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Cyproideidae*

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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

Two new species of cyproideid amphipods, *Cyproidea cobia*, **sp. nov.** and *Narapheonoides lowryi*, **sp. nov.**, are described from the Great Barrier Reef. *Cyproidea cobia*, **sp. nov.**, is characterized by gnathopod 1 having a rectolinear basis and gnathopod 2 ischium posterior process not developed. *Narapheonoides lowryi*, **sp. nov.**, differs from its congeners in that the basis in both pereopods 6 and 7 has a posterodistal flange and the pereopod 6 basis is broader. With the recently described *Gbroidea dingaalana* Lowry & Azman, 2008, collected from Lizard Island, this study brings the number of known cyproideid amphipods from the Great Barrier Reef to three species.

Key words: Crustacea, Amphipoda, Cyproideidae, Great Barrier Reef, Australia, taxonomy, new species, *Cyproidea cobia*, *Gbroidea dingaalana*, *Narapheonoides lowryi*

Introduction

Amphipods of the family Cyproideidae J.L. Barnard, 1969 are known to occur mostly in the Southern Hemisphere (Lowry & Stoddart 2003; Lowry & Azman 2008) and are naturally found in association with marine algae, intertidal rocks, or coral debris (Lowry & Stoddart 2003; Moore 1981; J.L. Barnard 1972). Cyproideids are also known to have associations with live corals (Myers 1985; Thomas 1999), sponges (Ortiz & Sanchez-Diaz 2000), crinoids (Potts 1915; Lowry & Azman 2008) and hydroids (Griffiths 1975). Members of the cyproideids are characterised by: coxae 1 and 2 being very small, with immensely enlarged and broadened coxae 3 and 4, uropod 3 biramous with elongated peduncle and often with dorsal keel. Up to now, 18 genera have been described worldwide, of which 3 genera i.e., *Austropheonoides* J.L. Barnard, 1972, *Gbroidea* Lowry & Azman, 2008, and *Narapheonoides* J.L. Barnard, 1972 are known to be endemic to Australia.

On examining the amphipod collections from the Great Barrier Reef deposited in the Australian Museum, Sydney (AM), two new species in the genera *Cyproidea* and *Narapheonoides* were discovered. In the present paper, these species, *Cyproidea cobia* **sp. nov.** and *Narapheonoides lowryi* **sp. nov.**, are described and their differences to other related species are discussed.

Materials and Methods

Material was hand-collected on scuba and is lodged in the Australian Museum, Sydney (AM). A set of colour plates, a list of standard abbreviations and detailed station data is available in Lowry & Myers (2009). A CD

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(*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.

Cyproideidae J.L. Barnard, 1974

***Cyproidea* Haswell, 1879**

***Cyproidea cobia* sp. nov.**
(Figs 1, 2, 3, Pl. 2G)

Type material. Holotype, sex unknown, 4.2 mm, AM P78320 (in slides), Cobia Hole, Lizard Island (14°39.09'S 145°26.51'E), coarse sediment, 17 m, J.K. Lowry, 25 February 2005 (QLD 1666). Paratype: 1 unsexed, AM P70762, Loomis Beach moorings, Lizard Island, Queensland (14°41.027'S 145°26.877'E), sand & silt, sandy bottom, 3 m, J. Just, 25 February 2005 (QLD 1650).

Type locality. Cobia Hole, Lizard Island, Queensland, Australia (14°39.09'S 145°26.51'E).

Additional Material Examined. 1 unsexed, AM P70781 (QLD 1666); 2 unsexed, AM P70913 (QLD 1672).

Etymology. Named after the type locality.

Description. Based on holotype, sex unknown, AM P70837.

Head. *Head* lateral cephalic lobe narrowly rounded apically; eyes large and round. *Antenna 1* peduncle article 2 produced distally; primary flagellum with 7 articles. *Antenna 2* slender and slightly longer than antenna 1. *Mandible* molar vestigial; palp present, with 3 articles, long and slender; lacinia mobilis multidentate; incisor strongly dentate. *Maxilla 1* palp 1-articulate. *Maxilla 2* outer plate longer than inner, both generally setose. *Maxilliped* outer plate not reaching the distal margin of palp article 1; palp with 4 articles, article 3 terminating in a lobe, article 4 dactylate. *Upper lip* asymmetrically. *Lower lip* apical margin of the outer lobe with small and deep cleft; mandibular process rounded.

Pereon. *Gnathopod 1* subchelate; coxa vestigial; basis slender with minute setae along anterior margin; ischium posterior margin bristly; merus produced into triangular process; carpus subtriangular, not produced in the posterior lobe, with long setae and bristly; propodus subovate, palm serrated; dactylus attenuate, inner margin serrate. *Gnathopod 2* carpochelate; coxa vestigial; basis subrectangular; ischium subrectangular, posterior process not developed; carpus lobe extending almost two third of propodus; propodus subovate, palm serrated; dactylus, inner margin serrated, attenuated. *Pereopod 3* coxa expanded, broadly triangular; basis to dactylus slender. *Pereopod 4* coxa very developed, relatively bigger than coxa 3; basis to dactylus slender. *Pereopod 5* basis rectolinear. *Pereopod 6* coxa small with minute seta posterodistally; basis rectolinear. *Pereopod 7* coxa small with minute seta posterodistally; basis slightly expanded proximally.

Pleon. *Pleonite 3* without dorsodistal process. *Epimeron 3* posteroventral corner rounded. *Urosomite 1* without dorsal keel. *Urosomite 3* with triangular process reaching beyond half of telson. *Uropod 1* peduncle longer than rami; rami subequal in length with minutely pectinate. *Uropod 2* similar to uropod 1 but smaller. *Uropod 3* peduncle as long as inner ramus, outer ramus slightly longer than inner. *Telson* apically rounded.

Habitat. Coarse sediment, 3–17 m.

Remarks. The genus *Cyproidea* is characterized by a having transverse palm on gnathopod 2, vaulted urosomite 3 overlapping the telson, telson small and not reaching apex of peduncle 3. So far, only five species of *Cyproidea* have been described, *Cyproidea ornata* Haswell, 1879, based on material from Port Jackson, New South Wales; *Cyproidea liodactyla* Hirayama, 1978, from Japan; *Cyproidea marmorata* Moore, 1981, from Tinderbox, Tasmania; *Cyproidea robusta* Ren, 2006 from Hainan, China; and *Cyproidea serratipalma* Schellenberg, 1938, from New Caledonia.

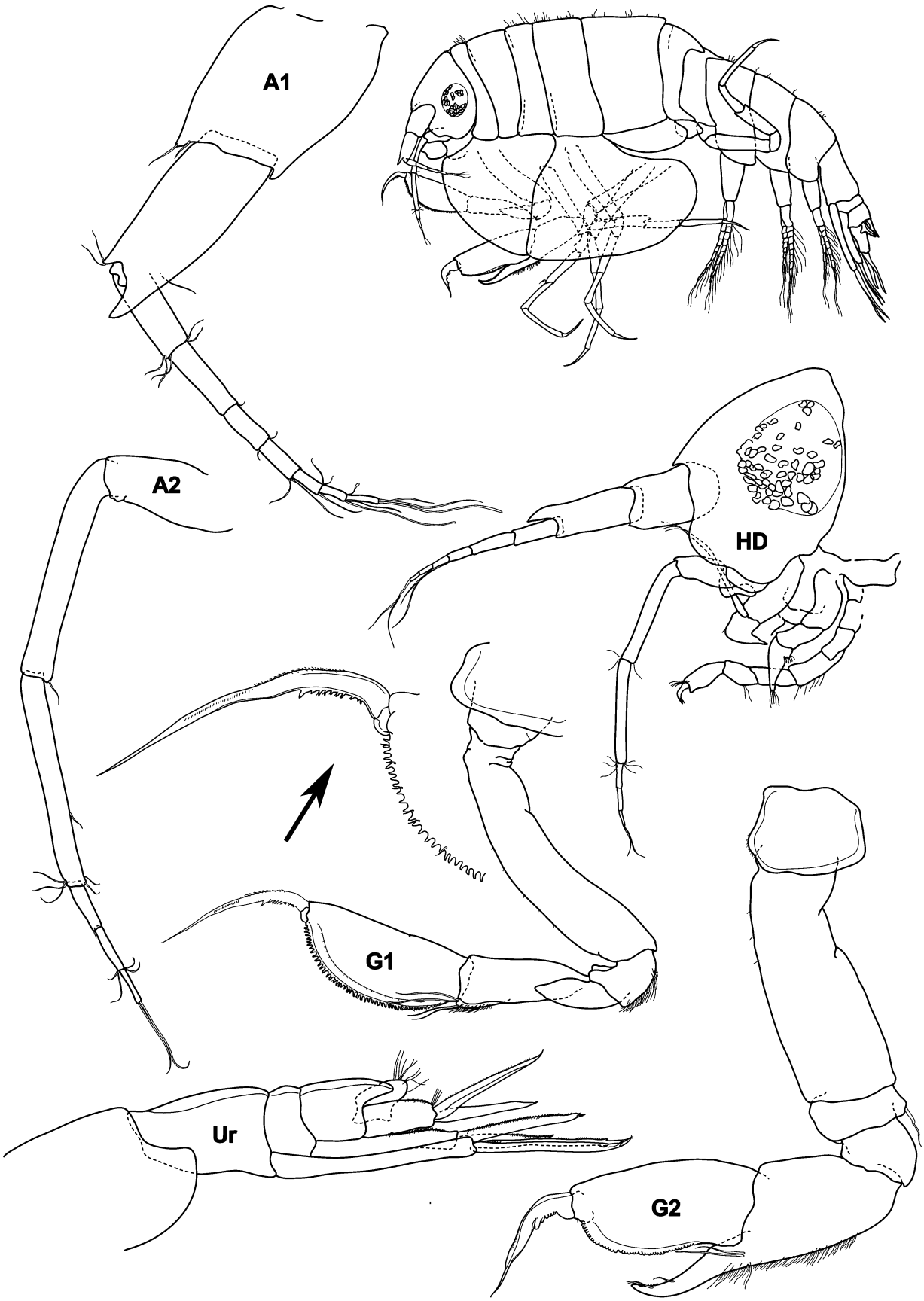

FIGURE 1. *Cyproidea cobia* **sp. nov.**, holotype, sex unknown, 4.2 mm, AM P78320, Cobia Hole, Lizard Island, Great Barrier Reef.

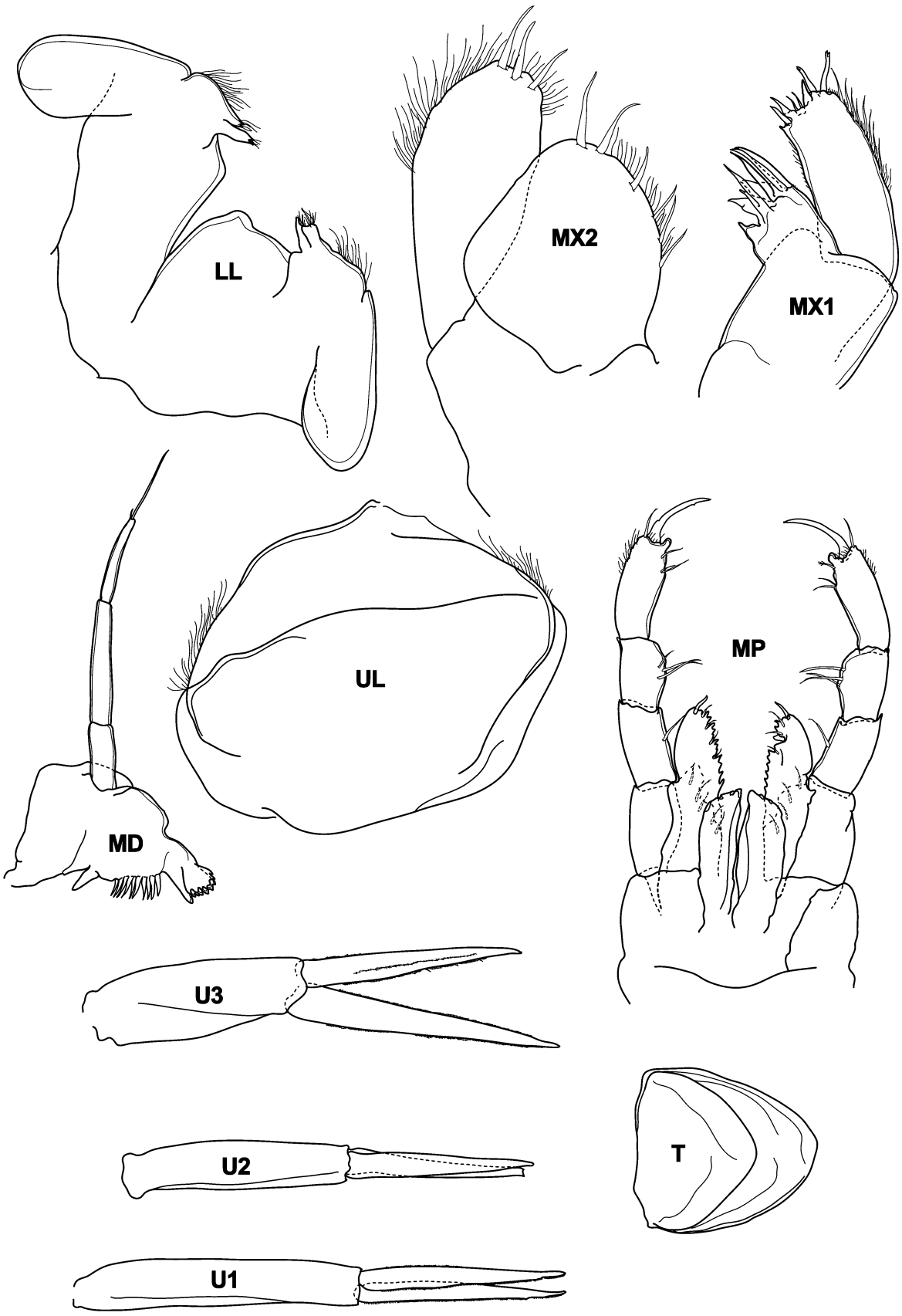

FIGURE 2. *Cyproidea cobia* **sp. nov.**, holotype, sex unknown, 4.2 mm, AM P78320, Cobia Hole, Lizard Island, Great Barrier Reef.

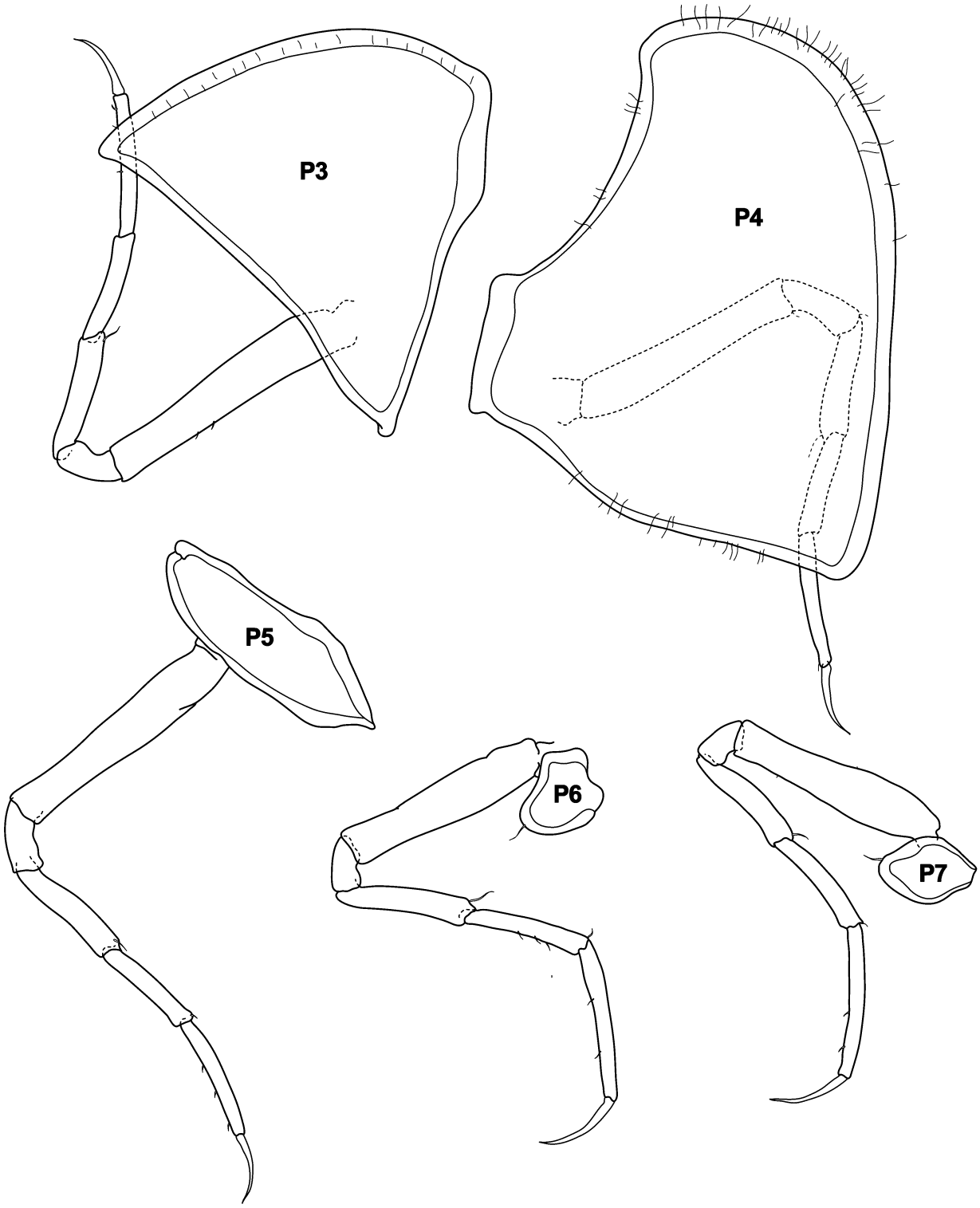

FIGURE 3. *Cyproidea cobia* **sp. nov.**, holotype, sex unknown, 4.2 mm, AM P78320, Cobia Hole, Lizard Island, Great Barrier Reef.

The new species can be distinguished from all other existing species of *Cyproidea* by the following characteristics: (1) the basis of gnathopod 2 is rectolinear whereas in the remaining species they are somewhat expanded anteriorly; (2) the posterodistal process of gnathopod 2 ischium is not developed, on the contrary it is well developed in the rest of the species. *Cyproidea cobia* **sp. nov.** closely resembles *Cyproidea liodactyla* in having slightly produced carpal lobe of gnathopod 1 and subequal length of uropod 2 rami, but is easily distinguishable by the undeveloped posterodistal process of gnathopod 2 ischium. However, in terms of body

size *Cyproidea cobia* at 4.2 mm is distinctly larger than *Cyproidea liodactyla* (2.8 mm), *Cyproidea marmorata* (3.5 mm) and *Cyproidea serratipalma* (4.0 mm).

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

Gbroidea Lowry & Azman, 2008

Gbroidea dingaalana Lowry & Azman, 2008
(Figs 4, 5, Pl. 2H)

Gbroidea dingaalana Lowry & Azman, 2008: 61, figs 2–4.

Type locality. Off Watsons Beach, Lizard Island, Queensland, Australia (14º40'S 145º28'E).
Material examined. Holotype female, 2.5 mm, AM P76155 (QLD 2010). Paratypes: 4 females, AM P38473 (QLD 2010); 2 females, AM P38471(QLD 2011); 4 females, AM P38472 (QLD 2011).

Description. Based on holotype female, 2.5 mm, AM P76155.

Head. *Head* lateral cephalic lobes apically acute. *Eyes* large, irregularly round with deep brown core. *Antenna 1* flagellum with about 4 articles each with long aesthetascs distally; accessory flagellum 1 articulate. *Antenna 2* slightly shorter than antenna 1, slender; flagellum with 4 articles, apex of terminal segment with few long setae. *Lower lip* outer lobes apically produced with dense short apical setae. *Maxilliped* inner plate not broad, apically truncate; outer plate extending beyond inner plate, apex with one small robust seta and several simple setae; palp 4-articulate, article 2 wider than long, dactylus apically falcate.

Pereon. *Gnathopod 1* coxa vestigial; basis robust, anterior margin with 4 medium length setae, posterior margin with 1 seta posterodistally; merus not elongated, posterior margin with two setae; carpus distally expanded, anterodistally rounded with a pair of setae, posterior margin slightly produced with 3 posterodistal setae; propodus subrectangular, anterior margin with 3 setae, tooth-like process anterodistally, posterior margin straight; dactylus falcate. *Gnathopod 2* basis robust, anterior margin lined with medium length setae, posterior margin without setae; merus posterodistal margin with long setae; carpus subtriangular, subequal in length with propodus, anterior margin without setae, anterodistal margin with two setae. *Pereopod 3* coxa anterior margin expanded, rounded, posterior margin slightly concave; basis anterior margin densely setose; merus gradually expanding anterodistally. *Pereopod 4* coxa enlarged, shield-like, anterior margin almost straight, posterior margin with well developed rounded posterodistal margin; basis anterior margin straight, posterior margin slightly concave. *Pereopod 5* coxa anterior and posterior margin rounded; basis slender, rectolinear; merus posterodistal margin slightly produced. *Pereopod 7* shorter than pereopod 6; coxa anteroventral margin produced, expanded; basis anterior margin straight, with 2 setae along margin, posterior margin expanded, with distal lobe extending beyond ischium.

Pleon. *Epimeron 3* posterodistal margin rounded. *Uropod 1* rami subequal, peduncle slightly shorter than rami, both margins of both rami pectinate. *Uropod 2* biramous, inner ramus shorter than outer ramus, both margins of both rami pectinate. *Uropod 3* biramous; peduncle subequal in length of inner ramus; inner ramus shorter than outer, outer margins pectinate. *Telson* entire.

Male (sexually dimorphic characters). Unknown.

Habitat. Living in association with the unstalked crinoids, *Comathus briareus*, *Comatula rotalaria* and *Zygometra microdiscus*.

Remarks. As Lowry & Azman (2008) pointed out, *Gbroidea dingaalana* has been observed on three crinoid species: *Comathus briareus*, *Comatula rotalaria* and *Zygometra microdiscus*. The weakly developed mouthparts of *G. dingaalana* indicate that it is probably feeding on soft tissue, possibly epidermal tissue from the crinoid. This relationship appears to be very similar to that mentioned by Vader (1978) and Comely & Ansell (1988) for the uristid amphipod, *Euonyx chelatus*, which is an epiparasite of the regular sea urchin, *Echinus esculentus*.

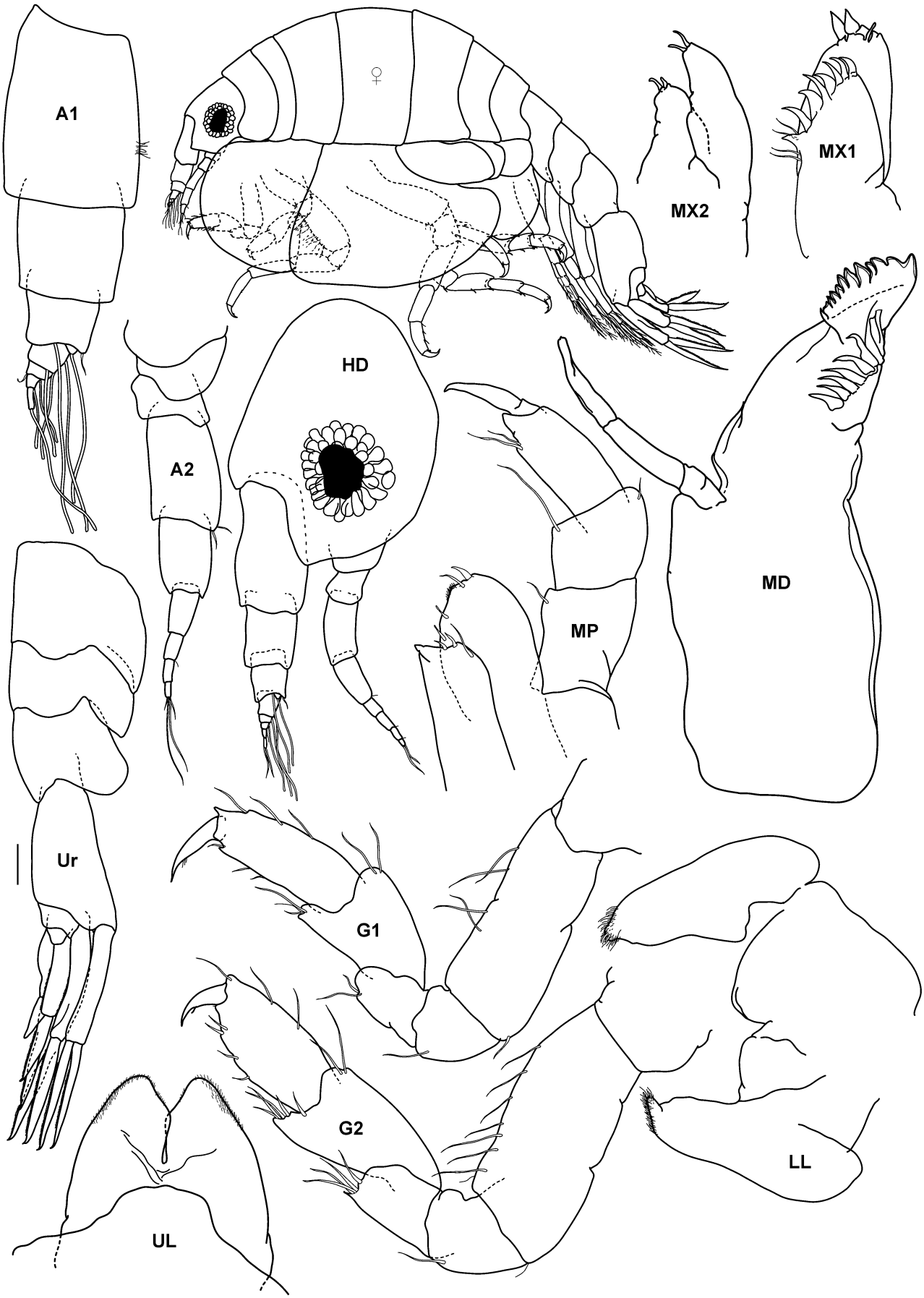

FIGURE 4. *Gbroidea dingaalana* Lowry & Azman, 2008, holotype, female, 2.5 mm, AM P76155, off Watsons Beach, Lizard Island, Great Barrier Reef (after Lowry & Azman 2008).

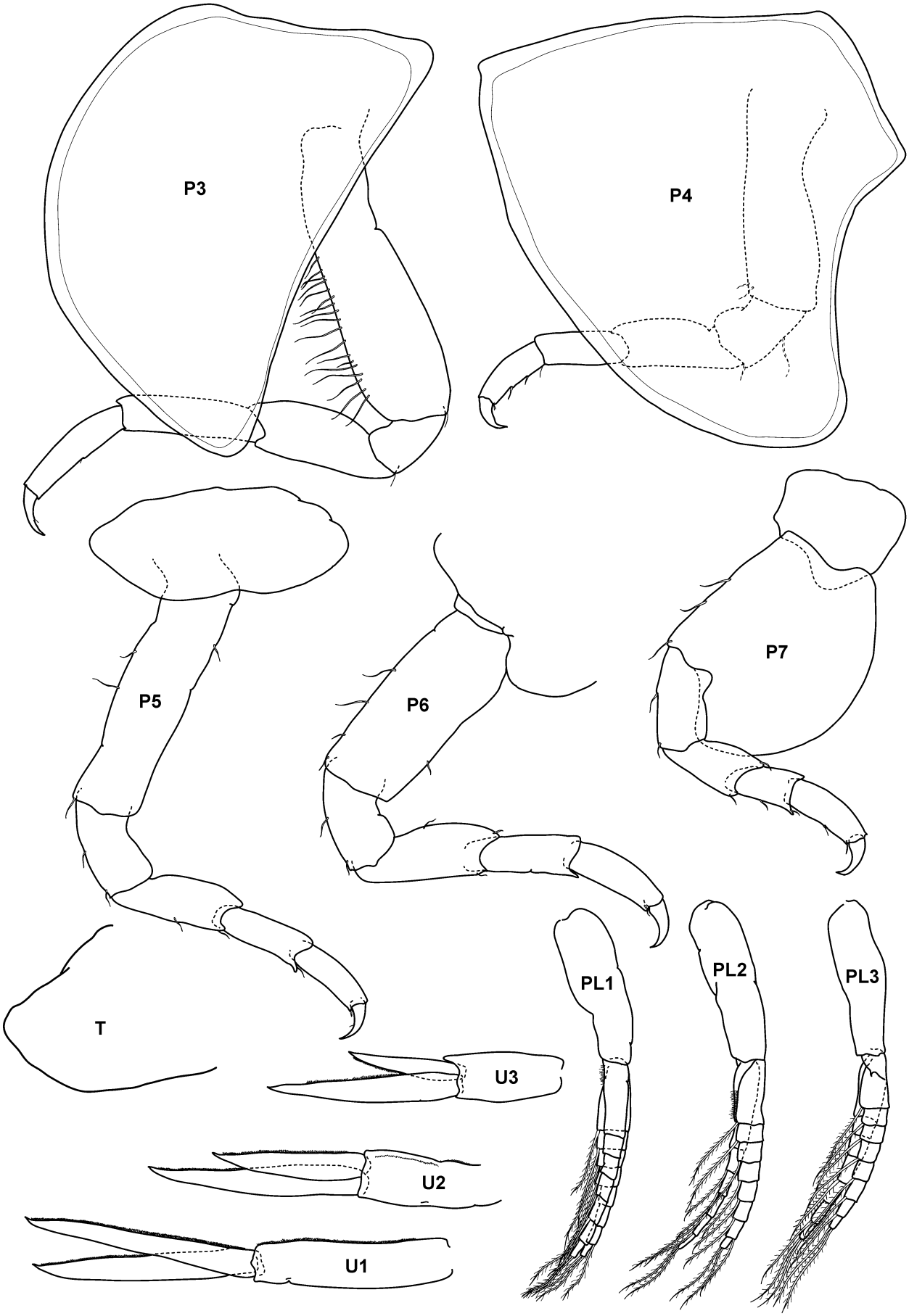

FIGURE 5. *Gbroidea dingaalana* Lowry & Azman, 2008, holotype, 2.5 mm, AM P76155, off Watsons Beach, Lizard Island, Great Barrier Reef (after Lowry & Azman 2008).

Morphologically *Gbroidea dingaalana* appears to be most closely related to the genera *Cyproidea* and *Mokuoloe* by having similar shape and embellishment especially the rectolinear basis of pereopod 5 to 6, however both of the genera differ from the present species by having subchelate gnathopod 1. Ultimately *Gbroidea dingaalana* has no agreement with any other species shown in its unique association with the three crinoid species, apart from that it is easily distinguished by the, (1) absence of molar, (2) gnathopod 1-2 simple, (3) pereopod 5-6 basis rectolinear, (4) urosomite 1 elongate, without dorsal keel, (5) urosomite 3 not projecting over telson, (6) telson laminar, shorter than apex of uropod 3 rami.

Distribution. *Australia*. Queensland: Lizard Island (Lowry & Azman 2008).

Narapheonoides Barnard, 1972

Narapheonoides lowryi sp. nov.

(Figs 6, 7, Pl. 3A)

Type material. Holotype, sex unknown, 1.9 mm, AM P70830 (in slides), Cobia Hole, Lizard Island (14°39.09'S 145°26.51'E), coarse sediment, 17 m, J.K. Lowry, 25 February 2005 (QLD 1666).

Additional material examined. 1 sex unknown, AM P70799 (QLD 1654).

Type locality. Cobia Hole, Lizard Island, Queensland, Australia (14°39.09'S 145°26.51'E).

Etymology. This species is dedicated to Dr J.K. Lowry (The Australian Museum), collector of most of the type series for this study.

Description. Based on holotype, AM P70830.

Head. *Head* dorsal margin longer than pereonites 2 and 3 combined. *Eyes* large, circular. *Antenna 1* slightly shorter than antenna 2; accessory flagellum 1-articulate; primary flagellum 4 articulate, each bearing a tuft of long aesthetascs ventrodistally. *Antenna 2* slender, sparsely setose; gland cone stout, almost reaching distal end of peduncular article 3. *Mandible* molar well developed; palp absent. *Maxilla 1* palp 1 articulate. *Maxilla 2* outer plate longer than inner plate. *Maxilliped* inner plate narrow; outer plate extending beyond palp article 1; palp 4 articulate; palp article 3 with lobe on inner margin; article 4 falcate. *Upper lip* asymmetrically bilobed. Lower lip inner lobes undefined; shoulders of outer lobe risen, densely bristly.

Gnathopod 1 scarcely subchelate; carpus gradually widening, carpal lobe extended distally to one fourth of propodus with three stout robust setae on distal margin; propodus almost straight and parallel, anterior margin with robust seta, palm with three robust setae; dactylus falcate with serrations along inner margin. *Gnathopod 2* subchelate; merus subcylindrical, gradually narrowing distally, with several robust setae; carpus anterodistally produced, posterodistal end produced as gnathopod 1, with a number of robust setae along the margin; propodus as long as carpus, posterior margin gradually expanding distally with several robust setae at distal end; palm transverse; dactylus falcate with serrations along inner margin. *Pereopod 3* coxa expanded, posterior margin gently concave; basis slender; merus gradually expanding on anteroproximal margin. *Pereopod 4* coxa subquadrate, posterior margin extended backward; basis to dactylus slender. *Pereopod 5* basis rectolinear. *Pereopod 6* coxa expanded backward and downward; basis uniform in width with flange, anterior margin with several robust setae along margin; merus posterior margin gradually expanding. *Pereopod 7* coxa semicircular; basis subovate, anterior margin slightly rounded with several robust setae along margin, posterior margin slightly rounded with flange; merus posterior margin gradually expanding proximally, distal extension subtriangular.

Pleon. *Urosomite 1* with dorsal keel. *Uropod 1* well developed; extending beyond uropod 2, slender; peduncle subequal to rami in length with ventromedial process; both rami subequal to each other in length. *Uropod 2* well developed; peduncle shorter than rami; outer ramus slightly longer than inner. *Uropod 3* reduced; peduncle with ventromedial process; outer ramus longer than inner. *Telson* elongate, semioval, reaching two thirds of peduncle of uropod 3.

Habitat. Coarse sediment, 17 m depth.

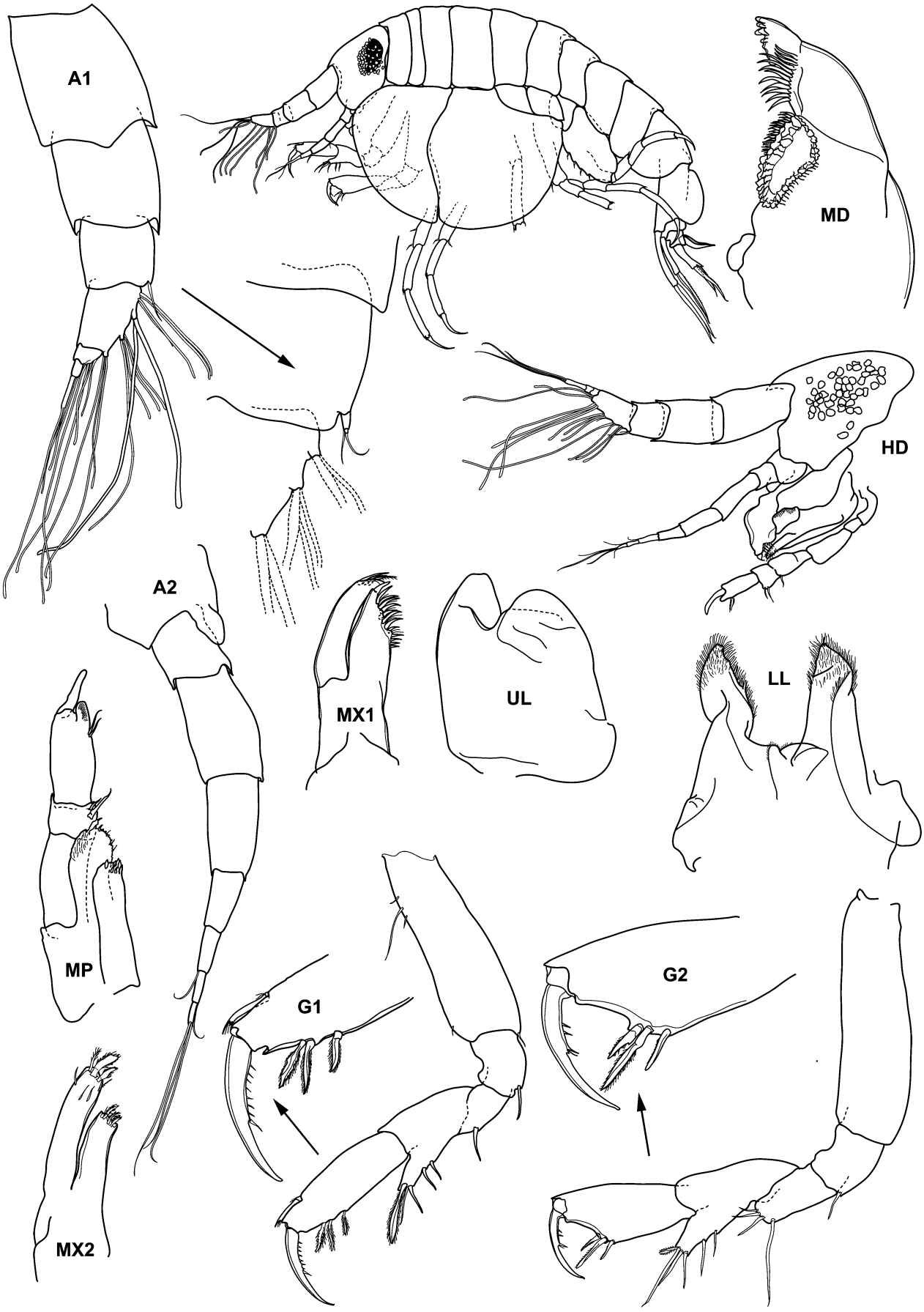

FIGURE 6. *Narapheonoides lowryi* **sp. nov.**, holotype, sex unknown, 1.9 mm, AM P70830, Cobia Hole, Lizard Island, Great Barrier Reef.

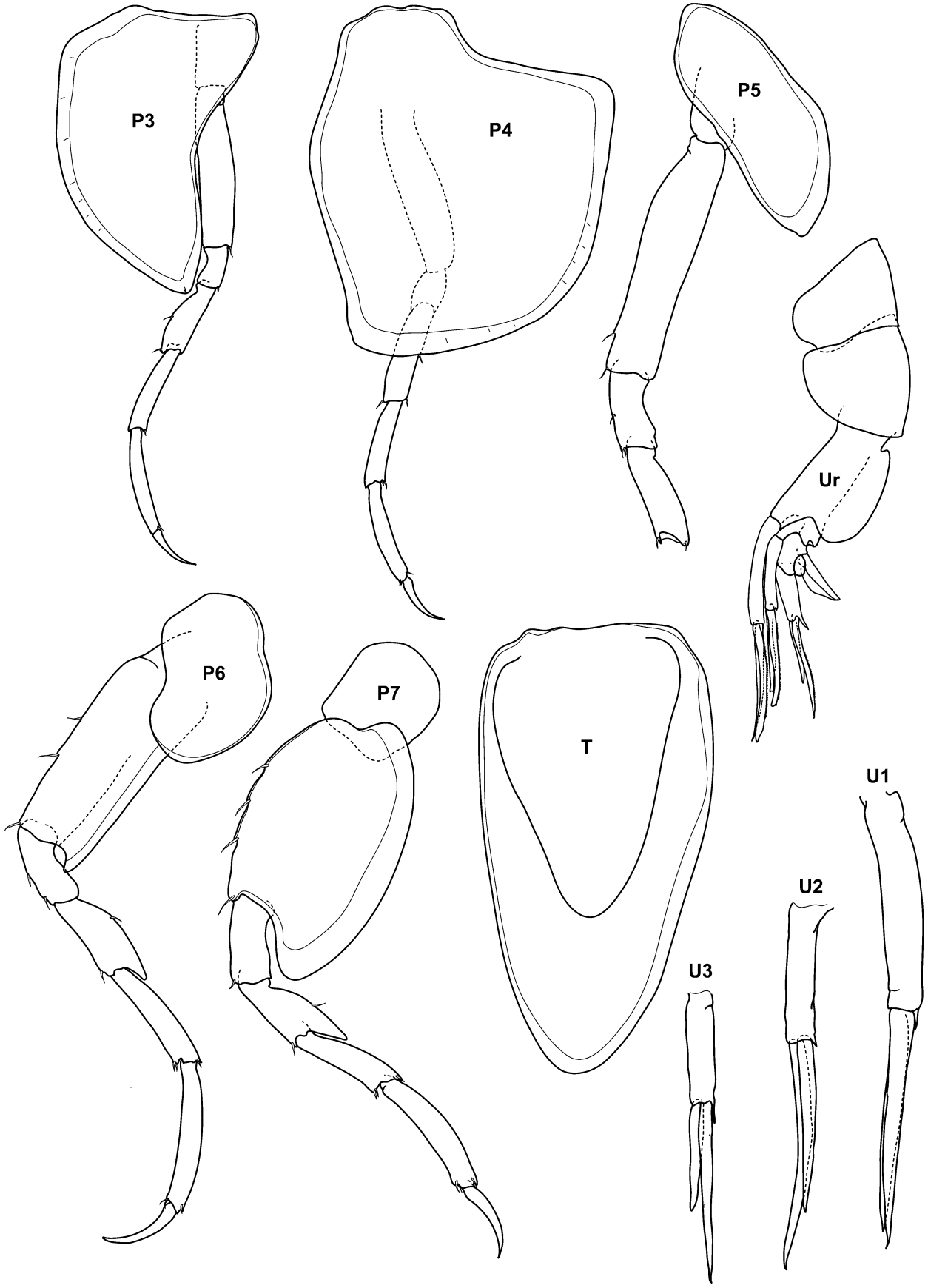

FIGURE 7. *Narapheonoides lowryi* **sp. nov.**, holotype, sex unknown, 1.9 mm, AM P70830, Cobia Hole, Lizard Island, Great Barrier Reef.

Remarks. *Narapheonoides* can be easily distinguished from the remaining genera of the family Cyproideidae by these combined characters: (1) mandible with well developed molar and the absence of mandibular palp; (2) pereopod 6 basis expanded; (3) maxilla 1 palp 1-articulate; (4) urosomite 1 with keel. As mentioned by J.L. Barnard (1972), the genus *Narapheonoides* has the closest affinity with the Caribbean *Hoplopheonoides* Shoemaker, 1956, but differs from the latter in the presence of an accessory flagellum, the stronger palm of gnathopod 1 and pereopod 6 basis expanded. To date the genus contained only a single species, *Narapheonoides mullaya* J.L. Barnard based on material from Cape Naturaliste, Western Australia. However, the present specimen is readily distinguished from *N. mullaya* by having a narrower propodus and less defined palm of gnathopod 1, basis of pereopod 6 broader and by the posterodistal flange of pereopods 6 and 7.

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

Acknowledgements

I am grateful to Dr. J.K. Lowry (The Australian Museum) for making the collections available for study, literature and for his valuable advice. I thank Dr. S.J. Keable (The Australian Museum) for providing valuable information on the type-locality. I am indebted to Prof. Dr. Othman Ross (EKOMAR UKM), for providing facilities and equipment during this research.

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