

3.2. The Koonungidae (Syncarida: Crustacea) with Descriptions of New Genera and Species.

Introduction

A taxonomic revision on the anaspidacean family Koonungidae is presented. The Koonungidae and *Koonunga cursor* was the second genus and species to be added to the Anaspidacea by Sayce in 1907 and the second family in 1908 (Sayce). Koonungidae inhabits both the surface and hyporheic environments in streams, temporary water bodies, wetlands and caves. The family has been expanded in this study from three species in two genera to now consist of three subfamilies, seven genera and thirteen species. The subfamilies include the Koonunginae, the Micraspidinae and the Drummonunginae. The Koonunginae contains two genera; *Koonunga* with one previously described species *Koonunga cursor*, and four new species, including: *K. burgessi* n. sp; *K. colaci* n. sp; *K. grampianensis* n. sp; *K. smithtoni* n. sp; and *Zeidlerunga* with *Z. crenarum*, and the new species *Z. gellibrandi* n. sp. The genus *Koonunga* is distributed from the Grampians of south western Victoria, south across the western Bass Strait including King Island to the North West of Tasmania. The new genus *Zeidlerunga* encompasses the south western coastal margins of Victoria and the south east of South Australia. The Subfamily Micraspidinae contains only one genus, *Micraspides* with two species, *M. calmani* and one new species *M. zeehanensis* n. sp. This genus occupies the central west coastal zone of Tasmania. The new subfamily Drummonunginae contains four monospecific genera including: *Boolarrunga* with *B. gippslandica* n. sp; *Drummonunga* with *D. welshpooli* n. sp; *Neonunga* with *N. minuta* n. sp; and *Pholeteronunga* with *P. silvani* n. sp. This subfamily covers the central southeastern area of Victoria.



Figure 3.2.1. Koonungidae. *Koonunga colaci* n. sp.

Abbreviations

Institutional Abbreviations

Prefixes of registration or catalogue numbers for the Institutions referred to in the text, tables and figures.

P - Australian Museum, Sydney, Australia

NMV – Museum of Victoria, Melbourne, Australia

QVM - Queen Victoria Museum and Art Gallery, Launceston, Australia

SAM - South Australian Museum

TM - Tasmanian Monitoring River Health, Tasmania, Australia

G - Tasmanian Museum and Art Gallery, Hobart, Australia

VEPA - Victorian AUSRIVAS EPA, Melbourne, Victoria, Australia

Classification of the Koonungidae

Table 3.2.1. Checklist of Species

Superorder SYNCARIDA Packard 1885

Order ANASPIDACEA Calman 1904

Family Koonungidae Sayce 2008

Subfamily Koonunginae n.subfam.

Koonunga Sayce 1907

Koonunga cursor

Koonunga burgessi n. sp.

Koonunga colaci n. sp.

Koonunga grampianensis n. sp.

Koonunga smithtoni n. sp.

Zeidlerunga n. gen.

Zeidlerunga crenarum (= *Koonunga* Sayce 1907)

Zeidlerunga gellibrandi n. sp.

Subfamily Micraspidinae n.subfam.

Micraspides Nicholls 1931

Micraspides calmani Nicholls 1931

Micraspides zeehanensis n. sp.

Subfamily Drummonunginae n.subfam.

Boolarrunga n. gen.

Boolarrunga gippslandica n. sp.

Drummonunga n. gen.

Drummonunga welshpooli n. sp.

Neonumga n. gen.

Neonumga minuta n. sp.

Pholeteronunga n. gen.

Pholeteronunga silvanensis n. sp.

Taxonomy

Family KOONUNGIDAE Sayce 1908

Diagnosis

Small to moderate anaspidaceans; body slender, length to width ratio 8:1; anterior portion of the body subcylindrical, dorsoventrally compressed becoming broader and more cylindrical posteriorly; integument smooth, thin, membranous and contains no calcification; no development of pleura; epimera inconspicuous; all segments of pereon and pleon subequal; pleon equal to length of pereon; telson short (length \leq width), broad, and triangular with 2-3 layers of spines on the dorsal, lateral margin and ventral margin; rostrum broad triangular extension of anterior margin of cephalic shield; eyes sessile or absent; no antennal scale; antenna without scaphocerite; mandible with single dentate cutting margin and a spinose molar expansion not separated into spine row and molar tubercle; maxillipeds without gnatho-basis lobes; thoracic appendages except last two bear an exopodite; thoracic appendages except last have at least one epipodite; last thoracic appendage turned backwards; pleopods uniramous, except first two pairs in male; uropod with large protopod and a single segment lateral and endopodite.

Key to Genera of Koonungidae

1. Anaspidacean small to moderate size (3-12mm), telson triangular, short (length \leq width), eyes sessile or absent, frontal margin of cephalon triangular but not lobed, uropod rami single segments but not forming a tail fan. **Family Koonungidae. 2.**
2. Male antennule with antennal organ on basal segment of flagellum, telson lateral margin with ventral row of short setae. **4.**
3. Male antennule without antennal organ on basal segment of flagellum, telson lateral margin without ventral row of short setae. **6.**
4. Male pleopod 2 sternal keel with an elongate, rounded medial ventral lobe and a prominent posterior process, pleopods 1 is a single, rectangular endopodite with a broadly rectangular or rounded distoventral margin and one large dorsal laterally directed hooked lobe, male pleopod 2 distal tip acutely

pointed, medially directed with a distomedial concavity, telson dorsal surface with stout pectinate setae.

Koonunginae. 7.

5. Male pleopod 2 sternal keel with no posterior process and a broad, low, rounded ventral lobe with lateral cuticular extensions, male pleopod 2 distal tip stylet shaped, with an abruptly tapered or tapering from the midline, acutely pointed, laterally directed apex, telson lateral margin with stout sparsely pectinate setae, **telson** dorsal surface with slender sparsely pectinate setae with bifid tips and small flagellum.

Drummonunginae. 9.

6. Male pleopod 2 sternal keels with posterior spinose process and a quadrate ventral lobe, eyes absent, male pleopod 2 distal tip medially truncated with distal nobs and no concavity, pleonite 6 posterior margin with a row of six short stout setae across margin, telson lateral margin without row of short, ventral setae, telson dorsal surface with simple stout setae.

Micraspidinae and *Micraspides*.

7. Eyes present, male pleopod 2 sternal keels with an elongate spinose posterior spinose process, pleopods 1 is a single, rectangular endopodite with a broadly rectangular distoventral margin and one large dsorsal laterally directed hooked lobe.

***Koonunga*. 8.**

8. Eyes absent, male pleopod 2 sternal keel with a short, broadly rounded posterior process, pleopods 1 is a single, rectangular endopodite with a broadly rectangular or rounded distoventral margin and one large dsorsal laterally directed hooked lobe.

***Zeidlerunga*.**

9. Male pleopod 1 sternal keel distally flattened (square or rectangular) **10.**

10. Eyes absent: colouration with pigmentation heavier anterior of cephalic groove, thoracopod 8 ischium with large tubercle on lateral surface, dactylus lateral claw minute; pleopod 1 of male endopodite with deep medial groove and bifurcated anteriorly, upper lip of groove with broad, medial process having coupling hooks subdistally and continued as a stout laterally directed process, expanded distally and covered in minute scale like spines, ventral lip of groove rounded anteriorly and directed upwards, pleopod 2 of males basal segment of endopodite stout at base medially curved and sharply inclined towards mid-line; group of coupling hooks at mid-length; male pleopod 2 distal segment narrower and slightly twisted distally; tip with dorsal spoon-like cavity.

***Boolarrunga*.**

11. Male pleopod 1 sternal keel shallow, broadly rounded, with square lateral extensions **12.**

12. Pleonite 6 posterior margin with a row of six simple, stout setae, male pleopod 2 distal segments sharply tapered stylet with a distal medial and lateral tapered edge.

Neonunga

13.

13. Pleonite 6 posterior margin with a two to three simple, stout setae on lateral corner, male pleopod 2 distal segment an elongate stylet with straight edges, a subdistal lateral extension with a small acutely pointed apex.

14.

14. Telson lateral ventral margin with complete lateral row of 14-15 uniform short stout pectinate setae, pleopod 1 laterodistal hook with bilobed apex, pleopod 2 distal segment lower 1/3 expanded and laterodistal extension rounded, pleonite 6 posterior margin with short simple setae, telson dorsal setae with nonsymmetrical bifid apex.

Drummonunga.

15.

15. Telson lateral ventral margin with staggered distolateral row of 5-6 variably sized short stout pectinate setae, pleopod 1 laterodistal hook single rounded apex, pleopod 2 distal segment without lower expansion and laterodistal extension angular, harpoon shaped, pleonite 6 posterior margin with elongate setae with a symmetrical bilobed apex and central flagella, telson dorsal setae with elongate setae with a symmetrical bilobed apex and central flagella.

Pholeteronunga.

Remarks

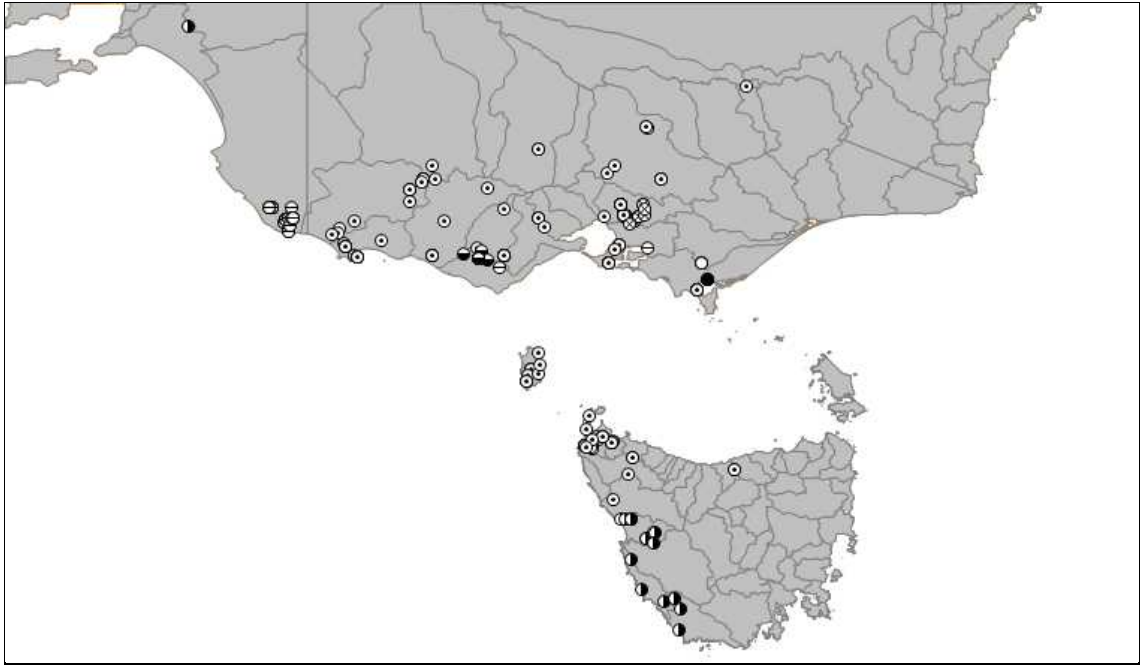
The Koonungidae encompasses a large geographic area and contains a plethora of species across the western and north west coast of Tasmania, across the Bass Strait on the remnants of a land bridge that connect western Tasmania to southern Victoria. In Victoria the family exclusively occupies the permanent and intermediate wetlands, streams and caves from the south east to the far southwest, as well as over the border into South Australia. The extremes of their range have even been recorded as far north as Albury on the border with New South Wales, east into Gippsland, west as far as the central south coast of South Australia and south to South West tip of Tasmania. They represent a family with a direct link and distribution that mirrors the early Cainozoic Murray Basin that developed during the breakup of Gondwana and the separation of Australia from Antarctica (Kingham 1998). This basin discharged in the western Bass Strait and eastern Great Australian Bight during the separation of Australia from Antarctica and now occupies the lower reaches of the Murray Darling River Catchment. The Koonungidae have only recently been recorded from the phreatic zone within aquifers in SE South Australia and are expected to be discovered more often in this environment with appropriate sampling is carried out across their range. Indeed, as this study will demonstrate, Victoria and Tasmania and South Australia has a rich diversity of Koonungidae, with many more species and genera to be discovered and described. This study aims only to illustrate a small representative selection of this biodiversity. One of the striking, although comparatively insignificant mouthpart structures but one whose shape is exhibited by all Koonungidae is the paragnath.

The paragnath within this family has a small notch or triangular medial endite below the midline of the medial margin of each lobe. This notch was never considered diagnostic in previous analyses however it now makes a direct link with the new family Raptornungidae as the structures are identical, particularly with the new genus and species *Drummonunga welshpooli* in that they both also have a v-shaped notch between the two lobes. This and other features discussed in the last chapter provide a direct linkage between the northern New South Wales and the southern families.

Geographic Distribution

The Koonungidae typically occur in streams in Victoria, the cave systems of southern South Australia, and the seeps, wetlands and caves of western Tasmania. Although they have a strong association with groundwater and are hereby classified as 'Stygofauna' in particular habitats they have not as yet been collected from bores or the phreatic zone in Tasmania or Victoria and thus far can be divided into either temporary or permanent hyporheic, pholeteros or cavernicoles depending on the geomorphology of the area and water courses. As they are associated with the pholeteros of land crayfish *Engaeus/Geocherax/Parasticoides* species and other land crayfish genera where dispersal is via movement through the phreatic saturated zone they can also be classed as phreatic stygofauna. The lack of records from bores is therefore attributed to one or both a lack of sampling effort in this environment and unsuitable substrates i.e. the subsurface geology is composed of fine grained sediments or lack of large fractured rock zones that preclude the movement of larger fauna. Koonungids are considered to be predominantly detritus and possibly algal grazers based on the mouthpart structures.

The *Koonungidae* are widespread in surface waters of the far south of New South Wales, south east South Australia and throughout most of Victoria and the north west coast of Tasmania but there are also hypogean species limited to the West coast and North West corner of Tasmania, King Island and other islands in the western region of Bass Strait. The first species of *Koonunga* described, *Koonunga cursor* was found in Victoria while *Koonunga crenarum* is widespread in the caves of the southern Naracoorte Coastal Plain Region of South Australia.



Map 3.2.1. Distribution of the Koonungidae in South East Australia.

Legend for the generic distribution: *Koonunga* - .⊙ circle with central dot; *Boolarrunga* - ○ circle hollow; *Drummonunga* - ● black circle; *Micraspides* - half circle vertical black; *Neonunga* - half circle horizontal black; *Pholeteronunga* - circle with inner cross; *Zeidlerunga* - circle with inner horizontal line.

Subfamily Koonunginae n.subfam

Etymology

Named after the original genus *Koonunga* Sayce 2007.

Diagnosis

Eyes present, small, sessile and round if present and situated on the anterolateral corner of the cephalon dorsal surface; antennule with basal segment of flagellum possessing sensory lobe in the male; male pleopods 1 is a short single segment endopodite with a broadly rectangular distoventral margin, a large laterallt directed hooked lobe on the dorsal margin and a medial endite with a patch of coupling hooks on the distomedial corner; pleopod 2 distal tip with medial concavity; pleopod 2 sternal keel with a ventral lobe and a posteriorly directed pointed lobe.

Remarks

The new subfamily encapsulates the two previous species *K. cursor* and *K. crenarum* that have now been separated into two genera. The main attributes linking these taxa is the presence of the antennal organ on the basal segment of flagellum of the antennula in the male and the common features in the structure of the male petasma.

Genus *Koonunga* Sayce 1907

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Koonunga. Sayce, O.A. 1907. Description of a remarkable new crustacean with primitive malacastrocan characters. Victorian Naturalist. 24: 117-120 [119].

Type species

Koonunga cursor Sayce 1907 by original designation.

Etymology

The name is derived from the aboriginal name of a creek which runs near the type locality (Sayce 1907).

Diagnosis

Modified from Sayce 1907, 1908.

Cephalon about equal in length to pereopod 2 and 3 combined, possessing a short transverse mandibular suture on each side; pleonite 6 posterior margin with two simple setae on lateal margin; telson is short , broad and triangular with apex broadly rounded; dorsal surface is convex with nine robust, dorsally directed spines; lateral margin spine row with 14 stout, plumose spines; ventral spine row with 40-50

simple and plumose short stout, spines around the entire posterior margin; small rostrum frontal margin of cephalon incised above the attachment of the second antennula flagellum, forming a small lateral lobe; eyes, small, sessile and round, on the anteriolateral corner; antenna basal segment of flagellum possessing a round sensory lobe in the male; paragnath formed of two membranous, narrow, ovoidal, widely divergent lobes with a basal medial extension on the medial margin; maxillula lateral endite distal spine row subequal with a straight diagonal base; maxillula distal spine row with a larger lateral terminal spine and subequal spines divided into an upper and lower grouping; maxillule medial endite is short and narrow with two elongate stout plumose spines; maxilla medial endite very short, with one or two elongate straight plumose setae; maxilliped coxa with 2 small lamellar epipodites, one minute and one half length of basal exopodite; male pleopds 1 is a short single segment endopodite with a broadly rectangular distoventral margin, a large laterallt directed hooked lobe on the dorsal margin and a medial endite with a patch of coupling hooks on the distomedial corner; male pleopod 2 stout and styliform in shape with two segments subequal in length; proximal segment elongate with a row of coupling setae midway along medial margin; distal segment acutely pointed with a distomedial concavity and distolateral notch; large sternal keel present with elongate, rounded central lobe and a large, basal, acutely point, posteriorly directed spine.

Species Composition

Koonunga cursor

Koonunga burgessi n. sp.

Koonunga colaci n. sp.

Koonunga grampianensis n. sp.

Koonunga smithtoni n. sp.

Remarks

This genus was first published as a brief description of *Koonunga cursor* by Sayce in 1907 in the Victorian Naturalist (Melbourne), Vol. XXIV., Nov. 1907, pp117-120 but was later reprinted in the Annals and Magazine of Natural History Series. 8, Vol i., April 1908, pp. 350-355.

The other previously described species of *Koonunga* i.e. *K. crenarum* has been removed from this genus and established within a new genus *Zeidlerunga* due to the significant morphological differences of the male genitalia (See *Zeidlerunga* n. gen for the full diagnosis).

***Koonunga cursor* Sayce 1907**

(Figs. 3.2.2-4)

Koonunga cursor Sayce, O.A. 1907. Description of a remarkable new crustacean with primitive malacastrocan characters. Victorian Naturalist. 24: 117-120 [120].

Type Material

Syntypes: NMV J.1046. Small freshwater reedy pools beside a tiny little runnel which joins the Mullum Mullum Creek at Ringwood near Melbourne, Victoria, Australia, Alt 139m, Zone 55, 344955.58m E, 5814763.03m S., Sayce, O.A. 1907.

Material Examined

Type Material

J46156, Ringwood, Victoria from type locality, Australia, Alt 125m, Zone 55, 344195.76m E, 5813228.07m S, Sayce, O.A., 1907; J40519, Ringwood, Victoria from type locality
Unassigned Rego No., Ringwood, Mullum Mullum Creek at Ringwood near Melbourne, Victoria, Australia, Alt 139m, Zone 55, 344955.58m E, 5814763.03m S, Sayce, O.A., 1907.

Other Material

P.14774, Ringwood, near Melbourne, Victoria, Australia, Alt 135m, Zone 55, 344213.45m E, 5812680.28m S, Unknown date and collector; Slide Box Sarcophaga III, 192-197 *Koonunga* F Telson, Ringwood, Victoria from type locality, Drummond, F. H., 1956; Slide Box Sarcophaga III, 192-197 K cursor Ringwood from type locality, F Legs, Drummond, F. H., 1956; Slide Box Sarcophaga III, 192-197 K cursor Ringwood M Legs 6 Victoria from type locality, Drummond, F. H., 1956; Slide Box Sarcophaga III, 192-197 K cursor Ringwood M Legs 5, Victoria from type locality, Drummond, F. H., 1956; Slide Box Sarcophaga III, 192-197 K cursor Ringwood M legs 4, Victoria from type locality, Drummond, F. H., 1956; Slide Box Sarcophaga III, 192-197 K cursor Ringwood M legs 3, Victoria from type locality, Drummond, F. H., 1956; Slide Box Sarcophaga III, 192-197 K cursor Ringwood M l3gs 2, Victoria from type locality, Drummond, F. H., 1956; Slide Box Sarcophaga III, 192-197 K cursor Ringwood M legs 1a, Victoria from type locality, Drummond, F. H., 1956; Slide Box Sarcophaga III, 192-197 K cursor Ringwood M legs 1b, Victoria from type locality, Drummond, F. H., 1956; Slide Box Sarcophaga III, 159/167 K cursor Ringwood F Mx2, Victoria from type locality, Drummond, F. H., 1956; Slide Box Sarcophaga III, 159/167 K cursor Ringwood F Md, Victoria from type locality, Drummond, F. H., 1956; K cursor Ringwood F Mx1, Victoria from type locality, Drummond, F. H., 1956; Slide Box Sarcophaga III, 159/167 K cursor Ringwood F Labrum, Victoria from type locality, Drummond, F. H., 1956; Slide Box Sarcophaga III, 159/167 K cursor Ringwood F Ant 1&2, Victoria from type locality, Drummond, F. H., 1956; Slide Box Sarcophaga III, 159/167 K cursor Ringwood F 1955, Victoria from type locality,

Drummond, F. H., 1956; Slide Box Sarcophaga III, 159/167 K cursor Ringwood F A1, A2, Victoria from type locality, Drummond, F. H., 1956; Slide Box Sarcophaga III, 159/167 K cursor Ringwood F Legs 4, Victoria from type locality, Drummond, F. H., 1956; Slide Box Sarcophaga III, 159/167 K cursor Ringwood F Pleopod 1&2, Victoria from type locality, Drummond, F. H., 1956; Slide Box Sarcophaga III, 153-156 K cursor Ringwood F pleopods, Victoria from type locality, Drummond, F. H., 1956; Slide Box Sarcophaga III, 153-156 K cursor Ringwood F Cephalon 1, Victoria from type locality, Drummond, F. H., 1956; Slide Box Sarcophaga III, 153-156 K cursor Ringwood F Cephalon 2, Victoria from type locality, Drummond, F. H., 1956; Slide Box Sarcophaga III, 153-156 K cursor Ringwood F Cephalon 3, Victoria from type locality, Drummond, F. H., 1956; Slide Box Sarcophaga III, 153-156 K cursor Ringwood F Cephalon 4, Victoria from type locality, Drummond, F. H., 1956; Slide Box Sarcophaga III, 153-156 K cursor Ringwood F legs 6, Victoria from type locality, Drummond, F. H., 1956; Slide Box Sarcophaga III, 153-156 K cursor Ringwood F Telson, Victoria from type locality, Drummond, F. H., 1956; Slide Box Sarcophaga III, 206/211 K cursor Ringwood M Mxp, Victoria from type locality, Drummond, F. H., 1956; Slide Box Sarcophaga III, 206/211 K cursor Ringwood M Mx2, Victoria from type locality, Drummond, F. H., 1956; Slide Box Sarcophaga III, 206/211 K cursor Ringwood M Mx1, Victoria from type locality, Drummond, F. H., 1956; Slide Box Sarcophaga III, 206/211 K cursor Ringwood M Mx2 L, Victoria from type locality, Drummond, F. H., 1956; Slide Box Sarcophaga III, 206/211 K cursor Ringwood M Md, Victoria from type locality, Drummond, F. H., 1956; Slide Box Sarcophaga III, 206/211 K cursor Ringwood M cephalon, Victoria from type locality, Drummond, F. H., 1956; Slide Box Sarcophaga III, 206/211 K cursor Ringwood M AII, Victoria from type locality, Drummond, F. H., 1956; Slide Box Sarcophaga III, 206/211 K cursor Ringwood M AI, Victoria from type locality, Drummond, F. H., 1956; Slide Box Sarcophaga III, K cursor Ringwood F Legs 7, Victoria from type locality, Drummond, F. H., 1956; Slide Box Sarcophaga III, K cursor Ringwood F Uropod, Victoria from type locality, Drummond, F. H., 1956; Slide Box Sarcophaga III, K cursor Ringwood F 2 whole mount, Victoria from type locality, Drummond, F. H., 1956; Slide Box Sarcophaga III, K cursor Ringwood F legs 5, Victoria from type locality, Drummond, F. H., 1956; Slide Box Sarcophaga III, K cursor Ringwood F legs 3, Victoria from type locality, Drummond, F. H., 1956; Slide Box Sarcophaga III, K cursor Ringwood F legs 1, Victoria from type locality, Drummond, F. H., 1956; Slide Box Sarcophaga III, K cursor Ringwood F legs 2, Victoria from type locality, Drummond, F. H., 1956; Slide Box Sarcophaga III, K cursor Ringwood F Mxp, Victoria from type locality, Drummond, F. H., 1956; Slide Box Sarcophaga III, K cursor Ringwood M pleopods, Victoria from type locality, Drummond, F. H., 1956; G20, Ringwood, Victoria, from type locality, Hall, R., Unknown date.

Other Records

P.14774, Ringwood, near Melbourne, Victoria, Australia, Alt 135m, Zone 55, 344213.45m E, 5812680.28m S, Unknown date and collector; G20, Ringwood, Victoria, from type locality, Hall, R., Unknown date.

Diagnosis

Modified from Sayce 1907.

Body length 9.5mm; body slender, length to width ratio 8:1; anterior portion of the body subcylindrical, dorsoventrally compressed becoming broader and more cylindrical posteriorly; integument smooth, thin, membranous and contains no calcification; no development of pleura; epimera inconspicuous; all segments of pereon and pleon subequal; pleon equal to length of pereon; colouration marbled dark brown with yellow background surface with black granules. Cephalon subquadrate with anterior margin triangular; pleonite 6 equal to preceding one with one or two dorsal spines close to the attachment of the telson.

Pleonite 6 posterior margin with two simple setae on lateral margin.

Telson is short, broad and roundly triangular with apex broadly rounded; dorsal surface is convex with 9 robust, dorsally directed spines; lateral margin spine row with 14 stout, plumose spines; ventral spines row with 40-50 simple and plumose short stout, spines around the entire posterior margin; telson entire, slightly broader than elongate, triangular with rounded apex; margin fringed with two or more series of stout spines.

Eyes situated on the dorsum at the angle formed by the frontal margin and the lateral incisions, close to the frontal margin; eyes are small circular and black.

Antennule peduncle with three segments; first segment is broad and as elongate as segment 2 and 3, with a few simple setae; statocyst with two ball setae; segments 2 and 3 are narrower, subequal to each other with tufts of setae on the medial and lateral margins tufted with setae; lateral flagellum with 20 segments; medial flagellum with eight segments; last peduncular segment with short broad, linguiform lobe with margin evenly rounded and fringed with elongate curved plumose setae; the surface of the lobe is studded with closely packed minute hyaline hollow cups attached on a short stalk. Antennae peduncle slender with first segment short and quadrate; flagellum with 18 segments; no scale on second peduncular segment.

Labrum thick and fleshy, curving evenly downward without transverse ridge (epistome), broadly and evenly rounded with apex covered in fine setules.

Right mandible with five stout, subequal denticles; left incisor process with six subequal denticles and the terminal medial denticle enlarged and laterally directed; molar process similar in each, forming a well extended broad ridge covered with short, stout setae, surrounding a minute triturating surface with chitinous papillae. Mandible incisor process with six denticles on left and five on right mandible; no spine row; palp three segmented, directed forwards and inwards to almost meet on the mid axis; first segment short with no setae; second three times as elongate with a row of six elongate plumose setae elongate medial margin in distal half; third is minute, apically broadly rounded having several elongate plumose setae; paragnath formed of two membranous, narrow, ovoidal, widely divergent lobes with a basal medial extension on the medial margin; medial margins fringed with setae. Maxillula lateral lobe with a minute one segmented palp on lateral surface with three very elongate spines on the apex and elongate plumose setae on the medial margins; the medial surface of the lobe has a double series of ten robust yellow simple spines; maxillula distal spine row with a larger lateral terminal spine and subequal spines divided into an

upper and lower grouping; maxillule medial endite is short and narrow with two elongate stout plumose spines surrounded by four smaller plumose spines; no definite exopodite.

Maxilla medial endite very short, with one or two elongate straight plumose setae; second broader with five plumose and plain spinuleas and setae; third is broader with 10 spinules and simple setae; fourth is wider than the others with 10 elongate spinules; maxillipeds basis with single segment exopodite, coxa with two small lamellar epipodites.

Maxilliped larger than thoracopods extending directly forwards about as far as the distal end of the peduncle of the upper antennae; dactylus with four claws. Maxilliped coxa with two small lamellar epipodites, one minute and one half length of basal exopodite; coxae is short and very broad and flattened on the medial surface; lateral surface robustly convex; ventral distal corner has raised tubercle covered with fine setae; distal margin is proelongated into a triangular extension with a few setae on apex; second segment is short, subquadrate in shape; dorsal subdistal margin with exopodite that extends to just beyond the third segment and has transverse line near proximal end; third segment is subquadrate and densely covered on medial face with elongate plumose setae; fourth segment is about one third more elongate slightly ovate and bearing few elongate setae; fifth is quite short; sixth is slightly more elongated but narrower; the seventh is minute having a row of four stout curved claws on apex.

Males have the opening of the vas deferens on the medial side at the proximal margin of the seventh thoracopod.

Females spermatheca small; pleopods natatory and multisegmented and become shorter posteriorly; no endopodite on pleopods.

Male pleopods 1 is a short single segment endopodite with a broadly rectangular distoventral margin, a large lateral directed hooked lobe on the dorsal margin with the hook not extending past the lateral margin, and a medial endite with a patch of coupling hooks on the distomedial corner. Male pleopod 2 stout and styliform in shape with two segments subequal in length; proximal segment elongate with a row of coupling setae midway along medial margin; distal segment acutely pointed with a distomedial concavity and distolateral notch; large sternal keel present with elongate, rounded central lobe and a large, basal, acutely point, posteriorly directed spine. Uropod with peduncle extending to half the length of the telson, rami more elongate than the peduncle; endopodite fringed, elongate with the medial margin with upturned spines, and three elongate spines on the apex pointing outwards; lateral margin and apex fringed with very elongate plumose setae; exopodite fringed with elongate plumose setae, and the lateral margins also with a row of upturned spines; uropod protopod stout, length > width and 0.5 length of telson; lateral and endopodite single segments, and subequal in length; endopodite medial margin with 9-10 stout setae followed by six short trifold setae, three large, elongate, robust pectinate setae; remainder of apex and medial margin with 10-15 elongate, plumose setae; exopodite covered with 20-25 elongate, plumose setae.

Habitat

Freshwater reedy pools beside a tiny runnel joining the Mullum Mullum Creek, Ringwood, Melbourne.

Distribution

Restricted to the type locality.

Remarks

Sayce suggest that the second and third segments of the antennula are fused as there is one less than in *Anaspides*. He stated that 'Last peduncular segment has a short broad linguiform lobe partly shields a pedunculated eye-like organ on the distal medial corner of the first segment of the Lateral flagellum,. Ziedler corrected this observation by demonstrating that the eye-like organ was located on the proximal medial margin of the second flagellum segment and the saucer shaped lobe is a modification of the basal medial flagellum. In terms of their behaviour this species is very active, usually running around on the substrate but can spring forwards and swims easily. It is also able to swim on their back in the same way exhibited by *Anaspides*. This species is now most probably extinct as the type locality is a now in the middle of inner suburban Melbourne and the small reedy pond is now a concrete storm drain.

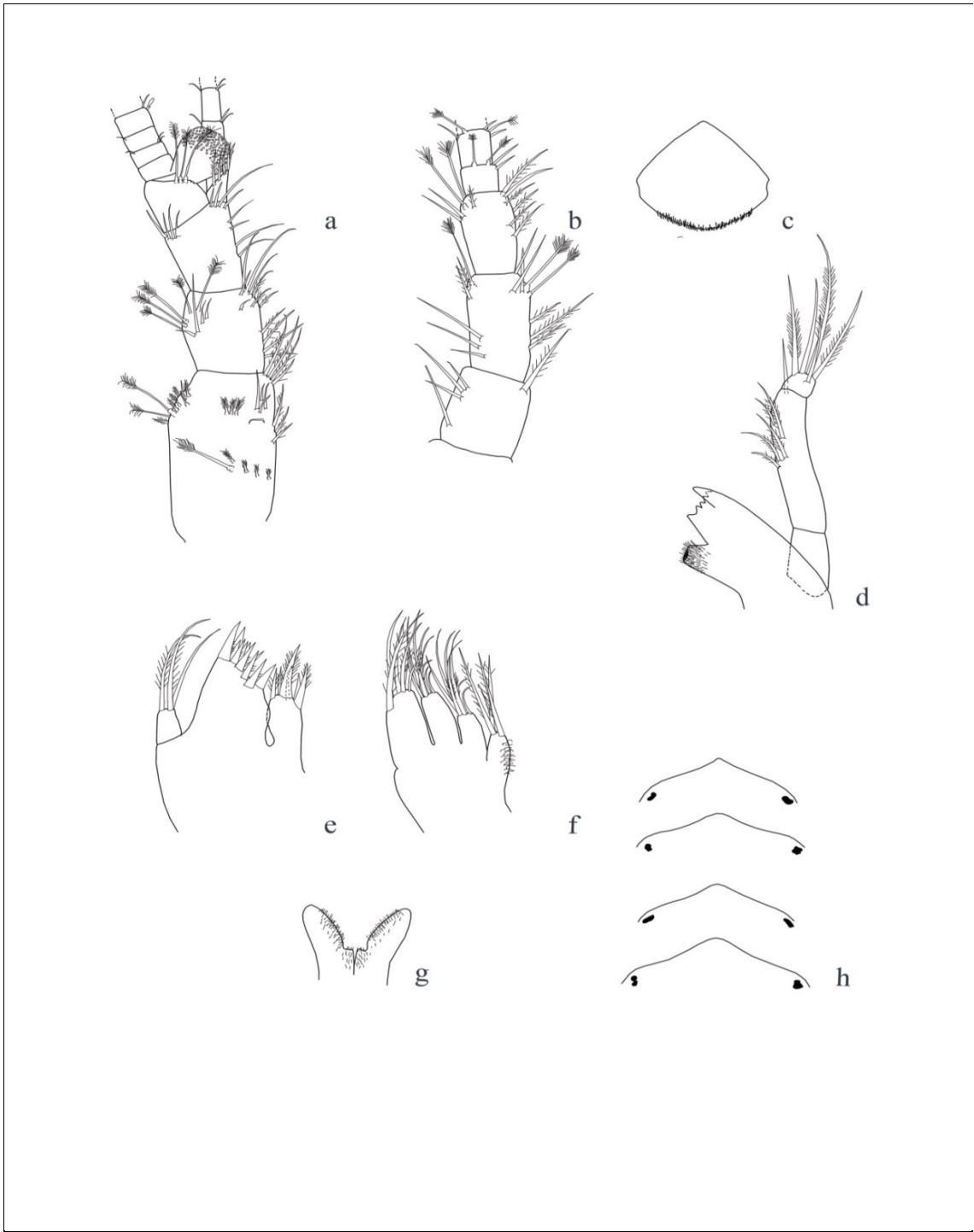


Figure 3.2.2. *Koonunga cursor*. Syntype male 9.5mm. Antennae: a- A1; b- A2 ; Mouthparts: c-labrum ; d-mandible; e- Mx1; f- Mx2; g- Paragnath; h- rostrum variability.

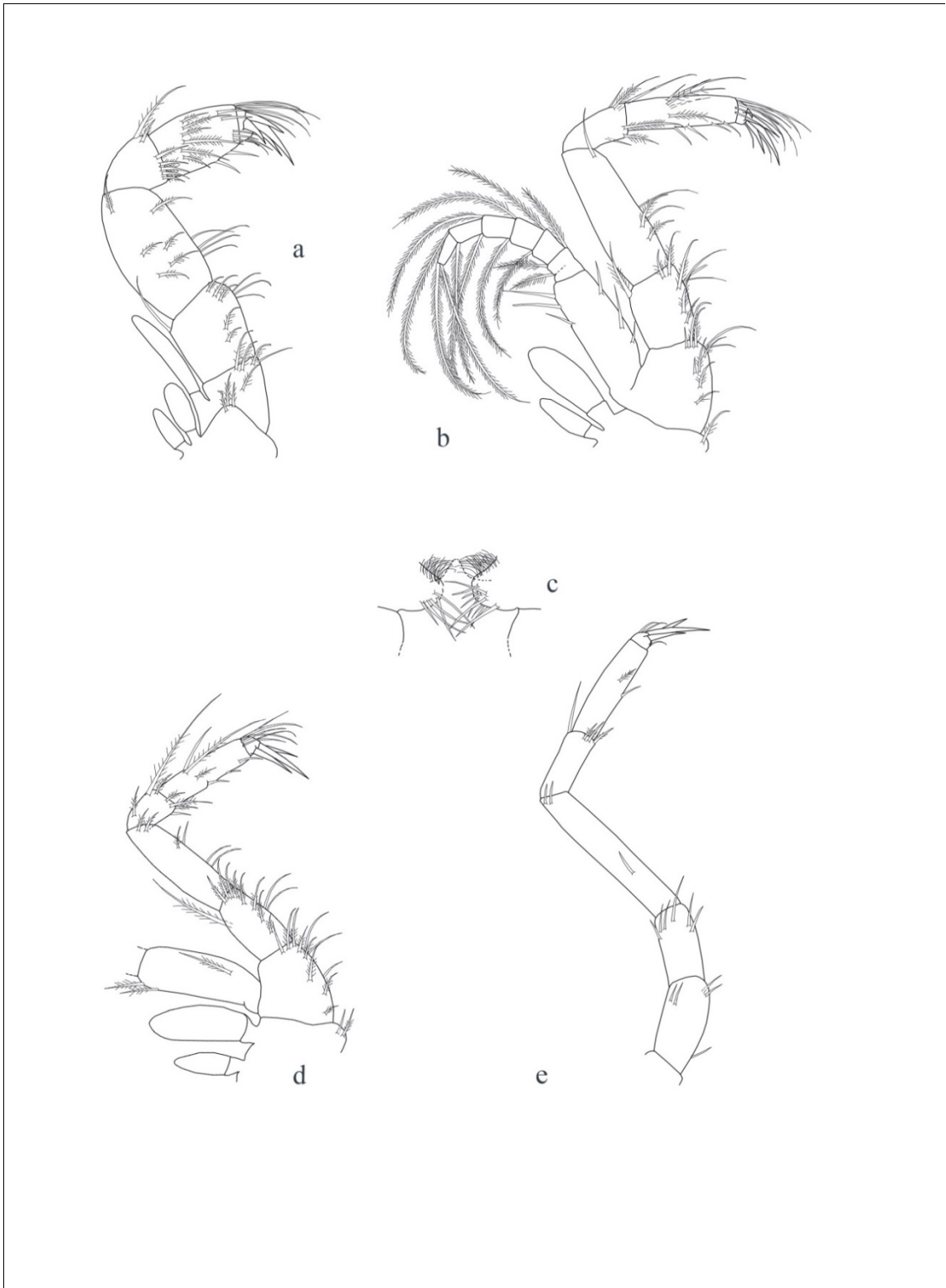


Figure 3.2.3. *Koonunga cursor*. Syntype male 9.5mm. Thoracopods: a- Mxp; b- Th2 ; c- Th 7 coxal lobes; d- Th5; e- Th8.

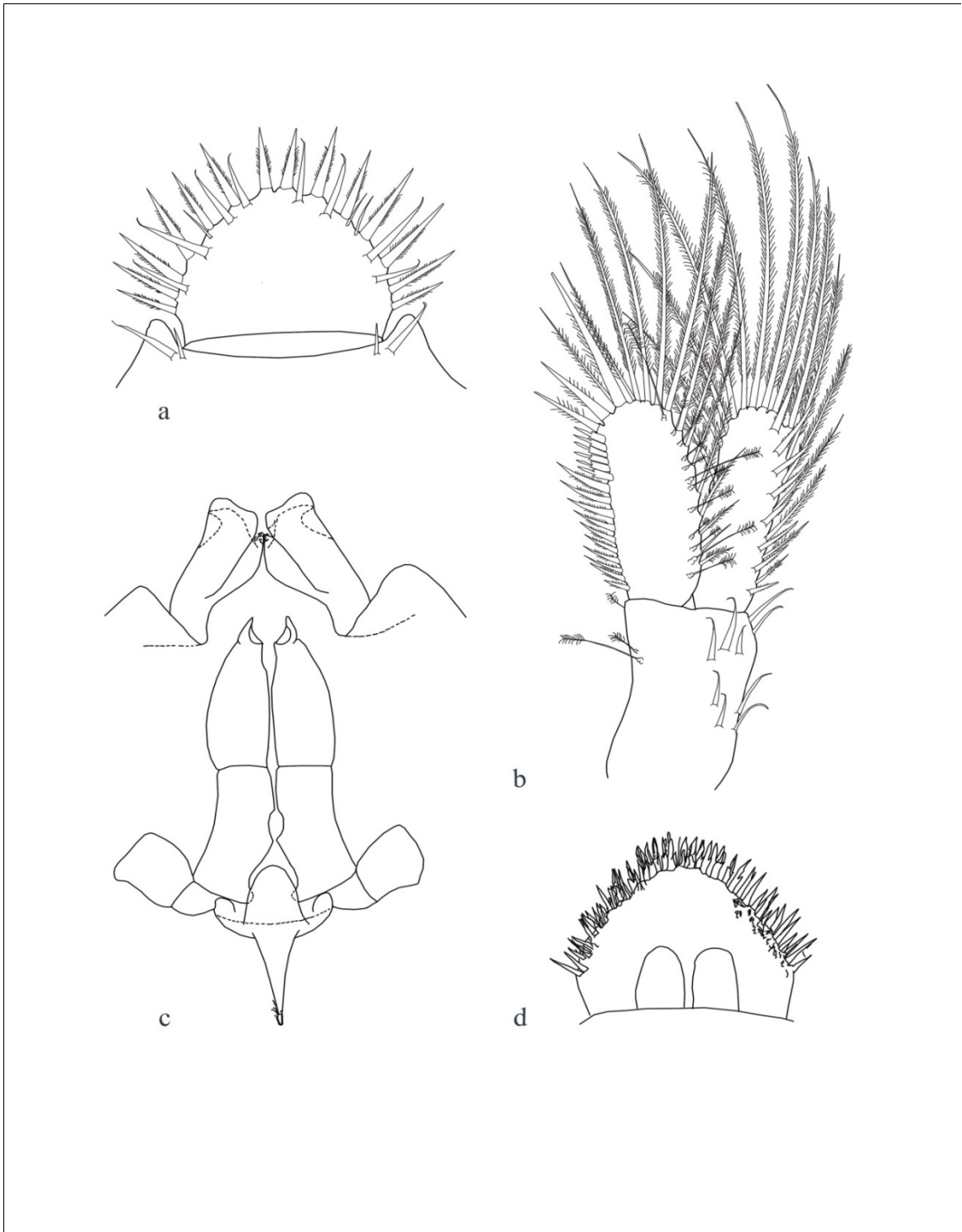


Figure 3.2.4. *Koonunga cursor*. Syntype male 9.5mm. Pleopods: a- telson dorsal view; b- uropod; c- petasma (P11+P12); d- telson ventral view.

Koonunga burgessi n. sp

(Figs.3.2.5-8)

Type Locality

Wetland 1km west of Martha Lavinia Lagoon and collected by pumping from freshwater crayfish burrows, King Island, Tasmania, Australia.



a.



b.

Figure 3.2.5. Collection sites for *Koonunga burgessi* n. sp on King Island: a- stream site on Grassy River Rd; b- Crayfish (*Geocherax* sp.) burrows at Martha Lavinia Reserve.

Material Examined

Type Material

Holotype. 1 male, Unassigned Rego No., King Island, Wetland 1 km west of Martha Lavinia Lagoon, pumped from freshwater crayfish burrows, Tasmania, Australia, Alt 28m, Zone 55, 248373.21m E, 5606244.13m S, Serov, P., 12-January-2009.

Paratypes: Unassigned Rego No., King Island, Swamp on Sea Elephant Bay Road, pholeteros sample, 5km south of Sea Elephant Bay boat ramp, King Island, Tasmania, Australia, Alt 17m, Zone 55, 251696.33m E, 5587081.29, m S, Serov, P., 12-January-2009; Unassigned Rego No., 1 specimen, King Island, Swamp on Sea Elephant Road, net sample, Grassy Road, King Island, Tasmania, Australia, Alt 104m, Zone 55, 250455.32m E, 5575161.29m S, Serov, P., 21-June-2009; J46135, 1 specimen, , King Island, Grassy River, between road and town, Grassy Road, King Island, Tasmania, Australia, Alt 65m, Zone 55, 249030.17m E, 5564140.02m S, Horwitz, P, 27-October-1981; J46136, 11 specimens, King Island, Grassy River, between road and town, Grassy Road, King Island, Tasmania, Australia, Alt 65m, Zone 55, 249030.17m E, 5564140.02m S, Horwitz, P., 27-October-1981; J46137, 5males, King Island, Grassy River, between road and town, Grassy Road, King Island, Tasmania, Australia, Alt 65m, Zone 55, 249030.17m E, 5564140.02m S, Horwitz, P., 27-October-1981; J46137, 5males, King Island, Grassy River, between road and town, Grassy Road, King Island, Tasmania, Australia, Alt 65m, Zone 55, 249030.17m E, 5564140.02m S, Horwitz, P., 27-October-1981; Unassigned Rego No., 2males, 1 females, King Island, Swan Lagoon, edge sweep, Tasmania, Australia, Alt 108m, Zone 54, 751153.10m E, 5571320.04m S, Sloane, T., 02-September-2002; King island, Tasmania, Australia, Alt 56m, Zone55, 249030.17m E, 5564140.02m S, Horwitz, P., 27, October-1981; Unassigned Rego No., 2males, 1 females, King Island, Swan Lagoon, edge sweep, Tasmania, Australia, Alt 108m, Zone 54, 751153.10m E, 5571320.04m S, Sloane, T., 02-September-2002; King island, Tasmania, Australia, Alt 56m, Zone 54, 754314.51m E, 5582038.56m S, Drummond, F.H., Miller, R.H., 1969; G2396, 2 specimens, King Island, Tasmania, Australia, Alt 56m, Zone 54, 754314.51m E, 5582038.56m S, Prof H.B.N. Hynes, 18-October-1978; Slide Box *Koonunga* Complex Appendages, 16-22, Tasmania, King Island, *Koonunga*, male, Cephalon, King island, Tasmania, Australia, Alt 56m, Zone 54, 754314.51m E, 5582038.56m S, Drummond, F. H., 1969; Slide Blue Box, *Koonunga*, King Island, male, telson, King island, Tasmania, Australia, Alt 56m, Zone 54, 754314.51m E, 5582038.56m S, Drummond, F. H., 1969.

Etymology

This species is named after Nigel and Mavis Burgess of Naracoopa, King Island for their life time of effort and passion towards the conservation and protecting of the islands unique ecosystems.

Diagnosis

Colouration marbled dark brown with yellow background surface with black granules; cephalon subquadrate with anterior margin forming triangular rostrum; pleonite 6 posterior margin with three simple setae on lateal margin; telson is short, triangular with straight distolateral margins with an acute apex; dorsal surface is convex with 12 robust, dorsally directed spines; lateral margin spine row with 17 stout, plumose spines; ventral spines row with 18 short pectinate lateral spines, four subdistal trifold spines and two shorter, pectinate spine on the apex; eyes situated on the dorsum at the angle formed by the frontal margin and the lateral incisions, close to the frontal margin; eyes are small circular and black; mandible incisor process with six denticles on left and five on right mandible with all denticles subequal with the terminal denticle laterally directed; mandibular palp second segment three times as elongate with a row of four elongate plumose setae elongate medial margin in distal half and two plumose setae on distolateral margin; maxillula lateral lobe distal spine row with two larger lateral terminal spine and subequal spines divided into an upper and lower grouping and a large terminal medial spine; maxilla lateral lobe with a minute one segmented palp on lateral surface with three very elongate spines on the apex and elongate plumose setae on the medial margins; maxilliped coxa with two small lamellar epipodites, one minute and one half length of basal exopodite; male pleopod 1 is a short single segment endopodite with a broadly rectangular distoventral margin, a large lateral directed hooked lobe on the dorsal margin with the hook extending past the lateral margin, and a medial endite with a diagonal patch of coupling hooks on the distomedial corner; male pleopod 2 stout and styliform in shape with two segments subequal in length; proximal segment elongate with a row of coupling setae midway along medial margin; distal segment acutely pointed with a distomedial concavity and distolateral notch; large sternal keel present with elongate, rounded central lobe and a large, basal, acutely point, posteriorly directed spine.

Description

Based on holotype male.

Body length 7.1mm; body slender, length to width ratio 8:1; anterior portion of the body subcylindrical, dorsoventrally compressed becoming broader and more cylindrical posteriorly; integument smooth, thin, membranous and contains no calcification; no development of pleura; epimera inconspicuous; all segments of pereon and pleon subequal; pleon equal to length of pereon; colouration marbled dark brown with yellow background surface with black granules. Cephalon subquadrate with anterior margin forming triangular rostrum.

Pleonite 6 equal to preceding one with one or two dorsal spines close to the attachment of the telson. Telson entire, slightly broader than elongate, triangular with acute apex; margin fringed with two or more series of stout spines; telson is short, triangular with straight distolateral margins with an acute apex; dorsal surface is convex with 12 robust, dorsally directed spines; lateral margin spine row with 17 stout, plumose spines; ventral spines row with 18 short pectinate lateral spines, four subdistal trifold spines and two shorter, pectinate spine on the apex.

Eyes situated on the dorsum at the angle formed by the frontal margin and the lateral incisions, close to the frontal margin; eyes are small circular and black.

Antennule peduncle with three segments; first segment is broad and as elongate as segment 2 and 3, with a few simple setae; statocyst with two ball setae; segments 2 and 3 are narrower, subequal to each other with tufts of setae on the medial and lateral margins tufted with setae; lateral flagellum with 20 segments; medial flagellum with eight segments; last peduncular segment with short broad, linguiform lobe with margin evenly rounded and fringed with elongate curved plumose setae; the surface of the lobe is studded with closely packed minute hyaline hollow cups attached on a short stalk.

Antennae peduncle slender with first segment short and quadrate; flagellum with 18 segments; no scale on second peduncular segment.

Labrum thick and fleshy, curving evenly downward without transverse ridge (epistome), broadly and evenly rounded with apex covered in fine setules. Mandible incisor process with 6 denticles on left and 5 on right mandible with all denticles subequal with the terminal denticle laterally directed; no spine row; palp three segmented, directed forwards and inwards to almost meet on the mid axis; first segment short with no setae; mandibular palp second segment three times as elongate with a row of four elongate plumose setae elongate medial margin in distal half and two plumose setae on distolateral margin; third is minute, apically broadly rounded having several elongate plumose setae.

Paragnath formed of two membranous, narrow, ovoidal, widely divergent lobes with a basal medial extension on the medial margin; medial margins fringed with setae.

Right mandible with five stout, subequal denticles; left incisor process with six subequal denticles; molar process similar in each, forming a well extended broad ridge covered with short, stout setae, surrounding a minute triturating surface with chitinous papillae.

Maxillula lateral lobe distal spine row with two larger lateral terminal spine and subequal spines divided into an upper and lower grouping and a large terminal medial spine; maxillule medial endite is short and narrow with two elongate stout plumose spines surrounded by four smaller plumose spines; no definite exopodite.

Maxilla lateral lobe with a minute one segmented palp on lateral surface with three very elongate spines on the apex and elongate plumose setae on the medial margins; the medial surface of the lobe has a double series of ten robust yellow simple spines; maxilla medial endite very short, with one or two elongate straight plumose setae; second broader with five plumose and plain spinules and setae; third is broader with 10 spinules and simple setae; fourth is wider than the others with 10 elongate spinules.

Maxillipeds basis with single segment exopodite, maxilliped coxa with two small lamellar epipodites, one minute and one half length of basal exopodite; coxae is short and very broad and flattened on the medial surface; lateral surface robustly convex; ventral distal corner has raised tubercle covered with fine setae; distal margin is elongated into a triangular extension with a few setae on apex; second segment is short, subquadrate in shape; dorsal subdistal margin with exopodite that extends to just beyond the third segment and has transverse line near proximal end; third segment is subquadrate and densely covered on medial

face with elongate plumose setae; fourth segment is about one third more elongate slightly ovate and bearing few elongate setae; fifth is quite short; sixth is slightly more elongated but narrower; the seventh is minute having a row of four stout curved claws on apex; maxilliped larger than thoracopods extending directly forwards about as far as the distal end of the peduncle of the upper antennae; dactylus with four claws.

Males have the opening of the vas deferens on the medial side at the proximal margin of the seventh thoracopod.

Females spermatheca small; pleopods natatory and multisegmented and become shorter posteriorly; no endopodite on pleopods.

Male pleopod 1 is a short single segment endopodite with a broadly rectangular distoventral margin, a large lateral directed hooked lobe on the dorsal margin with the hook extending past the lateral margin, and a medial endite with a diagonal patch of coupling hooks on the distomedial corner.

Male pleopod 2 stout and styliform in shape with two segments subequal in length; proximal segment elongate with a row of coupling setae midway along medial margin; distal segment acutely pointed with a distomedial concavity and distolateral notch; large sternal keel present with elongate, rounded central lobe and a large, basal, acutely point, posteriorly directed spine; pleonite 6 posterior margin with three simple setae on lateal margin.

Uropod with peduncle extending to half the length of the telson, rami more elongate than the peduncle; endopodite fringed, elongate with the medial margin with upturned spines, and three elongate spines on the apex pointing outwards; lateral margin and apex fringed with very elongate plumose setae; exopodite fringed with elongate plumose setae, and the lateral margins also with a row of upturned spines; uropod protopod stout, length > width and 0.5 length of telson; lateral and endopodite single segments, and subequal in length; endopodite medial margin with 9-10 stout setae followed by six short trifold setae, three large, elongate, robust pectinate setae; remainder of apex and medial margin with 10-15 elongate, plumose setae; exopodite covered with 20-25 elongate, plumose setae.

Habitat

Inhabits benthos of streams and lakes and permanent wetlands as well as the burrows (pholeteros) of both the *Engaeus* and *Geocherax* land crayfish.

Distribution

Current distribution covers the east coast coastal sand beds from Elephant Seal Bay to Martha Lavinia lagoon and in the streams and wetlands of southern central area of King Island.

Remarks

The current distribution for this species is described here as covering the known extent of King Island however, as the northeast and central south areas of the island are separated into two distinct water courses it is possible there are at least two species on the island.

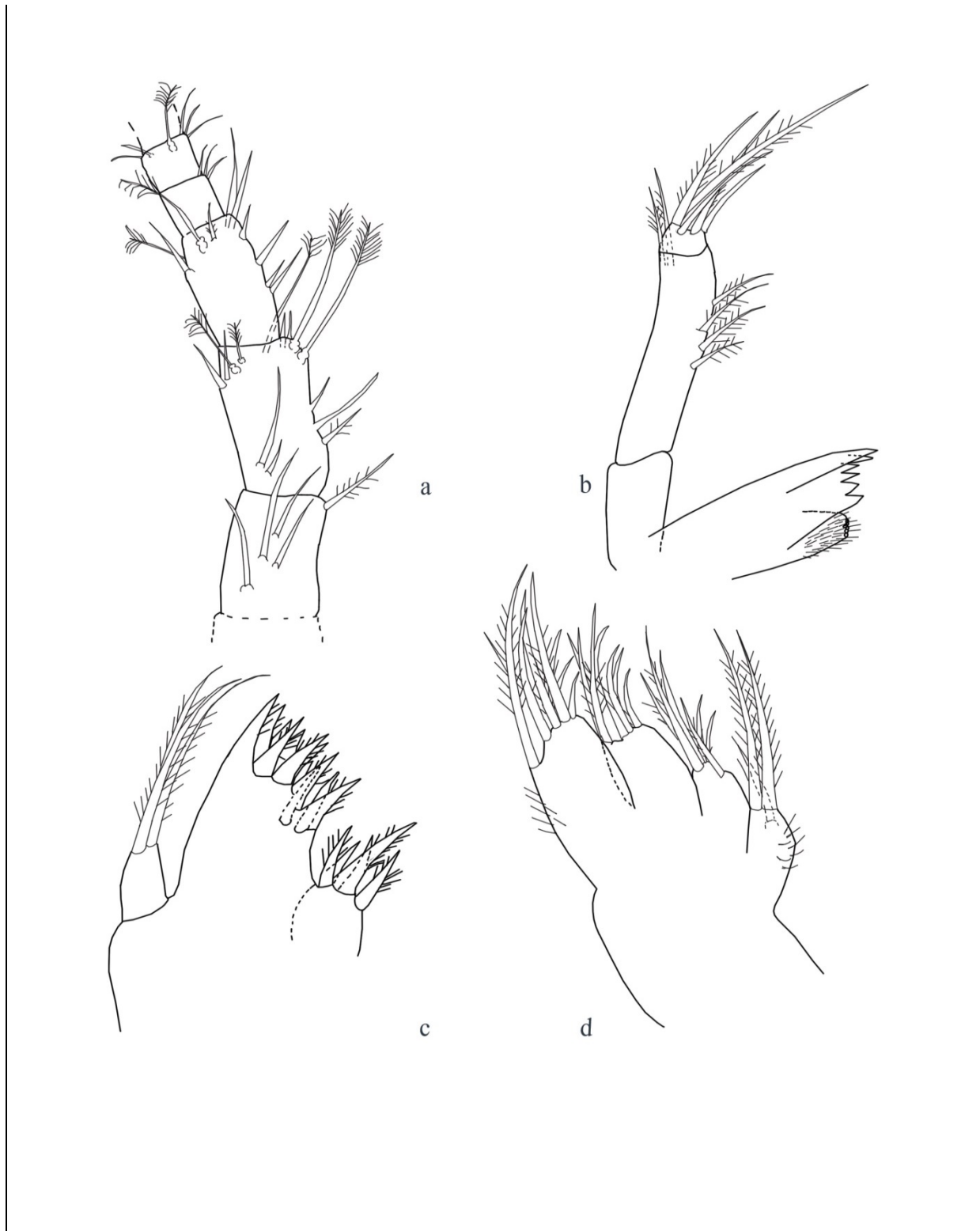


Figure 3.2.6. *Koonunga burgessi* n. sp. Holotype male 7.1mm. Antenna: a- A2. Mouthparts: b- mandible; c- Mx1; d- Mx2.



Figure 3.2.7. *Koonunga burgessi* n. sp. Holotype male 7.1mm. Thoracopods: a- Th2; b- Mxp; c- Th5; d- Th7; e- Th8.

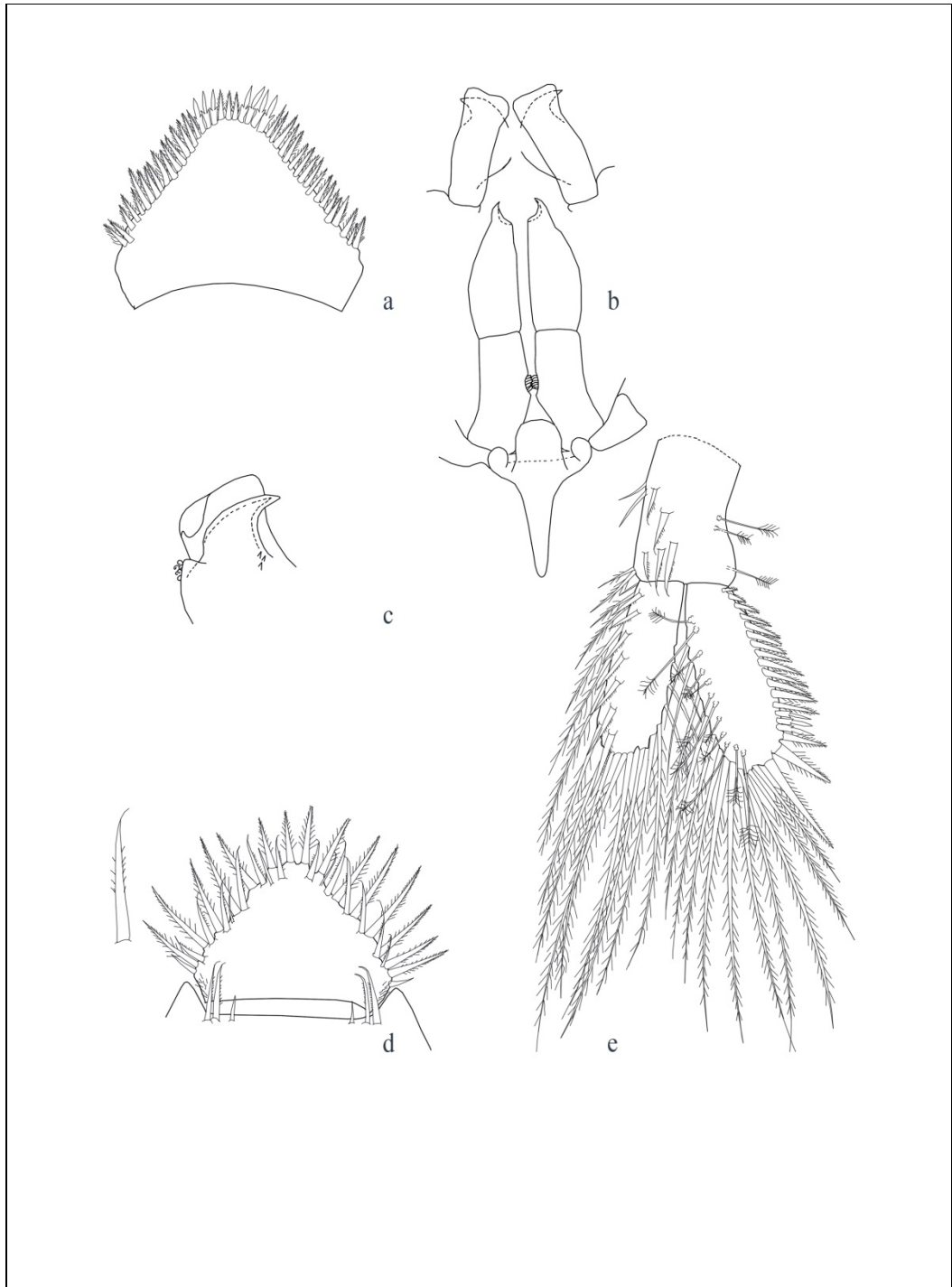


Figure 3.2.8. *Koonunga burgessi* n. sp. Holotype male 7.1mm: a- telson, ventral view; b- petasma (P11 + P12); c- close-up of P11 distal tip; d- telson dorsal view; e- uropod.

***Koonunga colaci* n. sp**

(Figs 3.2.9-11)

Type Locality

Colac, Victoria, Australia,

Material Examined

Type Material

J46158, 1 specimen, Colac, Victoria, Australia, Alt 138m, Zone 54, 728716.26m E, 5751969.62m S, Drummond, F.H., 19-September-1977.

Paratypes: J46127, 11 specimens, Colac, Victoria, Australia, Alt 138m, Zone 54, 728716.26m E, 5751969.62m S, Drummond, F.H., 19-September-1977; J46126, 1 specimen, Colac, Victoria, Australia, Alt 138m, Zone 54, 728716.26m E, 5751969.62m S, Drummond, F.H., 19-September-1977; J46125, 1 specimen, Colac, Victoria, Australia, Alt 138m, Zone 54, 728716.26m E, 5751969.62m S, Drummond, F.H., 19-September-1977; J46124, 9 specimens, Colac, Victoria, Australia, Alt 138m, Zone 54, 728716.26m E, 5751969.62m S, Drummond, F.H., 19-September-1977; J46123, 1 specimen, Colac, Victoria, Australia, Alt 138m, Zone 54, 728716.26m E, 5751969.62m S, Drummond, F.H., 19-September-1977; J46122, 1 specimen, Colac, Victoria, Australia, Alt 138m, Zone 54, 728716.26m E, 5751969.62m S, Drummond, F.H., 19-September-1977; J46121, 1 specimen, Colac, Victoria, Australia, Alt 138m, Zone 54, 728716.26m E, 5751969.62m S, Drummond, F.H., 19-September-1977; J46120, 1 specimen, Colac, Victoria, Australia, Alt 138m, Zone 54, 728716.26m E, 5751969.62m S, Drummond, F.H., 19-September-1977; J46119, 17 specimens, Colac, Victoria, Australia, Alt 138m, Zone 54, 728716.26m E, 5751969.62m S, Drummond, F.H., 19-September-1977.

Etymology

Named after the type locality.

Diagnosis

Telson is short, broad and roundly triangular with apex broadly rounded; dorsal surface is convex with eight robust, dorsally directed spines; lateral margin spine row with 14 stout, plumose spines; ventral spines row with six simple stout lateral spines and 35 trifold spines around the entire posterior margin; mandibular palp second segment twice as long as first, with five to six setae on distal half and one subapically; third segment with five setae; mandibular incisor process with six denticles on left side with all denticles subequal; maxilla medial endite 1 short reaching half length of endite 2, with two long simple setae and two stout simple setae without fine setules on medial surface; maxilliped coxa with two small lamellar epipodites with the distal one distally truncated, one minute and one distally truncated shaped half length of basal exopodite; maxilliped basis and ischium with curved, longitudinal, dorsomedial line of short

pectinate setae; maxilliped carpal comb of seven to eight pectinate setae; propodal comb of six to seven setae mostly pectinate; ischium proximally expanded; male pleopod 1 straight sided medially, bifurcate distally and straight sided laterally; dorsal lip with prominent medial endite with a small apical spine having coupling hooks; lobe extended as a stout hook terminating before lateral margin; lower lip weakly bilobed anteriorly; pleopod 2 proximal segment shorter than distal and coupling hooks at about mid length, and an acutely pointed apex, distomedial concavity and distolateral notch; basal rounded sternal keel between the bases of pleopods 2; anterior process of sternum 2 longer than wide; posterior process with prominent rounded shoulders, spine relatively short, stout and roundly pointed.

Description

Based on holotype male.

Male 5.5-6.5mm; female 7.0-8.5; anterior margin of cephalon subquadrate with a narrow cleft over base of antennule; lateral sulcus of about mid length.

Pereon thoracomere 2 with calcareous deposits ventrally.

Pleon segments 1-5 subequal, larger posteriorly with a narrower, triangular lateral corner with one to two stout setae and one to two simple setae; colouration pale brown however, the posterior segment of the pereon and the pleon segments have a median dark stripe and a row of dark patches on either side and in older females the patches tend to merge with one another and with the median stripe; no yellow pigment is present; some brown pigment on the peduncles of the antennule and antenna, the telson and the uropods. Telson is short, broad and roundly triangular with apex broadly rounded; dorsal surface is convex with eight robust, dorsally directed spines; lateral margin spine row with 14 stout, plumose spines; ventral spines row with five simple stout lateral spines and 35 trifid spines around the entire posterior margin. Eyes of oval shape and reddish-brown.

Antennule, first segment of peduncle with two to three pectinate setae on the medial margin at about mid length and three to five subapically; four simple dorsal setae anterior top statocyst opening; second peduncular segment with three to four pectinate setae medial on proximal half; six to seven subapically, one very long; four to five simple setae dorsally; lateral flagellum with 18-24 segments; antennal organ rounded with large cups; aesthetascs on third and following segments; medial flagellum with five to seven segments; flange on first segment with five to six pectinate setae; antenna peduncular segment with a subapical pectinate setae medially, a simple seta towards base near lateral margin and four dorsal simple setae, with one almost as long as third article of peduncle; third segment with two to three setae on medial border and two to three setae towards lateral margin near base; fourth article with two to three setae on medial border; flagellum with 14-16 segments with one to two plumose setae.

Mandible three segment palp; mandibular palp second segment twice as long as first, with five to six setae on distal half and one subapically; third segment with five setae, and one much longer than the others; mandibular incisor process with six denticles on left side with all denticles subequal and five on right;

molar process setose with a conspicuous apical tuberculate area. Maxillula palps with three long pectinate setae; lateral endite with 9-10 spines and a pectinate setae; medial endite with a stout pectinate seta, a smaller one and three to four pectinate setae. Maxilla medial endite 1 short reaching half length of endite 2, with two long simple setae and 2 stout simple setae without fine setules on medial surface.

Maxilliped coxa with two small lamellar epipodites with the distal one distally truncated, one minute and one distally truncated shaped half length of basal exopodite; maxilliped basis and ischium with curved, longitudinal, dorsomedial line of short pectinate setae; maxilliped carpal comb of seven to eight pectinate setae; propodal comb of six to seven setae mostly pectinate; ischium proximally expanded.

Thoracopod 1 longer and stouter than two to six except thoracopod 7; propodus with simple setae, with three stout setae near lower margin; dactylus with three slender claws and one stout elongate claw; exopodite with peduncle and seven segments; thoracopod 2 dactylus without stout, elongate claw; exopodite with eight segments; thoracopods 3-5 similar to 2; epipodites with the proximal one 0.7; thoracopod 6 coxal lobe with three setae; basis with basal group of three setae near medial margin; carpal comb with four denticulate setae; propodus with pectinate seta on lower margin; thoracopod 7 longest; first three segments all with simple setae; carpus with subapical series of six pectinate setae; pleopods 1 and 2. Male pleopod 1 straight sided medially, bifurcate distally and straight sided laterally; dorsal lip with prominent medial endite with small apical spine having coupling hooks; lobe extended as a stout hook terminating before lateral margin; lower lip weakly bilobed anteriorly.

Pleopod 2 proximal segment shorter than distal and coupling hooks at about mid length, and an acutely pointed apex, distomedial concavity and distolateral notch; basal rounded sternal keel between the bases of pleopods 2; anterior process of sternum 2 longer than wide; posterior process with prominent rounded shoulders, spine relatively short, stout and roundly pointed; exopodite 1-4 with six segments; exopodite 5 with five segments; telson triangular; length to width ratio 1.5; 8-11 submarginal dorsal spines and a few fine simple setae; 12-15 upper marginal stout spines weakly pectinate; 30-45 lower marginal setae including 19-29 trifold spines.

Uropods protopodite with five dorsal flagellate setae; lateral setae, three plumose setae ventrally near medial margin; exopodite with lateral submarginal series of 20 plumose setae.

Habitat

Collected in a small spring fed wetland.

Distribution

Known only from type locality

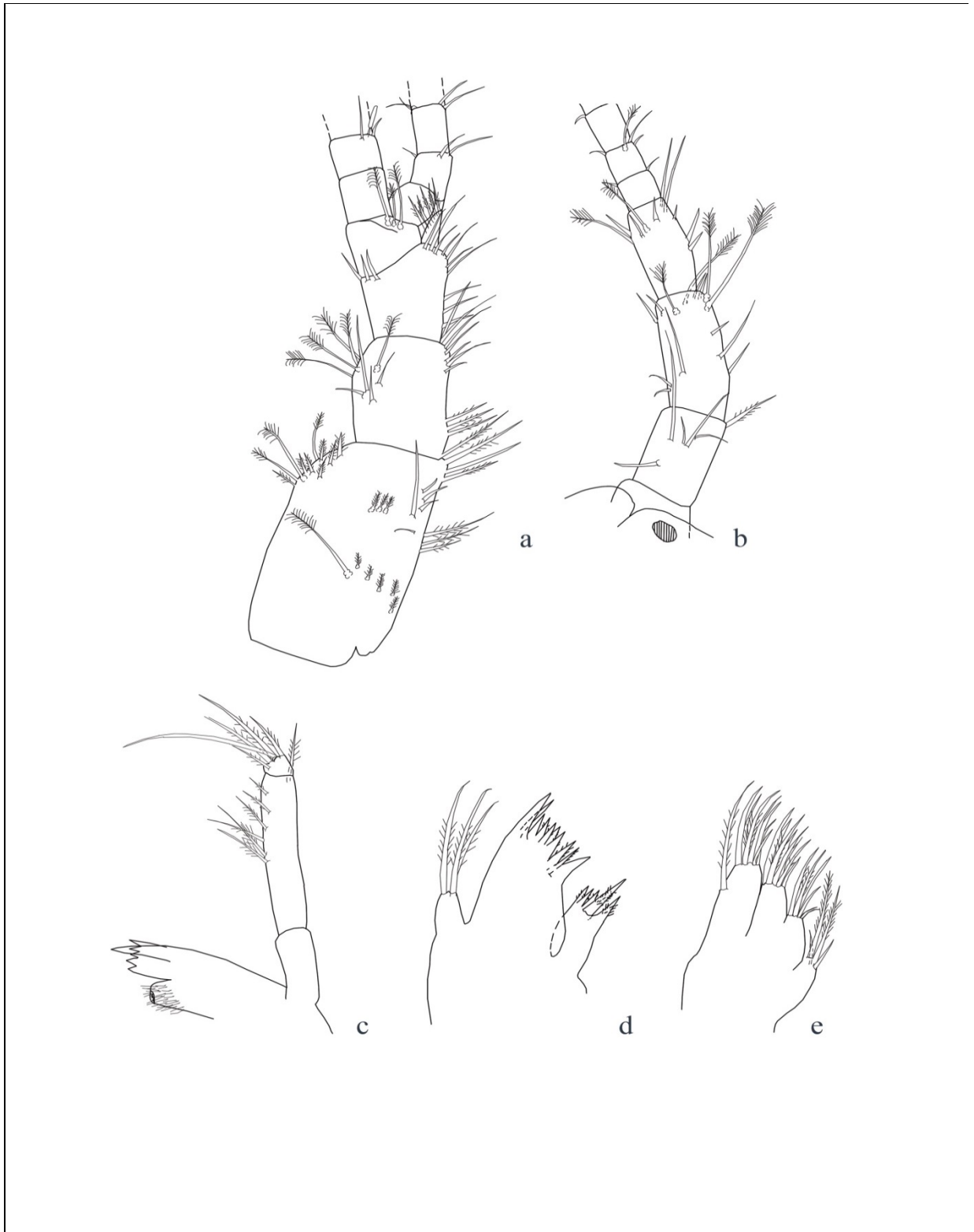


Figure 3.2.9. *Koonunga colaci* n. sp. Holotype male 6.5 mm. Antennae: a- A1; b- A2; Mouthparts: c- mandible; d- Mx1; e- Mx2.

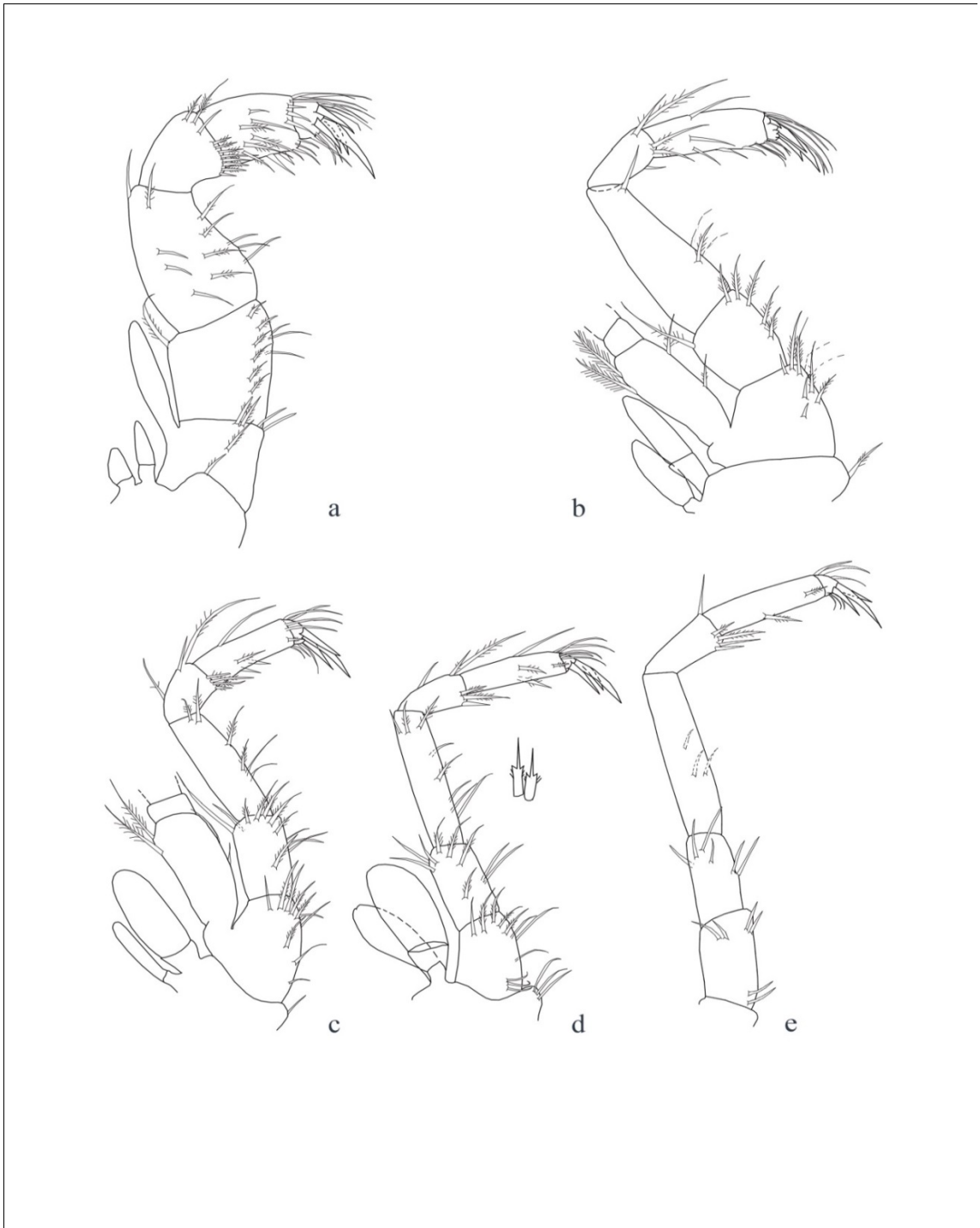


Figure 3.2.10. *Koonunga colaci* n. sp. Holotype male 6.5 mm. Thoracopods: a- Mxp; b- Th 2 ; c- Th 5; d- Th 7; e - Th 8.

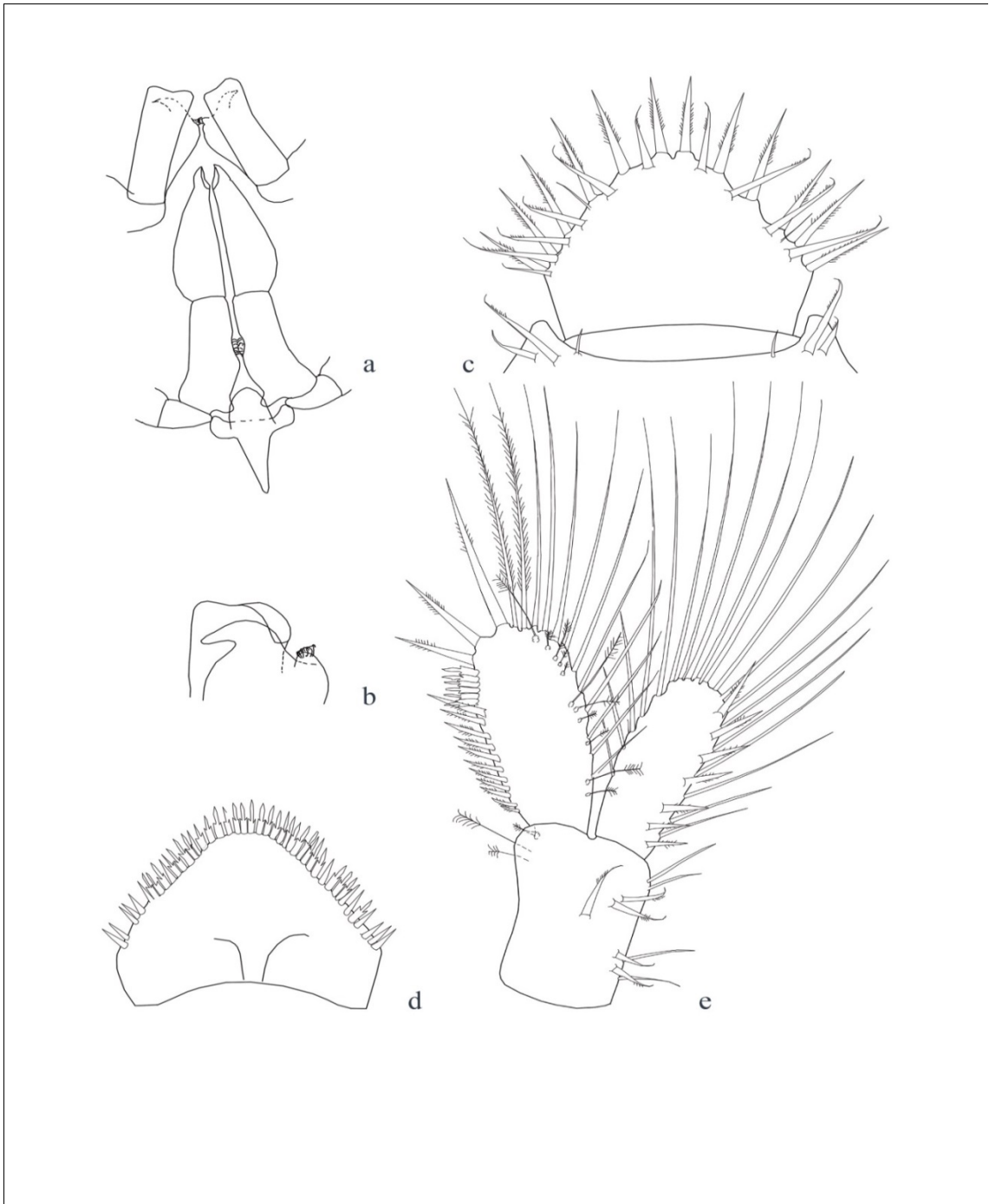


Figure 3.2.11. *Koonunga colaci* n. sp. Holotype male 6.5 mm: a- petasma (P11+P12); b- P11 close-up of distal tip; c- telson, dorsal view; d- telson, ventral view; e- uropod. Marginal setules on terminal uropod seta omitted for clarity.

***Koonunga grampianensis* n. sp**

(Figs. 3.2.12-14)

Type Locality

Jimmy Creek, Grampians, Victoria, Australia

Material Examined

Type Material

1 male, J46143, Jimmy Creek, Grampians, Victoria, Australia, Alt 326m, Zone 54, 632970.98m E, 5862962.51m S, M, R. C, J. A., 08-August-1985.

Paratypes: J46143, 10 specimens, Jimmy Creek, Grampians, Victoria, Australia, Alt 326m, Zone 54, 632970.98m E, 5862962.51m S, M, R. C, J. A., 08-August-1985. J46144, 5 specimens, Grampians, Jimmy Creek, Victoria, Australia, Alt 326m, Zone 54, 632970.98m E, 5862962.51m S, M, R. C, J. A., 08-August-1985; Slide Box *Koonunga* Complex Appendages, 43-45, *Koonunga*, Grampians, female, mx2, Grampians, Wannon River, Victoria, Australia, Alt 455m, Zone 54, 634389.58m E, 5868919.36m S, Drummond, F. H., Unknown date; Slide Box *Koonunga* Complex Appendages, 43-45, *Koonunga*, Grampians, female, mx1, Grampians, Wannon, River, Victoria, Australia, Alt 455m, Zone 54, 634389.58m E, 5868919.36m S, Drummond, F. H., Unknown date; EPA Victoria 003818, 1 specimen, , Grampians, Wannon River at Dunkeld from Edgewater, Victoria, Australia, Alt 237m, Zone 54, 617796.09m E, 5834220.44m S, Dean, J. , 25-March-1996; J46145, 1 specimen, Grampians, Victoria Valley, Dwyer Creek, Victoria, Australia, Alt 233m, Zone 54, 617908.57m E, 5852522.07m S, M, R. M, J., 07-August-1985; J46153, 8 specimens, Grampians, Victoria Valley, Dwyer Creek, Victoria, Australia, Alt 233m, Zone 54, 617908.57m E, 5852522.07m S, M, R. M, J., 07-August-1985; J46146, 4 specimens, Grampians, Victoria Valley, Dwyer Creek, Victoria, Australia, Alt 233m, Zone 54, 617908.57m E, 5852522.07m S, M, R. M, J., 07-August-1985; J46140, 1 specimen, Grampians, Wannon River bridge, Victoria, Australia, Alt 440m, Zone 54, 634389.58m E, 5868919.36m S, H, J L., 17-September-1962; J46141, 2 specimens, Grampians, Wannon River bridge, Victoria, Australia, Alt 440m, Zone 54, 634389.58m E, 5868919.36m S, H, J L., 17-September-1962; J46142, 2 specimens, Grampians, Wannon River bridge, Victoria, Australia, Alt 440m, Zone 54, 634389.58m E, 5868919.36m S, H, J L., 17-September-1962.

Etymology

Named after the type locality.

Diagnosis

Pleonite 6 equal to preceding one with three dorsal spines close to the attachment of the telson; telson is short, broad and triangular with apex narrowly rounded; dorsal surface is convex with eight robust, dorsally directed spines; lateral margin spine row with 14 stout, plumose spines; ventral spines row with 15 simple

lateral spines on each side and 12 trifid spines apically; anal lobes round; maxillula lateral lobe distal spine row with two larger lateral terminal spine and subequal spines divided into an upper with four small spines and lower grouping of three large terminal medial spines; maxilliped coxa with two small lamellar epipodites, one small and one medially expended and half length of basal exopodite; distal margin is elongated into a triangular extension with one plumose setae on apex; maxilliped ischium is subquadrate and densely covered on medial face with elongate plumose setae and 1 lateral subdistal, elongate plumose setae; male pleopods 1 is a short single segment endopodite with a broadly rectangular distoventral margin, a small rounded lobe (not hook shaped) on the dorsal margin with the hook not extending past the lateral margin, and a medial endite with a patch of coupling hooks on the distomedial corner; male pleopod 2 stout and styliform in shape with two segments subequal in length; proximal segment elongate with a row of coupling setae midway along medial margin; distal segment acutely pointed with a distomedial concavity and distolateral notch; large sternal keel present with elongate, rounded central lobe and a large, basal, acutely point, posteriorly directed spine.

Description

Based on holotype male.

Male body 7.2mm; body slender, length to width ratio 7:1; anterior portion of the body subcylindrical, dorsoventrally compressed becoming broader and more cylindrical posteriorly; integument smooth, thin, membranous and contains no calcification; no development of pleura; epimera inconspicuous; all segments of pereon and pleon subequal.

Pleon equal to length of pereon; colouration marbled dark brown with yellow background surface with black granules.

Cephalon subquadrate with anterior margin triangular.

Pleonite 6 posterior margin with two simple setae on lateal margin.

Telson entire, slightly broader than elongate, triangular with rounded apex; margin fringed with two or more series of stout spines; telson is short, broad and triangular with apex narrowly rounded; dorsal surface is convex with eight robust, dorsally directed spines; lateral margin spine row with 14 stout, plumose spines; ventral spines row with 15 simple lateral spines on each side and 12 trifid spines apically; anal lobes round; eyes situated on the dorsum at the angle formed by the frontal margin and the lateral incisions, close to the frontal margin; eyes are small circular and black.

Antennule peduncle with 3 segments; first segment is broad and as elongate as segment 2 and 3, with a few simple setae; statocyst with two ball setae; segments 2 and 3 are narrower, subequal to each other with tufts of setae on the medial and lateral margins tufted with setae; lateral flagellum with 20 segments; medial flagellum with eight segments; last peduncular segment with short broad, linguiform lobe with margin evenly rounded and fringed with elongate curved plumose setae; the surface of the lobe is studded with closely packed minute hyaline hollow cups attached on a short stalk.

Antennae peduncle slender with first segment short and quadrate; flagellum with 18 segments; no scale on second peduncular segment.

Labrum thick and fleshy, curving evenly downward without transverse ridge (epistome), broadly and evenly rounded with apex covered in fine setules.

Mandible incisor process with six denticles on left and five on right mandible; no spine row; palp three segmented, directed forwards and inwards to almost meet on the mid axis; first segment short with no setae; second three times as elongate with a row of six elongate plumose setae elongate medial margin in distal half; third is minute, apically broadly rounded having several elongate plumose setae; paragnath formed of two membranous, narrow, ovoidal, widely divergent lobes with a basal medial extension on the medial margin; medial margins fringed with setae. Maxillula lateral lobe distal spine row with two larger lateral terminal spine and subequal spines divided into an upper with 4 small spines and lower grouping of three large terminal medial spines; ; maxillule medial endite is short and narrow with two elongate stout plumose spines surrounded by four smaller plumose spines; no definite exopodite.

Maxilla lateral lobe with a minute one segmented palp on lateral surface with three very elongate spines on the apex and elongate plumose setae on the medial margins; the medial surface of the lobe has a double series of ten robust yellow simple spines; maxilla medial endite very short, with one or two elongate straight plumose setae; second broader with five plumose and plain spinules and setae; third is broader with 10 spinules and simple setae; fourth is wider than the others with 10 elongate spinules.

Maxillipeds basis with single segment exopodite, coxa with two small lamellar epipodites; coxae is short and very broad and flattened on the medial surface; maxilliped coxa with two small lamellar epipodites, one small and one medially expanded and half length of basal exopodite; lateral surface robustly convex; ventral distal corner has raised tubercle covered with fine setae; distal margin is elongated into a triangular extension with a one plumose setae on apex; basis is short, subquadrate in shape; dorsal subdistal margin with exopodite that extends to just beyond the ischium and has transverse line near proximal end; maxilliped ischium is subquadrate and densely covered on medial face with elongate plumose setae and one lateral subdistal, elongate plumose setae; fourth segment is about one third more elongate slightly ovate and bearing few elongate setae; fifth is quite short; sixth is slightly more elongated but narrower; the seventh is minute having a row of four stout curved claws on apex.

Right mandible with five stout, subequal denticles; left incisor process with 6 subequal denticles; molar process similar in each, forming a well extended broad ridge covered with short, stout setae, surrounding a minute triturating surface with chitinous papillae; maxilliped larger than thoracopods extending directly forwards about as far as the distal end of the peduncle of the upper antennae; dactylus with four claws.

Males have the opening of the vas deferens on the medial side at the proximal margin of the seventh thoracopod; females spermatheca small.

Pleopods natatory and multisegmented and become shorter posteriorly; no endopodite on pleopods.

Male pleopods 1 is a short single segment endopodite with a broadly rectangular distoventral margin, a small rounded lobe (not hook shaped) on the dorsal margin with the hook not extending past the lateral margin, and a medial endite with a patch of coupling hooks on the distomedial corner.

Male pleopod 2 stout and styliform in shape with two segments subequal in length; proximal segment elongate with a row of coupling setae midway along medial margin; distal segment acutely pointed with a distomedial concavity and distolateral notch; large sternal keel present with elongate, rounded central lobe and a large, basal, acutely point, posteriorly directed spine. Uropod with peduncle extending to half the length of the telson, rami more elongate than the peduncle; endopodite fringed, elongate with the medial margin with upturned spines, and three elongate spines on the apex pointing outwards; lateral margin and apex fringed with very elongate plumose setae; exopodite fringed with elongate plumose setae, and the lateral margins also with a row of upturned spines; uropod protopod stout, length > width and 0.5 length of telson; lateral and endopodite single segments, and subequal in length; endopodite medial margin with 9-10 stout setae followed by six short trifid setae, three large, elongate, robust pectinate setae; remainder of apex and medial margin with 10-15 elongate, plumose setae; exopodite covered with 20-25 elongate, plumose setae; pleonite 6 equal to preceding one with three dorsal spines close to the attachment of the telson.

Habitat

Small spring fed wetlands.

Distribution

Restricted to type locality in the central Grampian Ranges.

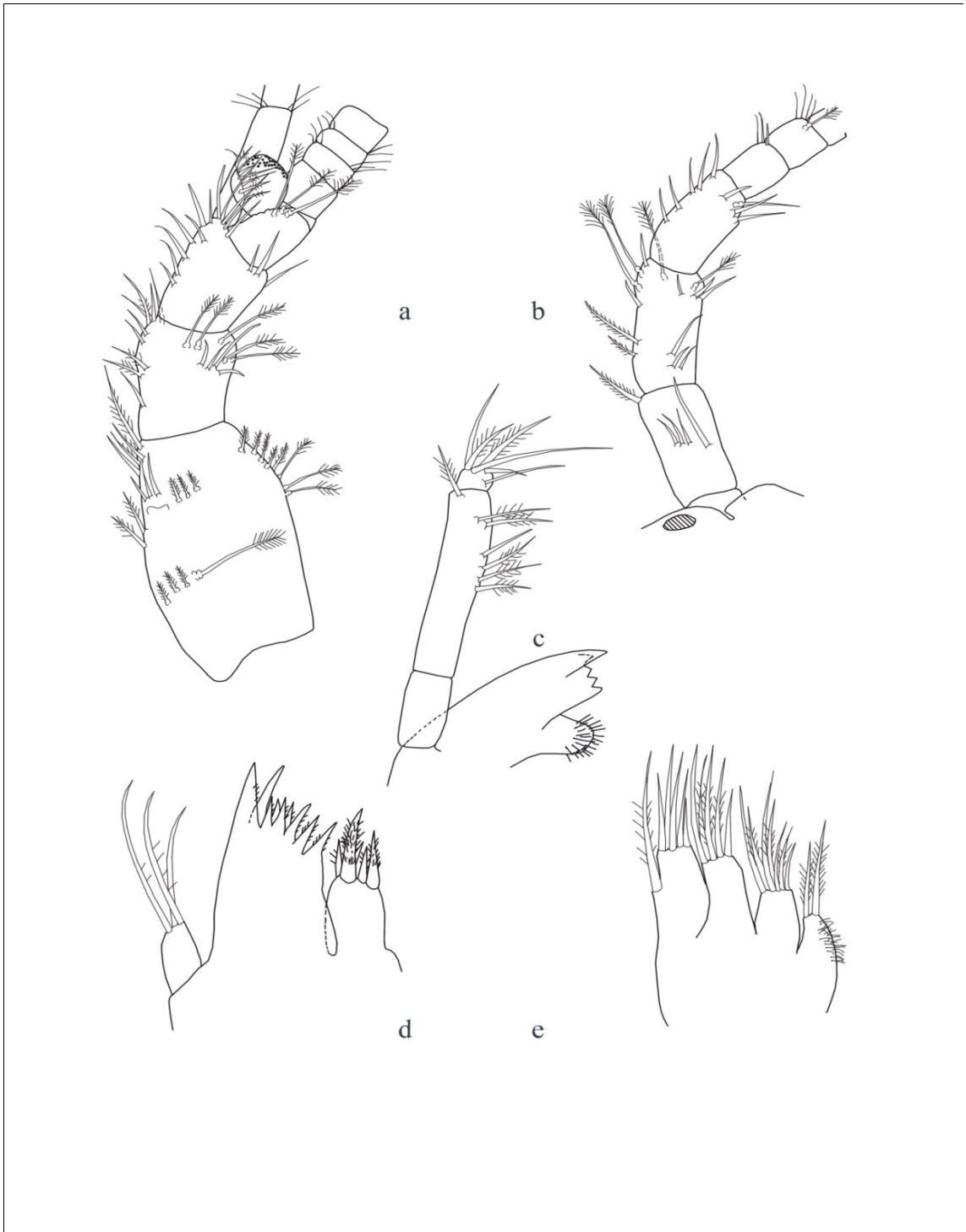


Figure 3.2.12. *Koonunga grampianensis* n. sp. Holotype male 7.2mm. Antennae: a- A1; b-A2; Mouthparts: c- mandible; d- Mx1; e- Mx2.

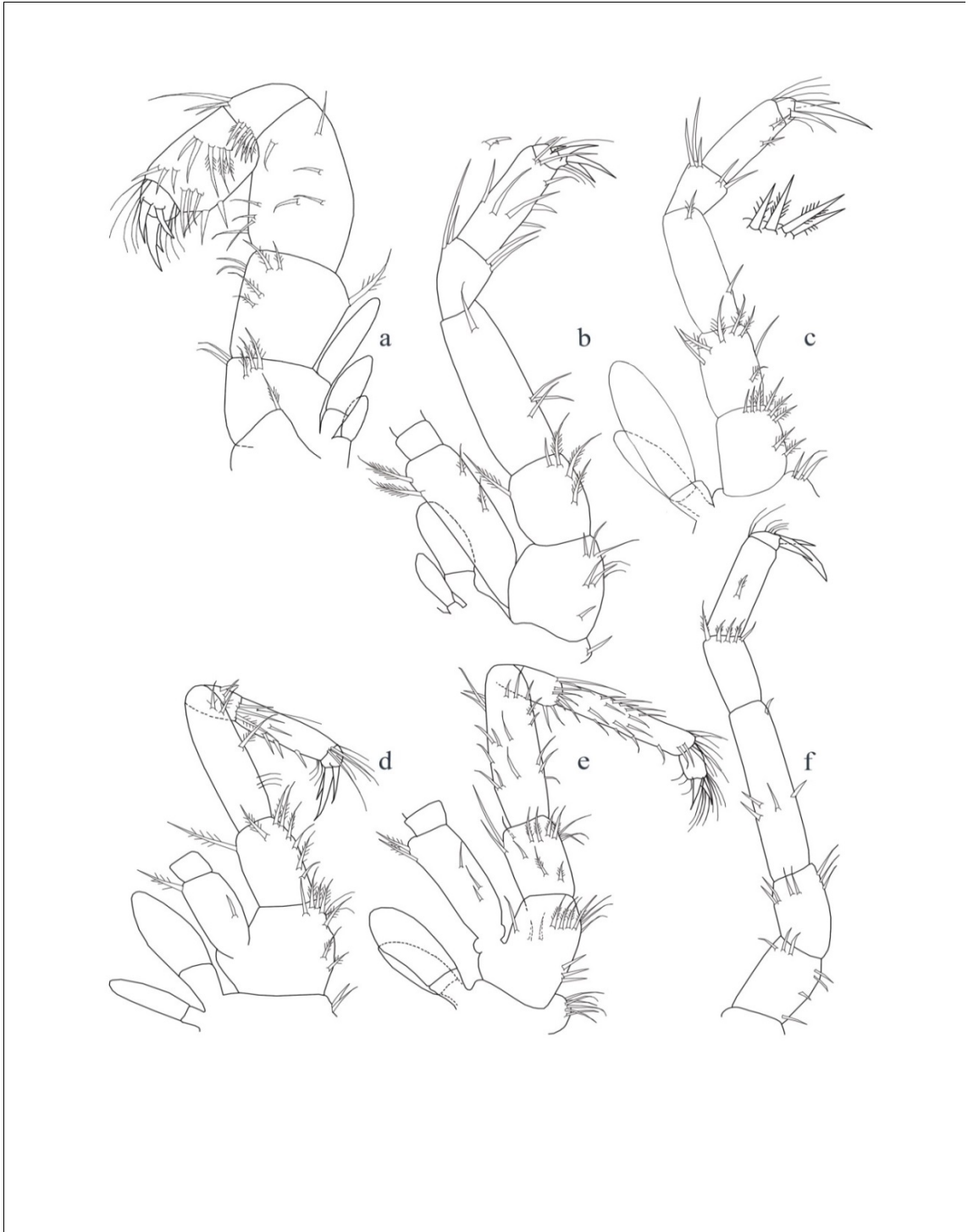


Figure 3.2.13. *Koonunga grampianensis* n. sp. Holotype male 7.2 mm. Thoracopods: a- Mxp; b- Th 2; c- Th 4; d- Th 5; e- Th 6; f- Th 8.

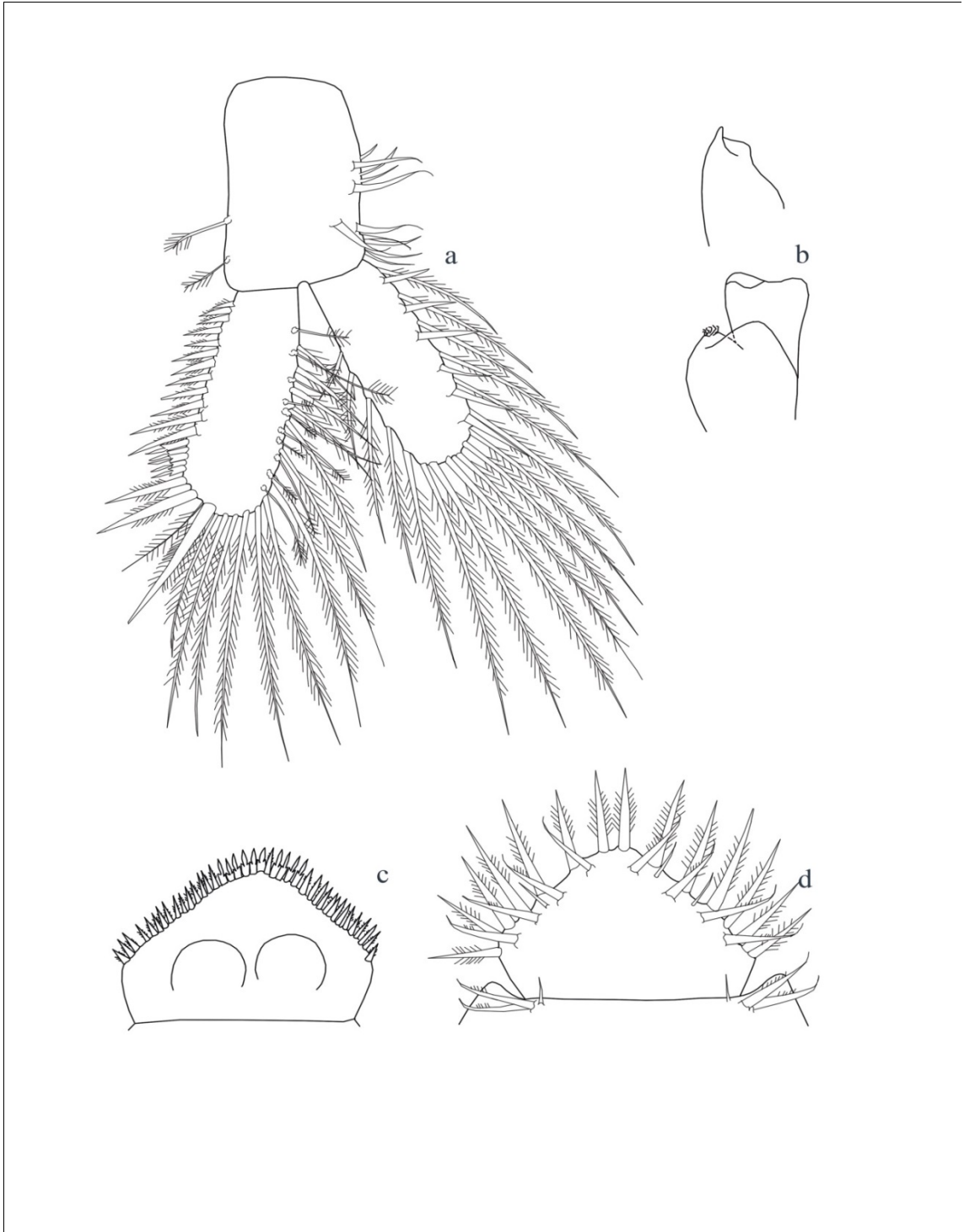


Figure 3.2.14. *Koonunga grampianensis* n. sp. Holotype male 7.2 mm: a- uropod; b- distal tip of P12 (upper) and P11 (lower); c- telson, ventral view; d- telson, dorsal view.

***Koonunga smithtoni* n. sp**

(Figs. 3.2.15-17)

Type Locality

Main Cave, Entrance, twilight and dark, Montague, N.W. Tasmania, Australia

Material Examined

Type Material

Holotype. 1 male, QVM:10:12441, Main Cave, Entrance, twilight and dark, Montague, N.W. Tasmania, Australia, Alt 19m, Zone 55, 327022.92m E, 5483273.78 m S, Eberhard, S., 31-May-1989.

Paratypes: are all from the type locality. QVM:10:12441, 7 females, 1 male, Main Cave, Entrance, twilight and dark, Montague, N.W. Tasmania, Australia, Alt 19m, Zone 55, 327022.92m E, 5483273.78 m S, Eberhard, S., 31-May-1989; J46164, 1 specimen, Smithton, Montagu, Tasmania, Australia, Alt 11m, Zone 55, 325974.37m E, 5483760.96m S, Drummond, F. H., 1982; J46163, 1 specimen, Smithton, Montagu, Tasmania, Australia, Alt 11m, Zone 55, 325974.37m E, 5483760.96m S, Drummond, F. H., 1982; J46162, 1 specimen, Smithton, Montagu, Tasmania, Australia, Alt 11m, Zone 55, 325974.37m E, 5483760.96m S, Drummond, F. H., 1982; Slide Box *Koonunga* Complex Appendages, Tasmania, *Koonunga*, male, Smithton/Montagu, A1, Smithton, Tasmania, Australia, Alt 17m, Zone 55, 336650.56m E, 5473050.61m S, Drummond, F. H., 1961; Slide Box *Koonunga* Complex Appendages, 16-22, Tasmania, *Koonunga*, male, Cephalon, Smithton, Tasmania, Australia, Alt 17m, Zone 55, 336650.56m E, 5473050.61m S, Drummond, F. H., 1961; Slide Box *Koonunga* Complex Appendages, 16-22, Tasmania, *Koonunga*, mature female, Cephalon, Smithton, Tasmania, Australia, Alt 17m, Zone 55, 336650.56m E, 5473050.61m S, Drummond, F. H., 1961; Slide Box *Koonunga* Complex Appendages, 16-22, Tasmania, *Koonunga*, mature male, A1, Smithton, Tasmania, Australia, Alt 17m, Zone 55, 336650.56m E, 5473050.61m S, Drummond, F. H., 1961; Slide Box *Koonunga* Complex Appendages, 16-22, Tasmania, *Koonunga*, mature female, A1, Smithton, Tasmania, Australia, Alt 17m, Zone 55, 336650.56m E, 5473050.61m S, Drummond, F. H., 1961; Unassigned Rego No., Mowbray Swamp near Mella, 5 km w of Smithton, Tasmania, Australia, Alt 21m, Zone 55, 339096.04m E, 5476371.04m S, Drummond, F. H., 1961; QVM 10 12266, 1 male, 3 females, Trowutta Arch, pools in dark, Trowutta, N.W. Tasmania, Australia, Alt 194m., Zone 55, 338882.40m E, 5455773.12m S, Eberhard, S., 08-December-1989.

Etymology

Named after the type locality.

Diagnosis

Colouration marbled dark brown with yellow background surface with black granules; pleonite 6 posterior margin with two equal, large, simple setae on lateal margin; telson is short, triangular with straight

distolateral margins with an acute apex; dorsal surface is convex with 12 robust, dorsally directed spines; lateral margin spine row with 15 stout, plumose spines; ventral spines row with 17 short pectinate lateral spines, 10 subdistal trifid spines on the apex; eyes situated on the dorsum at the angle formed by the frontal margin and the lateral incisions, close to the frontal margin; eyes are small circular and black; antenna third segment with a distal row of plumose and simple setae; maxillula lateral lobe distal spine row with one larger lateral terminal spine and eight subequal spines with the last terminal spine smaller than the others and not divided into an upper and lower grouping; maxilla fourth and lateral lobe is wider than the others with 10 elongate spinules and two lateral setae; maxillipeds basis with single segment exopodite with a pointed apex; maxilliped ischium is subquadrate and densely covered on medial face with elongate plumose setae with a longitudinal dorsomedial line of short stout setae; male pleopods 1 is a short single segment endopodite with a broadly rectangular distoventral margin, a large lateral directed flat topped, hooked lobe on the dorsal margin with the hook not extending to lateral margin, and a medial endite with a diagonal patch of coupling hooks on the distomedial corner; male pleopod 2 stout and styliform in shape with two segments subequal in length; proximal segment elongate with a row of coupling setae midway along medial margin; distal segment acutely pointed with a distomedial concavity and distolateral notch with a small lateral spine; large sternal keel present with elongate, rounded central lobe and a large, basal, acutely point, posteriorly directed spine.

Description

Based on holotype male.

Body length 8.2mm; body slender, length to width ratio 8:1; anterior portion of the body subcylindrical, dorsoventrally compressed becoming broader and more cylindrical posteriorly; integument smooth, thin, membranous and contains no calcification; no development of pleura; epimera inconspicuous; all segments of pereon and pleon subequal.

Pleon equal to length of pereon; colouration marbled dark brown with yellow background surface with black granules; cephalon subquadrate with anterior margin triangular.

Pleonite 6 posterior margin with two equal, large, simple setae on lateral margin.

Telson entire, slightly broader than elongate, triangular with acute apex; margin fringed with two or more series of stout spines; telson is short, triangular with straight distolateral margins with an acute apex; dorsal surface is convex with 12 robust, dorsally directed spines; lateral margin spine row with 15 stout, plumose spines; ventral spines row with 17 short pectinate lateral spines, 10 subdistal trifid spines on the apex; eyes situated on the dorsum at the angle formed by the frontal margin and the lateral incisions, close to the frontal margin; eyes are small circular and black. Antennule peduncle with three segments; first segment is broad and as elongate as segment 2 and 3, with a few simple setae; antenstatocyst with two ball setae; segments 2 and 3 are narrower, subequal to each other with tufts of setae on the medial and lateral margins tufted with setae; lateral flagellum with 20 segments; medial flagellum with eight segments; last peduncular segment with short broad, linguiform lobe with margin evenly rounded and fringed with

elongate curved plumose setae; the surface of the lobe is studded with closely packed minute hyaline hollow cups attached on a short stalk; antennae peduncle slender with first segment short and quadrate. Antenna third segment with a distal row of plumose and simple setae; flagellum with 18 segments; no scale on second peduncular segment.

Labrum thick and fleshy, curving evenly downward without transverse ridge (epistome), broadly and evenly rounded with apex covered in fine setules.

Mandible incisor process with six denticles on left and five on right mandible with all denticles subequal with the terminal denticle laterally directed; no spine row; palp three segmented, directed forwards and inwards to almost meet on the mid axis; first segment short with no setae; mandibular palp second segment three times as elongate with a row of four elongate plumose setae elongate medial margin in distal half and two plumose setae on distolateral margin; third is minute, apically broadly rounded having several elongate plumose setae; paragnath formed of two membranous, narrow, ovoidal, widely divergent lobes with a basal medial extension on the medial margin; medial margins fringed with setae.

Maxillula lateral lobe distal spine row with one larger lateral terminal spine and eight subequal spines with the last terminal spine smaller than the others and not divided into an upper and lower grouping; maxilla lateral lobe with a minute one segmented palp on lateral surface with three very elongate spines on the apex and elongate plumose setae on the medial margins; the medial surface of the lobe has a double series of ten robust yellow simple spines; maxillule medial endite is short and narrow with two elongate stout plumose spines surrounded by four smaller plumose spines; no definite exopodite.

Maxilla medial endite very short, with one or two elongate straight plumose setae; second broader with five plumose and plain spinules and setae; third is broader with 10 spinules and simple setae; maxilla fourth and lateral lobe is wider than the others with 10 elongate spinules and two lateral setae.

Maxillipeds basis with single segment exopodite with a pointed apex, maxilliped coxa with 2 small lamellar epipodites, one minute and one half length of basal exopodite; coxae is short and very broad and flattened on the medial surface; lateral surface robustly convex; ventral distal corner has raised tubercle covered with fine setae; distal margin is elongated into a triangular extension with a few setae on apex; basis is short, subquadrate in shape; dorsal subdistal margin with exopodite that extends to just beyond the ischium and has transverse line near proximal end; maxilliped ischium is subquadrate and densely covered on medial face with elongate plumose setae with a longitudinal dorsomedial line of short stout setae; fourth segment is about one third more elongate slightly ovate and bearing few elongate setae; fifth is quite short; sixth is slightly more elongated but narrower; the seventh is minute having a row of four stout curved claws on apex.

Right mandible with five stout, subequal denticles; left incisor process with six subequal denticles; molar process similar in each, forming a well extended broad ridge covered with short, stout setae, surrounding a minute triturating surface with chitinous papillae; maxilliped larger than thoracopods extending directly forwards about as far as the distal end of the peduncle of the upper antennae; dactylus with four claws.

Males have the opening of the vas deferens on the medial side at the proximal margin of the seventh thoracopod.

Females spermatheca small; pleopods natatory and multisegmented and become shorter posteriorly; no endopodite on pleopods.

Male pleopods 1 is a short single segment endopodite with a broadly rectangular distoventral margin, a large lateral directed flat topped, hooked lobe on the dorsal margin with the hook not extending to lateral margin, and a medial endite with a diagonal patch of coupling hooks on the distomedial corner.

Male pleopod 2 stout and styliform in shape with two segments subequal in length; proximal segment elongate with a row of coupling setae midway along medial margin; distal segment acutely pointed with a distomedial concavity and distolateral notch with a small lateral spine; large sternal keel present with elongate, rounded central lobe and a large, basal, acutely point, posteriorly directed spine; uropod with peduncle extending to half the length of the telson, rami more elongate than the peduncle; endopodite fringed, elongate with the medial margin with upturned spines, and three elongate spines on the apex pointing outwards; lateral margin and apex fringed with very elongate plumose setae; exopodite fringed with elongate plumose setae, and the lateral margins also with a row of upturned spines;

Uropod protopod stout, length > width and 0.5 length of telson; lateral and endopodite single segments, and subequal in length; endopodite medial margin with 9-10 stout setae followed by six short trifold setae, three large, elongate, robust pectinate setae; remainder of apex and medial margin with 10-15 elongate, plumose setae; exopodite covered with 20-25 elongate, plumose setae.

Habitat

Collected from a limestone cave deep within the cave and near the cave entrance. This species is also present in the pools in the stream with limestone geology that drain the small subcatchment.

Distribution

Restricted to the watershed associated with the Montagu caves, which is situated near the township of Smithton on the North West coast of Tasmania, Australia.

Remarks

The limestone caves and high carbonate content of the waters in this locality supports an exceptionally high diversity of aquatic crustaceans and should be listed as an aquatic biodiversity hotspot. Other associated fauna include a diversity of Amphipoda, Phreatoicoidea and Janiridae Isopods, Ostracoda, Copepoda as well other groups including the Plecoptera and Glossophiidae Hirudinea.

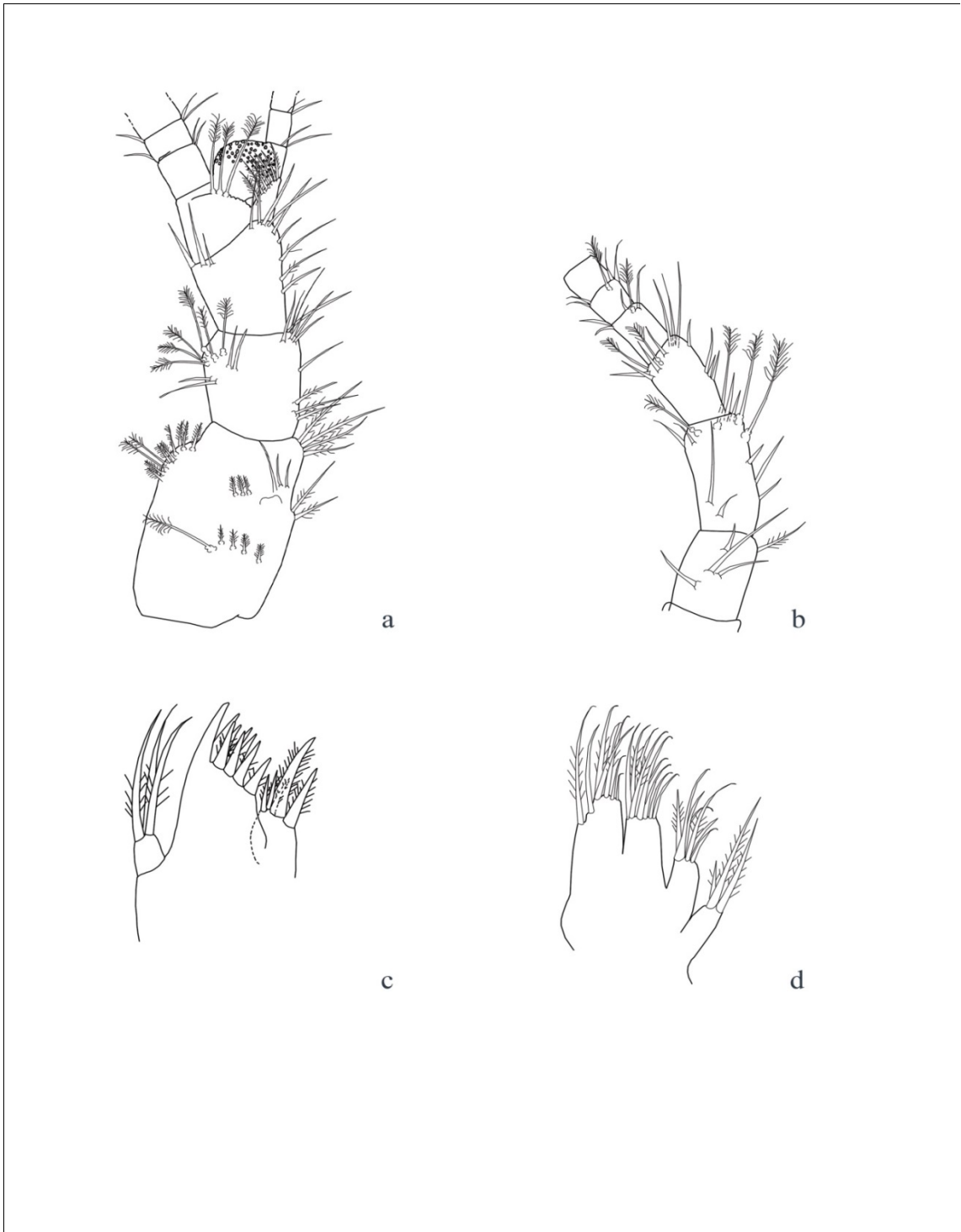


Figure 3.2.15. *Koonunga smithtoni* n. sp. Holotype male 8.2mm. Antennae: a- A1; b- A2; Mouthparts: c- Mx1; d- Mx2.

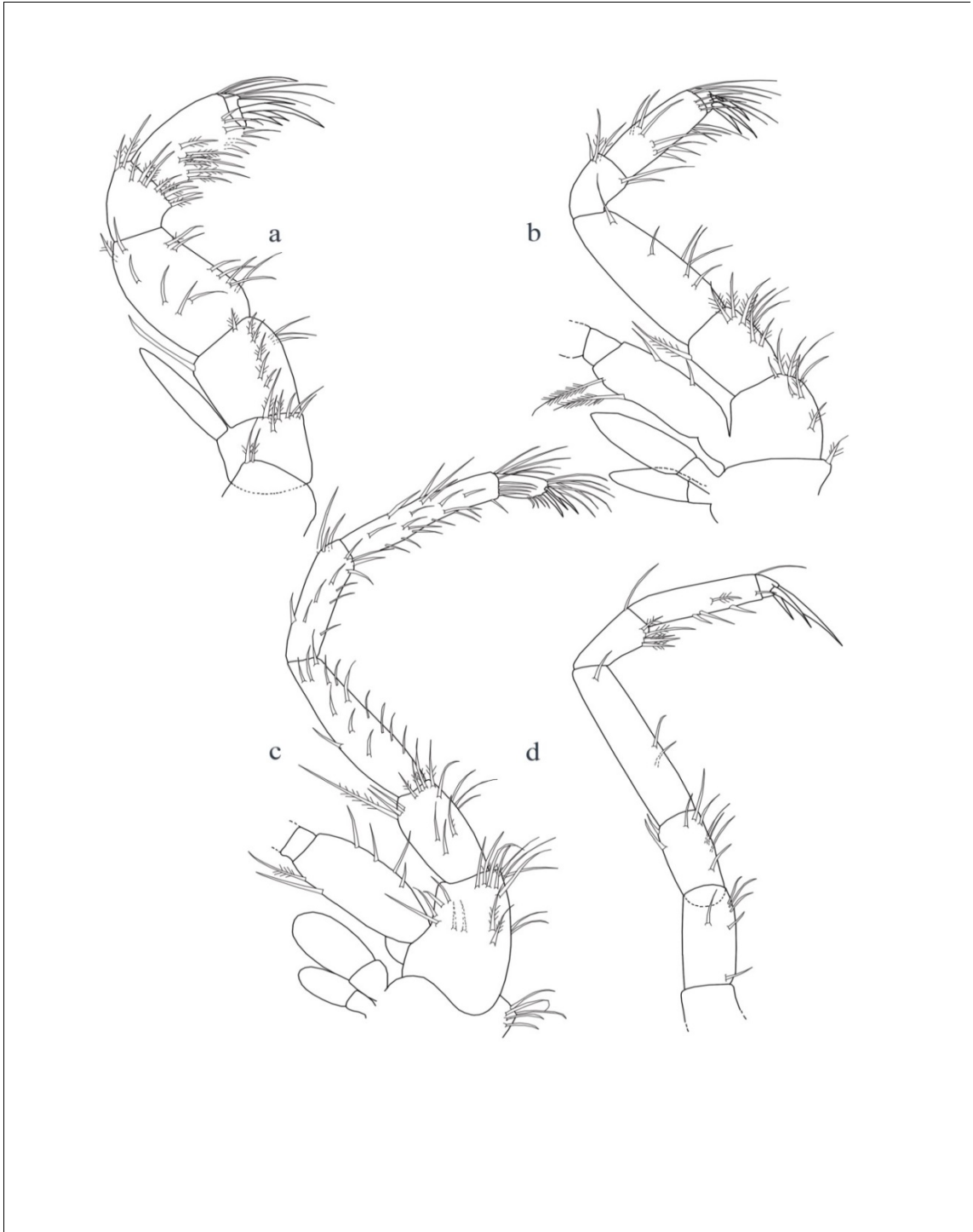


Figure 3.2.16. *Koonunga smithtoni* n. sp. Holotype male 8.2mm. Thoracopods: a- Mxp; b- Th 2; c- Th 5; d- Th 8.

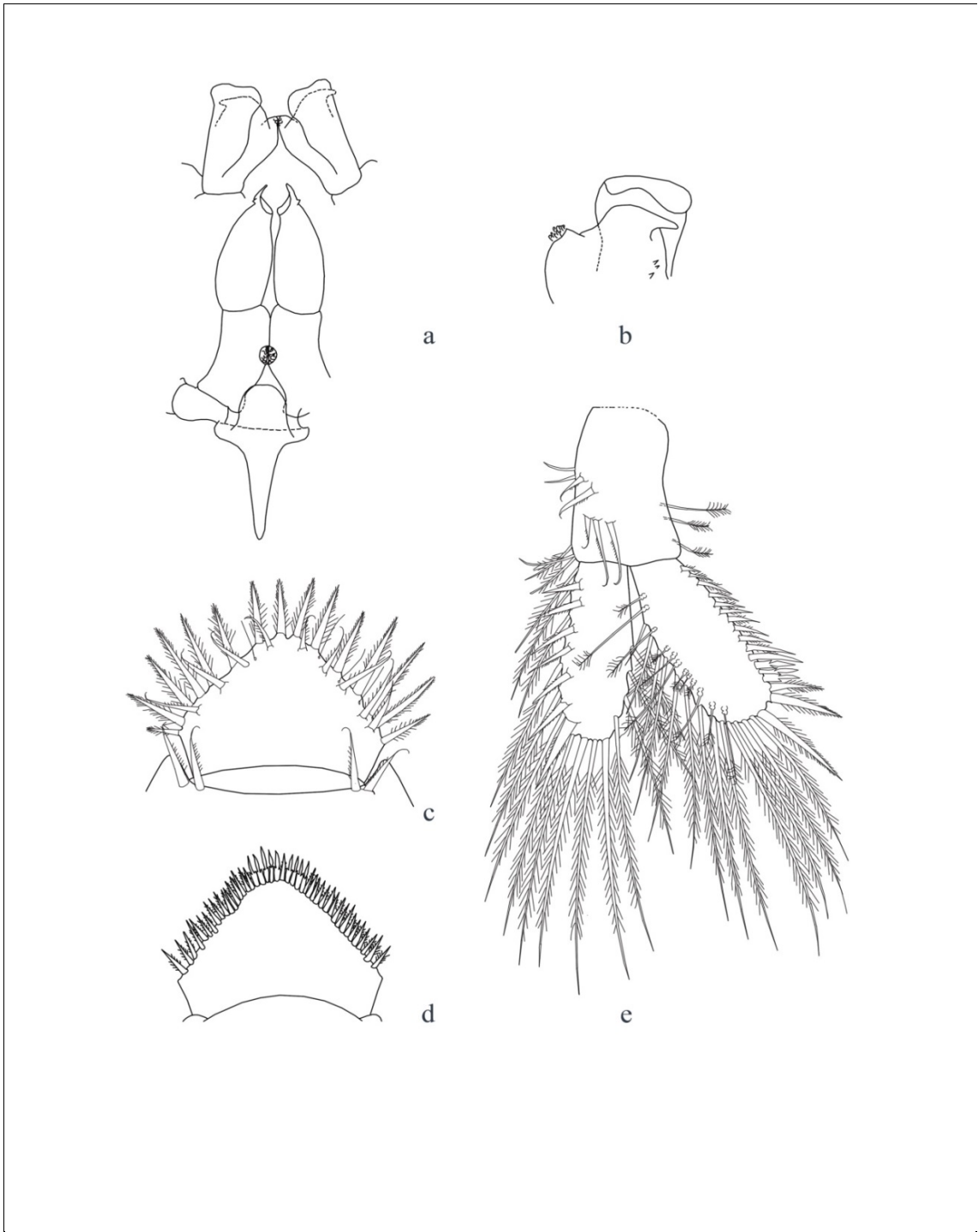


Figure 3.2.17. *Koonunga smithtoni* n. sp. Holotype male 8.2mm: a- petasma (P11+P12); b- P11 close-up of distal tip; c- telson, dorsal view; d- telson, ventral view; e- uropod

Genus *Zeidlerunga* n. gen

Synonymy

Koonunga. Sayce, O.A. 1907. Description of a remarkable new crustacean with primitive malacastrocan characters. Victorian Naturalist. 24: 117-120 [119].

Type species

Koonunga crenarum Zeidler, W. 1985

Etymology

Zeidlerunga is named after Dr. Wolfgang Zeidler, curator of the South Australian Museum in recognition of his original description of the type species. The name is an amalgamation of Zeidler and *Koonunga*.

Diagnosis

Eyes absent: pleonite 6 posterior margin with four evenly distributed short, simple setae; telson triangular in shape with rounded apex and slightly convex posterolateral margins; males slightly more pointed apically with lateral margin straight or even slightly concave; male pleopod 1 with medial groove for about middle half of lateral medial margin.; dorsal lobe distally rounded; ventral lobe with small distolaterally directed hook; and medial endite with coupling hooks situated at mid-length; pleopod 2 two segmented of about equal length; proximal segment slightly expanded proximally with coupling hooks near centre of medial margin and with small basal projection on medial proximal corner articulating with sterna process; distal segment apically pointed, with distomedial concavity and without distolateral indent; sternal process triangular in shape without posterior spine;

Species Composition

Zeidlerunga crenarum (= *Koonunga* Sayce 1907)

Zeidlerunga gellibrandi, n. sp.

Remarks

The original species in this genus *Z. crenarum* was originally placed with the *Koonunga* however, due to the variations principally within the structure of the male genitalia it has a separate genus. The distribution of this genus also defines *Koonunga* as a central south genus extending from around Melbourne to the North West corner of Tasmania, whereas *Zeidlerunga* is defined as occupying the far southwest of Victoria into the southeast of South Australia.

Zeidlerunga crenarum Zeidler 1985

Synonymy

Koonunga crenarum Zeidler, W. 1985. A new species of crustacean (Syncarida: Anaspidacea: Koonungidae), from sinkholes and caves in the south-east of South Australia. Transactions of the Royal Society of South Australia. **109** (3): 63-75 [63].

Etymology

From Greek mythology, “crenae” being nymphs of springs.

Type Locality

Tantanoola Caves, sinkhole 3.3 km SE of Tantanoola Caves on Princes Highway, South East, South Australia, Australia

Type Material

Holotype: 1 male, SAMA C3990; SAMA C3889, 1 female.

Allotype: 1 male, SAMA C3990.

Paratypes: SAMA C3990-4015, AM P.35067-68, NMV J.10809-10, TMH G. 2848-49, SAMA C.4027-29. Tantanoola Caves, sinkhole 3.3 km SE of Tantanoola Caves on Princes Highway, South Australia, Australia, Alt 31m, Zone 54, 457275.32m E, 5824246.50m S, Zeidler, W. , 01-March-1982.

Diagnosis

Antennae length 3/4 length of body, and reaches pereonite 7; cephalon pointed anteriorly and anterolateral incision distinct; eyes absent; male pleopod 2 sternal keel with oval ventral lobe and broad round sternal process with minute posterior projection; distinctive structure of endopodites P1 and 2; four dactyl claws on P 1-3 and four to five dactyl claws on P4-7;

Description

Modified from Zeidler and based on holotype male.

Male body size 7.8-16mm; female body size from 5.9-22.6; first thoracic somite fused with cephalon; body segments more robust from anterior to posterior.

Pereon with seven free somites.

Pleon with six free somites and a telson; all body segments with one pair of appendages; colouration light tan with some specimens darker than others.

Cephalon rectangular with short pointed rostrum; distinct anterolateral incision above attachment of antenna; pronounced short mid-lateral transverse sulcus; cephalon length equal to 3.5 pereonites; cephalon

broader than pereonites 1-4, equal to 5 and narrower than 6-7; anus opening at posterior limit of pleonite 6; pleon more elongate than pereon.

Pleonite 6 elongate body segment; pleonite 6 with row of six well-spaced spines near dorso-posterior margin interspersed with one to two fine setae.

Telson triangular in shape with rounded apex and slightly convex lateral margins; males slightly more pointed apically with lateral margin straight or even slightly concave; length slightly less than width; dorsal surface with eight spines, lateral margin with 14 spines and ventral margin with 8-10 short pectinate lateral spine and margins with 20 evenly spaced, elongate spines.

Eyes absent but pigment more concentrated near antero-lateral incision.

Antennule peduncle of three segments; lateral flagellum with 56 (left) and 48 (right) segments; medial flagellum with 16 (lhs) and 15 (rhs); lateral flagellum length to medial flagellum 3.5; peduncle and lateral flagellum 0.75 length of body; basal segment of peduncle broader and more elongate than next two segments; basal segment of lateral flagellum with oblique serrated medial margin; presence of statocyst could not be determined.

Male antennule with oval shaped sensory organ from second segment of lateral flagellum; basal segment of medial flagellum saucer shaped shielding sensory organ; antenna $\frac{2}{3}$ length of antennules; peduncle with four segments; female flagellum with 35 segments; male flagellum with 33 segments; basal segment short, segments 2-3 elongate, rectangular, segment 3 elongate. Paragnath rows of short setae on both sides at extremities; small mid depression on medial surface near extremity.

Mandibles with three segment palp; mid segment greatly enlarged and twice length of basal segment; plumose setae on elongate medial margin; terminal segment small, rounded with plumose setae on apex; molar process with small grinding surface surrounded by numerous spiniform setae; incisor process of left mandible with seven denticles arranged in an 's' shaped row, denticles nearest molar reduced; incisor process of right mandible with five denticles arranged in an 'c' shaped row; no spine row.

Labrum bifid with deep mid groove; medial lobes well developed (see *K. cursor*) with poorly developed medial lobe; lateral lobes upright almost perpendicular to the medial surface; distal margins of lobes and part of the lip covered by elongate setules, particularly on the medial surface.

Maxillule two lobed; lateral lobe with small one segmented palp with three elongate, terminal spinules, partly plumose elongate medial margin; lateral lobe extremity obliquely truncated with twelve robust spines, some more lateral than others and two smaller plumose spines near the medial surface; medial endite about $\frac{1}{2}$ width of lateral lobe with one elongate, stout plumose spine near medial surface surrounded by eight smaller plumose spines.

Maxilla smaller than maxillula; consisting of four lobes; medial one smallest, others increase successively in length and width; medial two lobes covered with short setae or setae; medial endite with six plumose spinules on apex of varying lengths and widths; medial two lobes covered with short setae or setae; other lobes with more numerous (>10) but similar terminal spinules which fan out laterally to medial and medial surface.

Maxilliped stout; limb with seven segments flexed posteriorly between merus and carpus; coxa shorter and wider than following segments with two lamellae epipodites near outer, medial corner; maxilliped coxa with 2 small lamellar epipodites, one minute and one half length of basal exopodite; basis with exopodite of two segments resembling lamellae epipodites elongate outer, medial margin with several fine setae near distal, medial margin; ischium with slight expansion distally, slightly wider and more elongate than basis, with several elongate, fine setae on medial surface near medial margin and clustered on latero-medial corner; merus inflated proximally, more elongate than any other segment, only slightly narrower than coxa, with elongate fine setae scattered over medial surface but more numerous near medial margin; carpus smallest segment with row of elongate setae elongate distal medial margin for medial half and medial and medial latero-distal margin; propodus robust, slightly shorter than merus, with two oblique rows of robust spines on medial surface and tuft of elongate setae on medial, distal lateral corner; dactylus small, rounded, armed terminally with none large and three smaller robust claw-like spines and few setae near medial margin.

Thorcapods similar in structure to maxilliped but with basis expanded proximally, almost as wide as coxa and becoming progressively more slender with all segments more elongate.

All thorcapods flexed between merus and carpus and in backward position except for Th7 which flexes inwards and Th8 which flexes forward; coxa with setose lobe near medial, distal corner barely recognizable on Th2 but progressively developed to maximum on Th7 but absent on Th8; Th 2-7 coxa with two unequal epipodites as in Mxp; Th 2-6 basis with multisegmented exopodite consisting of large basal segment reaching well past ischium and flagellum of 14-16 segments; each segment having two elongate plumose setae; Th 7 basis without exopodite; Th 8 without epipodites or exopodites; dactyl claws similar to Mxp but Th 6-8 have one extra claw.

Female spermatheca with two small ovoid plates, slightly raised from sternum just forward of proximal margin of Th 8 on last pereonite.

Pleopods all of similar structure; without endopodites but with elongate multi-segmented exopodites consisting of short stout basal segment followed by more elongate and slender one; flagellum of 15 segments in pls 1-4, 13 in pl 5; each segment having two elongate plumose setae; pls 1-3 equal in length and elongate pleopods; pl 4 slightly shorter; pl 5 shortest; pls 1-3 flattened laterally in cross section; pl 4-5 round in cross section.

Male pleopods 1 and 2 with endopodites modified to form complex copulatory styles (petasma); male pleopod 1 with medial grooved for about middle half of lateral medial margin.; dorsal lobe distally rounded; ventral lobe with small distolaterally directed hook; and medial endite with coupling hooks situated at mid length.

Male pleopod 2 two segmented of about equal length; proximal segment slightly expanded proximally with coupling hooks near centre of medial margin and with small basal projection on medial proximal corner articulating with sterna process; distal segment apically pointed, with distomedial concavity excavated at

tip and without distolateral indent; sternal process triangular in shape without posterior spine pleonite 6 posterior margin with four evenly distributed short, simple setae.

Uropod peduncle stout, rectangular, as elongate as telson; few scattered short spines on dorsal surface and near lateral margin; lateral ramus 1.25 peduncle length; slightly more elongate than medial ramus; with elongate plumose setae elongate medial and lateral margins; row of short robust upturned spines near laterodorsal margin; medial ramus with elongate plumose setae along lateral margin with three (lhs) or four (rhs) elongate spines distally; dorsal medial margin with row of robust upward curved spines for about 2/3, steadily increasing in size terminally followed by comb of smaller spines, ceasing at first terminal spine.

Habitat

Collected among surface algae, aquatic plants and at depth from a number of sinkholes and caves in SE of South Australia with a hand net or by entrapment in a glass jar while scuba diving.

Distribution

This species is restricted the Tantanoola Limestone Caves complex.

Remarks

Zeidler 1985 makes the comment that *K. crenarum* were too large for interstitial travel however, he does not specify the appropriate size range or the porosity of the surrounding sediments he is referring to or the size appropriate for interstitial travel. Although some of the interstitial syncarids are tiny such as the Stygocarididae and the Bathynellacea, which are often 3mm or less, the Psammaspididae and Raptornungidae can reach similar or larger sizes to the Koonungidae and are true stygobionts. The flexible nature of the body articulation and the thin, elastic integument allow these species to squeeze through far narrower voids than their resting body dimensions would suggest in just the same way as the Oligochaeta. Therefore, given their distribution, morphology and habitat preferences they should indeed be regarded as true interstitial animals.

Zeidlerunga gellibrandi n. sp

(Figs. 3.2.18-20)

Type Locality.

Gellibrand Rd, Victoria, Australia.

Material Examined

Type Material

1 male, Unassigned, Gellibrand Rd, Victoria, Australia, Alt 77m, Zone 54, 722018.48m E, 5734764.08m S, Drummond, F. H., unknown date.

Etymology

Named after the type locality of Gellibrand.

Diagnosis

Colouration anterior half of cephalon with dark brown epidermal cells sparsely scattered; posterior half of first four pereomeres pale; pleon darker but without median stripe in male; female generally darker, pleon with stripe; pleon first five segments subequal; pleomere 6 enlarged, with posterior margin with a blunt triangular process on each side; sides concave distally; pleonite 6 posterior margin with 4 small simple spines equally spaced; telson triangular in shape with acute apex and slightly convex posterolateral margins; telson dorsal submarginal spine of seven to eight stout flagellate setae and a few simple setae; lateral marginal series of 14-15 stout finely pectinate setae; ventral marginal series of 33-37 setae including 18-26 trifid setae mostly in a continuous apical group; pleopod 1 in males: endopodite excavated medially and bifurcate distally; dorsal lip with prominent obtusely triangular process with a short stout lobe having coupling hooks anteriorly continued as a stout process with a group of six to seven minute tubercles near base then turning laterally, narrowing and terminating in a delicate flange with prominent teeth at base; exopodite with peduncle and eight segments; pleopod 2 in males: proximal segment with group of coupling hooks at mid length; distal segment slender, 1.2 – 1.3 times length of proximal segment, excavated at tip without distolateral indent; exopodite with peduncle and eight segments; sternum with a prominent anterior process and a short, stout, blunt posterior process.

Description

Based on holotype male

Male body 11mm, female 9.5mm: pereon first six segments subequal with pereomere 7 longer with calcareous deposits ventrally; colouration: anterior half of cephalon with dark brown epidermal cells sparsely scattered; posterior half of first four pereomeres pale; pleon darker but without median stripe in

male; female generally darker, pleon with stripe; cephalon anterior margin subquadrate with a notch over base of antennule; lateral suture about mid length.

Pleon first five segments subequal.

Pleomere 6 enlarged, with posterior margin with a blunt triangular process on each side; sides concave distally; pleonite 6 posterior margin with four small simple spines equally spaced.

Telson triangular in shape with acute apex and slightly convex posterolateral margins; telson dorsal submarginal spine of seven to eight stout flagellate setae and a few simple setae; lateral marginal series of 14-15 stout finely pectinate setae; ventral marginal series of 33-37 setae including 18-26 trifold setae mostly in a continuous apical group.

Antennule first segment of peduncle with one seta on the medial margin and a subapical group of 5 setae, three dorsal setae in front of statocyst opening; second segment of peduncle with five setae on medial margin and three to four simple dorsal setae; third segment of peduncle with three to four setae on medial border; lateral flagellum with 27-30 segments with aesthetascs; antennal organ on first flagella segment; medial flagellum with nine segments; first with flange having five to six setae.

Antenna four segmented peduncle; second segment of peduncle with a set of apical pectinate setae, three short simple setae dorsally and one simple seta laterally; third segment with three pectinate setae on medial border, two simple setae near lateral margin; fourth segment with three setae medially and three subapically; flagellum with 17-20 segments with plumose setae. Mandible second segment of palp with six to seven setae on distal half and one apically; third segment with seven setae; incisor process with six tentacles on left mandible and five on right; no rugose area; molar process setose distally with apical area tuberculate.

Maxillule palp with three pectinate setae; lateral endite with 9-10 spines; medial endite with one large circumpectinate seta, one medium sized circumpectinate seta and three to four smaller pectinate setae.

Maxilla medial endite reaching almost length of adjacent endite with two long straight pectinate setae and a shorter one; other endites with simple and pectinate setae.

Maxilliped of usual form; carpus with apical row of seven pectinate setae; propodus with oblique row of five pectinate setae and two simple setae; lower margin with four stout setae; dactylus with three slender claws and a short stout claw.

Thoracopods 2-7 more slender than 1 and less setose; thoracopod 2 with claws as in 1; thoracopods 3-7 with three slender dactyl claws; thoracopod 6 with carpal comb of six setae with strong spinules at mid length and one pectinate seta; thoracopod 7 longest in series with setation reduced; exopodites with peduncle and flagellum with six segments on th.1, 7 segments on th.2-5; peduncle with few exceptions with one seta on lower margin and two on upper margin.

Pleopod 1 in males: endopodite excavated medially and bifurcate distally; dorsal lip with prominent obtusely triangular process with a short stout lobe having coupling hooks anteriorly continued as a stout process with a group of six to seven minute tubercles near base then turning laterally, narrowing and terminating in a delicate flange with prominent teeth at base; exopodite with peduncle and eight segments.

Pleopod 2 in males: proximal segment with group of coupling hooks at mid length; distal segment slender, 1.2 – 1.3 times length of proximal segment, excavated at tip without distolateral indent; exopodite with peduncle and eight segments; sternum with a prominent anterior process and a short, stout, blunt posterior process; pleopods 3-5 exopodites with seven segments.

Uropods protopodite with three to five flagellate setae dorsally, two simple setae laterally and two simple setae subapically; three plumose setae near medial margin; endopodite with a medial proximal series of trifold setae and three slender pectinate setae with the third seta three times length of the first; laterally with a sub marginal dorsal series of 14 plumose setae; exopodite with lateral series of eight upwardly directed, weakly pectinate setae.

Habitat

Pholeteros from crayfish burrows in a roadside ditch.

Distribution

This species was collected from crayfish burrows in a roadside ditch on a hillside about 2 km from Gellibrand. The ditch contained about 50m of water with crayfish burrows with the remainder of the ditch being dry with no burrows. The hillside above the road had no suitable wetlands or stream and downslope from the ditch was open pasture again with no wetland or stream therefore the ditch represents a spring fed soak. As no other Koonungids were collected elsewhere along the 25 km length of the Colac-Gellibrand Road the species is therefore restricted to the type locality.

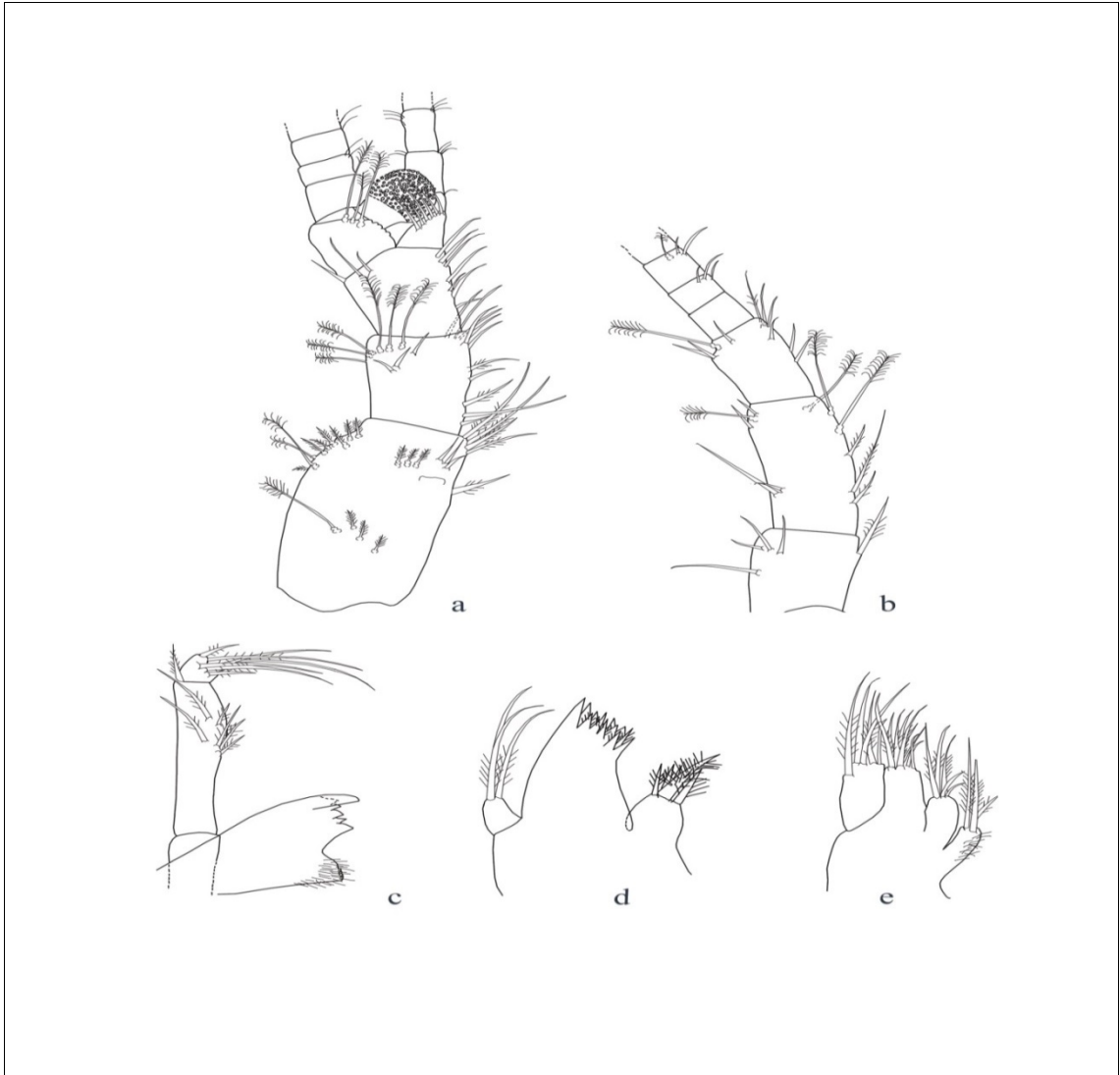


Figure 3.2.18. *Zeidlerunga gellibrandi* n. sp. Holotype male 11mm. Antennae: a- A1; b- A2; Mouthparts: c- mandible; d- Mx1; e- Mx2.

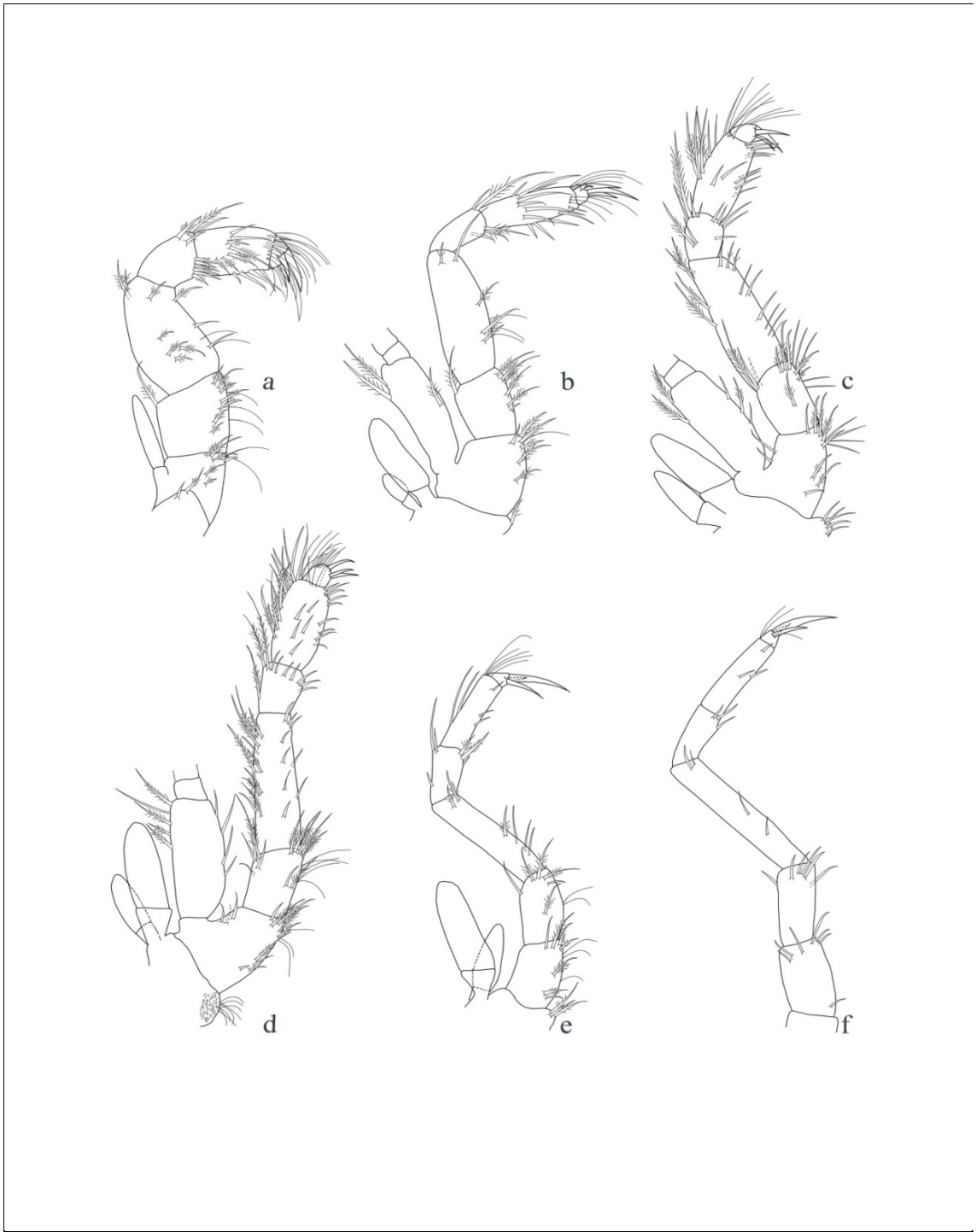


Figure 3.2.19. *Zeidlerunga gellibrandi* n. sp. Holotype male 11mm. Thoracopods: a- Mxp; b- Th 2; c- Th 3; d- Th 4; e- Th 7; f- Th 8.

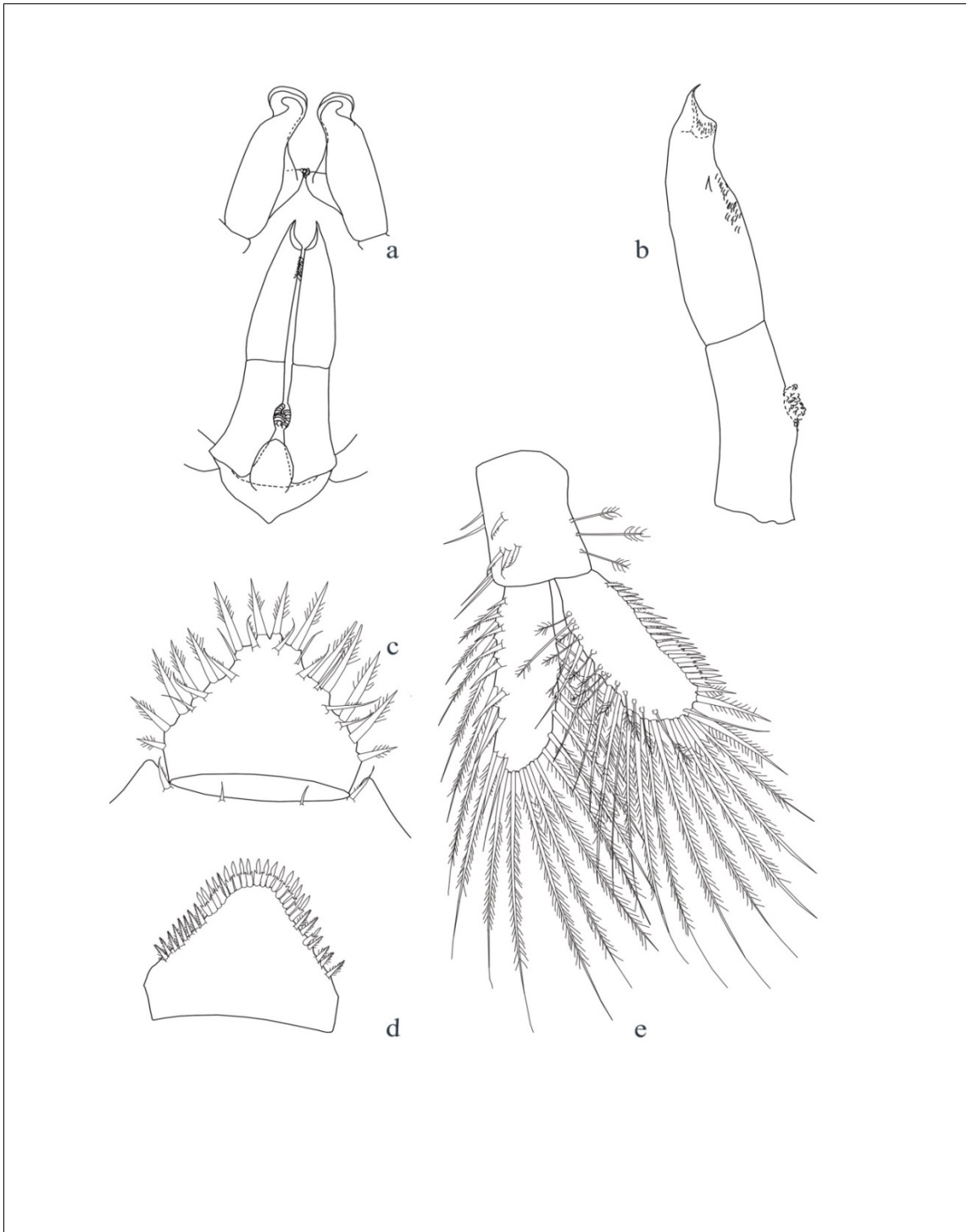


Figure 3.2.20. *Zeidlerunga gellibrandi* n. sp. Holotype male 11mm: a- petasma (PI 1+PI 2); b- PI 1; c- telson, dorsal view; d- telson, ventral view; e- uropod.

Subfamily Micraspidinae n.subfam

Etymology

Derived from the genus name.

Diagnosis

Modified from Nicholls 1931

Cephalon almost equal in length to first four thoracic segments; cephalon with transverse suture; cephalon in dorsal view subquadrate produced anteriorly into a broad triangular projection; frontal margin scarcely produced and with very slight incision above the attachment of the second antennae; colour transparent to white in life with brown markings on dorsal surface; female spermatheca on last thoracic sternite; telson subtriangular, slightly wider than elongate; pleopod 2 distal tip medially truncated with distal knob and no concavity; eyes absent; antennule without antennal organ on basal segment of flagellum in the male; lateral flagellum with 15-22 segments; medial flagellum with five to eight segments; antenna is uniramous without scale like exopodite; antennal flagellum with 10 segments; second antenna scarcely shorter than the first; mandible with three-segmented palp; maxillula with small palp; lateral endite spine row divided into 2 levels, lateral level with two large lateral, terminal spines and three smaller spines and lower level with six smaller spines; medial endite expanded distally with one large pectinate spine and four smaller robust spines; maxilla with four lobes; maxilliped coxa shorter and wider than following segments with two equal epipodites on distolateral margin; coxa with small triangular extension of distomedial corner with two distal setae; coxa with rounded extension on distomedial corner with two distal setae; basis with exopodite a single segment resembling epipodite on distolateral margin; basis of thoracopod 1-5 proximomedial margin with rounded curve covered in small spines forming a rasp like surface with six slender plumose setae near distomedial margin; paragnath with two distally rounded diagonal lobes and a medial endite with a distal, acutely pointed apex; thoracopods 1-4 with two epipodites; thoracopods 5-7 with one epipodite; short, rounded copulatory appendage with distal spines on the first pleopod of male; uropod with peduncle two-thirds the length of telson; uropodal rami subequal, more elongated than peduncle.

Micraspides Nicholls 1931

Micraspides Nicholls, G.E. 1931. *Micraspides calmani*, a new syncaridan from the west coast of Tasmania. Journal of the Linnean Society of London. Zoology. 37: 473-488, pls31-32 [475].

Type species. *Micraspides calmani* Nicholls 1931 by original designation.

Diagnosis

Genus diagnosis is the same as subfamily at this time.

Habitat

In muddy water, beneath sphagnum; in the diatom-loaded ooze of moss-grown puddles (Nicholls 1931) or in subterranean water of the burrows of Engaeus.

Species Composition

Micraspides calmani

Micraspides zeehanensis

Remarks

This genus is confined to the west coast of Tasmania along the narrow coast plain and up into the higher valley of the escarpment. So far collections have identified its range extending from the Port Davey catchment on the far south west up to the Pieman River in the central north area of the coast. It is suggested that it may extend as far as south of Arthur River of the North West coast given the same habitat types continue to this point however, there has been no targeted sampling through this region and therefore no records of any Anaspidae to date. It is highly likely that given the short ranges of these species that there will be a large biodiversity of Syncarida throughout this area.

There appears to be a connection with the *Zeidlerunga* of South Australia and SW Victoria suggested by the extended medial endite of the paragnath. This feature is only recorded in three taxa so far. These being *Zeidlerunga crenarum*, *Micraspides* and *Neonunga*. It is unclear if this structure has evolved independently or whether it is the plesiomorphic character linking the three genera.

Micraspides calmani Nicholls 1929

Micraspides calmani Nicholls, G.E. 1931. *Micraspides calmani*, a new syncaridan from the west coast of Tasmania. Journal of the Linnean Society of London. Zoology. 37: 473-488, pls31-32 [476].

Type Locality

Side of Mt Lyell, on Queenstown-Lake Margaret Narrow gauge railway line, Upper King River, Tasmania, Australia



Figure 2.2.21. Buttongrass plain wetlands sampling site for *M. calmani* on the Mt Lyell Rd with Mt Lyell in the background. This site is located to the east of Strahan, on the lower West Coast of Tasmania, Australia.

Type Material

Type status and whereabouts unknown. Water draining from *Sphagnum* filled hollow on side of Mt Lyell, on Queenstown-Lake Margaret Narrow gauge railway line, Upper King River, Tasmania, Australia, Alt 260m, Zone 55, 386476.83m E, 5341530.60m S, Nicholls, G.E., 01-January-1928.

Material Examined

Neotype. QVM:10:49054, 2 specimens, King River, at bridge in drift net, Tasmania, Australia, Alt 54m, Zone 55, 378771.16m E, 5331726.29m S, Horwitz, P., 12-August-1986; QVM:10:49010, 1 juvenile, King River, at bridge in drift net, Tasmania, Australia, Alt 54m, Zone 55, 378771.16mE, 5331726.29m S, Horwitz, P., 11-August-1986.

Other Records

Small stream in King River Valley adjacent to main rd to Hobart, Tasmania, Australia, Alt 250m, Zone 55, 387388.86m E, 5341273.08m S, Nicholls, G.E., 01-January-1928.

Diagnosis

Telson subtriangular, length to width ratio 0.86; telson posterior margin with three rows of spines; dorsal row 11 long robust simple setae; posterior margin with 17 robust plumose setae; ventral posterior margin with approximately 50 short robust barbed spines; mandibles with three segmented palp having plumose setae; middle segment with three plumose setae on mid lateral margin; maxillula with two lobes, two proximal lobes and one segmented palp; maxilla medial endite 1 with five distal elongate plumose setae medial margin with one elongate, plumose seta and row of fine setules; male pleopod 1 protopod roundly rectangular with small medial lobe; pleopod 1 exopodites multi-segmented with seven segments and a peduncular segment (or the peduncular segment of Sayce's and Thomson's description); male pleopod 2 with two segments; segment 1 is a small stalk slightly wider than long; segment 2 consists of two globular, hollow, lobes; medial endite oval with two valves; dorsal valve with distal rosette of hooks spines and one small spine laterally adjacent; ventral valve slightly smaller with distal spine hook directed proximally; lateral lobe with two sets of posteriorly directed spinose hooks and a small sub distomedial lobe; dorsal set of two posteriorly directed spinose hooks; ventral set of five posteriorly directed spinose hooks with sub-ventral ridge containing a trifid shaped spine and an elongate, medial endite with distal tuft of short digit-like projections.

Redescription

Based on male 7.7mm and female 7mm. from Mt Heemskirk, near Queenstown, Tasmania.

Body length males 7.7 and female 7mm; body slender, almost uniform width, widening slightly in pleon. Pereon shorter than pleon; colouration transparent to whitish translucent, with brown markings. Cephalon subquadrate with broad triangular anterior margin; rostrum small and bilobed; anterior of body subcylindrical slightly compressed broadening posteriorly.

Pereonites 2-6 subequal; pereonites 7-8 progressively longer.

Pleon longer than cephalon and pereon; pleon segments subequal; telson subtriangular, as long as wide; rounded distal margin with one long row of pectinate setae and a second row of short spiniform setae below; dorsal surface with widely spaced subdistal series of pectinate setae. Telson subtriangular, length to

width ratio 0.86; telson posterior margin with three rows of spines; dorsal row 11 long robust simple setae; posterior margin with 17 robust plumose setae; ventral posterior margin with approximately 50 short robust barbed spines.

Eyes absent.

Antennule 2/5 length of body; lateral flagellum with 15-22 segments; medial flagellum with five to eight segments.

Antenna flagellum with 10 segments.

Labrum bilobed, round with medial incision and a small pointed medial extension; distal margin with row of fine setules; mandibles with 3 segmented palp having plumose setae; middle segment with three plumose setae on mid lateral margin; distal segment with group of long simple and plumose setae.

Left mandible incisor process with two long and four short denticles; the short denticles forming a row (probably accessory process); molar process forming a triangular extension covered in fine setules and no grinding surface; maxillula with two lobes, two proximal lobes and a one segment palp; palp with three distal, elongate, plumose setae; medial endite with one robust, elongate, plumose setae and five short plumose setae; lateral lobe with 10-12 robust, curved spines; two small plates without setae, on medial margin below medial endite and one at the base of the two lobes; maxilla with four lobes.

Maxilla medial endite 1 with 5 distal elongate plumose setae medial margin with 1 elongate, plumose seta and row of fine setules; lobe 2 with 6 elongate, plumose setae; lobe 3 with 7 elongate, simple setae; maxilla lobe 4 (lateral) with eight elongate, simple setae and one elongate, plumose setae on subdistal lateral margin.

Paragnath with two distally rounded diagonal lobes and a medial endite with a distal, acutely pointed apex.

Maxilliped stout limb of seven segments flexed posteriorly between merus and carpus; maxilliped coxa shorter and wider than following segments with two equal epipodites on distolateral margin; coxa with small triangular extension of distomedial corner with two distal setae; coxa with rounded extension on distomedial corner with two distal setae; basis with exopodite a single segment resembling epipodite on distolateral margin.

Thoracopods 2-5 subequal; thoracopods 6 shorter; thoracopod 7 longest; thoracopods 2-4 with two small epipodites; thoracopods 4-6 with single large epipodite; basis of thoracopod 2-5 proximomedial margin with rounded curve covered in small spines forming a rasp like surface with six slender plumose setae near distomedial margin; ischium with slight expansion distally, slightly narrower and elongate than basis, with six slender, plumose setae on distomedial surface and one elongate plumose setae on distolateral corner; merus, more elongate than any other segment, only slightly narrower than coxa, with three slender setae on mid medial margin; carpus smallest segment with row of two elongate, plumose setae elongate distolateral margin; propodus robust, slightly shorter than merus, with three slender setae on medial surface and one elongate setae on mid lateral margin; dactylus small, rounded, with one large and three smaller robust claws and eight setae near medial margin; thoracopods 2-8: thoracopods 2-5 subequal in length; thoracopods 6 shortest in length; thoracopods 7-8 progressively longest in length. Thoracopods 2-7 coxa

with rounded extension on distomedial corner or medial endite with two to five distal setae; basis of thoracopod 1-5 proximal medial margin with rounded curve covered in small spines forming a rasp like surface with six slender plumose setae near distomedial margin; thoracopods 2-4 with two unequal epipodites, a large, dorsal, oval epipodite and a small, elongate epipodite; thoracopods 5-7 with one large epipodite; thoracopods 8 with no epipodites or exopodites; thoracopods 2-7 with multisegmented exopodite with six to eight segments and peduncular segment.

Females with spermatheca on pereonite 8.

Pleopod present on pleonites 1-5; pleopod exopodites multisegmented with two lateral plumose setae present on pleonites 1-5 with six to seven segments and a peduncular segment; male pleopod 1 protopod roundly rectangular with small medial lobe.

Male pleopod 1 exopodites multi-segmented with seven segments and a peduncular segment (or the peduncular segment of Sayce's and Thomson's description).

Male pleopod 2 with two segments; segment 1 is a small stalk slightly wider than long; segment 2 consists of two globular, hollow, lobes; medial endite oval with two valves; dorsal valve with distal rosette of hooks spines and one small spine laterally adjacent; ventral valve slightly smaller with distal spine hook directed proximally; lateral lobe with two sets of posteriorly directed spinose hooks and a small sub distomedial lobe; dorsal set of two posteriorly directed spinose hooks; ventral set of five posteriorly directed spinose hooks with sub-ventral ridge containing a trifid shaped spine and an elongate, medial endite with distal tuft of short digit-like projections; pleopod 2 consists of four segments; segment 1 a small narrow length to width ratio 2.0; segment 2 very short length to width ratio of 4.0; segment 3 broad and rectangular segment with rounded distal margin length to width 1.3; subdistal margin with a round group of coupling hooks; distal segment 4 spatulate with a distal ridge extending half length of segment and a curved distal extension with a group of three laterally directed spines; no sterna process between pleopods 2; pleonite 6 posterior margin with medial depression and six simple setae in two groups of three each side of depression; uropod with peduncle $\frac{2}{3}$ length of telson; rami subequal and longer than peduncle.

Uropods protopod square, length to width ratio 1.0; protopod lateral margin with two simple and ; protopod dorsal margin with two distolateral plumose setae and one simple seta; rami subequal, length to protopod length 1.38; exopodite unisegmented with distolateral point; length to width ratio 3.8; lateral margin with nine plumose setae; distomedial margin with eight plumose setae; medial margin bear of setae; distal point with two plumose setae; endopodite unisegmented with semi-rounded distal margin; length to width ratio 2.1; lateral margin with five plumose setae; distal margin with seven elongate plumose setae and three shorter simple setae; medial margin with 13 laterally directed hook setae.

Habitat

Muddy water in sphagnum, within *Engaeus* burrows

Distribution

Known only from type locality.

Remarks

This species is known from the material collected by Nicholls in 1927, 1928 and 1945 from a few localities in the vicinity of Queenstown on the west coast of Tasmania. Nicholls original description of the male copulatory appendages and the uropods require revision. With the copulatory appendages there can be little doubt that Nicholl's figure of the endopodite of the first pleopod was based on an appendage that was distorted during mounting. The following description is based on a dissection of the syntype and the mounted material. The endopodite is cleft almost to its base into dorsal and ventral lobes. The dorsal lobe has a rather narrow, armed process having coupling hooks at the tip. Beyond this the lobes forms a broad plumose plate armed with stout spines distally, two apically and 3 along the anterior margin and 2 very large spines laterally. The ventral lobe is rounded. Distally on its dorsal surface there is a swelling covered with minute rounded tubercles. The swelling merges into a narrow process directed medially. The endopodite of the second pleopod conforms to Nicholl's description. The basal segments have a patch of coupling hooks distally on its medial surface. The second segment is stout on the base. The apex is slightly excavated.

Micraspides has to be one of the most peculiar genera within the Koonungidae, not only in its distribution and habitats but also some of its morphological features that are autapomorphic to this genus. Examples include the feature Nicholls (1931) describes as two plates attached to the dorsal and ventral surface in the basal or proximal areas of the maxillula. He describes them as 'pseudopods' however they may more correctly be termed accessory endopodites. The functioning of these lobes is still unclear however until further study is done they are considered unique to this species, if not the genus. Nicholls also described "a small lamelliform scale" on the male pleopod 1 protopod that also appears to occur in no other species of Anaspidae. These small round lateral lobes with a latitudinal suture on the pleopods are in the same position as the two segmented epipodites of the thoracopods. They are therefore suggested to represent reduced epipodites. The multisegmented exopodites on the protopods differ in their mounting from the thoracopods as discussed by Nicholls in that in the thoracopods they are mounted on the basis with the epipodites mounted on the coxa, whereas in *Micraspides* the exopodites appear to be mounted on the protopod or coxa with endopodite and epipodites. It is therefore suggested that the basis and coxa have fused. The rosettes described on the distal tips of Pleopod 1 are suggested to be groups of coupling hooks or modified coupling hooks that now act as protective armaments for the sensitive pleopod 1 structure and may have been developed a response to the soft sediments they inhabit. The development of protective structures or armaments have evolved differently in each of the families and is suggested that the type and location of the armaments is direct response to the type of habitat they have evolved in and the amount of predation pressure that exists. This can be clearly seen in the development of large telson spines within the Psammaspididae and Raptornungidae.

Micraspides zeehanensis n. sp

(Figs. 3.2.23-25)



Figure 2.2.23. *Micraspides zeehanensis* n. sp. Holotype male 7.8mm.

Type Locality

2 miles from Zeehan on Remine Road, Tasmania, Australia.



a



b

Figure 3.2.22: a & b. Location of collection site stream habitat for *M. zeehanensis* above Trial Harbour. The site is situated on the mid-West coast of Tasmania, approximately 10km North West of Zeehan.

Material Examined

Type Material

Holotype. J46365, 1 male specimen, 2 miles from Zeehan on Remine Road, Tasmania, Australia, Alt 200m, Zone 55, 361752.5mE, 5359983.53m S, Drummond, F. H., 11-May-1961.

Paratypes: All from the Type Locality. J46365, 1 specimen, 2 miles from Zeehan on Remine Road, Tasmania, Australia, Alt 200m, Zone 55, 361752.5mE, 5359983.53m S, Drummond, F. H., 11-May-1961. J46357, 25 specimens, 2 miles from Zeehan on Remine Road, Tasmania, Australia, Alt 200m, Zone 55, 361752.56mE, 5359983.53m S, Drummond, F. H., 11-May-1961; J46364, 1 specimen, 2 miles from Zeehan on Remine Road, Tasmania, Australia, Alt 200m, Zone 55, 361752.56mE, 5359983.53m S, Drummond, F. H., 11-May-1961.

Etymology

Named after the town of Zeehan due to the proximity of the type locality.

Diagnosis

Colouration translucent white in life with brown pigment on cephalon and on lateral and lower margins of pereonite epimera; epimera of pleonites brown with a darker median stripe; antennule peduncle slightly shorter than cephalon; telson length $2/3$ of width; telson rounded and subtriangular with a small distal notch, length equal to width; telson posterior margin with two rows of spines; dorsal row of six long, robust, simple setae; posterior margin with 12 robust pectinate setae; maxillula palp with one segment; segment with three long setae; lateral endite spine row divided into two levels, lateral level with two large lateral, terminal spines and three smaller spines and lower level with six smaller spines; medial endite expanded distally with one large pectinate spine and 4 smaller robust spines; mandibular palp with 6 medial mid length plumose setae and one fine elongate simple setae on distolateral corner; pleopod 1 of male endopodite of first pleopod of male with two lobes forming a short base; dorsal lobe with a stout medially divided process near base and having coupling hooks at the tip; the other lobe has stout spines at the anterior margin; ventral lobe is rounded anteriorly; at the origin of the ventral lobe there is a rounded lateral swelling having a small upright plate; pleopod 2 of male endopodite of has two segments; basal segment short with a blunt point at the base and a group of coupling hooks distally; sternal plates a narrow transverse plate with straight lateral margins; uropods peduncle expanded; endopodite slightly wider than exopodite.

Description

Based on holotype male.

Body size of largest male 7.8mm; body size of largest female 8.5mm; body about eight times longer than wide; pereonites 1-6 subequal; pereonite 7 longer; pleonites 1-5 equal; pleonite 6 longer with a row of six long equally spaced setae on posterior margin; cephalon equal in length to first three pereonites combined;

anterior margin abruptly angled with a notch at the base of the antenna; colouration translucent white in life with brown pigment on cephalon and on lateral and lower margins of pereonite epimera; epimera of pleonites brown with a darker median stripe. Telson length $\frac{2}{3}$ of width; telson rounded and subtriangular with a small distal notch, length equal to width; telson posterior margin with two rows of spines; dorsal row of six long, robust, simple setae; posterior margin with 12 robust pectinate setae.

Eyes absent.

Antennule peduncle slightly shorter than cephalon; first segment of peduncle equal to second and third segment combined; first segment medial margin with two to three setae near base; four to five apical setae and a subapical group of four to five setae; lateral margin with two penicillate setae; second segment of peduncle medial margin with a few simple setae at mid length and an apical group of setae; third segment of peduncle with simple setae on the medial and apical margin; lateral flagellum with 20-25 segments; no antennal organ in either sex; flagellum segments with simple setae and aesthetascs; medial flagellum with six to eight segments;

antenna length about $\frac{1}{3}$ length of antennule; second segment of peduncle with a few simple setae on the medial margin and a subapical group of simple setae on lateral margin; third segment of peduncle with few simple setae on medial margin, an apical group of simple and penicillate setae; fourth segment of peduncle with simple setae on distal margin.

Mandible incisor process with six denticles; molar process with fine setae and distal tuberculate area.

Maxillula palp with one segment; segment with three long setae; lateral endite spine row divided in to two levels, lateral level with two large lateral, terminal spines and three smaller spines and lower level with six smaller spines; medial endite expanded distally with one large pectinate spine and four smaller robust spines.

Maxilla four endites; medial endite narrow with three to four strong setae apically and fine setae on upper surface; three remaining endites with apical setae, one long seta laterally expanded on fourth endite.

Paragnath with two distally rounded diagonal lobes with distolateral surface covered in fine setules, and a medial endite with a distal, acutely pointed apex;

Mandibular palp with six medial mid length plumose setae and one fine elongate simple setae on distolateral corner.

Maxilliped coxa with small triangular lobe with one to two setae; two subequal, distally rounded, epipodites; basis with apical group of setae on medial margin; exopodite elongate and lamellate; third and fourth segment with setae on inner edge and upper surface; fifth segment with apical row of setae.

thoracopod 4 longest in female; seventh longest on male; small coaxial lobes on thoracopods 2-5 in both sexes, slightly larger on fourth and fifth thoracopods; coxae of first four thoracopods of male with patch of very stout setae on medial surface; thoracopods 2-4 with two epipodites; thoracopods 5-7 with one epipodite; exopodites with peduncle and five to seven flagellum segment.

Pleopod 1 of male endopodite of first pleopod of male with two lobes forming a short base; dorsal lobe with a stout medially divided process near base and having coupling hooks at the tip; the other lobe has

stout spines at the anterior margin; ventral lobe is rounded anteriorly; at the origin of the ventral lobe there is a rounded lateral swelling having a small upright plate.

Pleopod 2 of male endopodite of has two segments; basal segment short with a blunt point at the base and a group of coupling hooks distally; sternal plates a narrow transverse plate with straight lateral margins.

Uropods peduncle expanded; endopodite slightly wider than exopodite.

Habitat

Collected from the hyporheic zone of within the fine muds and silts of short, small spring fed streams that drain from the escarpment to the sea.

Distribution

Only know from type locality

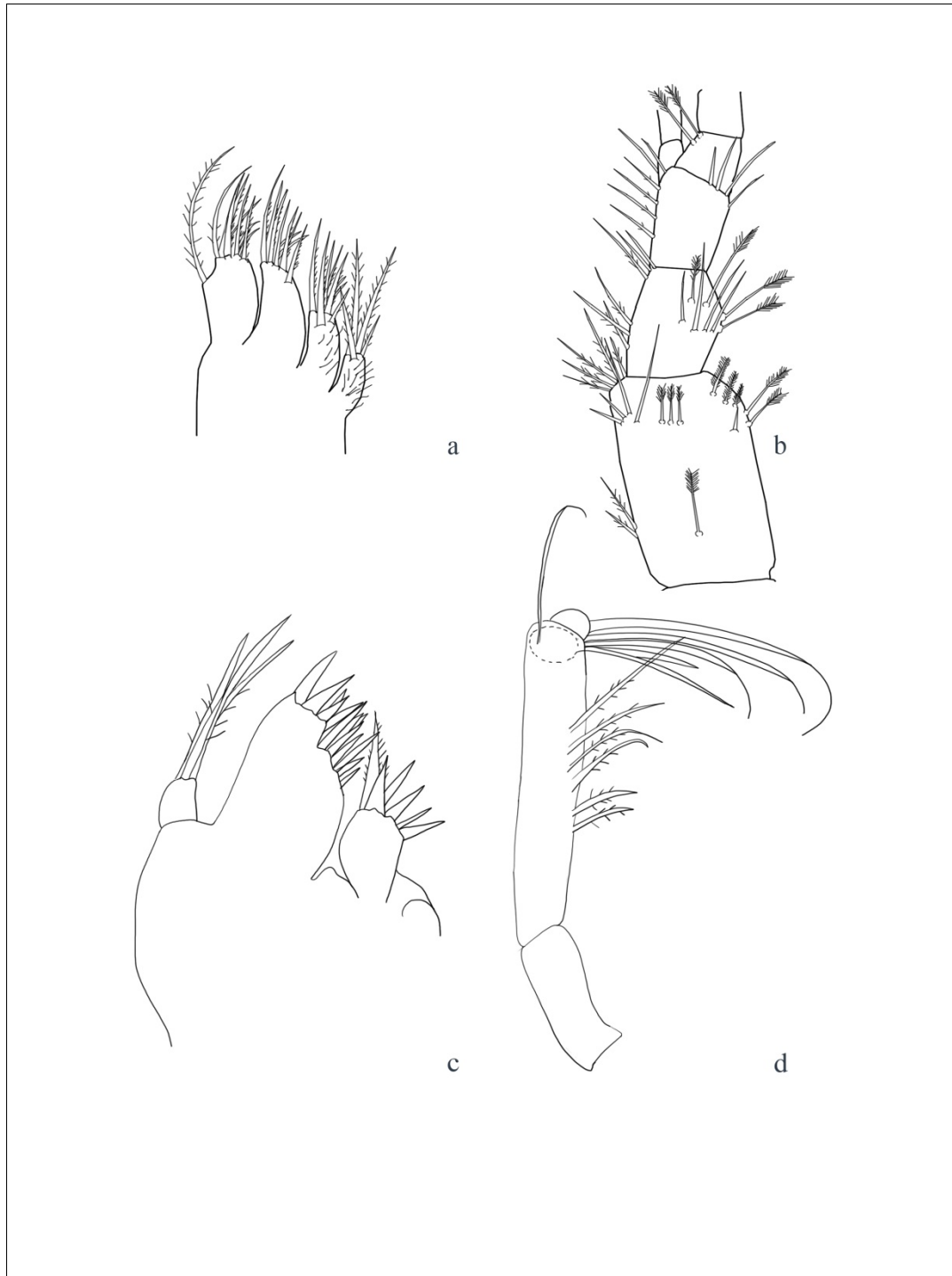


Figure 3.2.24. *Micraspides zeehanensis* n. sp. Holotype male 7.8mm. a- Mx2; b- A1; c- Mx1; d- mandibular palp.

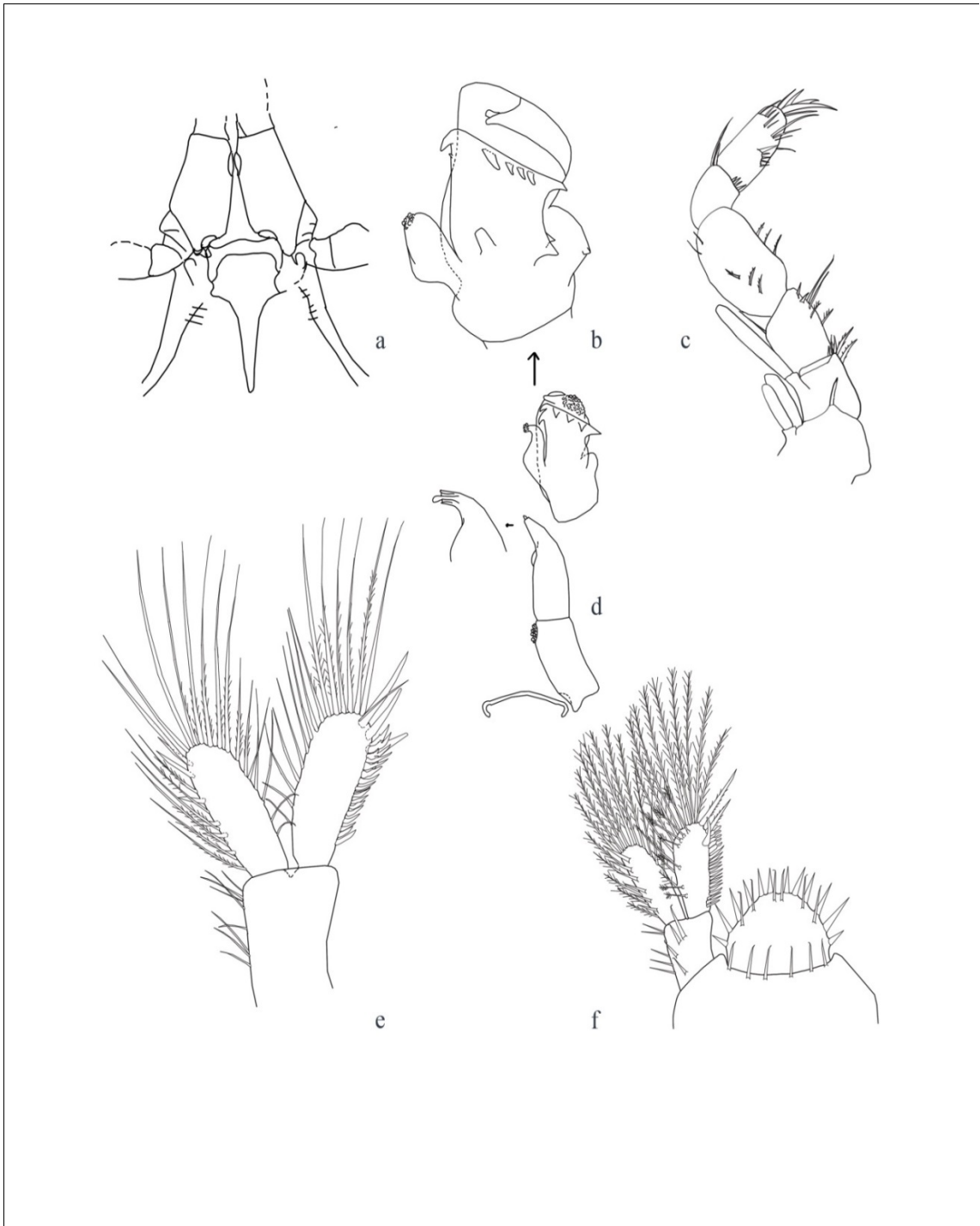


Figure 3.2.25. *Micraspides zeehanensis* n. sp. Holotype male 7.8mm: a-base of P1 2 showing sternal keel ; b- P1 1; c- Mxp; d- P1 2 ; e- uropod; f- uropod and telson.

Subfamily Drummonunginae, subfam.n

Etymology

Named after Dr. Frank Harvey Drummond and derived from the genus Drummonunga n. gen.

Diagnosis

Eyes absent; telson triangular with straight or concave distolateral margins and slightly shorter than wide; dorsal surface with sub marginal series of six to eight slender simple setae with curved tips or bifid pectinate setae with a very sparsely pectinate shaft with small spinules at base of a central flagellum; lateral marginal series of 16-18 stout pectinate setae; ventral marginal series of 41-51 setae, consisting of 28-34 pectinate setae and 9-19 trifold in a single distal series; first antennula flagellum segment with large, globular antennal organ on elongate stalk; peripheral cups twice the diameter of central cups; maxillula lateral endite distal spine row subequal with a straight diagonal base; maxillula medial endite with four to five slender pectinate setae, one very large circumpectinate seta; maxilla; paragnath lateral lobes broad, strongly setose; medial endite short forming a small to large mid length notch or small to large triangular medial lobe; pleopod 1 in male endopodite with deep medial groove and bifurcate anteriorly; dorsal lips of groove with medially directed process having a group of coupling hooks near tip and with a curved laterally directed process with three small tubercles near tip; ventral lip terminating in a broad, rounded lobe reflected upwards at tip; pleopod 2 in male basal segment of endopodite slender with subapical group of coupling hooks; distal segment stylet shaped, slightly expanded on proximal third narrowing slightly then abruptly to a an acutely point or tapering from the midline, with single or bifid apical points; distal third with a dorsal groove and a group of sclerotised denticles laterally; sternum of pleonite 2 with a small, rounded anterior process supported by lateral cuticular extensions; no posterior process; uropod endopodite about 1.5 times width of exopodite; medial margin with a proximal series of pectinate setae; a distal series of trifold setae and 3 stout, large pectinate setae subapically; and a dorsolateral series of 12-13 plumose setae; exopodite slightly longer than endopodite, its margin fringed with plumose setae, a row of stout upright setae dorsolaterally; ventrally with pectinate setae medially.

Remarks

The Drummonunginae is a grouping of taxa that are represented by having a fine elongate stylet for the male pleopod 2 that is significantly different from any other petasma structure within the Koonungidae. The structures of the petasma exhibited in this group are considered to be synapomorphic as they are much closer in form to those exhibited by both the Psammaspididae and the Stygocarididae. The diversity of the stylet shapes may at some future point require that these genera are further separated in particular the genus *Boolarrunga* due to the structures of not only the petasma but the paragnaths and telson as well. These features of this group represent the link between the Koonungidae and the other families within the Stygocaridinea.

Genus *Drummonunga* n. gen

Type species

Drummonunga welshpooli n. sp.

Etymology

Named after Dr. Frank Harvey Drummond.

Diagnosis

Eyes absent; telson slightly shorter than wide; dorsal surface with sub marginal series of six to eight slender simple setae with curved tips and three or occasionally four pairs of stout flagellate setae with very sparsely pectinate shaft with small spinules at base of flagellum; lateral marginal series of 16-18 stout pectinate setae; ventral marginal series of 41-51 setae, consisting of 28-34 pectinate setae and 9-19 trifold in a single distal series; five to six simple setae anterior to the opening of statocyst; antennula first flagellum segment with large, globular antennal organ on elongate stalk; peripheral cups twice the diameter of central cups; first segment with flange having six to seven pectinate setae; maxillula lateral endite distal spine row subequal with a straight diagonal base; maxillula medial endite with four to five slender pectinate setae, one very large circumpectinate seta and a smaller medial seta; maxilla medial endite with fine hairs and a row of 12-14 long pectinate setae extending whole length of medial margin to apex; lateral endite with three distolateral pectinate setae and simple and pectinate setae on the apex; paragnath lateral lobes broad, strongly setose; medial endite short forming a small mid length notch; pleopod 1 in male endopodite with deep medial groove and bifurcate anteriorly; dorsal lips of groove with medially directed process having a group of coupling hooks near tip and with a curved laterally directed process with three small tubercles near tip; ventral lip terminating in a broad, rounded lobe reflected upwards at tip; exopodite with peduncle and eight flagellum segments; pleopod 2 in male basal segment of endopodite slender with subapical group of coupling hooks; second segment slightly expanded on proximal third narrowing slightly then finally abruptly to a point; distal third with a dorsal groove and a group of sclerotised denticles laterally; sternum of pleonite 2 with a small, rounded anterior process supported by lateral cuticular extensions; no posterior process; exopodite with peduncle and 8 flagella segments; uropod endopodite about 1.5 times width of exopodite; medial margin with a proximal series of six to nine pectinate setae; a distal series of 8-12 trifold setae and three stout, large pectinate setae subapically; a dorsolateral series of 12-13 plumose setae; exopodite slightly longer than endopodite, its margin fringed with plumose setae, a row of seven to nine stout upright setae dorsolaterally; ventrally with four to five pectinate setae medially; and three to five plumose setae distally and near mid length;

Species Composition

Drummonunga welshpooli n. sp.

Remarks

The medial margin of the maxilla is thus an autapomorphic feature of the Koonungids and is also suggested to be a plesiomorphic feature as it is found extensively throughout the Stygocarididae.

Drummonunga welshpooli n. sp.

(Figs. 3.2.26-28)

Type Locality

Welshpool, Victoria, Australia

Material Examined

Type Material

Holotype. 1 male, Unassigned Rego No., *Koonunga*, Welshpool, female, A1 & A2, Welshpool, Victoria, Australia, Alt 35m, Zone 55, 444107.23 m E, 5720233.93m S, Drummond, F. H., 20-September-1981; Unassigned Rego No., Slide Blue Box, *Koonunga*, Welshpool, female, Mds, Welshpool, Victoria, Australia, Alt 35m, Zone 55, 444107.23 m E, 5720233.93m S, Drummond, F. H., 20-September-1981.

Etymology

Named after the type locality near the town of Welshpool, Victoria, Australia.

Diagnosis

Species diagnosis is the same as genus at this time.

Description

Based on holotype male.

Male - 6.8 mm and about seven times longer than wide; pereon segments subequal but pereonite 7 enlarged during breeding season; pleon segments 1-5, subequal, with segment 6 longer along posterior margin and somite convex with a small rounded process on each side and one to two slender setae with a curved lip adjacent to each process and a larger seta more medially and remote from posterior margin.

Cephalon anterior margin rounded emarginated and with shallow notch above base of antenna; short lateral suture.

Telson slightly shorter than wide; dorsal surface with sub marginal series of six to eight slender simple setae with curved tips and three or occasionally; four pairs of stout flagellate setae with very sparsely pectinate shaft with small spinules at base of flagellum; lateral marginal series of 16-18 stout pectinate setae; ventral marginal series of 41-51 setae, consisting of 28-34 pectinate setae and 9-19 trifold in a single distal series.

Eyes absent.

Antennula segment 1 of peduncle almost twice as long as wide with five to six pectinate setae on the distal quarter; five to six simple setae anterior to the opening of statocyst; two simple setae medially about 1/3 length from base; pectinate setae medially on segments 2 and 3; lateral flagellum with 17-21 segments; antennula first flagellum segment with large, globular antennal organ on elongate stalk; peripheral cups twice the diameter of central cups; segment 6 and following with aesthetasc; medial flagellum with six to eight segments; first segment with flange having six to seven pectinate setae; antenna about 3/4 length of antennule.

Antenna segment 1 of peduncle with two pectinate setae distally on medial margin and six to nine simple setae dorsolaterally; segment 2 with five to seven pectinate setae on or near medial margin and two to three simple or sparsely pectinate setae dorsolateral; flagellum with 17-20 segments; first and following setae with plumose setae.

Mandibular palp with three segments; segment 2 approximately 2.5 times length of first segment, with five to six pectinate setae; left mandible with six denticles; right mandible with five denticles; molar process setose distally and with tuberculate apical area.

Maxillula palp with three long pectinate setae; lateral endite with 12-14 sclerotised setae and two smaller setae; maxillula lateral endite distal spine row subequal with a straight diagonal base; maxillula medial endite with four to five slender pectinate setae, one very large circumpectinate seta and a smaller medial seta;

Maxilla medial endite with fine hairs and a row of 12-14 long pectinate setae extending whole length of medial margin to apex; lateral endite with three distolateral pectinate setae and simple and pectinate setae on the apex.

Paragnath lateral lobes broad, strongly setose; medial endite short forming a small mid length notch.

Thoracopod 2 with two epipodites; thoracopod 2 longest in series; basis, ischium and merus strongly setose on and near lower margins; dactylus with four claws, one short, curved and simple; coxal lobe small with two setae; exopodite with peduncle and seven segments; upper epipodite less than half the size of lower one; thoracopod 3-7 equal in length; thoracopod 3-7 with one epipodites; setation progressively reduced; dactylus of th.3 with both claws as in th.2, others with three claws only; thoracopod 4-7 dactylus medial claw progressively more elongate, with other claws progressively smaller; carpus comb absent on th.7; exopodites 3-6 with peduncle and eight segments; thoracopod 8 shortest in series; setation very reduced; dactylus with 3 minute claws but occasionally fourth claw present.

Pleopod 1 in male endopodite with deep medial groove and bifurcate anteriorly; dorsal lips of groove with medially directed process having a group of coupling hooks near tip and with a curved laterally directed process with three small tubercles near tip; ventral lip terminating in a broad, rounded lobe reflected upwards at tip; exopodite with peduncle and 8 flagellum segments. Pleopod 2 in male basal segment of endopodite slender with subapical group of coupling hooks; second segment slightly expanded on proximal third narrowing slightly then finally abruptly to a point; distal third with a dorsal groove and a group of

sclerotised denticles laterally; sternum of pleonite 2 with a small, rounded anterior process supported by lateral cuticular extensions; no posterior process; exopodite with peduncle and eight flagella segments; pleopods 3-4 with peduncle and eight flagella segment; pleopods 5 with peduncle and six flagella segments.

Uropods protopodite about same length as exopodite with two simple setae and one large flagellate setae on dorsal surface, six to eight simple setae and pectinate setae laterally and three plumose setae medially; uropod endopodite about 1.5 times width of exopodite; medial margin with a proximal series of six to nine pectinate setae; a distal series of 8-12 trifold setae and three stout, large pectinate setae subapically; a dorsolateral series of 12-13 plumose setae; exopodite slightly longer than endopodite, its margin fringed with plumose setae, a row of seven to nine stout upright setae dorsolaterally; ventrally with four to five pectinate setae medially ; and three to four plumose setae distally and near mid length;

Female differences from the male: No antennal organ or associated flange on antennule; thoracopods 3-8 dactylus sometimes with fourth claw similar to thoracopods 1 and 2; thoracopod 5 longest in series; basis with two setae near upper margin; ischium with three setae ; merus with three to four setae near upper margin; propodus longer and more slender than in other thoracopods and heavily setose; dactylus with three subequal claws; thoracopod 2-4 coxal lobes with two setae; thoracopod 5 coxal lobes with five setae; thoracopod 6 coxal lobes with six setae on ventral lip of genital opening; thoracopod 7 coxal lobes with 15-16 setae mostly directed upwards into intercoxal space; telson with ventral marginal series with 44-55 setae, consisting of 10-17 trifold setae in distal series.

Habitat

The specimens were collected from crayfish (*Engaeus sp.*) burrows in swampy ground adjacent to the road.

Distribution

Only known from type locality

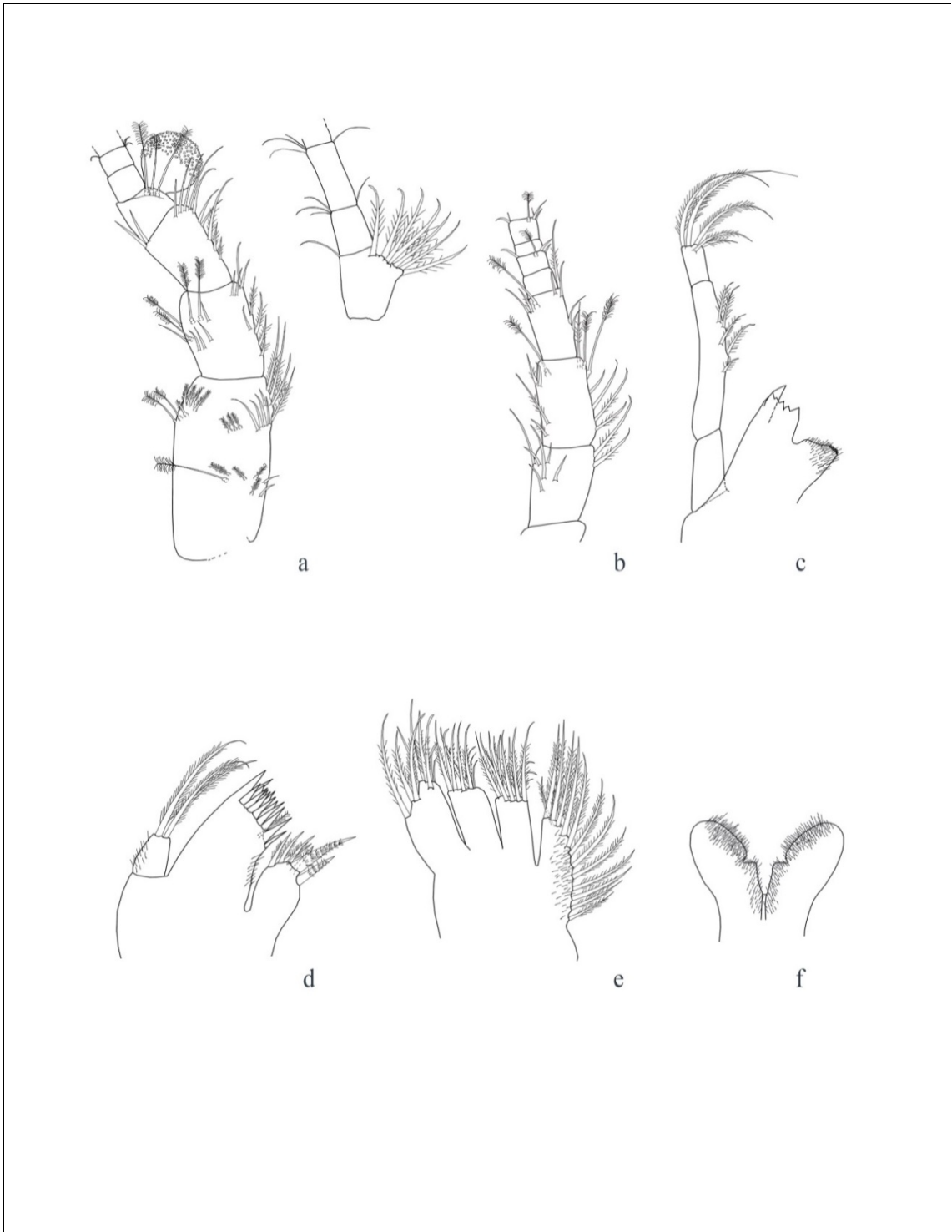


Figure 3.2.26. *Drummonunga welshpooli* n. sp. Holotype male 6.8mm. Antennae: a- A1 with medial flagellum (left) and lateral flagellum (right); b- A2; Mouthparts: c- mandible; d- Mx1; e- Mx2; f- paragnath.

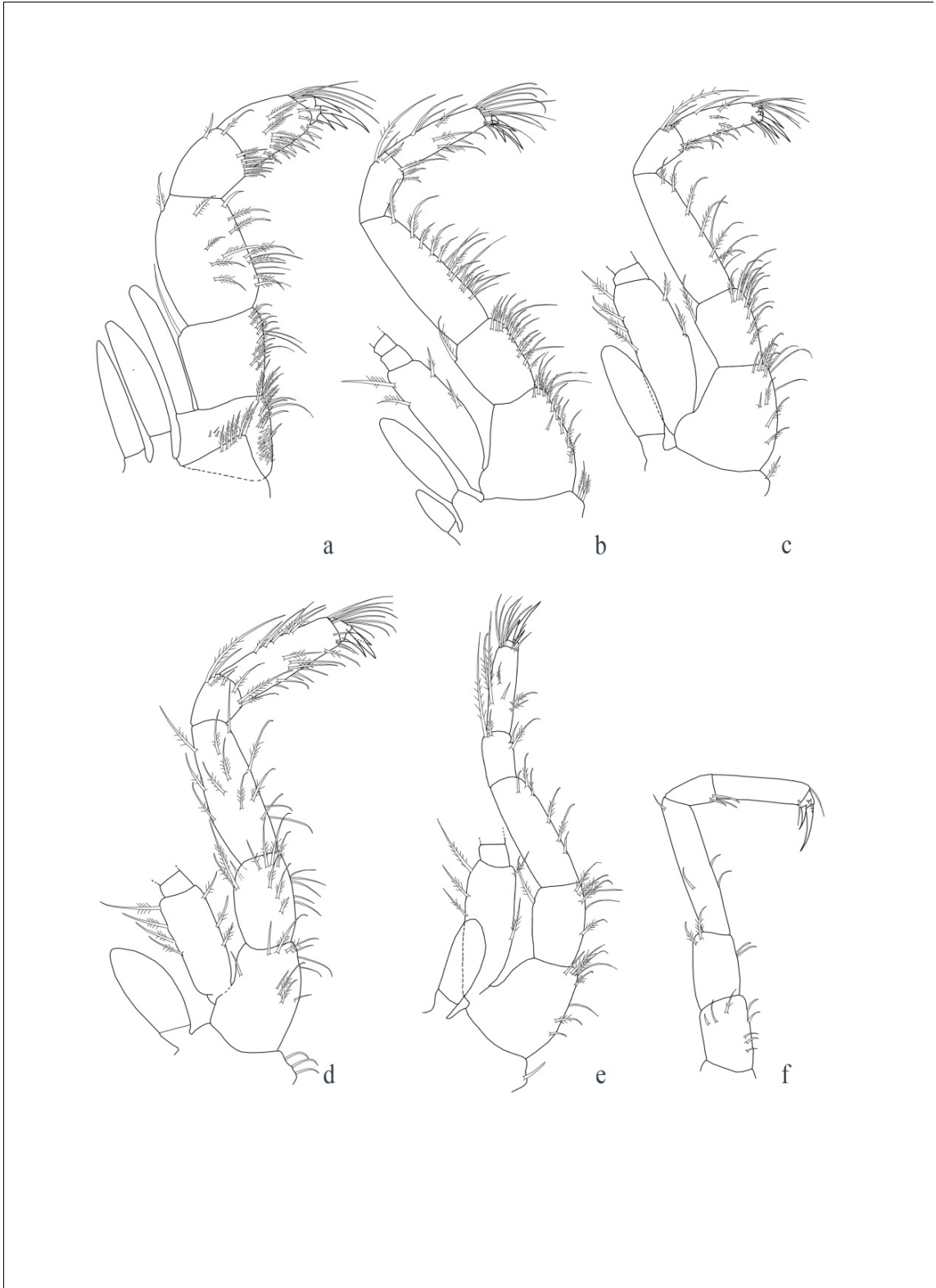


Figure 3.2.27. *Drummonunga welshpooli* n. sp. Holotype male 6.8mm. Thoracopods: a- Mxp; b- Th 2; c- Th 3; d- Th 5; e- Th 6; f- Th 8.

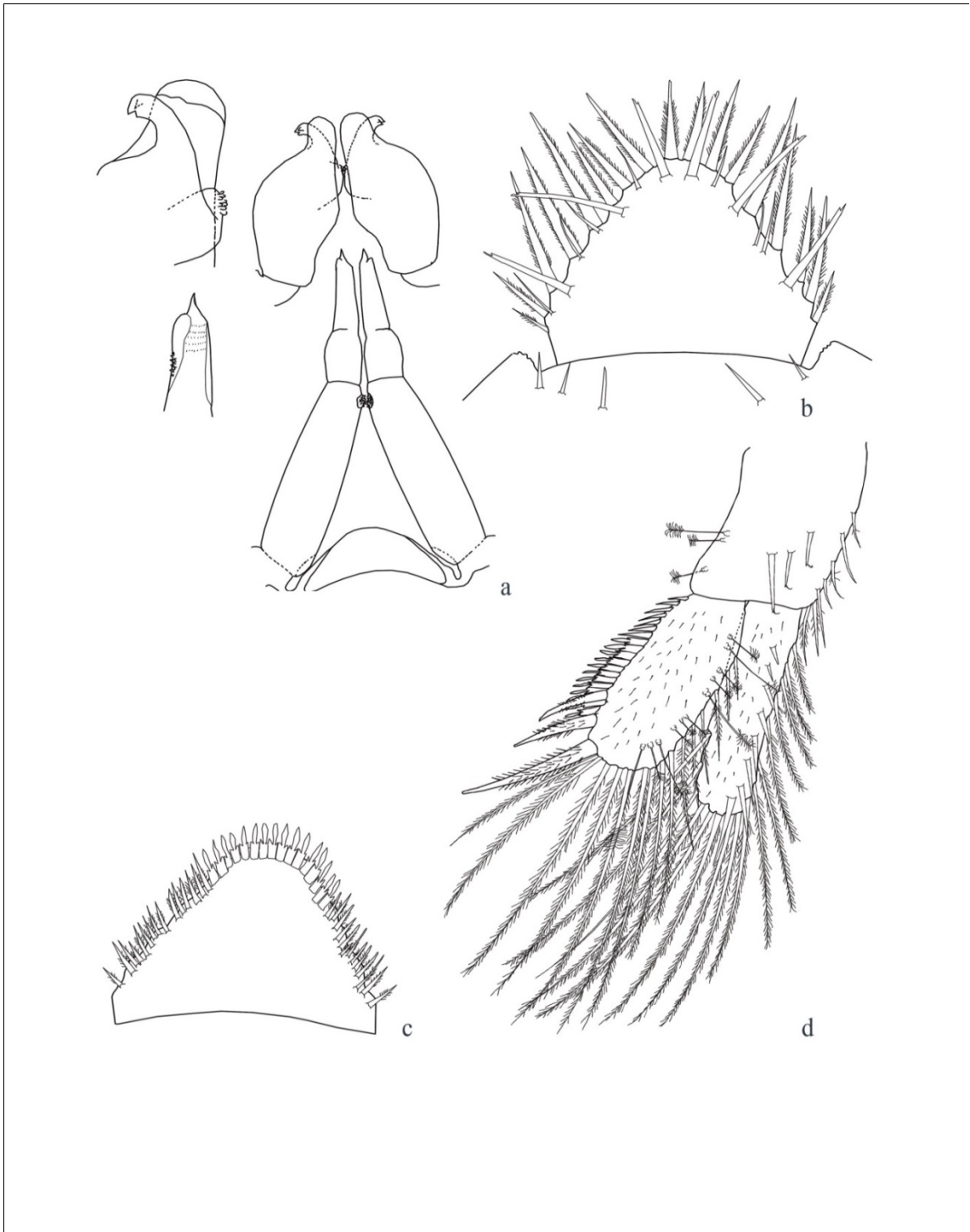


Figure 3.2.28. *Drummonunga welshpooli* n. sp. Holotype male 6.8mm: a- petasma with close-ups of distal tip of P11 (upper) and P12 (lower); b- telson, dorsal; c- telson, ventral; d- uropod.

Genus *Boolarrunga* n. gen

Type species

Boolarrunga gippslandica n. sp.

Etymology

Named after the type locality.

Diagnosis

Eyes absent: colouration with pigmentation heavier anterior of cephalic groove; telson slightly shorter than wide; short, diagonal, lateral margin; dorsal submarginal series of 8-10 upwardly directed simple setae; upper margin series of 14-16 stout, sparsely pectinate setae; ventral series of 38-48 setae consisting of 31-41 pectinate and 5-8 trifold setae; sternum of pleonite 2 with a broad, square, anterior process and stout flat lateral arms and no posterior process; antennula basal segment with two simple setae anterior to statocyst opening and laterally are three short penicillate setae; antennal organ present; labrum strongly arched or triangular above with free edge covered on fine setules; paragnath lateral lobes broad, strongly setose; medial endite short and broad; medial endite with four to five pectinate setae and one very large circumpectinate setae and one smaller one; thoracopod 8 longest in series, setation markedly reduced; ischium with large tubercle on lateral surface; dactylus lateral claw minute; pleopod 1 of male endopodite with deep medial groove and bifurcated anteriorly; upper lip of groove with broad, medial process having coupling hooks subdistally and continued as a stout laterally directed process, expanded distally and covered in minute scale like spines; ventral lip of groove rounded anteriorly and directed upwards.; exopodite of peduncle and five to six segments; pleopod 2 of males basal segment of endopodite stout at base medially curved and sharply inclined towards mid-line; group of coupling hooks at mid length; second segment narrower and slightly twisted distally; tip with dorsal spoon-like cavity;.

Species Composition

Boolarrunga gippslandica n. sp.

Remarks

Boolarrunga is one of the most easterly located species and is found at the top of the catchment that drains into the central Gippsland area. The male genitalia alone with its rectangular sternal between pleopods 2, the cup-shaped distal tip of pleopod 2 and the axe -shape of pleopod 1 are significant autapomorphic features for the genus. There is no doubt that this region will yield many more species including other anaspidacean families since there are already records of Stygocarididae and Psammaspididae from nearby areas.

Boolarrunga gippslandica n. sp

(Figs. 3.2.29-31)

Type Locality

8km South of Boolarra, Gippsland, Victoria, Australia.

Material Examined

Type Material

Holotype. 1 male Unassigned Rego No., *Koonunga*, Boolarra, female, Mds, 8km South of Boolarra, Gippsland, Victoria, Australia, Alt 300m, Zone 55, 436757.82m E, 5744255.07m S, Drummond, F. H., 20-September-1961; Unassigned Rego No., Slide Blue Box, *Koonunga*, Boolarra, female, Cephalon, 8km South of Boolarra, Gippsland, Victoria, Australia, Alt 300m, Zone 55, 436757.82m E, 5744255.07m S, Drummond, F. H., 20-September-1961; Unassigned Rego No., 8km South of Boolarra, Gippsland, Victoria, Australia, Alt 300m, Zone 55, 436757.82m E, 5744255.07m S, Drummond, F. H., 20-September-1961.

Etymology

Named after the town, Boolara, near the type locality.

Diagnosis

Species diagnosis is the same as genus at this time.

Description

Based on holotype male.

Male body 7.2; body approximately 7:1 length to width ratio; colouration with pigmentation heavier anterior of cephalic groove; thoracic segments subequal; pleonite segments 1-5 subequal; pleonite 6 1.5 times longer, its posterior margin with a small round lobe on each side with one to three adjacent slender setae.

Cephalon rounded anteriorly, emarginated on either side with a slight notch above the base of the antenna; short lateral sulci linked by a faint suture extending across the cephalon;

telson slightly shorter than wide; short, diagonal, lateral margin; dorsal submarginal series of 8-10 upwardly directed simple setae; upper margin series of 14-16 stout, sparsely pectinate setae; ventral series of 38-48 setae consisting of 31-41 pectinate and five to eight trifid setae.

Eyes absent.

Antennule segment 1 of peduncle nearly twice as long as wide, with pectinate setae medially on distal half; two simple setae anterior to statocyst opening and laterally are three short penicillate setae; dorsally on posterior half is one long plumose setae and a number of short penicillate setae; latero-dorsally on distal

half are two plumose setae and a number of penicillate setae; segment 2 of peduncle with eight pectinate setae medially; distally a group of four to five simple setae medially and a group of simple setae and six to seven plumose setae laterally; segment 3 of peduncle with medial series of seven to eight simple or sparsely pectinate setae, a subapical series of four to five simple setae and laterally two to three simple or pectinate apical setae; lateral flagellum with 17-19 segments, the first with antennal organ present having stalked cups; sixth and following segments with aesthetascs; medial flagellum with six to eight segments, first with proximal flange having 9-11 pectinate setae; antenna segment 1 of peduncle with two to three pectinate setae medially and four to five simple or pectinate setae dorso-laterally; segment 2 of peduncle with three to four pectinate setae medially and one to two dorso-lateral setae; subapical lateral group of three simple or sparsely pectinate setae and one plumose setae; segment 3 of peduncle with a medial series of five simple setae and a subapical dorsolateral group of three pectinate setae and one to two plumose setae; flagellum with 14-16 segments; second and following alternate segments with plumose setae; female with no antennal organ or associated flange on the antennule.

First segment of antenna peduncle with three to four pectinate setae medially and four to six dorsolaterally. Labrum strongly arched or triangular above with free edge covered on fine setules.

Mandible palp with three segments; the second twice the length of the first and with four to five pectinate setae; third segment with five to six pectinate setae; incisor process with six denticles on left mandible and five on right mandible; molar process with short setae distally.

Paragnath lateral lobes broad, strongly setose; medial endite short and broad.

Maxillula palp of segment 1 with three long, apical pectinate setae; lateral endite with 11-13 sclerotised setae and two fined ones; medial endite with four to five pectinate setae and one very large circumpectinate setae and one smaller one.

Maxilla medial endite with four to five straight apical pectinate setae and hair setae on medial margin; lateral endite with simple and pectinate setae.

Maxilliped coxa with broad triangular lobe having three to four setae; basis, ischium and merus rather sparsely setose; carpus with subapical comb of three to four pectinate setae; propodus with oblique comb of five to six pectinate setae and a strong simple setae on lower margin; dactylus with four stout claws; exopodite long and lamellate; two subequal epipodites; thoracopod 2 with two epipodites; thoracopods 3-7 with one epipodite.

Thoracopod 2 coxa lobe with 1 one setae; basis, ischium and merus moderately setose; propodus with three strong simple setae on lower margin dactylus with three slender claws and one stout simple claw; exopodite with peduncle and five to six segments; peduncle with fuzz of fine hairs at the base; two epipodites with the upper one small; thoracopod 5 longest in series; a seta near upper margin of lateral surface on basis and ischium; carpus and propodus stouter, more setose and with fine tubercles on medial surface; dactylus medial claw relatively short; coxal lobe of thoracopod 5 with 6 setae; coxal lobe of thoracopod 6 with eight setae; coxal lobe of thoracopod 7 with three setae; thoracopods 3-7 about equal in length and slightly shorter than th.2; setation progressively reduced; dactylus with four claws on th.3 and

th.4-7 with three slender claws; the median claw becoming progressively longer on th.5-7; the lateral claw becoming progressively reduced; no carpal comb on th.7; coxal lobes small with one to two setae; thoracopod 8 longest in series, setation markedly reduced; ischium with large tubercle on lateral surface; dactylus lateral claw minute.

Pleopod 1 of male endopodite with deep medial groove and bifurcated anteriorly; upper lip of groove with broad, medial process having coupling hooks subdistally and continued as a stout laterally directed process, expanded distally and covered in minute scale like spines; ventral lip of groove rounded anteriorly and directed upwards.; exopodite of peduncle and five to six segments. Pleopod 2 of males basal segment of endopodite stout at base medially curved and sharply inclined towards mid-line; group of coupling hooks at mid length; second segment narrower and slightly twisted distally; tip with dorsal spoon-like cavity; exopodite consists of peduncle and five to six segments; sternum of pleonite 2 with a broad, square, anterior process and stout flat lateral arms and no posterior process; pleopods 3-5 with peduncle and five to six segments.

Uropods protopodite about two thirds length of endopodite with six simple setae dorsally, four to five mostly pectinate setae laterally and three plumose setae mediodistally; medial margin of endopodite with a proximal row of 13-18 pectinate setae and a distal series of four to nine trifid setae; three large subapical setae submarginally over two to three trifid setae; a dorsolateral sub marginal series of 11-12 plumose setae; endopodite fringed with long plumose setae, a lateral series of five to six upwardly directed stout pectinate setae; ventrally with two setae on the medial margin, three apical plumose setae.

Habitat

The specimens inhabit crayfish (*Engaeus sp.*) burrows in swampy ground adjacent to the road (Drummond pers com. 1961)

Distribution

Currently only from type locality, 8km south of Boolarra on the Midlands Highway, Gippsland, Victoria.

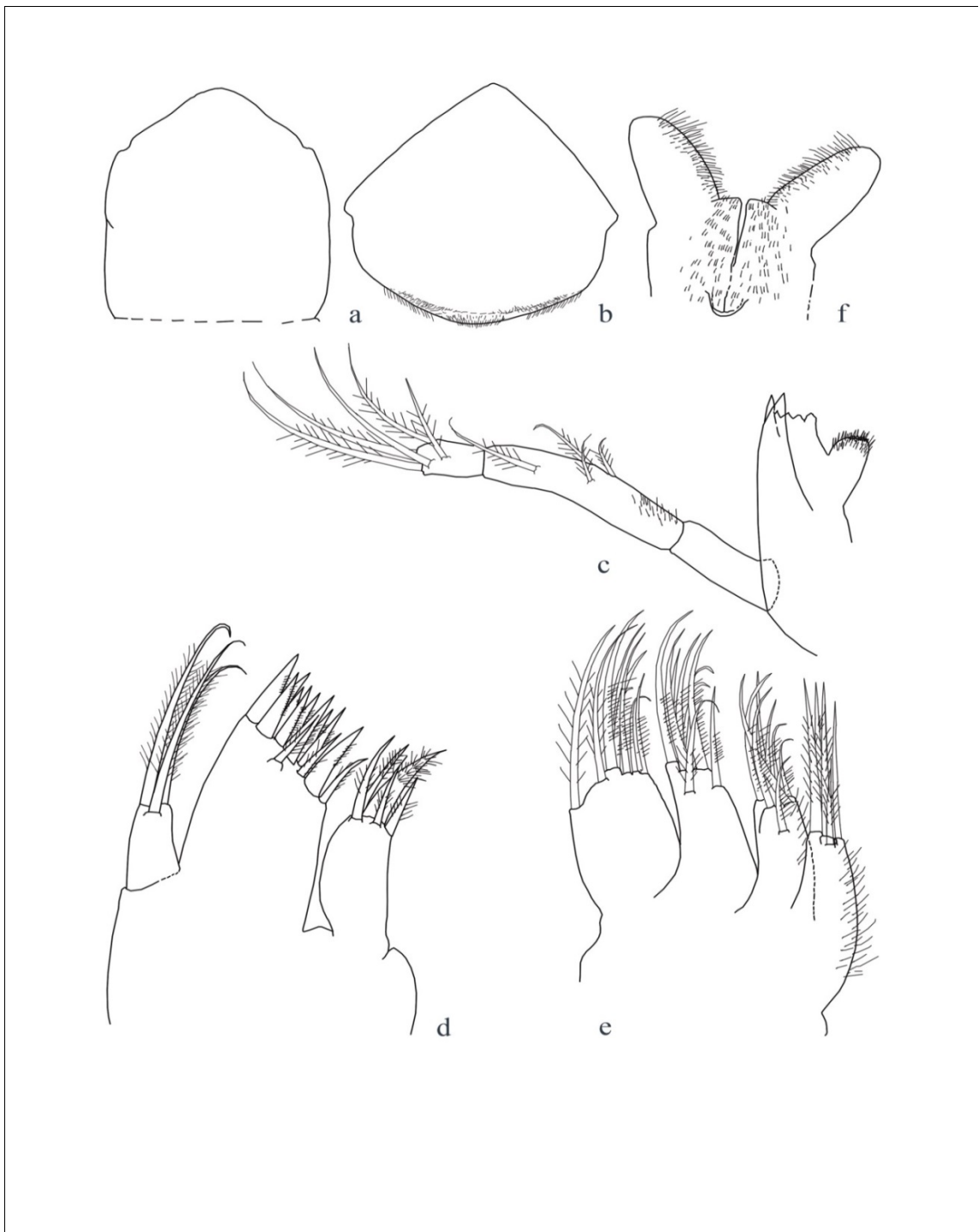


Figure 3.2.29. *Boolarrunga gippslandica* n. sp. Holotype male 7.2mm. Mouthparts: a- cephalon dorsal view; b- labrum; c- mandible; d- Mx1; e- Mx2; f- paragnath.

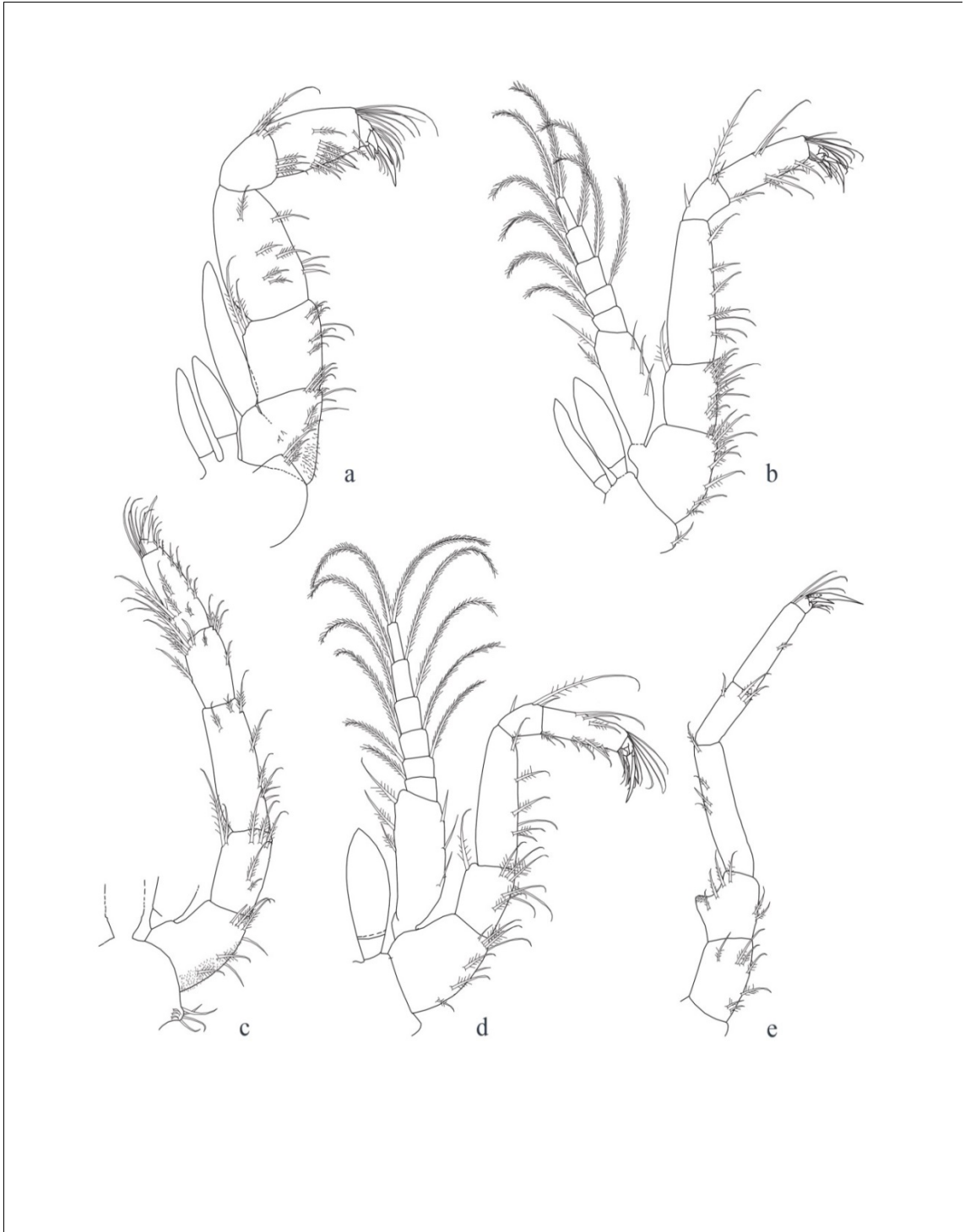


Figure 3.2.30. *Boolarrunga gippslandica* n. sp. Holotype male 7.2mm. Thoracopods: a- Mxp; b- Th 2; c- Th 3; d- Th 7; e- Th 8.

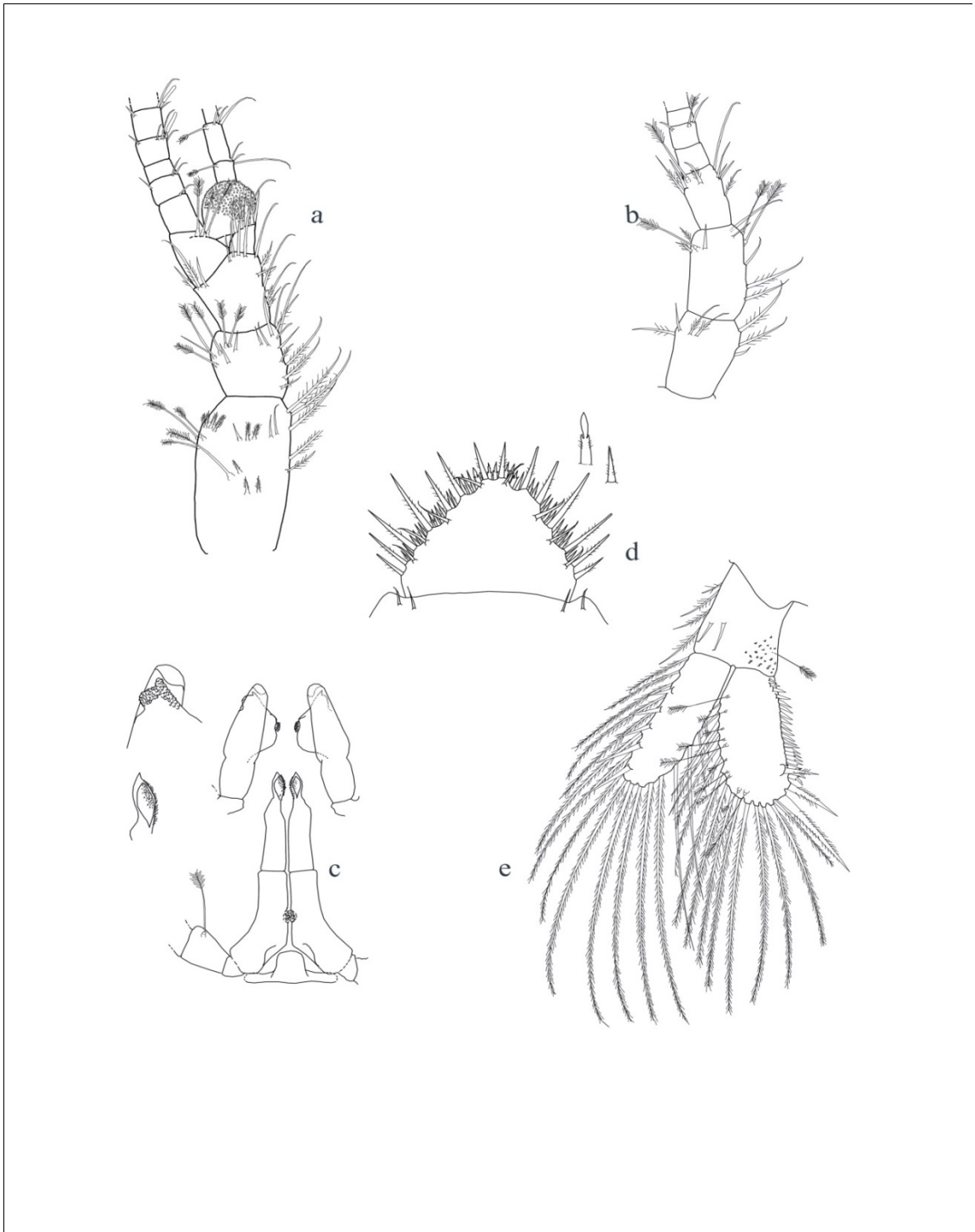


Figure 3.2.31. *Boolarrunga gippslandica* n. sp. Holotype male 7.2mm: a- A1; b- A2; c- petasma with enlargements of the distal tips of P1 1 and P1 2; d- telson, dorsal view; e- uropod.

Genus *Neonunga* n. gen

Type species

Neonunga minuta n. sp.

Etymology

This genus name refers to this genus being a new type of Koonungidae that is distinctly different in morphology to previously described genera.

Diagnosis

Eyes absent; colouration translucent white with some pale brown pigment on the margins of the pereonites; telson with straight lateral margin length 0.29 length of telson; dorsal surface with two lateral and two subdistal stout, pectinate spines; distolateral margin with 10 large, equally spaced pectinate spines; ventral margin with a spine row of about 24 short, distally rounded spines; maxillula medial endite with one stout spine strongly bristled distally and for smaller bristle setae; paragnath with two oval lobes with fine setules on the distomedial and medial margin and a large medial basal, anteriorly pointed extension; thoracopod exopodites with peduncle and flagellum with four to five segments; pleopods exopodites with peduncle and flagellum with two to four segments; no pleopod on fifth pleomeres; pleopod 1 of male endopodite with deep medial groove at base and distally divided into dorsal and ventral lobes; dorsal lobe with medial and lateral expansion with the medial expansion having a distomedial group of coupling hooks and fine setae; the lobe terminates in a narrow, laterally curved process; ventral lobe blunt with fine setae on medial margin; pleopod 2 of male endopodite with two segments; proximal segment very stout with a group of coupling hooks on subdistal medial surface; distal segment basally broad then narrowing rapidly into stylet with a fine medial ridge separating a lateral and medial bladed margin, finally terminating in an acutely pointed apex and attenuated and grooved distally on ventral surface; median sternal plate of second pleomere with straight posterior margin; pleonite 6 posterior margin with six evenly spaced, large, posteriorly directed stout, simple spines.

Species Composition

Neonunga minuta n. sp.

Remarks

The structure of the petasma, particularly of the male pleopod 2, the rows of long spines on both the posterior margin of pleonite 6 are reminiscent of the same structures within both the Psammaspididae and the Raptornungidae. The elongate, triangular shape and straight margins of the telson are also strikingly similar in structure to the Raptornungidae of northern NSW (compared with all other Koonungids) and may represent a possible linkage between the two families

Neonunga minuta n. sp

(Figs. 3.2.32-34)

Type Locality

Carpenteit, Victoria, Australia.

Material Examined

Type Material

Holotype. 1 male, 3mm, J46367, 2 specimens, Carpenteit, from pits by stream, Victoria, Australia, 163m, Zone 54, 697978.89 m E, 5749219.70 m S, Drummond, F. H., 15-January-1958, Soak/stream.

Allotype: 1 female, 4mm, Rego No. J46367, 2 specimens, Carpenteit, from pits by stream, Victoria, Australia, 163m, Zone 54, 697978.89 mE, 5749219.70 m S, Drummond, F. H., 15-January-1958, Soak/stream.

Paratypes: J46368, J46366, Slide Box *Koonunga* Complex Appendages, Carpenteit, *Koonunga*, 6mm, A1, Slide Box *Koonunga* Complex Appendages, Carpenteit, *Koonunga*, 7mm female, Mds left and right, Slide Box *Koonunga* Complex Appendages, Carpenteit, *Koonunga*, Mds left and right, Slide Box *Koonunga* Complex Appendages, Carpenteit, *Koonunga*, 7mm female, A1, 15-January-1958, Collector. Drummond, F. H. Paratypes are all from the type locality.

Etymology

Name refers to the small size of the species compared to other species of Koonungidae.

Diagnosis

Species diagnosis is the same as genus at this time.

Description

Based on holotype male.

Body length of largest male 3mm; body length of largest female 4 mm; body about eight times longer than wide; cephalon approximately equal in length to the first three pereonites combined with a slight notch over the base of each antenna; lateral suture indistinct; pereomeres subequal in length; first five pleonites subequal; pleonite 6 larger; with a row of six prominent stout, simple setae on posterior margin; colouration translucent white with some pale brown pigment on the margins of the pereonites.

Telson length about 0.75 of maximum width; telson with straight lateral margin length 0.29 length of telson; dorsal surface with two lateral and two subdistal stout, pectinate spines; distolateral margin with 10 large, equally spaced pectinate spines; ventral margin with a spine row of about 24 short, distally rounded spines.

Eyes absent.

Antennule length 0.15 of body length; peduncle equal to length of cephalon; medial margin of first segment of peduncle with bristle setae distally and on inner margin of dorsal side; later margin with two penicillate setae and distal to them two to three short plumose setae, one dorsal penicillate seta; second segment of peduncle with smooth and bristle setae on or near the medial margin; two smooth setae dorsally, towards lateral margin and distal to them an oblique row of penicillate setae; third segment of peduncle with smooth medial and apical setae; lateral flagellum with 12 segments with smooth setae and aesthetascs; no antennal organ; medial flagellum with four segments with simple setae.

Antenna about 2/3 length of antennule; peduncle of four segments; second peduncle segment with two smooth setae distally on medial border, one laterally; third segment with one proximal and one apical smooth seta on medial margin, two laterally and four penicillate setae distally; fourth segment with two subapical simple setae rows on medial margin and two smooth setae and one penicillate setae laterally; flagellum with seven segments with simple and penicillate setae.

Labrum rounded margin with lateral setose fringe of fine setules; mandible palp with three segments; second segment nearly three times length of first with two bristle setae on medial surface; third segment with two bristle setae; incisor process dentate edge curved with five to six denticles; molar process covered distally with short fine setae and a tuberculate apical area. Maxillula palp one segmented with two bristle setae; lateral endite with eight to nine spines; maxillula medial endite with one stout spine strongly bristled distally and four smaller bristle setae.

Maxilla four endites; medial endite with two apical bristle setae and long hairs on medial margin; maxilliped similar to *M. calmani* but with fewer setae; coxa with narrow medial lobe; two epipodites, with distal one slightly larger; exopodite lamellate.

Paragnath with two oval lobes with fine setules on the distomedial and medial margin and a large medial basal, anteriorly pointed extension; thoracopods 5 longest in female.

Thoracopod 8 longest in male; coxal lobes small; thoracopod exopodites with peduncle and flagellum with four to five segments; first three thoracopods with two epipodites with the distal one larger; 5-7 thoracopods with the distal epipodites becoming increasingly enlarged.

Pleopods exopodites with peduncle and flagellum with two to four segments; no pleopod on fifth pleomeres.

Pleopod 1 of male endopodite with deep medial groove at base and distally divided into dorsal and ventral lobes; dorsal lobe with medial and lateral expansion with the medial expansion having a distomedial group of coupling hooks and fine setae; the lobe terminates in a narrow, laterally curved process; ventral lobe blunt with fine setae on medial margin.

Pleopod 2 of male endopodite with two segments; proximal segment very stout with a group of coupling hooks on subdistal medial surface; distal segment basally broad then narrowing rapidly into stylet with a fine medial ridge separating a lateral and medial bladed margin, finally terminating in an acutely pointed apex and attenuated and grooved distally on ventral surface; median sternal plate of second pleomere with

straight posterior margin; pleonite 6 posterior margin with six evenly spaced, large, posteriorly directed stout, simple spines.

Uropods protopod slightly shorter than rami; outer margin with a few smooth setae, dorsal surface with two setae having a sparsely dentate shaft and at apex two to three pairs of spinules and a flexible process; endopodite stouter and longer than exopodite; medial margin with basal rows of barbed spines followed by a row of five spines; beyond these are three stout barbed spines and a long plumose seta; lateral margin with dorsal sub-marginal series of penicillate setae; exopodite with plumose setae distally; lateral margin with four upwardly directed spines; telson length 0.75 of maximum width; margin fringed with stout bristle spines; dorsal surface with two pairs of setae of same structure as those on the protopodite of the uropod.

Habitat

The specimens were collected from the subterranean hyporheic zone of a small stream that consisted of a series of spring fed seepage zone pools or swamps connected by a small runnel. The animals were collected by digging a number of pits approximately 30-40cm deep in and adjacent to the pools and *Engaeus* sp. crayfish burrows and sieving the water that collected. The pools contained macrophytes with the benthic layer consisting of fine organic mud as well as coarse sandy gravel. Associated fauna collected with the Syncarida included, snails, copepods, *Heterias* Isopoda, Chironomidae and planarians.

Distribution

This species is currently known from the type locality.

Remarks

Neonunga minuta n. sp. differs from the other genera of the subfamily Drummonunginae principally in the structure of male petasma and the presence of a row of long, stout, simple setae on the posterior margin of pleonite 6. In this last feature it closely resembles *Micraspides calmani*, however, differs by its smaller size, the absence of denticles on the somite of pleonite 6, the reduced number of spines on the medial margin of the uropod endopodite, the stylet shape of the male pleopod 2 and the structure of the paragnath...

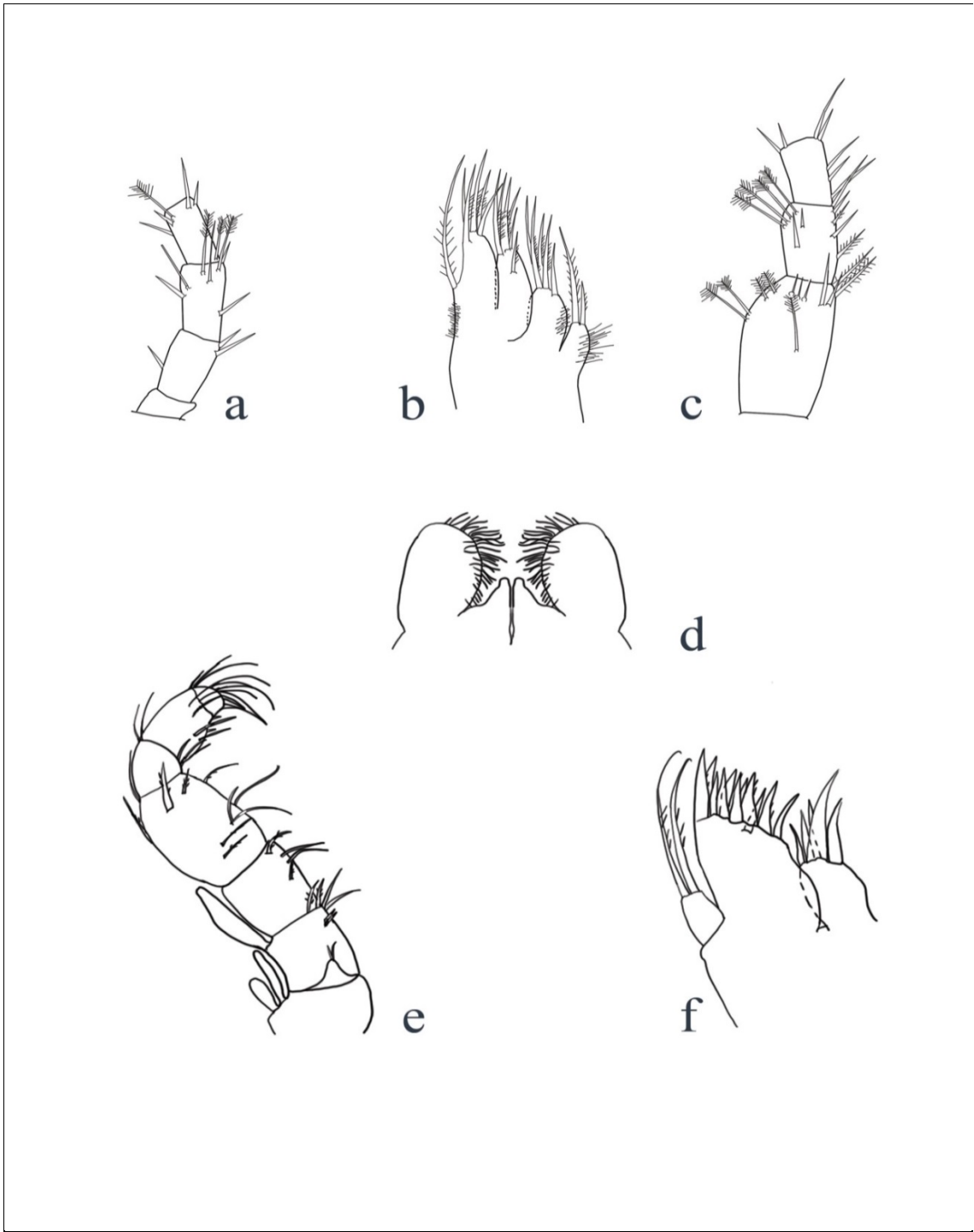


Figure 2.2.32. *Neonunga minuta* n. sp. Holotype male 3mm. Mouthparts: a- A2; b- Mx2; c- Mx1; d- Paragnath; e- Mxp; f- Mx1.

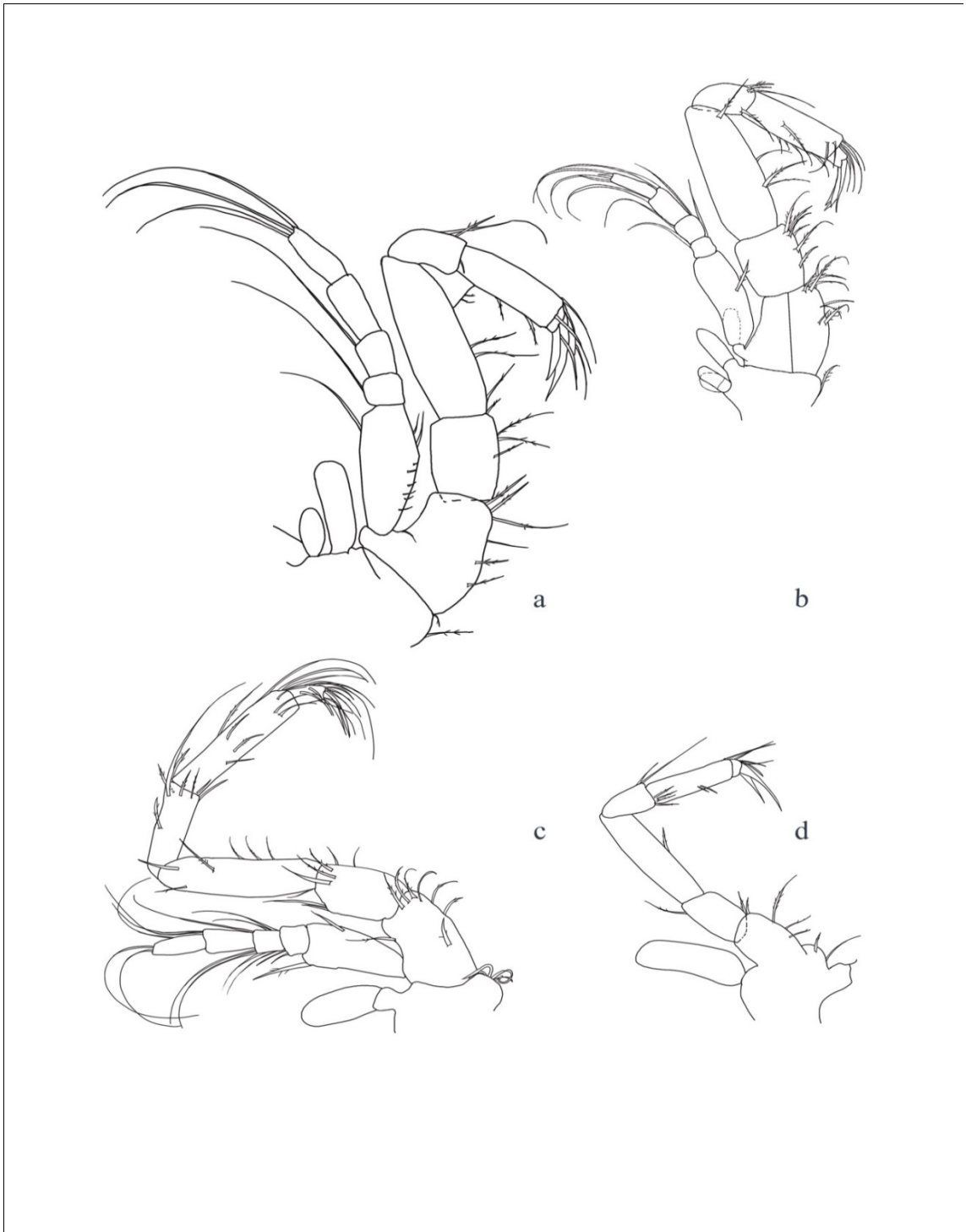


Figure 2.2.33. *Neonunga minuta* n. sp. Holotype male 3mm. Thoracopods: a- Th 3; b- Th 2; c- Th 5; d- Th 7.

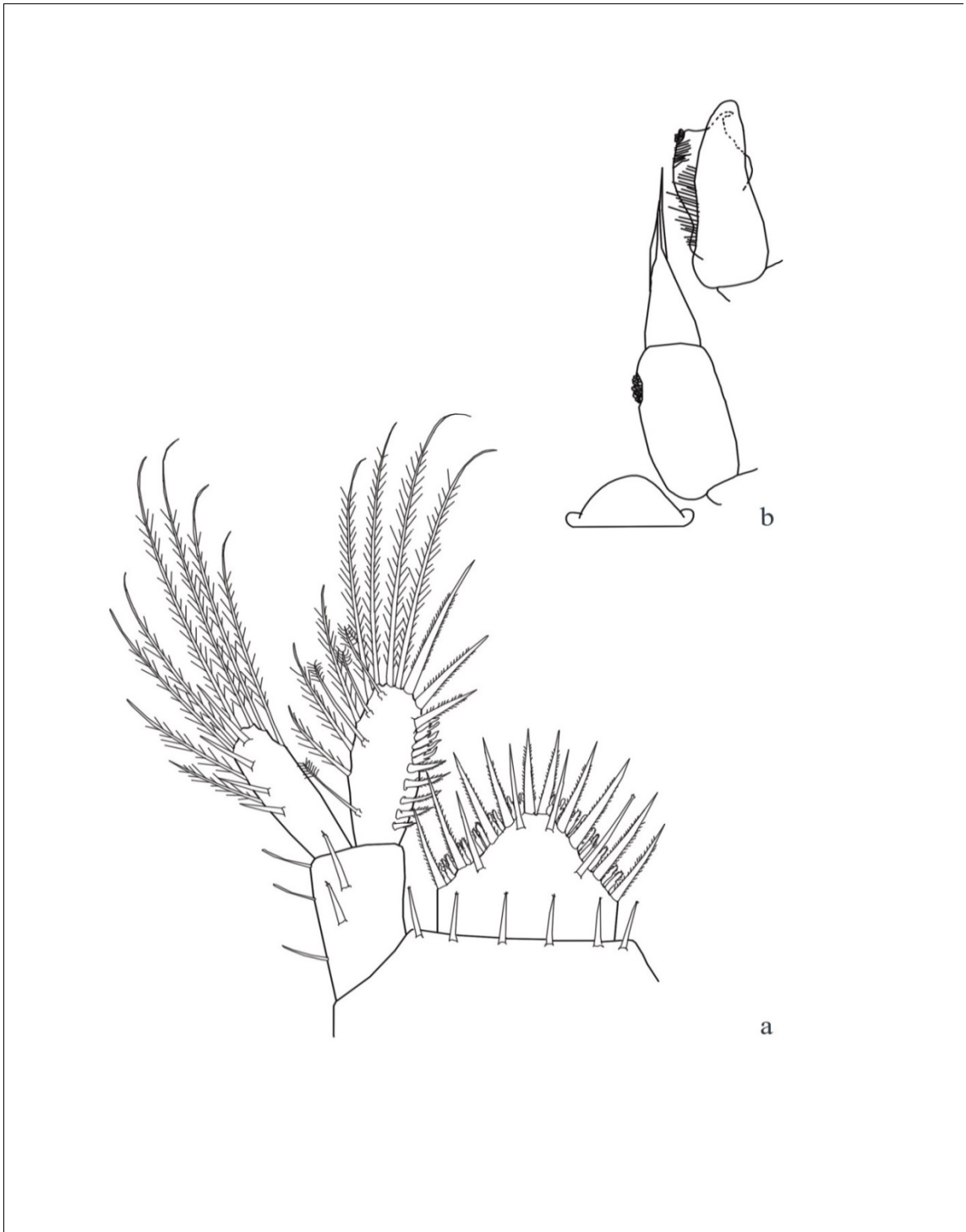


Figure 2.2.34. *Neonunga minuta* n. sp. Holotype male 3mm: a- petasma (P1 1+ P1 2); b- uropod and telson dorsal view.

Genus Pholeteronunga n. gen

Type species

Pholeteronunga silvanensis n. sp.

Etymology

The genus name refers to the association of the species with the pholeteros community, i.e. the aquatic invertebrate community specifically adapted to the subterranean environment within the burrows of the freshwater land crayfish, such as *Engaeus*.

Diagnosis

Body colouration is unpigmented and translucent white when alive; pleonite 6 posterior margin with four lateral, large, posteriorly directed stout, flagellate spines, each with a denticulate shaft and 2 pairs of denticles at base of flagellum;; uropod protopod with three upright flagellate setae; telson triangular with straight lateral margins, four lateral, large, laterally directed stout, spines with terminal flagella on the dorsal surface, 12-13 large, laterally directed stout, plumose spines on the distolateral margin, and nine distal trifold spines and four to five short, distolateral simple spines; maxillula lateral endite with 12-14 spines; medial endite with three pectinate setae and two circumpectinate, one very large; maxilla medial endite with three to four long apical setae and one short subapical seta; pleopod 1 in male single lamellate segment stout, distally, deeply excavated on medial face and bifurcated anteriorly; dorsal lip with broad medial process having retinacular distally and produced into a stout laterally curved process not forming a hook with several rows of minute denticles near the tip; ventral lip narrowed distally and reflected upwards; exopodite with peduncle and flagellum of five segments; pleopod 2 in male with basal segment curving towards the midline with medial, subapical group of coupling hooks; second article stylet shaped narrowing laterally to form a blade, with pointed distolateral extension and acutely pointed apex; sternal keel between the bases of the pleopod two flattened with square distal margin and a low rounded apex.

Species Composition

Pholeteronunga silvanensis n. sp.

Pholeteronunga silvanensis n. sp

(Figs. 3.2.35-37)

Type Locality

Silvan south, Victoria, Australia

Material Examined

Type Material

Holotype: 1 male, 6.2mm, Silvan south, in ephemeral wetland pools, Victoria, Australia, Alt 300m, Zone 55, 361372.90m E, 5811806.80m S, Drummond, F. H., 07-October-1958.

Allotype: 1 female, 8.1mm, from the type locality.

Paratypes: Slide Blue Box, *Koonunga*, Silvan, female, labrum, mandibles, Silvan south, in ephemeral wetland pools, Victoria, Australia, Alt 300m, Zone 55, 361372.90m E, 5811806.80m S, Drummond, F. H., 07-October-1958; Slide Blue Box, *Koonunga*, Silvan, female, left mandible, Silvan south, in ephemeral wetland pools, Victoria, Australia, Alt 300m, Zone 55, 361372.90m E, 5811806.80m S, Drummond, F. H., 07-October-1958; Slide Blue Box, *Koonunga*, Silvan, female, A1, A2, Silvan south, in ephemeral wetland pools, Victoria, Australia, Alt 300m, Zone 55, 361372.90m E, 5811806.80m S, Drummond, F. H., 07-October-1958; Silvan south, in ephemeral wetland pools, Victoria, Australia, Alt 300m, Zone 55, 361372.90m E, 5811806.80m S, Drummond, F. H., 07-October-1958; Slide Blue Box, *Koonunga*, Healesville, female, 1, A2, Healesville, Victoria, Australia, Alt 85m, Zone 55, 366288.71m E, 5830384.65m S, Drummond, F. H., 27-May-1955; Slide Blue Box, *Koonunga*, Sherbrook, female, Antennule, Sherbrook, Victoria, Australia, Alt 477m, Zone 55, 355815.55m E, 5806118.70m S, Drummond, F. H., 24-January-1953; Slide Blue Box, *Koonunga*, Sherbrook, mandible molar area, Sherbrook, Victoria, Australia, Alt 477m, Zone 55, 355815.55m E, 5806118.70m S, Drummond, F. H., 24-January-1953; Slide Blue Box, *Koonunga*, Sherbrook, female, 1, mandible, left, Sherbrook, Victoria, Australia, Alt 477m, Zone 55, 355815.55m E, 5806118.70m S, Drummond, F. H., 24-January-1953; Slide Blue Box, *Koonunga*, Sherbrook, female, A1 & A2, Sherbrook, Victoria, Australia, Alt 477m, Zone 55, 355815.55m E, 5806118.70m S, Drummond, F. H., 24-January-1953.

Other Records

Beenak, Victoria, Australia, Alt 146m, Zone 55, 367761.70m E, 5814535.29m S, Drummond, F. H., 07-October-1958; Healesville, Victoria, Australia, Alt 85m, Zone 55, 366288.71m E, 5830384.65m S, Drummond, F. H., 27-May-1955; Warramate Hills, Victoria, Australia, Alt 85m, Zone 55, 367960.09m E, 5822480.32m S, Drummond, F.H., Unknown date.; Lysterfield, Victoria, Australia, Alt 120m, Zone 55, 351328.96m E, 5799849.62m S, Drummond, F. H., Unknown date.

Etymology

Species named after the type locality of Silvan.

Diagnosis

Species diagnosis is the same as genus at this time.

Description

Based on holotype male.

Body size of males 4.8-6.4mm in length; body size of females 6.0-8.1mm in length; body colouration is unpigmented and translucent white when alive; body 7:1 longer than wide smallest specimens were 3mm long, sexual differentiation occurs at 3.5mm when the endopodite of the second pleopods appear as a small lobe; in male 4-4.5mm the endopodites are differentiated and the antennal organ is visible as a bulge but without cups.

Cephalon anterior margin of cephalon rounded, slightly emarginated, with a shallow notch above the base of the antenna; short lateral mandibular sulcus; pereon segments subequal; pleon segments 1-5 subequal; pleonite 6 longer than others.

Telson triangular with straight lateral margins, four lateral, large, laterally directed stout, spines with terminal flagella on the dorsal surface, 12-13 large, laterally directed stout, plumose spines on the distolateral margin, and nine distal trifold spines and four to five short, distolateral simple spines.

Antennule about half length of body; segment 1 of peduncle with two to three sparsely pectinate setae distally on the medial margin; segment 2 with two sparsely pectinate setae on the medial margin; lateral flagellum with 15-17 segments; antennal organ arising at the junction of the first and second segments; aesthetascs present on all segments, except for the first; medial flagellum with six segments, the first with a small flange having three to four pectinate seta.

Antenna two thirds length of antennule; segment 1 of peduncle with a subapical pectinate setae medially; one simple setae laterally and four dorsally; segment 2 of peduncle with two setae simple or pectinate medially and dorsolaterally; flagellum of 12-13 segments; the first and second segments with plumose setae.

Mandible palp with three segments, the second twice length of first with four to six pectinate setae; third segment with four pectinate setae; incisor process with six denticles on left mandible and five on right; molar process setose distally with prominent tuberculate apical area.

Maxillula palp with three apical pectinate setae; maxillula lateral endite with 12-14 spines; medial endite with three pectinate setae and two circumpectinate, one very large.

Maxilla medial endite with three to four long apical setae and one short subapical seta; fine hair setae on medial surface; other endites with simple and pectinate setae.

Maxilliped carpus and propodus with strong pectinate setae; dactylus with four stout claws; coxa with prominent triangular lobe with three pectinate setae; two epipodites; exopodite lamellar. Thoracopod 2

with two epipodites; thoracopod 2 longest of series; dactylus with three claws, outer claw twisted; peduncle of exopodite with one to two simple or sparsely pectinate setae on upper and lower margins; flagellum of five segments thoracopods 2-5 each with one epipodite; thoracopod 6 with two epipodites, with one much reduced in size; coxal lobes small with one seta; thoracopods 2-5 showing progressive reduction in length and setation; dactyl claws more elongate and straight; flagellum of exopodite with six segments; thoracopod 6 without comb on carpus; thoracopod 7 as long as thoracopod 2; setation much reduced; dactylus outer claw minute. Pleopod 1 in male single lamellate segment stout, distally, deeply excavated on medial face and bifurcated anteriorly; dorsal lip with broad medial process having retinacular distally and produced into a stout laterally curved process not forming a hook with several rows of minute denticles near the tip; ventral lip narrowed distally and reflected upwards; exopodite with peduncle and flagellum of five segments.

Pleopod 2 in male with basal segment curving towards the midline with medial, subapical group of coupling hooks; second article stylet shaped narrowing laterally to form a blade, with pointed distolateral extension and acutely pointed apex; sternal keel between the bases of the pleopod 2 flattened with square distal margin and a low rounded apex; pleopods 3-5 with small peduncle and five segments on third and fourth and three on fifth segment; pleonite 6 posterior margin with four lateral, large, posteriorly directed stout, flagellate spines, each with a denticulate shaft and two pairs of denticles at base of flagellum.

Uropod protopod with three upright flagellate setae; five to six simple or sparsely pectinate setae on lateral margin and three plumose setae medially; endopodite 1.5:1 as wide as exopodites; inner margin with prominent row of four to five pectinate setae, a distal row of four to five trifold setae, three subapical pectinate setae; distally and laterally fringed with plumose setae; dorsal surface with subequal series of plumose setae, four apically and five laterally; exopodite borders with plumose setae and submarginal series of four to six upright weakly pectinate setae; ventral surface with two to three simple setae on medial margin and a plumose seta apically and one approximately mid length.

Female differences from male: antennule lateral flagellum with 19-20 segments; no antennal organ; medial flagellum with flange; dactylus of thoracopods occasionally with a stout small slender fourth claw, outer claw not twisted; thoracopod 4 as long as 1; basis with two setae near upper margin; ischium with subapical group of three setae near upper margin; following segments more setose than adjacent thoracopods; claws subequal; coxal lobe with two strong setae and a few short fine setae; coxal lobe of thoracopod large, lower lip of genital opening with four long setae and a surface fuzz of minute setae; coxal lobe of thoracopod 6 with eight to nine long setae and a number of short ones mainly directed upwards towards the space between the two coxae.

Habitat

The type locality is a forested hillside with dense undergrowth near Silvan South. The collections were made from shallow pools under a fallen tree. These pools were also associated with many crayfish

burrows. Larger collections were also made from pits of unknown origin which were between 0.5m and 0.75m deep.

Distribution

The species is confined to the type locality with the genus occurring across the area encapsulating Silvan, Healesville, Sherbrook, Beenak, Lysterfield, Warramate Hills in Victoria with the possibility of 5-10 additional species.

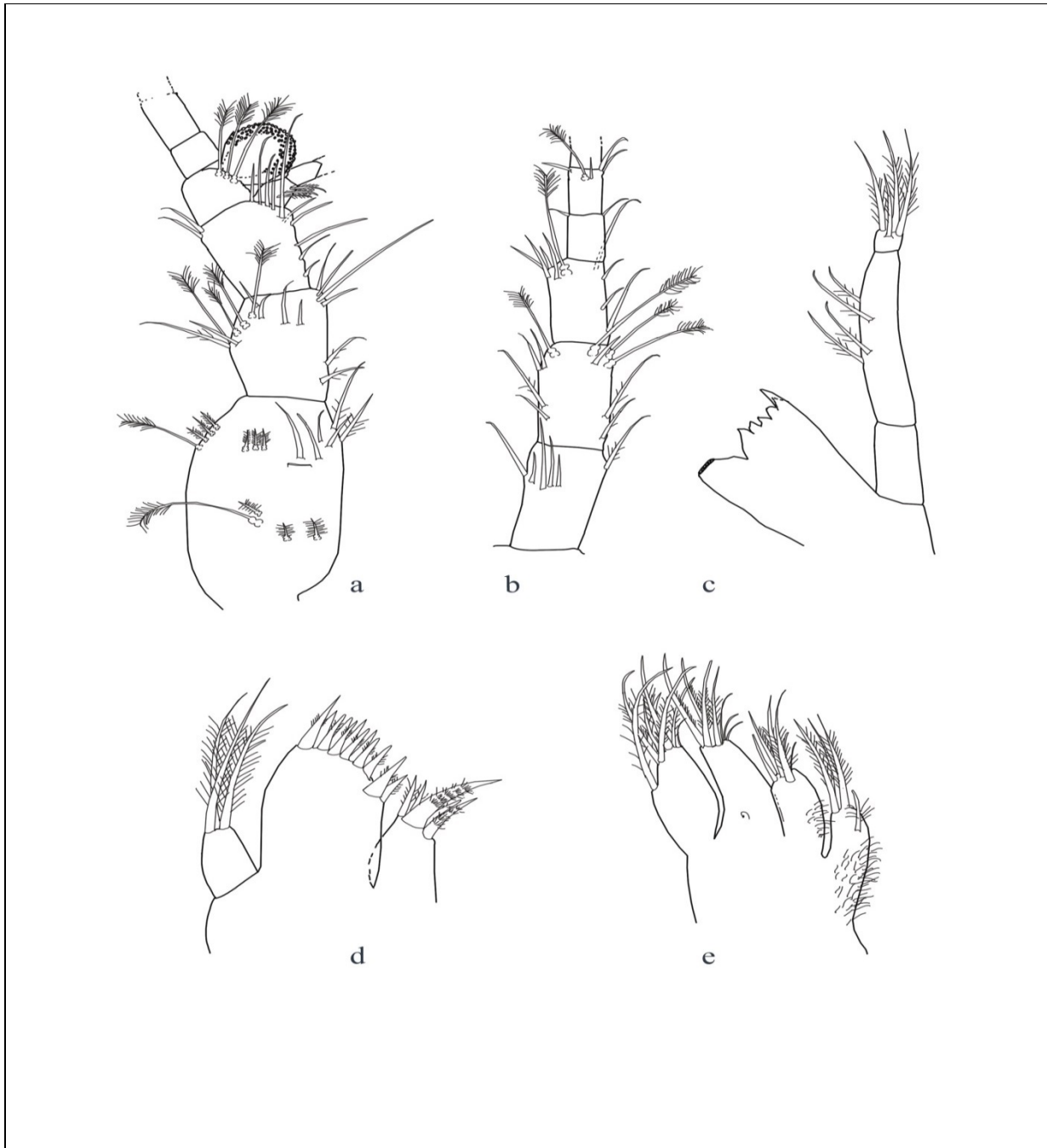


Figure 3.2.35. *Pholeteronunga silvanensis* n. sp. Holotype male 6.4mm. Antennae: a- A1; b- A2; Mouthparts: c- mandible; d- Mx1; e- Mx2.

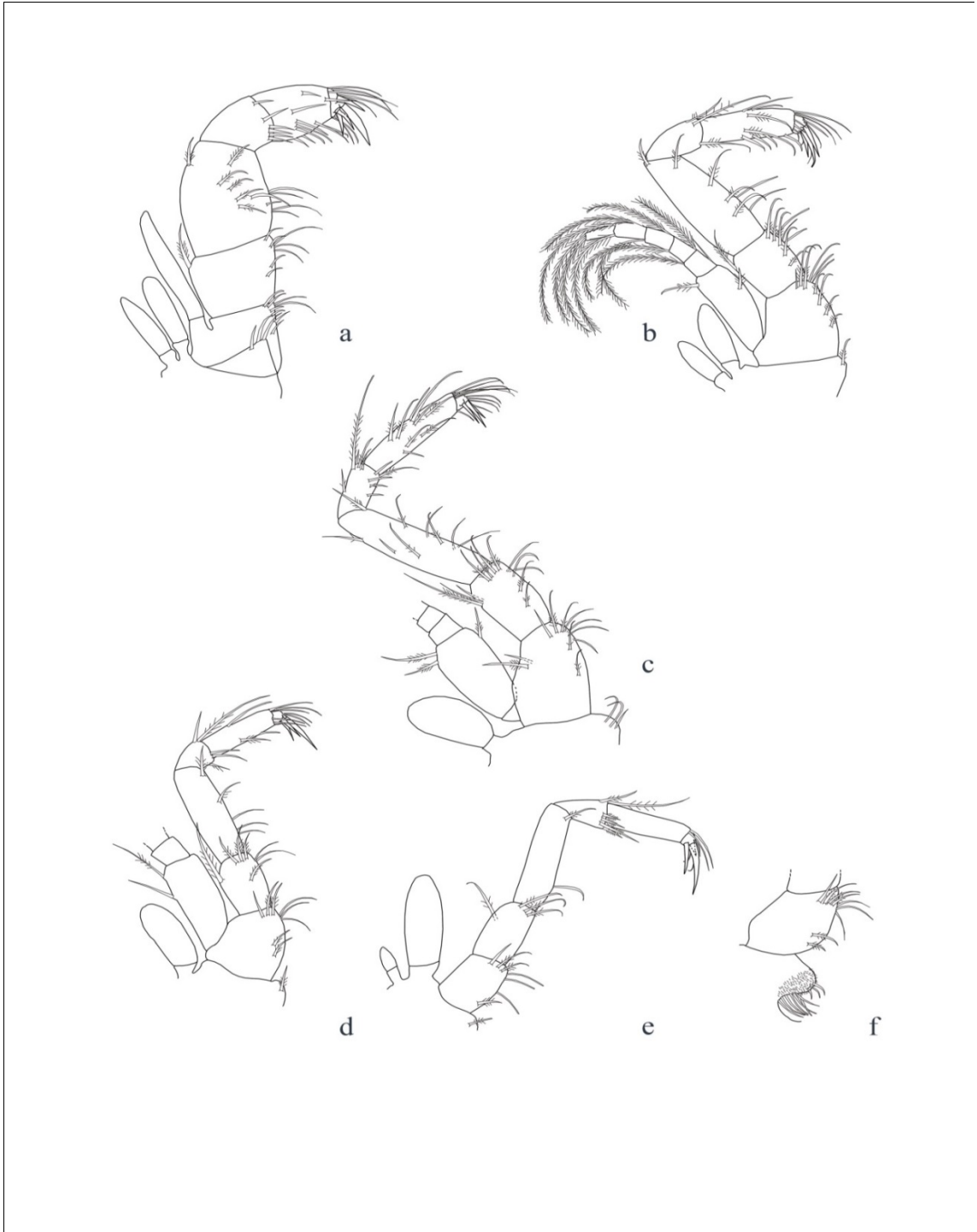


Figure 3.2.36. *Pholeteronunga silvanensis* n. sp. Holotype male 6.4mm. Thoracopods: a- Mxp; b- Th 2; c- Th 2; d- Th 6; e- Th 7; f- Th 7 coxal lobe.

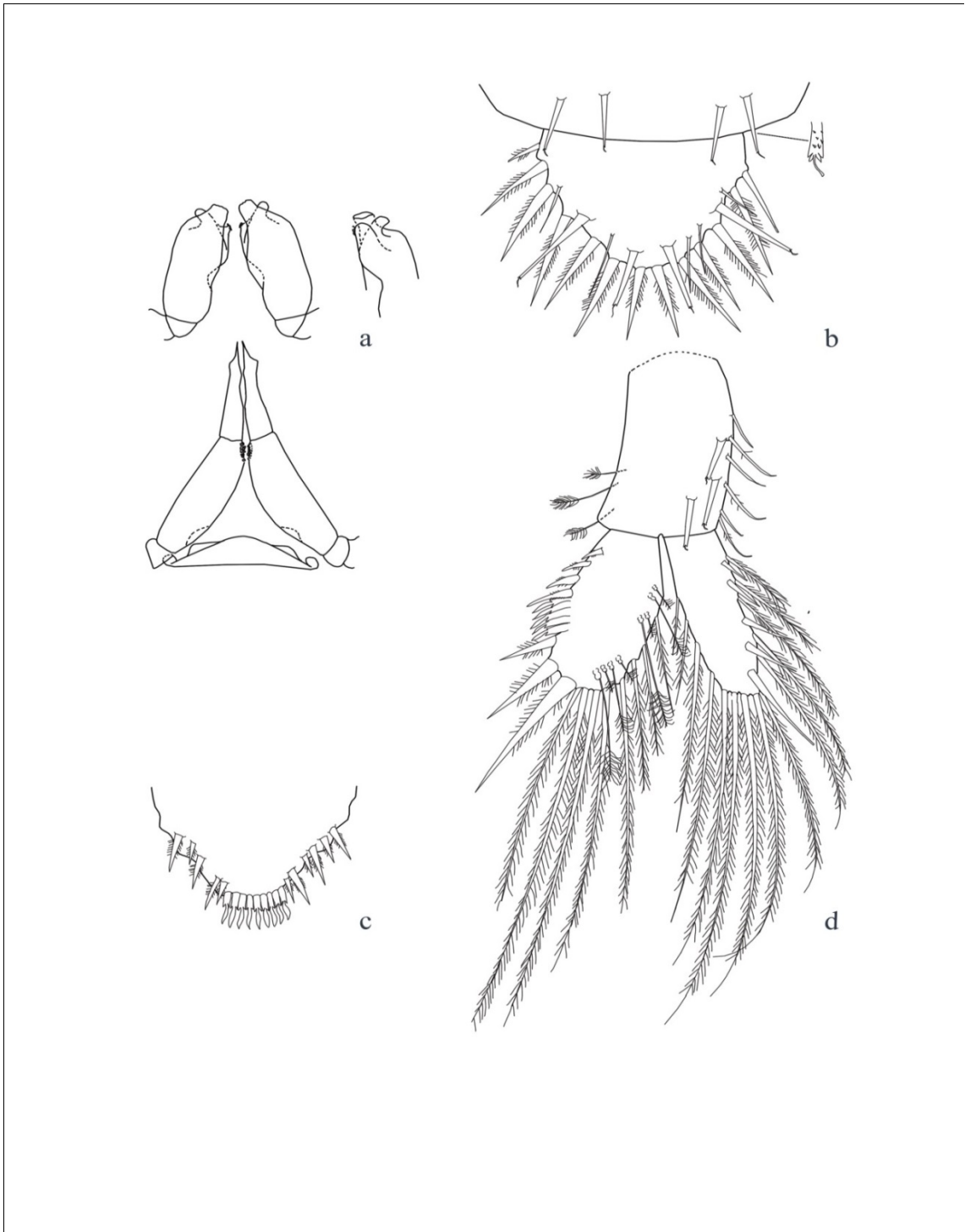


Figure 3.2.37. *Pholeteronunga silvanensis* n. sp. Holotype male 6.4mm: a- petasma with enlargement of distal tip PI 1; b- telson dorsal view; c- telson ventral view; d- uropod.