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The genera *Carpias* Richardson, *Ianiropsis* Sars and *Janaira* Moreira & Pires (Isopoda: Asellota: Janiridae) from Australia, with description of three new species

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Abstract

Three new species of janirid isopods are described: *Carpias montaguensis* **sp. nov.**, *Ianiropsis alanmillari* **sp. nov.** and *Janaira platyoura* **sp. nov.**; all three were collected in shallow waters of southern New South Wales, Australia. Our report represents new records for these genera in Australian waters. *Janaira platyoura* **sp. nov.** is the second species added to this genus, so a revision of generic diagnosis was required. The diagnostic features of *Carpias* and *Ianiropsis* are also discussed and a new combination for the species *Ianiropsis varians* Winkler & Brandt, 1993 is proposed. Keys to the species of *Carpias* and *Ianiropsis* are presented.

Key words: Asellota, Janiridae, *Carpias*, *Ianiropsis*, *Janaira*, new records, new species, Australia

Introduction

The cosmopolitan isopod family Janiridae includes more than 170 species distributed among 23 genera. Members of this family are typically found in shallow marine waters, although deep-sea and freshwater species are known. Wilson and Wägele (1994) reviewed the Janiridae, providing a new composition for this family and rediagnosing the genera. A phylogenetic analysis (Wilson, 1994) showed that Janiridae cannot be considered a monophyletic family.

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According Poore (2002), only seven species of Janiridae have been reported from Australian waters, viz.: *Heterias nichollsi* (Chappuis, 1951), *H. petrensis* Roberts, 1975 and *H. pusilla* (Sayce, 1900) recorded in fresh water environments; *Iais californica* (Richardson, 1904) and *Iathrippa inerme* (Haswell, 1881) collected on the continental shelf; and *Iathrippa longicauda* (Chilton, 1884) and *I. sarsii* (Pfeffer, 1887) found in the subantarctic waters of Macquarie Island. Additionally two unidentified species of janirid isopods, *Neojaera* sp. and *Ianiropsis* sp., were reported by Smith *et al.* (1996).

The high number of janirid isopods found among the material examined from New South Wales (Australia) attracted our attention and encouraged us to focus on this fauna. In the present paper, we describe three new species, viz: *Carpias montaguensis* **sp. nov.**, *Ianiropsis alanmillari* **sp. nov.** and *Janaira platyoura* **sp. nov.** collected in the south part of New South Wales. Species belonging to the genera *Carpias* and *Janaira* represent the first record of distribution of these genera in Australian waters.

Methods

Sampling and processing. Subtidal marine substrates were sampled on SCUBA in the regions of Montague Island and Batemans Bay, New South Wales, Australia. Several field trips during 2003–2004 sampled only algal substrates. The macroalgal species were identified by A. Millar (Royal Botanic Gardens Sydney, *RBGS*) underwater, and subsequently were verified during processing back on shore. All macroalgal vouchers, cross referenced with the Australian Museum sample numbers, are filed as pressed specimens in the National Herbarium of New South Wales (under acronym - “NSW”) in the Royal Botanic Gardens Sydney. To capture all species living on algal thalli, single species of algae were enclosed in a plastic bag and then cut off above the base and the bag closed with a rubber band. A subsequent trip in 2004 by the Australian Museum Marine Invertebrates section to Batemans Bay collected only non-algal substrates. During processing of each sample, the algal substrate and the contents of its bag were placed in a 2–3 litre container with either a weak solution of formaldehyde in seawater or only freshwater. The substrate was gently shaken and dipped in the solution and then removed. The material in the containers was then filtered with a 300 micron screen and the filtrate placed in either 4% formaldehyde-seawater solution or 95% ethanol solution. Specimens were extracted from the samples and identified to ordinal level categories. Additional specimens were obtained from collections in the Australian Museum (accession numbers indicated by a “P” prefix). Many non-type specimens in these collections are also recorded by "NSW" sample numbers.

Scanning electron microscopy. For SEM photographs, the specimen preparation described by Felgenhauer (1987) was followed with a few changes. The ethanol-preserved specimens were hydrated to distilled water; after that, a secondary fixation with a 1–2% solution of osmium tetroxide (OsO_4) in buffer was carried out for 2 h. Thereafter, the specimens were rinsed in buffer (3 changes, 5 min each), and washed in distilled water (3 changes, 5 min each). At this point, sonication for 3–5 seconds was performed to remove debris and epibionts. Finally, the specimens were dehydrated through a graded series of ethanol ending in 100%, critical point dried, mounted, gold-palladium sputter coated, and examined using the Evo LS15 Carl Zeiss microscope.

Descriptions. The descriptions were generated from a DELTA database (Dallwitz 1980, Dallwitz *et al.* 2000a, 2000b) and subsequently edited for clarity of language. Illustration of the whole animal and dissected appendages were made using an Olympus BH-2 compound microscope equipped with a camera lucida. The dissected parts were temporarily mounted in glycerin on concave slides in order to avoid damage the appendages. Pencil illustration were captured in digital format and inked with a graphics tablet (Wacom Co., Inc.) using Inkscape (ver. 0.46; http://www.inkscape.org/).

Implicit Attributes. Unless indicated otherwise, the following attributes are implicit throughout the descriptions, except where the characters concerned are inapplicable.

Head. Frontal margin width between antennulae near basal width of antennae. Anterolateral margin rounded and not projecting, lateral margin smoothly curved. Eyes present.

Pereonites. Pereonites 1–7 lateral margins not broadened, coxae visible in dorsal view. Pereonites 2 and 3 laterally without anterior or posterior projections.

Pleon. Pleotelson pleonite 1 articulations present, distinctly narrower and shorter than pereonite 7. Pleotelson posterior margin lateral to uropod insertions smoothly curved, without posterior inflection, uropodal insertion separated by distinct gap, with rounded posteriorly-directed inflection, at position of uropods with shallow concavity.

Antennula and Antenna. Antennula article 1 length greater than width, distal margin approximately quadrate and lacking medial projection. Antenna article 3 approximately same length as articles 1–2 combined, scale present, elongate and angular, projecting beyond margin of article 4; flagellum of male proximal articles separate and longer than wide.

Mouthparts. Mandible incisor process with 5 cusps; lacinia mobilis with 5 cusps; palp article 2 distolateral margin with 3 setulate setae. Maxilliped palp of adult terminal male not projecting, not visible on head in dorsal view, article 3 length similar to article 2 length; epipod distally acutely pointed, distolateral margin relatively linear.

Pereopod I. Dimorphic, carpus distinctly different between males and females.

Pereopod I of adult (terminal) male. Merus distodorsal margin projecting distally. Carpus ventral margin palm region roughly parallel with dorsal margin, flattened spines absent. Propodus ventral margin with robust setae. Dactylus present, with 2 claws.

Pereopods II–VII. Pereopods II–VII dactylus with accessory third claw on posterior side, ventral claw more robust than dorsal one. Pereopod II not sexually dimorphic. Pereopod IV having same relative to body length in terminal males as in adult females.

Pleopods. Operculum of female lateral margins glabrous. Pleopod III endopod distal margin with 3 plumose setae, gap between medial and middle setae larger than between middle and lateral setae; exopod distal margin plumose seta absent, lateral margins simple setae absent.

Uropods. Exopod present, shorter than the endopod.

Abbreviations and nomenclature. Abbreviations used are as follows: brooding female, *B*♀; preparatory female, *P*♀; terminal male, *T*♂; adult male, *A*♂; subadult male, *S*♂; juvenile male, *J*♂; mandible, *md*; body length, *bl*; New South Wales, *NSW*; Australian Museum, *AM* (assumed for registration numbers beginning with "P."); Royal Botanic Gardens Sydney, *RBGS*. Form of the descriptive text and use of ratios is described in Wilson (1989:16). The numbering system and limb nomenclature used here is discussed in Wilson (2009:170).

Taxonomy

Janiridae Sars, 1897

Type genus. *Janira* Leach, 1814.

Remarks. A diagnosis for the Janiridae *sensu lato* is not provided owing to the non-monophyly of the family (Wilson & Wägele, 1994). The genera *Carpias*, *Ianiropsis*, *Janaira*, *Janira*, *Janiralata* and *Iathrippa* represent the basal janirids (Wilson, 1994), which are characterised by relatively unmodified uropods and antennulae. In this paper, we deal with species belonging to the genera *Carpias*, *Ianiropsis* and *Janaira*: their diagnostic features and the geographic distribution are discussed. In the review of the family, Wilson and Wägele (1994) presented detailed diagnoses, written in parallel style for the recognised genera of Janiridae. The following generic diagnoses include characters that primarily distinguish the three genera treated here, and may not include those characters common to most Janiridae.

Carpias Richardson, 1902

Carpias Richardson, 1902: 294.—Bowman & Morris, 1979: 650; Wilson & Wägele, 1994: 695.
Bagatus Nobili, 1906: 268.—Nobili, 1907: 42; Pires, 1980: 96.

Janatus Carvacho, 1983: 289 (junior synonym by Wilson & Wägele, 1994).
Type species. *C. bermudensis* Richardson, 1902, by original designation.
Species included. *C. algicola* (Miller, 1941); *C. asterophilus* Pires, 1995; *C. bermudensis* Richardson, 1902; *C. brachydactylus* (Pires, 1982); *C. brucei* Monod, 1974; *C. crosslandi* (Stebbing, 1910); *C. deodatus* Müller, 1992; *C. floridensis* Menzies & Kruczynski, 1983; *C. galloprovincialis* (Amar, 1950); *C. harrietae* Pires, 1981; *C. ichthyoxenos* (Monod, 1961); *C. longidactylus* (Nordenstam, 1946); *C. longimanus* (Pillai, 1954) (junior synonym of *C. algicola*); *C. minutus* (Richardson, 1902); *C. montaguensis* **sp. nov.**; *C. mossambica* Kensley & Schotte, 2002; *C. nana* (Stebbing, 1905); *C. nereus* (Pires, 1982); *C. parvus* (Omer-Cooper, 1921); *C. platydactylus* (Nobili, 1906); *C. punctatus* (Kensley, 1984); *C. serricaudus* (Menzies & Glynn, 1968); *C. stebbingi* (Monod, 1933); *C. stylodactylus* (Nobili, 1906); *C. triocellatus* (Müller, 1992); *C. triton* (Pires, 1982); *C. villalobosi* (Carvacho, 1983).

Diagnosis. Eyes dorsolateral, extending to lateral margin. Maxilliped endite with 2 receptaculi. Pereopod I sexually dimorphic, carpus distinctly different between males and females. Pereopod I of adult (terminal) male ischium not elongate, near length of ischium on posterior pereopods (not recorded for most species); merus elongate, longer than merus on posterior pereopods; carpus carposubchelate, robust setae absent but with strong flattened spines on ventral margin; propodus ventral margin without robust setae, dactylus often reduced without claws. Pereopods II–VII not sexually dimorphic. Pleopod I of adult male medial lobe distal margin convex. Pleopod II of adult male stylet never coiled, shorter than protopod (except in *C. harrietae*). Pleopod III endopod distal margin with 3 (rarely 4) plumose setae; exopod uniarticulate, distally rounded with 1 simple seta. Uropod rami crossectional shape oval.

Distribution. Cosmopolitan, tropical and subtropical coastal waters.

Remarks. The monotypic genus *Rostrobagatus* Müller, 1993 is similar to *Carpias* because of the sexually dimorphic pereopod I. The main difference between these two genera is the presence of rostrum in *Rostrobagatus*. Among the Janiridae, some genera such as *Iathrippa* and *Janiralata*, show variation in the development of the rostrum. Nevertheless, minor differences support maintaining *Rostrobagatus* as a separate genus. These differences are: tergites of pereonites 2–4 projecting anteriorly, with linear lateral margins; coxa of pereopod I triangular projecting anteriorly; pereopods II–VII with accessory third claw absent.

Key to species of *Carpias*

This key requires a fully adult (terminal) male for most characters.

1. Pereopod I of T♂ carpus ventral margin palm region roughly parallel with dorsal margin 2
   Pereopod I of T♂ carpus ventral margin palm region angled proximally relative to dorsal margin 7
   Pereopod I of T♂ carpus ventral margin palm region transverse relative to dorsal margin 10
   Pereopod I of T♂ carpus ventral margin palm region angled distally relative to dorsal margin 16
2(1). Head anterior margin in dorsal view linear 3
   Head anterior margin in dorsal view sinuate with medial convexity 4
   Head anterior margin in dorsal view rounded, not projecting anteriorly 5
   Head anterior margin in dorsal view broadly concave ..... *Carpias parvus* (Omer-Cooper, 1921)
3(2). Head anterolateral margin angular; eyes posterior margin with distinct gap between pereonite 1; pleotelson posterior margin with rounded posteriorly-directed inflection; pereopod I of fully T♂ dactylus present ..... *Carpias longidactylus* (Nordenstam, 1946)
   Head anterolateral margin rounded and not projecting; eyes posterior margin adjacent to pereonite 1; pleotelson posterior margin broadly rounded, without posterior inflection; pereopod I of fully T♂ dactylus absent ..... *Carpias stylodactylus* (Nobili, 1906)
4(2). Eyes small, with 3 ocelli; pleotelson posterior margin broadly rounded, without posterior inflection; pereopod I of T♂ dactylus present; pleopod II of adult male endopod stylet weakly curved laterally and then reflexed medially ..... *Carpias triocellatus* (Müller, 1992)
   Eyes large, with more than 10 ocelli; pleotelson posterior margin with rounded posteriorly-directed inflection; pereopod I of T♂ dactylus absent; pleopod II of adult male endopod stylet curving laterally with no inflections ..... *Carpias algicola* (Miller, 1941)
5(2). Pleotelson lateral margin denticles present; pereopod I of T♂ dactylus present and well developed ..... *Carpias crosslandi* (Stebbing, 1910)
   Pleotelson lateral margin denticles absent; pereopod I of T♂ dactylus absent or minute 6

6(5). Eyes posterior margin adjacent to pereonite 1; pereonites 2–4 laterally concave; antenna article 3 distinctly longer than articles 1–2; maxilliped palp article 3 distally subrectangular, distomedial margin with distinct inflection ..... *Carpias platydactylus* (Nobili, 1906)

Eyes posterior margin with distinct gap between pereonite 1; pereonites 2–4 laterally linear; antenna article 3 approximately same length as articles 1–2; maxilliped palp article 3 distally tapering, broadest proximally..... *Carpias triton* (Pires, 1982)

7(1). Pereopod I of T♂ carpus ventral margin palm region with 2 flattened spines 8

Pereopod I of T♂ carpus ventral margin palm region with 3 flattened spines..... *Carpias stebbingi* (Monod, 1933)

8(7). Pereopod I of T♂ propodus ventral margin with 1 blunt flattened spine; coxa not projecting anterolaterally, rounded; pereopods II–VII dactylus ventral claw less robust than dorsal claw; mandible molar distal margin broad and truncate ..... *Carpias galloprovincialis* (Amar, 1950)

Pereopod I of T♂ propodus ventral margin without flattened spines, coxa projecting anterolaterally, angular; pereopods II–VII dactylus ventral claw more robust than dorsal claw; mandible molar distal margin with paired blade-like ridges 9

9(8). Pereopod I of adult T♂ basis subequal to carpus; pleopod II of adult male endopod stylet weakly curved laterally and then reflexed medially; eyes posterior margin with distinct gap between pereonite 1..... *Carpias ichthyoxenos* (Monod, 1961)

Pereopod I of adult T♂ basis shorter than carpus; pleopod II of adult male endopod stylet curving laterally with no inflections; eyes posterior margin adjacent to pereonite 1 ..... *Carpias villalobosi* (Carvacho, 1983)

10(1). Pereopod I of adult T♂ carpus ventral margin palm region with 2 flattened spines 11

Pereopod I of adult T♂ carpus ventral margin palm region with 3 flattened spines 12

Pereopod I of adult T♂ carpus ventral margin palm region with 4 flattened spines ..... *Carpias minutus* (Richardson, 1902)

11(10). Pereopod I of adult T♂ carpus setose with many fine long setae, propodus ventral margin with 3 flattened spines, dactylus well developed ..... *Carpias punctatus* (Kensley, 1984)

Pereopod I of adult T♂ carpus with few short setae, propodus ventral margin without spines, dactylus minute; carpus wider distally, with differentiated palm region ..... *Carpias nereus* (Pires, 1982)

12(10). Pereopod I of adult T♂ propodus ventral margin with flattened spines; propodus clearly shorter than carpus ... 13

Pereopod I of adult T♂ propodus ventral margin without flattened spines; propodus subequal in length or longer than carpus..... 14

13(12). Head anterior margin sinuate with medial convexity; pereopod I of T♂ basis length subequal to carpus; operculum of female distal margin concave; pleotelson posterior margin with rounded posteriorly-directed inflection .... *Carpias brucei* (Monod, 1974)

Head anterior margin linear; pereopod I of T♂ basis shorter than carpus; operculum of female distal margin convex but with two lateral indentation at the insertion of the setae; pleotelson posterior margin broadly rounded, without posterior inflection ..... *Carpias montaguensis* **sp. nov.**

14(12). Pleotelson lateral margin denticles absent; pereopod I of T♂ dactylus present..... 15

Pleotelson lateral margin denticles present; pereopod I of T♂ dactylus absent ..... *Carpias serricaudus* (Menzies & Glynn, 1968)

15(14). Pereopod I of T♂ carpus setose, distal flattened spine much larger than medial one; basis length subequal to carpus ..... *Carpias mossambica* Kensley & Schotte, 2002

Pereopod I of T♂ carpus with few short setae, distal flattened spine subequal to medial one; basis shorter than carpus ..... *Carpias nanus* (Stebbing, 1905)

16(1). Pleopod II of adult male endopod stylet weakly curved laterally and then reflexed medially..... 17

Pleopod II of adult male endopod stylet curving laterally with no inflections..... 18

Pleopod II of adult male endopod stylet coiled ..... *Carpias harrietae* Pires, 1981

Pleopod II of adult male endopod stylet almost straight ..... *Carpias asterophilus* Pires, 1995

17(16). Head anterolateral margin rounded; eyes posterior margin adjacent to pereonite 1; pereopod I of T♂ carpus setose with many fine long setae, ventral margin palm region with 3 flattened spines..... *Carpias deodatus* Müller, 1992

Head anterolateral margin angular; eyes posterior margin with distinct gap between pereonite 1; pereopod I of T♂ carpus with few short setae, ventral margin palm region with 2 flattened spines..... *Carpias floridensis* Menzies & Kruczynski, 1983

18(16). Pereopod I of T♂ carpus setose, ventral margin proximal to palm strongly convex and inflated, palm region with 4 flattened spines; dactylus minute ..... *Carpias bermudensis* Richardson, 1902

Pereopod I of T♂ carpus with few short setae, ventral margin proximal to palm approximately linear, palm region with 3 flattened spines; dactylus well developed..... *Carpias brachydactylus* (Pires, 1982)

***Carpias montaguensis* sp. nov.**
(Figs 1–7)

Etymology. The species is named for the type locality Montague Island, New South Wales, Australia.

Type fixation. Holotype adult ♂, 1.47 mm, P.81244, here designated.

Type locality. Montague Island, New South Wales, Australia: 'Northwest Trench', NSW 1775, 36º14.55'S, 150º13.45'E, depth 33 m.

Paratypes. Station NSW 1775 (data for type locality), Hermon Slade Foundation Montague Island Expedition, coll. by G.D.F. Wilson, 24 Mar 2001, among lacy bryozoan colonies at base of trench wall growing in rubble and detritus: B♀ (1.46 mm), P.81245; T♂ #5 (1.46 mm), dissected, P.81391; S♂ #3 (1.32 mm), dissected, P.81247; J♂ #1 (1.05 mm), dissected, P.81246; ♀, P.81392 dissected; T♂, SEM stub MI135, P.81113; T♂, SEM stub MI174, P.81118; B♀, SEM stub MI175, P.81119; 34 inds (♂♂ 1.05–1.67 mm; ♀♀ 1.46–1.60 mm), P.81393.

Other material. Australia, New South Wales, Station NSW 1777 (data for type locality), coll. by A.J.K. Millar & N.Yee, 24 Mar 2001, among *Spyridia filamentosa* & *Zonaria diesingiana* (red algae) on rocky substrate: 4 ♀♀, P.84007.

Batemans Bay region. Burrewarra Point, coll. by A.J.K. Millar & party, 25–27 Oct 2002: ♂, P.84008, NSW 1986, east Wall, 35º50.02'S, 150º14.16'E, 25 m, among *Curdiea crassa* with small amount of *Martensia australis*; 1 ♀, P.84009, NSW 1993, Gutters, 35º49.82'S, 150º14.08'E, 24 m, among *Pachymenia prostrata* (alga); ♂, P.84010, NSW 1997, Gutters, somewhat inshore, 35º49.87'S, 150º14.08'E, 23 m, among *Codium lucasii*.

Burrewarra Point, 35º49.81'S, 150º14.01'E, coll. by P. Berents & party, 23 Mar 2004: 3 ♀♀, P.84011, NSW 2499, 16.5 m, among *Sertularia adpressa* (hydroid); 23 inds, P.84012, NSW 2500, 20.8 m, dead & live bryozoans cf. *Triphyllozoon*; 5 ♀♀, P.84013, NSW 2513, 20.8 m, bryozoan rubble.

Burrewarra Point, 35º49.78'S, 150º13.96'E, coll. by P. Berents & party, 24 Mar 2004: ♀, P.84014, NSW 2518, 16 m, among cf. *Triphyllozoon* sp. (bryozoa); ♀, P.84015, NSW 2521, 13.4 m, among *Amathia* sp. (bryozoan); 1 ♂, 4 ♀♀, P.84016, NSW 2546, 14.1 m, among mixed bryozoan rubble.

Burrewarra Point, coll. by P. Berents & party, 27 Mar 2004: 16 inds (11 ♀♀, 4 ♂♂ & juv.), P.84017, NSW 2614, 35º49.89'S, 150º14.11'E, 20.3 m, among lacy bryozoan cf. *Triphyllozoon* sp.; 31 inds, P.84018, NSW 2627, 35º50.28'S, 150º14.09'E, 18.5 m, among orange lacy bryozoan cf. *Triphyllozoon*.

Tollgate Islands, 35º44.83'S, 150º15.42'E, coll. by P. Berents & party, 29 Mar 2004: 4 ♂♂, 6 ♀♀, P.84019, NSW 2643, 7 m, *Ecklonia radiata* (alga) holdfasts; 1 ♂, P.84020, NSW 2645, 7 m, chaetopterid tubes in dense mats.

Diagnosis. Eyes large, with more than 10 ocelli. Pereonites 2–4 laterally concave. Pleotelson lateral margin denticles absent; posterior margin broadly rounded, without posterior inflection. Mandible molar distal margin with paired blade-like ridges; palp article 1 simple setae absent. Maxilliped palp article 3 distolateral margin subrectangular, distomedial margin with distinct inflection (in T♂ distomedial margin convex). Pereopod I of adult (terminal) male carpus ventral margin proximal to palm approximately linear, slightly sinuous; palm region transverse relative to dorsal margin, with 3 flattened spines, ventral spine largest sharpest and curved; propodus distinctly shorter than carpus, tapering distally, ventral margin with 2 rounded flattened spines; dactylus well developed, with 2 claws. Pereopods II–VII dactylus ventral claw less robust than dorsal claw. Pleopod I of adult male projecting posteriorly, not curved; medial lobe distal margin convex, curving anteriorly and medially. Pleopod II of adult male protopod distal margin setae absent, endopod stylet weakly curved laterally and then reflexed medially.

Description. Pigmentation in preservative light coloured, without spots. *Body* length of male 1.05–1.67 mm, female 1.35–1.6 mm; length 2.6, 2.7 width (B♀, ♂, respectively), widest at pereonite 3.

Head (Fig. 1B, D) Width 1.68 length. Anterior margin in dorsal view linear. Eyes length 0.41 head medial length, posterior margin adjacent to pereonite 1.

Pereonites (Fig. 1D). Pereonites 1–7 medial length ratios relative to pereonite 2 (♀, P.81245, males too curved to measure accurately): 0.57, 1.0, 1.1, 0.42, 0.39, 0.71, 0.85, respectively. Pereonites 2–4 laterally concave.

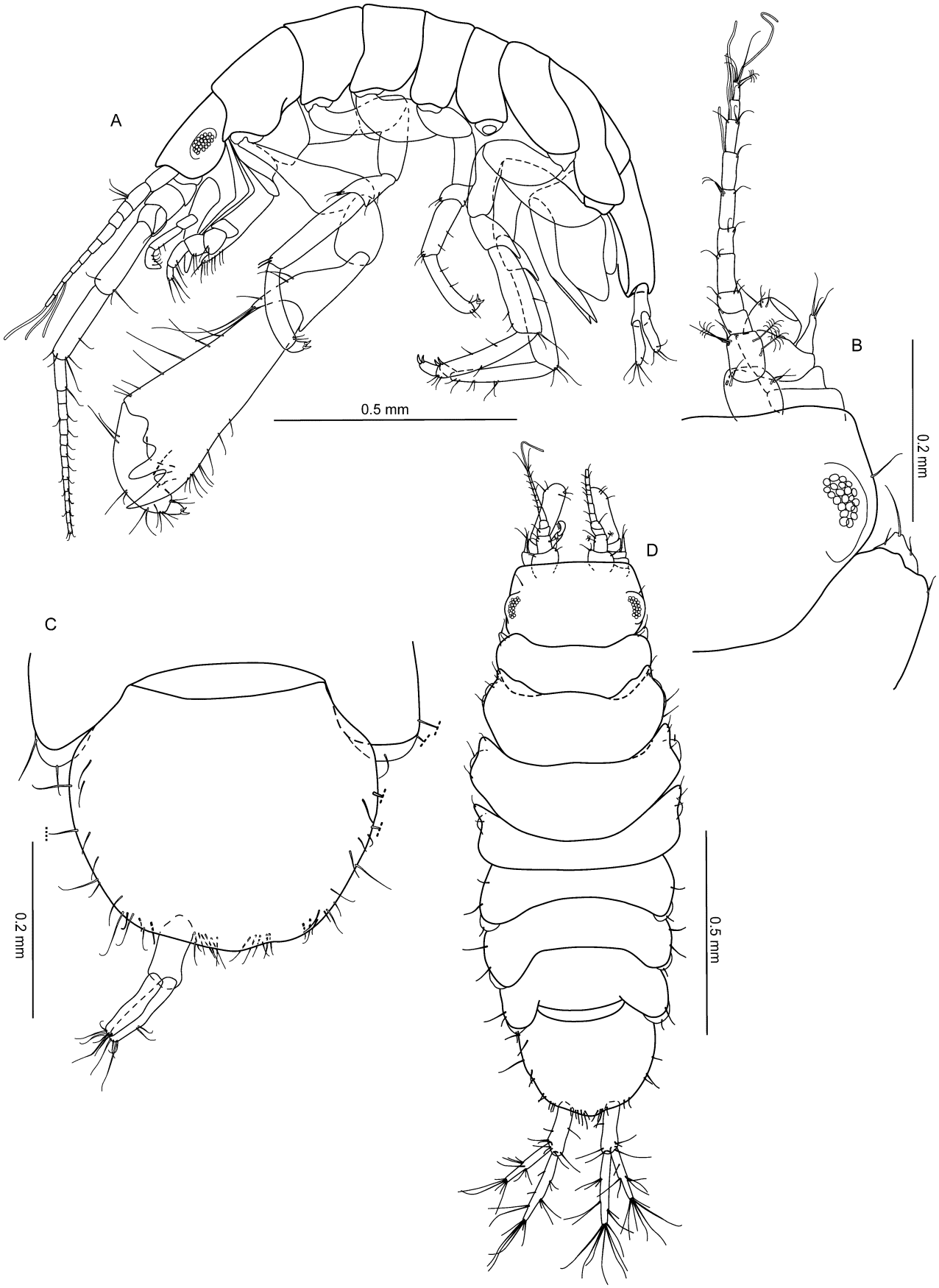

FIGURE 1. *Carpias montaguensis* **sp. nov.** Holotype male (P.81244): A, body, lateral view; B, head, dorsal view, right side; C, pleotelson, dorsal view. Paratype female (P.81245): D, body, dorsal view.

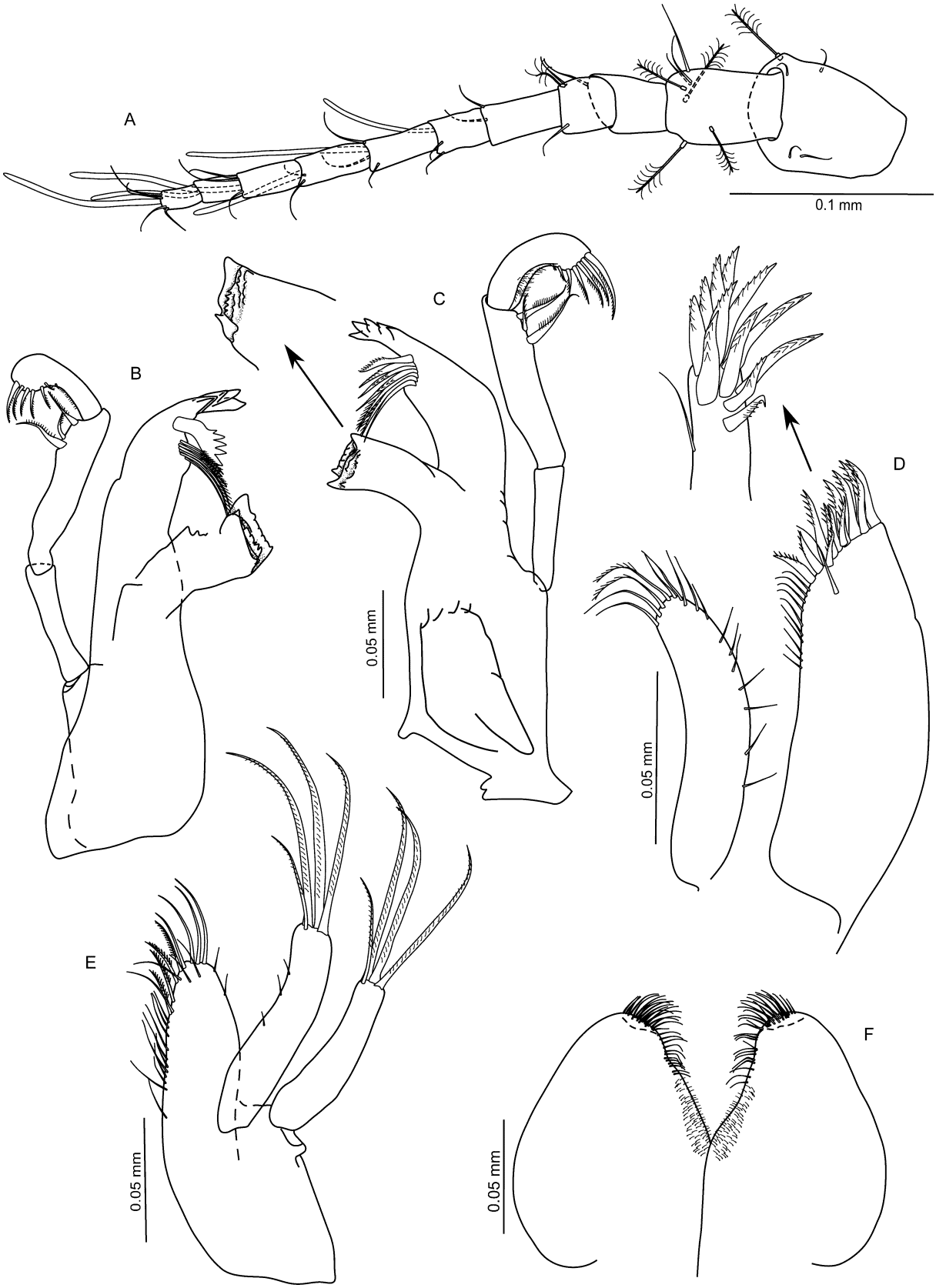

FIGURE 2. *Carpias montaguensis* **sp. nov.** Paratype male (P.81391): A, antennula; B, left mandible; C, right mandible with detail of molar process; D, left maxillula with detail of distal margin of lateral lobe; E, left maxilla; F, paragnaths.

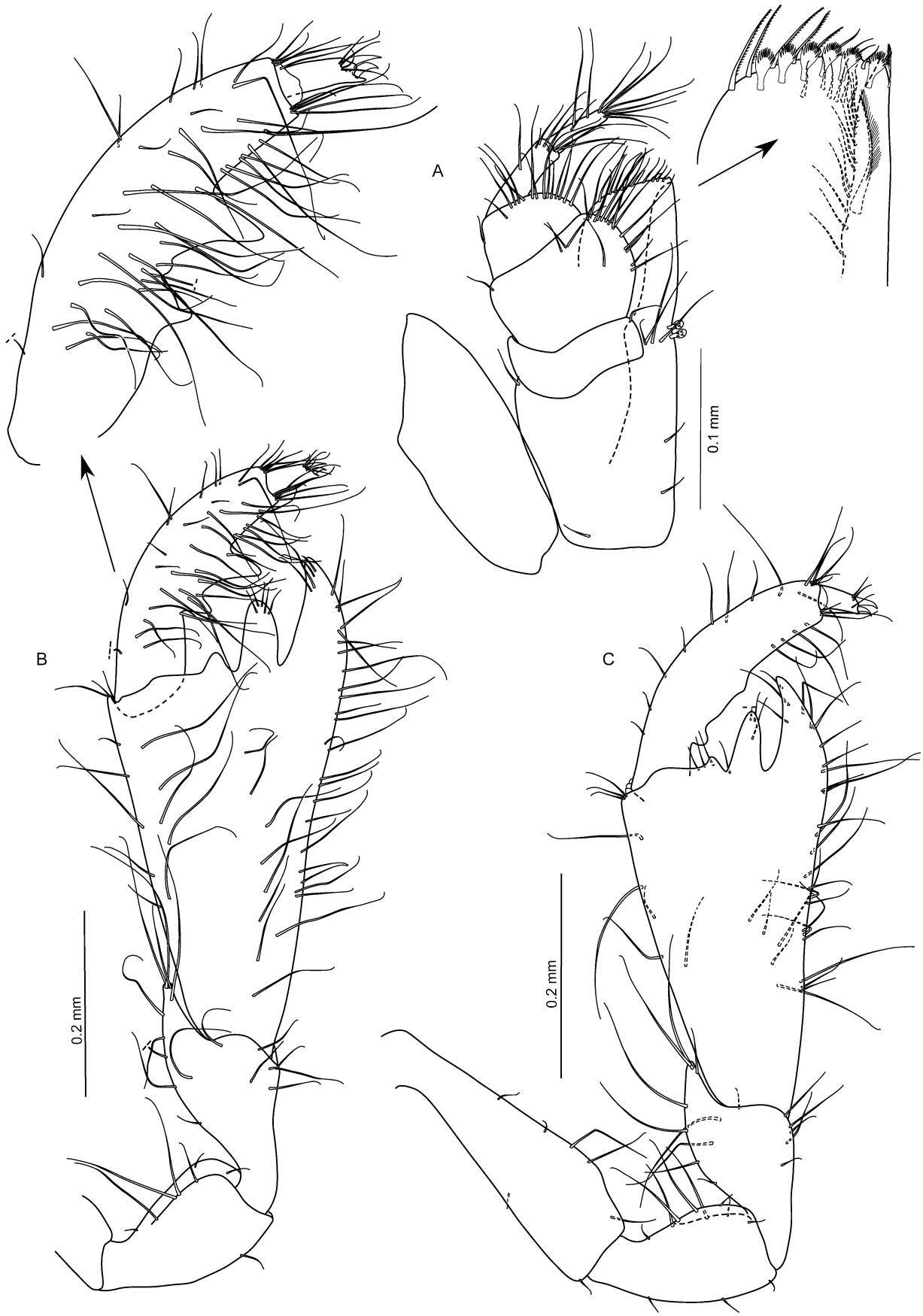

FIGURE 3. *Carpias montaguensis* **sp. nov.** Paratype male (bl 1.46 mm; P.81391): A, right maxilliped, with detail of endite distal margin; C, right pereopod I. Holotype male (bl 1.47 mm; P.81244): B, right pereopod I with detail of propodus and dactylus.

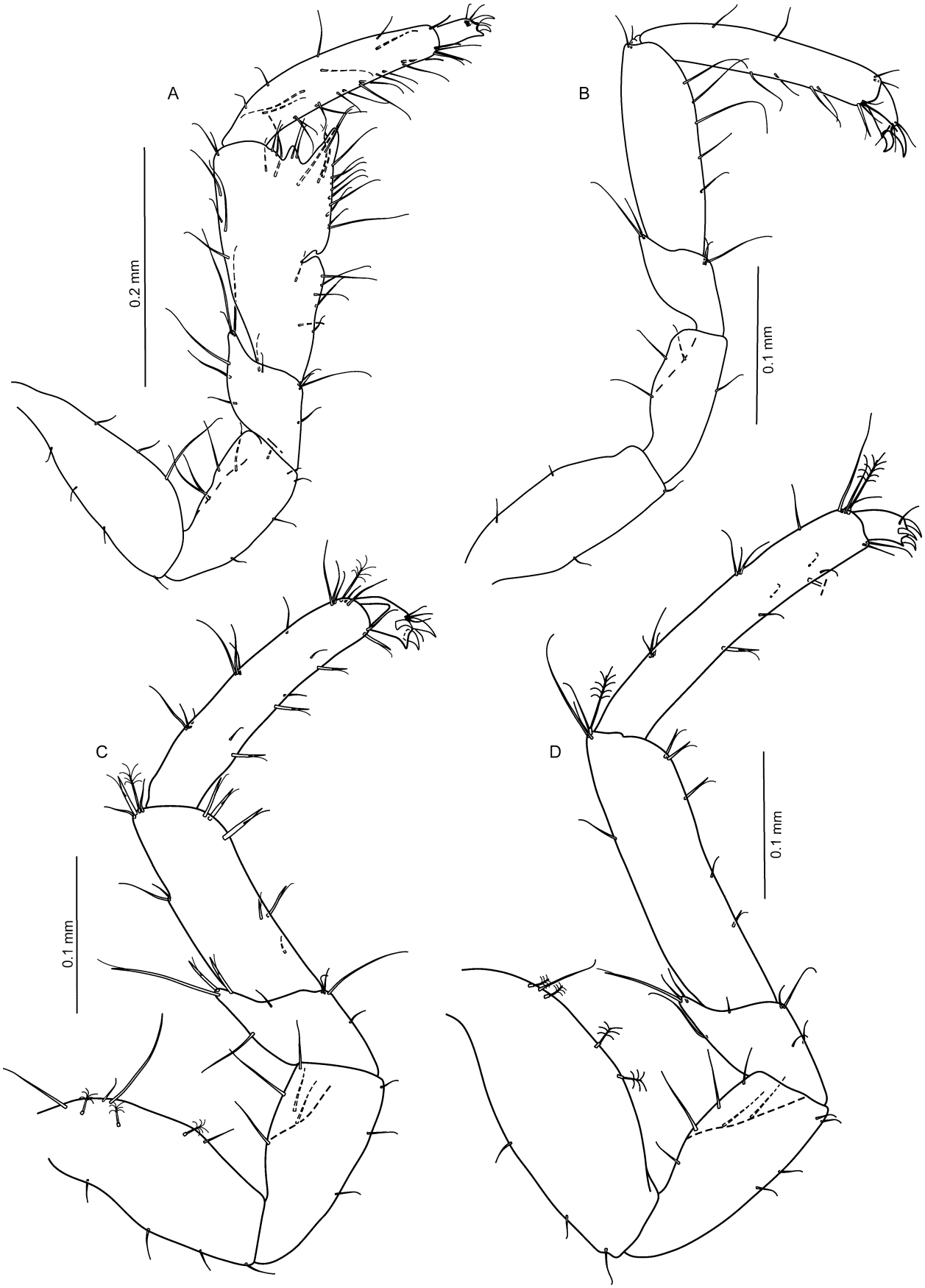

FIGURE 4. *Carpias montaguensis* **sp. nov.** Paratype subadult male (bl 1.32 mm; P.81247): A, right pereopod I. Paratype juvenile male (bl 1.05 mm; P.81246): B, right pereopod I. Paratype male (bl 1.46 mm; P.81391): C, right pereopod II; D, right pereopod VII.

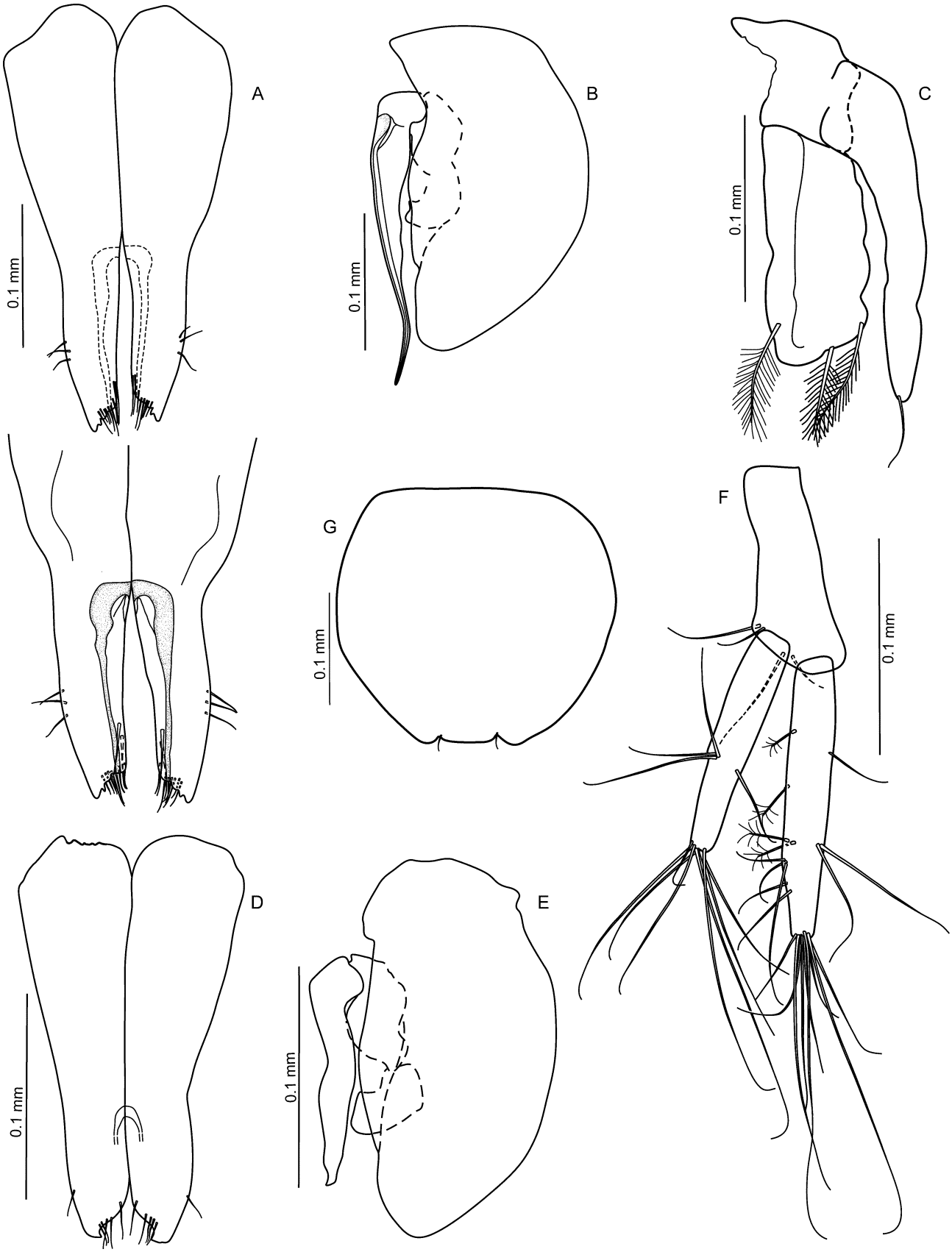

FIGURE 5. *Carpias montaguensis* **sp. nov.** Paratype male (bl 1.46 mm; P.81391): A, pleopod I, ventral view, with detail of distal margin, dorsal view; B, left pleopod II, ventral view; C, left pleopod III; F, left uropod. Paratype juvenile male (bl 1.05 mm; P.81246): D, pleopod I, ventral view; E, left pleopod II, ventral view. Paratype female (P.81245): G, operculum.

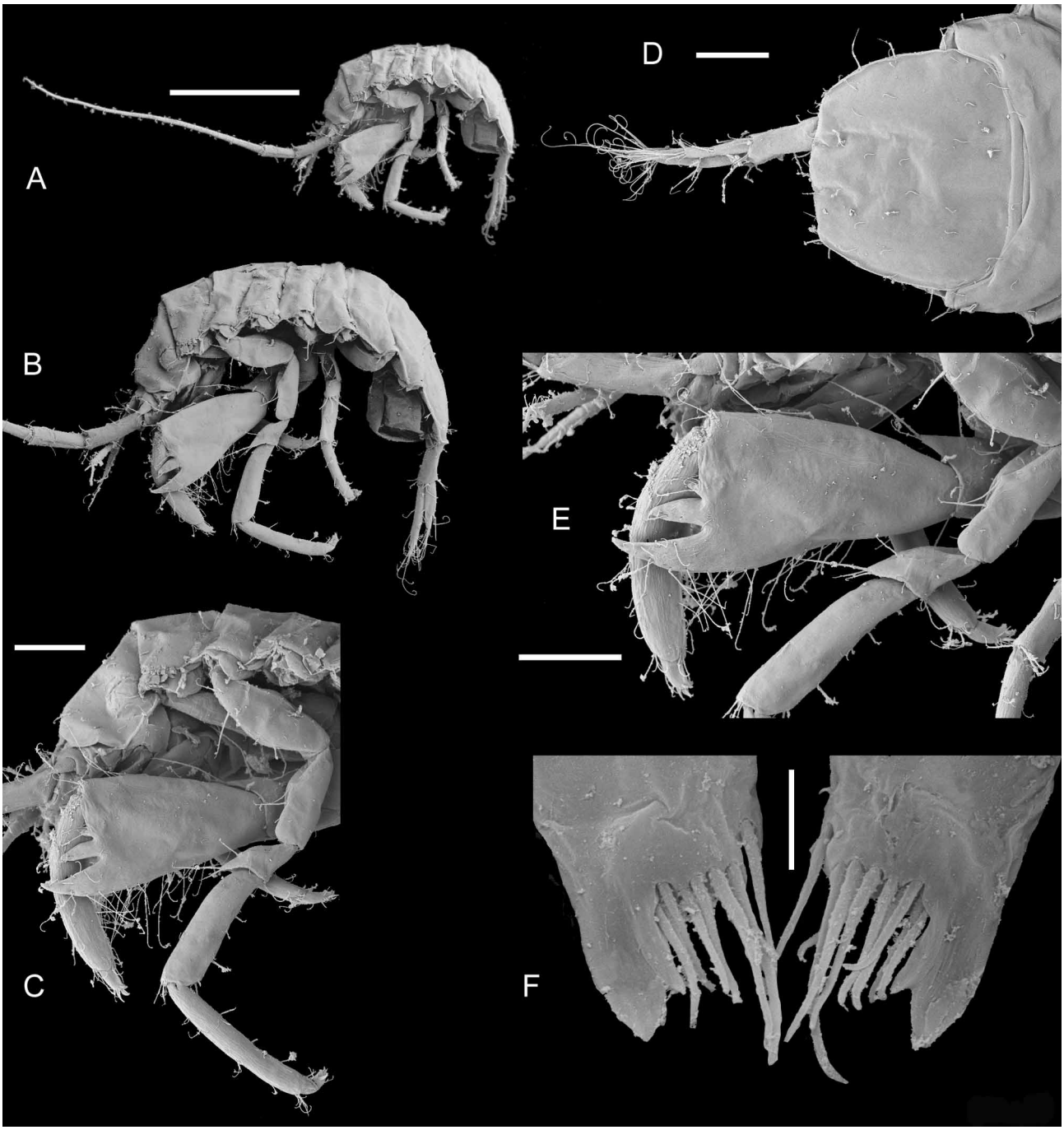

FIGURE 6. *Carpias montaguensis* **sp. nov.** SEM images. Paratype male (P.81113): A–B, lateral view; C, enlargement of anterior body, lateral view; D, pleotelson, dorsal view; E, pereopod I distal podomeres. Paratype male (P.81118): F, pleopod I, distal tip, ventral view. Scale bars: A–B, 0.5 mm; C–E, 0.1 mm; F, 0.01 mm.

Pleon (Figs 1C; 6D). Pleotelson length 0.93 width; lateral margins smooth, forming nearly circular arc; posterior margin broadly rounded, without posterior inflection.

Antennula and Antenna (Figs 1A–B, 2A, 6A). Antennula of male length 1.41 head median length, with 11 articles; in female length 1.06 head median length, with 11 articles, article 1 length 1.02 width, article 2 length 1.5 article 3 length. Antenna length 1.18 body length (Fig. 6A), articles 1–6 length 0.31–0.35 body length (♂), article 5 distinctly longer than articles 1–4, article 5 length 0.96 article 6 length, flagellum with 28 articles (♂).

Mouthparts (Figs 2B–F, 3A). Mandible left spine row with 6 spines; right spine row with 7 spines; molar distal margin with paired blade-like ridges. Mandible palp length 0.86 mandibular body length, article 1 simple setae absent. Maxillula lateral lobe distal margin with 12 robust denticulate setae. Maxilla lateral lobes

with 4 curved denticulate setae. Maxilliped palp article 2 width 1.5 endite width, article 3 distolateral margin subrectangular, distomedial margin with distinct inflection (in T♂ distomedial margin convex); endite length 1.48 width, distal margin with 6 fan setae, medial margin with 2 receptaculi.

Pereopod I. Coxa projecting anterolaterally, angular (Fig. 1B, D). Pereopod I adult female length 0.52 body length.

Pereopod I of adult (terminal) male (Figs 3B–C; 4A–B showing less adult specimens; 6C, E). Length 0.86 body length; basis elongate, longer than bases on posterior pereopods but not projecting past pereonite 4, basis slightly shorter than carpus. Ischium length 0.54 carpus length. Merus length 0.63 carpus length. Carpus setose, robust setae absent, width 0.46 length, ventral margin proximal to palm approximately linear, slightly sinuous, palm region transverse relative to dorsal margin. Propodus length 0.54 carpus length, distal width 0.65 proximal width. Dactylus length 1.08 propodus distal width.

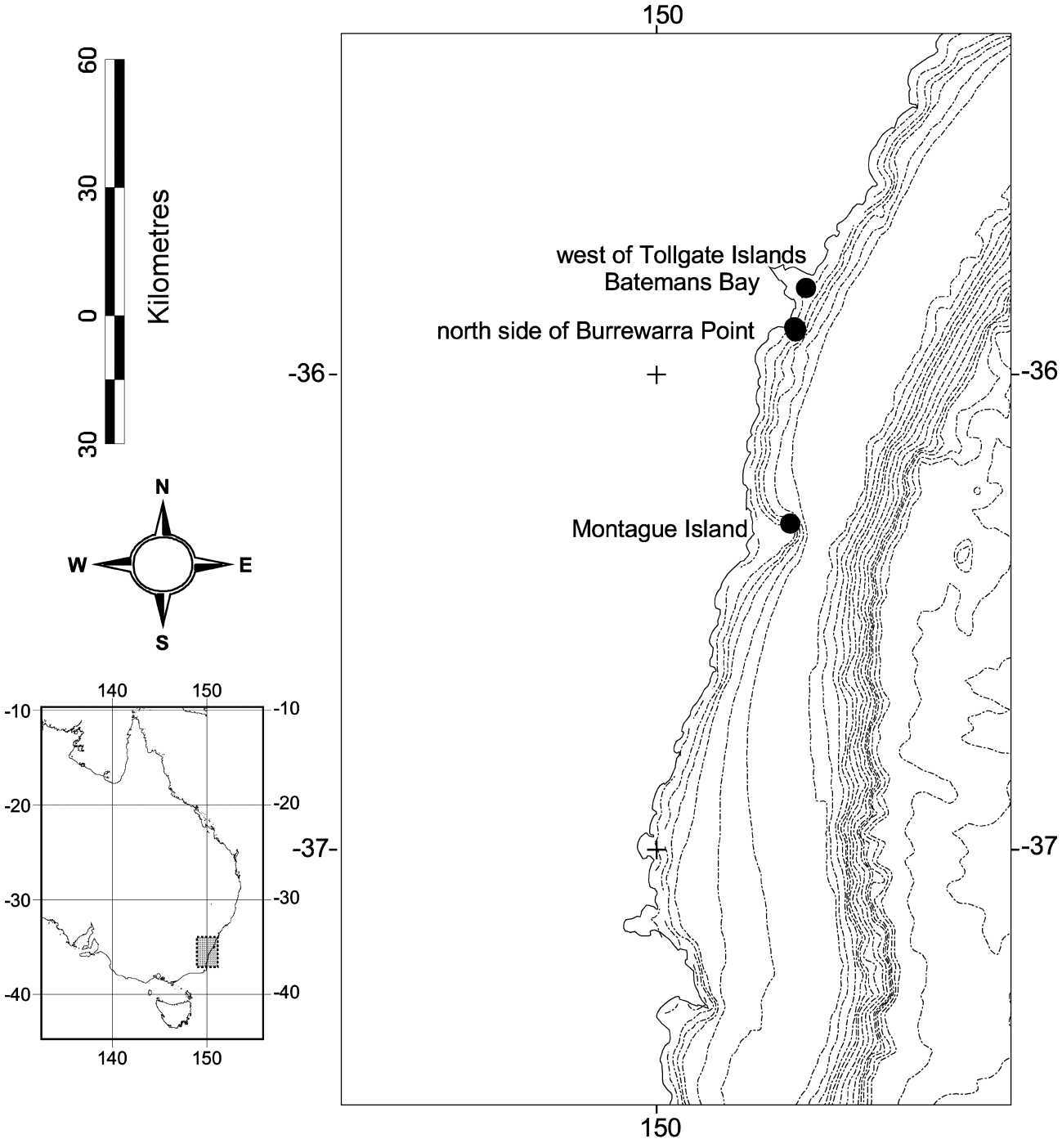

FIGURE 7. Distribution of *Carpias montaguensis* **sp. nov.** in New South Wales, Australia.

Pereopods II–VII (Figs 1A, 4C–D, 6B–C). Pereopod II length 0.5 body length (T♂); coxa anterolateral margin rounded. Pereopod IV length 0.65–0.68 body length (T♂, J♂). Pereopod VII length 0.6 body length.

Pleopods (Figs 5A–E, G, 6F). Operculum of female length 0.93 width, distal margin convex but with two lateral indentation at the insertion of the setae, distal margin with few setae (2 setae in indentations). Pleopod I of adult male distal width 0.31 proximal width; dorsal surface stylet guides lateral margin without denticles; lateral lobe distal margin present, single, with spine on medial side, with 5–6 setae; medial lobe without distinct indentation at inner margin of lateral lobe, margin not projecting, medially convex, width 0.07 pleopod (both sides) distal width, with 3 setae, of which 1 setae longer than others. Pleopod II of adult male protopod distal margin setae absent, endopod proximal article width near distal article maximum width , endopod stylet length 0.9 protopod length. Pleopod III exopod distal margin tapering to narrowly rounded tip, length 0.99 endopod and protopod length, articulation between 2 articles absent.

Uropods (Figs 1C, 5F, 6B, D). Shorter than pleotelson, length in adult male 0.64–0.84 pleotelson length, longer in adult female, length 0.96 pleotelson length. Protopod length 2.28 width, elongate trapezoidal, proximal width much narrower than distal width. Endopod length 1.26 protopod length, 1.26 exopod length.

Distribution. Montague Island, Burrewarra Point and Tollgate Island (Batemans Bay, Australia), 7–33 m (Fig. 7).

Remarks. Pereopod I of *Carpias montaguensis* **sp. nov.** terminal males resemble that of *C. brucei* (Monod, 1974) but with some differences: carpus with 3 spines equidistant that decrease in size from distal to proximal; propodus with distal spine larger than proximal one. *C. brucei*, however, has a carpus with a distinct gap between distal spine and two similarly sized proximal spines, and propodus has 2 similarly sized ventral spines.

Across the species of *Carpias*, variation in the width of the medial lobe of male pleopod I is worth noting. The medial lobe can be defined as the distal tip of the pleopod I that is medial to the lateral margin of the stylet guide. If the lines illustrated on the pleopod I of many species is indicative of the lateral margin of the stylet guide, then *Carpias* shows considerable variation in the composition of the pleopod I inner lobe. *C. montaguensis* **sp. nov.** is notable in that its medial lobe is limited to a thin strip on the inner margin of the pleopod distal tip.

The distribution of *Carpias montaguensis* **sp. nov.** is limited to southern NSW (Fig. 7), where this species appears to favour living among bryozoan colonies or rubble thereof. Of the algal species on which this species occurred, most were prostrate forms, which also would have associated sessile colonies of bryozoans. We did not, however, assess the sessile animals living on the prostrate algae.

Ianiropsis Sars, 1897

Ianiropsis G.O. Sars, 1897: 102.—Menzies, 1952: 134; 1962: 78; Kussakin, 1962: 40; 1988: 88; Wilson & Wägele, 1994: 702–703.

Janiropsis.—Richardson, 1905: 454; Gurjanova, 1936: 44.

Type species. *Janira breviremis* Sars, 1883, by subsequent designation.

Species included. *I. alanmillari* **sp. nov.**, *I. analoga* Menzies, 1952; *I. breviremis* (Sars, 1883); *I. derjugini* Gurjanova, 1933; *I. epilittoralis* Menzies, 1952; *I. kincaidi* Richardson, 1904; *I. koreaensis* Jang & Kwon, 1990; *I. kussakini* Carvacho, 1982; *I. longiantennata* Thielemann, 1910; *I. longipes* Sivertsen & Holthuis, 1980; *I. magnocula* Menzies, 1952; *I. minuta* Menzies, 1952; *I. montereyensis* Menzies, 1952; *I. neglecta* (Chilton, 1909); *I. notoensis* Nunomura, 1985; *I. pallidocula* Kussakin, 1962; *I. palpalis* Barnard, 1914; *I. perplexus* Menzies, 1962; *I. picta* Kussakin & Mezhov, 1979; *I. punctulata* Kussakin & Mezhov, 1979; *I. serricaudis* Gurjanova, 1936; *I. setifera* Gurjanova, 1950; *I. tridens* Menzies, 1952.

Not *Ianiropsis varians* Winkler & Brandt, 1993 (= *Iathrippa varians* (Winkler & Brandt, 1993), new combination).

Diagnosis. Head frontal margin width between antennulae near basal width of antennae (except *I. setifera*). Eyes dorsolateral, large, posterior margin with distinct gap between pereonite 1. Maxilliped endite with 2 receptaculi. In some species the maxilliped palp and/or the pereopod I is sexually dimorphic. Maxilliped palp of adult (terminal) male longer than antennule, projecting anteriorly, visible on head in dorsal view. Pereopod

I of adult (terminal) male basis-merus elongate, distinctly longer than those on posterior pereopods; carpus setose, ventral margin proximal to palm approximately linear, slightly sinuous; propodus ventral margin without spines; dactylus well developed. Pereopods II–VII not sexually dimorphic; coxa anterolateral margin rounded (unknown in several species). Pleopod I of adult male lateral lobe distal margin absent (or nearly so); medial lobe without distinct indentation at inner margin of lateral lobe. Pleopod II of adult male stylet curving laterally with no inflections. Pleopod III endopod with 3 (rarely 2) plumose setae, exopod with 2 articles, distally rounded or pointed with 1–3 simple setae. Uropods rami crossectional shape oval.

Distribution. Cosmopolitan, mostly temperate to cold temperate coastal waters.

Remarks. *Ianiropsis* species have several characteristics that ease their identification, despite the general similarities of most juveniles and females in species of the core taxa of the janirids. Key among these are the fairly consistent shape of the male pleopod I distal tip, and the elongate pereopod I of the males. These characters exclude the species *Ianiropsis varians* Winkler & Brandt, 1993 from *Ianiropsis*. We therefore propose a new combination, *Iathrippa varians* (Winkler & Brandt, 1993). Other characters that support this new combination are as follows. All species of *Ianiropsis*, including both sexes, have a narrow pleopod III exopod, which is distinctly different from the broad exopod found in *Iathrippa*. The broad exopod of *Iathrippa* is related to the partially opercular condition of this pleopod (Wilson, 1987). The *Ianiropsis* male pleopod II protopod has a distinct extension posterior to the exopod, while in *Iathrippa* it is abbreviated, owing to its nonopercular form. The terminal margin of the male pleopod I is consistent across the species within each genus, so that the projecting medial lobes of the species *I. varians* clearly places it with *Iathrippa.* This species was described without the characteristic rostrum, but our experience with Australian *Iathrippa* suggests that the rostrum can be variable between species in the genus *Iathrippa*. The rostrum can also be thin and hard to see in some species. Regarding more general body form characters, *Iathrippa* species have a broad body and eyes that project substantially from the head as in *I. varians*, whereas *Ianiropsis* species have narrow bodies and eyes that are more dorsal in position, with some separation from the head lateral margin.

Key to species of *Ianiropsis*

This key requires a fully adult (terminal) male for most characters.

1. Pleotelson lateral margin denticles absent 2
   Pleotelson lateral margin denticles present 16
2(1). Uropod protopod elongate and rectangular or trapezoidal 3
   Uropod protopod squat, broader than long or slightly longer than broad 15
3(2) Maxilliped palp of adult T♂ projecting substantially, visible on head in dorsal view ..... *Ianiropsis palpalis* Barnard, 1914
   Maxilliped palp of adult T♂ not projecting, not visible on head in dorsal view 4
4(3). Pleotelson posterior margin lateral to uropod insertions smoothly curved, without posterior inflection 5
   Pleotelson posterior margin lateral to uropod insertions with obtuse angular projection 14
5(4). Pleotelson posterior margin broadly rounded, without posterior inflection 6
   Pleotelson posterior margin with rounded posteriorly-directed inflection 7
6(5). Head anterior margin in dorsal view linear; frontal margin width between antennulae near basal width of antennae; eyes dorsal, set back from lateral margin; pleotelson posterior margin at position of uropods with shallow concavity; antennulae with 12–15 articles ..... *Ianiropsis alanmillari* **sp. nov.**
   Head anterior margin in dorsal view sinuate with medial convexity; frontal margin width between antennulae distinctly narrower than basal width of antennae; eyes dorsolateral, extending to lateral margin; pleotelson posterior margin at position of uropods with no indentation; antennulae with 9 articles ..... *Ianiropsis perplexus* Menzies, 1962
7(5). Pereopod I of adult T♂ carpus setose, with many fine short setae ..... *Ianiropsis picta* Kussakin & Mezhov, 1979
   Pereopod I of adult T♂ carpus with few short setae 8
8(7). Head frontal margin angular ..... *Ianiropsis montereyensis* Menzies, 1952
   Head frontal margin rounded 9
9(8). Pereonite 2–4 laterally concave 10
   Pereonite 2–4 laterally linear 12

10(9). Pleopod II of adult male endopod stylet weakly curved laterally and then reflexed medially .... *Ianiropsis longiantennata* Thielemann, 1910
Pleopod II of adult male endopod stylet curving laterally with no inflections 11
11(10). Pereopod I of adult T♂ propodus ventral margin with robust setae; pleotelson longer than broad, length/width ratio 1.21, lateral margin nearly straight flattened curve..... *Ianiropsis punctulata* Kussakin & Mezhov, 1979
Pereopod I of adult T♂ propodus ventral margin without robust setae; pleotelson broader than long, length/width ratio 0.91, lateral margin nearly circular arc ..... *Ianiropsis pallidocula* Kussakin, 1962
12(9). Pereopod I of adult T♂ propodus ventral margin with robust setae, propodus distal width 0.51 to 1 proximal width ..... *Ianiropsis chilensis* Menzies, 1962
Pereopod I of adult T♂ propodus ventral margin without robust spine-like setae; propodus distal width up to 0.5 proximal width 13
13(12). Pleotelson shorter than broad, length/width ratio 0.83, lateral margin nearly straight flattened curve; uropods subequal to pleotelson ..... *Ianiropsis longipes* Sivertsen and Holthuis, 1980
Pleotelson longer than broad, length/width ratio 1.03, lateral margin broadly curved; uropods shorter than pleotelson ..... *Ianiropsis neglecta* (Chilton, 1909)
14(4). Body margins strongly setose, with many fine long setae; head anterior margin in dorsal view sinuate with medial concavity, frontal margin width between antennulae distinctly narrower than basal width of antennae, anterolateral margin angular; female operculum distal margin concave ..... *Ianiropsis setifera* Gurjanova, 1950
Body margins with few short setae; head anterior margin in dorsal view sinuate with medial convexity, frontal margin width between antennulae near basal width of antennae, anterolateral margin rounded and not projecting; female operculum distal margin linear ..... *Ianiropsis kincaidi* Richardson, 1904
15(2). Head anterior margin in dorsal view linear; operculum of female distal margin with few setae .... *Ianiropsis minuta* Menzies, 1952
Head anterior margin in dorsal view sinuate with medial convexity; operculum of female distal margin glabrous ..... *Ianiropsis derjugini* Gurjanova, 1933
Head anterior margin in dorsal view broadly rounded and projecting anteriorly between antennae; operculum of female distal margin with row of setae along distal margin ..... *Ianiropsis magnocula* Menzies, 1952
16(1). Pleotelson lateral margin up to 4 denticles 17
Pleotelson lateral margin 5 denticles or more 20
17(16). Maxilliped palp of adult T♂ projecting substantially, visible in dorsal view; pereopod I of adult T♂ basis not elongate, near length of bases on posterior pereopods; pereopods II–VII dactylus without accessory third claw..... ..... *Ianiropsis notoensis* Nunomura, 1985
Maxilliped palp of adult T♂ not projecting, not visible on head in dorsal view; pereopod I of adult T♂ basis elongate, longer than bases on posterior pereopods; pereopods II–VII dactylus with accessory third claw on posterior side..... 18
18(17). Pereopod I of adult T♂ basis length subequal to carpus; pereonite 4 laterally concave; maxilliped palp article 3 in terminal male distomedial margin linear ..... *Ianiropsis koreaensis* Jang & Kwon, 1990
Pereopod I of adult T♂ basis length greater than carpus; pereonite 4 laterally linear; maxilliped palp article 3 in terminal male distomedial margin convex 19
19(18). Pleotelson posterior margin at position of uropods with no indentation; eyes dorsolateral, extending to lateral margin; antenna article 5 near length of articles 1–4; coxa of pereopod I rounded, not projecting anterolaterally ... . *Ianiropsis epilittoralis* Menzies, 1952
Pleotelson posterior margin at position of uropods with shallow concavity; eyes dorsal, set back from lateral margin; antenna article 5 distinctly longer than articles 1–4; coxa of pereopod I angular, projecting anterolaterally .... *Ianiropsis tridens* Menzies, 1952
20(16). Uropod protopod squat, broader than long or slightly longer than broad ..... *Ianiropsis analoga* Menzies, 1952
Uropod protopod elongate and rectangular or trapezoidal 21
21(20). Head anterior margin in dorsal view broadly concave; maxilliped palp of adult T♂ projecting substantially, visible on head in dorsal view..... *Ianiropsis serricaudis* Gurjanova, 1936
Head anterior margin in dorsal view broadly rounded and projecting anteriorly between antennae; maxilliped palp of adult T♂ not projecting, not visible on head in dorsal view..... *Ianiropsis breviremis* Sars, 1883

***Ianiropsis alanmillari* sp. nov.**
(Figs 8–14)

Etymology. The species is named for Dr. Alan J. K. Millar (Royal Botanical Gardens, Sydney) in recognition for his contribution to collecting this species and the other Asellota described herein.

Type fixation. Holotype adult ♂, 2.9 mm, P.81237, here designated.

Type locality. Australia, New South Wales, south of Batemans Bay, north of Burrewarra Point, Gutters, NSW 1996, 35º49.82'S, 150º14.08'E, 24 m, coll. by G. Wilson, A. Millar & N. Yee, 27 Oct 2002, among *Pachymenia prostrata*.

Paratypes. B♀ (2.5 mm) P.81238; B♀ (2.5 mm) dissected, P.81239; T♂ #3 (2.9 mm) dissected, P.81242; A♂ #2 (2.5 mm), dissected, P.81241; J♂ #1 (2 mm), dissected, P.81240; ♀ P.81228, SEM stub MI170; ♂ P.81229, SEM stub MI171; 24 inds (T♂♂: 2.5–3.3 mm; non-T♂♂: 2–2.5 mm; B♀♀: 2–2.5 mm; juvs 1.3–1.5 mm) P.81243.

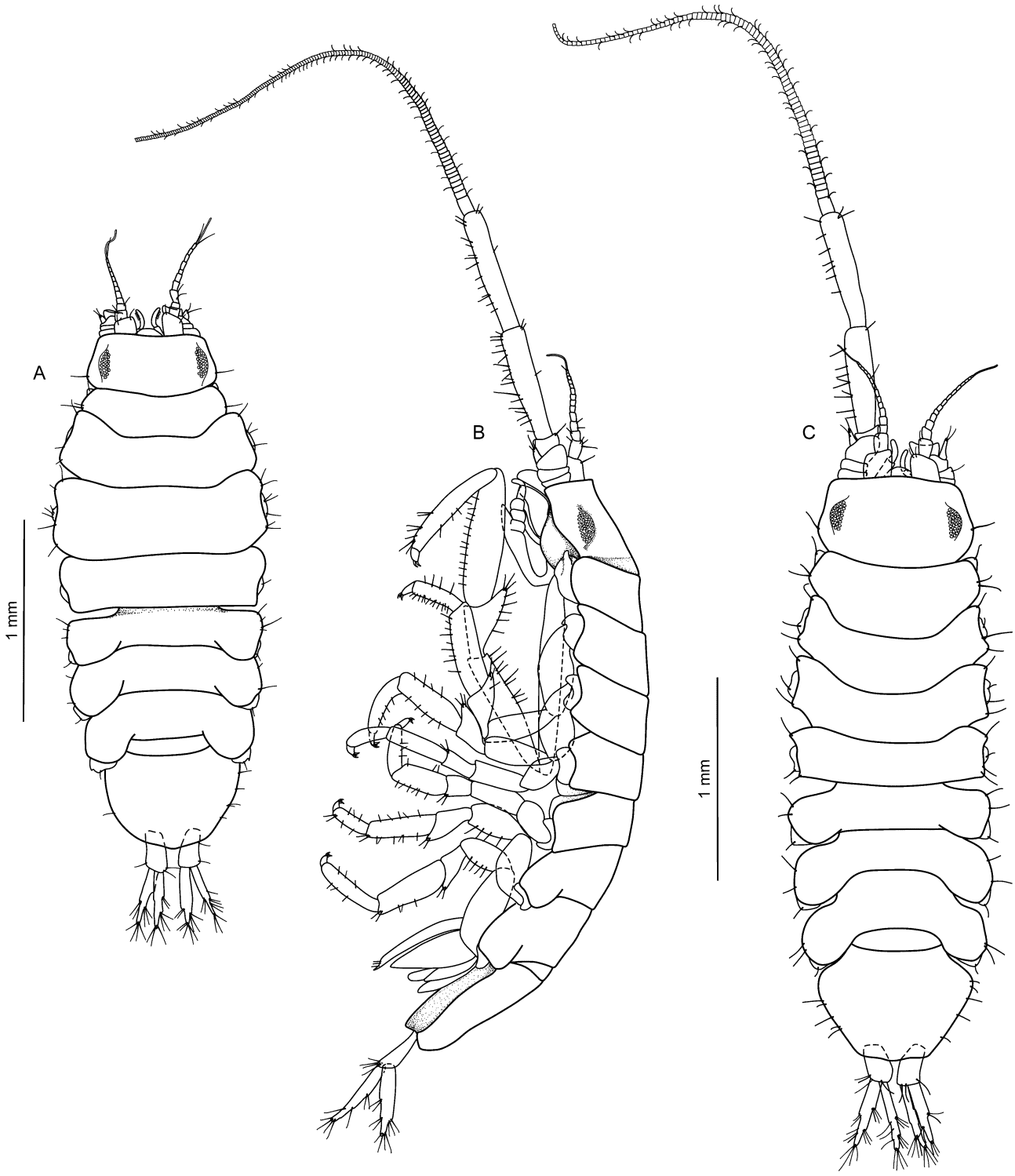

FIGURE 8. *Ianiropsis alanmillari* **sp. nov.** Paratype female (P.81238): A, body, dorsal view. Holotype male (P.81237): B, body, lateral view; C, body, dorsal view.

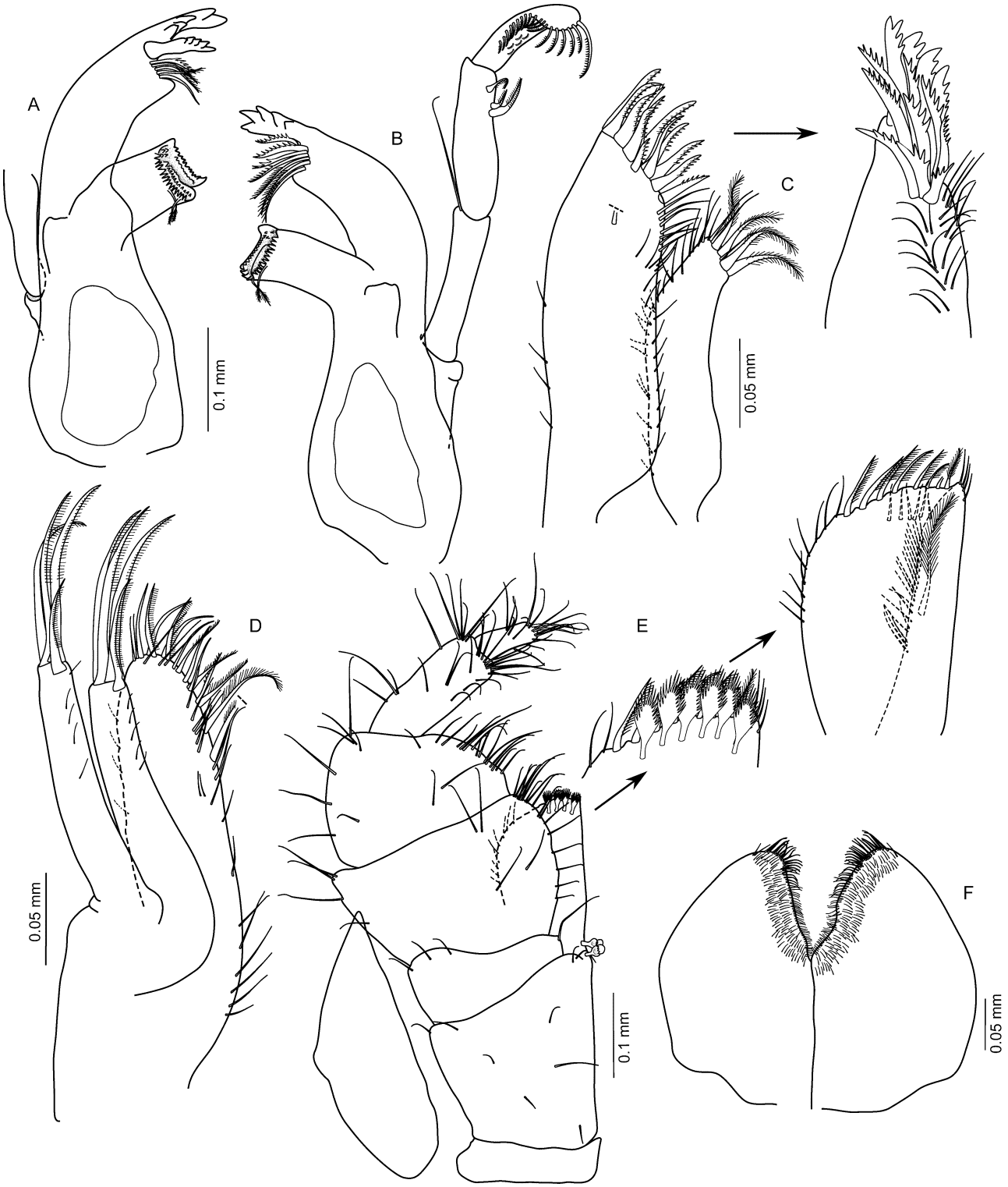

FIGURE 9. *Ianiropsis alanmillari* **sp. nov.** Paratype male (P.81242): A, left mandible; B, right mandible; C, left maxillula, with medial detail of lateral lobe distal margin; D, right maxilla; E, right maxilliped with detail of endite distal end (in second detail, fan setae not drawn); F, paragnath.

Other material. Montague Island, coll by A.J.K. Millar & party, 23–24 Mar 2001. Yakka Bay, 36º14.98'S, 150º13.37'E, 15 m: 33 inds, P.84021, NSW 1773, among *Ecklonia radiata* (alga holdfast); 1 juv, P.84022, NSW 1774, among mixed algae: *Pterocladia capillacea*, *Cystophora* sp., *Plocamium microcladioides*, *Sargassum* sp. (minor amount). 'Northwest Trench', 36º14.55'S, 150º13.45'E: ♀, 3 juvs, P.84023, NSW 1775, 33 m, among lacy bryozoan colonies; 51 inds, P.84024, NSW 1777, among *Spyridia*

filamentosa & *Zonaria diesingiana* (red algae); 23 inds (2 B♀♀, 9 ♀♀, 9 ♂♂, 3 juvs), P.84025, NSW 1779, 33 m, among *Heterosiphonia australis* (alga); 317 inds, P.84026, NSW 1781, 33 m, among *Lobophora variegata*, *Sargassum* (alga); 21 inds (4 B♀♀, 5 ♂♂, 3 ♀♀, 9 J♀), P.84027, NSW 1782, 30 m, among broad digitate orange sponge; 10 inds (1 B♀, 2 ♀♀, 2 ♂♂, 5 juvs), P.84028, NSW 1783, 30 m, among globose sponge.

'Twin Peaks', approx. 6 n.mi. from Tathra Wharf, coll by A.J.K. Millar & party, 26 Mar 2001: J♂, P.84029, NSW 1793, 36º40.12'S, 150º1.06'E, 25 m, among white bushy hydroid tufts.

Batemans Bay Region, coll. by A.J.K. Millar & party, 25–28 Oct 2002. Burrewarra Point, East Wall, 35º50.02'S, 150º14.16'E: 5 inds (2 ♂♂, 1 B♀, 2 ♀♀), P.84030, NSW 1985, 25 m, among *Peyssonelia novahollandiae* (alga); 25 inds (3 B♀♀, 10 ♀♀, 9 ♂♂, and 3 juvs), P.84031, NSW 1986, among *Curdiea crassa* with small amount of *Martensia australis* (alga); 4 inds (1 B♀, 2 ♀♀, 1 ♂), P.84032, NSW 1987, among *Corallina berteri* (alga). Burrewarra Point, Gutters, 35º49.82'S, 150º14.08'E, 24 m: 4 inds (2 B♀♀, 1 ♀, 1 ♂), P.84034, NSW 1993, among *Pachymenia prostrata* (alga); 41 inds, P.84035, NSW 1995, among branching hydroid; 1 ♀, P.84036, NSW 1998, Gutters, somewhat inshore, 35º49.87'S, 150º14.08'E, 23 m, among *Caulerpa hodgkinsoniae* (alga). Broulee Island: J♂, P.84033, NSW 1989, 35º50.83'S, 150º11.09'E, 8 m, among branching coralline algae: *Amphiora anceps* & *Jania natalensis*. Tollgate Islands: 1 P♀, P.84037, NSW 2005, 35º44.78'S, 150º15.47'E, 12 m, among *Galaxuara marginata* (alga).

Batemans Bay Region, coll. by A.J.K. Millar & party, 8–9 Feb 2003. Brush Island, 35º31.65'S, 150º24.96'E: 9 inds (3 B♀♀, 2 ♀♀, 2 ♂♂, 2 juvs), P.84038, NSW 2025, 12 m, among *Pterocladiella capillacea* (alga); 1 ♂, 1 ♀, P.81402, NSW 2026, 12 m, among *Ecklonia radiata* (alga); 3 inds (1 ♂, 1 B♀, 1 ♀), P.81404, NSW 2029, 16.2 m, among *Zonaria diesingiana* (alga). Grasshopper Island, 35º38.02'S, 150º19.85'E: 1 ♂, P.81403, NSW 2034, 11 m, among *Amphiroa anceps* (alga).

Batemans Bay Region, coll. by P. Berents & party, 23–30 Mar 2004. Burrewarra Point, 35º49.81'S, 150º14.01'E: 11 inds (3 ♂♂, 5 ♀♀, 3 juvs), P.84039, NSW 2498, 17 m, among gorgonacean; 2 ♀♀, P.84040, NSW 2502, 20 m, among honeycomb sponge; 1 ♀, P.84041, NSW 2510, 17 m, among gorgonacean cf. *Mopsella*; 5 inds (1 B♀, 4 juvs), P.84042, NSW 2511, 17 m, among rock with *Hydrodendron australe* (hydroid) and other encrusting fauna; 1 ♀, P.84043, NSW 2513, 20.8 m, among bryozoan rubble. Burrewarra Point, 35º49.78'S, 150º13.96'E: 5 inds (2 ♂♂, 3 ♀♀), P.84044, NSW 2525, 13.4 m, among dead bryozoan clumps attached to rocky reef; 1 juv, P.84045, NSW 2540, 15 m, among under stones, little sediment; 1 ♂, juv, P.84046, NSW 2542, 14.8 m, among *Mopsella* sp. (gorgonian); 22 inds (8 ♂♂, 3 B♀♀, 10 ♀♀, juv), P.84047, NSW 2543, 19.7 m, among cf. "*Triphyllozoon*" (bryozoan); (?) juv, P.84048, NSW 2544, 14 m, among small orange finger sponge; 16 inds (4 ♂♂, 1 B♀, 3 ♀♀, 5 juvs, 3 inds damaged), P.84049, NSW 2546, 14.1 m, among mixed bryozoan rubble. Three Islet Reef, 35º43.63'S, 150º16.01'E: 1 ♂, P.84050, NSW 2551, 10 m, among *Capnella* sp. (soft coral); 1 ♀, P.84051, NSW 2560, 12 m, among green sponge; 1 B♀, P.84052, NSW 2561, 10 m, among *Mopsella* sp.? (gorgonian); 1 ♂, P.84053, NSW 2568, 11 m, among cf. *Triphyllozoon* sp. (bryozoan). Tollgate Islands, 35º45.2'S, 150º15.75'E: 17 inds, P.84054, NSW 2573, 10 m, among yellow sponge encrusting barnacles; 2 juvs, P.84055, NSW 2596, 17.5 m, among massive dark grey sponge. Burrewarra Point, 35º49.89'S, 150º14.11'E: 6 inds (2 B♀♀, 4 juvs), P.84056, NSW 2597, 18 m, among bryozoan, hydroid and reef rock; (?) juv, P.84057, NSW 2598, 22 m, among coarse gravel, shell and bryozoan sediment. Burrewarra Point, 35º50.28'S, 150º14.09'E: 30 inds, P.84058, NSW 2618, 17 m, among brown lacy bryozoan cf. *Membranipora*; 1 ♀, P.84059, NSW 2620, 18 m, among sponges; 26 inds, P.84060, NSW 2627, 18.5 m, among cf. "*Triphyllozoon*" (bryozoan); 13 inds (3 B♀♀, 5 ♀♀, 4 ♂♂, 1 juv), P.84061, NSW 2630, 18.3 m, among grey sponge from vertical rock face. Tollgate Islands, 35º44.83'S, 150º15.42'E: 1 ♀, P.84062, NSW 2643, 7 m, among *Ecklonia radiata* (alga) holdfasts; 1 ♀, 1 ♂, P.84063, NSW 2652, 8.2 m, among bryozoans under rock.

Twofold Bay, Munganno Point: 14 inds, P.35657, 37º06.2'S, 149º55.7'E, 4 m, 10 Oct 1984, coll. by J. van der Velde; 12 inds, P.35659, M4, 37º06.2'S, 149º55.7'E, 10 Oct 1984, coll. by J. van der Velde; 1 ♀, P.84130, M8, 37º06.2'S, 149º55.7'E, 19 Dec 1985, coll. by S.J. Keable & S.J. Perry; 22 inds (9 ♂♂, 13 ♀♀), P.84131, M8, 9, 37º06.2'S, 149º55.7'E, 9 m, 09 Dec 1985, coll. by S.J. Keable & S.J. Perry; 103 inds (56 ♂♂, 47♀♀), P.84132, M6, 9, 37º06.2'S, 149º55.7'E, 19 Dec 1985, 9 m, coll. by S.J. Keable & S.J. Perry.

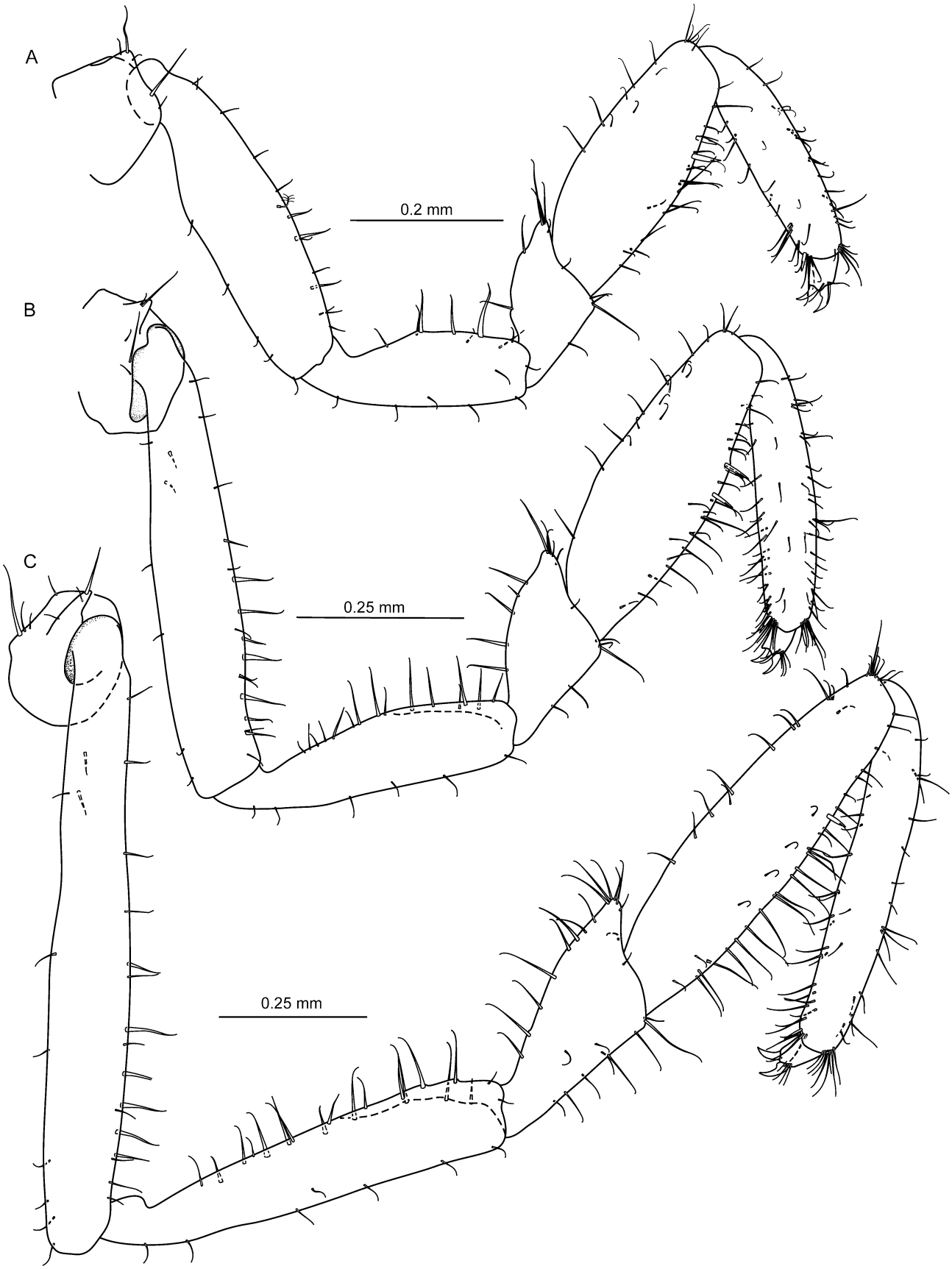

FIGURE 10. *Ianiropsis alanmillari* **sp. nov.** Pereopod I (right side) of paratype males in different developmental stages: A, juvenile male (bl 2.0 mm; P.81240); B, subterminal male (bl 2.5 mm; P.81241); C, terminal male (bl 2.9 mm; P.81242).

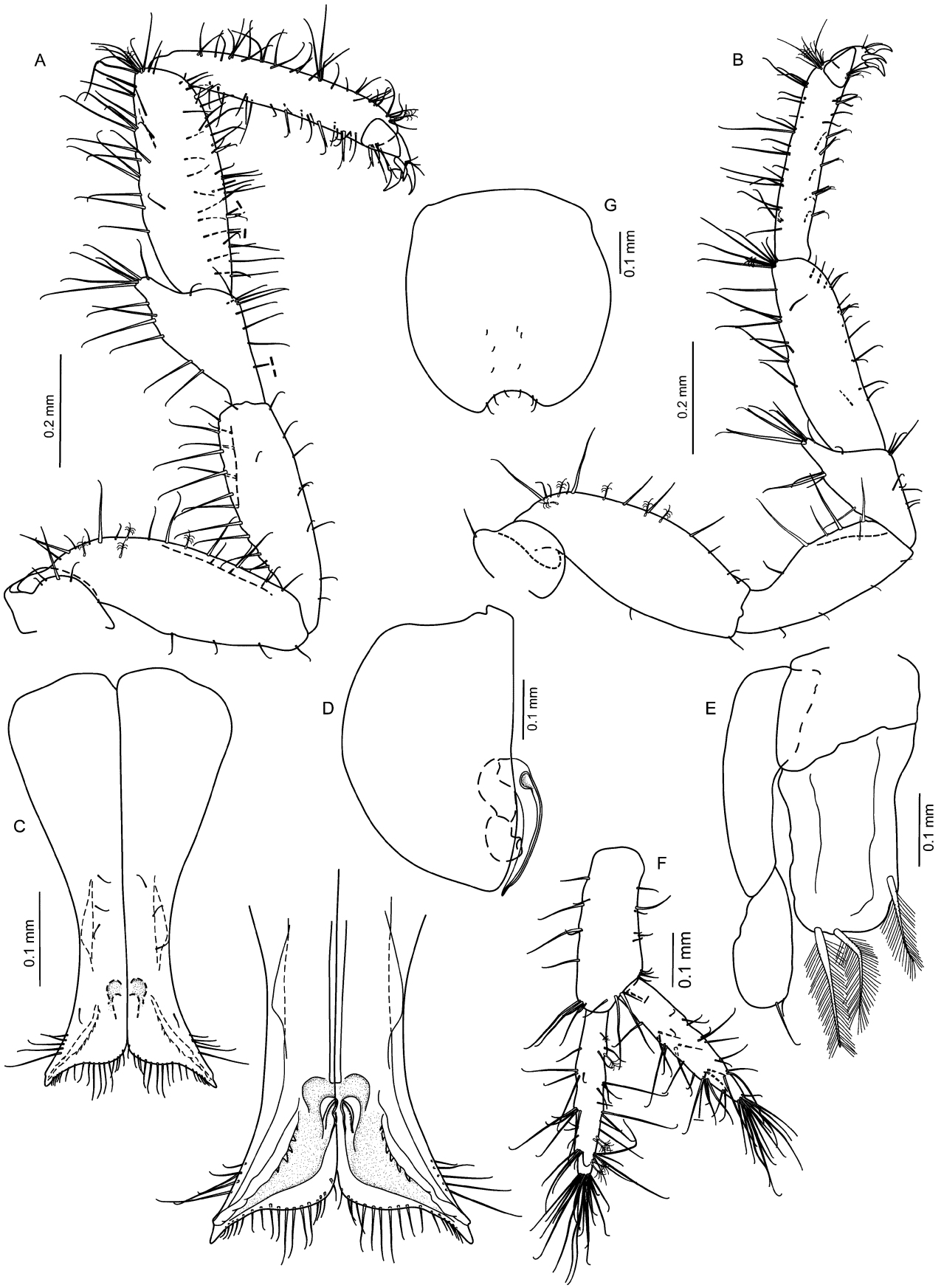

FIGURE 11. *Ianiropsis alanmillari* **sp. nov.** Paratype male (bl 2.9 mm; P.81242): A, right pereopod II; B, right pereopod VII; C, pleopod I, ventral view, with detail of distal margin, dorsal view; D, right pleopod II, dorsal view; E, right pleopod III; F, right uropod. Paratype female (2.5 mm; P.81238): G, operculum.

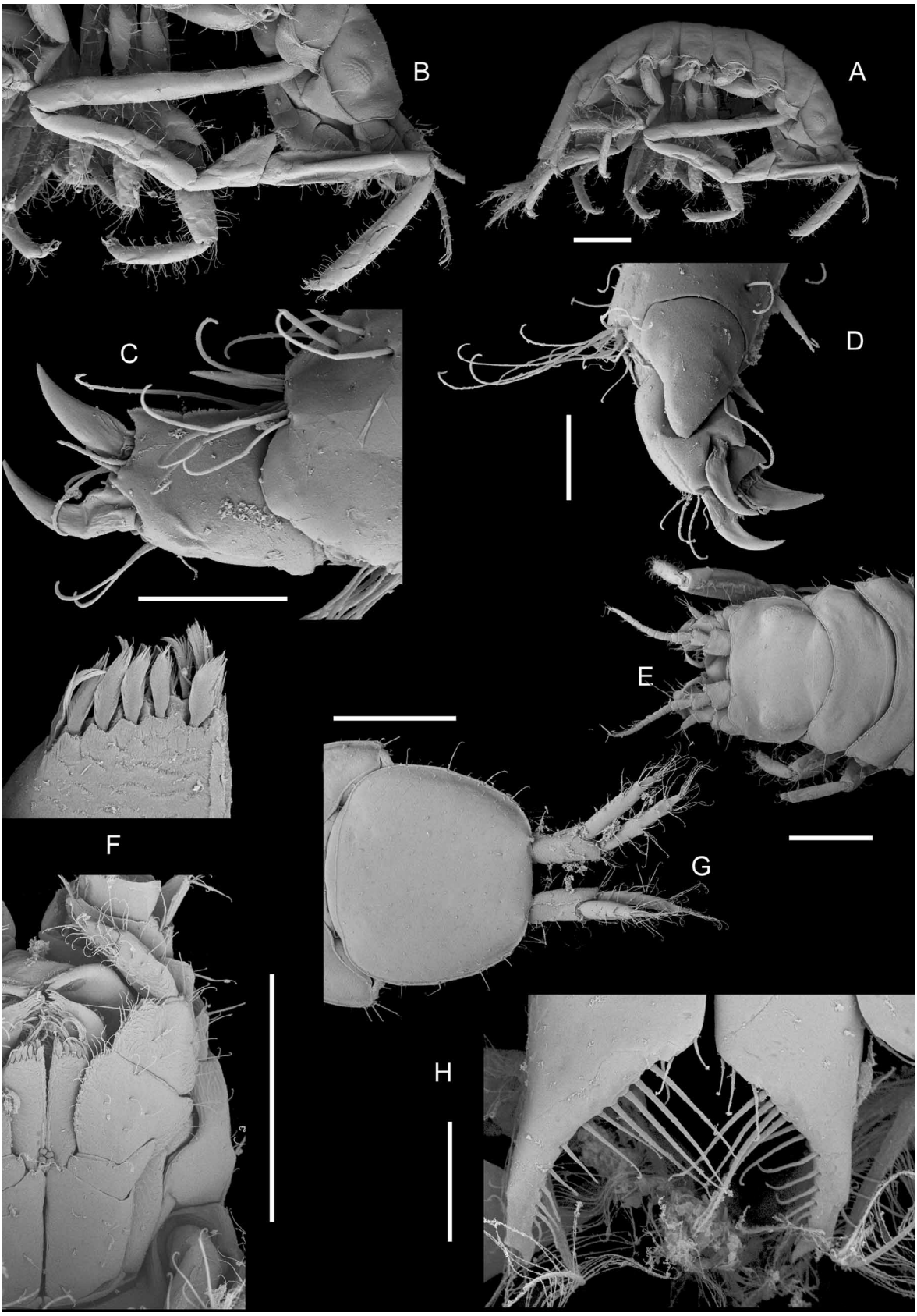

FIGURE 12. *Ianiropsis alanmillari* **sp. nov.** SEM images. Paratype male (P.81229): A, body, lateral view; B, body anterior, showing pereopod I; C, right pereopod I dactylus; D, left pereopod VII, dactylus and articular plate, medial view; E, head and pereonite 1, dorsal view; F, head and enlargement of right maxilliped endite distal tip, ventral view; G, pleotelson and uropods, dorsal view; H, pleopod I distal tip, ventral view. Scale bars: A, C, D, F–G, 0.5 mm; D, H, 0.05 mm.

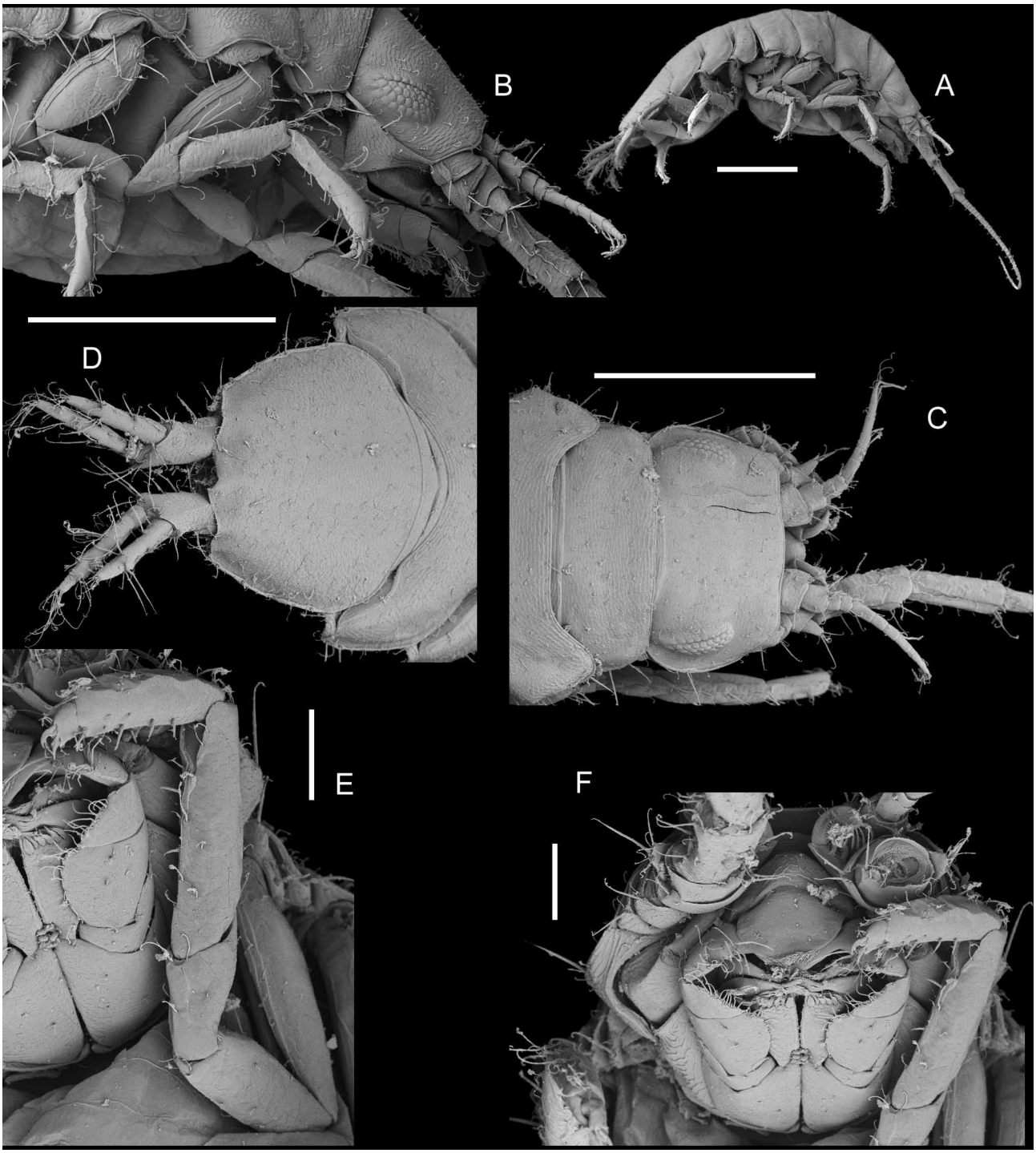

FIGURE 13. *Ianiropsis alanmillari* **sp. nov.** SEM images. Paratype female (P.81228): A, body, right lateral view; B, anterior body; C, head and pereonites 1–2, dorsal view; D, pereonite 7, pleotelson and uropods, dorsal view; E–F, pereopod I and head, right, ventral view and anteroventral view, respectively. Scale bars, A, C–D, 0.5 mm; E–F, 0.1 mm.

Twofold Bay, Murrumbulga Point: 2 inds, P.35658, Q2, 37º04.7'S, 149º53.1'E, 09 Oct 1984, coll. by S.J. Keable; 2 ♂♂, P.36152, Q7, 37º04.7'S, 149º53.1'E, 11 Dec 1984, coll. by S.J. Keable & E.A. Bamber; 3 ♀♀, 1 ♂, P.84133, Q15, 37º04.75'S, 149º53.067'E, 17 Sep 1985, coll. by P.A. Hutchings & S.J. Keable.

Port Jackson, Shark Bay, Steel Point: 24 inds, P.84139, NSW1176, 33º51.05'S, 151º15.9'E, 2 m, 21 Dec 1995, coll. by K. Dempsey & J.K. Lowry.

Jervis Bay, 1 n.mi. south of Governor Head: 40 inds (7 ♂♂, 33 ♀♀), P.84140, NSW 1226, 35º08.33'S, 150º45.72'E, 18 m, 28 Feb 1996, coll. by I. Takeuchi & R. Johnson.

Diagnosis. Head anterior margin in dorsal view linear; eyes dorsal, set back from lateral margin. Pereonites 2–4 laterally concave. Pleotelson lateral margin nearly circular arc, denticles absent. Antenna article 5 distinctly longer than articles 1–4. Mandible palp article 1 simple setae present. Maxilliped palp not projecting in front of head, article 3 in terminal male distomedial margin convex. Pereopod I coxa projecting anterolaterally, angular. Pereopod I of adult (terminal) male carpus with few short setae, robust setae in one row; propodus length 0.96 subequal to carpus length, distal width 0.9 proximal width, ventral margin without robust setae. Pleopod I of adult male distal margin concave. Pleopod II of adult male protopod distal margin setae absent. Uropods shorter than pleotelson; protopod elongate and rectangular.

Description. Pigmentation in preservative scattered brown pigment. *Body* length of male 2.5–3.3 mm (T♂), female 2.0–2.5 mm, length 2.3, 3.0 width (B♀, T♂, respectively), male widest at pereonites 3–4, female widest at pereonite 3.

Head (Figs 8; 12B, E; 13A, C). Width 1.73 length. Eyes with more than 10 ocelli, length 0.4 head medial length.

Pereonites (Fig. 8A, C). Pereonites 1–7 medial length ratios relative to pereonite 2 (T♂): 1.2, 1.0, 0.84 (>1.0 in B♀), 0.76, 0.76, 0.73, 1.19, respectively.

Pleon (Figs 8A, C; 12G; 13D). Pleotelson length 0.87 width. Pleotelson posterior margin broadly rounded, without posteromedial inflection (slight medial inflection visible in ethanol specimens).

Antennula and Antenna (Figs 8; 12E; 13A–C). Antennula of male length 1.24 head median length with 12–15 articles, female length 1.29 head median length with 12–14 articles; article 1 length 0.9 width, article 2 length 1.35 article 3 length. Antenna length 1.21 body length, articles 1–6 length 0.48 body length, article 5 distinctly longer than articles 1–4, article 5 length 0.94 article 6 length, flagellum with 40–50 articles.

Mouthparts (Fig. 9). Mandible left spine row with 5 spines; right spine row with 7 spines; molar distal margin with paired blade-like ridges. Mandible palp length 0.92 mandibular body length, article 1 with 1–2 simple setae (1 seta on left md and 2 on right). Maxillula lateral lobe distal margin with 13 robust denticulate setae. Maxilla lateral lobes with 4 curved denticulate setae. Maxilliped palp article 2 width 2.43 endite width, article 3 distally subrectangular, distomedial margin with distinct inflection, article 3 in terminal male distomedial margin convex; endite length 1.8 width, with 2 receptaculi, distal margin with 6 fan setae.

Pereopod I (Fig. 13E). In adult female length 0.49 body length.

Pereopod I of adult (terminal) male (Figs 10C; 12A–C). Length 1.1 body length; basis extremely elongate, longer than bases on posterior pereopods but projecting posteriorly well past pereonite 4, basis length 1.47 carpus length. Ischium elongate, distinctly longer than ischium on posterior pereopods, length 1.07 carpus length. Merus elongate, longer than merus on posterior pereopods, length 0.6 carpus length. Carpus width 0.28 length, proximal width near distal width, without differentiated palm region, with 1 robust seta (2–3 setae, thin but unequally bifid in subadult males, Fig. 10A, B). Carpus ventral margin proximal to palm approximately linear, slightly sinuous. Propodus subequal to carpus length, not tapering distally. Dactylus length 0.77 propodus distal width, well developed.

Pereopods II–VII (Figs 8B, 11A–B; 12A; 13A–B). Pereopod II length 0.7 body length (in ♂); coxa anterolateral margin rounded. Pereopod IV length 0.39 body length (2 ♀♀). Pereopod VII length 0.59 body length.

Pleopods (Figs 11C–E, G; 12H). Operculum of female length 0.98 width, distal margin concave with row of setae. Pleopod I of adult male distal width 0.75 proximal width; dorsal surface stylet guides lateral margin with row of denticles; medial lobe margin concave, width 0.77 pleopod (both sides) distal width, with 17 setae, of which 3–4 setae longer than others. Pleopod II of adult male protopod distal margin setae absent, endopod proximal article width near distal article maximum width, endopod stylet distal tip abruptly narrowed, length 0.49 protopod length. Pleopod III exopod length 1.2 endopod and protopod length, articulation between 2 articles present, distal margin broadly rounded, not tapering, with 2 simple setae.

Uropods (Figs 11F; 12G; 13D). Shorter than pleotelson, length in adult male 0.84 pleotelson length, in adult female 0.83 pleotelson length. Protopod length 2.56 width. Endopod length 1.0 protopod length, 1.03 exopod length.

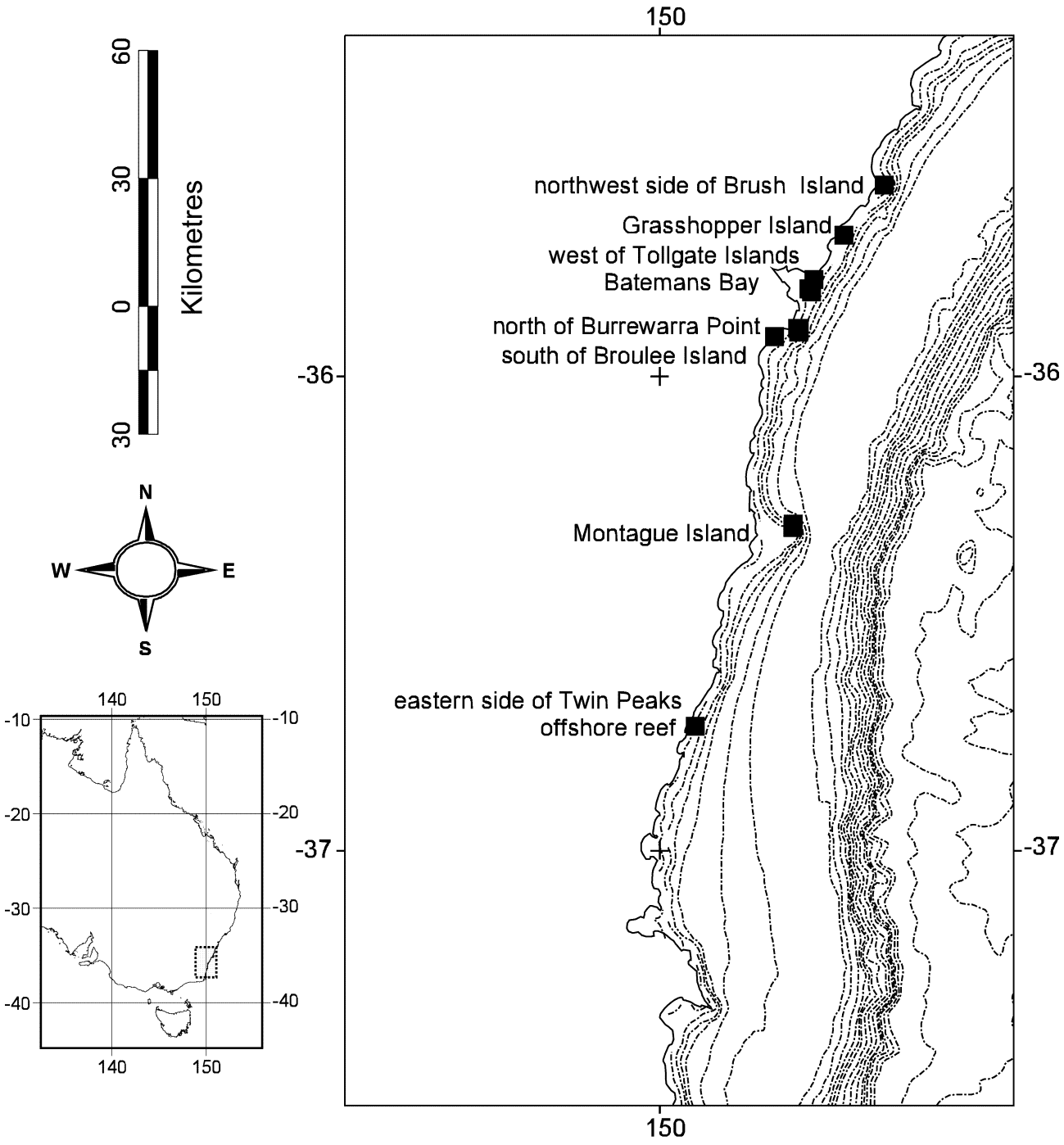

FIGURE 14. Distribution of *Ianiropsis alanmillari* **sp. nov.** in the Batemans Bay region of New South Wales, Australia.

Distribution. Port Jackson to Twofold Bay, including Jervis Bay and Batemans Bay region (NSW, Australia), 7–33 m (Fig. 14).

Remarks. *Ianiropsis alanmillari* **sp. nov.** adds to the already considerable diversity in this genus. Several features distinguish *I. alanmillari* from the remaining species of the genus, viz., head, anterior margin linear; pleotelson, posterior margin broadly rounded without posterior inflection; an extremely enlarged pereopod I of terminal males, in which the basis extends posteriorly beyond the pereonite 4; and pleopod I, dorsal surface with a row of denticles along the lateral margin of the stylet guides. Of these features, *I. alanmillari* shares an anteriorly linear margin of the head with *I. minuta* Menzies, 1952. The latter species, however, differs in the posterior margin of the pleotelson, which has the posterior inflection. On the other hand, *I. alanmillari*, *I. serricaudis* Gurjanova, 1936 and *I. notoensis* Nunomura, 1985 have the pleotelson posterior margin broadly

rounded, but *I. serricaudis* can be distinguished by the pleotelson laterally denticulate, and *I. notoensis* by the extremely enlarged maxilliped palp in terminal males. *I. alanmillari* is the first species of the genus that shows denticles on the stylet guides on the dorsal surfaces of pleopod I. This character, however, may have been overlooked in the known species of the genus because descriptions often do not include details of this appendage.

In the SEM images (Fig. 12H), the male pleopod I of *Ianiropsis alanmillari* **sp. nov.** appears to be unlike other *Ianiropsis* species in that the lateral lobes project posteriorly rather than posterolaterally. This condition is also seen in *I. chiliensis* Menzies, 1962, where only half of the distal tip was illustrated, and in specimen described as "*Ianiropsis* sp." by Nunomura (1985). The illustrations of the microscope preparation of the limb (Fig. 11C), however, show that it projects posterolaterally after the distal tip of the pleopod I is flattened on the slide for illustration.

In NSW, *Ianiropsis alanmillari* **sp. nov.** is one of the most frequently encountered isopods among both algal and non-algal substrates with no apparent preference for habitat.

Janaira Moreira & Pires, 1977

Janaira Moreira & Pires, 1977: 23; Wilson & Wägele, 1994: 708–709.
Type species. *Janaira gracilis* Moreira & Pires, 1977 by original designation.
Species included. *J. gracilis* Moreira & Pires, 1977; *J. platyoura* **sp. nov.**

Diagnosis. Head anterior margin in dorsal view sinuate with medial convexity. Eyes large, with more than 10 ocelli. Pereonites 2–3 laterally convex. Pleotelson lateral margin denticles absent. Antennula with 9–12 articles. Right mandible spine row with 7 spines; molar distal margin with paired blade-like ridges; palp article 1 simple setae absent. Maxilla lateral lobes with 3–4 curved denticulate setae. Maxilliped palp article 3 distally subrectangular, distomedial margin with distinct inflection; endite with 2 receptaculi. Pereopod I coxa projecting anterolaterally, angular. Pereopod I with limited sexual dimorphism, in males carpus proximally broader than distally, in females proximally as wide as distally. Pereopod I of adult (terminal) male carpus with few short setae, robust setae present in two rows, ventral margin proximal to palm approximately linear, slightly sinuous, ventral margin palm region roughly parallel with dorsal margin; propodus ventral margin with robust setae, without spines; dactylus well developed, with 2 claws. Pereopods II–VII dactylus ventral claw near same basal width as dorsal claw. Pereopods II–VII not sexually dimorphic; coxa anterolateral margin rounded. Operculum of female distal margin concave. Pleopod I of adult male lateral lobe distal margin present. Pleopod II of adult male stylet curving laterally with no inflections or almost straight; endopod proximal article width near distal article maximum width. Pleopod III exopod uniarticulate distal margin acute, tapering to narrowly rounded tip, distal margin with 1 simple seta, plumose seta absent.

Distribution. Coastal Brazil to Columbia in South America and southern New South Wales in Australia.

Remarks. *Janaira* is similar to *Carpias*, *Ianiropsis* and *Janira* (see discussion in Wilson & Wägele, 1994). *Janaira* can be easily distinguished from *Carpias* and *Ianiropsis* by their limited sexual dimorphism in pereopod I. In addition, *Janaira* have pereopods II similar in both sexes, while the males of *Janira* have an elongate pereopod II. Other features that make *Janaira* distinct from *Janira* are (*Janira* features in parenthesis): antennula short, with 9–12 articles (long, more than 25 articles), pleotelson lateral margins smooth (with denticles), pleopod III exopod lateral margin with no setae (exopod lateral margin with setae).

Janaira platyoura sp. nov.
(Figs 15–20)

Etymology. The species name is combined from the Greek "platy" meaning flat and "oura" meaning tail, alluding to the flattened uropods present in this species.

Type fixation. Holotype brooding ♀, 1.5 mm, P.81231, here designated.

Type locality. Australia, New South Wales, Batemans Bay, northwest side of Tollgate Island, NSW 2001, 35º44.82'S, 150º15.53'E, 7.9 m, coll. by G.D.F. Wilson & A.J.K. Millar, 28 Oct 2002, among *Caulerpa flexilis* (alga).

Paratypes. ♂ (1.3 mm), P.81232; B♀ (1.5 mm), P.81233, dissected; ♂, P.81234, dissected; 56 inds, P.81235; ♀, P.81116, SEM stub MI176; ♂, P.81117, SEM stub MI177; 896 inds, ethanol preservation only, P.81236.

Other material. Australia, New South Wales. Jervis Bay, Bowen Island, 35º6.81'S, 150º46.11'E, coll. by G.D.F. Wilson & P. Serov, 08 Dec 1993: 3 ♀♀, 1 ♂, P.84101, NSW 932, 13 m, among dense bryozoans under rock ledge.

Twin Peaks, ~6 n.mi. from Tathra, ~1.5n.mi. east of Wharf at Gillards Beach, 36º40.12'S, 150º1.06'E, coll. by G.D.F. Wilson & J. Eu, 26 Mar 2001: 3 ♂♂, P.84094, NSW 1793, 25 m, among white bushy hydroid tufts.

Bitangabee Bay (Inlet), ~4 n.mi. north of Green Cape, 37º12.88'S, 150º1.02'E, coll. by A.J.K. Millar & party, 27 Mar 2001: 1 ♂, P.84095, NSW 1806, 6 m, among surface plankton (may be a contaminant from another sample).

Broulee Island, south of Batemans Bay, 35º50.83'S, 150º11.09'E, coll. by A.J.K. Millar & party, 25 Oct 2002: 4 ♂♂, 1 ♀, P.84096, NSW 1989, 8 m, among branching coralline algae *Amphiora anceps* & *Jania natalensis*; 63 inds, P.84097, NSW 1990, 8 m, among *Halopteris platycena* (alga); 1 ♀, 1 ♂, P.84098, NSW 1991, 8 m, among *Zonaria diesingiana* (alga).

Burrewarra Point, Gutters, south of Batemans Bay, 36º40.12'S, 150º1.06'E, coll. by A.J.K. Millar & party, 27 Oct 2002: 1 ♂, P.84099, NSW 1996, 24 m, among *Pachymenia prostrata* (alga); 1 ♀, P.84100, NSW 1997, 23 m, among *Codium lucasii* (alga).

Batemans Bay, Tollgate Islands, 35º44.83'S, 150º15.53'E, coll. by A.J.K. Millar & party, 28 Oct 2002: 12 inds (2 B♀♀, 10 ♂♂), P.84102, NSW 2003, 28 Oct 2002, 7.9 m, among *Chondria succulenta* (alga); 6 inds (1 ♀, 3 ♂♂, 2 juvs), P.84103, NSW 2005, 12 m, among *Galaxuara marginata* (alga); 14 inds (6 ♀♀, 4 ♂♂, 4 juvs), P.84104, NSW 2006, 12 m, among *Sporochnus radiciformis* (alga).

Jimmy's Island, south of Batemans Bay, 35º48.94'S, 150º14.1'E, coll. by A.J.K. Millar & party, 29 Oct 2002: 5 inds (1 B♀, 1 ♀, 3 ♂♂), P.84105, NSW 2009, 16 m, among *Apjohnia laetevirens* (alga) with epiphytic coralline red algae.

Batemans Bay, Tollgate Islands, coll. by A.J.K. Millar & party: 19 inds (13 ♂♂, 5 B♀♀, juv. ♀), P.84106, NSW 2012, 29 Oct 2002, 35º44.76'S, 150º15.45'E, 12 m, among *Asparagopsis taxiformi*s (alga); ♂, P.81401, NSW 2018, 24 Mar 2004, 35º44.84'S, 150º15.48'E, 11 m, among *Asparagopsis armata* (alga); 26 inds (4 B♀♀, 6 ♀♀, 14 ♂♂, 2 juvs), P.81400, NSW 2022, 08 Feb 2003, Batemans Bay, north Tollgate Island, 35º44.84'S, 150º15.48'E, 11 m, among *Halopteris platycena* (alga); 1 ♂, P.84108, NSW 2024, 08 Feb 2003, Batemans Bay, north Tollgate Island, 35º44.84'S, 150º15.48'E, 11 m, among mixed algae.

Broulee Island, south of Batemans Bay, coll. by A.J.K. Millar & party: 2 B♀♀, P.84107, NSW 2017, 30 Oct 2002, 35º51.34'S, 150º11.64'E, 16 m, among *Phacelocarpus pepperocarpus* (alga).

Brush Island, Batemans Bay, 35º31.65'S, 150º24.96'E, coll. by A.J.K. Millar & party, 09 Feb 2003: 3 inds (2 ♂♂, 1 juv), P.84109, NSW 2031, 12 m, among *Caulerpa flexilis* (alga).

Burrewarra Point, south of Batemans Bay, 35º44.76'S, 150º15.45'E, coll. by P. Berents & party, 23–24 Mar 2004: 1 B♀, 1 ♂, P.84110, NSW 2511, 17 m, among rock with *Hydrodendron australe* (hydroid) & other encrusting fauna; 1 B♀, P.84111, NSW 2521, 35º49.78'S, 150º13.96'E, 13.4 m, among *Amathia* sp. (bryozoan).

Diagnosis. Head anterior margin in dorsal view sinuate with medial convexity; anterolateral margin angular, lateral margin linear. Eyes posterior margin adjacent to pereonite 1. Pereonites 1–7 lateral margins broadened, coxae covered, visible in dorsal view on pereonites 5–7 only. Pleotelson posterior margin broadly rounded, without posterior inflection. Antenna article 5 near length of articles 1–4 and shorter than head median length. Pereopod I of adult (terminal) male merus not elongate, near length of merus of posterior pereopods; carpus proximal width greater than distal width. Pleopod II of adult male endopod stylet curving laterally with no inflections. Uropod shorter than pleotelson, rami crossectional shape flattened with linear sides.

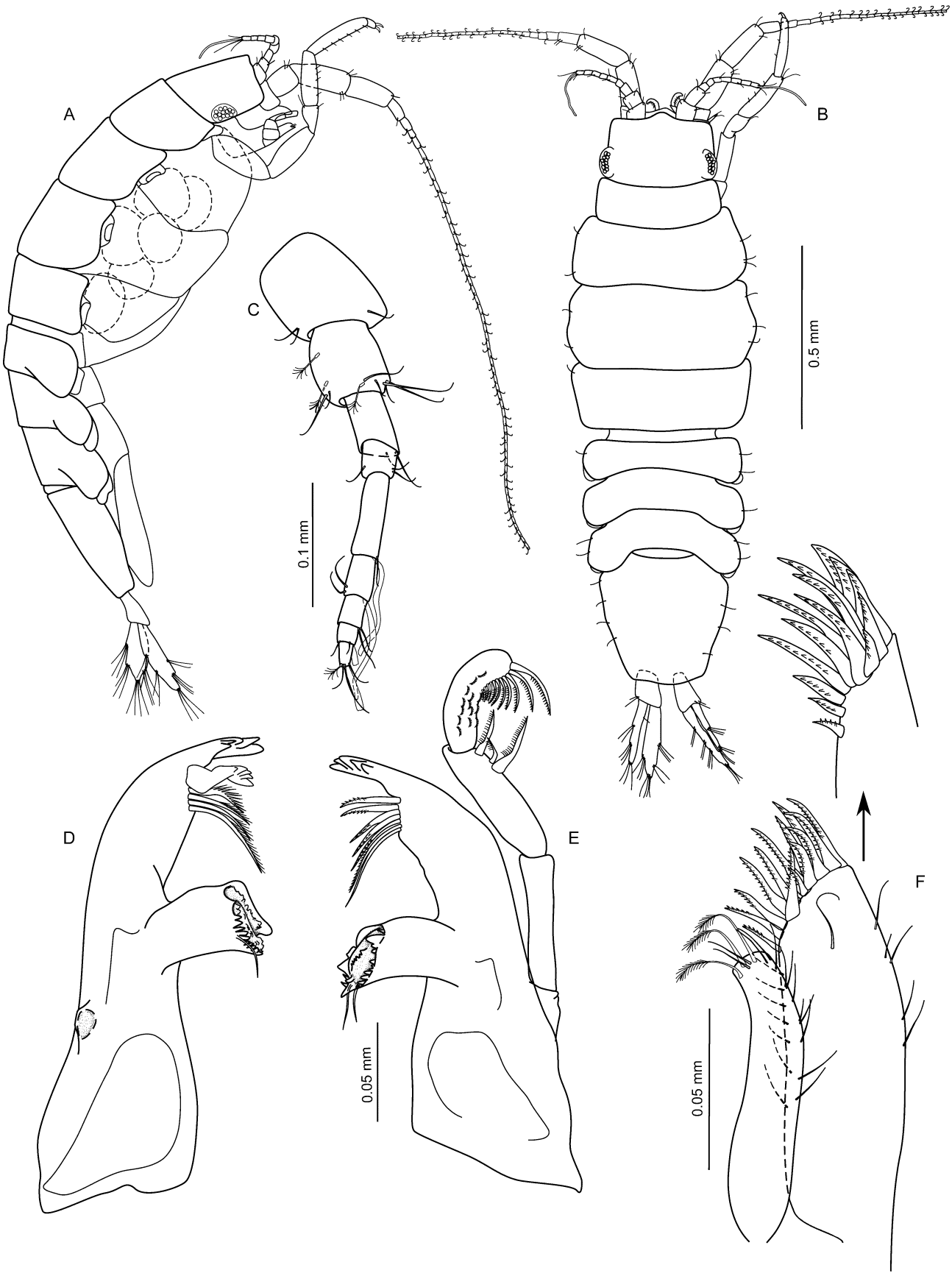

FIGURE 15. *Janaira platyoura* **sp. nov.** Holotype female (P.81231): A, body, lateral view (pereopods II–VII missing); B, body, dorsal view. Paratype female (P.81233): C, right antennula; D, left mandible; E, right mandible; E, left maxillula with detail of distal margin of lateral lobe.

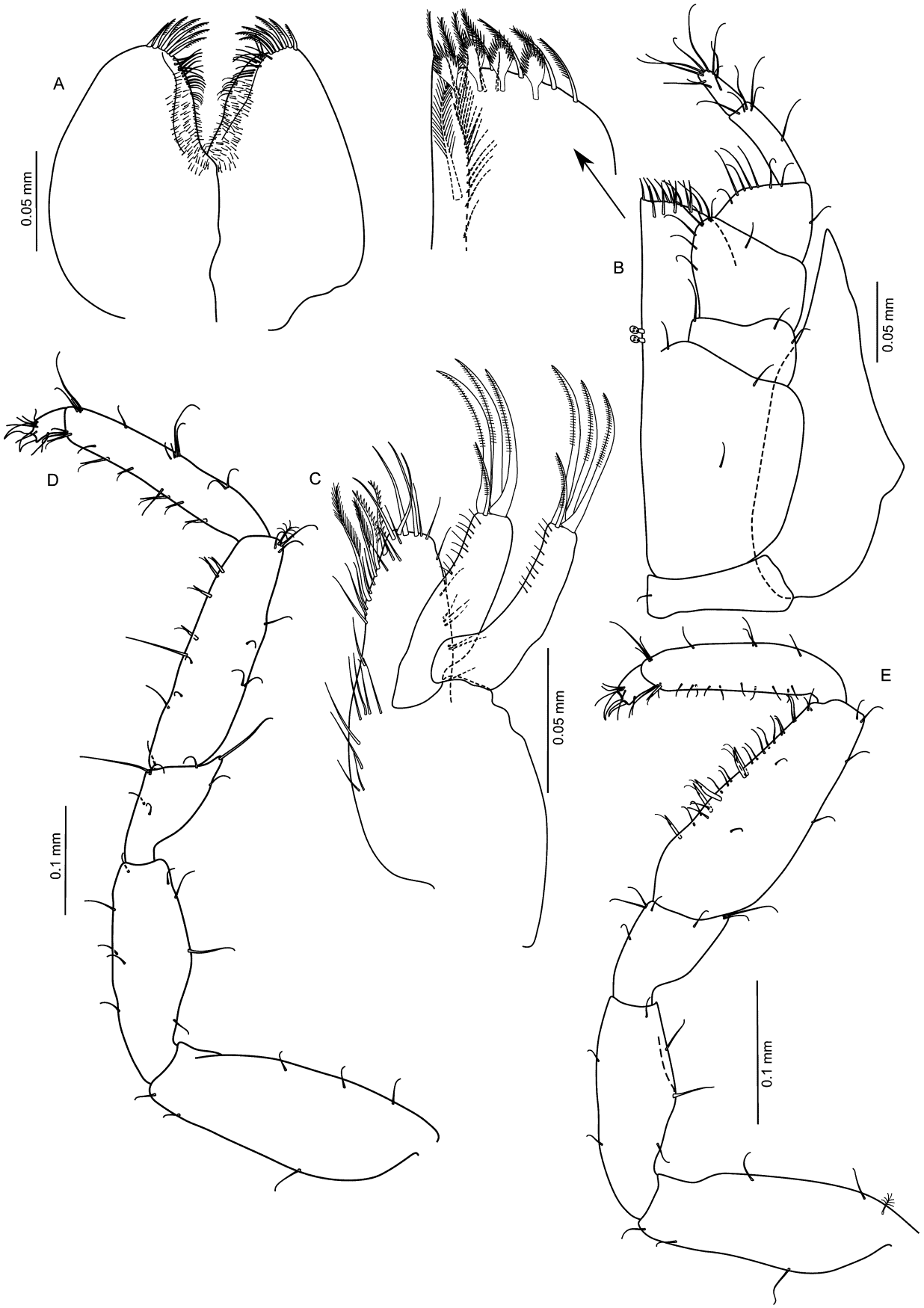

FIGURE 16. *Janaira platyoura* **sp. nov.** Paratype female (P.81233): A, paragnath; B, left maxilliped with detail of endite distal margin; C, left maxilla; D, left pereopod I. Paratype male (P.81234): E, left pereopod I.

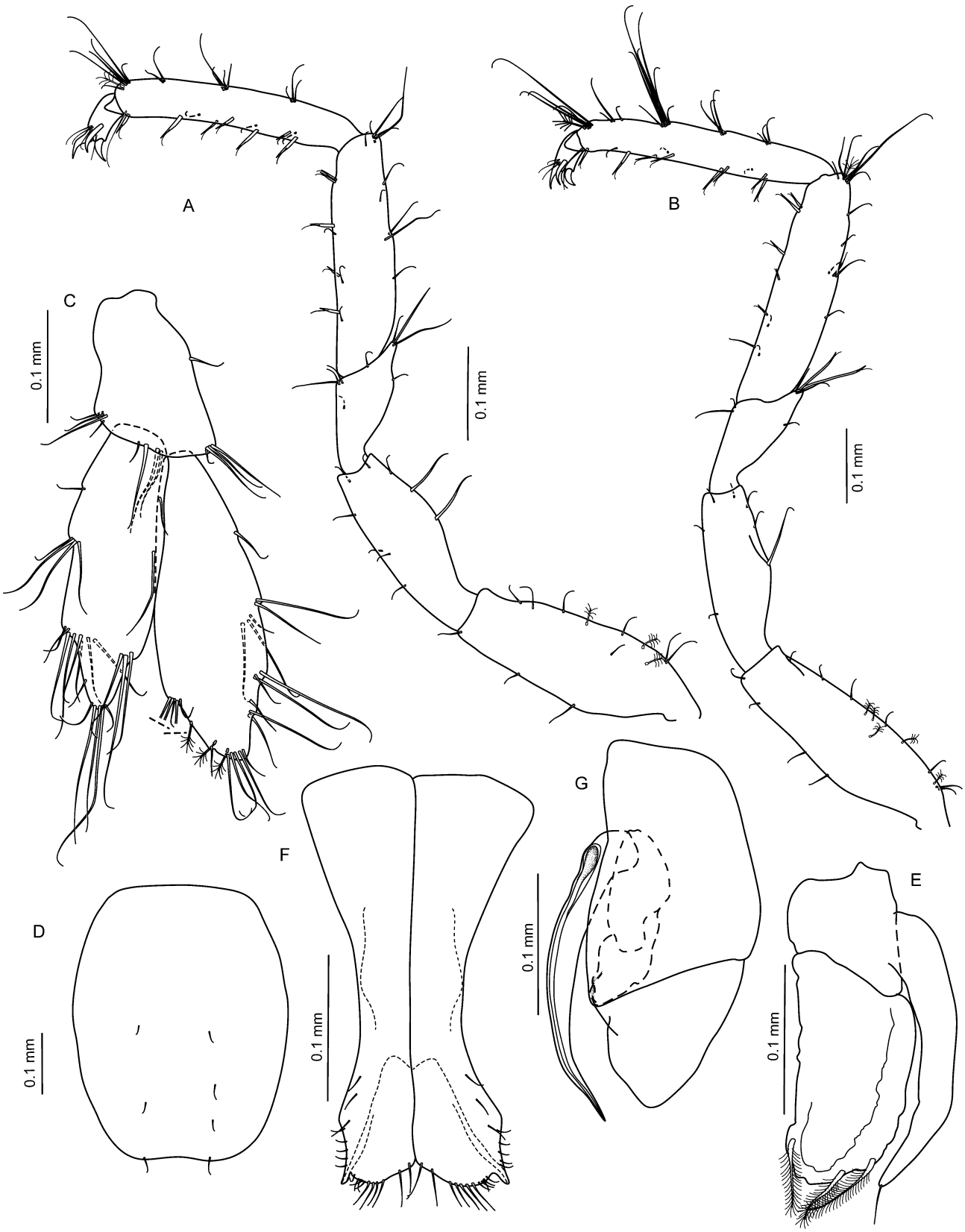

FIGURE 17. *Janaira platyoura* **sp. nov.** Paratype female (P.81233): A, right pereopod II; B, left pereopod VII; C, left uropod; D, operculum; E, right pleopod III. Paratype male (P.81234): F, pleopod I, ventral view; G, right pleopod II.

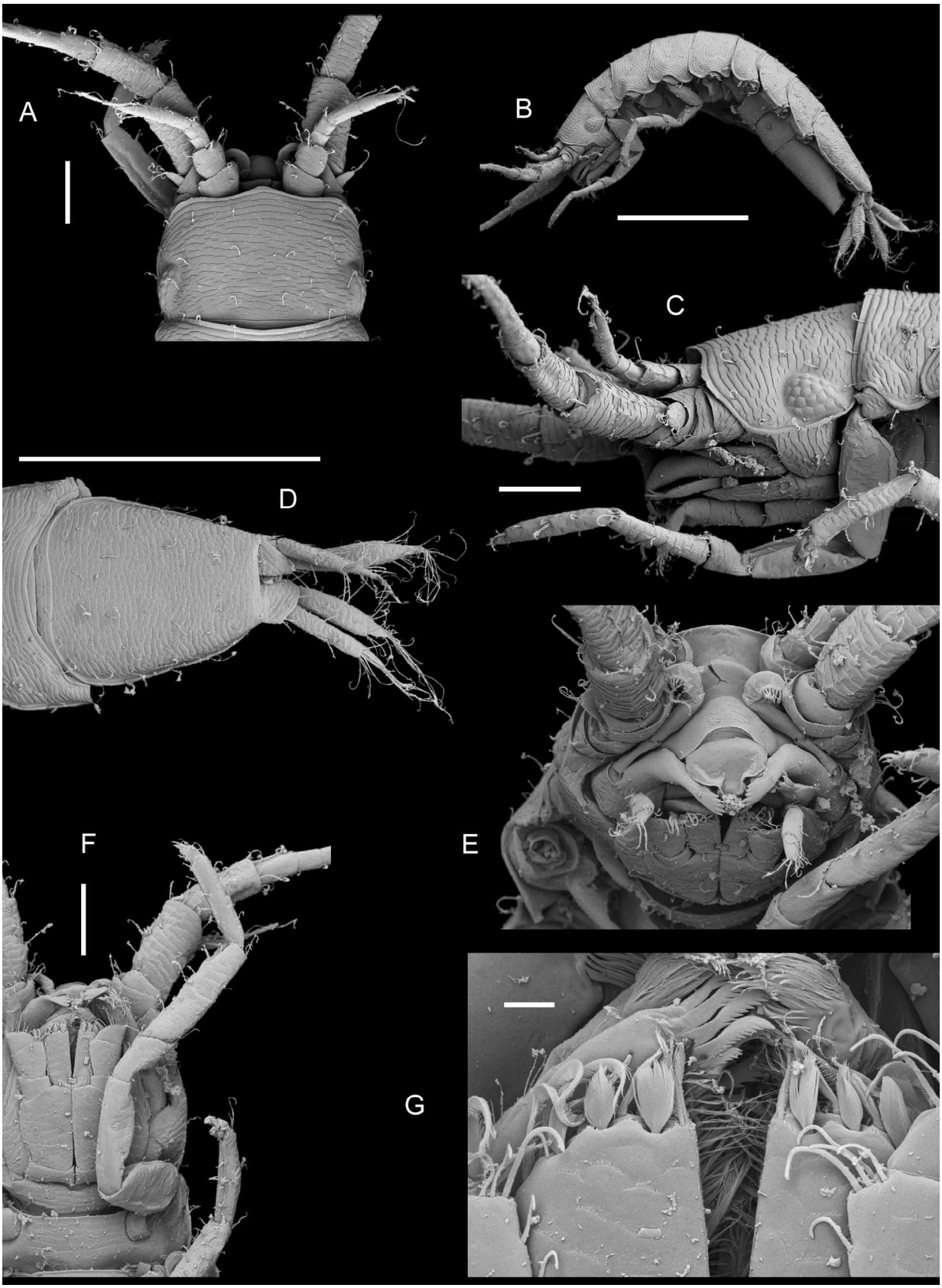

FIGURE 18. *Janaira platyoura* **sp. nov.** SEM images. Paratype female (P.81116): A, head, dorsal view; B, body, lateral view; C, head, lateral view; D, pleotelson and uropods, dorsal view; E, head, anterior view; F, head, pereonite 1 and pereopod I, ventral view; G, mouth field showing maxilliped endite distal tip, maxillula lateral lobe and paragnaths (above and underneath maxilliped). Scale bars: A, C, F, 0.1 mm; B, D, 0.5 mm; G, 0.01 mm.

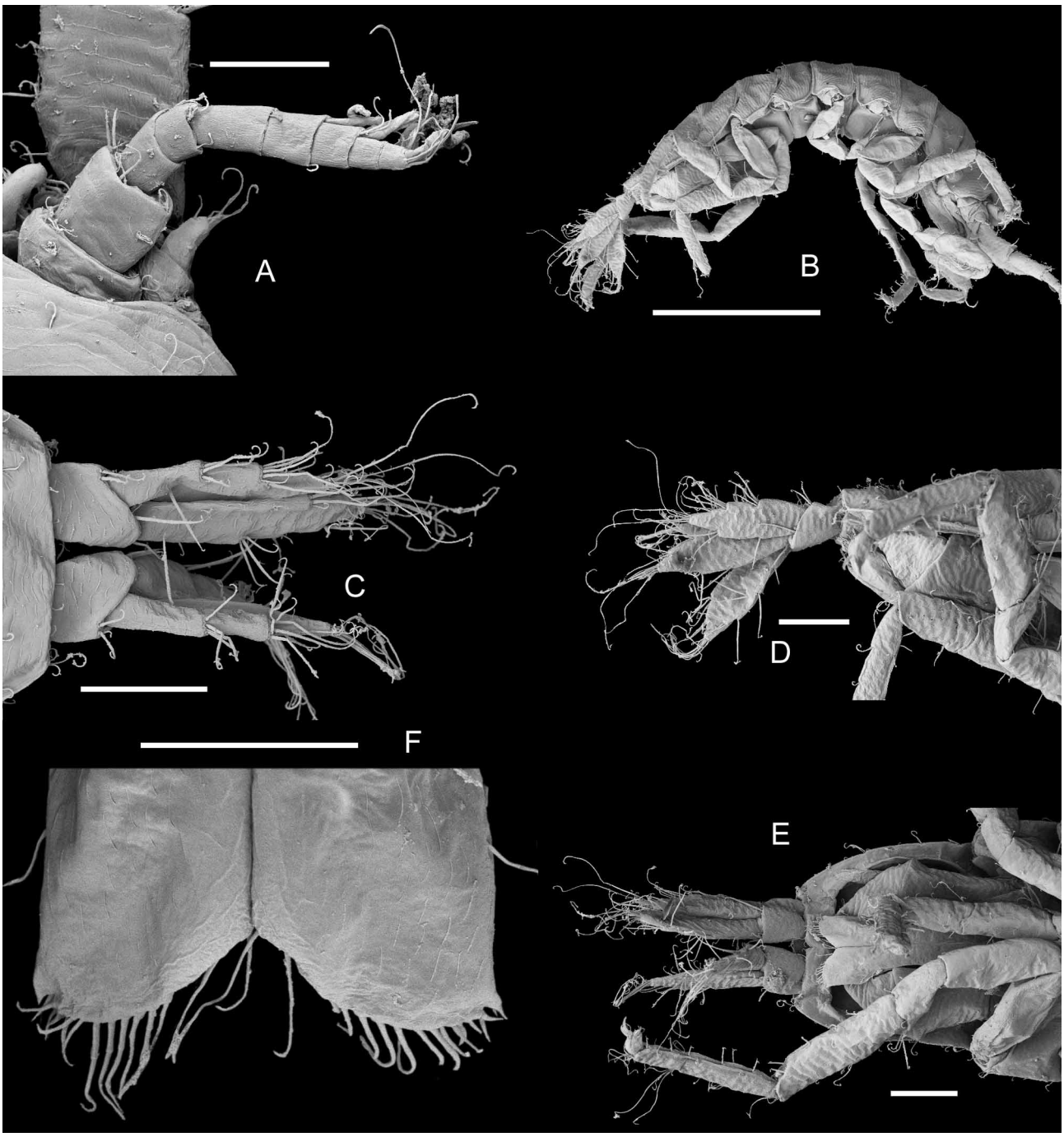

FIGURE 19. *Janaira platyoura* **sp. nov.** SEM images. Paratype male (P.81117): A, right antennula, dorsal view; B, body, lateral view; C–D, uropods dorsal and lateral view; E, pleotelson, uropods, and pereopod VII, ventral view; F, pleopod I distal tip, ventral view. Scale bars: A, C–E, 0.1 mm; B, 0.5 mm; F, 0.05 mm.

Description. Pigmentation in preservative scattered brown pigment. *Body* length of male 1–1.5 mm, female 1.5–2 mm (B♀), male length 2.92 width, widest at pereonite 3 in both sexes.

Head (Figs 15B; 18A, C). Width 1.53 length. Frontal margin sinuate, medial section rounded (concentrated in small projection between antennulae). Anterolateral margin angular. Eyes large, with more than 10 ocelli, length 0.46 head medial length, dorsolateral, extending to lateral margin.

Pereonites (Fig. 15B). Pereonites 1–7 medial length ratios relative to pereonite 2: 0.71, 1.0, 1.47, 1.04, 0.47, 0.71, 0.66, respectively. Pereonites 2–3 laterally convex. Pereonite 4 laterally linear.

Pleon (Figs 15B; 18D). Pleotelson length 1.2 width, lateral margin nearly straight flattened curve, denticles absent.

Antennula and Antenna (Figs 15A–C; 18A–C; 19A). Antennula of male length 1.1 head median length, female length 1.46 head median length, with 9 articles in both sexes, article 1 length 1.29 width, article 2 length 1.55 article 3 length. Antenna length 1.1 body length, articles 1–6 length 0.37 body length, article 5 near length of articles 1–4 and shorter than head median length, article 5 length 1.35 article 6 length, flagellum with 45–50 articles.

Mouthparts (Figs 15D–F; 16A–C). Mandible left spine row with 4 spines; right spine row with 7 spines; molar distal margin with paired blade-like ridges. Mandible palp length 0.98 mandibular body length, article 1 simple setae absent. Maxillula lateral lobe distal margin with 14 robust denticulate setae. Maxilla lateral lobes with 4 curved denticulate setae. Maxilliped palp article 2 width 1.28 endite width, article 3 distally subrectangular, distomedial margin with distinct inflection, in terminal male distomedial margin linear; endite length 1.56 width, with 2 receptaculi, distal margin with 4 fan setae.

Pereopod I (Figs 16D–E; 18F). Coxa projecting anterolaterally, angular (but not visible in dorsal view). Pereopod I adult female length 0.84 body length. Carpus sexual dimorphism not pronounced, adult female carpus narrower and less robust than in male, approximately 40% narrower in adult female than in terminal male.

Pereopod I of adult (terminal) male (Figs 16E; 19B). Length 0.5 body length; basis not elongate, near length of bases on posterior pereopods, basis length subequal to carpus. Ischium not elongate, near length of ischium on posterior pereopods, length 0.86 carpus length. Merus length 0.44 carpus length. Carpus with few short setae, robust setae in two rows, 5 robust setae altogether (3 medially, 2 laterally), width 0.4 length; ventral margin proximal to palm approximately linear, slightly sinuous. Propodus length 0.79 carpus length, ventral margin with 1 robust distal seta and without spines. Dactylus length 1.0 propodus distal width, well developed.

Pereopods II–VII (Figs 17A–B). Pereopod II length 0.78 body length; coxa anterolateral margin rounded. Pereopod VII length 0.92 body length.

Pleopods (Figs 17D–G; 19E, F). Operculum of female length 1.4 width, distal margin concave, with few setae. Pleopod I of adult male distal width 0.69 proximal width; dorsal surface stylet guides lateral margin without denticles; lateral lobe distal margin present, single, projecting posterolaterally, without setae; medial lobe with distinct indentation at inner margin of lateral lobe, margin convex, projecting posteriorly, width 1.25 pleopod (both sides) distal width, with 11–12 setae, of which 4–5 setae longer than others. Pleopod II of adult male protopod distal margin setae absent, endopod proximal article near maximum width of distal article, endopod stylet length 0.87 protopod length. Pleopod III exopod length 1.06 endopod and protopod length, distal margin acute, tapering to narrowly rounded tip, with 1 simple seta.

Uropods (Figs 17C; 18D; 19C–E). Length in adult male 0.78 pleotelson length, length in adult female 0.75 pleotelson length. Protopod length 1.4 width, elongate trapezoidal, proximal width narrower than 0.5 distal width. Endopod length 1.85 protopod length, 1.14 exopod length.

Distribution. Jervis Bay to Batemans Bay region (NSW, Australia), 6–25 m (Fig. 20).

Remarks. *Janaira platyoura* **sp. nov.** differs from the type species, *J. gracilis*, by the following features (those of *J. gracilis* are in parenthesis): antennula with 9 articles (12 articles); antenna articles 5 and 6, each one shorter than the head (each one longer than the head); male pleopod I, medial lobes convex projecting posteriorly with a distinct indentation at inner margin of lateral lobe (medial lobes straight angling smoothly into posteriorly pointed lateral lobes); uropods rami broad and flat (thin and cylindrical). Since *Janaira platyoura* **sp. nov.** is the second species to be added to this genus, it provides new information that allows a revision of the definition of *Janaira*. Specifically, regarding the male pleopod I and the uropods, the interspecific variation in *Janaira* is unlike the consistency of form seen in other genera, such as *Ianiropsis*. The genus *Carpias*, however, also shows some variation in the morphology of the male pleopod I. As mentioned above, the genera *Janaira*, *Carpias*, *Ianiropsis* and *Janira* are similar in general habitus, and Wilson & Wägele (1994) found differences between *Janaira* and *Janira* to be subtle. Nevertheless, we conclude that the new species described herein is best placed in *Janaira* Moreira & Pires, 1977 owing to weakly modified pereopods I, and unmodified pereopods II of the adult male.

The male pleopod II protopod of *Janaira platyoura* **sp. nov.** has an unusual transverse fold on its ventral surface (Fig.17G). This transverse fold was seen in several specimens and is not an artefact. This is a new structure and is not homologous to a podomere because it occurs distally and laterally to the exopod, and does not have intrinsic musculature.

J. platyoura **sp. nov.** appears to be limited to southern New South Wales (Fig. 20), extending from Green Cape (possibly - see Additional Material) to Jervis Bay. No specimens of this species were found outside NSW based on our inspection of the Australian Museum and Queensland Museum collections. *J. platyoura* was collected primarily on algae. In particular, the highest number of specimens were found on the algae *Caulerpa flexilis* and *Halopteris platycena*. This species was also found occasionally on bryozoans, which are a dominant structural component of benthic assemblages in southeastern Australia.

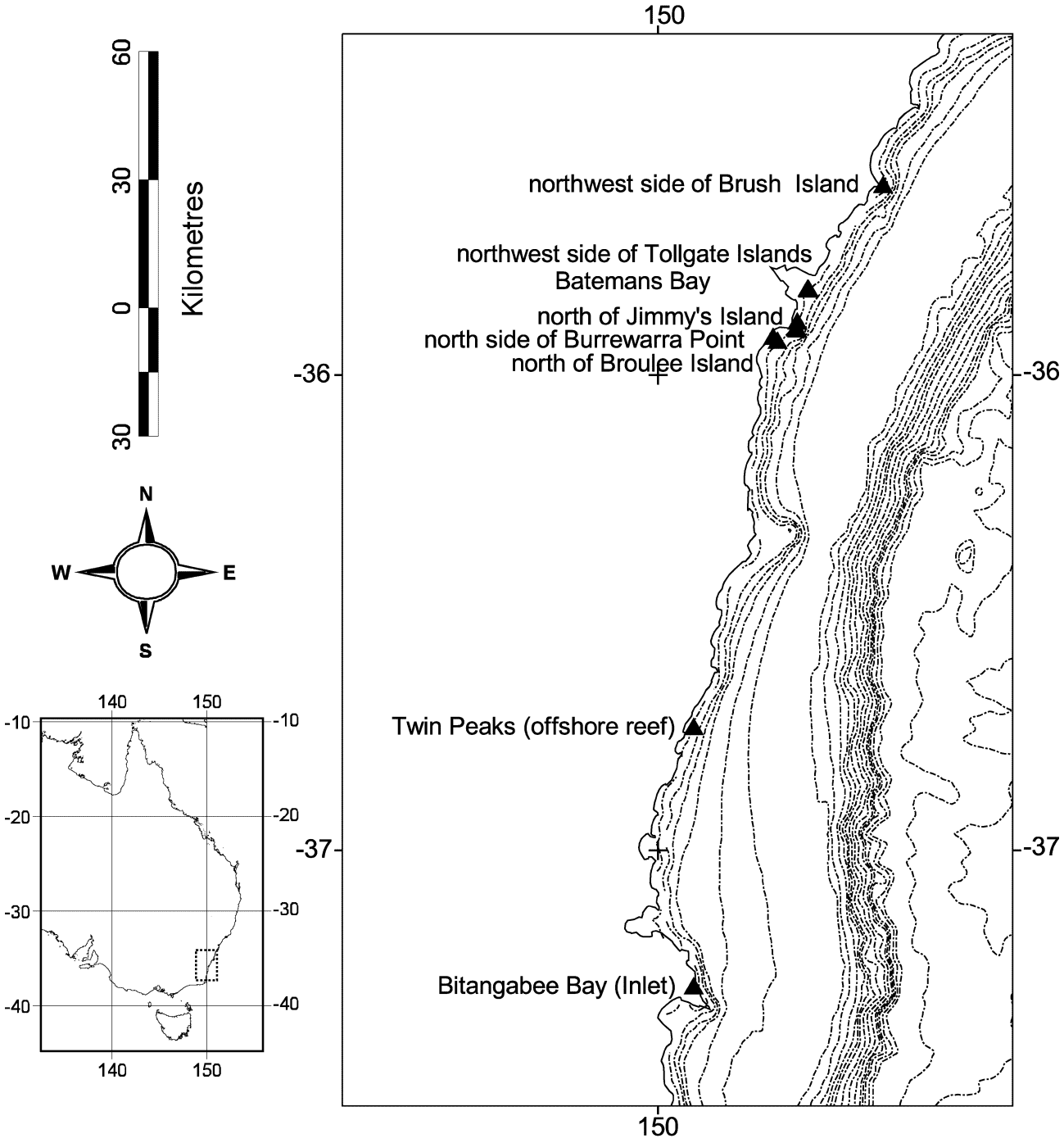

FIGURE 20. Distribution of *Janaira platyoura* **sp. nov.** in the Batemans Bay region of New South Wales, Australia.

Diversity and distribution

Carpias and *Janaira* species are distributed mainly in tropical or subtropical waters, while the *Ianiropsis* species range from tropical to cold waters. In Australia, *Janaira* currently has a restricted distribution, being limited to southern New South Wales. *Ianiropsis* and *Carpias* species, however, are found frequently in samples from shallow marine environments. Although we herein describe only one species in each genus, we are aware of multiple species of *Carpias* and *Ianiropsis* from several regions of Australia (Fig. 21). At least 7 additional species of *Ianiropsis* and 5 species of *Carpias* occur in New South Wales alone, based on our survey of the collections. Because several species belonging to the pan-tropical *Carpias algicola* complex, species of which were figured but not reclassified in Kensley & Schotte (2002), we expect this number to rise further. Moreover, many other species and genera of Janiridae were identified among the material examined; this demonstrates that the diversity of Janiridae in Australia is much higher than the previous records suggested.

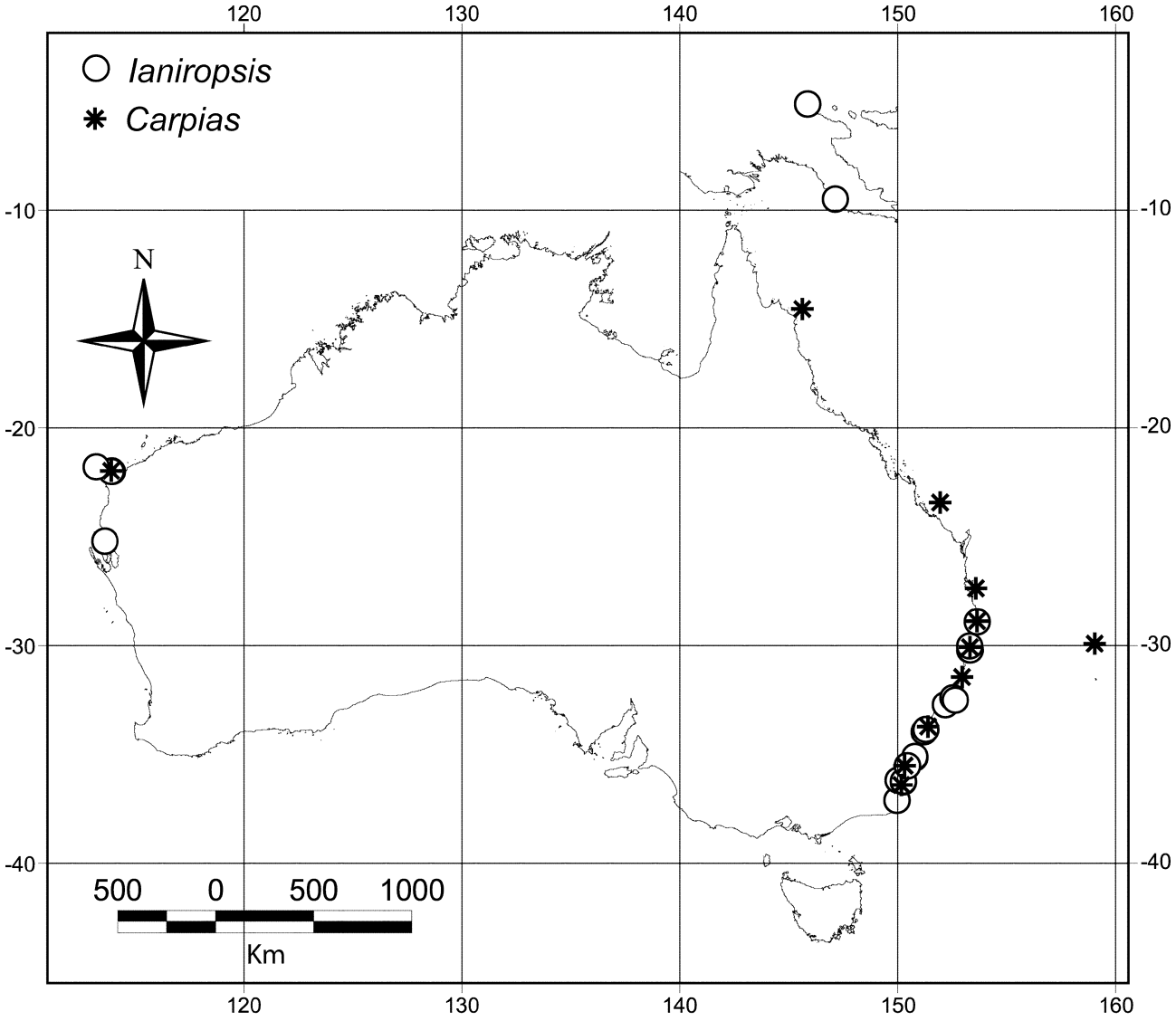

FIGURE 21. Distribution of *Ianiropsis* spp. and *Carpias* spp. in Australia and Papua New Guinea, most are undescribed species from the collections of the Australian Museum. This distribution reflects only available specimens and is incomplete (see text).

The three new species described herein were found both on algae and non-algae substrates. *Carpias montaguensis*, however, showed its highest abundance on bryozoan colonies, while *Janaira platyoura* was remarkably more abundant on algae substrates. *Ianiropsis alanmillari*, on the other hand, was equally frequent on both types of substrates.

Research programs that sample rocky subtidal areas often use a coarse 1 mm mesh screen, which loses many smaller and more abundant animals. While a South Australian study (Hirst, 2003, 2008) found only a single asellotan species (an unidentified *Stenetrium* species) in similar habitats to this study, our research (Wilson, Doti & Millar, in preparation), which employed a 0.3 mm mesh screen, finds that Asellota are abundant and diverse in these habitats, living both on the algae and on other sessile animals. Our records for just the Batemans Bay region finds over 30 species of Asellota living on benthic macroalgae and other substrates. Therefore, the diversity reported for cryptic faunal biodiversity on macroalgal-dominated subtidal reefs is especially likely to be richer than previously reported.

The Australian Museum Marine Invertebrates Section has collected at numerous localities in New South Wales using methods similar to those described here, thus contributing to the data shown in Fig. 21. The patchy distribution of *Carpias* and *Ianiropsis* species is probably a sampling artefact, with many more species likely to be discovered once rocky subtidal areas are sampled and processed using screens with 0.3 mm or smaller. Therefore we predict that Janiridae in Australasia are likely to be much more diverse and more frequently observed than is reported here.

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References

Amar, R. (1950) Sur un *Bagatus* nouveau pour la faune Méditerranéenne française. *Bulletin de la Societe Zoologique de France*, 75, 36–42.

Barnard, K.H. (1914) Contributions to the crustacean fauna of South Africa. 3. Additions to the marine Isopoda with notes on some previously incompletely known species. *Annals of the South African Museum*, 10, 325–442.

Bowman, T.E. & Morris, B.F. (1979) *Carpias* Richardson 1902, a senior synonym of *Bagatus* Nobili 1906, and the validity of *Carpias minutus* (Richardson 1902) (Isopoda: Asellota: Janiridae). *Proceedings of the Biological Society of Washington*, 92, 650–657.

Carvacho, A. (1982) Isópodos litorales de la costa de Concepción Chile central. *Studies on Neotropical Fauna and Environment*, 17, 195–207.

Carvacho, A. (1983) Asellota del Golfo de California, con descripción de dos nuevos géneros y dos nuevas especies (Crustacea, Isopoda). *Cahiers de Biologie Marine*, 24, 281–295.

Chappuis, P.A. (1951) Un nouveau Parasellide de Tasmanie, *Pseudasellus nichollsi* n. gen. n. sp. *Archives de Zoologie Expérimentale et Générale, Notes et Revues II*, 88, 7–19.

Chilton, C. (1884) Additions to the sessile eyed Crustacea of New Zealand. *Transactions and Proceedings of New Zealand Institute*, 16, 249–265.

Chilton, C. (1909) The Crustacea of the Subantarctic Islands of New Zealand. *In:* C. Chilton (Ed.), *The Subantarctic Islands of New Zealand, Wellington*. Philosophical Institute of Canterbury, Christchurch; John McKay, Government Printer, Wellington, pp. 601–671.

Dallwitz, M.J. (1980) A general system for coding taxonomic descriptions. *Taxon*, 29, 41–46.

Dallwitz, M.J., Paine, T.A. & Zurcher, E.J. (2000a) User's guide to the DELTA editor. Available from http: //delta-intkey.com

Dallwitz, M.J., Paine, T.A. & Zurcher, E.J. (2000b) User's guide to the DELTA system: a general system for processing taxonomic descriptions. Edition 4.12, December 2000. CSIRO, Canberra, 158 pp.

Felgenhauer, B.E. (1987) Techniques for preparing crustaceans for scanning electron microscopy. *Journal of Crustacean Biology*, 7 (1), 71–76.

Gurjanova, E.F. (1933) Die marinen Isopoden der Arktis. *In:* Römer, F. & Schaudinn, F. (Eds.) *Fauna Arctica. Vol. 6.* G. Fischer Verlag: Jena, pp. 392–472. (In German).

Gurjanova, E.F. (1936) Isopods of the Eastern Seas. *In:* Crustacea. Vol. 7, Chapt. 3, pp. 280. *In Series Fauna of the USSR, vol. 6.* Academy of Sciences of the USSR, Leningrad. (In Russian).

Gurjanova, E.F. (1950) On the fauna of Isopoda from the Pacific Ocean. 5. Isopoda collected by the Kamchatka Marine Station of the State Hydrological Institute. *In: Exploration of the Far-Eastern Seas of the USSR. Vol. 2*, pp. 281–292. Academy of Sciences of the USSR, Leningrad. (In Russian).

Haswell, W.A. (1881) On some new Australian marine Isopoda. *Proceedings of the Linnean Society of New South Wales*, 5, 470–481.

Hirst, A.J. (2003) Encounter 2002 expedition to the Isles of St Francis, South Australia: Peracarid crustacean epifauna of subtidal macroalgal canopies. *Transactions of the Royal Society of South Australia*, 127, 189–203.

Hirst, A.J. (2008) Surrogate measures for assessing cryptic faunal biodiversity on macroalgal-dominated subtidal reefs. *Biological Conservation*, 141, 211–220.

Jang, I.K. & Kwon, D.H. (1990) *Ianiropsis* (Isopoda, Asellota, Ianiridae) from Korea, with description of a new species. *The Korean Journal of Systematic Zoology*, 6, 193–208.

Kensley, B. (1984) The Atlantic barrier reef ecosystem at Carrie Bow Cay, Belize, III: new marine Isopoda. *Smithsonian Contributions to the Marine Sciences*, 24, 1–81.

Kensley, B. & Schotte, M. (2002) New species and records of Asellota from the Indian Ocean (Crustacea: Peracarida: Isopoda). *Journal of Natural History*, 36, 1421–1461.

Kussakin, O.G. (1962) On the fauna of Janiridae (Isopoda, Asellota) from the Seas of the USSR. *Trudy Zoologicheskogo Instituta Akademii Nauk SSSR*, 30, 17–65. (In Russian).

Kussakin, O.G. (1988) Marine and brackishwater likefooted Crustacea (Isopoda) from the cold and temperate waters of the northern hemisphere. Volume 3. Suborder Asellota. Part 1. Families Janiridae, Santidae, Dendrotionidae, Munnidae, Paramunnidae, Haplomunnidae, Mesosignidae, Haploniscidae, Mictosomatidae, Ischnomesidae. In series: *Opredeliteli po Faune SSSR, Izdavaemye Zoologicheskim Institutom Academii Nauk SSSR*. Leningrad, 1–501. (In Russian).

Kussakin O.G. & Mezhov, B.V. (1979) Isopoda Crustacea of the sublittoral and the upper bathyal zone of the Kurile Islands. *In:* Kussakin, O.G. (Ed.). Biology of the Shelf of the Kurile Islands. *Academy of Sciences, USSR, Far East Science Center, Institute of Marine Biology, Moscow*, pp 125–199. (In Russian).

Leach, W.E. (1814) Crustaceology. *In:* Brewster, D. (Ed.). *The Edinburgh Encyclopedial. 1st Edition, vol. 7*. Baldwin, London, pp 383–437.

Menzies, R.J. (1952) Some marine asellote isopods from northern California, with descriptions of nine new species. *Proceedings of the United States National Museum*, 102, 117–159.

Menzies, R.J. (1962) The zoogeography, ecology and systematics of the Chilean marine isopods. *Reports of the Lund University Chile Expedition 1948–49. No. 2. Lund Universitets Årrskrifter*, 57 (11), 1–162.

Menzies, R.J. & Glynn, P.W. (1968) Studies on the Fauna of Curaçao and other Caribbean Islands No. 27. The common marine isopod Crustacea of Puerto Rico. *Utigaven van de Natuurwetenschappelijke Kring voor Suriname en de Nederlandse Antillen*, 51, 1–133.

Menzies, R.J. & Kruczynski, W.L. (1983) Isopod Crustacea (exclusive of Epicaridea). *Memoirs of the Hourglass Cruises*, 6, 1–126.

Miller, M.A. (1941) The isopod Crustacea of the Hawaiian Islands, II. Asellota. *Occasional Papers of the Bishop Museum*, 16, 305–320.

Monod, T. (1933) Tanaidacea et Isopoda. Mission Rober Ph. Dollfus en Égypte. *Mémoires de l'Institut d'Égypte*, 21, 161–264.

Monod, T. (1961) Sur un Isopode Asellote du genre *Bagatus* recueilli sur un poisson du Senegal. *Crustaceana*, 2, 68–77.

Monod, T. (1974) Nouvelles observations sur le genre *Bagatus* (Crustacea, Isopoda). *Bulletin du Muséum National d'Histoire Naturelle, 3e série Zoologie*, 166, 1121–1135.

Moreira, P.S. & Pires, A.M.S. (1977) *Janaira gracilis*, a new genus and species of janirid isopod from Brazil. *Crustaceana*, 33, 23–32.

Müller, H.-G. (1992) Janiridae from Malaysian coral reefs, with description of two new species of *Bagatus* Nobili, 1906 and *Carpias* Richardson, 1902 (Crustacea: Isopoda: Asellota). *Mitteilungen aus dem Zoologischen Museum in Berlin*, 68, 331–343.

Müller, H.-G. (1993) Marine janiroidea from Martinique, French Antilles, with descriptions of a new genus and four new species (Crustacea: Isopoda). *Cahiers de Biologie Marine*, 34, 433–460.

Nobili, G. (1906) Diagnoses préliminaires de Crustacés, Décapodes et Isopodes nouveaux recueillis par M. le Dr G. Seurat aux iles Touamotou. *Bulletin du Muséum National d'Histoire Naturelle*, 1e série, 12, 256–270.

Nobili, G. (1907) Richerche Sui Crostacei Della Polinesia. Decapodi, Stomatapodi, Anisopodi e Isopodi. *Memorie della Reale Accademia delle Scienze di Torino*, 57, 351–430.

Nordenstam, Å. (1946) Marine Isopoda from Professor Dr Sixten Bock's Expedition 1917–1918. *Arkiv für Zoölogi*, 37A, 1–31.

Nunomura, N. (1985) Marine isopod crustaceans in the coast of Toyama Bay. *Memoirs of the Natural Science Museum*, Tokyo, 18, 121–139.

Omer-Cooper, J. (1921) A new species of isopod (*Janiropsis parva*) from Tanning Island. *Proceedings of the Bournemouth Natural Science Society*, 12, 79–82.

Pfeffer, G. (1887) Die Krebse von Snach der Ausbeute der Deutschen Station 1882–1883. 1 Teil. *Jahrbuch der Hamburgischen Wissenschaftlichen Austalten, Hamburg*, 4, 1–110.

Pillai, N.K. (1954) A preliminary note on the Tanaidacea and Isopoda of Travancore. *Bulletin of the Central Research Institute, University of Kerala, India*, 3, 1–21.

Pires, A.M.S. (1980) Revalidation and redescription of the genus *Carpias* Richardson, 1902 (Isopoda, Asellota). *Crustaceana*, 39, 95–103.

Pires, A.M.S. (1981) *Carpias harrietae* (Isopoda, Asellota), a new species from Florida. *Crustaceana*, 40, 206–212.

Pires, A.M.S. (1982) Taxonomic revision of *Bagatus* (Isopoda, Asellota) with a discussion of ontogenetic polymorphism in males. *Journal of Natural History*, 16, 227–259.

Pires, A.M.S. (1995) The janirid isopods (Crustacea, Isopoda, Asellota) living on the sea star *Echinaster brasiliensis* Müller & Troschel at São Sebastião Channel, southeastern Brazil coast, with description of a new species. *Revista Brasileira de Zoologia*, 12, 303–312.

Poore, G.C.B. (2002) Crustacea: Malacostraca. Syncarida, Peracarida: Isopoda, Tanaidacea, Mictacea, Thermosbaenacea, Spelaeogriphacea. *In:* Houston, W.W.K. & Beesley, P.L. (Eds.). *Zoological Catalogue of Australia*, 19.2A. Melbourne, CSIRO Publishing, Australia, pp 26–61.

Richardson, H. (1902) The marine and terrestrial isopods of the Bermudas with descriptions of new genera and species. *Transactions Connecticut Academy of Arts and Sciences*, 11, 277–310.

Richardson, H. (1904) Isopod crustaceans of the northwest coast of North America. Harriman Alaska Expedition. *Crustacea*, 10, 213–230.

Richardson, H. (1905) A Monograph on the isopods of North America. *Bulletin of the United States National Museum*, 54, 1–717.

Roberts, P.C. (1975) *Heterias petrensis*, a new species of freshwater isopod from Tasmania (Family Janiridae, Tribe Asellota). *Papers and Proceedings of the Royal Society of Tasmania*, 109, 21–31.

Sars, G.O. (1883) Oversigt af Norges Crustaceer med forelúbige Bemaerkninger over de nye eller mindre bekjendte Arter. I. (Podophthalmata-Cumacea-Isopoda-Amphipoda). *Forhandlinger I Videnskabs-Selskabet I Kristiania*, 1882, 1–124.

Sars, G.O. (1897) Isopoda. Part V, VI. Idoteidae, Arcturidae, Asellidae, Ianiridae, Munnidae. *An account of the Crustacea of Norway with short descriptions and figures of all the species.* Vol. 2. (Bergen Museum: Bergen, Norway).

Sayce, O.C. (1900) *Janirella*, a new genus of Isopoda from fresh-water, Victoria. *Proceedings of the Royal Society of Victoria*, 13, 124–130.

Sivertsen, E. & Holthuis, L.B. (1980) The marine isopod Crustacea of the Tristan da Cunha Archipelago. Resultats of the Norwegian Scientific Expedition to Tristan da Cunha 1937–1938. *Gunneira*, 35, 1–128.

Smith, S.D.A., Simpson, R.D. & Cairns, S.C. (1996) The macrofaunal community of *Ecklonia radiata* holdfasts: description of the faunal assemblage and variation associated with differences in holdfast volume. *Australian Journal of Ecology,* 21, 144–153.

Stebbing, T.R.R. (1905) South African Crustacea, Part III. *Marine Investigations in South Africa, Department of Agriculture, Cape Town,* 4, 21–120.

Stebbing, T.R.R. (1910) Reports on the Marine Biology of the Sudanese Red Sea. XIV. On the Crustacea Isopoda and Tanaidacea. *Journal of the Linnean Society of London (Zoology)*, 31, 215–230.

Thielemann, M. (1910) Beiträge zur Kenntnis der Isopodenfauna Ostasiens. In: Dolfein, F. (Ed.) Beiträge zur naturgeschichte Ostasiens. *Abhandlungen der mathematique-physique Klasse der K. Bayer Akademie der Wissenschaften*, 2, (supplement 3), 1–109.

Wilson, G.D.F. (1987) The road to the Janiroidea: Comparative morphology and evolution of the asellote isopod

crustaceans. *Zeitschrift fuer Zoologische Systematik und Evolutionsforschung*, 25, 257–280.
Wilson, G.D.F. (1989) A systematic revision of the deep-sea subfamily Lipomerinae of the isopod crustacean family Munnopsidae. *Bulletin of the Scripps Institution of Oceanography*, 27, 1–138.
Wilson, G.D.F. (1994) A phylogenetic analysis of the isopod family Janiridae (Crustacea). *Invertebrate Taxonomy*, 8, 749–766.
Wilson, G.D.F. (2009) The phylogenetic position of the Isopoda in the Peracarida (Crustacea: Malacostraca). *Arthropod Systematics & Phylogeny*, 67 (2), 159–198.
Wilson, G.D.F. & Wägele, J.-W. (1994) A systematic review of the family Janiridae (Crustacea: Isopoda: Asellota). *Invertebrate Taxonomy*, 8, 683–747.
Winkler, H. & Brandt, A. (1993) Janiridae (Crustacea, Asellota) from the Southern Hemisphere: *Ianiropsis varians* sp. n. and redescriptions of five little-known species. *Zoologica Scripta*, 22 (4), 387–423.