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## The genera *Archaeobemlos* n.gen., *Bemlos* Shoemaker, *Protolembos* Myers and *Globosolembos* Myers (Amphipoda, Aoridae, Aorinae) from Australia

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ABSTRACT. Twenty-six species of Aorinae are recorded from Australia of which 21 species are as yet unknown from outside the continent. Sixteen species are new to science and are described and figured. Five further species which were poorly known, which showed minor differences from previously described material, or which were previously unknown from the western Pacific, are also figured. A new genus is erected for *Autonoe philacantha* Stebbing.

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### Contents

Introduction .....	265	<i>Bemlos arkooolus</i> n.sp. ....	305
<i>Archaeobemlos</i> n.gen. ....	267	<i>Bemlos gilgi</i> n.sp. ....	310
<i>Archaeobemlos philacanthus</i> (Stebbing) ..	267	<i>Protolembos</i> Myers .....	313
<i>Bemlos</i> Shoemaker .....	270	<i>Protolembos chiltoni</i> (Myers) .....	314
<i>Bemlos mollis</i> n.sp. ....	271	<i>Protolembos murrarum</i> n.sp. ....	315
<i>Bemlos ephippium</i> n.sp. ....	275	<i>Protolembos drummondiae</i> n.sp. ....	317
<i>Bemlos australis</i> (Haswell) .....	278	<i>Protolembos clematis</i> (Moore) .....	321
<i>Bemlos aequimanus</i> (Schellenberg) ....	282	<i>Protolembos yaranus</i> n.sp. ....	322
<i>Bemlos quadrimanus</i> (Sivaprakasam) ..	282	<i>Protolembos arinyas</i> n.sp. ....	324
<i>Bemlos saloteae</i> (Myers) .....	284	<i>Protolembos verrucularum</i> (Moore) ....	324
<i>Bemlos trudis</i> n.sp. ....	286	<i>Globosolembos</i> Myers .....	324
<i>Bemlos tridentatus</i> n.sp. ....	289	<i>Globosolembos ruffoi</i> (Myers) .....	327
<i>Bemlos triangulum</i> n.sp. ....	291	<i>Globosolembos excavatus</i> (Myers) ....	329
<i>Bemlos bidens</i> n.sp. ....	293	<i>Globosolembos lunatus</i> n.sp. ....	329
<i>Bemlos tris</i> n.sp. ....	297	Acknowledgements .....	332
<i>Bemlos dolichomanus</i> n.sp. ....	299	References .....	332
<i>Bemlos strigilis</i> n.sp. ....	299		

Twenty-six species and four genera of Aorinae (*sensu* Myers 1988) are recorded from Australia. Twenty-one species, of which 16 are new to science, are figured. A new genus is erected for *Autonoe philacantha* Stebbing. Previous to the present work, only four species of *Lembos sensu lato* (*Bemlos*

*australis* (Haswell), *Archaeobemlos philacanthus* (Stebbing), *Protolembos chiltoni* (Myers) and *Globosolembos excavatus* (Myers) were known from Australia. Sampling of the Australian amphipod fauna has as yet been too scanty to allow a satisfactory biogeographic analysis to be performed.

**Table 1.** Distribution of Australian species of *Bemlos*, *Archaeobemlos*, *Globosolembos* and *Protolembos*. Parentheses indicate deep water occurrence in tropical thermal regime.

	Qld	NSW	Vic.	Tas.	S.A.	W.A.
<b>Tropical Eastern Flock</b>						
<i>Bemlos mollis</i>	+					
<i>Bemlos saloteae</i>	+					
<i>Bemlos tridentatus</i>	+					
<i>Bemlos triangulum</i>	+					
<i>Bemlos bidens</i>	+					
<i>Globosolembos ruffoi</i>	+					
<i>Globosolembos excavatus</i>	+					
<i>Bemlos ephippium ephippium</i>	+	+				
<i>Bemlos australis</i>	+	+				
<i>Bemlos aequimanus</i>	+	+	+			
<b>Cool-warm temperate Southern Flock</b>						
<i>Archaeobemlos philacanthus</i>	(+)		+			
<i>Protolembos murrarum</i>		+				
<i>Bemlos trudis</i>		+				+
<i>Bemlos tris</i>			+			
<i>Bemlos dolichomanus</i>			+			
<i>Bemlos gilgi</i>			+			
<i>Protolembos drummondiae</i>			+			
<i>Protolembos arinyas</i>			+			
<i>Globosolembos lunatus</i>			+			
<i>Protolembos chiltoni</i>			+	+		
<i>Protolembos clematis</i>				+		
<i>Protolembos verrucularum</i>				+		
<i>Bemlos arkoolus</i>			+		+	
<b>Tropical Western Flock</b>						
<i>Bemlos strigilis</i>					+	+
<i>Bemlos quadrimanus</i>						+
<i>Protolembos yaranus</i>						+
<i>Bemlos ephippium disjuncta</i>						+

There appear, however, to be three main flocks (Table 1): 1. tropical eastern Australia, 2. cool-warm temperate southern Australia, and 3. tropical western Australia. The cool-warm temperate element interdigitates with the tropical elements on eastern and western coasts. Only one species, *Bemlos ephippium* n.sp. is known from both eastern and western coasts (as different subspecies), but *Protolembos arinyas* n.sp. and *P. yaranus* n.sp. form a sibling pair, the former from Victoria, the latter from Western Australia.

Of the four genera discussed here, *Archaeobemlos* n.gen. and *Protolembos* are with one exception, unique to Australia and are cool-warm temperate

taxa (the exception being *Protolembos kidoli* from East Africa), while *Bemlos* and *Globosolembos* are primarily tropical. Of the five species in the present work which have extrinsic distributions, one (*Bemlos quadrimanus*) is western Australian and has a broad Indian Ocean distribution westward to East Africa, and four are eastern Australian. Of these, two (*Bemlos aequimanus* and *B. saloteae*) have west Pacific distributions and two (*Globosolembos excavatus* and *G. ruffoi*) have Indian Ocean distributions, although the former extends eastwards to Tonga.

Keys to Australian taxa are provided, but females and juveniles cannot readily be identified.

**Key to the Aorinae of Australia**

1. Mandible palp article 2 longer than 3 ..... *Archaeobemlos*  
 —Mandible palp article 3 longer than 2 ..... 2
2. Uropod 1 peduncle shortened, only a little longer than broad, inter-ramal process much longer than peduncle and over two thirds length of rami .....  
 ..... *Australomicrodeutopus*  
 —Uropod 1 peduncle not markedly shortened, much longer than broad, inter-ramal process shorter than peduncle and less than two thirds length of rami ..... 3

3. Maxilliped basis with strong flange on anterior margin ..... *Protolembos*  
 —Maxilliped basis lacking flange ..... 4
4. Male gnathopod 1 merus greatly elongated extending over much of length or  
 exceeding length of elongate carpus ..... *Aora*  
 —Male gnathopod 1 merus not greatly elongated, never exceeding length of  
 carpus ..... 5
5. Gnathopod 1 greatly enlarged in both sexes, propodus lacking an intrapalmar  
 sinus or strong tooth ..... 6  
 —Gnathopod 1 greatly enlarged in males only, propodus generally with  
 intrapalmar sinus and strong tooth ..... *Bemlos*
6. Gnathopod 2 carpus with strongly setose anterodistal expansion ..... *Xenocheira*  
 —Gnathopod 2 carpus lacking setose anterodistal expansion ..... *Globosolembos*

#### *Archaeobemlos* n.gen.

**Type species.** *Autonoe philacantha* Stebbing 1888 (by monotypy).

**Diagnosis.** Mandible palp article 2 strongly setose, longer than article 3, article 3 falcate, posterior margin strongly setose, setae of varying length, some marginal setae longer than distal setae, left mandible molar with crenulate ridges traversing molar. Maxilla 1 outer plate with 11 terminal spines, palp article 2 broad, with setal row on anterodistal margin. Gnathopod 1 enlarged, similar in both sexes. Pereopods 5 and 6 propodus posterior margin with several spines. Uropod 3 rami with marginal spines inner ramus with marginal setae, both rami with long distal setae outer ramus lacking a second article.

**Remarks.** In its non sexually dimorphic gnathopoda, this genus resembles the plesiomorphic genus *Arctolembos* Myers, but also the otherwise rather apomorphic *Globosolembos* Myers. It also resembles *Arctolembos* in the mandibular palp shape and setation, but differs in the unmodified head lobes, normal labium, normal maxilliped, ridged molar and much less spinous uropods. It resembles *Protolembos* Myers in the mandibular palp and uropod structure, but that genus has rounded molar plates, maxilliped flanges and sexually dimorphic gnathopoda.

#### *Archaeobemlos philacanthus* (Stebbing)

Figs 1–3

*Autonoe philacantha* Stebbing, 1888: 1082, pl. 110;—  
 Stebbing, 1906: 598, fig. 102;—Stebbing, 1910: 605;—  
 Sheard, 1937: 26.

**Material examined.** Victoria: 38 males, 45 females, + 5 slides male, 1 slide female, Bass Strait, 40°09.2'S 147°31.9'E, 51 m, shell gravel, 14 Nov 1981, NZ01 R.V. *Tangaroa* stn 162, AM P37401; Queensland: 5

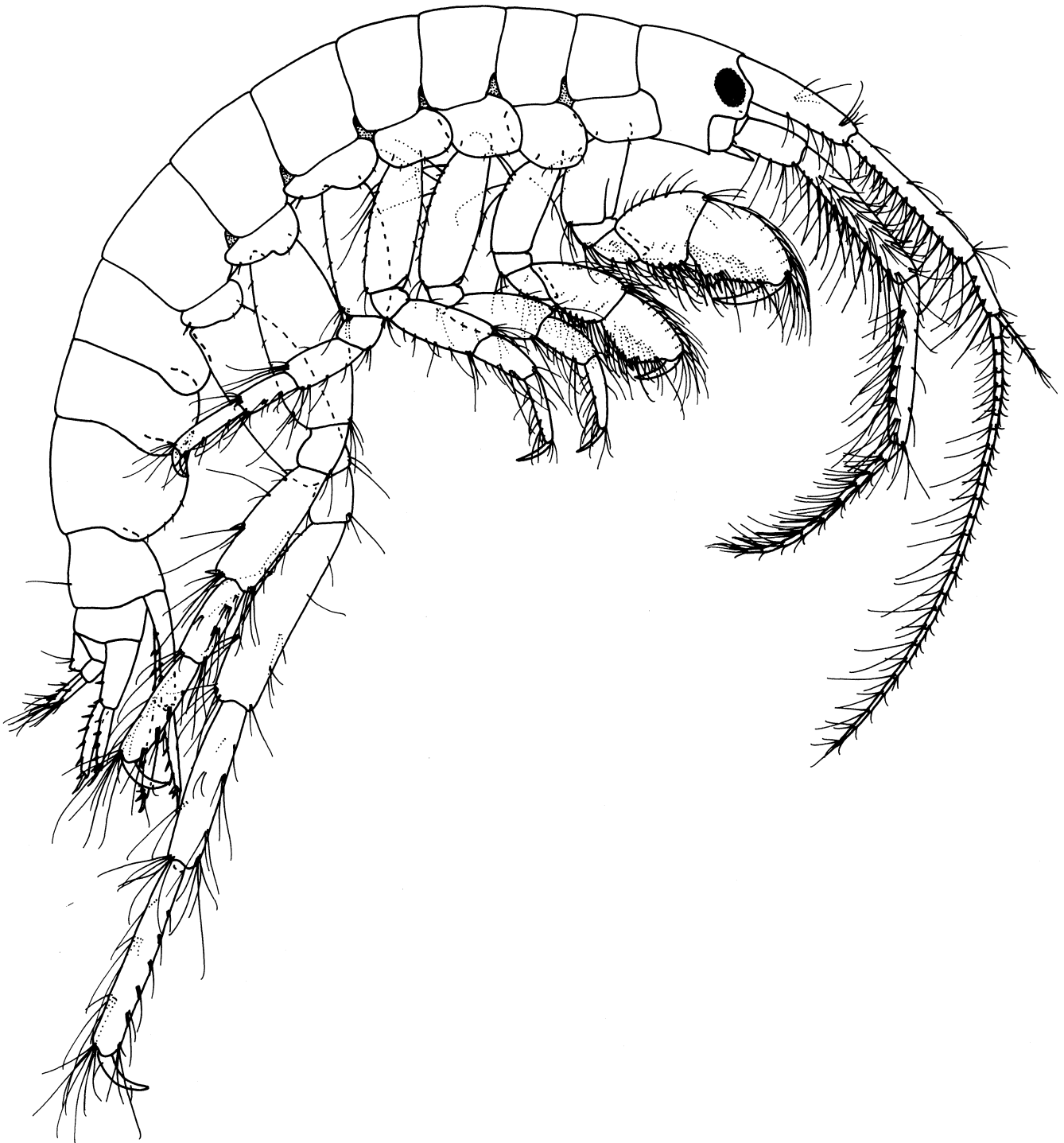
males, 14 females, north-east of Lady Elliot Island, 24°03.7'S 152°49.4'E, 150 m, rubble bottom with small disc corals, 4 July 1984, HMAS *Kimbla* stn 3, AM P37402.

**Description.** Body (in alcohol) of a uniform pale tan. Male pereon segments lacking sternal processes. Head anteroventral margin scarcely produced. Labium outer plate distal margin with about 5 spines. Mandible palp article ratios 4 : 12 : 11, article 2 posterior margin setose, article 3 posterior margin concave, strongly setose, the setae of variable length, some marginal setae longer than distal setae; mandible molar with 7 crenulate ridges traversing it. Maxilla 1 outer plate with 11 terminal spines, palp article 1 very short, palp article 2 with setal row on anterodistal margin and with 6 terminal spines. Antenna 1 about two thirds body length, peduncular articles in the length ratios 7 : 8 : 3; accessory flagellum with 5 articles, the terminal article rudimentary; primary flagellum a little longer than peduncle with about 26 articles. Antenna 2 about two thirds length of antenna 1, peduncular articles 4 and 5 subequal; flagellum a little longer than peduncular article 5, with about 10 articles. Gnathopod 1 (both sexes) coxa subquadrangular, anterodistal margin rounded; basis robust about one and one half times as long as broad; carpus almost as broad as long; propodus longer than carpus, palm long, oblique and sinuous, defined by a triangular tooth and a spine; dactylus fitting palm. Gnathopod 2 (both sexes) basis stout; propodus longer than carpus, palm oblique, defined by a weak hump and a spine; dactylus fitting palm. Pereopods 3 and 4 dactylus little over half length of propodus. Pereopods 5–7 in the length ratios 2 : 3 : 4; pereopod 7 about three quarters body length. Epimera 1–3 rounded. Uropod 1 peduncle with inter-ramal tooth one quarter length of peduncle; rami slender, spinose, inner ramus slightly the longer, but shorter

than peduncle. Uropod 2 lacking interramal process; rami stout, spinose, inner ramus a little longer than outer and longer than peduncle. Uropod 3 inner ramus distinctly longer than outer and nearly twice length of peduncle; both rami with marginal spines and long terminal setae; inner ramus with marginal setae.

**Habitat.** On gravel, sand and mud bottoms in depths of 50–150 m.

**Distribution.** Probably widely distributed on suitable bottoms from Victoria to Queensland.



**Fig.1.** *Archaeobemlos philacanthus* (Stebbing), male, 10.0 mm, Bass Strait.

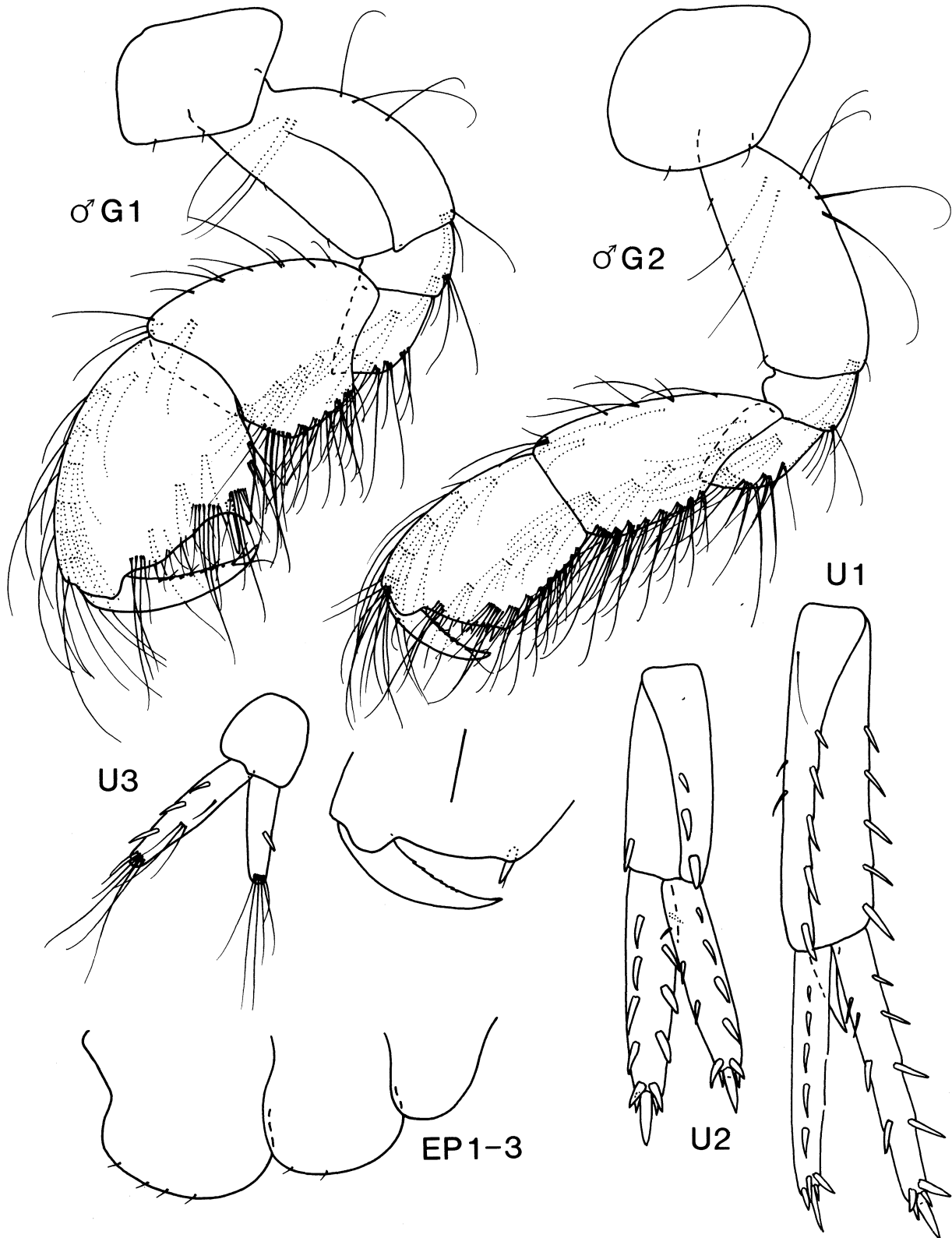


Fig.2. *Archaeobemlos philacanthus* (Stebbing), male, 10.0 mm, Bass Strait.

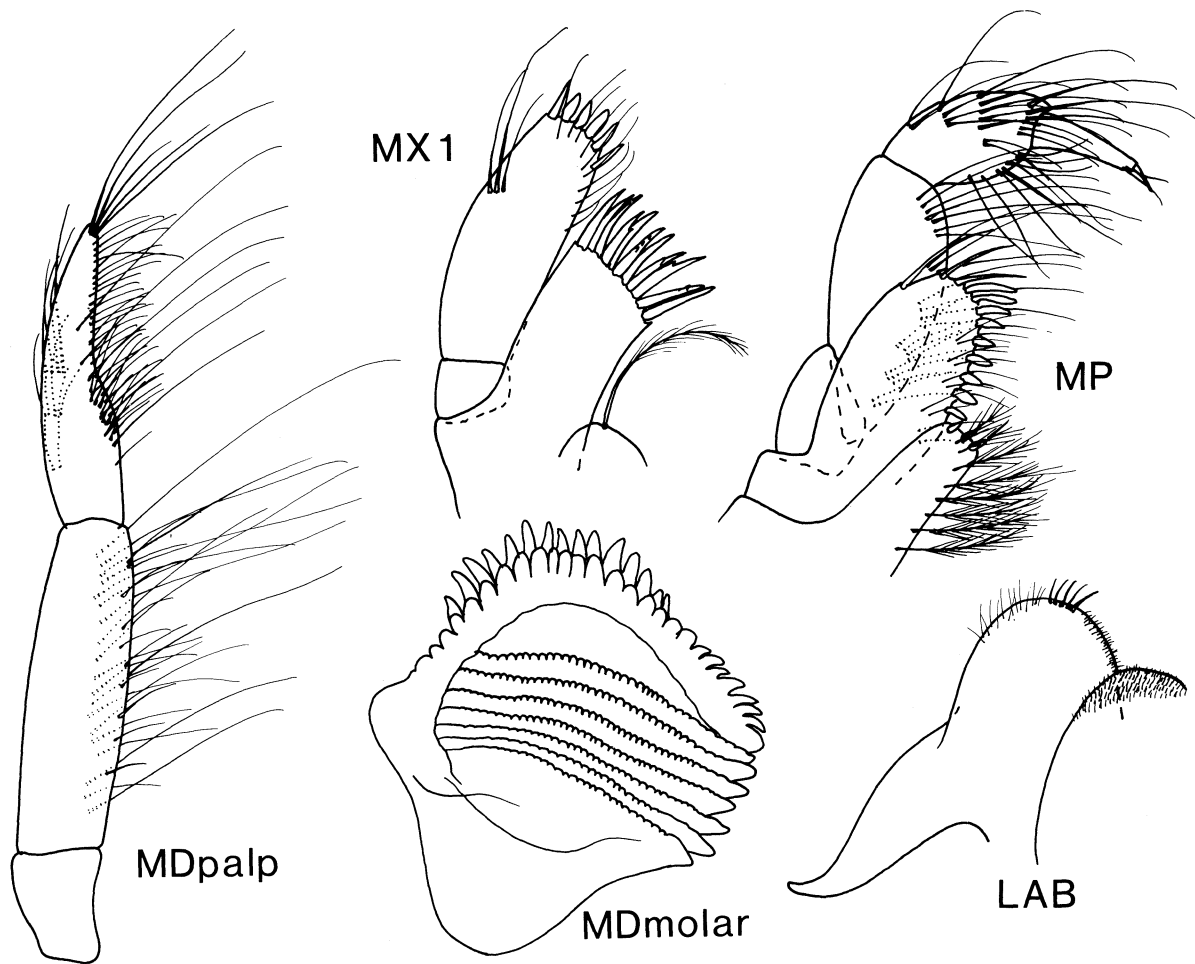


Fig.3. *Archaeobemlos philacanthus* (Stebbing), male, 10.0 mm, Bass Strait.

***Bemlos* Shoemaker**

*Bemlos* Shoemaker, 1925: 36; Myers, 1988: 188.

**Type species.** *Bemlos macromanus* Shoemaker.

**Diagnosis.** Mandible palp article 2 usually less than two thirds length of article 3, weakly setiferous, article 3 generally not markedly falcate, posterior margin with setae of 2 distinct lengths, left molar with well-developed plates, rounded or with primary

plate falcate. Maxilla 1 outer plate with 10 spines. Maxilliped without flanges. Male pereon generally with sternal processes. Gnathopod 1 always sexually dimorphic. Gnathopod 2 of similar size in both sexes but sometimes sexually dimorphic. Pereopods 5 and 6 propodus posterior margin with several spines. Uropod 3 rami weakly spinous with very long terminal setae outer ramus with small second article.

**Key to male *Bemlos* of Australia**

- 1. Gnathopod 1 carpus larger than propodus ..... 2
- Gnathopod 1 carpus smaller than propodus ..... 4
- 2. Gnathopod 1 carpus lacking teeth ..... 3
- Gnathopod 1 carpus posterior margin with stout teeth ..... *B. tridentatus*
- 3. Pereon segments 2–3 with strong acute sternal processes ..... *B. triangulum*
- Pereon segments lacking sternal processes ..... *B. australis*

4. Gnathopod 2 carpus anterior margin densely setose ..... 5  
 —Gnathopod 2 carpus anterior margin weakly setiferous ..... 6
5. Gnathopod 1 basis with wing-like process on outer face (Fig. 37) lacking  
 posterodistal brush of long setae ..... *B. arkoolus*  
 —Gnathopod 1 basis lacking wing-like process on outer face, with posterodistal  
 brush of long setae ..... *B. mollis*
6. Pereon segments 1–7 or 2–7 with dense brown bands or blocks of pigment  
 (Fig. 10) ..... *B. ephippium*  
 —Pereon segments not pigmented as above ..... 7
7. Gnathopod 1 merus and carpus each with posterodistal tooth ..... 8  
 —Gnathopod 1 merus and carpus lacking teeth ..... 9
8. Gnathopod 2 basis very elongate and slender (Fig. 37) ..... *B. tris*  
 —Gnathopod 2 basis not markedly elongate and slender (Fig. 25) ..... *B. bidens*
9. Gnathopod 2 basis anterodistal corner produced into a distinct tooth ..... 10  
 —Gnathopod 2 basis anterodistal corner not produced into a tooth ..... 13
10. Gnathopod 1 propodus broad, less than one and one half times as long as broad  
 ..... *B. quadrimanus*  
 —Gnathopod 1 propodus slender, more than one and one half times as long as  
 broad ..... 11
11. Gnathopod 1 dactylus less than half length of propodus, scarcely overlapping  
 palmar defining tooth ..... *B. dolichomanus*  
 —Gnathopod 1 dactylus over half length of propodus, greatly overlapping palmar  
 defining tooth ..... 12
12. Gnathopod 1 palm terminating acutely, pereon processes acute ..... *B. saloteae*  
 —Gnathopod 1 palm terminating obtusely, pereon processes obtuse .....  
 ..... *B. aequimanus*
13. Gnathopod 1 propodus much broader distally, basis and carpus with  
 stridulating ridges ..... *B. strigilis*  
 —Gnathopod 1 propodus not broader distally, basis and carpus lacking  
 stridulating ridges ..... 14
14. Gnathopod 1 propodus with strong posterodistal tooth ..... *B. trudis*  
 —Gnathopod 1 propodus lacking posterodistal tooth ..... *B. gilgi*

***Bemlos mollis* n.sp.**

Figs 4–6

**Type material.** HOLOTYPE: male, 3.0 mm. Lizard Island, Qld, rubble and algal turf on top of patch reef in lagoon 1.5 m, 15 Jan 1982, coll. B. Kensley, AM P37403. PARATYPES: 1 female, + slide, type locality, AM P37404. PARATYPE: 1 male, + 4 slides, reef off North Point, rubble and *Amphiroa* from reef crest 3 m, 12 Jan 1982, B. Kensley, AM P37406.

**Additional material.** Lizard Island, Queensland: 2 males, 2 females, between South Island and Bird Island, scattered coral heads, rubble from depressions in coral, 7.7–9.0 m, 9 Jan 1982, B. Kensley, AM P37405.

**Description.** Body (in alcohol) white, with weak, irregular, narrow dorsal bands of reddish brown

pigment on pereon segments 2 and 5–7. Male pereon segment 2 with slender, acute, midventral sternal process, pereon segments 3–4 with short, subacute sternal processes. Head anteroventral margin quite strongly produced but subacute. Labium outer plate distal margin with about 8 spines. Mandible palp article ratios 4 : 9 : 13, article 3 posterior margin straight and setiferous over two thirds of its length, marginal setae of 2 distinct lengths. Maxilla 1 palp article 2 with 6 distal spines. Antenna 1 very slender, slightly exceeding body length, peduncular articles in the length ratios 5 : 8 : 3; accessory flagellum with 4 articles, the terminal article rudimentary; primary flagellum about one and one half times length of



peduncle with up to 15 articles. Antenna 2 very slender, two thirds length of antenna 1, peduncular articles 4 and 5 subequal; flagellum a little shorter than peduncular article 5 with about 8 articles. Male gnathopod 1 coxa subquadrangular, anterodistal margin rounded; basis swollen mediolaterally, anterior margin weakly convex, posterior margin strongly convex bearing a distal brush of very long setae; carpus well developed, a little longer than broad, with a small, triangular, posterodistal tooth; propodus less than twice as long as carpus, broadening distally, palm straight in anterior portion, with relatively deep, narrow, triangular excavation in posterior portion, defining tooth slender, acute, with proximal spine; dactylus

elongate, overlapping palm. Female gnathopod 1 slender, basis over 3 times as long as broad; propodus a little longer than carpus, broadening distally, palm very slightly sinuous; dactylus overlapping palm. Male gnathopod 2 basis anterior margin very weakly concave, posterior margin strongly convex; merus posterior margin with numerous long setae; carpus distinctly longer than propodus; carpus and propodus anterior margins strongly setose; dactylus fitting palm. Female gnathopod 2 slender, basis over 4 times as long as broad; carpus and propodus subequal in length; propodus widening distally; dactylus fitting palm. Pereopods 3 and 4 dactylus two thirds length of propodus. Pereopods 5-7 delicate and slender, in the length ratios 2 : 3 : 5; pereopod 7

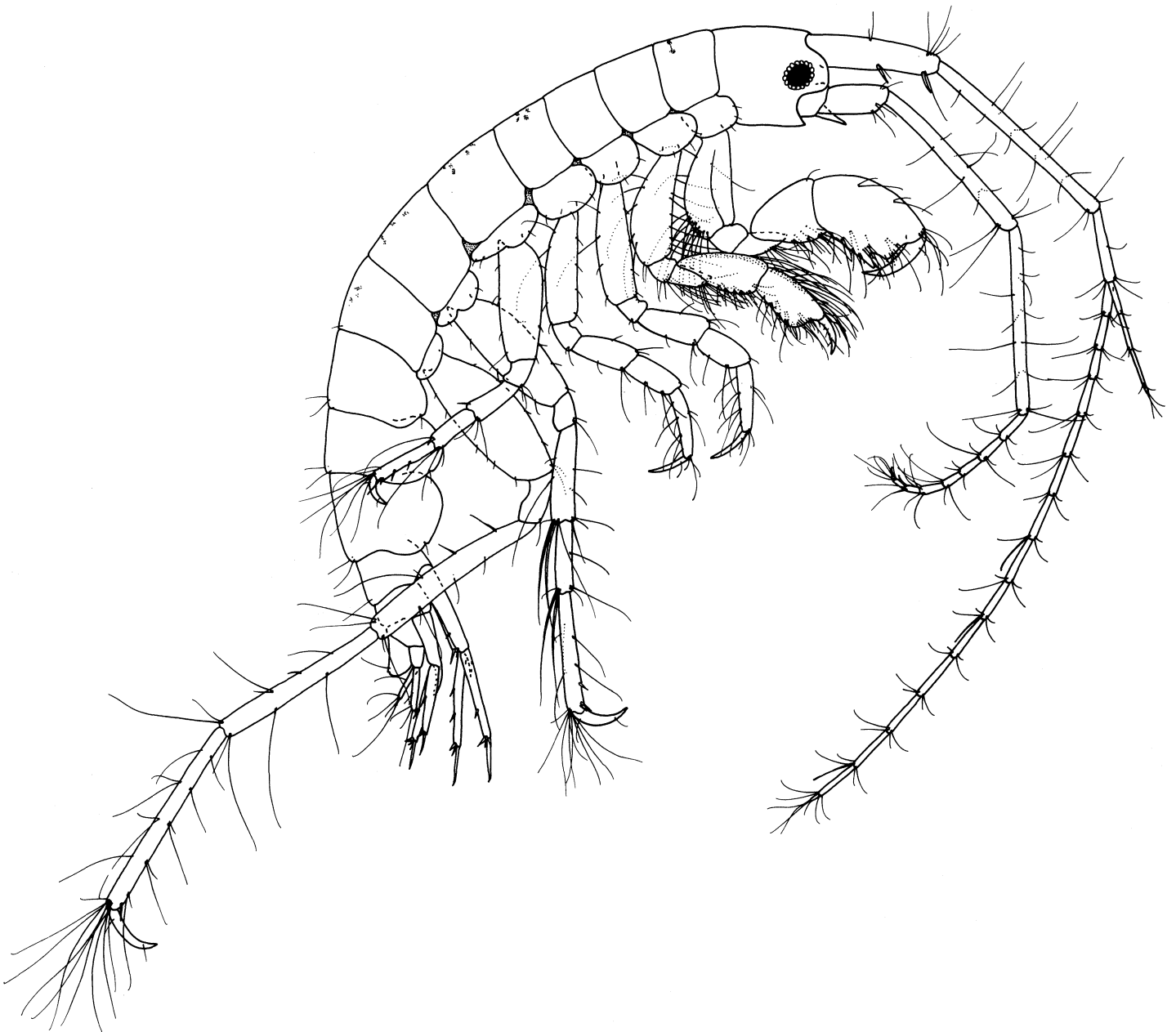


Fig.4. *Bemlos mollis* n.sp., male, 3.0 mm, Lizard Island.

almost equal to body length. Epimera 1-3 rounded. Uropod 1 peduncle with inter-ramal tooth less than one third length of peduncle; rami slender, outer ramus a little longer than inner and longer than peduncle. Uropod 2 peduncle with inter-ramal tooth a little less than half length of peduncle; outer ramus longer than inner and one and one half times length of peduncle. Uropod 3 rami elongate; inner ramus longer than outer, and two and one half times length

of peduncle; outer ramus with small second article; both rami with very long terminal setae which exceed length of rami.

**Remarks.** The extremely elongate and slender antennae and pereopods of this species readily distinguish it from all other Australian species.

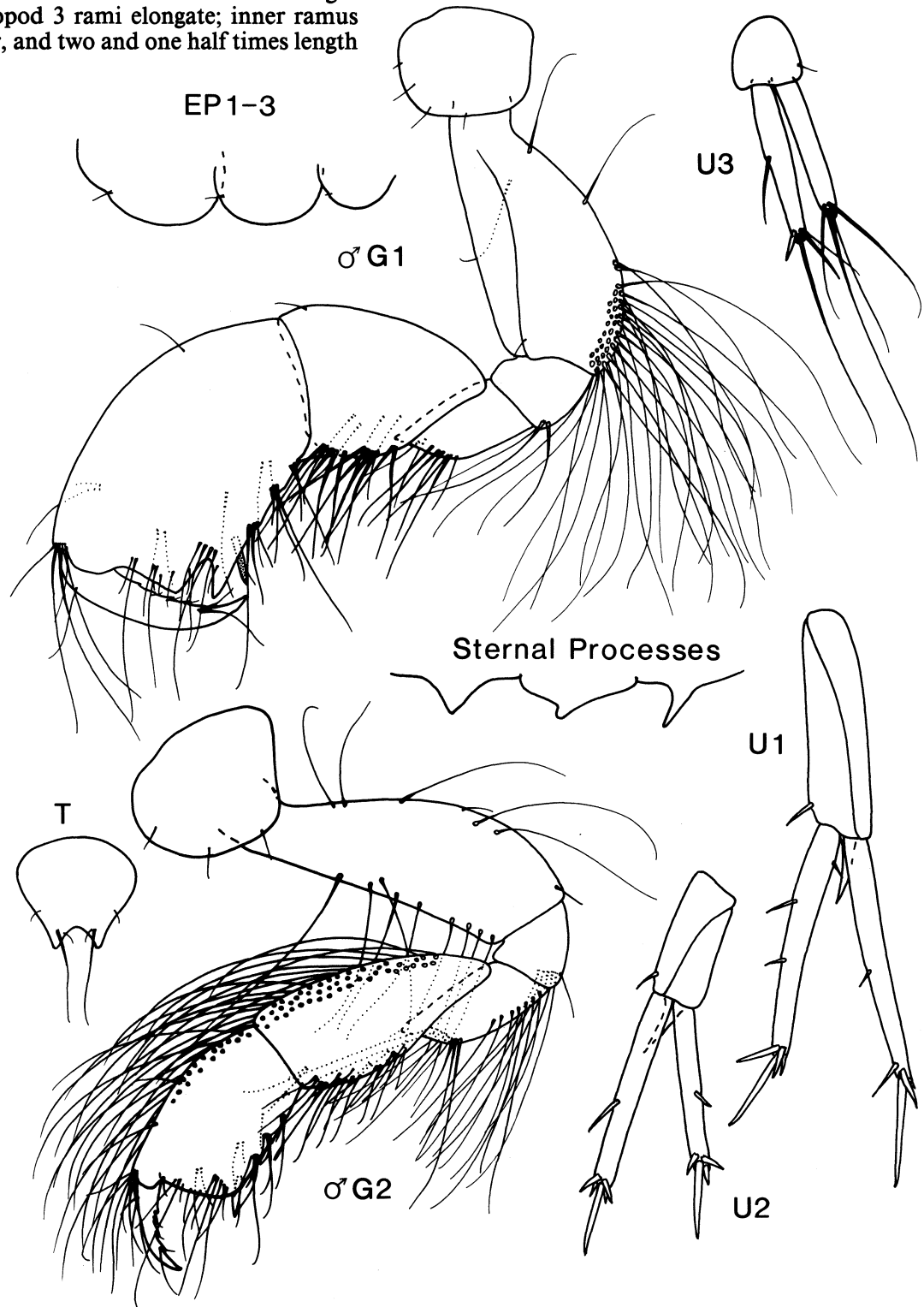
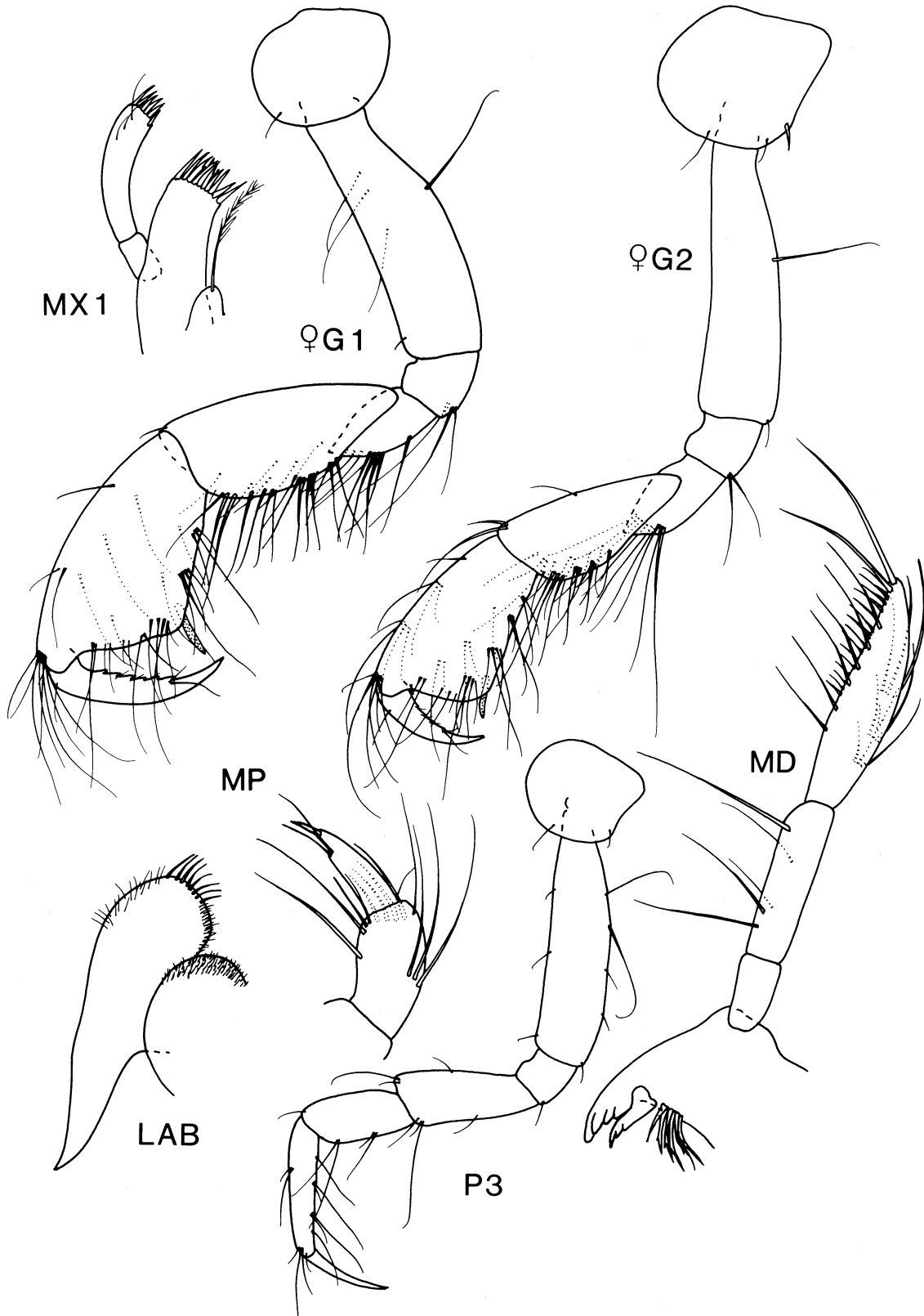


Fig.5. *Bemlos mollis* n.sp., male, 3.0 mm, Lizard Island.

**Habitat.** Among algal turf and reef rubble.

**Distribution.** At present known only from Lizard Island, Queensland.

**Etymology.** From the latin *mollis* = pliant, referring to its slender appendages.



**Fig.6.** *Bemlos mollis* n.sp., male, female, 3.0 mm, Lizard Island.

***Bemlos ephippium* n.sp.**

Figs 7-10

**Type material.** HOLOTYPE: male, 2.8 mm. Lizard Island, Queensland, rubble from depressions in crest of patch reef in lagoon, 1.5-2.5 m, 16 Jan 1982, B. Kensley, AM P37407. PARATYPES: 2 females, + 1 slide, type locality, AM

P37408. PARATYPE: 1 male, + 4 slides. Lizard Island, Qld, reef flat between Bird Island and South Island, algal encrusted rubble, 1.5-2.5 m, 16 Jan 1982, B. Kensley, AM P37409.

**Additional material.** Lizard Island, Queensland: 1 female, between South Island and Palfrey Island, algal turf from shallow ridge between islands, 1.0-1.5 m, 14 Jan

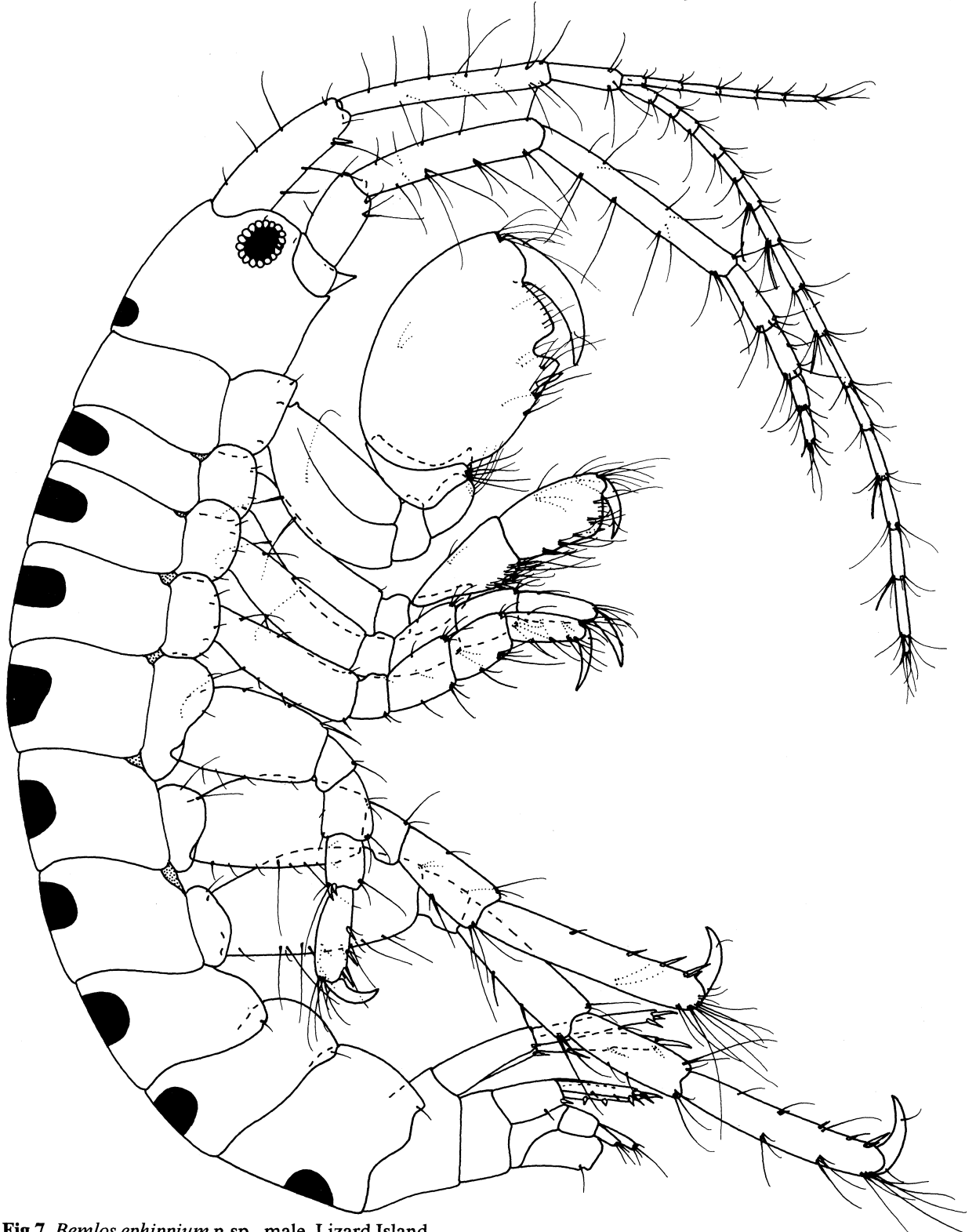


Fig.7. *Bemlos ephippium* n.sp., male, Lizard Island.

1982, B. Kensley, AM P37410. New South Wales: 3 males, Broom Heads in *Ecklonia radiata* holdfasts, 0.5 m, 5 Sept 1986, A.A. Myers, AM P37411; 1 male, 2 females, Broom Heads, in *Sargassum* sp., 0.5 m, 5 Sept 1986, A.A. Myers,

AM P37412; 1 male, 3 females, Byron Bay, in *Sargassum*, 0.5 m, 6 Sept 1986, A.A. Myers, AM P37413; 1 female, Woolgoolga, in *Jania*, islet connected to mainland at L.T., 0.25 m, 3 Sept 1986, A.A. Myers, AM P37414.

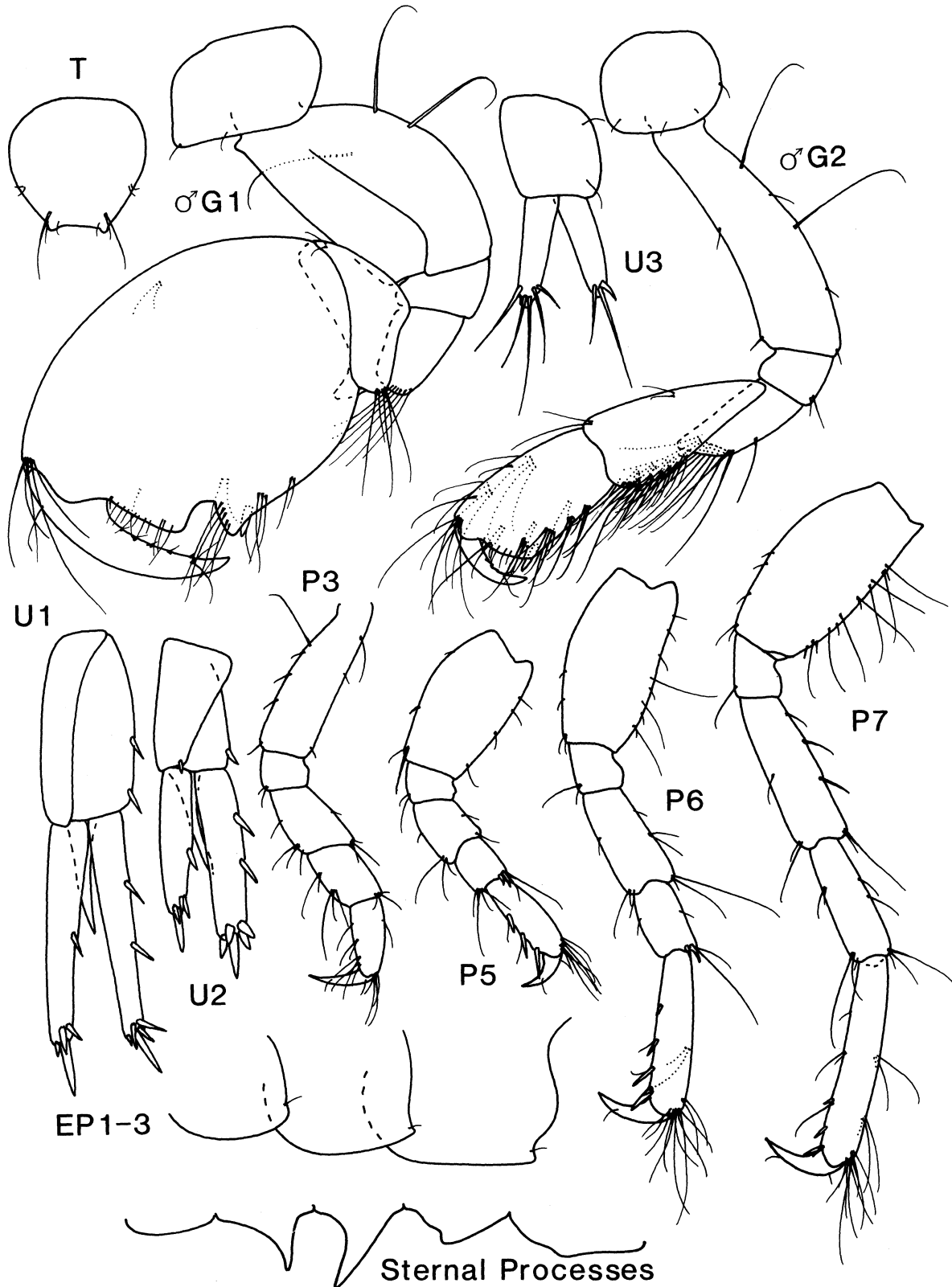
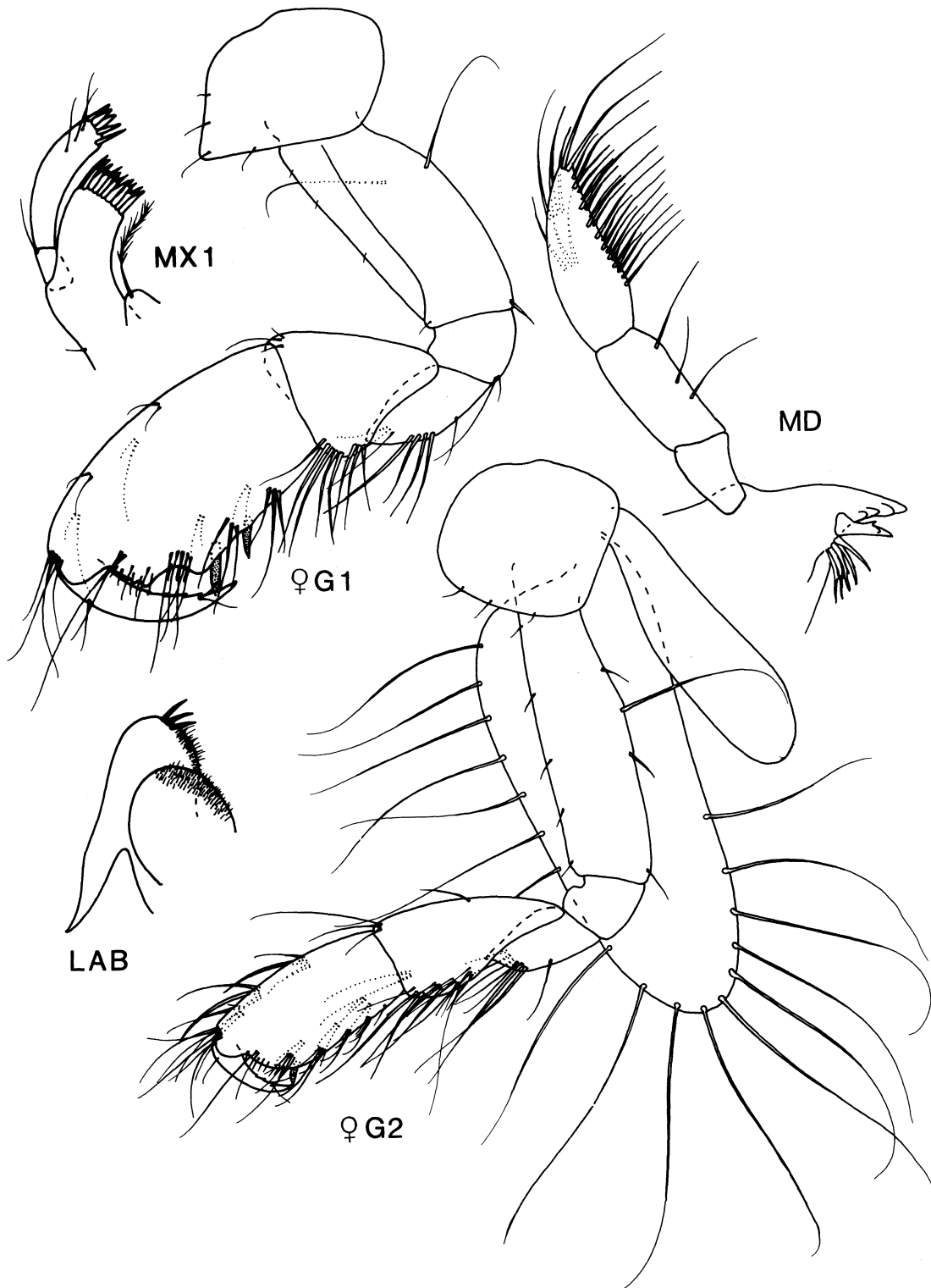


Fig.8. *Bemlos ephippium* n.sp., male, Lizard Island.

**Description.** Body (in alcohol) with saddles of dense brown pigment on the dorsum of the head, pereon segments 2-7 and pleon segments 1-3. Male pereon segments 2-3 with strong, acute, midventral sternal processes, pereon segment 4 with small rounded process. Head anteroventral margin only moderately produced, subacute. Labium outer plate

distal margin with 3 spines. Mandible palp article ratios 3 : 5 : 7, article 3 posterior margin weakly concave, setiferous over three quarters its length with marginal setae of 2 distinct lengths. Maxilla 1 palp article 2 with 5 distal spines. Antenna 1 about three quarters body length, peduncular articles in the length ratios 7 : 9 : 3; accessory flagellum strongly



**Fig.9.** *Bemlos ephippium* n.sp., male female, Lizard Island.

developed with 7 articles; primary flagellum one and one half times length of peduncle with up to 16 articles. Antenna 2 two thirds length of antenna 1, peduncular article 5 longer than article 4; flagellum shorter than peduncular article 5 with about 4 articles. Male gnathopod 1 coxa subquadrangular, anterodistal corner a right-angle; basis robust, anterior margin weakly convex with a proximal nipple-like projection, posterior margin strongly convex; carpus greatly reduced, cup-shaped; propodus massive, about 5 times length of carpus and about three quarters as broad as long, palm with triangular excavation of moderate depth, defined by a broad, triangular tooth, proximal to which is a spine; dactylus stout, fitting palm. Female gnathopod 1 coxa somewhat produced anterodistally; basis stout; carpus of moderate size, triangular; propodus parallel-sided, twice length of carpus, palm sinuous with short crenulate anterior portion and evenly excavate posterior portion, posterior margin with 2 mediobasal spines, dactylus overlapping palm. Male gnathopod 2 basis slender, anterior margin concave, posterior margin convex; carpus elongate, slightly longer than propodus; dactylus fitting palm. Female gnathopod 2 basis only moderately slender, anterior margin straight, posterior margin only weakly convex; carpus and propodus subequal. Pereopods 3 and 4 sturdy, dactylus shorter than propodus. Pereopods 5–7 sturdy, in the length ratios 2 : 3 : 4; pereopod 7 less than two thirds length of body. Epimera 1–3 each with small posterodistal tooth. Uropod 1 peduncle with inter-ramal tooth less than half length of peduncle; rami subequal, longer than peduncle. Uropod 2 peduncle with inter-ramal tooth only slightly shorter than peduncle; inner ramus longer than outer and longer than peduncle. Uropod 3 rami short, subequal, scarcely longer than peduncle; outer ramus with small second article; margins of both rami lacking spines or setae, but with long distal setae.

**Etymology.** From the latin *ephippium* = saddle, referring to its pigmentation.

***Bemlos ehippium disjuncta* n.subsp.**

Fig. 10

**Type material.** HOLOTYPE: male, 4.0 mm. Red Bluff, Kalbarri, WA, 27°42'S 114°09'E, mixed algae and sediment, 3–4 m, 10 Jan 1984, R.T. Springthorpe, AM P37415. PARATYPES: 2 males, 2 females, type locality, AM P37416.

**Additional material.** Western Australia: 1 male, inshore limestone reef, Ned's Camp, Cape Range National Park, 21°59'S 113°55'E, brown alga, 1–5 m, 2 Jan 1984, R.T. Springthorpe, AMP37823.

**Description.** Differs principally from nominate form in the different pigmentation pattern: Pereon segments 1–7 and pleon segments 1–3 with paired dorsal blocks of dark brown pigment separated in the

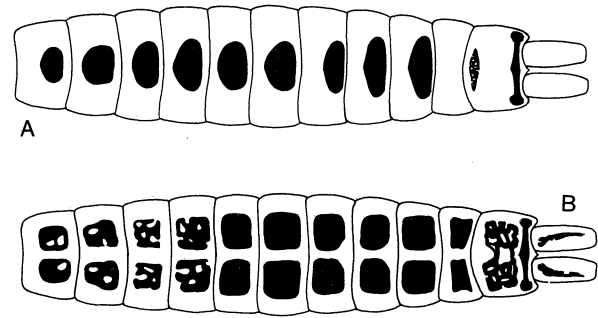


Fig.10. *Bemlos ehippium* n.sp., male, A. Lizard Island, B. Kalbarri.

midline. In hyperadult males the palmar excavation of gnathopod 1 is deeper and narrower than in the nominate form. Males of ssp. *disjuncta* were however larger (4.0 mm) than the males of the nominate form examined (2.8 mm).

**Remarks.** This species, in either form, is readily distinguished from all other known Australian *Bemlos* by the dense dorsal pigment bars.

**Habitat.** In algal turfs and reef rubble.

**Distribution.** Eastern Australia (Queensland and New South Wales) and Western Australia as two distinct subspecies. Not known outside Australia.

**Etymology.** From the latin *disiunctio* = separate, referring to the separate dorsal blocks of pigment.

***Bemlos australis* (Haswell)**

Figs 11–13

*Microdeuteropus* (sic) *australis* Haswell, 1879: 271, pl. 11, fig. 5.

*Microdeutopus australis* Haswell, 1882: 263.

*Lemboides australis*.—Stebbing, 1899: 350; 1906: 601.

*Bemlos australis*.—Myers, 1988: 188.

**Material examined.** Lizard Island, Queensland: 1 female, reefs at western end of lagoon, *Caulerpa racemosa* and *Halimeda micronesea*, 0–3 m, 5 Oct 1978, J.K. Lowry, C. Short, P.C. Terrill; 1 male, 12 females, lagoon entrance between Bird Islet and Trawler Beach, fine sand, 15 m, 5 Oct 1978, J.K. Lowry, P.C. Terrill; 1 male, 10 females, same locality, fine to coarse sand, 15 m, 5 Oct 1978, J.K. Lowry, P.C. Terrill; 1 female, fringing reef, between Bird Islet and South Island, *Halophila*, mixed algae, *Caulerpa*, *Halimeda* with coral rubble, predominated by platelet foraminifera, 24–27 m, 7 Oct 1978, J.K. Lowry; 1 male, 100 m off Freshwater Beach, sediment sample from sand bottom, 1.5 m, 10 October 1978, C. Short; 1 male, 3 females, inside lagoon entrance, between Bird Islet and Trawler Beach, drift and attached algae from sandy bottom, 10 m, 12 Oct 1978, P.C. Terrill; 1 male, off North Point, red algae and coral rubble from subtidal caves, 3–6 m, 14 Oct 1978, J.K. Lowry; 2 females, off North Point, mixed algal sample, 3–6 m, 14 Oct 1978, J.K. Lowry; 4 males, 9 females, reef edge, 200 m, north-west of Palfrey Island, sand sample off reef base, 12 m, 16 Oct 1978, J.K. Lowry; 5 males, 6 females, 119 mm, halfway between

Mangrove Beach and South Island, fine sediment, 10 m, 30 Sept 1978, A. Jones. New South Wales: 1 male, 2 females, Munganno Point, Twofold Bay, subtidal rock platform, 7 m, 10 Oct 1984, P. Hutchings, AM P36189; 3 females, Murrumbulga Point, Twofold Bay, subtidal rock platform, 5 m, 17 Sept 1985, S. Keable, P. Hutchings, AM P37479; 2 females, 1 male, Quarantine Bay, Twofold Bay, airlift from

*Posidonia* beds, 9 Oct 1984, S. Keable, J. van der Velde, AM P36031; 3 females, same locality, S. Keable, A. Reid, AM P37480; 2 males, same locality, sediment from *Posidonia* beds, 11 Dec 1984, S. Keable, E. Bamber, AM P37481; 9 males, 2 females, 3 mm, same locality, airlift from *Posidonia* beds, 28 Mar 1985, S. Keable, A. Paul, L. Walker, AM P37482; 13 females, 6 males, 5 mm, same

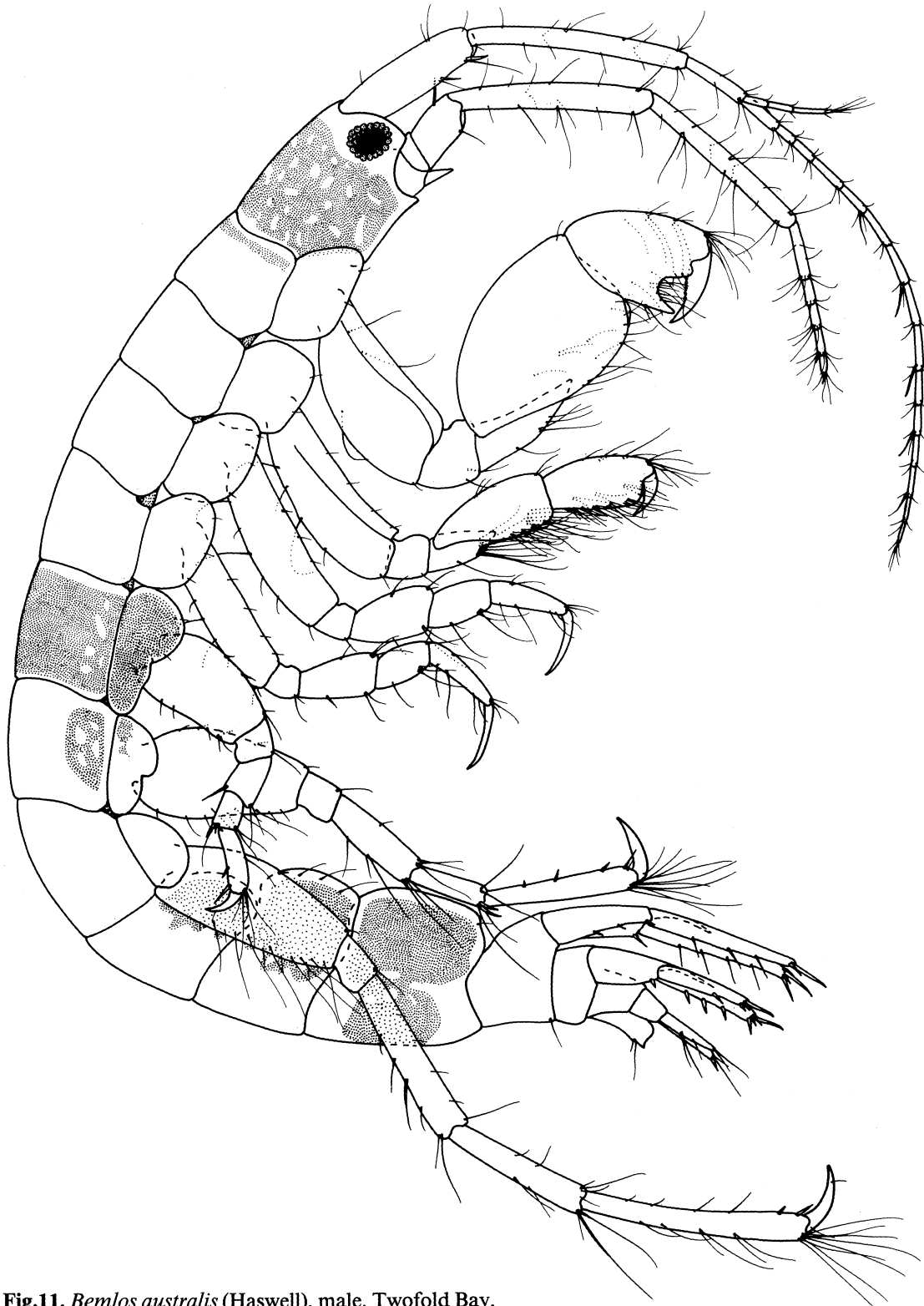
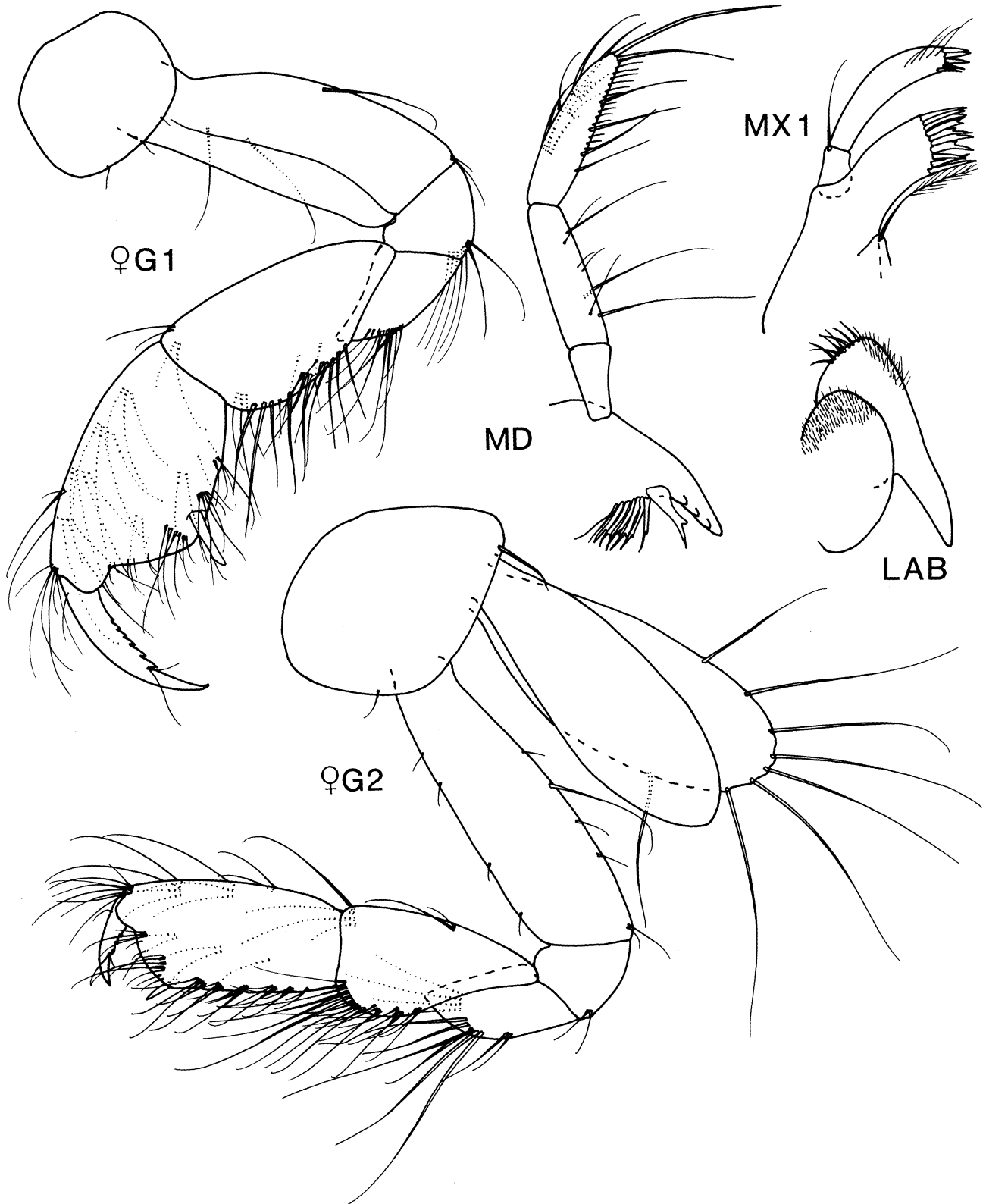


Fig.11. *Bemlos australis* (Haswell), male, Twofold Bay.



locality, 25 June 1985, S. Keable, A. Reid, AM P37483; 15 females, 11 males, same locality, 17 Sept 1985, S. Keable, P. Hutchings, AM P37484.

**Description.** Head, pereon segments 1 and 5-6+7 and pleon 1-3 with dense, irregular brown pigment (in alcohol), pigment extending on to coxae and



**Fig.12.** *Bemlos australis* (Haswell), male, female, Twofold Bay.

epimera. Male sternum without processes. Head anteroventral margin moderately produced, subacute. Labium outer plate, distal margin, with about 9 spines. Mandible palp article ratios 3 : 5 : 6; article 3 posterior margin almost straight, setiferous

over four fifths of its length with marginal setae of 2 distinct lengths. Maxilla 1 palp article 2 with 5 spines. Antenna 1 two thirds body length; peduncular articles in the length ratios 2 : 3 : 1; accessory flagellum with 4 articles, the terminal

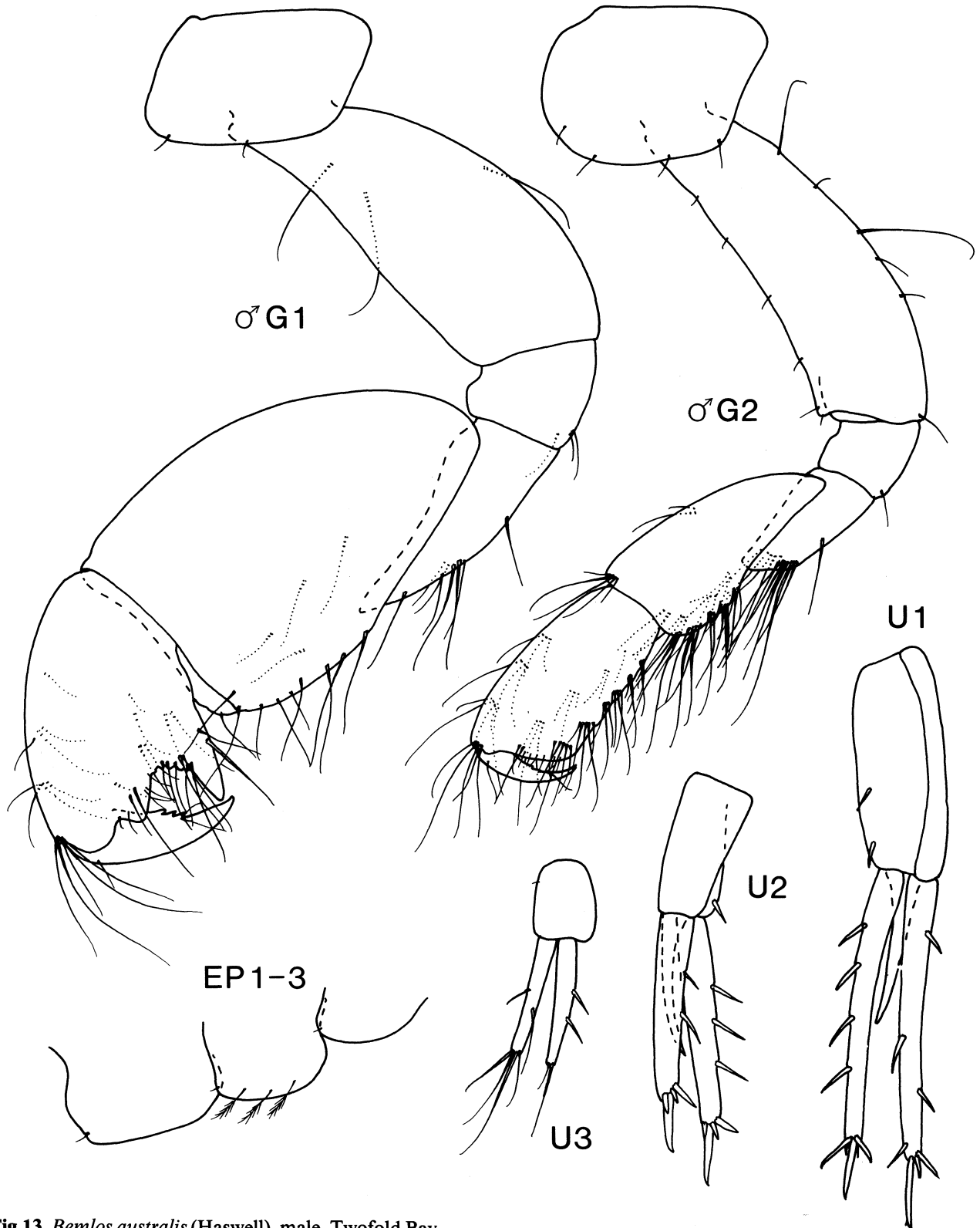


Fig.13. *Bemlos australis* (Haswell), male, Twofold Bay.

article rudimentary; primary flagellum longer than peduncle with up to 16 articles. Antenna 2 two thirds length of antenna 1; peduncular articles 4 and 5 subequal; flagellum a little shorter than peduncular article 5 with about 6 articles. Male gnathopod 1 coxa subquadrangular, anterodistal margin rounded; basis stout, anterior margin straight or weakly convex, posterior margin moderately convex; ischium elongate, over twice as long as broad; carpus enlarged, subovoid, one and one half times as long as broad; propodus two thirds length of carpus, broadening distally, palm deeply excavated, with short, almost transverse proximal palm remnant and strong posterodistal tooth; dactylus stout, slightly overlapping tooth. Female gnathopod 1 carpus and propodus subequal; palm evenly rounded; dactylus slender, overlapping palm. Male gnathopod 2 basis stout, anterior margin very weakly concave, posterior margin moderately convex; carpus and propodus subequal; dactylus slightly overlapping palm. Female gnathopod 2 similar to that of the male but carpus somewhat shorter than propodus. Pereopods 3 and 4 dactylus only a little shorter than propodus. Pereopods 5–7 in the length ratios 2 : 4 : 5; pereopod 7 scarcely half length of body. Epimera 1–3 rounded; epimeron 2 with ventral pectinate setae. Uropod 1 peduncle with inter-ramal tooth a little shorter than peduncle; rami subequal and longer than peduncle. Uropod 2 peduncle with inter-ramal tooth subequal with peduncle; inner ramus longer than outer and one and one half times length of peduncle. Uropod 3 rami subequal, elongate and slender; outer ramus with small second article; both rami with long terminal setae.

**Remarks.** This species superficially resembles species of *Lemboides* Stebbing in the enlarged, toothless carpus of the male gnathopod 1. This character is, however, due to convergence. *Bemlos australis* can be seen to differ from *Lemboides* species in the shape and setation of the mandibular palp, in the presence of multiple, rounded, molar plates as revealed by S.E.M. (see Myers, 1988) and by the presence of long distal setae on the rami of uropod 3. All these characters align the species with *Bemlos* Shoemaker.

**Habitat.** Appears to be rather eurytopic, occurring among *Posidonia*, algae, in coral rubble, fine sands and on a breakwater.

**Distribution.** Recorded from Queensland and New South Wales between Lizard Island in the north to Twofold Bay in the south. Not known outside Australia.

*Bemlos aequimanus* (Schellenberg)

*Lembos aequimanus* Schellenberg, 1938: 76, fig. 39;—Barnard, 1965: 527, fig. 26; 1970: 72, figs 36a–e;—

Ledoyer, 1984: 31, fig. 14;—Myers, 1985: 385, figs 246–248.

*Bemlos aequimanus*.—Myers, 1988: 188.

**Material examined.** Queensland: 2 males, Dingo beach, south-east of Bowen, 20°05'S 148°30'E, algal washings from muddy sand flats, 30 May 1977, I. Loch, AM P37821. New South Wales: 6 females, 2 males, Quarantine Bay, Twofold Bay, *Posidonia* infauna, 2 m, 11 Dec 1984, S. Keable, J. van der Velde, AM P36033; 1 male, same locality, airlift, *Posidonia* beds, 9 Oct 1984, S. Keable, J. van der Velde, AM P37474; 3 females, same locality, 25 June 1985, AM P37475; 3 males, 13 females, same locality, 17 Sept 1985, AM P37476; 1 female, Murrumbulga Point, Twofold Bay, subtidal rock platform, 2–9 m, 11 Dec 1984, S. Keable, AM P36180; 7 females, same locality, kelp holdfasts on subtidal breakwater wall, 29 Mar 1985, S. Keable, A. Paul, L. Walker, AM P37477; 1 female, same locality, 17 Sept 1985, AM P37478. Victoria: 1 male, 15 females, Crib Point, Western Port, 38°20.83'S 145°13.49'E, 13 m, sandy gravel, 23 Mar 1965; 8 males, 11 females, 251 mm, Crib Point, 38°20.29'S 145°14.18'E, 10 m, sandy gravel, 10 Mar 1965. South Australia: 2 males, Stokes Bay, Kangaroo Island, 7 m, 4 March 1978, I. Loch, AM P37822.

**Habitat.** Among algae and phanerogammes in shallow water.

**Distribution.** Widely distributed in western Pacific from Australia to Hawaii.

*Bemlos quadrimanus* (Sivaprakasam)

Fig. 14

*Lembos quadrimanus* Sivaprakasam, 1970: 81, fig. 1.

*Lembos waipio*.—Ledoyer, 1972: 200, pls 21A, 22, 24. (not *L. waipio* Barnard, 1970: 85, figs 44–45).

*Lembos quadrimanus mozambicus* Myers, 1975a: 359, figs 33–39.

*Bemlos quadrimanus*.—Myers, 1988: 188.

**Material examined.** Western Australia: 4 males, 6 females, Ned's Camp, Cape Range National Park, inshore limestone reef, brown algae, 1.5 m, 2 Jan 1984, R.T. Springthorpe, AM P37451; 6 males, 4 females, same locality, *Caulerpa* plus sediment, 1.5 m, 2 Jan 1984, J.K. Lowry, AM P37452.

**Remarks.** Myers (1974) erected a new subspecies of this species from Tanzania and Kenya based on the presence of a tooth on the merus and carpus of the female gnathopod 1. Western Australian material is identical to East African material in this respect, as also is material described by Ledoyer (1982) from Madagascar. In view of the wide distribution of this subspecies across the Indian Ocean, its status must be questioned. Sivaprakasam's (1970) material is unique in lacking these teeth and the possibility exists that they were overlooked.

**Habitat.** Among algae, sponges and coral.

**Distribution.** East Africa, Madagascar, India, Western Australia.

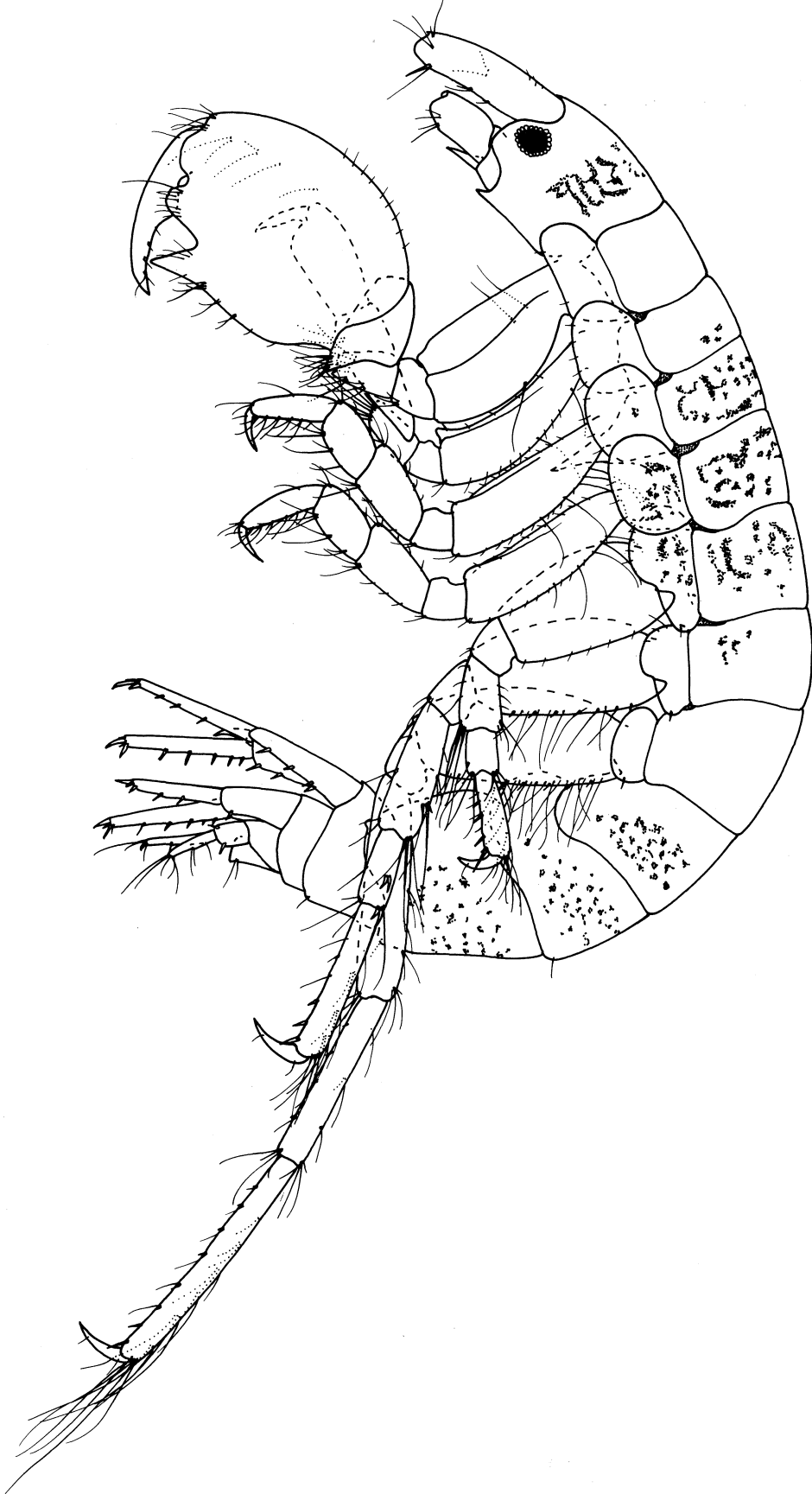


Fig.14. *Bemlos quadrimanus* (Sivaprakasam), male, Cape Range National Park.

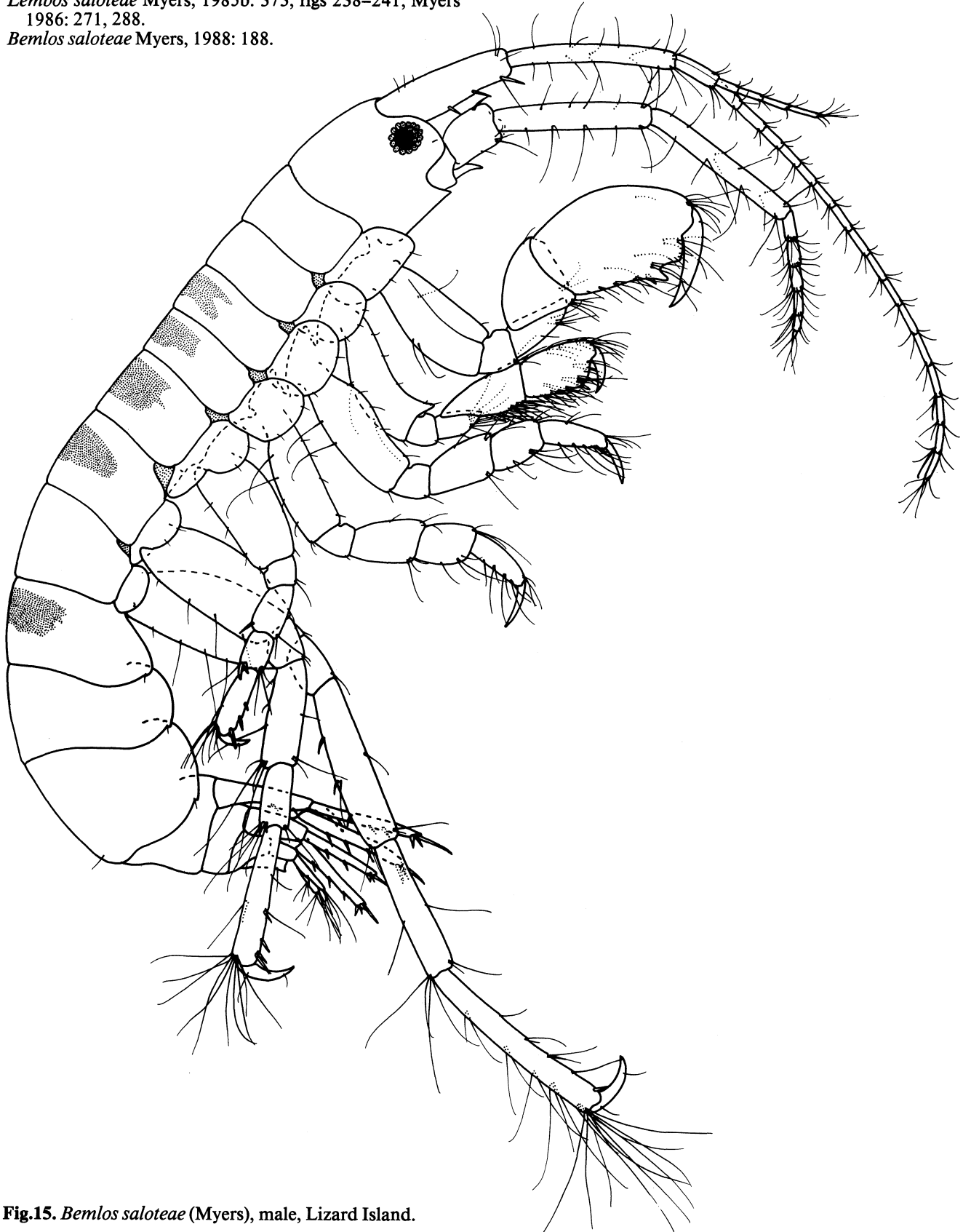
***Bemlos saloteae* (Myers)**

Figs 15–16

*Lembos saloteae* Myers, 1985b: 373, figs 238–241; Myers  
1986: 271, 288.

*Bemlos saloteae* Myers, 1988: 188.

**Material examined.** Queensland: 2 males, Lizard Island,  
reef off North Point, coral rubble at base of cliff, 18 m, 13  
Jan 1982, B. Kensley, AM P37417; 2 males, 4 females,



**Fig.15.** *Bemlos saloteae* (Myers), male, Lizard Island.

Lizard Island, between South Island and Palfrey Island, rubble with low algal turf from shallow ridge between islands, 1.5–2.5 m, 14 Jan 1982, B. Kensley, AM P37418; 1 male, 4 females, + 8 slides, Lizard Island, reef flat between Bird Island and South Island, algal encrusted rubble, 1.5–2.5 m, 16 Jan 1982, B. Kensley, AM P37419; 2 males, 1 female, Lizard Island, shelf between Palfrey Island and South Island, coarse sand and sediment, 0.5 m, 19 Jan 1982, B. Kensley, AM P37420; 1 male, 1 female, 3 km northwest of Nymph Island, 14°36'S 145°14'E, green algae, 15 m, 8 Feb 1979, AM P37421.

**Remarks.** Queensland material differs from Tongan material in the shape of the male gnathopod

1 propodus which in present material is less ovoid as a result of a straighter posterior margin. In addition, male gnathopod 2 is less elongate and the male sternal processes are less curved and restricted to segments 2–4 (2–5 in Tongan material). In all other characters including pigmentation, it agrees well with Tongan material and it does not seem sensible at this time to create a separate taxon for the present entity.

**Habitat.** Sand, reef rubble and algal turf.

**Distribution.** Tonga, Queensland.

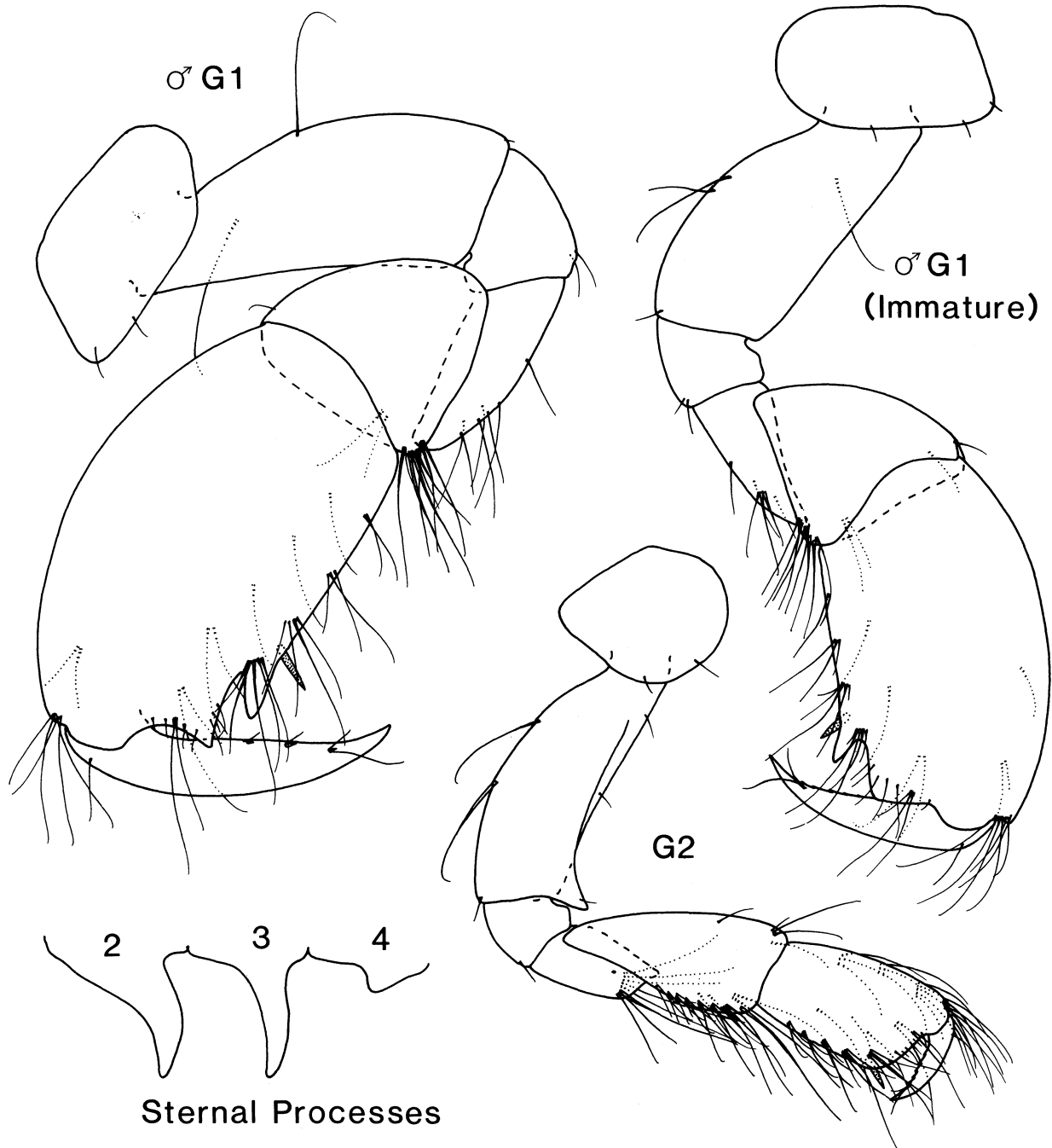


Fig.16. *Bemlos saloteae* (Myers), male, Lizard Island.

***Bemlos trudis* n.sp.**

Figs 17-19

**Type material.** HOLOTYPE: male, 5.0 mm, near Moona Moona Creek, Jervis Bay, NSW, with Ascidians, 3 m, 24 Apr 1982, P.B. Berents, AM P37422. PARATYPES: 1 male +

4 slides, AM P37423, 1 female, + 1 slide, AM P38609, 1 female, P38610, type locality.

**Additional material.** New South Wales: 2 females, 1 male, near Moona Moona Creek, Jervis Bay, with Ascidians, 4-6 m, 18 June 1982, P.B. Berents, AM P37424. South Australia: 1 male, Maston Point, American River,

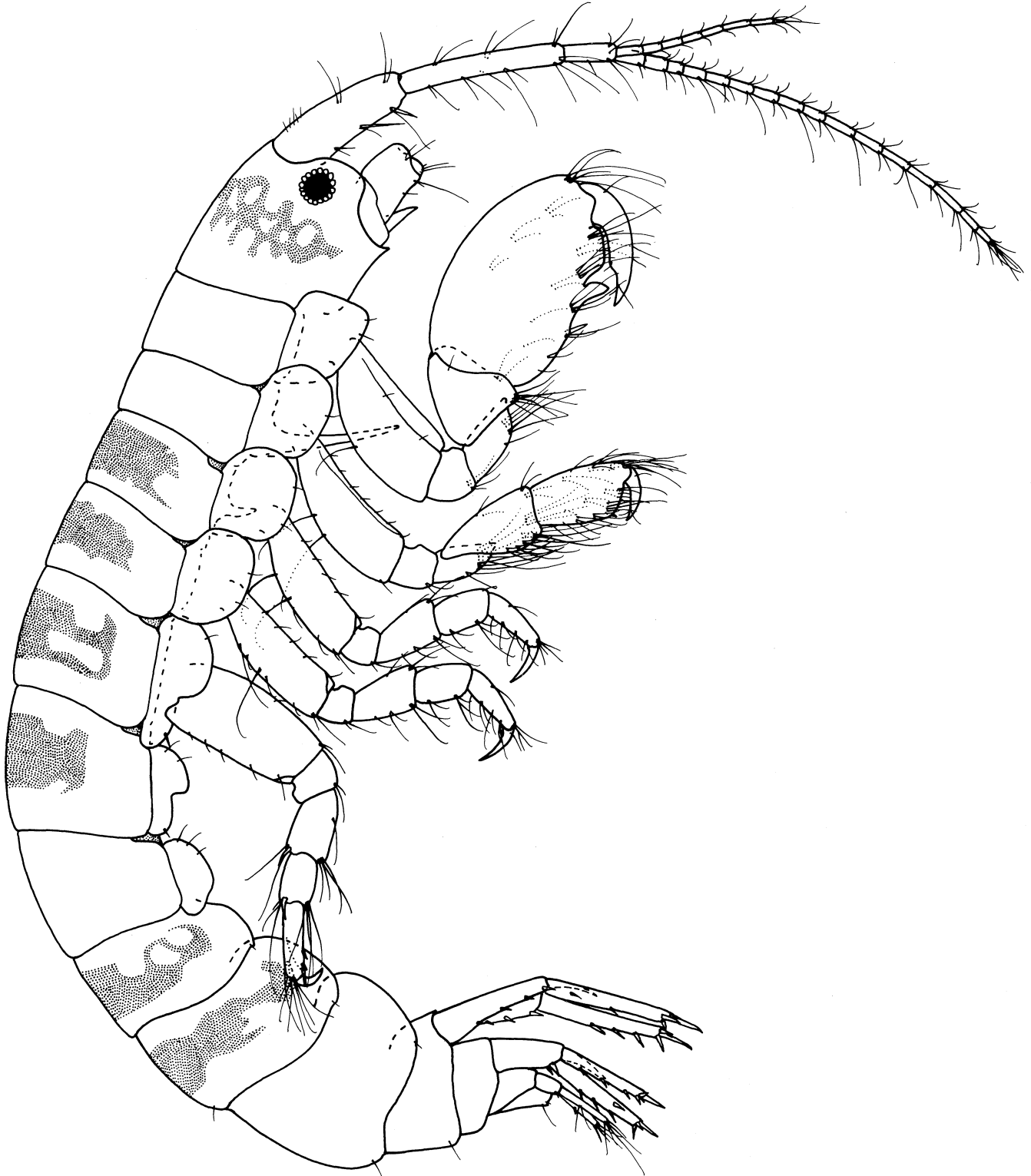


Fig.17. *Bemlos trudis* n.sp., male, Jervis Bay.

Kangaroo Island, clumps of sponge in channel below wharf, 4-5 m, 2 Mar 1979, P. Hutchings, AM P37425.

**Description.** Body (in alcohol) with broad bands of brown pigment on the dorsum of pereon segments 3-6 and pleon segments 2-3, the pigment bands

extending laterally onto the epimera, but not onto the coxae, head with reticulate pattern of brown pigment dorsally and laterally. Male pereon segment 2 with an extremely long, spear-like sternal process, segment 3 with a short acute process. Head anteroventral

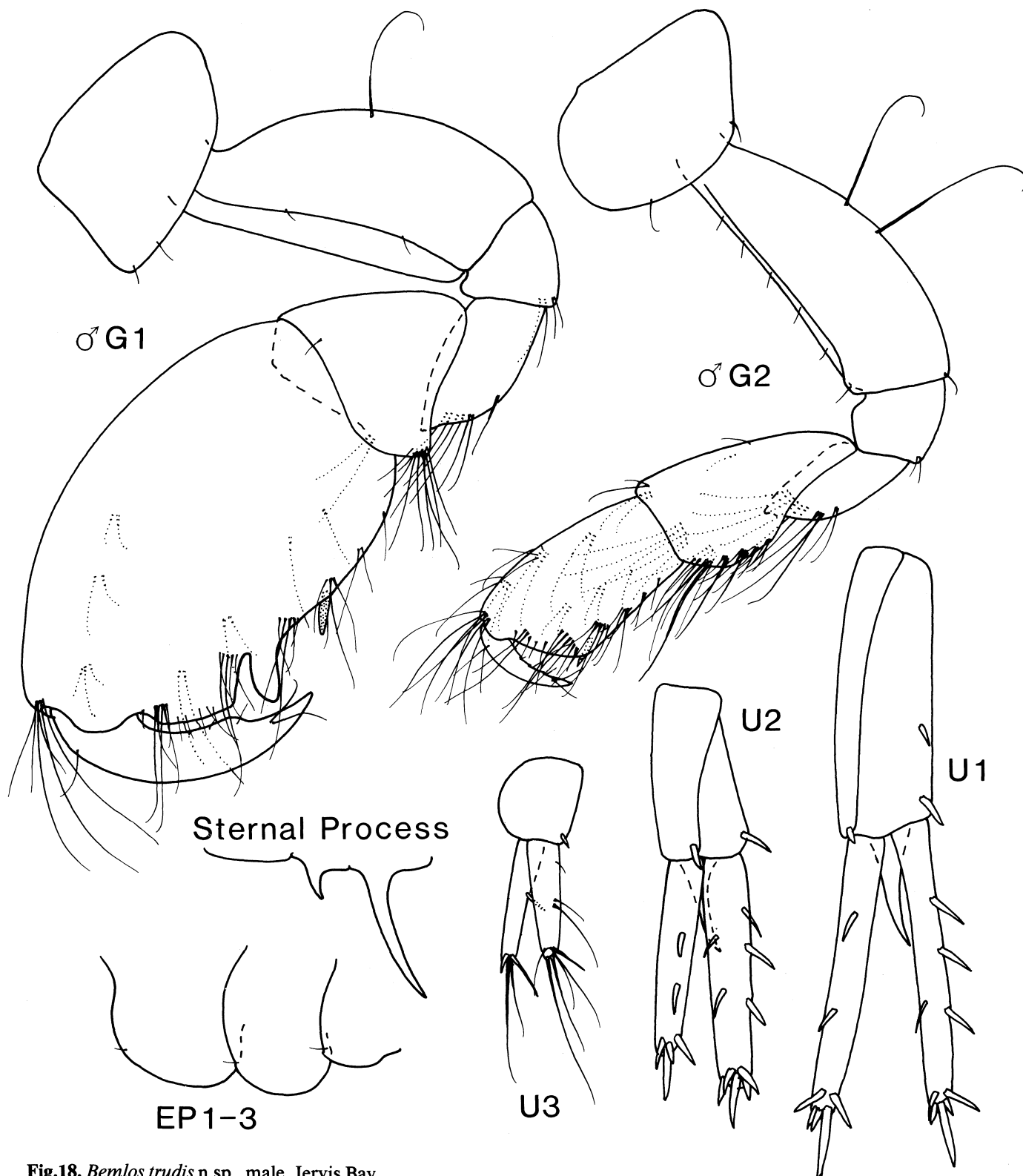


Fig.18. *Bemlos trudis* n.sp., male, Jervis Bay.



margin moderately produced, acute. Labium outer plate distal margin with about 10 spines. Mandible palp article ratios 3 : 5 : 8, article 3 posterior margin almost straight and setiferous over three quarters of its length, marginal setae of 2 distinct lengths. Maxilla 1 palp article 2 with 6 distal spines. Antenna 1 less than two thirds body length, peduncular articles in the length ratios 5 : 6 : 2; accessory flagellum with 8 articles, the terminal article rudimentary; primary flagellum a little longer than peduncle with about 17 articles. Antenna 2 missing in all specimens. Male gnathopod 1 coxa subquadrangular, anterodistal corner a rounded right-angle; basis stout; carpus triangular; propodus enlarged, almost 3 times length of carpus, subovoid, palm oblique, separated from a thumb-like posterodistal tooth by a deep narrow sinus, posterior margin with mediolateral spine; dactylus stout, posterior margin sinuous, overlapping palm. Female gnathopod 1 subsquare, carpus elongate; propodus a little longer than carpus, palm oblique; dactylus slender, overlapping palm. Male gnathopod 2 basis anterior margin straight, posterior margin convex; carpus slightly longer than propodus; dactylus slender, fitting oblique palm. Female gnathopod 2

carpus and propodus subequal. Pereopods 3 and 4 dactylus two thirds length of propodus. Pereopods 6-7 missing. Epimera 1-3 rounded. Uropod 1 peduncle with inter-ramal tooth less than half length of peduncle; rami slender, subequal and only a little shorter than peduncle. Uropod 2 peduncle with inter-ramal tooth over half length of peduncle; inner ramus stouter and longer than outer and one and one third times length of peduncle. Uropod 3 rami slender, subequal, one and one half times length of peduncle; outer ramus with small second article and long terminal setae.

**Remarks.** *Bemlos trudis* resembles *B. saloteae* but differs in the more oblique and obtuse ending palm, and short dactylus of the male gnathopod 1, in the absence of an anterodistal tooth on the basis of the male gnathopod 2, and not least in the extremely long and slender sternal process of pereon segment 2.

**Habitat.** Among ascidians and sponges in shallow water.

**Distribution.** New South Wales (Jervis Bay) and South Australia (Kangaroo Island).

**Etymology.** From the latin *trudis* = stake, referring to the long, stake-like pereon process of the male.

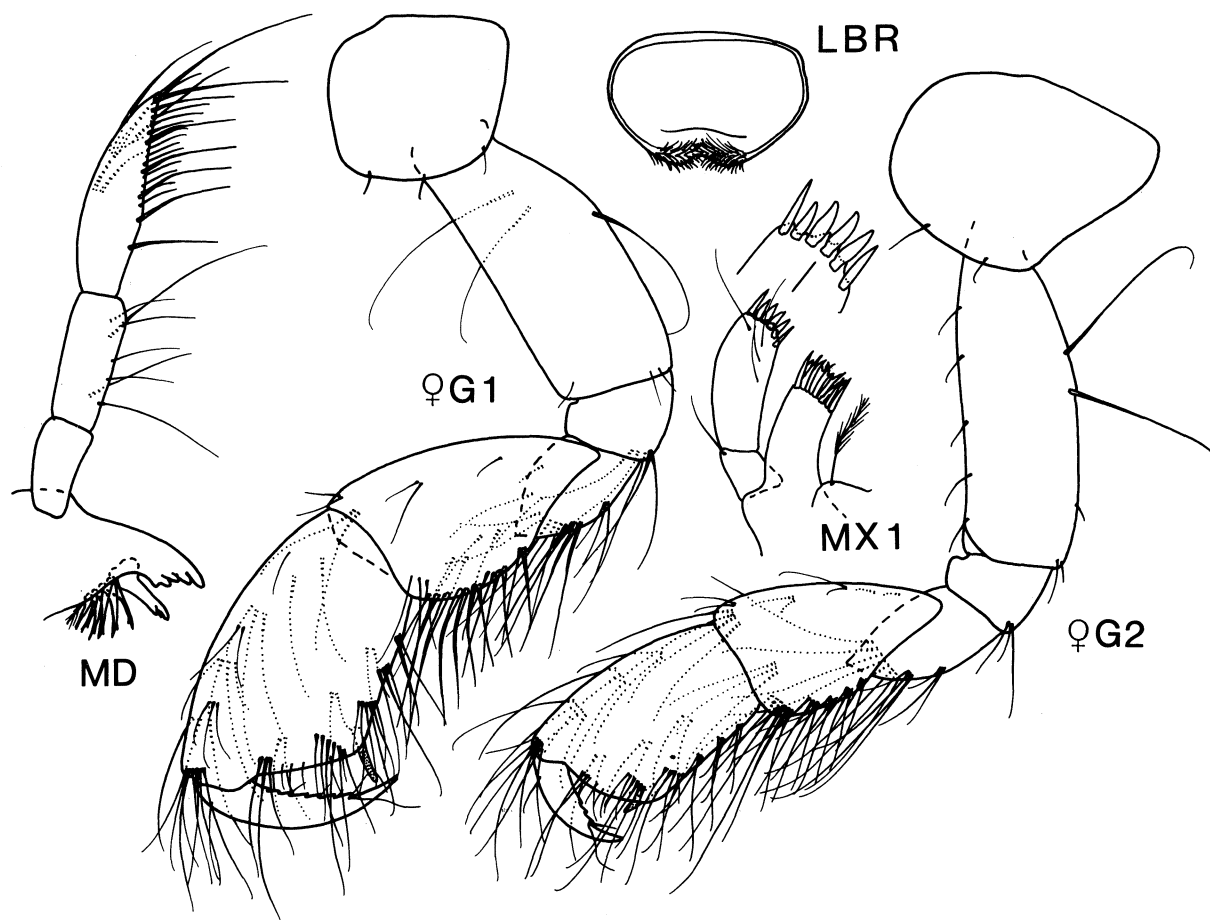


Fig.19. *Bemlos trudis* n.sp., male, female, Jervis Bay.

***Bemlos tridentatus* n.sp.**

Figs 20–21

**Type material.** HOLOTYPE: male, 2.8 mm, + 3 slides, Lizard Island, Qld, reef off North Point, coral rubble at base of cliff, 18.5 m, 13 Jan 1982, B. Kensley, AM P37426. PARATYPES: 2 females, AM P37427, 1 female + 3 slides, AM P38609, type locality.

**Description.** Body (in alcohol) without distinctive markings. Male pereon segments 3–5 with stout, forward facing sternal processes, that of segment 4 the longest. Head anteroventral margin unproduced, obtuse. Labium outer plate distal margin with about 7 spines. Mandible palp article ratios 7 : 8 : 10, article

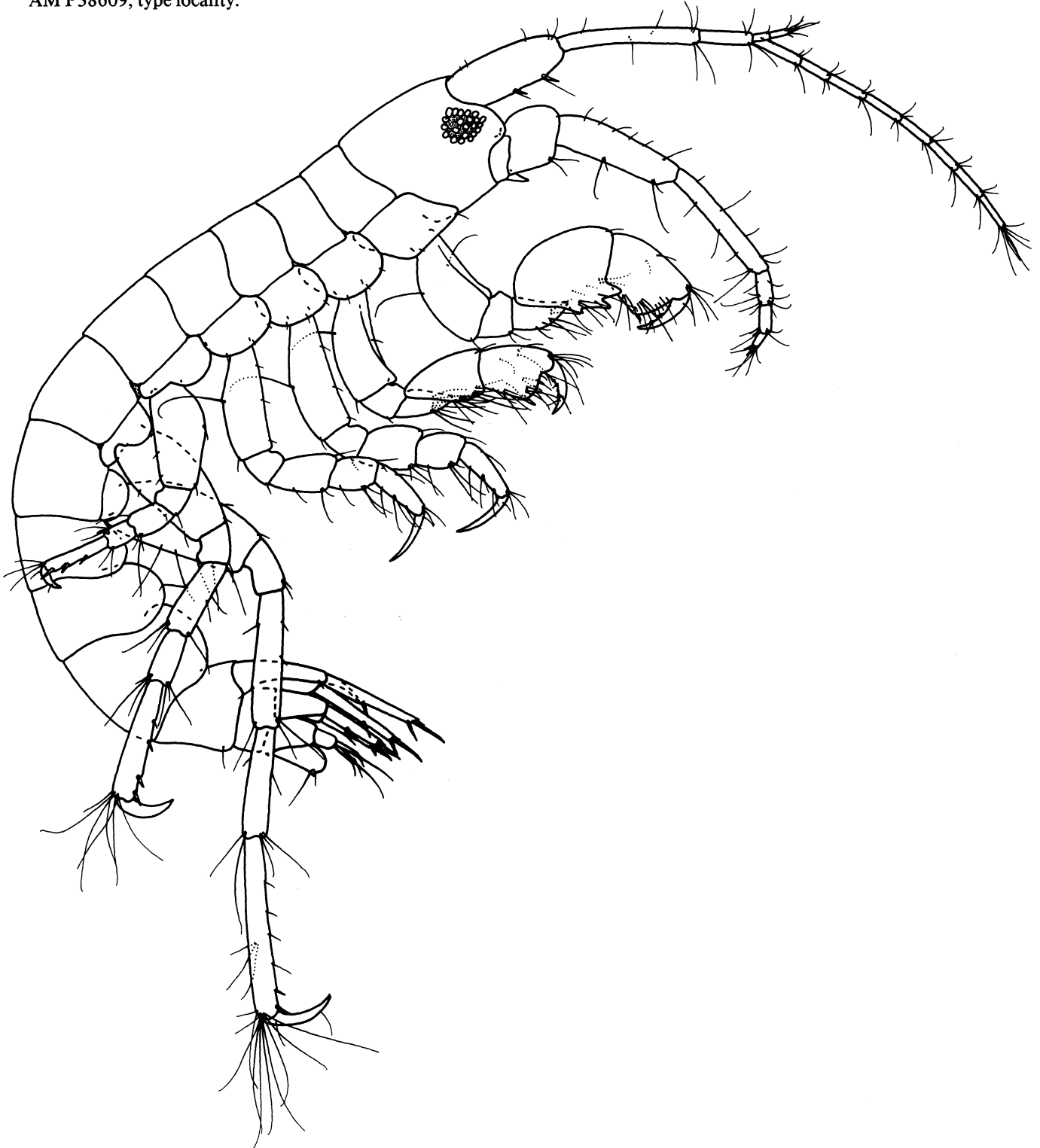


Fig.20. *Bemlos tridentatus* n.sp., male, Lizard Island.

3 subovoid, posterior margin setiferous on distal half, marginal setae of 2 distinct lengths. Maxilla 1 palp article 2 with 5 distal spines. Antenna 1 slender, about two thirds body length; peduncular articles in

the length ratios 9 : 11 : 4; accessory flagellum with 3 articles, the third article rudimentary; primary flagellum subequal with peduncle, with about 9 articles. Male antenna 2 stout, peduncular article 3

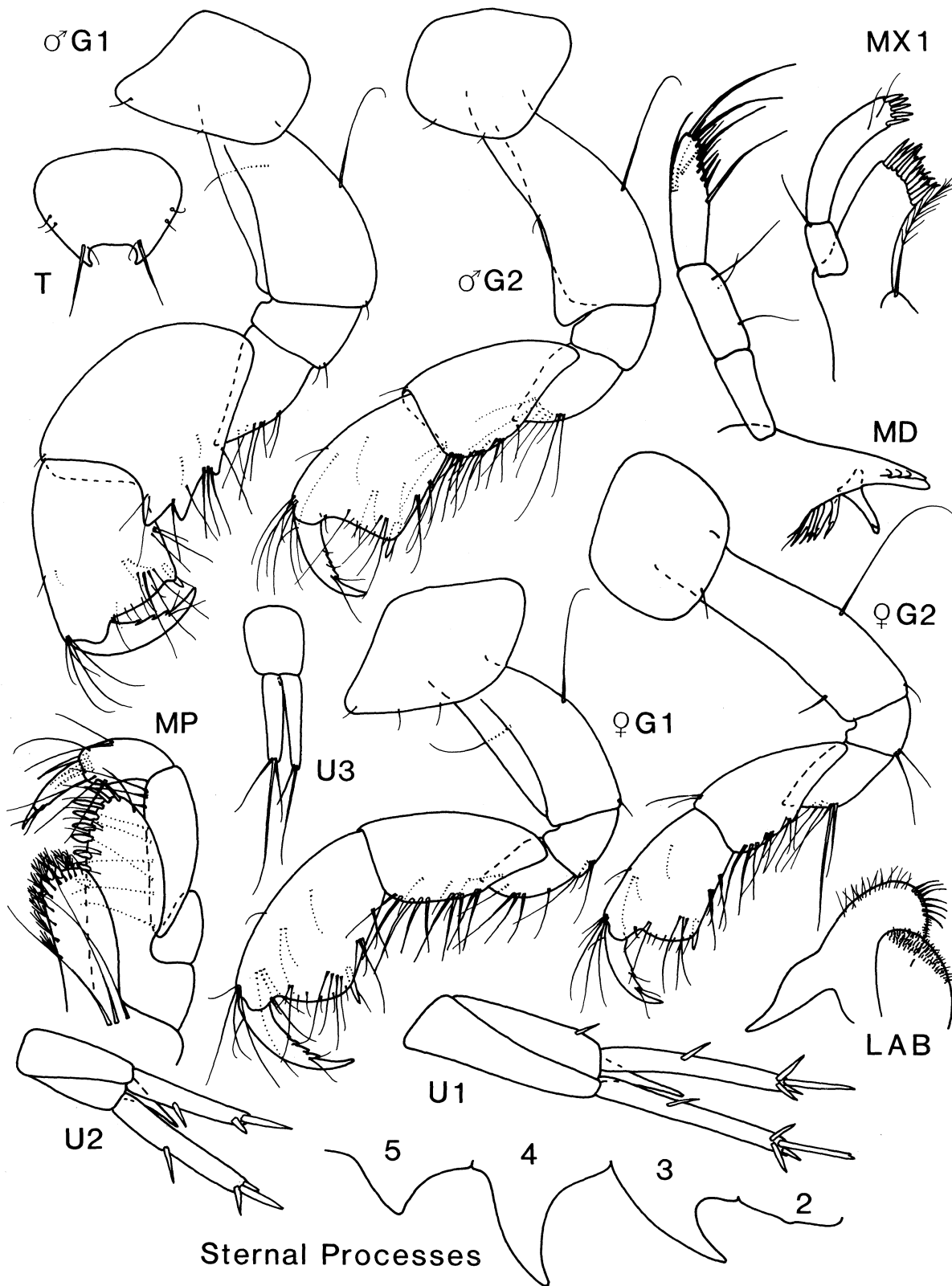


Fig.21. *Bemlos tridentatus* n.sp., male, female, Lizard Island.

swollen; article 4 broad; article 5 slender, but equal in length with article 4; flagellum shorter than peduncular article 5 with 3 articles. Female antenna 2 peduncular articles 3 and 4 not expanded, otherwise similar to that of male. Male gnathopod 1 coxa with anterodistal margin produced, rounded; basis stout, only a little longer than carpus; merus subtriangular; carpus enlarged, almost as broad as long, posterior margin with 3 triangular teeth, the most distal the longest, anterior margin strongly convex; propodus only a little shorter than carpus, widening distally, palm oblique, delimited by a small rounded process and a spine; dactylus scarcely overlapping palm. Female gnathopod 1 basis quite stout, but carpus and propodus slender, propodus a little longer than carpus, palm oblique, evenly rounded, delimited only by a spine; dactylus overlapping palm. Male gnathopod 2 basis expanded distally; carpus longer than propodus; propodus expanded distally, palm almost straight, forming a right-angle with posterior margin and delimited by a spine. Female gnathopod 2 basis elongate and slender; carpus and propodus subequal, palm evenly convex. Pereopods 3 and 4 dactylus only a little shorter than propodus. Pereopods 5–7 in the length ratios 2 : 3 : 5; pereopod 7 about two thirds body length. Epimera 1–3 rounded. Uropod 1 peduncle with inter-ramal process less than half length of peduncle; outer ramus a little longer than inner ramus and longer than peduncle. Uropod 2 peduncle with inter-ramal process over half length of peduncle; outer ramus shorter than inner ramus but a little longer than peduncle. Uropod 3 rami slender, longer than peduncle, lacking marginal spines and setae and with very long terminal setae which exceed length of rami.

**Remarks.** This species sits rather uneasily in the genus *Bemlos* with its sexually dimorphic antenna 2 with much reduced flagellum, and anteriorly produced, angular coxa 1 in the male. In the former character it resembles *Aorella* Myers, but differs in head shape, much shallower coxae and angular male coxa 1. The carpocheleate male gnathopod 1 is reminiscent of *Australomicrodeutopus* Myers (1988), but in that genus all three pairs of uropods are markedly different. For the present, pending further subdivision of the genus, *B. tridentatus* is most appropriately placed in the genus *Bemlos*.

**Habitat.** In coral rubble.

**Distribution.** As yet known only from the type locality.

**Etymology.** From the latin *tridens* = three teeth, referring to the three teeth on the male gnathopod 1 carpus.

***Bemlos triangulum* n.sp.**

Figs 22–23

**Type material.** HOLOTYPE: male, 4.0 mm, + 1 slide. Sandbank reef, north Qld, 13°45'S 144°16'E, rubble washings from south-west end of reef, 8–10 m, 6 Dec 1982, I. Loch, AM P37428. PARATYPE: 1 female, + 3 slides, AM P37429, 2 females, AM P38612, type locality.

**Description.** Body (in alcohol) without distinct markings. Male pereon segments 2–3 with strong, straight, spiniform sternal processes, segment 4 with small nipple-like process. Head anteroventral margin produced, acute. Labium outer plate distal margin with about 11 spines. Mandible palp article ratios 9 : 6 : 3; article 3 subovoid, posterior margin weakly convex, setiferous on distal two thirds, setae of 2 distinct lengths. Maxilla 1 palp article 2 with 7 distal spines. Antenna 1 and 2 missing in all specimens. Male gnathopod 1 coxa anterodistal corner produced, subacute; basis massively swollen, scarcely longer than carpus; merus subtriangular; carpus enlarged, subovoid with posterodistal margin truncate; propodus equal in length to carpus but narrower, palm defined by a strong triangular tooth; dactylus overlapping palm. Female gnathopod 1 basis quite short, but carpus and propodus slender; propodus a little longer than carpus, palm oblique; dactylus overlapping palm. Male gnathopod 2 basis unexpanded; carpus and propodus subequal, palm oblique. Female gnathopod 2 scarcely differing from that of male. Pereopods 3 and 4 dactylus a little over two thirds length of propodus. Pereopod 5 basis broad. Pereopods 6 and 7 missing in all material available. Epimera 1–3 with small distoventral tooth. Uropod 1 peduncle with inter-ramal process less than half length of peduncle; outer ramus a little longer than inner and longer than peduncle. Uropod 2 peduncle lacking an inter-ramal process; outer ramus shorter than inner and scarcely longer than peduncle. Uropod 3 rami slender, longer than peduncle; inner ramus with 1 spine on inner margin; outer ramus with 1 seta on each of inner and outer margins and with a small second article; both rami with long terminal setae.

**Remarks.** This species appears to be closely related to the previous one, although it is not known whether antenna 2 is sexually dimorphic.

**Habitat.** Coral rubble.

**Distribution.** Known only from the type locality.

**Etymology.** From the latin *triangulum* = triangular, referring to the shape of the tooth on the male gnathopod 1 propodus.

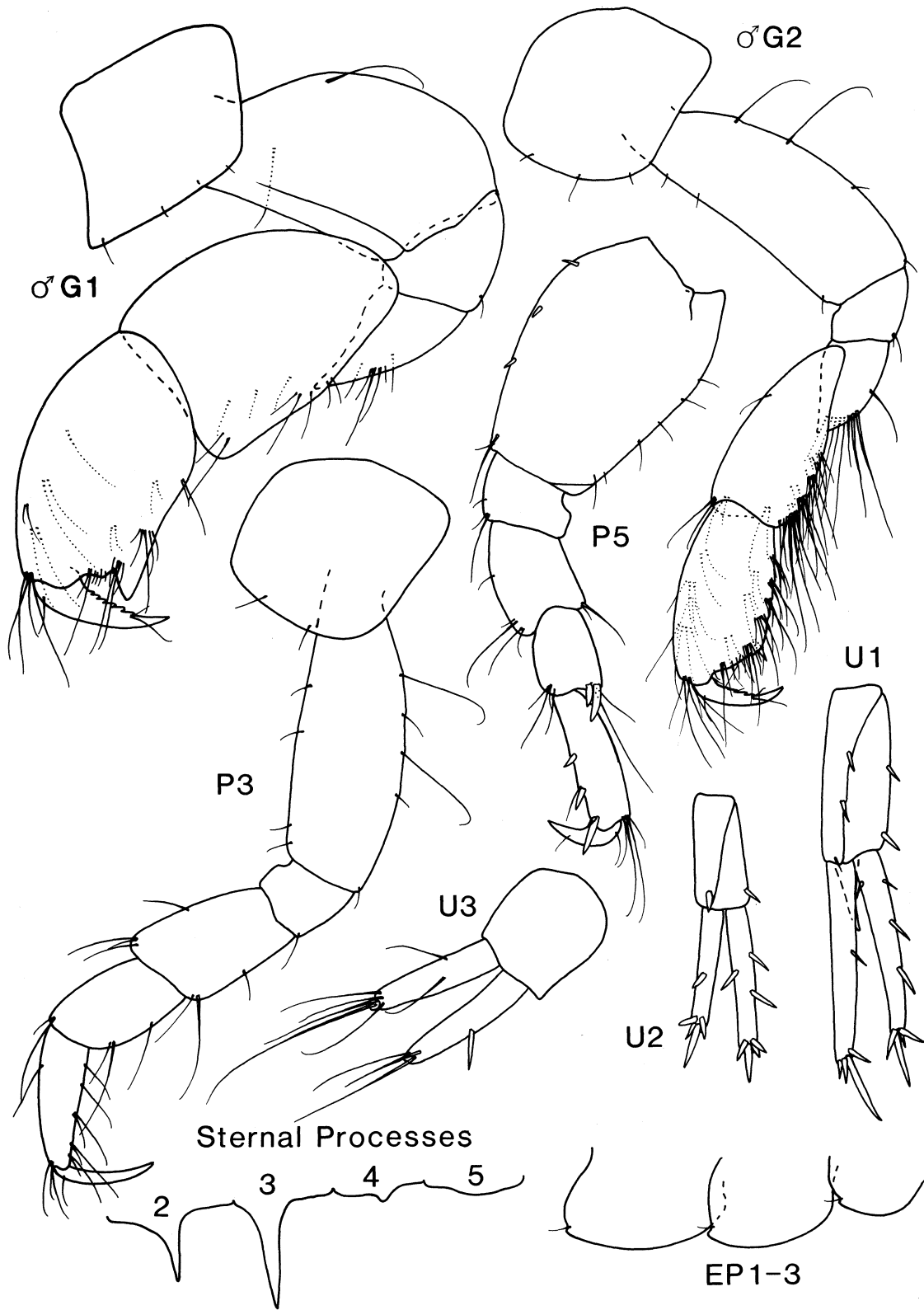


Fig.22. *Bemlos triangulum* n.sp., male, Sandbank reef.

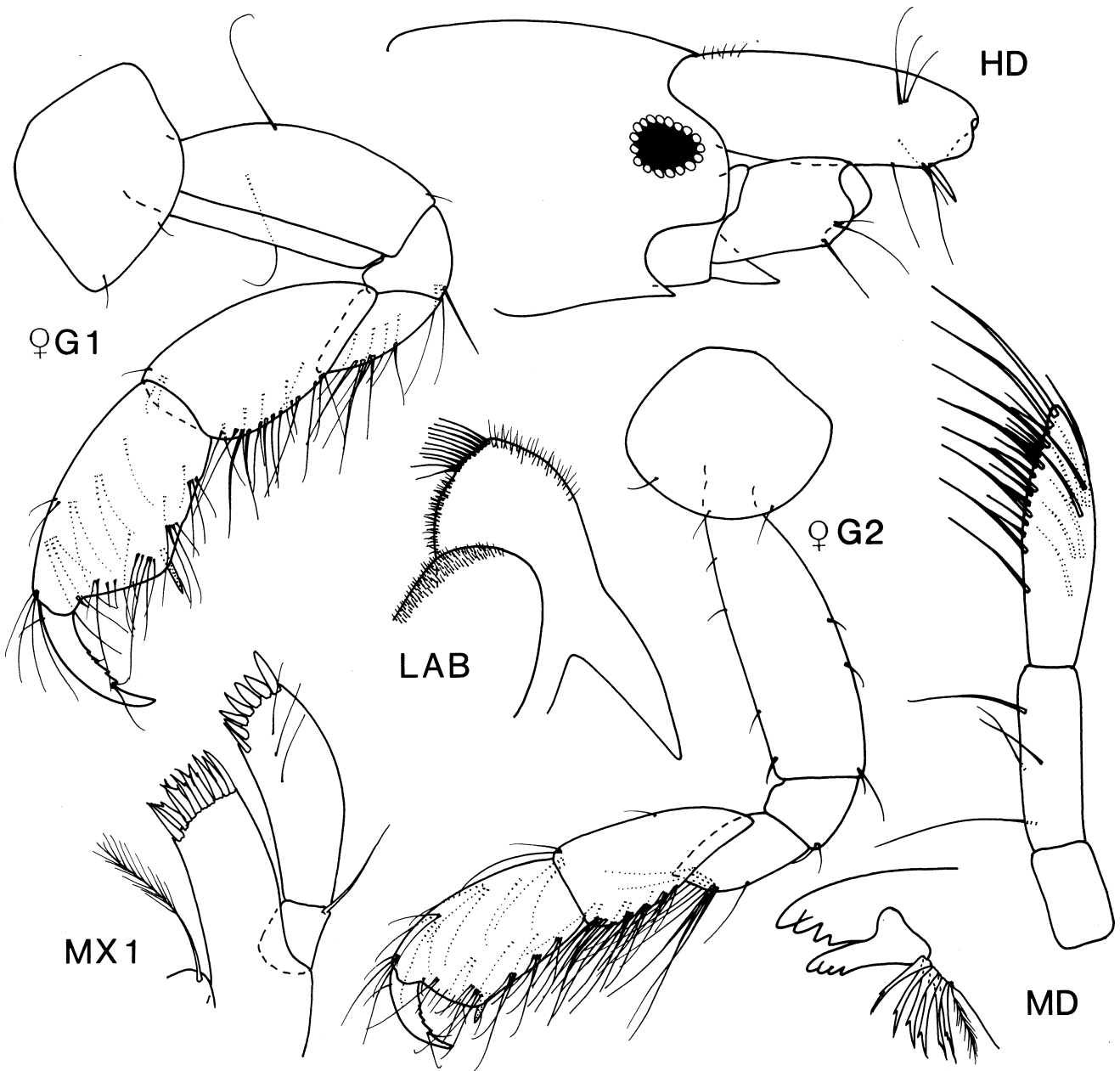


Fig.23. *Bemlos triangulum* n.sp., male, female, Sandbank reef.

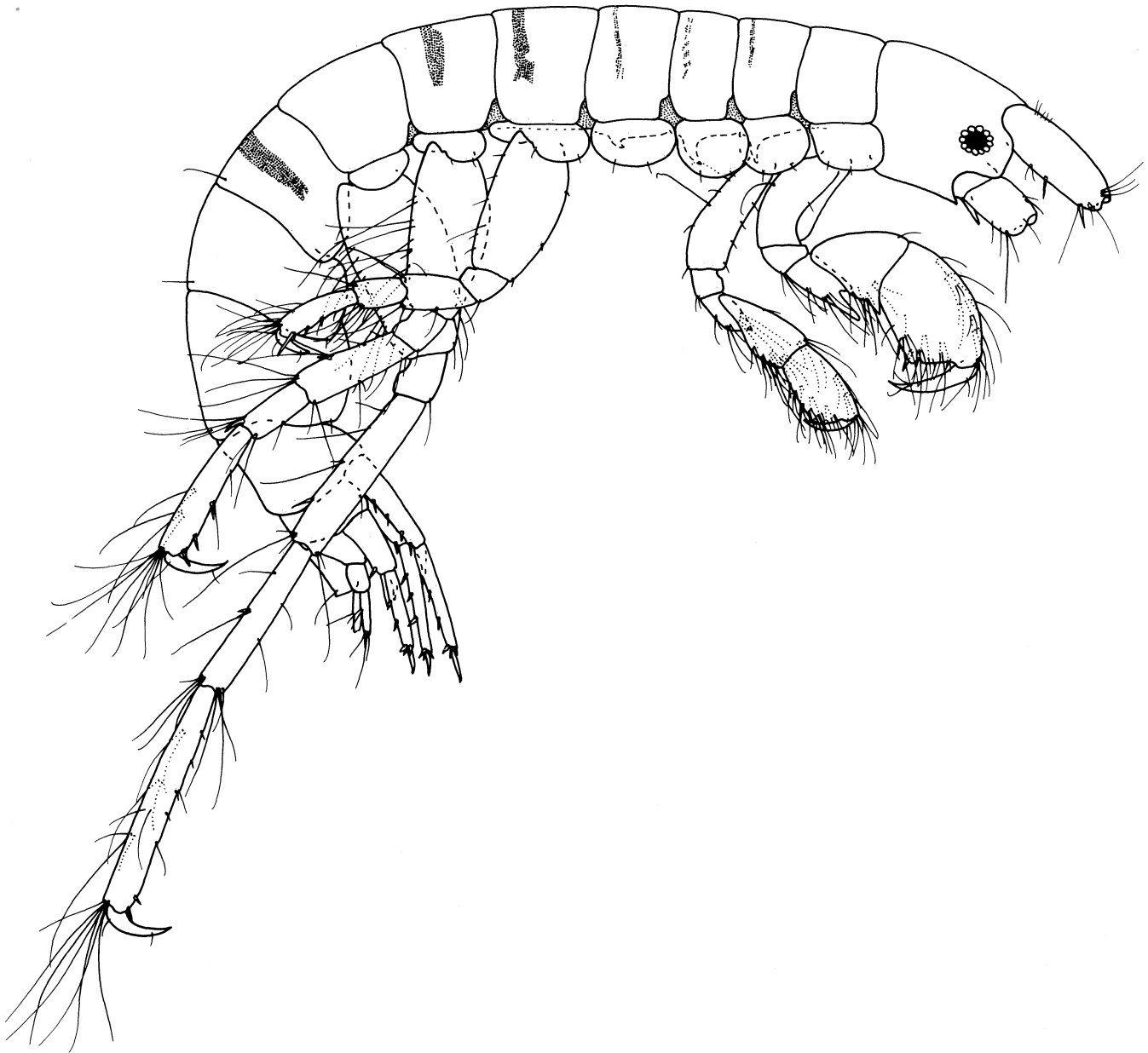
***Bemlos bidens* n.sp.**

Figs 24–25

**Type material.** HOLOTYPE: male, 3.9 mm, + 4 slides. Great Detached Reef, near Raine Island, Qld, 11°43'S 144°03'E, reef flat, 10 m behind seaward face, 1–2 m, 10 Feb 1979, AM P37430.

**Description.** Body (in alcohol) with thin dorsal bands of brown pigment on pereon segments 2–4, and somewhat thicker dorsal bands on pereon segments 5 and 6 and pleon segment 2. The bands extend laterally but not onto coxae or epimera. Male pereon segments 2–4 with spiniform, acute, sternal

processes. Head anteroventral margin quite strongly produced, acute. Labium outer plate distal margin with 9 distal spines. Mandible palp article ratios 4 : 6 : 9; article 3 posterior margin straight and setiferous over two thirds of its length, marginal setae of 2 distinct lengths. Maxilla 1 palp article 2 with 7 distal spines. Antenna 1 and antenna 2 missing. Male gnathopod 1 coxa subquadrangular, evenly rounded anteriorly; basis stout; merus posterodistal margin produced into a long, acute tooth; carpus subtriangular, posterodistal margin produced into an acute tooth, shorter than that of merus; propodus over one and one half times length of carpus, palm



**Fig.24.** *Bemlos bidens* n.sp., male, Raine Island.

with shallow posterodistal depression resulting in defining obtuse tooth with a stout spine at its base; dactylus strongly overlapping palm. Male gnathopod 2 basis anterior margin weakly concave posterior margin moderately convex; carpus distinctly longer than propodus; dactylus slender, overlapping palm. Pereopods 3 and 4 missing. Pereopods 5-7 in the length ratios 4 : 6 : 9; pereopod 7 two thirds body length. Epimera 1-3 rounded. Uropod 1 peduncle with inter-ramal tooth a little over one thirds length of peduncle; rami slender; outer ramus a little longer than inner and subequal in length with peduncle. Uropod 2 peduncle with inter-ramal tooth a little less than two thirds length of peduncle; outer ramus slender, one and one third times length of peduncle;

inner ramus broken. Uropod 3 rami slender; outer ramus one and one half times length of peduncle with small second article and long terminal setae; inner ramus with marginal spines, broken distally. Female unknown.

**Remarks.** This species is clearly closely related to *B. virgus* from Fiji, but differs from that species in the presence of a carpal tooth on the male gnathopod 1, in lacking a brush of setae on the basis of that appendage and in lacking a truncate process on the inner face of the coxa of the male gnathopod 2.

**Habitat.** Unknown.

**Distribution.** Only known from type locality.

**Etymology.** From the latin *bidens* = two teeth, referring to the two teeth on the male gnathopod 1, one on the merus and one on the carpus.

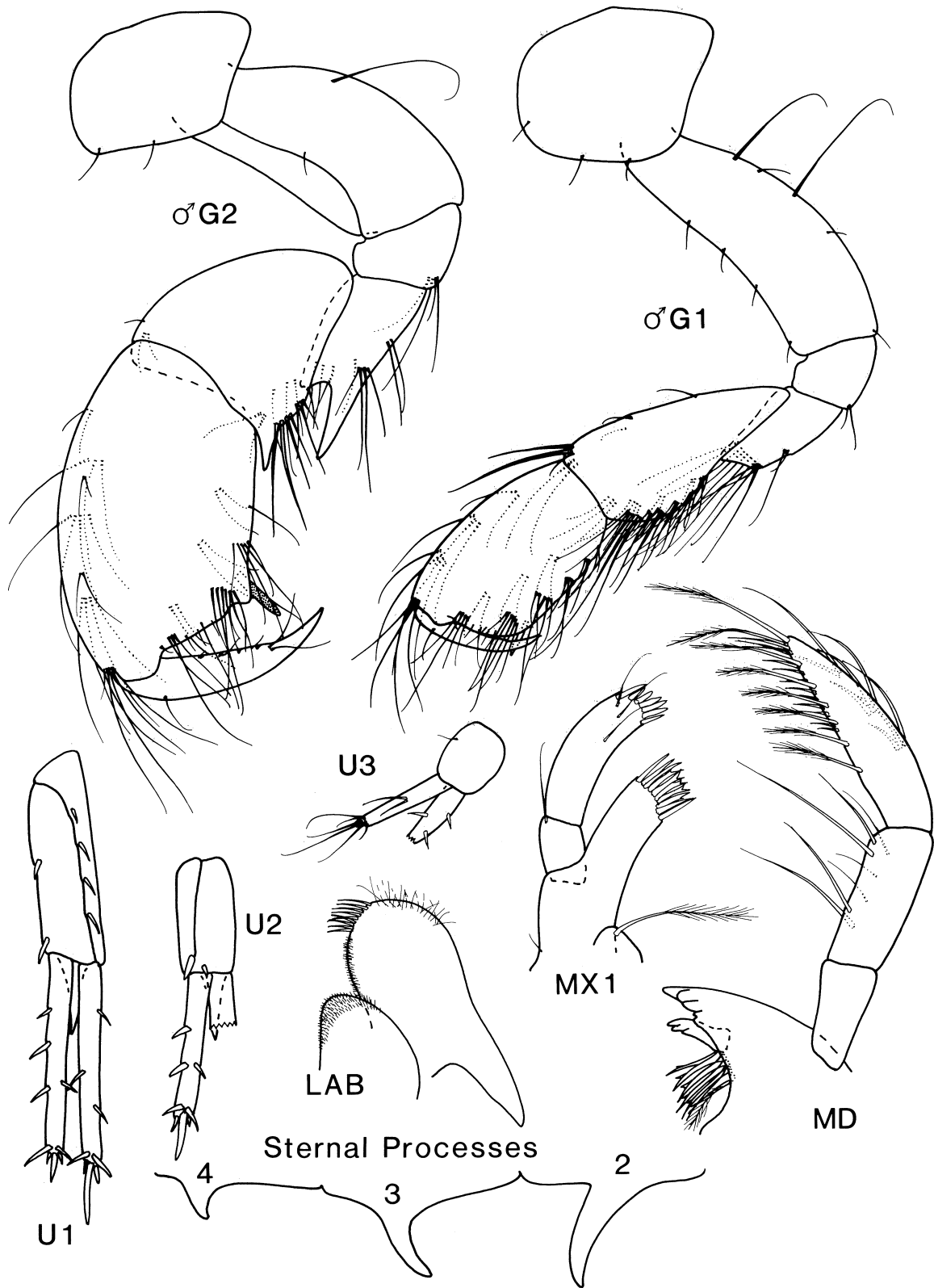


Fig.25. *Bemlos bidens* n.sp., male, Raine Island.



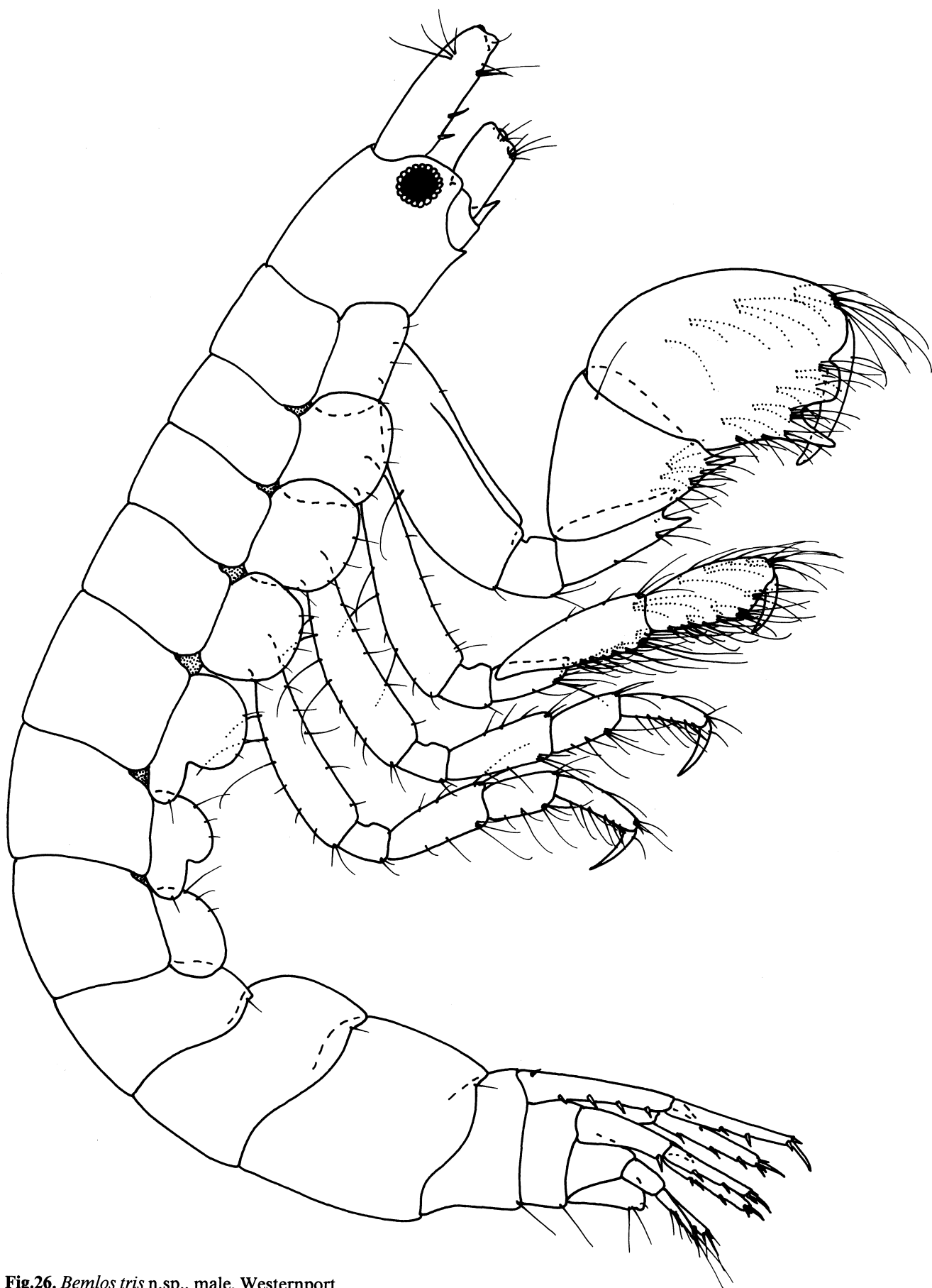


Fig.26. *Bemlos tris* n.sp., male, Westernport.

***Bemlos tris* n.sp.**

Figs 26–28

**Type material.** HOLOTYPE: male, 4.4 mm. Westernport, Vic., 38°21.65'S 145°31.69'E, intertidal, 29 Jan 1974, NMV J14035. PARATYPES: 29 males, 82 females, + 4 slides, NMV J13611.

**Additional material.** Westernport, Victoria: 3 males, 11 females, 38°18.56'S 145°22.52'E, intertidal sand, 9 Jan 1974, NMV J13615; 6 males, 20 females, 38°15.31'S 145°22.38'E, intertidal sandy clay, 8 Jan 1974, NMV J13612; 1 female, 38°14.47'S 145°21.86'E, intertidal mud, 7 Jan 1974, NMV J13614; 1 male, 38°24.25'S 145°15.93â, intertidal sand, 10 Jan 1974, NMV J13613; 1 male, 38°25.45'S 145°20.45'E, intertidal, silty-clay, 10 Jan

1974, NMV J13617; 5 males, 16 females, 38°22.90'S 145°31.83'E, intertidal sand-silt-clay, 24 Jan 1974, NMV J13606; 24 Jan 1974, NMV J13616; 2 males, 10 females, 38°29.19'S 145°21.34'E, 6 m, sand-silt-clay, 26 Nov 1973, NMV J13610; 1 male, 38°29.34'S 145°21.62'E, 6 m, sand-silt-clay, 26 Nov 1973, NMV J13609; 3 males, 3 females, 38°28.59'S 145°22.38'E, 6 m, sand, 26 Nov 1973, NMV J13607; 21 males, 40 females, 38°29.30'S 145°22.83'E, 6 m, 26 Nov 1973, NMV J13608; 7 males, 5 females, Crib Point, 38°22.29'S 145°13.41'E, 3 m, fine sand, 6 Apr 1965, NMV J13790; 2 males, 3 females, Crib Point, 38°21.73'S 145°13.23'E, 3 m, 1 Apr 1965, NMV J13792.

**Description.** Body (in alcohol) pale brown. Male pereon segments lacking sternal processes. Head anteroventral margin moderately produced

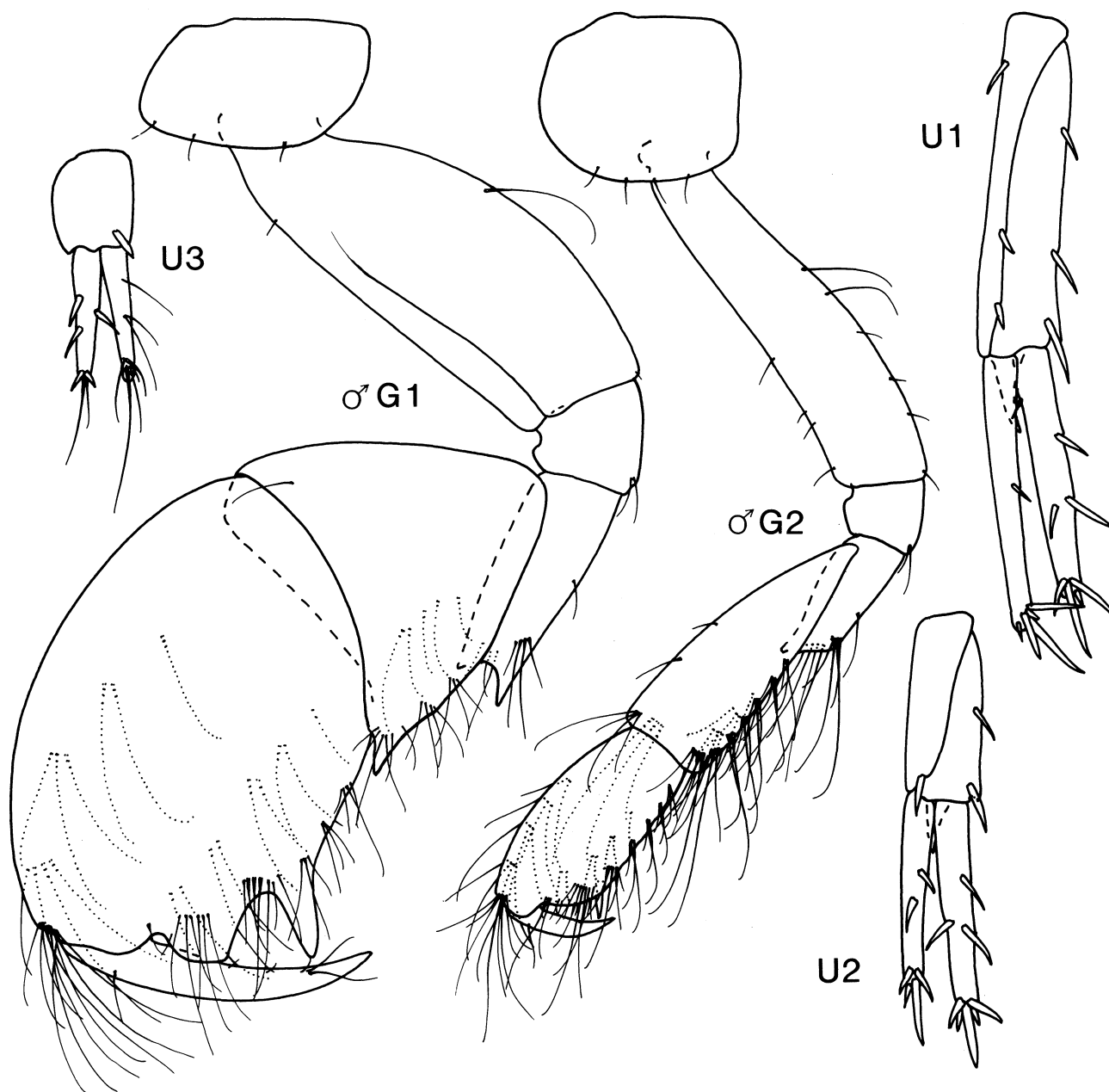


Fig.27. *Bemlos tris* n.sp., male, Westernport.

anteriorly, acute. Labium outer plate distal margin with 5 distal spines and a small compound coronate spine. Mandible palp article ratios 2 : 5 : 6, article 3 posterior margin falcate and setiferous over two thirds of its length, marginal setae of 2 distinct lengths. Maxilla 1 palp article 2 with 7 distal spines. Antenna 1 and 2 missing. Male gnathopod 1 coxa subquadrangular; basis moderately stout, anterior margin weakly sinuous, posterior margin moderately convex; merus elongate, posterodistal margin produced into a strong, acute tooth; carpus relatively large, triangular, posterodistal margin produced into an acute tooth; propodus one and one half times length of carpus, posterior proximal margin strongly convex, anterior proximal margin almost straight, palm stout, oblique, separated from dactylus hinge by a small sinus and from a strong, acute, posterodistal tooth, by a round-bottomed excavation; dactylus slender, elongate, overlapping posterodistal tooth. Female gnathopod 1 basis stout; carpus and propodus subequal, palm sinuous and defined by a weak tooth; dactylus slender, strongly

overlapping palm. Male gnathopod 2 elongate, slender; basis over 4 times as long as broad, anterior margin straight proximally, weakly concave distally, posterior margin weakly convex; carpus almost 3 times as long as its maximal width; propodus four fifths length of carpus, palm oblique, defined by a spine; dactylus moderately stout, overlapping palm. Female gnathopod 2 not markedly slender; carpus less than twice as long as broad; propodus a little longer than carpus, palm oblique, defined by a spine; dactylus scarcely overlapping palm. Pereopods 3 and 4 dactylus two thirds length of propodus. Pereopods 5-7 missing. Epimera 1-3 each with broad, rounded, distoventral tooth. Uropod 1 peduncle with interramal tooth less than one quarter length of peduncle; rami subequal, shorter than peduncle. Uropod 2 peduncle with inter-ramal tooth a little over one quarter length of peduncle; inner ramus longer than outer and longer than peduncle. Uropod 3 rami slender, subequal, about one and one half times length of peduncle; outer ramus with small second article.

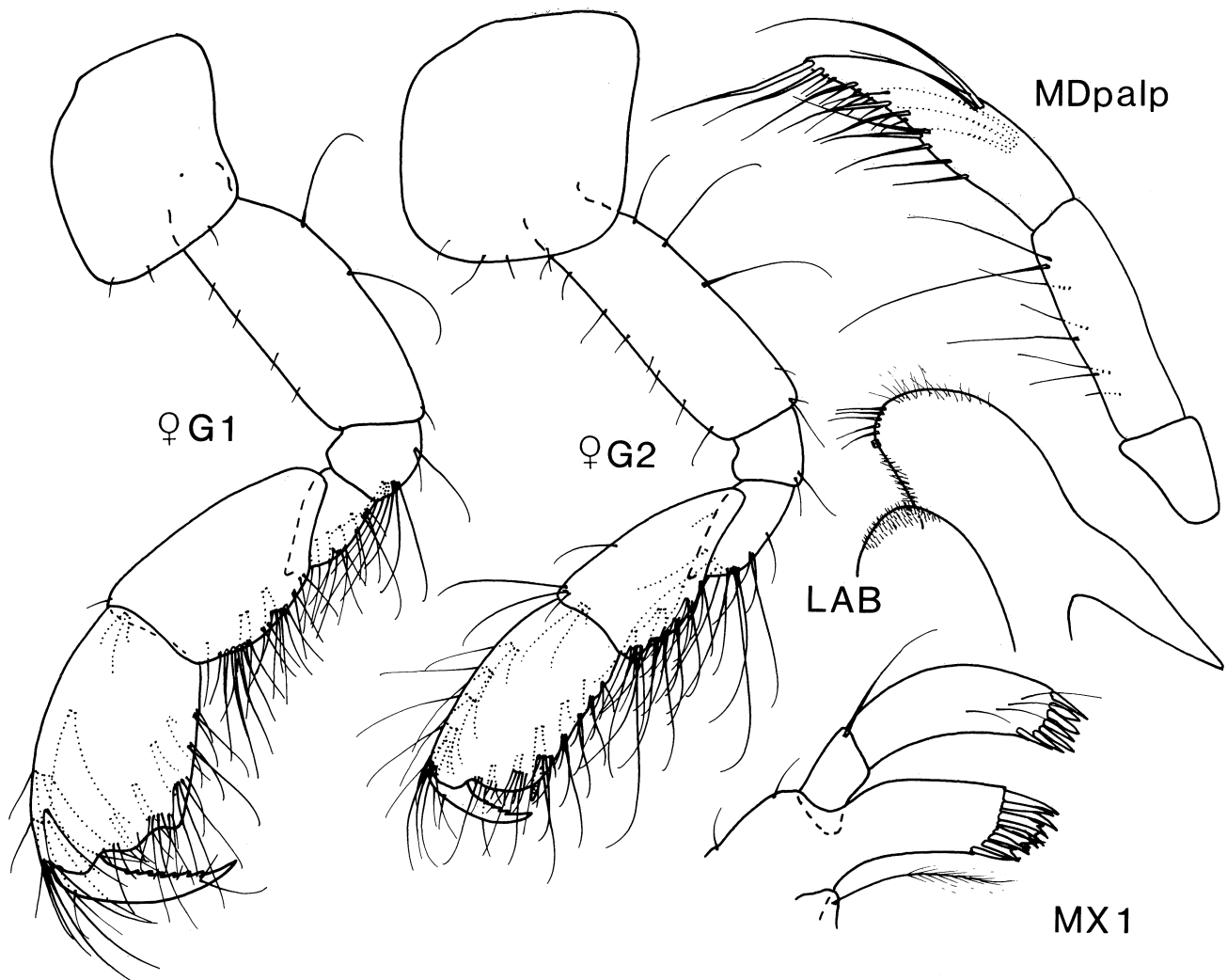


Fig.28. *Bemlos tris* n.sp., male, female, Westernport.

**Remarks.** This species resembles *B. bidens* but that species has a poorly excavate palm in the male gnathopod 1 and a relatively stout male gnathopod 2. It seems unlikely that the rather poorly known *B. bidens* is the subadult of *B. tris* as might be suspected from its smaller size and poorly developed propodus, since the meral tooth of *B. bidens* is very strongly developed by comparison with that of *B. tris*.

*Bemlos tris* also appears to be quite closely related to *B. tridens* (Schellenberg), from which it differs in the poorly setiferous male gnathopod 2 and to *B. quadrimanus* (Sivaprakasam) from which it differs in the much larger carpus of the male gnathopod 1, and from both species in lacking sternal processes.

**Habitat.** On muds and sands in the intertidal and to 6 m depth.

**Distribution.** Victoria.

**Etymology.** From the latin *tres* = three, referring to the three teeth on the male gnathopod 1, one on the merus, one on the carpus, one on the propodus.

***Bemlos dolichomanus* n.sp.**

Figs 29–31

**Type material.** HOLOTYPE: male, 4.3 mm. South-western Bass Strait (Victorian Institute of Marine Science Cruise 80-Sa-1, Stn 117, FV *Sarda*), 40°38.0'S 145°23'E, 36 m, muddy shell, 4 Nov 1980, G.C.B. Poore, NMV J14033. PARATYPES: 2 males, 2 females, + 6 slides, type locality, NMV J2459.

**Additional material.** 1 male, + 5 slides, Crib Point, Westernport, Vic., 38°20.29'S 145°14.18'E, sandy gravel, 10 Mar 1965m NMV J14039; 1 male, Bass Strait (Victorian Institute of Marine Sciences Cruise 81-T-1 NZ01, RV *Tangaroa* Stn 180), 39°12.9'S 146°27.3'E, 65 m, muddy sand, 18 Nov 1981, NMV J13701.

**Description.** Body (in alcohol) with brown bands of pigment on pereon segments 3, 4 and 7. Male pereon segment 2 with broad, triangular sternal process, pereon segments 3 and 4 each with nipple-like sternal process. Head anteroventral margin moderately produced, subacute. Labium outer plate distal margin with 7 simple spines and a compound coronate spine. Mandible palp article ratios 5 : 11 : 14, article 3 weakly falcate, setiferous over three quarters its length, with marginal setae of 2 distinct lengths. Maxilla 1 palp article 2 with 7 distal spines. Antenna 1 missing. Antenna 2 slender, peduncular articles 4 and 5 subequal; flagellum subequal with peduncular article 5, with 8 articles. Male gnathopod 1 weakly setiferous, coxa subquadrangular; basis anterior margin weakly sinuous, posterior margin moderately convex; carpus stout, cup-shaped; propodus elongate, 3 times length of carpus, anterior margin weakly convex, posterior margin sinuous, palm short, straight almost transverse, separated from stout, triangular posterodistal tooth, by an asymmetrical, round-bottomed excavation, marginal spine some distance from posterodistal tooth; dactylus stout overlapping tooth and

opposable to spine. Female gnathopod 1 slender; carpus very slightly shorter than propodus; propodus with palm oblique, evenly convex and continuous with posterior margin, defined by a spine; dactylus in one female medially swollen, in the other female slender, in both cases, overlapping palm. Male gnathopod 2 basis anterior margin weakly concave, produced distally into triangular tooth, posterior margin moderately convex; carpus and propodus subequal, palm oblique; dactylus fitting palm. Female gnathopod 2 basis slender; propodus longer than carpus, parallel sided, palm oblique rather strongly convex; dactylus in one female swollen in the other relatively slender, fitting palm. Pereopods 3 and 4 propodus and dactylus very slender, dactylus over half length of propodus. Pereopods 5–7 missing. Epimera 1–3 each with small ventrodistal tooth, above which is inserted a small seta. Uropod 1 peduncle with inter-ramal tooth less than half length of peduncle; rami slender, subequal with each other and with peduncle. Uropod 2 peduncle with inter-ramal tooth about half length of peduncle; inner ramus longer than outer and longer than peduncle. Uropod 3 rami slender, the inner ramus the longer and distinctly longer than peduncle; outer ramus with small second article, at least 1 terminal seta longer than ramus.

**Remarks.** The shape of the male gnathopod 1 is quite distinctive. The peculiar expanded dactyls of gnathopods 1 and 2 in one of the two female specimens (as figured) may be an aberration rather than a species characteristic.

**Habitat.** On muddy sand and shell and sandy gravel in 10–65 m.

**Distribution.** Victoria.

**Etymology.** From the Greek *dolicho* = long; and *manus* = hand, referring to the long propodus of the male gnathopod 1.

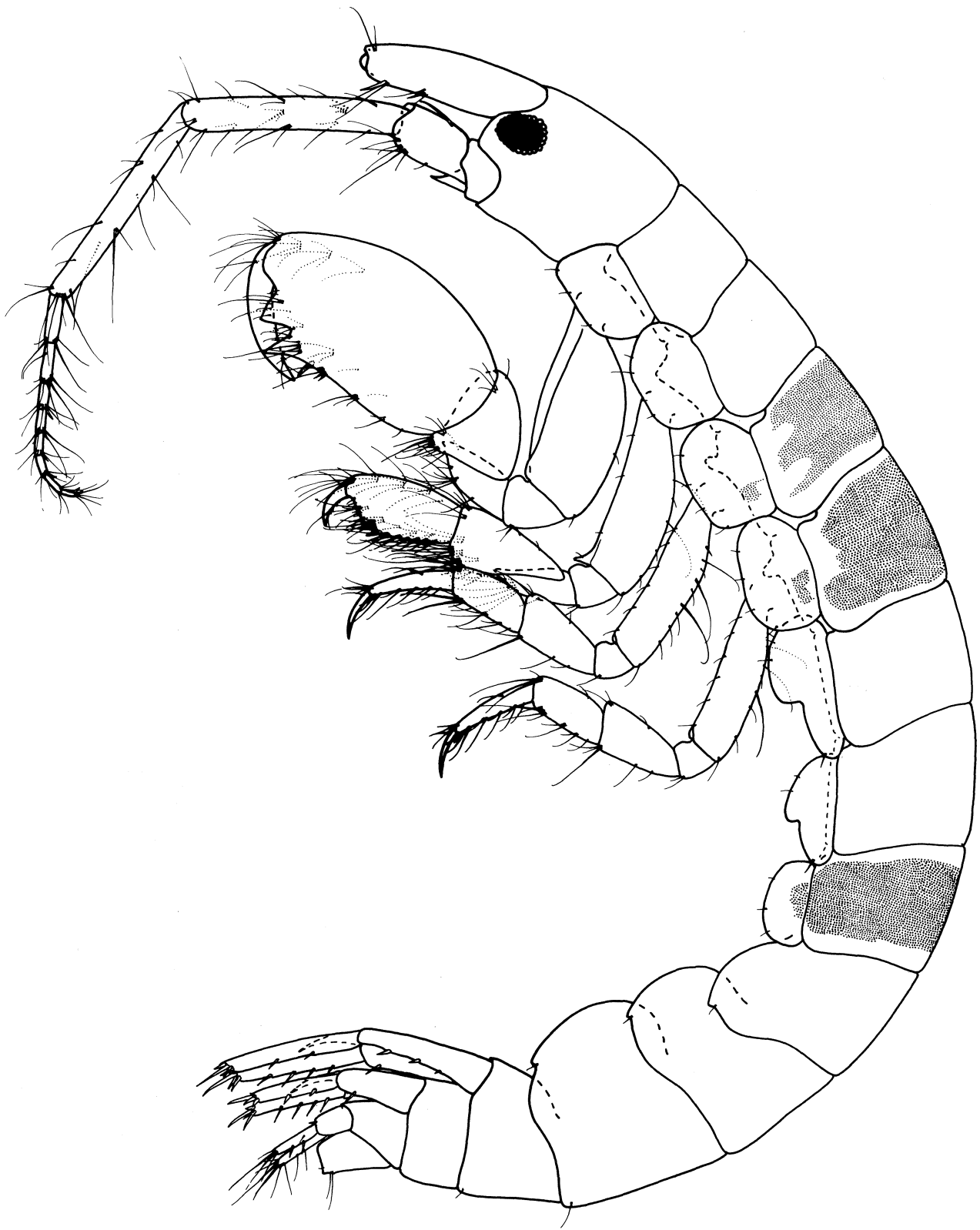
***Bemlos strigilis* n.sp.**

Figs 32–34

**Type material.** HOLOTYPE: male, 4.3 mm. Cathedral Rock, Rottnest Island, WA, 32°01'S 115°27'E, red algae, 6 m, 21 Dec 1983, R.T. Springthorpe, AM P37431. PARATYPES: 3 males, 4 females, type locality, AM P37432. PARATYPES: 1 female + 3 slides, AM P38613, 1 male + 1 slide, AM P38614, 8 females, 2 males, AM P37433, 1 km west of Red Bluff, Kalbarri, 27°42'S 114°09'E, *Ecklonia* holdfasts, 18 m, 9 Jan 1984, J.K. Lowry; 1 male, 1 female, same locality and data, R.T. Springthorpe, AM P37434.

**Additional material.** South Australia: 1 male, Stokes Bay, north coast Kangaroo Island, algae on vertical rock face, 7 m, 4 Mar 1972, I. Loch, AM P37473.

**Description.** Body (in alcohol) with faint brown markings on dorsum of pereon segments 2–5 and 7 and pleon segments 1–2. Male pereon segments lacking sternal processes. Head anteroventral margin moderately produced, subacute. Labium outer plate distal margin with about 5 spines. Mandible palp



**Fig.29.** *Bemlos dolichomanus* n.sp., male, Bass Strait.

article ratios 3 : 6 : 9; article 3 posterior margin very weakly concave and setiferous over three quarters of its length, marginal setae of 2 distinct lengths. Maxilla 1 palp article 2 with 7 spines. Antenna 1 peduncular articles in the ratios 3 : 3 : 1; accessory flagellum broken, with 2+ articles; primary flagellum broken. Antenna 2 peduncular articles 4 and 5 subequal; flagellum subequal with peduncular article 5, with about 7 articles. Male gnathopod 1 coxa strongly produced forward, broadly rounded and down turned; basis enormous, anterodistal margin

expanded into rounded flange, bordered with stridulating ridges; inner face of basis with numerous long setae; carpus about as broad as long, anterior margin with stridulating ridges which rub against those of the basis anterior margin; propodus enormous expanded distally, palm with small sinus near dactylus hinge, with almost transverse anterior palmar portion followed by a deep triangular excavation in posterior portion and with defining triangular tooth lacking a spine in hyperadults; dactylus very robust scarcely overlapping palm.

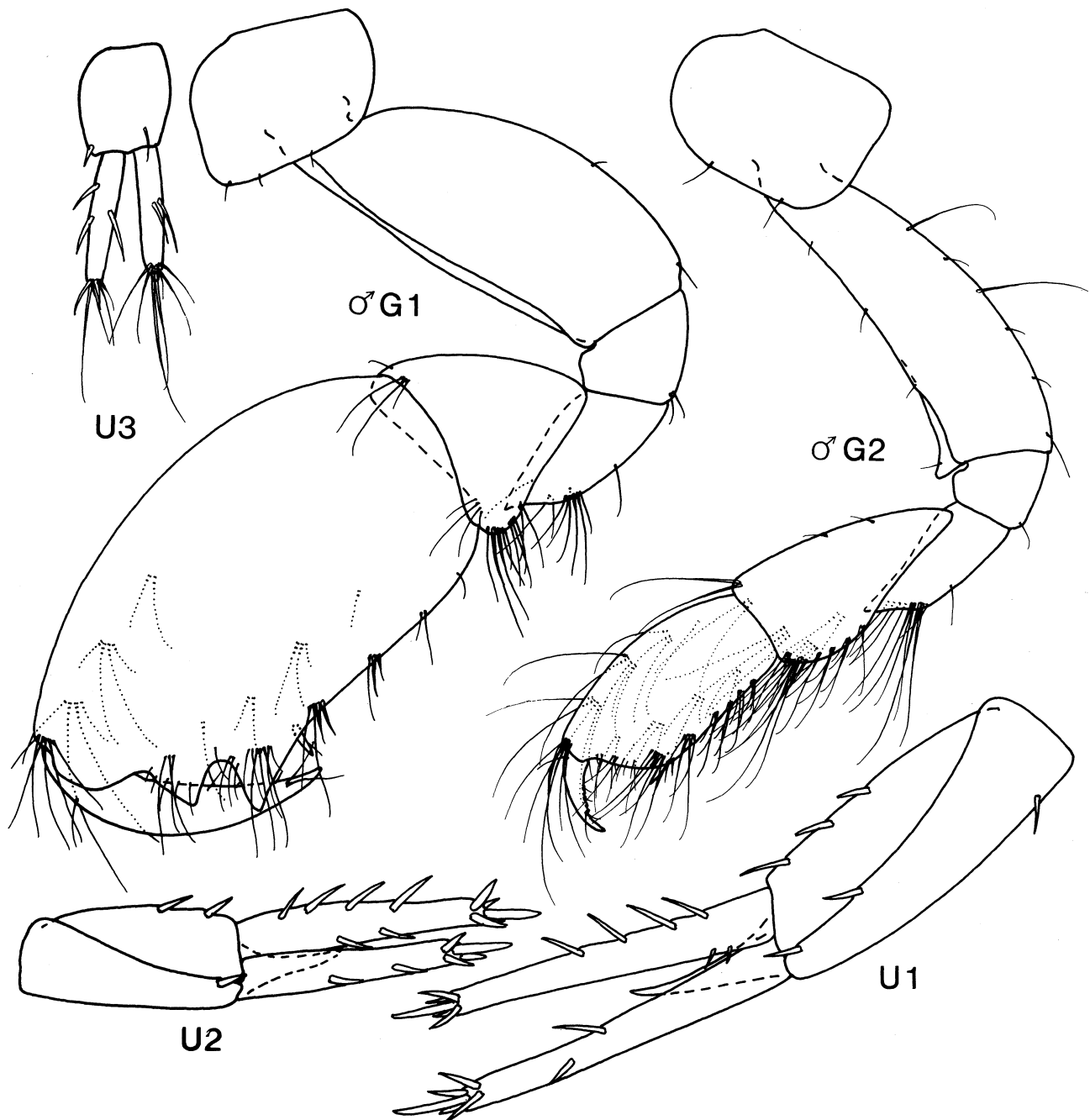


Fig.30. *Bemlos dolichomanus* n.sp., female, Bass Strait.

Female gnathopod 1 carpus longer than broad; propodus larger than carpus, parallel sided, palm sinuous; dactylus overlapping palm. Male gnathopod 2 basis about 3 times as long as broad; carpus and propodus elongate, slender; carpus slightly the longer; dactylus fitting palm. Female gnathopod 2 similar to that of male but less slender. Pereopods 3-4 sturdy, dactylus shorter than propodus. Pereopods 5-7 in the length ratios 2 : 4 : 6; pereopod

7 less than two thirds body length. Epimera 1-3 each with small posterodistal tooth. Uropod 1 peduncle with inter-ramal tooth about half length of peduncle; rami subequal, scarcely longer than peduncle. Uropod 2 peduncle with inter-ramal tooth about two thirds length of peduncle; inner ramus longer and straighter than outer. Uropod 3 rami short, subequal, scarcely longer than peduncle; outer ramus with small second article; rami with long terminal setae.

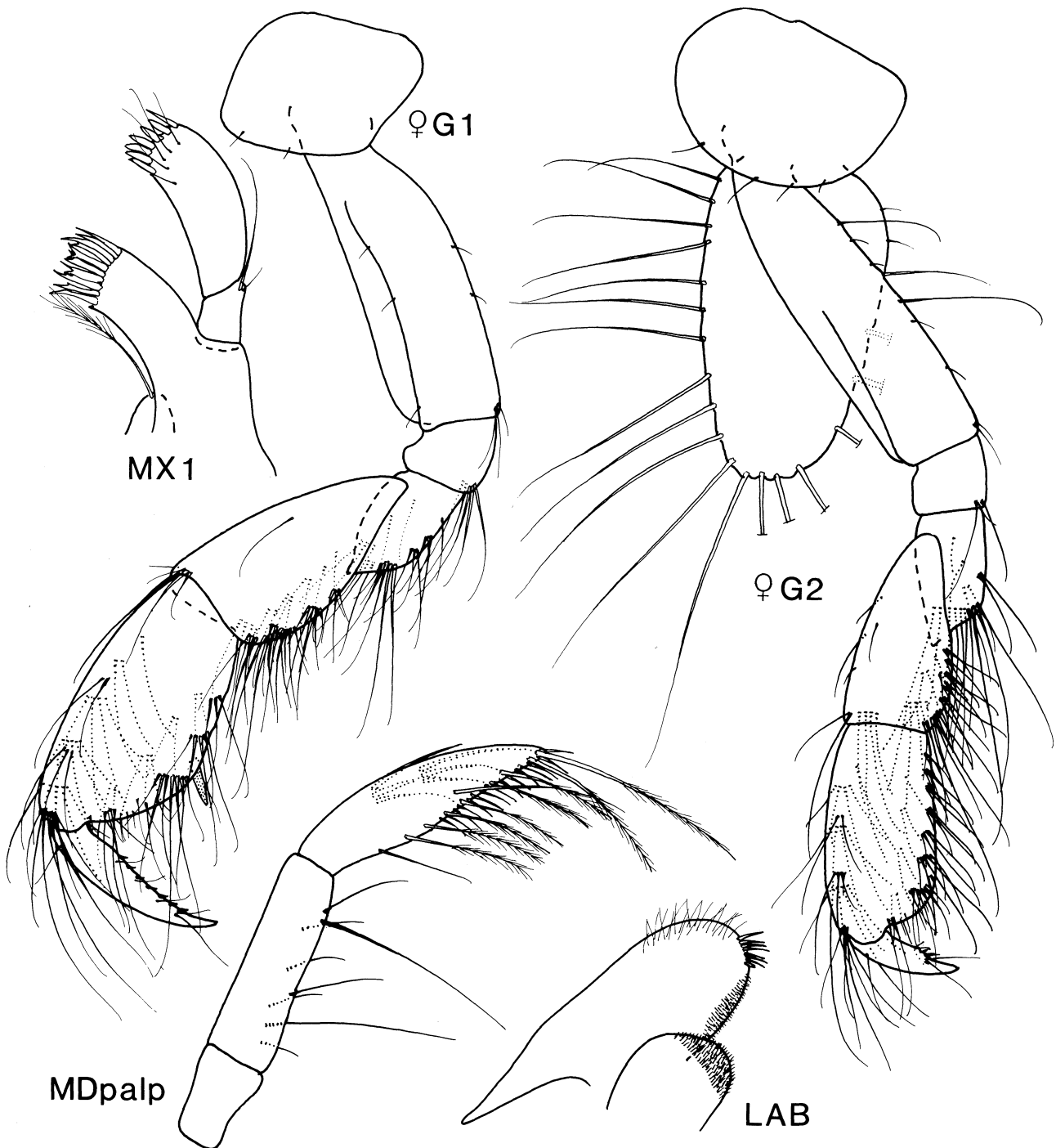


Fig.31. *Bemlos dolichomanus* n.sp., male, female, Bass Strait.

**Remarks.** This is the first species of *Bemlos* in which stridulating ridges have been described, nor is it known in any closely related genera, but is well known in *Grandidierella* spp., and in *Erichthonius* spp.

**Habitat.** Among algae in shallow water.

**Distribution.** Western Australia to South Australia.

**Etymology.** From the latin *strigilis* = scraper, referring to the stridulating ridges on the basis and carpus of the male gnathopod 1.

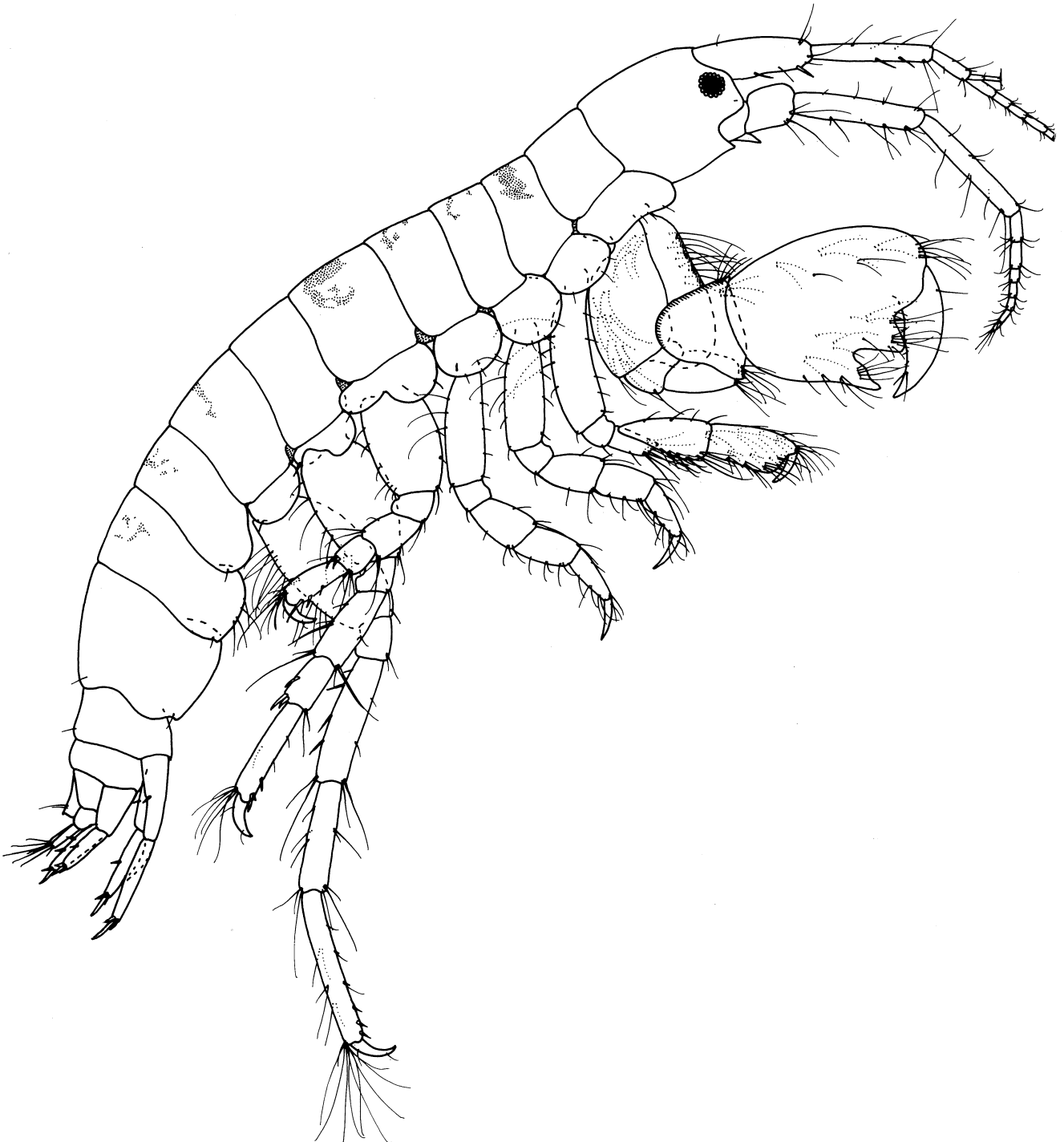


Fig.32. *Bemlos strigilis* n.sp., male, Rottneest Island.



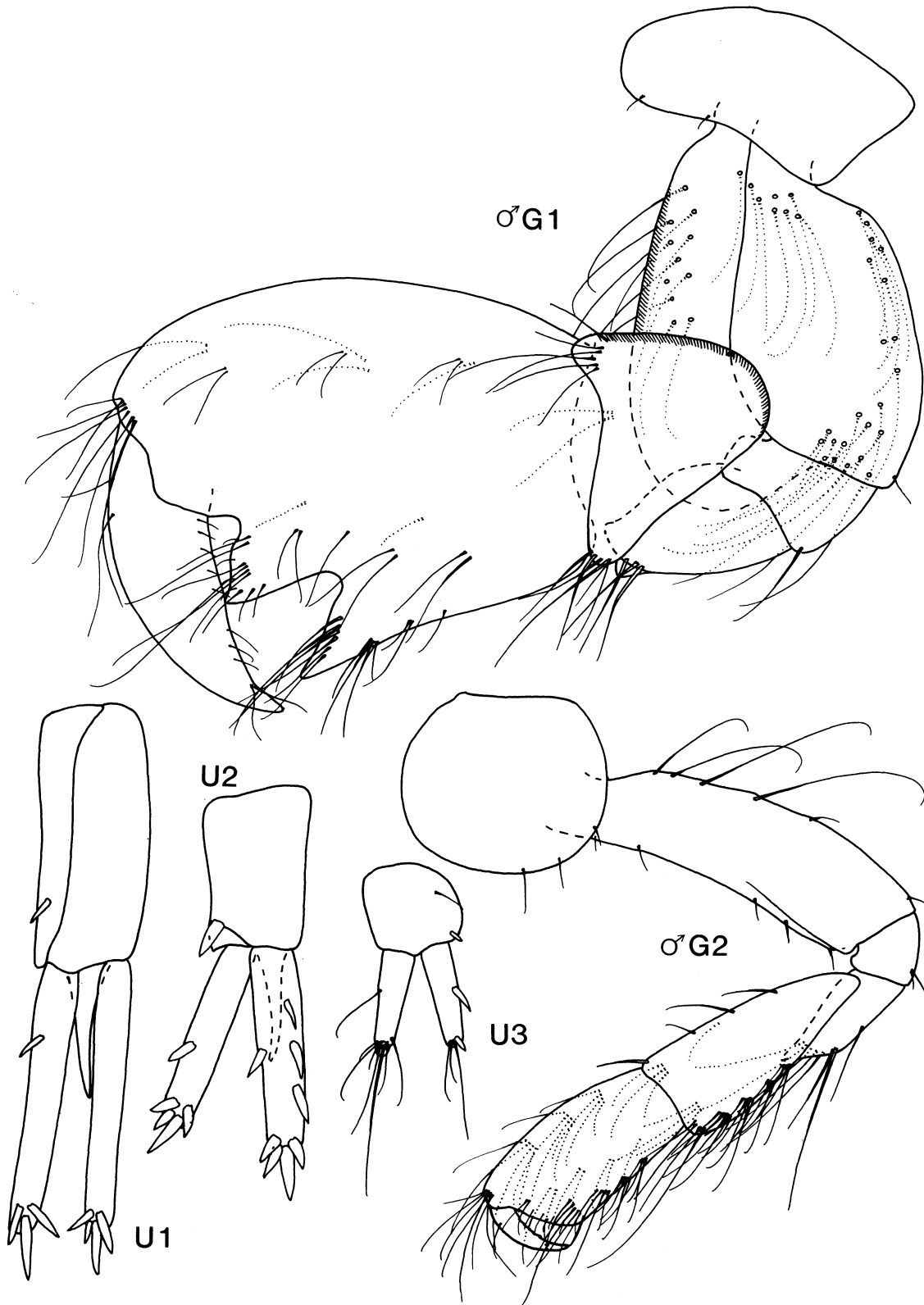


Fig.33. *Bemlos strigilis* n.sp., male, Rottnest Island.

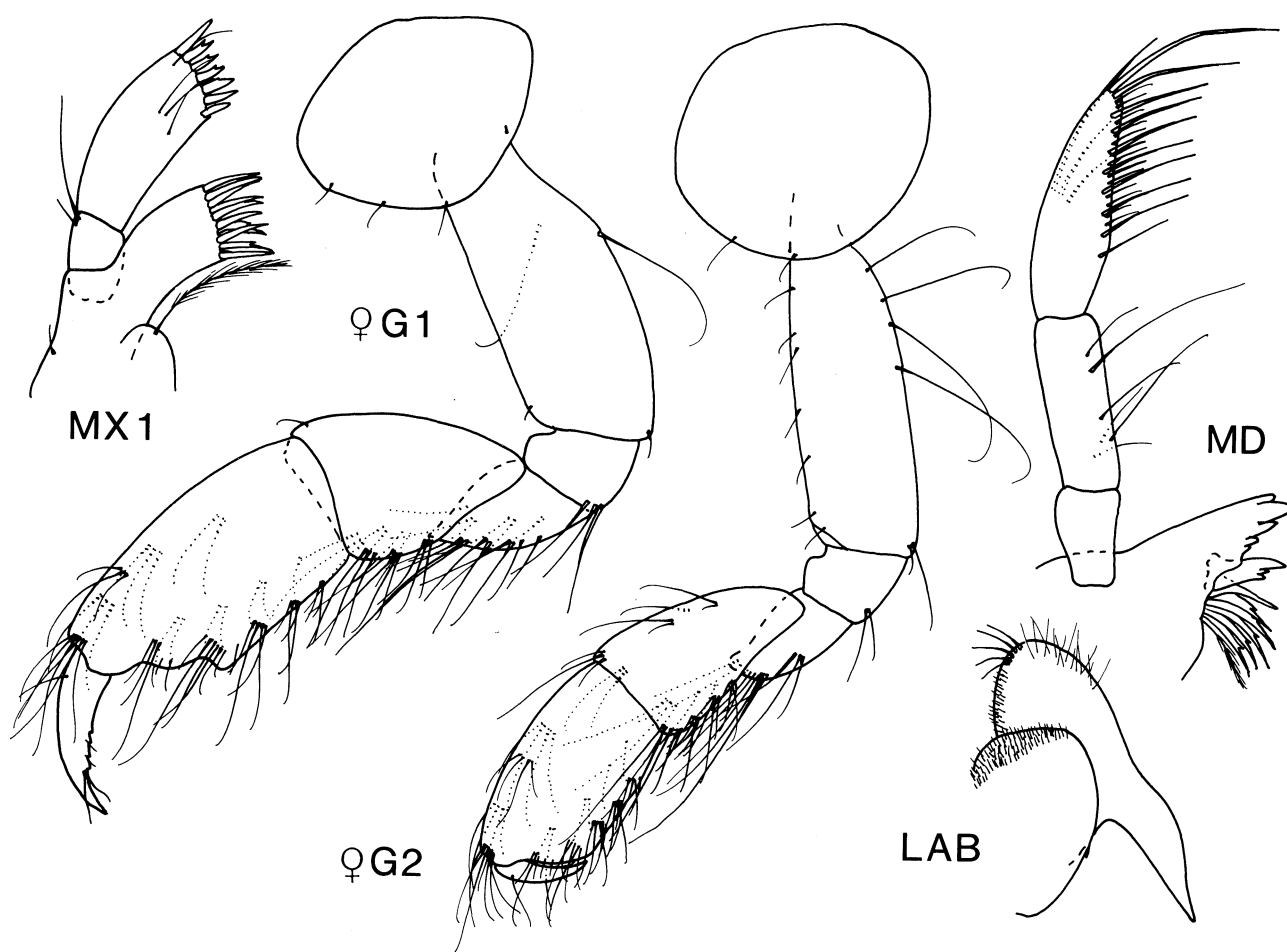


Fig.34. *Bemlos strigilis* n.sp., male, female, Rottneest Island.

***Bemlos arkooolus* n.sp.**

Figs 35–39

**Type material.** HOLOTYPE: male, 8.0 mm, East of Grassy Creek, Vic., among *Galeolaria* tubes, 23 Jan 1968, W. Seed. NMV J14032. PARATYPES: 1 male, 2 females, type locality, 2 immature, NMV J13708. PARATYPES: 1 male + 1 slide, AM P38615, 1 female + 3 slides, AM P37435, 1 female AM P38616 male, 1 slide female. Stokes Bay, Kangaroo Island, SA, algae at low tide, 4 Mar 1978, L.K. Handley.

**Description.** (Victoria material). Body (in alcohol) with irregular bands of reddish-brown pigment on head, and pereon segments 2–7, the pigment extending onto the posterior coxae and onto epimera 1–2. Male pereon segments lacking sternal processes. Head anteroventral margin weakly produced, but acute. Labium outer plate distal margin with 2 distal spine-setae. Mandible palp article ratios 3 : 5 : 7, article 3 posterior margin weakly convex with setae of 2 distinct lengths. Maxilla 1 palp article 2 with 7 distal spines. Antenna 1 missing. Antenna 2 slender, peduncular article 5 distinctly longer than article 4; flagellum subequal with peduncular article 5, with 12

articles. Male gnathopod 1 coxa anterodistal margin produced, angular, subacute; basis robust, anterior margin substraight, outer face with large wing-like process, curving evenly forward narrowing, but truncate distally; carpus moderate, subtriangular, the posterodistal margin produced into a small, rounded tooth; propodus elongate, twice length of carpus, palm short, oblique, separated from stong, triangular defining tooth by a moderately deep, round-bottomed excavation; tooth with strong proximal spine; dactylus stout, overlapping tooth. Female gnathopod 1 coxa anteriorly rounded; basis moderately stout, lacking process on outer face; carpus subtriangular with posterodistal tooth; propodus elongate, palm sinuous, very oblique; dactylus overlapping palm. Male gnathopod 2 basis stout, anterior margin with proximal fold; carpus very elongate over twice as long as broad; propodus about three quarters length of carpus, palm very oblique; dactylus fitting palm; anterior margin of propodus and anterodistal margin of carpus densely setose. Female gnathopod 2 carpus stout, subtriangular; propodus slightly exceeding length of

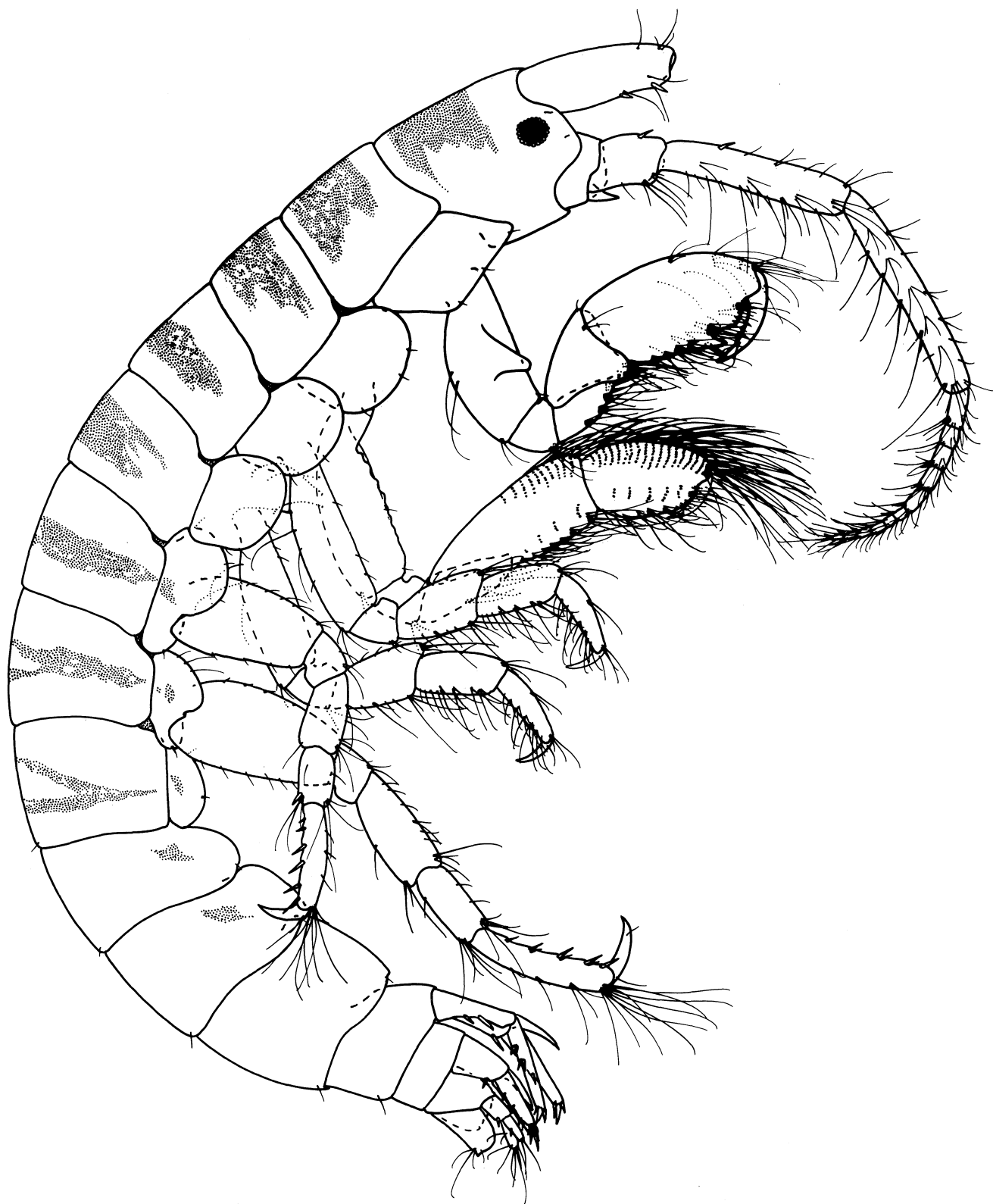


Fig.35. *Bemlos arkoolus* n.sp., male, Grassy Creek.

carpus; dactylus fitting palm. Pereopods 3-4 dactylus short, less than half length of propodus. Pereopods 5-7 in the length ratios 3 : 4 : 4. Pereopod 7 a little over one third body length. Epimera 1-3 rounded, but each with a small distoventral depression bearing a small seta. Uropod 1 peduncle with inter-ramal tooth over half length of peduncle;

inner ramus a little longer than outer and a little longer than peduncle. Uropod 2 peduncle with inter-ramal tooth over three quarters length of peduncle; inner ramus longer than outer and longer than peduncle. Uropod 3 rami shorter than peduncle, and lacking marginal spines; outer ramus with small second article.

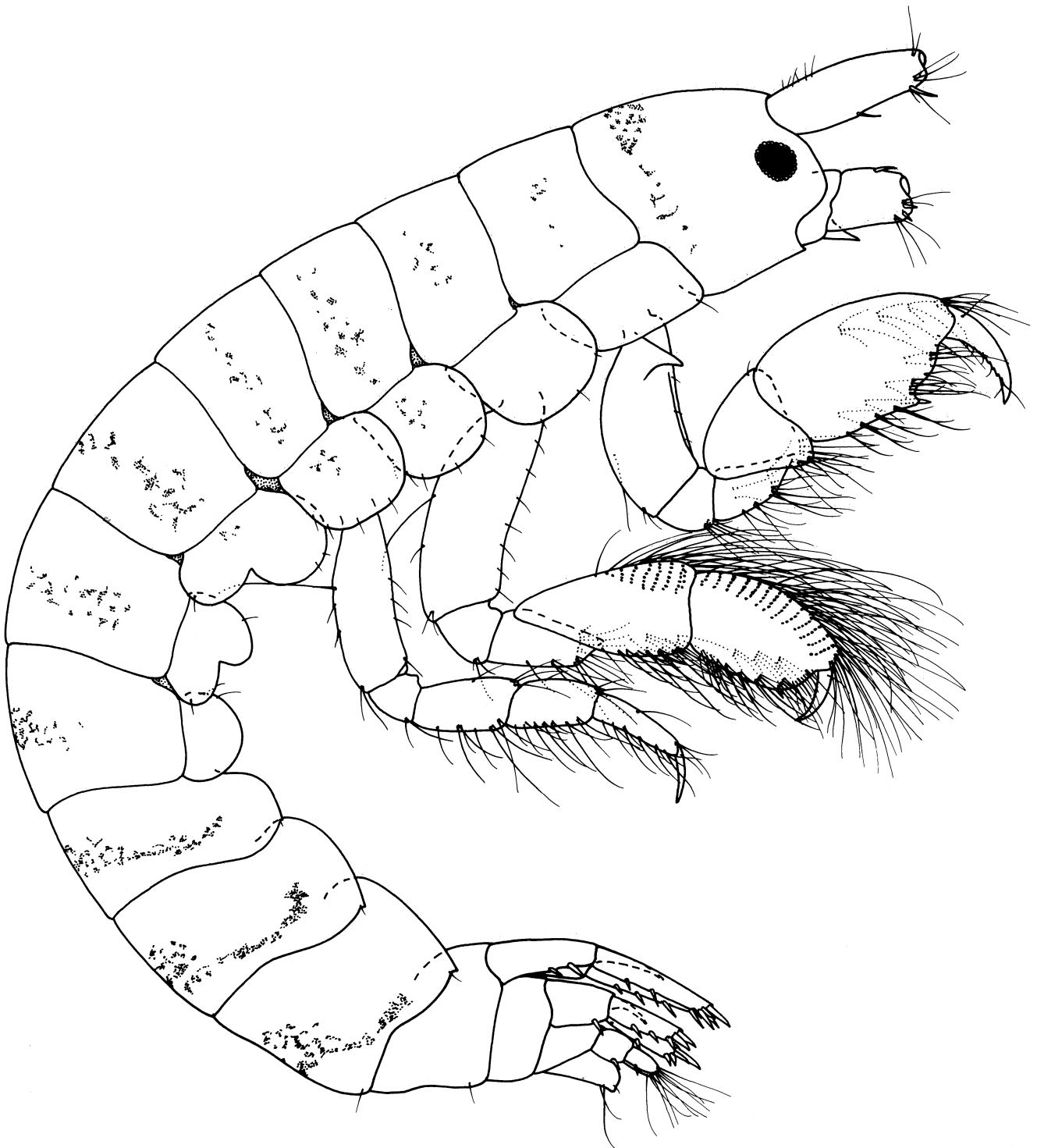


Fig.36. *Bemlos arkooolus* n.sp., male, Stokes Bay.

South Australian material. Body (in alcohol) with head, pereon and pleon segments speckled with red-brown pigment spots which extend on to coxae and epimera. Male gnathopod 1 basis with wing-like process proximal in position; palmar tooth poorly developed. Male gnathopod 2 carpus shorter, only a little longer than propodus.

In both maximum size and in morphological development, this material seems to be submature.

**Remarks.** This species is readily distinguished by the winged basis of the male gnathopod 1 and elongate setose carpus of the male gnathopod 2. The peculiar folded anterior margin of the basis of the male gnathopod 2 occurs on both left and right

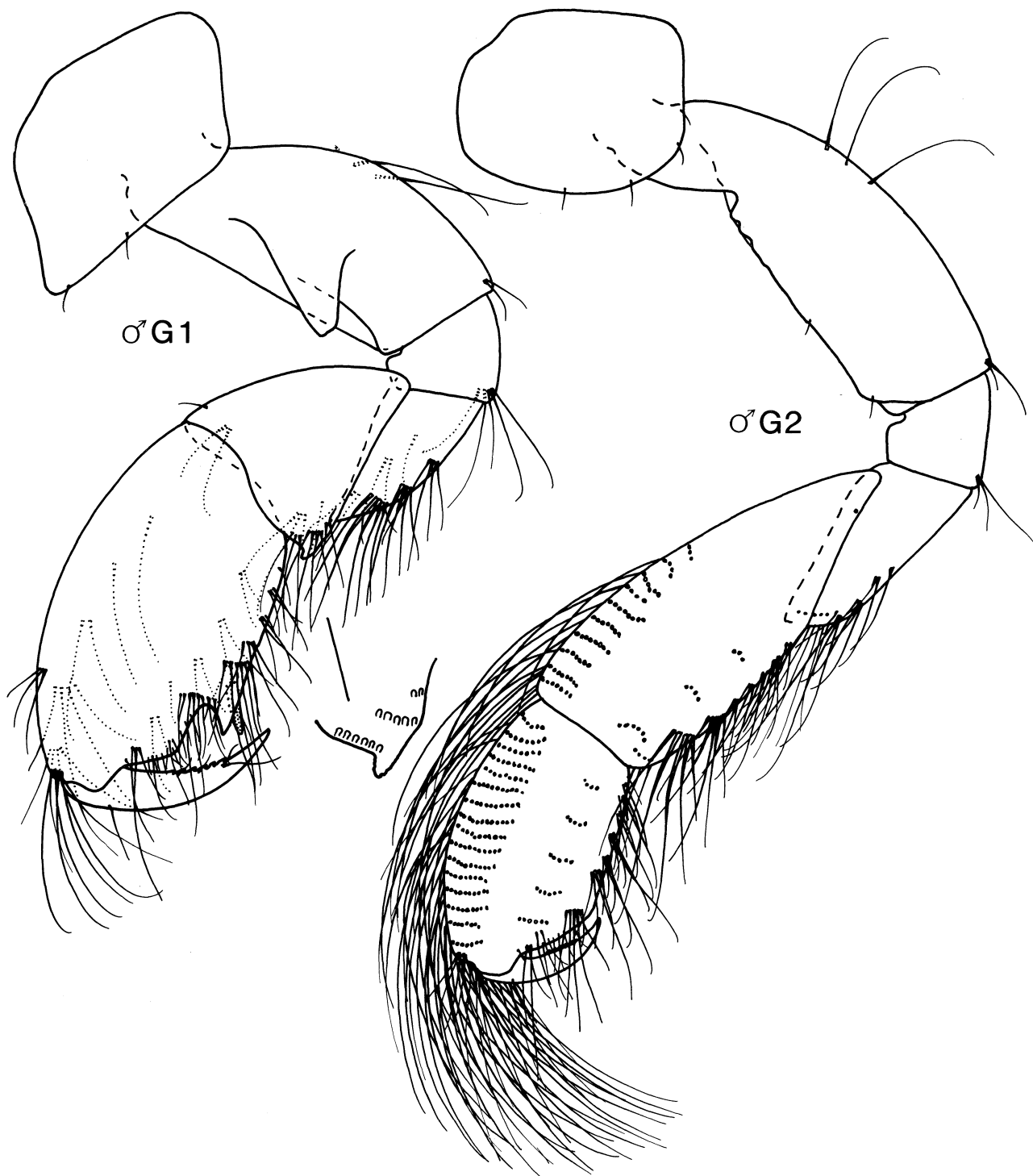


Fig.37. *Bemlos arkoolus* n.sp., male, Grassy Creek.

gnathopods of the only hyperadult male in the collection. It is assumed to be a real character and not a postmortem effect, as the posterior margin is not folded and the folding is similar in both gnathopods.

In the short, stout uropod 3 rami and subovoid mandible palp article 3, this species resembles *Australomicrodeutopus* but differs in the unmodified uropod 1 and unenlarged carpus of the male gnathopod 1. In addition, species of

*Australomicrodeutopus* lack an inter-ramal process on uropod 2. For the present this species is assigned to *Bemlos*.

**Habitat.** Among algae and *Galeolaria* in shallow water.

**Distribution.** Victoria and South Australia.

**Etymology.** Latinised aboriginal.

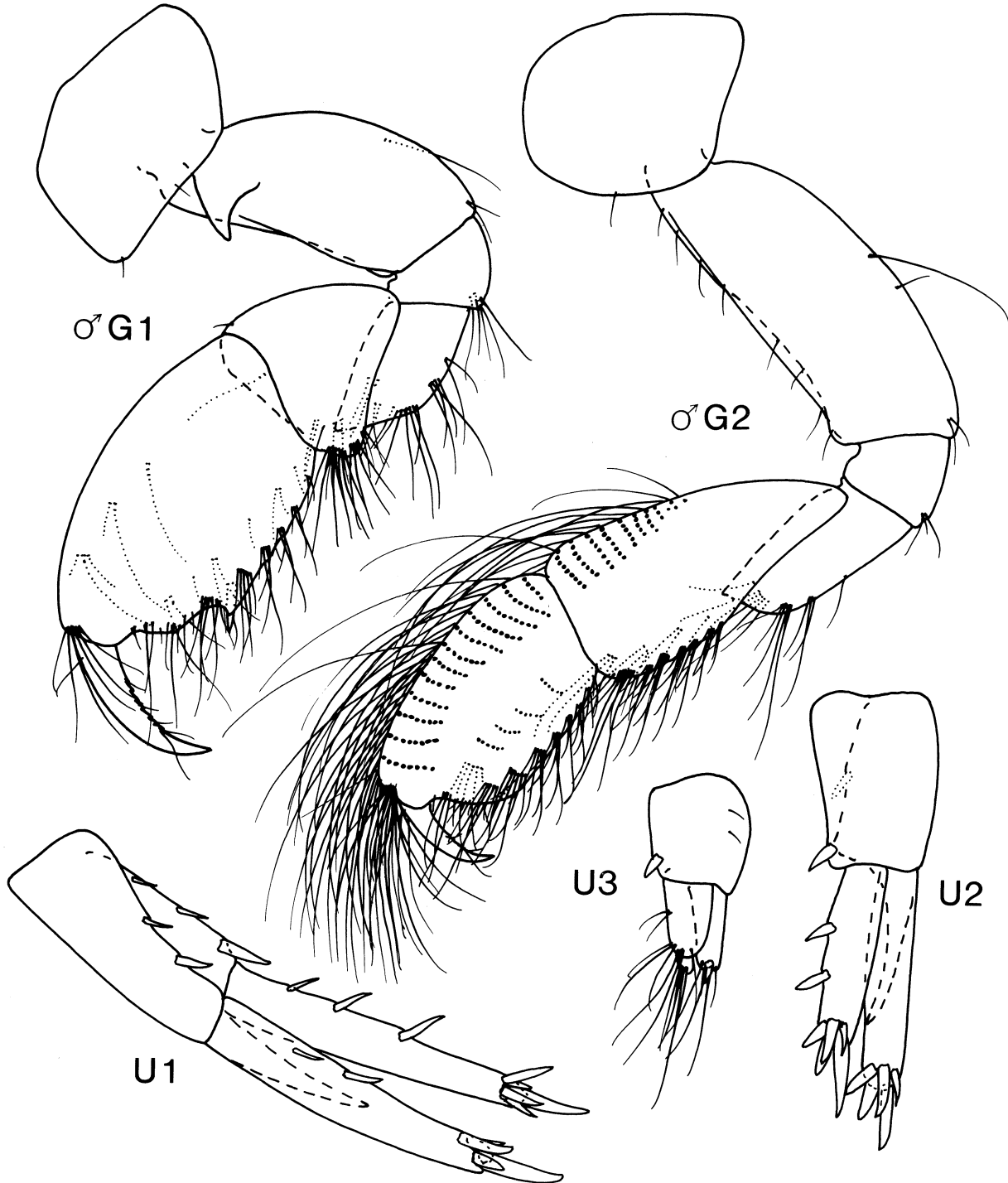


Fig.38. *Bemlos arkoolus* n.sp., male, Stokes Bay.

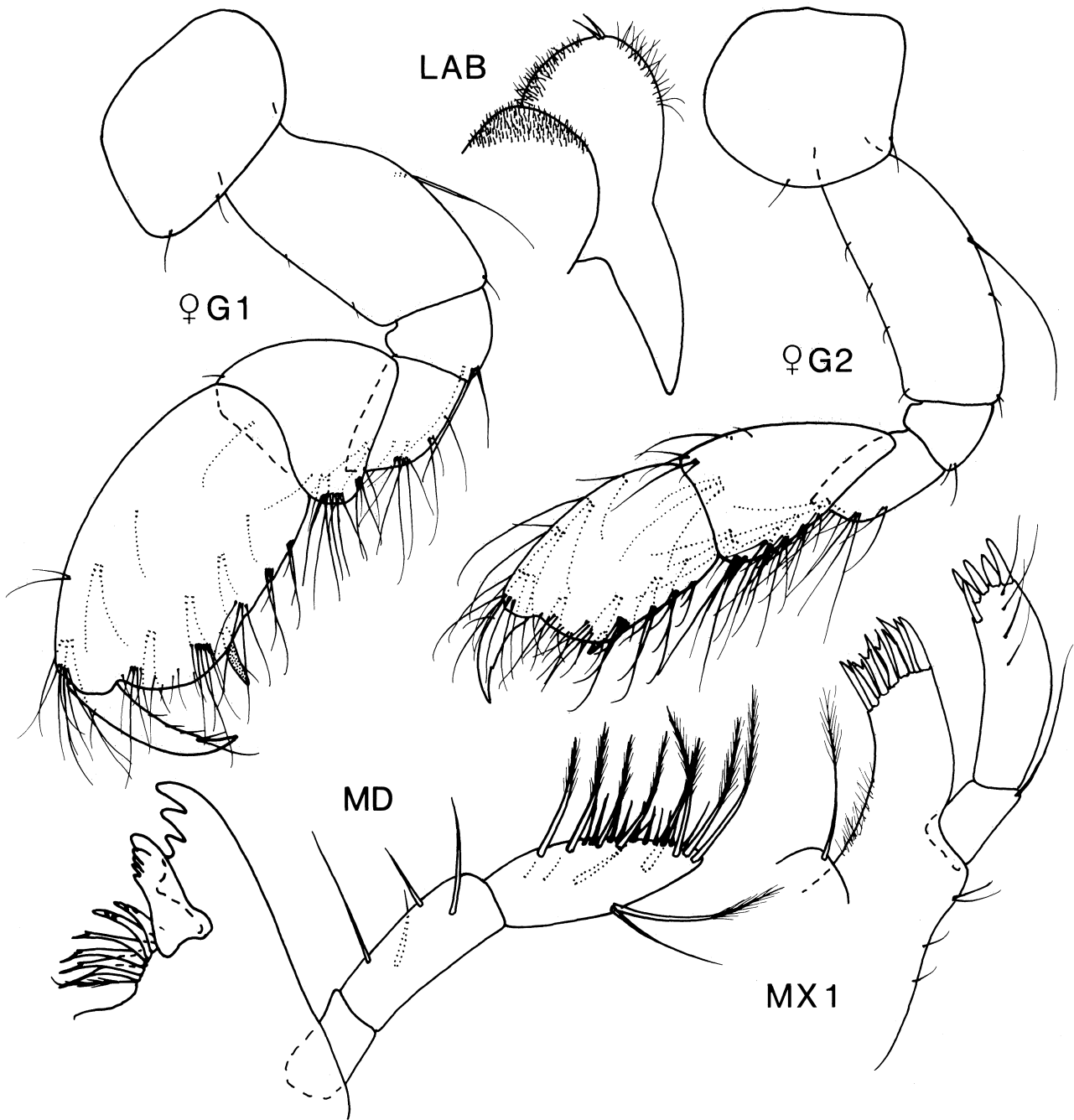


Fig.39. *Bemlos arkooolus* n.sp., male, female, Stokes Bay.

***Bemlos gilgi* n.sp.**

Figs 40-41

**Type material.** HOLOTYPE: male, 6.2 mm. Shelf, eastern Bass Strait (Victorian Institute of Marine Sciences Cruise 79-k-1, HMAS *Kimbla* Stn 32), 39°41.7'S 148°39.5'E, muddy sand, 115 m, 27 Mar 1979, G.C.B. Poore. NMV J14034. PARATYPES: 22 males, 26 females, + 4 slides, type locality, NMV J13704.

**Additional material.** 4 males, 1 female. Shelf, eastern Bass Strait (HMAS *Kimbla* Stn 38), 39°22.4 . 148°35.5'E,

muddy sand, 73 m, 29 Mar 1979, G.C.B. Poore, NMV J13703.

**Description.** Body (in alcohol) uniform pale cream. Male pereon segments without sternal processes. Head anteroventral margin moderately produced. Labium outer plate distal margin with 4 spines. Mandible palp article ratios 1 : 2 : 3, article 3 posterior margin straight, setiferous over three quarters its length, marginal setae of 2 distinct lengths. Maxilla 1 palp article 2 with 6 distal spines.

Antenna 1 and 2 missing. Male gnathopod 1 weakly setiferous, coxa subquadrangular anterior margin straight, anterodistal margin a little produced; basis stout, anterior margin straight; carpus small, cup shaped; propodus enlarged, over twice length of

carpus anterior margin evenly convex, posterior proximal margin straight, palm short, oblique, posterior margin-palm junction obliterated by long shallow excavation with a spine at its proximal base; dactylus relatively long, opposable to spine. Female

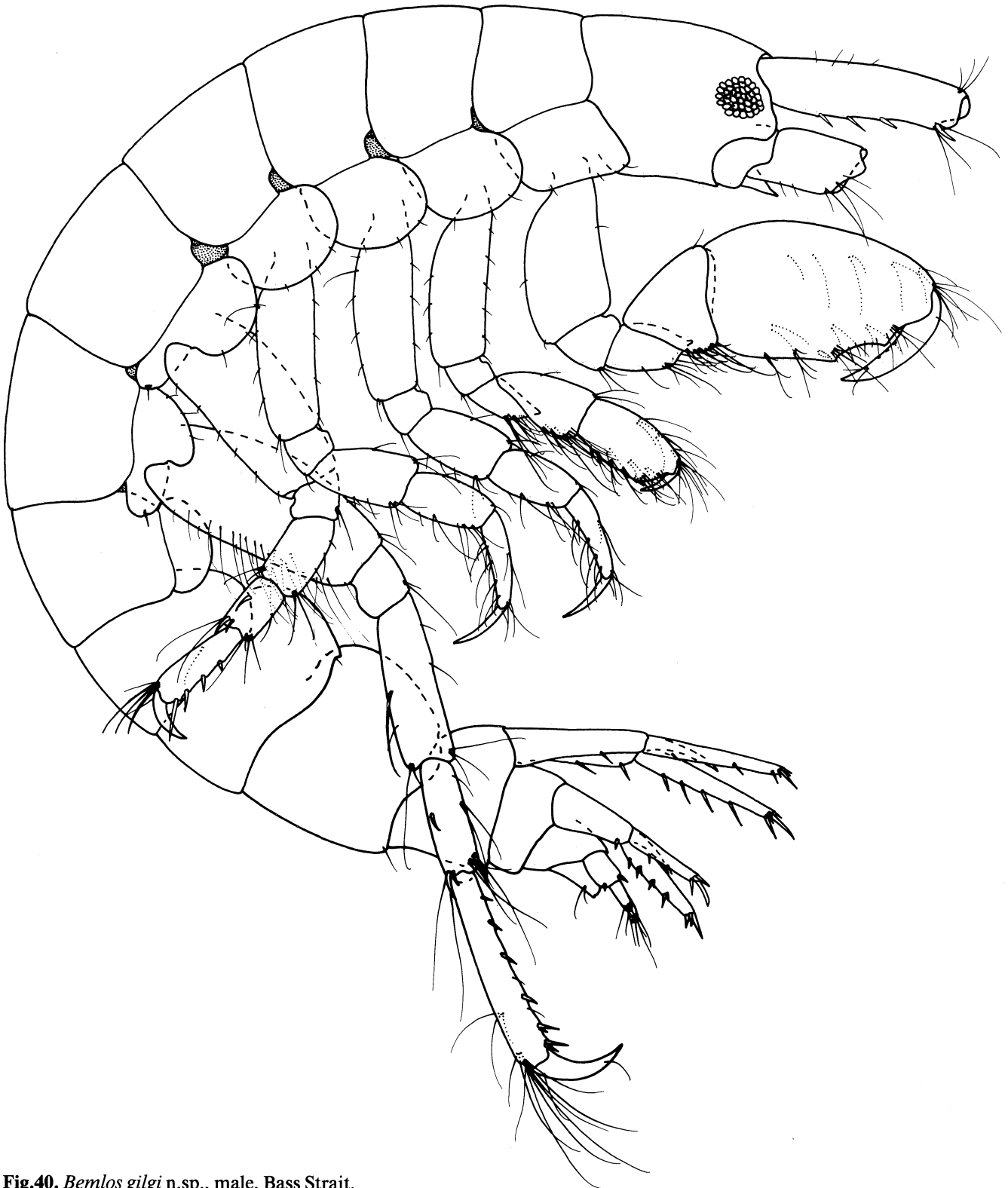


Fig.40. *Bemlos gilgi* n.sp., male, Bass Strait.



gnathopod 1 basis only moderately stout; carpus about one and one half times as long as broad; propodus one and one half times length of carpus, subovoid, palm very oblique, evenly continuous with posterior margin but delimited by spine; dactylus

relatively long, opposable to spine. Male gnathopod 2 basis anterior margin straight, posterior margin moderately convex; carpus only a little shorter than propodus; propodus widest medially, palm oblique; dactylus fitting palm. Female gnathopod 2 not

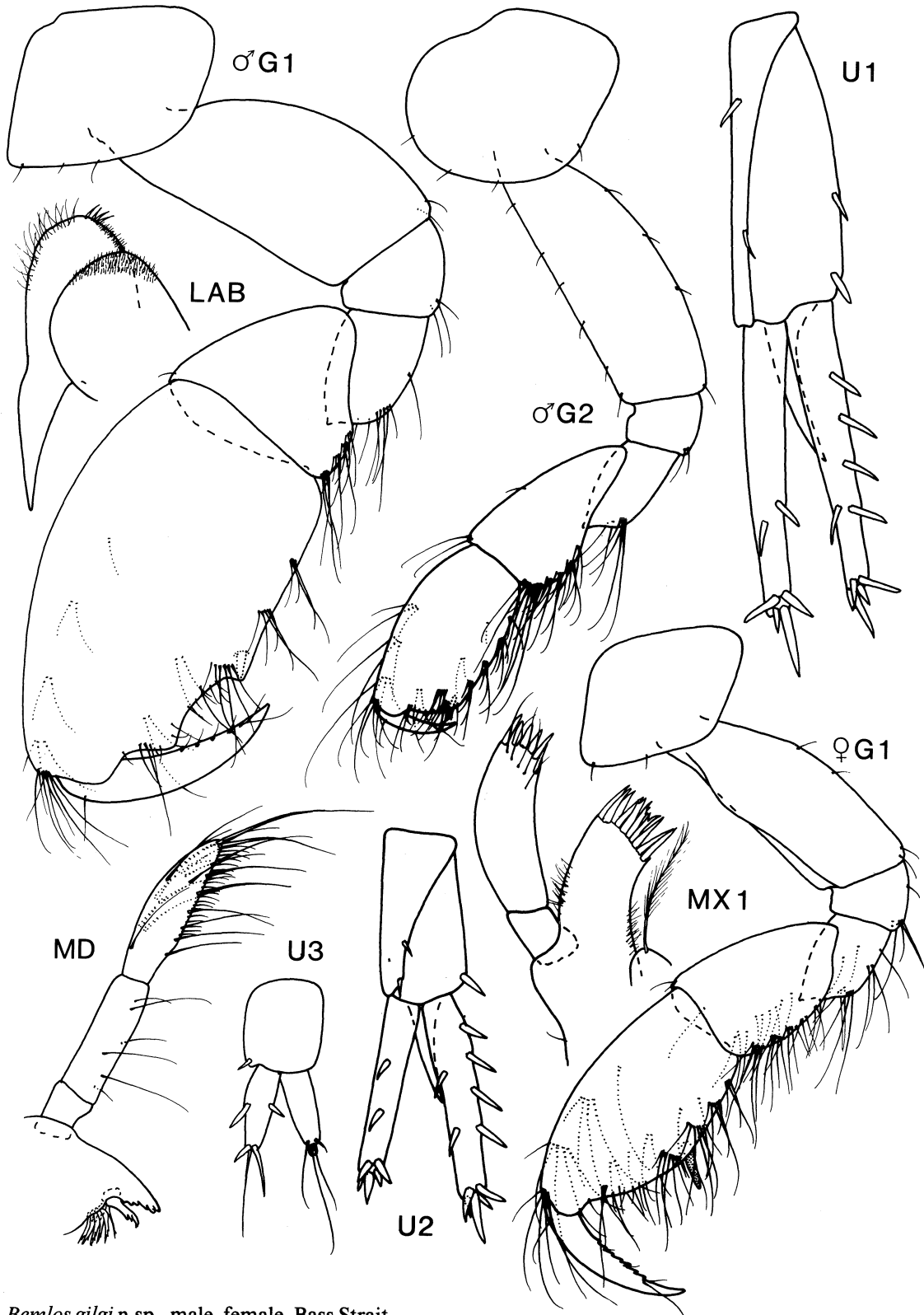


Fig.41. *Bemlos gilgi* n.sp., male, female, Bass Strait.

significantly different from that of male. Pereopods 3 and 4 dactylus two thirds length of propodus. Pereopods 5 and 6 in the length ratio 3 : 5, pereopod 7 missing. Epimera 1-3 with small posterodistal tooth. Uropod 1 peduncle with inter-ramal tooth, half length of peduncle; rami subequal with each other and with peduncle. Uropod 2 peduncle with inter-ramal tooth two thirds length of peduncle; inner ramus longer than outer and longer than peduncle. Uropod 3 rami subequal shorter than peduncle; inner ramus with marginal spines; outer ramus lacking marginal spines or setae, but with small second article bearing long setae.

**Remarks.** The shape of male gnathopod 1 distinguishes this species from all other known Australian *Bemlos*, but is superficially similar to *Globosolembos excavatus* and *G. lunatus*. However, both of those species have a strongly setose male gnathopod 2.

**Habitat.** 73-115 m over muddy sand.

**Distribution.** Bass Strait.

**Etymology.** Latinised aboriginal.

*Protolembos* Myers

*Protolembos* Myers, 1988: 190.

**Type species.** *Lembos chiltoni* Myers, 1981.

**Included species.** *P. murrarum* n.sp., *P. drummondiae* n.sp., *P. yarranus* n.sp., *P. arinyas* n.sp., *P. kidoli* (Myers), *P. clematis* (Moore), *P. verrucularum* (Moore).

**Diagnosis.** Mandible palp article 2 shorter than, but more than two thirds length of article 3, moderately to strongly setiferous, article 3 falcate, elongate, marginal setae variable but with understory of short setae, left molar with rounded plates. Maxilla 1 outer plate with 10 spines. Maxilliped basis with strong flange on anterior margin. Male pereon always lacking sternal processes. Gnathopod 1 enlarged in male, sexually dimorphic. Gnathopod 2 of similar size in both sexes. but sexually dimorphic. Female palm always sinuous. Pereopods 5 and 6 propodus posterior margin with several spines. Uropod 3 inner ramus spinous, outer ramus with small second article and with marginal setae + spines.

**Remarks.** *Protolembos* resembles other plesiomorphic genera such as *Archaeobemlos* and *Arctolembos* but differs from both in the rounded molar plates and flanged maxilliped basis. In addition, it differs from the former in the sexually dimorphic gnathopoda and in lacking a setal row on the anterodistal margin of maxilla palp article 2, and from the latter in the unmodified head lobes, normal labium and unelongate maxilliped palp.

**Key to male *Protolembos***

- 1. Gnathopod 2 propodus short, palm excavate, forming a flat platform (Fig. 46) ..... *P. drummondiae*
- Gnathopod 2 propodus elongate, palm variable, but never as above ..... 2
- 2. Gnathopod 1 with palmar defining tooth and with medial tooth on posterior margin ..... 3
- Gnathopod 1 with palmar defining tooth only ..... 4
- 3. Gnathopod 2 propodus with acute palmar tooth ..... (*P. kidoli*)
- Gnathopod 2 propodus lacking palmar tooth ..... *P. murrarum*
- 4. Pereon segments 1-4 with sternal processes ..... *P. clematis*
- Pereon segments lacking sternal processes ..... 5
- 5. Gnathopod 1 basis, ischium and merus with long setae ..... 6
- Gnathopod 1 basis, ischium and merus with short setae only ..... *P. verrucularum*
- 6. Gnathopod 2 carpus and propodus anterior margin with dense clothing of long setae, propodus palm without defining tooth ..... 7
- Gnathopod 2 carpus and propodus anterior margin only moderately setiferous, propodus with short defining tooth ..... *P. chiltoni*
- 7. Gnathopod 1 carpus anterior margin with dense brush of long setae ..... *P. arinyas*
- Gnathopod 1 carpus anterior margin with dense brush of short setae ..... *P. yarranus*

Only one species of *Protolembos* is known from outside Australian waters, it is included in the above key in parentheses.

*Protolembos chiltoni* (Myers)

*Lembos chiltoni* Myers, 1981: 104, figs 216–219.  
*Protolembos chiltoni* Myers, 1988: 191.

**Material examined.** Tasmania: HOLOTYPE: 1 male, D'Entrecasteaux Channel, Hobart, east of Middleton, euhaline, 5 Oct 1973, T.M. Walker, AM P37850. PARATYPES: 1 female, type locality, AM P37851; 1 male,

D'Entrecasteaux Channel, 200 m offshore of Gallagher's Point, in *Heterozostera tasmanica*, euhaline, 11 Apr 1975, T.M. Walker; 3 females, D'Entrecasteaux Channel, 200 m east of Kettering Point, 11 Apr, 1975, T.M. Walker. Victoria: 2 males, 7 females, Crib Point, Westernport, 38°21.65'S 145°15.21'E, 2 m, sandy mud, 13 Apr 1965, NMV J14040.

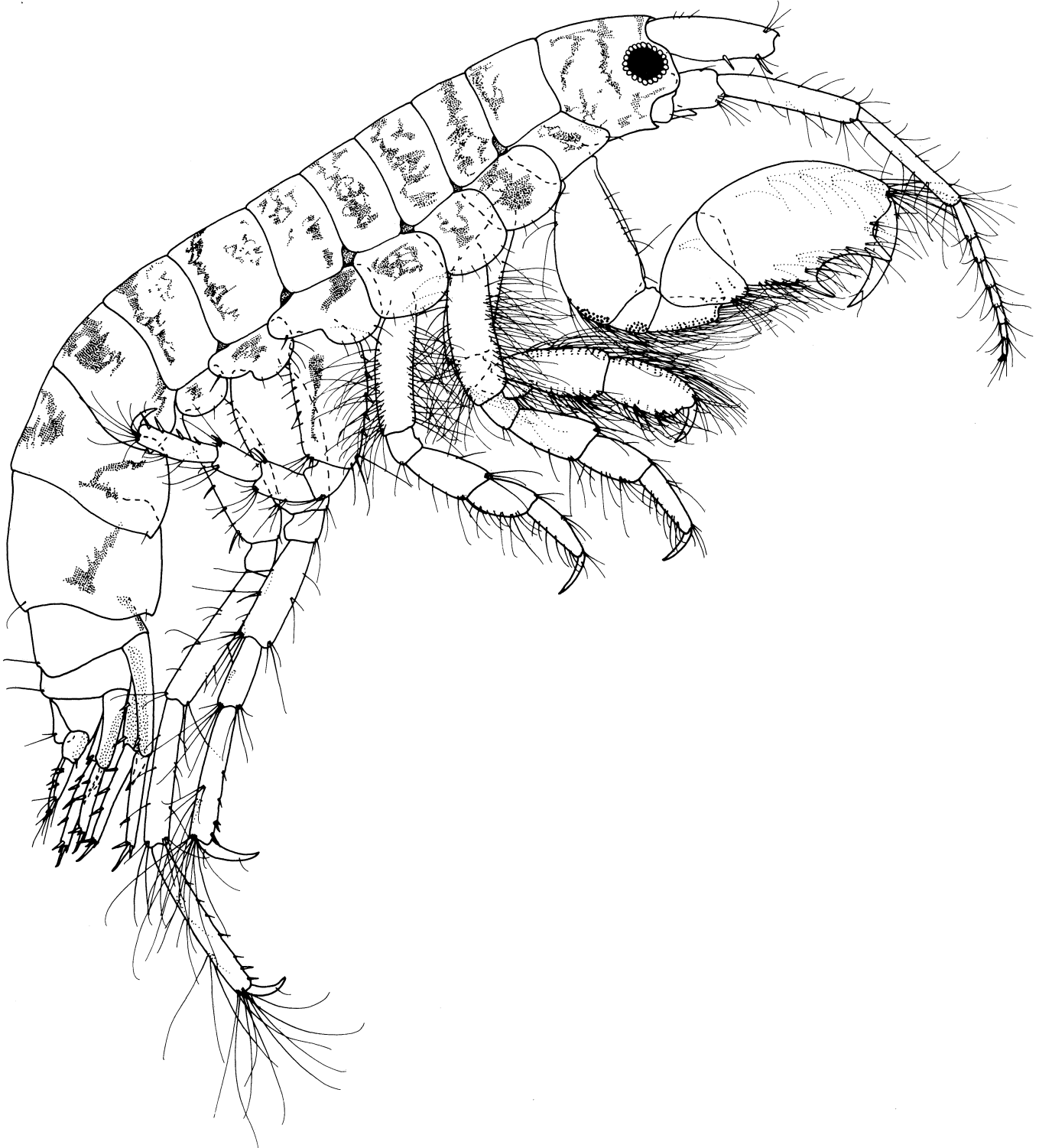


Fig.42. *Protolembos murrarum* n.sp., male, Jervis Bay.

**Remarks.** This material was fully figured by Myers (1981).

**Habitat.** Presumed to be phanerogammes and algae.

**Distribution.** Tasmania and Victoria.

*Protolembos murrarum* n.sp.

Figs 42–44

**Type material.** HOLOTYPE: male, 5.0 mm. Off Plantation Point, Jervis Bay, NSW, weed, 21 Feb 1982, P.B. Berents, AM P37436. PARATYPES: 2 males, 4 females, + 7 slides, type locality, AM P37437.

**Additional material.** 2 males, 3 females, off Plantation Point, Jervis Bay, NSW, *Liagora* washings, 3 m, 25 Sept

1982, P.B. Berents, AM P37438; 3 females, near Moona Moona Creek, Jervis Bay, NSW, with ascidians, 5 m, 18 June 1982, P.B. Berents, AM P37439.

**Description.** Body (in alcohol) irregularly and strongly mottled with dark brown pigment which extends onto coxae, epimera, pereopod bases and uropod peduncles. Male pereon segments without sternal processes. Head anteroventral margin moderately produced, acute; eye large. Labium outer plate distal margin with about 8 spines. Mandible palp article ratios 2 : 5 : 6, article 3 posterior margin weakly concave and setiferous over two thirds of its length, marginal setae of 2 distinct lengths. Maxilla 1 palp article 2 with 7 distal spines. Antenna 1 missing in all specimens. Antenna 2 peduncular article 4

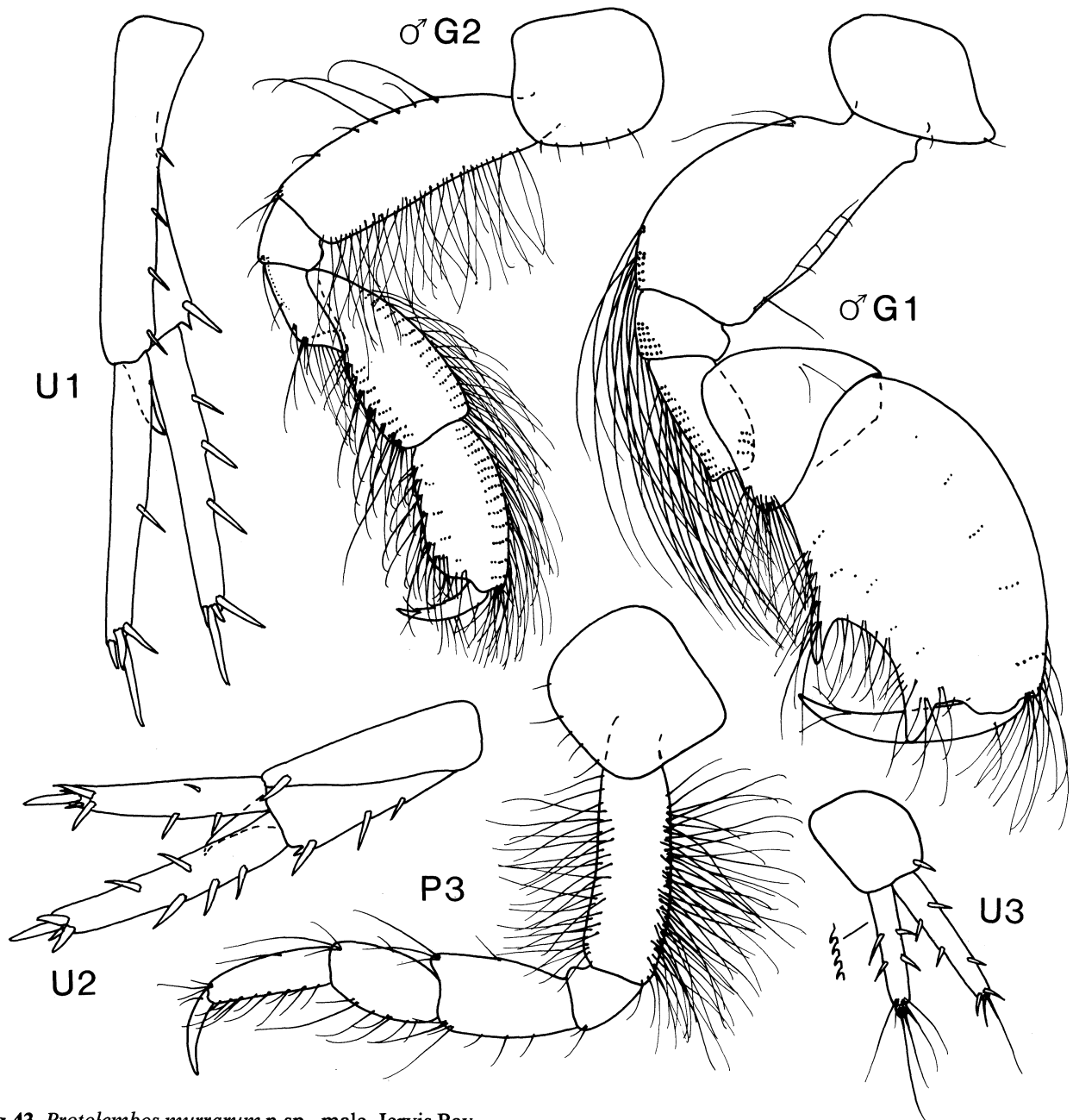


Fig.43. *Protolembos murrarum* n.sp., male, Jervis Bay.

slightly longer than article 5; flagellum slender, a little longer than peduncular articles 5 with about 7 articles. Male gnathopod 1 coxa anterodistal margin produced, rounded; basis swollen, anterior margin irregularly convex; basis, ischium and merus posterior margins each with a brush of very long setae; merus subrectangular; carpus short, cup shaped; propodus two and one half times length of carpus, posterior margin with a strong medial and a strong distal tooth separated by a concave excavation, palm short, delimited by distal tooth;

dactylus elongate, greatly overlapping palm and opposable to medial tooth. Female gnathopod 1 carpus subovoid; propodus distinctly longer than carpus, palm oblique, defined by a rounded tooth, proximal to which is a spine; dactylus overlapping palm. Male gnathopod 2 basis anterior margin straight, heavily setose; carpus and propodus slender; carpus the longer, both podomeres with heavily setose anterior and posterior margins, palm oblique; dactylus overlapping palm. Female gnathopod 2 propodus distinctly longer than carpus;

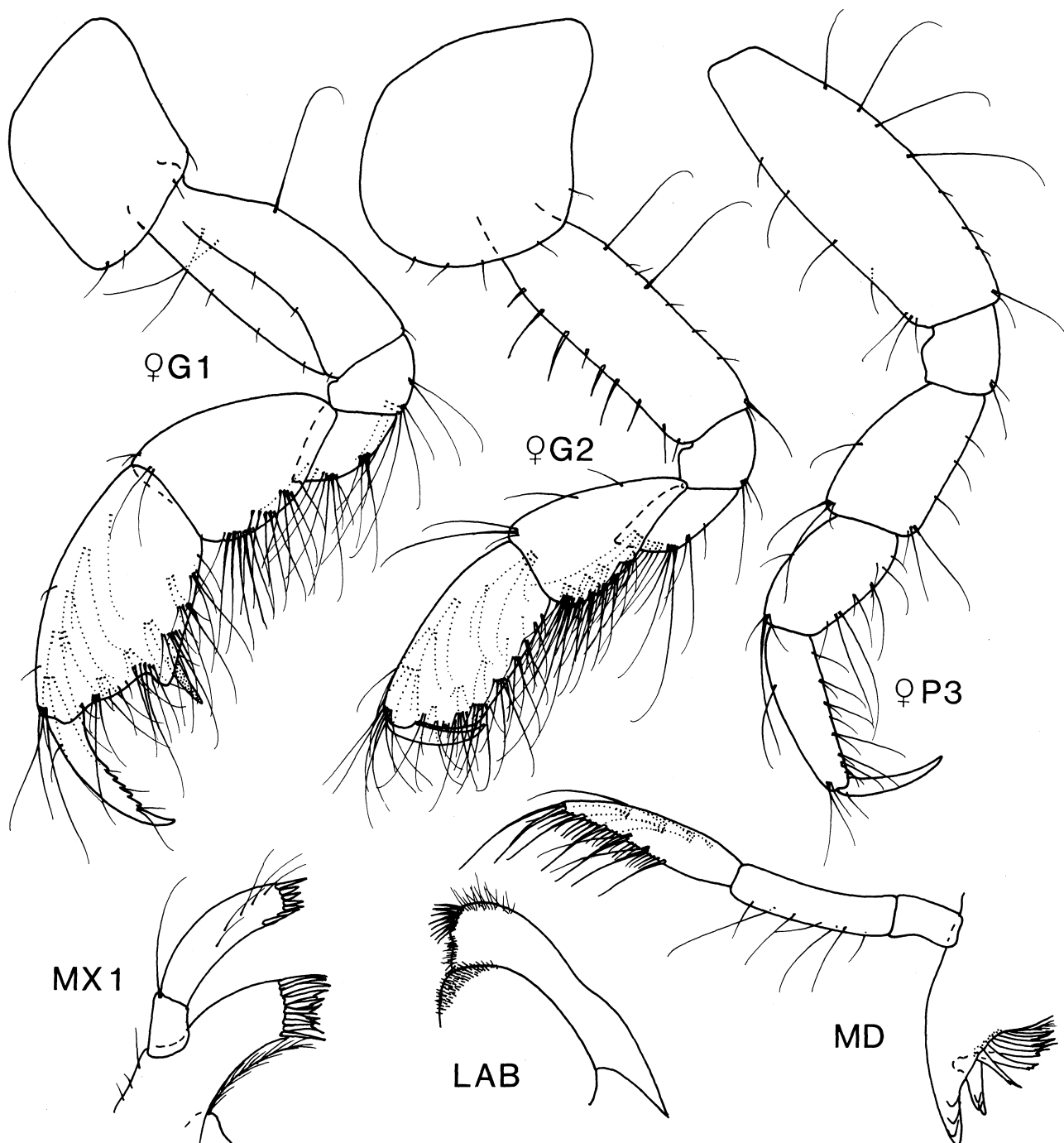


Fig.44. *Protolembos murrarum* n.sp., male, female, Jervis Bay.

anterior margins of basis, carpus and propodus only moderately setiferous, palm oblique; dactylus fitting palm. Male pereopod 3–4 basis heavily setose on anterior and posterior margins; dactylus two thirds length of propodus. Female pereopods 3–4 basis weakly setiferous. Pereopods 5–7 in the length ratios 2 : 3 : 4; pereopod 7 less than two thirds body length. Epimera 1–3 with small posterodistal tooth. Uropod 1 peduncle with inter-ramal process less than one quarter length of peduncle; rami subequal and shorter than peduncle. Uropod 2 peduncle with inter-ramal process over one third length of peduncle; inner ramus stouter and longer than outer ramus and longer than peduncle. Uropod 3 rami slender, margins minutely denticulate; inner ramus longer than outer and one and one half times length of peduncle; outer ramus with small second article and very long terminal setae.

**Remarks.** This species is closely related to *P. kidoli* (Myers). It differs in the more linear basis and simple palm of the male gnathopod 2, in the presence of setal brushes on the basis, ischium and merus of the male gnathopod 1, in the setose basis of the male pereopods 3 and 4 and in the shorter pereopod 7 as well as in the shape and chaetotaxy of the mandible palp. The minute denticulation of the margins of the uropod 3 rami appears to be unique to these two species. It also resembles *P. drummondiae*. For differences see remarks under that species.

**Habitat.** Among algae and epizooites in shallow water.

**Distribution.** Known only from the type locality.

**Etymology.** Latinised aboriginal.

***Protolembos drummondiae* n.sp.**

Figs 45–47

**Type material.** HOLOTYPE: male, 10.0 mm. Westernport, Vic., 38°21.30'S 145°22.83'E, 6m, 26 Nov 1973, NMV J14038. PARATYPES: 3 males, 3 females, + 6 slides, type locality, NMV J13644.

**Additional material.** Westernport, Victoria: 1 male, 1 female, 38°14.47'S 145°21.86'E, mud, intertidal, 7 Jan 1974, NMV J13691; 5 males, 3 females, 38°15.31'S 145°22.38'E, sandy-clay, intertidal, 8 Jan 1974, NMV J13643; 6 males, 1 female, 38°18.56'S 145°22.52'E, sand, intertidal, 9 Jan 1974, NMV J13640; 1 female, 38°16.12'S 145°24.52'E, sand, 12 m, 9 Jan 1974, NMV J13645; 1 female, 38°28.81'S 145°25.10'E, clayey-sand, intertidal, 24 Jan 1974, NMV J13638; 1 male, 1 female, 38°22.90'S 145°31.83'E, sand-silt-clay, intertidal, 24 Jan 1974, NMV J13642; 2 males, 2 females, 38°21.65'S 145°31.69'E, intertidal, 29 Jan 1974, NMV J13639; 1 female, 38°27.53'S 145°08.59'E, sand, 18 m, 25 Nov 1974, NMV J13637. Crib Point, Victoria: 1 female, 38°19.95'S 145°15.13'E, mud and *Zostera*, 2 m, 16 Mar 1965, NMV J13787.

**Description.** Body (in alcohol) uniformly but irregularly mottled in dark brown, head with reticulate pattern. Male pereon segments without sternal processes. Head anteroventral margin

unproduced. Labium outer plate distal margin with about 10 spines. Mandible palp article ratios 3 : 7 : 8, article 3 elongate, falcate, posterior margin with setae of 2 distinct lengths. Maxilla 1 palp article 2 with 7 distal spines. Maxilliped basis with flange on anterior margin, ischium with small protrusion on anterior margin. Antenna 1 missing. Antenna 2 peduncular article 4 with large ventral flange, broader proximally than distally; article 5 slender, but subequal in length with peduncular article 4; flagellum subequal with peduncular article 5, with about 12 articles. Male gnathopod 1 coxa subquadrangular, anterior margin straight or weakly concave, not markedly produced; basis only moderately broad, anterior distal margin produced into a small rounded tooth; carpus short cup shaped; propodus enlarged, three and one half times length of carpus, palm short, transverse, separated from long, slender, acute tooth by a deep, triangular, round bottomed excavation; posterior margin of ischium, carpus and propodus densely setose, anterior margin of carpus and propodus weakly setiferous; dactylus slender, elongate, greatly overlapping palm. Female gnathopod 1 carpus three quarters length of propodus; palm of propodus oblique, sinuous; dactylus slender, overlapping palm. Male gnathopod 2 basis anterior margin sinuous, minutely crenulate, posterior margin weakly convex; carpus stout; propodus broader but shorter than carpus, true palm obsolete, replaced by straight, subdistal shelf, delimited by a spine; posterior margin of ischium, carpus and propodus and distal margin of propodus densely setose; dactylus slender, fitting false palm. Female gnathopod 2 basis slender; carpus and propodus slender, subequal, palm oblique, evenly convex; dactylus fitting palm. Pereopods 3 and 4 dactylus about half length of propodus. Pereopods 5 and 6 in the length ratio 2 : 3. Pereopod 7 missing. Epimera 1–3 each with a distoventral tooth. Uropod 1 peduncle with inter-ramal tooth one third length of peduncle; rami slender, subequal, longer than peduncle. Uropod 2 peduncle with inter-ramal tooth more than one third length of peduncle; rami slender; inner ramus longer than outer and longer than peduncle. Uropod 3 rami elongate; inner ramus with marginal spines; outer ramus with spines on inner margin and setae on outer margin and with small second article; both rami with long terminal setae; inner ramus over one and one half times length of peduncle.

**Remarks.** This species appears to be most closely related to *P. murrarum*, but differs in the peculiarly flanged article 4 of the male antenna 2, in the excavated palm of the male gnathopod 2, in the poorly setiferous basis of the male pereopods 3 and 4, in the flanged basis of the maxilliped and in the longer uropod 3 rami. It also resembles *P. kidoli* from East Africa but in that species the tooth on the propodus of the male gnathopod 1 is more proximal and the entire appendage less setose and male

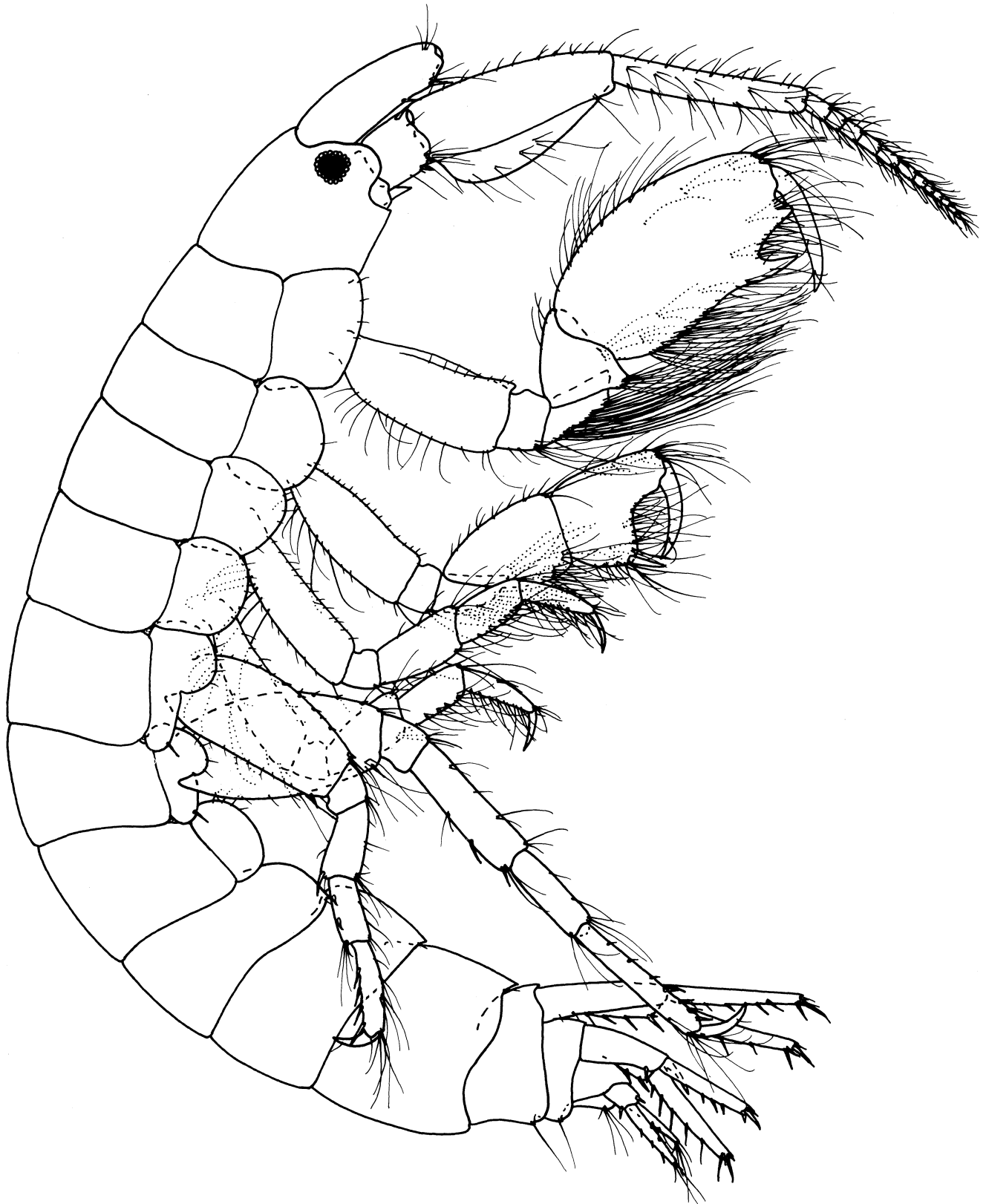


Fig.45. *Protolembos drummondiae* n.sp. male, Westernport.

gnathopod 2 has a flask-shaped basis, strongly setose anterior margin to the carpus and slender propodus with an acute posterodistal tooth.

**Habitat.** On muds and sands, sometimes with *Zostera* from the intertidal to 18 m depth.

**Distribution.** Known only from Victoria.

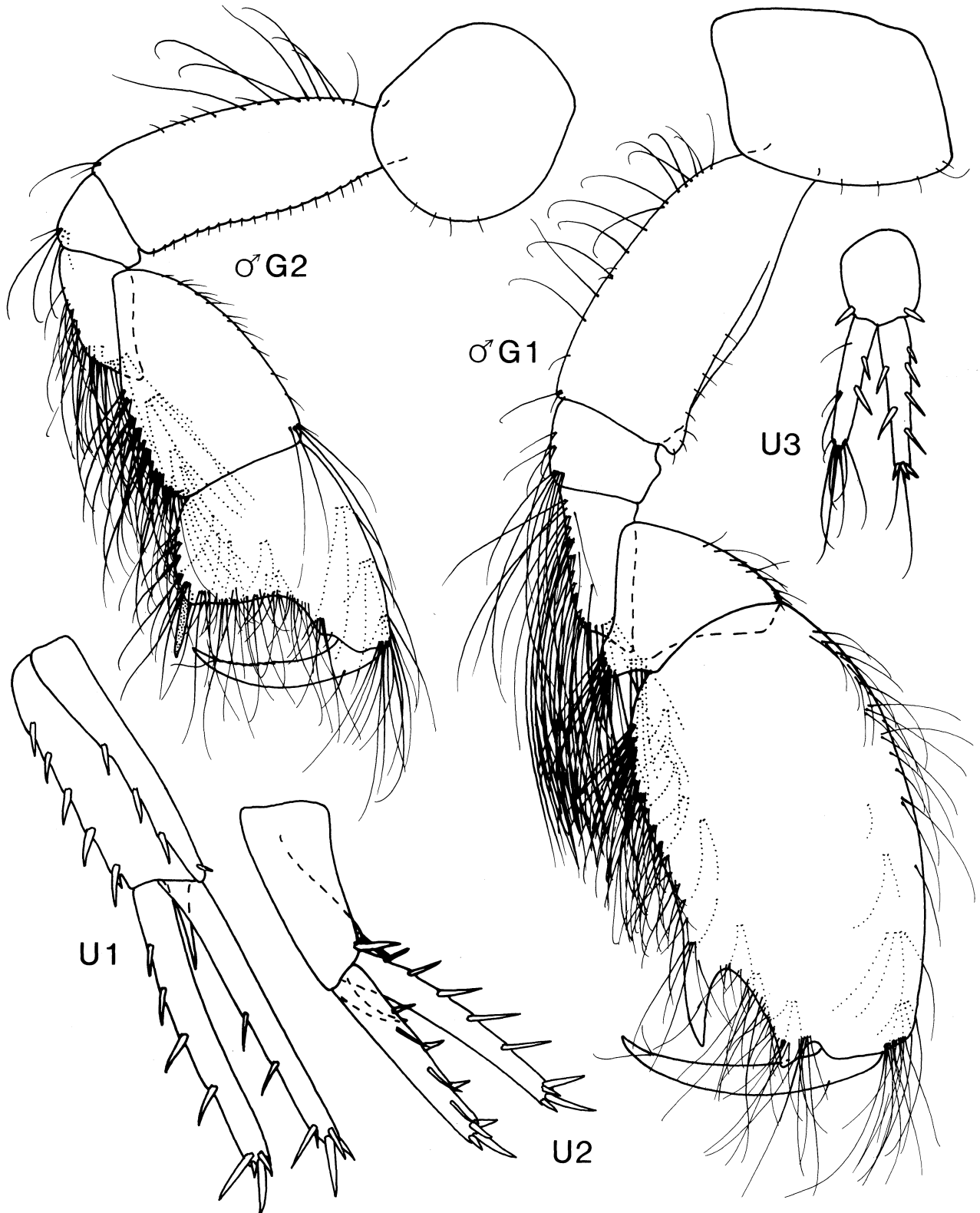


Fig.46. *Protolembos drummondiae* n.sp. male, Westernport.



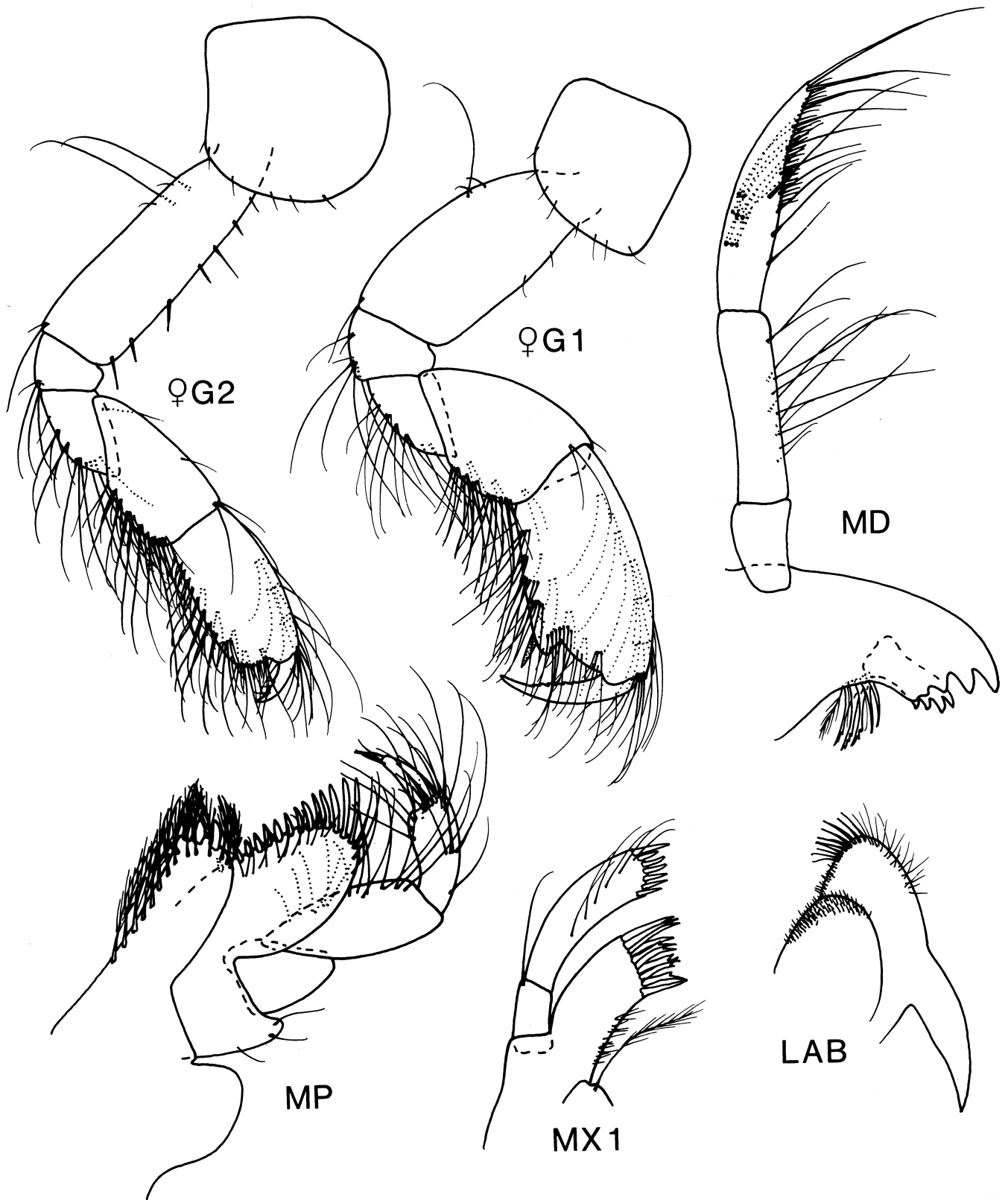


Fig.47. *Protolembos drummondiae* n.sp. female, Westernport.

**Etymology.** In honour of Margaret M. Drummond, Museum of Victoria, for her fine works on Australian Amphipoda.

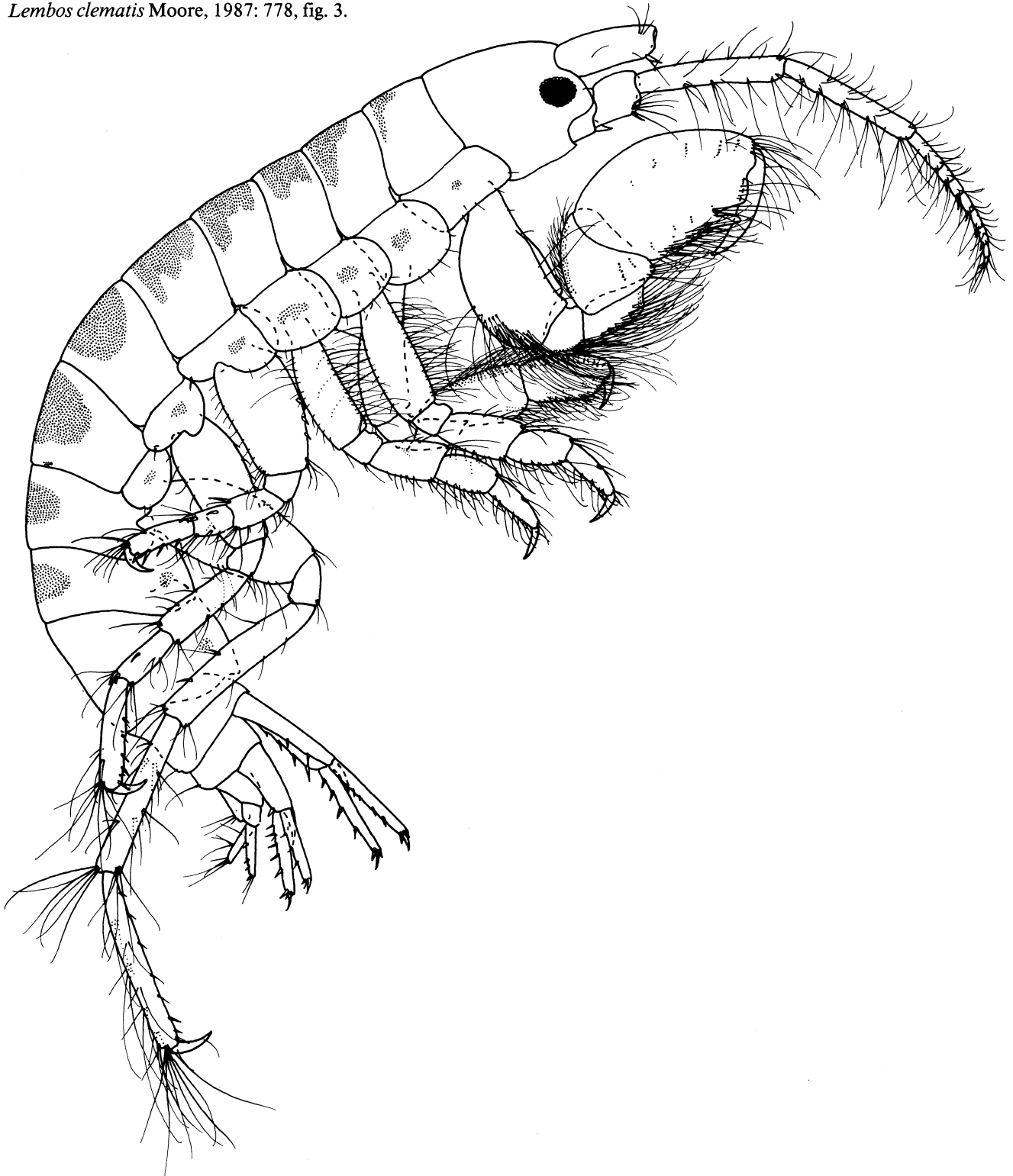
***Protolembos clematis* (Moore)**

*Lembos clematis* Moore, 1987: 778, fig. 3.

**Remarks.** This species is well figured by Moore (1987).

**Habitat.** In holdfasts of *Macrocystis pyrifera*.

**Distribution.** Tasmania.



**Fig.48.** *Protolembos yaranus* n.sp., male, Kalbarri.

***Protolembos yaranus* n.sp.**

Figs 48–50

**Type material.** HOLOTYPE: male, 5.2 mm, Red Bluff, Kalbarri, WA, 27°42'S 114°09'E, mixed algae and sediment, 3–4 m, 10 Jan 1984, R.T. Springthorpe, AM P37440. PARATYPES: 4 males + 1 slide, AM P37441, 6 females + 2 slides, AM P38617, type locality.

**Additional material.** Western Australia. 1 male, Vancouver Peninsula, near Mistaken Island, Albany, 35°04'S 117°56'E, sponges, 2 m, 13 Dec 1983, J.K. Lowry, AM P37442.

**Description.** Body (in alcohol) with dorsal bands of dark brown pigment on pereon segments 1–7 and pleon segments 1–2. Coxae 1–7 and epimera 1–3 with small central patches of similar pigment. Male

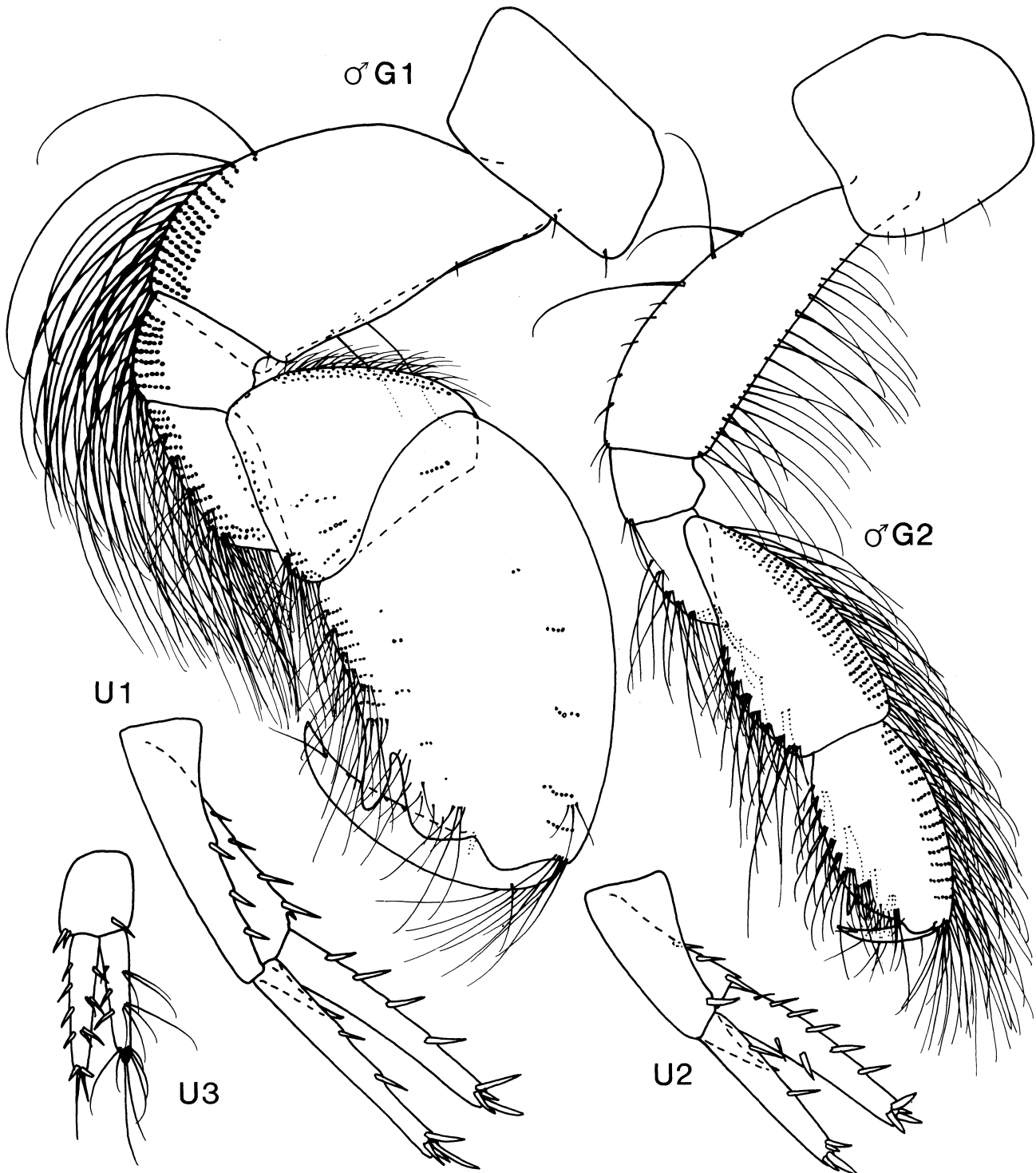


Fig.49. *Protolembos yaranus* n.sp., male, Kalbarri.

pereon segments without sternal processes. Head anteroventral margin unproduced. Labium outer plate distal margin with 8 spines. Mandible palp article ratios 3 : 6 : 8, article 3 elongate, weakly falcate, posterior margin with setae of 2 distinct lengths. Maxilla 1 palp article 2 with 8 distal spines. Maxilliped basis with flange on anterior margin, ischium with small protrusion on anterior margin. Antenna 1 missing. Antenna 2 peduncular articles 4 and 5 subequal in length; flagellum subequal in length with peduncular article 5 with about 9 articles. Male gnathopod 1 coxa subquadrangular, anterior margin straight, anterodistal margin a rounded right angle; basis greatly expanded, anterior margin weakly convex, posterior margin strongly convex; carpus short, cup shaped; propodus over twice length of carpus, broadest medio-proximally, palm short, oblique, separated from thumb-like posterodistal

tooth by deep, narrow, v-shaped excavation; dactylus elongate greatly overlapping posterodistal tooth; posterior proximal margin of basis and posterior margins of ischium and merus with dense brush of long setae, anterior margin of carpus with dense brush of relatively short setae. Female gnathopod 1 basis stout; propodus one and a half times length of carpus, parallel sided, palm sinuous, defined by triangular tooth and a spine; dactylus slender, overlapping tooth. Male gnathopod 2 basis anterior margin straight, with numerous long setae, posterior margin moderately convex; carpus : propodus ratio 5 : 4; propodus subovoid, palm oblique evenly continuous with posterior margin, but delimited by a spine; dactylus slender, scarcely overlapping palm; anterior margin of carpus and propodus densely setose. Female gnathopod 2 carpus and propodus subequal; palm oblique; dactylus fitting palm.

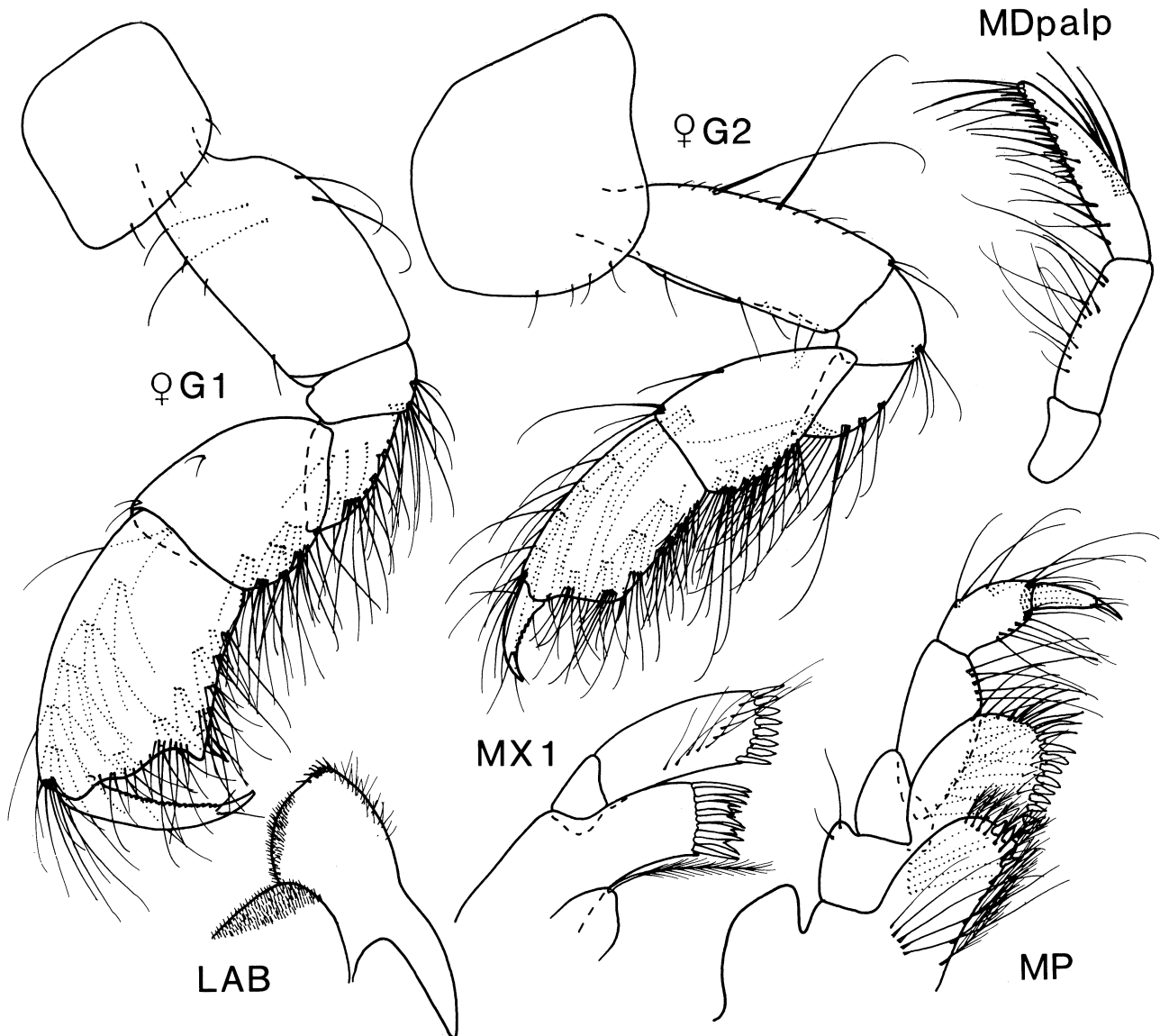


Fig.50. *Protolembos yaranus* n.sp., male, female, Kalbarri.

Pereopods 3 and 4 with anterior margin of basis strongly setose; dactylus half length of propodus. Pereopods 5–7 in the length ratio 4 : 5 : 9; pereopod 7 two thirds body length. Epimera 1–3 each with a distoventral tooth. Uropod 1 peduncle with interramal tooth one third length of peduncle; rami slender, subequal, scarcely shorter than peduncle. Uropod 2 peduncle with interramal tooth less than half length of peduncle; rami stout, inner ramus longer than outer and longer than peduncle. Uropod 3 rami elongate over one and a half times length of peduncle; inner ramus with marginal spines; outer ramus with spines on inner margin and setae on outer margin and with small second article bearing a pair of long setae.

**Remarks.** *Protolembos yaranus* is a sibling species of *P. arinyas* from Victoria. It differs from the latter species in the more slender antenna 2 with more flagellar articles and in the different male gnathopod 1 in which the palmar tooth is weakly divergent, the relatively short setae on the anterior margin of the carpus, and the sparse setae on the anterior margin of the propodus. In the male gnathopod 2 the palm is evenly convex, not sinuous as in *P. arinyas*.

**Habitat.** Epifaunal among algae and sponges in 2–4 m.

**Distribution.** Western Australia.

**Etymology.** Latinised aboriginal.

### *Protolembos arinyas* n.sp.

Figs 51–53

**Type material.** HOLOTYPE: male, 8.0 mm, Corner Inlet, Nooramunga, Vic., CIN Station 28E, Nov 1983, NMV J14037. PARATYPES: 2 males, 6 females, + 6 slides, type locality, NMV J12659.

**Additional material.** Westernport, Vic., 10 males, 16 females, 100 1 mm, 38°27.53'S 145°08.59'E, 18 m, sand, 25 Nov 1974, NMV J13666; 4 males, 9 females, 10 1 mm, 38°26.48'S 145°13.03'E, 23 m, sand, 25 Nov 1974, NMV J13667.

**Description.** Body (in alcohol) variably mottled in dark brown over much of the surface of the head, body coxae and antennal and uropod peduncles. Male pereon segments without sternal processes. Head anteroventral margin only moderately produced; eye relatively large. Labium outer plate distal margin with 9 simple spines and a compound coronate spine. Mandible palp article ratios 2 : 6 : 7 article 3 elongate, weakly falcate, posterior margin with setae of 2 distinct lengths. Maxilla 1 palp article 2 with 8 distal spines. Maxilliped basis with flange on anterior margin, ischium with small protrusion on anterior margin. Antenna 1 missing. Antenna 2 peduncular articles 4 and 5 subequal; flagellum shorter than peduncular article 5 with 5 stout articles. Male gnathopod 1 coxa subquadrangular, anterior margin straight, anterodistal margin rounded; basis expanded, flask shaped; carpus short

subtriangular; propodus one and a half times length of carpus, approximately parallel sided, palm short, oblique, separated from strong triangular tooth by a broad, v-shaped excavation; dactylus elongate, slightly overlapping tooth; posterior proximal margin of basis and posterior margins of ischium, merus, carpus and propodus with dense brush of very long setae, anterior margin of carpus and propodus with very long setae in profusion. Female gnathopod 1 basis stout; propodus one and a half times length of carpus, parallel sided, palm sinuous defined by a triangular tooth and a spine; dactylus slender, overlapping tooth. Male gnathopod 2 basis anterior margin straight, with numerous long setae, posterior margin quite strongly convex; carpus : propodus ratio 8 : 7, propodus broadening distally, palm sinuous, distinct from posterior margin and delimited by a spine; dactylus slender, scarcely overlapping palm; anterior margin of carpus and propodus densely setose. Female gnathopod 2 propodus longer than carpus, palm oblique; dactylus fitting palm. Pereopods 3 and 4 with anterior margin of basis strongly setose; dactylus over half length of propodus. Pereopods 5 and 6 in the length ratio 5 : 6; pereopod 7 missing. Epimeron 1 rounded; epimera 2–3 with strong distoventral tooth. Uropod 1 peduncle with inter-ramal tooth one third length of peduncle; rami slender, subequal, slightly longer than peduncle. Uropod 2 peduncle with inter-ramal tooth less than half length of peduncle; inner ramus longer than outer and longer than peduncle. Uropod 3 rami elongate; inner ramus one and a half times length of peduncle with marginal spines; outer ramus with spines on inner margin, setae on outer margin and with small second article bearing a pair of long setae.

**Remarks.** This species is closely related to *P. yaranus* n.sp. For distinguishing characters see under remarks for that species.

**Habitat.** On sandy bottoms in ? 18–23 m.

**Distribution.** Victoria.

**Etymology.** Latinised aboriginal.

### *Protolembos verrucularum* (Moore)

*Lembos verrucularum* Moore, 1987: 780, fig. 4.

**Remarks.** This species is well figured by Moore (1987).

**Habitat.** In holdfasts of *Macrocystis pyrifera*.

**Distribution.** Tasmania.

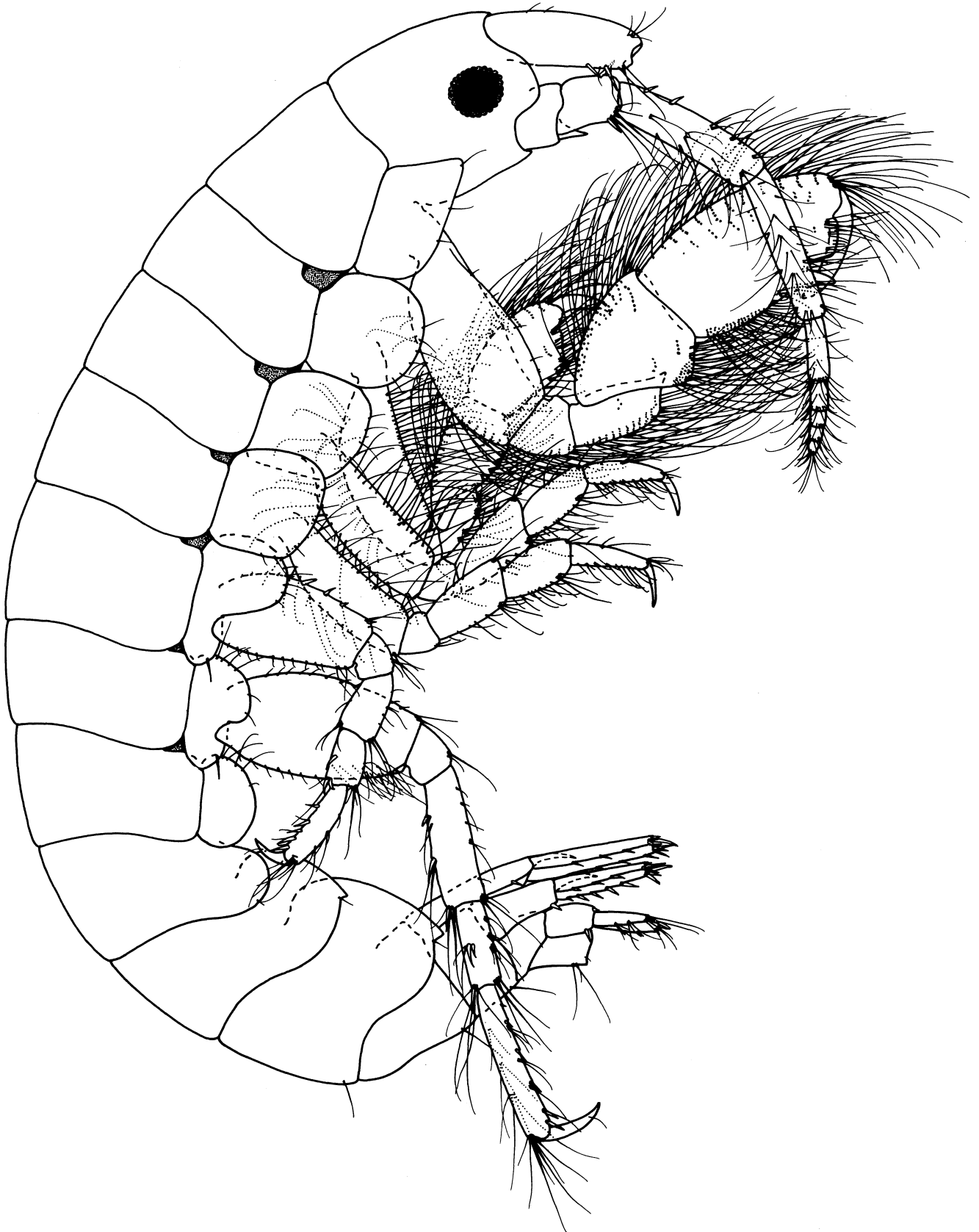
### *Globosolembos* Myers

*Globosolembos* Myers, 1985a: 341.

**Type species.** *Autonoe smithi* Holmes.

**Included species.** See Myers (1985a).

**Diagnosis.** Mandible palp article 2 shorter than article 3 moderately to strongly setiferous, article 3



**Fig.51.** *Protolembos arinyas* n.sp., male, Nooramunga.

generally falcate, elongate, rarely shortened subovoid, marginal setae variable, generally of more than 2 distinct lengths, left molar with well developed plates, the primary plate falcate. Gnathopod 1 equally or almost equally enlarged in both sexes with little sexual dimorphism, propodus larger than carpus tending to globose, lacking an intrapalmar excavation but sometimes with

excavation on palmar-posterior margin, defining process or tooth weak or absent. Gnathopod 2 generally setose in both sexes, sometimes less so in female. Pereopods 5 and 6 propodus posterior margin with setae but never spines, except for palmar locking spine. Uropod 3 outer ramus lacking a second article.

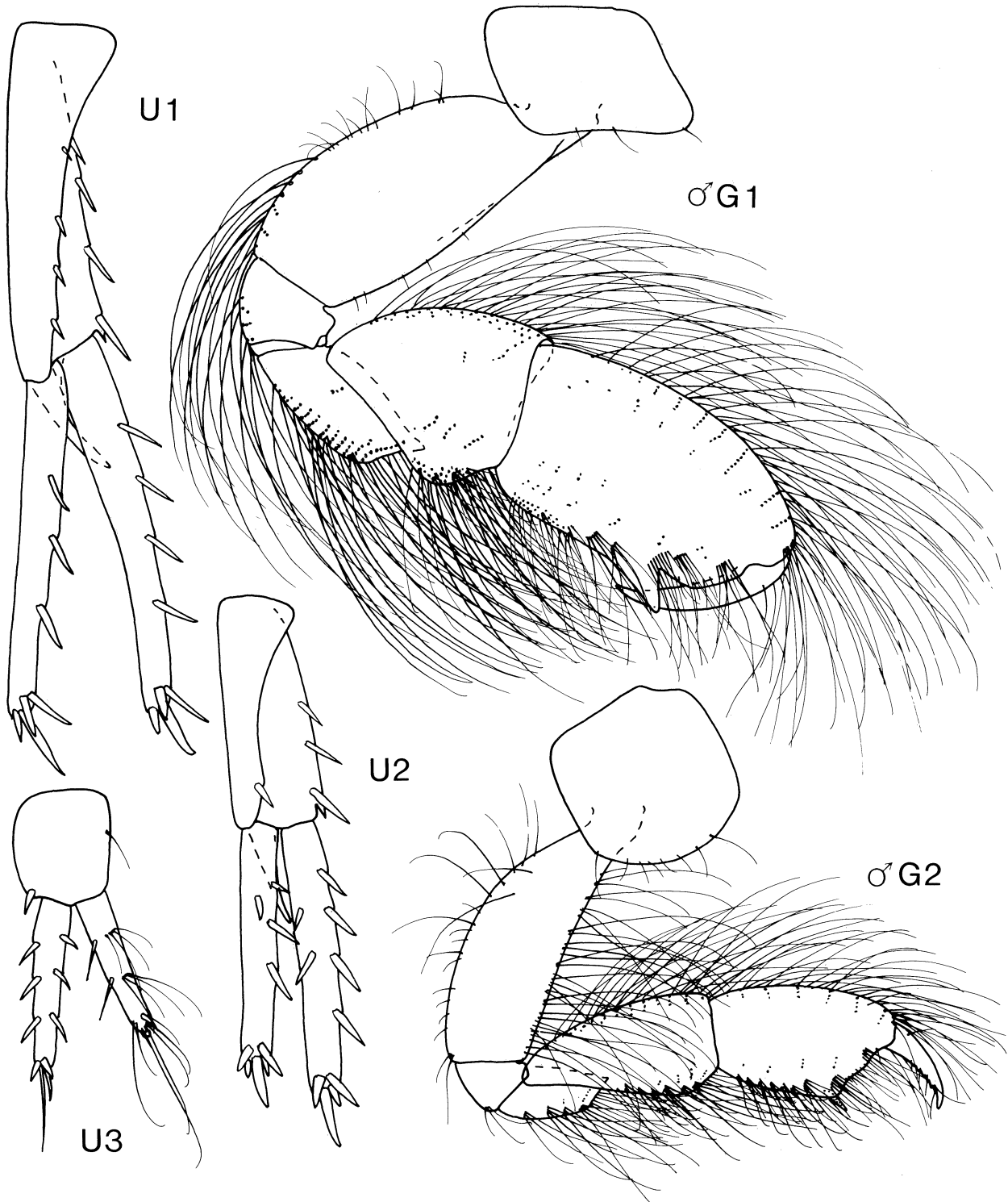


Fig.52. *Protolembos arinyas* n.sp., male, Nooramunga.

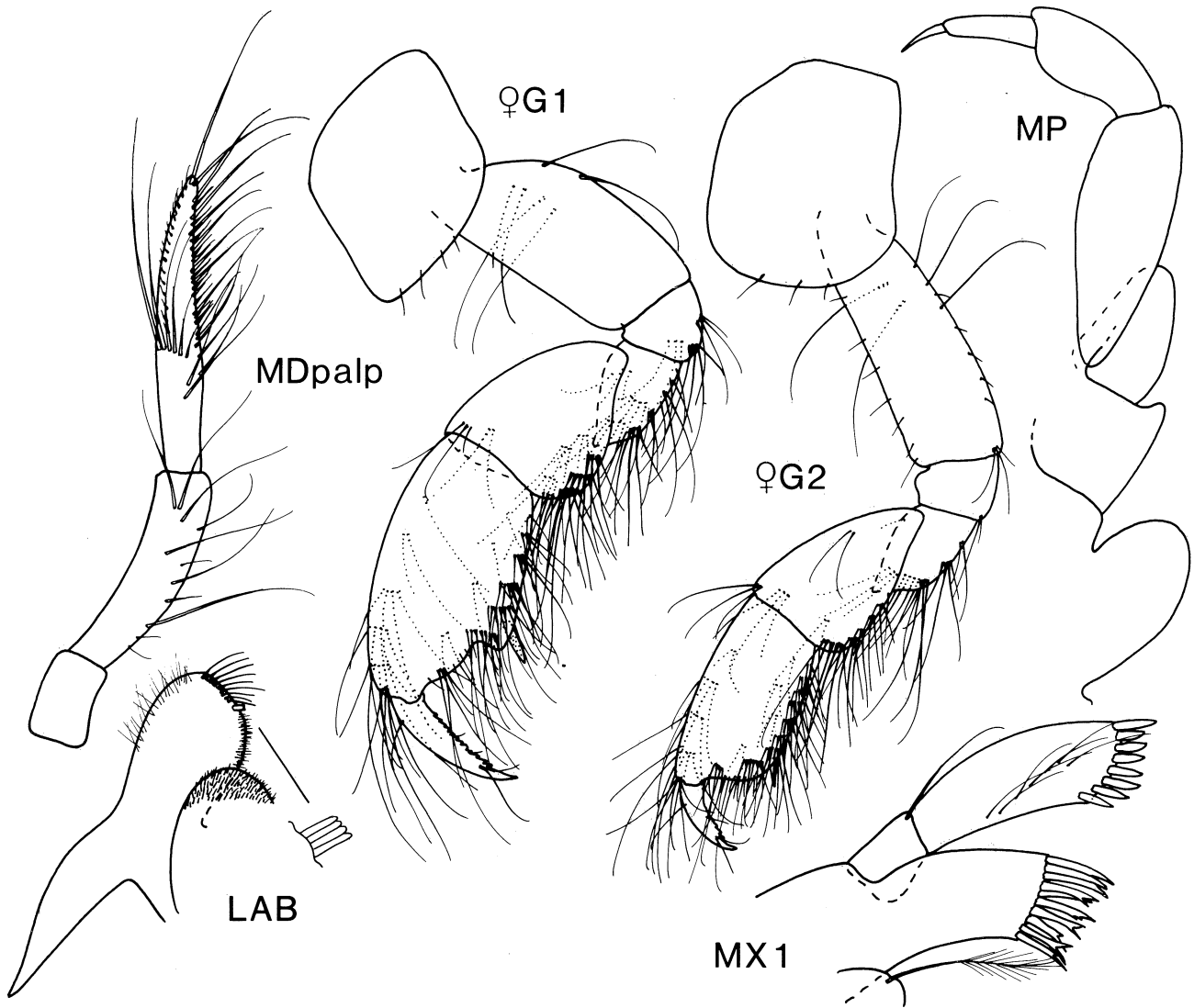


Fig.53. *Protolembos arinyas* n.sp., male, female, Nooramunga.

**Key to male *Globosolembos* of Australia**

- 1. Gnathopod 1 palm defined by an acute tooth ..... *G. ruffoi*  
 —Gnathopod 1 palm excavate, lacking a tooth ..... 2
- 2. Gnathopod 1 palm sharply angled at junction with excavation, uropods strongly spinous ..... *G. lunatus*  
 —Gnathopod 1 palm rounded at junction with excavation, uropods moderately spinous ..... *G. excavatus*

***Globosolembos ruffoi* (Myers)**

Fig. 54

*Lembos ruffoi* Myers, 1975b: 22, figs 68–75.  
*Lembos (Globosolembos) ruffoi* Myers, 1985a: 341.  
*Lembos* sp. Myers, 1985a: 365, fig. 235.  
*Globosolembos ruffoi* Myers, 1988: 189.

**Material examined.** Queensland: 1 male, 2 females, patch reefs off Palfrey Island near Lizard Island, rubble with filamentous reds and encrusting reds, 7.7 m, 10 Jan 1982, B. Kensley, AM P37443; 1 male, reef off North Point, Lizard Island, rubble and clumps of *Amphiroa* from reef crest, 3 m, 12 Jan 1982, B. Kensley, AM P37444; 3 females, reef off North Point, Lizard Island, coral rubble at



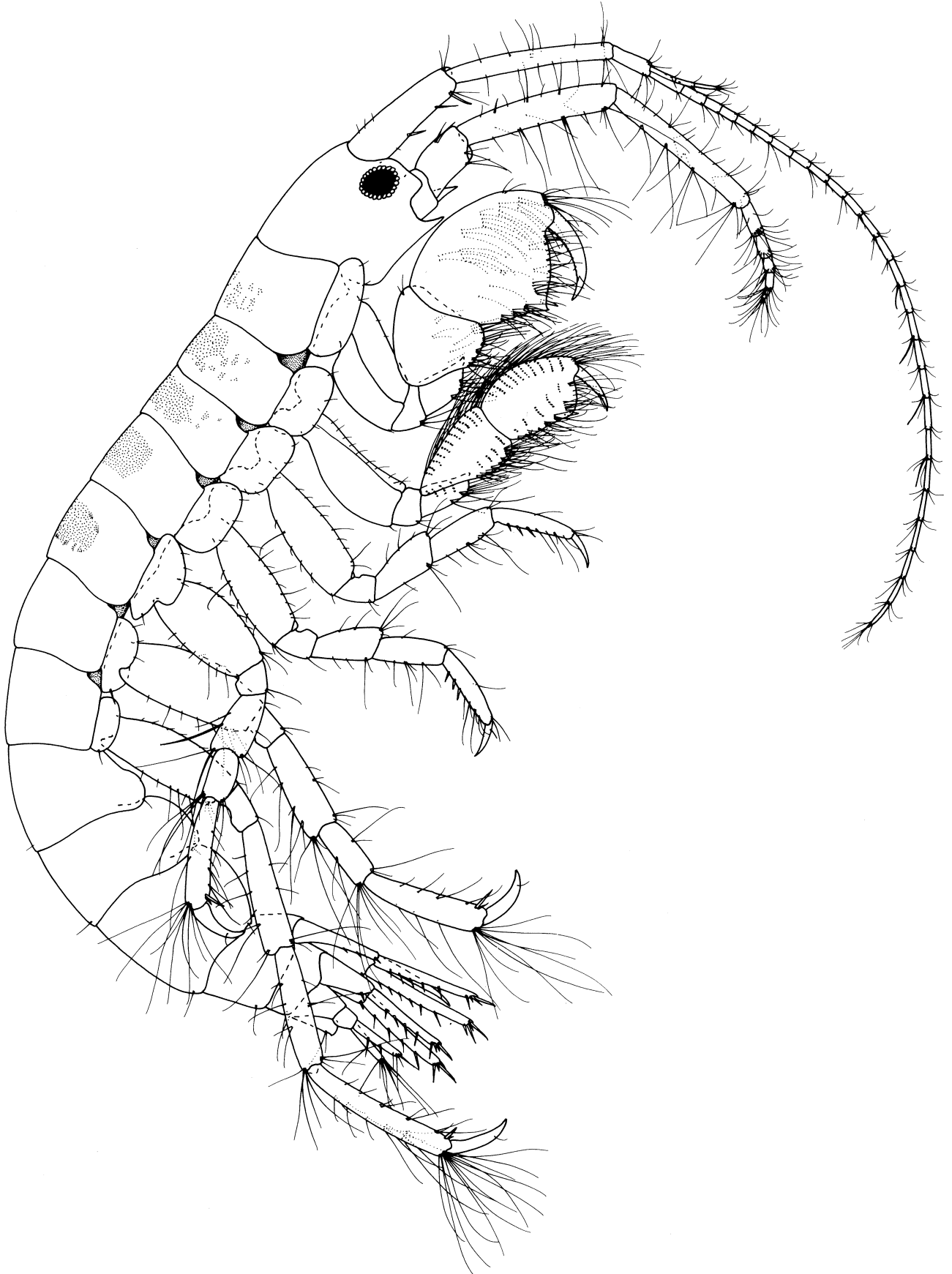


Fig. 54. *Globosolembos ruffoi* (Myers), male, Lizard Island.

base of cliff, some red algae, 18 m, 13 Jan 1982, B. Kensley, AM P37445; 2 males, between South Island and Palfrey Island, near Lizard Island, rubble with low algal turf from shallow ridge between islands, 2 m, 14 Jan 1982, B. Kensley, AM P37446; 2 males, 3 females, Lizard Island lagoon, rubble and low algal growth at base of patch reef, 10 m, 15 Jan 1982, AM P37447; 5 males, 5 females, 3 immature, + 3 slides, crest of patch reef in lagoon, rubble in algal turf from depression on crest, 2 m, 16 Jan 1982, B. Kensley, AM P37448; 4 males, 3 females, shelf between Palfrey and South Islands, coarse sand and sediment, 1 m, 19 Jan 1982, B. Kensley, AM P37449; 1 female, Sandbank Reef, north Queensland, 13°45'S 144°16'E, rubble washings from southwest end of reef, 8–10 m, 6 Dec 1982, I. Loch, AM P37450.

**Habitat.** Among coral rubble.

**Distribution.** East Africa, Queensland, ?India.

### *Globosolembos excavatus* (Myers)

*Lembos excavatus* Myers, 1975b: 32, figs 76–82;—Ledoyer, 1982: 218, figs 104–105 (in part).

*Lembos processifer*.—Ledoyer, 1984: 35 (in part), fig. 16 ("forme 2"). (not *L. processifer* Pirlot, 1938: 330, figs 147–149).

*Lembos (Globosolembos) excavatus* Myers, 1985a: 363, fig. 234.

*Globosolembos excavatus* Myers, 1986: 285, figs 11–12.

**Material examined.** Queensland: 3 males, 5 females, 2 immature, fringing reef between Bird Islet and South Island, Lizard Island, coral rubble, 6.1 m, 7 Oct 1978, J.K. Lowry and P.C. Terrill, AM P29705; 5 males, 1 female, reef flat near research station, Heron Island, on *Holothuria atra*, low water, 4 Sept 1978, A. Waren, AM P28862.

**Remarks.** This species is figured by Myers (1986) and is not therefore figured here.

**Habitat.** Generally an amphipod associated with coral rubble. The record from *Holothuria atra* is unusual.

**Distribution.** East Africa, Madagascar, north-eastern Australia, New Caledonia, Tonga.

### *Globosolembos lunatus* n.sp.

Figs 55–56

**Type material.** HOLOTYPE: male, 6.3 mm. Westernport, Vic., 38°29.78'S 145°06.28'E, 24 m, sand, 25 Nov 1974, NMV J14036. PARATYPES: 10 females, 9 males, 22 immature, same locality, NMV J13664.

**Additional material.** 1 male, Westernport, Vic., 38°28.70'S 145°06.07'E, 13 m, sand, 25 Nov 1974, NMV J13663.

**Description.** Body (in alcohol) without distinctive markings. Male pereon segments 2–4 with weak, rounded, sternal processes. Head anteroventral, corner strongly produced, acute. Labium outer plate distal margin with 5 spines. Mandible palp article ratio 2 : 5 : 6; article 3 elongate, falcate, posterior margin setae of variable length. Maxilla 1 palp article 2 with 8 distal spines. Antenna 1 peduncular articles

in the ratios 6 : 7 : 3; accessory flagellum with 5 articles, the terminal article rudimentary; primary flagellum broken in material examined. Antenna 2 peduncular articles 4 and 5 subequal, flagellum shorter than peduncular article 5, with 7 articles. Male gnathopod 1 coxa strongly expanded; carpus enlarged, subtriangular; propodus twice length of carpus, subovoid, palm straight, oblique, separated from posterior margin by shallow, evenly concave excavation delimited by a medial spine, propodus inner face with many rows of long setae; dactylus elongate strongly curved, opposable to medial spine. Female gnathopod 1 similar to that of male, but palm sinuous defined by weak tooth and spine and lacking posterodistal excavation. Male gnathopod 2 basis anterior margin straight or weakly concave, posterior margin moderately convex; carpus elongate, twice as long as broad; propodus shorter than carpus, anterior margin inflated; dactylus short, fitting evenly convex palm; anterior margin of carpus and propodus densely setose. Female gnathopod 2 coxa posteroproximal margin with row of stout setae; basis slender, anterior margin sinuous; carpus short subtriangular; propodus longer than carpus, parallel sided; dactylus short, fitting evenly convex palm; anterior margin of carpus and propodus less densely setose than that of male. Pereopods 3–4 dactylus short, less than one third length of propodus. Pereopods 5–6 missing. Pereopod 7 elongate, over half body length; basis with long setae on posterior margin only. Epimera 1–3 rounded. Uropod 1 peduncle with interramal tooth a little over one third length of peduncle; rami slender, strongly spinose; inner ramus the longer and a little longer than peduncle. Uropod 2 peduncle with inter-ramal tooth about half length of peduncle; rami elongate and strongly spinose; inner ramus distinctly the longer and longer than peduncle. Uropod 3 rami slender; inner ramus spinose; outer ramus setose, lacking a second article; both rami with long terminal setae.

**Remarks.** *Globosolembos lunatus* is closely related to *G. excavatus* and *G. indicus* but differs from both species in the strongly spinous uropods and in the sharply angled palmar termination of the hyperadult male gnathopod 1. The elongate male gnathopod 2 carpus is similar to that of *G. excavatus* but *G. lunatus* differs from that species in the larger carpus and weakly excavate posterodistal palmar margin of the male gnathopod 1, weakly developed sternal teeth of the male and strongly setiferous anterior margin (inner face) of the male gnathopod 1. The male gnathopod 1 of *G. lunatus* is quite similar to that of *G. indicus*, but that species has a crenulate palm to that appendage, a much less elongate carpus in the male gnathopod 2, long setae on the anterior margin of the basis of pereopod 7 and a more elongate carpus on the female gnathopod 2. Myers (1985a, 1986) pointed out the difficulties associated with the taxonomy of this genus which consists of numerous sibling species. It is principally a

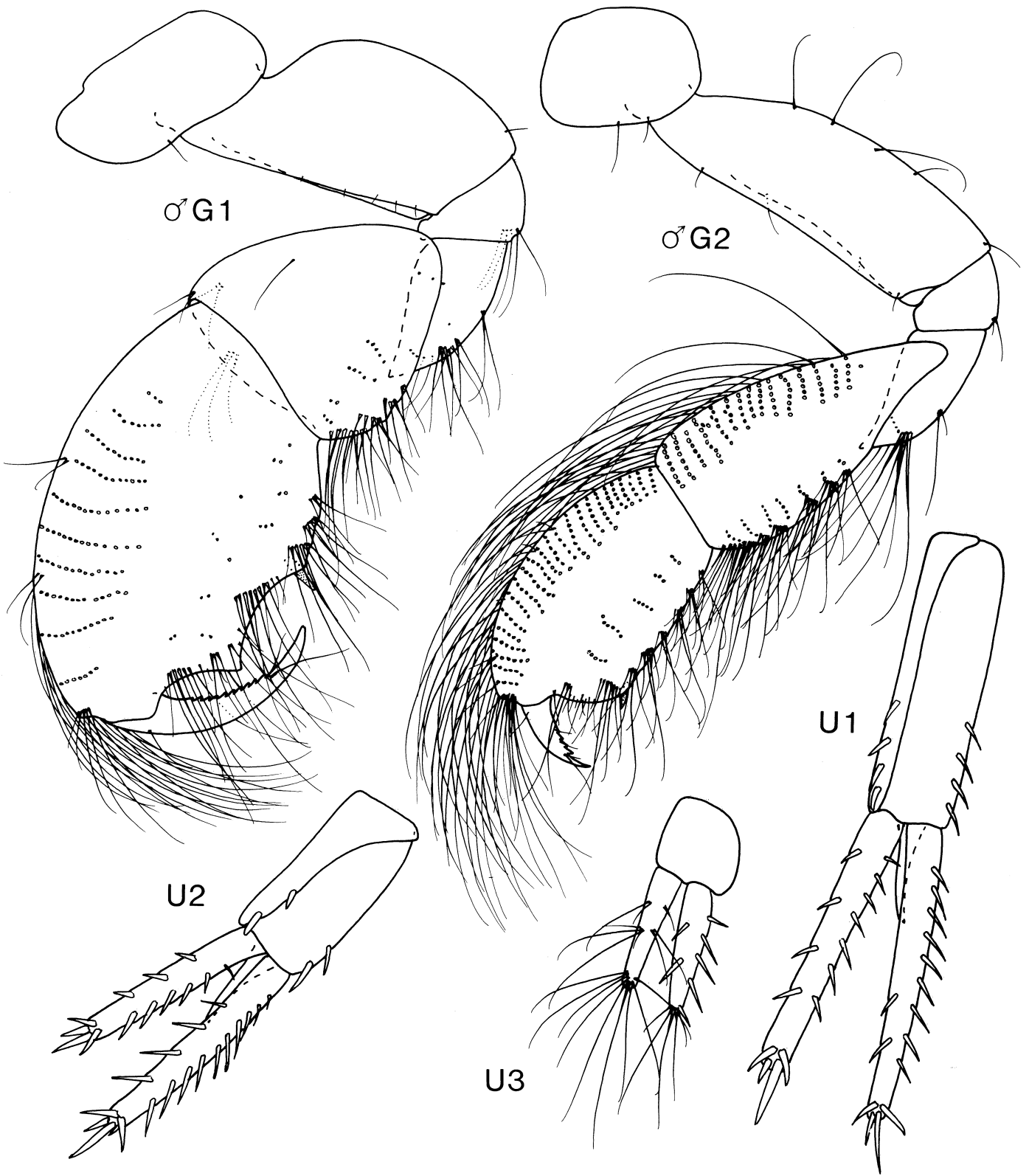


Fig.55. *Globosolembos lunatus* n.sp., male, Westernport.

circumtropical genus which reaches its greatest diversity in the Indo-Pacific. This is the first record of the genus from outside 30° N or S of the Equator.

**Habitat.** 13–24 m on sandy bottom.

**Distribution.** Victoria.

**Etymology.** From the latin *lunaris* = moon, referring to the shape of the excavation on the propodus of the male gnathopod 1.

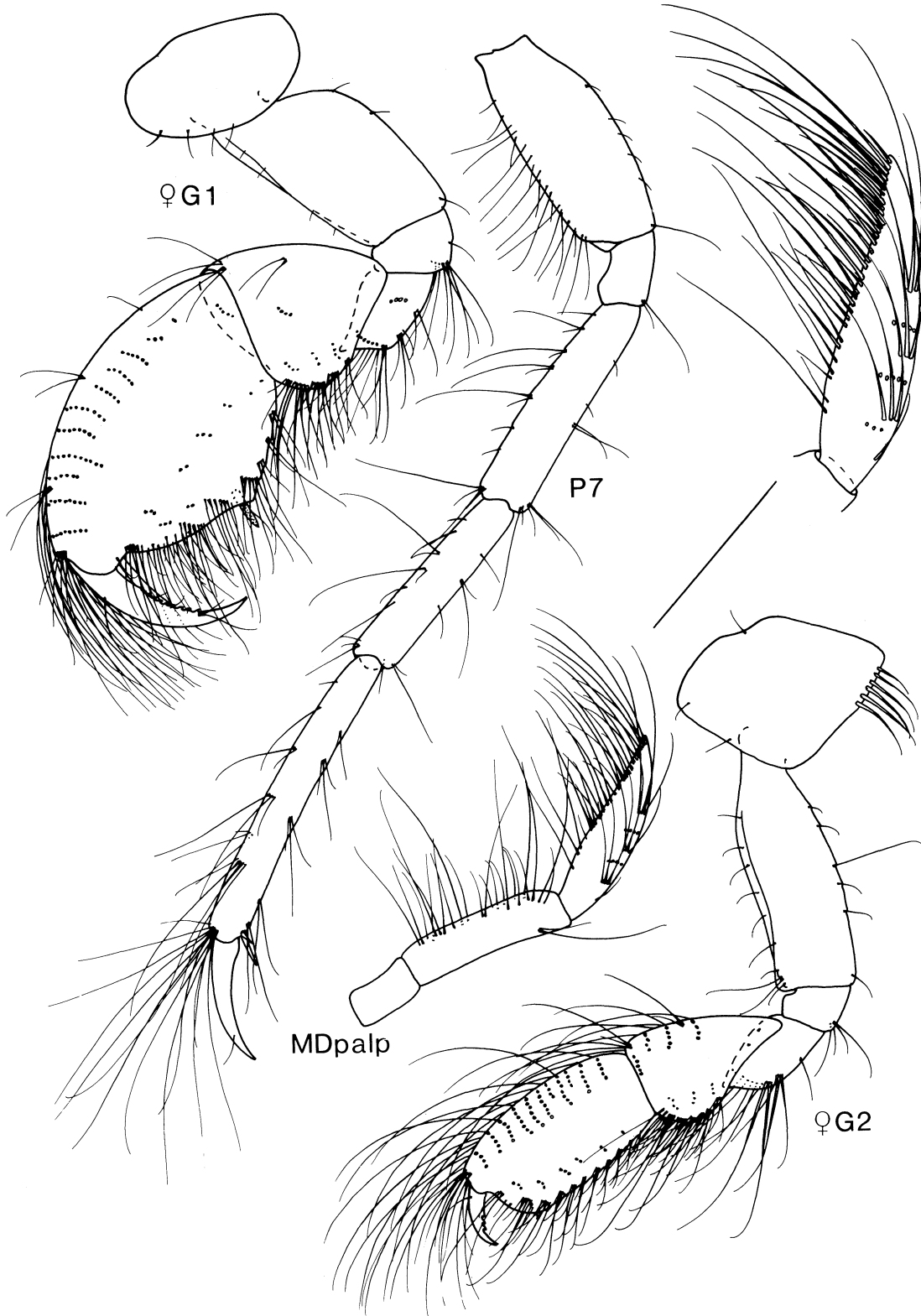


Fig.56. *Globosolembos lunatus* n.sp., male, female, Westernport.

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