Zootaxa 2260: 440–452 (2009)
www.mapress.com/zootaxa/

Article

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

Hyalidae*

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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

As a result of the Amphipod Lizard Island workshop (2005) three species of Hyalidae were found: two new species are described, *Hyachelia lowryi* **sp. nov.** and *Lelehua myersi* **sp. nov.** and *Parhyale hawaiensis* is recorded for the first time for Australia.

Key words: Amphipoda, Hyalidae, new species, Great Barrier Reef, Australia, *Hyachelia lowryi, Lelehua myersi, Parhyale hawaiensis*

Introduction

Hyalidae Bulycheva, 1957 is part of the superfamily Talitroidea, which according to Serejo (2004) also includes three other families – Chiltoniidae J.L. Barnard, 1972, Dogielinotidae Gurjanova, 1953 and Talitridae Rafinesque, 1815. The family Hyalidae is predominantly found among algae of tropical and subtropical zones inhabiting the intertidal and shallow infralittoral areas of the world. Bousfield & Hendrycks (2002) revised the hyalids, based on the North Pacific fauna and split the large *Hyale* Rathke, 1837 genus into five additional new genera, and created a further 13 new species. They considered the Hyalidae to include about 110 species distributed in 12 genera and three subfamilies. However, according to Serejo´s (2004) classification, Hyalidae encompasses 11 genera in two subfamilies (Hyacheliinae Bousfield & Hendrycks, 2002 and Hyalinae Bulycheva, 1957).

The first studies to describe hyalids for Australia were those of Dana (1852) and Haswell (1879a, 1879b). Sheard (1937) included 19 species of Talitridae (*sensu lato*, Hyalidae + Talitridae + Chiltoniidae) in his Australian catalogue. J.L. Barnard (1974) studied the Australian *Hyale* (*sensu lato*) genus, redescribing some Haswell species and describing four new species. A key to the 12 known species was presented at that time. More recently, Lowry & Stoddart (2003) catalogued the Australian amphipod fauna and updated our knowledge of the Hyalidae. Twenty species of Hyalidae (including chiltoniids, *Allorchestes* Dana, 1849 and *Hyale* (*sensu lato*)) were recorded.

Material and methods

The descriptions were generated from a DELTA database (Dallwitz 2005) based on the Hyalidae world genera and Australian species. Material was hand-collected from sea turtles or on snorkel or SCUBA and is lodged in the Australian Museum, Sydney (AM), the Queensland Museum (QM) and Museu Nacional, Universidade

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

Federal do Rio de Janeiro (MNRJ). A set of colour plates, a list of standard abbreviations (except **Ha**, habitus; **Y**, largest male juvenile; **y**, smallest male juvenile) and detailed station data is available in Lowry & Myers (2009). 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.

Hyalidae Bulycheva, 1957

Hyacheliinae Bousfield & Hendrycks, 2002

Hyachelia J.L. Barnard, 1967

Diagnosis. Maxilla 1 with palp vestigial or **reaching base of the outer ramus setal-teeth**. Article 4 of maxilliped blunt to triangular with normal (short) or **whip-like (very long) distal setae in males**. Gnathopods 1–2 subchelate, male gnathopod 2 enlarged and lacking a produced lobe on carpus. All pereopods prehensile with grasping robust setae. Uropod 1 without inter-ramal robust seta. Urosomite 3 obscure, uropod 3 lacking rami, peduncle narrowing distally with 1–2 distal robust setae. Telson formed of two separated lobes narrowing distally.

Remarks. *Hyachelia* has been, until the present study, a monotypic genus described by J.L. Barnard (1967), based on the species *Hyachelia tortugae* J.L. Barnard, 1967, collected from the sea-turtle *Chelonia mydas* (Linnaeus, 1758) at the Galapagos Islands. With the discovery of *H. lowryi* **sp. nov.** some generic characters are herein revised, which expands to some extent its diagnosis as pointed above in a bold text. The reduction in size of the maxillary palp within the Talitroidea is the rule. However, in some species it is partially reduced as seen in *Lelehua myersi* **sp. nov.** within the subfamily Hyalinae (reaching the base of the outer lobe setal-teeth); it can be very reduced (not reaching the base of the outer lobe setal-teeth) as seen in *H. tortugae* and groups such as Talitridae and Dogielinotidae or it can be absent as seen in the chiltoniids (Serejo 2004). Despite these differences in the maxillary palp, and in the maxilliped, unique characters within the Talitroidea, such as the prehensile pereopods 3–7 and the reduction of urosome 3 with lose of rami were observed and are used to maintain these species in the same genus. These characters are probably a response to a commensal lifestyle on sea-turtles. Also, coxae 1–4 do not have posterior processes, a character commonly found in Hyalinae and not in Hyacheliinae (Serejo 2004).

Hyachelia lowryi sp. nov.

(Figs 1, 2)

Type material. Male, holotype 7.5 mm, QM W28860, Mon Repos, Queensland, Australia (~24°48’S 152°26’E), on loggerhead turtle *Caretta caretta* (Linnaeus, 1758), C. Limpus, 1975-1976. Paratypes: female, 5.2 mm, QM W28861, same station data; male, 7.5 mm, AM P80162, same station data; 45 males and 7 females, QM W28862, same station data; 2 males, 1 female, AM P80163, same station data; 4 males (3.3–4.8 mm) and 7 females (3.2–4.4 mm), QM W7387, Heron Island, Queensland, Australia (~23°27’S 151°55’E), from turtle, C. Limpus & R. Monroe, July 1975; 4 males (7.1–7.7 mm) and 5 females (8.2–8.6 mm), QM W7393, Heron Island, Queensland, Australia (~23°27’S 151°55’E), on green turtle *Chelonia mydas*, C. Limpus, 10 July 1975.

Type locality. Mon Repos, Queensland, Australia (~24°48’S 152°26’E) (on loggerhead turtle, *Caretta caretta*).

Etymology. The name of the species is in honor to Dr Jim Lowry (Australian Museum), a great amphipod specialist, a good friend, and also one of the organizers of the Lizard Island workshop and consequently editor of this book.

Description. Male, holotype, 7.5 mm, QM W28860.

Head. *Head* eyes present, well developed, round. *Antenna 1* slightly longer than peduncle of antenna 2. *Antenna 2* short, not surpassing pereonite 2, peduncle slender, flagellum with 9 articles. *Upper lip* distally setose. *Lower lip* with distal and inner margin densely setose. *Mandible* right with bifid lacinia; left lacinia 5–6 dentate. *Maxilla 1* palp 1-articulate, reaching the base of setal-teeth of outer lobe. Maxilliped palp with long, whip-like apical seta, about 4 x article 4 length.

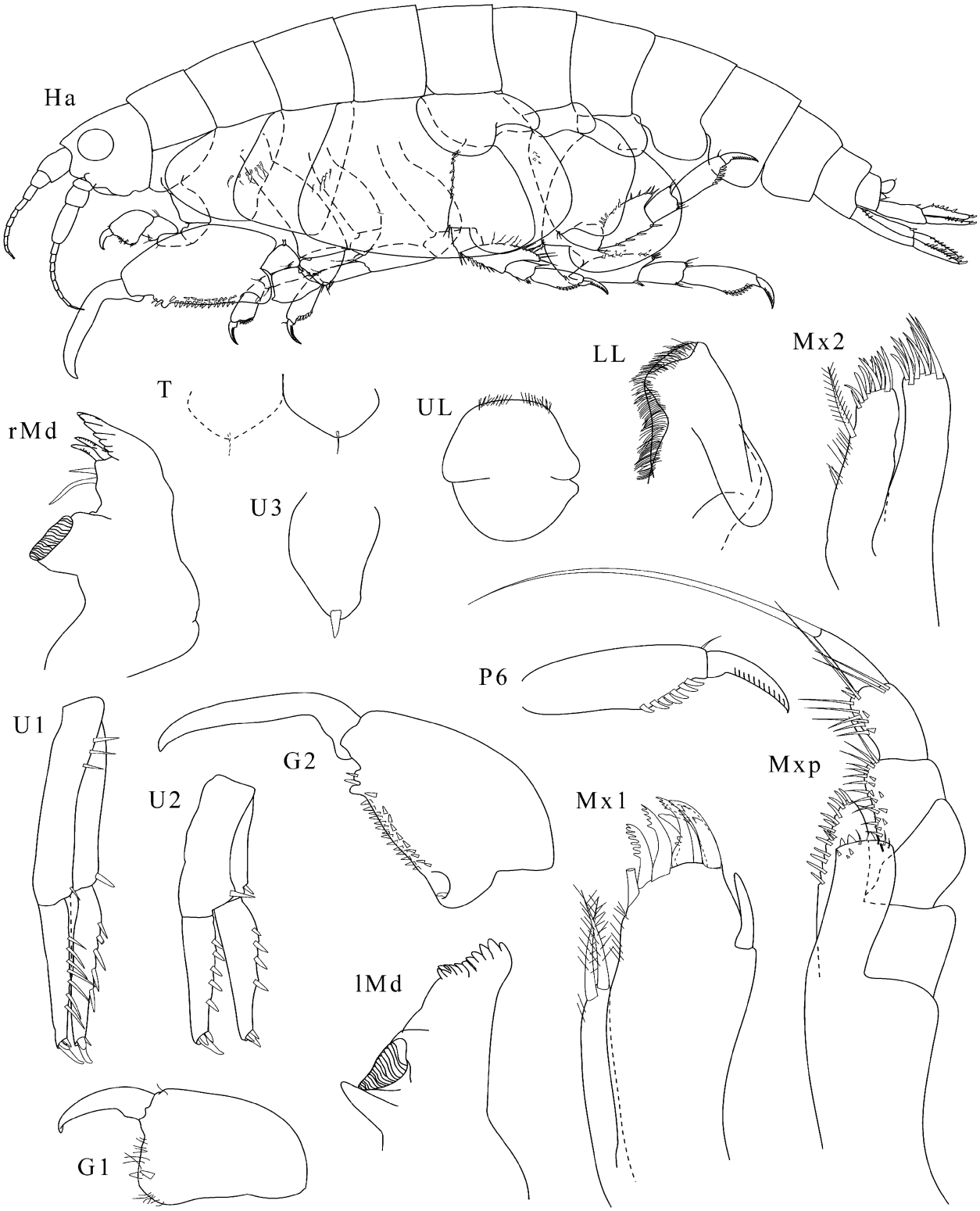

FIGURE 1. *Hyachelia lowryi* **sp. nov.**, holotype, male, 7.5 mm, QM W28860, Mon Repos, Queensland.

Pereon. *Gnathopods 1–2* distinctly different in size. *Gnathopod 1* subchelate; coxa about as long as broad, narrowing distally and distinctly smaller than subsequent coxae; propodus palm transverse, dactylus shorter than palm. *Gnathopod 2* subchelate; coxa subquadrate; carpus not projecting between merus and propodus, without setae on the posterior margin; palm extremely acute, parallel to anterior margin and with robust setae all over its extension; dactylus about as long as palm. *Coxae 1–4* lacking posterior process. *Coxa 2–4* longer than wide; coxa 4 wider than long. *Pereopods 3–7* prehensile, propodus with 7 distal robust setae in a sequence; dactylus lacking seta on inner margin. *Pereopod 7* basis about as long as broad.

Pleon. *Epimeron 3* posterior margin smooth, posteroventral corner subquadrate. *Uropod 1* peduncle without enlarged distal robust seta. *Uropod 3* peduncle narrowing distally, with a distal robust seta. *Uropod 3* lacking rami. *Telson* cleft, much wider than long.

Female (sexually dimorphic characters). Based on female, 5.2 mm QM W28861. *Maxilliped* palp with short apical seta, slightly longer than article 4. *Gnathopods 1–2* subequal in size and similar; carpus projecting between merus and propodus; palm nearly transverse. *Oostegite* 2 subtriangular with about 42 setae, oostegite 3 trapezoidal with about 59 setae, oostegite 4 half circle-shaped with about 52 setae, oostegite 5 elongated, narrow with about 34 setae.

Habitat. Ectocommensal on sea-turtles.

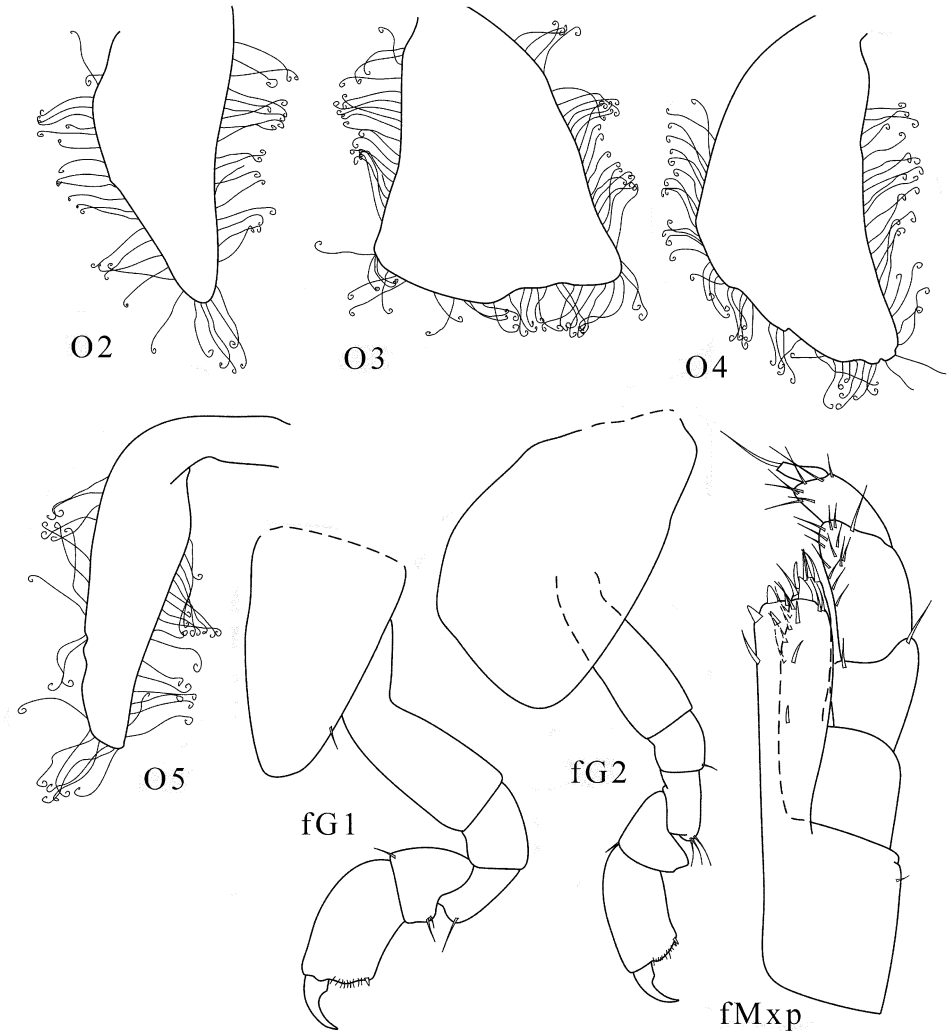

FIGURE 2. *Hyachelia lowryi* **sp. nov.**, paratype, female, 5.2 mm, QM W28861, Mon Repos, Queensland.

Remarks. Besides some important characters discussed at a generic level that also can be used to distinguish *H. lowryi* **sp. nov.** from *H. tortugae*, such as the palp of maxilla 1 reaching the base of outer lobe setal-teeth (vs vestigial) and the whip-like seta of the male palp of maxilliped (vs. short seta), other differences were noticed. Coxa 4 is wider, about 1.2 x wider than long (vs. as long as wide); propodus of pereopods 3–7 with 7 robust setae (vs 4 robust setae); and the inner ramus of uropods 1–2 with 4–5 setae (vs. lacking setae).

Distribution. *Australia*. North-eastern Queensland (current study).

Hyalinae Bulycheva, 1957

***Lelehua* J.L. Barnard, 1970**

***Lelehua myersi* sp. nov.**
(Figs 3, 4)

Type material. Holotype, male, 3.5 mm, AM P80164, Picnic Beach, Palfrey Island, Lizard Island, Queensland, Australia (14°41.69'S 145°26.89'E), on the red alga *Galaxaura subfruiticulosa* Chou, from reef flat, 1 m, R.A. King, 27 February 2005 (QLD 1704). Paratypes: 1 male, 3.5 mm, AM P80165; 1 female, 3.1 mm, AM P80166; 1 female, 3.3 mm, AM P80167; 57 males, 3.2–3.7 mm and 29 females, 2.2–3.3 mm, AM P71064; 2 males and 2 females, MNRJ; same locality. 2 females, 2.4 and 2.5 mm, AM P70572, 200 m off Research Beach, Lizard Island, Queensland, Australia (14°40.834'S 145°26.749'E), algae on aquarium pipe, sandy bottom, coral reef, 2 m, J. Just, 22 February 2005 (QLD 1618), 1 male, 3.1 mm and 1 female, 2.7 mm, AM P71031, Picnic Beach, Palfrey Island, Lizard Island, Queensland, Australia (14°41.69'S 145°26.89'E), algal mat and fine sediment from rubble bottom on reef flat, 3 m, S.E. LeCroy, 27 February 2005 (QLD 1708); 1 male, 3.9 mm, AM P71090, 20 males, 2.5–4.1 mm and 31 females, 2.3–3.7 mm, AM P71097, Picnic Beach, Palfrey Island, Lizard Island, Queensland, Australia (14°41.69'S 145°26.89'E), green alga *Codium* sp. from reef flat, 2 m, T. Krapp-Schickel, 27 February 2005, (QLD 1716), 1 male, 3.6 mm, AM P71185, Mermaid Cove, Lizard Island, Queensland (14°38.91'S 145°27.26'E), encrusting algae and rubble from sand with rubble bottom, 2 m, T. Krapp-Schickel, 28 February 2005 (QLD 1730).

Etymology. The name of the species is in honor to Dr Alan Myers, recognized senior amphipod researcher and also one of the editors of this book.

Description. Based on holotype, male, 3.5 mm, AM P80164.

Head. *Head* antenna 1 slightly longer than half way of antenna 2; lateral cephalic lobe broad and distally truncated; eyes small and round. *Upper lip* distally setose. *Mandible*, left lacinia mobilis 5-dentate, accessory setal row with 2 robust setae and a long plumose seta, molar well triturative. Lower lip normal for the family. *Maxilla 1* inner lobe with 2 long plumose setae; outer lobe with 9 setal-teeth, palp surpassing slightly the base of setal-teeth. Maxilla 2 normal for the family. Maxilliped sexually dimorphic, palp article 4 triangular, medial margin not concave, distal setae long, about 2 x article 4 length.

Pereon. *Coxae 1–4* with posterior process weakly produced. *Gnathopod 1* palm acute, dactylus long, well surpassing palm. *Gnathopod 2* enlarged, basis anterodistal margin expanded, finely crenulate; palm with a shallow concavity, followed by two small humps near dactylus ring; dactylus fitting palm, inner margin with large hump. *Pereopods 3–4* propodus with a medial and 2 subdistal setae. *Pereopod 5* merus slightly lobate, about 1.3 x wider than long.

Pleon. *Uropod 1* with well developed distal robust seta, ramus with 1–2 robust setae. *Uropod 2* outer ramus slightly shorter than inner ramus, each ramus with 1 robust seta. *Uropod 3* ramus about half the peduncle, tipped with 4 distal robust setae. *Telson* deeply cleft, lacking seta, lobes not pointed distally.

Female (sexually dimorphic characters). Based on paratype, female, 3.1 mm, AM P80166. *Gnathopods 1–2* similar in shape and subequal in size; propodus not enlarged, about 2 x longer than wide, dactylus fitting palm. *Maxilliped* palp article 4 triangular, distal seta short, about 2/3 of article 4 length. *Oostegites* 2

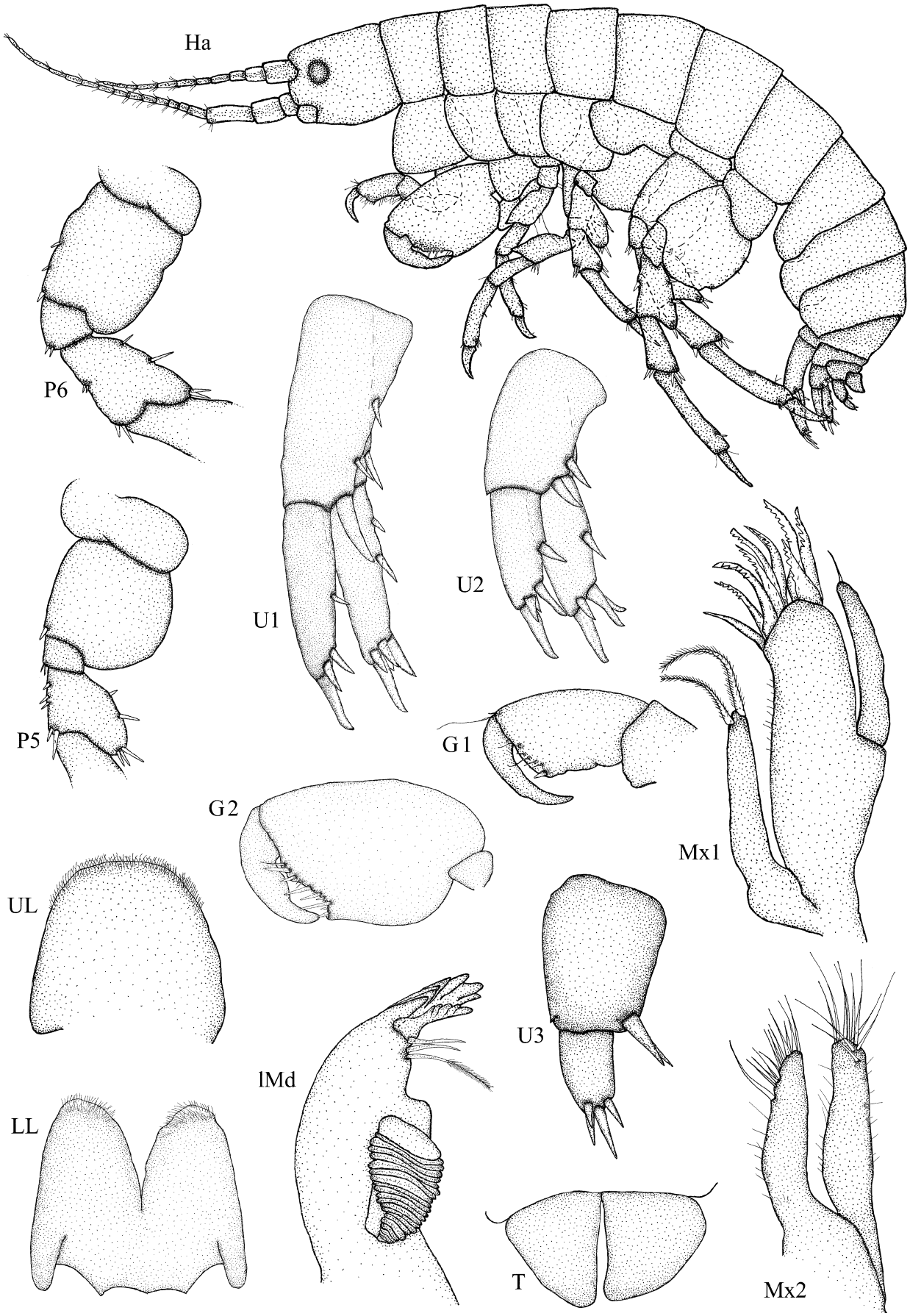

FIGURE 3. *Lelehua myersi* **sp. nov.**, holotype, male, 3.5 mm, AM P80164; paratype male, 3.5 mm, AM P80165 (maxilla 1, maxilla 2, left mandible, upper lip, lower lip); Lizard Island, Great Barrier Reef.

triangular with 33 setae, oostegites 3–4 oval with distal end slightly curved with 39 and 46 setae respectively, oostegite 5 curved, thinner than the others and with 29 setae.

Habitat. At Lizard Island this species was found on algal mat and fine sediment from rubble bottom on reef flat and on *Codium* sp. (green algae).

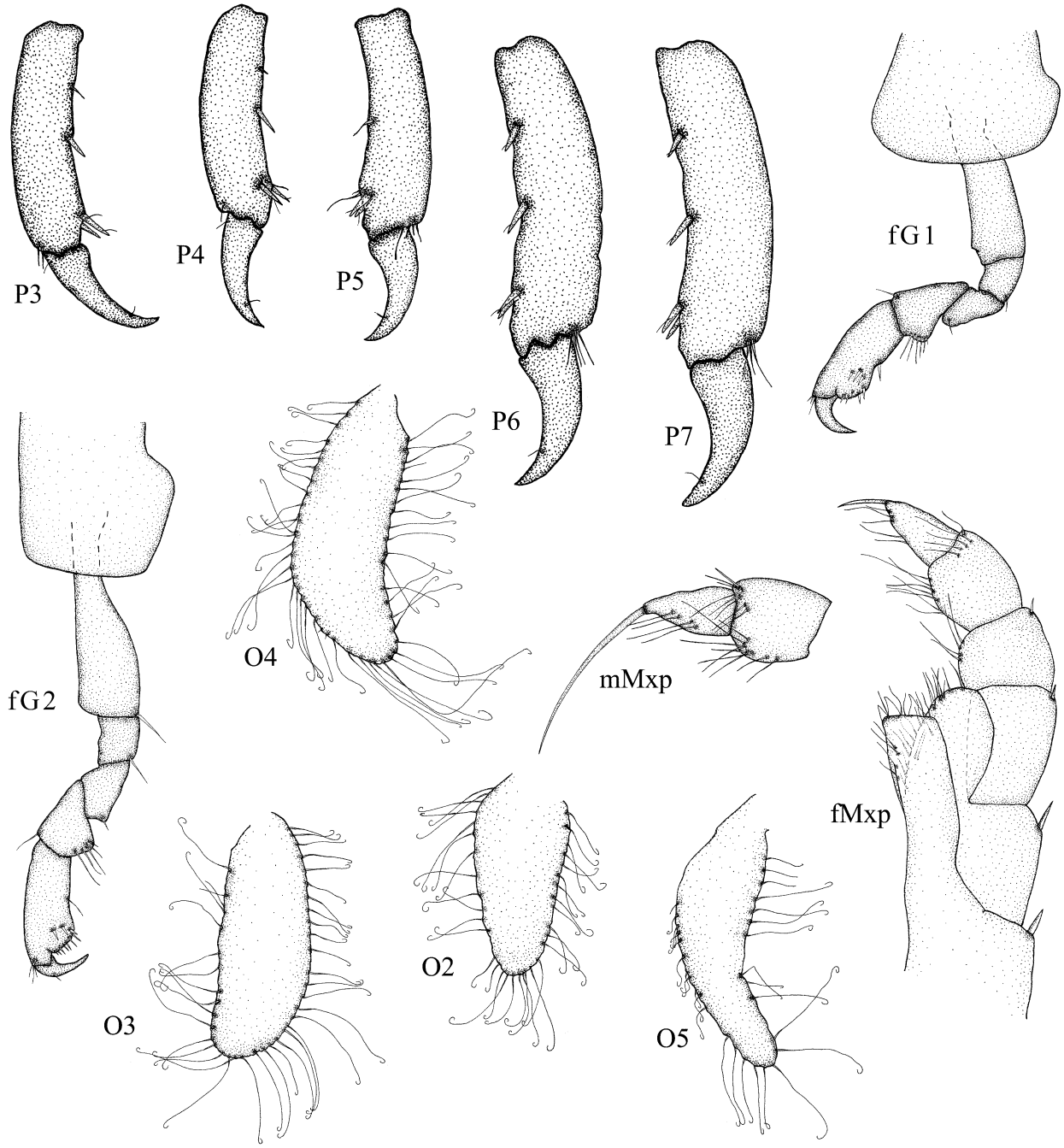

FIGURE 4. *Lelehua myersi* **sp. nov.**, holotype, male, 3.5 mm, AM P80164; paratype, female, 3.1 mm, AM P80166 (gnathopods 1–2, oostegites 2–5); paratype, female, 3.3 mm, AM P80167 (maxilliped); Lizard Island, Great Barrier Reef.

Remarks. There are three known species of *Lelehua*, *L. waimea* (J.L. Barnard, 1970), *L. kandari* (J.L. Barnard, 1974) and *L. malevua* Myers, 1985. *Lelehua myersi* **sp. nov.** differs from the other three species in the shape of palm of gnathopod 2, size of the whip-like seta of male maxilliped palp article 4, telson lobes

distally subacute as stated in Table 1. Both *L. myersi* and *L. kandari* are found in Australia, but the former seems to be more closely related to *L. malevua* as both are from the tropical Pacific province. Besides the characters cited in Table 1, these species also have in common the gnathopod 1 dactylus well surpassing palm and basis of male gnathopod 2 crenulated.

Distribution. *Australia*. North-eastern Queensland (current study).

TABLE 1. Morphological differences and distribution of world *Lelehua* species.

	L. waimea	*L. kandari*	*L. malevua*	***L. myersi* sp. nov.**
Palm of male gnathopod 2	With large excavation	Straight, no excavations or concavities, only a cusp to fit dactylus	With large excavation	Sinuous, with shallow concavity and small hump
Whip-like seta of male maxilliped palp	2.8 x palp article 4 length	4 x palp article 4 length	1.6 x palp article 4 length	2 x palp article 4 length
Merus of pereopod 5	Strongly lobate, about 1.6 x wider than long	Not distinctly lobate, as long as wide	Slightly lobate, about 1.2 x wider than long	Slightly lobate, about 1.3 x wider than long
Telson lobes	Distally pointed	Distally pointed	Distally subacute	Distally subacute
Distribution	Hawaii	Victoria (Australia)	Fiji	Lizard Island (Queensland, Australia)

Parhyale Stebbing, 1897

Parhyale hawaiensis (Dana, 1853)

(Figs 5, 6, Pl. 3F)

Allorchestes hawaiensis Dana, 1853: 900, pl. 61 fig. 5. —Bate, 1862: 47, pl. 8 fig. 1.
Hyale brevipes Chevreux, 1901: 400, figs 15–18. —Walker, 1909: 337. —Chilton, 1921: 545, fig. 9. —Chilton, 1925: 536. —Schellenberg, 1928: 658. —K.H. Barnard, 1935: 292.
Hyale nilssoni. —Walker, 1904: 238. —Walker, 1905: 925, fig. 140.
Hyale hawaiensis. —Stebbing, 1906: 573. —Schellenberg, 1938: 66, fig. 34. —Ruffo, 1950: 57. —Nayar, 1959: 30, pl. 10, figs 10–24.
Parhyale trifoliadens Kunkel, 1910: 72, fig. 26.
Hyaloides chelonitis Oliveira, 1953: pls 20, 21.
Parhyale inyacka. —J.L. Barnard, 1955: 23, fig. 12.
Parhyale hawaiensis. —Shoemaker, 1956: 349, figs 3–4. —Ruffo, 1959: 17. —J.L. Barnard, 1965: 521, fig. 24. —Ruffo, 1969: 38. —Olerod, 1970: 388. —Sivaprakasam, 1970: 560, fig. 5. —J.L. Barnard, 1971: 131, figs 65–68. —Tararam, Wakabara, & Leite, 1978: 783, figs 6–12. —Ledoyer, 1979: 176. —Myers, 1985: 72, fig. 56. —Ledoyer, 1986: 1013, fig. 400. —Sá Rego, 1987: 142, figs 1–5. —Serejo, 1999: 611, figs 11–12.

Material examined. 1 male, 3.9 mm, AM P70567 (QLD 1621); 1 male, 7.1 mm, 1 male, 7.6 mm, female, 6.6 mm (drawings), 4 juvenile males, 4.0–6.7 mm, 9 females, 2.8–6.6 mm, AM P70585 (QLD 1623); 1 male, 7.4 mm, 3 females, 4.1–6.4 mm, AM P70588 (QLD 1623); 1 male, 6.7 mm, 1 female, 6.3 mm, AM P70561 (QLD 1623); 2 juvenile males, 3.8 and 5.4 mm, 3 females, 2.4–5.9 mm, AM P70587 and MNRJ (QLD 1623); 1 female, 3.8 mm, AM P71274 (QLD 1773).

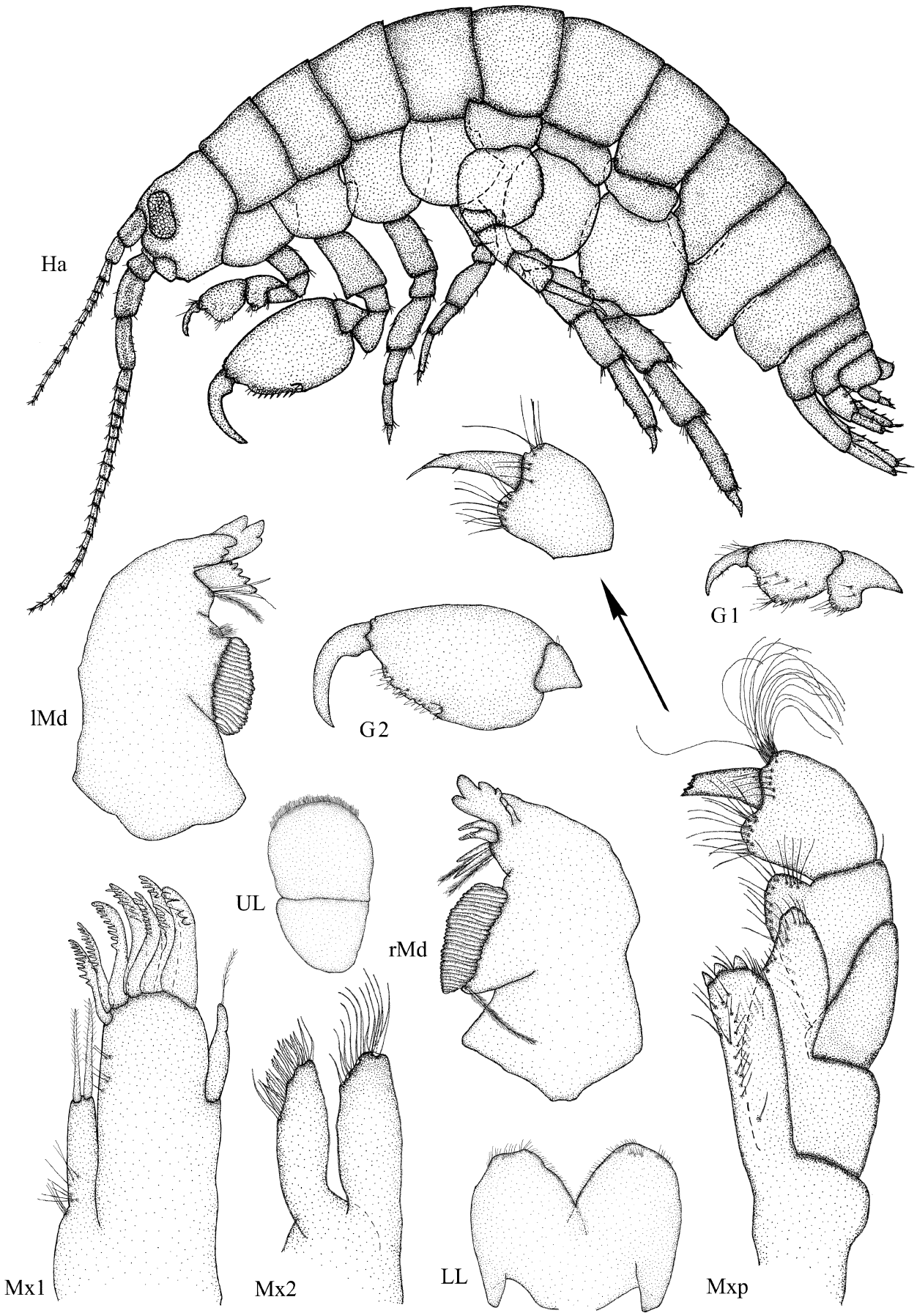

FIGURE 5. *Parhyale hawaiensis* (Dana, 1853), male, 7.1 mm, AM P70585; male, 7.6 mm, AM P70585 (maxilla 1 and detail of maxilliped); Lizard Island, Great Barrier Reef.

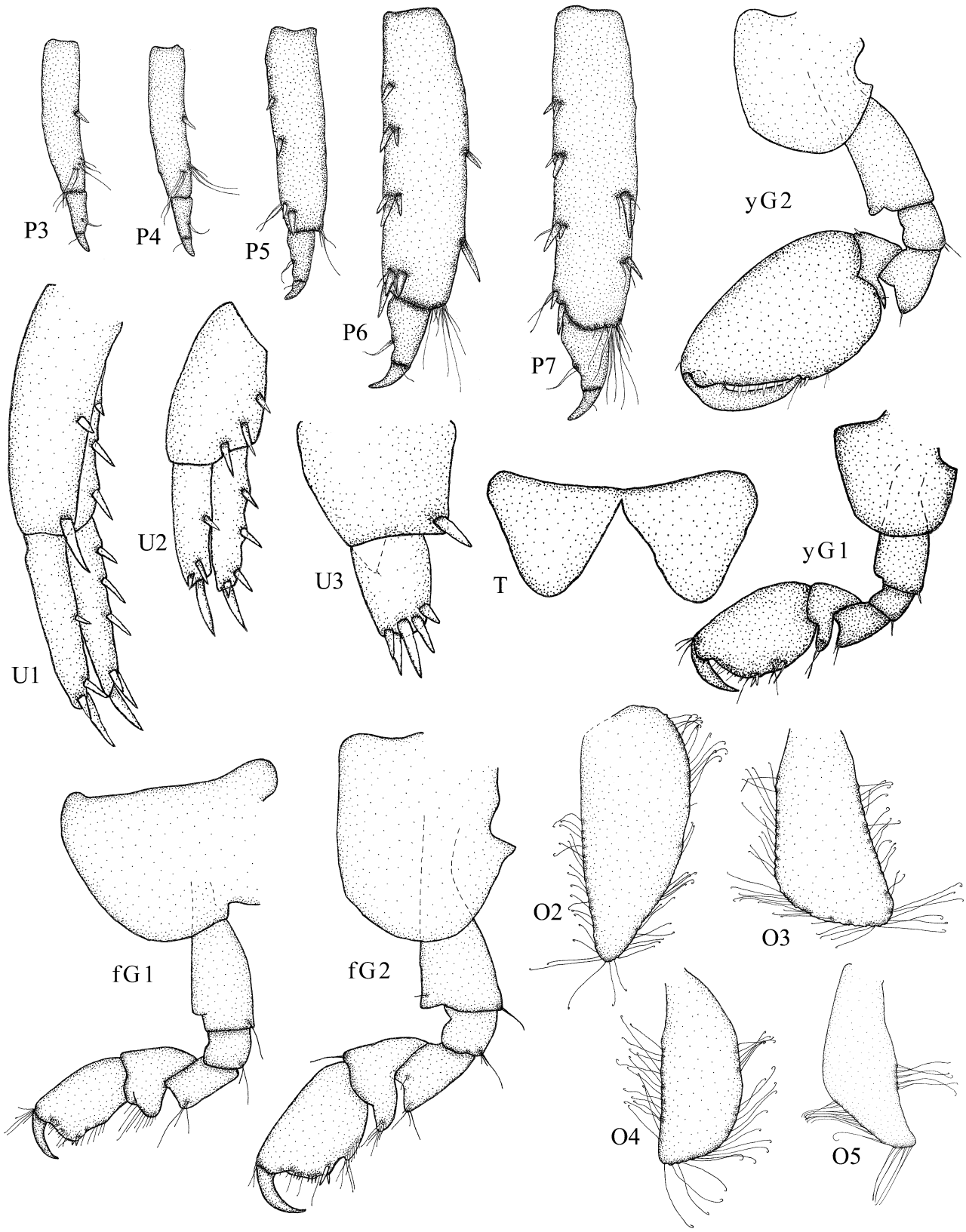

FIGURE 6. *Parhyale hawaiensis* (Dana, 1853), male, 7.1 mm, AM P70585; juvenile male, 4.0 mm, AM P70585 (gnathopod 2); juvenile male, 6.7 mm, AM P70585 (gnathopod 2); female, 6.6 mm, AM P70585 (maxilliped and oostegites 2–5); Lizard Island, Great Barrier Reef.

Type locality. Honolulu, Hawaii. Based on neotype information (Shoemaker 1956).

Description. Based on male, 7.1 mm, AM P70585.

Head. *Head* antenna 1 about half size of antenna 2. *Antenna 2* reaching pereonite 4; eyes large and oval. *Upper lip* setose distally. *Mandible* left lacinia mobilis 5-dentate; right mandible with molar bearing a plumose seta. *Lower lip* normal for the family. *Maxilla 1* palp reaching base of outer lobe setal-teeth. *Maxilla 2* normal for the family. *Maxilliped* palp article 2 lobate, article 3 with an anterodistal tuft of setae.

Pereon. *Gnathopod 1* palm acute, slightly sinuous. *Gnathopod 2* basis anterodistal corner produced into a narrow pointing lobe; palm acute and with several stout setae; dactylus fitting palm. *Pereopods 3–4* alike, but pereopod 4 a little shorter than pereopod 3; propodus with a single medial seta. *Pereopod 5* much shorter than pereopod 6–7, propodus with 2 medial setae. *Pereopods 6–7* propodus with 3 groups of setae on anterior margin and 2–3 groups of setae on posterior margin.

Pleon. *Uropod 1* with a distolateral seta; rami subequal, inner ramus with three setae and outer ramus with one seta. *Uropod 2* rami subequal, inner ramus with three setae and outer ramus with one seta. *Uropod 3* peduncle with a stout seta distally; outer ramus shorter than peduncle with 5 distal robust setae; inner ramus tinny and triangular, typical for the genus. *Telson* deeply cleft, with lobes widely gapping.

Female (sexually dimorphic characters). Based on female, 6.6 mm, AM P70585. *Gnathopod 1* carpus lobate; palm transverse, defining angle with a stout seta on each side. *Gnathopod 2* slightly larger than gnathopod 1, palm acute, posterior margin with a medial process. *Oostegite* 2 subtriangular with about 47 curl-tipped setae, oostegite 3–5 oblique distally with 43, 35 and 19 curl-tipped setae.

Habitat. In Lizard Island this species was found in mangrove swamps, among coral rubble, and on algae.

Remarks. Despite that this is a well known species for the tropical Pacific (Schellenberg 1938; Myers 1985), it has never been reported from Australia. However, Shoemaker (1956), who compared in detail *P. hawaiensis* with *P. fascigera*, noticed that there was material of *P. hawaiensis* from New South Wales in the collection of the National Museum of Natural History, Smithsonian Institution.

The material examined here is compared with other descriptions of *P. hawaiensis* such as Shoemaker (1956) and Myers (1985) and agrees with them in diagnostic characters such as: eyes large and oval; basis of male and female gnathopod 2 with anterodistal process; propodus of pereopods 6–7 with robust setae on posterior margin, uropod 1 with well developed distal robust seta and uropod 3 with distal seta only.

Parhyale includes 14 species, but apart from *P. hawaiensis*, only *P. iwasai* (Shoemaker, 1956) and *P. basrensis* Salman, 1986 have the propodus of pereopods 6–7 with robust setae on posterior margin. *Parhyale iwasai* was first described by Iwasa (1939) (as *Hyale gracilis*) from Japanese waters. As J.L. Barnard (1979) noticed *P. iwasai* has a rectangular propodus of male gnathopod 1 (vs. propodus expanded) and uropod 3 bears a marginal robust seta (vs no marginal setae). Also, uropod 1 was illustrated by Iwasa (1939) without a distolateral seta and uropod 3 lacked the tiny scale-like inner ramus, which suggests that this species belongs to the genus *Hyale* (*sensu lato*). *Parhyale basrensis* was recorded from Iraq and differs from *P. hawaiensis* in uropod 1 which lacks a distolateral robust seta and other minor differences pointed by the author (Salman 1986).

Distribution. Circum-tropical (Myers 1985; Serejo 1999).

Acknowledgments

I would like to thank Dr Jim Lowry (Australian Museum) for making available this wonderful workshop to happen and inviting me to be part of the amphipod team. I also want to thank Dr Penny Berents (Australian Museum) for helping in the organization of the workshop and all the amphipod team that made the two weeks in Lizard Island a very pleasant experience.

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