Zootaxa 2260: 800–827 (2009)
www.mapress.com/zootaxa/

Article

ISSN 1175-5326 (print edition)
ZOOTAXA
ISSN 1175-5334 (online edition)

Phoxocephalidae*

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* *In*: Lowry, J.K. & Myers, A.A. (Eds) (2009) Benthic Amphipoda (Crustacea: Peracarida) of the Great Barrier Reef, Australia. *Zootaxa*, 2260, 1–930.

Abstract

Nine species from three genera of Phoxocephalidae (Crustacea: Amphipoda) are reported from the Great Barrier Reef, Queensland, Australia. Seven species are new to science including five species of *Birubius* Barnard & Drummond, 1976: *Birubius banksi* **sp. nov.**, *Birubius casuarina* **sp. nov.**, *Birubius kingae* **sp. nov.**, *Birubius oti* **sp. nov.** and *Birubius parvus* **sp. nov.**; one species of *Limnoporeia* Fearn-Wannan, 1968: *Limnoporeia cooki* **sp. nov.** and one species of *Metaphoxus* Bonnier, 1896: *Metaphoxus varanus* **sp. nov.** *Limnoporeia woorake* Barnard & Drummond, 1978 is reported for the first time from the Great Barrier Reef and more records of *Birubius batei* (Haswell, 1879) are reported, prompting the designation of a neotype for the species. These records expand the number of phoxocephalid species previously recorded from the Great Barrier Reef.

Key words: Crustacea, Amphipoda, Phoxocephalidae, Great Barrier Reef, Australia, taxonomy, new species, neotype, *Birubius banksi*, *Birubius batei*, *Birubius casuarina*, *Birubius kingae*, *Birubius oti*, *Birubius parvus*, *Limnoporeia cooki*, *Metaphoxus varanus*, *Limnoporeia woorake*

Introduction

The Phoxocephalidae is a strictly marine amphipod family found in all oceans and depths. Most species are benthic, with almost one third of the known species occurring in Australian waters. To date, only two species of Phoxocephalidae have been described or recorded from Queensland waters. *Birubius wallisae* Taylor & Poore, 2001 was described from Moreton Bay and a collection, misidentified by K.H. Barnard as *Pontharpinia rostrata* (Dana, 1853) was reported from the Great Barrier Reef Expedition 1928–1929. This record is now considered as *Birubius batei* (Haswell, 1879) and *Pontharpinia? barnardi* Pirlot, 1932 (refer to Barnard & Drummond (1978) and Lowry & Stoddart (2003) for explanation and further discussion).

The relatively small number of phoxocephalids described to date from the Great Barrier Reef (GBR) is as much a reflection of the geographic focus of previous work done on the family, as it is on their abundance in that part of Australia. Barnard & Drummond's (1978) work documenting the Phoxocephalidae of Australia described 88 species from 26 genera; however none were described from Queensland. Their material was mostly from surveys conducted in Western Port, Crib Point and Port Phillip Bay (Victoria) between 1964 and 1974. Other material studied was from benthic surveys conducted in New South Wales off Sydney. Since the early 1970's, phoxocephalid material has been collected from localities in Queensland, including the Great Barrier Reef, but to date has remained undescribed in museum collections.

This paper reports on Phoxocephalidae from the first survey aimed at documenting the amphipod fauna of the Great Barrier Reef to 50 m depth. This material collected during a 2005 workshop held at the Lizard Island Research Station together with material previously lodged in the Australian Museum and Museum Victoria

 Accepted by J.K. Lowry: 15 Jun. 2009; published: 8 Oct. 2009

has yielded nine species from three genera. Five of these were new species of *Birubius* (*Birubius banksi* **sp. nov.**, *Birubius casuarina* **sp. nov.**, *Birubius kingae* **sp. nov.**, *Birubius oti* **sp. nov.**, *Birubius parvus* **sp. nov.**), others comprised one new species of *Limnoporeia* (*Limnoporeia cooki* **sp. nov.**), a new species of *Metaphoxus* (*Metaphoxus varanus* **sp. nov.**), a range extension of *Limnoporeia woorake* Barnard & Drummond, 1978 and further records of *Birubius batei* (Haswell, 1879) from the Great Barrier Reef.

Materials and Methods

The descriptions were generated from a DELTA database (Dallwitz 2005) to phoxocephalid genera and species. A set of colour plates, a list of standard abbreviations and detailed station data are available in Lowry & Myers (2009). All dissections and illustrations follow the methods of Barnard & Drummond (1978): the left side of the animal is illustrated unless otherwise stated. Original illustrations were scanned and inked using Adobe Illustrator following Coleman's (2003) methods. A CD (*Benthic Amphipoda (Crustacea: Peracarida) of the Great Barrier Reef: Interactive Keys*) is available with the book or the keys can be accessed at the crustacea.net website.

Phoxocephalidae Sars, 1895

Birubius Barnard & Drummond, 1976

Birubius banksi sp. nov.
(Figs 1, 2, Pl. 5E)

Type material. Holotype female, 3.8 mm, AM P70915, Cobia Hole, Lizard Island (14°39.154'S 145°26.851'E), sediment, patches of reef and sand, 17 m, 25 February 2005 (QLD 1672). Paratypes: male, 3.0 mm, AM P77834; 17 females, 1 damaged male, 1.3–3.0 mm AM P77835, same station data.

Type locality. Cobia Hole, Lizard Island, Queensland, Australia.

Additional material examined. 1 female, AM P70620 (QLD 1621); 1 female, AM P70580 (QLD 1622); 1 female, AM P70591 (QLD 1622); 10 females, AM P70822 (QLD 1666); 1 female, AM P70782 (QLD 1666); approx. 30 females, AM P71418 (QLD 1805).

Etymology. Named for naturalist Joseph Banks who, after visiting Lizard Island with navigator James Cook in 1770, was to lament in his journal that he had too little time to study the wealth of strange creatures he saw in the waters of the Great Barrier Reef.

Description. Based on holotype female 3.8 mm.

Head. *Rostrum* constricted; eyes present. *Antenna 1* peduncle article 2 with ventral setae situated on middle. *Antenna 2* peduncle article 4 facial robust setae not in a single row, dorsal setae present; article 5 midfacial robust setae present as a single set of 2; flagellum multiarticulate. *Mandible palp* article 2 with outer setae; *molar* simple, form D (bearing 4 or more widely spaced spines usually without common base); right molar with 6 spines, without disjunct spines, right incisor with 3 teeth, right lacinia mobilis simple, right raker row of 7 teeth. *Maxilla 1* inner plate with 4 setae; outer plate without an especially thickened robust seta. *Maxilliped* inner plate with 1 large thin-thick apical robust seta; outer plates, inner margin poorly armed, with 6 or fewer setae.

Pereon. *Coxae*, long ventral setae present on coxae 1–3 but absent from coxa 4, main ventral setae of coxae 1–4 = 5–5–5–0. *Coxa 1* expanded distally. *Gnathopods* similar. Gnathopod 1 palms oblique. *Pereopods 3–4*, carpus with 1 posteroproximal robust setae, propodus slender setae absent. *Pereopod 5* basis tapering distally (slightly), without facial ridge. *Pereopod 6* basis with 2 facial ridges. *Pereopod 7* basis with few or no long ventral setae, with 1 facial ridge.

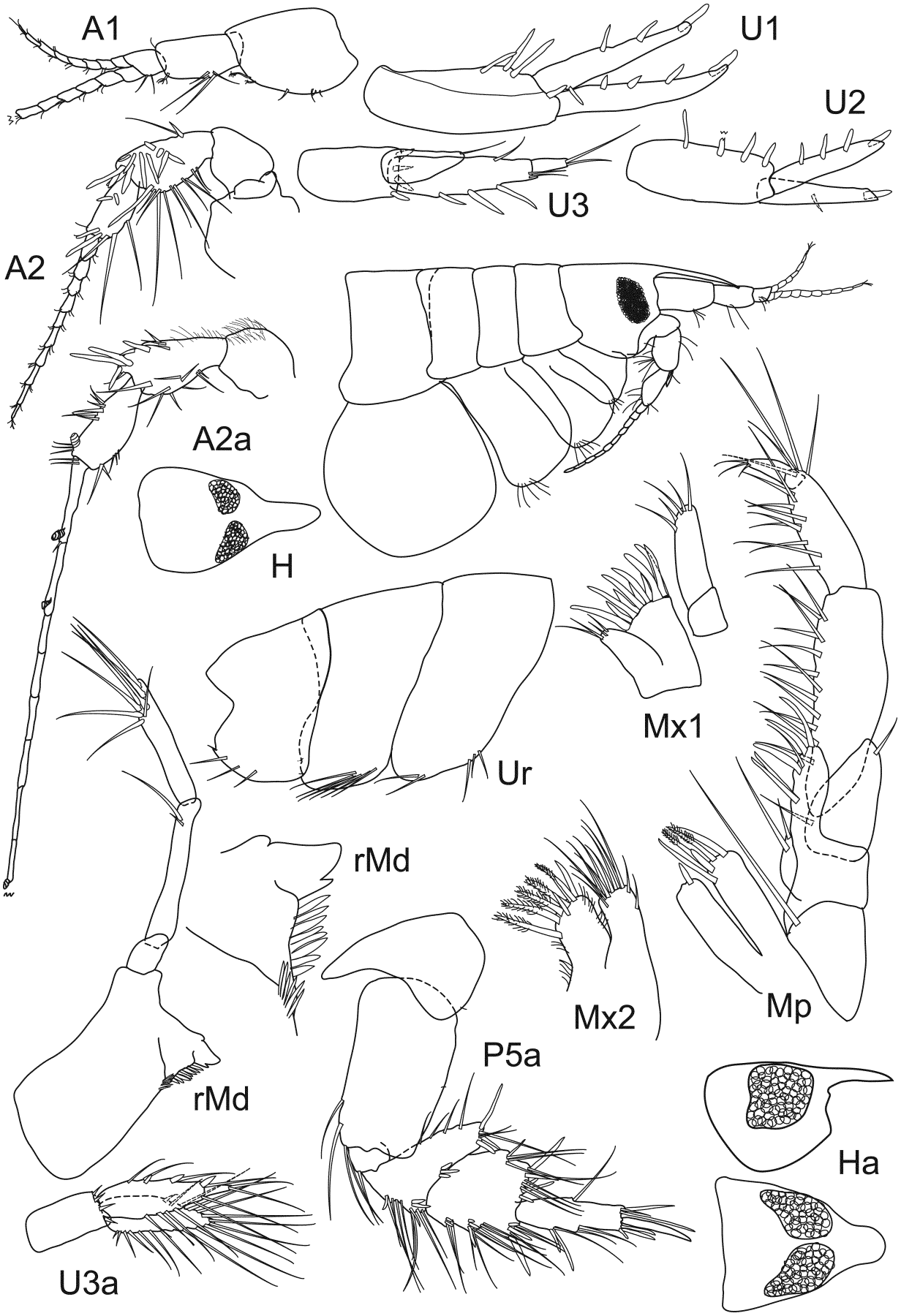

FIGURE 1. *Birubius banksi* **sp. nov.**, holotype, female, 3.8 mm, AM P70915; (a) paratype, male, 3.0 mm, AM P77834, Cobia Hole, Lizard Island, Great Barrier Reef.

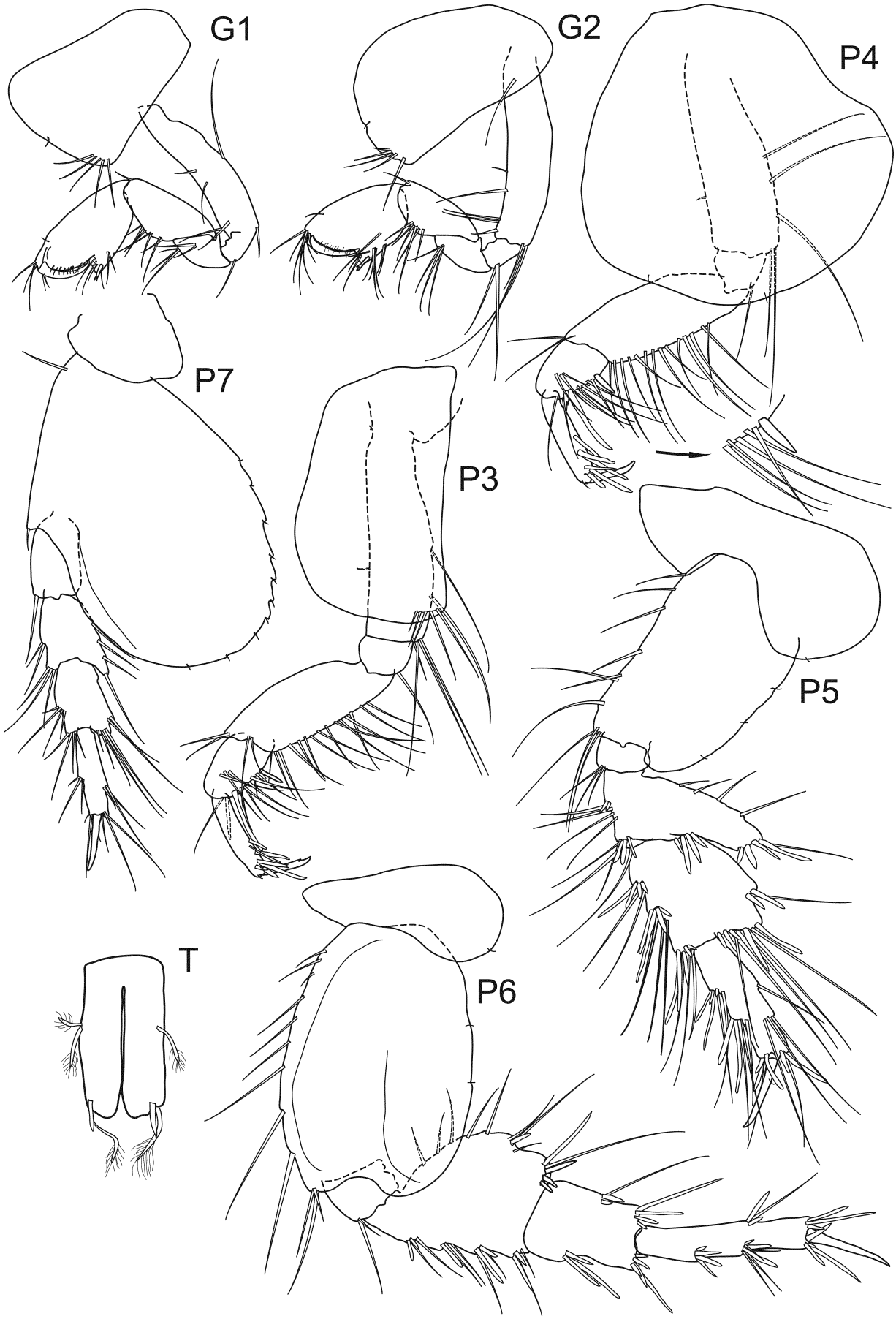

FIGURE 2. *Birubius banksi* **sp. nov.**, holotype, female, 3.8 mm, AM P70915, Cobia Hole, Lizard Island, Great Barrier Reef.

Pleon. *Epimeron 1* anteroventral margin with 3 setae, posteroventral face with 2 long setae, posterior pair of posteroventral setae not set vertically. *Epimeron 2* with 6 facial setae, crowded anteriorly. *Epimeron 3* facial setae absent, posterior setae absent, with 3 ventral setae. *Uropod 1*, peduncle basofacial setae absent, without major displaced robust setae, with 1 apicolateral spine; inner ramus of uropod 1 with 2 dorsal spines, without subapical accessory robust seta, outer rami continuously spinose to apex. Uropods 1–2 rami with well developed apical nails. *Uropod 3* outer ramus article 2 with 2 apical setae.

Habitat. In sediment with patches of reef and sand.

Remarks. This new species of *Birubius* can be distinguished from all other species of the genus by the following combination of traits; coxa 1 expanded distally with 4 long ventral setae, right mandibular incisor with 3 teeth; pereopods 3–4 carpus with 1 posteroproximal robust setae. It can be further distinguished from *Birubius batei* by the simple right lacinia mobilis and constricted rostrum; from *B. casuarina* sp. nov. by the absence of basofacial setae on uropod 1, and from other species of the genus from the GBR by the lack of posterior and facial setae on epimeron 3.

Distribution. *Australia*. Queensland: Lizard Island (current study).

***Birubius batei* (Haswell, 1879)**
(Figs 3, 4)

Phoxus batei Haswell, 1879: 259, pl. 9, fig. 3.
Birubius batei? —Barnard & Drummond, 1978: 312, figs. 152-155. —Lowry & Stoddart, 2003: 226.
Pontharpinia rostrata. —Stebbing, 1906: 146 [in part]. —Stebbing, 1910: 635.

Type material. Neotype, female "f", 5.39 mm, AM P26125, off Towra Beach, Botany Bay, New South Wales, Australia (34°00'S 151°10'E), sand, 2.7 m, 11 April 1973, (EBS 200), [Herein selected].

Material examined. 2 females, NMV J55299 and AM P77836 (JDT/LIZ-19); 3 males, AM P56148 (Lizard Island); 1 female, 2 males AM P77837 (QLD 20); 1 female, 1 male, AM P54642 (QLD 21); 2 females, AM P77838 (QLD 33); 1 male, AM P54647 (QLD 45); 5 females, AM P77839 (QLD 54); 1 male, AM P54652 (QLD 55); 20 females, 5 males, AM P54653 (QLD 56); 4 females, 3 males, AM P54655 (QLD 63).

Type locality. Towra Beach, Botany Bay, New South Wales, Australia.

Description. Based on female, 3.5 mm, NMV J55299.

Head. *Rostrum* unconstricted; eyes present (red pigmented in preserved specimens). *Antenna 1* peduncle article 2 with midventral setae. *Antenna 2* peduncle article 4 facial robust setae not in a single row, dorsal setae present; article 5 midfacial robust setae present as two sets of 2; flagellum multiarticulate. *Mandible molar* simple, form D, right with 5 spines, right lacinia mobilis bifid, distal branch simple, pointed. *Maxilla 1* inner plate unknown; outer plate with 1 robust seta enlarged; palp biarticulate.

Pereon. *Coxae 1–3* with long ventral setae present posteroventrally but absent from coxa 4, main ventral setae of coxae 1–4 = 5–5–5–0. *Coxa 1* expanded distally. *Gnathopods* similar, palms oblique. *Pereopods 3–4* carpus with 2 posteroproximal robust setae, propodus lacking slender setae. *Pereopod 5* basis not tapering distally, without facial ridge. *Pereopod 6* basis with 2 facial ridges. *Pereopod 7* basis with few long ventral setae, with 2 facial ridges.

Pleon. *Epimeron 1* anteroventral margin with 3 setae, posteroventral face with 2 long setae, set vertically. *Epimeron 2* with 6 facial setae, crowded anteriorly. *Epimeron 3* facial setae absent, with 7 long posterior setae, without ventral setae. *Uropod 1*, peduncle basofacial setae present, without major displaced robust setae (special enlarged spine), with 1 apicolateral spine; inner ramus with 2 dorsal spines, without subapical accessory robust seta; outer ramus not continuously spinose to apex. Uropods 1–2 rami with well developed apical nails. *Uropod 3* outer ramus article 2 with 2 apical setae.

Habitat. Soft bottom, nocturnal swimming males, 0–60 m depth.

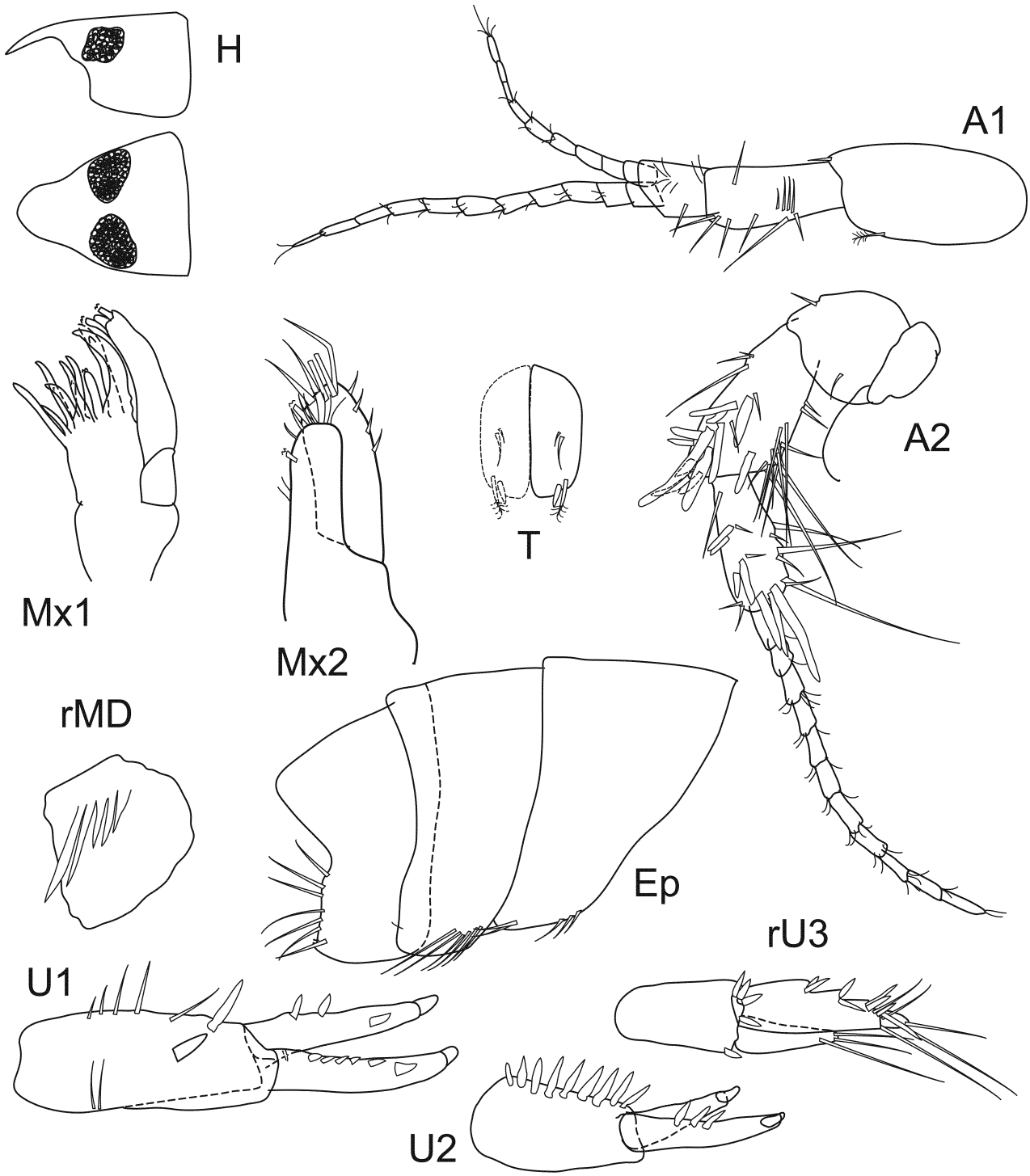

FIGURE 3. *Birubius batei* (Haswell, 1879), female, 3.5 mm, NMV J55299, off Lizard Head, Lizard Island, Great Barrier Reef.

Remarks. The original description and illustrations by Haswell (1879) of material from Port Jackson were not detailed. Barnard & Drummond (1978) noted that material registered in the AM as Haswell's original type material of *Phoxus batei* is “confounded” and “clearly not what Haswell described and illustrated”. They thus designated a "Main Voucher" from material from nearby Botany Bay that they called “*Birubius batei?*”, “until such time that a review of the fauna of Port Jackson is undertaken” to see if *B. batei* and a similar

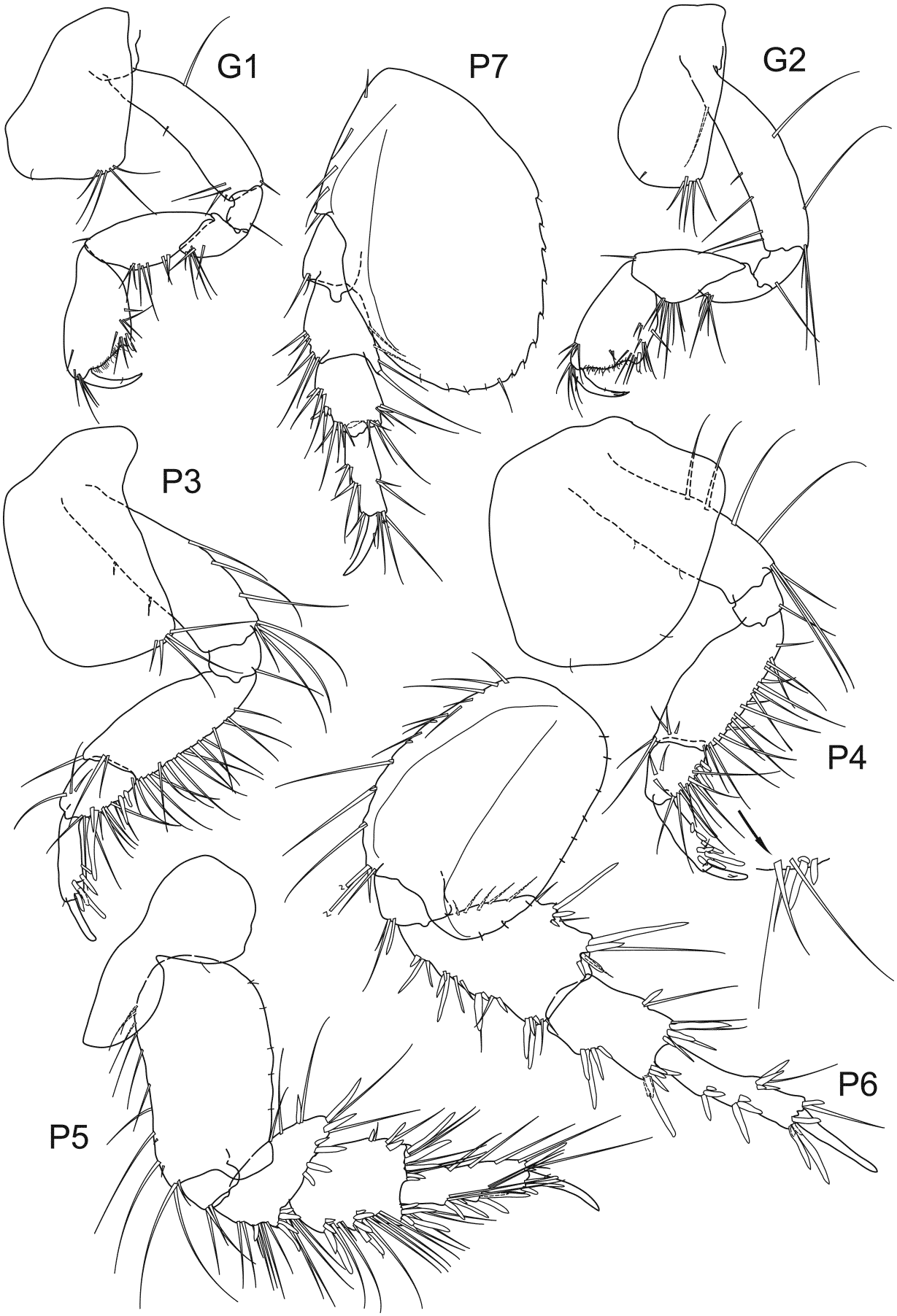

FIGURE 4. *Birubius batei* (Haswell, 1879), female, 3.5 mm, NMV J55299, off Lizard Head, Lizard Island, Great Barrier Reef.

species *B. jirrandus* cohabit the region. No such survey has been undertaken, nor is likely in the foreseeable future, and Barnard's hesitation to designate this "Main Voucher" specimen as a 'neotype' has resulted in 30 years of confusion over the applicability of the species name. The discovery of specimens from Lizard Island that closely resemble Barnard's "Main Voucher" has prompted me to designate the "Main Voucher" female "f" illustrated and described in great detail by Barnard & Drummond (1978) as the neotype of *Phoxus batei* Haswell.

Birubius batei can be diagnosed by the combination of the following traits; right lacinia mobilis bifid, distal branch simple; long ventral setae present on coxae 1–3 but absent from coxa 4; pereopods 3–4 carpus with 2 posteroproximal robust setae.

The material examined from Lizard Island fits the description and illustrations of the "Main Voucher" female "f", although has fewer basofacial setae on basis of uropod 1. It can be distinguished from other species of the genus from the GBR by the unconstricted rostrum, presence of 2 posteroproximal robust setae on the carpus of pereopods 3–4, and a lack of ventral and facial setae on epimeron 3. The eyes are pigmented red in preserved specimens (see remarks for *B. casuarina* sp. nov.). These specimens reconfirm the presence of the species in the Great Barrier Reef.

Distribution. *Australia*. Queensland: off Lizard Head peninsula, Lizard Island. New South Wales: Botany Bay, Lake Macquarie and Jervis Bay (current study). Western Australia: Barrow Island and Middleton Beach, near Albany (Barnard & Drummond, 1978).

***Birubius casuarina* sp. nov.**
(Figs 5, 6, Pl. 5F)

Type material. Holotype female, 6.0 mm, AM P71222, Casuarina Beach, Lizard Island (14°40.38'S 145°26.69'E), fine sediment in grass beds, sandy bottom with rubble, algae & sparse seagrass, 1 m, S. LeCroy, 2 March 2005 (QLD 1771). Paratype: female, 5.5 mm, AM P77840 (QLD 1771); 1 female, 4.0 mm, AM P54648 (QLD 50).

Type locality. Casuarina Beach, Lizard Island, Queensland, Australia.

Etymology. Named for the type locality Casuarina Beach, Lizard Island.

Description. Based on holotype female.

Head. *Rostrum* slightly/weakly constricted, broadly rounded distally. Eyes present (pigmented black in preserved specimens). *Antenna 1* peduncle article 2 with ventral setae situated on middle. *Antenna 2* peduncle article 4 facial robust setae not in a single row, dorsal setae present; article 5 midfacial robust setae present as a single set of 1–3; flagellum multiarticulate. *Mandible palp* article 2 without outer setae, *molar* simple, form D; right molar with 6 spines and 1 strongly disjunct short spine; right incisor with 3 teeth, right lacinia mobilis simple, right raker row of 7 teeth,. *Maxilla 1* inner plate unknown; outer plate with 1 robust seta especially thickened. *Maxilliped* inner plate with 1 large thick apical robust seta; outer plates, inner margin with well developed setae.

Pereon. *Coxae*, long ventral setae present on coxae 1–3 but absent from coxa 4, main ventral setae of coxae 1–4 = 6–8–10–0. *Coxa 1* weakly-scarcely expanded distally. *Gnathopods* similar. Gnathopod 1 palms oblique. *Pereopods 3–4*, carpus with 2 posteroproximal robust setae, propodus slender setae absent. *Pereopod 5* basis not tapering distally, without facial ridge. *Pereopod 6* basis with 1 facial ridge. *Pereopod 7* basis with long ventral setae, with 2 facial ridges.

Pleon. *Epimeron 1* anteroventral margin with 6 setae, posteroventral face with 2 long setae. *Epimeron 2* with 9 facial setae, crowded anteriorly. *Epimeron 3* facial setae absent, with 5 long posterior setae, with 5 ventral setae. *Uropod 1*, peduncle basofacial setae present, without major displaced robust setae, with 3–4 apicolateral spines; inner ramus with 1 dorsal spine, without subapical accessory robust seta; outer ramus not continuously spinose to apex. Uropods 1–2 rami with well developed apical nails. *Uropod 3* outer ramus article 2 with 2 apical setae.

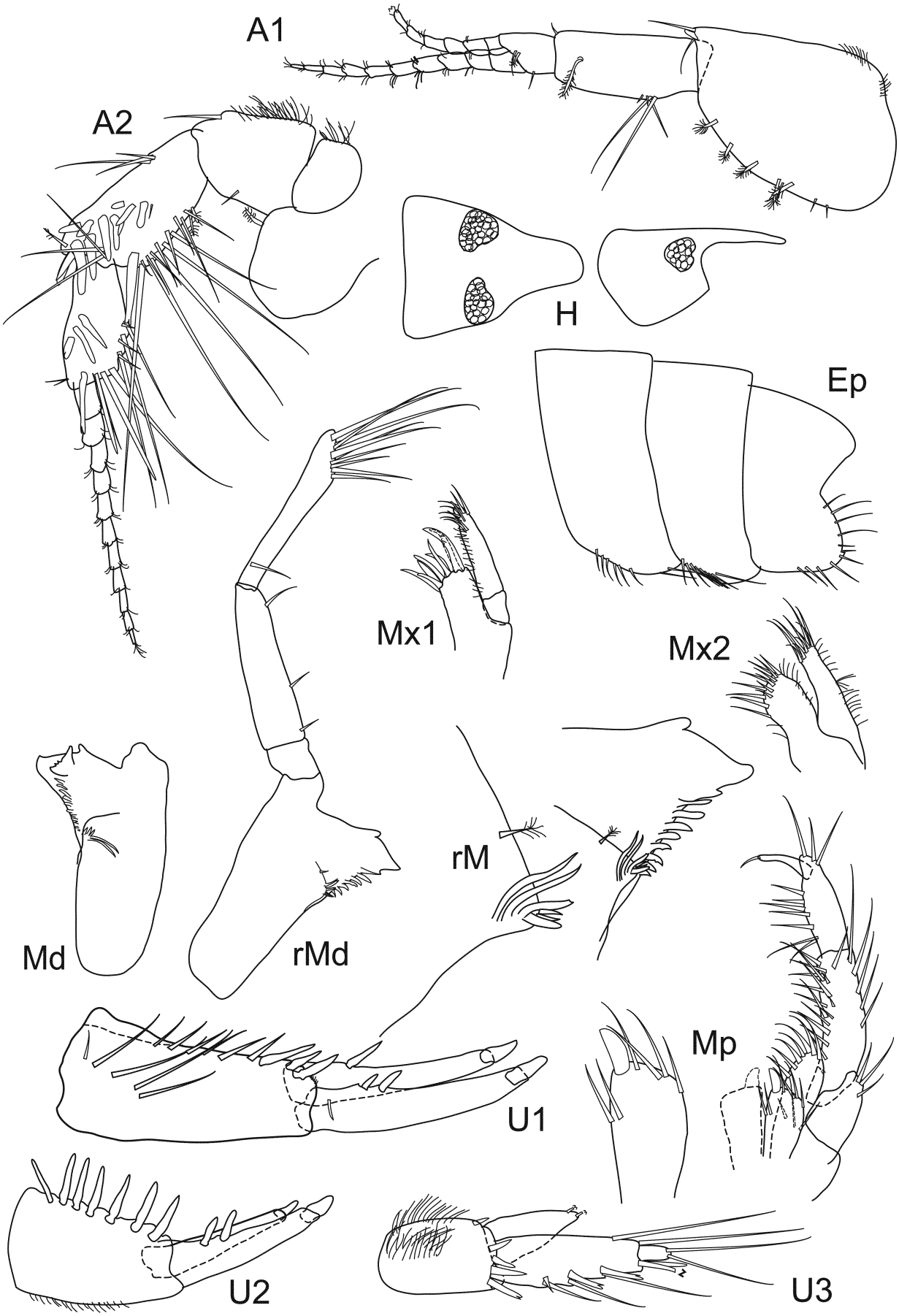

FIGURE 5. *Birubius casuarina* **sp. nov.**, holotype, female, 6.0 mm, AM P71222, Casuarina Beach, Lizard Island, Great Barrier Reef.

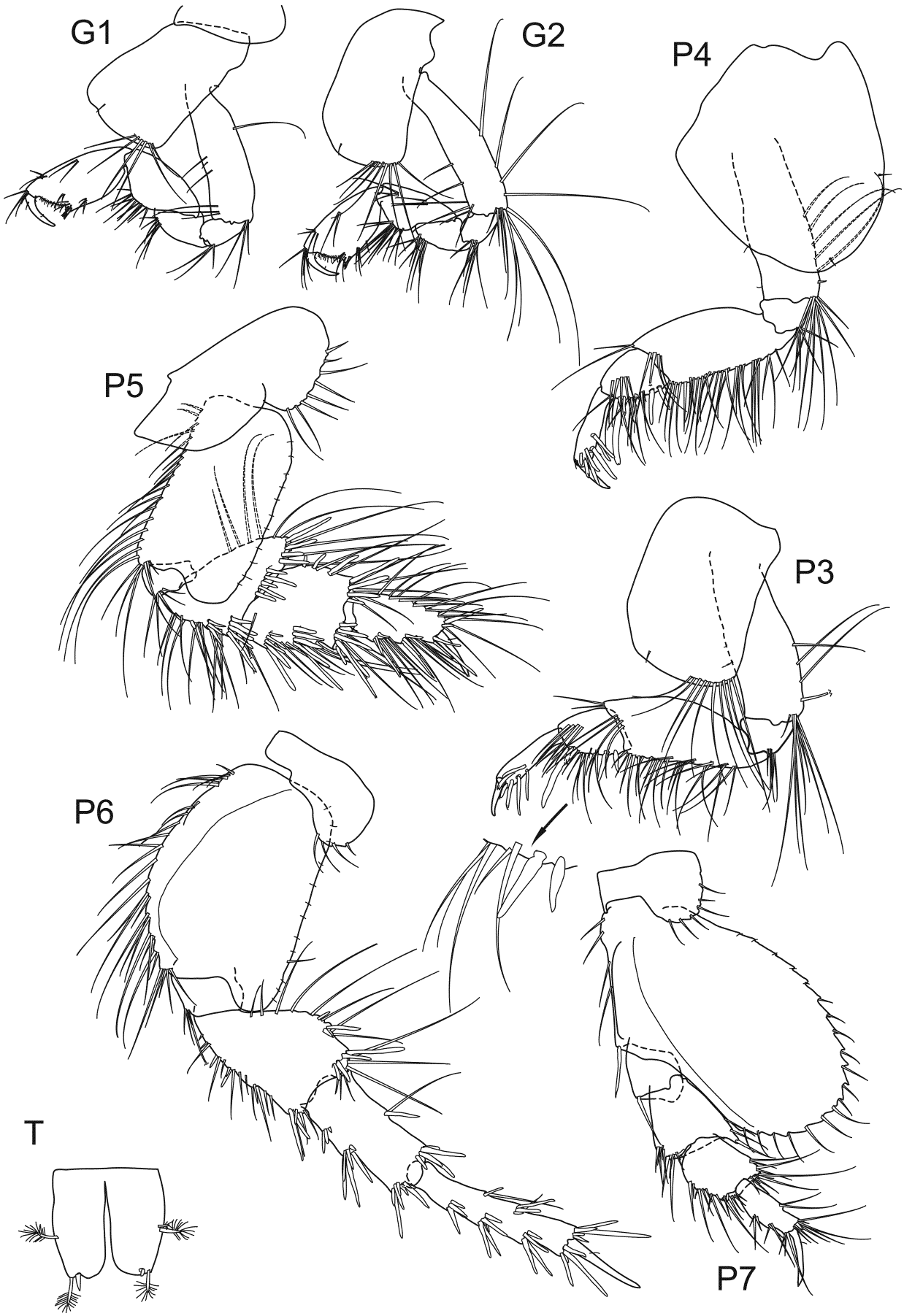

FIGURE 6. *Birubius casuarina* **sp. nov.**, holotype, female, 6.0 mm, AM P71222, Casuarina Beach, Lizard Island, Great Barrier Reef.

Habitat. Coarse-fine sediment in grass beds, sandy bottom with rubble, algae and sparse seagrass.

Remarks. This species is very close to *Birubius jirrandus* Barnard & Drummond, 1978 described from Western Port and Port Phillip Bay, Victoria and Barrow Island, Western Australia. Comparison of the Lizard Island material with the holotype confirmed differences warranting the erection of a new species. The material from Lizard Island lacks the distally expanded coxa 1 of *B. jirrandus* and has longer setae and more pronounced ventral serration on pereopod 7. The robust seta on the inner plate of the maxilliped is considerably more robust than *B. jirrandus*. The characters useful in distinguishing this species from other species of the genus from the GBR are pereopods 3–4 carpus with 2 posteroproximal robust setae; long ventral setae on pereopod 7 basis; the presence of basofacial setae on uropod 1. The eyes are pigmented black in preserved material which aids in distinguishing this species from the red pigmented eyes of *B. batei*. It can be distinguished from all species of the genus from the GBR by the presence of ventral and posterior setae, but lacks fully facial setae on epimeron 3.

Distribution. *Australia.* Queensland: Lizard Island (current study).

***Birubius kingae* sp. nov.**
(Figs 7, 8)

Type material. Holotype female, 4.0 mm, AM P77841, Lizard Island (14°40'S 145°28'E), light trap at night in 3 m of water over reef flat, 3 m, Smith & Marshall, September 1976 (QLD 2015). Paratypes: 15 females, 2.5 mm–4.0 mm AM P77842, same station data.

Type locality. Lizard Island, Queensland, Australia.

Etymology. Named for crustacean taxonomist Dr Rachael King who assisted in the sorting and initial identification of the material collected at the workshop held in Lizard Island.

Description. Based on holotype female.

Head. *Rostrum* constricted; eyes present (red pigmented in preserved specimens). *Antenna 1* peduncle article 2 with ventral setae situated proximal to midpoint. *Antenna 2* peduncle article 4 facial robust setae not in a single row, dorsal setae present; article 5 midfacial robust setae present as a single set of 2; flagellum multiarticulate. *Mandible palp* article 2 without outer setae; *molar* simple, form D; right molar with 4 spines, without disjunct spines, right incisor with 3 teeth, right lacinia mobilis simple, with right raker row of 9 teeth. *Maxilla 1* inner plate with 3 setae; outer plate without an especially thickened robust seta. *Maxilliped* inner plate with 1 large thin-thick apical robust seta; outer plates, inner margin with well developed setae.

Pereon. *Coxae*, long ventral setae present on coxae 1–3 but absent from coxa 4, main ventral setae of coxae 1–4 = 5–5–6–0. *Coxa 1* expanded distally. *Gnathopods* similar. Gnathopod 1 palms oblique. *Pereopods 3–4*, carpus with 1 posteroproximal robust setae, propodus slender setae absent. *Pereopod 5* basis of broad form, not tapering distally, without facial ridge. *Pereopod 6* basis without facial ridge. *Pereopod 7* basis with few or no long ventral setae, with 2 facial ridges.

Pleon. *Epimeron 1* anteroventral margin with 3 setae, posteroventral face without setae. *Epimeron 2* with 7 facial setae, crowded anteriorly. *Epimeron 3* with fully facial setae arranged in oblique row, posterior setae absent, with 2 ventral setae. *Uropod 1*, peduncle basofacial setae absent, without major displaced robust setae, with 1 apicolateral spine; inner ramus with 2 dorsal spines, without subapical accessory robust seta; outer ramus not continuously spinose to apex. Uropods 1–2 rami with well developed apical nails. *Uropod 3* outer ramus article 2 with 2 apical setae.

Habitat. Collected in light traps at night in 3 m depth.

Remarks. This new species of *Birubius* can be diagnosed from all other species of the genus by the combination of the following traits; right lacinia mobilis simple, coxa 1 expanded distally with 5 long ventral setae; pereopods 3–4 carpus with 1 posteroproximal robust setae, epimeron 3 with facial and ventral setae, absence of basofacial setae on uropod 1.

Distribution. Australia. Queensland: Lizard Island (current study).

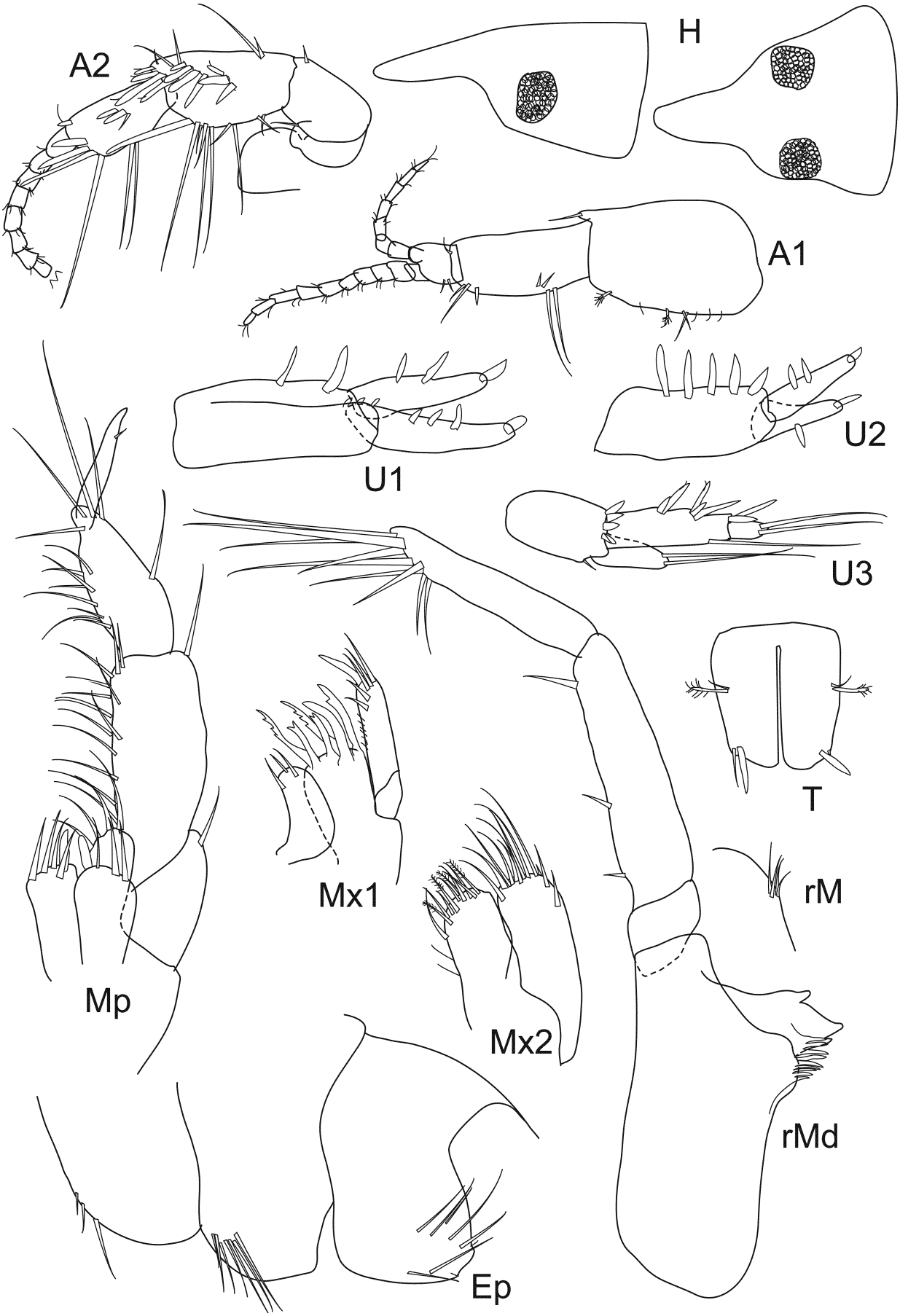

FIGURE 7. *Birubius kingae* **sp. nov.**, holotype, female, 4.0 mm, AM P77841, Lizard Island, Great Barrier Reef.

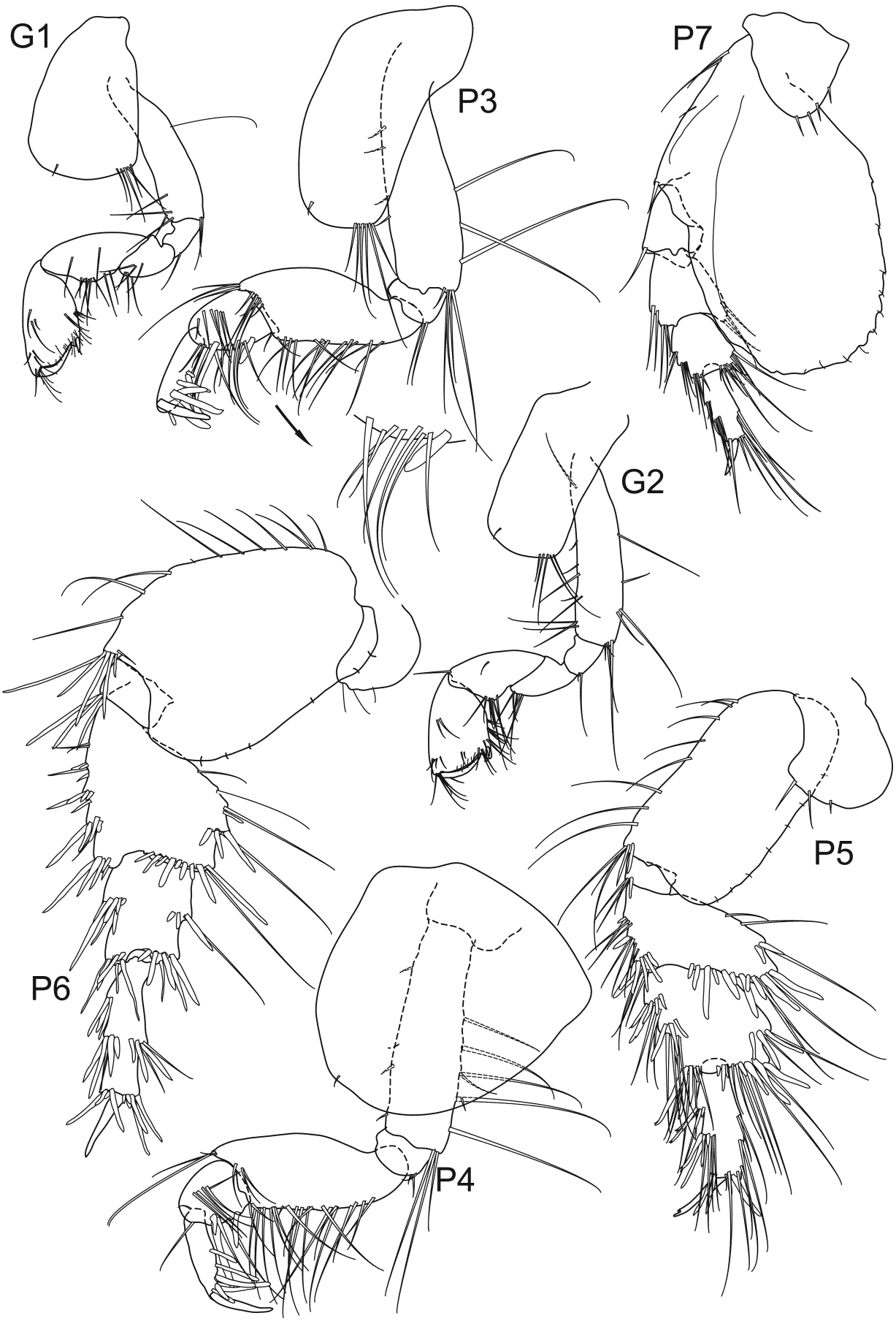

FIGURE 8. *Birubius kingae* **sp. nov.**, holotype, female, 4.0 mm, AM P77841, Lizard Island, Great Barrier Reef.

***Birubius oti* sp. nov.**
(Figs 9, 10)

Type material. Holotype male, 4.5 mm, AM P77843, One Tree Island lagoon (23°30'S 152°05'E), light trap, P.S. McWilliam, 02 Dec 1977 (DN 77–42). Paratypes: 30 males, 2.0–5.2 mm, AM P77844; 10 males 2.0–5.2 mm NMV J57287, same locality.

Additional material examined. More than 200 males, P75539, same locality as types.

Type locality. One Tree Island, Queensland, Australia.

Etymology. Named for the acronym of the type locality, One Tree Island (OTI).

Description. Based on holotype male.

Head. *Rostrum* unconstricted; eyes present (red pigmented in preserved specimens). *Antenna 1* peduncle article 2 with ventral setae situated just proximal to middle. *Antenna 2* peduncle article 4 facial robust setae not in a single row. *Mandible palp* article 2 with outer setae; *molar* simple, form D; right molar with 4 spines, without disjunct spines; right incisor with 3 teeth, right lacinia mobilis simple, right raker row of 8 teeth. *Maxilla 1* inner plate with 3 setae; outer plate with 1 robust seta especially thickened. *Maxilliped* inner plate with 2 large thick apical robust setae; outer plates, inner margin with well developed setae.

Pereon. *Coxae*, long ventral setae present on coxae 1–3 but absent from coxa 4, main ventral setae of coxae 1–4 = 4–5–4–0. *Coxa 1* sub rectangular. *Coxa 2* widened distally. *Gnathopods* similar. Gnathopod 1 palms oblique. *Pereopods 3–4*, carpus with 3 posteroproximal robust setae, propodus slender setae absent. *Pereopod 5* basis of broad form, not tapering distally, without facial ridge. *Pereopod 6* basis with 2 facial ridges. *Pereopod 7* basis with few or no long ventral setae, with 2 facial ridges.

Pleon. *Epimeron 1* anteroventral margin with 4 setae, posteroventral face with 2 long setae, posterior pair not set vertically. *Epimeron* 2 with 6 facial setae, not crowded anteriorly. *Epimeron 3* fully facial setae absent, with 2 long posterior setae, with 1 short ventral setae. *Uropod 1*, peduncle basofacial setae present, without major displaced robust setae, with 3 apicolateral spines; inner ramus of uropod 1 with 1 dorsal spine, with subapical accessory robust seta; outer ramus not continuously spinose to apex. Uropods 1–2 rami with well developed apical nails. *Uropod 3* outer ramus article 2, with 2 apical setae.

Habitat. Collected in light traps.

Remarks. This new species of *Birubius* can be distinguished from all other species of the genus by the following combination of traits; right lacinia mobilis simple, coxa 1 not expanded distally, with 4 long ventral setae; pereopods 3–4 carpus with 3 posteroproximal robust setae, epimeron 3 without fully facial setae and the presence of 2 basofacial setae on uropod 1. This species is most easily distinguished from others from the GBR by the unconstricted rostrum, 3 posteroproximal robust setae on pereopods 3-4 carpus and the presence of a subapical accessory robust seta on uropod 1 inner ramus.

Distribution. *Australia*. Queensland: One Tree Island (current study).

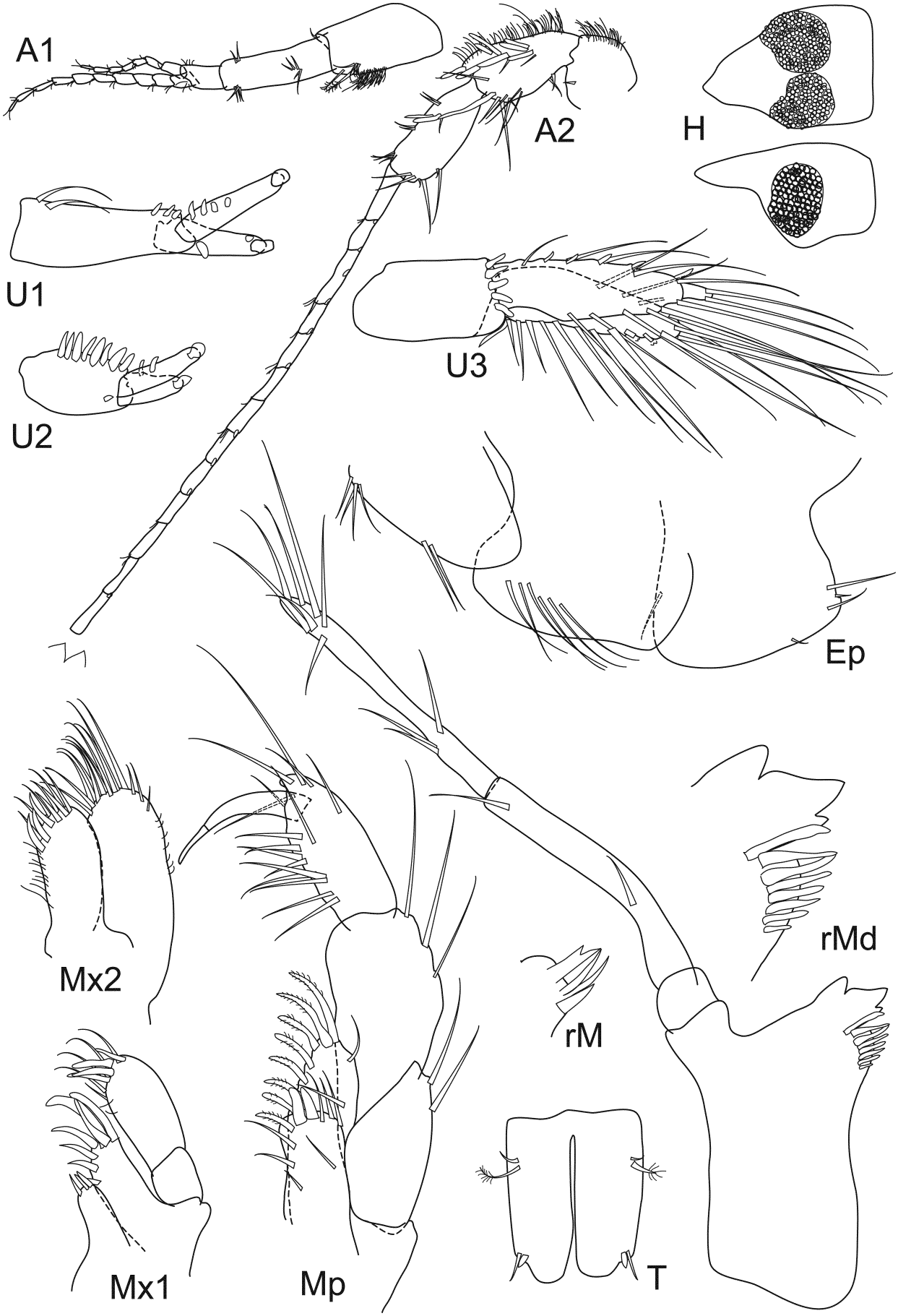

FIGURE 9. *Birubius oti* **sp. nov.**, holotype, male, 4.5 mm, AM P77843, One Tree Island, Great Barrier Reef.

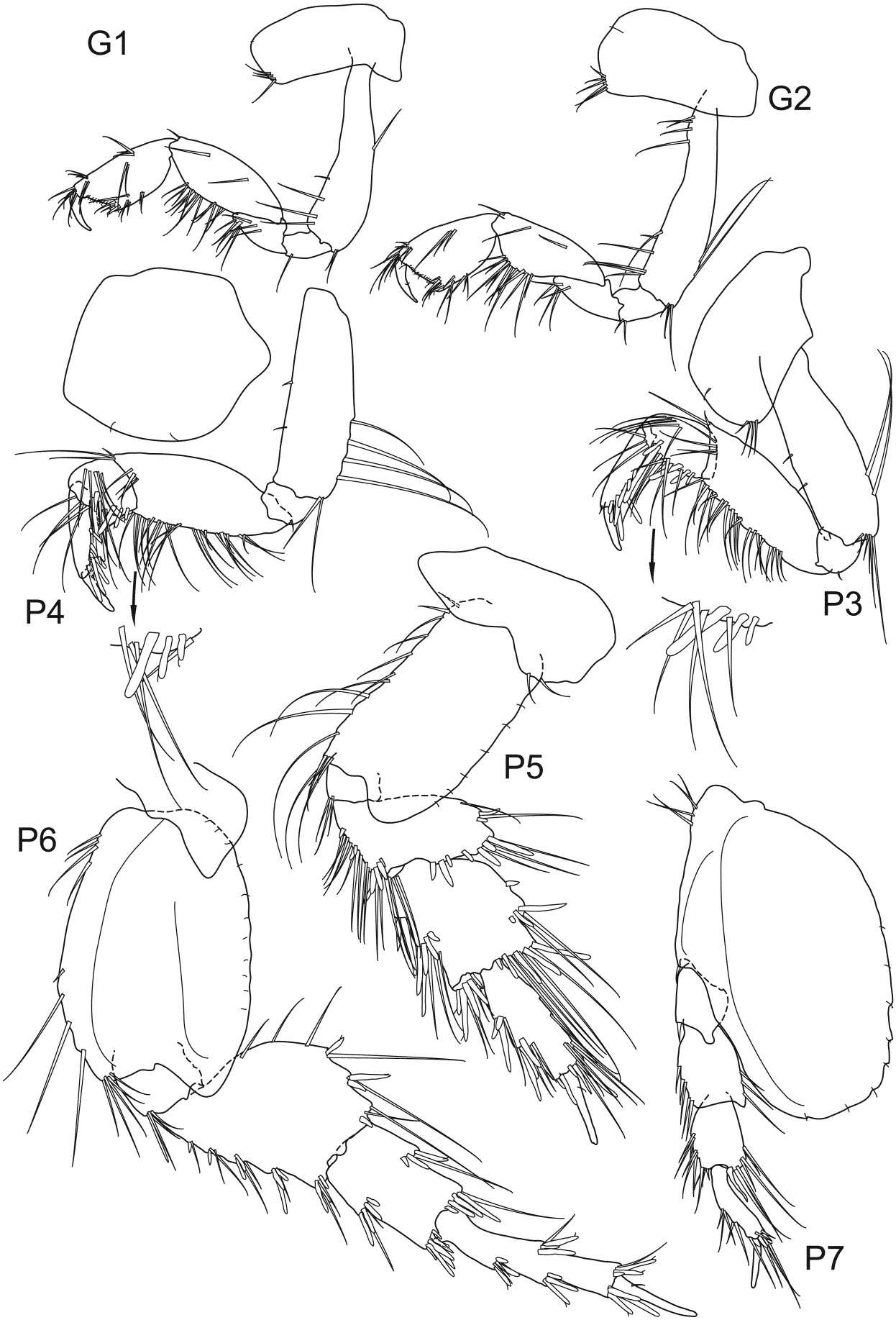

FIGURE 10. *Birubius oti* **sp. nov.**, holotype, male, 4.5 mm, AM P77843, One Tree Island, Great Barrier Reef.

***Birubius parvus* sp. nov.**
(Figs 11, 12)

Type material. Holotype female, 2.5 mm, AM P38468, Blue Lagoon bommie, Lizard Island (14°40'S 145°28'E), light trap 1 m below surface in 12–15 m depth, M. Milicich & J.K. Lowry, 7 February 1987 (QLD 2014). Paratypes: 1 male, 2.0 mm, AM P77845, same locality; 35 females 2.0–3.2 mm, AM P77846 same locality.

Type locality. Blue Lagoon, Lizard Island, Queensland, Australia.

Additional material examined. Many males (more than 200), AM P38467 same locality as types.

Etymology. Named in reference to its diminutive size.

Description. Based on holotype female.

Head. *Rostrum* constricted; eyes present (red pigmented in preserved specimens). *Antenna 1* peduncle article 2 with ventral setae situated proximally. *Antenna 2* peduncle article 4 facial robust setae not in a single row, dorsal setae present; article 5 midfacial robust setae present as a single set of 2; flagellum multiarticulate. *Mandible palp* article 2 without outer setae; *molar* simple, form D; right molar with 8 spines, without disjunct spines; right incisor with 3 teeth, right lacinia mobilis simple, right raker row of 5–6 teeth. *Maxilla 1* inner plate with 4 setae; outer plate without an especially thickened robust seta. *Maxilliped* inner plate with 1 large thin-thick apical robust seta; outer plates, inner margin with well developed setae.

Pereon. *Coxae*, long ventral setae present on coxae 1–3 but absent from coxa 4, main ventral setae of coxae 1–4 = 6–7–8–0. *Coxa 1* subrectangular. *Gnathopods* similar. Gnathopod 1 palms oblique. *Pereopods 3–4*, carpus lacking posteroproximal robust setae, propodus slender setae absent. *Pereopod 5* basis of broad form, not tapering, slightly widened distally, without facial ridge. *Pereopod 6* basis with 1 facial ridge. *Pereopod 7* basis with few or no long ventral setae, with 1 facial ridge.

Pleon. *Epimeron 1* anteroventral margin with or without setae, posteroventral face with 0–2 long setae, not set vertically. *Epimeron 2*, with 5–9 facial setae, not crowded anteriorly. *Epimeron 3* with fully facial setae arranged in oblique row, posterior setae absent, with 2–4 ventral setae. *Uropod 1*, peduncle basofacial setae present, without major displaced robust setae, with 3–4 apicolateral spines; inner ramus of uropod 1 with 1 dorsal spine, without subapical accessory robust seta; outer rami not continuously spinose to apex. Uropods 1–2 rami with well developed apical nails. *Uropod 3* outer ramus article 2 with 2 apical setae.

Habitat. Collected in light traps 1 m below surface in water 12–15m deep.

Remarks. This new species of *Birubius* can be distinguished from all other species of the genus by the following combination of traits; constricted rostrum; coxa 1 not expanded distally (sub rectangular); pereopods 3–4 carpus without posteroproximal robust setae; pereopod 5 basis is slightly widened distally and the arrangement of facial setae on epimeron 3. The males of the species collected are very similar in appearance to the females, except that they are slightly smaller in size, possess the usual sexual dimorphic characters and have more setae on epimeron 1.

Distribution. *Australia*. Queensland: Lizard Island (current study).

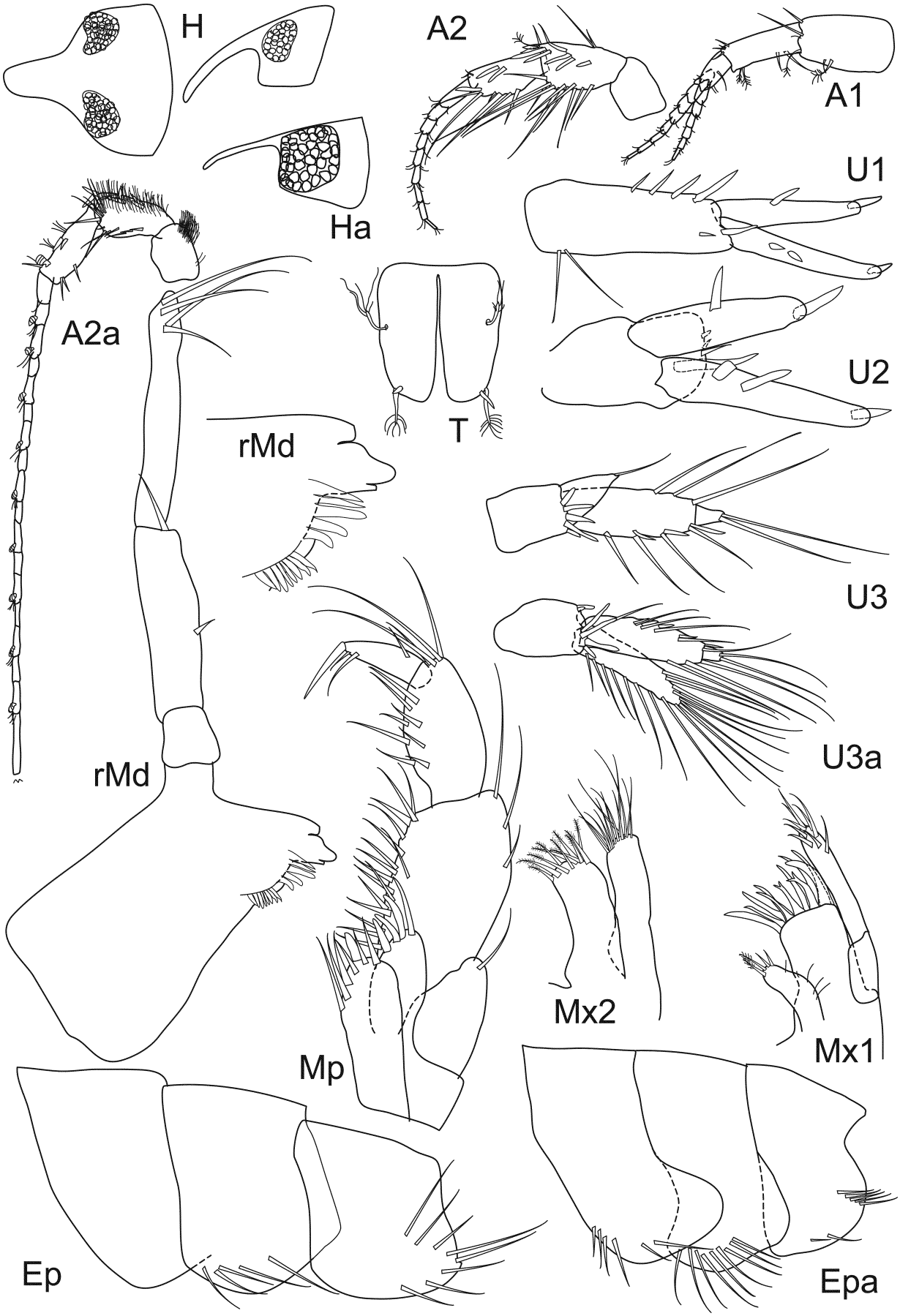

FIGURE 11. *Birubius parvus* **sp. nov.**, holotype, female, 2.5 mm, AM P38468, Blue Lagoon bommie, Lizard Island, Great Barrier Reef.

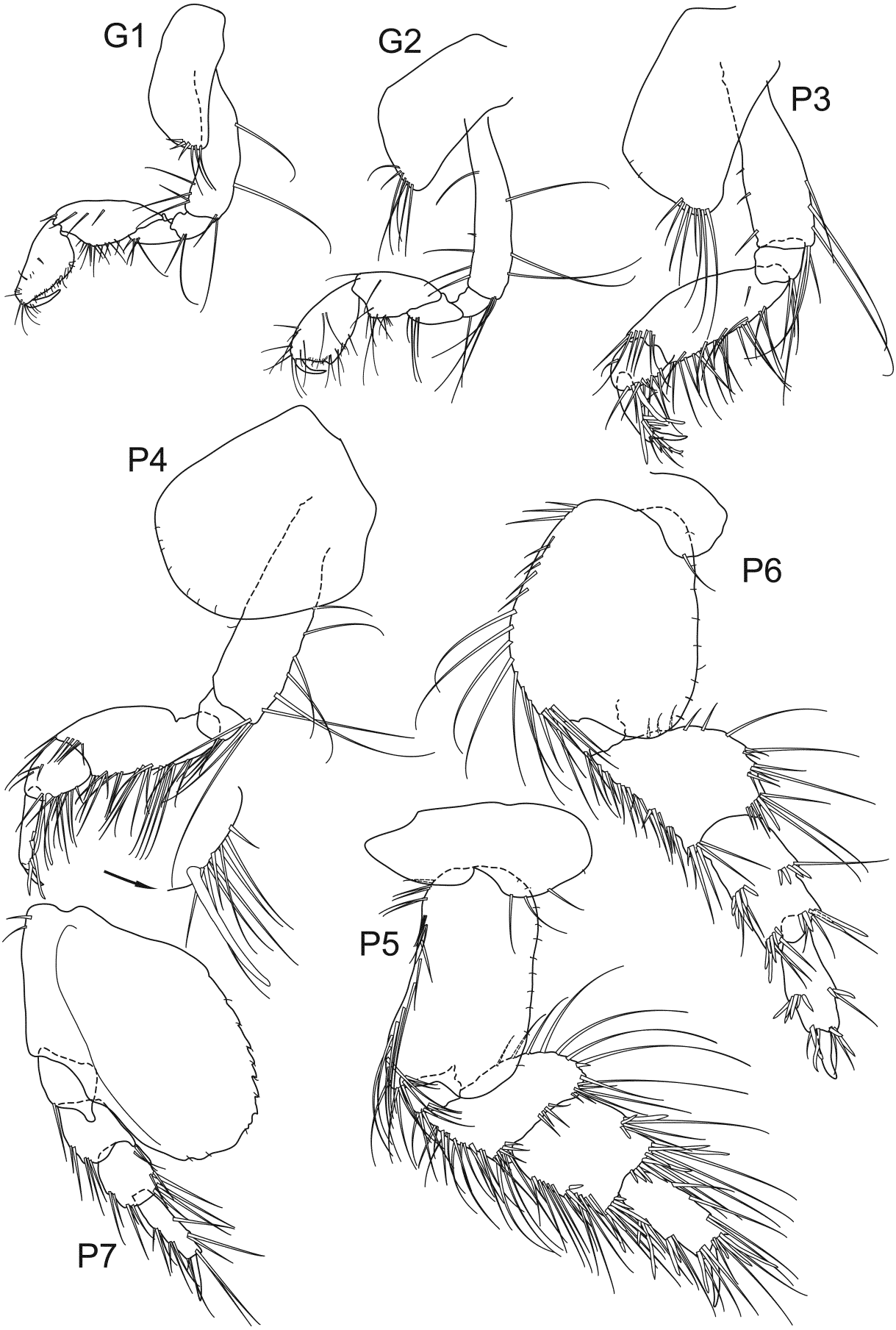

FIGURE 12. *Birubius parvus* **sp. nov.**, holotype, female, 2.5 mm, AM P38468; (a) paratype, male, AM P77845, Blue Lagoon bommie, Lizard Island, Great Barrier Reef.

***Limnoporeia* Fearn-Wannan, 1968**

***Limnoporeia cooki* sp. nov.**
(Figs 13, 14, Pl. 5G)

Type material. Holotype female 2.0 mm, AM P71013, 500 m north-east of North Point, Lizard Island (14°38.700'S 145°27.213'E), 23.9 m, R.T. Springthorpe, 27 February 2005 (QLD 1707). Paratype: female 2.0 mm, AM P70632 (QLD 1621).

Type locality. North-east of North Point, Lizard Island, Queensland, Australia.

Additional material examined. 1 female (damaged), AM P71452 (QLD 1836).

Etymology. Named for English navigator James Cook who, in 1770, climbed to Lizard Island's summit in a desperate bid to find a way out of the labyrinth of reefs within which he found himself trapped.

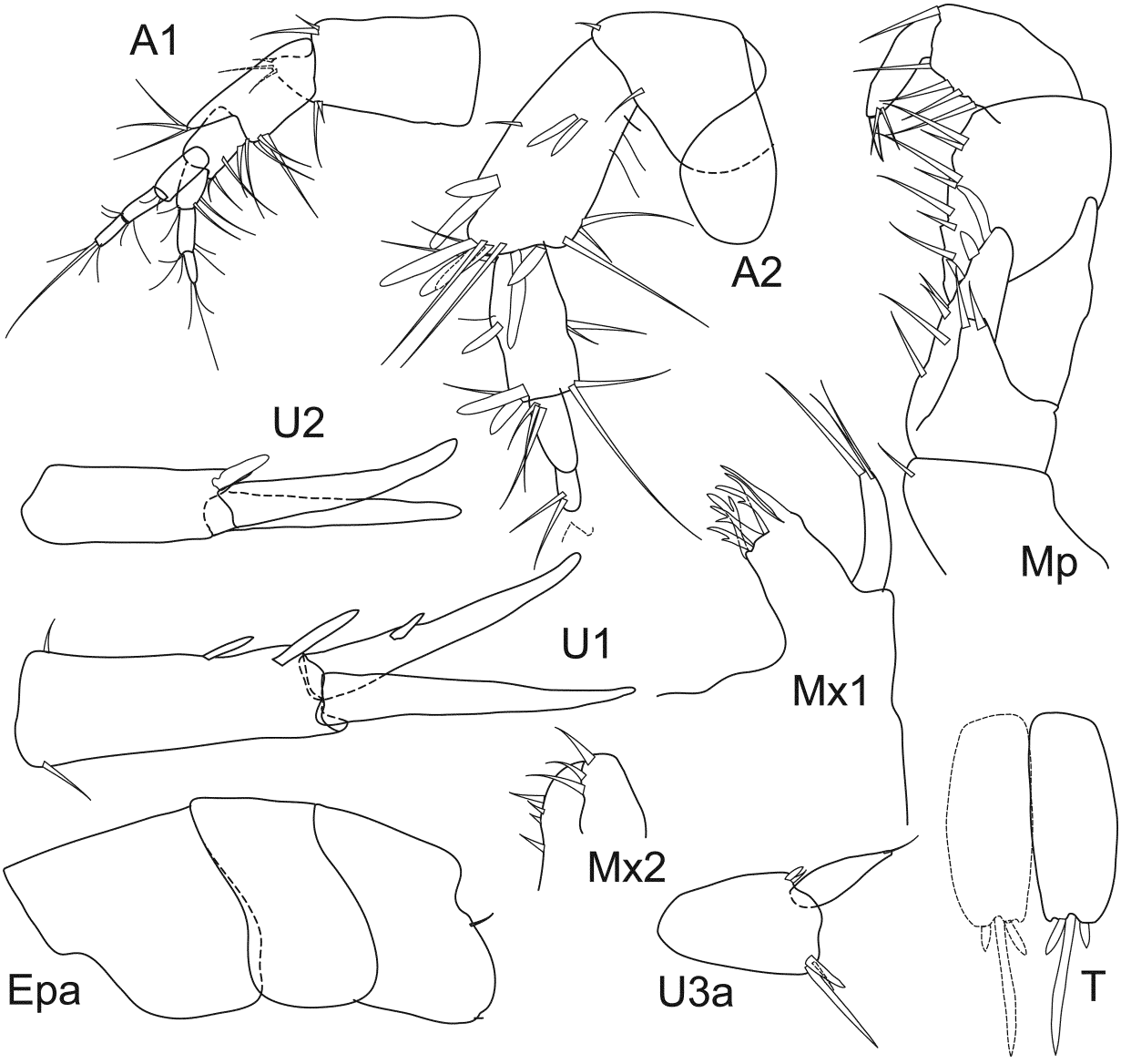

FIGURE 13. *Limnoporeia cooki* **sp. nov.**, holotype, female, 2.0 mm, AM P71013, North Point, Lizard Island; (a) paratype, female, 2.0 mm, P70632, Palfrey Island, Lizard Island, Great Barrier Reef.

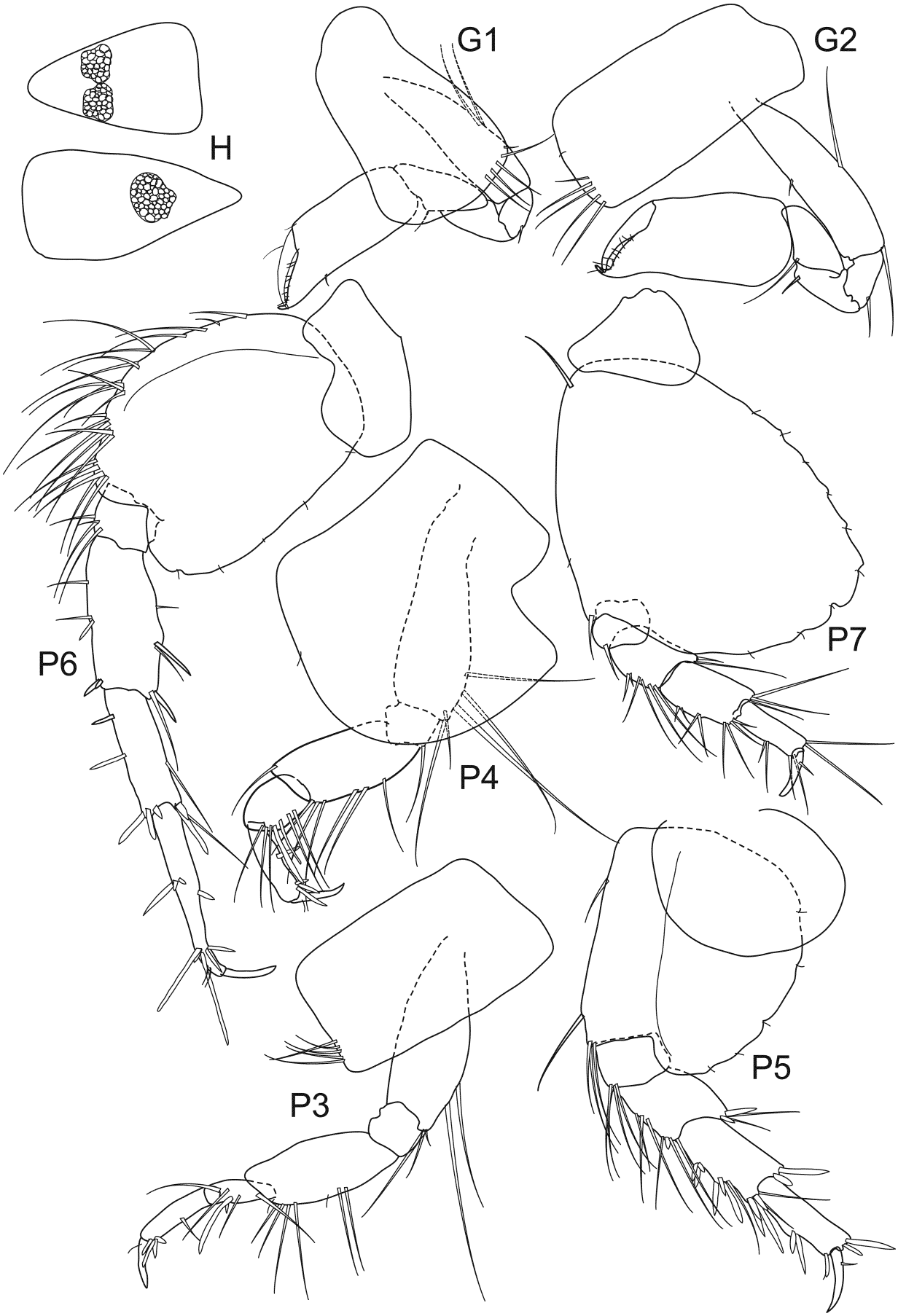

FIGURE 14. *Limnoporeia cooki* **sp. nov.**, holotype, female, 2.0 mm, AM P71013, North Point, Lizard Island, Great Barrier Reef.

Description. Based on holotype female.

Head. *Rostrum* unconstricted; eyes present. *Antenna 1* peduncle article 2 with ventral setae confined apically, article 2 produced mediodistally beyond midpoint of article 3. *Antenna 2* peduncle article 4 facial robust setae in 1 main/apical row, dorsal setae absent or with 1 short setule; article 5 midfacial robust setae present as a single set of 1–3. *Maxilla 1* inner plate unknown; outer plate without an especially thickened robust seta; palp uniarticulate. *Maxilliped* inner plate without large thick apical robust setae; outer plate inner margin poorly armed, with 6 or fewer setae.

Pereon. *Coxae*, long posteroventral setae present on coxae 1–3, absent from coxa 4, main ventral setae of coxae 1–4 = 4–5–5–0. *Coxa 1* expanded distally. *Gnathopods* chelate, slightly dissimilar. Gnathopod 1 carpus free (not cryptic), gnathopod 2 carpus cryptic. *Pereopods 3–4*, carpus lacking posteroproximal robust setae, propodus slender setae absent. *Pereopod 5* basis of broad form, tapering distally (slightly), with 1 facial ridge. *Pereopod 6* basis with 1 facial ridge. *Pereopod 7* basis with few or no long ventral setae, without facial ridge.

Pleon. *Epimeron 1* anteroventral margin without setae, posteroventral face without setae. *Epimeron 2* without facial setae. *Epimeron 3* facial setae absent, with 1 short posterior setae, without facial setae, without ventral setae or with very short setules only. *Uropods 1–2* rami naked, without apical nails. *Uropod 1*, peduncle with 1 basofacial setae, without major displaced robust setae, with 1 apicolateral spine; inner ramus with 1 dorsal spine, without subapical accessory robust setae; outer ramus not continuously spinose to apex.

Habitat. *Halimeda* sp. (green alga) with epiphytes, soft bottom with foraminifera, crinoids, *Halimeda macroloba, Halimeda cylindracea, Caulerpa taxifolia, Gracilaria* sp., *Lobophora* sp. and sediment.

Remarks. The carpus of gnathopod 1 is shortened in comparison with most other species (*L. maranowe*, *L. woorake*, *L. ungamale*, *L. wakkine* and *L. kalduke*). The unreduced and non-recurved dactyl of pereopod 3, and lack of apicoventral process on rostrum distinguishes this new species from other known species of the genus. See also remarks for *L. woorake* herein.

Distribution. *Australia.* Queensland: Lizard Island (current study).

Limnoporeia woorake Barnard & Drummond, 1978

(Figs 15, 16)

Limnoporeia woorake Barnard & Drummond, 1978: 501, figs 255–257. —Lowry & Stoddart, 2003: 236.

Type locality. Western Port, Victoria, Australia.

Material examined. Holotype female "a", NMV J620; 1 female, AM P70995, 1 male and 1 female, AM P77847 and 2 females AM P71001 (QLD1619).

Description. Based on female, 2.0 mm, AM P70995 and 2 females, 2.0, 2.5 mm, AM P71001.

Head. *Rostrum* unconstricted; eyes present. *Antenna 1* peduncle article 2 with ventral setae confined apically. *Antenna 2* peduncle article 4 facial robust setae in a single group of 2, dorsal setae absent or with 1 short setule; article 5 midfacial robust setae present, as a single set of 1–3; flagellum reduced to 6 or fewer articles. *Mandible palp* article 2 without outer setae; *molar* simple, form E (3 or fewer spines usually with common base); right molar with 1 spine, without disjunct spines; right incisor with 3 teeth and notch or mid-cusp, right lacinia mobilis flabellate, right raker row of 2 teeth. *Maxilla 1* inner plate without setae; outer plate without an especially thickened robust seta; maxilla 1 palp uniarticulate. *Maxilliped* inner plate without large thick apical robust setae; outer plate, inner margin poorly armed, with 6 or fewer setae.

Pereon. *Coxae 1–4* with 2 short ventral setae present. *Coxa 1* expanded distally. *Gnathopods* dissimilar. Gnathopod 1 palms weakly chelate, carpus of gnathopod 1 free (not cryptic), of gnathopod 2 cryptic. *Pereopods 3–4* carpus lacking posteroproximal robust setae, propodus slender setae absent. *Pereopod 5* basis of broad form, broader than long, not tapering distally, without facial ridge. *Pereopod 6* basis with 1 facial ridge. *Pereopod 7* basis with few or no long ventral setae, with 1 facial ridge.

Pleon. *Epimeron 1* anteroventral margin without setae, posteroventral face without setae. *Epimeron 2* without facial setae. *Epimeron 3* facial setae absent, with 4 short posterior setae, without ventral setae or with very short setules only. *Uropod 1*, peduncle basofacial setae absent, without major displaced robust setae, with 1 apicolateral spine; inner ramus naked, without subapical accessory robust setae, outer ramus not continuously spinose to apex. Uropods 1–2 rami without apical nails. *Uropod 3* outer ramus article with 2 apical setae.

Habitat. Coarse sand and sand patches between reef.

Remarks. The Lizard Island material closely resembles the illustrations of the female holotype (Barnard & Drummond 1978: 502–505). This species can be distinguished from other phoxocephalids of the GBR by the shape and size of the propodus of gnathopods 1–2 and pereopod 7 basis, few ventral setae on coxae 1–4 and lack of apical nails on uropods 1–2. It can be distinguished from *Limnoporeia cooki* sp. nov. and other species of the genus by the proportions of the gnathopods.

Distribution. *Australia*. Queensland: Lizard Island (current study). Victoria: Western Port and Port Phillip Bay (Barnard & Drummond 1978).

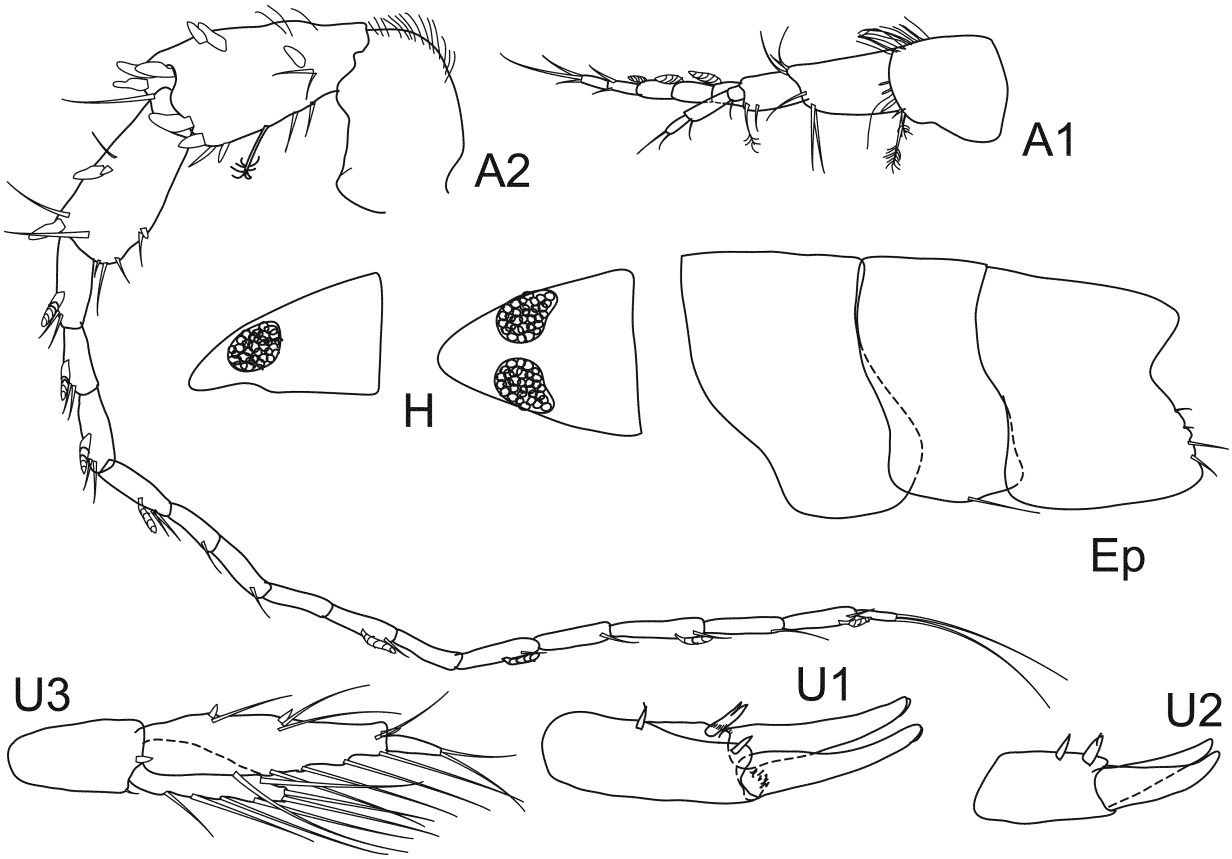

FIGURE 15. *Limnoporeia woorake* Barnard & Drummond, 1978, female, 2.0 mm, AM P70995, reef crest off Coconut Beach, Lizard Island, Great Barrier Reef.

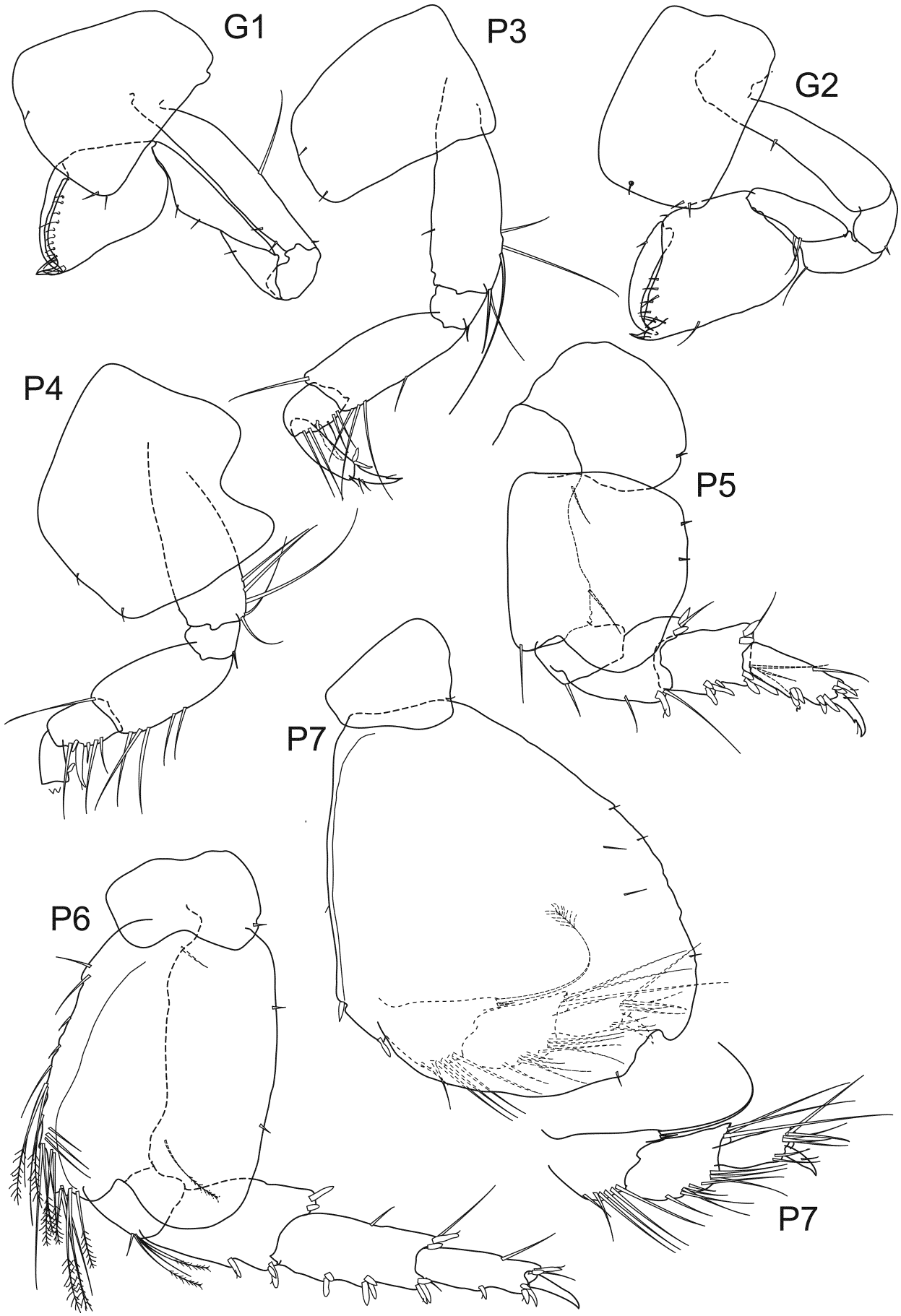

FIGURE 16. *Limnoporeia woorake* Barnard & Drummond, 1978, female, 2.0 mm, AM P70995, reef crest off Coconut Beach, Lizard Island, Great Barrier Reef.

***Metaphoxus* Bonnier, 1896**

***Metaphoxus varanus* sp. nov.**
(Figs 17, 18, Pl. 5H)

Type material. Holotype female, 2.2 mm, AM P71481, Back Reef, Yonge Reef, Lizard Island (14°36.761'S 145°37.362'E), rubble and sediment, bommie on back reef surrounded by sand, airlift, 14.9 m, R.T. Springthorpe, 4 March 2005 (QLD 1809). Paratypes: 2 females, 2.3–2.4 mm, AM P77848, same station data.

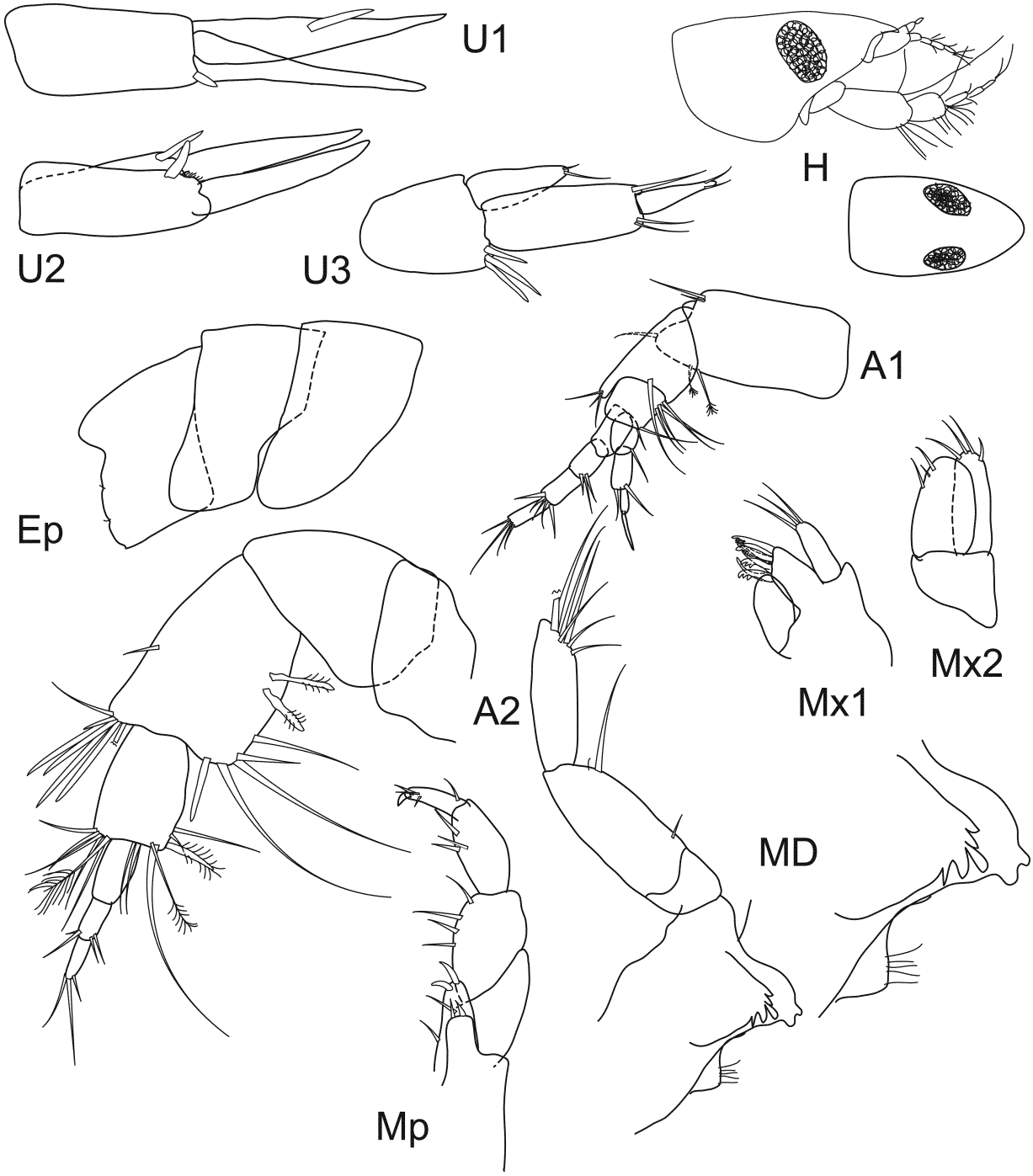

FIGURE 17. *Metaphoxus varanus* **sp. nov.**, holotype, female, 2.2 mm, AM P71481, Yonge Reef, Lizard Island, Great Barrier Reef.

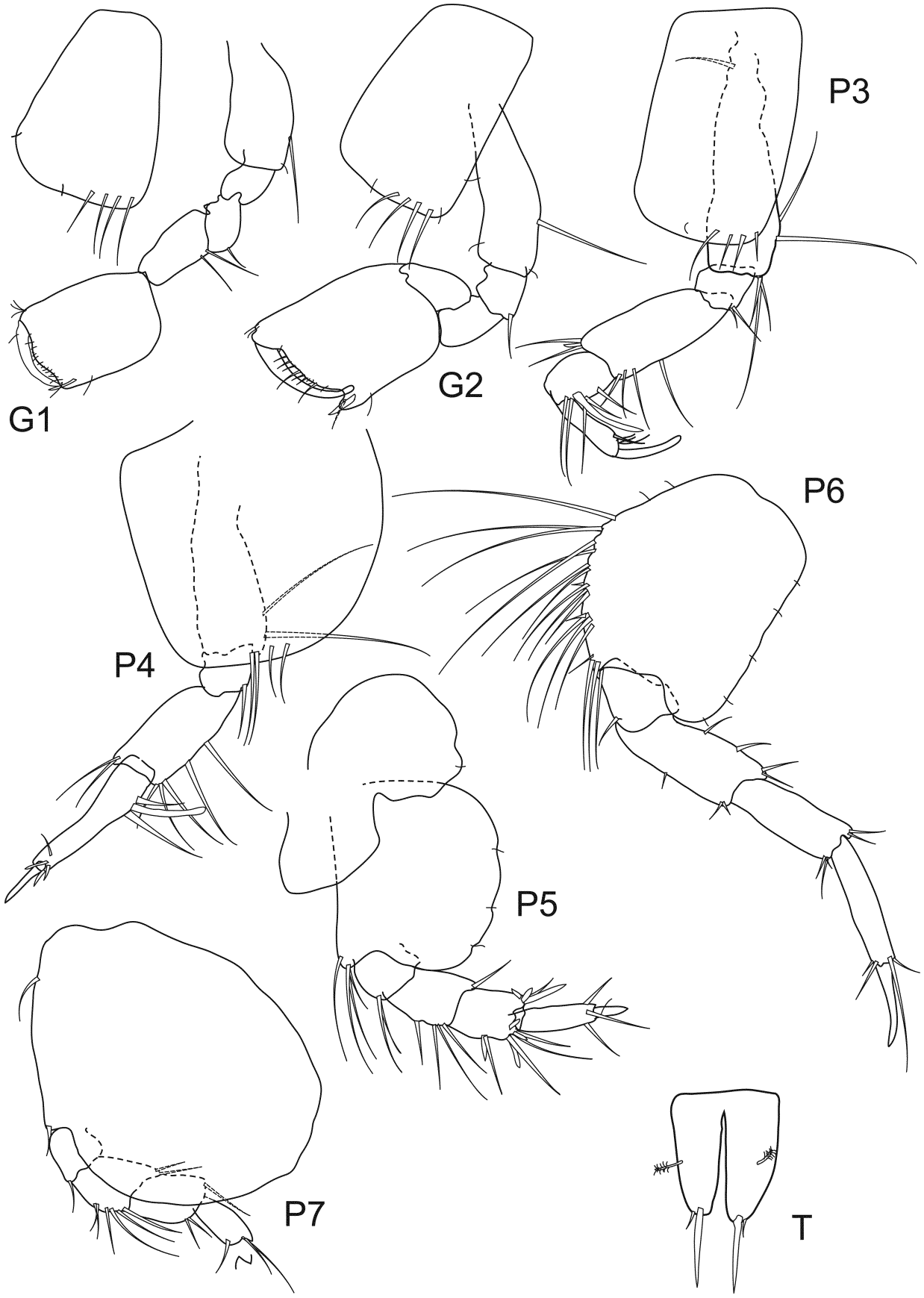

FIGURE 18. *Metaphoxus varanus* **sp. nov.**, holotype, female, 2.2 mm, AM P71481, Yonge Reef, Lizard Island, Great Barrier Reef.

Type locality. Yonge Reef, Lizard Island, Queensland, Australia.

Additional material examined. 1 female, AM P54646 (QLD 44); 1 female, AM P54650 (QLD 52); 3 females, AM P54823 (QLD 805); 16 females, AM P54827 (QLD 809); 8 females, AM P77849 (QLD 907); 1 male, AM P77850 (QLD 940); 1 female, AM P71004 (QLD 1620); 1 female, AM P70879 (QLD 1700); 1 female, AM P71144 (QLD 1707); 1 female, AM P71049 (QLD 1718); 1 female, AM P71306 (QLD 1761); 1 female, AM P77851 (QLD 1621); 1 female, AM P71255 (QLD 1725); 5 males, AM P71525 (QLD 1805); 1 male, AM P71343 (QLD 1805); 4 unsexed (QLD 2014).

Etymology. Named for the genus *Varanus* which includes Gould's Sand Goanna, a common inhabitant of Lizard Island that inspired the Island's name.

Description. Based on holotype female.

Head. *Rostrum* unconstricted; eyes present. *Antenna 1* peduncle article 2 without ventral setae. *Antenna 2* peduncle article 4 without facial robust setae, with a single slender setae, dorsal setae absent; article 5 midfacial robust setae absent; flagellum reduced to 6 or fewer articles. *Mandible palp* article 2 without outer setae; *molar* simple. *Maxilla 1* inner plate without setae; outer plate without an especially thickened robust seta; palp uniarticulate.

Pereon. *Coxae*, long ventral setae present on coxae 1–4, main ventral setae of coxae 1–4 = 4–4–4–5. *Coxa 1* expanded distally. *Gnathopods* dissimilar in size. Gnathopod 1 palm almost transverse, carpus of gnathopod 1 free (not cryptic), of gnathopod 2 cryptic. *Pereopods 3–4*, carpus lacking posteroproximal robust setae, propodus slender setae present. *Pereopod 5* basis of broad form, basis equal to or greater than twice width of ischium, basis not tapering distally, without facial ridge. *Pereopod 6* basis without facial ridge. *Pereopod 7* basis with few or no long ventral setae, without facial ridge.

Pleon. *Epimera 1–3* without facial and marginal setae. *Epimeron 3* without ventral setae or with very short setules only posteriorly. *Uropods 1–2* rami without apical nails. *Uropod 1*, peduncle basofacial setae absent, without major displaced robust setae, with 1 apicolateral spine; inner ramus naked, without subapical accessory robust setae; outer ramus not continuously spinose to apex. *Uropod 3* outer ramus article 2 elongate with 3 apical setae.

Habitat. Rubble and sediment.

Remarks. The broad form of the basis of pereopod 5 and the uniarticulate palp of maxilla 1 place this new species in the Phoxocephalinae. It is placed in the genus *Metaphoxus* differing from closely related *Parametaphoxus* in the length of pereopod 1 carpus and shape of gnathopods. A combination of traits, such as the shape and length/width ratio of propodi of gnathopods and setation and length of uropodal rami, distinguishes this new species from known species of the genus.

Distribution. *Australia.* Queensland: Lizard Island (current study).

Acknowledgments

I am indebted to Dr Rachael King for her initial sorting of the phoxocephalid material and advice throughout the preparation of the manuscript. Thanks to Dr Jim Lowry for encouraging me to work on this interesting fauna and for guidance throughout the project. Colour plates were reproduced with the kind permission of photographer Roger Springthorpe who together with Stephen Keable, dealt with the collection management of the type material. The work was aided by the technical support provided in the Marine Invertebrates Department of Museum Victoria, in particular the collection management support from Chris Rowley and David Staples and assistance from volunteers David Collins and Hannah Murphy. Thanks to my husband Anthony for his patience and for keeping my daughters Rhiannon and Alannah entertained during many hours of drawing. The manuscript benefited from the constructive comments of the anonymous reviewer.

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