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New Species of *Cerapus* from Australian Waters (Amphipoda: Senticaudata: Ischyroceridae)

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Abstract. Five new species of tube building amphipods in the genus *Cerapus* are described from Australian waters: *Cerapus brevirostris* sp. nov., *C. chiltoni* sp. nov., *C. dildilgang* sp. nov., *C. lowryi* sp. nov. and *C. moonamoona* sp. nov. All five new species build tubes from sediment or sediment and detritus. These bring the number of species of *Cerapus* in Australian waters to ten. A key to Australian species is provided.

Introduction

This work represents a continuation of the study of the Cerapodini by J. K. Lowry and P. B. Berents. Jim Lowry's first work on the Cerapodini was to describe three new species of *Cerapus* from New Zealand (Lowry, 1981), which are now attributed to the genus *Notopoma* (Lowry & Berents, 1996). The status of the type species of the genus, *Cerapus tubularis* Say, 1817, was clarified by Lowry & Berents (1989) and the genus is now represented worldwide by 24 species (Table 1).

Five species of *Cerapus* are known in Australian waters from the northern Great Barrier Reef, south around the Australian continent to Ningaloo Reef, Western Australia, from intertidal to depths of 165 m on the continental shelf (Table 1). Five new species of Australian *Cerapus* are described herein bringing the total number of species in Australian waters to ten.

Materials and methods

The species descriptions were generated from a DELTA database (Dallwitz, 2010) to the species of Cerapodini of the world and subsequently edited to improve the language. Characters in **bolded** text are diagnostic. Material is lodged in the Australian Museum, Sydney (AM), Museums Victoria, Melbourne (MV) and the South Australian Museum, Adelaide (SAM). The following abbreviations are used in the figures: **A**, antenna; **G**, gnathopod; **P**, pereopod; **PL**, pleopod; **U**, uropod; **UR**, urosome; **l**, left; **r**, right. The terminology for cuticular structures follows Watling (1989).

Locality data presented in *Material examined* includes museum station data codes (e.g., MI WA-480, SWA-56, MI NSW 3369, K80-20-11).

Keywords: Crustacea, Amphipoda, Ischyroceridae, Cerapodini, *Cerapus*, Australia, new species, taxonomy, tube building
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Table 1. Checklist and distribution of *Cerapus* Say, 1817.

taxon	distribution
Cerapus alquirta (Barnard & Drummond, 1981)	Australia: Victoria
Cerapus benthophilus Thomas & Heard, 1979	Gulf of Mexico
Cerapus brevirostris sp. nov.	Australia: South Australia; Western Australia
Cerapus bumbumiensis Nurshazwan, Ahmad-Zaki & Azman, 2020	Malaysia: Sabah
Cerapus bundegi Lowry & Berents, 2005	Australia: Western Australia
Cerapus calamicola (Giles, 1885)	India: Bay of Bengal
Cerapus chaomai Lowry & Berents, 2002	Thailand: Trang
Cerapus chiltoni sp. nov.	Australia: New South Wales
Cerapus cudjoe Lowry & Thomas, 1991	USA: Florida
Cerapus dildilgang sp. nov.	Australia: New South Wales
Cerapus erae Bulycheva, 1952	Japan: Russia
Cerapus jonsoni Valério-Berardo, Souza & Rodrigues, 2008	Brazil: Santos Continental Shelf
Cerapus longicervicum Lim, Park & Min, 2008	Korea
Cerapus longirostris Shen, 1936	China: Shantung Peninsula; Japan: Uematsu
Cerapus lowryi sp. nov.	Australia: New South Wales; Bass Strait.
Cerapus maculanigra Zeina & Asakura, 2017	Red Sea
Cerapus micronesicus Myers, 1995	Micronesia: Kosrae
Cerapus moonamoona sp. nov.	Australia: New South Wales
Cerapus murrayae Lowry & Berents, 2005	Australia: New South Wales
Cerapus nudus Just, 2009	Australia: Great Barrier Reef
Cerapus oceanicus Lowry, 1985	Western Samoa: Upolu
Cerapus orteai Ortiz & Thomas, 2007	Costa Rica
Cerapus pacificus Lowry, 1985	Fiji: Viti Levu
Cerapus ryanadamsi Drumm, 2018	USA: Gulf of Mexico
Cerapus slayeri Drumm, 2018	USA: northwest Atlantic
Cerapus thomasi Ortiz & Lemaitre, 1997	Colombia: Gulf of Morrosquillo
Cerapus tubularis Say, 1817	USA: northeast coast
Cerapus volucola Lowry & Berents, 2005	Australia: Queensland; Papua New Guinea: Madang Lagoon
Cerapus yuyatalay Lowry & Berents, 2002	Thailand, Sikao district

Key to Australian species of *Cerapus* (male)

1 Recurved spines on telson in 2 rows 2
—— Recurved spines on telson in 3 rows ..... *Cerapus nudus* Just, 2009

2 Antenna 2 longer than antenna 1 3
—— Antenna 2 equal to or shorter than antenna 1 4

3 Coxa 6 with setal fringe ..... *Cerapus moonamoona* sp. nov.
—— Coxa 6 lacking setal fringe ..... *Cerapus alquirta* (Barnard & Drummond, 1981)

4 Pereopods 6–7 dactylus with 2 accessory hooks 5
—— Pereopods 6–7 dactylus with 1 accessory hook 7

5 Rostrum short ..... *Cerapus murrayae* Lowry & Berents, 2005
—— Rostrum long 6

6 Pereopods 3–4 coxa fused to pereonites ..... *Cerapus volucola* Lowry & Berents, 2005
—— Pereopods 3–4 coxa not fused to pereonites ..... *Cerapus bundegi* Lowry & Berents, 2005

7 Antenna 1 very long relative to body length (> 0.9 times body length) ..... *Cerapus brevirostris* sp. nov.
—— Antenna 1 less than 0.9 times body length 8

8 Gnathopod 2, carpus palm straight ..... *Cerapus dildilgang* sp. nov.
—— Gnathopod 2, carpus palm deeply excavate 9

9 Pereopod 7 basis with patch of small setae on posterior margin ..... *Cerapus lowryi* sp. nov.
—— Pereopod 7 basis without patch of small setae on posterior margin ..... *Cerapus chiltoni* sp. nov.

Systematic Account

Suborder Senticaudata Lowry & Myers, 2013

Infraorder Corophiida Leach, 1814

Parvorder Caprellidira Leach, 1814

Superfamily Photoidea Boeck, 1871

Family Ischyroceridae Stebbing, 1899

Subfamily Ischyrocerinae Stebbing, 1899

Tribe Cerapodini Smith, 1880

Genus *Cerapus* Say, 1817

Type species: *Cerapus tubularis* Say, 1817.

Cerapus brevirostris sp. nov.

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Figs 1–3

Holotype: Male, 2.4 mm, AM P.106325, Penneshaw, Kangaroo Island, South Australia, Australia, 35°43'S 137°56'E, in *Caulerpa* sp. on jetty piles, 5 m, I. Loch, 9 March 1978. **Paratypes**: 1 female, ovigerous, 2.7 mm, AM P.106326; 1 female, ovigerous, 2.5mm, AM P.106327; all with same data as holotype. 1 male, 2.8 mm, AM P.106328; 14 specimens, AM P.106329; 1 male, 2.2 mm, AM P.106330; Stokes Bay, Kangaroo Island, South Australia, Australia, 35°37'S 137°12'E, algae on vertical rock face, 7 m, I. Loch, 4 March 1978. 6 specimens, SAM C14774, Sellicks Beach, South Australia, Australia, 35°20'06"S 138°26'44"E, K. Sheard & H. M. Hale, 16 January 1937; 10 specimens, MV J.13186, north of False Island, King George Sound, Western Australia, Australia, 35°00.702'S 118°10.08'E, 27 m, scuba, SWA-57 G. C. Poore & H. M. Lew Ton, 15 April 1984.

Additional material examined. 2 specimens, SAM C14775, Sellicks Beach, South Australia, Australia, 35°20'06"S 138°26'44"E, dead low tide, outer edge, K. Sheard, April 1939; 43 specimens, MV J.13190, north of False Island, King George Sound, Western Australia, Australia, 35°01.002'S 117°25.02'E, scuba, 25 m, SWA-56, G. C. B. Poore & H. M. Lew Ton, 15 April 1984; 2 specimens, MV J.13187, south side off Eden Road, Wilson Inlet, Western Australia, Australia, 35°00.702'S 1188°10.08'E, by hand, 0.1 m, SWA-58, G. C. B. Poore & H. M. Lew Ton, 16 April 1984; 5 specimens, AM P.106331, Ningaloo Reef, Western Australia, 21°55'41"S 113°55'11"E, brown algae on rocks under jetty, 13 m, MI WA 979, N. L. Bruce & M. Blazewicz-Paszkowycz, 17 June 2008; 1 male, 6 females, several juveniles, AM P.106332, same data as holotype; 7 specimens, AM P.106333, Red Bluff, Kalbarri, Western Australia, Australia, 27°42'S 114°09'E, rocky shore, mixed coralline algae, 3–4 m, MI WA-480, R. T. Springthorpe, 10 January 1984; 1 female, ovigerous, 2 juveniles, AM P.106334, 500 m off Chinamans Rock, Kalbarri, Western Australia, Australia, 27°42'S 114°09'E, rocky bottom, brown algae with epiphytic coralline algae, 6 m, MI WA-462, J. K. Lowry, 10 January 1984; 1 male, 6 females, AM P.106335, 500 m off

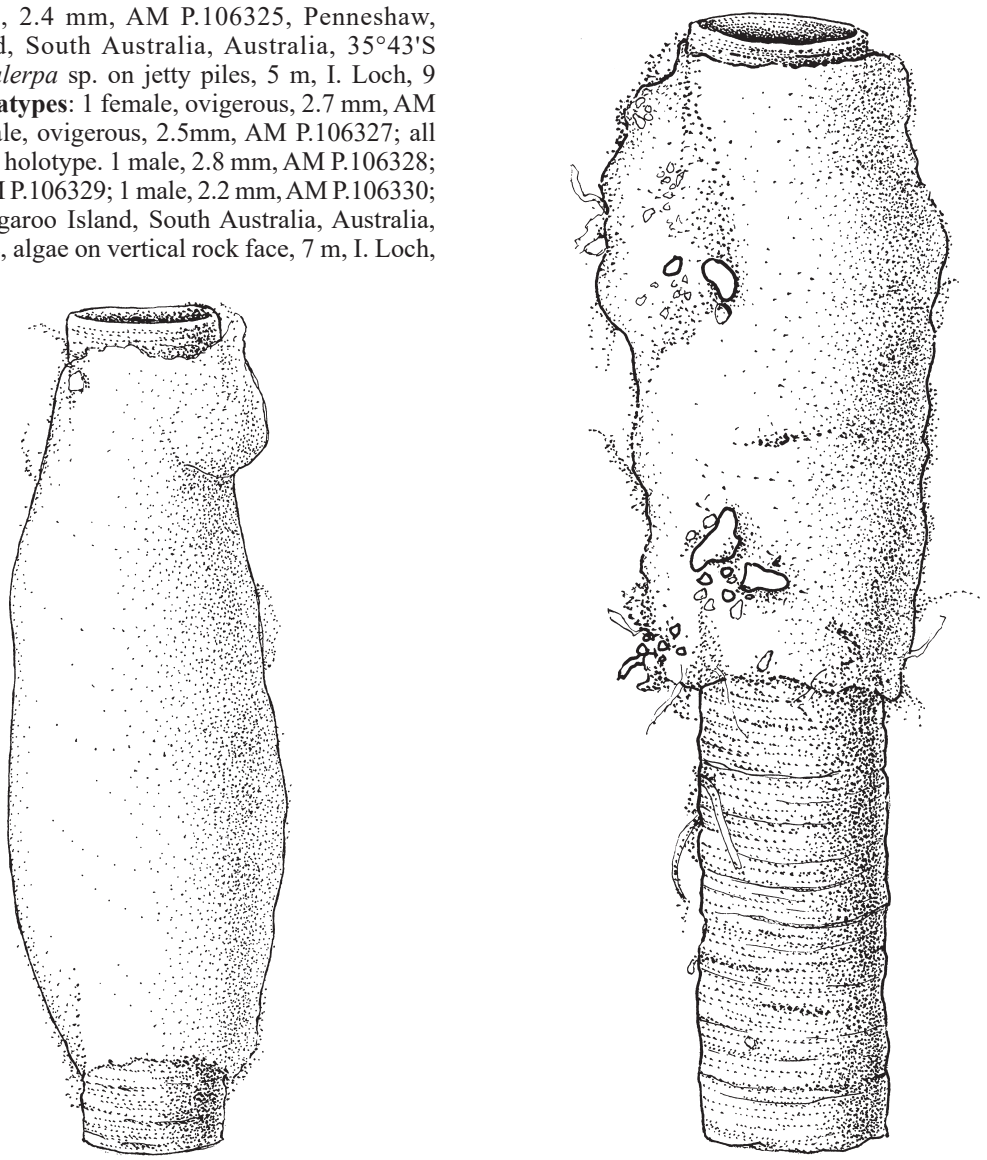

Figure1. *Cerapus brevirostris* sp. nov., tubes from paratypes, AM P.106329, Penneshaw, Kangaroo Island, South Australia, Australia, length of tubes 2–3 mm.

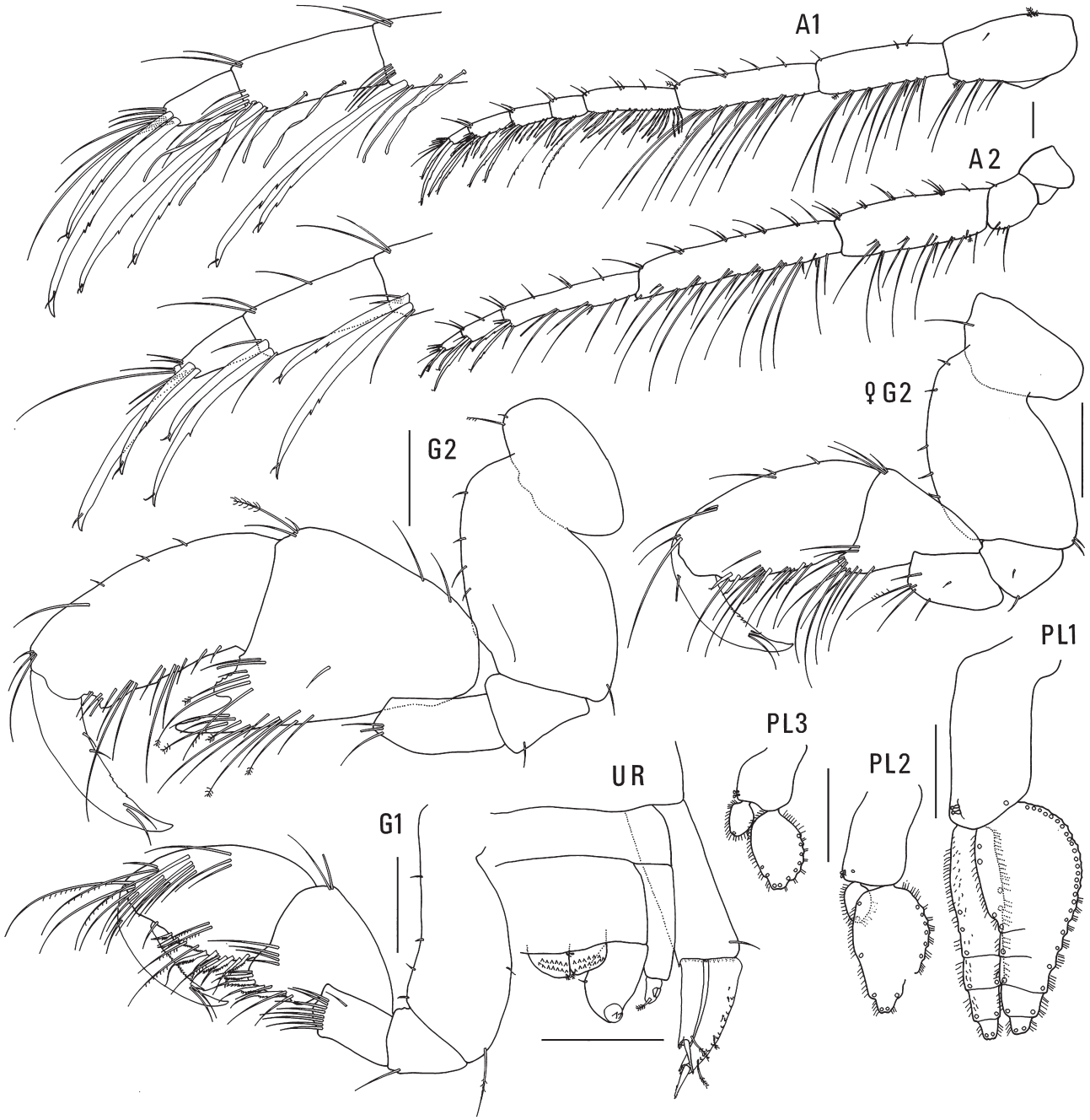

Figure 2. *Cerapus brevirostris* sp. nov.: holotype, male, 2.4 mm, AM P.106325; paratype, female, 2.7 mm, AM P.106326; Penneshaw, Kangaroo Island, South Australia. Pleopods 1–3 insertion points of setae are indicated by small circles. Scale 0.1 mm.

Chinaman's Rock, Kalbarri, Western Australia, Australia, 27°42'S 114°09'E, brown alga *Padina* sp., 6 m, MI WA-465, J. K. Lowry, 10 January 1984; 1 specimen, AM P.106336, 500 m off Chinamans Rock, Kalbarri, Western Australia, Australia, 27°42'S 114°09'E, 6 m, MI WA-460, R. T. Springthorpe, 10 January 1984; 2 females, AM P.106337, Stokes Bay, Kangaroo Island, South Australia, Australia, 35°37'S 137°12'E, 7 m, I. Loch, 4 March 1978; 1 specimen, AM P.106338, 500 m off Chinaman's Rock, Kalbarri, Western Australia, Australia, 27°42'S 114°09'E, rocky bottom, brown and coralline algae, 6 m, MI WA-459, J. K. Lowry, 10 January 1984; 20 specimens, AM P.106339, Thompsons Bay, Rottnest Island, Western Australia, Australia, 32°00'S 115°32'30"E, airlift sample from *Posidonia* sp., 3 m, MI WA-221, J. K. Lowry & R. T. Springthorpe, 20 December 1983; 3 specimens, MV J.75812, The Hotspot Reef, 9.3 km west of north end of Flinders Island, South Australia, Australia, 33°40'48"S 134°22'30"E, scuba, 21 m, SA 70, G. C. B. Poore, 20 April 1985; 1 specimen, MV J.75813, The Hotspot Reef, 9.3 km west of north end of Flinders Island, South Australia, Australia, 33°40'30"S 134°22'1"E, scuba, 17 m, SA 62, G. C. B. Poore, 19 April 1985; 1 male, AM P.106340, reef west of groyne, 2 km south of Cape Peron, Western Australia, Australia, 32°16'S 115°41'E, deep channels in limestone reef, sand from pocket in reef, 6 m, MI WA-292, J. K. Lowry, 26 December 1983; 1 male, 3 juveniles, MV J.75814, north-east side of Topgallant Island, Investigator Group, South Australia, Australia, 33°43'0"S 134°36'36"E, scuba, 12 m, SA 83, S. Shepherd & G. C. B. Poore, 22 April 1985; 1 female, ovigerous, 4 juveniles, MV J.75815, The Hotspot Reef, 9.3 km west of north end of Flinders Island, South Australia, Australia, 33°40'30"S 134°22'1"E, scuba, 7 m, SA 64, S. Shepherd, 19 April 1985.

Type locality. Penneshaw, Kangaroo Island, South Australia, Australia, 35°43'S 137°56'E.

Etymology. Named for the short rostrum of this species. Used as a noun in apposition.

Description. **Male** (based on holotype, 2.4 mm, AM P.106325).

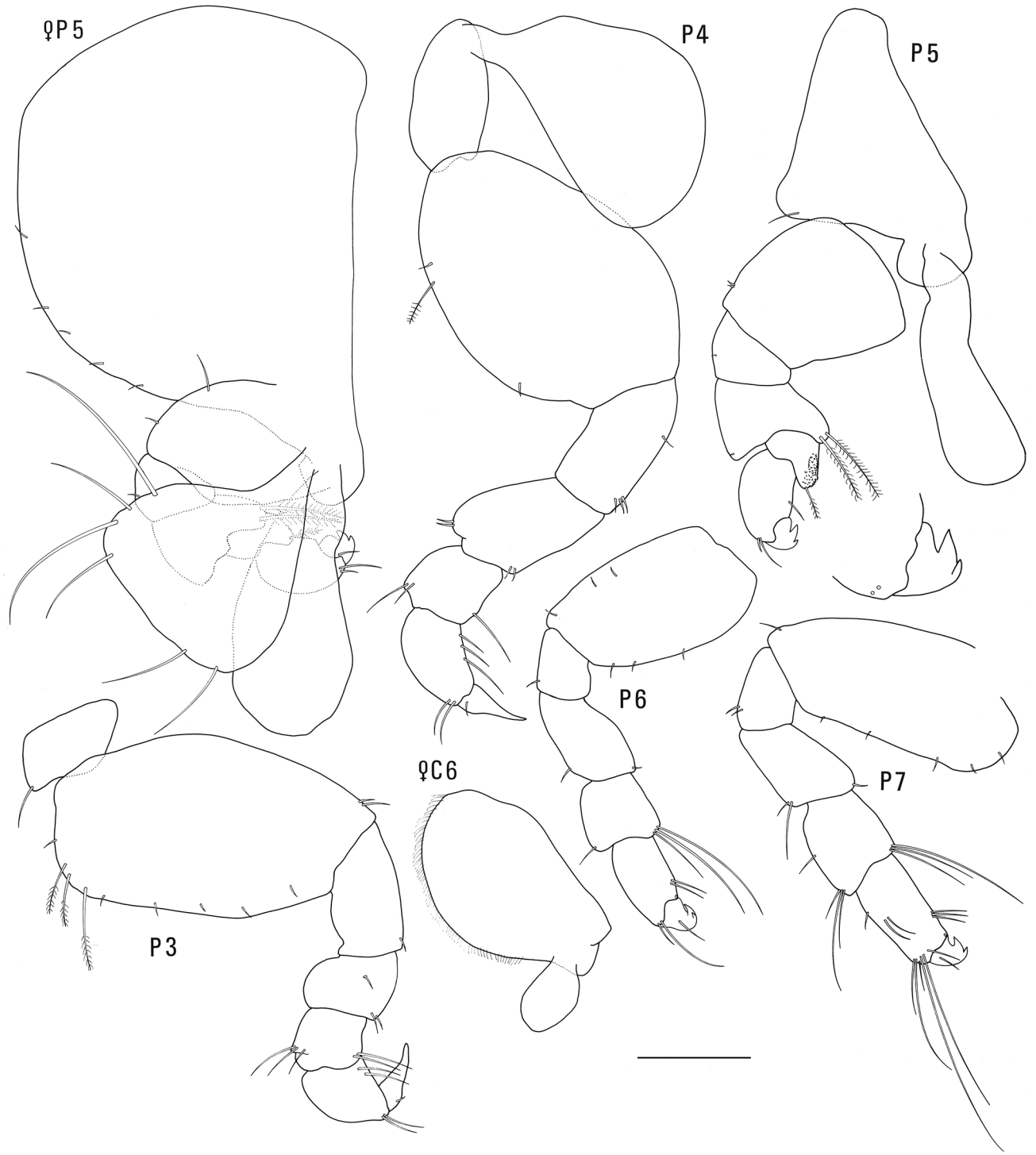

Figure 3. *Cerapus brevirostris* sp. nov.: holotype, male, 2.4 mm, AM P.106325; paratype, female, 2.7 mm, AM P.106326; Penneshaw, Kangaroo Island, South Australia. Scale 0.1 mm.

Head. **Rostrum short, length 0.2 × head**, evenly tapered, apically subacute; lateral cephalic lobe with ventral corner acute, subocular margin weakly recessed, not reaching beyond eye, anteroventral corner subquadrate, ventral margin horizontal, posterior margin vertical.

Antenna 1 **very long, length 0.9 × body length**; peduncle without scales; peduncular article 1 subequal to article 3, length 0.9 × peduncular article 3, swollen along posterior margin, posterodistal corner not produced; peduncular article 2 anterodistal corner without distal projection; flagellum 5-articulate; article 1 long. ***Antenna 2*** **length equal to antenna 1;** flagellum 3-articulate.

Pereon. *Pereonite 1* without lateral keel or sternal keel. *Pereonites 2–3* without sternal keel.

Gnathopod 1 coxa not fused to pereonite 1, length 0.9 × depth, without anteroventral lobe; basis length twice depth; carpus broad, length 1.2 × depth with setose posterior lobe; propodus palm extremely acute, with barbed robust setae. *Gnathopod 2* carpochelate; coxa not fused to pereonite 2, length 1.9 × depth, **without anteroventral lobe or**

cusp; basis short, broad, length 1.5 × breadth, without anteroproximal group of long slender setae; carpus short, length 1.3 × breadth, broad, posterior margin without teeth, **palm shallowly excavate**, anterodistal tooth large, located distal to articulation with propodus, posterodistal tooth well defined, medium length, length 1.4 × width; propodus very broad, slightly curved, length 2.3 × width, **with small tooth on posterior margin**, posterodistal corner smooth; dactylus, length 0.7 × propodus.

Pereopod 3 coxa without anteroventral lobe, not fused to pereonite 3, length 1.9 × depth; basis length 1.7 × breadth, with proximal, subquadrate anterodorsal corner, with plumose setal group along anterior margin, without denticles along anterior margin; ischium short, length 1.2 × breadth; merus length 1.2 × breadth; short, without ridges. *Pereopod 4* coxa not fused to pereonite 4, with anterior lobe separated from an anteroventral lobe; basis length 1.4 × breadth, without setal group along anterior margin; ischium long, length twice breadth; merus long, length 1.8 × breadth. *Pereopod 5* coxa length 1.7 × depth, without patches of small setae, with 1 seta along ventral margin; merus with anterior lobe extending beyond anterior margin of carpus, posterior lobe with 2 plumose setae; propodus with 1 seta along posterior margin; dactylus short, uncinate with 1 accessory hook. ***Pereopod 6* coxa without setal fringe ventrally,** without patches of small setae near margins; basis without patch of small setae near anterior margin; merus, length 1.6 × breadth; dactylus short, uncinate, with 1 accessory hook. *Pereopod 7* merus length 1.3 × breadth; dactylus short, uncinate, with 1 accessory hook.

Pleon. *Pleopods 1–3* biramous, decreasing in size. *Pleopod 1* inner ramus 4-articulate; outer ramus 3-articulate, article 1 with straight medial margin; *Pleopod 2* inner ramus reduced, 1-articulate; outer ramus, broad, 1-articulate. *Pleopod 3* inner ramus reduced, 1-articulate; outer ramus broad, 1-articulate. *Uropod 1* biramous; peduncle length 1.4 × outer ramus; rami with distoventral fan of robust setae; outer ramus with lateral row of denticles, without medial setae, with 4 lateral setae, with large apical robust seta, without smaller slender setae; inner ramus, length 0.8 × outer ramus, without medial and lateral setae, with large apical robust seta. *Uropod 2* uniramous, peduncle, length 3.5 × breadth, 4.2 × length of ramus; ramus small with 2 denticles and 1 slender apical seta. *Uropod 3* uniramous, peduncle length 1.5 × breadth; ramus with 2 curved hooks. *Telson* broader than long, length 0.4 × breadth, cleft to base, **each lobe with 13 anteriorly directed recurved spines in 2 rows**.

Female (sexually dimorphic characters). Based on paratype female, 2.7 mm, AM P.106326. *Antenna 1* peduncle without scales; flagellum 4-articulate. *Antenna 2* flagellum 4-articulate. *Pereonite 1* without lateral keel. *Pereonite 2–3* without sternal keel. *Gnathopod 1* coxa, length equalling depth; basis length 2.3 × depth; carpus length 0.9 × depth with setose posterior lobe. *Gnathopod 2* subchelate; coxa length 1.7 × depth; basis, length 1.4 × depth, without medial line of setae; palm extremely acute. *Pereopod 5* coxa length 1.4 × depth. *Oostegites* from gnathopod 2 to pereopod 5.

Tube. Smooth tube of mud and fine particles with light and dark stripes, often covered by clay-coloured sponge or pale ascidian; may be swollen in the middle; tubes often bound together by the ascidian or the sponge.

Habitat. Marine, 0.1–27 m.

Remarks. *Cerapus brevirostris* sp. nov. and *C. alquirta* are the only Australian species lacking a setal fringe on coxa 6 and with a 4-articulate outer ramus on pleopod 1. *Cerapus brevirostris* differs from *C. alquirta* in having antenna 1 and 2 equal in length. The outer ramus of pleopod 1 in *C. brevirostris* has a straight medial margin whereas all other Australian species have the margin evenly swollen. *Cerapus brevirostris* is the only Australian species with a tooth on the posterior margin of the propodus of male gnathopod 2 and with antenna 1 very long relative to body length (0.9 × body length).

Distribution. Sellicks Beach and Kangaroo Island, South Australia to Ningaloo Reef, Western Australia.

Cerapus chiltoni sp. nov.

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Figs 4–8

Cerapus flindersi.—Chilton, 1892: 1–6, pl. 1.

Holotype: Male, 4.1 mm, AM P.106341, Port Jackson, New South Wales, Australia, 33°51'S 151°16'E, R. Helms, pre-1892. **Paratypes**: Female, 3.3 mm, AM P.106345; male, 4.1 mm, AM P.106343; male 2.8 mm, AM P.106344; male, 5.5 mm, AM P.106342; male, 3.3 mm, AM P.106345; data as for holotype. Male, 4.6 mm, AM P.27296, Fly Point, Port Stephens, New South Wales, Australia, 32°43'S 152°9'E, on orange hydroid, 20 m, N. Coleman, 27 November 1977.

Additional material examined. 5 specimens, AM P.106355, north-west end of South Solitary Island, New South Wales, Australia, 30°12'07"S 153°15'59"E, coral rubble, hand collected on scuba, 14.5 m, NSW 2813, K. B. Atwood, 1 May 2005; >1000 specimens, AM P.106354, Port Jackson, New South Wales, Australia, 33°51'S 151°16'E, K. Sheard.

Type locality. Port Jackson, New South Wales, Australia, 33°51'S 151°16'E.

Etymology. Named for Professor Charles Chilton who first examined Australian Museum specimens of this species from Port Jackson and attributed them to *Cerapus flindersi* Stebbing, 1888.

Description. **Male** (based on holotype, 4.1 mm, AM P.106341).

Head. **Rostrum short, length 0.1 × head**, evenly tapered, apically subacute; lateral cephalic lobe with ventral corner rounded, subocular margin deeply recessed, reaching beyond eye, anteroventral corner subquadrate, ventral margin horizontal, posterior margin vertical. ***Antenna 1* long, length 0.6 × body length**; peduncle without scales; peduncular article 1 shorter than article 3, length 0.8 × peduncular article 3, not produced anterodistally and anteromedially, slightly swollen along posterior margin, posterodistal corner not produced; peduncular article 2 anterodistal corner without distal projection; flagellum 7-articulate; article 1 long. ***Antenna 2* length equal to antenna 1**; flagellum 9-articulate.

Pereon. *Pereonite 1* with lateral keel, without sternal keel. *Pereonite 2* with sternal keel. *Pereonite 3* without sternal keel. *Pereonite 5* length 1.9 × depth.

Gnathopod 1 coxa not fused to pereonite 1, length 1.5 × depth, without anteroventral lobe; basis length 2.2 × depth;

carpus broad, length 1.6 × depth with setose posterior lobe; propodus palm extremely acute, robust setae absent. *Gnathopod 2* carpochelate; coxa not fused to pereonite 2, length 1.9 × depth, **with strongly produced anteroventral lobe** or cusp; basis short, broad, length twice breadth, without anteroproximal group of long slender setae; carpus very long, length 1.9 × breadth, slender, posterior margin without teeth**, palm deeply excavate**, anterodistal tooth extremely produced, located near articulation with propodus, posterodistal tooth well defined, long, length 2.2 × width; propodus slender, strongly curved, length 5.3 × width, **without tooth on posterior margin**, posterodistal corner smooth, without teeth; dactylus, length 0.5 × propodus.

Pereopod 3 coxa with narrow anteroventral lobe, not fused to pereonite 3, length 1.7 × depth; basis, length 1.6 × breadth, with proximal rounded anterodorsal corner, with simple setae along anterior margin, without denticles along anterior margin; ischium long, length 1.6 × breadth; merus length 1.2 × breadth; short; without ridges. *Pereopod 4* coxa not fused to pereonite 4, with anterior lobe separated from an anteroventral lobe; basis length 1.5 × breadth, with simple setal group midway along anterior margin; ischium long, length 2.3 × breadth; merus long, length 1.3 × breadth. *Pereopod 5* coxa length 1.8 × depth, without patches of small setae, with setae along ventral margin few or absent; merus with anterior lobe not extending beyond anterior margin of carpus, posterior lobe with 1 plumose seta; propodus with 1 seta along posterior margin; dactylus short, uncinate with 1 accessory hook. ***Pereopod 6* coxa with setal fringe ventrally**, without patches of small setae near margins; basis without patch of small setae near anterior margin; merus, length 1.9 × breadth; dactylus short, uncinate, with 1 accessory hook. *Pereopod 7* coxa without posterodorsal lobe; merus length 2.3 × breadth; dactylus short, uncinate, with 1 accessory hook.

Pleon. *Pleopods 1–3* biramous, decreasing in size. *Pleopod 1* inner ramus 7-articulate; outer ramus 3-articulate article 1 evenly swollen. *Pleopod 2* inner ramus reduced, 1-articulate; outer ramus, broad, 1-articulate. *Pleopod 3* inner ramus reduced, 1-articulate; outer ramus broad, 1-articulate. *Uropod 1* biramous; peduncle, length 1.3 × outer ramus; rami with distoventral fan of robust setae; outer ramus with lateral row of denticles, without medial setae, with 3 lateral setae, with large apical robust seta, without smaller slender setae; inner ramus, length 0.6 × outer ramus, without medial and 1 lateral seta, with large apical robust seta. *Uropod 2* uniramous, peduncle, length 2.1× breadth, 5 × length of ramus; ramus small with 2 denticles and 1 slender apical seta. *Uropod 3* uniramous, peduncle length 1.7 × breadth; ramus with 2 curved hooks. *Telson* as broad as long, length 1.0 × breadth, cleft to base, **each lobe with 7–8 anteriorly directed recurved spines in 2 rows**.

Female (sexually dimorphic characters). Based on paratype female, 3.3 mm, AM P.106345. *Antenna 1* peduncle without scales; flagellum 7-articulate. *Antenna 2* flagellum 9-articulate. *Pereonite 1* without lateral keel. *Pereonites 2–3* without sternal keel. *Pereonite 5* length 1.9 × depth. *Gnathopod 1,* coxa length 1.2 × depth; basis length 1.5 × depth; carpus, length equal to depth with setose posterior lobe. *Gnathopod 2* subchelate; coxa length 2.7 × depth; basis length 1.7 × depth without medial line of setae; palm extremely acute. *Pereopod 5* coxa, length 1.9 × depth. *Oostegites* from gnathopod 2 to pereopod 5.

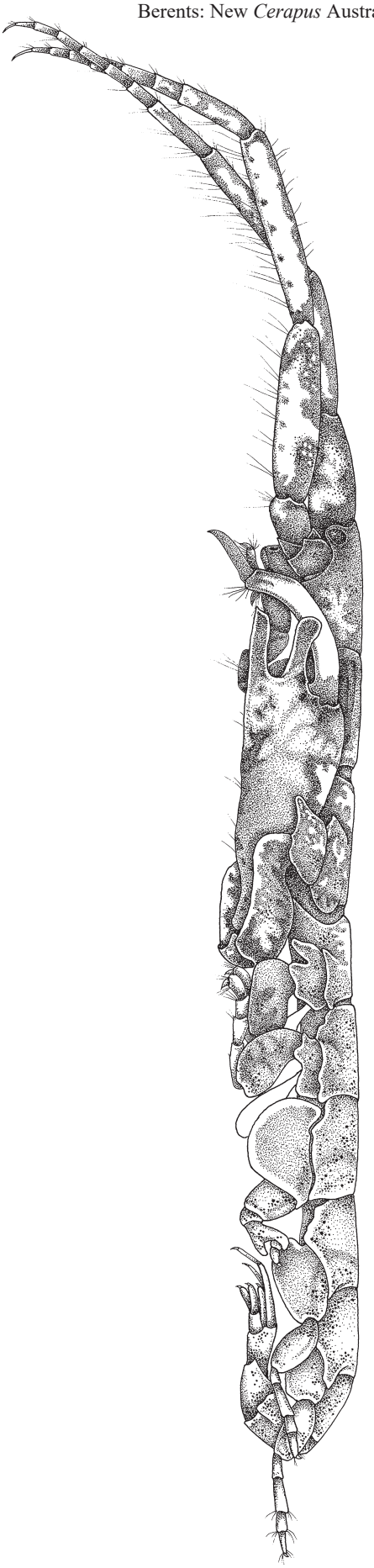

Figure 4. *Cerapus chiltoni* sp. nov., male, 4.2 mm, AM P.106351, Port Jackson, New South Wales, Australia.

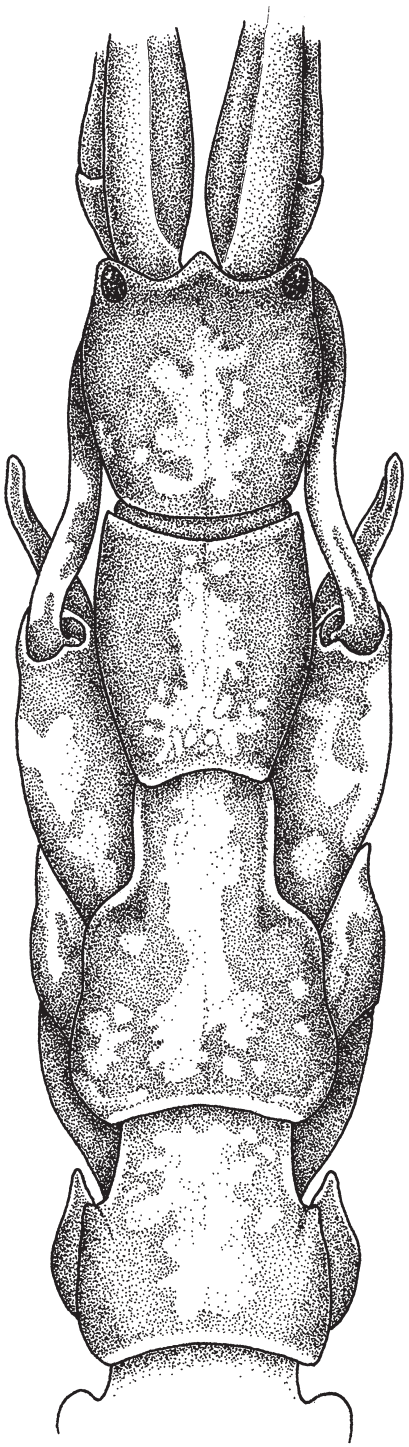

Figure 5. *Cerapus chiltoni* sp. nov., male, 4.2 mm, dorsal view of head and pereonites 1–3, AM P.106351, Port Jackson, New South Wales, Australia.

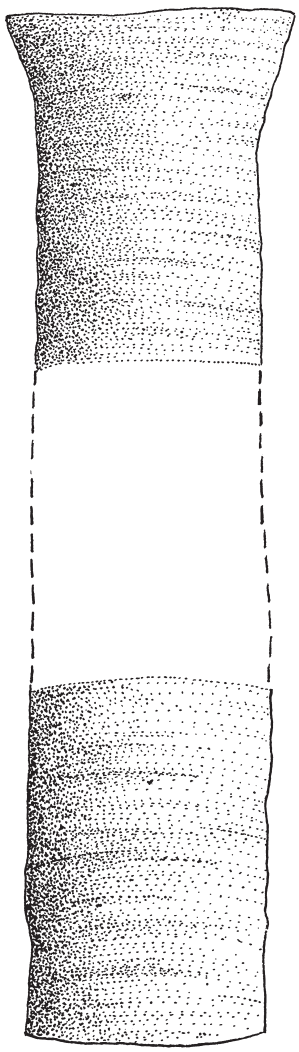

Figure 6. *Cerapus chiltoni* sp. nov., tube, AM P.106351, Port Jackson, New South Wales, Australia, length of tube 6 mm.

Tube. Composed of fine-grained grey sediment, flared at one end.

Habitat. Marine, 14.5–20 m depth.

Remarks. The Port Jackson material of *C. chiltoni* sp. nov. was collected by Richard Helms and deposited in the collections of the Australian Museum. Helms was a collector for the Australian Museum from 1888 but the precise locality and date of these collections is unknown. Specimens collected by Helms were sent to Professor Charles Chilton who published a description of amphipod specimens that were collected in Port Jackson (Chilton, 1892). Chilton illustrated and described the specimens, attributing the material to *Cerapus flindersi* Stebbing, 1888. Specimens in ethanol and seven microscope slides prepared by Chilton are held in the Australian Museum collections (4 slides of parts of large male, 1 slide of parts of smaller male, 2 slides of whole females) and are considered to be the slides used for the description and illustrations by Chilton (1892). Labels on the slides confirm that the Chilton's material was collected by Helms.

Berents & Lowry (2018) assigned *Cerapus flindersi* Stebbing, 1888 to the new genus *Kapalana* and considered Chilton's specimens to be an undescribed species of *Cerapus*. The material examined by Chilton is attributed to the new species described herein as *Cerapus chiltoni.*

The shape of the male gnathopod 2 changes with body size. The carpus and the propodus become more elongate as the male grows. The length to breadth ratio of the carpus changes from 1.3:1 in small males (up to 3.3 mm) to 1.9:1 in large

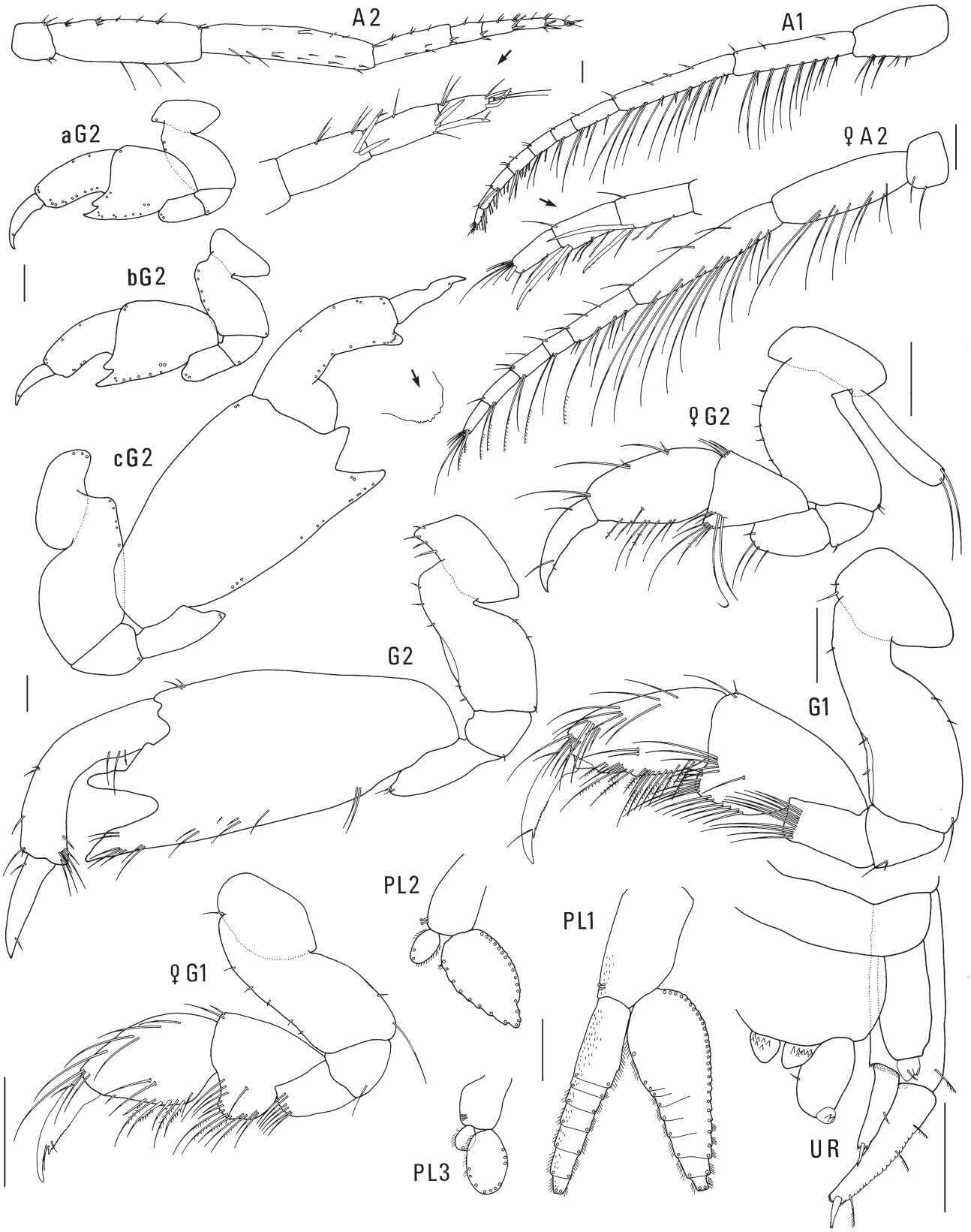

Figure 7. *Cerapus chiltoni* sp. nov.: holotype, male, 4.2 mm, AM P.106341; paratype, male "a", 2.8 mm, AM P.106344; paratype, male "b", 3.3 mm, AM P.106346; paratype, male "c", 4.1 mm, AM P.106343; paratype, female, 3.3 mm, AM P.106345; Port Jackson, New South Wales, Australia. Pleopods 1–3 insertion points of setae are indicated by small circles. Scale 0.1 mm.

males (greater than 4.0 mm). The palm changes from shallowly excavate in males less than 3.0 mm to deeply excavate in males larger than 4.0 mm. The posterodistal tooth becomes more elongate and chisel-like in large males (> 4.0 mm). The chisel-like posterodistal tooth is unique to *C. chiltoni.*

Distribution. New South Wales: Port Jackson to South Solitary Island.

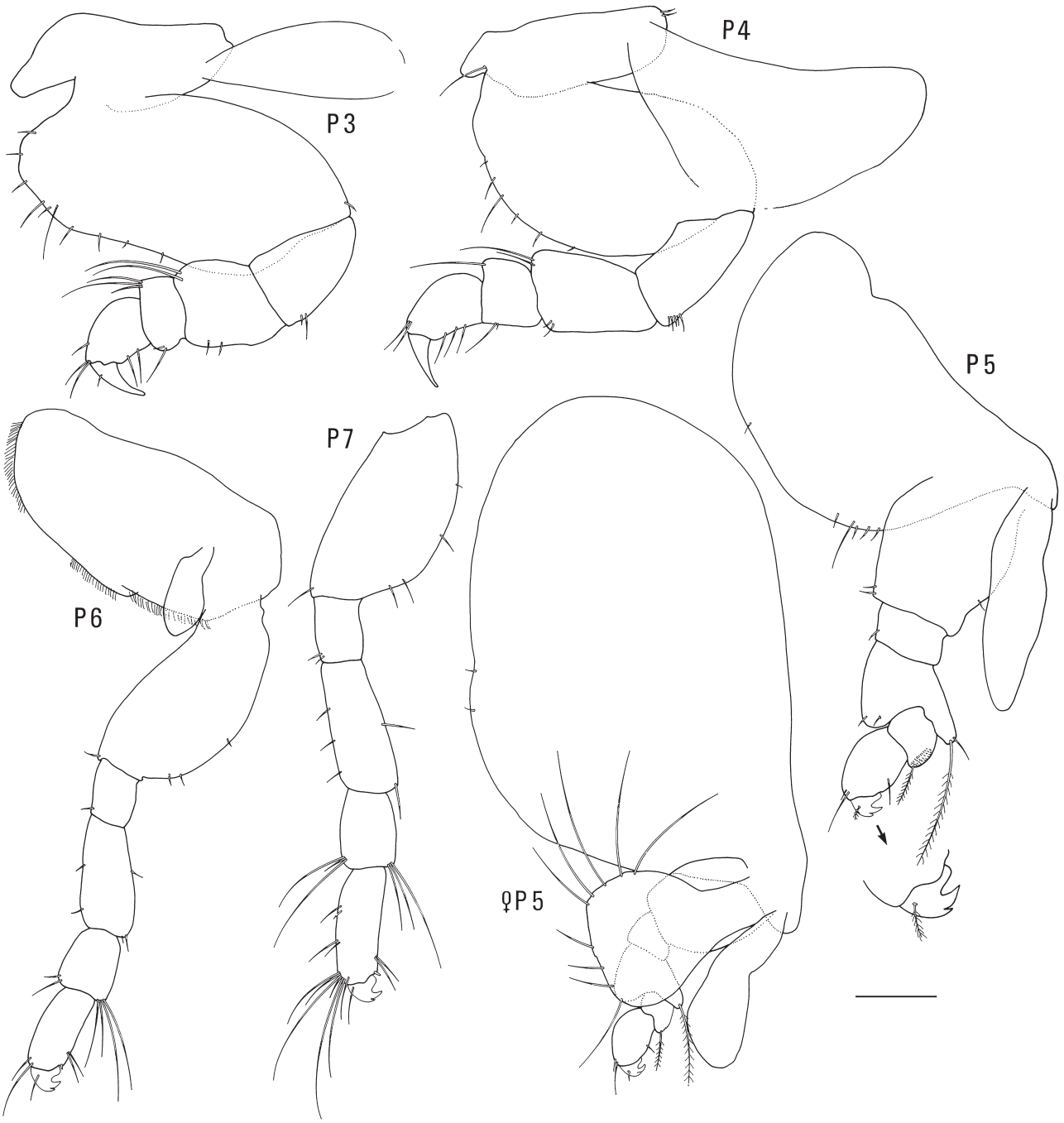

Figure 8. *Cerapus chiltoni* sp. nov.: holotype, male, 4.2 mm, AM P.106341; paratype, female, 3.3 mm, AM P.106345; Port Jackson, New South Wales, Australia. Pleopods 1–3 insertion points of setae are indicated by small circles. Scale 0.1 mm.

Cerapus dildilgang sp. nov.

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Figs 9–13

Holotype: Male, 3.8 mm, AM P.26097, off Sow and Pigs Reef, Port Jackson, New South Wales, Australia, 33°50'S 151°16'E, Smith-McIntyre benthic grab, shell and sandy mud, 5 m, J. K. Lowry & A. R. Jones, 30 September 1976. **Paratypes**: 1 female, ovigerous, 3.2 mm, AM P.106356; 1 male, 3.3 mm, AM P.106357; 1 male, 2.3 mm, AM P.106358; all with same data as holotype. 6 males, 3 females, 4 juveniles, AM P.10659, Store Beach, Port Jackson, New South Wales, Australia, 33°48'48"S 151°17'12"E, sand, detritus, and fine shell fragments, *Halodule* sp. and other algae, hand dredge on scuba, 3 m, AU 59, J. Just, P. B. Berents & R. T. Springthorpe, 26 September 1984.

Additional material examined. Many specimens, AM P.106360, same data as holotype; 157 specimens, AM P.106362, 200 m south-east of Croppy Point, Hawkesbury River, New South Wales, Australia, 33°33'S 151°14'E, sandy mud, Smith-McIntyre benthic grab, 12 m, HRS 2-3-2 Feb 84, A. R. Jones & A. Murray, 9 February 1984; many specimens, AM P.106361, just beyond beach flats, off Bagnalls Beach, Port Stephens, New South Wales, Australia, 32°43'17"S 152°7'17"E, 3 m, benthic sled, W. F. Ponder & J. Hall, 25 October 1980; 5 specimens, AM P.106363, Store Beach, Port Jackson, New South Wales, Australia, 33°48'48"S 151°17'12"E, sand, detritus, and fine shell fragments, *Halodule* sp. and other algae, hand dredge on scuba, 3 m, AU 59, J. Just, P. B. Berents & R. T. Springthorpe, 26 September 1984; 5 specimens, AM P.106364, Quarantine Beach, Port Jackson, New South Wales, Australia, 33°49'S 151°17'E, hand dredge on scuba, 2 m, J. Just, P. B. Berents & P. M. Berents, 1 March 1986; 2 males & 1 female, ovigerous, AM P.73726, Outer Latitude Rock, Forster, New South Wales, Australia, 32°12'39"S 152°34'06"E, sediment from rock face, hand collected on scuba, 16 m, NSW 2154, Australian Museum party, 18 March 2003; 1 male, AM P.106365, north of Moon Island, Swansea Heads, New South Wales, Australia, 33°05'08"S 151°40'25"E, rocky reef with barnacles, turf algae, and shelly sediment, airlift on scuba, 10 m, MI NSW 3458, R. T. Springthorpe, 5 May 2009.

Type locality. Off Sow and Pigs Reef, Port Jackson, New South Wales, Australia, 33°50'S 151°16'E.

Etymology. The species epithet means "little prawn" (prawn "dildil"; little "gang") in the language of the Dharawal people of Port Jackson. Used as a noun in apposition.

Description. **Male** (based on holotype, 3.8 mm, AM P.26097).

Head. **Rostrum short, length 0.2 × head**, evenly tapered, apically subacute; lateral cephalic lobe with ventral corner rounded, subocular margin deeply recessed, reaching beyond eye, anteroventral corner rounded, ventral margin sloping, posterior margin sloping. ***Antenna 1*** **long, length 0.6 × body length**; peduncle without scales; peduncular article 1 shorter than article 3, length 0.8 × peduncular article 3, not produced anterodistally and anteromedially, swollen along posterior margin, posterodistal corner not produced; peduncular article 2 anterodistal corner without distal projection; flagellum 4-articulate; article 1 long. ***Antenna 2*** **length equal to antenna 1**; flagellum 3-articulate.

Pereon. *Pereonite 1* with lateral keel, without sternal keel. *Pereonite 5* length 1.5 × depth.

Gnathopod 1 coxa not fused to pereonite 1, length 1.3 × depth, without anteroventral lobe; basis length twice depth; carpus broad, length 1.5 × depth with setose posterior lobe; propodus palm extremely acute, robust setae present. *Gnathopod 2* carpochelate; coxa not fused to pereonite

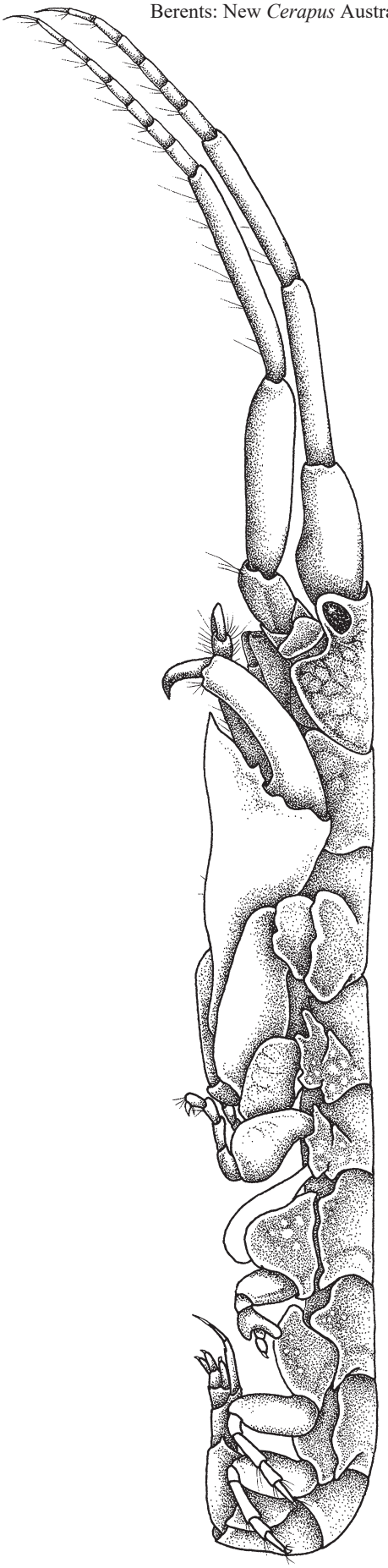

Figure 9. *Cerapus dildilgang* sp. nov., male, 3.7 mm, AM P.106360, off Sow and Pigs Reef, Port Jackson, New South Wales, Australia.

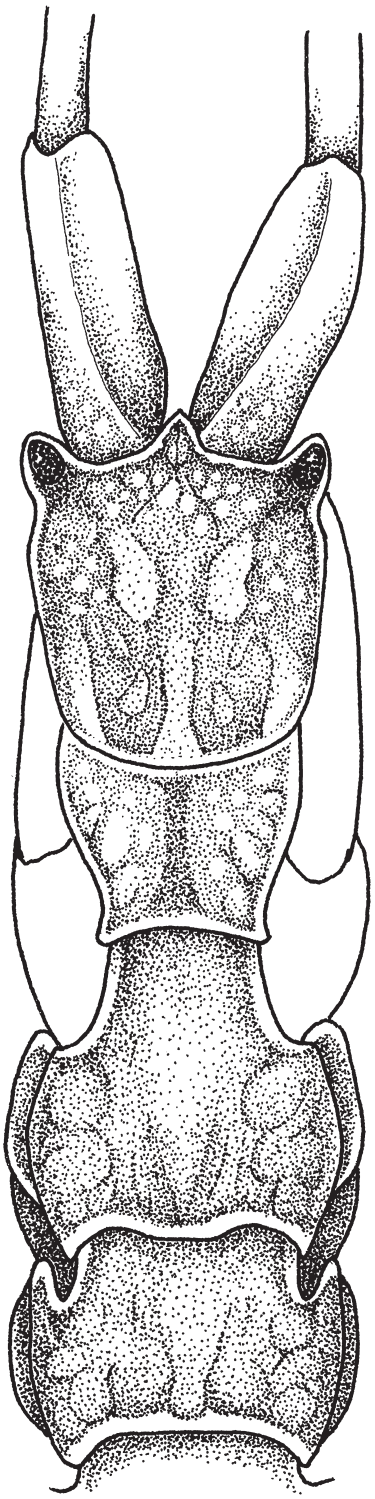

Figure 10. *Cerapus dildilgang* sp. nov., male, 3.7 mm, AM P.106360, dorsal view of head and pereonites 1–3, off Sow and Pigs Reef, Port Jackson, New South Wales, Australia.

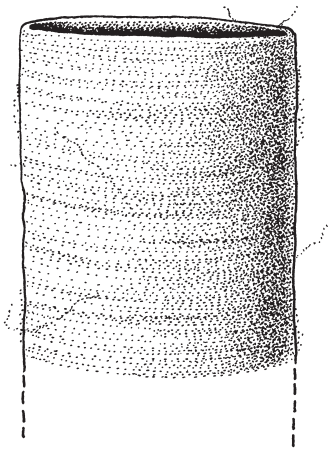

Figure 11. *Cerapus dildilgang* sp. nov., tube from AM P.106360, off Sow and Pigs Reef, Port Jackson, New South Wales, Australia, total length of tube 4 mm.

2, length twice depth, **without anteroventral lobe or cusp;** basis short, broad, length 1.7 × breadth, without anteroproximal group of long slender setae; carpus very long, length 1.9 × breadth, slender, posterior margin without teeth**, palm straight**, anterodistal tooth small, located near articulation with propodus, posterodistal tooth poorly defined; propodus slender, curved, length 4.8 × width, **without tooth on posterior margin**, posterodistal corner smooth, without teeth; dactylus length 0.5 × propodus.

Pereopod 3 coxa with narrow anteroventral lobe, not fused to pereonite 3, length 1.9 × depth; basis length 1.7 × breadth, anterior margin evenly rounded with simple setae, without denticles along anterior margin; ischium long, length 1.8 × breadth; merus length 1.1 × breadth; short; without ridges. *Pereopod 4* coxa not fused to pereonite 4, with anterior lobe separated from an anteroventral lobe; basis length 1.3 × breadth, with simple setal group midway along anterior margin; ischium long, length 2.2 × breadth; merus long, length 1.6 × breadth. *Pereopod 5* coxa length 1.5 × depth, without patches of small setae, with setae along ventral margin few or absent; merus with anterior lobe not extending beyond anterior margin of carpus, posterior lobe with 2 plumose setae; propodus with 1 seta along posterior margin; dactylus short, uncinate with 1 accessory hook. ***Pereopod 6* coxa with setal fringe** ventrally, without patches of small setae near margins; basis without patch of small setae near anterior margin; merus length 1.5 × breadth; dactylus short, uncinate, with 1 accessory hook. *Pereopod 7* coxa with posterodorsal lobe, without patch of small setae; merus length 1.4 × breadth; dactylus short, uncinate, with 1 accessory hook.

Pleon. *Pleopods 1–3* biramous, decreasing in size. *Pleopod 1* inner ramus 7-articulate; outer ramus 4-articulate, article 1 evenly swollen; *Pleopod 2* inner ramus reduced, 1-articulate; outer ramus, broad, 3-articulate. *Pleopod 3* inner ramus reduced, 1-articulate; outer ramus broad, 1-articulate. *Uropod 1* biramous; peduncle, length 1.5 × outer ramus; rami with distoventral fan of robust setae; outer ramus with lateral row of denticles, without medial setae, with 5 lateral

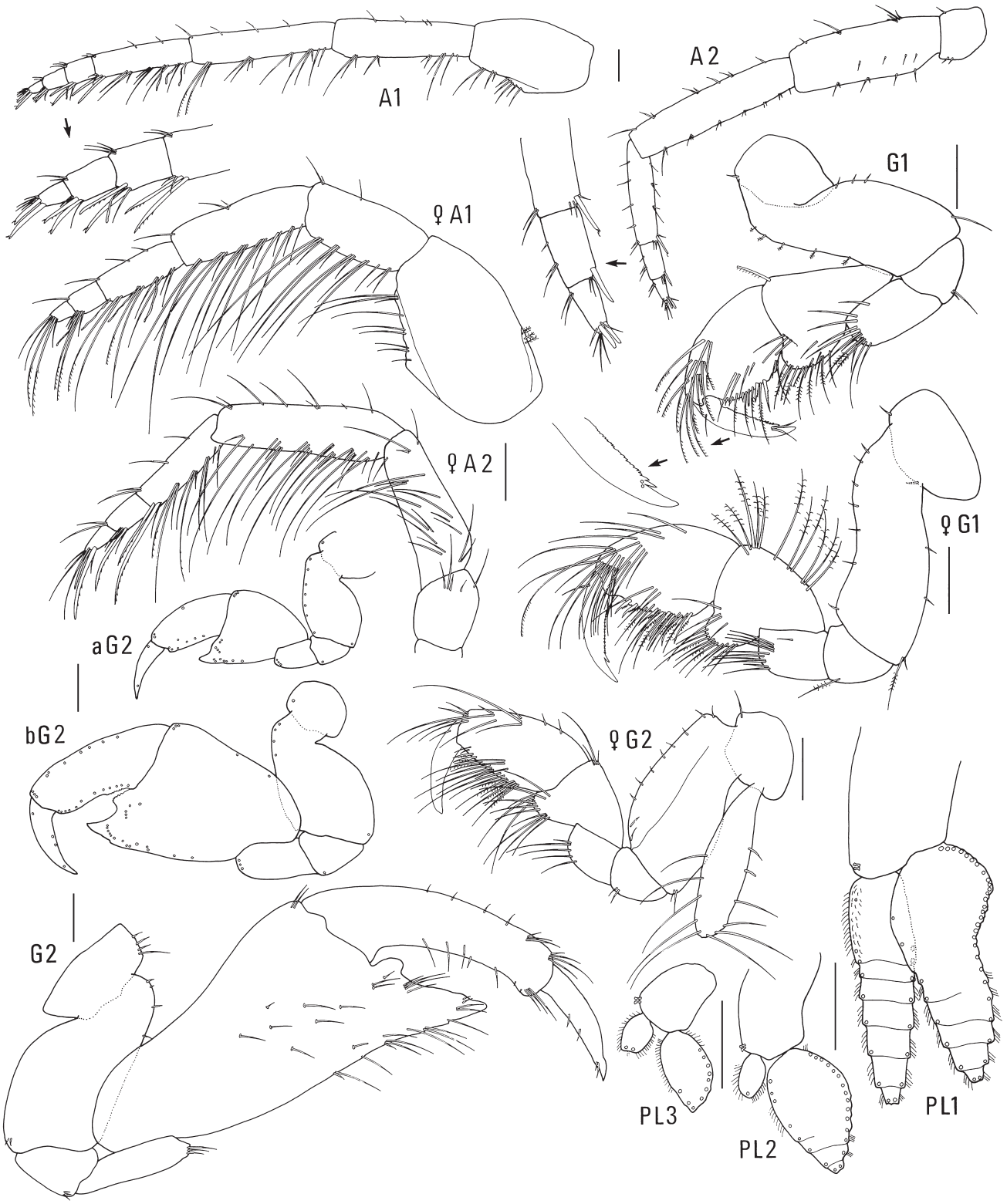

Figure 12. *Cerapus dildilgang* sp. nov., holotype, male, 3.8 mm, AM P.26097; paratype, male "a", 2.3 mm, AM P.106358; paratype, male "b", 3.3 mm, AM P.106357; paratype, female, 3.2 mm, AM P.106356; Port Jackson, New South Wales, Australia. Pleopods 1–3 insertion points of setae are indicated by small circles. Scale 0.1 mm.

setae, with large apical robust seta and smaller slender setae; inner ramus, length 0.6 × outer ramus, without medial and with 1 lateral seta, with large apical robust seta. *Uropod 2* uniramous, peduncle, length 3.6 × breadth, 5.9 × length of ramus; ramus small with 2 denticles and 1 slender apical seta. *Uropod 3* uniramous, peduncle length 1.3 × breadth; ramus with 2 curved hooks. *Telson* broader than long, length 0.4 × breadth, cleft to base, **each lobe with 12 anteriorly directed recurved spines in 2 rows**.

Female (sexually dimorphic characters). Based on paratype female, 3.1 mm, AM P.106356. *Antenna 1* peduncle without scales; flagellum 3-articulate. *Antenna 2* flagellum

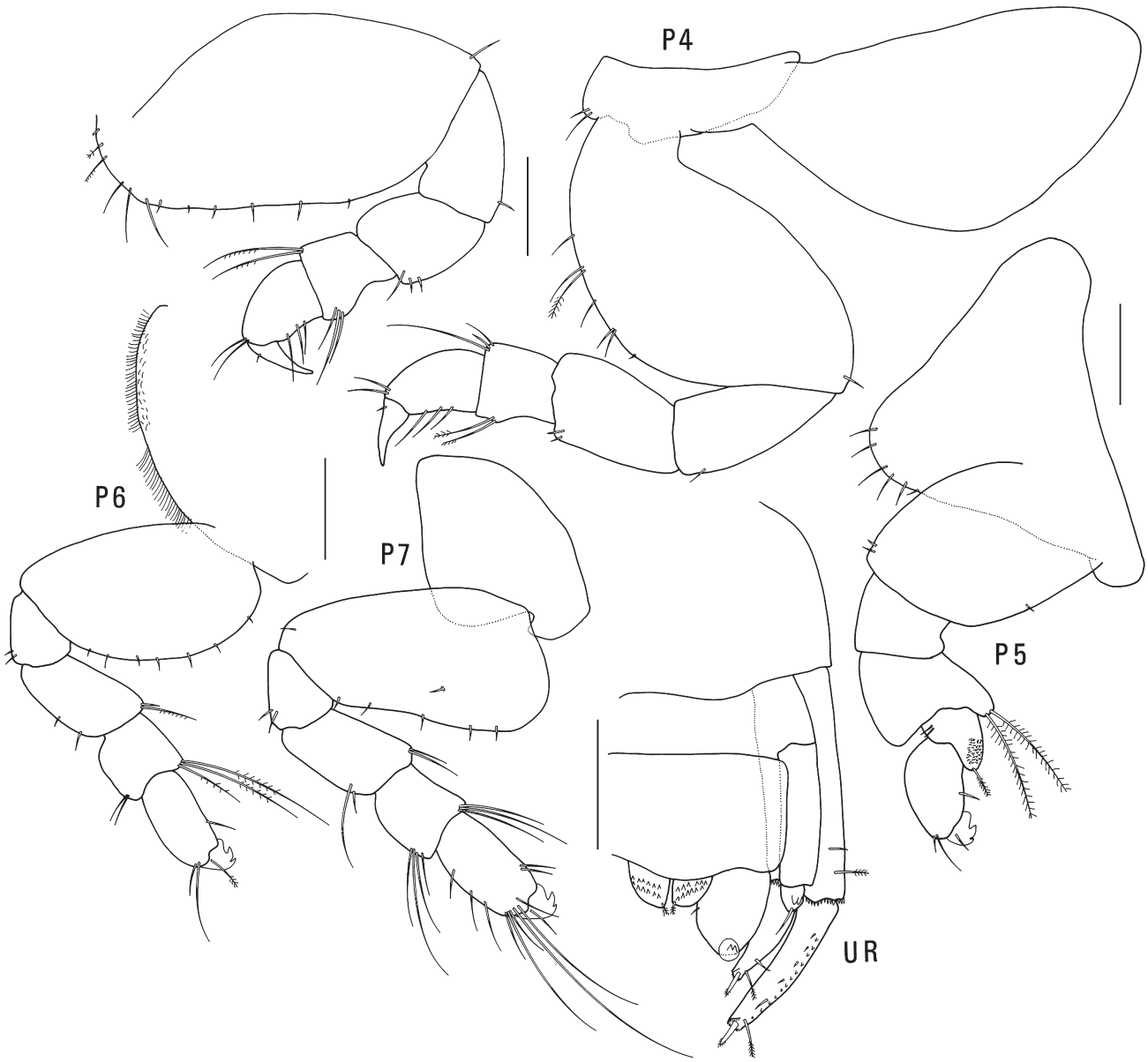

Figure 13. *Cerapus dildilgang* sp. nov., holotype, male, 3.8 mm, AM P.26097, Port Jackson, New South Wales, Australia. Scale 0.1 mm.

3-articulate. *Pereonite 1* without lateral keel. *Pereonite 2–3* without sternal keel. *Gnathopod 1* coxa length 1.5 × depth; basis length 2.6 × depth; carpus length 1.2 × depth, with setose posterior lobe. *Gnathopod 2* subchelate; coxa length 1.2 × depth; basis length 1.6 × depth, without medial line of setae; palm extremely acute *Pereopod 5* coxa length 1.6 × depth. *Oostegites* from gnathopod 2 to pereopod 5.

Tube. Fine grained smooth tube with light and dark rings.

Habitat. Marine, 2–16 m.

Remarks. The shape of gnathopod 2 propodus and carpus in *C. dildilgang* changes as males grow, with the propodus becoming curved and slender in larger males. The carpus comes more elongate in larger males with the length to breadth ratio increasing from 1.1:1 in males less than 3 mm, 1.2:1 in males up to 3.5 mm and 1.9:1 in the holotype (3.8 mm in length). On the carpus, the anterodistal tooth near the articulation with the propodus becomes more prominent in larger males. In males less than 3 mm in length the tooth is absent, and poorly defined in males up to 3.5 mm. The tooth is small but well defined in the holotype. The palm of gnathopod 2 is straight rather than excavate as in most species of *Cerapus*.

Distribution. New South Wales: Port Jackson to Port Stephens.

Cerapus lowryi sp. nov.

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Figs 14–18

Holotype: Male, 7.2 mm, AM P.51212, east of Port Jackson, New South Wales, Australia, 33°52'S 151°23'E, mud, epibenthic sled, 80 m, FRV *Kapala*, K80-20-11, R. T. Springthorpe, 11 December 1980. **Paratypes**: 1 male, 4.9 mm, AM P.106369; 1 male, 3.8 mm, AM P.106370; 1 male 6.1 mm, AM P.106371; 1 female, 5.1 mm; AM P.51213; all same data as holotype. 1 male, 6.5 mm, AM P.18116; 1 male 5.4 mm, AM P.106366; 2 females, AM P.106367, Bass Strait, Victoria, Australia, 39°S 148°30'E, 126 m, Esso-Gippsland st. 19, C. Phipps, 7–9 May 1969.

Additional material examined. 15 specimens, AM P.106373; 1 male AM P.106372; same data as holotype. 1 male, AM P.2525, 3–4 km off Botany Bay, New South Wales, Australia, 34°5'S 151°15'E, mud, 91–95 m, HMCS "Thetis", st. 37, E. R. Waite, 11 March 1898; 1 male, 1 female, AM P.106368, 9–12 km off Cape Three Points, New South Wales, Australia, 33°32'S 151°32'30"E, sticky mud & shell, 75–91 m, HMCS "Thetis", st. 13, E. R. Waite, 25 February 1898; 1 male, AM P.106374, southeast of Broken Bay, New South Wales, Australia, 33°36'S 151°30'E, trawl, 71–75 m, FRV "Kapala", 10 February 1986, K86-01-02; 1 male, AM P.106375, east of Port Jackson, New South Wales, Australia, 33°50'S 151°32'E, trawl, 132–135 m, FRV "Kapala", K85-21-01, J. K. Lowry & R. T. Springthorpe, 18 December 1985; 6 specimens, AM P.106376, east of Newcastle, New South Wales, Australia, 32°53'S 152°35'E, bottom tow with plankton net, 146–165 m, FRV "Kapala", K85-12-23, 15 August 1985; 1 male, AM P.22508, east of Malabar, New South Wales, Australia, 33°58'S 151°16'E, 32 m, Australian Museum Shelf Benthic Survey, 1973; 1 female, AM P.22507, 1 km east of Magic Point, New South Wales, Australia, 33°57'40"S 151°16'10"E, 31 m, Australian Museum Shelf Benthic Survey, Shipek Collection pt. D, 17 May 1972; 1 female ovigerous, 3.4 mm, AM P.22502, east of North Head, New South Wales, Australia, 33°49'S 151°18'E, on sponge *Polymastia craticia* Hallman, 1912, 26 m, Australian Shelf Benthic Survey, transect 7, 26 February 1974; many specimens, MV J.75818, 85 km north-east of North Point, Flinders Island, eastern Bass Strait, Tasmania, Australia, 39°02'24"S 148°30'36"E, dredge, 121 m, stn 169D, R. S. Wilson, 15 November 1981; 7 specimens, MV J.75817, 45 km north-east of North Point, Flinders Island, eastern Bass Strait, Tasmania, Australia, 39°31'48"S 148°24'25"E, Smith-McIntyre grab, 40 m, BSS 168G, R. S. Wilson, 15 November 1981; many specimens, MV J.75816, 85 km north-east of North Point, Flinders Island, eastern Bass Strait, Tasmania, Australia, 39°02'24"S 148°30'36"E, Smith-McIntyre grab, 121 m, stn 169G, R. S. Wilson, 15 November 1981.

Type locality. East of Port Jackson, New South Wales, Australia, 33°52'S 151°23'E.

Etymology. Named for Dr Jim Lowry, mentor, colleague, and friend, in recognition of his immense contribution to the study of the Amphipoda.

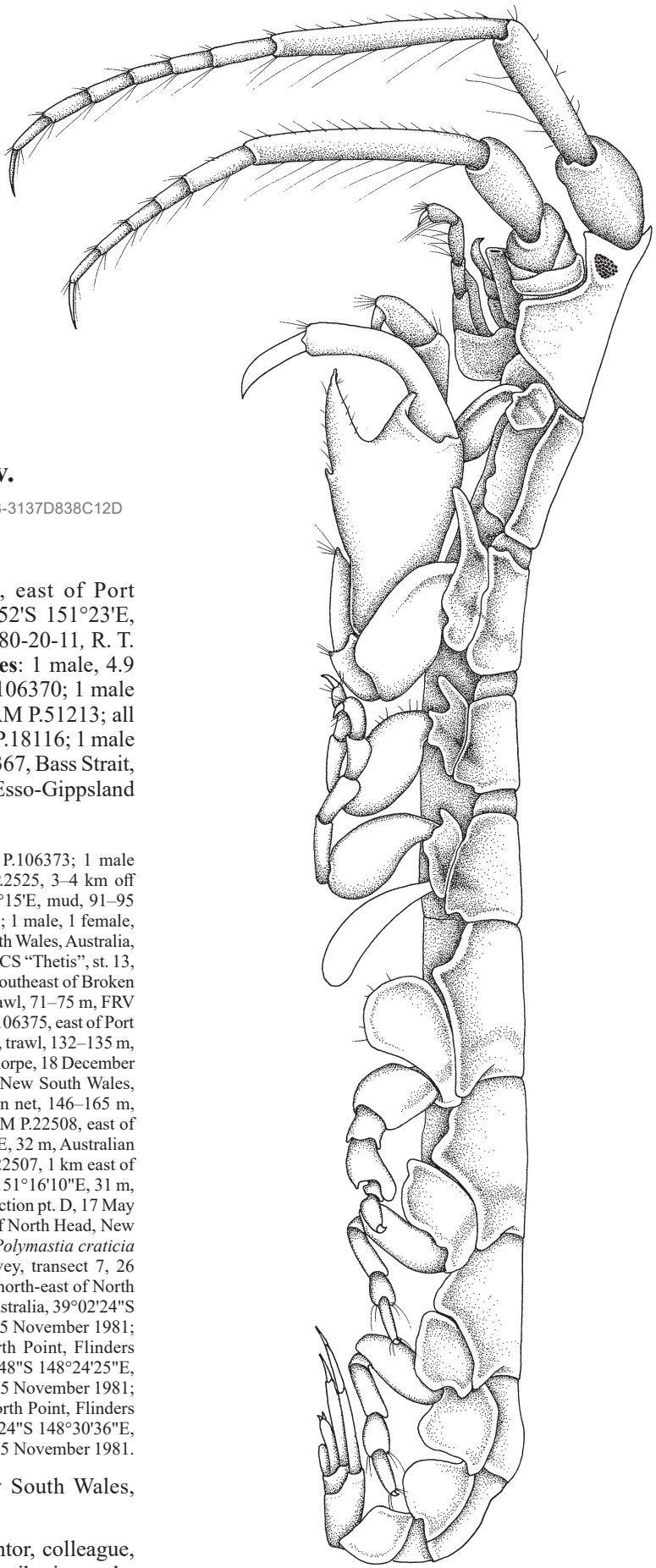

Figure 14. *Cerapus lowryi* sp. nov., paratype, male, 6.5 mm, AM P.18116, Bass Strait, Australia.

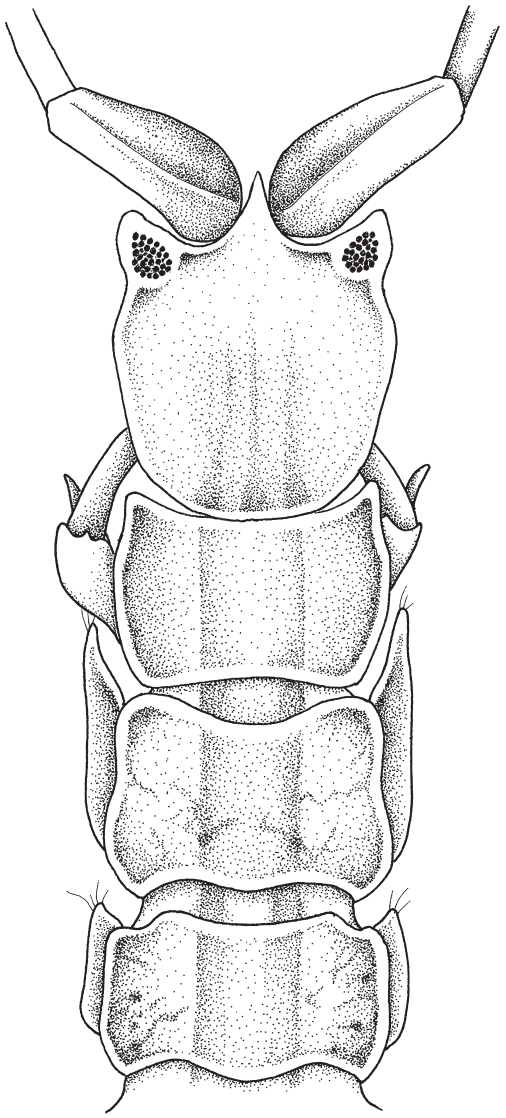

Figure 15. *Cerapus lowryi* sp. nov., paratype, male, 6.5 mm, AM P.18116, dorsal view of head and pereonites 1–3, Bass Strait, Victoria, Australia.

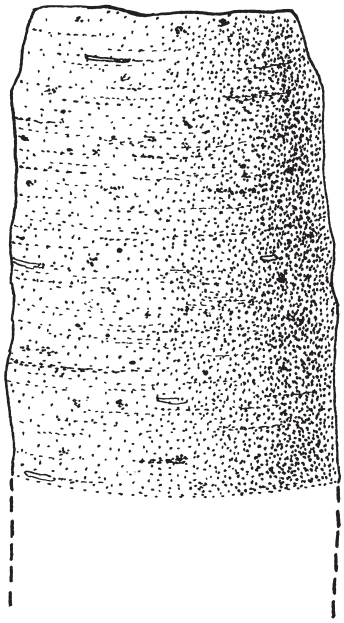

Figure 16. *Cerapus lowryi* sp. nov., tube from AM P.106373, east of Port Jackson, New South Wales, Australia, K80-20-11, length of tube 8 mm.

Description. **Male** (based on holotype, 7.2 mm, AM P.51212).

Head. Rostrum long, length 0.3 × head, evenly tapered, apically acute; lateral cephalic lobe with ventral corner acute, subocular margin deeply recessed, reaching beyond eye, anteroventral corner subquadrate, ventral margin horizontal, posterior margin sloping. ***Antenna 1*** **long, length 0.5 × body length**; peduncle with scales; peduncular article 1 shorter than article 3, length 0.7 × peduncular article 3 not produced anterodistally and anteromedially, with strong sub-quadrate projection along posterior margin, posterodistal corner not produced; peduncular article 2 anterodistal corner without distal projection; flagellum 5-articulate; article 1 short. ***Antenna 2*** **length 0.7 × antenna 1**; flagellum 5-articulate.

Pereon. *Pereonite 1* with lateral keel, without sternal keel. *Pereonite 2* with sternal keel. *Pereonite 3* without sternal keel. *Pereonite 5* length 1.6 × depth.

Gnathopod 1 coxa not fused to pereonite 1, length 1.9 × depth, without anteroventral lobe; basis length 2.1 × depth; carpus very broad, length 1.6 × depth with setose posterior lobe; propodus palm extremely acute, robust setae absent. *Gnathopod 2* carpochelate; coxa not fused to pereonite 2, length 2.6 × depth, **with a strongly produced anteroventral lobe**; basis short, broad, length 1.4 × breadth, without anteroproximal group of long slender setae; carpus long, length 1.6 × breadth, broad, posterior margin with small spine, **palm deeply excavate,** anterodistal tooth extremely produced, located near articulation with propodus, posterodistal tooth well defined, medium length, length 1.4 × width; propodus slender, strongly curved, length 5.6 × width, **without tooth on posterior margin**, posterodistal corner smooth, without teeth; dactylus, length 0.5 × propodus.

Pereopod 3 coxa with narrow anteroventral lobe, not fused to pereonite 3, length 1.9 × depth; basis, length 1.6 × breadth, evenly rounded, with plumose setal group and simple setae along anterior margin, with patches of denticles along medial surface; ischium long, length 2.5 × breadth; merus length 1.1 × breadth, short; without ridges. *Pereopod 4* coxa not fused to pereonite 4, with anterior lobe separated from several small anteroventral lobes; basis length 1.6 × breadth, with plumose setae along entire anterior margin; ischium long, length 3.1 × breadth; merus very long, length 2.2 × breadth. *Pereopod 5* coxa, length 1.5 × depth, without patches of small setae, with setae along ventral margin; merus with anterior lobe not extending beyond anterior margin of carpus, posterior lobe with 1 plumose seta; propodus with 2 setae along posterior margin; dactylus short, uncinate with 1 accessory hook.

Pereopod 6 **coxa with setal fringe ventrally**, without patches of small setae near margins; basis with patch of small setae near anterior margin; merus, length 1.8 × breadth; dactylus short, uncinate, with 1 accessory hook. *Pereopod 7* coxa without posterodorsal lobe**, with patch of small setae;** merus length 2.3 × breadth; dactylus, short, uncinate, with 1 accessory hook.

Pleon. *Pleopods 1–3* biramous, decreasing in size. *Pleopod 1* inner ramus 7-articulate; outer ramus 5-articulate,

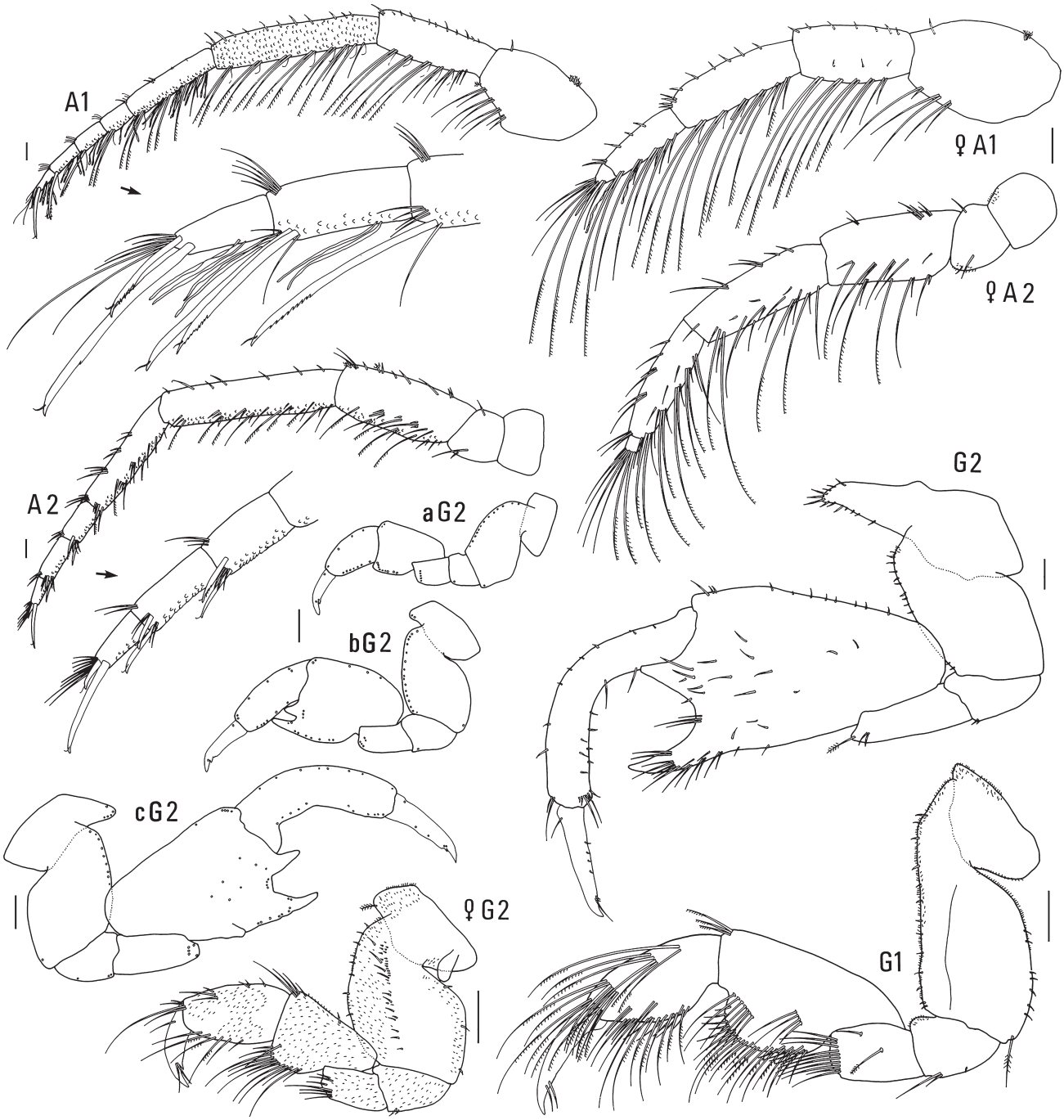

Figure 17. *Cerapus lowryi* sp. nov.: holotype, male, 7.2 mm, AM P.51212; paratype, male "a", 3.8 mm, AM P.106370; paratype, male "b", 4.9 mm, AM P.106369; paratype male "c", 6.1 mm, AM P.106371; paratype, female, 5.1 mm, AM P.51213; east of Port Jackson, New South Wales, Australia. Scales 0.1 mm.

article 1 evenly swollen; *Pleopod 2* inner ramus reduced, 1-articulate; outer ramus, broad, 1-articulate. *Pleopod 3* inner ramus reduced, 1-articulate; outer ramus broad, 1-articulate. *Uropod 1* biramous; peduncle, length 1.4 × outer ramus; rami with distoventral fan of robust setae; outer ramus with lateral row of denticles, without medial setae, with 10 lateral setae, with large apical robust seta, without smaller slender setae; inner ramus, length 0.8 × outer ramus, medial setae absent, with 8 lateral setae, with large apical robust seta. *Uropod 2* uniramous, peduncle, length 3.2 × breadth, 4.1 × length of ramus; ramus small with 6 denticles and 1 slender apical seta. *Uropod 3* uniramous, peduncle length 1.9 × breadth; ramus with 2 curved hooks. *Telson* broader than long, length 0.4 × breadth, cleft to base, **each lobe with 28–29 anteriorly directed recurved spines in 2 rows**.

Female (sexually dimorphic characters). Based on paratype female, 5.1 mm, AM P.51213. *Antenna 1* peduncle without scales; flagellum 2-articulate. *Antenna 2* flagellum 2-articulate. *Pereonite 1* without lateral keel. *Pereonites 1, 2, 3* without sternal keel. *Pereonite 5* length 1.7 × depth. *Gnathopod 1* coxa, length 1.7 × depth; basis length 1.9 × depth; carpus, length equal to depth with setose posterior lobe. *Gnathopod 2* subchelate; coxa length 1.9 × depth with short anteroventral lobe; basis length 1.1 × depth, with medial

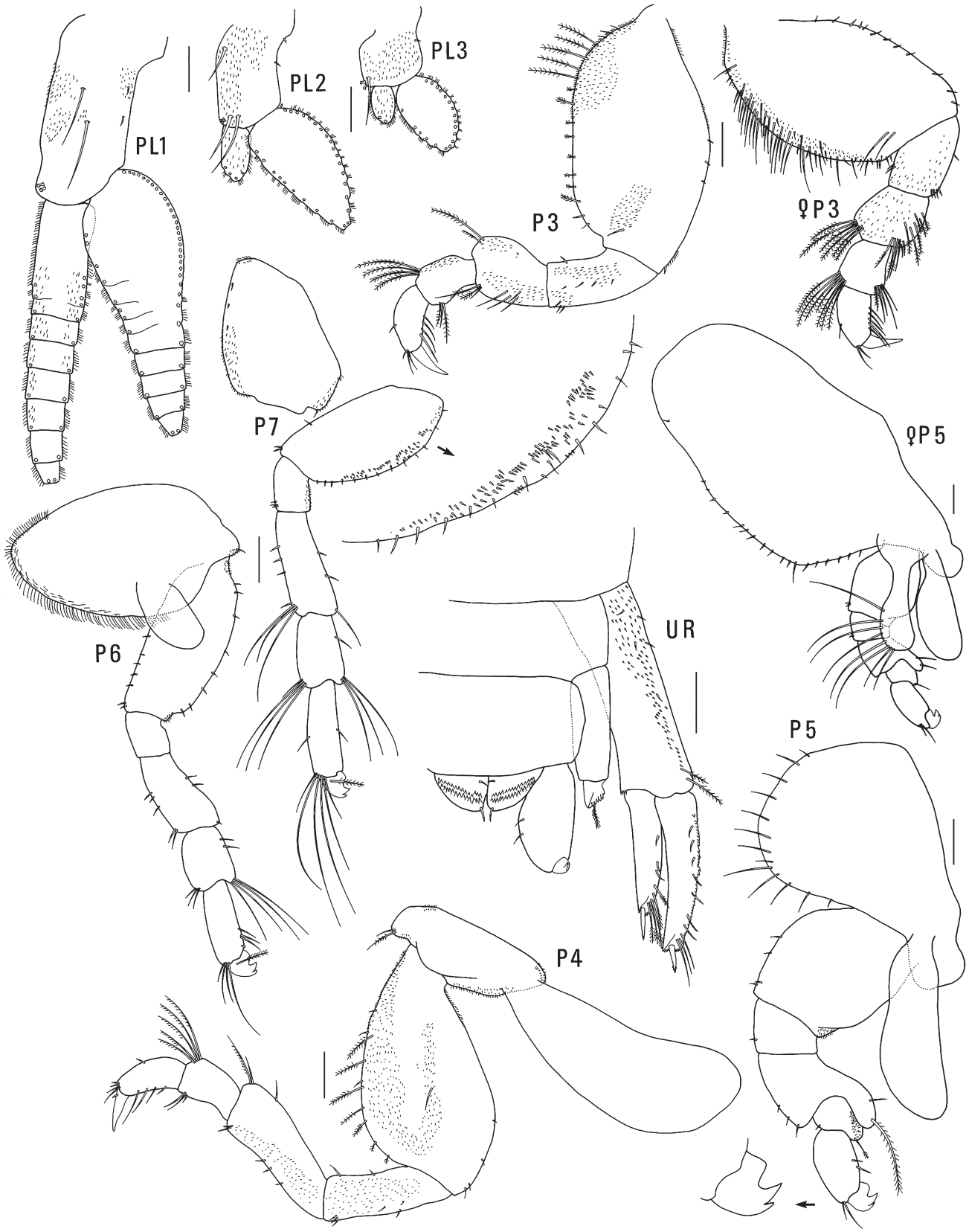

Figure 18. *Cerapus lowryi* sp. nov.: holotype, male, 7.2 mm, AM P.51212; paratype, female, 5.1 mm, AM P.51213; east of Port Jackson, New South Wales, Australia. Pleopods 1–3 insertion points of setae are indicated by small circles. Scales 0.1 mm.

line of setae; palm extremely acute. *Pereopod 5* coxa, length twice depth. *Oostegites* from gnathopod 2 to pereopod 5.

Tube. Long slender tube composed of fine grey sediment and detritus.

Habitat. Marine, 26–165 m.

Remarks. *Cerapus lowryi* and *C. chiltoni* are the only Australian species of *Cerapus* with a strongly produced anteroventral lobe on coxa 2. In *C. lowryi* the lobe becomes more produced in mature males. *Cerapus lowryi* differs from *C. chiltoni* in having a long rostrum and in the shape of the palm of gnathopod 2, which is deeply excavate in both, but narrow in *C. chiltoni* and wide in *C. lowryi* with the posterodistal tooth long in *C. chiltoni* and medium length in *C. lowryi*. The second gnathopod of *C. lowryi* also changes as males mature. The propodus becomes more curved and elongate in males greater than 7 mm in length. The carpus also becomes elongate with the ratio of length to width changing from 1:1.3 in males 3 mm to 6 mm in length, to 1:1.6 in males greater than 7 mm in length. *Cerapus lowryi* is the only Australian species with a very broad lobe on the carpus of gnathopod 1 in the male. Pereopod 3 is dimorphic in *C. lowryi* with all articles except the ischium bearing more setae in the female than the male. The basis of pereopod 7 has a patch of setae, which is unique to *C. lowryi* and *C. yuyatalay*.

Distribution. Bass Strait, Tasmania to east of Cape Three Points, New South Wales.

Cerapus moonamoona sp. nov.

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Figs 19–20

Holotype: Male, 5.0 mm, AM P.106377, off Moona Moona Creek, Jervis Bay, New South Wales, Australia, 35°02'54"S 150°41'12"E, airlift on scuba, 8 m, P. B. Berents, 17 November 1981. **Paratypes**: 1 female, ovigerous, 5.7 mm, AM P.106378, same data as holotype; 1 male, 3.7 mm, AM P.26872, north-east Botany Bay, New South Wales, Australia, 33°58'39"S 151°12'21"E, sandy mud, 7.5 m, State Pollution Control Commission, SPCC Stn. 29, 7 December 1976; 1 male, 4.2 mm, AM P.26875, east Botany Bay, New South Wales, Australia, 34°00'S 151°12'E, 11.6 m, State Pollution Control Commission, SPCC Stn.74, 27 January 1977; 1 male, 4.8 mm, AM P.106380, 1 male 4.5 mm, AM P.106381, off Moona Moona Creek, Jervis Bay, New South Wales, Australia, 35°03'S 150°40'E, silty sand with fine shell fragments, hand dredge on scuba, AU 76, J. Just, P. B. Berents & R. T. Springthorpe, 18 November 1984.

Additional material examined. 5 females, AM P.106379, same data as holotype; 1 female, 6 juveniles, AM P.106382, off Moona Moona Creek, Jervis Bay, New South Wales, Australia, 35°03'S 150°40'E, silty sand with fine shell fragments, hand dredge on scuba, AU 76, J. Just, P. B. Berents & R. T. Springthorpe, 18 November 1984.

Type locality. Off Moona Moona Creek, Jervis Bay, New South Wales, Australia, 35°2'54"S 150°41'12"E.

Etymology. Named for the type locality. Used as a noun in apposition.

Description. **Male** (based on holotype, 5.0 mm, AM P.106377).

Head. **Rostrum short, length 0.2 × head**, evenly tapered, apically subacute; lateral cephalic lobe with ventral corner subacute, subocular margin deeply recessed, reaching beyond eye, anteroventral corner acute, ventral margin horizontal, posterior margin vertical. ***Antenna 1*** **long, length 0.5 × body length**; peduncle without scales; peduncular article 1 longer than article 3, length 1.3 × peduncular article 3, slightly swollen, posterodistal corner not produced; peduncular article 2 anterodistal corner without distal projection; flagellum 5-articulate; article 1 long. ***Antenna 2*** **1.3 × length antenna 1**; flagellum 5-articulate.

Pereon. *Pereonite 1* without lateral keel, without sternal keel. *Pereonite 2* with sternal keel. *Pereonite 3* without sternal keel.

Gnathopod 1 coxa not fused to pereonite 1, length 1.4 × depth, without anteroventral lobe; basis length 1.7 × depth; carpus broad, length 1.3 × depth with setose posterior lobe; propodus palm extremely acute, with barbed robust setae. *Gnathopod 2* carpochelate; coxa not fused to pereonite 2, length 1.7 × depth, **without anteroventral lobe or cusp**; basis short, broad, length 1.6 × breadth, without anteroproximal group of long slender setae; carpus long, length 1.6 × breadth, broad, **palm shallowly excavate, with 2 apical robust setae**, anterodistal tooth tiny, located near articulation with propodus, posterodistal tooth long, well defined, length 1.6 × width; propodus slender, curved, length 5.4 × width, **without tooth on posterior margin**, posterodistal corner smooth, without teeth; dactylus length 0.4 × propodus.

Pereopod 3 coxa with broad anteroventral lobe, not fused to pereonite 3, length 2.7 × depth; basis, length 1.8 × breadth, with proximal, subquadrate anterodorsal corner, with simple setae along anterior margin, without denticles along anterior margin; ischium long, length 1.9 × breadth; merus length 1.1 × breadth, short, with ridges. *Pereopod 4* coxa with anteroventral lobe, not fused to pereonite 4, length 2.2 × depth; basis length 1.3 × breadth, with simple setal group midway along anterior margin; ischium long, length 2.3 × breadth; merus long, length 1.3 × breadth. *Pereopod 5* coxa, length 1.5 × depth, without patches of small setae, with setae along ventral margin few or absent; merus with anterior lobe extending beyond anterior margin of carpus, posterior lobe with 3 plumose setae; propodus with 2 setae along posterior margin; dactylus short, uncinate with 1 accessory hook.

Pereopod 6 **coxa with setal fringe ventrally**, without patches of small setae near margins; basis without patch of small setae near anterior margin; merus length 1.7 × breadth; dactylus short, uncinate, with 1 accessory hook. *Pereopod 7* coxa with posterodorsal lobe, without patch of small setae; merus length 1.6 × breadth; dactylus short, uncinate, with 1 accessory hook,

Pleon. *Pleopods 1–3* biramous, decreasing in size. *Pleopod 1* inner ramus 8-articulate; outer ramus 3-articulate, article 1 evenly swollen; *Pleopod 2* inner ramus reduced, 1-articulate; outer ramus, broad, 1-articulate. *Pleopod 3* inner ramus reduced, 1-articulate; outer ramus broad, 1-articulate. *Uropod 1* biramous; peduncle, length 1.5 × outer ramus; rami with distoventral fan of robust setae; outer ramus with lateral row of denticles, without medial setae, with 6 lateral setae, with large apical robust seta, without smaller slender

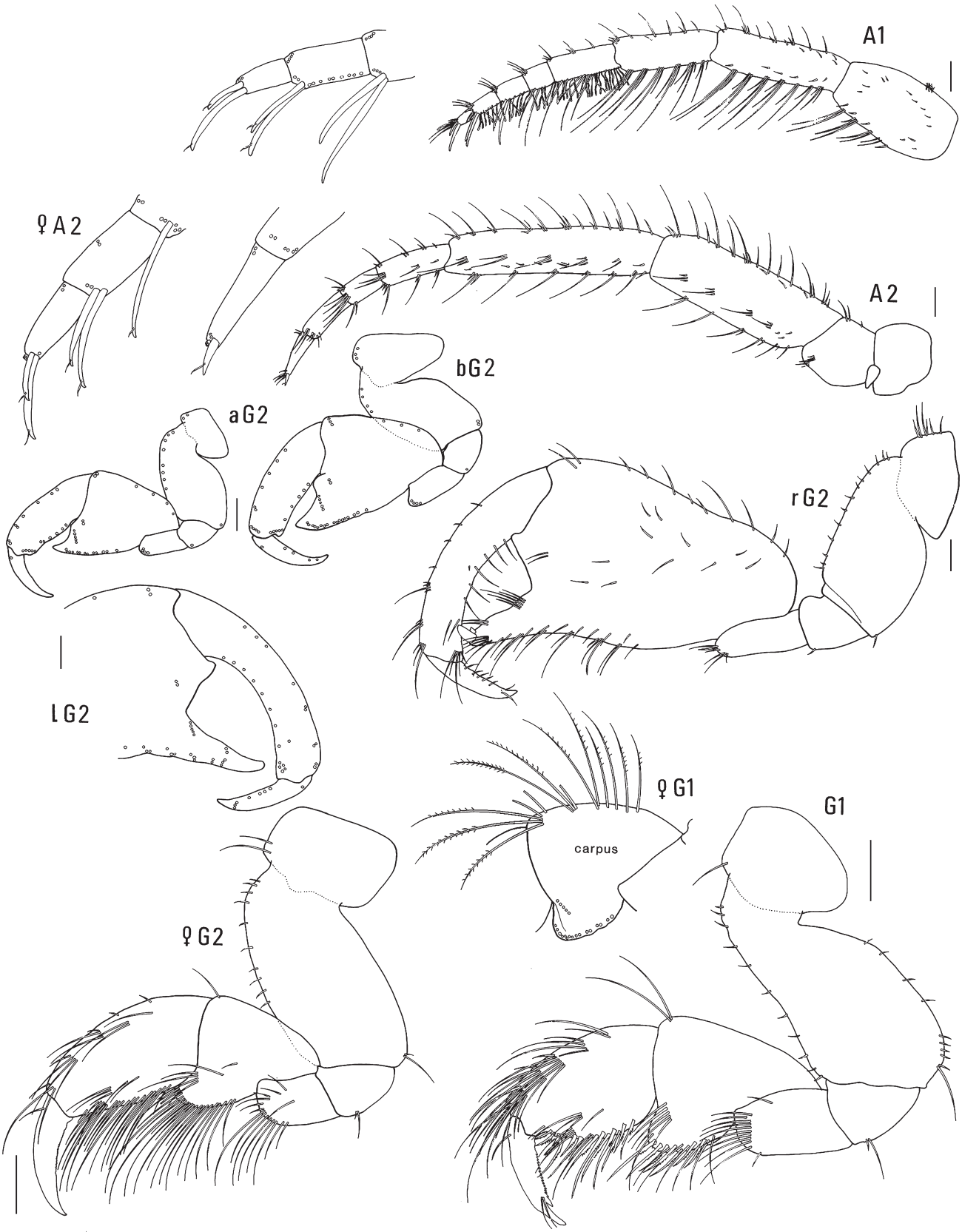

Figure 19. *Cerapus moonamoona* sp. nov.: holotype, male, 5.0 mm, AM P.106377; paratype, male "b", 4.5 mm, AM P.106381; paratype, female, 5.7 mm, AM P.106378; off Moona Moona Creek, Jervis Bay, New South Wales, Australia. Paratype, male "a", 3.7 mm, AM P.26872, north-east Botany Bay, New South Wales, Australia. Gnathopod 2 males "a", "b" and left G2 holotype insertion points of setae are indicated by small circles. Scales 0.1 mm.

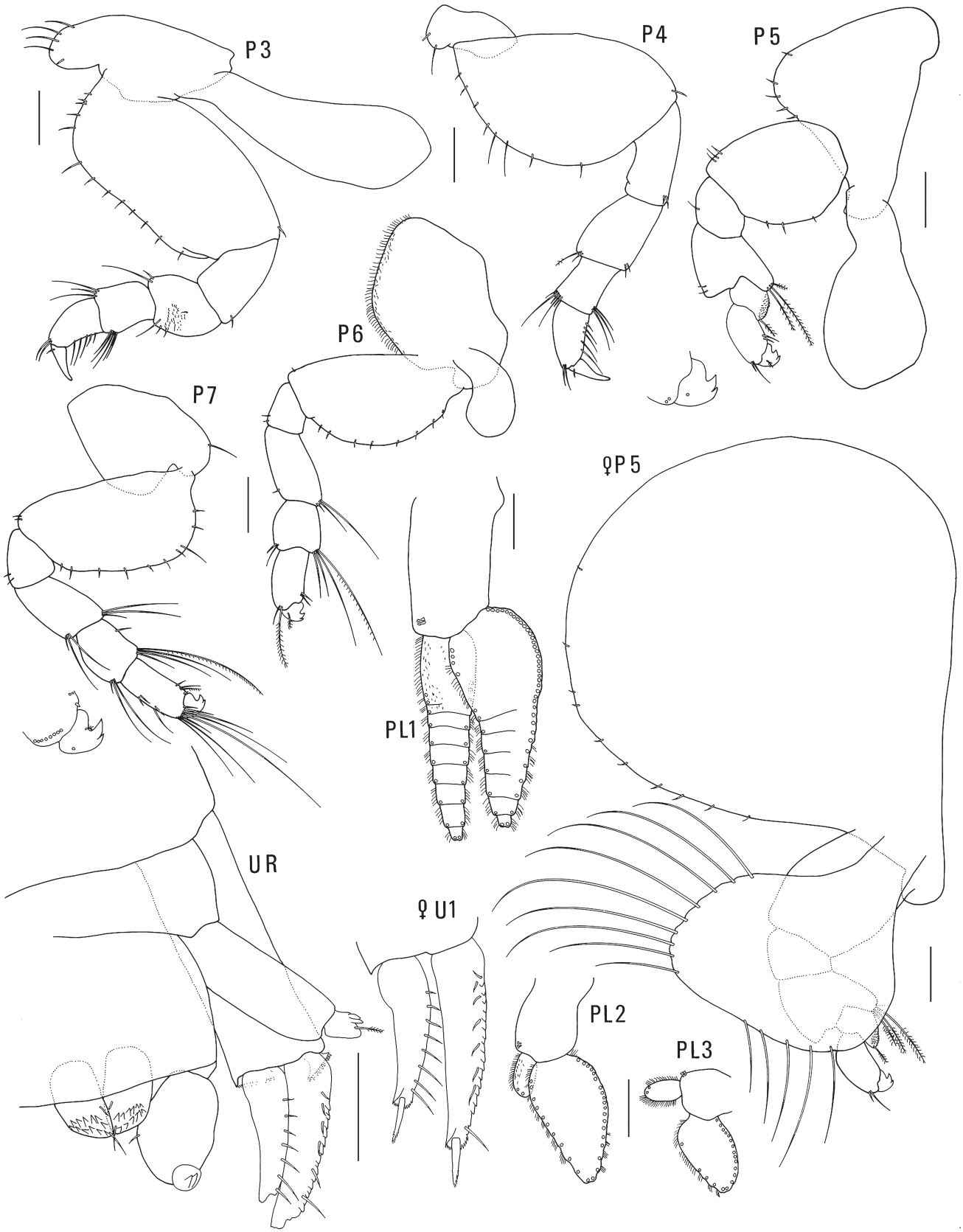

Figure 20. *Cerapus moonamoona* sp. nov.: holotype, male, 5.0 mm, AM P.106377; paratype, female, 5.7 mm, AM P.106378; off Moona Moona Creek, Jervis Bay, New South Wales, Australia. Pleopods 1–3 insertion points of setae are indicated by small circles. Scales 0.1 mm.

setae; inner ramus, length 0.7 × outer ramus, with 7 medial and no lateral setae, with large apical robust seta. *Uropod 2* uniramous, peduncle, length 2.5 × breadth, 4.2 × length of ramus; ramus small with 2 denticles and 1 slender apical seta. *Uropod 3* uniramous, peduncle length 1.4 × breadth; ramus with 2 curved hooks. *Telson* length 0.8 × breadth, cleft to base, **each lobe with 11 or 12 anteriorly directed recurved spines in 2 rows**.

Female (sexually dimorphic characters). Based on paratype female, 5.7 mm, AM P.106378. *Antenna 1* peduncle without scales; flagellum 4-articulate. *Antenna 2* flagellum 2-articulate. *Pereonite 1* without lateral keel. *Pereonite 2–3* without sternal keel. *Gnathopod 1,* coxa, length 1.4 × depth; basis, length 1.7 × depth; carpus, length 1.3 × depth with setose posterior lobe. *Gnathopod 2* subchelate; coxa, length 1.7 × depth; basis, length 1.8 × depth, without medial line of setae; palm extremely acute. *Pereopod 5* coxa, length 1.1 × depth. *Oostegites* from gnathopod 2 to pereopod 5.

Tube. Composed of fine sediment.

Habitat. Marine, 7–12 m.

Remarks. *Cerapus moonamoona* is the only Australian species with peduncular article 1 longer than peduncular article 3 on antenna 1. *Cerapus moonamoona* and *C. alquirta* are the only Australian species with the male second antenna 2 longer than antenna 1 and both species have a sternal keel on pereonite 2. *Cerapus moonamoona* differs from *C. alquirta* in having 11 or 12 recurved spines on the telson whereas *C. alquirta* has 8 recurved spines on the telson; *C. alquirta* lacks a setal fringe on coxa 6; the posterior margin of the carpus and propodus of female gnathopod 2 is more densely setose in *C. moonamoona* and male coxa 5 is twice as long as wide in *C. alquirta* compared with 1.5 times longer than wide in *C. moonamoona*. The tube of *C. alquirta* is broader at one end and the tube of *C. moonamoona* is straight.

The male gnathopod 2 of *C. moonamoona* changes in shape as the male matures. The propodus is curved and slender in males longer than 4.5 mm. The posterodistal tooth of the carpus of gnathopod 2 becomes longer and more strongly defined in males of 5.0 mm. The carpus of gnathopod 2 is more elongate in mature males with the ratio of length to width 1:1.2–1:1.3 in males of 3.7–4.5 mm and 1:1.6 in males of 5.0 mm. Mature males have 2 apical robust setae on the palm, which is unique to *C. moonamoona.*

Distribution. New South Wales: Botany Bay and Jervis Bay.

Discussion

The domiciliary tubes of cerapodinines are particular to each species and are useful in distinguishing species. Most species construct their tubes from sediment and detritus but some species construct a tube by wrapping algae and seagrass as seen in *C. bundegi*, *C. murrayae* and *C. volucola* (Lowry & Berents, 2005). The tubes of *Kapalana* spp. are characterized by the female tube with the tubes of juveniles encircling the female tube (Berents & Lowry, 2018). The five species described herein all build tubes from sediment or sediment and detritus. The tube of *C. chiltoni* is composed of sediment and has one end with a distinctive flare. The tubes of *C. brevirostris* are usually partly covered with sponge and ascidians. The tubes constructed by *C. lowryi* are long and slender. Barnard *et al*. (1991) described tube construction in amphipods, including in two species of *Cerapus,* but it is not known how tubes are constructed for any Australian species of *Cerapus*.

The large carpochelate gnathopod 2 is a distinctive character of mature male *Cerapus.* As the male grows the carpus lengthens and the propodus becomes slender and curved. The palm develops distinctive characters that vary from the straight palm of *C. dildilgang* to the shallowly excavate palm of *C. moonamoona* and *C. brevirostris,* and the deeply excavate palm of *C. chiltoni* and *C. lowryi.* Characters such as the tooth on the posterior margin of the propodus of *C. brevirostris*, the large chisel-shaped posterior tooth of the palm of *C. chiltoni* and the apical robust setae on the posterior tooth of the palm of *C. moonamoona* only appear in large males. Gnathopod 2 of immature males have a straight or shallowly excavate palm, hence gnathopod 2 is not a useful taxonomic character for smaller males.

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