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A new species of *Pentaceration* (Paramunnidae, Isopoda, Crustacea) from the Otago region of Aotearoa New Zealand

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A new paramunnid species, *Pentaceration forkandbrewer* sp. nov., is described from Otago, Aotearoa New Zealand (Otago region). The majority of specimens examined were collected during a "Ports of Otago" survey carried out by the National Institute of Water and Atmospheric Research Ltd., Christchurch. *Pentaceration forkandbrewer* sp. nov. can be identified by the following characters: by the lack of dorsal protuberances, the reduced mid-head spine and the flattened, and calcified pereon with serrated margins. All the pereonites end in a point and are reasonably broad. *Pentaceration forkandbrewer* sp. nov. is most similar to the Australian species *P. serrata* and the Argentinian species *P. pleonarietis*. The new species is described, and an adapted key to the *Pentaceration* species of Aotearoa New Zealand is provided.

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KEYWORDS

Isopoda, *Pentaceration*, New Zealand, Paramunnidae, species

1 Introduction

Pentaceration Just, 2009 is a species-rich genus in the family Paramunnidae (Vanhöffen, 1914) containing 23 species, including this current new species. It is the most species rich genus in the family and primarily has a Gondwanan distribution (Just, 2009, 2011; Kaiser and Marnier, 2012), with all but one species recorded from Australian and Aotearoa New Zealand waters. This genus generally occurs from shallow, coastal waters to depths of approximately 5,500 m. This is a large genus established by Just in 2009. In that paper, the genus was established along with two new species. This was followed up by a large 2011 monograph by Just describing another 18 species from Australia and New Zealand. Subsequent work has included one new species from New Zealand (Kaiser and Marnier, 2012) and one species from Argentina (Doti, 2017).

In New Zealand waters, there are seven species including the species described here. These are *Pentaceration bifficyro* Kaiser and Marnier, 2012, *P. curvicornis* Just, 2011,

P. dentifera Just, 2011, *P. epipedos* Just, 2011, *P. forkandbrewer* sp. nov., *P. novaezealandia* Just, 2011, and *P. setosa* Just, 2011, with an eighth species on the edge of New Zealand's Exclusive Economic Zone, *P. kermadecia* Just, 2011.

Pentaceration species are often distinctive in appearance and sometimes extremely sculptured. There appears to be two main groups of species within this genus: those with a row of dorsal projections and those who are smooth dorsally. Here, we describe a new species of *Pentaceration* from the Otago coast of the South Island of New Zealand, collected from shallow water. This new species is compared to both the New Zealand fauna and the global *Pentaceration* fauna in general. A key to the New Zealand species of *Pentaceration* is also provided.

2 Materials and methods

The material was obtained from a series of collections for an environmental assessment of the impact of dredging over time conducted every three years in the Otago port region (Seaward et al., 2021). The specimens were identified as being new to science through the use of Just, (2009, 2011) and Kaiser and Marner (2012).

Dorsal illustrations were conducted of specimens in glycerine. The female holotype and one male paratype were dissected and the appendages fixed in glycerine. Pencil drawings were made using a Zeiss Axioskop 2 compound microscope with a camera lucida. These drawings were inked using pens and drawing film, scanned and plates were arranged using a Wacom Intuos 4 drawing board using Adobe Photoshop CS software. In addition, scanning electron microscope (SEM) pictures were taken of a paratype female and a paratype male to examine micro-structural features. Assessment of length:width ratios and the terminology follows methods proposed by Just and Wilson (2004, 2006) and Just (2009); the length provided for specimens under examined material is given as total body length in mm taken. Additionally, lateral pereonite spine length is measured from the point, where pereonites diverge from each other, to the distal tip. Furthermore, the length of distal projection of the pleotelson is measured from the insertion of the uropods to the posterior tip. The terminology of the setation follows Riehl and Brandt (2010).

The type materials, including those used for SEM images, are deposited at the National Institute of Water and Atmospheric Research Ltd. (NIWA), Wellington (New Zealand) (NIWA173287 – 90).

Abbreviations used in text and figures include the following: A1, antennula; A2, antenna; Mx1, maxilla; Mx2, maxillula; Mxp, maxilliped; MdR, right mandible; Op, operculum; PI–VII, pereopods I–VII; Plp1–5, pleopods 1–5; Urp, uropods; NIWA, National Institute of Water and Atmospheric Research Ltd.

3 Results

3.1 Genus composition

3.1.1 Composition

Order ISOPODA Latreille, 1817

Suborder ASELOTA Latreille, 1802

Paramunnidae Vanhoeffen, 1914

Pentaceration Just, 2009

Synonyms: *Janirella*? sp. Gamō, 1987: 44

Type species: *Pentaceration bassiana* Just, 2009, by original designation.

Species composition. *P. bassiana* Just, 2009, *P. bifficyro* Kaiser and Marner, 2012, *P. bifida*, Just, 2011, *P. bovicornis* Just, 2011, *P. curvicornis* Just, 2011, *P. denticornis* Just, 2011, *P. dentifera* Just, 2011, *P. epipedos* Just, 2011, *P. globopleonis* Just, 2011, *P. kermadecia* Just, 2011, *P. lancifera* Just, 2011, *P. magna* Just, 2011, *P. megalomos* Just, 2011, *P. novaezealandia* Just, 2011, *P. omalos* Just, 2011, *P. pleonarietis* Doti, 2017, *P. rihotalassa* Just, 2011, *P. serrata* Just, 2011, *P. setosa* Just, 2011, *P. simplex* Just, 2011, *P. spinosissima* Just, 2009, *P. tasmaniensis* Just, 2011.

3.1.2 Genus distribution

South-East Australia, Arafura Sea, Kermadec Trench, New Zealand, and associated sub-Antarctic islands; Argentine Sea, South-West Atlantic. 7–5340 m.

3.1.3 Genus diagnosis

(After Just, 2009). Head frontal margin between antennulae with 1 median forward pointing spine and 2 lateral spines pointing forward and outward at ~60° angle to the head midline. Eystalks elongate, spine-like, or distally rounded, with or without ommatidia. Coxae not visible in dorsal view. Pereonites with lateral spines of varying length, pereonite 1 often rounded laterally; width of pereonite 4 reduced compared with 3 and 5. Pleotelson lateral margins serrate. Mandible palp present, stubby with bean-shaped article 3, molar process triturate, distally flared. Pereopod I carpus with 2 straight robust setae on posterior margin; propodus with robust and simple setae on margin opposing carpus. Uropods inserted dorsally just inside pleotelson margin, uniramous or biramous, protopod recessed, exopod distinctly developed, vestigial, or absent.

3.1.4 Genus remarks

Due to the high morphological diversity in this genus, there have been numerous comments and discussions regarding the possibility of splitting the genus based on apparent apomorphies. These include: presence/absence of a middorsal spine on pereonites 1 – 7: present in *P. spinosissima*, *P. denticornis*, *P. curvicornis*, *P. lancifera*, *P. omalos* and *P. magna* and absent in the other species (Just, 2011); the state of presence/vestigial/absence of the uropod exopod: obviously present – *P. bifficyro* and *P. magna*; vestigial/reduced – *P. bassiana*, *P. bovicornis*, *P. kermadecia*, *P. rihotalassa*, *P. spinosissima* or absent – all remaining) (Kaiser and Marner, 2012); and the shape of the pleotelson: lateral margins diverging with distolateral corners hooked inwards – *P. rihotalassa*, *P. bassiana*; possessing an elongated distal projection – *P. bifficyro*, *P. denticornis*, *P. lancifera*, *P. omalos*, and *P. spinosissima* (Doti, 2017); two anterolateral processes curved backwards – *P. pleonarietis*; possessing a short distal projection – all remaining (Doti, 2017). It is evident by the variety and distribution of states that no clear set of characters can divide the genus.

3.2 Proposed species

3.2.1 New species

Pentaceration forkandbrewer sp. nov.

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Figures 1–5

3.2.2 Material examined

Holotype, female, 1.0 mm, NIWA 173287, station AB C4, Blueskin Bay, Otago, 45°39.044736' S 170°48.873858' E, 25 m, collectors: NIWA.

Paratypes: male, 1.5 mm, NIWA 173288, female, 1.5 mm, NIWA173289 (SEM), male, 1.0 mm, NIWA173289 (SEM), same collection data as holotype.

Additional material examined. 1 female (1.5 mm), 1 male (1.0 mm), 1 juvenile (0.5 mm), NIWA173290, same collection data as holotype.

3.2.3 Etymology

The name *forkandbrewer* is derived from the craft beer brewery “The Fork and Brewer” in Wellington New Zealand. During the Tenth International Crustacean Congress held in Wellington May 2023, a ‘most crustiest craft beer’ competition was run by the conference organisers, the various beers were judged by the delegates of the conference and the general public with the reward being the naming of a species after the brewery. Fork and

Brewer won with an interesting stout beer. The species name is used as a noun in apposition.

3.2.4 Diagnosis

Head, cephalothorax without functional eyes; frontal margin mid-spine broad and rounded with small acute point, lateral spines narrower and longer from head than anterior projection, sinuous in shape, curving anteriorly ending in an acute point. Lateral spines diverging at approximately 115°, all three projections with denticulate margins, stronger on the anterior margins. Eyestalks shorter than the lateral margins of pereonite 1, pointing almost laterally (~10°), distally rounded, without ommatidia. Pereonites 1–7 without mid-dorsal projections; pereonites 1–7 laterally pointed and projecting, pereonite 4 shorter than all the others, pereonite 7 angled posteriorly; lateral margins of all pereonites denticulate. Pleotelson roughly triangular, no hooked projection; lateral margins denticulate; apex rounded or subacute.

Antenna article 3 slender but slightly rounded. Pleotelson subtriangular, with numerous lateral denticles; distal projection reduced, length less than half pleotelson length. Operculum ovoid, with several (14) setae medially. Uropods uniramous inserting dorsolaterally in cuticle fold of the pleotelson, tipped with 4 setae each.

3.2.5 Description

Based on holotype female, 1.0 mm, NIWA 173287.

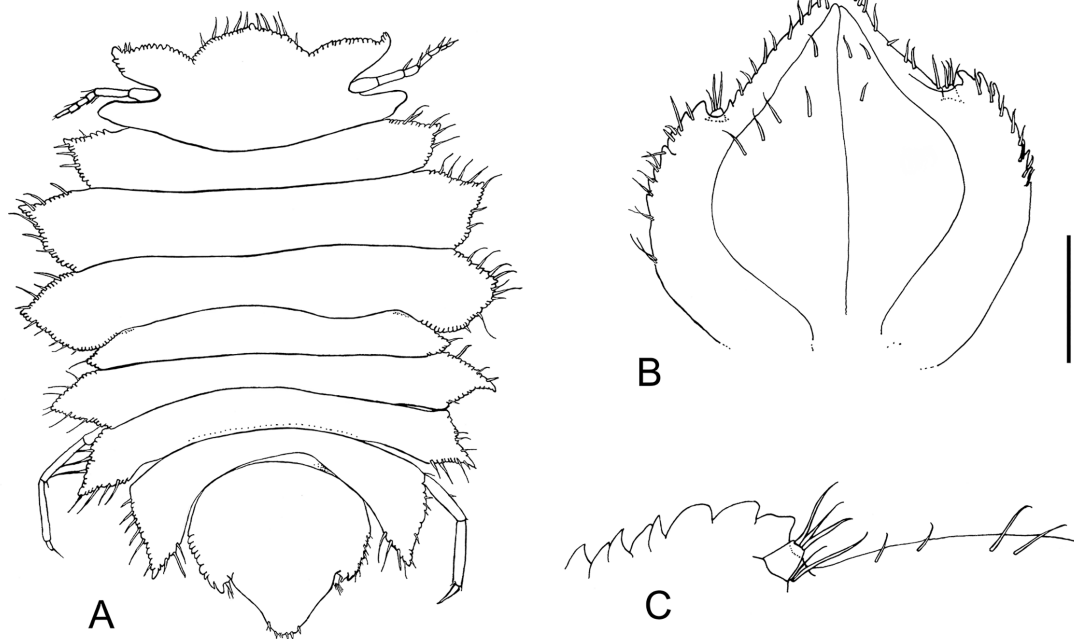


FIGURE 1

Pentaceration forkandbrewer sp. nov., holotype, female, NIWA 173287, 1.0 mm, Otago, New Zealand. (A) Habitus-dorsal. (B) Pleotelson, ventral view. (C) Close-up of uropod, ventral view. Scale represents 0.1 mm.

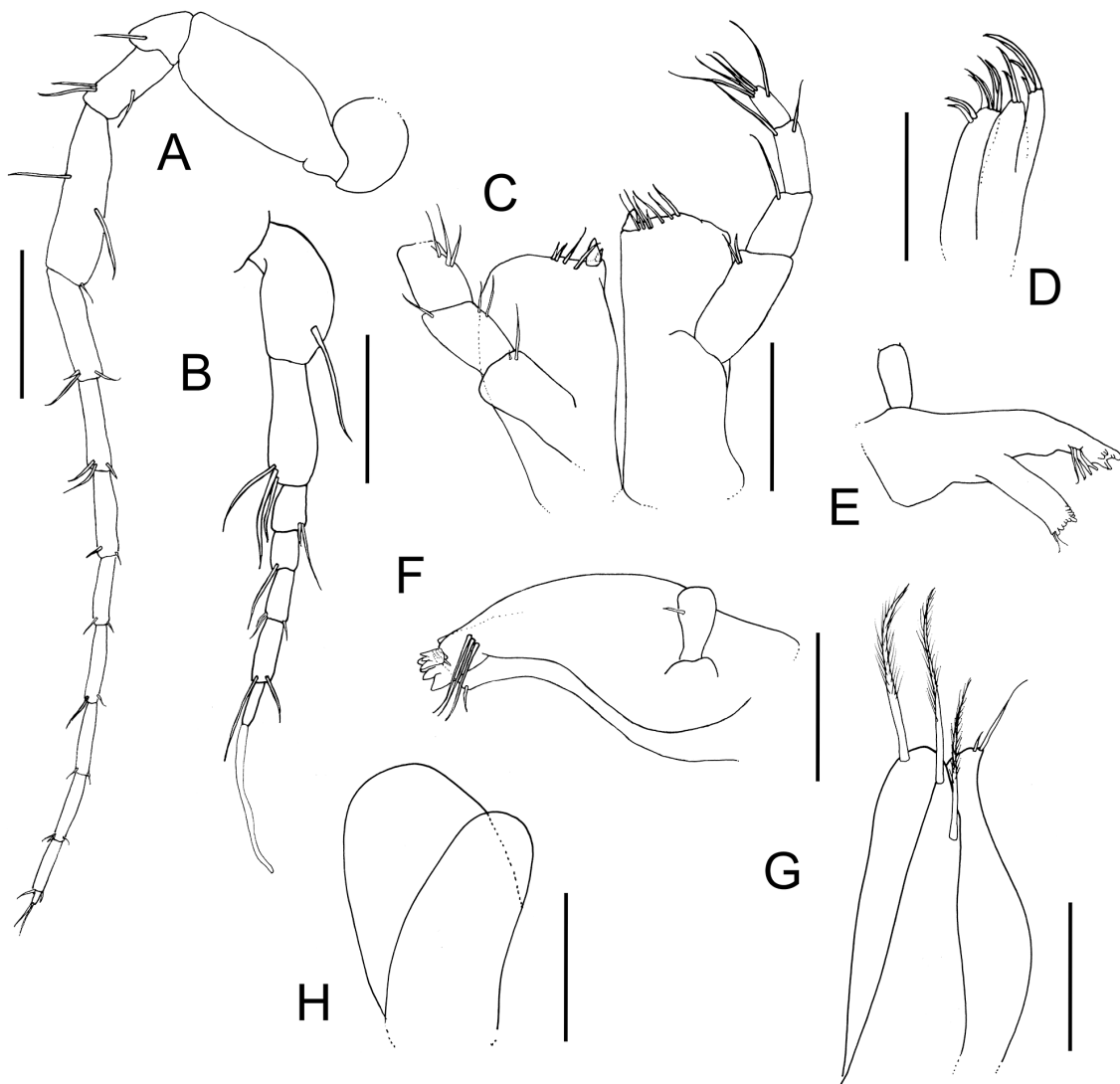


FIGURE 2

Pentaceration forkandbrewer sp. nov., holotype, female, NIWA 173287, 1.0 mm, Otago, New Zealand. (A) Antenna. (B) Antennula. (C) Maxillipeds, ventral view. (D) Left Maxillula. (E) Left mandible. (F) Right mandible. (G) Pleopod 3. (H) Pleopod 5. Scales represent 0.1 mm.

Head and body: body dorsoventrally flattened, ovoid almost rounded, width 0.61 times length, widest between pereonites 2 and 3; pereonites 1–7 length ratio: 1: 1.6: 1.4: 1.2: 0.9: 0.8: 0.85; pereonite 1–7 lateral margins broad, ending in an acute tooth/process, with denticles of varying size and intermittent setae; pereonites 2–6 with acute lateral spines; lateral spines of pereonite 3 and 7 longest, though pereonite 7 curved and directed posteriorly; pereonite 4 by far the shortest. Pleotelson oval, with numerous lateral denticles; length just under one-third body length; distal projection short and broad, length less than half pleotelson length.

Cephalothorax: Head length $0.3 \times$ width; length approximately $0.15 \times$ body length, no mid-dorsal spines. Eystalks length approximately $2 \times$ width, smooth without denticles, lateral projections and mid-cephalic projection with several lateral denticles and few small, simple setae in between; insertion of eystalks approximately 0.4 from posterior margin and 0.5 from anterior margin; eystalk length $1.7 \times$ mid-cephalic spine length,

about 0.3 cephalothorax width; lateral spine length 0.4 cephalothorax width, $2 \times$ mid-cephalic spine length.

Pereonites 1–7 lateral margins sinuous and distinctly projecting; all pereonites marginally denticulate; coxae not visible in dorsal view. Pereonites 2–3 lateral spines diverging from each other at around 108° .

Antennula: length $0.17 \times$ body length, with 7 articles; first article twice as long as wide, with 1 long simple seta subdistally; second article long and slender, $0.82 \times$ length of article 1, about $2.5 \times$ longer than wide, with 3 simple setae of equal size distally; third article slightly longer than fourth ($1.15 \times$) and about $0.37 \times$ article 2, fourth article about $0.3 \times$ of article 2 length; article 4 with 1 short simple seta distally; article 5 about $0.43 \times$ length of article 2, $2.5 \times$ longer than wide, with 2 simple setae distally; article 6 $1.3 \times$ length of article 5, with 2 long, simple setae distally; article 7 $0.7 \times$ article 6 and with 1 aesthetasc and 1 tiny simple seta terminally.

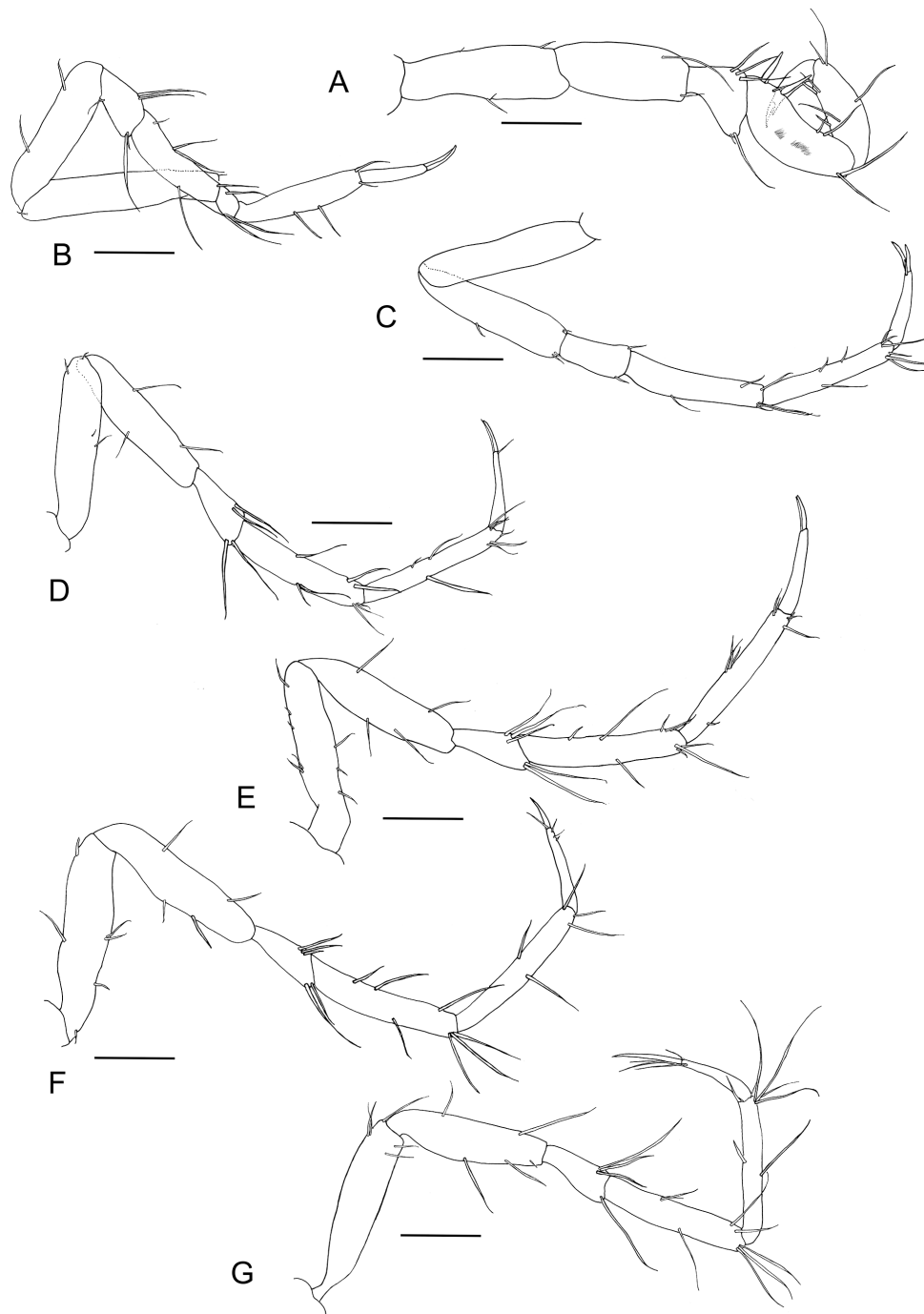


FIGURE 3

Pentaceration forkandrewer sp. nov., holotype, female, NIWA 173287, 1.0 mm, Otago, New Zealand. (A) Pereopod I. (B) Pereopod II. (C) Pereopod III. (D) Pereopod IV. (E) Pereopod V. (F) Pereopod VI. (G) Pereopod VII. Scales represent 0.1 mm.

Antenna: length approximately $0.4 \times$ body length, with 6 peduncular and 9 flagellar articles (peduncular article 1 broken off); peduncular article 3 long and slightly expanded, $2.6 \times$ longer than wide, without setae; peduncular article 4 short and subtriangular, length $0.2 \times$ of article 2, as long as wide, with 1 simple seta; peduncular article 5 medium length and slender $1.8 \times$ article 4, $2.4 \times$ longer than wide, with 3 lateral setae; peduncular article 6 long and slightly expanded, length $2.0 \times$ article 5, $3.75 \times$

longer than wide, with 2 long slender setae laterally, and one small seta distally; flagellar article 1 slightly longer than article 2 ($1.15 \times$), together about as long as peduncular article 3, each with 3 simple setae distally; flagellum articles 3 and 4, and 5 and 6 of similar length, gradually getting shorter than flagellum article 1, each with 1–3 simple setae distally; flagellum articles 7–9 length decreasing distally; flagellum article 7 somewhat shorter than article 6, with 3 short simple setae; flagellum article 8 with 4 simple setae distally;

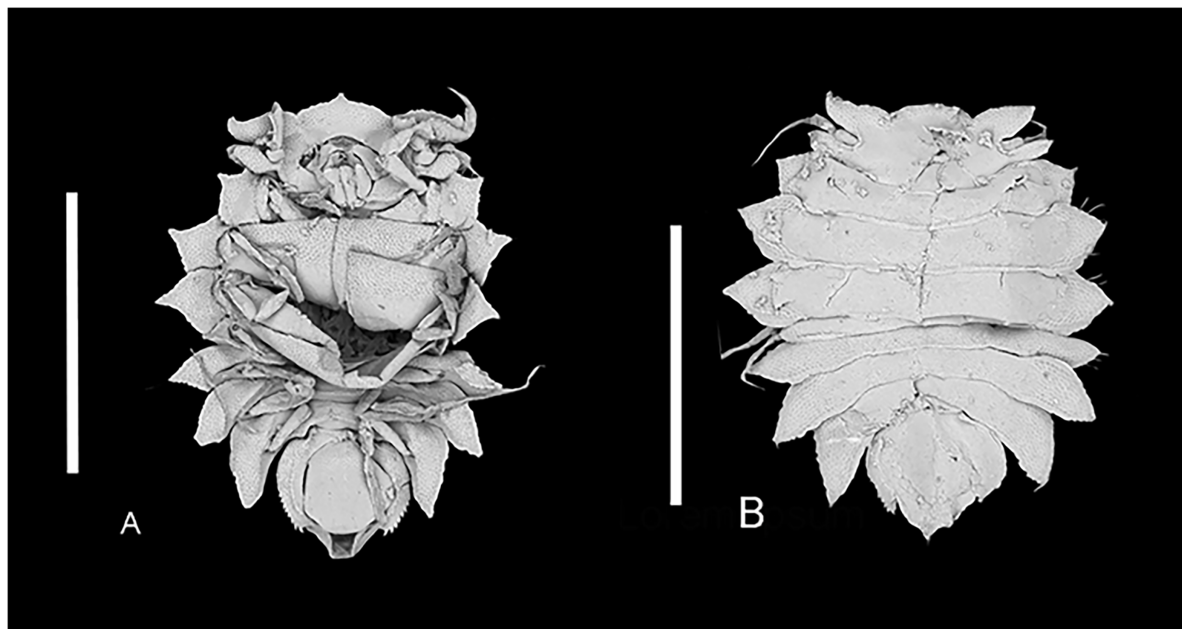


FIGURE 4

Pentacertion forkandbrewer sp. nov. (A) Paratype, female, NIWA 173289, 1.5 mm. Otago. Ventral view (SEM). (B) Paratype, male, NIWA 173289, 1.5 mm, dorsal view (SEM). Scales represent 1.0 mm.

flagellum article 9 short, about $0.25 \times$ article 8 with 2 long, slender setae terminally.

Maxillula: outer endite with 10 strong spine-like setae distally, with small slender setae on outer margin; inner endite slender; width about half outer endite width; length $1.2 \times$ outer endite length, with 3 robust setae and 2 slender simple setae distally.

Maxilla: lateral endite slightly shorter than inner endite; lateral and medial endite each with 3 long, strong setae terminally; inner (medial) margin and ventral surface of inner endite with several setae of varying size, with 7 setae distally.

Mandible: palp on both mandibles broken to one article; incisor process with 5 teeth, lacinia mobilis with 2 cusps; setal row with 4 long robust setae, distal one dentate, dentation and robustness of setae decreasing proximally; molar process elongated and cylindrical, with several teeth and few simple setae distally.

Maxilliped: left and right maxilliped connected by 2 retinacula; epipod smooth, twice as long as wide, reaching mid-length of palpal article 3, outer lateral margin weakly convex, inner margin slightly curved; palpal article 1 short, as long as wide; palpal article 2 $1.4 \times$ as long as article 1 length, longer than wide, with 1 short and 1 long robust setae on inner margin; palpal article 3 slightly shorter ($0.88 \times$) than article 4, length $1.6 \times$ article 1 length, with 8 strong, long setae medially and laterally; palpal article 4 as long as article 3 and article 5, article 4 $2.5 \times$ longer than wide, with 3 long, slender setae; palpal article 5 about $1.56 \times$ as long as article 1, with 3 slender simple setae terminally; endite reaching midlength of palpal article 3, with 2 feathered three-lobed fan setae distally, with several simple setae of varying size on posterior margin and 1 plumose seta medially.

Pereopod I: more robust than pereopods 2–7; basis $3.0 \times$ longer than wide, with 2 small slender setae on posterior margin and one small slender seta on the anterior margin; ischium length $0.88 \times$

basis length, $2.3 \times$ longer than wide; with 1 long slender simple seta on the posterior margin; merus length $0.45 \times$ ischium length, flask/triangular shaped, as wide as long (at the widest point), with 1 long and 1 small slender simple seta on the disto-anterior margin, and with 3 long slender simple setae on posterior and distal margin; carpus curved, rectangular shape, anterior margin convex and posterior margin concave, length $2.0 \times$ merus length, about $2.4 \times$ as long as wide; with 2 long slender setae on the distal anterior margin, with 2 long, robust setae on the proximal half of the posterior margin and 2 long slender simple setae on the distal half of the posterior margin; propodus length $0.8 \times$ carpus length, $2.6 \times$ longer than wide; with 1 long slender simple seta on anterior margin, with 2 long, slender setae distally, with 2 small robust setae and 4 slender simple setae on the posterior margin; dactylus $0.8 \times$ propodus length, $4.6 \times$ as long as wide, without setae, unguis about half the length of dactylus, ventral claw about half length of unguis.

Pereopod II: basis $5.1 \times$ longer than wide, with 2 short simple setae on posterior margin; ischium length $0.75 \times$ basis length, $3.6 \times$ longer than wide; with 2 simple setae on posterior margin; merus length $0.36 \times$ ischium length, $1.5 \times$ longer than wide; with 1 long simple seta on anterior margin and 2 slender simple setae, one long, one short distally, 2 long setae on the distal part of the posterior margin; carpus length $2.2 \times$ merus length, $4.4 \times$ longer than wide; with 1 long slender seta on anterior margin and 2 long slender setae distally, with 4 long setae and 1 short simple seta on posterior margin; propodus length $0.9 \times$ carpus length, $4.6 \times$ longer than wide; with 2 long, slender simple setae on posterior margin, and 1 small seta distally, with 1 long seta on anterior-distal margin; dactylus $0.8 \times$ propodus length, about $7.5 \times$ times as long as wide.

Pereopod III: basis $5.0 \times$ longer than wide, without setae on margins; ischium length $0.95 \times$ basis length, $3.9 \times$ longer than wide;

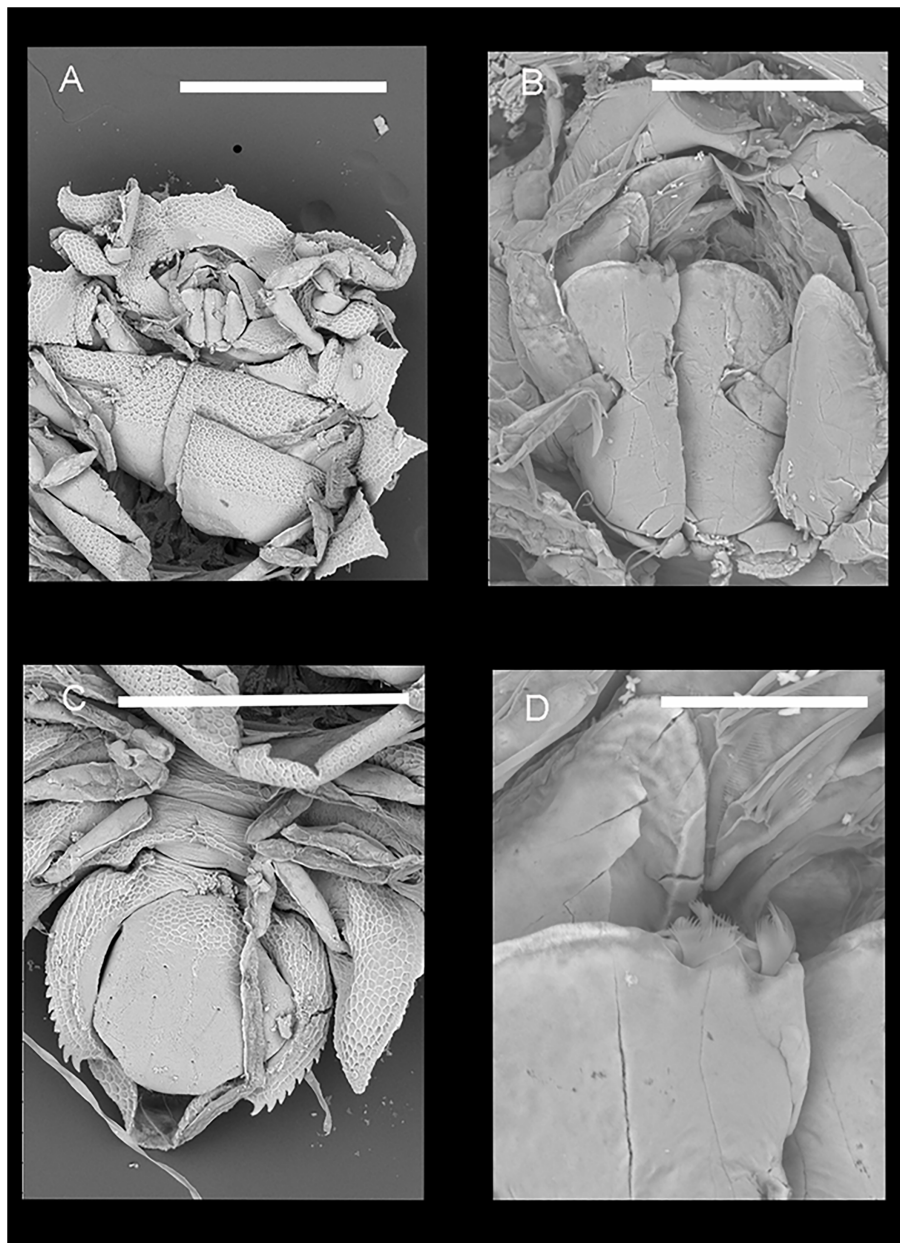


FIGURE 5

Pentaceration forkandbrewer sp. nov. (A) Paratype, female, NIWA173289, head and anterior body, ventral view (SEM). Scale represents 0.5 mm. (B) Paratype, female, NIWA173289, ventral close-up of maxilliped (SEM). Scale represents 0.1 mm. (C) Paratype, female, NIWA173289, pleotelson (SEM). Scale represents 0.5 mm. (D) Paratype, female, NIWA173289, close-up of feathered setae on the maxilliped (SEM). Scale represents 0.03 mm.

with 1 simple seta on anterior margin and 2 simple setae on each side of the distal corner; merus length $0.4 \times$ ischium length, about $2.1 \times$ longer than wide, with 1 simple seta on disto-anterior margin, with 2 simple setae on posterior-distal corner; carpus length $2.0 \times$ merus length, $4.8 \times$ longer than wide; with 1 slender seta on anterior margin and 3 simple setae on anterodistal corner, with 1 simple seta on posterior margin and 1 simple seta on postero-distal corner, propodus approximately the same length as carpus length, $6.5 \times$ longer than wide; with 4 long, slender simple setae on anterior margin, and 5 slender setae on posterior margin, dactylus $0.5 \times$ propodus length, about $5.25 \times$ longer than wide; with 1 long, slender

seta between unguis and ventral claw; unguis about $0.4 \times$ dactylus length, ventral claw about as long as unguis.

Pereopod IV: basis $4.3 \times$ longer than wide, with 2 short simple setae on anterior margin and 2 small simple setae on the postero-distal corner; ischium $0.9 \times$ basis length, $4.5 \times$ longer than wide; with 2 long simple setae on anterior margin and 1 simple seta on posterior margin; merus length $0.43 \times$ ischium length, about $1.9 \times$ longer than wide; with 2 simple setae on antero-distal corner, with 2 long, slender setae on postero-distal corner, carpus length $2 \times$ merus length, $4.4 \times$ longer than wide; with 3 slender setae of varying size on anterior margin, and 3 simple slender setae on antero-distal

corner with 3 long simple setae on posterior margin; propodus same length as carpus, $8.1 \times$ longer than wide; with 4 slender simple setae on anterior margin, with 2 slender setae on posterior margin with 3 slender simple setae distally; dactylus $0.53 \times$ propodus length, about $6.1 \times$ longer than wide; with 1 short, simple seta on disto-anterior margin; unguis $0.4 \times$ dactylus length, ventral claw very thin and slightly longer than unguis.

Pereopod V: basis $4.8 \times$ longer than wide, with 3 short simple setae on anterior margin and 5 simple setae on posterior margin; ischium length $0.85 \times$ basis length, $4.1 \times$ longer than wide; with 2 long simple setae on each of the margins; merus length $0.4 \times$ ischium length, about $1.9 \times$ longer than wide; with 2 long simple setae on disto-anterior margin, with 3 long simple setae on postero-distal corner; carpus length $2.3 \times$ merus length, $5.6 \times$ longer than wide; with 4 slender setae of varying size on anterior margin, with 4 simple setae on posterior margin; propodus length as long as carpus length, $6.3 \times$ longer than wide; with 3 long, slender simple setae on anterior margin, with 6 slender setae on posterior margin; dactylus $0.5 \times$ propodus length, about $5.3 \times$ longer than wide, without setae; unguis $0.4 \times$ dactylus length, ventral claw same length as unguis.

Pereopod VI: basis $3.6 \times$ longer than wide, with 3 simple long setae on anterior margin and 3 simple setae on posterior margin; ischium length nearly as long as basis length, $4.1 \times$ longer than wide; with 2 simple setae on anterior margin and 2 long simple setae on the posterior margin; merus length $0.4 \times$ ischium length, about $2.3 \times$ longer than wide; with 2 simple setae on disto-anterior margin, with 2 simple setae on disto-posterior margin; carpus length $2.2 \times$ merus length, $5.2 \times$ longer than wide; with 4 long, slender setae on anterior margin, and 3 long simple setae on posterior margin; propodus length about as long as carpus length, about $5.3 \times$ longer than wide; with 1 slender simple seta on anterior margin, with 3 simple setae of varying size distally, with 3 simple setae on posterior margin; dactylus $0.5 \times$ propodus length, about $6 \times$ longer than wide; with 2 simple setae medially; unguis about $0.44 \times$ dactylus length, ventral claw slightly shorter than unguis.

Pereopod VII: basis $4.8 \times$ longer than wide, with 2 short simple setae on anterior margin and 3 long slender setae on posterior margin; ischium length $0.84 \times$ basis length, $3.7 \times$ longer than wide; with 2 simple setae on anterior margin and 2 simple long setae on posterior margin; merus length $0.4 \times$ ischium length, $2.4 \times$ longer than wide; with 1 long simple seta on disto-anterior margin, with 3 simple setae on postero-distal margin; carpus length $2.2 \times$ merus length, $5.3 \times$ longer than wide; with 1 simple seta on anterior margin, with 4 setae distally, and 3 simple setae on posterior margin; propodus length $0.95 \times$ carpus length, $7.6 \times$ longer than wide; with 5 long, slender simple setae on anterior margin and 3 slender setae on posterior margin; dactylus $0.56 \times$ propodus length, $6.1 \times$ longer than wide; with 3 slender setae distally; unguis $0.9 \times$ dactylus length, ventral claw about $0.8 \times$ unguis.

Pleopod 2 (operculum): ovoid almost diamond-shape, width $0.73 \times$ length, ventral surface alveolarly structured, with 6 simple medial setae.

Pleopod 3: endopod width $0.5 \times$ length, with 3 long plumose setae distally. Exopod with 1 long, slender seta distally.

Pleopod 4: large, oval, width $0.7 \times$ length, no setae.

Pleopod 5: small oval lobe, width 0.6 times length.

Uropods: (drawn in situ, holotype female) uniramous, inserting postero-laterally in non-protruding cuticle fold, with 4 long simple setae distally.

Male (based on paratype, NIWA 173288). Head lateral projections almost straight. Pereon broader. Pleotelson as broad as long.

3.2.6 Distribution

Known from the east coast of Aotearoa New Zealand, 20 – 30 m.

4 Discussion

Paramunnidae species, especially those from the genus *Pentaceration*, appear to show a particular Australasian phylogenetic radiation (Just, 2011). This newly recorded species adds to the New Zealand fauna and is distinctive from all the other *Pentaceration* species recorded due to the lack of mid-dorsal spines, the shape of the pereonites (all extending to form acute points), the serrations on all the margins of the cephalothorax, pereon and pleotelson, the conservative shape of the pleotelson, and the reduced size of the anterior projection on the head.

Pentaceration forkandbrewer sp. nov. is superficially similar to *P. pleonarietis* due to the strongly serrated margins of the head, pereonites and pleotelson. However, there are significant differences, primarily the shape of the pleotelson. The pleotelson lateral margins of the new species are evenly convex reaching to small subacute tip whereas *P. pleonarietis* has the pleotelson with two posteriorly curved antero-lateral processes. Additionally, the new species has pereonites 5 – 7 a similar size to pereonites 1–4, also subtriangular with serrated margins whereas, *P. pleonarietis* has pereonites 5 – 7 reduced and rounded. The new species also has superficial similarities to *P. serrata* from Australian waters. The similarities include the serrated margins of all the pereonites and the shape and size of the pleotelson. The main differences include the size and shape of the central head projection (rounded with small tooth in *P. forkandbrewer* sp. nov., but acute and elongate in *P. serrata*) and the shape of the lateral projections of the head (sinuous in the new species and straight and acute in *P. serrata*), and the shape of the pereonite 1 projections (extended and acute in the new species and broadly rounded in *P. serrata*).

Within the New Zealand *Pentaceration* species, the new species has the closest affinity to *P. dentifera*. This is a species that also has strongly serrated/denticulated margins of the head, pereonites and pleotelson. The new species differs from *P. dentifera* by having serrated/denticulated margins on pereonites 4 and 7, the anterior head spine is broadly rounded and not hugely extended, pereonite 1 is subtriangular not broadly subquadrate and blunt eyestalks and no obvious eyes.

The depth distribution as shown in Just (2011) shows that the majority of species occur between 150 – 1000 m depth. This makes the new species one of four that occur in shallower than 50 m depth. The species were recorded from relatively shallow environs with fine sand and mud. Interesting, samples from a similar environment of sediment and depth but off Hawkes Bay (North Island, New Zealand) were also examined from another project and very similar (most likely the same species) specimens were seen (Leduc et al. 2024).

5 Key for New Zealand *Pentaceration*

1. Head spines broad, pereonites 1 – 7 shape broad triangular...
***P. forkandbrewer* sp. nov.**

- Head spines and pereonite shape acute, narrow triangular... 2

2. Pereon with middorsal row of slender upright spines; pleotelson posteriorly extended into long spine... 3

- Pereon dorsum without spines or at most with low, broad spines; pleotelson posteriorly triangular, pointed or rounded... 4

3. Pereonites 1–7 with single row of mid-dorsal spines; uropods uniramous; distal projection of pleotelson about half length of pleotelson... ***P. curvicornis* Just, 2011.**

- Pereonites 1–7 with two rows of smaller mid-lateral spines in addition to prominent mid-dorsal spines, uropods biramous; length of distal projection of pleotelson slightly longer than pleotelson length... ***P. bifficyro* Kaiser and Marner, 2012.**

4. Each pereonites with single broad, conical middorsal spine; uropods inserted in low cuticle tubes rimmed with pointed denticles... ***P. kermadecia* Just, 2011.**

- Pereon dorsally smooth; uropod insertion not flanked by distinct denticles... 5

5. Head spines and pereonite lateral spines fringed with dense rows of equal-sized denticles; eyestalks apex blunt, with a few small ocelli, barely overreaching pereonite 1 lateral margin... ***P. dentifera* Just, 2011.**

- Head spines and pereonite lateral spines without regular marginal denticles, or with tiny denticles not in regular rows, or with some large, irregularly placed denticles... 6

6. Body strongly flattened; pereonite 1 lateral margins with mid spines; pereonite 2 lateral spines slender, unadorned... ***P. epipedos* Just, 2011.**

- Body ordinarily vaulted; pereonite 1 lateral margin without spines... 7

7. Pereonite 1 lateral margin convex, broadest at posterior corner, with irregular denticles; pereonites 2 and 3 lateral spines with dentate lobe in proximal half of posterior margin; eyestalks not reaching widest point of pereonite 1... ***P. novaezealandia* Just, 2011.**

- Pereonite 1 lateral margin truncate, with irregular denticles; pereonites 2 and 3 lateral spines with anterior and posterior dentate lobes at base; eyestalks overreaching pereonite 1 with about 0.25 their length; head and body spines with numerous short, curled setae along margins ... ***P. setosa* Just, 2011.**

6 Conclusion

This newly recorded species, *Pentaceration forkandbrewer* sp. nov., is added to the shallow-water Australasian paramunnid fauna. The asellotes are abundant in abyssal basin and inshore sediments and this new species adds to this vital fauna, which contributes to the transfer of carbon through the water column.

Data availability statement

The datasets presented in this study can be found in online repositories. The names of the repository/repositories and accession number(s) can be found in the article/supplementary material.

Ethics statement

Ethical approval was not required for the study involving animals in accordance with the local legislation and institutional requirements because the study used retrospectively collected specimens.

Author contributions

RP: Conceptualization, Data curation, Formal analysis, Investigation, Methodology, Software, Visualization, Writing – original draft, Writing – review & editing. KS: Data curation, Writing – review & editing.

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Conflict of interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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