

The Coastal Talitridae (Amphipoda: Talitroidea) of Southern and Western Australia, with Comments on *Platorchestia platensis* (Krøyer, 1845)

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ABSTRACT. A total of eight coastal talitrid amphipods from Victoria, South Australia and Western Australia are documented. Three new genera (*Australorchestia* n.gen.; *Bellorchestia* n.gen. and *Notorchestia* n.gen.) and seven new species (*Australorchestia occidentalis* n.sp.; *Bellorchestia richardsoni* n.sp.; *Notorchestia lobata* n.sp.; *N. naturaliste* n.sp.; *Platorchestia paraplatensis* n.sp. *Protorchestia ceduna* n.sp. and *Transorchestia marlo* n.sp.) are described. *Notorchestia australis* (Fearn-Wannan, 1968) is reported from Twofold Bay, New South Wales, to the Eyre Peninsula, South Australia. Seven Australian and New Zealand “*Talorchestia*” species are transferred to *Bellorchestia*: *B. chathamensis* (Hurley, 1956); *B. kirki* (Hurley, 1956); *B. marmorata* (Haswell, 1880); *B. pravidactyla* (Haswell, 1880); *B. quoyana* (Milne Edwards, 1840); *B. spadix* (Hurley, 1956) and *B. tumida* (Thomson, 1885). Two Australian “*Talorchestia*” species are transferred to *Notorchestia*: *N. australis* (Fearn-Wannan, 1968) and *N. novaehollandiae* (Stebbing, 1899). Type material of *Platorchestia platensis* and *Protorchestia lakei* were re-examined for comparison with Australian species herein described. A key to the species herein described is provided.

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The family Talitridae includes about 250 species distributed in 52 genera, being the only amphipod group that has colonized terrestrial habitats. Coastal talitrids reported herein include species living by the sea on beaches, in estuarine areas, and even fully freshwater streams. Worldwide they include about 22 genera represented by the marsh-hoppers, beach-hoppers, and sand-hoppers. The fourth ecological group within the Talitridae, the land-hoppers, can be found near the sea or at high altitudes, but they inhabit the forest-floor litter, and are considered truly terrestrial. Definitions of

these four ecological groups were first proposed by Bousfield (1982, 1984) and are currently used in the literature, although they do not reflect monophyletic groups.

Australian land-hoppers are relatively well known from the works of Friend (1979, 1982, 1987). Richardson *et al.* (1991, 1997) and Richardson & Mulcahy (1996) showed the zonation of species, including land-hoppers, along Tasmanian coastlines. More recently, Peart & Lowry (2006) described six new land-hoppers from New South Wales. Land-hoppers will not be considered further in this study.

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The first genera established to include coastal talitrids were *Orchestia* Leach, 1793, *Talitrus* Latreille, 1802, *Orchestoidea* Nicolet, 1849, and *Talorchestia* Dana, 1852. Until Bousfield's revisions (1982, 1984) most coastal species were identified within these genera. However, line drawings at that time were insufficient to define these groups, especially between *Orchestia* and *Talorchestia*, leading to the current difficulties (Hurley, 1956; Morino & Miyamoto, 1988). Bousfield (1982) revised part of the coastal talitrids based on material from the northeastern Pacific coast. The *Orchestia* complex was subdivided into six genera, and the *Orchestoidea* complex into four genera. *Uhlorchestia* was erected to include some of the marsh-hopper species from the Atlantic coast of North America (Bousfield & Heard, 1986). The *Talorchestia* complex was not considered at that time.

Morino and Miyamoto (1988) proposed a redefinition of *Talorchestia* (*sensu stricto*), that included the type species, *T. gracilis* (Dana, 1852), plus *T. spinipalma* (Dana, 1852), *T. martensii* (Weber, 1892) and *T. palawanensis* Morino & Miyamoto, 1988. Subsequently, Miyamoto & Morino (1999) included a fifth species, *T. mindorensis* Olerod, 1970. Although this new definition may be correct, it is incomplete because it leaves the remaining species of *Talorchestia* (*sensu lato*) without a generic name. Later, Bousfield (1991) treated some sand-hoppers species from the Gulf of Mexico and erected *Americorchestia*, including part of the *Talorchestia* species to this new genus. Serejo (2004) created *Atlantorchestioidea* to include the common, highly adapted Brazilian sand-hopper from open beaches, *A. brasiliensis* (Dana, 1853). Ruffo (in Tafani *et al.*, 2004) proposed two new genera, *Deshayesorchestia* and *Sardorchestia*, for Mediterranean species of *Talorchestia* (*sensu lato*) based on molecular analysis. Some *Talorchestia* (*sensu lato*) species have also been transferred to new genera (*Notorchestia* and *Bellorchestia*) in this study. At this point 26 species of *Talorchestia* (*sensu lato*) remain unplaced.

Although quite common on Australian beaches and in mangrove areas, knowledge of the coastal Australian talitrid fauna is scattered and based mainly on works from the 19th century. Of the 42 known Talitridae species in Australia, 14 are recorded for the coastal zones, all from the eastern or southern coasts (Lowry & Stoddart, 2003). There were no records of talitrids from the Northern Territory or from Western Australia until this study.

Dana (1852) was the first to describe talitrid species from Australia, recording two species of *Orchestia* from New South Wales (NSW), *O. dispar* and *O. quadrimanus*. Haswell (1879; 1880) studied material from Queensland, New South Wales and Tasmania, and described six additional species of *Orchestia* and *Talorchestia*: *O. macleayana* Haswell, 1879; *O. marmorata* Haswell, 1880; *T. diemenensis* Haswell, 1879; *T. limicola* Haswell, 1880; *T. pravidactyla* Haswell, 1880 and *T. terraereginae* Haswell, 1880. Stebbing (1899) described *T. novaehollandiae* from New South Wales. More recently, Fearn-Wannan (1968) described *Orchestia australis* from Victoria; Marsden & Fenwick (1984) described a new genus and species, *Chroestia lota*, from Queensland; Richardson

(1993) described two new species of estuarine talitrids, *Eorchestia palustris* and *E. rupestris* from Tasmania and Richardson (1996) described *Protorchestia lakei* also from Tasmania. Morino & Miyamoto (1988) recorded *Talorchestia palawanensis* (Morino & Miyamoto, 1988) from Thursday Island, Queensland, and *T. spinipalma* (Dana, 1852) from Port Denison, Queensland. However, the Australian record of *T. spinipalma* is based on a synonymy proposed by Stebbing (1906), who considered *T. terraereginae* Haswell (1880), type locality, Port Denison, Queensland, to be a junior synonym of *T. spinipalma*, type locality, Tongatabu, Tonga. This study is a step in the improvement of the knowledge of the Australian coastal talitrids.

Methods

Aside from the work of Alastair Richardson in Tasmania, there have been no comprehensive collections of Australian coastal talitrids. Between 8 October and 6 November 2003, we drove along the southern Australian coastline making 65 collections from 18 sites in Victoria, 21 sites in South Australia and 26 sites in Western Australia as far north as Exmouth Gulf. We collected eight species from exposed and sheltered beaches, mangroves and marshes in what became known as the "Australian National Talitrid Survey" (ANTS 1). Only one of the eight species had been reported earlier for this area.

For each collection, some of the specimens were fixed in 10% formalin and some were fixed in 95% ethanol. Formalin-fixed specimens were prepared for SEM as follows. Dissected parts were cleaned, taken through alcohol up to 100%, critical point dried, mounted individually on aluminium stubs using carbon double-adhesive tape and gold sputter coated. They were then imaged on a LEO 435 VP scanning electron microscope. Digital images were taken with a Hotshot camera connected to a computer. Images were prepared for plates using *Adobe Photoshop*. Line draw plates were done using a stereomicroscope with camera lucida. Scale bars of plates 4, 8, 12, 16, 20, 24, 26, and 33 were given only to one structure of a group of pieces. So, the scale given to one of the oostegites should be considered to the others, to one of the branchiae should be considered to the others and to one of the pleopods should be considered to the others. Material from these collections is deposited in the Australian Museum, Sydney (AM), the Museu Nacional, Rio de Janeiro (MNRJ), Museum Victoria, Melbourne (NMV) and the Zoological Museum, Copenhagen (ZMUC), and forms the basis of this study.

The taxonomic descriptions and diagnoses presented in this paper were generated from a DELTA (Dallwitz, 2005) database to world talitrid genera and species. The following abbreviations are used on the plates: **A**, antenna; **Art**, article; **BR**, branchiae; **EP**, epimeron; **G**, gnathopod; **LL**, lower lip; **MD**, mandible; **MP**, maxilliped; **MX**, maxilla; **O**, oostegite; **P**, pereopod; **PL**, pleopod; **T**, telson; **UL**, upper lip; **U**, uropod; **l**, left; **r**, right. Abbreviations in the text are as follows: **NSW**, New South Wales; **SA**, South Australia; **VIC**, Victoria; **WA**, Western Australia.

Systematics

Key to coastal talitrid species of Victoria, South Australia and Western Australia

- 1 Pereopods 3–7 simplidactylate; dactylus of pereopod 4 similar to that of pereopod 3 (Figs 27, 28) *Protorchestia ceduna* n.sp.
 — Pereopods 3–7 cuspidactylate; dactylus of pereopod 4 variously thickened, unlike that of pereopod 3 2
- 2 Antenna 2 geniculate; gills 2–6 simple, sac-like and similar in size; uropod 1 peduncle with distolateral robust seta; uropod 2 outer ramus without marginal setae (Figs 1, 3, 4) *Australorchestia occidentalis* n.sp.
 — Antenna 2 not geniculate; gills 2–6 lobate and/or convoluted, gills 3–5 smaller than gills 2 and 6; uropod 1 peduncle without distolateral robust seta; uropod 2 outer ramus with marginal robust setae 3
- 3 Epistome with robust setae; uropods 1–2 peduncle with ventral robust setae; telson broader than long (Figs 5, 7) *Bellorchestia richardsoni* n.sp.
 — Epistome without robust setae; uropods 1–2 peduncle without ventral robust setae; telson longer than broad 4
- 4 Left lacinia mobilis 5-dentate; outer ramus of uropod 1 without setae (Figs 21, 23) *Platorchestia paraplatensis* n.sp.
 — Left lacinia mobilis 4-dentate (rarely 5-dentate); outer ramus of uropod 1 with setae 5
- 5 Male antenna 2 peduncle enlarged; article 2 of maxilliped palp without lobe; oostegites 2–5 curl-tipped setae; telson slightly emarginate (Figs 30, 32, 33) *Transorchestia marlo* n.sp.
 — Male antenna 2 peduncle not enlarged; article 2 of maxilliped palp with lobe; oostegites 2–5 with simple or multi-furcate tip setae; telson cleft to half length (Figs 9, 11, 12) (*Notorchestia*) 6
- 6 Antenna 2 with many robust setae; female and juvenile male gnathopod 2 merus with posterodistal hook-like process on medial surface; pereopod 7 basis with lateral sulcus (Figs 13–15) 7
 — Antenna 2 with few robust setae; female and juvenile male gnathopod 2 merus without posterodistal hook-like process on medial surface; pereopod 7 basis without lateral sulcus (Figs 9–11) *Notorchestia australis*
- 7 Adult male gnathopod 2 propodus sub-quadrate; palm slightly acute to transverse, with large midpalmar concavity; male pereopod 7 basis with posteroventral lobe, but lacking frontal rounded lobe; peduncle of pleopod 1 with medial robust setae (Figs 14, 16) *Notorchestia lobata* n.sp.
 — Adult male gnathopod 2 propodus sub-triangular; palm acute, sinuous, with small midpalmar concavity; male pereopod 7 basis without posteroventral lobe, but with frontal rounded lobe; peduncle of pleopod 1 without medial robust setae (Figs 18, 20) *Notorchestia naturaliste* n.sp.

Australorchestia n.gen.

Type species. *Australorchestia occidentalis* n.sp.

Etymology. The name is a combination of Australia and the generic name *Orchestia*.

Diagnosis. Antenna 2 geniculate, sexually dimorphic, male peduncle slightly enlarged when compared with female. Mandible left lacinia mobilis 4-dentate. Maxillipedal

palp dactylus present, reduced. Gnathopod 2 subchelate; basis narrow; propodus palm posterodistal corner without protuberance; dactylus attenuated distally. Pereopods 3–7 cuspidactylate. Pereopod 4 carpus significantly shorter than carpus of pereopod 3. Pereopod 6 not sexually dimorphic. Pereopod 7 sexually dimorphic or not, distal articles (merus and carpus) slightly expanded in terminal males; basis lateral sulcus absent. Gills simple, sac-like and similar in size. Oostegites 2–5 setae with simple straight tips. Pleopods all well developed. Uropod 1 outer ramus with lateral marginal

Table 1. Morphological differences among 4-dentate cuspidactylate beach-hopper genera. Abbreviations given on p. 162.

	<i>Australorchestia</i> n.gen.	<i>Chroestia</i> Mardesen & Fenwick, 1984	<i>Floresorchestia</i> Bousfield, 1984	<i>Orchestia</i> Leach, 1813–1814	<i>Tethorchestia</i> Bousfield, 1984	<i>Transorchestia</i> Bousfield, 1982
A2 article 2 of MP palp	geniculate without lobe medially strongly attenuated distally	not geniculate with well-devel- oped lobe strongly atten- uated distally	geniculate with small or without lobe* attenuated	not geniculate with well- developed lobe not attenuated	geniculate with small or without lobe attenuated	not geniculate with well- developed lobe not attenuated
G2 male dactylus	slender	expanded	slightly expanded	expanded	expanded antero- proximally	slightly expanded
G2 female basis	slightly expanded	expanded	slender	expanded	slender	expanded
merus and carpus of male adult	absent	absent	present	absent	absent	absent
submarginal row of pits on EP2–3	present, well developed	present, well developed	usually developed	weak/lacking	present, well developed	lacking
U1 distolateral robust setae	with 1–3 setae	developed lacking setae	lacking setae ^a	with at least 1 seta	lacking setae	with setae
U1 outer ramus margins	lacking setae	with 1 seta	with at least 1 seta	with at least 1 seta	with 2 setae	with at least 1 seta
U2 outer ramus margin	simple	curl-tipped	simple	simple	simple	curl-tipped
Oostegites setae	subequal in size	2, 6 largest	?	2, 6 largest	2, 6 largest	2, 6 largest
coxal gills 2–6 distribution	tropical western Australia	tropical eastern Australia (QLD)	tropical and warm- temp. Indo-Pacific and Caribbean Sea	Atlantic-Medi- terranean Sea	Caribbean Sea and adjacent Western Atlantic	New Zealand and northeastern Pacific (California, Lake Merritt) estuarine
habitat	mangroves and clayey mudflats	estuarine	mostly terrestrial	seashore with few terrestrial spp.	seashore and one terrestrial sp.	estuarine

^a occasionally with an “amplexing” seta on male; * Bousfield (1984) did not state this character in the formal description of the genus, although figures of *F. anomala* and *F. pecinispina* indicate absence or a very small lobe respectively (Bousfield, 1971: 272, fig. 9 and 278, fig. 12).

robust setae. Uropod 2 outer ramus without marginal robust setae. Telson longer than broad with 3–5 robust setae per lobe.

Species composition. *Australorchestia occidentalis* n.sp.

Remarks. Despite the uncommon, mud clayey habitat in which *Australorchestia occidentalis* n.sp. was found, some specimens were also found inhabiting mangrove areas. This habitat suggests that *Australorchestia* could be one of the more basal palustral genera proposed by Bousfield (1984). Some similarities with the palustral genera are: left lacinia mobilis 4-dentate, article 2 of maxilliped palp not lobate medially; and gills 2–6 similar, simple and sac-like. However, *Australorchestia* has the maxilliped palp obscurely 4-articulate, dactyli of pereopods 3–7 are distinctly cuspidactylate, and the telson has lateral and distal setae, characters not present in the palustral genera described by Bousfield (1984). *Australorchestia* has pereopods and the peduncles of pleopods poorly setose, suggesting that this genus is possibly closely related to Bousfield’s (1982, 1984) 4-dentate cuspidactylate beach-hopper genera. Comparisons between these genera are given in Table 1. Although similar in some aspects to the other five known, 4-dentate, cuspidactylate beach-hopper genera, *Australorchestia* can be generally distinguished by a combination of characters and more specifically by the unexpanded basis of female gnathopod 2, coxal gills 2–6 subequal in size and sac-like, and lack of marginal setae on the outer ramus of uropod 2.

Australorchestia occidentalis n.sp.

Figs 1–4

Type material. HOLOTYPE: male 11.6 mm AM P69130 (1 slide, stubs J053–J055, J057–J059). PARATYPES: male 11.3 mm (habitus) AM P69153 (stub J060); 1 female 6.3 mm AM P69130 (1 slide, stub J056, SEM micrographs); 9 males and 12 females, AM P69132, mangroves near mouth of Gascoyne River (end of Harbour Road), Carnarvon, Western Australia (24°54.2'S 113°38.96'E), small mangrove area with dead seagrasses among roots and pneumatophores and some stones on sand substrate, C. Serejo & J.K. Lowry, 30 Oct. 2003.

Type locality. Mangroves near mouth of Gascoyne River (end of Harbour Road), Carnarvon, Western Australia (24°54.2'S 113°38.96'E), small mangrove area with dead seagrasses among roots and pneumatophores and some stones on sand substrate, C. Serejo & J.K. Lowry, 30 Oct. 2003, WA 768.

Additional material examined. *Western Australia:* 1 male and 9 females, AM P69133, Mangrove Bay, Cape Range National Park, (22°08'S 113°59'E), low thick mangroves in a sheltered bay, C. Serejo & J.K. Lowry, 31 Oct. 2003, WA 770; 14 males and 27 females (some ovigerous), AM P69134, Disappointment Loop, Henri Freycinet Harbour, Shark Bay (26°40.21'S 113°40.31'E), low rock platform moving into clayey mudflats with small banks covered

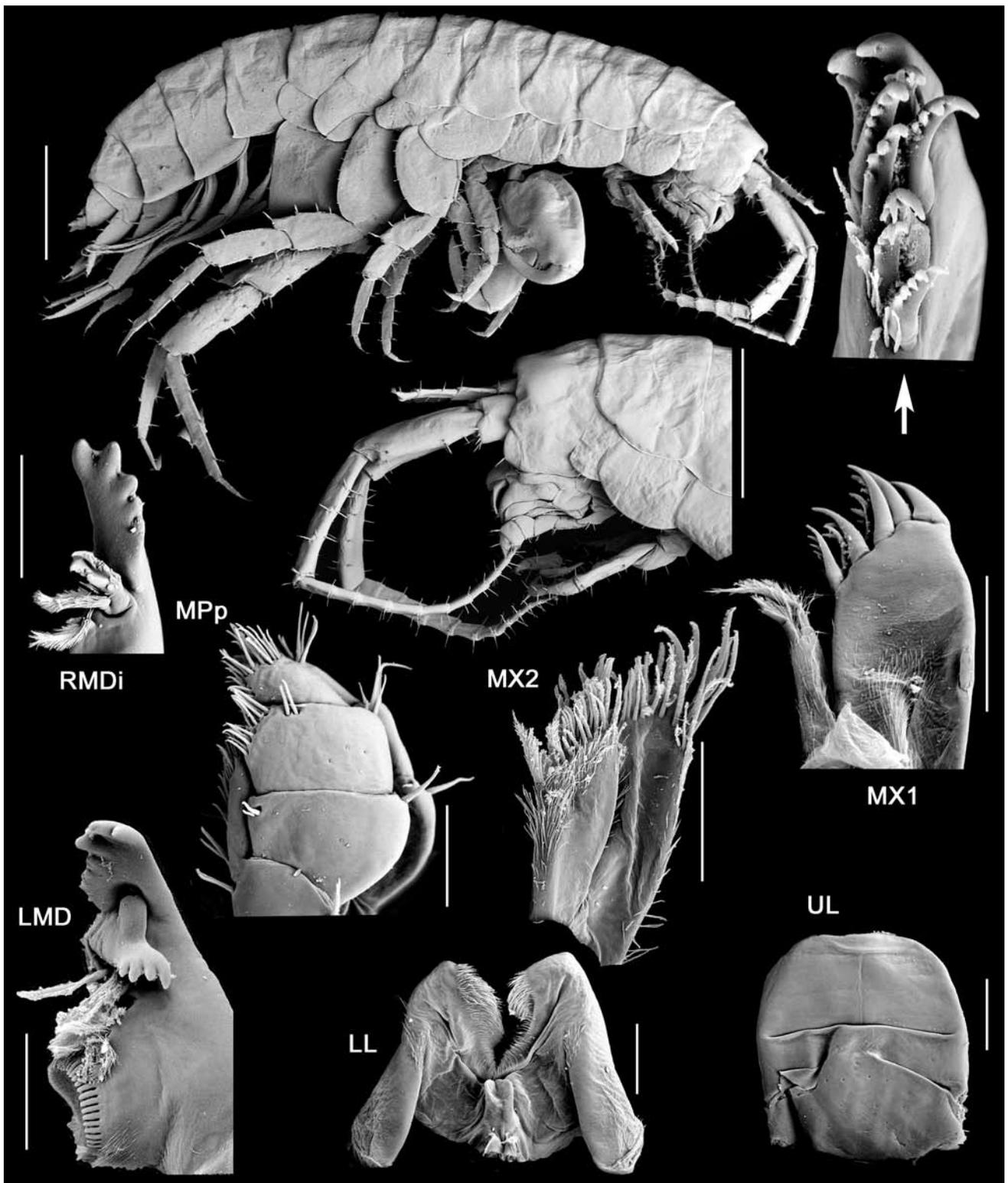


Fig. 1. *Australorchestia occidentalis* n.sp., paratype male, 11.3 mm, habitus, AM P69153; holotype male, 11.6 mm, other parts, AM P69130, Gascoyne River, Carnarvon, Western Australia. Scales for habitus: 1 mm; head: 0.2 mm; remainder: 0.1 mm.

in holes interspersed with small smooth clay channels, C. Serejo & J.K. Lowry, 4 Nov. 2003, WA 775.

Etymology. The specific name refers to the endemic locality of this species from western Australia.

Diagnosis. As for the genus.

Description

Male, 11.6 mm. Eye medium, $\frac{1}{5}$ – $\frac{1}{3}$ head length. Antenna 1 short, rarely longer than peduncle article 4 of antenna 2. Antenna 2 shorter than head and first 3 pereonites; geniculate at flagellum; peduncular articles slightly expanded; with sparse, small robust setae; article 5 subequal to article

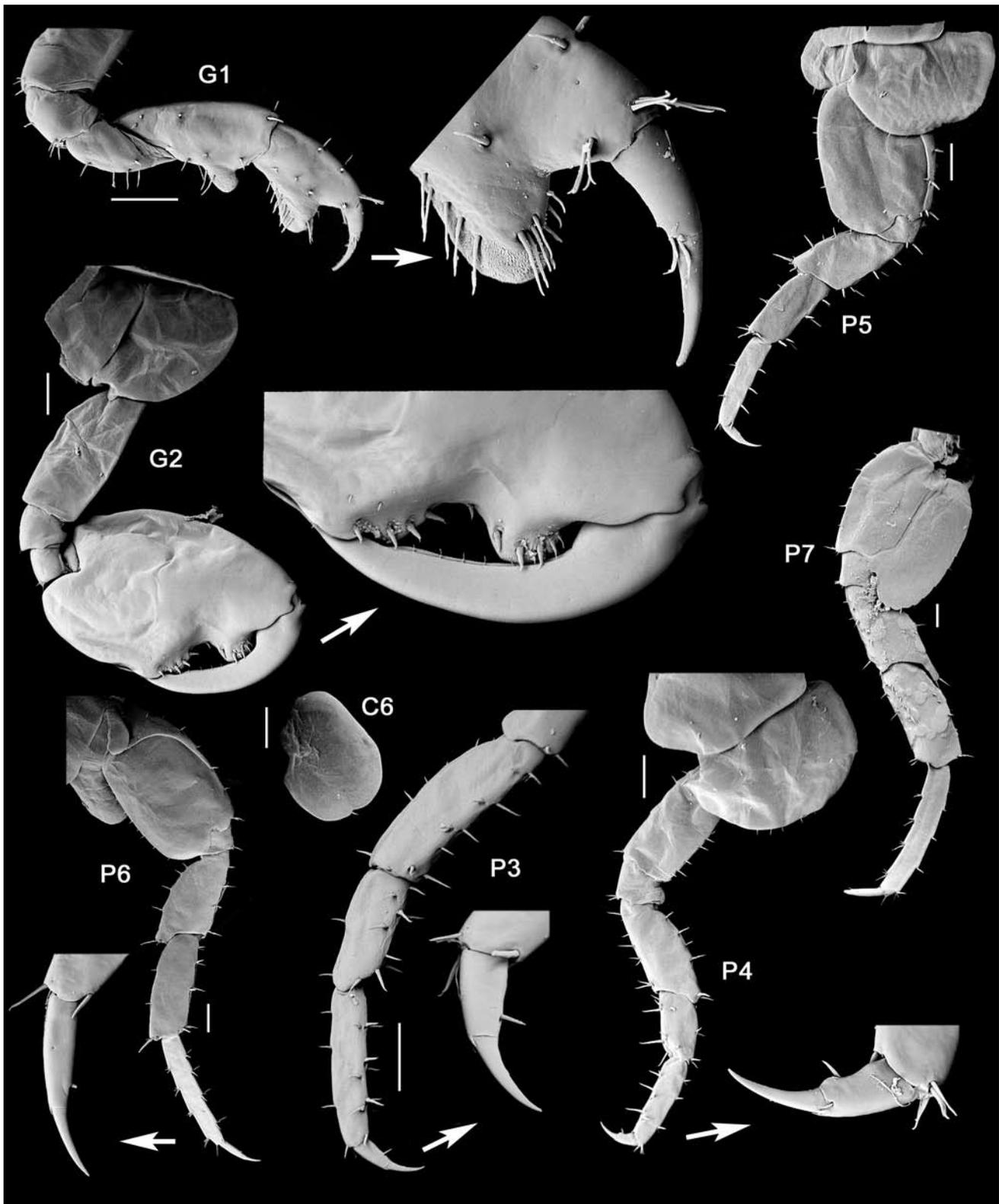


Fig. 2. *Australorchestia occidentalis* n.sp., holotype male, 11.6 mm, AM P69130, Gascoyne River, Carnarvon, Western Australia. Scales represent 0.2 mm.

4. Epistome of upper lip without robust setae. Lower lip distolateral setal tuft present. Mandible left lacinia mobilis 4-dentate. Maxilliped palp article 2 without distomedial lobe, article 4 present, reduced.

Gnathopod 1 subchelate; posterior margin of carpus and propodus with rugose lobe; propodus sub-triangular;

palm strongly excavated, transverse; dactylus subequal in length to palm, without ventral setal row, simplidactylate. Gnathopod 2 subchelate; palm acute, with subquadrate protuberance near dactylar hinge and large midpalmar sinus, posterodistal corner without enlarged protuberance; dactylus longer than palm, attenuated distally. Coxae 2–4 as wide as

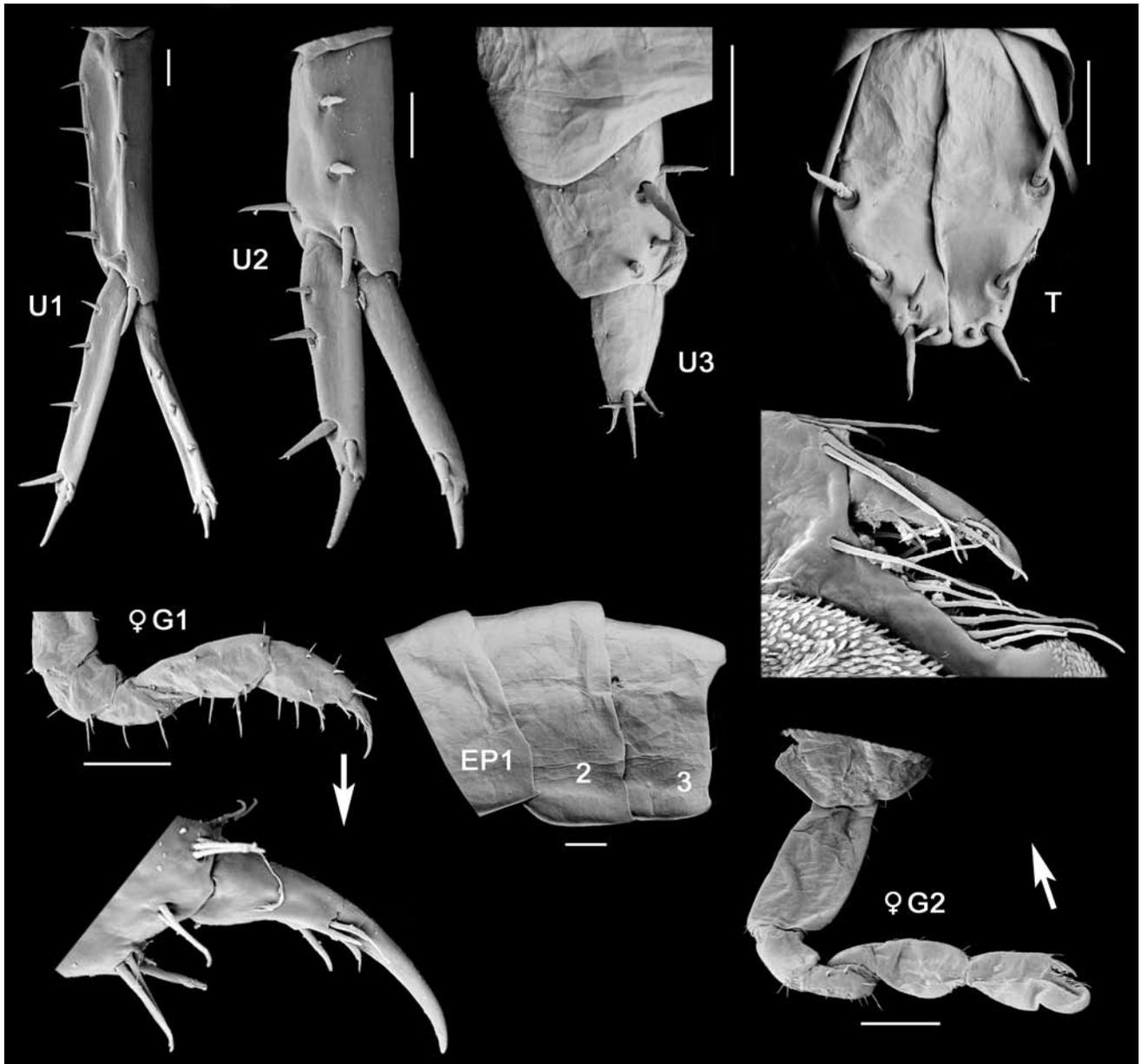


Fig. 3. *Australorchestia occidentalis* n.sp., holotype male, 11.6 mm, U1–3, T, EP1–3, AM P69130; paratype female, 6.3 mm, G1–2, AM P69130, Gascoyne River, Carnarvon, Western Australia. Scales for U1–3, T: 0.1 mm; remainder: 0.2 mm.

deep. Pereopods 3–7 cuspidactylate; dactylus without row or patch of dorsal short setae. Pereopod 4 dactylus slightly thickened and pinched posteriorly, different to pereopod 3 dactylus. Pereopod 5 propodus longer than carpus. Pereopod 6 not sexually dimorphic; shorter than pereopod 7; coxa posterior lobe anterodistal corner rounded, with 1 marginal seta, posterior margin perpendicular to ventral margin, outer surface with ridge. Pereopod 7 sexually dimorphic; basis without lateral sulcus, posterodistal lobe present; distal articles (merus and carpus) slightly expanded in terminal males; carpus sub-rectangular. Coxal gills 2–6 simple or slightly lobate and subequal in size.

Pleopods 1–3 well developed, biramous. Pleopods 1–2 peduncle without marginal setae. Pleopod 3 peduncle with one marginal slender seta. Epimeron 2 subequal in length to epimeron 3. Epimeron 2–3 posterior margin smooth, with one tiny seta faraway from the corner, posteroventral corner with small subacute spine, ventral margin without robust

setae. Uropod 1 peduncle with 7 robust setae in two rows; distolateral robust seta present, small, less than 1/4 length of outer ramus; inner ramus subequal in length to outer ramus, with 3 marginal robust setae; outer ramus with 2–3 marginal robust setae. Uropod 2 peduncle with 4 robust setae in two rows; inner ramus subequal in length to outer ramus, with 2 marginal robust setae; outer ramus without marginal robust setae. Uropod 3 peduncle with 4 robust setae; ramus slightly shorter than peduncle, oval to spatula-shape, broad distally, without marginal setae and with 4–5 apical setae. Telson longer than broad; entire; dorsal midline entire; with marginal and apical robust setae; about 3 to 5 robust setae per lobe.

Female (sexually dimorphic characters). 6.3 mm. Antenna 2 peduncular articles narrow. Gnathopod 1 parachelate, with very short palm surpassed by dactylus; propodus ovoid; palm very short, acute; dactylus longer than palm. Gnathopod 2 basis narrow; about 3.2× longer than wide, palm

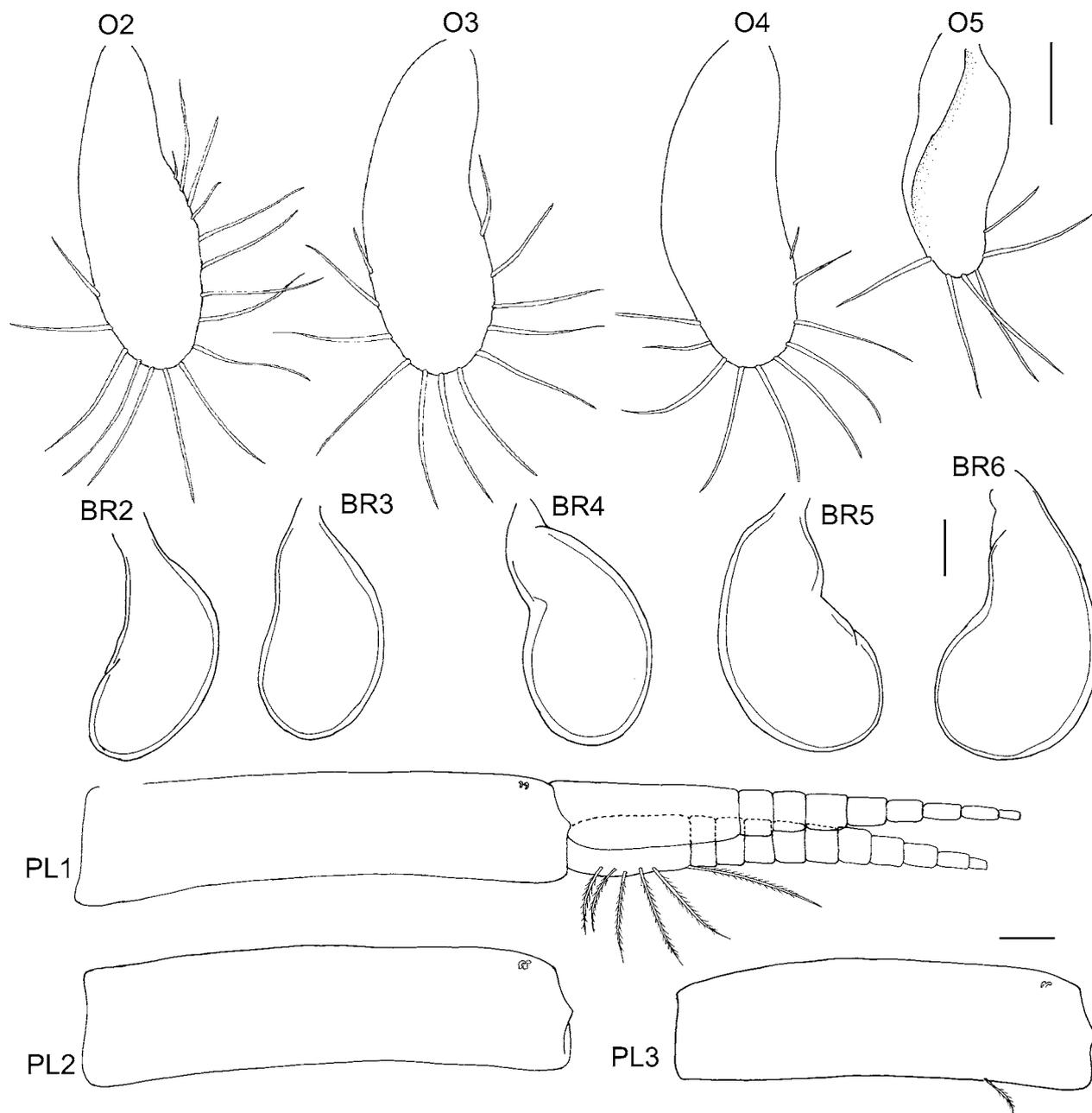


Fig. 4. *Australorchestia occidentalis* n.sp., holotype male, 11.6 mm, PL1–3; BR2–6, AM P69130; paratype female, 6.3 mm, O2–5, AM P69130. Scales for PL1–3 and BR2–6: 0.1 mm; remainder: 0.2 mm.

obtuse; dactylus shorter than palm. Pereopod 7, merus and carpus slender. Uropod 1 outer ramus with 1 marginal seta. Oostegites longer than wide; setae with simple straight tips. Oostegites 2–5 weakly setose (from 6 to 15 setae).

Habitat. Marsh-hoppers living on mud of mangroves and on a clayey mudflat of a salty embayment of Shark Bay, WA.

Remarks. See discussion of *Australorchestia* and Table 1.

Distribution. *Western Australia:* Mouth of Gascoyne River, Carnarvon; Disappointment Loop, Henri Freycinet Harbour, Shark Bay; Mangrove Bay, Cape Range National Park.

***Bellorchestia* n.gen.**

Talorchestia Dana, 1852: 851.–Stebbing, 1906: 543 (partim).–Stephensen, 1948: 7 (partim).–Hurley, 1956: 359 (partim.).

Type species. *Bellorchestia richardsoni* n.sp.

Etymology. *Bella* means beautiful and refers to the general appearance of species in the genus, attached to the stem *Orchestia* from the Greek *orchestes* = dancer.

Diagnosis. Antenna 2 not geniculate and not sexually dimorphic. Mandible left lacinia mobilis 5-dentate. Maxillipedal palp dactylus present, reduced. Male gnathopods 1–2 subchelate; male gnathopod 2 basis narrow; propodus palm posterodistal corner defined by large protuberance; dactylus not attenuated distally. Pereopods 3–7 cuspidactylate. Pereopod 4 carpus significantly shorter than carpus of pereopod 3. Pereopods 6–7 sexually dimorphic, merus and carpus slightly more robust in terminal males. Pereopod 7 basis lateral sulcus present, slightly pronounced. Gills lobate and/or convoluted; gills 3–5 smaller than gills 2 and 6. Oostegites 2–5 setae with simple straight tips. Pleopods all well developed. Uropods 1–2 outer rami with marginal robust setae. Telson broader than long with more than 10 robust setae.

Species composition. *Bellorchestia* contains 7 species: *B. chathamensis* (Hurley, 1956); *B. kirki* (Hurley, 1956); *B. marmorata* (Haswell, 1880); *B. pravidactyla* (Haswell, 1880); *B. quoyana* (Milne Edwards, 1840); *B. richardsoni* n.sp.; *B. spadix* (Hurley, 1956) and *B. tumida* (Thomson, 1885).

Remarks. We have tentatively placed some of the remaining “*Talorchestia*” species from Tasmania and New Zealand into *Bellorchestia*. However, some diagnostic characters of *Bellorchestia* were not described in the respective literature. Re-examination of local material would clarify the identification of these taxa.

Bellorchestia is part of the so called sand-hopper group, which are large, strongly setose talitrids adapted for burrowing, also known as substrate modifiers (Bousfield, 1982). Eleven genera are included in this group: *Americorchestia* Bousfield, 1991, *Atlantorchestoidea* Serejo, 2004, *Bellorchestia* n.gen., *Deshayesorchestia* Ruffo, 2004, *Megalorchestia* Brandt, 1851, *Orchestoidea* Nicolet, 1849, *Pseudorchestoidea* Bousfield, 1982, *Sardorchestia* Ruffo, 2004, *Talitrus* Latreille, 1802, *Talorchestia* Dana, 1852 (*sensu stricto*), and *Trinorchestia* Bousfield, 1982. From these, *Atlantorchestoidea*, *Orchestoidea*, *Pseudorchestoidea*, and *Talitrus* have a 4-dentate left lacinia mobilis and male and female gnathopods 1 are simple. The remaining six genera are compared with *Bellorchestia* n.gen. in Table 2. *Deshayesorchestia* and *Sardorchestia* were briefly described recently based in a molecular analysis (Ruffo in Tafani *et al.*, 2004). Important characters, such as state of the lacinia mobilis and pleopods, were not properly described, but other significant characters are pointed out in Table 2. Among other characters, the presence of robust setae on epistome and on ventral margins of peduncle of uropods 1–2 distinguish *Bellorchestia* n.gen. from the other related sand-hoppers.

Table 2. Morphological differences among 5-dentate cuspidactylate sand-hopper genera. Abbreviations given on p. 162. Bold states are diagnostic for each genera.

	<i>Americorchestia</i> Bousfield, 1991	<i>Bellorchestia</i> n.gen.	<i>Deshayesorchestia</i> Ruffo, 2004	<i>Megalorchestia</i> Bousfield, 1982	<i>Sardorchestia</i> Ruffo, 2004	<i>Talorchestia</i> Dana, 1852	<i>Trinorchestia</i> Bousfield, 1982
left lacinia mobilis	5-dentate	5-dentate	?3-dentate	5–6 dentate	?	5-dentate	5-dentate
epistome	without robust setae	with robust setae	without robust setae	without robust setae	without robust setae	without robust setae	without robust setae
Gnt 1 male	parachelate	subchelate	parachelate	simple	parachelate	parachelate	parachelate
Gnt 1 female	simple	parachelate	parachelate	simple	simple	parachelate	parachelate
Gnt 2 female	broadly expanded	linear	weakly expanded	simple expanded	expanded	expanded	moderately expanded
basis	slightly shorter than peduncle,	slightly shorter than peduncle,	?	shorter, around half peduncle,	?	slightly shorter than peduncle,	slightly shorter than peduncle,
PL1–3 rami	7–10 segmented with several robust setae	7–10 segmented with several robust setae	?	1–3 segmented with several robust setae	?	7–10 segmented without setae	7–10 segmented with several robust setae
U1, outer ramus	wider than long	wider than long	with several robust setae	wider than long	with several robust setae	longer than wide	wider than long
telson	North Atlantic	southern	European coast	North Pacific	Mediterranean Sea	Indo-Pacific	northwestern
distribution	and Gulf of Mexico coast	Australia	from Baltic and England to the Black Sea; Egypt				Pacific

***Bellorchestia richardsoni* n.sp.**

Figs 5–8

Type material. HOLOTYPE: male, 22.3 mm, AM P69238 (1 slide, stubs J095–J097, J099, J101–J103). PARATYPES: male, 20.7 mm (habitus) AM P69239 (stub J104); 1 female, 21.8 mm, AM P69240 (1 slide, stubs J6098, J100, SEM micrographs); 18 males and 120 females, AM P69241, supralittoral zone on exposed ocean beach, Point Ricardo, Victoria (37°48.39'S 148°38'E), under dead *Sargassum* on exposed ocean beach, C. Serejo & J.K. Lowry, 8 Oct. 2003, VIC 120.

Type locality. Supra-littoral zone on exposed ocean beach, Point Ricardo, Victoria (37°48.39'S 148°38'E), under dead *Sargassum* on exposed ocean beach.

Etymology. The specific name honours Dr Alastair Richardson (University of Tasmania) who has been contributing to the knowledge of Australian talitrids for many years.

Diagnosis. Male gnathopod 2 palm acute, with 3 protuberances, 2 before dactylar enclosure and 1 defining the posterodistal corner; dactylus shorter than palm, strongly concave medially and not attenuated distally. Peduncle of pleopods 1–3 stout, peduncle 1 about 3× longer than wide, peduncle 2 about 2.5× longer than wide; peduncle 3 about 2.1× longer than wide.

Description

Holotype male, 22.3 mm. Eye medium, $\frac{1}{5}$ – $\frac{1}{3}$ head length. Antenna 1 short, rarely longer than peduncle article 4 of antenna 2. Antenna 2 longer than pereonite 3 and up to half body length; peduncular articles narrow; with sparse, small robust setae; article 5 long, about 2× article 4 length. Epistome with several robust setae. Lower lip distolateral setal tuft absent. Mandible left lacinia mobilis 5-dentate. Maxilliped palp article 2 with distomedial lobe, article 4 present, reduced.

Gnathopod 1 subchelate; posterior margin of propodus with rugose lobe; propodus subrectangular; palm obtuse; dactylus subequal in length to palm, without ventral setal row, simplidactylate. Gnathopod 2 subchelate; basis anteriorly smooth; merus without medial lobe; palm acute, with 3 protuberances, 2 before dactylar enclosure and 1 defining the posterodistal corner; dactylus shorter than palm, strongly concave medially and not attenuated distally. Coxae 2–4 deeper than wide. Pereopods 3–7 cuspidactylate; dactylus without row or patch of dorsal short setae. Pereopod 4 significantly shorter than pereopod 3. Pereopod 4 dactylus thickened and pinched posteriorly, different to pereopod 3 dactylus. Pereopod 5 propodus distinctly longer than carpus. Pereopod 6 sexually dimorphic; shorter than pereopod 7; coxa posterior lobe anterodistal corner rounded, with 5 or more marginal setae, posterior and ventral margins continuously rounded, outer surface with ridge; carpus expanded. Pereopod 7 sexually dimorphic; basis with lateral sulcus

slightly pronounced, posterodistal lobe present; distal articles expanded; carpus subrectangular. Coxal gills convoluted, processiferous or lobate. Pereopods 3–5 gills smaller than gills 2 and 6.

Pleopods 1–3 well developed, rami shorter than peduncle; peduncle stout with several marginal robust setae, peduncle 1 about 3× longer than wide, peduncle 2 about 2.5× longer than wide; peduncle 3 about 2.1× longer than wide, both rami shorter than peduncle. Epimeron 2 subequal in length to epimeron 3. Epimeron 3 posterior margin smooth, with setae, posteroventral corner subquadrate, ventral margin without robust setae. Uropod 1 peduncle with 20–23 robust setae in two rows and a row of ventral setae; distolateral robust seta absent; inner ramus subequal in length to outer ramus, with 8–10 robust setae on each margin and 6–8 smaller setae on facial surface; outer ramus with 9 robust setae on outer margin; rami with ventral setae. Uropod 2 peduncle with 24 robust setae in two rows and a row of ventral setae; inner ramus subequal in length to outer ramus, with 7–8 robust setae on each margin and 6–7 smaller setae on facial surface; outer ramus with 5 robust setae on outer margin. Uropod 3 peduncle with 11 robust setae; ramus subequal in length to peduncle; oval to spatula-shape, broad distally; ramus with 24 marginal setae, and 4–5 apical setae. Telson broader than long; apically incised; dorsal midline vestigial or absent; with marginal and apical robust setae; around 19 setae per lobe.

Female (sexually dimorphic characters), 21.8 mm. Gnathopod 1 parachelate; posterior margin of merus, carpus and propodus without rugose lobe; palm minute, transverse and with a tuft of robust setae on the palmar angle; dactylus longer than palm. Gnathopod 2 mitten-shaped; basis narrow and long; about 2.8× longer than wide, posterior margin of propodus with rugose lobe; palm obtuse, smooth. Pereopod 6 carpus slender. Pereopod 7 distal articles slender. Oostegites longer than wide; setae with simple straight tips. Oostegites 2–4 moderately setose (around 24 setae).

Habitat. Exposed ocean beaches.

Remarks. *Bellorchestia richardsoni* n.sp. is similar to *Bellorchestia pravidactyla* described from Tasmania by Haswell (1880) in general aspects of the body, such as peduncular article 5 of antenna 2 which is long, about 2× article 4 length, and male gnathopod 1, which is subchelate with a transverse palm. Some differences between these species are the propodus of male gnathopod 1, which has a well-developed rugose lobe (versus small lobe, nearly undistinguished), male gnathopod 2 with 3 protuberances, 2 before dactylar enclosure and 1 defining the posterodistal corner (versus no protuberances) and female gnathopod 1 is parachelate instead of simple. Considering that *B. pravidactyla* was only briefly described and that the types are lost (Lowry & Stoddart, 2003), we prefer to consider the Victorian species as new. Designation of a neotype based on topotypic material from Tasmania would better elucidate the status of *B. pravidactyla*.

Distribution. Victoria: Point Ricardo.

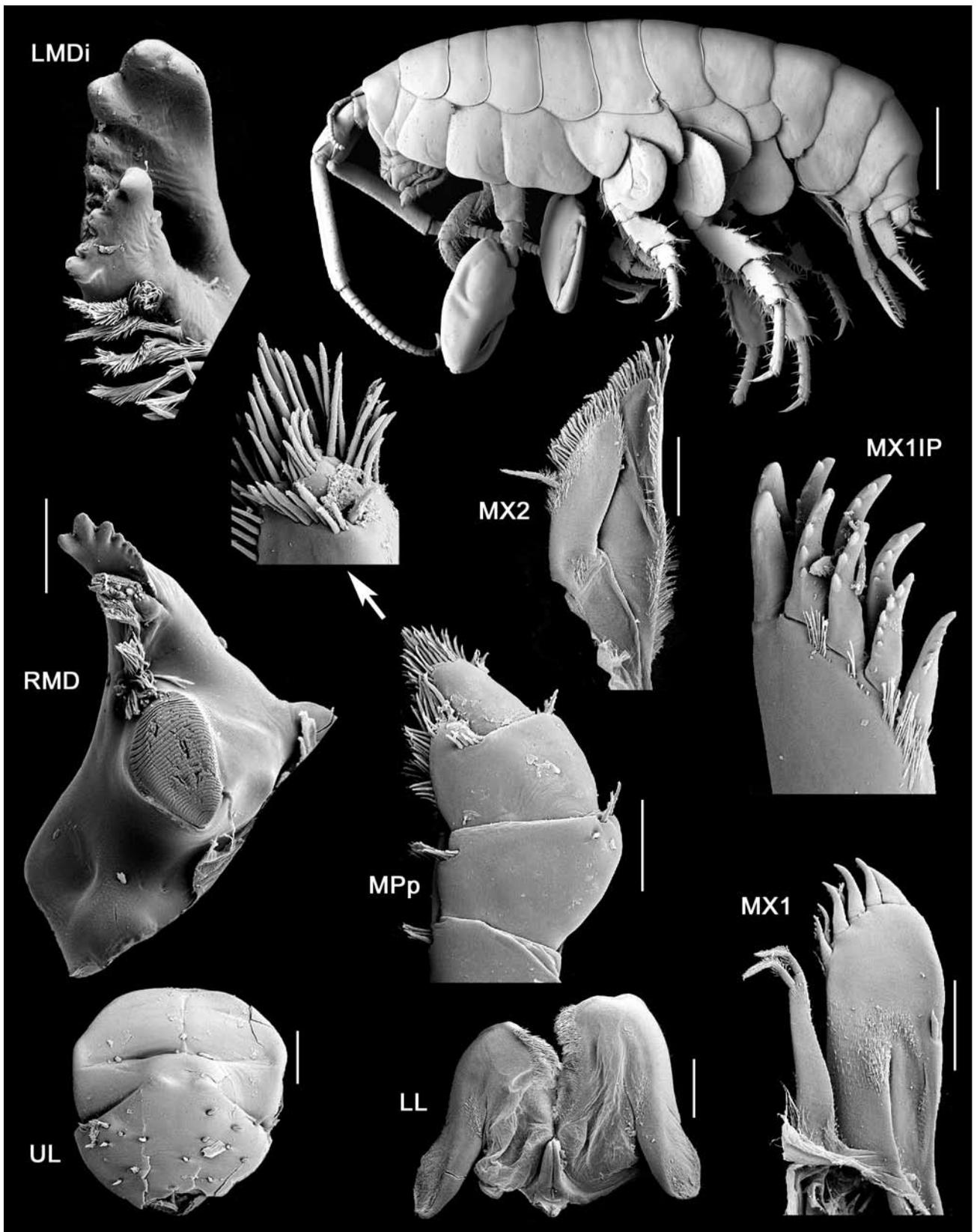


Fig. 5. *Bellorchestia richardsoni* n.sp., paratype male, 20.7 mm, habitus, AM P69239; holotype male, 22.3 mm, other parts, AM P69238, Point Ricardo, Victoria. Scale for habitus: 1 mm, remainder: 0.2 mm.

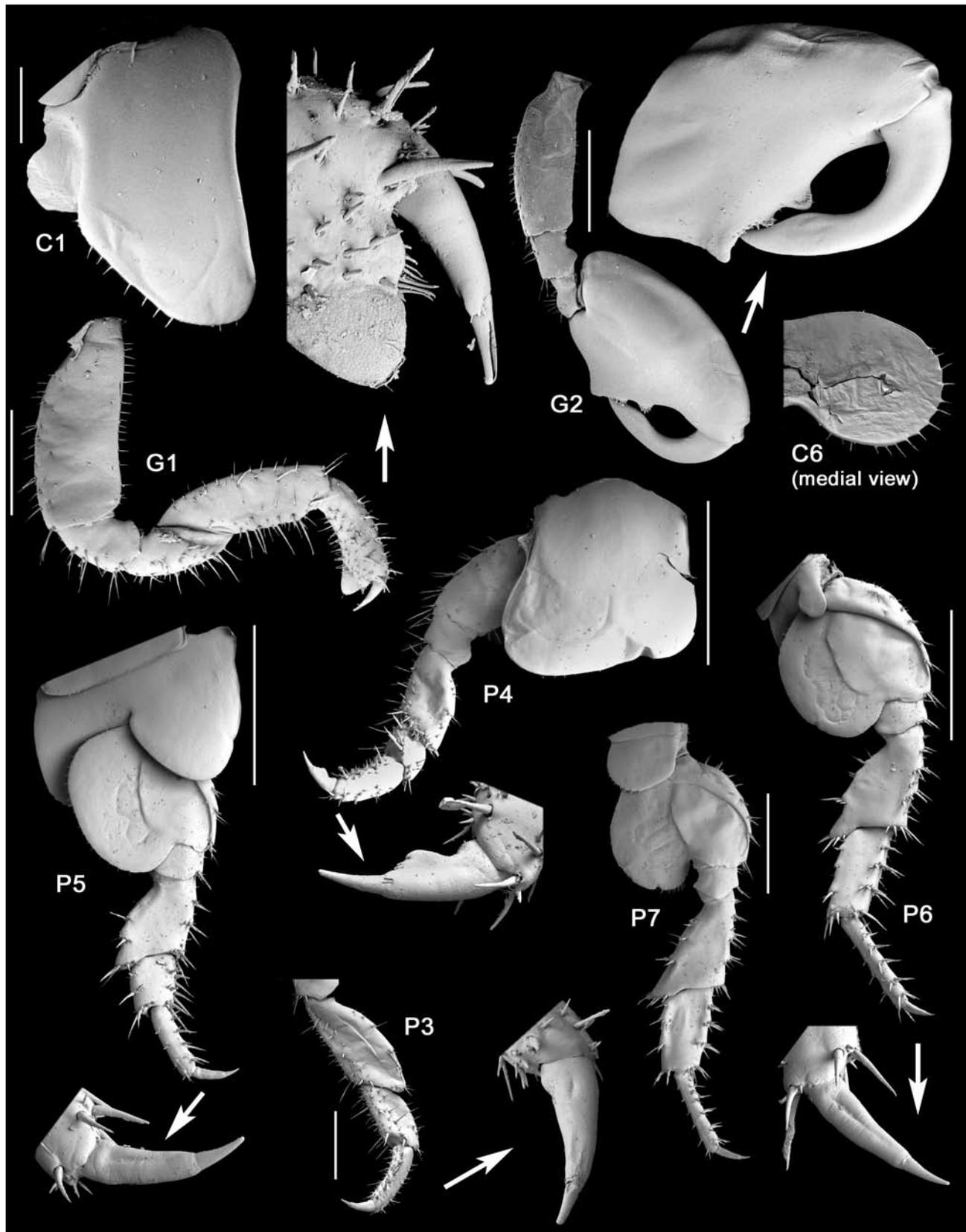


Fig. 6. *Bellorchestia richardsoni* n.sp., holotype male, 22.3 mm, AM P60238, Point Ricardo, Victoria. Scales for G1–2: 1 mm; C1: 0.5 mm; remainder: 2 mm.

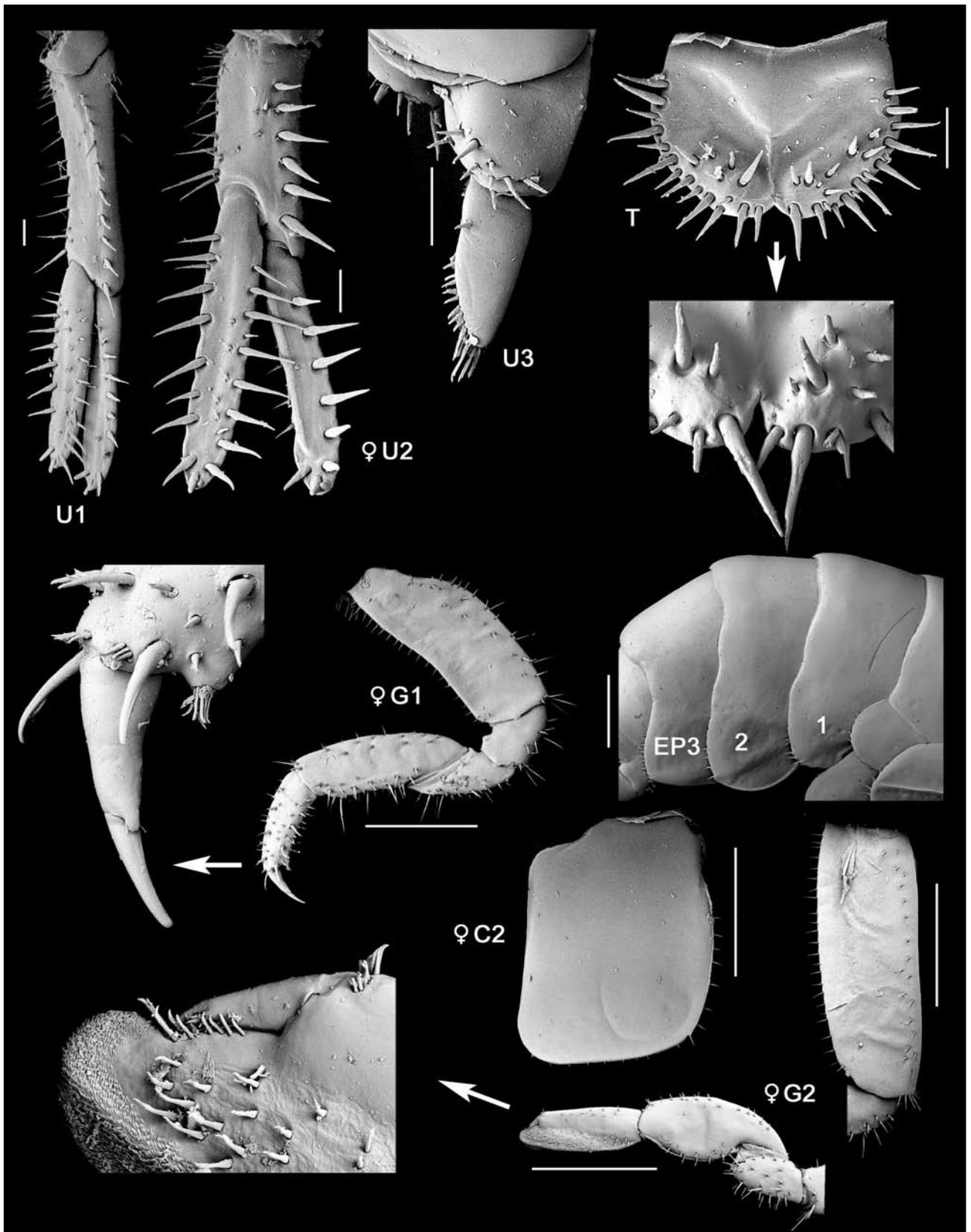


Fig. 7. *Bellorchestia richardsoni* n.sp., holotype male, 20.3 mm, T, EP1–3, AM P60238; paratype male, 22.7 mm, U1–3, AM P69239; paratype female, 21.8 mm, G1–2, AM P69240, Point Ricardo, Victoria. Scales for EP1–3, G1–2: 1 mm; remainder: 0.2 mm.

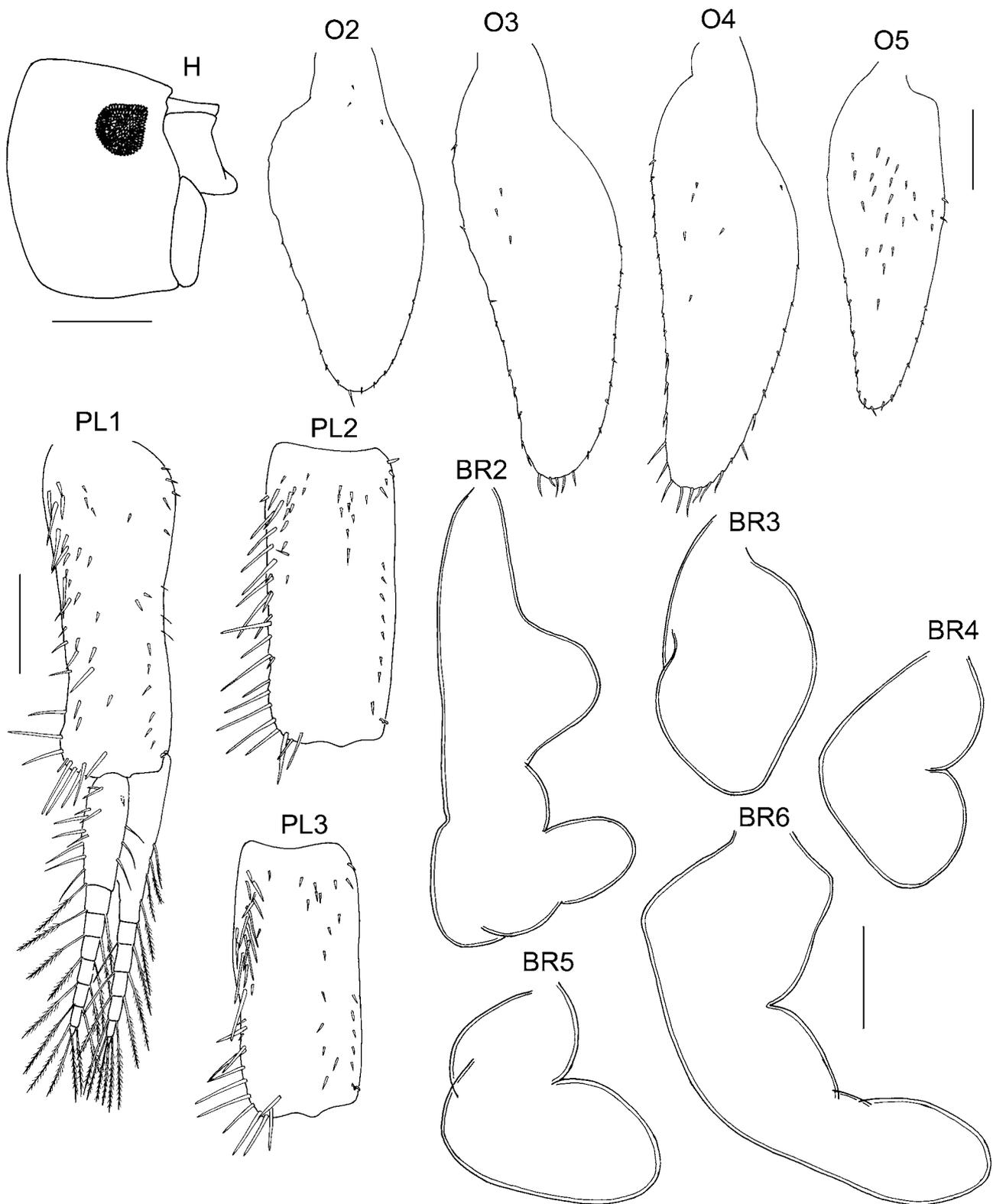


Fig. 8. *Belloresthia richardsoni* n.sp., paratype female, 21.8 mm, O2–5, AM P69240; paratype male, 22.7 mm, PL1–3 and BR2–6, AM P69239. Scales represent 0.5 mm.

***Notorchestia* n.gen.**

Orchestia J.L. Barnard, 1969: 470 (partim).
Talorchestia Dana, 1852: 851.–Stebbing, 1906: 543
(partim).–Stephensen, 1948: 7 (partim).–J.L. Barnard,
1969: 472 (partim.).

Type species. *Notorchestia lobata* n.sp.

Etymology. *Noto* means southern and refers to the distribution of the genus, attached to the stem *Orchestia* from the Greek *orchestes* = dancer.

Diagnosis. Antenna 2 not geniculate and not sexually dimorphic. Mandible left lacinia mobilis 4 or 5 dentate. Maxillipedal palp dactylus present, reduced. Gnathopod 2 subchelate; basis slightly expanded; propodus palm posterodistal corner with or without protuberance. Pereopods 3–7 cuspidactylate, dactylus with row or patch of dorsal setae. Pereopod 4 carpus similar in length to pereopod 3 carpus. Pereopod 6 not sexually dimorphic. Pereopod 7 sexually dimorphic or not; basis lateral sulcus present or absent, if present very pronounced. Gills lobate and/or convoluted; gills 3–5 smaller than gills 2 and 6. Oostegites 2–5 setae with simple and multi-furcate tips. Pleopods all well developed. Uropods 1–2 outer rami with marginal robust setae. Telson cleft, longer than broad with 3–5 robust setae per lobe.

Species composition. *Notorchestia* contains 4 species: *N. australis* (Fearn-Wannan, 1968); *N. lobata* n.sp.; *N. naturaliste* n.sp. and *N. novaehollandiae* (Stebbing, 1899).

Remarks. The weakness of the definition of *Orchestia* and *Talorchestia* based on the female gnathopod 2 chelation is herein reconfirmed. A restricted definition of *Talorchestia* (*sensu stricto*) was proposed by Morino and Miyamoto (1988) and Miyamoto and Morino (1999), but this is incomplete because it leaves a large number of species with no generic name. A revision of the whole complex is still needed. Some species within *Notorchestia* were part of the *Talorchestia* (*sensu lato*) group, a wide complex currently including about 35 species. We move eight species to *Bellorchestia* and two to *Notorchestia*, reducing the number of unplaced species to 25.

Notorchestia n.gen. is endemic to Australia, and its species show new characters for the Talitridae in general, such as the dactylus of pereopod 3–7 with a dorsal row of setae (Figs 14, 18), the multi-furcate tip setae on oostegites 2–5 (Fig. 12, 16, 20) and a clearly cleft telson (Fig. 11, 15, 19). *Notorchestia* is a member of the 4-dentate left lacinia mobilis group. The one exception is found in *N. australis*, which has a 4 or 5-dentate left lacinia. Not all of the diagnostic characters were observed in *N. novaehollandiae*, but the lateral sulcus on the basis of pereopod 7 and cleft telson strongly suggests that this species is part of this genus.

***Notorchestia australis* (Fearn-Wannan, 1968)**

Figs 7–9

Lowry & Stoddart, 2003: 272.

Type material. HOLOTYPE: male, 15 mm, NMV J160, Hastings, Western Port, Victoria, Australia. PARATYPES: 1 female, 11.5 mm, NMV J161, same data as holotype.

Material examined. *New South Wales:* 5 females, AM P 36217, Fisheries Creek, Twofold Bay, on saltmarsh, J.T. van der Velde & S.J. Keable, 19 Sep. 1984; 1 male, AM P 36037, Curralo Lagoon, Twofold Bay, on saltmarsh, S.J. Keable & M.L. Reid, 27 June 1985. *Victoria:* 1 female, 12 mm, NMV J42333, Apollo Bay, Victoria, Australia; 5 males and 9 females, AM P68961, Old Port, Port Albert (38°40.03'S 146°40.13'E), narrow beach with a lot of dead *Zostera* and marsh directly behind, specimens living among *Zostera* at top of beach and among roots of marsh plants, C. Serejo & J.K. Lowry, 10 Oct. 2003, VIC 125; 1 male and 2 females, AM P68962, among roots of marsh plants under bridge, Painkalac Creek (38°28.01'S 144°5.54'E), C. Serejo & J.K. Lowry, 11 Oct. 2003, VIC 127; 1 female, AM P68963, Peterborough Beach where the river comes into the sea, Peterborough (38°36.6'S 142°52.67'E), freshwater creek with stony bottom, specimens living under stones (freshwater), C. Serejo & J.K. Lowry, 12 Oct. 2003, VIC 133. *South Australia:* 1 female 11.1 mm, AM P69009 (2 slides, stub J064, SEM micrographs); 1 male, 15.4 mm, AM P69014 (slide), + 236 specimens, AM P68964, beach on west side of breakwater, Port Macdonnell, South Australia (38°3.56'S 140°41.63'E), broad flat beach thickly covered in dead algae and seagrass 3–4 m from water line, C. Serejo & J.K. Lowry, 14 Oct. 2003, SA 137; 2 males, 16.1 mm, AM P69007 (slide, stubs J063, J065–J070), male, 13.3 mm, AM P69008 (left mandible); 15.3 mm (habitus), AM P69006 (stub J083, SEM micrographs) + 116 specimens, AM P68965, beach on west side of breakwater, Port Macdonnell, (38°3.56'S 140°41.63'E), broad flat beach thickly covered in dead algae and seagrass 24 m from water line, C. Serejo & J.K. Lowry, 14 Oct. 2003, SA 138; 1 male and 7 females, AM P68966, *Melaluca* marsh, Lake Baddy, (37°10.45'S 139°47.41'E), marshland with *Juncus* and tall marsh grass, C. Serejo & J.K. Lowry, 14 Oct. 2003, SA 141; 1 male, AM P68967, *Melaluca* marsh beside main fishing port, Robe, (37°9.05'S 139°44.98'E), stones on mud in scraggly *Melaluca* marsh, C. Serejo & J.K. Lowry, 14 Oct. 2003, SA 143; 60 specimens, AM P68968, Goolwa marsh, Coorong National Park, (35°31.82'S 138°48.51'E), estuarine area with rocks and dry vegetation near water, C. Serejo, J.K. Lowry & J. Bradbury, 15 Oct. 2003, SA 145; 7 males and 3 females, AM P68969, Victor Harbour, Encounter Bay, (35°33.07'S 138°37.44'E), sheltered harbour beach, C. Serejo, J.K. Lowry & J. Bradbury, 15 Oct. 2003, SA 146; 84 specimens, AM P68970, beach in Yankalilla Bay, Fleurieu Peninsula (35°28.73'S 138°46.75'E), sandy, rocky beach, C. Serejo, J.K. Lowry & J. Bradbury, 15 Oct. 2003, SA 148; 14 males and 22 females, AM P68971, Lucky Bay, Spencer Gulf, Eyre Peninsula (33°42.48'S 137°2.59'E), broad, flat, sheltered, white sand beach rising in the supra-littoral, C. Serejo & J.K. Lowry, 17 Oct. 2003, SA 151; 4 males and 7 females, AM P68972, small mangrove just north of town, Ceduna, Eyre Peninsula (32°8.87'S 133°40.24'E), small mangrove area with stony substrate, C. Serejo & J.K. Lowry, 19 Oct. 2003, SA 156; 400 specimens, AM P68973, Fowlers Beach, Fowlers Bay, Eyre Peninsula, (31°59.24'S 132°26.26'E), broad beach covered to a depth of at least a meter with dead seaweed, C. Serejo & J.K. Lowry, 19 Oct. 2003, SA 157; 2 males, 1 female, AM P68974, Sleaford Mere, Eyre Peninsula (34°48'S 135°44'E), on stromatolite-like structures on the bottom of salt lake [talitrids living in cracks among calcite structures on the bottom of the lake, so the talitrids were completely submersed in the water—salinity about the same as seawater], B. Timms, 20 Jul 2003, SA 158; 4 males, AM P68975, Sleaford Mere, Eyre Peninsula (34°48'S 135°44'E), on stromatolite-like structures on the bottom of salt lake [talitrids living in cracks among calcite structures on the bottom of the lake, so the talitrids were completely submersed in the water—salinity about the same as seawater], B. Timms, 27 Oct. 2003, SA 159.

Type locality: Hastings, Western Port, Victoria, Australia. On rocky beach found in the damp sand under stones in the inter-tidal zone.

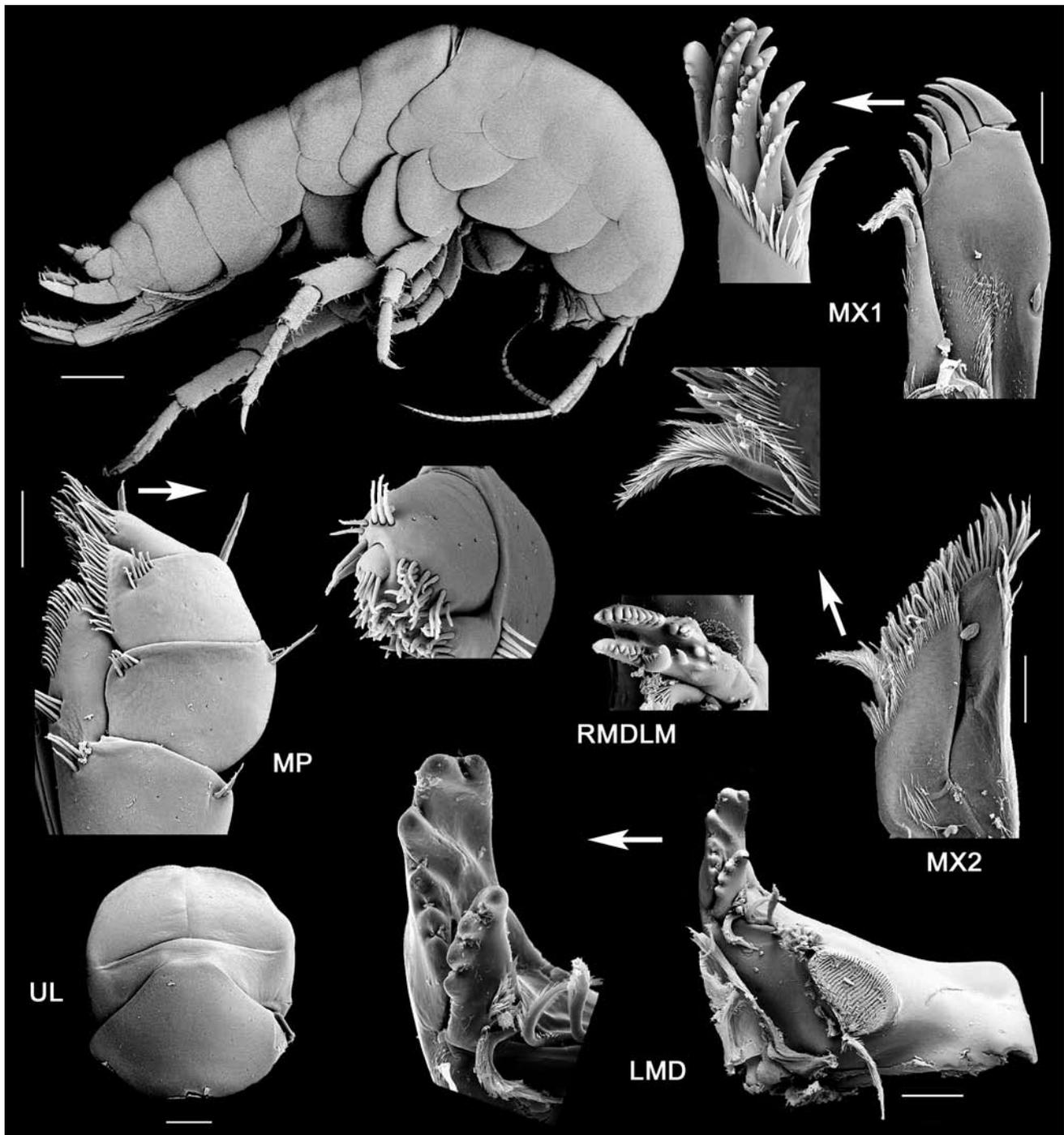


Fig. 9. *Notorchestia australis* (Fearn-Wannan, 1968), male, 15.3 mm, habitus, AM P69006; male, 16.1 mm, other parts, AM P69007, Port Macdonnell, South Australia. Scale for habitus: 1 mm; remainder: 0.1 mm.

Diagnosis. Mandible left lacinia mobilis 4–5 dentate. Male gnathopod 2, palm smooth, with row of robust setae; dactylus slightly attenuated distally. Coxa 6, posterior lobe posteroventral margins with 1–3 robust setae. Pereopod 7 basis in male tapering distally, lateral sulcus absent, posterodistal corner with 90° angle, lobe absent.

Description

Male, 13.3–16.1 mm. Eye medium, $\frac{1}{5}$ – $\frac{1}{3}$ head length. Antenna 1 short, rarely longer than peduncular article 4 of antenna 2. Antenna 2 shorter than head and first 3 pereonites;

peduncular articles narrow; with sparse, small robust setae. Epistome of upper lip without robust setae. Lower lip, dislateral setal tuft absent. Mandible left lacinia mobilis 4–5 dentate. Maxilliped palp article 2 with mediolateral lobe, article 4 present, reduced.

Gnathopod 1 sexually dimorphic; subchelate; posterior margin of merus, carpus and propodus with rugose lobe; propodus subtriangular; palm transverse; dactylus shorter than palm, simplidactylate. Gnathopod 2 sexually dimorphic; subchelate; palm acute, smooth, with row of robust setae, posterodistal corner with groove; dactylus longer than palm, slightly attenuated distally. Coxae 2–4 as wide as deep.

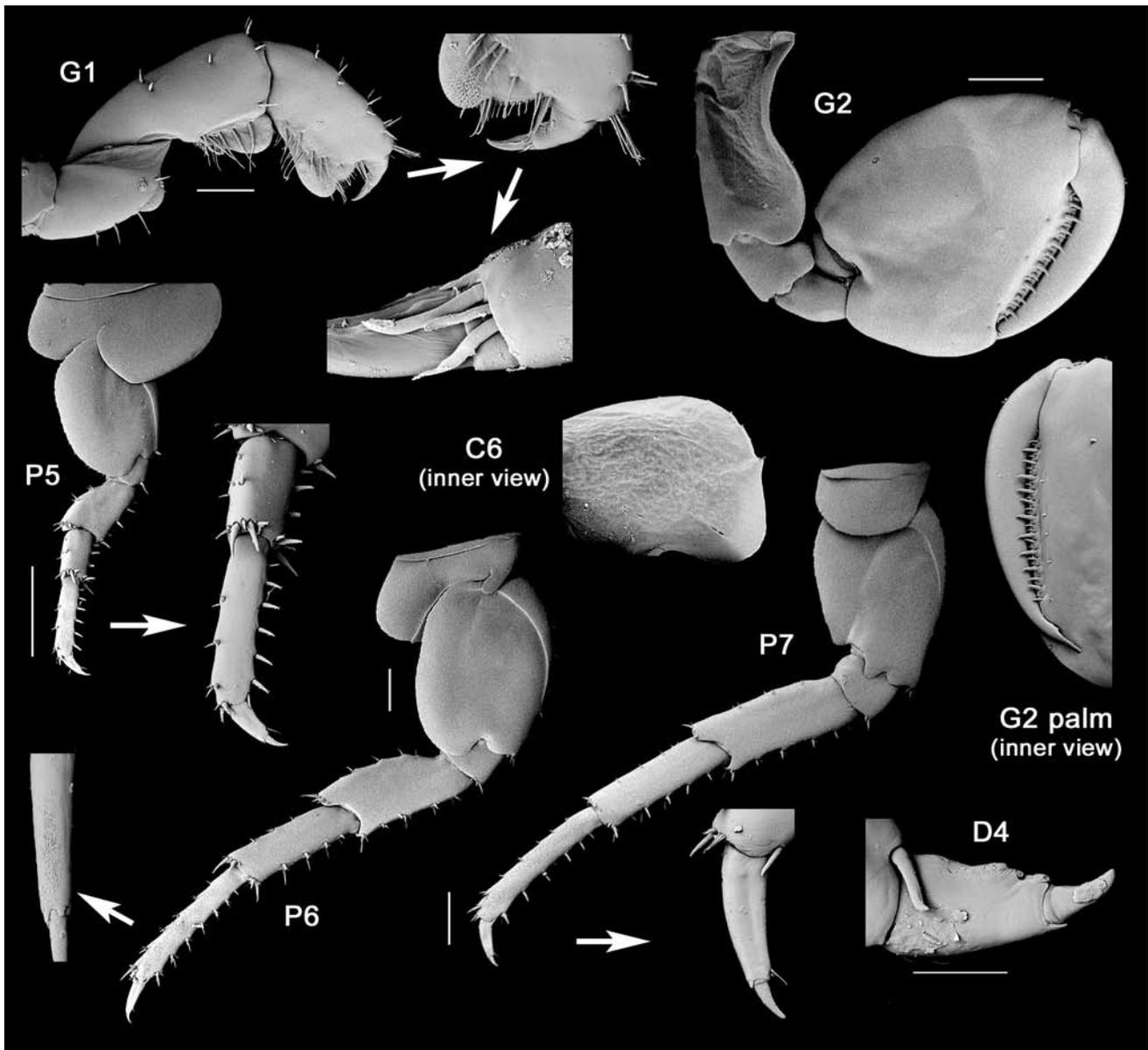


Fig. 10. *Notorchestia australis* (Fearn-Wannan, 1968), male, 16.1 mm, AM P69007, Port Macdonnell, South Australia. Scales for G1: 0.2 mm; D4: 0.1 mm; remainder: 0.5 mm.

Pereopods 3–7 cuspidactylate; dactylus with row or patch of dorsal short setae. Pereopod 4 subequal or slightly shorter than pereopod 3. Pereopod 4 dactylus thickened and pinched posteriorly, different to pereopod 3 dactylus. Pereopod 5 propodus distinctly longer than carpus. Pereopod 6 not sexually dimorphic; shorter than pereopod 7; coxa posterior lobe anterodistal corner rounded, posteroventral margins with 1–3 marginal setae, posterior margin perpendicular to ventral margin, outer surface with ridge. Pereopod 7 basis sexually dimorphic; basis without lateral sulcus, posterior margin tapering distally, posterodistal corner forming a 90° angle, lobe absent; distal articles slender. Coxal gills simple or slightly lobate. Pereopods 3–5 gills smaller than gills 2 and 6.

Pleopods 1–3 well developed; biramous; inner ramus slightly longer than outer ramus. Pleopod 1 peduncle with 2–3 setae on outer margin and 1 medio-facial seta. Pleopod 2 with 2 setae on outer margin and 4–5 medio-facial setae.

Pleopod 3 peduncle outer margin apparently without setae and 8–10 medio-facial setae. Epimera 1–3 posteroventral corner slightly produced into a small subacute spine. Epimeron 3 posterior margin minutely serrate, with setae, ventral margin without setae. Uropod 1, peduncle with 12 robust setae in two rows; distolateral robust seta absent; inner ramus subequal in length to outer ramus; inner ramus with 5 marginal robust setae; outer ramus with 3 marginal robust setae. Uropod 2 peduncle with 7 robust setae in two rows; inner ramus subequal in length to outer ramus; inner ramus with 4 marginal robust setae, 3 on outer margin and 1 on inner margin; outer ramus with 1 marginal robust setae. Uropod 3 peduncle with 3–4 robust setae; ramus subequal in length to peduncle; triangular, narrowing distally; ramus with a sequence of 7–9 marginal slender setae and 5–6 apical setae. Telson longer than broad; incised to half the length; each lobe with 3 lateral robust setae and 1–2 smaller distal robust setae.

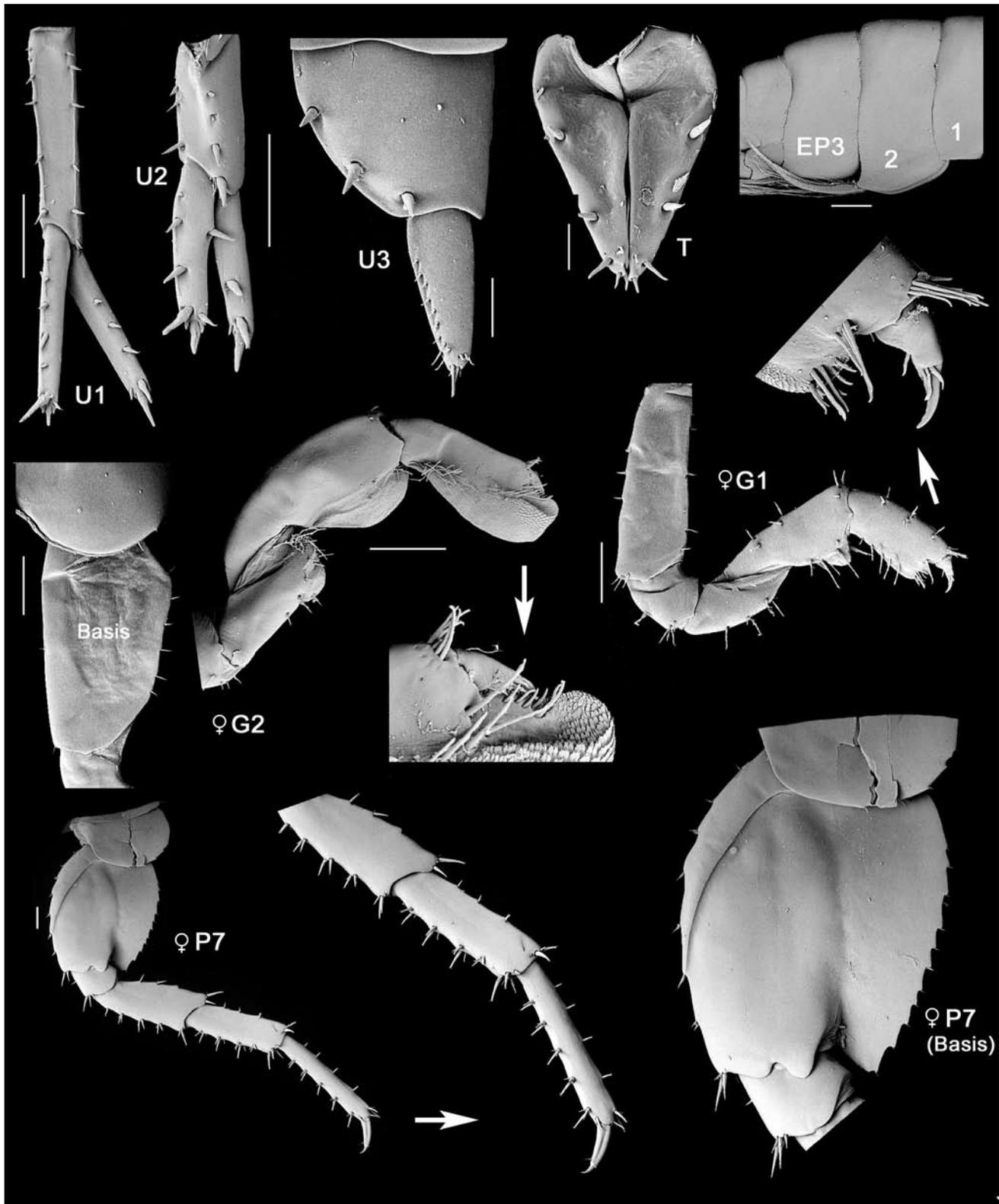


Fig. 11. *Notorchestia australis* (Fearn-Wannan, 1968), male, 16.1 mm, EP1–3, U1–3, T, AM P69007; female 11.1 mm, G1–2, P7, AM P69009, Port Macdonnell, South Australia. Scales for U3 and T: 0.1 mm; G1–2 and P7: 0.2 mm; EP1–3 and U1–2: 0.5 mm.

Female (sexually dimorphic characters), 15.1 mm. Gnathopod 1 subchelate; posterior margin of carpus and propodus with rugose lobe; propodus subrectangular; dactylus subequal in length to palm. Gnathopod 2 mitten-shaped; basis slightly expanded, about 1.8× longer than wide; carpus well developed, not enclosed by merus and propodus; posterior margin of

merus, carpus and propodus with rugose lobe; palm obtuse; dactylus shorter than palm. Pereopod 7 basis not tapering distally, posterodistal corner slightly produced into a small pointed lobe. Uropod 3 ramus with 6 marginal setae. Oostegites longer than wide; setae with simple and multi-furcate tips. Oostegites 2–4 moderately setose (around 24 setae).

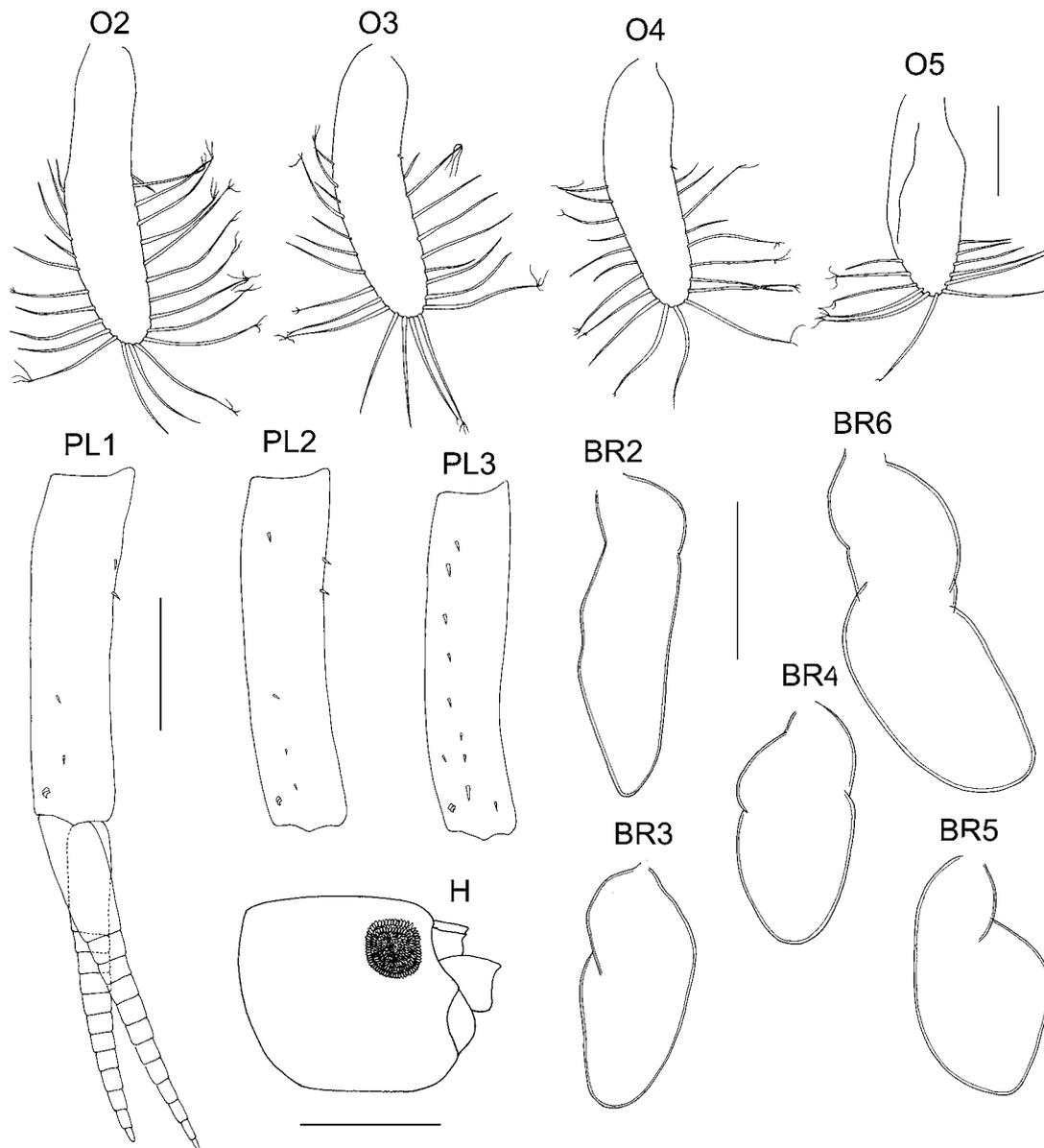


Fig. 12. *Notorchestia australis* (Fearn-Wannan, 1968), female, 11.1 mm, O2–5 and BR2–6, AM P69009; male, 16.1 mm, H and PL1–3, AM P69007. Scales for H: 1 mm; remainder: 0.5 mm.

Habitat. This species colonized a variety of habitats ranging from the supra-littoral of protected beaches to estuarine areas as salt-marshes.

Remarks. The type material of *N. australis* (Fearn-Wannan, 1968) was re-examined and compared carefully with material collected in this study. All the diagnostic characters described in Fearn-Wannan (1968) as well as other characters herein proposed were found in the holotype and the examined material. One exception was the number of teeth on the left lacinia mobilis. The holotype examined has a 5-dentate lacinia although the fifth tooth is very small and the paratypes have a well defined 5-dentate lacinia. On the other hand, all the specimens dissected in the material examined (8) have a 4-dentate left lacinia mobilis. This variation leads to confusion as Bousfield (1982, 1984) used the number of the left lacinia to define genera within the Talitridae. However, variation in the number of teeth on the left lacinia (4 to 5 teeth) of

Traskorchestia species was also noted (Bousfield, 1982). Thus, we decided to maintain this character as an intra-specific variation and consider the ANTS material as *N. australis*.

Notorchestia australis was commonly found on the South Australia samples occurring in 17 of the 23 stations. It occurs sympatrically with *Notorchestia lobata* n.sp. in two stations (SA 146 and SA 148).

Distribution. *New South Wales:* Twofold Bay. *Victoria:* Old Port, Port Albert; Painkalac Creek; Peterborough Beach (ANTS material). Lake King; Port Philip Bay and Western Port Bay (Fearn-Wannan, 1968). *South Australia:* Port Macdonnell; Lake Baddy; Robe; Goolwa marsh, Coorong National Park; Victor Harbour, Encounter Bay; Fleurieu Peninsula; Yankalilla Bay, Eyre Peninsula; Spencer Gulf, Eyre Peninsula; Ceduna, Eyre Peninsula; Fowlers Beach, Fowlers Bay, Eyre Peninsula; Sleaford Mere, Eyre Peninsula.

Notorchestia lobata n.sp.

Figs 13–16

Type material. HOLOTYPE: male, 10.8 mm, AM P69051 (slide, stubs J085–J087, J091–J094). PARATYPES: male, 10.8 mm, AM P69055 (stub J084); 1 female, 11 mm, AM P69052 (slide, stubs J088, J090 [part, G1–2]); 2 juvenile males, 10 mm and 7.9 mm, AM P69053 (mixed on stub J089, SEM micrographs); male, 12.5 mm, AM P69054; female, 9.1 mm, AM P69056 (stub J090 [part, G1]); 51 specimens, AM 69057, all from Goolwa Beach, Encounter Bay, South Australia (35°31.47'S 138°48.51'E), wide beach with a lot of dead seagrass and seaweed over hard grey sand. C. Serejo, J.K. Lowry & J. Bradbury, 15 Oct. 2003, SA 144.

Type locality. Goolwa Beach, Encounter Bay (35°31.47'S 138°48.51'E), SA.

Additional material examined. *Victoria*: 42 specimens, AM P69015, supra-littoral zone on exposed ocean beach, Point Ricardo (37°48.39'S 148°38'E), beach-hoppers under dead *Sargassum* on exposed ocean beach, C. Serejo & J.K. Lowry, 8 Oct. 2003, VIC 120; 20 specimens, AM P69016, Woodside Beach (between Sale and Yarram) (38°33.29'S 146°58.47'E), beach-hoppers under dead *Sargassum*, exposed windswept beach with little seaweed, C. Serejo & J.K. Lowry, 9 Oct. 2003, VIC 123; AM P69017, 85 specimens, Lorne Beach near mouth of Erskine River, Lorne (38°32.1'S 143°58.59'E), broad ocean beach with dead seaweed in supra-littoral, C. Serejo & J.K. Lowry, 12 Oct. 2003, VIC 128; 72 specimens, AM P69018, Ocean beach, Separation Creek (38°37.96'S 143°53.78'E), ocean beach with rock reefs immediately offshore, C. Serejo & J.K. Lowry, 12 Oct. 2003, VIC 130; 22 specimens, AM P69019, Peterborough Beach, Peterborough (38°36.6'S 142°52.67'E), ocean beach with beach-hoppers under seaweed, C. Serejo & J.K. Lowry, 12 Oct. 2003, VIC 132; 130 specimens, AM P69020, Sandy beach, The Craigs (38°22.36'S 142°6.59'E), narrow sandy beach with vertical cliffs directly behind and rock platform in front with *Ulva*, *Sargassum* and *Cystophora*, C. Serejo & J.K. Lowry, 13 Oct. 2003, VIC 134; 76 specimens, AM P69021, Shelly Beach, Bridgewater Bay (38°21.65'S 141°26.14'E), sandy beach with accumulations of small gastropod shells, C. Serejo & J.K. Lowry, 13 Oct. 2003, VIC 136; 47 specimens, AM P69033, Sandy Point (38°50'S 146°08'E), under dry kelp, A. Murray, 29 Dec. 2003, VIC 137.

South Australia: 12 specimens, AM P69022, Beachport Beach, Rivoli Bay (37°29.01'S 140°3.39'E), sheltered beach, dunes behind beach, C. Serejo & J.K. Lowry, 14 Oct. 2003, SA 140; 35 specimens, AM P69023, Victor Harbour, Encounter Bay (35°33.07'S 138°37.44'E), sheltered harbour beach, C. Serejo, J.K. Lowry & J. Bradbury, 15 Oct. 2003, SA 146; 89 specimens, AM P69024, beach in Yankalilla Bay, Fleurieu Peninsula (35°28.73'S 138°46.75'E), sandy, rocky beach, C. Serejo, J.K. Lowry & J. Bradbury, 15 Oct. 2003, SA 148.

Western Australia: 2 males and 3 females, AM P69025, Ocean beach, Eucla (31°43.29'S 129°53.31'E), broad white sand beach with clumps of seagrass and seaweed, with dunes behind, C. Serejo & J.K. Lowry, 20 Oct. 2003, WA 753; 40 specimens, AM P69026, Fourth Beach, Esperance (33°53.29'S 121°50.7'E), exposed white sand beach with small amounts of seaweed, C. Serejo & J.K. Lowry, 21 Oct. 2003, WA 754; 10 males and 19 females, AM P69027, West Beach, Hopetoun (33°52'S 121°52'E), on seaweed at enclosed sheltered white sand beach, C. Serejo & J.K. Lowry, 21 Oct. 2003, WA 755; 2 males and 3 females, AM P69028, Slippery Rock, Cape Leuwin (34°21.44'S 115°7.64'E), mixed and dead seaweed lodged between large boulders at the end of a steeply sloping white sand beach, C. Serejo & J.K. Lowry, 23 Oct. 2003, WA 759; 48 specimens, AM P69029, Binningup Beach, Bunbury (33°9.02'S 115°41.08'E), exposed sandy beach, C. Serejo & J.K. Lowry, 24 Oct. 2003, WA 761; 33 specimens, AM P69030, South Cottesloe Beach, Perth (32°0.28'S 115°45.03'E), sandy beach with a lot of dead seagrasses and seaweed, C. Serejo, J.K. Lowry & D. Jones, 26 Oct. 2003, WA 762; 140 specimens, AM P69031, Jurien Beach, Jurien (30°18.38'S 115°1.99'E), sandy beach with a lot of dead seagrasses and seaweed, C. Serejo & J.K. Lowry, 28 Oct. 2003, WA 765; 1 female, AM P69032, Disappointment Loop, Henri Freycinet Harbour, Shark Bay (26°40.21'S 113°40.31'E), low rock platform moving into clayey mudflats with small banks covered in holes with small smooth clay channels between, C. Serejo & J.K. Lowry, 4 Nov. 2003, WA 775.

Etymology. This species is named for the lobate structure on the posterodistal margin of the merus of gnathopod 2.

Diagnosis. Mandible left lacinia mobilis 4-dentate. Dactylus of gnathopod 1 with row of ventral short setae. Gnathopod 2 male, propodus subquadrate; palm slightly acute to transverse, with large midpalmar concavity. Female and male juvenile gnathopod 2 merus with distally rounded posterodistal medial lobe. Coxa 6 posterior lobe posteroventral margins with 13–15 robust setae. Basis of pereopod 7 with lateral sulcus. Telson cleft to half length.

Description

Holotype male, 10.8 mm. Eye medium, $\frac{1}{5}$ – $\frac{1}{3}$ head length. Antenna 1 short, rarely longer than peduncle article 4 of antenna 2. Antenna 2 shorter than head and first 3 pereonites; peduncular articles narrow; with many robust setae; article 5 longer than article 4. Epistome of upper lip without robust setae. Lower lip distolateral setal tuft absent. Mandible left lacinia mobilis 4-dentate. Maxilliped palp article 2 with distomedial lobe, article 4 present, reduced.

Gnathopod 1 sexually dimorphic; subchelate; posterior margin of carpus and propodus with rugose lobe; propodus sub-triangular; palm transverse; dactylus subequal in length to palm, with ventral setal row, simplidactylate. Gnathopod 2 sexually dimorphic; sub-chelate; basis anteriorly smooth; merus without posterodistal medial lobe; propodus sub-quadrate; palm slightly acute to transverse, with large midpalmar concavity; dactylus longer than palm, concave and not attenuated distally. Coxae 2–4 deeper than wide. Pereopods 3–7 cuspidactylate; dactylus with row or patch of dorsal short setae. Pereopod 4 significantly shorter than pereopod 3. Pereopod 4 dactylus thickened and pinched posteriorly, different to pereopod 3 dactylus. Pereopod 5 propodus distinctly longer than carpus. Pereopod 6 not sexually dimorphic; shorter than pereopod 7; coxa posterior lobe anterodistal corner rounded, posteroventral margins with 13–15 robust setae, posterior margin perpendicular to ventral margin, outer surface with ridge; carpus slender. Pereopod 7 sexually dimorphic; basis with lateral sulcus well developed, posterodistal lobe present; distal articles slender. Coxal gills convoluted, processiferous or simple. Pereopods 3–5 gills smaller than gills 2 and 6.

Pleopods 1–3 well developed, biramous. Peduncles of pleopods 1–2 with 10 robust setae, 8 on outer margin and 1–2 facial. Peduncle of pleopod 3 with 14 setae, 7 on outer margin and 7 facial. Epimeron 2 longer than epimeron 3. Epimeron 3 posterior margin minutely serrate, with setae, posteroventral corner with small subacute spine, ventral margin without robust setae. Uropod 1 peduncle with 16 robust setae in two rows; distolateral robust seta absent; inner ramus shorter than outer ramus, with 6 marginal robust setae; outer ramus with 5 marginal robust setae. Uropod 2 peduncle with 10 robust setae in two rows; inner ramus longer than outer ramus, with 3 marginal robust setae; outer ramus with 3–4 marginal robust setae. Uropod 3 peduncle with 5 robust setae; ramus shorter than peduncle; triangular, narrowing distally; with 5 marginal setae and 4–5 apical setae. Telson longer than broad; incised to half length; with marginal and apical robust setae; about 3 to 5 robust setae per lobe.

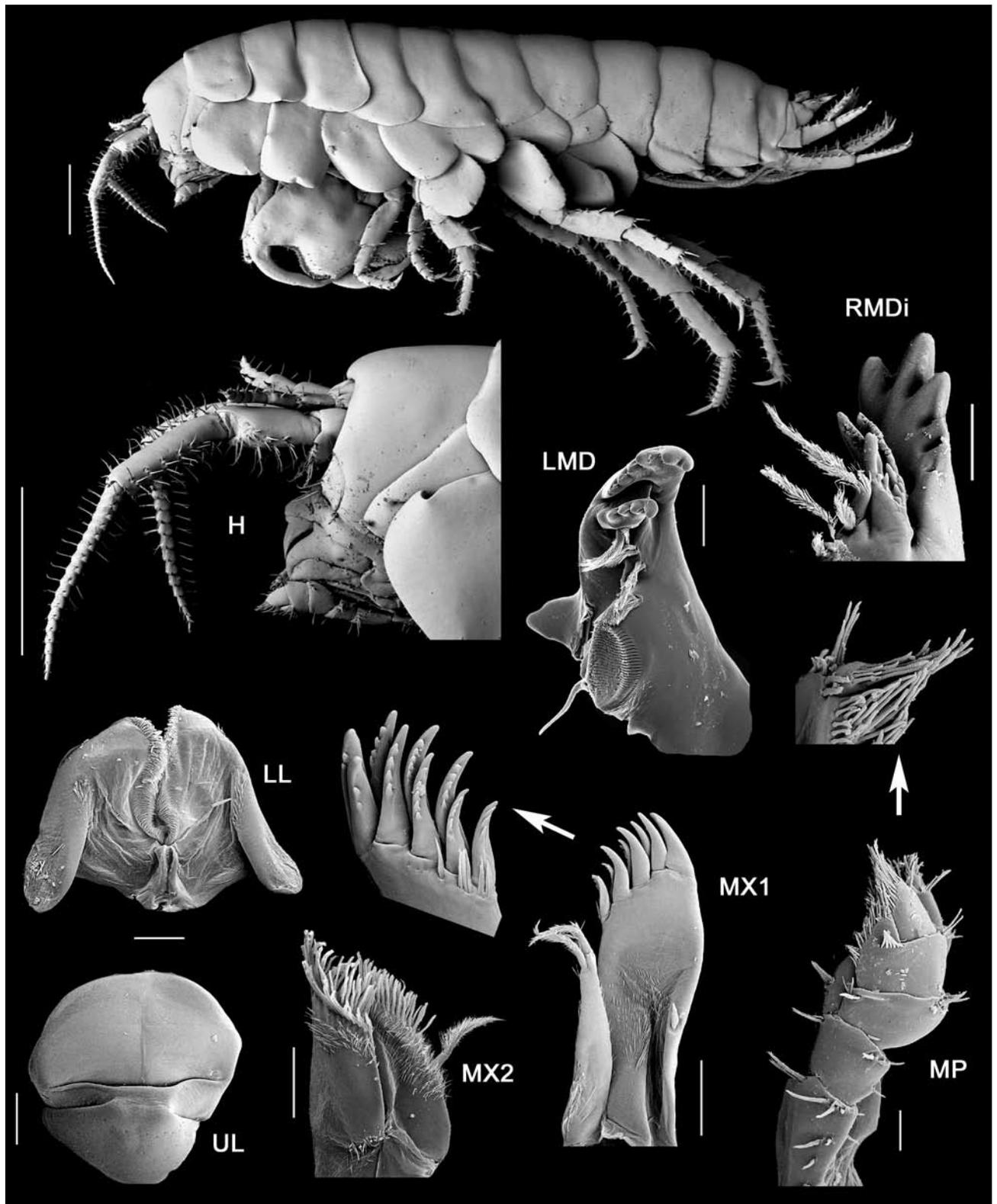


Fig. 13. *Notorchestia lobata* n.sp., paratype male, 10.8 mm, habitus, AM P69055; holotype male, 10.8 mm, other parts, AM P69051, Goolwa Beach, Encounter Bay, South Australia. Scales for habitus: 1 mm; remainder: 0.5 mm.

Female (sexually dimorphic characters), **11 mm**. Gnathopod 1 parachelate; posterior margin of merus, carpus and propodus without rugose lobe; propodus ovoid; palm very short, acute; dactylus longer than palm, with ventral row of setae. Gnathopod 2 mitten-shaped; basis slightly expanded;

about 1.5× longer than wide; merus with distally rounded posterodistal lobe on medial surface; palm obtuse; dactylus shorter than palm. Pereopod 7 basis with lateral sulcus slightly pronounced. Oostegites setae with simple and multi-furcate tips. Oostegites 2–4 moderately setose (around 24 setae).

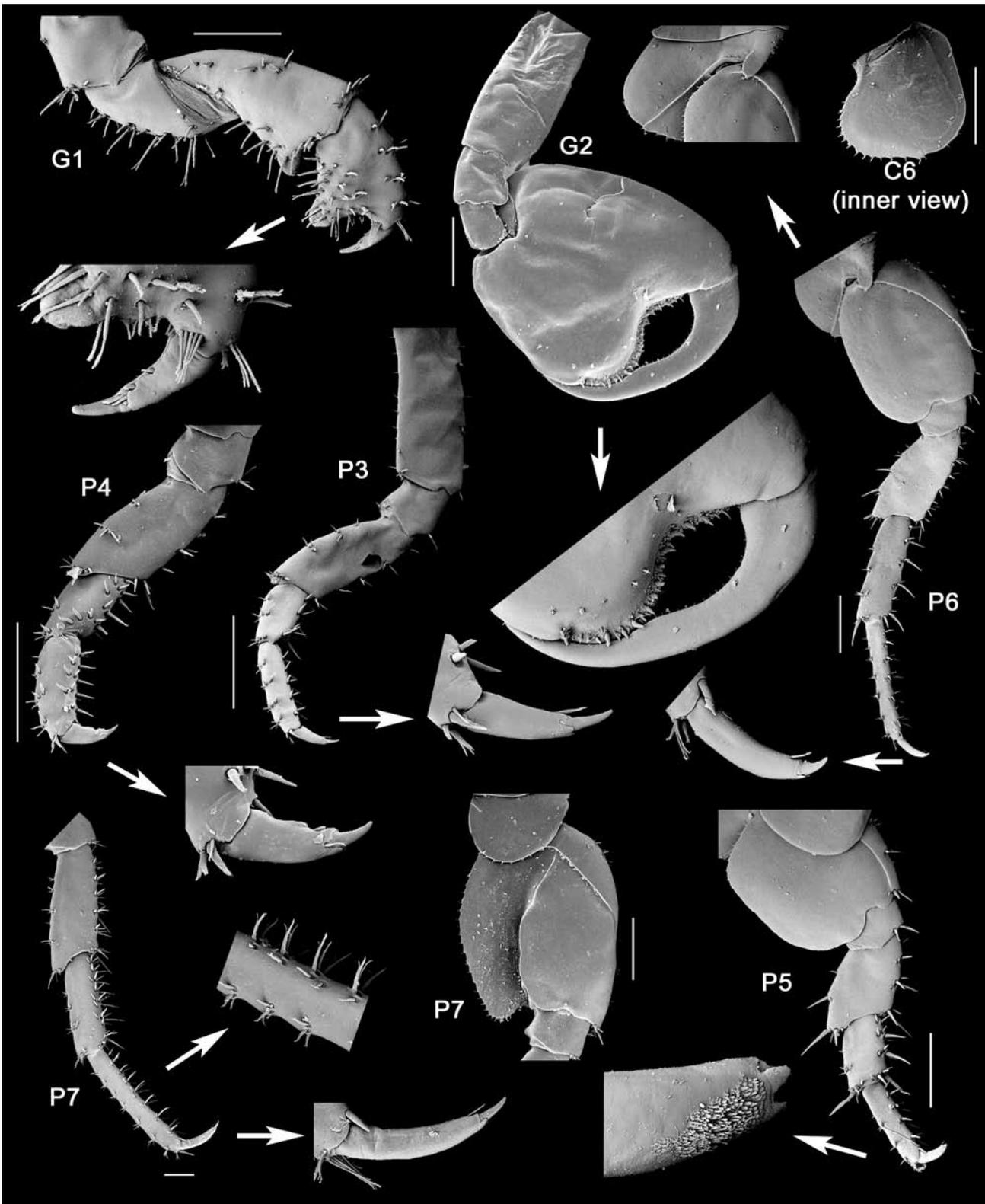


Fig. 14. *Notorchestia lobata* n.sp., holotype male, 10.8 mm, AM P69051, Goolwa Beach, Encounter Bay, South Australia. Scales represent 0.5 mm.

Variation. Juvenile males observed (7.9–10 mm) presented the gnathopod 2 with a distinct medial lobe on merus as seen in females, a lobe that reduces gradually in each moult, until disappearing completely in adult forms. The medial palm concavity of the gnathopod 2 is very shallow or imperceptible.

Habitat. Supra-littoral zone mainly on exposed ocean beaches, but also occurring in sheltered areas.

Remarks. *Notorchestia lobata* n.sp. is similar to *Orchestia quadrimana* (Dana, 1852), originally described from Illawarra, New South Wales. Both species have the shape

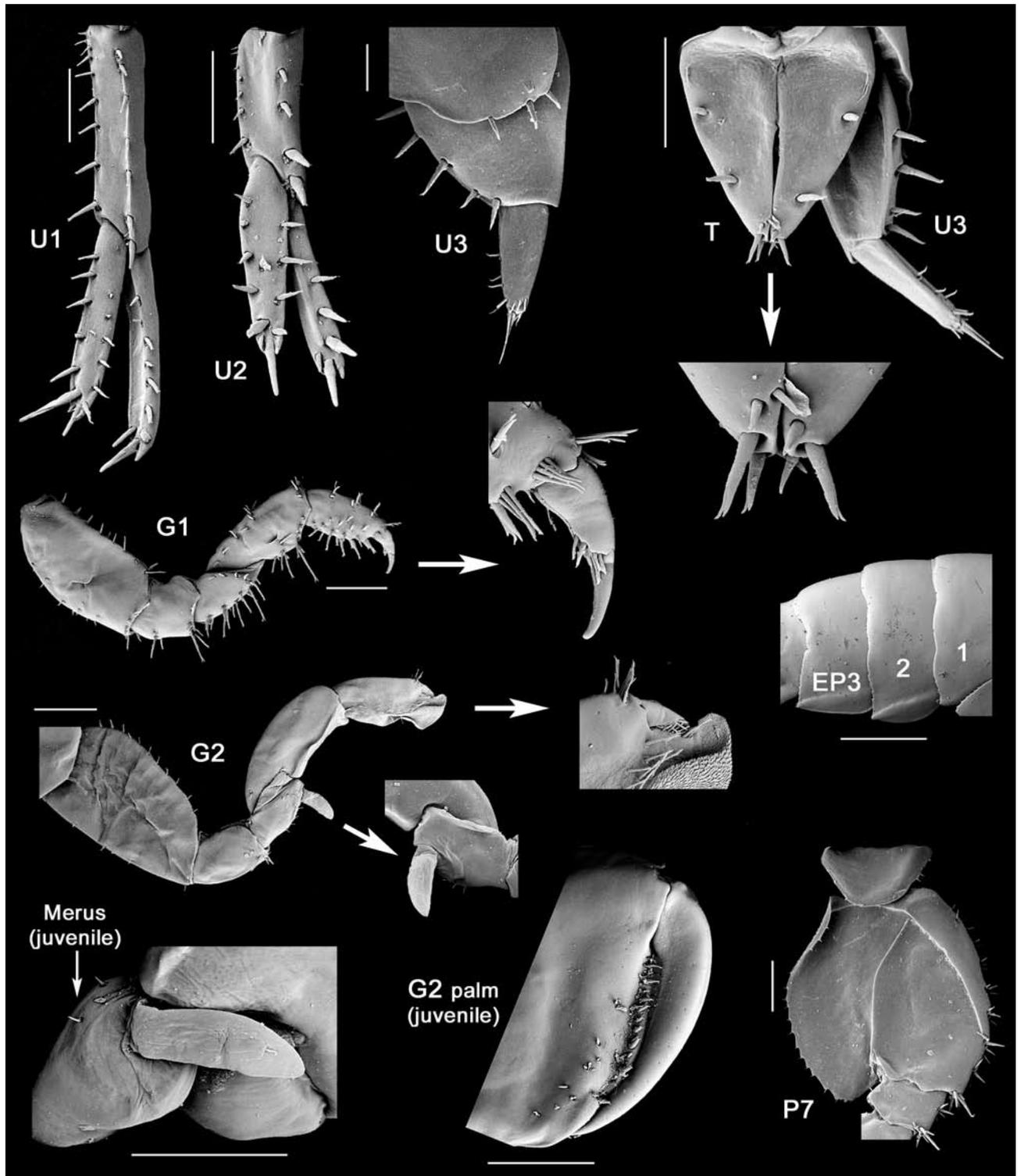


Fig. 15. *Notorchestia lobata* n.sp., holotype male, 10.8 mm, U3 and T, AM P69051; female, 9.1 mm, G1, AM P60956; female 11 mm, G2 and P7, AM P69052, juvenile male, 10 mm, G2, AM P69053, Goolwa Beach, Encounter Bay, South Australia. Scales for G1, G2, P7, U1–3: 0.3 mm; EP1–3: 1 mm; merus (juvenile) and T: 0.2 mm.

of propodus of male gnathopod 2 subquadrate with palm excavate. However, *N. lobata* has the outer ramus of uropod 1 with 5 robust setae, while *O. quadrimana* lacks marginal setae on outer ramus of uropod 1. Dana's (1852; 1853) description of *O. quadrimana* is poorly detailed and the species needs to be redescribed. Unfortunately, the type material appears to be lost (Ardis Jonston, in litt, from

the Museum of Comparative Zoology, Harvard) and our attempts to recollect this species from the type locality were unsuccessful.

Notorchestia lobata (Stebbing, 1899) is also close to *N. novaehollandiae* (Stebbing, 1899), originally described from Manly, New South Wales. Both species have setose antenna 2, subquadrate shape of propodus of male

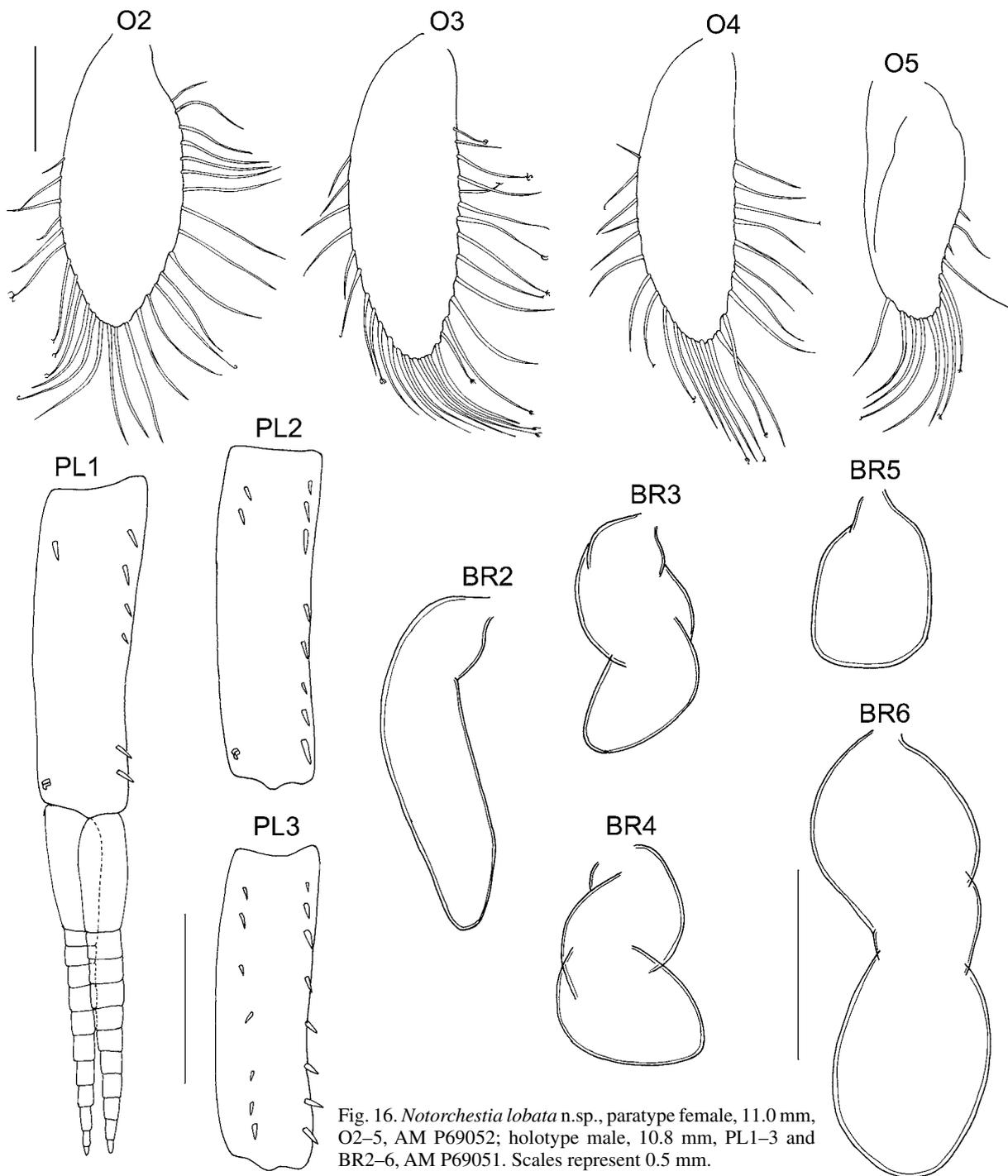


Fig. 16. *Notorchestia lobata* n.sp., paratype female, 11.0 mm, O2–5, AM P69052; holotype male, 10.8 mm, PL1–3 and BR2–6, AM P69051. Scales represent 0.5 mm.

gnathopod 2, basis of pereopod 7 with lateral sulcus and a cleft telson. Distinct differences are noticed on the male palm of gnathopod 2, which in *N. lobata* is strongly excavate (10.8 mm), not slightly excavate (10 mm); female palm of gnathopod 1 is parachelate, not simple; and the presence of the conspicuous lobe on the merus of female gnathopod 2, not described for *N. novaehollandiae*. The excavation on the palm of gnathopod 2 varies with the stage of development as noticed in *N. lobata*. Thus, the 10 mm male herein observed had a less excavate palm, but also had the medial lobe on the merus (Fig. 15), a character also not described for the *N. novaehollandiae* males.

Distribution. *Victoria*: Point Ricardo; Woodside Beach (between Sale and Yarram); Lorne Beach near mouth of Erskine River; Ocean Beach, Separation Creek; Peterborough Beach, Peterborough; Sandy Beach, The Craigs; Shelly Beach, Bridgewater Bay; Sandy Point. *South Australia*: Beachport Beach, Rivoli Bay; Goolwa Beach and Victor Harbour, Encounter Bay; Yankalilla Bay, Fleurieu Peninsula. *Western Australia*: Ocean Beach, Eucla; Fourth Beach, Esperance; West Beach, Hopetoun; Slippery Rock, Cape Leuwin; Binningup Beach, Bunbury; South Cottesloe Beach; Jurien Beach, Jurien; Disappointment Loop, Henri Freycinet Harbour, Shark Bay.

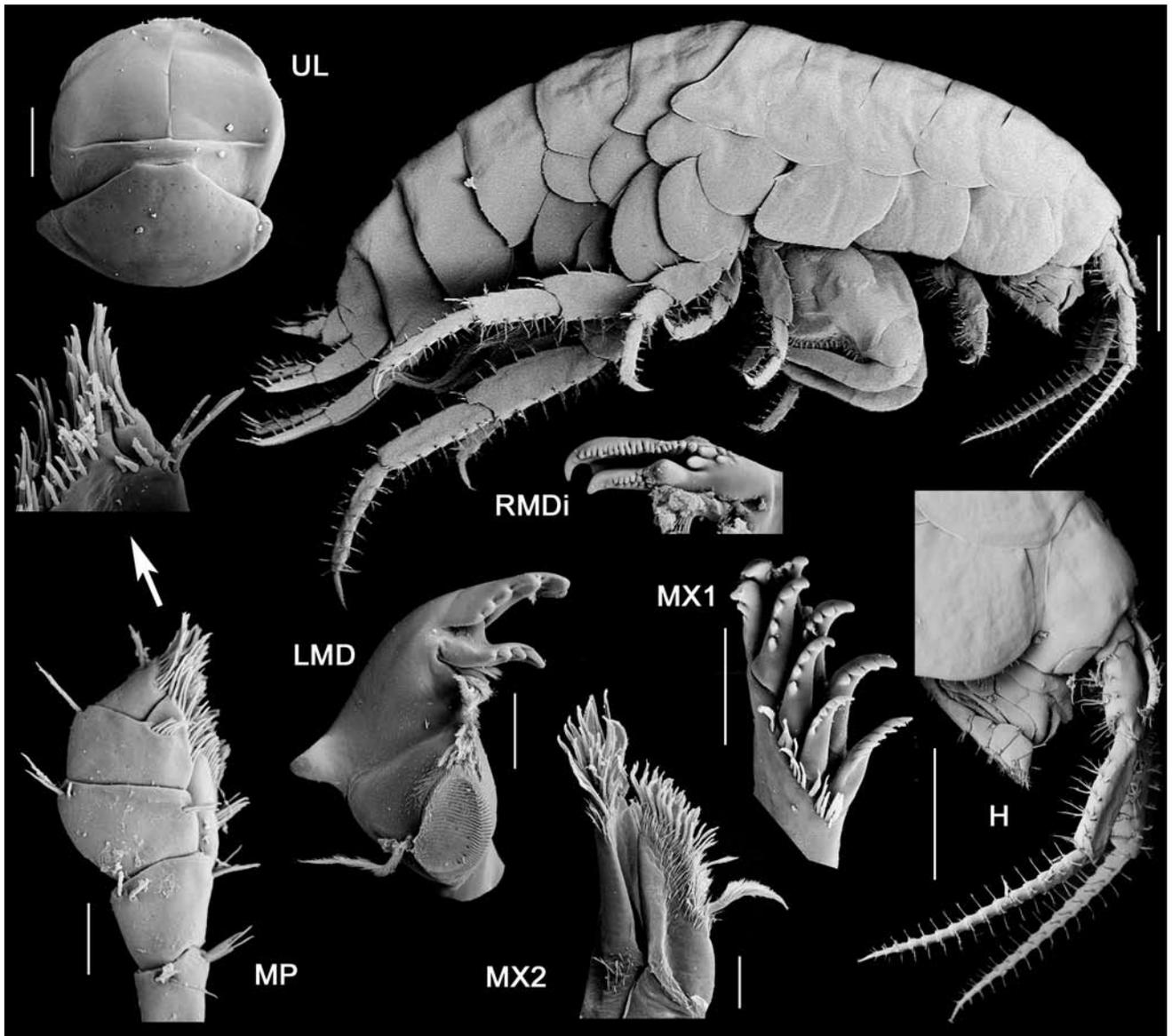


Fig. 17. *Notorchestia naturaliste* n.sp., paratype male, 16.2 mm, habitus, AM P69122; holotype male 14.8 mm, other parts, AM P69121, Bunker Bay, Cape Naturaliste, Western Australia. Scales for habitus: 1 mm; H: 0.5 mm; UL, MD, MX2, MP: 0.1 mm; MX1: 0.06 mm.

***Notorchestia naturaliste* n.sp.**

Figs 17–20

Type material. HOLOTYPE: male, 14.8 mm, AM P69121 (1 slide, stubs J046–J049–J052). PARATYPES: 1 male, 16.2 mm, AM P69122 (stub J061, habitus); 1 juvenile male, 15.5 mm, AM P69123; 1 female 14.6 mm, AM P69124; (stub J048, SEM micrographs); 10 males and 90 females, AM P69125; all from Bunker Bay, Cape Naturaliste, Western Australia (33°32.39'S 115°1.8'E), protected small rocky beach, C. Serejo & J.K. Lowry, 24 Oct. 2003, WA 760.

Type locality. Bunker Bay, Cape Naturaliste, Western Australia (33°32.39'S 115°1.8'E).

Additional material examined. *Western Australia:* 8 males and 30 females (multicoloured), AM P69126, Blackwood River mouth, Augusta (34°19.54'S 115°10.07'E), flat beach near boat ramp, substrate coarse dark sand with some tan

to orange and almost black pebbles, substrate covered with large patches of a green alga, probably *Enteromorpha*, C. Serejo & J.K. Lowry, 23 Oct. 2003, WA 758; 6 males and 52 females, AM P69127, Slippery Rock, Cape Leuwin (34°21.44'S 115°7.64'E), mixed and dead seaweed lodged between large boulders at the end of a steeply sloping white sand beach, C. Serejo & J.K. Lowry, 23 Oct. 2003, WA 759; 1 male, 1 female and 2 juvenile males, AM P69128, beach, Freshwater Point (29°36.34'S 114°58.42'E), small sandy beach with a lot of dead seagrass and seaweed adjacent to a rocky point, C. Serejo & J.K. Lowry, 28 Oct. 2003, WA 766; 6 males, AM P69129, Denham Beach, Denham, Shark Bay (25°56'S 113°32.53'E), white sandy beach with a strand of dead seagrasses at the high tide mark, C. Serejo & J.K. Lowry, 5 Nov. 2003, WA 776.

Etymology. This species is named for Cape Naturaliste, the type locality.

Diagnosis. Dactylus of gnathopod 1 with row of ventral

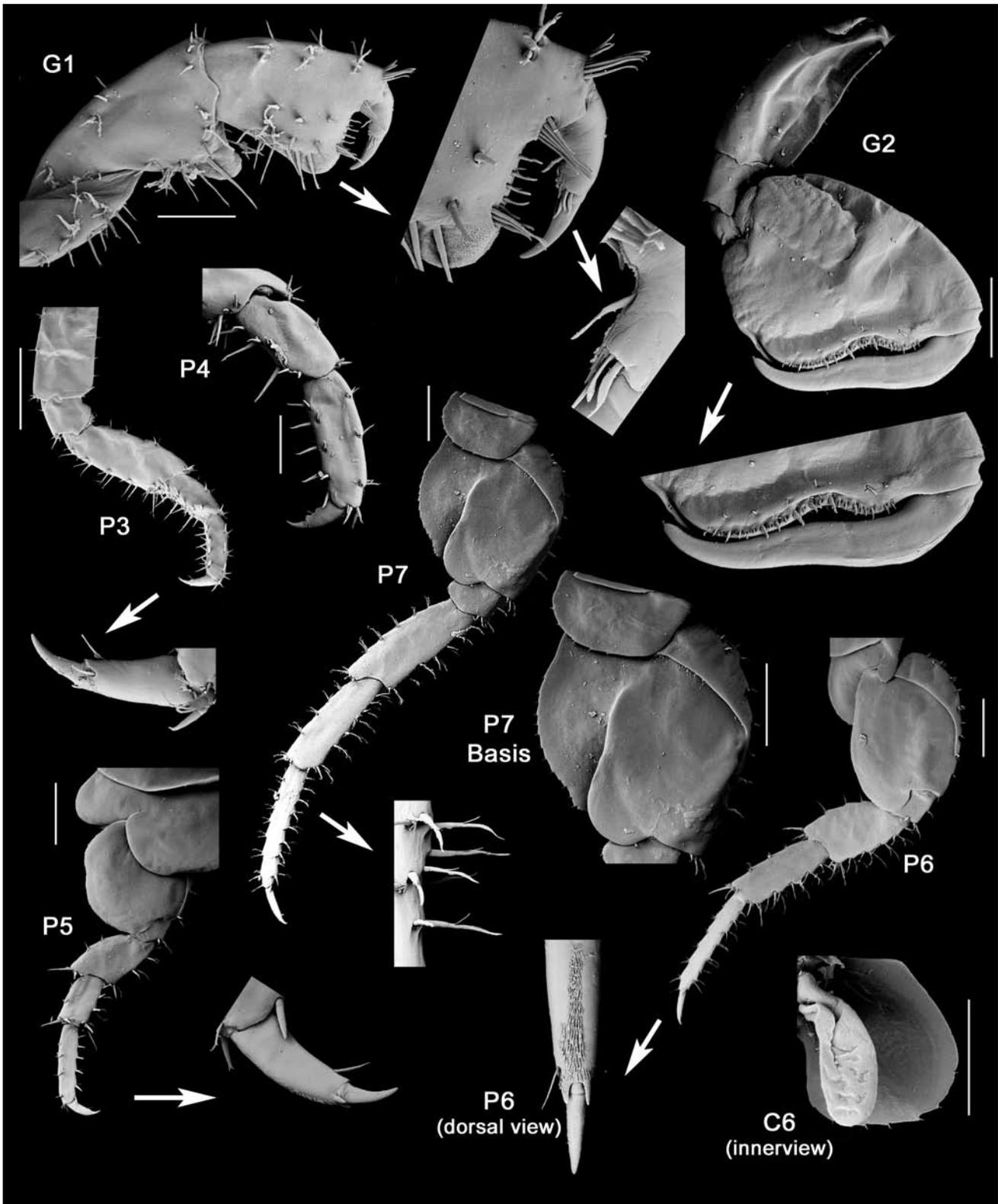


Fig. 18. *Notorchestia naturaliste* n.sp., holotype male, 14.8 mm, AM P69121, Bunker Bay, Cape Naturaliste, Western Australia. Scales for G1 and P4: 0.2 mm; remainder: 0.5 mm.

short setae. Female and male juvenile gnathopod 2 merus with distally pointed posterodistal medial lobe. Gnathopod 2 male, propodus subtriangular; palm acute and sinuous. Coxa 6 posterior lobe posteroventral margins with 6–7 robust setae. Basis of pereopod 7 with lateral sulcus. Telson cleft to half length.

Description

Holotype male, 14.8 mm. Eye medium, $\frac{1}{5}$ – $\frac{1}{3}$ head length. Antenna 1 short, rarely longer than peduncle article 4 of antenna 2. Antenna 2 shorter than head and first 3 pereonites; peduncular articles narrow; with many robust setae; article

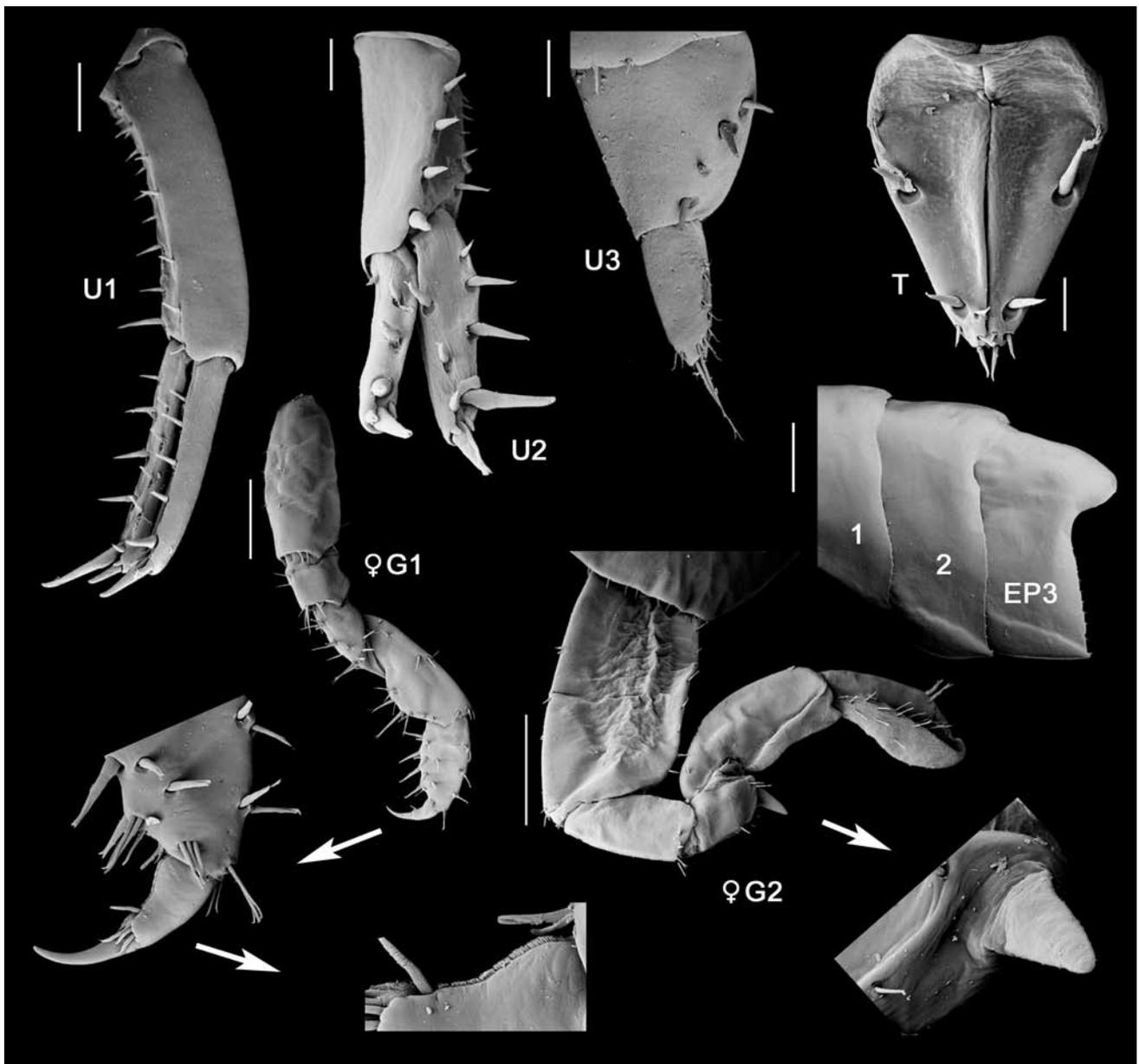


Fig. 19. *Notorchestia naturaliste* n.sp., holotype male, 14.8 mm, U1–3, EP1–3, T, AM P69121, paratype female, 14.6 mm, G1–2, AM P69124, Bunker Bay, Cape Naturaliste, Western Australia. Scales for U1–3: 0.2 mm; G1–2: 0.3 mm; EP1–3: 0.5 mm; T: 0.1 mm.

5 longer than article 4. Epistome of upper lip without robust setae. Lower lip distolateral setal tuft absent. Mandible left lacinia mobilis 4-dentate. Maxilliped palp article 2 with distomedial lobe, article 4 present, reduced.

Gnathopod 1 sexually dimorphic; subchelate; posterior margin of carpus and propodus with rugose lobe; propodus sub-triangular; palm transverse; dactylus shorter than palm, with row of ventral short setae. Gnathopod 2 sexually dimorphic; subchelate; merus without posterodistal medial lobe; carpus triangular, reduced, enclosed by merus and propodus; propodus sub-triangular; palm acute, sinuous, with small midpalmar concavity, posterodistal corner without protuberance; dactylus longer than palm, not attenuated distally. Coxae 2–4 as wide as deep. Pereopods 3–7 cuspidactylate; dactylus with row or patch of dorsal short setae. Pereopod 4 significantly shorter than pereopod 3. Pereopod 4 dactylus thickened and pinched posteriorly, different to pereopod 3 dactylus. Pereopod 5 propodus distinctly longer than carpus.

Pereopod 6 not sexually dimorphic; shorter than pereopod 7; coxa posterior lobe anterodistal corner rounded, posteroventral margins with 6–7 robust setae, outer surface with ridge. Pereopod 7 sexually dimorphic; basis with lateral sulcus well developed, posterodistal lobe absent; distal articles slender. Coxal gills simple or slightly lobate. Pereopods 3–5 gills smaller than gills 2 and 6.

Pleopods 1–3 well developed, biramous. Pleopod 1 peduncle without setae; pleopods 2–3 peduncles with 5–6 short marginal robust setae. Epimeron 2 subequal in length to epimeron 3. Epimeron 3 posterior margin with setae, posteroventral corner with small subacute spine. Uropod 1 peduncle with 12 robust setae in two rows; distolateral robust seta absent; inner ramus subequal in length to outer ramus; inner ramus with 4 marginal robust setae; outer ramus with 4 marginal robust setae. Uropod 2 peduncle with 11 robust setae in two rows; inner ramus subequal in length to outer ramus, with 5 marginal robust setae; outer ramus with 2 marginal

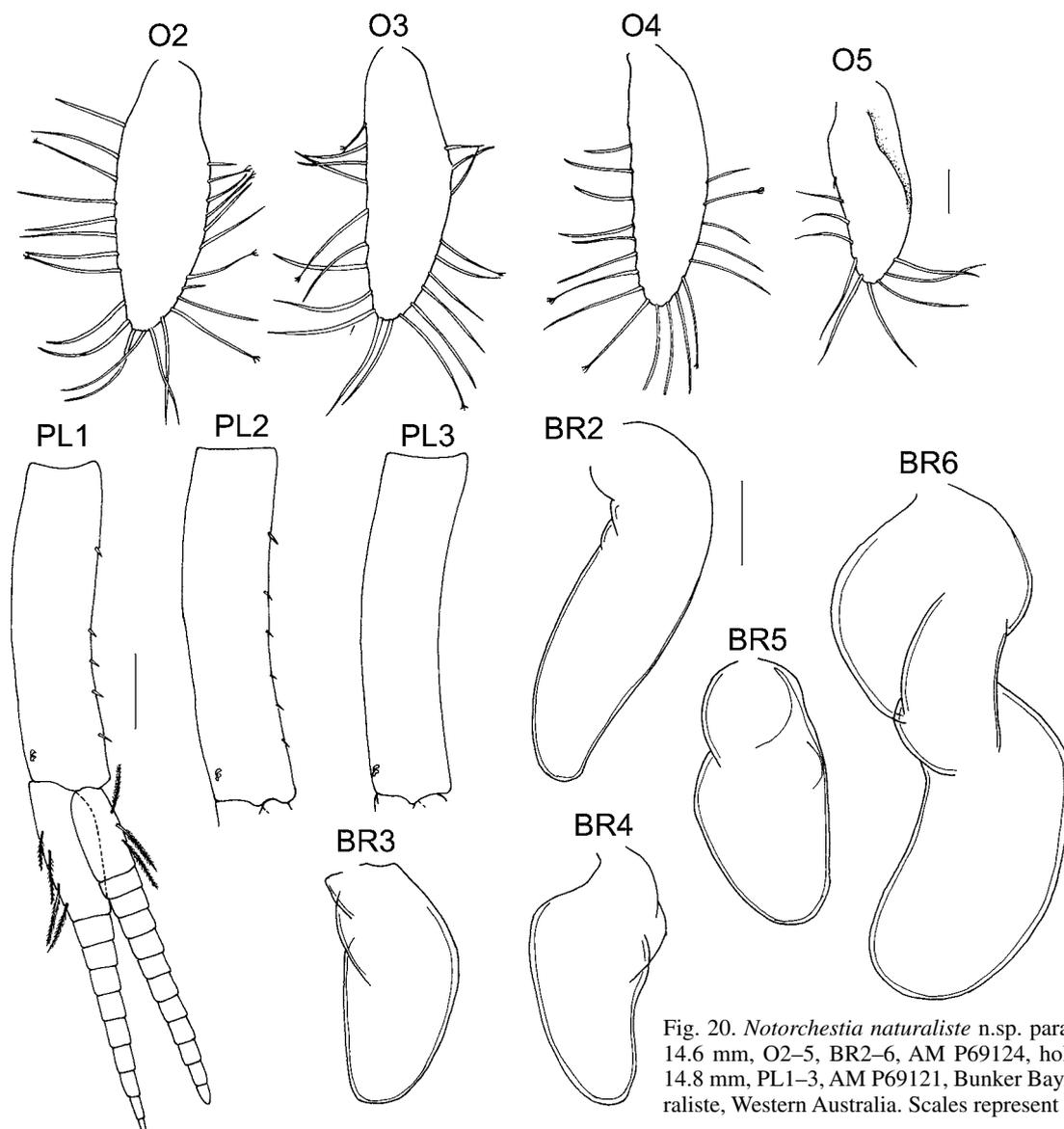


Fig. 20. *Notorchestia naturaliste* n.sp. paratype female 14.6 mm, O2–5, BR2–6, AM P69124, holotype male, 14.8 mm, PL1–3, AM P69121, Bunker Bay, Cape Naturaliste, Western Australia. Scales represent 0.2 mm.

robust setae. Uropod 3 peduncle with 4 robust setae; ramus shorter than peduncle; oval to spatula-shape, broad distally; ramus with 5–6 marginal setae and 4–5 apical setae. Telson longer than broad; incised to half length; with marginal and apical robust setae, about 3 to 5 robust setae per lobe.

Female (sexually dimorphic characters), 14.6 mm. Gnathopod 1 parachelate; posterior margin of merus, carpus and propodus without rugose lobe; propodus ovoid; palm very short, acute; dactylus longer than palm, with row of ventral short setae. Gnathopod 2 basis slightly expanded, about 2× longer than wide; merus with distally pointed posterodistal medial lobe; palm obtuse, smooth; dactylus shorter than palm. Pereopod 7 basis with lateral sulcus slightly pronounced. Oostegites longer than wide; setae with simple and/or multi-furcate tips. Oostegites 2–4 moderately setose (around 24 setae).

Variation. In juvenile males the process on the merus of gnathopod 2 may be present; the palm of gnathopod 2 is nearly straight and the sulcus on basis of pereopod 7 is slightly pronounced.

Remarks. *Notorchestia naturaliste* n.sp. resembles *N. lobata* n.sp. in the short antenna 1; heavily setose antenna 2; male gnathopod 1 subchelate, with rugose lobe on carpus and propodus; basis of pereopod 7 with lateral sulcus; and cleft telson. However, *N. naturaliste* can be distinguished from *N. lobata* by the sub-triangular shape of propodus of gnathopod 2 (not subquadrate), palm of gnathopod 2 with shallow concavity (not strong concavity in adult males); coxa 6 posterior lobe posteroventral margins with 6–7 robust setae, (not 14–15 setae); basis of pereopod 7 without posteroventral lobe on posterior margin, but with a frontal facial lobe formed from the sulcus (Fig. 18). *Notorchestia naturaliste* n.sp. occurred only in Western Australia and was found living sympatrically with *N. lobata* at Slippery Rock, Cape Leuwin.

Distribution. *Western Australia:* Blackwood River mouth; Slippery Rock, Cape Leuwin; Bunker Bay, Cape Naturaliste; Freshwater Point; Denham Beach, Denham, Shark Bay.

Platorchestia Bousfield, 1982

Platorchestia Bousfield, 1982: 26; Jo, 1988: 160; Richardson, 1991: 186; Miyamoto & Morino, 2004: 68; Serejo, 2004: 20.

Type species. *Platorchestia platensis* (Krøyer, 1845).

Diagnosis. Antenna 2 not geniculate, occasionally sexually dimorphic. Mandible left lacinia mobilis 5-dentate. Maxillipedal palp dactylus present, reduced. Gnathopod 2 subchelate; basis narrow or slightly expanded; propodus palm posterodistal corner without protuberance. Pereopods 3–7 cuspidactylate. Pereopod 4 carpus similar in length to or significantly shorter than carpus of pereopod 3. Pereopod 6 sexually dimorphic, or not. Pereopod 7 sexually dimorphic; basis lateral sulcus present, slightly pronounced. Gills lobate and/or convoluted; gills 3–5 smaller than gills 2 and 6. Oostegites 2–5 setae with simple straight tips. Pleopods all well developed. Uropod 1 outer ramus without marginal robust setae. Uropod 2 outer ramus with marginal robust setae. Telson entire, as long as or longer than broad with 3–10 robust setae per lobe.

Species composition. *Platorchestia* contains 16 species: *P. ashmoleorum* Stock, 1996; *P. bousfieldi* Ho & Li, 2003; *P. chathamensis* Bousfield, 1982; *P. humicola* (Martens, 1868); *P. japonica* (Tattersall, 1922); *P. joi* Stock & Biernbaum, 1994; *P. kaalensis* (Barnard, 1955); *P. lanipo* Richardson, 1991; *P. monodi* Mateus *et al.*, 1986; *P. munmui* Jo, 1988; *P. pachypus* (Derzhavin, 1937); *P. pacifica* Miyamoto & Morino, 2004; *P. paraplatensis* n.sp.; *P. pickeringi* (Dana, 1853); *P. platensis* (Krøyer, 1845) and *P. zachsii* (Derzhavin, 1937).

Platorchestia paraplatensis n.sp.

Figs 21–24

Type material. HOLOTYPE: male, 19.3 mm AM P69144 (slides, stubs J037–J042, J043 [part P7]). PARATYPES: male, 15.1 mm (stub J044, habitus) AM P69145; 1 female, 12.5 mm, AM P69146 (1 slide, stub J036, SEM micrographs); 355 specimens, AM P69147, juvenile male, 11 mm, AM P69149 (stub J043 [part, G2]); west of Blackwell Reach, Swan River, Perth (32°1.91'S 115°45.72'E), flat beach with stones and large patches of *Enteromorpha*, C. Serejo, J.K. Lowry & D. Jones, 26 Oct. 2003, WA 763; 242 specimens, AM P69148, east of Point Walter, Swan River, Perth, (32°01'S 115°47'E), flat sandy beach with large patches of *Enteromorpha*, C. Serejo, J.K. Lowry & D. Jones, 26 Oct. 2003, WA 764.

Etymology. This species named “paraplatensis” indicates its similarity to *P. platensis*.

Diagnosis. Male antenna 2 and pereopod 7 strongly sexually dimorphic. Male gnathopod 1 cuspidactylate. Coxa 6 posterior lobe with anterodistal corner subquadrate, with process, 1–2 marginal setae, posterior margin perpendicular to ventral margin, outer surface with ridge. Pleopod 2 with 3 median marginal robust setae; pleopod 3 with 3 distal marginal robust setae.

Description

Male, 15.1–19.3 mm. Eye medium, $\frac{1}{5}$ – $\frac{1}{3}$ head length. Antenna 1 short, rarely longer than article 4 of antenna 2. Antenna 2 shorter than head and first 3 pereonites; peduncular articles expanded; peduncular articles with sparse, small robust setae. Lower lip distolateral setal tuft absent. Mandible left lacinia mobilis 5-dentate. Maxilliped palp, article 2 with mediodistal lobe, article 4 present, reduced.

Gnathopod 1 sexually dimorphic; subchelate; posterior margin of carpus and propodus with rugose lobe; propodus subtriangular; palm transverse; dactylus slightly shorter than palm, without ventral setal row, cuspidactylate. Gnathopod 2 sexually dimorphic; subchelate; basis slightly expanded; merus without medial lobe; carpus triangular, reduced, enclosed by merus and propodus; palm acute, with well-developed midpalmar notch, posterodistal corner without protuberance; dactylus fit into a sulcus internally and narrowed distally. Coxae 2–4 as wide as deep. Pereopods 3–7 cuspidactylate; dactylus without row or patch of dorsal short setae. Pereopod 4 significantly shorter than pereopod 3. Pereopod 4 dactylus thickened and pinched posteriorly, different to pereopod 3 dactylus. Pereopod 5 propodus distinctly longer than carpus. Pereopod 6 not sexually dimorphic, shorter than pereopod 7; coxa 6 posterior lobe with anterodistal corner subquadrate, with process, and with 1–2 marginal setae, posterior margin perpendicular to ventral margin, outer surface with ridge; carpus slender. Pereopod 7 sexually dimorphic; basis without lateral sulcus, posterodistal lobe present; distal articles expanded; carpus oblong. Coxal gills convoluted or simple. Pereopods 3–5 gills smaller than gills 2 and 6.

Pleopods 1–3 well developed, biramous; peduncle slender. Pleopod 1 peduncle without marginal setae. Pleopod 2 peduncle with 3 marginal robust setae and one slender seta. Pleopod 3 peduncle with 3 subdistal robust setae. Epimera 1–3 with posterior margin slightly serrated, posteroventral corner of epimera 1–2 produced. Uropod 1 peduncle with 15 robust setae in two rows, distolateral robust seta absent; inner ramus subequal in length to outer ramus and with 4 marginal inner setae and 3 marginal outer setae; outer ramus without robust setae. Uropod 2 peduncle inner margin with 7–10 setae and outer margin with 3–4 setae; inner ramus subequal in length to outer ramus; inner ramus with 3 marginal inner setae and 2 marginal outer setae; outer ramus with 1–2 marginal robust setae. Uropod 3 peduncle with 2–3 robust setae; ramus subequal in length to peduncle, triangular, narrowing distally; with 2 marginal setae, and 4–5 apical setae. Telson longer than broad, apically incised, with marginal and apical robust setae; each lobe with 3–5 robust setae; dorsal midline entire.

Female (sexually dimorphic characters), 12.5 mm. Antenna 2 peduncular articles narrow. Gnathopod 1 parachelate; posterior margin of merus, carpus and propodus with rugose lobe vestigial or absent; propodus subrectangular; palm acute; dactylus much longer than palm. Gnathopod 2 mitten-shaped; basis produced proximally, 1.7× longer than wide, posterior margin of merus, carpus and propodus with rugose lobe; palm obtuse, smooth; dactylus shorter than palm. Pereopod 7 distal articles slender. Oostegites setae with simple straight tips. Oostegites 2–4 moderately setose (around 24 setae). Oostegite 5 with about 11 setae, posterior

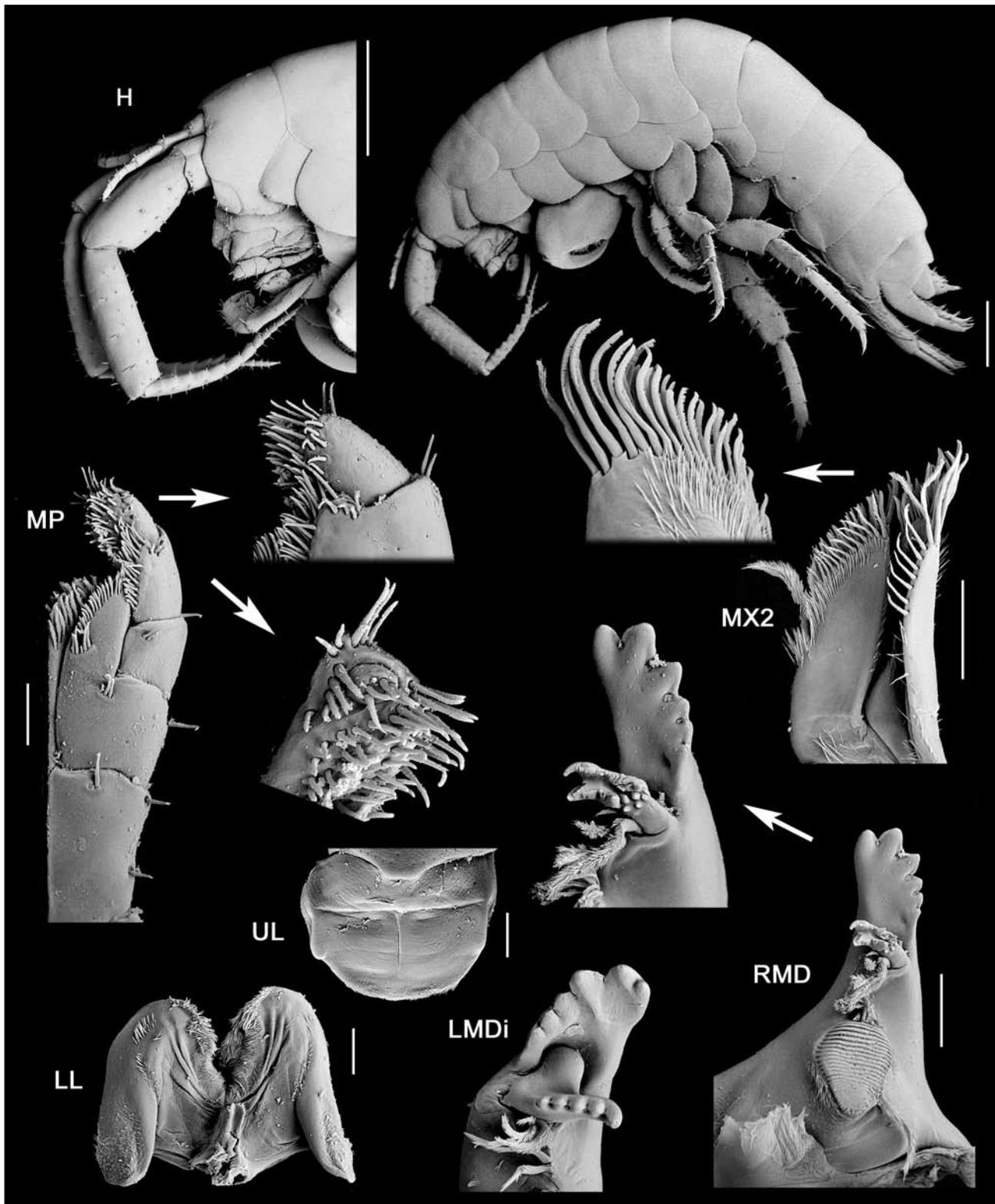


Fig. 21. *Platorchestia paraplatis* n.sp., paratype male, 15.1 mm, habitus and H, AM P69145, holotype male, 19.3 mm, other parts, AM P69144, Blackwell Reach, Swan River, Perth, Western Australia. Scales for habitus and H: 1 mm; remainder: 0.1 mm.

margin with fewer setae than anterior margin. Uropod 2 peduncle inner margin with 4–6 setae.

Habitat. Under *Enteromorpha* sp. on the margin of Swan River, brackish water.

Remarks. The genus *Platorchestia* includes supra-littoral and terrestrial species, which is reflected by a degree of sexual dimorphic characters in male antenna 2 and pereopod 7 as pointed recently by Miyamoto & Morino (2004). Attempts to elucidate the *P. platensis* complex started with Jo (1988), who compared *P. platensis* based on material from Denmark,



Fig. 22. *Platorchestia paraplatis* n.sp., holotype male, 19.3 mm, AM P69144, Blackwell Reach, Swan River, Perth, Western Australia. Scales represent 0.5 mm.

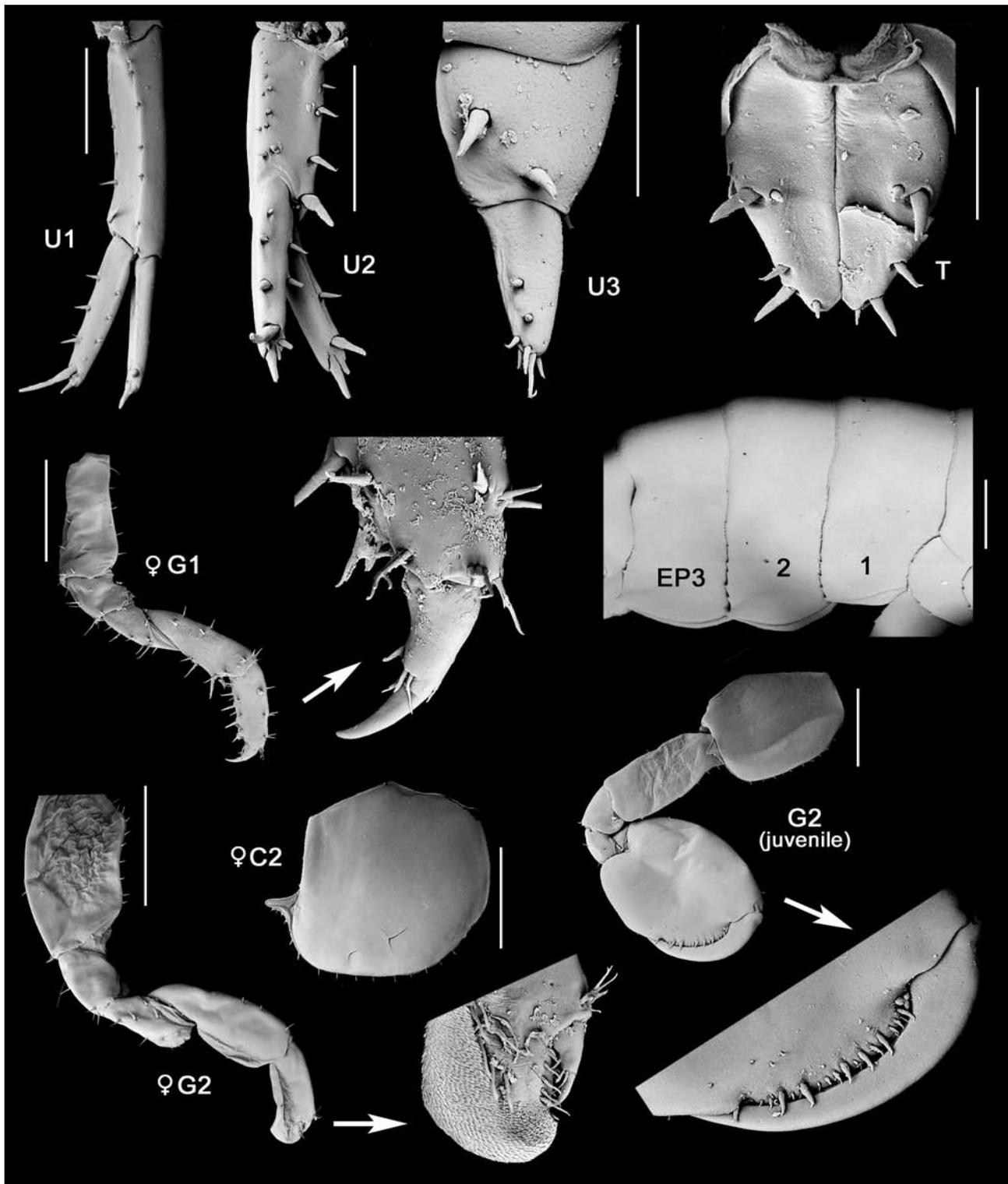


Fig. 23. *Platorchestia paraplatis* n.sp., holotype male, 19.3 mm, U1–3, T, EP1–3, AM P69144; paratype female, 12.5 mm, G1–2, AM P69146; juvenile male, 11.0 mm, G2, AM P69149, Blackwell Reach, Swan River, Perth, Western Australia. Scales for U3, T: 0.2 mm; remainder: 0.5 mm.

the Netherlands and Florida with previous identifications of *P. platensis* from the Western Pacific and other similar species. Serejo (2004) did a list of the 13 species included in the genus and also compared *P. platensis*, based on the type material from Montevideo, Uruguay, with the Atlantic *P. monodi* (Mateus *et al.*, 1986) found on the Brazilian coast. Recently Miyamoto & Morino (2004) described the supra-

littoral *Platorchestia pacifica* from Taiwan comparing it to *P. platensis* (from Kent, England) and allies. Miyamoto & Morino (2004) divided *Platorchestia* into three groups according to the sexual dimorphism in antenna 2 and pereopod 7. *Platorchestia paraplatis* n.sp. is part of group 1, which includes species with strong sexual dimorphism in antenna 2 and pereopod 7 including *P. joi* Stock & Biernbaum, 1994; *P.*

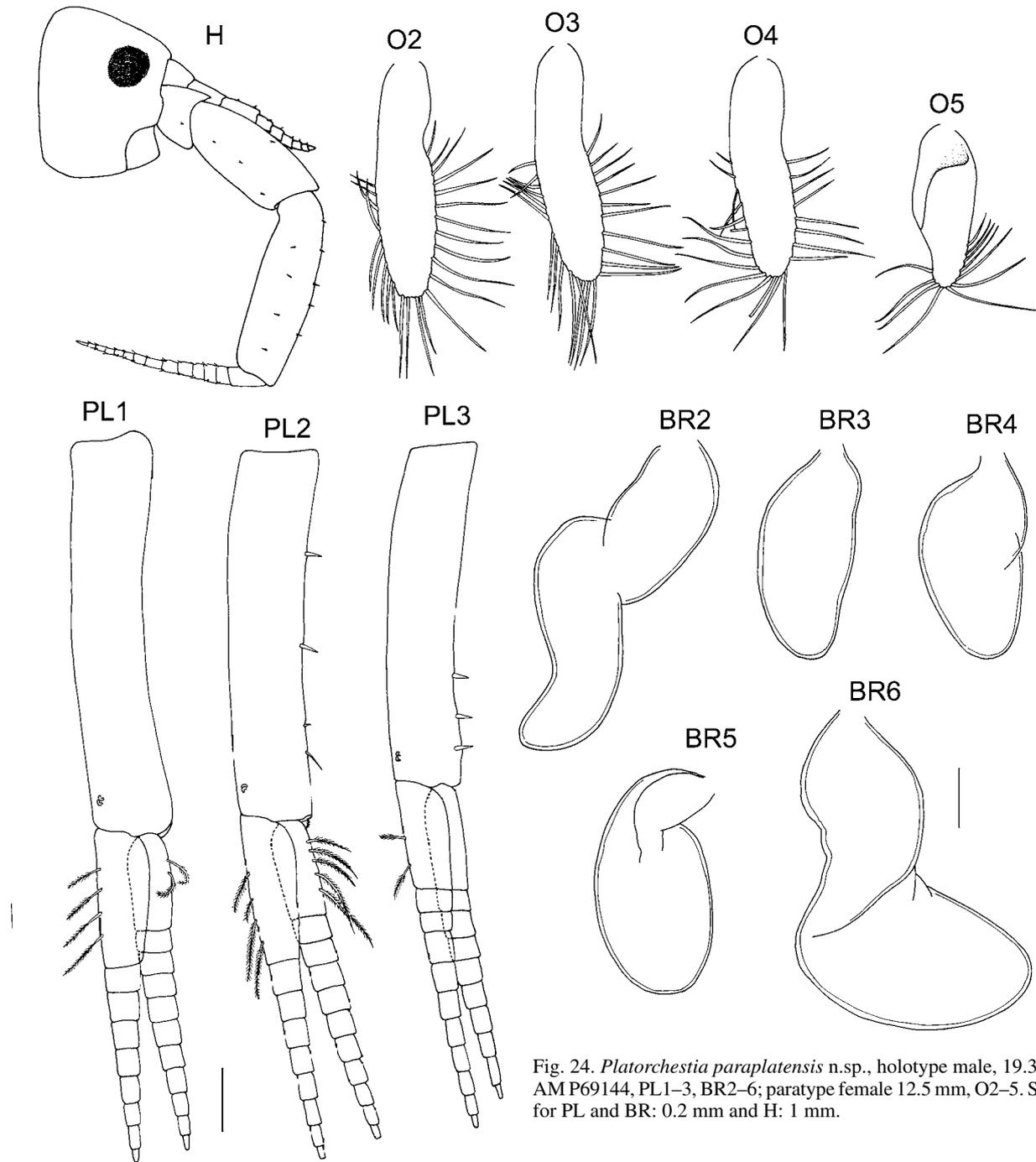


Fig. 24. *Platorchestia paraplatis* n.sp., holotype male, 19.3 mm, AM P69144, PL1–3, BR2–6; paratype female 12.5 mm, O2–5. Scales for PL and BR: 0.2 mm and H: 1 mm.

munmui Jo, 1988, *P. pacifica*; *P. pachypus* (Derzhavin, 1937) and *P. platensis*. These species are generally found on the supralittoral zone of beaches, mouth of rivers, estuaries etc. Three of these species, *P. pacifica*, *P. platensis* and *P. paraplatis* n.sp., have gnathopod 1 cuspidactylate, and the anterodistal corner of posterior lobe of coxa 6 with process. The outer plate of maxilla 2 with pectinate setae was pointed out by Miyamoto & Morino (2004) as diagnostic for *P. pacifica*, and can also be seen in *P. paraplatis* n.sp. and in the types of *P. platensis*. Although similar to the Atlantic *P. platensis* and *P. pacifica* in the characters above, the Australian species can be distinguished from these species by pleopod 2 bearing 3 marginal median setae versus 3 marginal proximal seta

on *P. pacifica* and 4 marginal median setae on *P. platensis*; pleopod 3 with 3 marginal distal setae, versus 9 marginal setae and 6 facial on *P. pacifica* and 4 marginal distal setae on *P. platensis*. Also the gnathopod 2 notch is well defined and the dactylus is narrowed distally when compared with the *P. platensis* lectotype 12.3 mm (Serejo, 2004, fig. 10), which has male gnathopod 2 palm sinuous, lacking a conspicuous notch with dactylus not narrowing distally. Oostegite 5 has around 11 setae and the posterior margin has fewer setae than anterior margin, compared with *P. pacifica*, which has 8 setae distributed evenly on both sides.

Distribution. *Western Australia:* Swan River.

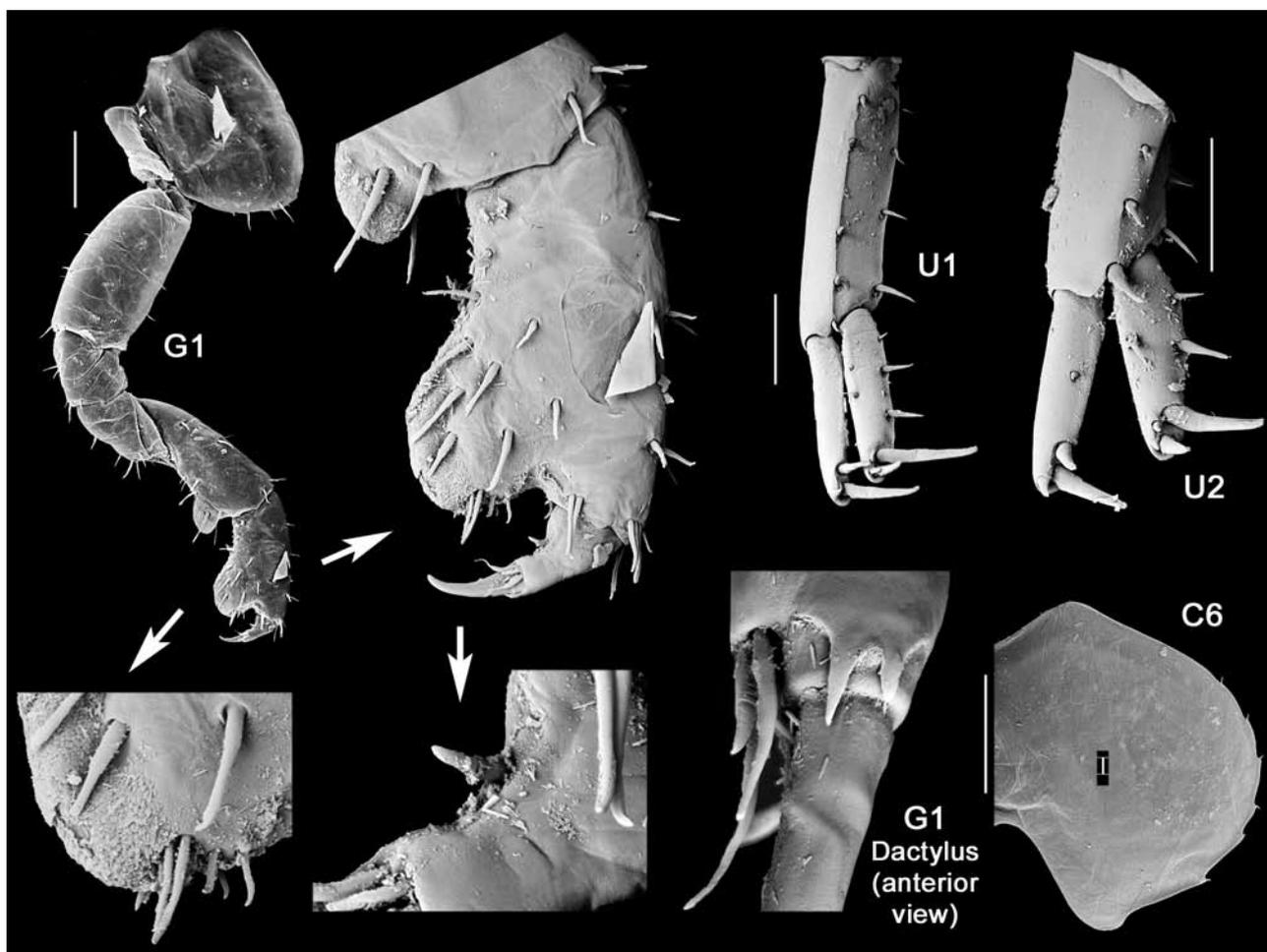


Fig. 25. *Platorchestia platensis* (Krøyer, 1845), paralectotype male, 6.8 mm, ZMUC CRU 7803, Montevideo, Uruguay. Scales represent 0.2 mm.

Platorchestia platensis (Krøyer, 1845)

Figs 25–26

Platorchestia platensis.—Stock, 1996: 153, Figs 2D, 3D; Jo, 1988: 166, fig. 8; Miyamoto & Morino, 2004: 81: fig. 7; Serejo, 2004: 19: fig. 10.

Material examined. Type material of *Orchestia platensis* Krøyer, 1854, PARALECTOTYPES: male, 6.8 mm, female, 7.6 mm, ZMC CRU7803, Rio de la Plata, Montevideo, Uruguay.

Diagnosis. Outer plate of maxilla 2 with pectinate setae. Male antenna 2 and pereopod 7 strongly sexually dimorphic. Carpus of pereopod 7 incrassate, laterally elliptic. Male gnathopod 1 cuspidactylate. Male gnathopod 2 with palm sinuous, lacking conspicuous notch; dactylus not narrowing distally. Coxa 6 posterior lobe with anterodistal corner subquadrate, with process, 1–3 marginal setae, posterior margin perpendicular to ventral margin. Pleopod 1 lacking marginal setae. Pleopod 2 with 4 median marginal robust setae; pleopod 3 with 4 median marginal robust setae. Coxal gills convoluted or simple. Pereopods 3–5 gills smaller than gills 2 and 6. Oostegites 2–4 moderately setose (around 20 setae). Oostegite 5 with 9 setae, posterior margin with fewer setae than anterior margin.

Remarks. Considering the similarity of *P. platensis* with *P. paraplatis* n.sp. herein described, other characters, based on the lectotype, such as shape of coxa 6, oostegite 5 setae, and number of setae on pleopods of the former species were observed and used to differentiate these taxa as discussed above. Recent studies on *Platorchestia*, including *P. platensis*, were based on material from Europe (Jo, 1988; Miyamoto & Morino, 2004), despite the fact that the type locality of this species is Montevideo, Uruguay. Small differences were noted when comparing the type material with some European redescrptions of *P. platensis*, such as the dactylus of gnathopod 2, which is narrowing distally in material from Kent, England (Miyamoto & Morino, 2004) (versus not narrowing), the palm of gnathopod 2, which is notched (versus sinuous), and the dactylus of gnathopod 1 in Denmark specimens (Jo, 1988), which fits the palm (versus shorter). As new characters of the *P. platensis* complex come to light it is important for future studies on the group to show clearly the diagnostic features noted herein for an accurate assessment. For the time being, we consider the European species as *P. platensis*, although a careful examination from the southern population of Montevideo with the European specimens may prove that we are dealing with different taxa. Genetic studies would be helpful in this case.

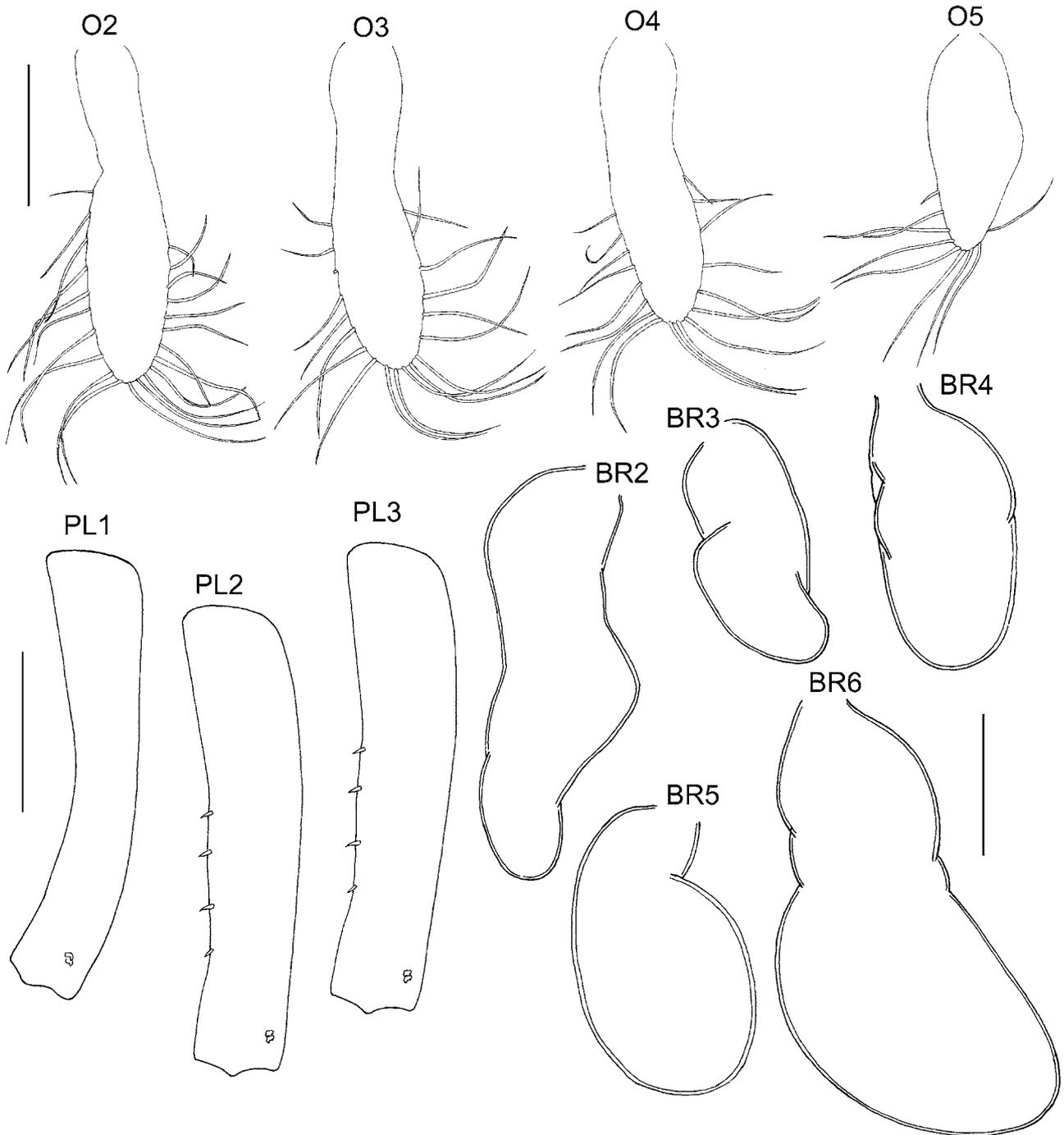


Fig. 26. *Platorchestia platensis* (Krøyer, 1845), paralectotype female, 7.8 mm, PL1–3, ZMUC CRU 7803. Scales for PL1–3: 0.3 mm; BR2–6 and O2–5: 0.5 mm.

***Protorchestia* Bousfield, 1982**

Protorchestia Bousfield, 1982: 7; Richardson, 1996: 580 (key).

Type species. *Orchestia nitida* Dana, 1852.

Diagnosis. Antenna 2 geniculate and not sexually dimorphic. Mandible left lacinia mobilis 5-dentate. Maxillipedal palp dactylus present, distinct. Gnathopod 2 subchelate; narrow or slightly expanded; propodus palm posterodistal corner without protuberance. Pereopods 3–7 simplidactylate. Pereopod 4 carpus similar in length to pereopod 3 carpus. Pereopods 6–7 not sexually dimorphic. Pereopod 7 basis lateral sulcus present, slightly pronounced. Gills simple, sac-like and similar in size. Oostegites 2–5 setae curl-tipped. Pleopods all well developed. Uropods 1–2 outer rami without marginal robust setae. Telson as long as or longer than broad without robust setae or with 2–5 robust setae per lobe.

Species composition. *Protorchestia* contains four species: *P. campbelliana* (Bousfield, 1964); *P. ceduna* n.sp., *P. lakei* Richardson, 1996; and *P. nitida* (Dana, 1852).

***Protorchestia ceduna* n.sp.**

Figs 27–29

Type material. HOLOTYPE: male 18.1 mm, AM P69066 (stubs J028–J032, J034–J035). PARATYPES: 1 female ovigerous, 10.2 mm AM P69067 (2 slides, stub J033, SEM micrographs); 2 males and 6 ovigerous females, AM P69068; male, 10.9 mm, AM P69069 (slide), small mangrove north of town, Ceduna, Eyre Peninsula, South Australia (32°8.87'S 133°40.24'E), small mangrove area with stony substrate, C. Serejo & J.K. Lowry, 19 Oct. 2003, SA 156.

Additional material examined. *Victoria*: 1 male and 3 females, AM P69063, boat ramp with man-made rocky shore, Port Albert (38°40.23'S 146°41.86'E), among rocks, C. Serejo & J.K. Lowry, 10 Oct. 2003, VIC 124.

South Australia: 7 males and 7 females, AM P69064, North Beach, Wallaroo (33°54.51'S 137°37.77'E), broad flat beach with hard packed grey sand with a broad band of dead seagrass (*Zostera*) and large patches of beach rock, C. Serejo & J.K. Lowry, 16 Oct. 2003, SA 149; 1 male, AM P69065, mangroves near boat ramp, Franklin Harbour, Cowell (33°41.26'S 136°55.65'E), thick mangrove (similar to *Avicennia*) with rocks and logs on muddy substrate, C. Serejo & J.K. Lowry, 17 Oct. 2003, SA 150; 2 males and 1 female, Rio Rego?, sheltered beach, Baird Bay, Eyre Peninsula (33°6.43'S 134°16.63'E), stones on a very protected beach, C. Serejo & J.K. Lowry, 18 Oct. 2003, SA 154.

Type material of *Protorchestia lakei* Richardson, 1996. Holotype female 7.7 mm, AM P45574. Paratype male, 9.2 mm, AM P 45575, northeast slope of Maatsuyker Island, Tasmania (on sea bird rookery between 10–80 m above sea level).

Etymology. This species is named for the town of Ceduna, near the type locality.

Diagnosis. Maxillipedal palp article 4 distinct and small, 1/5 of article 3. Lower lip with distolateral setal tuft. Uropod 3 ramus with or without setae. Oostegites 2–4 moderately setose, with 26, 35 and 32 setae respectively. Telson about 1.5× longer than wide.

Description

Holotype male, 18.1 mm. Eye medium, 1/5–1/3 head length. Antenna 1 elongate, from midpoint to end of peduncle article 5 of antenna 2, flagellum with 8 articles. Antenna 2 shorter than head and first 3 pereonites, peduncular articles narrow and with sparse, small robust setae; flagellum with 16 articles. Lower lip with distolateral setal tuft. Mandible left lacinia mobilis 5-dentate. Maxilliped palp, article 2 without distomedial lobe, article 4 distinct and small, 1/5 of article 3.

Gnathopod 1 sexually dimorphic; subchelate; posterior margin of merus, carpus and propodus with rugose lobe; propodus subtriangular; palm transverse; dactylus shorter than palm, simplidactylate. Gnathopod 2 sexually dimorphic; subchelate; merus without medial lobe; carpus triangular, reduced, enclosed by merus and propodus; palm acute, smooth, posterodistal corner without protuberance; dactylus subequal in length to palm, attenuated distally. Coxae 2–4 as wide as deep. Pereopods 3–7 simplidactylate; dactylus without row or patch of dorsal short setae. Pereopod 4 subequal or slightly shorter than pereopod 3. Pereopod 4 dactylus similar to pereopod 3 dactylus. Pereopod 5 propodus distinctly longer than carpus. Pereopod 6 not sexually dimorphic; shorter than pereopod 7; coxa posterior lobe anterodistal corner rounded, with 1–2 marginal setae, posterior margin oblique to ventral margin, outer surface with ridge; carpus slender. Pereopod 7 basis posterodistal lobe absent; distal articles slender. Coxal gills simple or slightly lobate. Pereopods 3–5 gills subequal in size to gills 2 and 6.

Pleopods 1–3 well developed and biramous. Pleopods 1–3 peduncle without marginal setae. Epimeron 2 subequal in length to epimeron 3. Epimeron 3 posterior and ventral margins smooth, without setae, posteroventral corner with small subacute spine. Uropod 1 peduncle with 4–6 robust setae; distolateral robust seta present, large, about 1/3 to 1/2 length of outer ramus; inner ramus longer than outer ramus; inner ramus with 3 marginal robust setae; outer ramus without robust setae. Uropod 2 peduncle with 4 robust setae in two rows; inner ramus subequal in length to outer ramus; inner ramus with 3 marginal robust setae; outer ramus with marginal robust setae or without marginal robust setae; outer ramus with 1–2 marginal robust setae. Uropod 3 peduncle with 3 robust setae; ramus shorter than peduncle, triangular, narrowing distally, with 0–1 marginal seta, and 4 to 5 apical setae. Telson about 1.5× longer than wide; apically incised; with 2 apical robust setae per lobe; dorsal midline entire.

Female (sexually dimorphic characters), 10.2 mm. Antennae 1 with 6 articles. Antenna 2 with 13 articles. Gnathopod 1 propodus subrectangular; dactylus subequal in length to palm. Gnathopod 2 mitten-shaped; basis narrow, 3.4× longer than wide; posterior margin of merus, carpus and propodus with rugose lobe; palm obtuse; dactylus shorter than palm. Oostegites longer than wide; setae with curl-tips. Oostegites 2–4 moderately setose, with 26, 35 and 32 setae respectively. Uropod 3 peduncle with 0–1 robust setae.

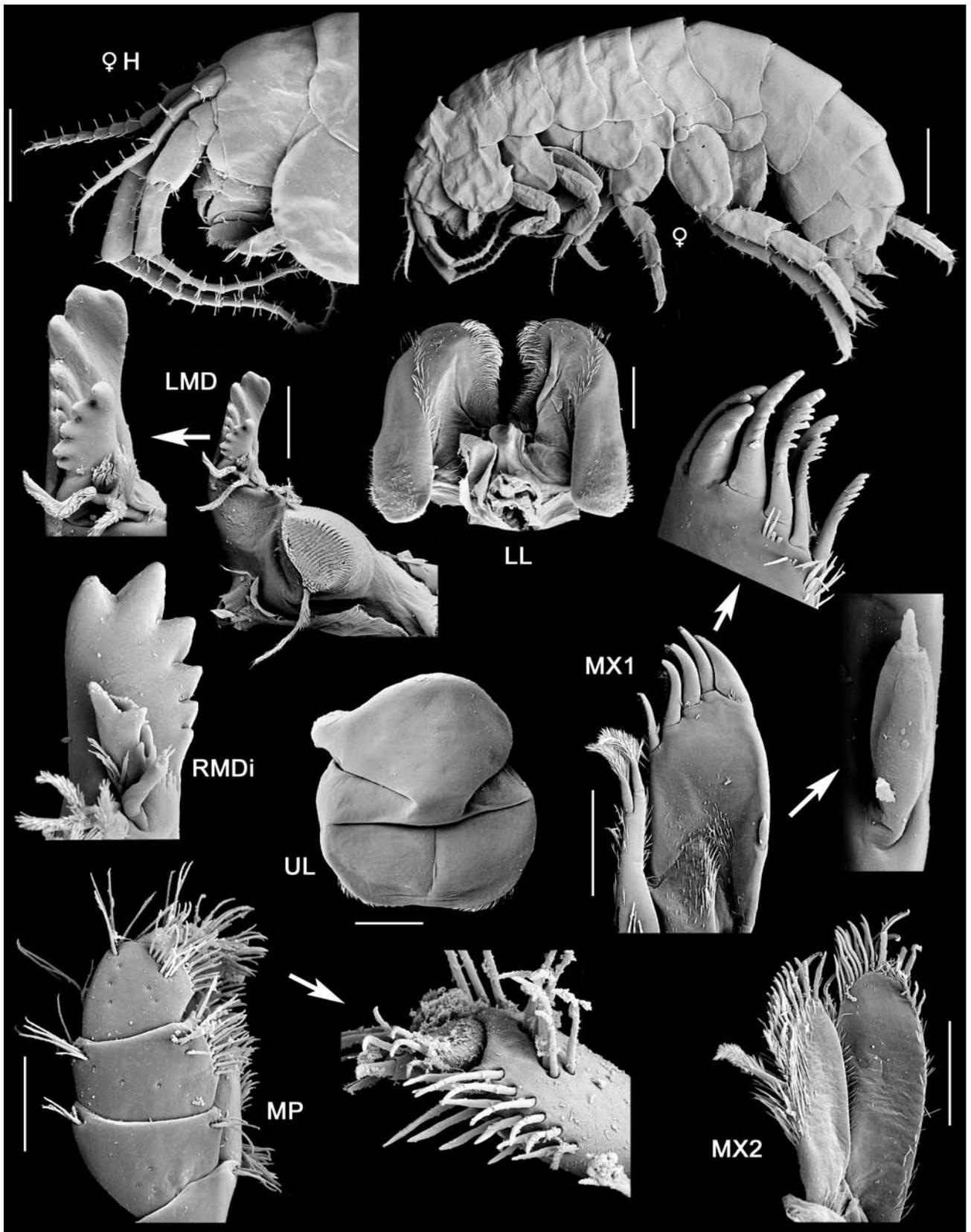


Fig. 27. *Protorchestia ceduna* n.sp., paratype female, 10.2 mm, habitus and H, AM P69067, Ceduna, South Australia; holotype male, 18.1 mm, other parts, AM P69066, Port Albert, Victoria. Scales for habitus: 1 mm; H: 0.5 mm; remainder: 0.1 mm.

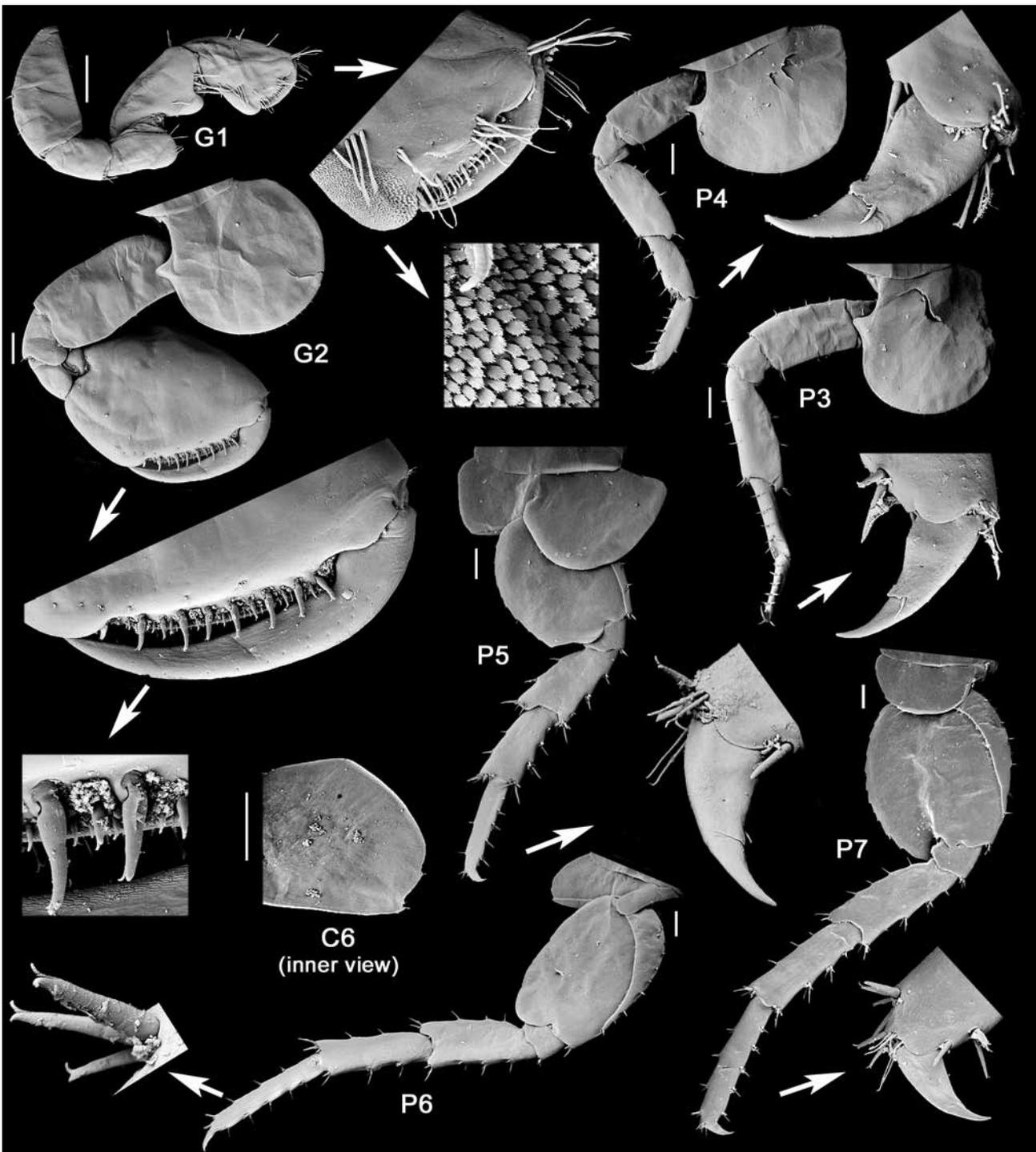


Fig. 28. *Protorchestia ceduna* n.sp., holotype male, 18.1 mm AM P69066, Port Albert, Victoria. Scales represent 0.2 mm.

Habitat. Estuarine zones and marshes.

Remarks. *Protorchestia ceduna* n.sp. is similar to *P. lakei*, species endemic to Tasmania northeast slope of Maatsuyker Island, in presenting a lower lip with distolateral setal tuft, general aspects of male and female gnathopods 1–2, and oostegites 2–4 with less than 36 marginal setae. Richardson (1996) described oostegite 2 bearing 24 setae and oostegites 3–4 bearing 20 and 24 setae respectively for *P. lakei*. The oostegites in the observed material have 26, 35 and 32 setae

respectively, never surpassing 50 setae as seen in *P. nitida* and *P. campbelliana*. Also, a clear transversal ridge on coxa 6, 1–4 facial minute setae on the peduncle of pleopods 1–3, and posterior margin of propodus of pereopods 3–5 having 1–2 pairs of robust setae were observed. Richardson (1996) did not mention the coxa 6 ridge, described only pleopod peduncle 1 with setae, and noted that pereopod 5 lacked posterior setae but did not describe them for pereopods 3–4. Re-examination of the type material of *P. lakei* confirmed the presence of these character states.

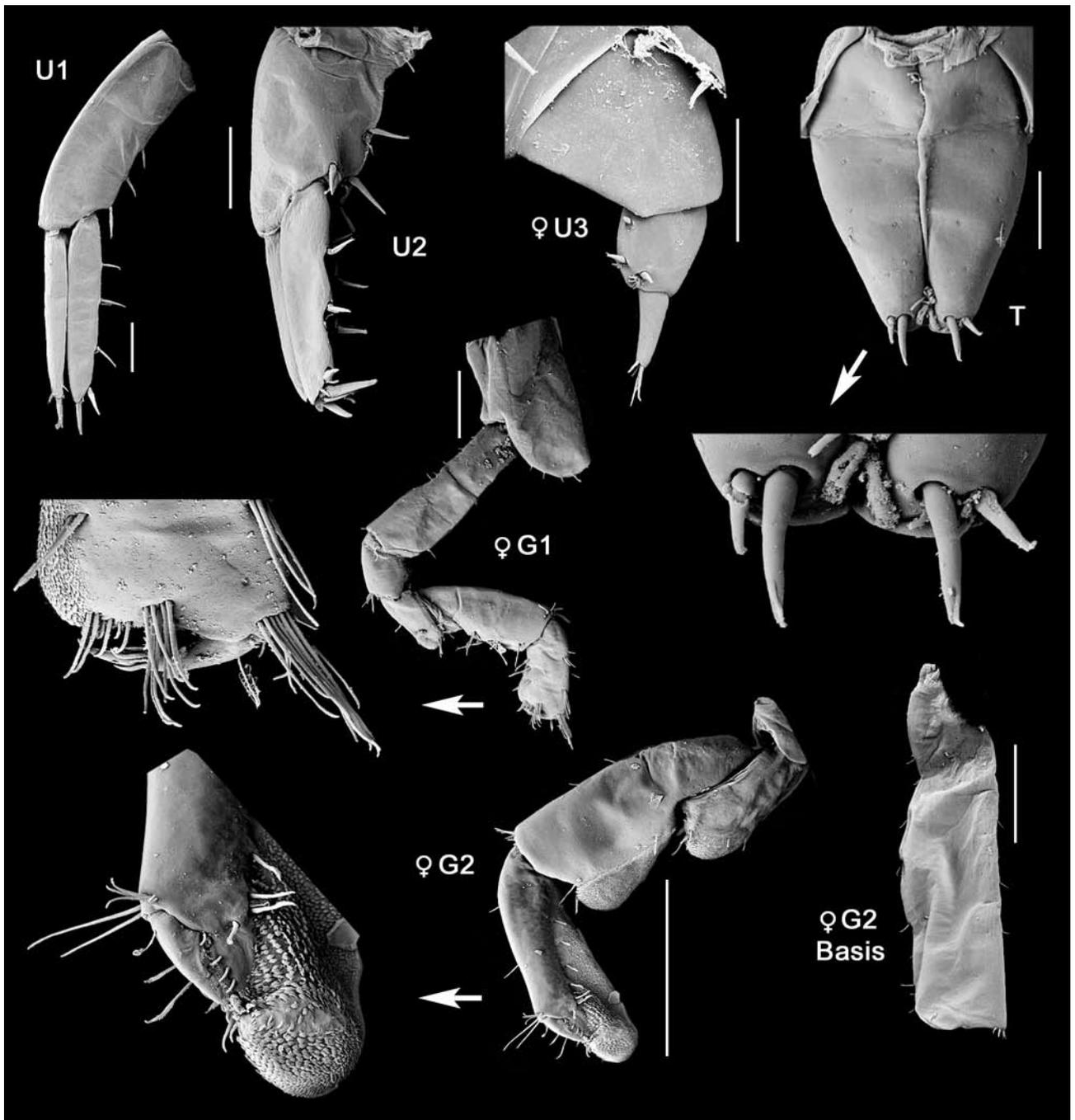


Fig. 29. *Protorchestia ceduna* n.sp., holotype male, 18.1 mm, U1–2 and T, AM P69066, Port Albert, Victoria; female, 10.2 mm, G1–2, AM P69067, Ceduna, South Australia. Scales represent 0.2 mm.

The more intriguing variation occurs on uropods 2 outer ramus and ramus of uropod 3, which generally lack robust setae. This state is found in most specimens herein observed (males and females) varying in size from 7.2 to 11.7 mm. However, in some larger males (16.6 to 18.1 mm), and even a smaller female (9.8 mm), the uropod 2 outer ramus and/or uropod 3 ramus had 1 or rarely 2 robust setae. Furthermore, in a female and a large male (16.6 mm) the left uropod 3 had a robust seta and the right one had none, showing the variation in a single individual. Richardson's 1996 description for *P.*

lakei stated that the outer ramus of uropod 2 and ramus of uropod 3 lack marginal robust setae and variation in these structures in the type material was not observed.

Distribution. *Victoria:* Port Albert. *South Australia:* North Beach, Wallaroo; Franklin Harbour, Cowell; sheltered beach, Baird Bay, Eyre Peninsula; Ceduna, Eyre Peninsula.

Transorchestia* Bousfield, 1982Transorchestia* Bousfield, 1982: 19.**Type species.** *Orchestia chiliensis* Milne-Edwards, 1840.

Diagnosis. Antenna 2 not geniculate, sexually dimorphic. Mandible left lacinia mobilis 4-dentate. Maxillipedal palp dactylus present, reduced. Gnathopod 2 subchelate; basis slightly or strongly expanded; propodus palm posterodistal corner without protuberance. Pereopods 3–7 cuspidactylate. Pereopod 4 carpus significantly shorter than carpus of pereopod 3. Pereopods 6–7 sexually dimorphic. Pereopod 7 basis lateral sulcus present, slightly pronounced. Gills lobate and/or convoluted; gills 3–5 smaller than gills 2 and 6. Oostegites 2–5 setae curl-tipped. Pleopods all well developed. Uropods 1–2 outer rami with marginal robust setae. Telson longer than broad with more than 10 robust setae per lobe.

Species composition. *Transorchestia* contains 7 species: *T. ?bollonsi* (Chilton, 1909); *T. chiliensis* (Milne Edwards, 1840); *T. enigmatica* (Bousfield & Carlton, 1967); *T. gracilis* (Chilton, 1920); *T. marlo* n.sp.; *T. miranda* (Chilton, 1916); and *T. serrulata* (Dana, 1852).

Remarks. Hurley (1957) considered that *T. chiliensis* occurred in New Zealand and included *Orchestia serrulata* Dana, 1852, also described from New Zealand, as its junior synonym. Bousfield (1982) redescribed *T. chiliensis* based on material from Chile and stated that Hurley's material from New Zealand was not *T. chiliensis*. Based on the opinion of Bousfield (1982) and our own assessment of Hurley's (1957) description we reject *T. chiliensis* from New Zealand and replace it with the next available name, *Transorchestia serrulata* (Dana, 1852). Hurley designated as hypotypes: slides No. 19, male; female, Quail Island, Lyttelton, 10 October 1903, in the Chilton collection, Canterbury Museum. We here designate the male as a neotype of *Transorchestia serrulata* (Dana, 1852).

***Transorchestia marlo* n.sp.**

Figs 30–33

Type material. HOLOTYPE: 1 male, 18.6 mm, AM P69136 (slide, stubs J071–J074, J075 [part, G1], J077–J079, SEM micrographs), near mouth of Separation Creek, Victoria (38°37.96'S 143°53.78'E), freshwater creek with stony bottom, under stones (freshwater), C. Serejo & J.K. Lowry, 12 Oct. 2003, VIC 131. PARATYPES: 1 male, 15.5 mm (habitus), AM P69137 (stub J081); 1 juvenile male, 13.1 mm, AM P69138 (stub J075 [part, G2]); 1 female 13.6 mm, AM P69139 (slide, stub J076, J080, SEM micrographs); 73 specimens, AM P69140, mouth of Erskine River just beside the swinging bridge, Lorne, Victoria (38°32.1'S 143°58.59'E), limestone rocks in small pools (freshwater), C. Serejo & J.K. Lowry, 12 Oct. 2003, VIC 129; 1 male AM P69143, VIC 131.

Type locality. Near mouth of Separation Creek, Victoria (38°37.96'S 143°53.78'E), freshwater creek with stony bottom, under stones (freshwater).

Additional material examined. *Victoria*: 10 males and 22 females, AM P69141, large marsh near Snowy River Boat Club, Marlo (37°47.88'S 148°31.6'E), beach-hoppers sheltering in dead logs in marsh on the margin of the Snowy River (freshwater), C. Serejo & J.K. Lowry, 9 Oct. 2003, VIC 121.

Western Australia: 3 males and 10 females, AM P69142, Wilson Inlet, Denmark River mouth (34°58.28'S 117°22.04'E), soil bank on edge of river just where it opens into the inlet, C. Serejo & J.K. Lowry, 22 Oct. 2003, WA 757.

Etymology. This species is named for the town of Marlo, near the site of the first collections of the species.

Diagnosis. Gnathopod 2, basis anteriorly serrate, palm very concave posterior to a strong distal hinge tooth; dactylus sinuous, subequal in length to palm, not attenuated distally. Male pereopods 6–7 article 5 about 2.3× longer than wide. Basis of female gnathopod 2 about 1.7× as long as wide. Oostegites 2–5 with curl-tipped setae. Oostegite 2 with 37 setae distributed unevenly.

Description

Male, 18.6 mm. Antenna 1 short, rarely longer than peduncle article 4 of antenna 2, flagellum with 7 articles. Antenna 2 shorter than head and first 3 pereonites, peduncular articles expanded, with sparse, small robust setae; article 5 subequal than article 4; flagellum with 20 articles. Epistome of upper lip without robust setae. Lower lip distolateral setal tuft absent. Mandible left lacinia mobilis 4-dentate. Maxillipedal palp article 2 without mediobasal lobe, article 4 present, reduced.

Gnathopod 1 sexually dimorphic; subchelate; posterior margin of merus, carpus and propodus with rugose lobe; propodus subtriangular; palm transverse; dactylus shorter than palm, simplidactylate. Gnathopod 2 sexually dimorphic; subchelate; basis anteriorly serrate; merus without medial lobe; carpus posterior margin not distally concave; palm concave posterior to a strong distal hinge tooth, posterodistal corner without protuberance; dactylus subequal in length to palm, not attenuated distally. Coxae 2–4 as wide as deep. Pereopods 3–7 cuspidactylate; dactylus without row or patch of dorsal short setae. Pereopod 4 dactylus thickened and pinched posteriorly, different to pereopod 3 dactylus. Pereopod 5 propodus subequal to or shorter than carpus. Pereopod 6 sexually dimorphic; shorter than pereopod 7; coxa posterior lobe anterodistal corner subquadrate, with 12 marginal setae, posterior margin perpendicular to ventral margin, outer surface with ridge; carpus expanded, about 2.3× longer than wide. Pereopod 7 sexually dimorphic; basis without lateral sulcus, posterodistal lobe present; distal articles expanded; carpus subrectangular, about 2.3× longer than wide. Coxal gills convoluted or simple. Pereopods 3–5 gills smaller than gills 2 and 6.

Pleopods 1–3 well developed, biramous. Pleopod 1 peduncle without marginal setae. Pleopod 2–3 peduncle with few marginal robust setae. Epimeron 2 subequal in length to epimeron 3. Epimera 1–3 posterior margin minutely serrate, posteroventral corner acutely produced, ventral margin without robust setae. Uropod 1 peduncle with more than 6 robust setae; distolateral robust seta absent; inner ramus subequal in length to outer ramus, with 3 marginal robust setae; outer ramus with 5 marginal robust setae. Uropod

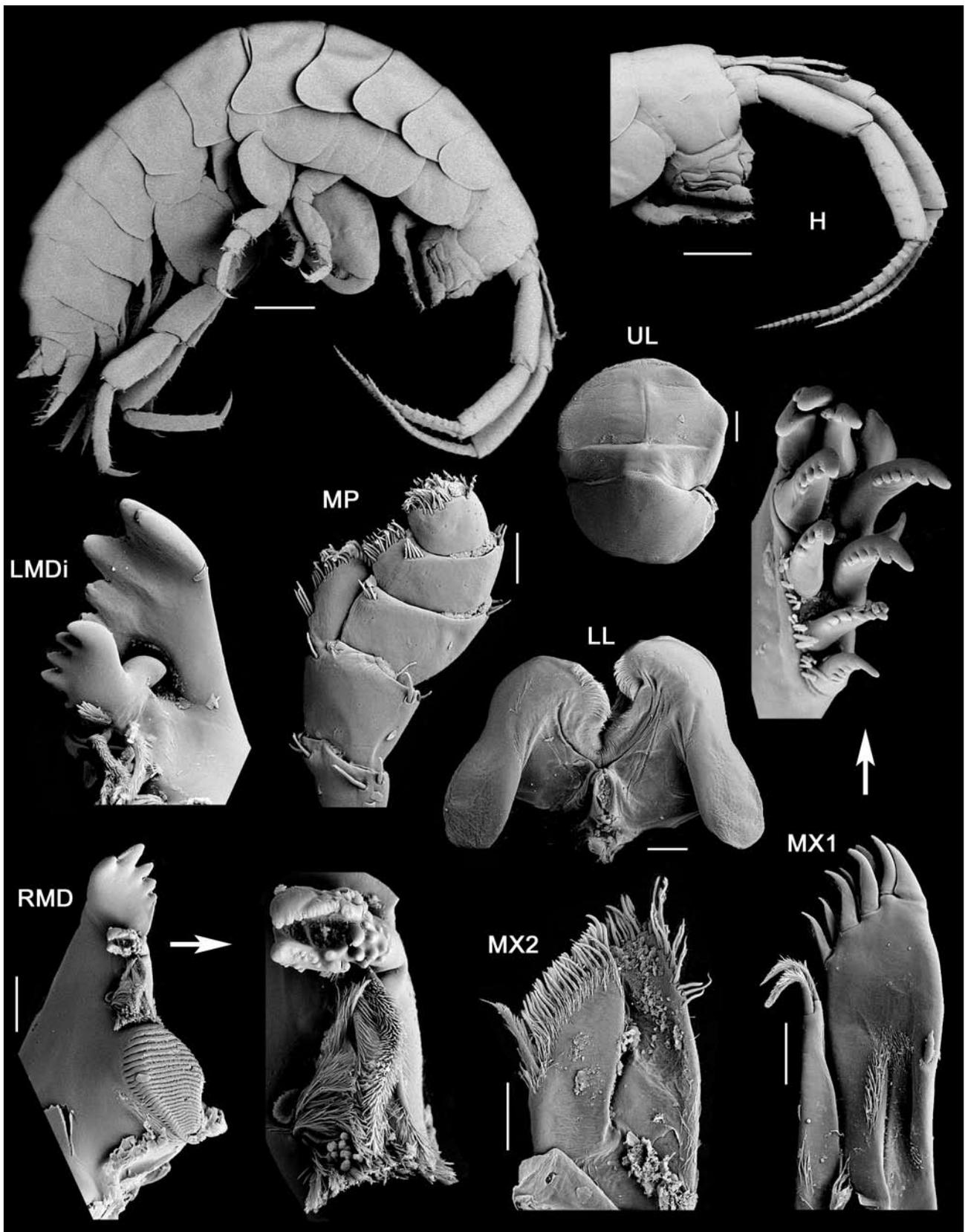


Fig. 30. *Transorchestia marlo* n.sp., paratype male, 15.5 mm, habitus and head, AM P69137, mouth of the Erskine River, Victoria; holotype male, 18.6 mm, other parts, AM P69136, near mouth of Separation Creek, Victoria. Scales for habitus and H: 1 mm; remainder: 0.1 mm.



Fig. 31. *Transorchestia marlo* n.sp., holotype male, 18.6 mm, AM P69136, near mouth of Separation Creek, Victoria. Scales represent 0.5 mm.

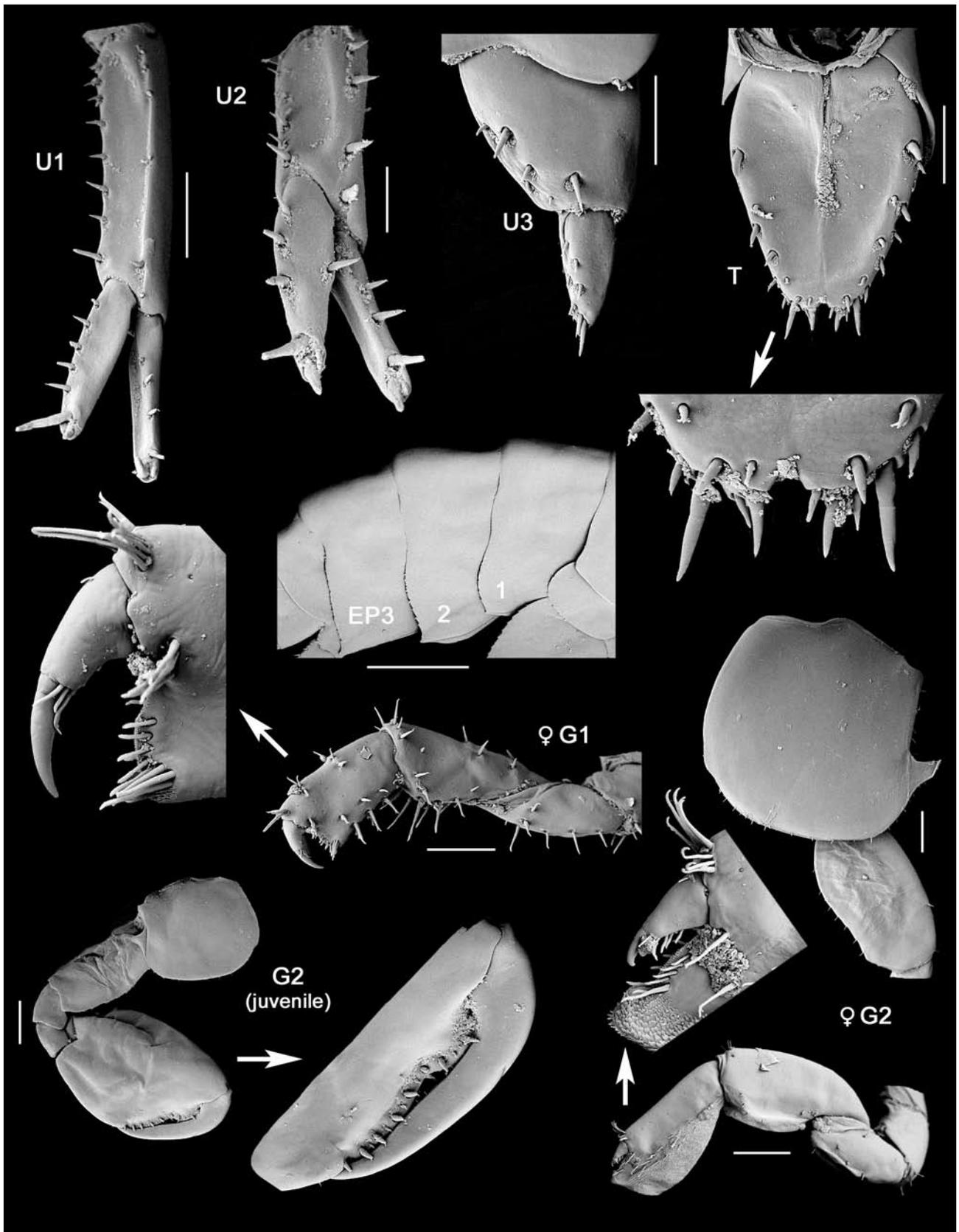


Fig. 32. *Transorchestia marlo* n.sp., holotype male, 18.6 mm, U1–3, T, AM P69136, near mouth of Separation Creek, Victoria.; paratype female, 13.6 mm, G1–2, AM P69139; paratype juvenile male, 13.1 mm, G2, AM P69138, mouth of the Erskine River, Victoria. Scale for EP3: 1 mm; remainder: 0.2 mm.

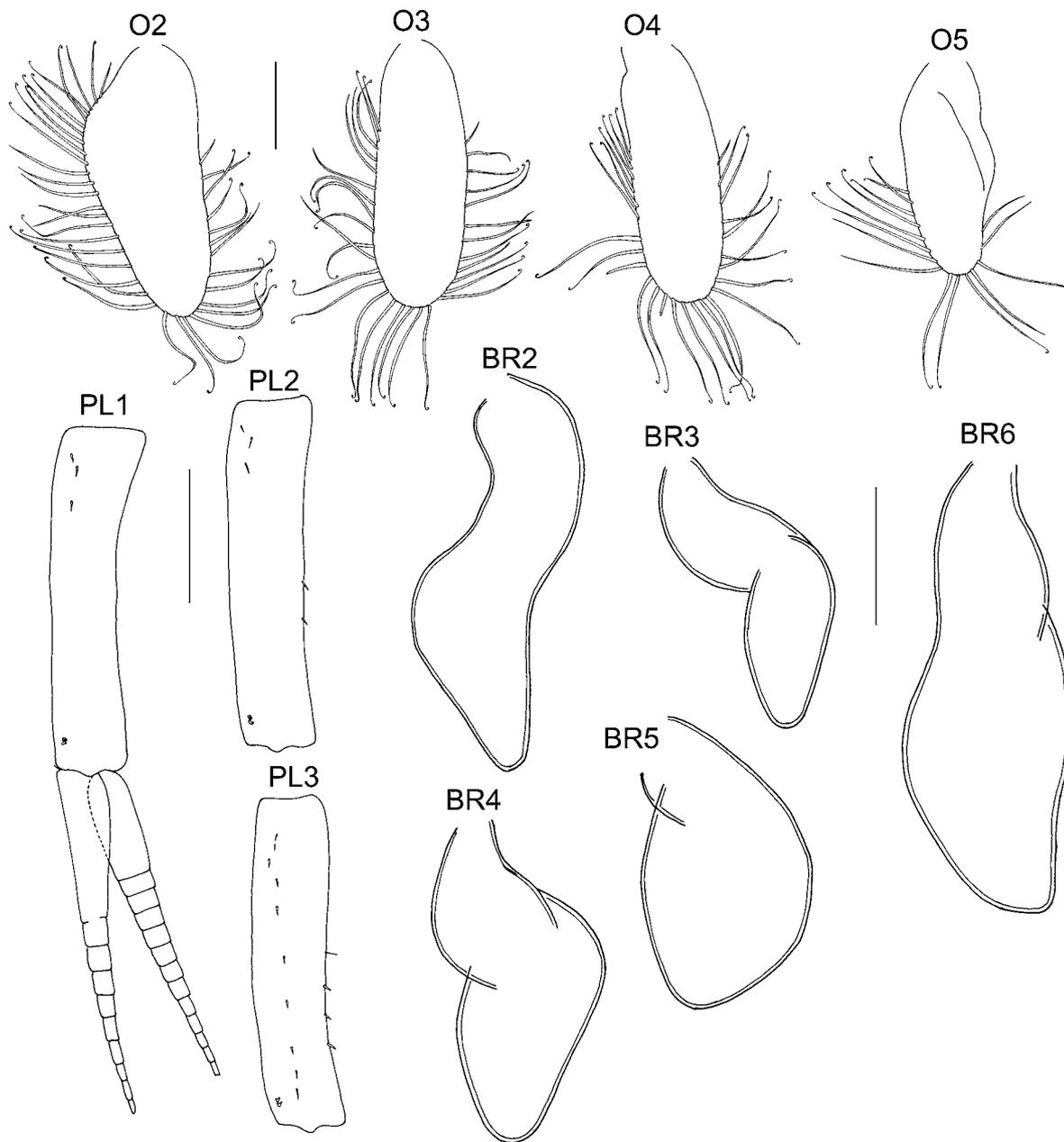


Fig. 33. *Transorchestia marlo* n.sp., paratype female, 13.6 mm, O2–5, AM P69139, mouth of the Erskine River, Victoria; holotype male, 18.6 mm, PL1–3 and BR2–6, AM P69136, near mouth of Separation Creek, Victoria. Scales represent 0.5 mm.

2 peduncle with 10 robust setae in two rows; inner ramus subequal in length to outer ramus, with 2 marginal robust setae; outer ramus with 3 marginal robust setae. Uropod 3 peduncle with 6 robust setae; ramus shorter than peduncle; oval to spatula-shape, broad distally; ramus with 5 marginal setae and 3 apical setae. Telson longer than broad; apically incised; dorsal midline halfway; with marginal and apical robust setae; more than 10 robust setae per lobe.

Female (sexually dimorphic characters), 13.6 mm. Antenna 2 peduncular articles narrow. Gnathopod 1 subchelate, posterior margin of merus, carpus and propodus without

rugose lobe; propodus subrectangular; dactylus subequal in length to palm. Gnathopod 2 mitten-shaped; basis expanded proximally, about 1.7× longer than wide; posterior margin of merus, carpus and propodus with rugose lobe; dactylus shorter than palm. Pereopod 6 carpus slender. Pereopod 7 distal articles slender. Oostegites longer than wide; setae with curl-tips. Oostegites 2–4 moderately setose (between 37 to 15 setae respectively).

Habitat. Found on mouth or on margin of rivers hidden under logs, roots and other organic matter.

Remarks. *Transorchestia marlo* n.sp. is part of the *T. chiliensis* (Milne-Edwards, 1840) complex because the palm of gnathopod 2 is concave posterior to a strong distal hinge tooth and pereopod 7 carpus is incrassate (Bousfield, 1982). *Transorchestia marlo* n.sp. differs from *T. chiliensis* from Puerto Robalo, Chile (Bousfield, 1982) as follows: the basis of male gnathopod 2 is distinctly serrate (versus not serrate); the palm and dactylus of gnathopod 2 are more strongly sinuous; the carpus of pereopod 7 is not so enlarged, and the basis of female gnathopod 2 is about 1.5× as long as wide (not 2× as long as wide). The Australian species is closer to Hurley's (1957) material from New Zealand (considered here as *T. serrulata* Dana, 1852) in having a similar shape of gnathopod 2 (serrate basis and strongly sinuous palm and dactylus), but some differences were observed between these two taxa as follows: male pereopods 6–7 article 5 longer and less enlarged, about 2.3× longer than wide (versus 1.5× longer than wide); oostegites 2–5 are curl-tipped (illustrated as not curl-tipped, but could have been overlooked by the author); oostegite 2 with 37 setae distributed unevenly, with about 12–13 setae on one side and 24–25 setae on other side (versus about 33 setae distributed evenly [16–17 setae for each side]). The males figured here (Fig. 30, habitus = 15.5 mm; Fig. 31, P6–7 = 18.6 mm) are similar in size or larger from the male figured by Hurley (1957) (15.75 mm), which eliminates the age dependent factor that influences characters such as shape of gnathopod 2 and stoutness of pereopod 6–7. The juvenile form of gnathopod 2 was observed in a 13.1 mm male (Fig. 32).

Distribution. *Victoria*: Marlo; Erskine River; Separation Creek. *Western Australia*: Wilson Inlet, Denmark River mouth.

Discussion

This study is mainly based on the results of ANTS 1, a project that collected specimens from Victoria and South Australia to Exmouth Gulf, Western Australia. The lack of knowledge about coastal talitrids in this area was confirmed, since of the eight species documented, seven are new to science. The most common species found were *Notorchestia australis* and *N. lobata*. In South Australia, *N. australis* appeared in 17 of the 21 sites collected, although this species was not found in Western Australia. On the other hand, *Notorchestia lobata* has a wider distribution, found from South Australia to Jurien Beach in Western Australia. The other species presented a more punctuated distribution, with three of them restricted to Western Australia—*A. occidentalis*; *N. naturaliste* and *P. paraplatisensis*.

Australia is a large and long-time isolated continent, which results in high rates of endemism in many zoological groups (Hutchings & Glasby, 1991; Poore, 2002; Lowry & Stoddart, 2003). All eight species treated in this study are endemic to Australia.

The second part of this study, named as ANTS 2, was done with collections from tropical eastern Australia, including Queensland and northern New South Wales. Species of *Platorchestia*, *Chroestia*, *Talorchestia* s.str. and a new palustral (marsh-hopper) form were found and will be described in a subsequent paper.

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References

- Barnard, J.L., 1969. The families and genera of marine gammaridean Amphipoda. *Bulletin of the United States National Museum* 271: 1–535.
- Bousfield, E.L., 1971. Amphipoda of the Bismarck Archipelago and adjacent Indo-Pacific islands (Crustacea). *Steenstrupia* 1: 255–293.
- Bousfield, E.L., 1982. The amphipod superfamily Talitroidea in the northeastern Pacific region. 1. Family Talitridae: systematics and distributional ecology. National Museum of Natural Sciences (Ottawa). *Publications in Biological Oceanography* 11: 1–73.
- Bousfield, E.L., 1984. Recent advances in the systematics and biogeography of landhoppers (Amphipoda: Talitridae) of the Indo-Pacific Region. *Bishop Museum Special Publication* 72: 171–210.
- Bousfield, E.L., 1991. New sand-hoppers (Crustacea: Amphipoda) from the Gulf coast of the United States. *Gulf Research Reports* 8(3): 271–283.
- Bousfield, E.L., & R.W. Heard, 1986. Systematics, distributional ecology, and some host parasite relationships of *Uthlorchestia uhleri* (Shoemaker) and *U. spartinophila* new species (Crustacea: Amphipoda), endemic to salt marshes of the Atlantic coast of North America. *Journal of Crustacean Biology* 6: 264–274. <http://dx.doi.org/10.2307/1547986>
- Brandt, J.F., 1851. Krebse. Dr. A. Th. v. Middendorff's Reise in den Aussersten Norden und Osten Sibiriens. *Zoologie* 2: 77–148.
- Dana, J.D., 1852. Conspectus crustaceorum quae in Orbis Terrarum circumnavigatione, Carolo Wilkes e Classe Reipublicae Faederatae Duce, lexit et descripsit Jacobus D. Dana. Pars III. *Proceedings of the American Academy of Arts and Sciences* 2: 201–220.
- Dallwitz, M.J., 2005. *Overview of the DELTA System*. <http://delta-intkey.com/www/overview.htm> [21 August 2006]
- Fearn-Wannan, H.J., 1968. Littoral Amphipoda of Victoria. Part 1. *Proceedings of the Royal Society of Victoria* 81(1): 31–58.
- Friend, J.A., 1979. Two new terrestrial species of *Talitrus* (Amphipoda: Talitridae) from Tasmania. *Papers and Proceedings of the Royal Society of Tasmania* 113: 85–98.
- Friend, J.A., 1982. New terrestrial amphipods (Amphipoda: Talitridae) from Australian forests. *Australian Journal of Zoology* 30(3): 461–491. <http://dx.doi.org/10.1071/ZO9820461>
- Friend, J.A., 1987. The terrestrial amphipods (Amphipoda: Talitridae) of Tasmania: systematics and zoogeography. *Records of the Australian Museum, Supplement* 7: 1–85. <http://dx.doi.org/10.3853/j.0812-7387.7.1987.97>
- Haswell, W.A., 1879. On some additional new genera and species of amphipodous crustaceans. *Proceedings of the Linnean Society of New South Wales* 4(4): 319–50, pls 18–24.

- Haswell, W.A., 1880. On some new amphipods from Australia and Tasmania. *Proceedings of the Linnean Society of New South Wales* 5(1): 97–105, pls 5–7.
- Hurley, D.E., 1956. Studies on the New Zealand amphipodan fauna. No. 13. Sandhoppers of the genus *Talorchestia*. *Transactions of the Royal Society of New Zealand* 84(2): 359–389.
- Hurley, D.E., 1957. Terrestrial and littoral amphipods of the genus *Orchestia*. Family Talitridae. *Transactions of the Royal Society of New Zealand* 85(1): 149–199.
- Hutchings, P., & C. Glasby, 1991. Phylogenetic implications of the biogeography of Australian Terebellidae (Polychaeta). *Ophelia Supplement* 5: 565–572.
- Jo, Y.W., 1988. Talitridae (Crustacea—Amphipoda) of the Korean coasts. *Beaufortia* 38(7): 153–179.
- Lowry, J.K., & H.E. Stoddart, 2003. Crustacea: Malacostraca: Syncarida, Peracarida: Amphipoda, Cumacea, Mysidacea. In *Zoological Catalogue of Australia*, vol. 19.2B, ed. P.L. Beesley & W.W.K. Houston, 531 pp. Melbourne: CSIRO Publishing, Australia.
- Marsden, I.D., & G.D. Fenwick, 1984. *Chroestia*, a new supralittoral amphipod from Queensland, Australia (Talitroidea: Talitridae). *Journal of Natural History* 18(6): 843–851.
<http://dx.doi.org/10.1080/00222938400770731>
- Miyamoto, H., & H. Morino, 1999. Taxonomic studies on the Talitridae (Crustacea, Amphipoda) from Taiwan I. The genera *Talorchestia* and *Sinorchestia* n.gen. *Publications of the Seto Marine Biological Laboratory* 38(5/6): 169–100.
- Miyamoto, H., & H. Morino, 2004. Taxonomic studies on the Talitridae (Crustacea, Amphipoda) from Taiwan II. The genus *Platorchestia*. *Publications of the Seto Marine Biological Laboratory* 40(1/2): 67–96.
- Morino, H., & H. Miyamoto, 1988. Redefinition of *Talorchestia* (Amphipoda: Talitridae) with description of a new species from the tropical West Pacific. *Journal of Crustacean Biology* 8(1): 91–98.
<http://dx.doi.org/10.2307/1548434>
- Nicolet, H., 1849. Historia fisica y politica de Chile segun documentos adquiridos en esta republica durante doce anos de residencia en ella y publicada bajo los auspicios del supremo gobierno por Claudio Gay. *Zoologia* 3: 115–318.
- Olerod, R., 1970. Littoral gammaridean Amphipoda from Mindoro, the Philippines. *Zoologischer Anzeiger* 184(5/6): 359–396.
- Peart, R., & J.K. Lowry, 2006. The Amphipod Genus *Arcitalitrus* (Crustacea: Amphipoda: Talitridae) of New South Wales Forests, with descriptions of six new species. *Records of the Australian Museum* 58(1): 97–118.
<http://dx.doi.org/10.3853/j.0067-1975.58.2006.1459>
- Poore, G.C.B., 2002. Crustacea: Malacostraca: Syncarida, Peracarida: Mictacea, Thermosbaenacea, Spelaeogriphacea. In *Zoological Catalogue of Australia*, vol. 19.2A, ed. W.W.K. Houston & P.L. Beesley, 433 pp. Melbourne: CSIRO Publishing, Australia.
- Richardson, A.M.M., 1991. Two new species of landhoppers (Crustacea: Talitridae) from O'ahu, Hawaiian Islands, with redescription of *Platorchestia pickeringi* and key to landhoppers of O'ahu. *Bishop Museum Occasional Papers* 31: 185–201.
- Richardson, A.M.M., 1993. Tasmanian intertidal Talitridae (Crustacea: Amphipoda). Palustral talitrids: two new species of *Eorchestia* Bousfield, 1984. *Journal of Natural History* 27(2): 267–284.
<http://dx.doi.org/10.1080/00222939300770131>
- Richardson, A.M.M., 1996. *Protorchestia lakei*, new species (Amphipoda: Talitridae) from Maatsuyker Island, Tasmania, with a key to the genus and notes on the diversity of Tasmanian Talitridae. *Journal of Crustacean Biology* 16(3): 574–583.
<http://dx.doi.org/10.2307/1548749>
- Richardson, A.M.M., & M.E. Mulcahy, 1996. The distribution of talitrid amphipods (Crustacea) on a salt marsh in southern Tasmania, in relation to vegetation and substratum. *Estuarine Coastal and Shelf Science* 43(6): 801–817.
<http://dx.doi.org/10.1007/BF00047634>
- Richardson, A.M.M., R. Swain & S.J. Smith, 1991. Local distribution of sand-hoppers and landhoppers (Crustacea: Amphipoda: Talitridae) in the coastal zone of western Tasmania. *Hydrobiologia* 223: 127–140.
- Richardson, A.M.M., R. Swain & V. Wong, 1997. Translittoral Talitridae (Crustacea: Amphipoda) and the need to preserve transitional habitat: examples from Tasmanian saltmarshes and other coastal sites. *Memoirs of the Museum of Victoria* 56(2): 521–529.
- Serejo, C.S., 2004. Talitridae (Amphipoda, Gammaridea) from the Brazilian coastline. *Zootaxa* 646: 1–29.
<http://www.mapress.com/zootaxa/2004/z100646.pdf>
- Stebbing, T.R.R., 1899. Amphipoda from the Copenhagen Museum and other sources. Part II. *Transactions of the Linnean Society, London, Series 2, Zoology* 7(8): 395–432, pls 30–35.
- Stebbing, T.R.R., 1906. Amphipoda. I. Gammaridea. *Das Tierreich* 21: 1–806.
- Stephensen, K., 1948. Amphipods from Curaçao, Bonaire, Aruba and Margarita. *Studies on the Fauna of Curaçao, Aruba, Bonaire and the Venezuelan Islands* 3(11): 1–20.
- Stock, J.H., 1996. The genus *Platorchestia* (Crustacea, Amphipoda) on the Mid-Atlantic islands, with description of a new species from Saint Helena. *Miscelanea Zoologica* 19.1: 149–157.
- Tafari, B., A. Ugolini, M. Bazzicalupo, A. Mengoni & S. Ruffo, 2004. Phylogenetic relationships among Mediterranean sandhoppers. *Journal Natural History* 38: 499–508.
- Weber, B., 1992. Der Baikäl: geographische und biologische Aspekte eines aussergewöhnlichen Süßwassersees. *Natur Und Museum* 122: 101–125.

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