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Amphipods of the Genera *Ceradocus, Dulichiella, Melita* and *Nuuanu* (Crustacea: Melitidae) from Mauritius, Indian Ocean

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ABSTRACT. Taxonomic descriptions and figures are provided for five new species of Melitidae (*Ceradocus greeni* n.sp., *Dulichiella cuvettensis* n.sp., *Melita corticis* n.sp. *Melita setimera* n.sp. and *Nuuanu rectimana* n.sp.) from collections made in the shallow coastal waters of Mauritius.

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In the current study a new species of *Ceradocus, C. greeni* n.sp. is described, bringing the number of species of the genus known from Mauritius to three. The two other species, *C. hawaiensis* J.L Barnard (1955) and *C. mahafalensis* var. *incisa* Ledoyer (1978), were reported by Ledoyer (1978). A new species of *Dulichiella, D. cuvettensis* n.sp. is recognized, previously wrongly ascribed to *D. appendiculata* (Say, 1818) by Ledoyer (1978) as well as by Appadoo & Steele (1998) and *Nuuanu rectimana* n.sp. is described bringing the number of species of this genus known from the island to two, the other being *Nuuanu amikai* J.L. Barnard, reported by Ledoyer (1978). Only one species of the genus *Melita* was previously recorded from Mauritius, *Melita zeylanica* (Appadoo & Steele, 1998), here attributed to a new species, *Melita corticis* n.sp. A second new species *Melita setimera* n.sp. is now known.

Material and methods

Amphipods were collected from algae, seagrass and coral rubble from 24 sites around the island of Mauritius (19°59'–20°32'S 57°18'–57°47'E, Indian Ocean) and from Ile D'Ambre (20°01'–20°02.2'S 57°41'–57°42.2'E), a small island on the northeast coast within the lagoon from February 1998 to February 2000. The sites were visited at low tide and samples were collected from the intertidal and shallow subtidal zones. Algae and rubble were collected by scraping them off their substrates using a small hand trowel. Amphipods were extracted using the formalin-wash method as formalin is an irritant that causes the animals to release hold of the substrates (Barnard, 1976).

Some of the substrates were also collected by snorkelling and diving from depths not exceeding 2 to 3 m. The

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substrates were then transferred to a plastic bag as soon as they were scraped off and amphipods were extracted using the above mentioned method once on shore.

Prior to dissection the body length of amphipods was recorded by holding it straight and measuring the distance along the dorsal side of the body from the base of the first antennae to the base of the telson. A stereomicroscope with a micrometer scaled eyepiece was used to take the measurement. Drawings were made using a Nikon compound microscope equipped drawing tube attachment. Type material is deposited in the Australian Museum (AM). All other material is kept in the first author's collection. The terminology for cuticular extensions and setae follows that of Watling (1989). Geo-spatial coordinates were read from a map of scale 1:25 000.

Abbreviations used in figures. A, Antenna (1–2); C, Coxa; D, Dactylus (3–7); Ep, Epimeron; G, Gnathopod (1–2); L, Lower lip; Md, Mandible; Mx, Maxilla (1–2); Mxp, Maxilliped; P, Pereopod (3–7); Pl, Pleonite (1–3); p, palp; T, Telson; U, Uropods (1–3); lt, left; r, right.

Taxonomic section

Ceradocus (Denticeradocus) greeni n.sp.

Figs. 1–3

Ceradocus sp. 1 Appadoo & Steele 1998: 639.

Type material. HOLOTYPE ♂, 5.2 mm, AM P60865, at depths of 0.5–2 m living on coral rubble and *Pocockiella variegata*, Flic-en-Flac (20°16.5'S 57°21.7'E), Mauritius, C. Appadoo, 9 November 1998. PARATYPES: 2♂♂, 2♀♀, AM P60866, same data as holotype; 1♀ from

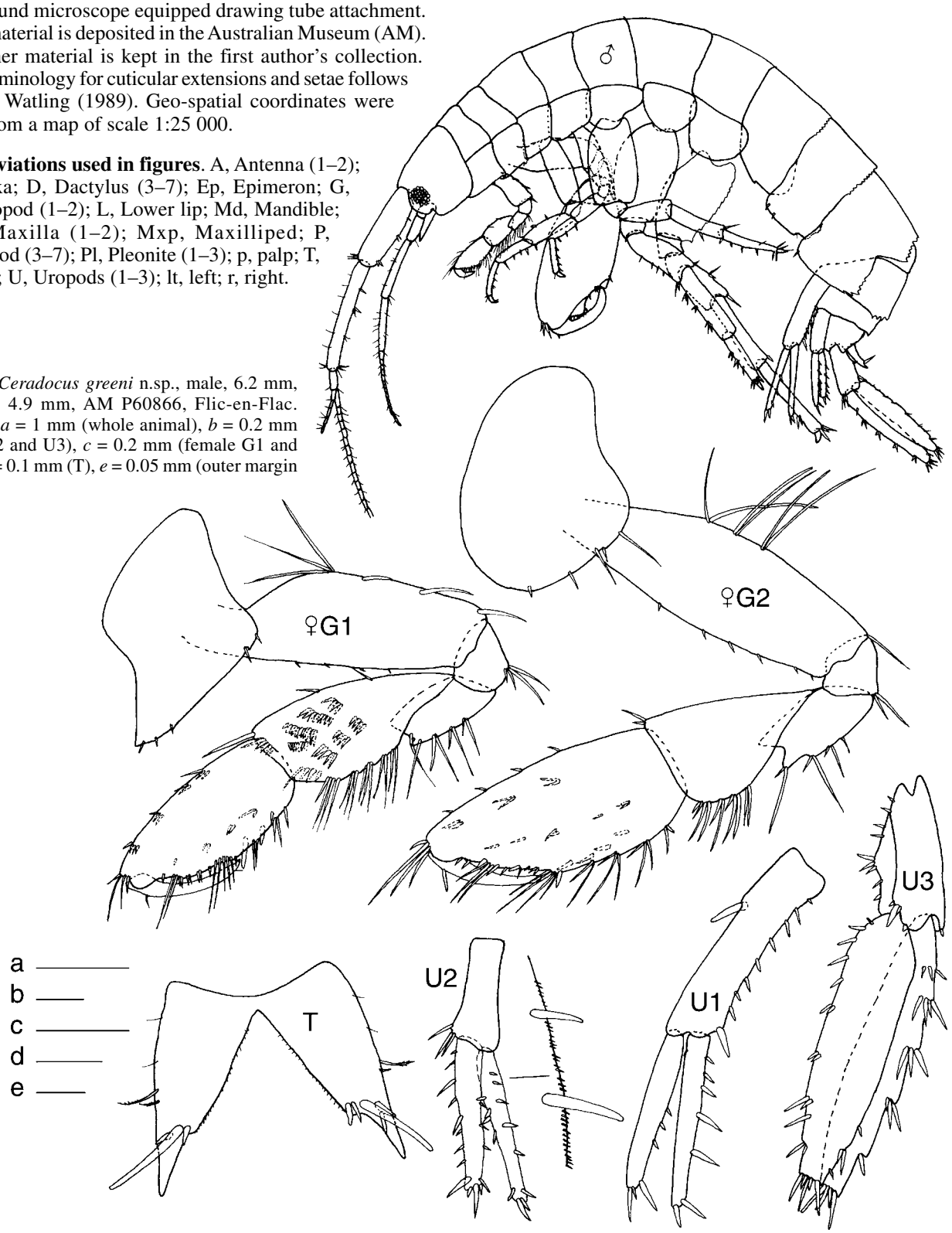

Fig. 1. *Ceradocus greeni* n.sp., male, 6.2 mm, female, 4.9 mm, AM P60866, Flic-en-Flac. Scales: *a* = 1 mm (whole animal), *b* = 0.2 mm (U1, U2 and U3), *c* = 0.2 mm (female G1 and G2), *d* = 0.1 mm (T), *e* = 0.05 mm (outer margin of U2).

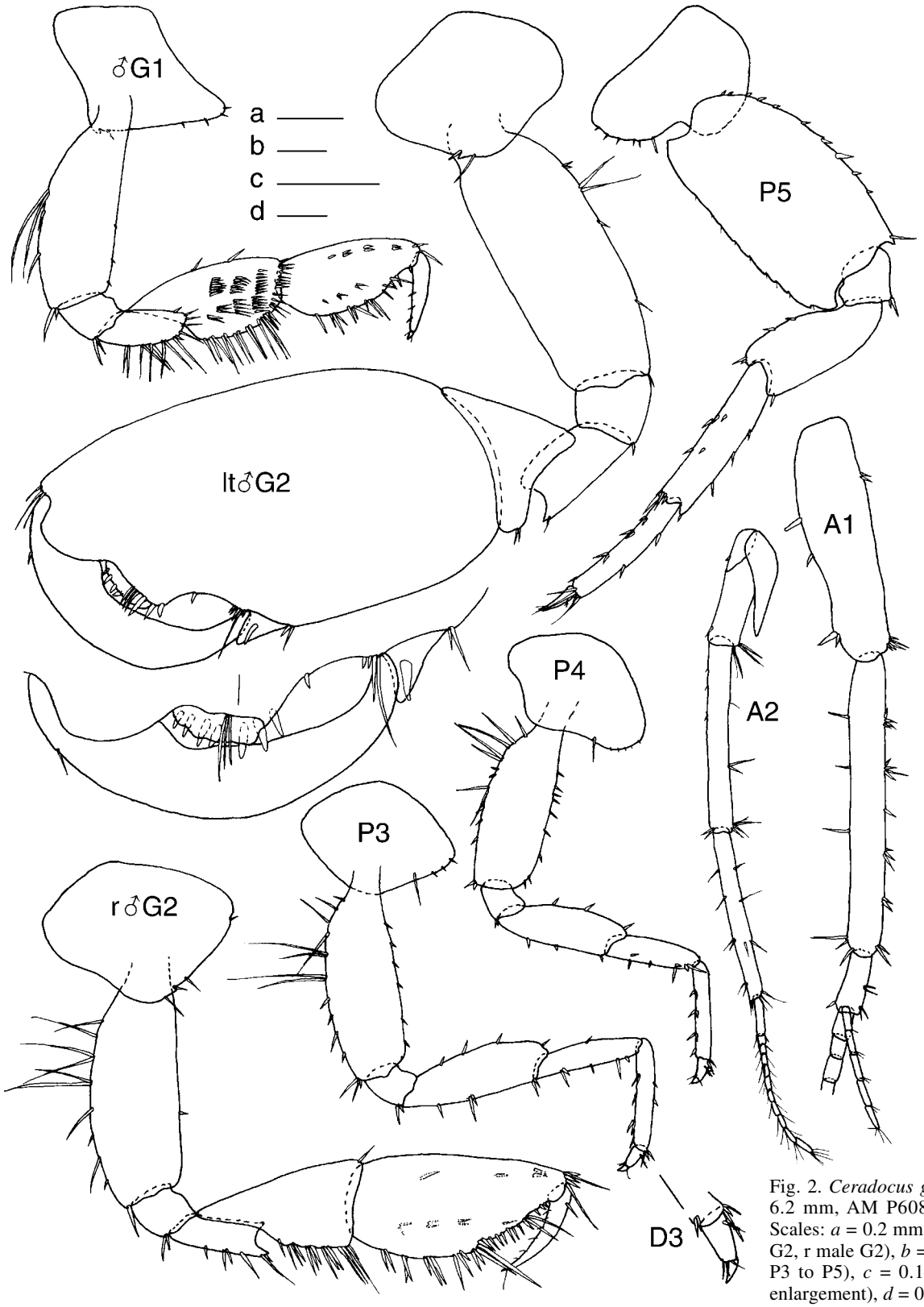

Fig. 2. *Ceradocus greeni* n.sp., male, 6.2 mm, AM P60866, Flic-en-Flac. Scales: *a* = 0.2 mm (male G1, lt male G2, r male G2), *b* = 0.2 mm (A1, A2, P3 to P5), *c* = 0.1 mm (lt male G2 enlargement), *d* = 0.1 mm (D3).

coral rubble and *Pocockiella variegata*, Flic-en-Flac, 3 March 1998; 1 juv. from coral rubble and *Pocockiella variegata*, Flic-en-Flac, 9 November 1998; 1♂, 4♀♀, 2 juv. from coral rubble, *Padina* sp. and *Pocockiella variegata*, Flic-en-Flac, 5 April 1999; 7♂♂, 5♀♀ from coral rubble, *Padina* and *Pocockiella variegata*, Flic-en-Flac, 10 December 1999; 3♂♂, 3♀♀, 1 juv. from coral rubble, *Padina* sp., *Pocockiella variegata* and *Turbinaria ornata*, Flic-en-Flac, 27 January 2000.

Description. Male length, 6.2 mm. Head with subocular notch; eyes round with discrete ommatidia. Antenna 1 peduncle article 1 with stout robust setae on posterior margin; article 2 longer than 1; article 3, 0.3× article 1; accessory flagellum 5-articulate; primary flagellum 14-articulate. Antenna 2 peduncle 3× as long as flagellum; gland cone of article 2 extending to 0.7× the length of article 3; article 4 slightly longer than article 5; flagellum 11-articulate. Mandible palp 3-articulate, article 1 with medial cusp, article 2 longest and 2.5× article 1, with long setae on

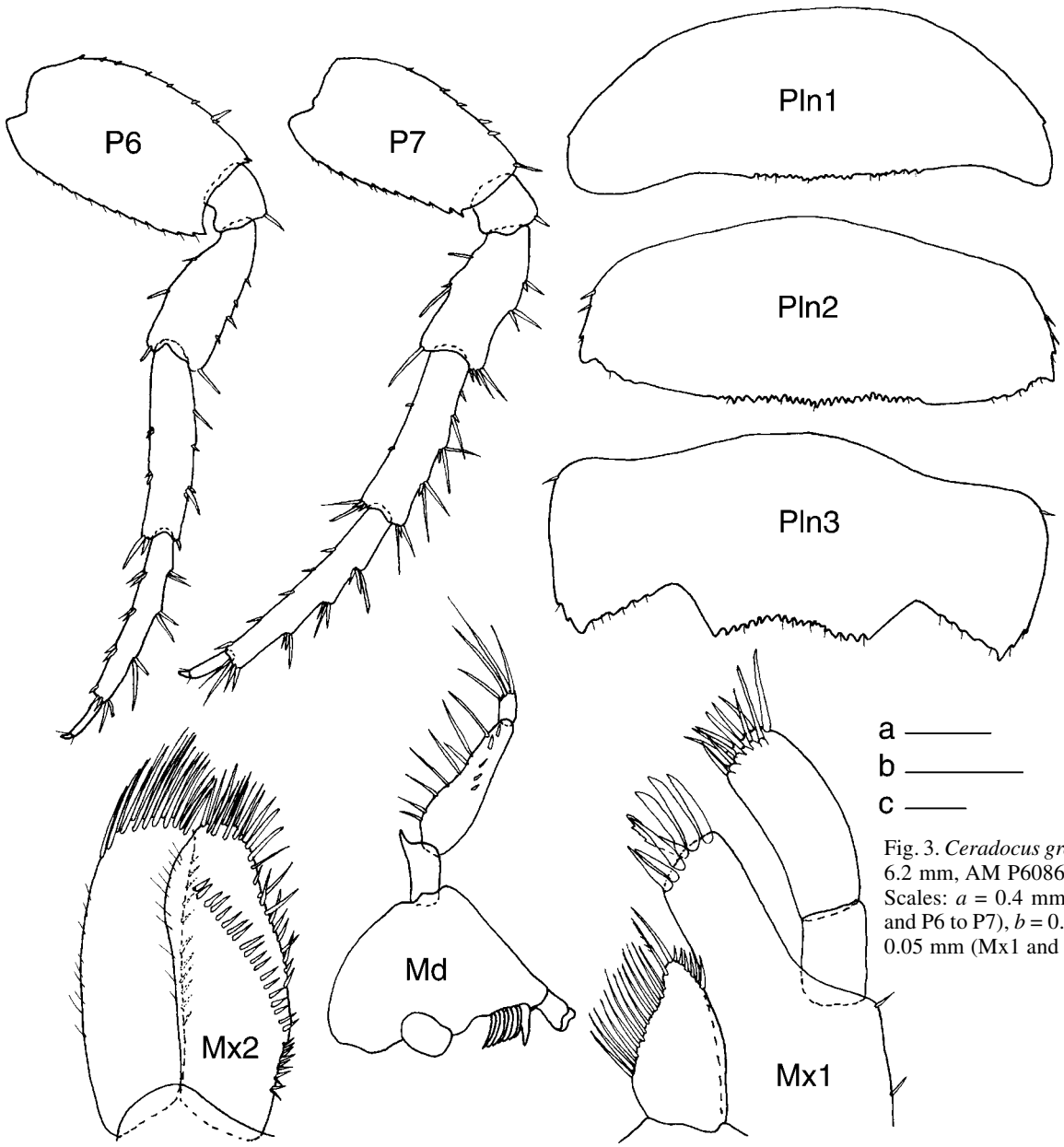

Fig. 3. *Ceradocus greeni* n.sp., male, 6.2 mm, AM P60866, Flic-en-Flac. Scales: *a* = 0.4 mm (Pln1 to Pln 3 and P6 to P7), *b* = 0.2 mm (Md), *c* = 0.05 mm (Mx1 and Mx2).

lateral margins and short setae on medial face, article 3 shortest and 0.6× the length of article 1. Maxilla 1 inner plate triangular with plumose setae; outer plate with terminal serrated robust setae; palp 2-articulate with double-row of terminal setae. Maxilla 2 outer plate with distal setae, inner plate with distal setae, inner marginal setae and an oblique row of setae. Lower lip with rounded mandibular lobes. Maxilliped palp 4-articulate, article 2 longest and 2.2× article 1. Gnathopod 1 coxa 1.3× as long as broad, anterodistal margin produced into a lobe, posterodistal margin notched; basis slender, slightly less than three times as long as broad, anterior margin with short robust setae, posterior margin with long setae; carpus with groups of medial setae, anterior margin sparsely setiferous, posterior margin densely setose; propodus subequal in length to carpus with a few medial patches of setae, palmar margin oblique with short setae; dactylus with short setae on inner margin. Gnathopod 2 asymmetrical. Small gnathopod 2 (left or right) coxa subrectangular, slightly longer than broad, distal margin with a notch and a few setae; basis 2.5× as long as broad, posterior margin with strong patches of setae; merus anteroventral and posterodistal corners sharply produced; propodus 2× as long as broad, 1.3× carpus, palm oblique with short robust setae and a few groups of long setae; dactylus slender, inner margin with short setae. Large gnathopod 2 (left or right) coxa subrectangular, ventral margin notched and with 2 setae; basis 2.5× as long as broad; merus posterodistal corner sharply produced; carpus triangular, slightly more than 1.5× as broad as long; propodus robust, slightly over 1.5–1.75× as long as broad, palm oblique, distal margin with a process close to base of dactylus with stout robust setae followed by an excavation and a triangular process with fine setae and robust setae at the posterodistal margin; dactylus robust and fitting into the triangular process of propodus. Pereopod 3 coxa subrectangular, almost as broad as long, ventral margin with 1 long seta and a few short-setae at the anteroventral corner; basis slender with short robust setae on anterior margin and groups of long setae on posterior margin; propodus subequal to carpus; dactylus with a distinct unguis and anterior margin with one plumose seta and posterior margin with 3 setae. Pereopod 4 coxa posteriorly excavate, 0.7× as long as broad

with one long seta and a few short setae on the anterodistal corner, other features similar to pereopod 3. Pereopod 5 slender, coxa bilobed; basis 1.8× times as long as broad, anterodistal and posterodistal margins sharply produced, anterior margin with robust setae, posterior margin weakly serrated and with small setae; propodus subequal to carpus; dactylus slender. Pereopod 6 slender; basis similar to that of pereopod 5, but posterior margin more deeply serrated; propodus subequal to carpus, anterior margin with strong patches of setae; dactylus slender and similar to that of pereopod 5. Pereopod 7 similar to pereopod 6, but basis is distally less produced and narrower than basis of pereopod 6; propodus slightly longer than carpus. Pleonites 1–3 strongly toothed. Epimeron 2 with one tooth on posterodistal margin and a few irregular teeth on distal margin. Epimeron 3 with 2 teeth on posterodistal margin and 5 teeth on distal margin. Urosomite 1 and 2 each with 7 dorsal teeth. Uropod 1 peduncle, 1.3× outer ramus with a stout robust seta on medial outer margin; outer ramus slightly shorter than inner ramus. Uropod 2 peduncle 0.7× inner ramus; inner and outer rami subequal, armed with robust setae, margins of rami with very short fine robust setae. Uropod 3 peduncle inner margin with numerous robust setae; rami spatulate, equal in length to each other, twice as long as peduncle; outer ramus outer margin with long robust setae; inner ramus outer margin with numerous robust setae; rami with stout terminal robust setae. Telson deeply cleft; telsonic lobes well separated, with a pair of plumose setae on outer margin, notched at apex, with outer tooth produced and inner tooth vestigial, apices with one long and a few short setae.

Female: length, 4.9 mm. Gnathopod 1 coxa 1.2× as long as broad, anterodistal margin produced, posterodistal margin with a notch; basis slender, posterior margin with long setae, anterior margin with short robust setae; merus produced at posterodistal corner; carpus subequal to propodus with groups of medial setae, ventral margin setose; propodus 2.3× as long as broad, anterior margin with 5 groups of setae, palm oblique with fine setae and short robust setae and stout robust setae on medial face. Gnathopod 2 coxa 1.2× as long as broad, distal margin with a notch and a few setae; basis 3.1× as long as broad, anterior margin with robust setae, posterior margin with groups of long setae; carpus 0.75× length of propodus; propodus 2.2× as long as broad, palm with short robust setae and patches of fine setae, with stout robust setae on inner medial face.

Habitat. In the subtidal at depths of 0.5 to 2 m, occurring mostly on coral rubble and the associated brown alga, *Pocockiella variegata*.

Remarks. *Ceradocus greeni* n.sp. is assigned to the subgenus *Denticeradocus* because pleonites 1–3 are multidentate dorsally. This species is distinguished from *Ceradocus hawaiensis* J.L. Barnard (1955) recorded from Mauritius by Ledoyer (1978), by having the larger male gnathopod 2 with an oblique palm lacking many tooth-like processes. The species differs from *Ceradocus mahafalensis* Ledoyer (1978) var. *incisa*, reported from Mauritius, which also has an oblique palm in the larger male gnathopod 2, by the broadly sinuous palmar border, with a distal process with robust setae as opposed to a palmar margin with a deep medial incision. Urosomites 1 and 2 each have 7 teeth in *Ceradocus greeni* n.sp. instead of 5 and 4 respectively in *Ceradocus mahafalensis* var. *incisa* and *C. mahafalensis* from Madagascar (Ledoyer, 1979).

Ceradocus greeni shares with *C. spiniferus* Ledoyer (1973), *C. tattersalli* Ledoyer (1982) and *C. serratus* (Bate, 1862), the multidentate pleonites and oblique palm in the large male gnathopod 2. However, the shape of the larger gnathopod 2 propodus palm separates it from these three species. *Ceradocus serratus* lacks the smooth excavation and the triangular process, *C. spiniferus* has a convex palmar margin and a small U-shaped excavation and *C. tattersalli* lacks the triangular process and has a palm with numerous robust setae.

Two other species of *Ceradocus* with multidentate pleonites 1–3 and oblique palm in the male gnathopod 2 are *Ceradocus (Denticeradocus) oxydus* Berents (1983) and *Ceradocus (Denticeradocus) yandala* Berents (1983). The shape of the large male gnathopod 2 is the distinguishing feature. *Ceradocus oxydus* lacks an excavation in the palmar margin which is convex with numerous robust setae. *Ceradocus greeni* differs from *C. yandala* by having a gentle excavation on the male gnathopod 2 without any mid-palmar sinus, *C. yandala* has a quadrate mid-palmar sinus.

Type locality. Flic-en-Flac, Mauritius.

Distribution. Mauritius.

Etymology. This species is named after Prof. John Green of Memorial University of Newfoundland for his help in the field to one of authors (CA) during an initial study on amphipods from Mauritius in 1995.

Dulichiella cuvettensis n.sp.

Fig. 4

Melita appendiculata.–Ledoyer, 1978: 282; Appadoo & Steele, 1998: 639. (Not *Gammarus appendiculatus* Say, 1818: 377–379).

Type material. HOLOTYPE ♂, 3.3 mm, AM P67233, from *Sargassum* sp. at depth less than 1 m, La Cuvette (20°00'S 57°34.2'E), Mauritius, C. Appadoo, 12 October 1999. PARATYPES: 1♂, 1♀, from *Sargassum* sp., La Cuvette (20°00'S 57°34.2'E), 14 May 1998. 1♀ from *Turbinaria* sp., Bain Boeuf (19°59'S 57°36'E), 15 May 1998; 1♂, 3♀♀ from *Acanthophora spicifera*, Anse la Raie (19°59.5'S 57°37.5'E), 15 May 1998; 5♂♂, 3♀♀ and 4 juv. from *Sargassum binderi*, Bain Boeuf, 16 June 1998; 1♂, 2♀♀ from *Sargassum* sp. and *Padina* sp., Ile D'Ambre (20°02'S 57°40'E), 12 November 1998; 1♂ from *Sargassum* sp. and *Ulva reticulata*, La Cuvette, 5 May 1999; 1♂ from *Padina* sp. and *Halimeda* sp., Grand Baie (20°0.5'S 57°34'E), 5 May 1999; 1♂, 1♀, from mixture of *Padina* sp., *Pocockiella variegata* and *Sargassum* sp., Bain Boeuf; 2♂♂ and 1♀, AM P67234, from *Sargassum* sp. and *Pocockiella variegata*, Bain Boeuf, 12 October 1999.

Description. Male length, 4 mm. Head without subocular notch; eyes round with well-developed ommatidia. Antenna 1 poorly setiferous, peduncle article 1 with 3 stout robust setae on ventral margin; article 2 longest, 1.5× article 1; article 3, 0.3× the length of article 1; accessory flagellum 4-articulate, primary flagellum 35-articulate. Antenna 2 weakly setiferous, peduncular article 4 subequal to 5, flagellum 14-articulate. Mandible palp slender, article 1 with a small tooth; article 3 slightly longer than article 2. Maxilla 1 palp, article 1 with long setae on distal margin; inner plate with 2 apical plumose setae. Gnathopod 1 coxa 1.6× as long as broad, posterodistal margin with a notch; basis slender, 4× as long as broad; propodus slightly 0.7× length of carpus, palmar margin with short and long setae; dactylus normal. Gnathopods 2 dissimilar (left and right). Larger gnathopod

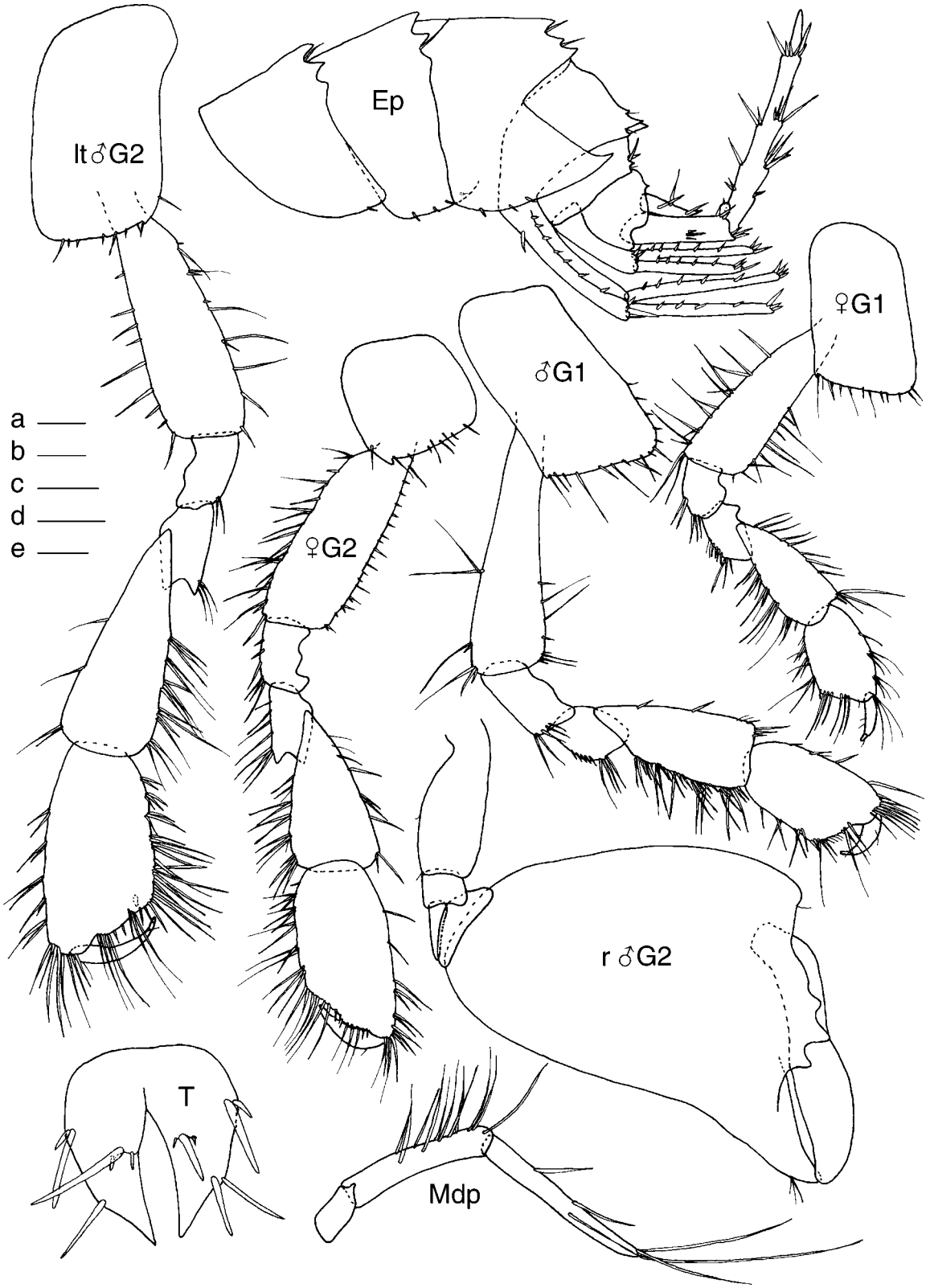

Fig. 4. *Dulichiella cuvettensis* n.sp., male, 4 mm, female, 4.8 mm, La Cuvette. Scales: *a* = 0.2 mm (Ep and r male G2), *b* = 0.1 mm (male G1 and lt male G2), *c* = 0.2 mm (female G1 and G2), *d* = 0.1 mm (T), *e* = 0.05 mm (Mdp).

2 basis without setae, and 2.3× as long as broad; carpus reduced, 3.3× as long as broad; propodus robust, distally expanded, palmar margin transverse, with 3 well-developed medial protuberances; dactylus broad throughout its length. Small gnathopod 2, coxa slightly less than 2× as long as broad, distal margin with short setae; basis slender, 3.5× as long as broad, with setae on anterior and posterior margins; merus posterodistal margin acute; propodus slightly shorter than carpus, subrectangular, palm oblique, dactylus fitting palm. Pereopod 3 coxa subrectangular with a small notch on posterodistal margin; basis anterior margin with stout short setae; propodus 1.5× length of carpus; dactylus with

bifid tip. Pereopod 4 similar to pereopod 3, but coxa without posterodistal notch and weakly excavate posteriorly. Pereopod 5 basis subrectangular, slightly more than 2× as long as broad, anterior and posterior margins parallel, anterior margin with numerous robust setae, posterior margin weakly serrated with short setae; dactylus bifid. Pereopod 6 similar to pereopod 5 but basis more slender; merus and propodus with strong groups of setae on anterior and posterior margins. Pereopod 7 basis anterior margin straight, posterior margin slightly convex; other features similar to pereopod 6. Pleonites 1 and 2 with 7 teeth, median tooth and the last tooth on either side shorter than others. Pleonite 3 with 7 teeth, median tooth small, other teeth on either side of this median tooth are successively longer than one another. The concavities of the teeth of pleonites have small setae. Urosomite 1 produced into acute teeth on dorsal surface. Urosomite 2 with a small robust seta and small tooth on dorsal surface. Urosomite 3 with a small dorsal tooth. Epimeron 1 with one robust seta on distal margin, posterodistal margin rounded. Epimeron 2 posterodistal margin slightly produced, posterior margin smooth, distal margin bears 3 robust setae. Epimeron 3 posterodistal margin produced into an acute tooth, posterior margin with a very small tooth, distal margin with three robust setae. Uropod 1 slender, with robust setae, rami subequal to each other and slightly longer than peduncle; inner margin of inner ramus with very fine short setae. Uropod 2 outer ramus slightly shorter than inner ramus; peduncle 0.75× inner ramus; inner margin of inner ramus similar to that of uropod 1. Uropod 3 outer ramus 1.8× peduncle, 2-articulate, article 1 truncate, article 2 pointed; inner ramus vestigial consisting of a small oval lobe with one robust seta. Telson cleft to about three-quarter its length, telsonic lobes produced at apex. Telson with three groups of robust setae, located subapically and medially on inner and outer margins.

Female: length, 4.8 mm (mature, with eggs). Gnathopod 1 coxa 0.75× as long as broad, posterodistal margin with notch and setae; basis with setae on anterior and posterior margins; merus with a triangular process at anterodistal margin; propodus palm oblique, palm with long setae. Gnathopod 2 coxa subrectangular about as long as broad; basis anterior and posterior margins setose; ischium anterior margin sinuous; propodus slightly longer than carpus, palm oblique with setae on margins.

Remarks. *Dulichiella cuvettensis* n.sp. differs from *D. appendiculata* (Say, 1818) in having epimeron 1 with a smoothly rounded posteroventral margin (rather than with a small acute spine) and the propodus disto-lateral margin with three (as apposed to two) subacute teeth. *Dulichiella cuvettensis* n.sp. is most similar to *D. australis* (Haswell, 1879) but differs from that species in the strongly setose uropod 3 outer ramus as well as in the rounded postero-ventral corner of epimeron 1.

Habitat. This species was collected in depths of less than 1 m. It occurs mostly on brown algae especially *Sargassum* sp. and was collected from sites on the north coast of the island.

Type locality. La Cuvette, Mauritius.

Distribution. Mauritius.

Etymology. Named after the type locality.

Melita corticis n.sp.

Figs. 5–6

Melita zeylanica Appadoo & Steele, 1998: 639.

Type material. HOLOTYPE ♂, 4.3 mm, AM P60867, 0–1 m depth, living on a mixture of *Ulva lactuca* and *Ulva reticulata*, le Bouchon (20°28'S 57°40.5'E), C. Appadoo, 27 October 1998. PARATYPES: 1♂, 3♀♀, AM P60868, same data as holotype; 2♂♂, 16♀♀, and 10 juv. from *Ulva lactuca* and *Ulva reticulata*, Le Bouchon, 16 May 1998; 2♂♂, 2♀♀, 3 juv. from *Ulva lactuca* and *Ulva reticulata*, Le Bouchon, 27 October 1998.

Description. Male length, 6.2 mm. Head with subocular notch, eyes round, a ring of clear ommatidia surrounding a dark central core. Antenna 1 weakly setiferous, article 2, 1.3× article 1, article 3, 0.5× article 1; accessory flagellum 3-articulate; primary flagellum 16-articulate (possibly regenerating in this specimen), flagellum can be 27-articulate (observed from additional material). Antenna 2 weakly setiferous, peduncular article 5 subequal to 4, flagellum 8-articulate. Mandible palp article 3 slightly longer than 2, article 1, 0.3× article 3; article 2 with two groups of setae on posterior margin, article 3 with a few lateral and terminal setae. Maxilla 1 inner plate with 8 plumose apical setae; Lower lip with rounded mandibular lobes. Gnathopod 1 coxa 1.4× as long as broad with short setae on ventral margin; basis 3× as long as broad with a strong patch of setae on anterodistal margin; carpus 1.5× length of propodus; propodus with transverse palm and forming a hood above dactylus; dactylus with medial protrusion on posterior margin. Gnathopod 2 coxa subrectangular 1.5× as long as broad, with setae on distal margin; basis 2.9× as long as broad, with a few groups of long setae on anterior margin; merus slightly produced ventrodistally; carpus 1.2× as broad as long; propodus subrectangular, 1.6× as long as broad, palmar margin weakly convex, palm rounded, with short stout setae and slender setae; dactylus broad throughout its length and slightly tapered at tip and closing across inner face of propodus. Pereopod 3 coxa subrectangular, 1.6× as long as broad, with very short setae on ventral margin; propodus and carpus subequal; dactylus with distal unguis. Pereopod 4 coxa deeply excavate posteriorly; other features similar to pereopod 3. Pereopod 5 coxa about 1.2× as long as broad, anterior margin with robust setae, posterior margin weakly serrated with short setae; dactylus short and robust with terminal unguis. Pereopod 6 coxa lobular; basis subovate, 1.4× as long as broad, anterior margin with stout setae, posterior margin serrated with stout setae; propodus 2× length of carpus; other features similar to pereopod 5. Pereopod 7 basis, 1.3× as long as broad, anterior margin with numerous robust setae, posterior margin more convex and weakly serrated; other features similar to pereopod 6. Epimera 2 and 3 posterior margin weakly serrated, distal margins with a few stout setae. Urosomite 1 smooth. Urosomite 2 with two stout robust setae on each side. Uropods 1–2, rami subequal to each other and shorter than peduncle. Uropod 3 inner ramus rudimentary, with one robust seta; outer ramus 1-articulate, spatulate, 2.5× the length of peduncle, with robust setae and slender setae. Telson cleft to base, lobes with pointed apex; each lobe with two robust setae on distal inner margins and one on the outer margin; 1 or 2 robust setae present about half-way along inner margin.

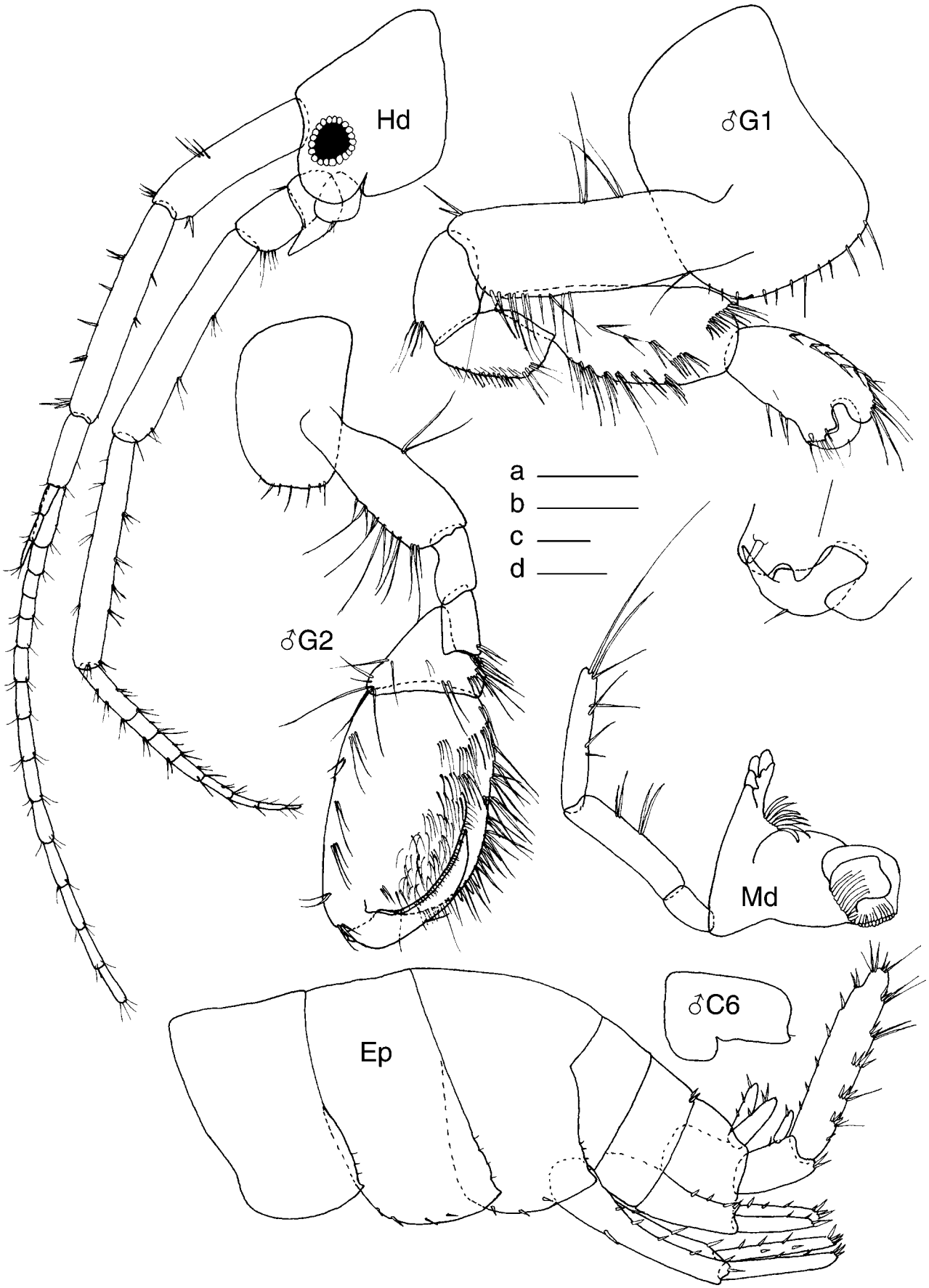

Fig. 5. *Melita corticis* n.sp., male, 6.2 mm, AM P60868, Le Bouchon. Scales: *a* = 0.4 mm (Hd, Ep, male G2, male C6), *b* = 0.2 mm (male G1, enlargement of male G2), *c* = 0.05 mm (enlargement of male G1), *d* = 0.1 mm (Mdp).

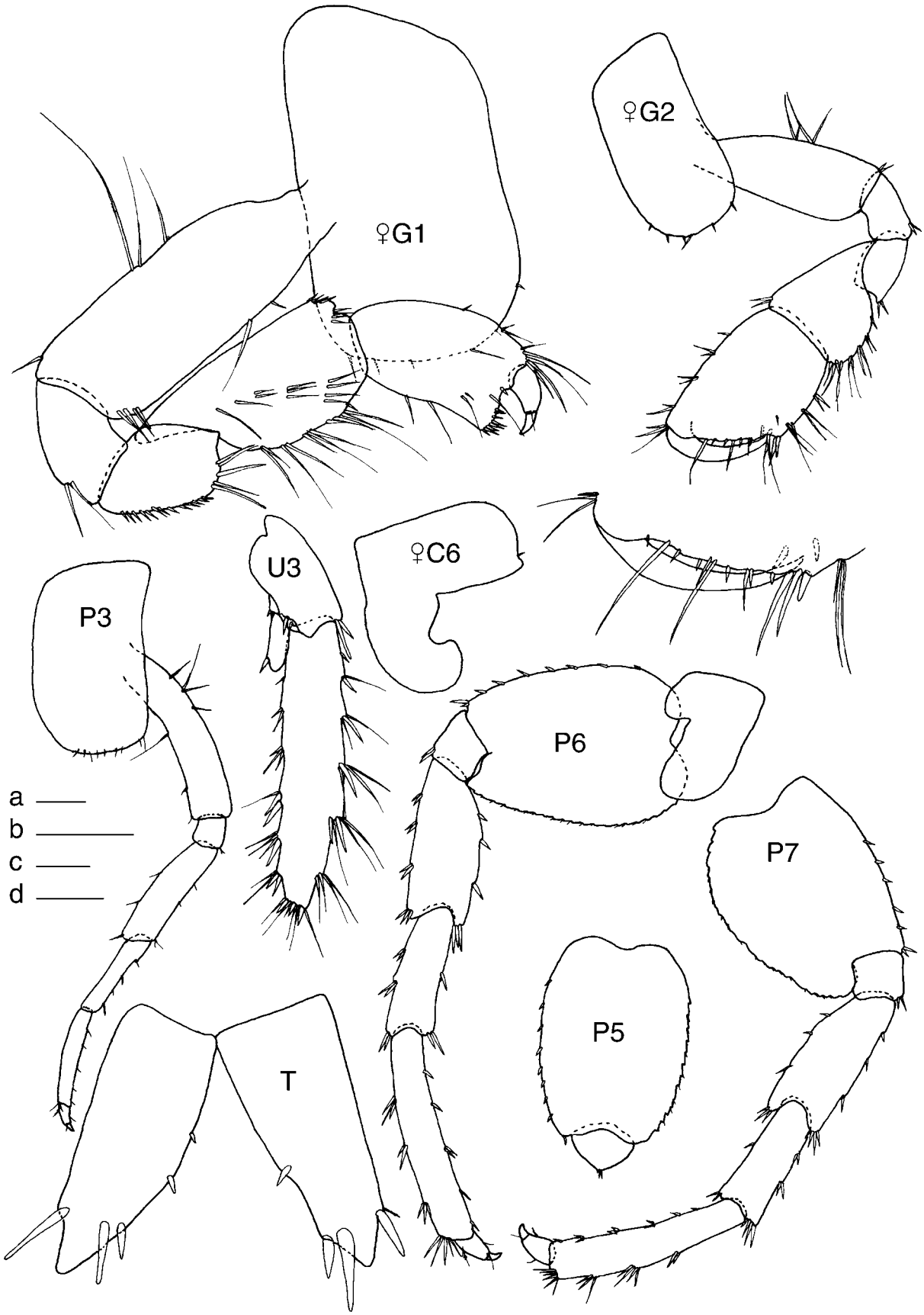

Fig. 6. *Melita corticis* n.sp., male, 6.2 mm, female, 3.3 mm, AM P60868, Le Bouchon. Scales: *a* = 0.2 mm (P3 and P5-P7), *b* = 0.2 mm (female G2 and female C6), *c* = 0.05 mm (female G1 and T), *d* = 0.2 mm (U3).

Table 1. The character states in the *Melita zeylanica* group of species.

	Antenna 2	Gnathopod 1 (male) dactylus proximal process	Gnathopod 2 carpus	U1 peduncle basofacial robust seta	U3 inner ramus terminal robust setae	Urosomite 2 dorsal robust setae
M. zeylanica Stebbing, 1904	weakly setose	not swollen	compressed	absent	1	4–6
M. zeylanica kauerti Barnard, 1972	weakly setose	swollen	not compressed	present	3–4	6
M. setiflagella Yamato, 1988	densely setose	swollen	not compressed	present	3	6
M. corticis n.sp.	weakly setose	swollen	not compressed	present	1	4

Female: length, 3.3 mm (mature with eggs). Gnathopod 1 coxa subrectangular, 1.6× as long as broad; basis about three times as long as broad; carpus 1.3× length of propodus; propodus palm transverse, palmar margin with short setae; dactylus large at base and tapered at tip. Gnathopod 2, coxa 2× as long as broad; propodus subrectangular, 1.3× length of carpus with stout setae and slender setae on palm. Pereopod 6, coxa with a large hook-like anterior lobe.

Remarks. The present material falls into the group of *Melita* that lacks a second article on the outer ramus of uropod 3 (see Ledoyer, 1982: 568). It resembles *M. pahuwai* Barnard (1970) from Hawaii in having only one robust seta instead of 3 in the inner face of male gnathopod 1 propodus; in having the robust setae on the palmar margin of the female gnathopod 2 shorter than the inner facial robust setae rather than vice-versa and in lacking robust setae on the proximal outer margins of the telson.

It appears to be particularly closely related to *Melita zeylanica* Stebbing, 1904, *M. zeylanica kauerti* J.L. Barnard 1972 and *M. setiflagella* Yamato 1988.

It can be distinguished from *M. setiflagella* Yamato (1988) by the well-developed circular eyes (smaller, slightly reniform eyes in *M. setiflagella*) by antenna 2 peduncular articles 5 and 4 being subequal (peduncular article 5 shorter than 4 in *M. setiflagella*) by antenna 2 being poorly setiferous and 8-articulate (densely setiferous and 15-articulate in *M. setiflagella*), and by female coxa 6 being without scale-like denticles.

It differs from *Melita zeylanica* Stebbing (1904) in the presence of an anterodistal bulge near the base of the dactylus in the male gnathopod, in the non-compressed carpus of the gnathopod 2 in females, and in the presence of a robust basofacial seta on the peduncle of uropod 1, the latter feature, however, may have been overlooked by Stebbing (1904). Unlike *Melita zeylanica kauerti* Barnard (1972: 235, fig. 139–140) it has 2 (rather than 3) dorsolateral robust setae on urosomite 2 and one (rather than four) robust seta in the apex of the inner ramus of uropod 3. Barnard (1972) notes that Sri Lankan material of *Melita zeylanica* has one robust seta on uropod 3 inner ramus as in present material.

These four species form a group of related forms. The current material compares most closely with *Melita zeylanica kauerti* but that species is closer to *M. setiflagella* than it is to the present material. Also *Melita zeylanica kauerti* differs more from *Melita zeylanica* than it does from the present material. This material is considered to represent a new species that can be distinguished from its close congeners by the combination of characters shown in Table 1.

Habitat. Known only from Le Bouchon at depths of less than 1 m. The site is characterized by low salinity, green-algal growth and some estuarine conditions, which is in agreement with the general occurrence of the genus in brackish waters (Bousfield, 1973).

Type locality. Le Bouchon, Mauritius.

Distribution. Mauritius.

Etymology. From the Latin *cortex* meaning a cork, in reference to the name of the type locality.

Melita setimera n.sp.

Figs. 7–8

Type material. HOLOTYPE ♂, 4.1 mm, AM P60869, 0–1 m depth, living on a mixture of *Centroceras clavulatum, Hypnea* sp., *Gracilaria corticata, Enteromorpha flexuosa* and *Sargassum densifolium*, Tamarin (20°19.5'S 57°22'E), Mauritius, C. Appadoo, 11 October 1999. PARATYPES: 2♂♂, 4♀♀, AM P60870, same data as holotype; 1♀ from *Acanthophora spicifera*, Souillac (20°31'S 57°30.7'E), 10 November 1998; 1♂, 1♀ from *Padina* sp. and *Halimeda* sp., Grand Baie (20°0.5'S 57°34'E), 5 May 1999; 2♂♂, 1♀, 1 juv. from mixture of *Padina* sp., *Enteromorpha flexuosa, Hypnea* sp., *Amphiroa* sp. and *Caulerpa sertulariodes*, Tamarin, 18 June 1999; 1♂, 3♀♀, 3 juv. from *Amphiroa flagellisima* and *Padina, Ulva lactuca* and *Enteromorpha* sp. and ash-coloured sand, Tamarin, 2 August 1999; 9♂♂, 12♀♀, 9 juv. from mixture of *Centroceras clavulatum, Hypnea* sp., *Gracilaria corticata, Enteromorpha flexuosa* and *Sargassum densifolium*, Tamarin, 11 October 1999.

Description. Male length, 4.3 mm. Head lacking subocular notch; eyes subround. Antenna 1 peduncle article 1 with stout robust setae on ventral margin; article 2, 1.2× article 1; article 3 slightly less than half length of article 1; accessory flagellum 2-articulate, primary flagellum 20-articulate. Antenna 2 article 5 subequal to 4, flagellum 9-articulate. Mandible palp article 3 slightly longer than article 2, article 1, 0.5× the length of article 3. Maxilla 1 inner plate with 6 apical plumose setae. Lower lip with rounded mandibular lobes. Gnathopod 1 coxa subrectangular, 1.6× as long as broad, distal margin with very short setae; basis slender, 2.9× as long as broad, with very dense patches of setae on anterior margin; propodus 0.6× length of carpus, with a hood over the dactylus; dactylus broad at base, with a small medial expansion and tapering tip. Gnathopod 2 coxa subrectangular, 1.4× as long as broad; basis slightly expanded about 2.2× as long as broad, with dense long setae on anterior margin and a few patches of setae on posterior margin; carpus cup-shaped, 1.5× as broad as long; propodus 1.3× times as long as broad, palmar margin slightly oblique, palmar border broadly sinuous; dactylus slender and 0.6× the length of propodus, dactylus closing across the medial face of propodus. Pereopod 3 coxa subrectangular, 1.5× as long as broad with short setae on ventral margin; basis slender, anterior margin concave, 3.5× as long as broad;

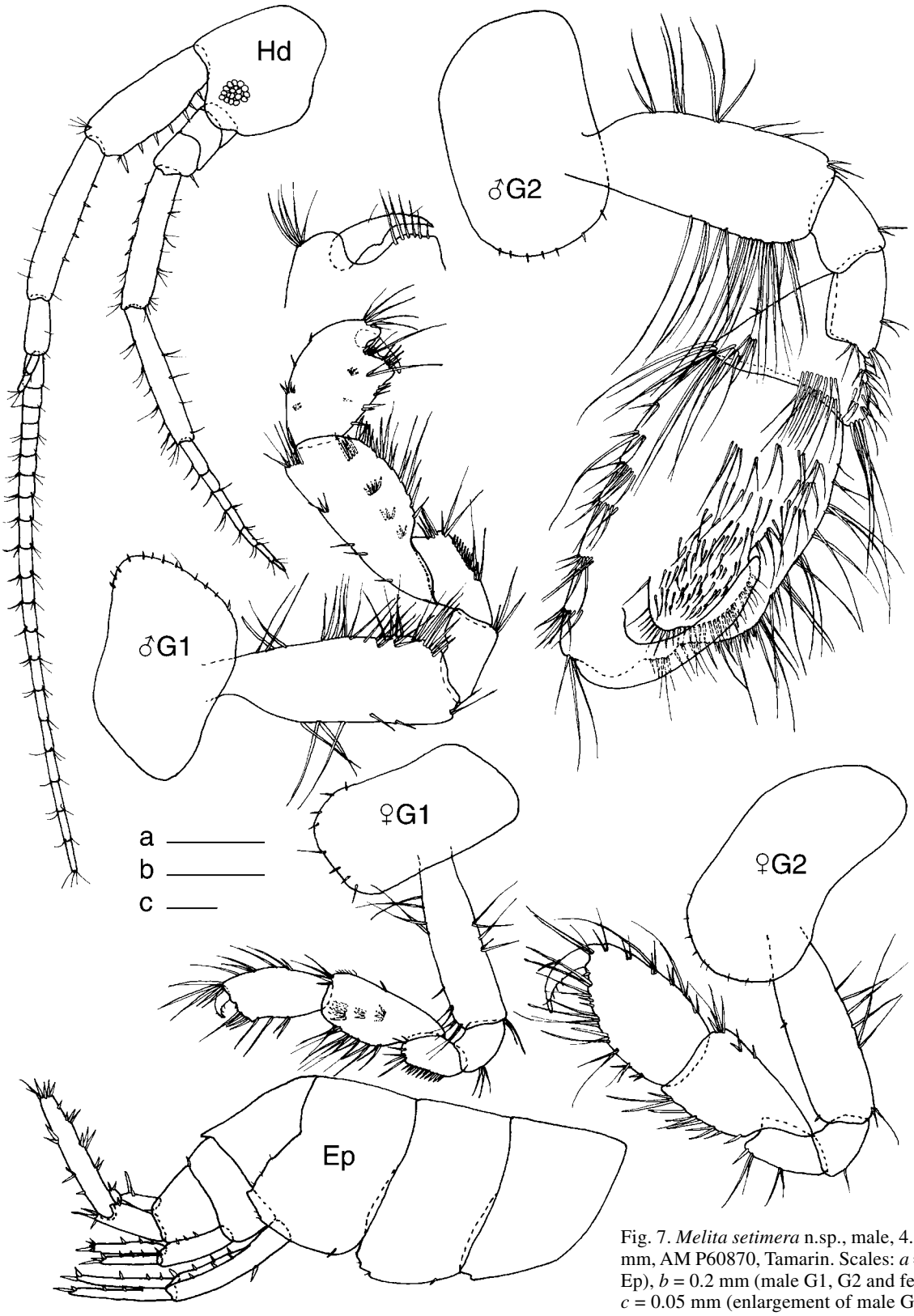

Fig. 7. *Melita setimera* n.sp., male, 4.3 mm, female, 3.8 mm, AM P60870, Tamarin. Scales: *a* = 0.4 mm (Hd and Ep), *b* = 0.2 mm (male G1, G2 and female G1 and G2), *c* = 0.05 mm (enlargement of male G1).

propodus subequal to carpus; dactylus with terminal unguis and one seta on anterior margin. Pereopod 4 coxa excavate on posterior margin; other features as pereopod 3. Pereopod 5 basis, 1.5× as long as broad, anterior margin with stout robust setae, posterior margin weakly serrated and with short setae; dactylus with 1 seta on anterior margin. Pereopod 6 basis 1.4× as long as broad, otherwise like that of pereopod 5; merus and carpus with dense patches of long setae on anterior margins and short robust setae on posterior margin. Pereopod 7 similar to pereopod 6 except dense patches of setae on merus and carpus on the posterior margins and short robust setae on anterior margins. Epimeron 1 with small posterodistal tooth. Epimeron 2 weakly toothed at posterodistal margin. Epimeron 3 weakly toothed on posterodistal margin. Urosomite 1 with

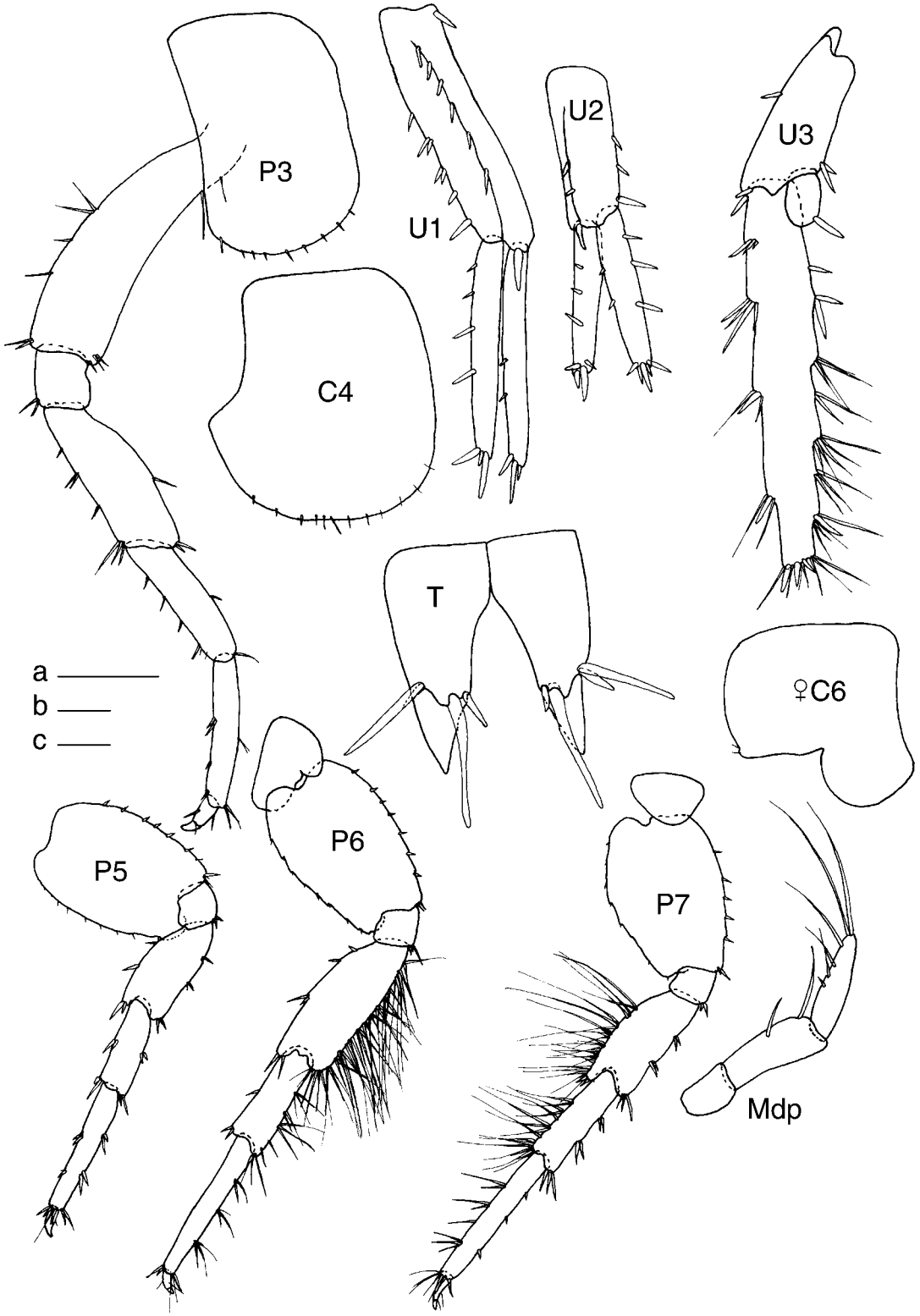

Fig. 8. *Melita setimera* n.sp., male, 4.3 mm, female, 3.8 mm, AM P60870, Tamarin. Scales: *a* = 0.2 mm (P3, C4, U1,2, and female C6), *b* = 0.2 mm (P5 to P7), *c* = 0.05 mm (U3, T).

acute dorsal tooth, urosomite 2 with one robust seta on mid-dorsal surface. Uropod 1 peduncle with basofacial robust seta, rami slender, 0.9× peduncle. Uropod 2 rami subequal to peduncle. Uropod 3 inner ramus rudimentary, with one or two terminal robust setae; outer ramus 1-articulate, 2× length of peduncle, spatulate, and with short robust setae and long fine setae. Telson apices pointed, each lobe with two robust setae on outer margin and two on medial hump.

Female: length, 3.8 mm (mature, with eggs). Gnathopod 1 coxa 2× as long as broad; basis slender, with patches of setae on proximal and distal anterior margins and on medial posterior margin; propodus palm transverse; dactylus

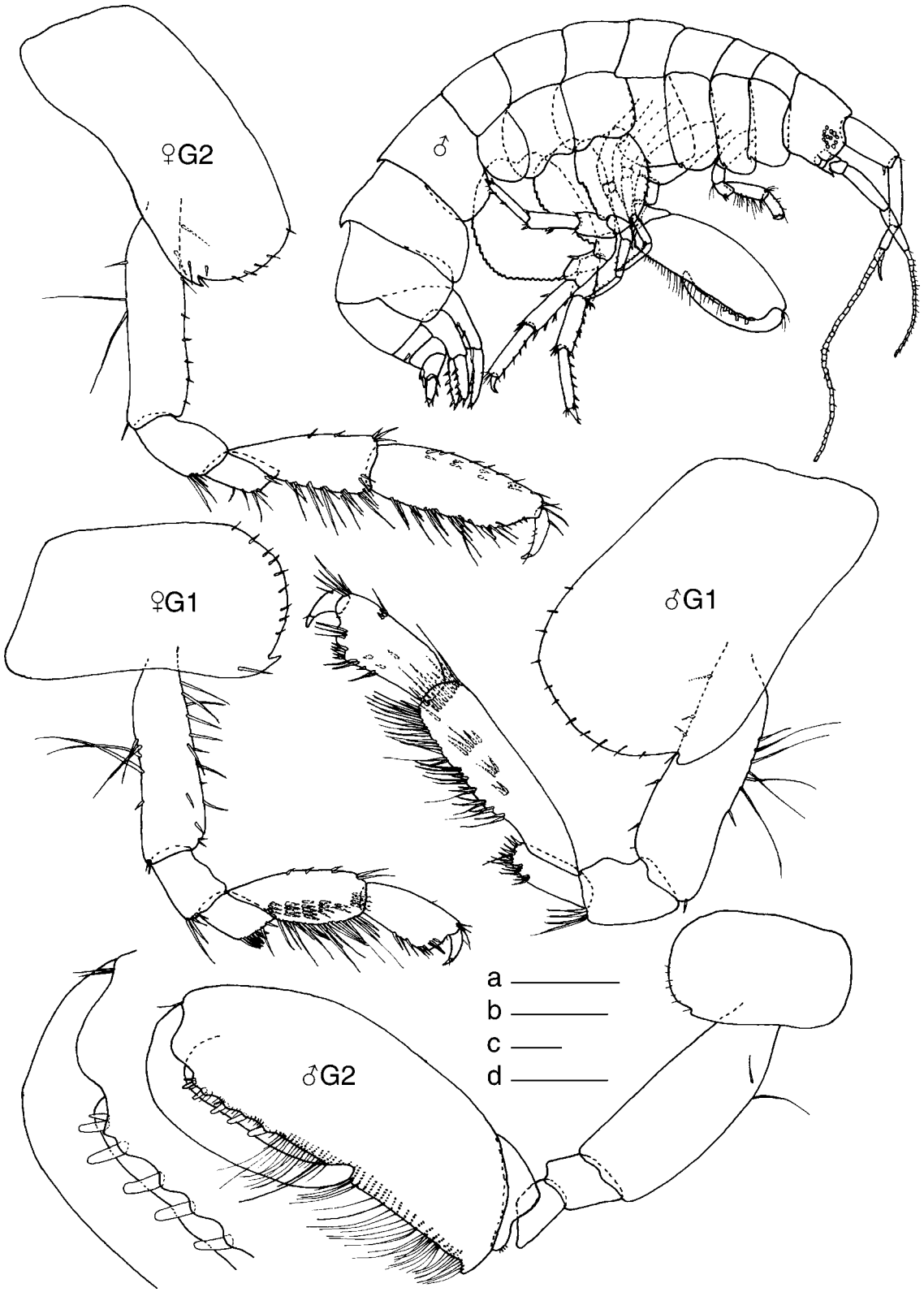

Fig. 9. *Nuuanu rectimana* n.sp., male, 5.2 mm, female, 4.2 mm, AM P60906, Albion. Scales: *a* = 1 mm (whole animal), *b* = 0.2 mm (female G1 and male G1 and G2), *c* = 0.2 mm (male G2) and *d* = 0.2 mm (enlargement of male G2).

normal. Gnathopod 2 coxa 2.1× as long as broad; basis slender, 3× as long as broad; propodus slightly longer than carpus, palm oblique, with long setae on palmar margin and anterior margin. Pereopod 6, coxa bilobed without any finger-like protuberance. Female pereopods 6 and 7 without dense setae on merus and carpus.

Remarks. This species most closely resembles *Melita simplex* Myers (1985) from Fiji, in having an acute dorsal tooth on urosomite 1 and a non sexually-dimorphic female coxa 6. *Melita setimera* male gnathopod 1, however, has a densely setose distal margin on the basis, the propodus is shorter than the carpus and it has a lobe above the dactylus.

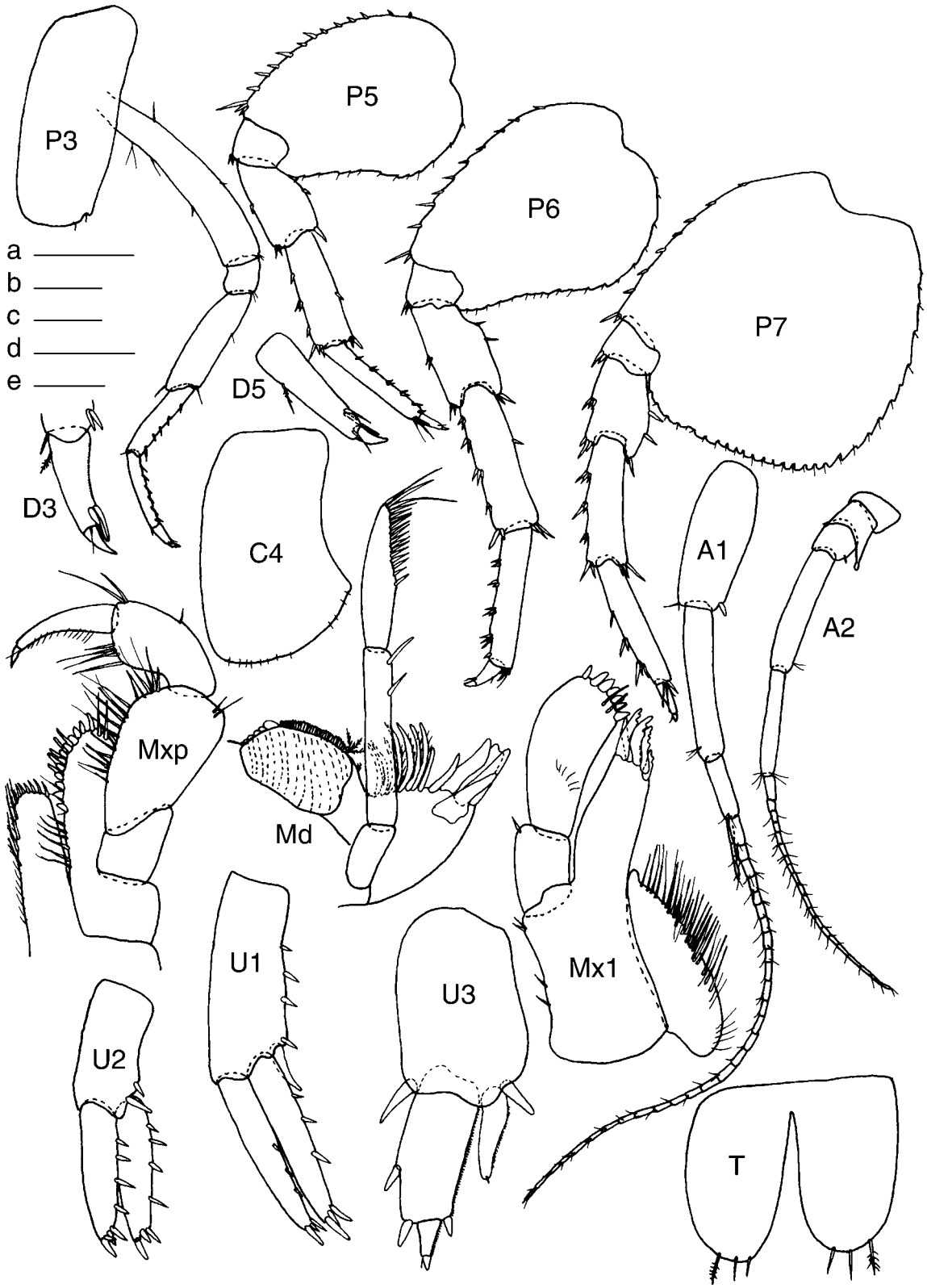

Fig. 10. *Nuuanu rectimana* n.sp., male, 5.2 mm, AM P60906, Albion. Scales: *a* = 0.4 mm (P3, C4, P5 to P7, A1 to A2), *b* = 0.2 mm (U1 to U3), *c* = 0.1 mm (Mxp), *d* = 0.1 mm (Md, Mx1, D3, D5), *e* = 0.05 mm (T).

The male gnathopod 2 propodus of *M. setimera* has parallel margins and the palmar border is broadly sinuous whereas the ventral margin of male gnathopod 2 of *M. simplex* is evenly convex. Pereopods 6 and 7 merus and carpus are densely setose in *M. setimera*, but this character state is unknown in *Melita simplex*. The telson apices of *M. simplex* have a terminal robust seta that is lacking in *M. setimera*.

Melita setimera can be distinguished from all other species of *Melita* from Mauritius, by the presence of the dorsal tooth on urosomite 1 on both males and females.

Males are easily distinguished by the broadly sinuous palmar margin of gnathopod 2 and the presence of dense long setae on merus of pereopods 6 and 7.

Habitat. *Melita setimera* was collected only at Tamarin at depths of less than 1 m. The site has some freshwater influence due to a river flowing in the vicinity.

Type locality. Tamarin, Mauritius.

Distribution. Mauritius.

Etymology. From the Latin *saeta* = bristle coupled with *merus* referring to the strongly setose merus of male pereopods 6 and 7.

Nuuanu rectimana n.sp.

Figs. 9–10

Nuuanu sp. 1 (Appadoo & Steele, 1998).

Type material. HOLOTYPE ♂, 4 mm, AM P60905, 0.5–1 m depth, living on mixture of *Enteromorpha flexuosa, Laurencia papillosa, Halodule uninervis*, Poste La Fayette (20°08.2'S 57°44.5'E), Mauritius, C. Appadoo, 7 February 2000. PARATYPES: 1♂, 3♀♀, AM P60906, 0.5 m, living among *Gracilaria salicornia*, Souillac (20°31'S 57°30.7'E), Mauritius, 25 March 1999; 1♂, 1 juv. from green filamentous algae and *Halodule uninervis* Albion (20°13'S 57°23.7'E), 12 May 1998; 1♂ from *Sargassum* sp., Bain Boeuf (19°59'S 57°36'E), 15 May 1998; 1♂ from *Sargassum* sp., Bain Boeuf, 16 June 1998; 1 juv. from *Jania* sp. and *Valonia* sp., Bain Boeuf, 28 July 1998; 1 juv. from *Pocockiella variegata* and *Valonia* sp., Balaclava (20°03.7'S 57°30.7'E), 10 September 1998; 1 juv. from *Gracilaria salicornia*, Souillac, 25 March 1999; 2♂♂, 11♀♀, 5 juv. from *Laurencia papillosa* and *Cladophora* sp., Albion, 20 April 1999; 1 juv. from *Sargassum* sp., *Amphiroa* sp., *Pocockiella variegata* and *Cymodocea* sp., Bain Boeuf, 16 June 1999; 1♂, 2 juv. from *Sargassum* sp., La Cuvette, 12 October 1999; 1♀ from coral rubble, *Padina* sp. and *Pocockiella variegata*, Flic-en-Flac, 10 December 1999; 1♀ from mixture of *Padina* sp., *Turbinaria* sp., *Sargassum* sp., *Pocockiella variegata*, Bain Boeuf, 24 January 2000; 1 juv. from mixture of *Enteromorpha flexuosa, Laurencia papillosa* and *Halodule uninervis*, Poste La Fayette, 7 February 2000.

Description. Male length, 4.0 mm. Head with lateral cephalic lobe notched; ommatidia of eyes sparse. Antenna 1 poorly setiferous, peduncle article 2 slightly longer than article 1; article 3, 0.5× article 1; accessory flagellum 4-articulate, primary flagellum 30-articulate. Antenna 2 poorly setiferous, article 5, 0.8× article 4, flagellum 20-articulate. Mandible palp slender, subfalcate, article 2 longest; article 3, 0.8× article 2 and 2.1× article 1; article 3 with short setae on medial margin and three long terminal setae. Maxilla 1 palp 2-articulate, article 2 with stout blunt robust setae at tip; inner plate with a small protuberance at apex and with long marginal setae. Maxilla 2 inner plate with oblique setal row. Gnathopod 1 coxa 1.5× as long as broad, posterodistal margin with a notch and distal margin with very short setae; basis slender, 3× as long as broad, posterior margin with a strong patch of setae; carpus slender, subrectangular, 3.5× as long as broad; propodus 0.6× length of carpus; palmar margin oblique with few setae; dactylus short, fitting palm. Gnathopod 2 coxa subrectangular 1.6× as long as broad, posterodistal margin with notch and distal margin with very few short setae; basis 2.5× as long as broad; carpus over three and half times as broad as long; propodus subrectangular, posterior margin straight, defined by a small hump at the proximal end and well-developed blunt projections embedded at the distal end, densely setose, palm obsolete, dactylus 0.6× length of propodus, robust and broad throughout its length. Pereopod 3 coxa subrectangular, 2.2× as long as broad, posterodistal margin with notch; dactylus with two long stout setae and one small slender seta close to apical unguis. Pereopod 4 coxa 1.7× as long as broad, posterior margin excavate; other features similar to pereopod 3. Pereopod 5 basis 1.3× as long as broad, anterior margin convex and with stout robust setae, posterior margin serrated, convex proximally and concave distally; propodus subequal to carpus; dactylus with 2 long setae and one slender seta at unguis. Pereopod 6 basis about 1.5× as long as broad, similar to that of pereopod 5 except posterior margin is more castelloserrate. Pereopod 7 basis broadly expanded, about as long as broad, anterior margin with robust setae, posterior margin strongly convex, castellate with short setae; propodus slightly longer than carpus. Pleonites 1 and 2 with well-developed dorsal tooth. Epimera 1 to 3 subrectangular, distal margins smooth. Uropod 1 rami subequal to each other and 0.8× the length of peduncle. Uropod 2 rami subequal to each other, and slightly longer than peduncle, with stout robust setae. Uropod 3 peduncle 1.5× as long as broad; outer ramus 2-articulate, article 1 truncate with a stout robust setae on mid-lateral margin and two stout distal robust seta; article 2 produced with a stout robust seta; inner ramus short and sub-falcate; inner margins of both rami with very fine short setae. Telson cleft to 80% its length; telson lobes with broadly rounded apex, each with one plumose seta and two short slender setae.

Female: length, 4.2 mm (mature, oostegites with setae). Gnathopod 1 coxa 1.7× as long as broad, posterodistal margin with a notch and short setae; basis slender, 3.5× as long as broad; anterior margin with patches of setae, posterior margin with one strong patch of setae; propodus 0.7× length of carpus; palmar margin oblique, with short setae; dactylus stout, fitting palm. Gnathopod 2 coxa 2.1× as long as broad, posterodistal margin with notch and short setae; basis slender and 3.6× as long as broad; propodus 1.2× length of carpus; propodus slightly less 3.5× as long as broad, palmar margin oblique, defined by a stout robust seta; dactylus stout, fitting palm.

Remarks. The genus *Nuuanu*, established by Barnard (1970), belongs to the "*Gammarella*" group, recently revised by Lowry & Watson (2002). Males of *Nuuanu rectimana* n.sp. can easily be distinguished from *Nuuanu amikai* Barnard (1970), recorded by Ledoyer (1978) from Mauritius, by the presence of a well-developed flat-topped processes on the propodus of gnathopod 2. Other differences include the shape, setation and spination of the telson. *Nuuanu rectimana* n.sp. telson is symmetrical with two robust setae and one plumose seta on each lobe whereas in *Nuuanu amikai* Barnard (1970: 167, fig. 105) the telson is asymmetrical, with one robust seta and two plumose setae on one lobe and one plumose seta on the other. In addition in *Nuuanu rectimana* n.sp. the inner lobe of uropod 3 is slender, subfalcate and about half the left of the outer lobe whereas in *N. amikai* (Barnard 1970: 168, fig. 106) the inner lobe is triangular and less than half the length of the outer ramus. Nuuanu rectimana n.sp. differs from *Nuuanu numbadi* Barnard (1974: 39, fig. 27) from Australia by having more distally tapered telson lobes with one robust and two plumose setae as compared to more distally broad telson lobes with two robust and one plumose seta. Another difference is that epimera 2 and 3 are less acute in *N. rectimana* n.sp. than in *N. numbadi*.

Habitat. *Nuuanu rectimana* was collected in depths of less than 1 m, from seagrass (*Halodule uninervis* or *Cymodocea* sp.) mixed with other algae and coral rubble at Albion, Poste La Fayette and Bain Boeuf.

Type locality. Poste La Fayette, Mauritius.

Distribution. Mauritius.

Etymology. The species is named from the Latin *rectus* meaning straight and *manus* meaning hand, referring to the straight posterior margin of the propodus of the male gnathopod 2.

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References

Appadoo, C., & D.H. Steele, 1998. Shallow-water marine gammaridean amphipods of Mauritius Island. *Crustaceana* 71(6): 633–645.

Barnard, J.L., 1955. Gammaridean Amphipoda (Crustacea) in the collections of the Bishop Museum. *Bernice P. Bishop Museum occasional papers* 215: 1–46.

Barnard, J.L., 1970. Sublittoral gammaridea (Amphipoda) of the Hawaiian Islands. *Smithsonian Contributions to Zoology* 34: 1–286.

Barnard, J.L., 1972. Gammaridean Amphipoda of Australia, part I. *Smithsonian Contributions to Zoology* 103: 1–327.

Barnard, J.L., 1974. Gammaridean Amphipoda of Australia, part II. *Smithsonian Contributions to Zoology* 139: 1–148.

Barnard, J.L., 1976. Amphipoda (Crustacea) from the Indo-Pacific tropics: a review. *Micronesica* 12(1): 169–176.

Bate, C.S., 1862. *Catalogue of the Specimens of Amphipodous Crustacea in the Collections of the British Museum London*, pp. 1–399. London: British Museum of Natural History.

Berents, P.B., 1983. The Melitidae of Lizard Island and adjacent reefs, The Great Barrier Reef, Australia (Crustacea: Amphipoda). *Records of the Australian Museum* 35(3): 101–143.

Bousfield, E.L., 1973. *Shallow-water Gammaridean Amphipod of New England*, 312 pp. Ithaca and London: Cornell University Press.

Haswell, W.A., 1879. On Australian Amphipoda. *Proceedings of the Linnean Society of New South Wales* 4(3): 245–279, pls 7–12.

Ledoyer, M., 1973. Etude des amphipodes gammariens des biotopes sableux et sablo-vaseux de la region de Tulear et de Nosy-Be (Madagascar). *Tethys Supplement* 5: 51–94.

Ledoyer, M., 1978. Amphipodes gammariens (Crustacea) des biotopes cavitaires organogènes récifaux de L'Ile Maurice (Océan, Indien). *The Mauritius Institute Bulletin* 7(3): 197–332.

Ledoyer, M., 1979. Les gammaridiens de la pente externe du Grand recif de Tulear (Madagascar) (Crustacea, Amphipoda). *Memorie del Museo Civico di Storia Naturale di Verona (II Serie)* 2: 1–150.

Ledoyer, M., 1982. Crustacés Amphipodes Gammaridiens famille des Acanthonotozomatidae à Gammaridae. *Faune de Madagascar* 59(1): 1–598.

Lowry, J.K., & M. Watson, 2002. Revision of the *Gammarella* group, with a new species from the Andaman Sea (Crustacea, Amphipoda, Melitidae). *Phuket Marine Biological Centre Special Publication* 23: 197–212.

Myers, A.A., 1985. Shallow-water, coral reef and Mangrove Amphipoda (Gammaridea) of Fiji. *Records of the Australian Museum, Supplement* 5: 1–143.

Say, T., 1818. An account of the Crustacea of the United States. *Journal of the Academy of Natural Sciences of Philadelphia* 1: 374–401.

Stebbing, T.R.R., 1904. Gregarious Crustacea from Ceylon. *Spolia Zeylanica* 2: 1–29.

Watling, L., 1989. Classification system for crustacean setae based on the homology concept. In *Functional morphology of feeding and grooming in Crustacea*, Crustacean Issues 6, ed. B.E. Felgenhauer, L. Watling & A.B. Thristle, pp. 15–27, Rotterdam: Balkema press.

Yamato, S., 1988. Two new species of the genus Melita (Crustacea: Amphipoda) from the brackish waters in Japan. *Publications of the Seto Marine Biological Laboratory* 33: 80–95.

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