 239–248 m, coll. SPANBIOS cruise, N.O. "Alis", 17 July 2021; ZRC 2022.0046, 1 female (cl 38.0 mm, pcl 30.8 mm, cw 30.9 mm, pcw 26.3 mm), 1 female (cl 38.1 mm, pcl 32.1 mm, cw 32.1 mm, pcw 26.2 mm), station DW 5207, east of Atoll de la Surprise, New Caledonia, 18°09'S 163°05.3'E, 239–248 m, coll. SPANBIOS cruise, N.O. "Alis", 17 July 2021; MNHN-IU-2021-3746, 1 female (cl 30.1 mm, pcl 24.5 mm, cw 26.4 mm, pcw 20.2 mm), 1 juvenile, station DW5174, south of Atoll Pelotas, New Caledonia, 18°57.8'S 163°23.2'E, 320–342 m, coll. SPANBIOS cruise, N.O. "Alis", 8 July 2021; MNHN-IU-2022-186, 1 male (cl 30.8 mm, pcl 21.9 mm, cw 25.0 mm, pcw 16.6 mm), 1 subadult female (cl 14.1 mm, cw 10.8 mm), station DW727, slope southwest of Dumbéa passage, New Caledonia, 22°48.03'S 167°29.03'E, 299–302 m, coll. BATHUS 2 cruise, N.O. "Alis", 12 May 1993.

Diagnosis. Carapace very wide posteriorly, inflated medially; dorsal surface strongly granulous, anterior half gently convex. Pseudorostral spines divergent. Supraocular eave wide; intercalated spine narrow, distally blunt, almost totally closing gap between antorbital and postorbital spines; postorbital spine long, foliaceous, divided distally into 2 spines, proximal angle with distinct tooth. Basal antennal article surface almost flat, outer margin distinctly convex. Third maxilliped with junction of merus and ischium gently swollen; ischium with distinctly Y-shaped median furrow, anteroexternal angle forming large tooth with rounded tip. Ambulatory legs, especially meri, with smooth dorsal margin. Male thoracic sternites with lateral surfaces shallowly but distinctly excavated. Male telson subpentagonal. G1 slender, distal one-third curving outwards; distal part relatively long, gently sinuous.

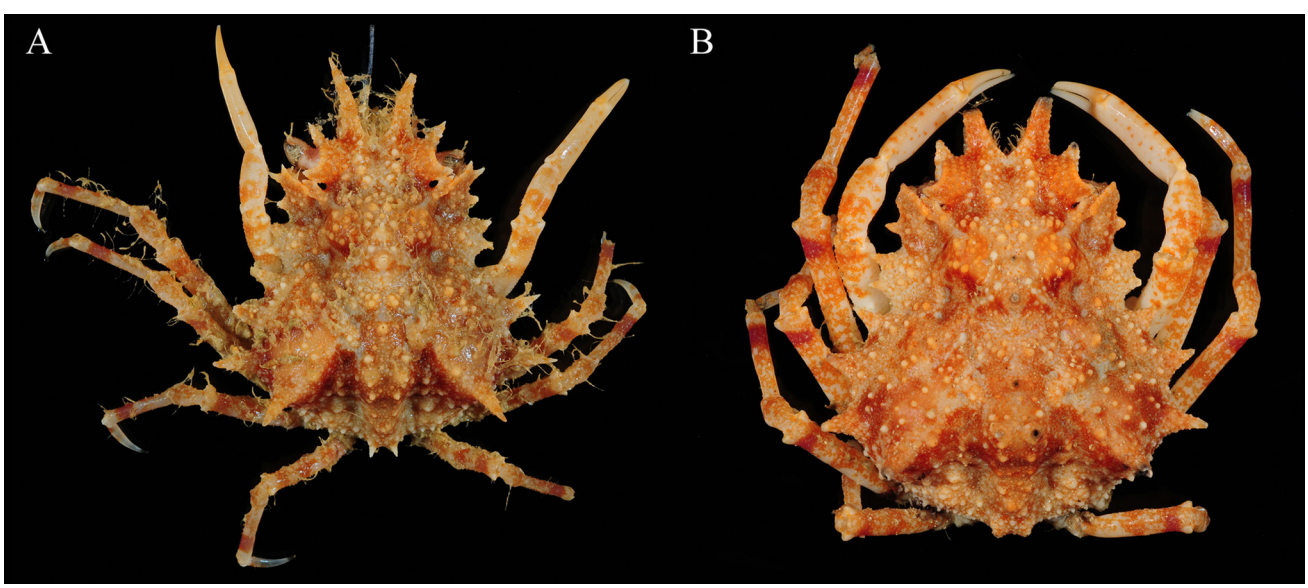

Figure 1. Colouration of fresh specimens of *Leptomithrax lowryi* sp. nov., New Caledonia: (*A*) paratype male (cl 28.0 mm, pcl 22.4 mm) (MNHN-IU-2020-3639); (*B*) paratype male (cl 32.3 mm, pcl 31.7 mm) (ZRC 2022.0045). Photographs Laure Corbari.

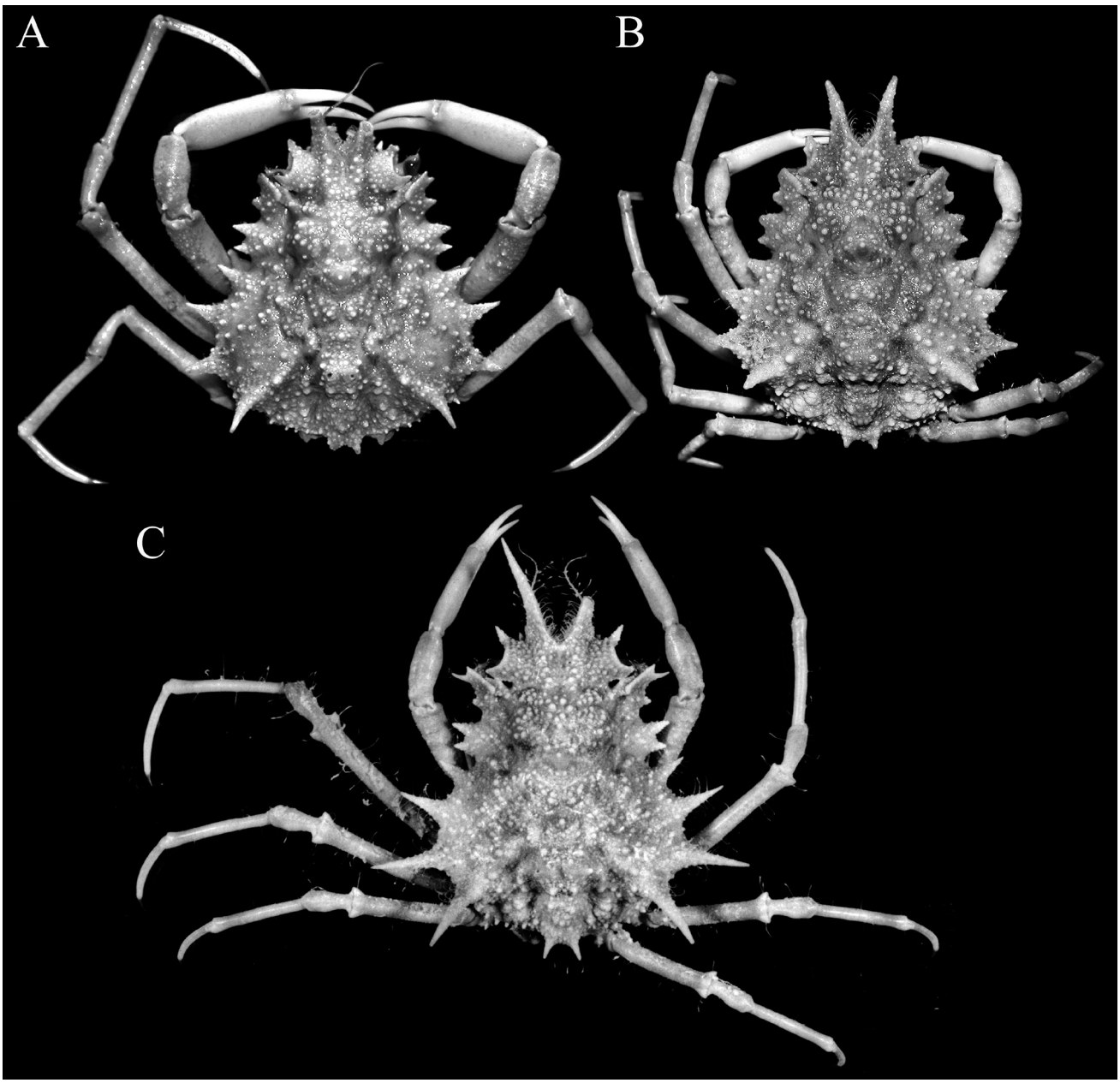

Figure 2. *Leptomithrax lowryi* sp. nov., New Caledonia, dorsal habitus: (*A*) holotype male (cl 40.7 mm, pcl 34.3 mm) (MNHN-IU-2022-187); (*B*) paratype female (cl 38.0 mm, pcl 30.8 mm) (ZRC 2022.0046); (*C*) paratype male (cl 30.8 mm, pcl 21.9 mm) (MNHN-IU-2022-186). All from New Caledonia.

Description. Carapace pyriform, very wide posteriorly; dorsal surface very granulous, anterior half gently convex; gastric and branchial regions distinct, separated by distinct grooves; carapace and pereiopods covered with scattered short setae, not obscuring surface or margins (Figs 2, 3A–C). Pseudorostral spines sharp, gently curved, diverging, cylindrical in cross-section, lateral margins without distinct spines or tubercles (Figs 1, 2, 3A–C). Proepistome with sharp, gently curved spine, visible in dorsal view (Figs 3B, C, 4C). Supraocular eave wide, forming sharp anterior and posterior angles, deeply convex above eye; intercalated spine narrow, distal part acute with proximal part subtruncate, almost totally closing gap between antorbital and postorbital spines with narrow basal fossae visible; postorbital spine long, foliaceous, divided distally into 2 short spines, proximal angle with distinct tooth (Figs 2, 3A, B, 4A, B). Carapace inflated medially, with granulated tubercles but no spine; posterior margin of carapace with 2 short sharp divergent spines; hepatic area with 2 strong spines directed outward; 4 lateral branchial spines, with posterolateral part armed with 3 sharp long spines, posteriormost one subdorsal in position, directed posteriorly and upwards, distinctly longer than other spines (Figs 2C, 3D, 4F). Basal antennal article wide, surface smooth, almost flat, completely fused with carapace, internal distal margin forming blunt tooth, outer margin distinctly convex, smooth; urinary article with subrectangular orifice; separated from postorbital spine by basal fossa (Fig. 4B); antenna deeply protected, far from orbit, flagellum long (Figs 3B, D, 4A–D). Eye short, protected by inner surface of postorbital tooth; cornea ovate, large, with small granule at distal tip (Fig. 4C–D). Epistome medially depressed with smooth surface (Fig. 4D). Epistome transversely rectangular;

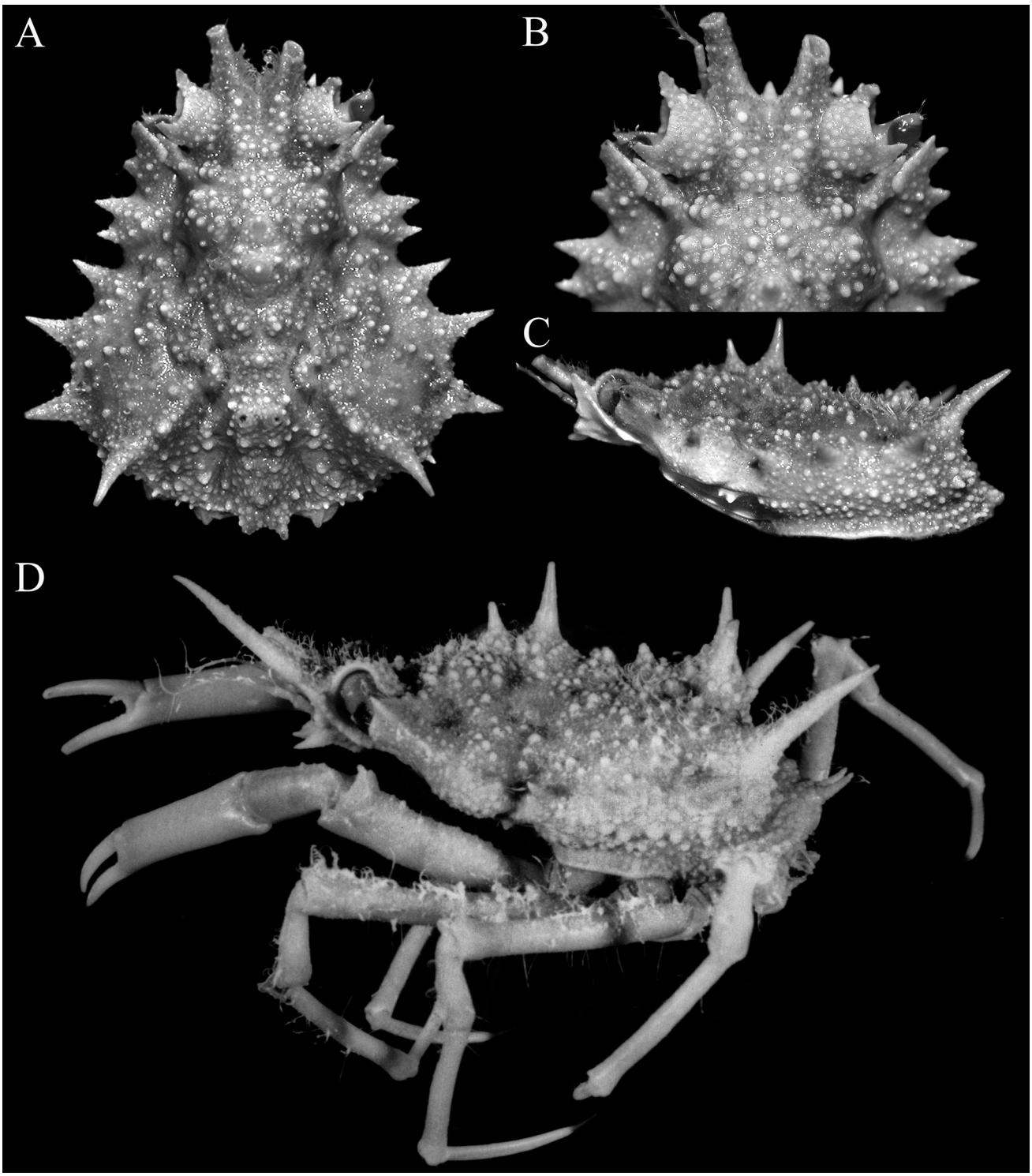

Figure 3. *Leptomithrax lowryi* sp. nov. (*A–C*) holotype male (cl 40.7 mm, pcl 34.3 mm), New Caledonia (MNHN-IU-2022-187); (*D*) paratype male (cl 30.8 mm), pcl 21.9 mm (MNHN-IU-2022-186): (*A*) dorsal view of carapace; (*B*) anterior part of carapace (denuded); (*C, D*) lateral view of cephalothorax.

posterior margin with broad, subtruncate median plate, with deep median fissure; separated from lateral parts by deep V-shaped cleft (Fig. 4C, D).

Third maxilliped short, with smooth surface, bordered by setae on margin of merus; junction of merus and ischium gently swollen medially; ischium with distinctly Y-shaped median furrow, outer branch of furrow about three-quarters length of inner branch, anteroexternal angle with large tooth with rounded tip; merus short, anteroexternal angle auriculiform, distal median margin with rounded tooth, separated from inner part by deep cleft; exopod relatively slender, reaching to median part of merus, with long flagellum (Fig. 4D, E).

Chelipeds not elongate; merus short, dorsal margin lined with rounded and sharp granules, without distal spine; carpus short, proximal dorsal surface with granules, rest

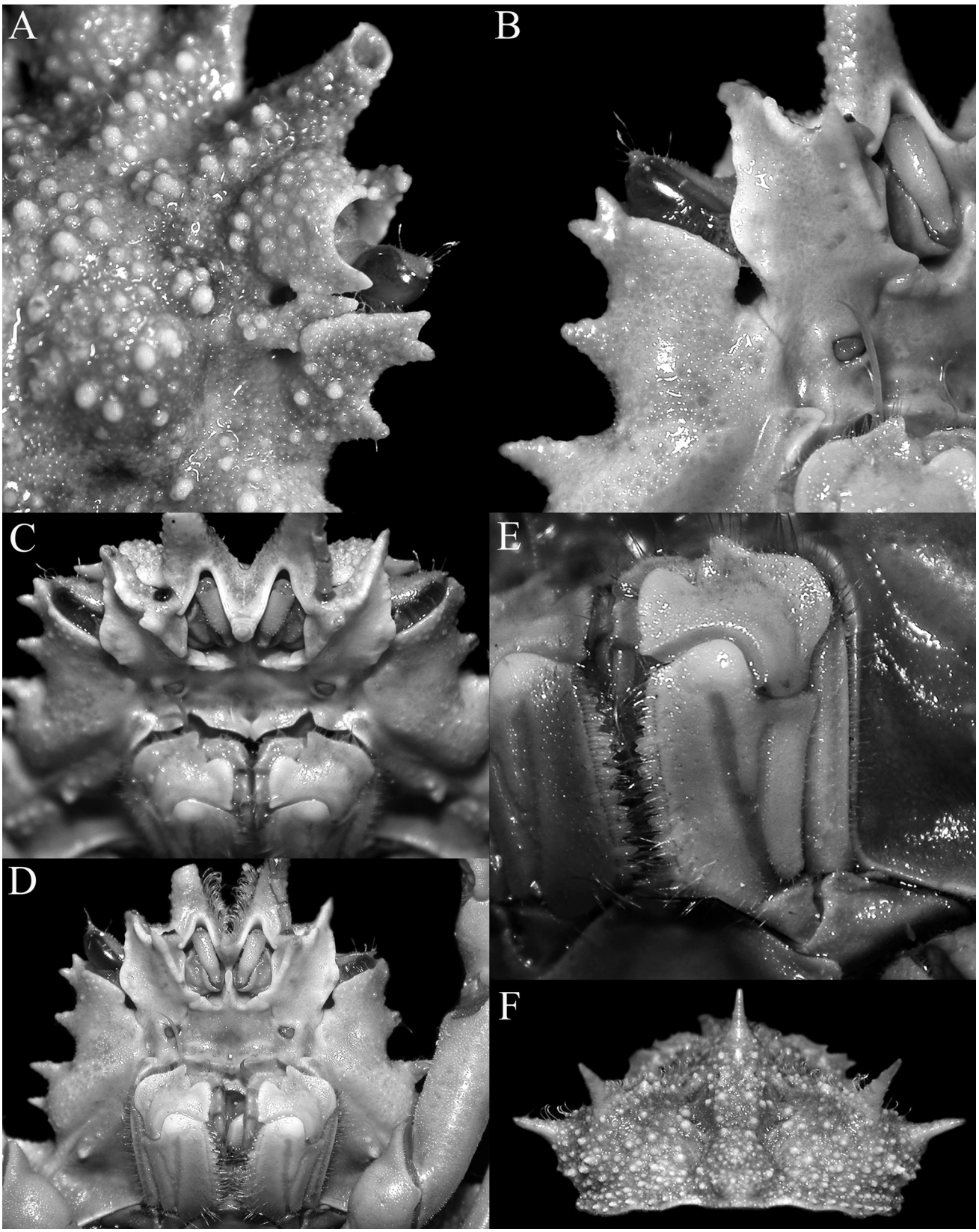

Figure 4. *Leptomithrax lowryi* sp. nov., holotype male (cl 40.7 mm, pcl 34.3 mm) (MNHN-IU-2022-187), New Caledonia: (*A*) right side of orbital region (dorsal view); (*B*) right side of orbital region (ventral view); (*C, D*) epistome, antennae, antennules, buccal cavity and third maxillipeds; (*E*) left third maxilliped; (*F*) posterior view of carapace.

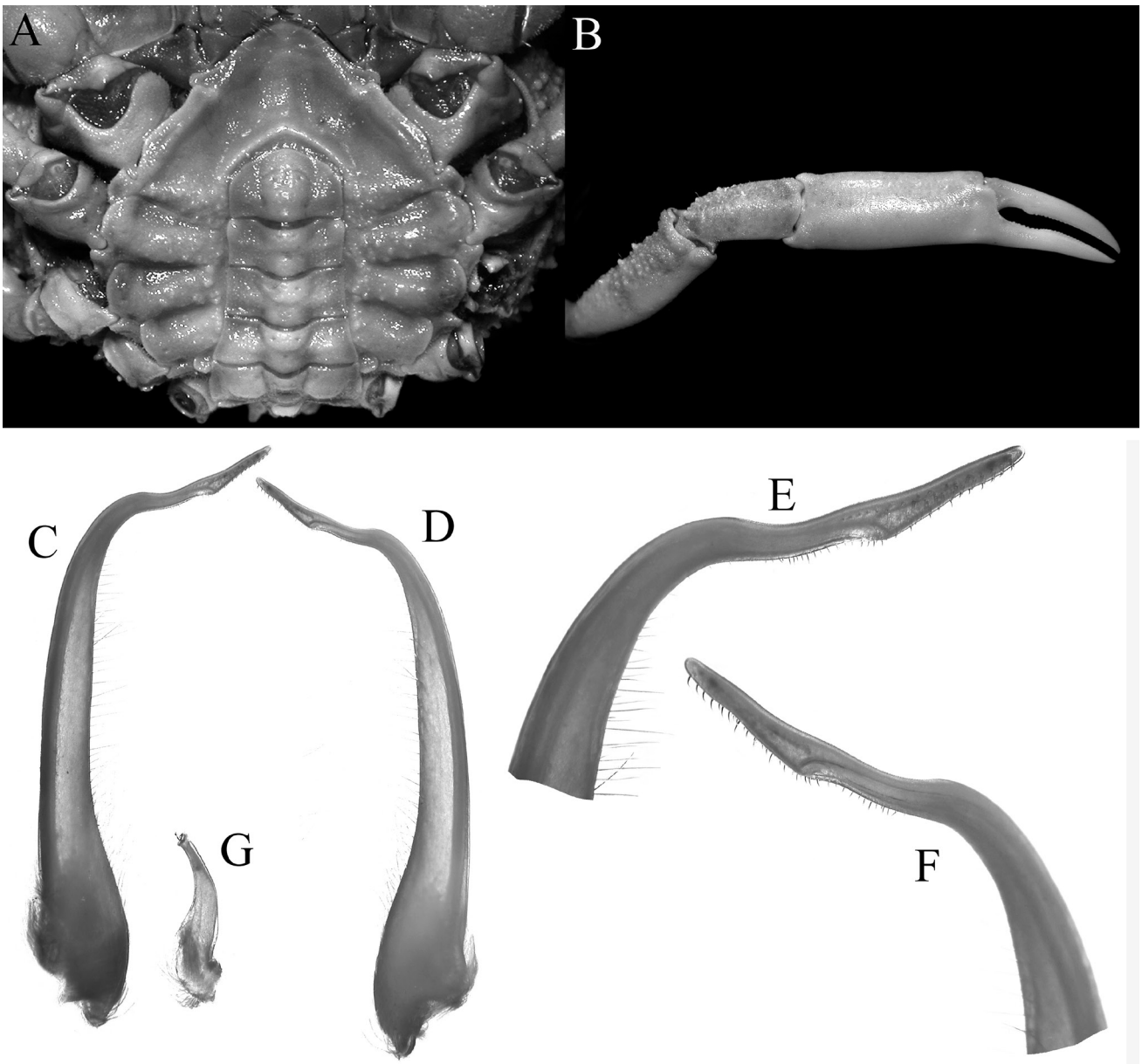

Figure 5. *Leptomithrax lowryi* sp. nov., holotype male (cl 40.7 mm, pcl 34.3 mm) (MNHN-IU-2022-187), New Caledonia: (*A*) thoracic sternum and pleon; (*B*) right cheliped; (*C*) left G1 (ventral view); (*D*) left G1 (dorsal view); (*E*) distal part of left G1 (ventral view); (*F*) distal part of left G1 (dorsal view); (*G*) G2.

of surface smooth; chela slender, surfaces smooth; fingers shorter than palm, almost straight, cutting margins with denticles; proximal part of cutting margin of dactylus with low concavity, followed by low, wide tooth (Figs 2, 3D, 5B).

Ambulatory legs, especially meri, proportionately long; first leg longest, fourth leg shortest; merus subcylindrical, dorsal margin smooth, distal angle of dorsal margin angular but not spiniform or dentiform; propodus longer than dactylus; dactylus gently curved with corneous tip (Figs 2, 3D).

Thoracic sternites 1–4 completely fused; proximal part of sternite 4, median surface of sternites 5 and 6 with low granules; median longitudinal ridge on sternites 3 and 4 relatively low, with lateral surfaces shallowly but distinctly excavated; distal part of sternopleonal cavity demarcated by relatively sharp C-shaped ridge; part of sternite 8 exposed when male pleon closed (Fig. 5A).

Male pleon subrectangular in shape, with 6 free somites and telson; telson subpentagonal with convex distal margin; somite 3 widest, reaching coxae of last ambulatory legs; somite 4 trapezoidal; somites 5 and 6 rectangular; (Fig. 5A).

G1 slender, distal one-third curving outwards; distal part relatively long, gently sinuous, ventral margin lined with distinct spinules (Figs 5C–F, 6A–C). G2 short, *ca.* one-fifth length of G1; tip cup-like with very short flagellum (Fig. 6D).

Colour. Dorsal surfaces orange (Fig. 1).

Etymology. This species is named in honour of our friend and colleague James (Jim) Kenneth Lowry from the Australian Museum. A prolific taxonomist of peracarids, especially amphipods of the superfamily Lysianassoidea, he was also responsible for an important revision of the giant deep-sea isopods of the genus *Bathynomus* A. Milne-Edwards, 1879.

Remarks. Griffin & Tranter (1986: 208) divided *Leptomithrax* into several species groups, separated by various carapace and third maxilliped features. One group, with

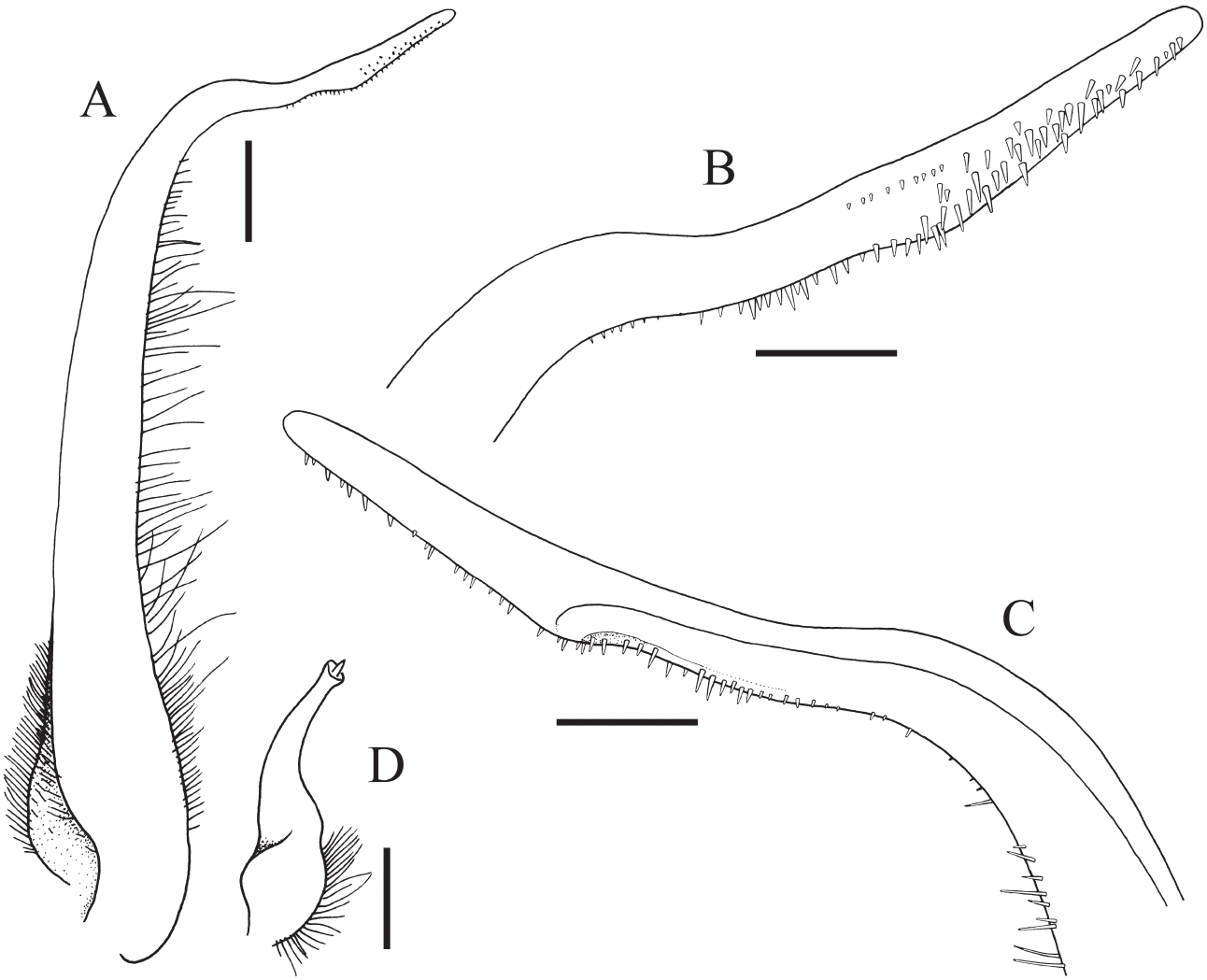

Figure 6. *Leptomithrax lowryi* sp. nov., holotype male (cl 40.7 mm, pcl 34.3 mm) (MNHN-IU-2022-187), New Caledonia: (*A*) left G1 (ventral view); (*B*) distal part of left G1 (ventral view); (*C*) distal part of left G1 (dorsal view); (*D*) G2. Scales: A, D = 1.0 mm; B, C = 0.5 mm.

L. sternocostulatus and *L. bifidus*, has the distal part of the postorbital tooth truncate or bifid, the intercalated spine is mostly excluded from the rim of the incipient supraorbital margin, the junction of the ischium and merus of the third maxilliped is swollen, and the surfaces of the thoracic sternum and/or pleon are excavated. Griffin & Tranter (1986: 208) placed *L. sinensis* elsewhere as its third maxilliped and sternal conditions were not known, but Wong *et al*. (2018) showed it was close to *L. bifidus* and should also be in this group of species. Two other species, *L. depressus* and *L. eldredgei* also belong to this group.

Leptomithrax sternocostulatus can immediately be separated from other members of this group in that it only has three lateral branchial spines and the excavations on the male thoracic sternum and pleon are very deep with rims around the depressions; all the others have four lateral branchial teeth and the excavations on the ventral surface are distinctly shallower (cf. Grant & McCulloch, 1906: pl. 3 fig. 2; Poore, 2004: figs. 111b, c, 115p). *Leptomithrax depressus* is distinct in that the anterior one-third of the dorsal surface of the carapace is more flattened than any of the congeners and can also be separated from *L. lowryi* sp. nov. in having the male pseudorostral spines proportionately shorter and subparallel (Richer de Forges, 1993: fig. 7a, b) (versus long and distinctly diverging in *L. lowryi* sp. nov.; Fig. 2); the proximal angle of the postorbital tooth is demarcated by a low rounded lobe (Richer de Forges, 1993: fig. 7b) (versus a distinctly dentiform lobe in *L. lowryi* sp. nov.; Fig. 3A, B); the intercalated spine is short, triangular with a rounded tip (Richer de Forges, 1993: fig. 7b) (versus spine longer with a sharp distal part and a more truncate base in *L. lowryi* sp. nov.; Fig. 3A, B); the fourth subdorsal branchial spine is stouter and slightly longer than the third spine (Richer de Forges, 1993: fig. 7b) (versus spine is distinctly longer and more slender in *L. lowryi* sp. nov.; Figs 2, 3A); the ambulatory legs, in particular the meri, are proportionately shorter (Richer de Forges, 1993: fig. 7a) than in *L. lowryi* sp. nov. (Fig. 2); the surface of the merus of the ambulatory legs, especially upper surface, is coarsely granular and uneven (Richer de Forges, 1993: fig. 7b) (versus smooth in *L. lowryi* sp. nov.; Fig. 2); and the distal quarter of the G1 is gently curved (Richer de Forges, 1993: fig. 7c) (versus distal part of the G1 is sinuous in *L. lowryi* sp. nov.; Figs 5C–F, 6A–C).

Leptomithrax eldredgei can be separated from *L. lowryi* sp. nov. by the more slender carapace and the proportionally shorter lateral branchial spines (compare Richer de Forges &

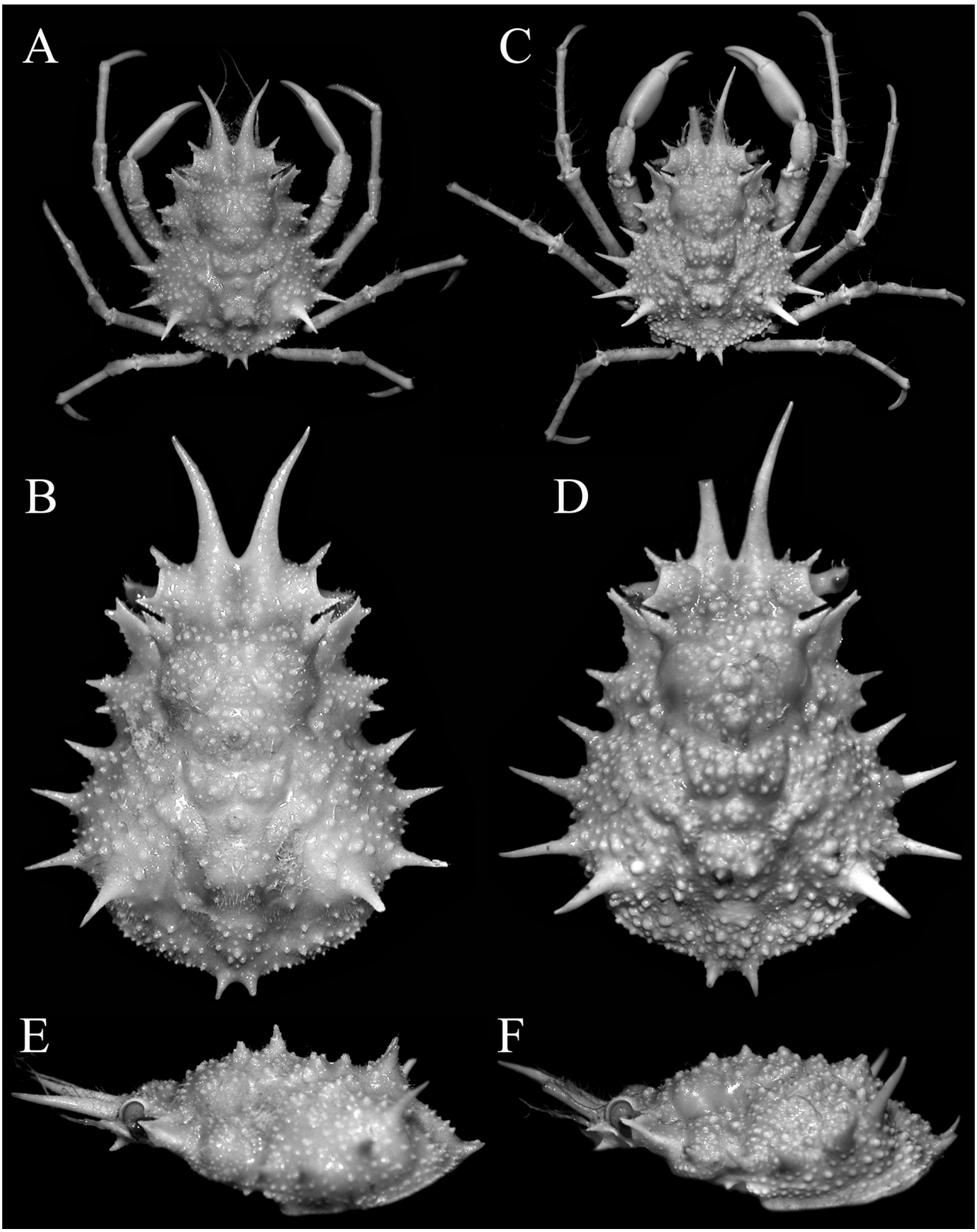

Figure 7. (*A, B, E*) *Leptomithrax bifidus* male (pcl 18.0 mm) (ZRC 2014.0354), Japan; (*C, D, F*) *Leptomithrax sinensis* male (pcl 32.1 mm, pcw 40.6 mm) (ZRC 2018.0726), Japan. (*A, C*) overall dorsal view; (*B, D*) dorsal view of carapace; (*E, F*) lateral view of cephalothorax.

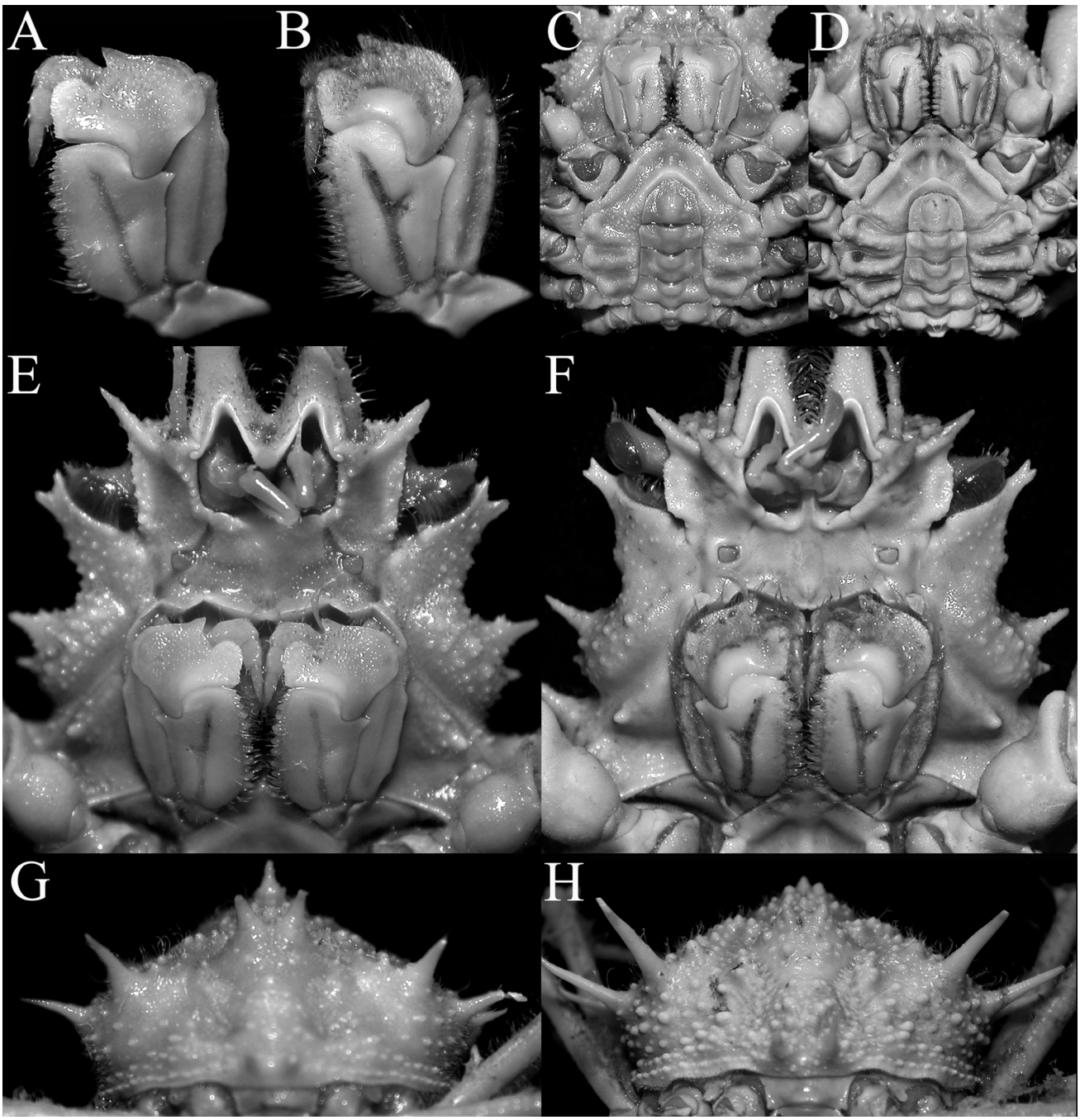

Figure 8. (*A, C, E, G*) *Leptomithrax bifidus* male (pcl 18.0 mm) (ZRC 2014.0354), Japan; (*B, D, F, H*) *L. sinensis* male (pcl 32.1 mm, pcw 40.6 mm) (ZRC 2018.0726), Japan. (*A, B*) left third maxilliped; (*C, D*) thoracic sternum and pleon; (*E, F*) epistome, antennae, antennules, buccal cavity and third maxillipeds; (*G, H*) posterior view of carapace.

Ng, 2015: fig. 1A with Figs 2, 3A); the male pseudorostral spines are proportionately shorter and subparallel (Richer de Forges & Ng, 2015: fig. 1A, D) (versus long and distinctly diverging in *L. lowryi* sp. nov.; Fig. 2); the postorbital tooth appears foliaceous and almost entire, with the distal angle marked by a low bifurcation and the posterior angle broad and rounded (Richer de Forges & Ng, 2015: fig. 1A) (versus distal and proximal parts separated by deep cleft, the proximal angle marked by a distinct tooth in *L. lowryi* sp. nov.; Fig. 3A, B); the submedian sulcus on ischium of third maxilliped is almost entire and the anteroexternal angle has a sharp tooth (Richer de Forges & Ng, 2015: fig. 1C) (versus the sulcus on the ischium is Y-shaped with the anteroexternal angle rounded in *L. lowryi* sp. nov.; Fig. 4E); and the distal part of the G1 is gently curved and proportionately shorter (Richer de Forges & Ng, 2015: fig. 2) (versus distal part of the G1 is sinuous in *L. lowryi* sp. nov.; Figs 5C–F, 6A–C).

The morphology of *Leptomithrax lowryi* sp. nov. appears to be closest to two east Asian species, *L. bifidus* Ortmann, 1893 and *L. sinensis* Rathbun, 1916 (Figs 7–9). The identity of *L. sinensis* was clarified by Richer de Forges & Ng (2015) from the type which is a dried carapace; with Wong *et al*. (2018) redescribing the species from fresh material from Taiwan and Japan and comparing it at length with *L. bifidus*.

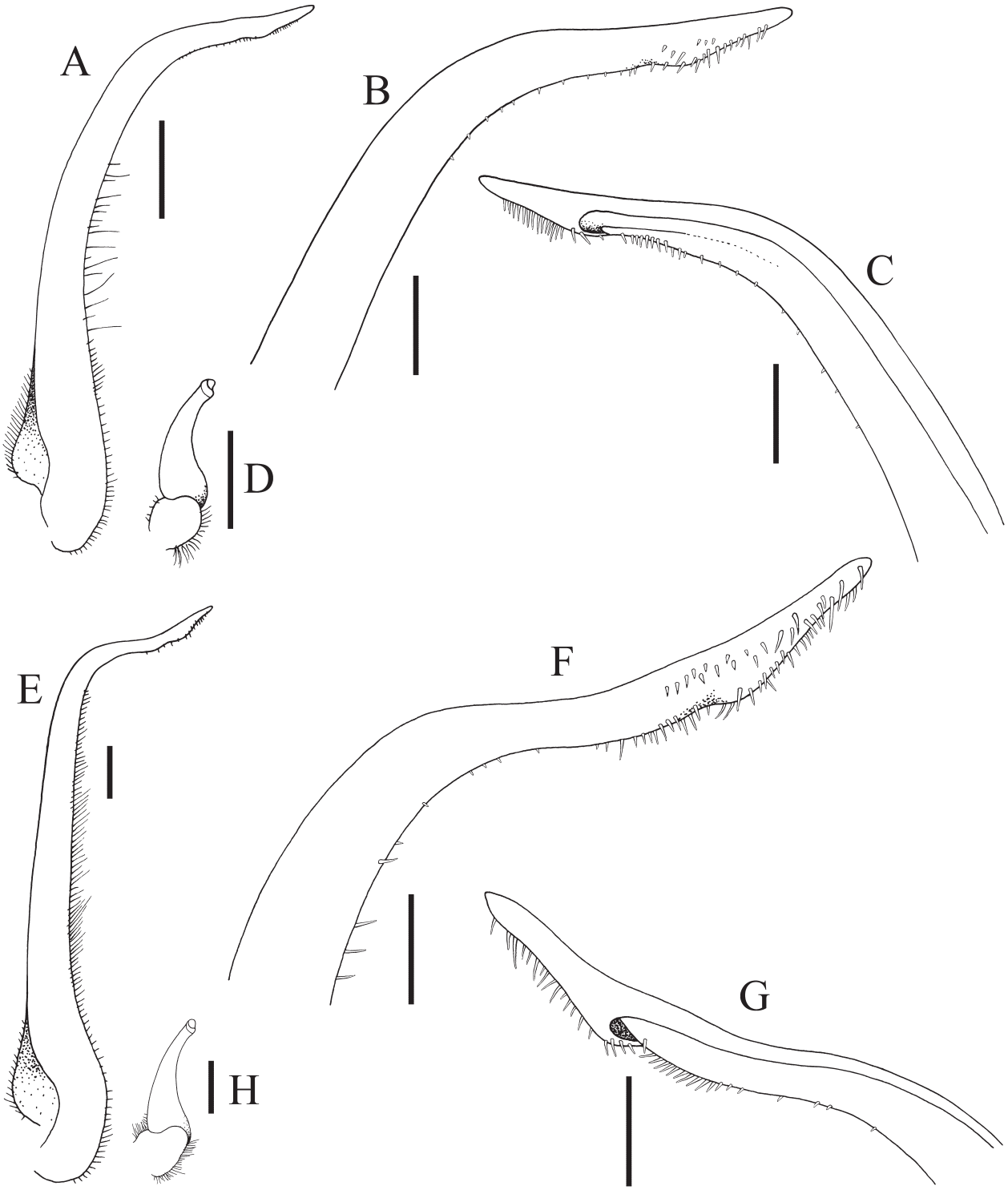

Figure 9. (*A–D*) *Leptomithrax bifidus* male (pcl 18.0 mm) (ZRC 2014.0354), Japan; (*E–G*) *L. sinensis* male (pcl 32.1 mm, pcw 40.6 mm) (ZRC 2018.0726), Japan. A, E, left G1 (ventral view); B, F, distal part of left G1 (ventral view); C, G, distal part of left G1 (dorsal view); D, H, G2. Scales: A, D, E, H = 1.0 mm; B, C, F, G = 0.5 mm.

Leptomithrax lowryi sp. nov. differs from the two species in that its carapace is proportionately wider posteriorly (Figs 2, 3A) than in *L. bifidus* and *L. sinensis* (Fig. 7A–D); the posterolateral spines are relatively stout (Fig. 3A) (versus more slender in *L. bifidus* and *L. sinensis*, Fig. 7B, D); the intercalated spine is blunt (Fig. 3A, B) (versus sharp in *L. bifidus* and *L. sinensis*, Fig. 8E, F); the pseudorostral spines are less curved and diverging (Figs 2, 3A) (versus more curved and clearly diverging in *L. bifidus* and *L. sinensis*, Fig. 7B, D); the deep furrow on the ischium of the third maxilliped is distinctly Y-shaped with the outer branch about three-quarters the length of the inner one (Fig. 4D, E) (versus furrow weakly Y-shaped with the outer branch less than half the length of the inner one in *L. sinensis* and *L.*

bifidus, Fig. 8A, B, E, F); the surface of the basal antennal article is almost flat (Fig. 4B–D) (versus gently depressed in *L. sinensis* and *L. bifidus*, Fig. 8E, F); the outer margin of the basal antennal article is distinctly convex and smooth (Fig. 4B–D) (versus almost straight, gently convex and may be lined with granules in *L. sinensis* and *L. bifidus*, Fig. 7E, F); and the median longitudinal ridge on fused male thoracic sternites 3 and 4 is relatively low, with the lateral surfaces gently depressed (Fig. 5A) (versus with median longitudinal ridge high, separating the two deep lateral depressions in *L. sinensis* and *L. bifidus*, Fig. 8C, D). The telson of the male of *L. lowryi* sp. nov. resembles that of *L. sinensis*, being subquadrate-subpentagonal in shape (Figs 5A, 8D), whereas that of *L. bifidus* is distinctly more triangular (Fig. 8C). The G1 of *L. lowryi* sp. nov. is distinctly different from that of *L. bifidus* in that the distal part is sinuous rather than gently curved (Figs 5C–F, 6A–C versus Fig. 9A–C). The G1 of *L. lowryi* sp. nov. is most similar to *L. sinensis* except that the distal spinous part is proportionately longer in the former species (Fig. 6A–C versus Fig. 9E–G).

It is noteworthy that *L. lowryi* sp. nov. from New Caledonia is morphologically closest to two East Asian species, *L. bifidus* and *L. sinensis*, rather than to taxa from Australia, viz. *L. tuberculatus, L. sternomaculatus* and *L. depressus* (cf. Griffin, 1966; Richer de Forges, 1993; Poore *et al*., 2008).

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