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## New Zealand Bodotriidae (Crustacea: Cumacea)

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### Abstract

The cumacean fauna of New Zealand has been little studied, and recent collections on the Chatham Rise and Challenger Plateau have yielded many new species and new genera of Cumacea. A recent manuscript on the New Zealand Nannastacidae (Gerken 2012) increased the described New Zealand fauna by 66%. Within the Bodotriidae, 6 new species were discovered. The new species *Apocuma chathamensis* n. sp., *A. sculpta* n. sp., *Bathycuma dayae* n. sp., *Cyclaspis petrescui* n. sp., *C. hayeae* n. sp. and *C. zealandiaensis* n. sp. are described, and keys to all New Zealand Bodotriidae are provided.

**Key words** :Cumacea, Bodotriidae, New Zealand, *Cyclaspis*, *Apocuma*, *Bathycuma*

## Introduction

The cumaean fauna of New Zealand waters has been little studied. Jones (1963) volume on the Cumacea of New Zealand recorded 32 species, including eight bodotriids. Seven of the recorded species were in the genus *Cyclaspis* Sars 1865, and the eighth was a species of *Pomacuma* Hale 1944. The current collections include *Apocuma* Jones 1973 and *Bathycuma* Hansen 1895, bringing the total of bodotriid genera recorded from New Zealand waters to four, and the number of species to 14.

The Bodotriidae currently consists of approximately 400 species in 31 genera (Haye 2007). Bodotriid diversity is highest in warm, shallow waters, so it is expected that the waters of New Zealand would be relatively depauperate in bodotriids relative to Australia. There are about 90 bodotriid species in 13 genera recorded from Australian waters (Hale 1928, 1932, 1936, 1944, 1948, 1949, 1953, Greenwood & Johnson 1967, Petrescu 2004, Tafe & Greenwood 1996), 67% of which are *Cyclaspis*. In comparison, the New Zealand fauna of 14 species in four genera is much less rich. The proportion of *Cyclaspis* in the bodotriid fauna of New Zealand is 71%, slightly higher than in Australian waters. Three of the genera from New Zealand are also known from Australia, *Apocuma*, *Cyclaspis* and *Pomacuma*, but the genus *Bathycuma* is not currently reported from Australia.

## Material and methods

Samples were collected as part of New Zealand's National Ocean Survey 20/20 marine benthic surveys of the Chatham Rise and Challenger Plateau in 2007 on the R/V Tangaroa. Samples were collected using a Brenke epibenthic sledge (Brenke 2005), elutriated at sea, and preserved in EtOH. In addition, the sledge residue of sediment was preserved in formalin, transferred to EtOH and additional specimens were picked from the residue (Loerz 2011). Sample preservation is part of the record in the NIWA database, associated with the registration numbers, to allow potential future genetic work on appropriately preserved samples.

Specimens were temporarily mounted in a mixture of 95% glycerin/ 5% EtOH, and illustrated using *camera lucida* on a dissecting microscope and a compound microscope. Some specimens were temporarily stained using a dilute solution of Chlorazole Black dissolved in ethanol. Body length is measured from the tip of the pseudorostral lobes to the posterior border of pleonite 6. The term preparatory female indicates a female with small external brood plates, ready to molt into a female with large brood plates and a brood. A subadult female is one that does not have small external brood plates. Because there are cumaceans with life histories that include multiple broods the females molt between large and small brood plates multiple times (Bishop 1982), preparatory female and subadult female are therefore not synonymous. Setal terminology largely follows Watling (1989). Illustrations were prepared in Adobe Illustrator using a Wacom Intuos 3 tablet, according to the procedures described in Coleman (2003, 2009).

## Systematics

### Bodotriidae Scott 1901

#### Key to the genera recorded from New Zealand waters

(for a global key to all genera, see Haye 2007)

1. Exopods present only on maxilliped 3 and pereopod 1 . . . . . *Cyclaspis* Bodotriinae
- Exopods present at least maxilliped 3– pereopod 2 or more. . . . . 2
2. Pereopod 1 with brush of long setae on propodus and dactylus . . . . . *Pomacuma* Vaunthompsoniinae
- Pereopod 1 without brush . . . . . 3
3. Carapace with many small spines anteriorly, pseudorostrum not dorsally directed. . . . . *Bathycuma* Vaunthompsoniinae
- Carapace without small spines anteriorly, pseudorostrum dorsally directed. . . . . *Apocuma* Vaunthompsoniinae

## *Apocuma* Jones 1973

**Type species.** *Apocuma brasiliense* Jones 1973

**Diagnosis.** *Female.* Pseudorostral lobes meeting in front of eyelobe and extending at least 0.1 times carapace length past anterior border of eyelobe; pleonite 6 projecting weakly between uropods. Fully developed exopods on maxilliped 3–pereopod 2, pereopod 3 with or without a rudimentary exopod. *Male.* Fully developed exopods on maxilliped 3–pereopod 4 and 5 pairs of pleopods.

**Remarks.** This genus is quite different looking from any of the other New Zealand bodotriids, in that it has a dorsally directed pseudorostrum that extends well beyond the eye lobe. The eyelobe is short and broad, without lenses.

**New Zealand species.** *Apocuma chathamensis* n. sp., *A. sculpta* n. sp.

### Key to the New Zealand species

1. Carapace with pair of dorsal posterior expansions, strongly sculptured. . . . . *Apocuma sculpta* n. sp.
- Carapace without distinct dorsal posterior expansions, not strongly sculptured . . . . . *A. chathamensis* n. sp.

### *Apocuma chathamensis* n. sp.

Figures 1–2

**Type material.** Holotype subadult female, NIWA 80743; Paratype subadult female, dissected, NIWA 80744; Paratypes, 2 subadult males, NIWA 80745; 44.0162°S, 178.5210°E–44.0143°S, 178.5175°E, 769–771 m, 7 April 2007.

**Other material examined.** 1 subadult female, NIWA 80746, 44.0162°S, 178.5210°E–44.0143°S, 178.5175°E, 769–771 m, 7 April 2007.

**Diagnosis.** *Female.* Carapace expanded ventrolaterally, no dorsal crest. Pereonites and pleonites with dorsal keel extending to pleonite 5. Pereopod 5 carpus long, 0.9 times basis length. *Male.* Adult unknown.

**Description of preparatory female and subadult male.** Holotype preparatory female, 5.0 mm, NIWA 80743; paratype preparatory female, 4.3 mm, NIWA 80744; paratype subadult male, 5.2 mm, NIWA 80745. Carapace expanded ventrolaterally, anterolateral corner strongly produced, serrate; pseudorostral lobes 0.3 times carapace length; eye lobe without lenses, broad, 0.04 times carapace length; carapace twice length of pereon. Pereonites 2–5 and pleonites 1–5 with dorsal keel. Pleon longer than carapace and pereon together. Carapace, pereon and pleon covered with fine reticulations. (Figure 1A–C).

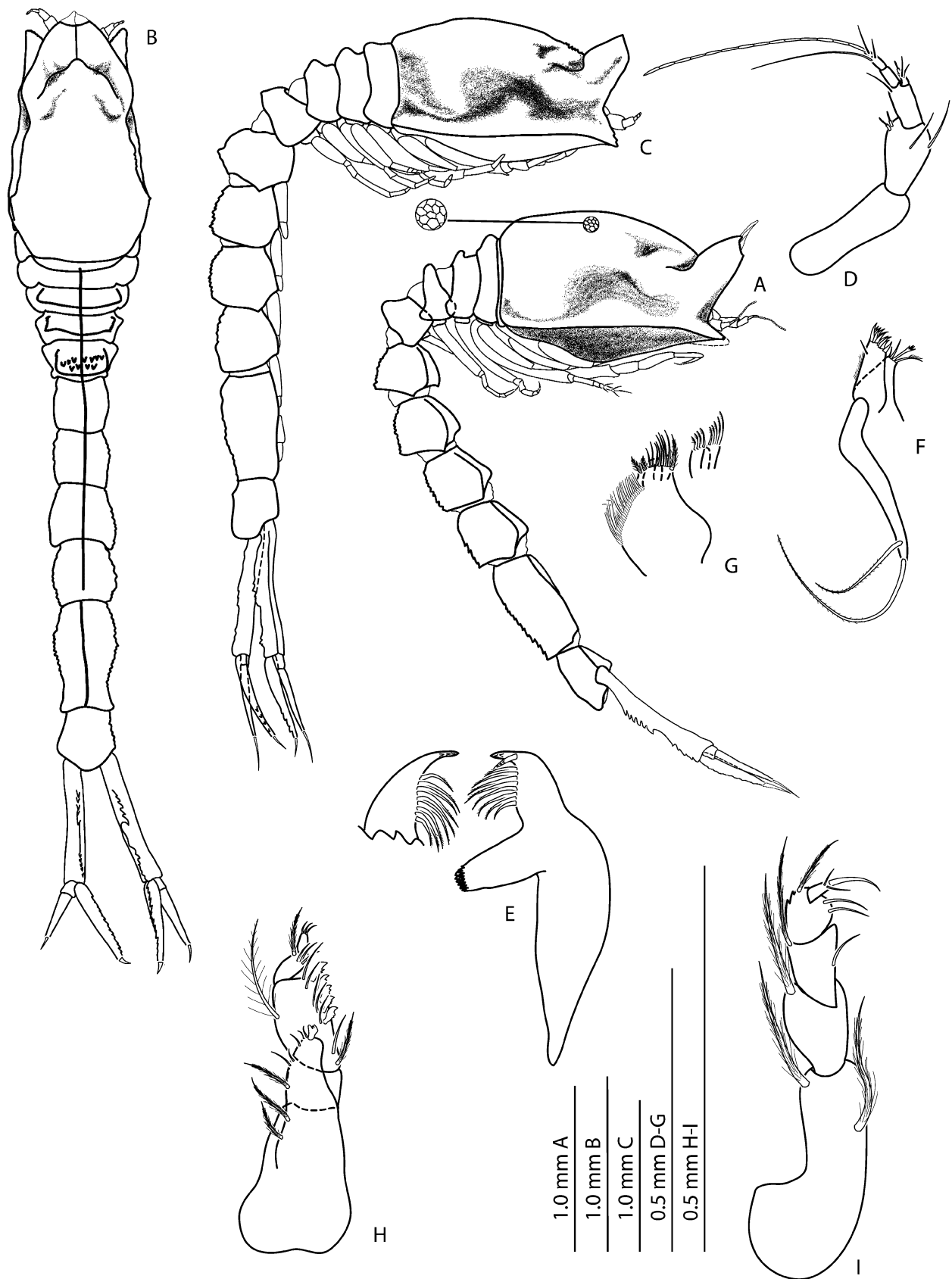
**Description of preparatory female.** Antennule peduncle article 1 as long as articles 2 and 3 together, unarmed; article 2 0.6 times article 1 length, with 2 simple and 2 pedunculate setae; article 3 0.6 times article 2 length with simple seta; main flagellum of 3 articles, with 1 aesthetasc and 3 simple setae; accessory flagellum of 1 article, with 2 simple and 1 pedunculate setae (Figure 1D).

Mandible navicular, *lacinia mobilis* with 3 cusps (Figure 1E).

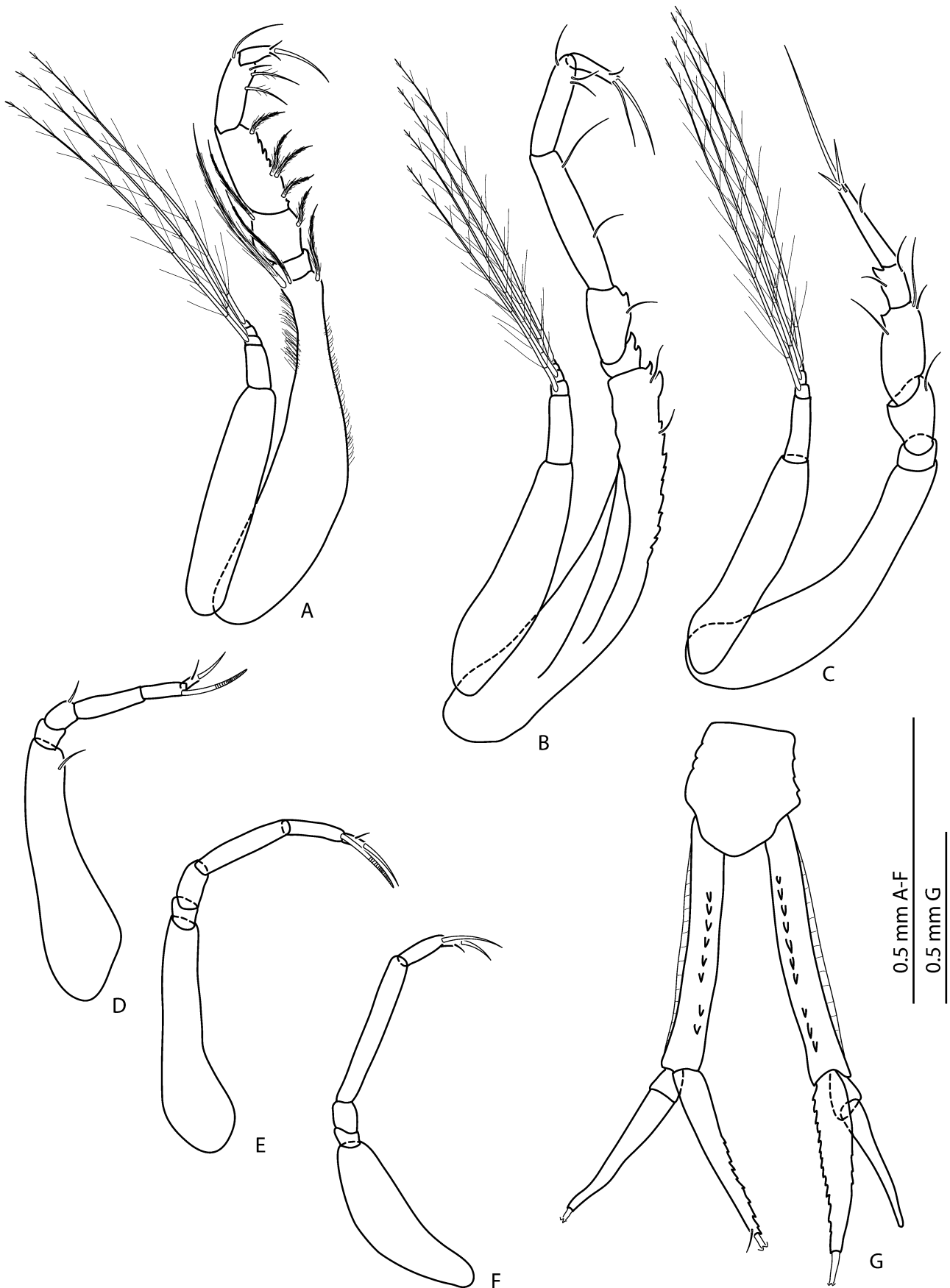
Maxillule with 2 endites; outer endite broad, with 9 simple setae, margin lined with fine hairlike setae, with simple seta; inner endite with 2 simple, 1 tricuspid and 1 microserrate setae; palp with 2 microserrate setae (Figure 1F).

Maxilla with 3 endites; broad endite with row of simple setae distally, medial distal corner with 2 pappose setae, medial margin with row of setae; medial narrow endite with 4 microserrate setae terminally; distal narrow endite with 5 microserrate setae terminally; both narrow endites extending past distal margin of broad endite (Figure 1G).

Maxilliped 1 basis 0.8 times length of all other articles together; ischium absent; merus 0.3 times basis length; carpus 2.6 times merus length, with 6 simple, 5 beak and 1 pappose setae medially, plumose seta laterally; propodus 0.3 times carpus length, with 3 simple and 1 pappose setae; dactylus 0.8 times propodus length, with 3 simple setae terminally (Figure 1H).



**FIGURE 1.** *Apocuma chathamensis* n. sp. Holotype preparatory female, NIWA 80743. A, side view. Paratype preparatory female, NIWA 80744. B, dorsal view; D, antennule; E, mandibles; F, maxillule; G, maxilla; H, maxilliped 1; I, maxilliped 2. Paratype subadult male, NIWA 80745. C, side view.



**FIGURE 2.** *Apocuma chathamensis* n. sp. Paratype preparatory female, NIWA 80744. A, maxilliped 3; B, pereopod 1; C, pereopod 2; D, pereopod 3; E, pereopod 4; F, pereopod 5; G, pleonite 6 and uropods.

Maxilliped 2 basis 1.4 times length of all other articles together, with 2 pappose setae; ischium absent; merus 0.4 times basis length, with pappose seta; carpus 0.8 times merus length, with 1 simple and 1 pappose setae; propodus 0.6 times carpus length with 1 pappose and 2 simple setae; dactylus 0.6 times propodus length, with 3 simple setae (Figure 1I).

Maxilliped 3 basis 1.3 times length of all other articles together, with 3 pappose setae distally; ischium 0.06 times basis length, unarmed; merus 2.5 times ischium length, with 2 pappose setae; carpus 1.8 times merus length, with 4 pappose setae, medial margin weakly serrate distally; propodus 0.8 times carpus length, with 2 simple and 2 plumose setae; dactylus 0.4 times propodus length, with 3 simple setae terminally; exopod shorter than basis, flagellum with plumo–annulate setae (Figure 2A).

Pereopod 1 basis equal to all other articles together, with 2 simple setae, medial margin serrate; ischium 0.04 times basis length, unarmed, produced as 2 teeth medially; merus 4.7 times ischium length, with simple seta, produced as tooth medially; carpus 2.0 times merus length, with 2 simple setae; propodus 0.7 times carpus length, with 3 simple setae; dactylus 0.5 times propodus length, with 3 simple setae terminally; exopod shorter than basis, flagellum with plumo–annulate setae (Figure 2B).

Pereopod 2 basis equal to all other articles together, unarmed; ischium 0.05 times basis length, unarmed; merus 3.7 times ischium length, with simple seta; carpus 1.6 times merus length, with 3 simple setae; propodus 0.4 times carpus length, with 2 simple setae, produced as tooth distally; dactylus 2.3 times propodus length, with 3 simple setae terminally; exopod longer than basis, flagellum with plumo–annulate setae (Figure 2C).

Pereopod 3 basis 1.5 times length of all other articles together, with simple seta; ischium 0.08 times basis length, unarmed; merus 1.5 times ischium length, with simple seta; carpus 2.2 times merus length, unarmed; propodus 0.6 times carpus length, with annulate seta; dactylus 0.4 times propodus length, with 2 simple setae terminally; exopod absent (Figure 2D).

Pereopod 4 basis equal to all other articles together, unarmed; ischium 0.09 times basis length, unarmed; merus 1.8 times ischium length, unarmed; carpus 2.9 times merus length, unarmed; propodus 0.5 times carpus length, with annulate seta; dactylus 0.4 times propodus length, with 2 simple setae terminally (Figure 2E).

Pereopod 5 basis 0.7 times length of all other articles together, unarmed; ischium 0.09 times basis length, unarmed; merus 1.7 times ischium length, unarmed; carpus elongate, 6.0 times merus length, unarmed; propodus 0.3 times carpus length, with simple seta; dactylus 0.4 times propodus length, with 2 simple setae terminally (Figure 2F).

Uropod peduncles 1.8 times pleonite 6 length, outer margins with hyaline fringe, serrate mid–dorsally. Uropod endopod uniarticulate, 0.8 times peduncle length, with 0–1 lateral simple setae, terminal seta stout, medial margin serrate. Uropod exopod of 2 articles, 0.9 times length of endopod; article 1 0.2 times length of article 2, unarmed; article 2 with stout terminal seta (Figure 2G).

**Etymology.** The species is named *chathamensis* for the place of collection, the Chatham Rise.

**Remarks.** The elongate carpus of pereopod 5, 3 times the length of the propodus, is unusual. The only other elongate carpus in the genus is found in the subadult male of *A. australiense* (Hale 1949) described by Petrescu 2004. However, in Petrescu 2004 the elongate carpus is only figured for the subadult male, with the female having a carpus that is only twice the length of the propodus, while in *A. chathamensis* the elongate carpus is found in both the subadult males and females.

*Apocuma gerkenae* Roccatagliata, Alberico & Heard 2012 shares the the lack of a rudimentary exopod on pereopod 3 in the female, but the carpus of pereopod 5 is only equal in length to the propodus and dactylus together, while in *A. chathamensis* the carpus is twice the length of the propodus and dactylus together.

### ***Apocuma sculpta* n. sp.**

Figures 3–4

**Type material.** Holotype ovigerous female, NIWA 45999, 36.9202°S, 167.5302°E–36.9120°S, 167.5325°E, 1207–1213 m, 30 May 2007; Paratype ovigerous female, dissected, NIWA 45998, 43.5300°S, 178.5048°E–43.5363°S, 178.5118°E, 346 m, 24 April 2007.

**Other material examined.** 2 juveniles, 1 manca, NIWA 46001, 43.2903°S, 175.5522°W–43.2933°S, 175.5630°W, 638–644, 15 April 2007. 1 subadult male, NIWA 84454, 39.1087°S, 168.2819°E–39.1119°S, 168.2799°E, 559 m, 2 June 2007. 1 juvenile, NIWA 84456, 40.1277°S, 170.2140°E–40.1352°S, 170.2090°E,

803–805 m, 5 June 2007. 1 ovigerous female, 1 subadult female, 2 juveniles, NIWA 46000, 40.8800°S, 170.8555°E–40.8883°S, 170.8565°E, 529–534 m, 6 June 2007. 4 juveniles, 5 mancae, NIWA 84455, 43.5300°S, 178.5048°E–43.5363°S, 178.5118°E, 346 m, 24 April 2007. 1 ovigerous female, 1 subadult male, 5 mancae, NIWA 46004, 40.8800°S, 170.8555°E–40.8883°S, 170.8565°E, 529–534 m, 6 June 2007.

**Diagnosis.** *Female.* Carapace pitted, expanded ventrolaterally, with deep lateral depression continuous around carapace, posterior part of carapace expanded dorsally, with strong medial dorsal keel. Pereonites and pleonites with dorsal keel extending to pleonite 6. Pereopod 5 carpus 0.6 times basis length. *Male.* Adult unknown.

**Description of ovigerous female.** Holotype ovigerous female, 5.2 mm, NIWA 45999. Paratype ovigerous female, 3.9 mm, NIWA 45998. Carapace strongly sculptured with strong ridges and bumps, expanded dorsally posteriorly, expanded ventrolaterally, sulcus present, anterolateral corner strongly produced and serrate, with strong horizontal keel from anterolateral corner to posterior border of carapace, additional incomplete keel dorsal of sulcus, entire carapace covered in minute pits, very strong dorsal medial ridge continuing from carapace through pereon and pleon, narrowing on pleonite 5–6; pseudorostral lobes 0.3 times carapace length; eye lobe without lenses, broad, 0.04 times carapace length; carapace 3.0 times pereonites together; pleon shorter than carapace and pereonites together (Figures 3A–B).

Antennule peduncle article 1 longest, unarmed; article 2 0.4 times article 1 length, with 1 simple and 2 pedunculate setae; article 3 0.6 times article 2 length with 2 pedunculate setae; main flagellum of 2 articles, with 2 aesthetascs; accessory flagellum of one article, with 6 simple setae (Figure 3C).

Mandible navicular, *lacinia mobilis* with 4 cusps (Figure 3D).

Maxillule with 2 endites; outer endite broad, with 8 stout setae terminally; inner endite with 2 simple, 1 tricuspid and 1 microserrate setae; palp with 2 microserrate setae (Figure 3E).

Maxilla with 3 endites; broad endite with simple setae distally, 2 pappose setae at disto–medial corner, row of setae medially; medial narrow endite with 3 microserrate setae terminally; distal narrow endite with 4 microserrate setae terminally; both narrow endites extending to distal margin of broad endite (Figure 3F).

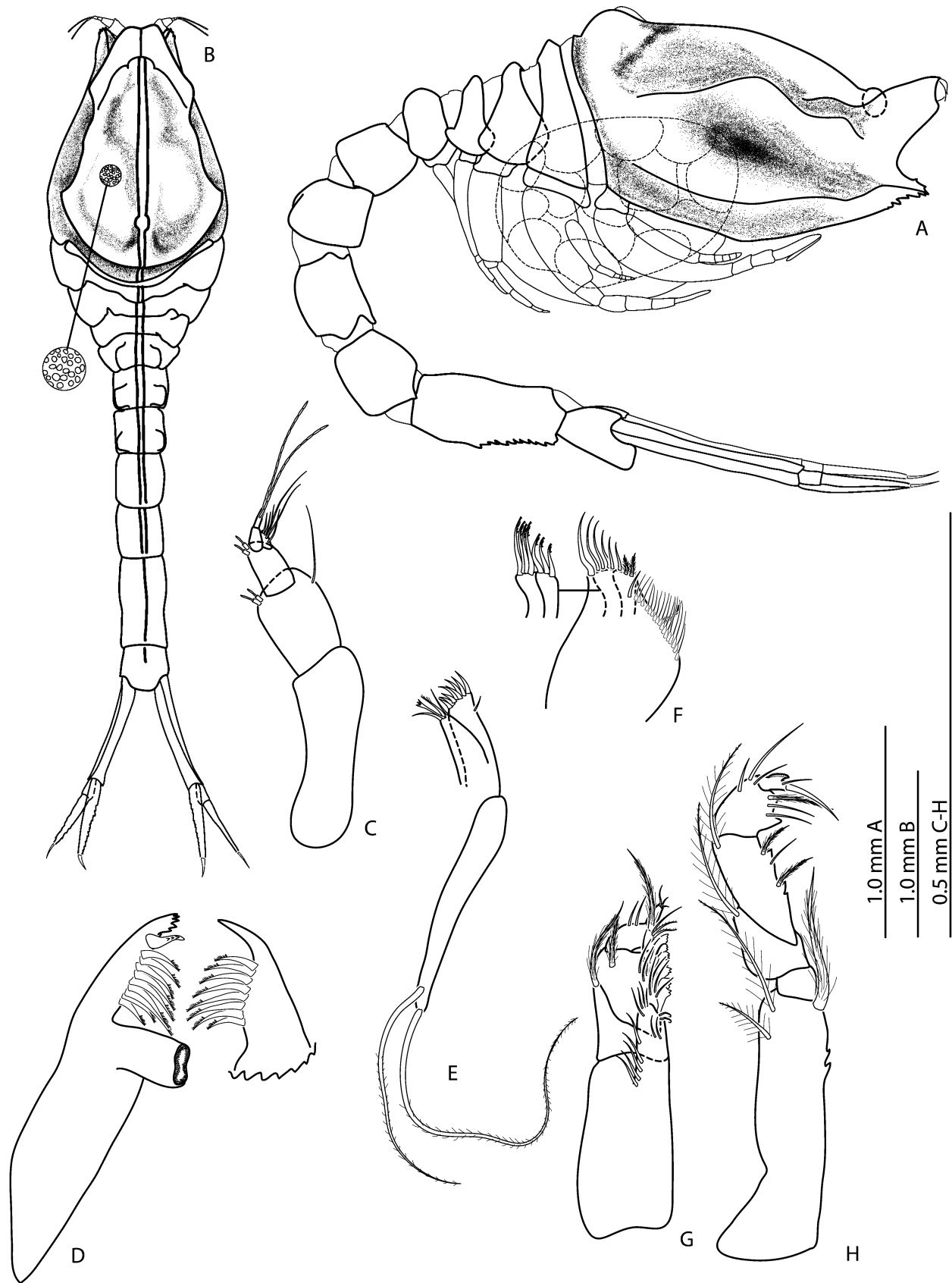
Maxilliped 1 basis 1.2 times length of all other articles together, produced as lobe medially, lobe with simple and hook setae; ischium absent; merus 0.1 times basis length, with 2 simple setae medially, pappose seta laterally; carpus 2.8 times merus length, with simple and 6 beak setae medially, pappose seta laterally; propodus 0.4 times carpus length, with 3 simple, 2 microserrate and 1 pappose setae; dactylus 0.8 times propodus length, with 3 simple setae terminally (Figure 3G).

Maxilliped 2 basis equal to all other articles together, pappose seta medially and 2 plumose setae laterally; ischium 0.1 times basis length, unarmed; merus 0.2 times basis length, with plumose seta laterally; carpus 2.5 times merus length, with 1 simple and 2 pappose setae medially, plumose seta laterally, medial margin produced as teeth; propodus 0.5 times carpus length, with 2 simple and 1 pappose setae medially, 2 simple setae laterally; dactylus 0.5 times propodus length, with 2 simple setae terminally, lateral margin with hyaline fringe (Figure 3H).

Maxilliped 3 basis equal to all other articles together, with 2 pappose setae medially and plumose seta laterally; ischium 0.1 times basis length, with pappose seta; merus 2.8 times ischium length, with pappose seta medially, plumose seta laterally; carpus 1.1 times merus length, with 2 simple and 4 pappose setae, plumose seta laterally, medial margin produced as teeth with hyaline fringe; propodus 0.7 times carpus length, with 1 simple and 2 pappose setae medially, 2 simple setae laterally; dactylus 0.4 times propodus length, with 3 simple setae terminally; exopod shorter than basis, flagellum with plumo–annulate setae (Figure 4A).

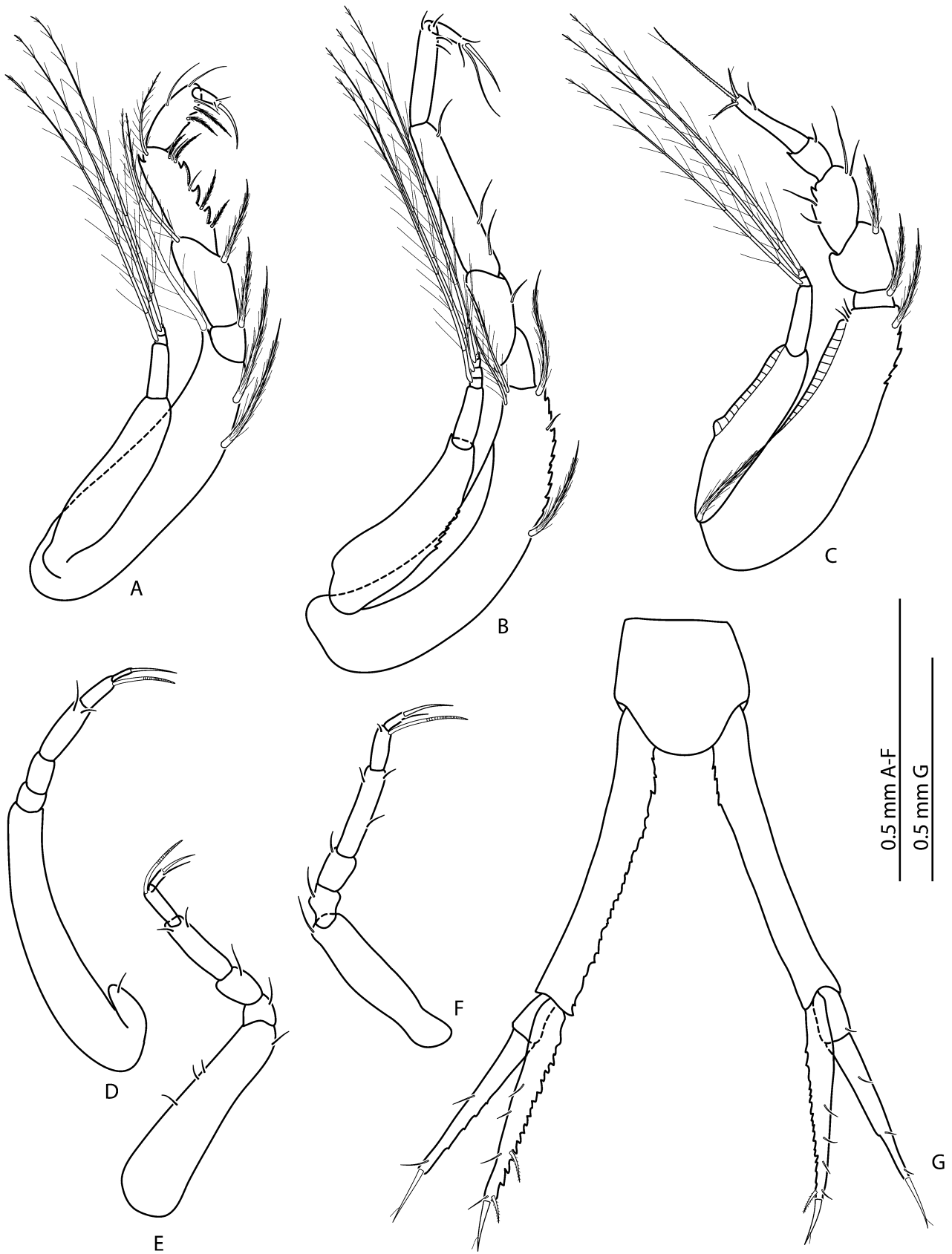
Pereopod 1 basis 0.8 times length of all other articles together, with 2 pappose setae medially, 2 plumose setae laterally, medial margin serrate; ischium 0.1 times basis length, unarmed; merus 2.3 times ischium length, with simple seta; carpus 1.7 times merus length, with 3 simple setae; propodus 0.6 times carpus length, with 4 simple setae; dactylus 0.4 times propodus length, with 4 simple setae terminally; exopod shorter than basis, flagellum with plumo–annulate setae (Figure 4B).

Pereopod 2 basis 1.1 times length of all other articles together, with pappose seta medially, 3 simple setae laterally, medial margin serrate, lateral margin with hyaline fringe; ischium 0.06 times basis length, with pappose seta; merus 4 times ischium length, with pappose seta; carpus 1.2 times merus length, with 4 simple setae; propodus 0.5 times carpus length, with simple seta; dactylus 2.4 times propodus length, with 3 microserrate setae with single subterminal setule terminally; exopod shorter than basis, flagellum with plumo–annulate setae (Figure 4C).



**FIGURE 3.** *Apocuma sculpta* n. sp. Holotype ovigerous female, NIWA 45994. A, side view Paratype ovigerous female, NIWA 45998. B, dorsal view; C, antennule; D, mandibles; E, maxillules; F, maxilla; G, maxilliped 1; H, maxilliped 2.





**FIGURE 4.** *Apocuma sculpta* n. sp. Paratype ovigerous female, NIWA 459998. A, maxilliped 3; B, pereopod 1; C, pereopod 2; D, pereopod 3; E, pereopod 4; F, pereopod 5; G, pleonite 6 and uropods.

Pereopod 3 basis 1.6 times length of all other articles together, unarmed; ischium 0.08 times basis length, unarmed; merus 1.5 times ischium length, unarmed; carpus 2.2 times merus length, with 2 simple setae; propodus 0.5 times carpus length, with annulate seta; dactylus 0.6 times propodus length, with simple seta terminally; exopod rudimentary, 0.2 basis length, uniarticulate, with simple seta (Figure 4D).

Pereopod 4 basis 1.2 times length of all other articles together, with 4 simple setae; ischium 0.09 times basis length, with simple seta; merus 1.8 times ischium length, with simple seta; carpus 1.9 times merus length, with 2 simple setae; propodus 0.7 times carpus length, with annulate seta; dactylus 0.3 times propodus length, with 2 simple setae terminally (Figure 4E).

Pereopod 5 basis 0.7 times length of all other articles together, with simple seta; ischium 0.2 times basis length, with simple seta; merus 1.0 times ischium length, with simple seta; carpus 2.6 times merus length, with 3 simple setae; propodus 0.4 times carpus length, with 1 simple and 1 annulate setae; dactylus 0.5 times propodus length, with 2 simple setae terminally (Figure 4F).

Uropod peduncles 2.1 times pleonite 6 length, medial margins weakly serrate. Uropod endopod uniarticulate, 0.7 times peduncle length, with 1–2 microserrate setae medially, 4 simple setae laterally, medial margin serrate, terminal seta simple with single subterminal setule. Uropod exopod of 2 articles, equal to length of endopod; article 1 0.3 times length of article 2, with 0–1 simple setae; article 2 with 2–3 simple setae, terminal seta simple with single subterminal setule (Figure 4G).

**Etymology.** The species is named *sculpta* for the strong sculpturing of the carapace.

**Remarks.** The species is easily differentiated from the other species in New Zealand, *Apocuma chathamensis*, by the much more strongly sculptured carapace. The most similar species in the genus is *A. poorei* Petrescu 2004, known from Australian waters. However, in *A. sculpta* the uropod peduncles are more than twice the length of pleonite 6, and the pereopods have few strong serrations. In comparison, in *A. poorei* the uropod peduncles are less than twice the length of pleonite 6, and the pereopods and uropods are strongly serrated on all or most of the article margins.

## ***Bathycuma* Hansen 1895**

**Type species.** *Bathycuma elongatum* Hansen 1895

**Diagnosis.** *Female.* Carapace shorter than abdomen, eye lobe without pigment or lenses. Maxilliped 3–pereopod 3 with fully developed exopods in female, maxilliped 3–pereopod 4 with fully developed exopods in male. *Male.* Antennal flagellum extending to mid pleon or past uropod peduncles; with 5 pairs of pleopods.

**Remarks.** This genus is quite different from the other two vaunthompsoniini genera present in New Zealand waters. *Pomacuma* is similar in overall carapace shape, with pseudorostral lobes meeting just in front of the eyelobe, but *Pomacuma* has a brush of long setae on the propodus and dactylus of pereopod 1, while *Bathycuma* has no such brush on pereopod 1. *Apocuma* has dorsally directed pseudorostral lobes that extend well in front of the eyelobe, while *Bathycuma* does not. The presence of a long antennal flagellum in the male expands the generic definition, as the previous definition included the antennal flagellum only reaching to the mid pleon (Haye 2007).

**New Zealand species.** *Bathycuma dayae* n. sp.

### ***Bathycuma dayae* n. sp.**

Figures 5–8

**Type material.** Holotype ovigerous female, NIWA 46003; Paratype ovigerous female, dissected, NIWA 80741; 42.7820°S, 176.7152°W–42.7817°S, 176.7042°W, 1023–1026 m, 16 April 2007. Paratype adult male, dissected, NIWA 80742, 40.1277°S, 170.2140°E–40.1352°S, 170.2090°E, 803–805 m, 5 June 2007.

**Other material examined.** 1 ovigerous female, 3 manca, NIWA 45835, 36.9202°S, 167.5302°E–36.9120°S, 167.5325°E, 1207–1213 m, 30 May 2007. 2 juveniles, NIWA 45830, 42.7820°S, 176.7152°W–42.7817°S, 176.7042°W, 1023–1026 m, 16 April 2007. 1 juvenile, 4 manca, NIWA 46003, 42.7820°S, 176.7152°W–42.7817°S, 176.7042°W, 1023–1026 m, 16 April 2007. 2 juveniles, 1 manca, NIWA 84493,

44.4862°S, 177.1413°E–44.4841°S, 177.1416°E, 1235–1239 m, 6 April 2007. 1 subadult male, 4 juveniles, 1 manca, NIWA 84492, 44.4862°S, 177.1413°E–44.4841°S, 177.1416°E, 1235–1239 m, 6 April 2007. 1 subadult female, 5 juveniles, 3 mancae, NIWA 84496, 44.4862°S, 177.1413°E–44.4841°S, 177.1416°E, 1235–1239 m, 6 April 2007. 1 ovigerous female, NIWA 84495, 43.9790°S, 179.6298°E–43.9850°S, 179.6218°E, 529–530 m, 9 April 2007. 1 ovigerous female, 2 mancae, NIWA 84494, 40.1277°S, 170.2140°E–40.1352°S, 170.2090°E, 803–805 m, 5 June 2007. 1 adult male, 3 juveniles, 2 mancae, NIWA 46002, 43.2903°S, 175.5522°W–43.2933°S, 175.5630°W, 638–644, 15 April 2007. 1 juvenile, NIWA 84497, 43.2903°S, 175.5522°W–43.2933°S, 175.5630°W, 638–644, 15 April 2007.

**Diagnosis.** *Female.* Carapace with teeth in two disorganized rows dorsally, concentrated anteriorly; antennal notch deep; anteroventral corner serrate; carapace longer than pereon; pleon longer than carapace and pereon together; pleonite 6 with dorsal teeth. Uropod peduncles shorter than pleonite 6; uropod endopod biarticulate, article 1 1.5 times length of article 2; uropod exopod shorter than endopod, both articles subequal in length. *Male.* Carapace with teeth dorsally only on frontal lobe; antennal notch oblique; anteroventral corner smooth; carapace longer than pereon; pleon longer than carapace and pereon together; pleonite 6 smooth. Antennule with brush of aesthetascs on first article of main flagellum. Antennal flagellum extending past uropod peduncles. Uropod peduncles slightly shorter than pleonite 6; endopod biarticulate, articles subequal; exopod with first article much shorter than second. Appendages much more setose than in female.

**Description of the ovigerous female.** Holotype ovigerous female, 10.2 mm, NIWA 46003. Paratype ovigerous female, 7.9 mm, NIWA 80741. Carapace with disorganized double row of teeth dorsally, with lateral sulcus anteriorly, antennal notch deep, anteroventral corner strongly serrate, with arched ridge posteriorly on carapace, below midline; pseudorostral lobes 0.4 times carapace length, anterior margin weakly serrate; eye lobe 0.07 times carapace length; carapace 1.05 times pereon; abdomen 1.3 times carapace and pereon together (Figures 5A–C).

Antennule peduncle article 1 longest, unarmed; article 2 0.5 times article 1 length, unarmed; article 3 equal to article 2 length, with simple seta; main flagellum of 3 articles, with 2 aesthetascs and 2 simple setae; accessory flagellum of 2 articles, with 3 simple setae (Figure 5D).

Mandible navicular, *lacinia mobilis* with 4 cusps (Figure 5E).

Maxillule with 2 endites; outer endite broad, with microserrate setae distally, lateral margin with fine hairlike setae and plumose seta; inner endite with 2 simple, 1 tricuspid and 1 microserrate setae; palp with 2 microserrate setae (Figure 5F).

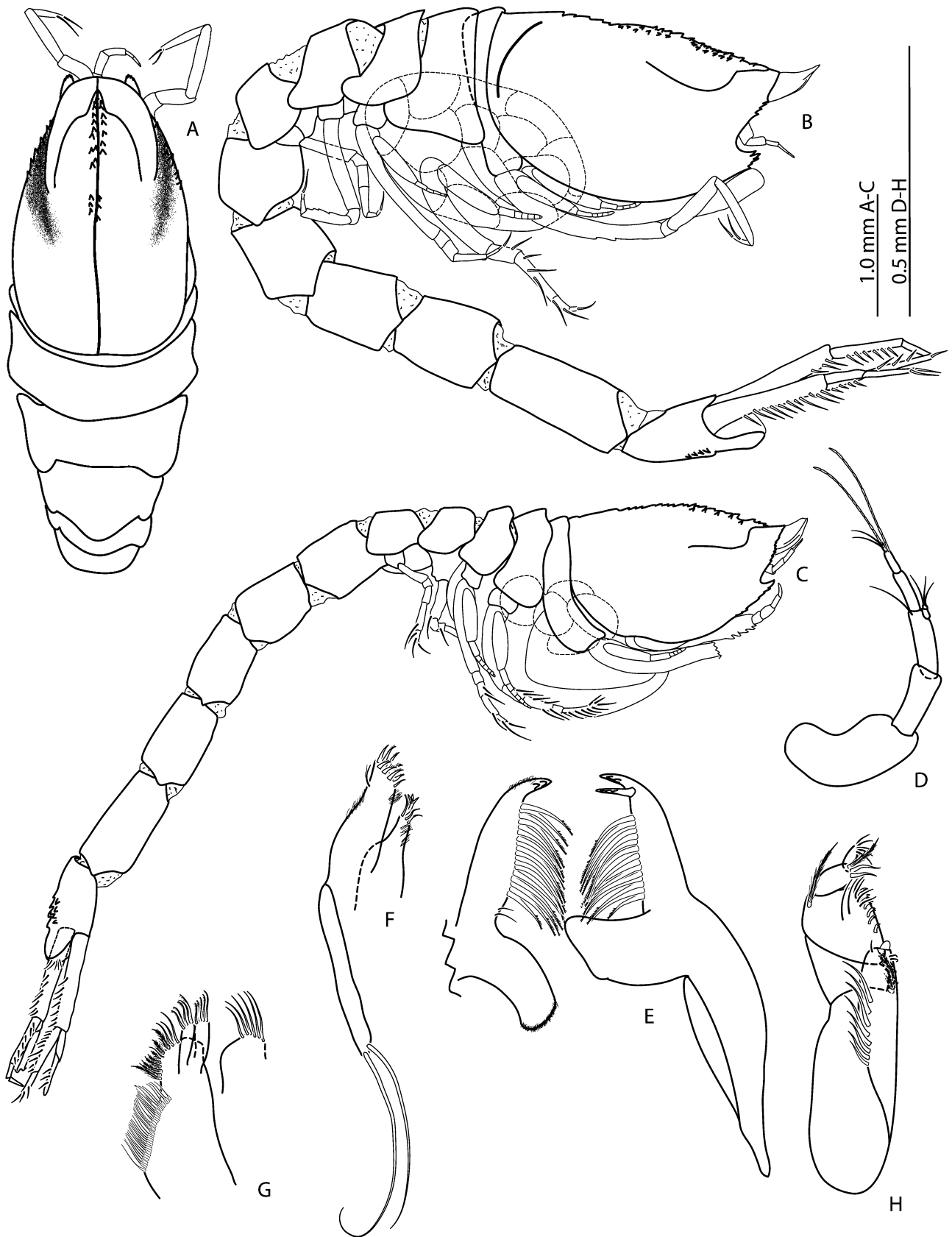
Maxilla with 3 endites; broad endite with simple setae distally, several pappose setae around distal medial corner, row of setae medially; medial narrow endite with 5 microserrate setae terminally; distal narrow endite with 5 microserrate setae terminally; both narrow endites extending well past distal margin of broad endite (Figure 5G).

Maxilliped 1 basis 1.3 times length of all other articles together, produced as lobe medially, with 8 simple setae laterally, 2 hook and 1 stout setae distally; ischium absent; merus 0.2 times basis length, with 2 pappose setae; carpus 1.5 times merus length, with 6 simple and 6 beak setae medially, pappose seta laterally; propodus 0.6 times carpus length, with 2 simple and 1 pappose setae; dactylus 0.7 times propodus length, with 5 simple setae terminally (Figure 5H).

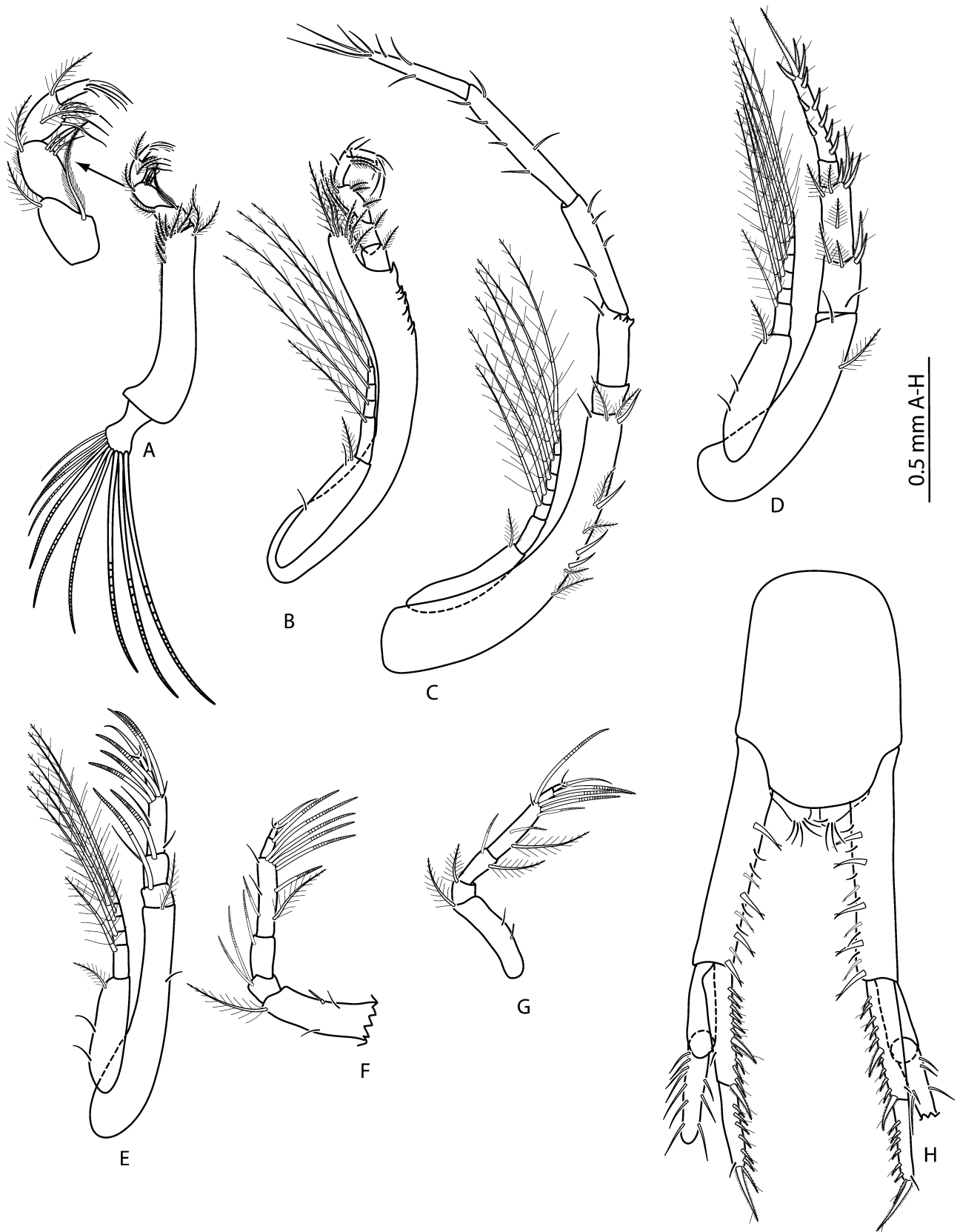
Maxilliped 2 basis 2.0 times length of all other articles together, with 9 plumose setae distally; ischium absent; merus 0.1 times basis length, with 2 plumose setae; carpus equal to merus length, with 3 plumose setae medially, plumose seta laterally; propodus 0.8 times carpus length, with 5 plumose setae; dactylus 0.8 times propodus length, with 5 simple setae terminally (Figure 6A).

Maxilliped 3 basis 2.2 times length of all other articles together, with 5 plumose setae on distal expansion, medial margin with strong teeth distally; ischium 0.08 times basis length, with plumose seta; merus 0.8 times ischium length, with 2 plumose setae; carpus 1.8 times merus length, with 3 plumose setae medially, plumose seta laterally; propodus 0.9 times carpus length, with 2 plumose and 2 simple setae; dactylus 0.8 times propodus length, with 5 simple setae terminally; exopod shorter than basis, flagellum with plumo-annulate setae (Figure 6B).

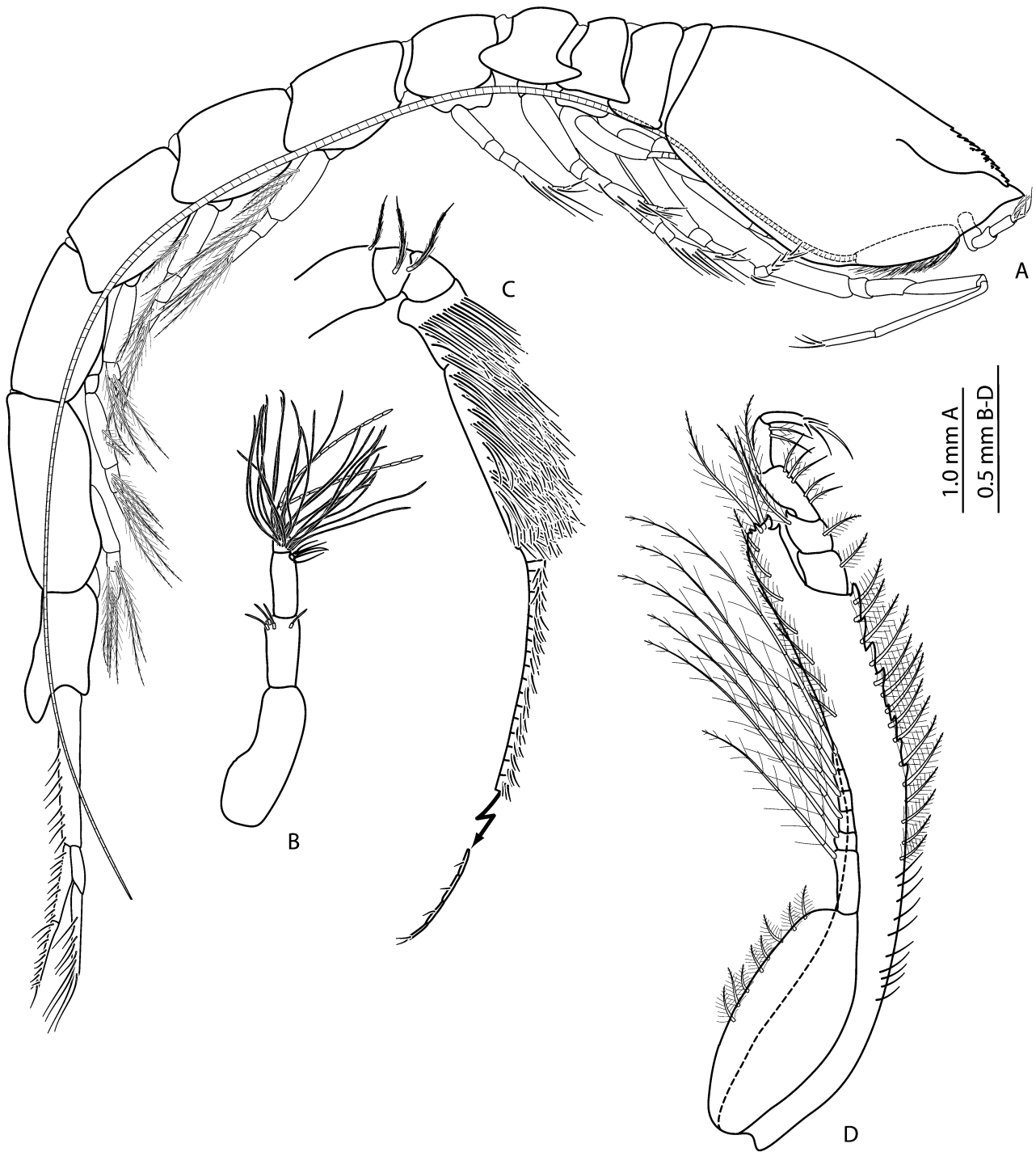
Pereopod 1 basis 0.7 times length of all other articles together, with 6 plumose and 4 simple setae; ischium 0.08 times basis length, unarmed; merus 2.6 times ischium length, with simple seta and several teeth distally; carpus 1.7 times merus length, with 4 simple setae; propodus 1.2 times carpus length, with 6 simple setae; dactylus 0.7 times propodus length, with 4 simple setae and 4 simple setae terminally; exopod shorter than basis, flagellum with plumo-annulate setae (Figure 6C).



**FIGURE 5.** *Bathycuma dayae* n. sp. Holotype ovigerous female, NIWA 46003. A, side view; B, dorsal view. Paratype ovigerous female, NIWA 80741. C, side view; D, antennule; E, mandibles; F, maxillule; G, maxilla; H, maxilliped 1.



**FIGURE 6.** *Bathycuma dayae* n. sp. Paratype ovigerous female, NIWA 80741. A, maxilliped 2; B, maxilliped 3; C, pereopod 1; D, pereopod 2; E, pereopod 3; F, pereopod 4; G, pereopod 5; H, pleonite 6 and uropods.



**FIGURE 7.** *Bathycuma dayae* n. sp. Paratype adult male, NIWA 80742. A, side view; B, antennule; C, antenna; D, maxilliped 3.

Pereopod 2 basis 0.9 times length of all other articles together, with 1 plumose and 1 simple setae; ischium 0.02 times basis length, unarmed; merus 8.0 times ischium length, with 2 plumose and 2 microserrate with single subterminal setule setae; carpus 1.6 times merus length, with 3 plumose setae and 3 microserrate with single subterminal setule setae; propodus 0.4 times carpus length, unarmed; dactylus 3.4 times propodus length, with 7 microserrate with single subterminal setule setae and 3 microserrate with single subterminal setule setae terminally; exopod longer than basis, flagellum with plumo–annulate setae (Figure 6D).

Pereopod 3 basis 1.2 times length of all other articles together, with 1 plumose and 1 simple setae; ischium 0.09 times basis length, with annulate seta; merus 1.3 times ischium length, with 1 annulate and 1 simple setae; carpus 2.0 times merus length, with 1 simple and 4 annulate setae; propodus 0.4 times carpus length, with annulate

seta; dactylus 0.8 times propodus length, with 3 simple setae terminally; exopod shorter than basis, flagellum with plumo-annulate setae (Figure 6E).

Pereopod 4 basis broken, with 2 simple, 1 plumose and 1 pedunculate setae; ischium with 2 annulate setae; merus 2.3 times ischium length, with annulate seta; carpus 2.0 times merus length, with 1 simple, 1 plumose and 6 annulate setae; propodus 0.3 times carpus length, with annulate seta; dactylus 0.8 times propodus length, with 3 simple setae terminally (Figure 6F).

Pereopod 5 basis 0.4 times length of all other articles together, with 1 simple, 1 plumose and 1 pedunculate setae; ischium 0.3 times basis length, with plumose seta; merus 2.3 times ischium length, with 1 plumose and 1 annulate setae; carpus 2.4 times merus length, with 1 simple, 1 plumose and 5 annulate setae; propodus 0.2 times carpus length, with annulate seta; dactylus 0.7 times propodus length, with 3 simple setae terminally (Figure 6G).

Uropod peduncles 0.9 times pleonite 6 length, with 4 simple and 7–8 setae with single subterminal setule medially. Uropod endopod biarticulate, 0.7 times peduncle length; article 1 with 11–12 microserrate with single subterminal setule setae medially, simple seta laterally; article 2 0.7 times article 1 length, with 7 microserrate with single subterminal setule setae medially, simple seta laterally, terminal seta microserrate with single subterminal setule. Uropod exopod of 2 articles, 0.9 times length of endopod; article 1 subequal to article 2 length, unarmed; article 2 with 10 simple setae, no terminal seta (Figure 6H).

**Description of adult male.** Paratype adult male, 11.8 mm, NIWA 80742. Carapace with disorganized dorsal teeth on frontal lobe; antennal notch oblique; anteroventral corner smooth; pseudorostral lobes 0.4 times carapace length; eye lobe 0.06 times carapace length; carapace 1.2 times pereon length (Figure 7A).

Antennule peduncle article 1 longest, unarmed; article 2 0.6 times article 1 length, with 4 pedunculate setae; article 3 equal to article 2 length, with simple seta; main flagellum of 3 articles, first article expanded with group of aesthetascs, with 2 aesthetascs terminally on flagellum; accessory flagellum of 2 articles, with 4 simple setae (Figure 7B).

Antenna peduncle of 5 articles; article 1 with pappose seta; article 2 with 2 pappose setae; article 3 with pappose setae; article 4 with ranks of thin setae; article 5 longest, with ranks of fine setae; antennal flagellum of short articles, extending past uropod peduncles (Figure 7C).

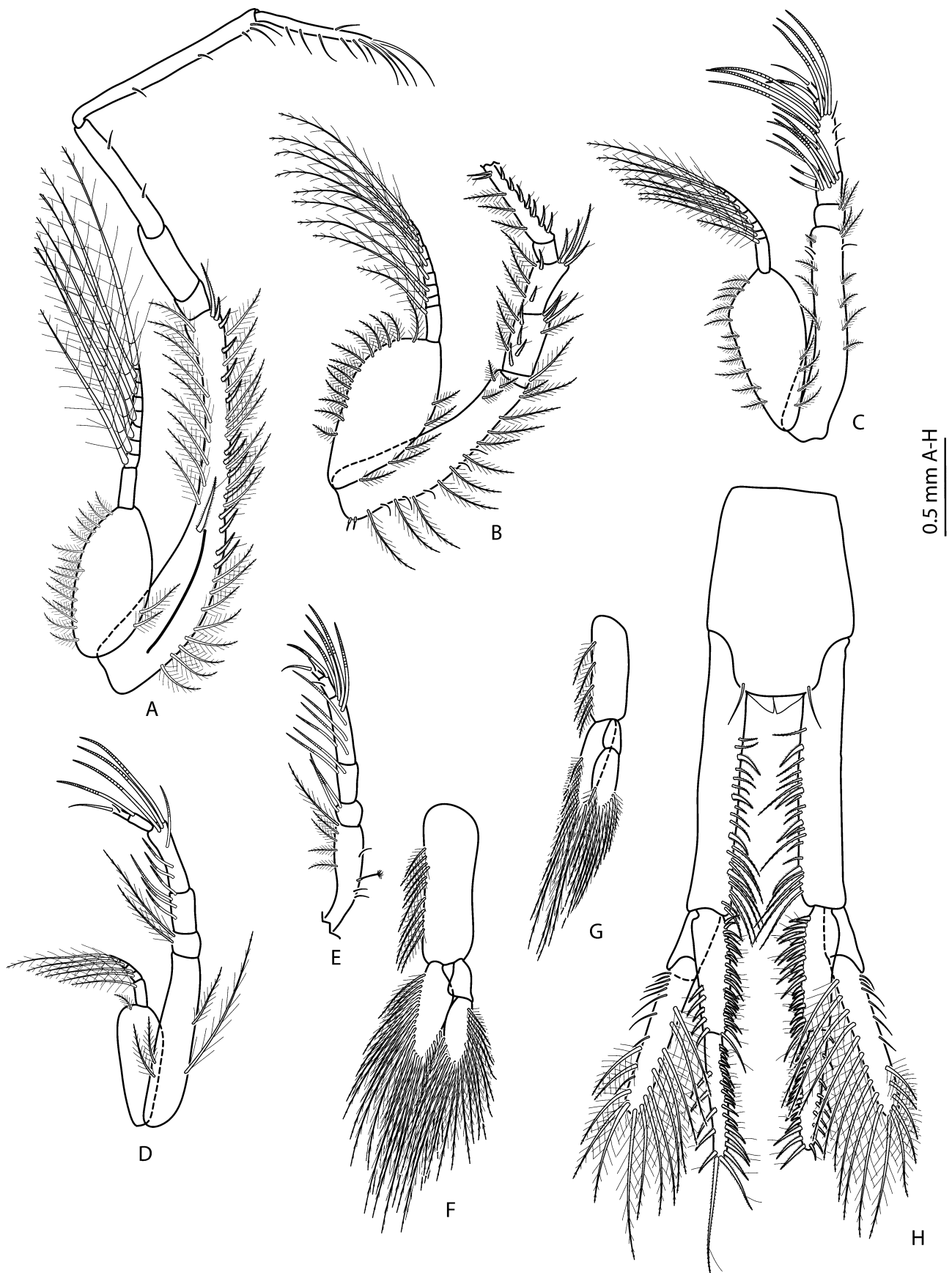
Maxilliped 3 basis 2.4 times length of all other articles together, margins lined with simple setae proximally, plumose setae laterally, medial margin produced as teeth distally, lateral corner expanded to distal margin of merus, with plumose setae and teeth; ischium 0.07 times basis length, with plumose seta; merus 0.9 times ischium length, with 2 plumose setae; carpus 2.0 times merus length, with 5 plumose setae medially, plumose seta laterally; propodus 0.7 times carpus length, with 2 plumose setae medially; dactylus equal to propodus length, with 4 simple setae terminally; exopod shorter than basis, flagellum with plumo-annulate setae (Figure 7D).

Pereopod 1 basis 0.7 times length of all other articles together, with 9 plumose setae laterally, 17 plumose setae medially, 15 microserrate with single subterminal setule setae medially; ischium 0.04 times basis length, unarmed; merus 4.3 times ischium length, unarmed; carpus 2.0 times merus length, with 2 simple setae; propodus 1.5 times carpus length, with 5 simple setae; dactylus 0.6 times propodus length, with 7 simple setae and 4 simple setae terminally; exopod shorter than basis, flagellum with plumo-annulate setae (Figure 8A).

Pereopod 2 basis shorter than all other articles together, with 14 plumose, 2 pedunculate and 5 simple setae; ischium 0.05 times basis length, with plumose setae; merus 6.0 times ischium length, with 4 plumose and 7 microserrate with single subterminal setule setae; carpus 0.8 times merus length, with 3 plumose and 6 microserrate with single subterminal setule setae; propodus 0.4 times carpus length, unarmed dactylus broken, with plumose and microserrate with single subterminal setule setae; exopod longer than basis, flagellum with plumo-annulate setae (Figure 8B).

Pereopod 3 basis 1.5 times length of all other articles together, with 10 plumose and 3 simple setae; ischium 0.1 times basis length, with 2 plumose setae; merus 1.3 times ischium length, with 7 annulate setae; carpus 2.4 times merus length, with 7 annulate and 3 simple setae; propodus 0.3 times carpus length, with annulate seta; dactylus equal to propodus length, with simple seta terminally; exopod longer than basis, flagellum with plumo-annulate setae (Figure 8C).

Pereopod 4 basis equal to all other articles together, with 2 plumose setae; ischium 0.1 times basis length, with 2 plumose setae; merus 2.0 times ischium length, with 4 annulate setae; carpus 1.5 times merus length, with 6 annulate setae; propodus 0.4 times carpus length, with annulate seta; dactylus 0.6 times propodus length, with 2 simple setae terminally; exopod longer than basis, flagellum with plumo-annulate setae (Figure 8D).



**FIGURE 8.** *Bathycuma dayae* n. sp. Paratype adult male, NIWA 80742. A, pereopod 1; B, pereopod 2; C, pereopod 3; D, pereopod 4; E, pereopod 5; F, pleopod 1; G, pleopod 5; H, pleonite 6 and uropods.



Pereopod 5 basis broken, with 5 plumose, 3 simple and 1 complex pedunculate setae; ischium with 2 annulate setae; merus 2.0 times ischium length, with 2 annulate setae; carpus 1.6 times merus length, with 8 annulate setae; propodus 0.3 times carpus length, with 1 simple and 1 annulate setae; dactylus 0.5 times propodus length, with 2 simple setae terminally (Figure 8E).

Pleopod 1 longest, exopod and endopod subequal, endopod biarticulate, without process, lined with plumose setae (Figure 8F).

Pleopod 5 shortest, exopod and endopod subequal, endopod biarticulate, without process, lined with fewer plumose setae than pleopod 1 (Figure 8G).

Uropod peduncles 1.3 times pleonite 6 length, with 20–22 microserrate setae medially. Uropod endopod biarticulate, 0.9 times peduncle length; article 1 subequal to article 2 length, with many microserrate with single subterminal setule setae medially and laterally; article 2 with many microserrate with single subterminal setule setae medially and laterally, terminal seta subequal to article 2 length, microserrate with single subterminal setule. Uropod exopod 0.9 times length of endopod; article 1 unarmed; article 2 2–3 times length of article 1, margins lined with long plumose setae, no distinct terminal seta (Figure 8H).

**Etymology.** The species is named for Jennifer Day, for all her work on the South African Cumacea.

**Remarks.** There are no other species of *Bathycuma* known from New Zealand or Australian waters. Unusually for species of *Bathycuma*, I had complete specimens of both adult males and ovigerous females. Therefore, it is useful to point out some differences in addition to the typical changes in setation between the males and females. The ovigerous female has teeth dorsally on pleonite 6, while pleonite 6 is smooth dorsally in the male. In the ovigerous female, the uropod peduncle is barely shorter than pleonite 6, while in the male the peduncles are distinctly longer than pleonite 6. The first article of the uropod endopod is longer than the second article, and the exopod articles are subequal in the ovigerous female, while in the male the uropod endopod articles are subequal and the first article of the exopod is much shorter than the second article. The uropod exopod proportions in the male appear to be a result of a lengthening of uropod exopod article 2, rather than a shortening of article 1, as the article 1 lengths are similar in both.

## *Cyclaspis* Sars 1865

**Type species.** *Cyclaspis quadriplicata* Sars 1865

**Diagnosis.** *Female.* Carapace longer than pereon, pleon longer than pereon and carapace together; eyelobe extending to end of pseudorostral lobes or beyond; antennal notch present, open; branchial siphons short. Pleonite 6 longer than wide. Pereopods 2–4 with ischium. Uropod endopod uniarticulate. Uropod exopod article 1 shorter than article 2. *Male.* With 5 pairs of pleopods.

**Remarks.** All species of Bodotriinae found in New Zealand waters belong to this genus, at present.

**New Zealand species.** *Cyclaspis argus* Zimmer 1902, *C. petrescui* n.sp., *C. coelebs* Calman 1917, *C. elegans* Calman 1907, *C. hayeae* n. sp, *C. levis* Thomson 1892, *C. similis* Calman 1907, *C. thomsoni* Calman 1907, *C. triplicata* Calman 1907, *C. zealandiaensis* n. sp.

## Key to the New Zealand species

1. Carapace smooth, may have dorsal keel . . . . . 2
- Carapace with lateral ridges or tubercles or both . . . . . 5
2. Eye lobe with lenses . . . . . 3
- Eyelobe entirely without lenses. . . . . 4
3. Uropod peduncles equal to or longer than pleonite 6; carapace 0.5 as high as long. . . . . *Cyclaspis levis*
- Uropod peduncles shorter than pleonite 6; carapace 0.6 as high as long or more . . . . . *Cyclaspis petrescui* n. sp.
4. Carapace 0.7 as high as long. . . . . *Cyclaspis hayeae* n. sp.
- Carapace 0.5 as high as long. . . . . *Cyclaspis zealandiaensis* n. sp.
5. Carapace with 1–2 vertical ridges posteriorly, but no ridges, tubercles or protrusions ventral to the pseudorostral suture. . . . . 6
- Carapace with ridges, tubercles or protrusions ventral to pseudorostral suture . . . . . 7
6. Carapace with 2 vertical ridges posterior of frontal lobe . . . . . *Cyclaspis argus*
- Carapace with 1 vertical ridge posterior of frontal lobe . . . . . *Cyclaspis thomsoni*

- 7. Carapace with distinct lateral depression . . . . . 8
- Carapace without distinct lateral depression . . . . . 9
- 8. Carapace with robust, calcified ridges raised from carapace; 4 tubercles within lateral depression . . . . . *Cyclaspis elegans*
- Carapace with distinct ridges barely raised from carapace; less than 4 tubercles within lateral depression . . . . . *Cyclaspis similis*
- 9. Carapace with 3 oblique transverse ridges, anteriormost ridge ventral to pseudorostral suture. . . . . *Cyclaspis triplicata*
- Carapace with 1 transverse ridge posteriorly, single tubercle below origin of pseudorostral suture . . . . . *Cyclaspis coelebs*

***Cyclaspis argus* Zimmer 1902**

**Synonymy.** *Cyclaspis bistrinata* in Zimmer 1902; *C. biplicata* in Calman 1907; *C. bistrinata* in Zimmer 1913, Stebbing 1913, Calman 1917.

**Diagnosis.** *Female.* Carapace finely pitted; 0.7 as high as long; eyelobe with distinct lenses; antennal notch open; anteroventral corner smooth. Pereonite 1 visible only from side. Pereonite 2 produced as large dorsal tooth directed anteriorly. Pleon with lateral articular pegs. Uropod peduncles longer than or equal to pleonite 6; endopod subequal to exopod; endopod with single seta medially; exopod with several setae. *Male.* Carapace less arched than in female, ridges present but fainter; eyelobe with more lenses; antennal notch oblique; appendages with more setae than in female. Uropod peduncles longer than pleonite 6, rami subequal.

**Remarks.** In the New Zealand *Cyclaspis* fauna, this species can easily be distinguished by the posterior pair of vertical ridges on the carapace.

***Cyclaspis coelebs* Calman 1917**

**Diagnosis.** *Female.* Unknown. *Male.* Carapace with single transverse ridge posteriorly, with single tubercle ventral to origin of pseudorostral suture; 0.7 as high as long; eyelobe with lenses; antennal notch present; anteroventral corner smooth. Pereonite 1 not visible. Pereonite 2 not produced dorsally. Pleon with lateral articular pegs. Uropod peduncles longer than pleonite 6; endopod subequal to exopod; endopod with long plumose setae proximally and stout setae distally; exopod with long plumose setae.

**Remarks.** Only the adult male of this species has been described, the female is currently unknown. Within the New Zealand fauna, the combination of a single posterior transverse ridge and a single tubercle distinguishes this species from all other species of *Cyclaspis*. Jones (1963) suggests that the record of this species from the Andaman Islands by Kurian (1956) is unlikely to have been correctly identified.

***Cyclaspis elegans* Calman 1907**

**Diagnosis.** *Female.* Carapace granulated, with many stout ridges, quadrilateral depression on sides bounded by strong ridges, rising into prominent tubercles at corners; 0.7 as high as long; eyelobe with lenses; antennal notch oblique; anteroventral corner smooth. Pereonite 1 only visible from side. Pereonite 2 produced dorsally as large tooth directed posteriorly. Pleon with lateral articular pegs. Uropod peduncles shorter than pleonite 6; endopod subequal to exopod; endopod with with single seta medially; exopod with plumose setae medially. *Male.* Carapace with similar pattern of ridges as in female, but less strongly pronounced, tubercles at corners of depression smaller; 0.5 as high as long. Pereonite 1 entirely concealed. Appendages with more setae than in female. Uropod peduncles longer than pleonite 6; endopod slightly shorter than exopod.

**Remarks.** This is the most strongly ornamented of the *Cyclaspis* currently described from New Zealand. The most similar species is *C. similis*, which can be differentiated by the carapace ornamentation being much less strongly marked, with a similar depression on the sides but without tubercles at the corners of the depression.

***Cyclaspis hayeae* n. sp.**

Figures 9–10

**Type material.** Holotype preparatory female, NIWA 80735; Paratype ovigerous female, dissected, NIWA 80736;

Paratypes, 2 ovigerous females, NIWA 80737; 38.6177°S, 168.9428°E–38.6258°S, 168.9490°E, 480–482 m, 29 May 2007.

**Other material examined.** 1 subadult male, NIWA 84459, 43.7967°S, 175.3158°E–43.8045°S, 175.3148°E, 418–422 m, 27 April 2007. 1 ovigerous female, 1 manca, NIWA 84457, 42.6213°S, 175.9225°E–42.6203°S, 175.9335°E, 1194–1199 m, 26 April 2007. 3 juveniles, 1 manca, NIWA 84458, 38.6177°S, 168.9428°E–38.6258°S, 168.9490°E, 480–482 m, 29 May 2007. 1 manca, NIWA 84463, 44.4862°S, 177.1413°E–44.4841°S, 177.1416°E, 1235–1239 m, 6 April 2007. 1 ovigerous female, 3 juveniles, NIWA 84460, 43.9790°S, 179.6298°E–43.9850°S, 179.6218°E, 529–530 m, 9 April 2007. 1 subadult male, NIWA 84461, 40.1277°S, 170.2140°E–40.1352°S, 170.2090°E, 803–805 m, 5 June 2007. 2 juveniles, 8 mancae, NIWA 84462, 43.0650°S, 174.9325°W–43.0732°S, 174.9348°W, 933–940 m, 13 April 2007. 1 manca, NIWA 84464, 38.3720°S, 168.5670°E–38.3720°S, 168.5670°E, 482 m, 28 May 2007. 2 juveniles, 1 manca, NIWA 45838, 42.9958°S, 178.9957°E–42.9910°S, 179.0052°E, 520–530 m, 24 April 2007. 2 subadult males, 6 juveniles, 15 mancae, NIWA 45840, 42.7820°S, 176.7152°W–42.7817°S, 176.7042°W, 1023–1026 m, 16 April 2007. 1 juvenile, NIWA 45839, 43.2903°S, 175.5522°W–43.2933°S, 175.5630°W, 638–644, 15 April 2007. 4 juveniles, 6 mancae, NIWA 84465, 38.6177°S, 168.9428°E–38.6258°S, 168.9490°E, 480–482 m, 29 May 2007. 1 manca, NIWA 84466, 44.0750°S, 174.5069°E–44.0750°S, 174.5074°E, 520 m, 3 April 2007. 1 manca, NIWA 84467, 43.0650°S, 174.9325°W–43.0732°S, 174.9348°W, 933–940 m, 13 April 2007.

**Diagnosis.** *Female.* Carapace smooth, not reticulated nor pitted; 0.7 as high as long; eyelobe without lenses; antennal notch present; anteroventral corner smooth. Pereonite 1 entirely concealed. Pereonite 2 not produced dorsally. Pleon without lateral articular pegs. Uropod peduncles much shorter than pleonite 6; endopod slightly longer than exopod; endopod with single seta medially; exopod with no medial setae. *Male.* Adult unknown.

**Description.** Holotype ovigerous female, 8.2 mm, NIWA 80735. Paratype ovigerous female, 6.5 mm, NIWA 80736. Carapace smooth, 0.7 as high as long; pseudorostral lobes 0.3 times carapace length; eye lobe 0.1 times carapace length, without lenses; carapace twice as long pereonites together. Pereonite 1 concealed. Pleon longer than carapace and pereonites together (Figures 9A–B).

Antennule peduncle article 1 longest, unarmed; article 2 0.5 times article 1 length, unarmed; article 3 1.3 times article 2 length, with simple seta; main flagellum of 4 articles, with 2 aesthetascs and pedunculate seta; accessory flagellum of 1 article, with 4 simple setae (Figure 9C).

Mandible navicular (Figure 9D).

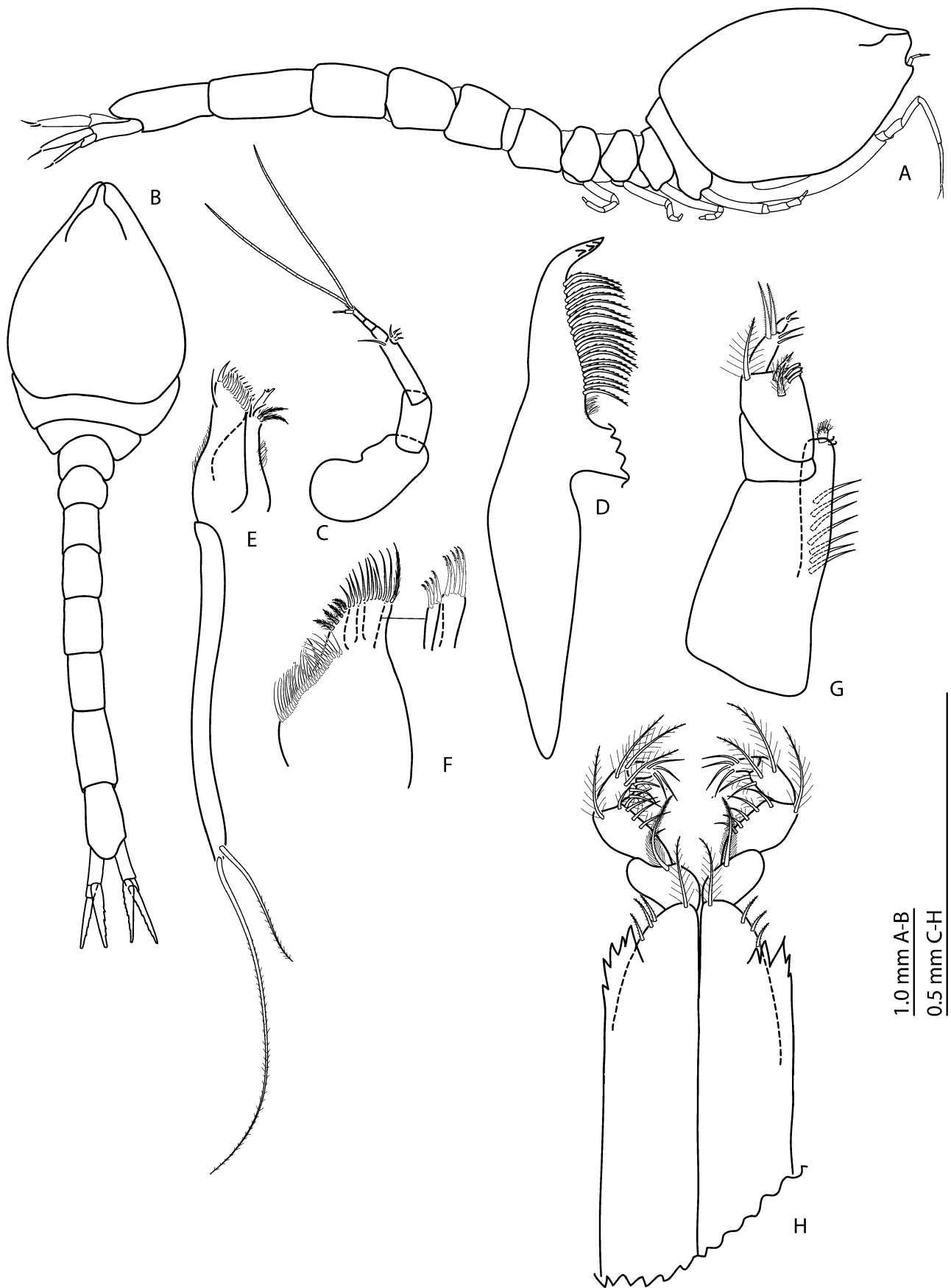
Maxillule with 2 endites; outer endite broad, with 2 rows of stout simple setae terminally, lateral margin with fine hairlike setae and simple seta; inner endite with 2 simple, 1 tricuspid and 2 pappose setae; palp with 2 microserrate setae (Figure 9E).

Maxilla with 3 endites; broad endite distal margin with pappose seta and row of simple setae, distomedial corner with 4 pappose setae, medial margin with row of setae; medial narrow endite with 4 microserrate setae terminally; distal narrow endite with 5 microserrate setae terminally; both narrow endites extending to distal margin of broad endite (Figure 9F).

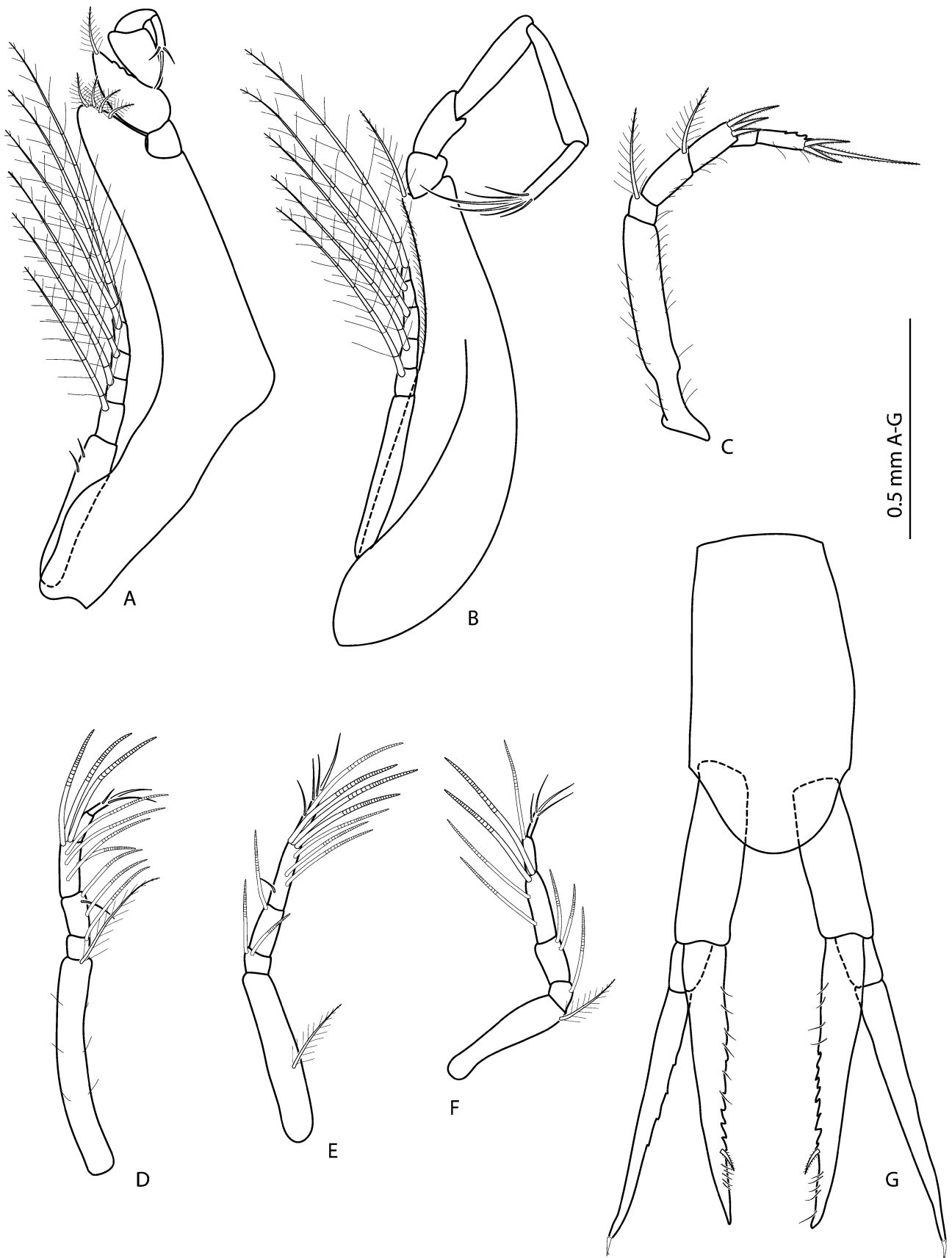
Maxilliped 1 basis 1.2 times length of all other articles together, produced as lobe medially, medial margin with 7 simple setae, 2 hook and 1 pappose setae distally; ischium absent; merus 0.2 times basis length, unarmed; carpus 2.0 times merus length, with 3 beak and 2 pappose setae medially, plumose seta laterally; propodus 0.6 times carpus length, with 2 simple and 2 microserrate setae distally; dactylus 0.4 times propodus length, with 3 simple setae terminally (Figure 9G).

Maxilliped 2 broken, produced as strong teeth laterally, lateral margin with 3 microserrate setae distally, plumose seta at medial distal corner; ischium absent; merus with thickly plumose seta medially; carpus 1.8 times merus length, with 5 plumose setae medially, plumose seta laterally; propodus 0.6 times carpus length, with 4–6 plumose setae; dactylus 0.6 times propodus length, with 4 simple setae terminally (Figure 9H).

Maxilliped 3 basis 2.3 times length of all other articles together, produced distally to midpoint of merus, with 4 short plumose setae terminally; ischium 0.06 times basis length, unarmed; merus 1.8 times ischium length, with plumose seta laterally; carpus 1.1 times merus length, unarmed; propodus 0.6 times carpus length, unarmed; dactylus equal to propodus length, with 3 simple setae terminally; exopod shorter than basis, flagellum with plumo-annulate setae (Figure 10A).



**FIGURE 9.** *Cyclops hayeae* n. sp. Holotype preparatory female, NIWA 80735. A, side view. Paratype ovigerous female, NIWA 80736. B, dorsal view; C, antennule; D, mandible; E, maxillule; F, maxilla; G, maxilliped 1; H, maxilliped 2.



**FIGURE 10.** *Cyclaspis hayeae* n. sp. Paratype ovigerous female, NIWA 80736. A, maxilliped 3; B, pereopod 1; C, pereopod 2; D, pereopod 3; E, pereopod 4; F, pereopod 5; G, pleonite 6 and uropods.

Pereopod 1 basis 1.1 times length of all other articles together, lateral margin lined with fine hairlike setae, with plumose seta at distolateral corner; ischium 0.08 times basis length, unarmed; merus 1.3 times ischium length, unarmed; carpus 2.2 times merus length, unarmed; propodus 1.1 times carpus length, unarmed; dactylus 0.7 times propodus length, with 6 simple setae terminally; exopod shorter than basis, flagellum with plumo-annulate setae (Figure 10B).

Pereopod 2 basis 1.1 times length of all other articles together, with fine hairlike setae; ischium 0.08 times basis length, with plumose seta; merus 3.3 times ischium length, with plumose seta; carpus equal to merus length, with 3 microserrate setae; propodus 0.4 times carpus length, unarmed; dactylus 2.5 times propodus length, with 3 microserrate setae terminally (Figure 10C).

Pereopod 3 basis 1.4 times length of all other articles together, with plumose seta distally; ischium 0.08 times basis length, with annulate seta; merus 2.3 times ischium length, with 1 simple and 2 annulate setae; carpus 1.3 times merus length, with 7 annulate setae; propodus 0.6 times carpus length, unarmed; dactylus 0.6 times propodus length, with 3 simple setae terminally (Figure 10D).

Pereopod 4 basis 0.9 times length of all other articles together, with plumose seta; ischium 0.1 times basis length, with 2 annulate setae; merus 3.0 times ischium length, with annulate seta; carpus 1.3 times merus length, with 1 simple and 6 annulate setae; propodus 0.5 times carpus length, with 1 simple and 1 annulate setae; dactylus 0.7 times propodus length, with 3 simple setae terminally (Figure 10E).

Pereopod 5 basis 0.7 times length of all other articles together, with plumose seta; ischium 0.2 times basis length, with annulate seta; merus 1.8 times ischium length, with 2 annulate setae; carpus 1.7 times merus length, with 4 annulate setae; propodus 0.5 times carpus length, with annulate seta; dactylus 0.7 times propodus length, with 4 simple setae terminally (Figure 10F).

Uropod peduncles 0.4 times pleonite 6 length, unarmed. Uropod endopod medial margin serrate, with microserrate seta medially, no terminal seta, 2.0 times peduncle length. Uropod exopod of 2 articles, 1.1 times length of endopod; article 1 0.2 times article 2 length, unarmed; article 2 unarmed, medial margin weakly serrate, short stout terminal seta simple with single subterminal setule (Figure 10G).

**Etymology.** The species is named for Dr. Pilar Haye, in recognition of her contributions to the systematics of the Bodotriidae.

**Remarks.** This species is most similar to the other New Zealand species that have no lateral ridges on the carapace, *C. levis*, *C. petrescui* and *C. zealandiaensis*. Both *C. levis* and *C. petrescui* have distinct lenses in the eyelobe, unlike *C. hayeae*. *Cyclaspis zealandiaensis* can be differentiated by the carapace being about 0.5 as high as long, and the female uropod exopod bearing 3 long microserrate setae medially. In comparison, *C. hayeae* has the carapace about 0.7 as high as long, and the female uropod exopod has no setae medially. The male of *C. hayeae* is unknown.

## *Cyclaspis levis* Thomson 1892

**Synonymy.** *Cyclaspis calmani* in Hale 1944.

**Diagnosis.** *Female.* Carapace finely pitted, without ridges; 0.5 as high as long; eyelobe with distinct lenses; antennal notch present; anteroventral corner smooth. Pereonite 1 visible from side only. Pereonite 2 not produced dorsally. Pleon with lateral articular pegs, dorsal keel and lateral keel. Uropod peduncles equal or slightly longer than pleonite 6; endopod shorter than exopod; endopod with 4 stout setae medially; exopod with plumose setae and short terminal seta. *Male.* Carapace less arched than in female. Pereonite 1 concealed entirely. Uropod peduncles distinctly longer than pleonite 6; endopod slightly longer than exopod. Appendages with more setae than in female.

**Remarks.** See Jones (1963, p.30) for a synopsis and discussion of the poor original description, and the current understanding of this species. The most similar species in the New Zealand fauna is *Cyclaspis petrescui*, which also has a smooth carapace and distinct lenses in the eyelobe. However, in *C. petrescui*, the carapace is finely reticulated, 0.7 times as high as long, the pleon has only a dorsal keel, the uropod peduncles are distinctly shorter than pleonite 6 in the female, and there are fewer setae on the uropod rami. In comparison, in *C. levis* the carapace is finely pitted, 0.5 times as high as long, the pleon has a dorsal keel and lateral keel, the uropod peduncles are equal to or longer than pleonite 6 in the female, and there are more setae on the uropod rami.

*Cyclaspis petrescui* n. sp.

Figures 11–14

**Type material.** Holotype preparatory female, NIWA 80738; Paratype subadult male, dissected, NIWA 80739; Paratype adult male, dissected, NIWA 80740; 43.5300°S, 178.5048°E–43.5363°S, 178.5118°E, 346 m, 24 April 2007.

**Other material examined.** 4 juveniles, NIWA 46237, 43.5300°S, 178.5048°E–43.5363°S, 178.5118°E, 346 m, 24 April 2007. 1 juvenile, NIWA 84498, 43.3071°S, 176.1058°W–43.3121°S, 176.1064°W, 209 m, 14 April 2007.

**Diagnosis.** *Female.* Carapace finely reticulated; 0.7 times as high as long; eyelobe with distinct lenses; antennal notch present; anteroventral corner smooth. Pereonite 1 entirely concealed. Pereonite 2 not produced dorsally. Pleon with lateral articular pegs, dorsal keel. Uropod peduncles much shorter than pleonite 6; endopod longer than exopod; endopod with medial margin serrate, single stout simple seta; exopod with weakly serrate margins, terminal seta short, stout and simple. *Male.* Carapace less arched than in female. Uropod peduncles longer than pleonite 6.

**Description of female.** Holotype preparatory female, 6.1 mm, NIWA 80738. Carapace finely reticulated; pseudorostral lobes 0.4 times carapace length; eye lobe 0.1 times carapace length, with distinct lenses; carapace 1.5 times pereonites. Carapace, pereon and pleon with dorsal keel. Pleon with lateral articular pegs (Figure 11A).

**Description of subadult male.** Paratype subadult male, 6.1 mm, NIWA 80739. Carapace finely reticulated; pseudorostral lobes 0.4 times carapace length; eye lobe 0.1 times carapace length, with distinct lenses; carapace 1.5 times pereonites. Carapace, pereon and pleon with dorsal keel. Pleon with lateral articular pegs (Figure 11B).

Antennule peduncle article 1 longest, unarmed; article 2 0.6 times article 1 length, with simple seta; article 3 equal to article 2 length, with 2 simple and 1 complex pedunculate setae; main flagellum of 3 articles, with 2 aesthetascs and 4 simple setae; accessory flagellum of 1 article, with 2 simple setae (Figure 11C).

Mandible navicular (Figure 11D).

Maxillule with 2 endites; outer endite broad, with 2 rows of stout simple setae terminally, lateral pappose seta; inner endite with 2 simple, 1 microserrate and 1 tricuspid setae; palp with 2 microserrate setae (Figure 11E).

Maxilla with 3 endites; broad endite with simple and pappose setae distally, medial distal margin with plumose setae, medial margin with row of setae, with 2 pappose setae, central face with groups of fine hairlike setae; medial narrow endite with 6 microserrate setae terminally; distal narrow endite with 6 microserrate setae terminally; both narrow endites extending past distal margin of broad endite (Figure 11F).

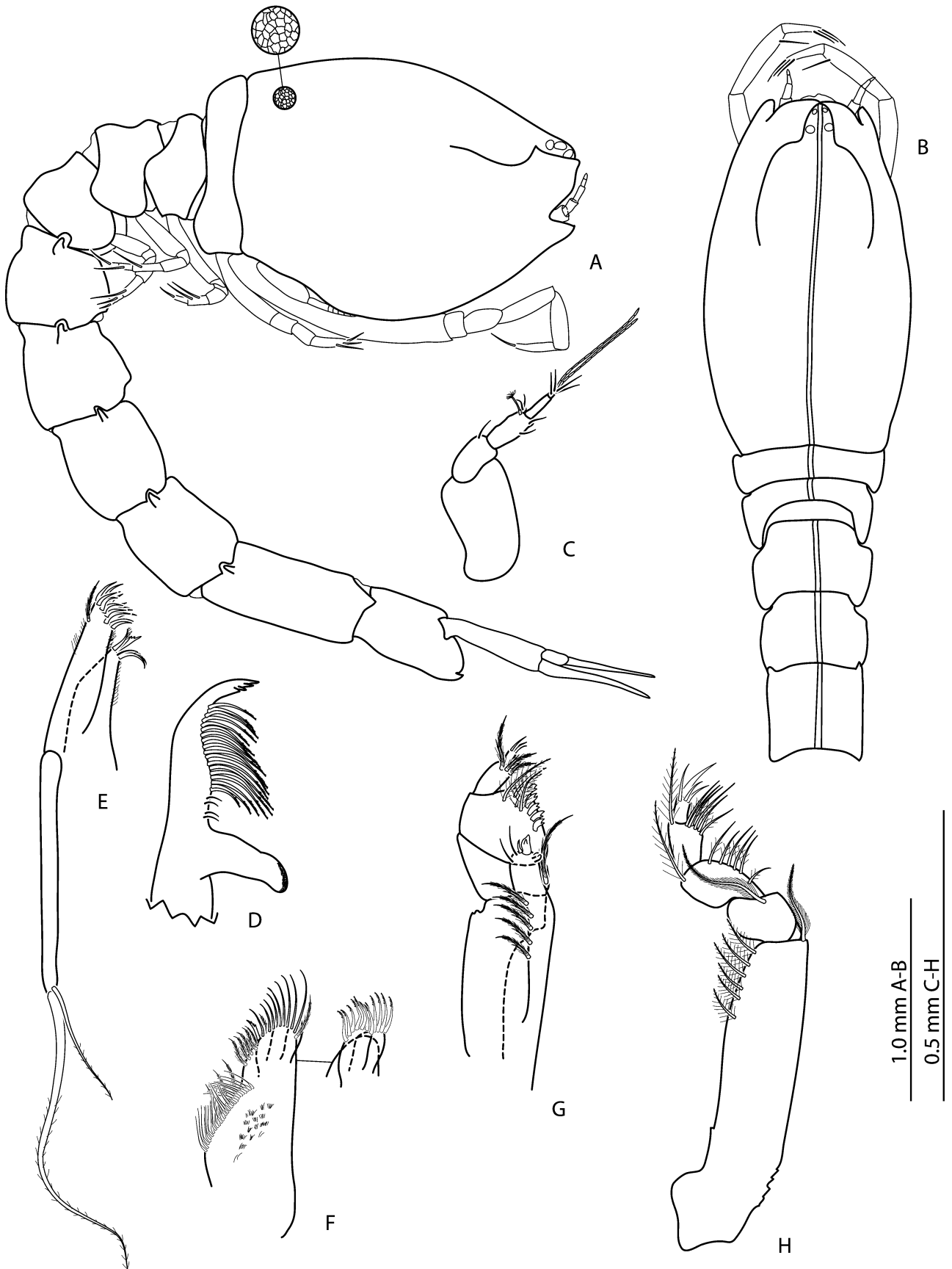
Maxilliped 1 basis produced as broad lobe medially, with 5 pappose setae on margin, 2 hook 3 simple and 1 stout bicuspid setae distally; ischium absent; merus with pappose seta medially; carpus 1.9 times merus length, with 5 beak and 4 plumose setae medially; propodus 0.5 times carpus length, with 3 pappose setae distally; dactylus 0.4 times propodus length, with 3 simple setae terminally (Figure 11G).

Maxilliped 2 basis 1.7 times length of all other articles together, with 6 plumose setae laterally, thickly plumose seta medially; ischium 0.02 times basis length, unarmed; merus 0.2 times basis length, with thickly plumose seta; carpus 1.3 times merus length, with 6 plumose setae medially, plumose seta laterally; propodus 0.7 times carpus length, with 7 plumose setae distally; dactylus 0.6 times propodus length, with 4 simple setae terminally (Figure 11H).

Pereopod 1 basis equal to length of all other articles together, with 2 plumose setae distally; ischium 0.06 times basis length, unarmed; merus 3 times ischium length, unarmed; carpus 1.6 times merus length, unarmed; propodus 1.1 times carpus length, with simple seta; dactylus 0.6 times propodus length, with 5 simple setae terminally; exopod shorter than basis, flagellum with plumo-annulate setae (Figure 12A).

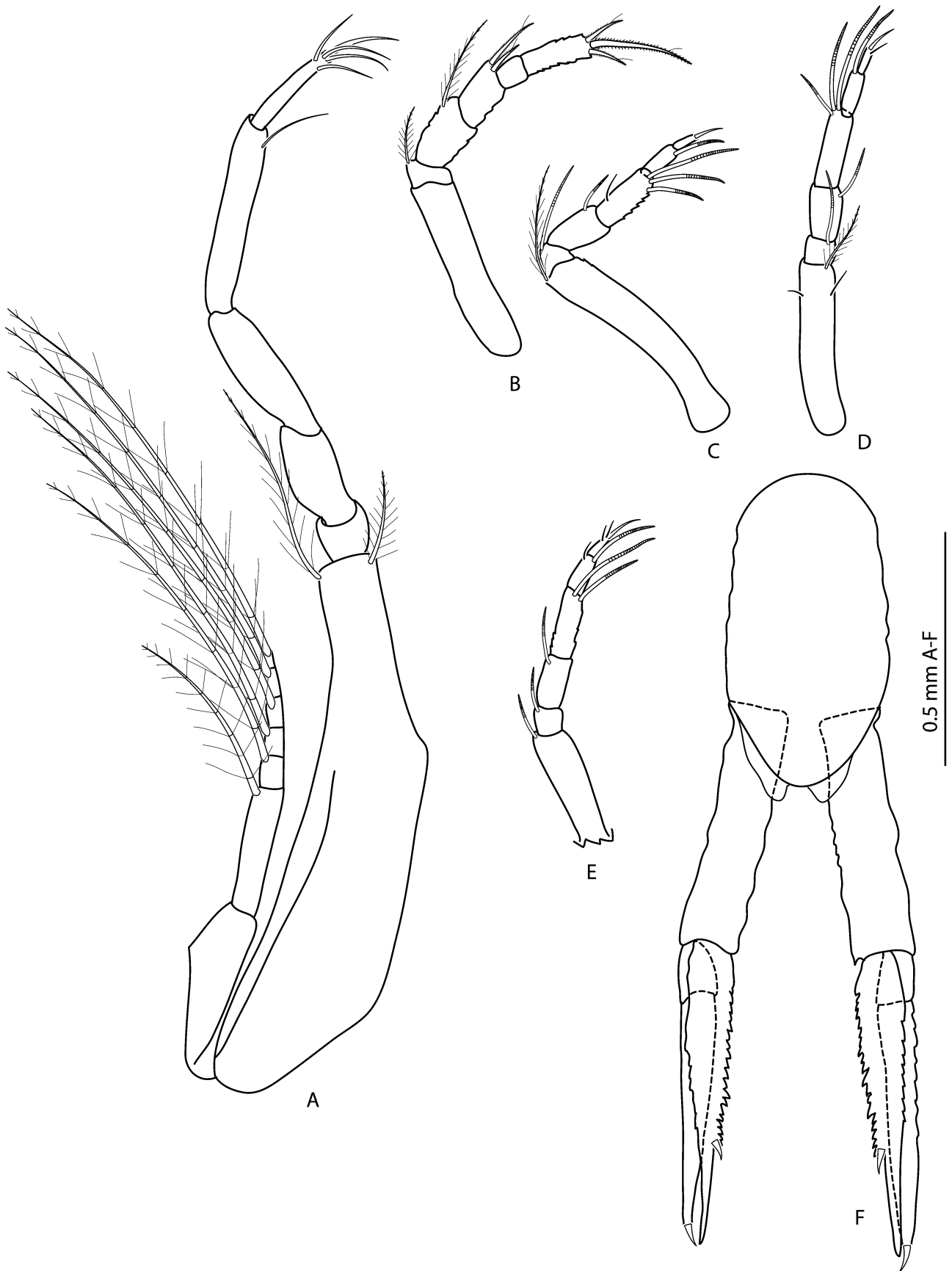
Pereopod 2 basis 0.9 times length of all other articles together, unarmed; ischium 0.08 times basis length, with plumose seta; merus 4 times ischium length, with plumose seta; carpus 0.8 times merus length, with 2 microserrate setae with single subterminal setule; propodus 0.5 times carpus length, unarmed; dactylus 2.6 times propodus length, with 3 microserrate setae with single subterminal setule terminally (Figure 12B).

Pereopod 3 basis 1.2 times length of all other articles together, with plumose seta distally; ischium 0.07 times basis length, with annulate seta; merus 3 times ischium length, with annulate seta; carpus 1.6 times merus length, with 1 simple and 3 annulate setae, margin serrate; propodus 0.4 times carpus length, with annulate seta; dactylus 0.8 times propodus length, with simple seta terminally (Figure 12C).



**FIGURE 11.** *Cyclaspis petrescui* n. sp. Holotype preparatory female, NIWA 80738. A, side view. Paratype subadult male, NIWA 80739. B, dorsal view; C, antennule, D, mandible; E, maxillule; F, maxilla; G, maxilliped 1; H, maxilliped 2.





**FIGURE 12.** *Cyclaspis petrescui* n. sp. Paratype subadult male, NIWA 80739. A, pereopod 1; B, pereopod 2; C, pereopod 3; D, pereopod 4; E, pereopod 5; F, pleonite 6 and uropods.

Pereopod 4 basis 0.8 times length of all other articles together, with 2 simple and 1 plumose setae; ischium 0.2 times basis length, with annulate seta; merus 2 times ischium length, with annulate seta; carpus 1.4 times merus length, with 3 annulate setae; propodus 0.6 times carpus length, with annulate seta; dactylus 0.6 times propodus length, with 2 simple setae terminally (Figure 12D).

Pereopod 5 basis with annulate seta; ischium with annulate seta; merus 2 times ischium length, with annulate seta; carpus 1.3 times merus length, with 2 annulate setae; propodus 0.5 times carpus length, with 1 simple and 1 annulate setae; dactylus 0.7 times propodus length, with 3 simple setae terminally (Figure 12E).

Uropod peduncles 0.6 times pleonite 6 length, unarmed. Uropod endopod uniarticulate, 1.5 times peduncle length, medial margin strongly serrate with stout simple seta, lateral margin weakly serrate. Uropod exopod of 2 articles, 0.95 times length of endopod; article 1 0.2 times length of article 2, unarmed; article 2 with weakly serrate lateral margin, terminal seta short and simple (Figure 12F).

**Description of adult male.** Paratype adult male, 9.2 mm, NIWA 80740. Carapace antennal notch less deep than in female and subadult male; pseudorostral lobes 0.4 times carapace length; eye lobe 0.1 times carapace length, with large, obvious lenses; carapace 1.9 times length of pereonites together. Pereonite 1 completely concealed (Figure 13A–B).

Antennule broken; peduncle article 1 with fine hairlike setae on margins distally; article 2 with complex pedunculate seta; article 3 equal to length of article 2, with complex pedunculate seta and aesthetasc distally; main flagellum of 3 articles, with 3 aesthetascs; accessory flagellum of 1 article, with 3 simple setae (Figure 13C).

Antenna broken during dissection; peduncle article 5 with ranks of simple setae; antennal flagellum of short articles with 1–2 setae per article, extending past uropods (Figure 13A, 13D).

Maxilliped 3 basis 2.2 times length of all other articles together, lateral margin lined with fine hairlike setae distally, produced as lobe extending nearly to lateral corner of merus–carpus border, with 2 plumose setae, with pappose seta medially; ischium 0.1 times basis length, with 2 pappose setae medially; merus equal to ischium length, with plumose seta laterally; merus carpus border diagonal, carpus 0.8 times merus length, unarmed; propodus equal to carpus length, with 2 plumose setae medially; dactylus 0.7 times propodus length, with 3 simple setae terminally; exopod shorter than basis, flagellum with plumo–annulate setae (Figure 13E).

Pereopod 1 basis with 3 simple setae proximally, 2 plumose setae distally; ischium 0.06 times basis length, unarmed; merus 2.2 times ischium length, unarmed; carpus 1.8 times merus length, with simple seta; propodus 1.3 times carpus length, with simple seta; dactylus broken; exopod shorter than basis, flagellum with plumo–annulate setae (Figure 13F).

Pereopod 2 basis broken, unarmed; ischium with plumose seta; merus 5 times ischium length, with plumose seta; carpus 0.9 times merus length, with 3 microserrate setae with single subterminal setule; propodus 0.3 times carpus length, unarmed; dactylus 4.3 times propodus length, with 3 microserrate setae with single subterminal setule terminally (Figure 14A).

Pereopod 3 basis broken, with 2 plumose setae; ischium with annulate seta; merus 2.6 times ischium length, with annulate seta; carpus 1.2 times merus length, with 3 annulate setae; propodus 0.6 times carpus length, with annulate seta; dactylus 0.6 times propodus length, with 2 simple setae terminally (Figure 14B).

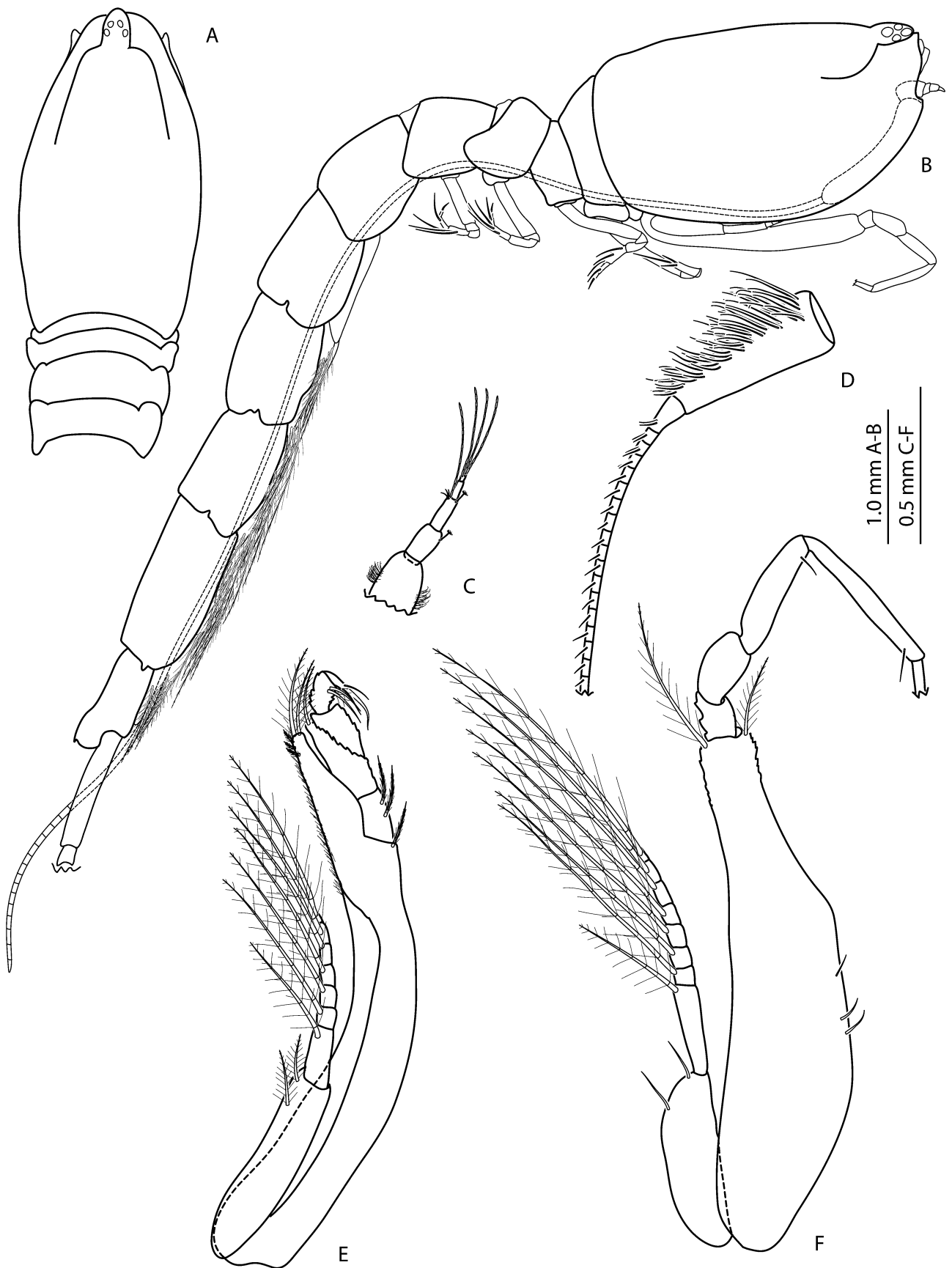
Pereopod 4 basis 0.8 times length of all other articles together, with complex pedunculate seta; ischium 0.1 times basis length, unarmed; merus 2.2 times ischium length, with annulate seta; carpus 1.4 times merus length, with 3 annulate setae; propodus 0.5 times carpus length, with annulate seta; dactylus 0.6 times propodus length, with 2 simple setae terminally (Figure 14C).

Pereopod 5 basis 0.7 times length of all other articles together, with annulate seta; ischium 0.1 times basis length, with annulate seta; merus 2.8 times ischium length, with annulate seta; carpus 1.3 times merus length, with 5 annulate setae; propodus 0.6 times carpus length, with annulate seta; dactylus 0.5 times propodus length, with 2 simple setae terminally (Figure 14D).

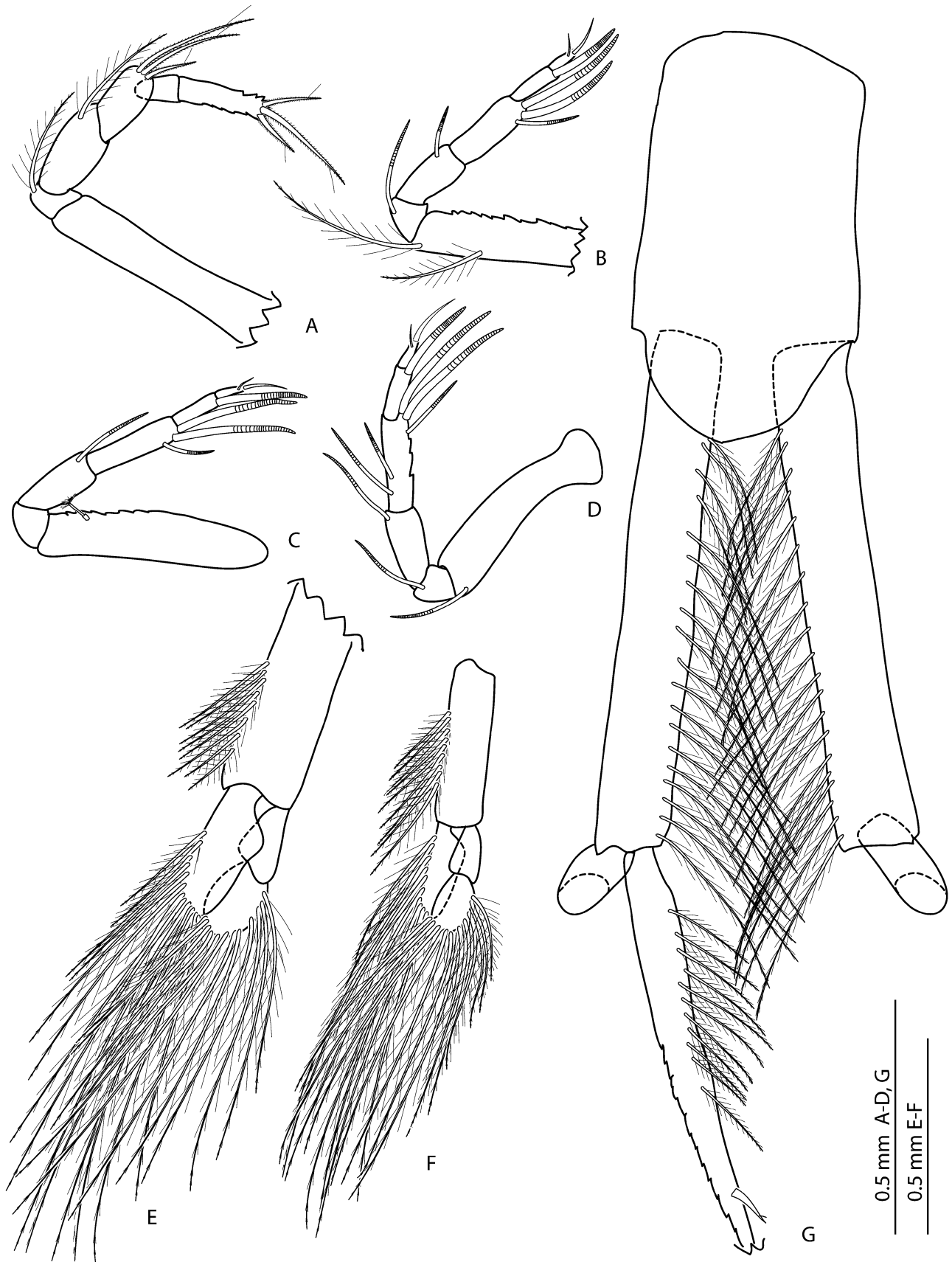
Pleopod 1 longest; peduncle with plumose setae medially; endopod uniarticulate, process weak, exopod biarticulate, both with many long plumose setae (Figure 14E).

Pleopod 5 shortest; peduncle with plumose setae medially; endopod uniarticulate, process weak, exopod biarticulate, both with long many long plumose setae (Figure 14F).

Uropod peduncles 1.1 times pleonite 6 length, medial margin lined with long plumose setae. Uropod endopod uniarticulate, medial margin with long plumose setae proximally, single stout seta with single subterminal setule distally; broken. Uropod exopods broken (Figure 14G).



**FIGURE 13.** *Cyclaspis petrescui* n. sp. Paratype adult male, NIWA 80740. A, dorsal view; B, side view; C, antennule; D, antenna; E, maxilliped 3; F, pereopod 1.



**FIGURE 14.** *Cyclops petrescui* n. sp. Paratype adult male, NIWA 80740. A, pereopod 2; B, pereopod 3; C, pereopod 4; D, pereopod 5; E, pleopod 1; F, pleopod 5; G, pleonite 6 and uropods.

**Etymology.** The species is named for Dr. Iorgu Petrescu, for his excellent and tireless efforts in cumacean systematics.

**Remarks.** The only other species in New Zealand waters with a smooth carapace and lenses in the eyelobe is *Cyclaspis levis*. However, the new species can be differentiated from *C. levis* by the fine ornamentation of the carapace, the carapace proportions, pleon ornamentation, uropod proportions and uropod setation. In *C. levis* the carapace is finely pitted, 0.5 times as long as high, the pleon has a dorsal and lateral keels, the uropod peduncles are equal to or longer than pleonite 6 in the female, and there are more setae on the uropod rami. In comparison, in *C. petrescui* the carapace is finely reticulated, 0.7 times as long as high, the pleon has a dorsal keel only, the uropod peduncles are shorter than pleonite 6 in the female and subadult male, and there are fewer setae on the uropod rami.

### *Cyclaspis similis* Calman 1907

**Diagnosis.** *Female.* Carapace sparsely tuberculated, without pitting or reticulation, with quadrangular lateral depression bounded by ridges, bounding may be incomplete dorsally, corners not marked by large tubercles, ridges not standing away from carapace; 0.6 times as high as long; eyelobe with lenses; antennal notch present; anteroventral corner serrate. Pereonite 1 visible laterally, occasionally dorsally in ovigerous females. Pereonite 2 not produced dorsally tooth, paired dorsal crests present on all pereonites and to pleonite 5. Pleon with lateral articular pegs. Uropod peduncles shorter than pleonite 6; endopod slightly shorter than or equal to exopod length; endopod without setae; exopod with few plumose setae distally. *Male.* Carapace less arched than in female, ridges less pronounced, lateral depression smaller than in female. Pleon articular pegs less pronounced than in female.

**Remarks.** *Cyclaspis similis* is most similar to *C. elegans*. The carapace ornamentation is similar, in that both species have a lateral quadrangular depression bounded by ridges. However, in *C. elegans* the ornamentation is much stronger, with the ridges standing out away from the carapace and large tubercles marking the corners of the depression, while in *C. similis* the ridges are less strong, the depression may not be entirely bounded by ridges, and there are not large tubercles at the corners of the depression.

### *Cyclaspis thomsoni* Calman 1907

**Diagnosis.** *Female.* Carapace covered with shallow pits, with a rugose appearance rather than smooth, with single incomplete vertical ridge posteriorly; about 0.5 times as high as long; eyelobe with lenses; antennal notch present; anteroventral corner acute. Pereonite 1 visible laterally. Pereonite 2 not produced dorsally as tooth, but with dorsal keel; pereonites 3–5 with lateral keels. Uropod peduncles longer than pleonite 6; endopod shorter than exopod; endopod with 4 setae medially; exopod with plumose setae medially. *Male.* Carapace less arched than in female, vertical ridge faint; eyelobe extending beyond terminal margin of pseudorostral lobes. Pereonite 1 not visible. Uropod peduncles longer than pleonite 6, with many plumose setae medially; endopod medial margin with plumose setae proximally and short stout setae distally.

**Remarks.** In the New Zealand fauna, the most similar species is *C. levis*. *Cyclaspis thomsoni* has larger pitting in the carapace, giving a rugose appearance to the carapace, unlike the fine pitting and overall smooth appearance of the carapace in *C. levis*. Also, *C. thomsoni* has a vertical ridge posteriorly on the carapace, and there is no such ridge in *C. levis*. The adult males are the most likely to be confused, as the vertical ridge in *C. thomsoni* is weaker, and the carapace a little less rugose than in the female.

### *Cyclaspis triplicata* Calman 1907

**Diagnosis.** *Female.* Carapace without pitting or reticulation, with 3 oblique ridges on the carapace, joining ventrally and continuing to the anterior margin of the carapace, ventral to the antennal notch, with a tubercle at the midpoint of the pseudorostral suture acting as the origin of the anteriormost oblique ridge; 0.7 times as high as long; eyelobe with lenses; antennal notch present; anteroventral corner acute. Pereonite 1 visible laterally. Pereonite 2 expanded dorsally, not as tooth, overhanging pereonite 3. Pleon with lateral articulating pegs. Uropod peduncles longer than pleonite 6; endopod subequal to exopod; endopod with single stout medial seta; exopod with

few plumose setae medially. *Male*. Carapace less arched than in female, 3 oblique ridges present but do not join ventrally, with tubercle at origin of pseudorostral suture acting as origin of anteriormost ridge. Pereonite 1 not visible. Pereonite 2 produced dorsally as anteriorly directed blunt tooth. Uropod endopod with plumose setae proximally and short stout setae distally.

**Remarks.** This species is unique in the New Zealand fauna in having 3 oblique ridges on the carapace, as denoted in the name *triplicata*. The most similar species is *C. argus*; however, *C. argus* has only 2 oblique ridges, both posterior to the origin of the pseudorostral suture. In comparison, *C. triplicata* has 3 oblique ridges, the anterior most ridge ventral to the pseudorostral suture.

### *Cyclaspis zealandiaensis* n. sp.

Figures 15–18

**Type material.** Holotype ovigerous female, NIWA 80731; Paratype ovigerous female, dissected, NIWA 80732; Paratype adult male, dissected, NIWA 80733; Paratype ovigerous female, adult male, NIWA 80734; 43.9790°S, 179.6298°E–43.9850°S, 179.6218°E, 529–530 m, 9 April 2007.

**Other material examined.** 1 preparatory, 1 subadult females, NIWA 84473, 43.7967°S, 175.3158°E–43.8045°S, 175.3148°E, 418–422 m, 27 April 2007. 4 ovigerous females, 2 subadult males, 7 mancae, NIWA 84485, 42.6213°S, 175.9225°E–42.6203°S, 175.9335°E, 1194–1199 m, 26 April 2007. 1 ovigerous female, NIWA 84486, 44.4862°S, 177.1413°E–44.4841°S, 177.1416°E, 1235–1239 m, 6 April 2007. 6 adult males, 1 ovigerous female, 38 juveniles, NIWA 84484, 43.9790°S, 179.6298°E–43.9850°S, 179.6218°E, 529–530 m, 9 April 2007. 1 ovigerous female, 3 juveniles, NIWA 84478, 40.1277°S, 170.2140°E–40.1352°S, 170.2090°E, 803–805 m, 5 June 2007. 4 ovigerous females, 13 juveniles, 7 mancae, NIWA 84490, 43.8363°S, 176.7092°E–43.8330°S, 176.7127°E, 478–479 m, 5 April 2007. 1 ovigerous female, 2 juveniles, NIWA 84489, 43.0650°S, 174.9325°W–43.0732°S, 174.9348°W, 933–940 m, 13 April 2007. 3 adult males, 23 juveniles, 13 mancae, NIWA 45834, 43.5300°S, 178.5048°E–43.5363°S, 178.5118°E, 346 m, 24 April 2007. 4 juveniles, NIWA 45836, 38.3720°S, 168.5670°E–38.3720°S, 168.5670°E, 482 m, 28 May 2007. 1 juvenile, NIWA 84468, 44.0750°S, 174.5069°E–44.0750°S, 174.5074°E, 520 m, 3 April 2007. 4 ovigerous females, 30 juveniles, 6 mancae, NIWA 45831, 40.8800°S, 170.8555°E–40.8883°S, 170.8565°E, 529–534 m, 6 June 2007. 1 juvenile, NIWA 84488, 42.9958°S, 178.9957°E–42.9910°S, 179.0052°E, 520–530 m, 24 April 2007. 6 ovigerous females, 23 adult males, 28 juveniles, 13 mancae, NIWA 45832, 42.9958°S, 178.9957°E–42.9910°S, 179.0052°E, 520–530 m, 24 April 2007. 1 adult male, 2 juveniles, 3 mancae, NIWA 45833, 43.2903°S, 175.5522°W–43.2933°S, 175.5630°W, 638–644, 15 April 2007. 1 manca, NIWA 84483, 0705/346. 1 ovigerous female, 1 juvenile, 2 mancae, NIWA 84482, 44.0162°S, 178.5210°E–44.0143°S, 178.5175°E, 769–771 m, 7 April 2007. 1 preparatory female, 1 adult male, 1 subadult male, 13 juveniles, 3 mancae, NIWA 84480, 43.5212°S, 178.6203°W–43.5228°S, 178.6315°W, 424–425 m, 18 April 2007. 1 manca, NIWA 84476, 42.5037°S, 176.5766°W–42.5058°S, 176.5705°W, 853 m, 17 April 2007. 1 juvenile, NIWA 84487, 43.0650°S, 174.9325°W–43.0732°S, 174.9348°W, 933–940 m, 13 April 2007. 2 juveniles, NIWA 84475, 43.5212°S, 178.6203°W–43.5228°S, 178.6315°W, 424–425 m, 18 April 2007. 3 ovigerous females, 3 adult males, 1 manca, NIWA 84471, 42.9958°S, 178.9957°E–42.9910°S, 179.0052°E, 520–530 m, 24 April 2007. 6 adult males, 6 juveniles, 3 mancae, NIWA 84479, 44.1208°S, 174.8432°E–44.1242°S, 174.8448°E, 512–513 m, 4 April 2007. 1 juvenile, NIWA 84470, 43.9790°S, 179.6298°E–43.9850°S, 179.6218°E, 529–530 m, 9 April 2007. 1 juvenile, NIWA 84474, 44.4862°S, 177.1413°E–44.4841°S, 177.1416°E, 1235–1239 m, 6 April 2007. 2 ovigerous females, NIWA 84477, 44.1208°S, 174.8432°E–44.1242°S, 174.8448°E, 512–513 m, 4 April 2007. 1 juvenile, NIWA 84481, 40.8800°S, 170.8555°E–40.8883°S, 170.8565°E, 529–534 m, 6 June 2007. 1 ovigerous female, NIWA 84469, 39.6373°S, 172.1532°E–39.6457°S, 172.1522°E, 264–266 m, 7 June 2007.

**Diagnosis.** *Female*. Carapace smooth, unornamented; 0.5 times as high as long; eyelobe without lenses, extending past anterior margin of pseudorostral lobes; antennal notch present; anteroventral corner serrated. Pereonite 1 visible laterally. Pereonite 2 not produced dorsally. Pleon without articular pegs. Uropod peduncles much shorter than pleonite 6; endopod subequal to exopod; endopod with short stout seta medially; exopod with 3 microserrate setae medially. *Male*. Carapace smooth, less arched than in female; antennal notch weak; anteroventral corner smooth. Pereonite 1 not visible. Uropod endopod with short plumose setae proximally, stout microserrate setae with single subterminal setule distally; exopod without terminal seta.

**Description of the ovigerous female.** Holotype ovigerous female, 6.3 mm, NIWA 80731. Paratype ovigerous female, 7.2 mm, NIWA 80732. Carapace smooth; pseudorostral lobes 0.4 times carapace length; eye lobe 0.1 times carapace length, extending past anterior margin of pseudorostral lobes, without lenses; carapace 1.7–2.2 times length of pereonites together. Pleonite 6 with dorsal keel distally (Figure 15A–B).

Antennule peduncle article 1 longest, with 4 complex pedunculate setae; article 2 0.5 times article 1 length, with 4 complex pedunculate setae; article 3 equal to article 2 length, unarmed; main flagellum of 3 articles, with 2 aesthetascs and simple seta; accessory flagellum of 2 articles, with 3 simple setae (Figure 15C).

Mandible navicular (Figure 15D).

Maxillule with 2 endites; outer endite broad, with 7 microserrate setae terminally, margin with fine hairlike setae and simple seta; inner endite with 2 simple, 1 tricuspid and 1 pappose setae; palp with 2 microserrate setae (Figure 15E).

Maxilla with 3 endites; broad endite with simple setae distally, microserrate, bicuspid, and pappose setae at medial lateral corner, medial margin with row of setae; medial narrow endite with 4 simple setae terminally; distal narrow endite with 4 simple setae terminally; both narrow endites extending past margin of broad endite (Figure 15F).

Maxilliped 1 basis 0.9 times length of all other articles together, produced as lobe medially, medial margin with pappose and plumose setae, distal margin with 2 hook, 3 simple and 1 broad microserrate setae; ischium absent; merus 0.3 times basis length, unarmed; carpus 1.6 times merus length, with 7 simple and 3 beak setae medially, plumose seta distally; propodus 0.4 times carpus length, with 4 plumose setae; dactylus 0.6 times propodus length, with 3 simple setae terminally (Figure 15G).

Maxilliped 2 basis 1.8 times length of all other articles together, with thickly plumose seta medially, lateral margin produced as strong serrations distally, with 1 simple and 1 microserrate setae; ischium 0.02 times basis length, only partially visible; merus 0.1 times basis length, with thickly plumose seta; carpus 1.7 times merus length, with 5 plumose setae medially, 2 plumose setae distally; propodus 0.7 times carpus length, with 4 plumose setae; dactylus 0.7 times propodus length, with 5 simple setae (Figure 15H).

Maxilliped 3 basis 2.6 times length of all other articles together, lateral margin produced distally to midpoint of merus, with 5 pappose setae; ischium 0.08 times basis length, unarmed; merus 1.1 times ischium length, with simple seta laterally; carpus 1.1 times merus length, with simple seta laterally; propodus 0.4 times carpus length, with several simple setae; dactylus 1.8 times propodus length; exopod shorter than basis, flagellum with plumo–annulate setae (Figure 15I).

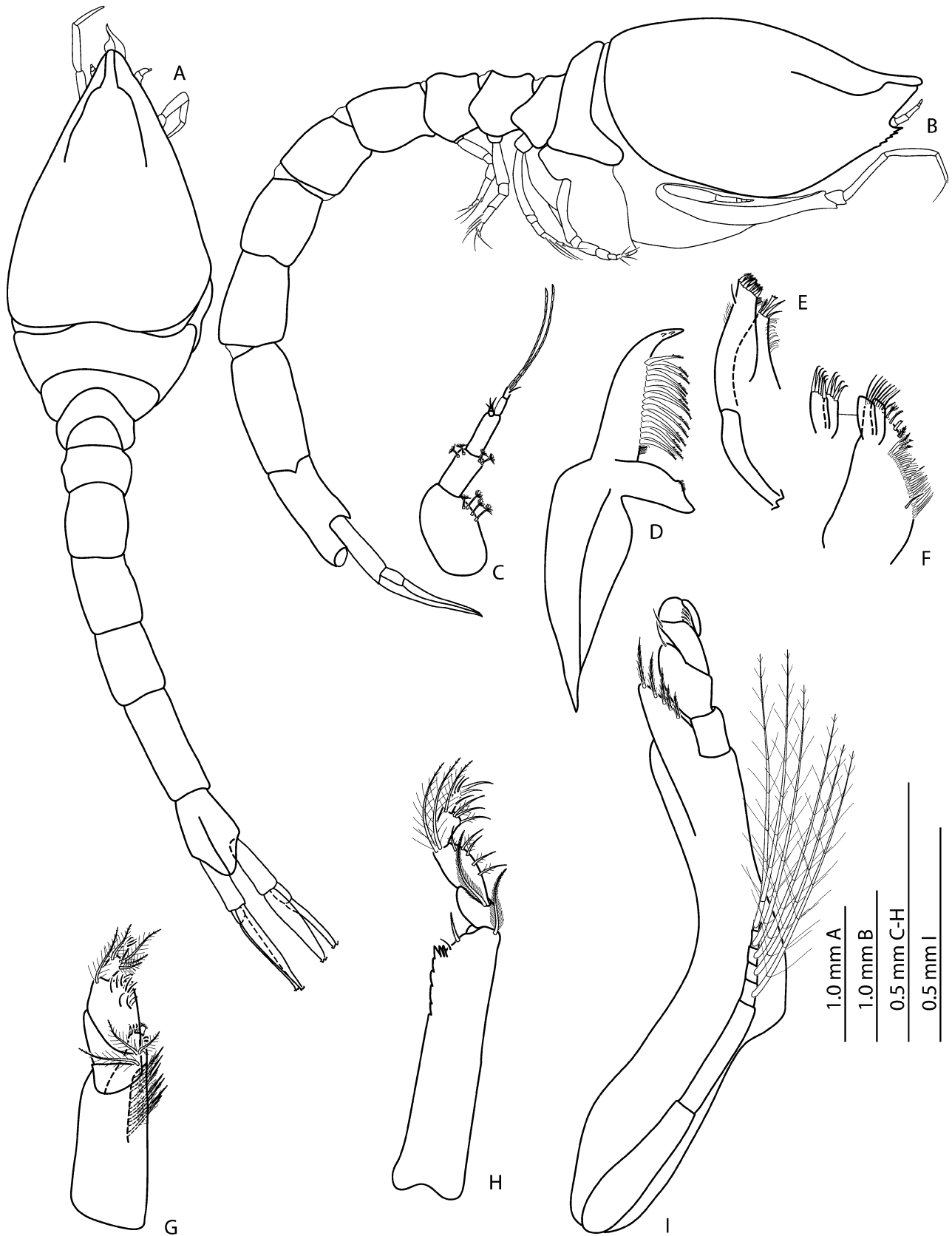
Pereopod 1 basis 1.2 times length of all other articles together, medial margin lined with fine hairlike setae; ischium 0.08 times basis length, unarmed; merus 1.1 times ischium length, unarmed; carpus 2.9 times merus length, unarmed; propodus 1.1 times carpus length, unarmed; dactylus 0.6 times propodus length, with 6 simple setae terminally; exopod shorter than basis, flagellum with plumo–annulate setae (Figure 16A).

Pereopod 2 basis equal to length of all other articles together, margins with simple setae, plumose seta distally; ischium 0.1 times basis length, with plumose seta; merus 2.4 times ischium length, with plumose seta; carpus 0.8 times merus length, with 2 microserrate setae with single subterminal setule; propodus 0.6 times carpus length, unarmed; dactylus 1.8 times propodus length, with simple seta, margin strongly serrate, 5 microserrate setae terminally (Figure 16B).

Pereopod 3 basis 1.5 times length of all other articles together, with plumose seta; ischium 0.1 times basis length, with 1 simple and 1 annulate setae; merus 1.4 times ischium length, with annulate seta; carpus 1.4 times merus length, with 1 simple and 4 annulate setae; propodus 0.5 times carpus length, with annulate seta; dactylus 0.8 times propodus length, with 3 simple setae terminally (Figure 16C).

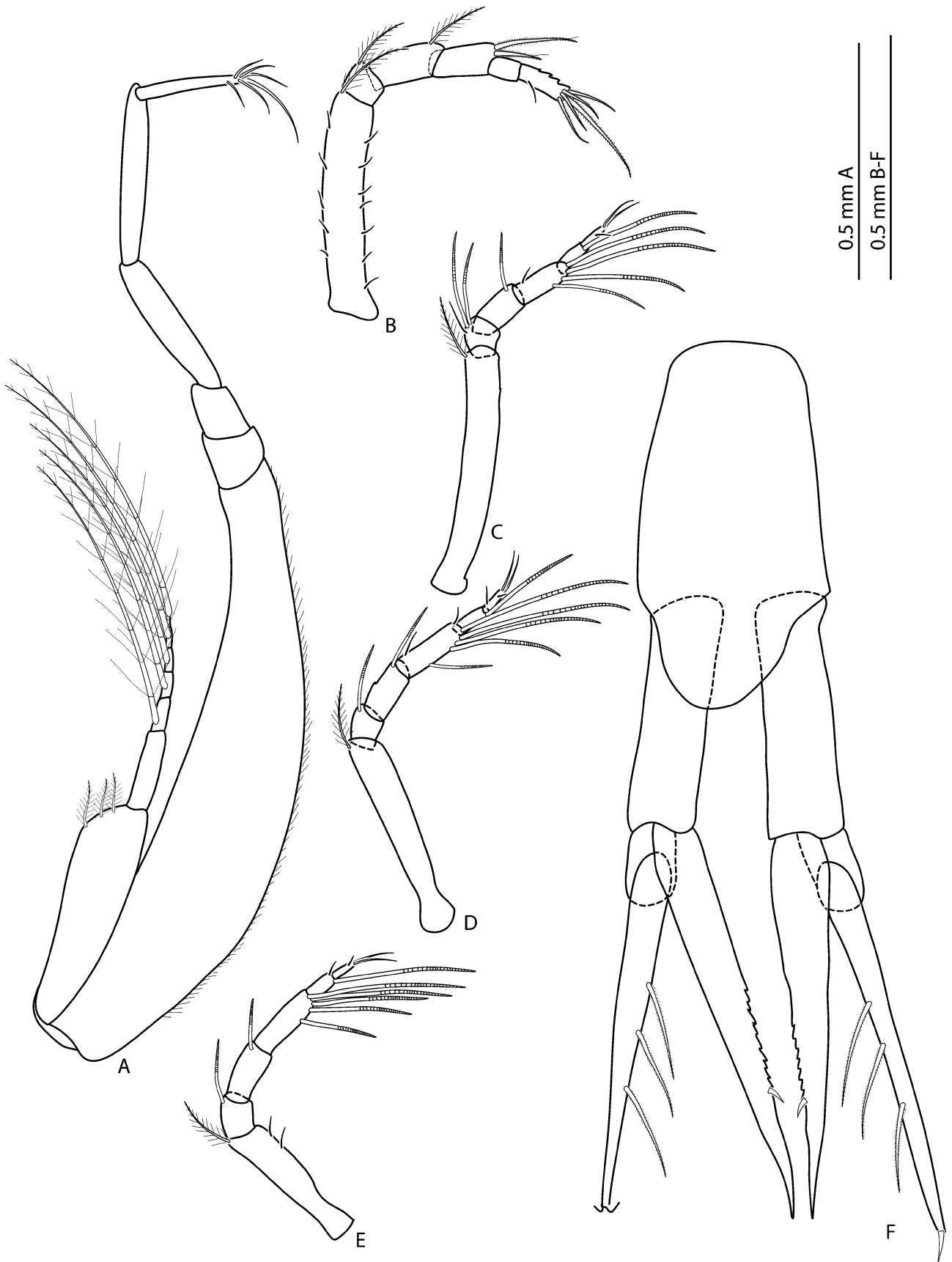
Pereopod 4 basis 0.8 times length of all other articles together, with plumose seta; ischium 0.1 times basis length, with annulate seta; merus 2.2 times ischium length, with annulate seta; carpus 1.3 times merus length, with 1 simple and 4 annulate setae; propodus 0.5 times carpus length, with annulate seta; dactylus 0.8 times propodus length, with 3 simple setae terminally (Figure 16D).

Pereopod 5 basis 0.7 times length of all other articles together, with 2 simple and 1 plumose setae; ischium 0.2 times basis length, with annulate seta; merus 1.7 times ischium length, with annulate seta; carpus 1.3 times merus length, with 5 annulate setae; propodus 0.4 times carpus length, with 1 simple and 1 annulate setae; dactylus 0.8 times propodus length, with 3 simple setae terminally (Figure 16E).

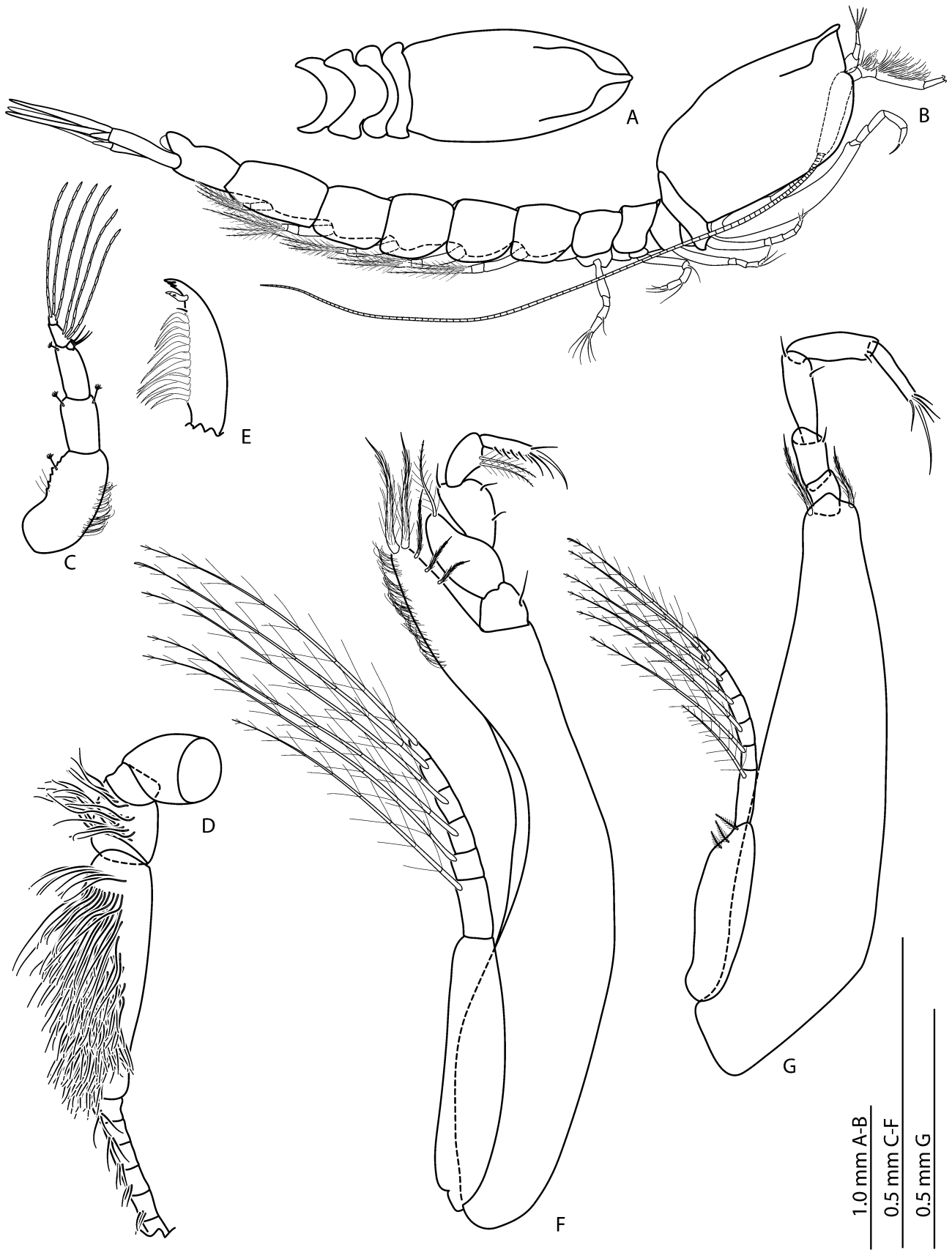


**FIGURE 15.** *Cyclaspis zealandiaensis* n. sp. Holotype ovigerous female, NIWA 80731. A, dorsal view. Paratype ovigerous female, NIWA 80732. B, side view; C, antennule; D, mandibles; E, maxillule; F, maxilla; G, maxilliped 1; H, maxilliped 2; I, maxilliped 3.

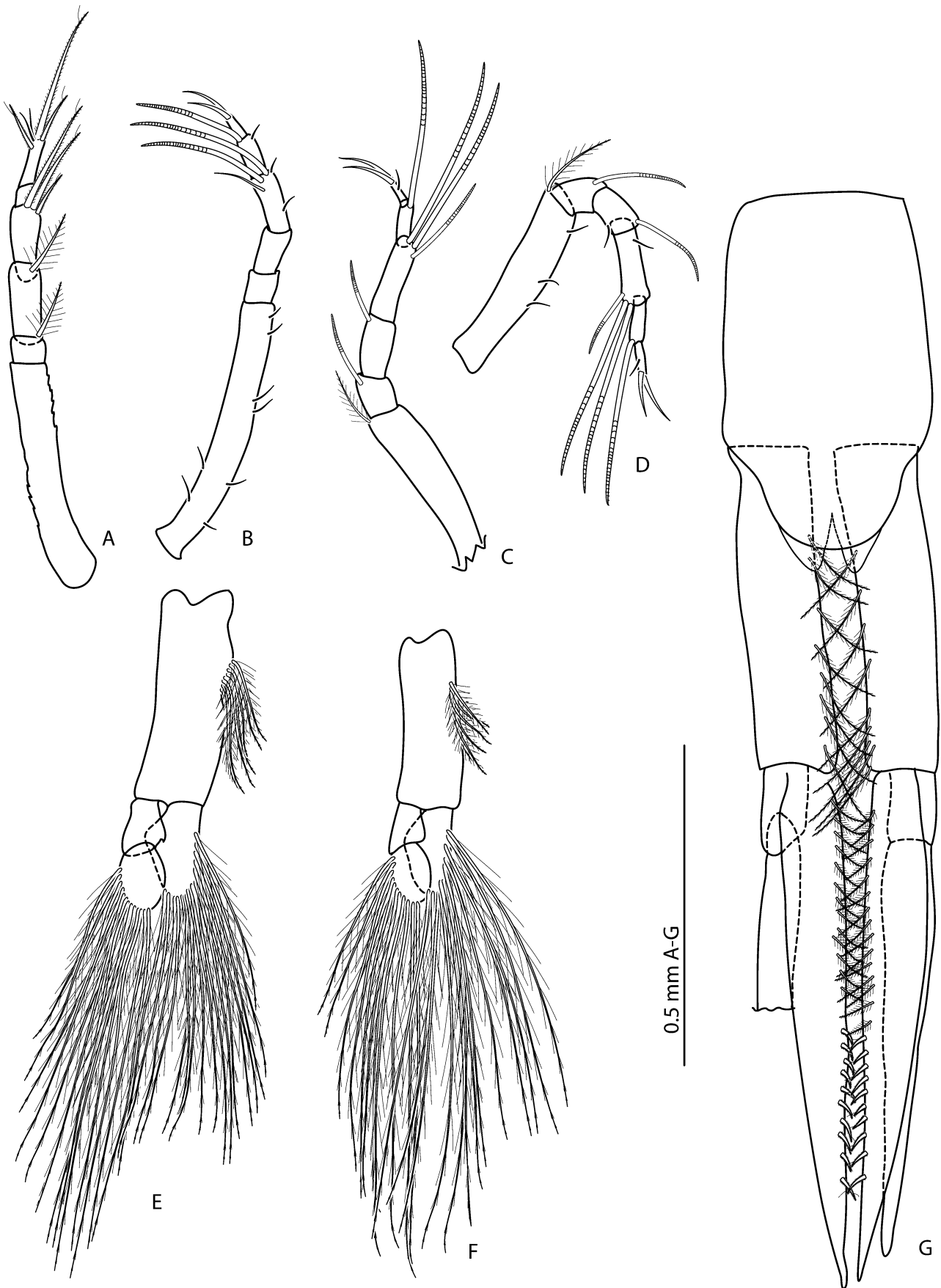




**FIGURE 16.** *Cyclaspis zealandiaensis* n. sp. Paratype ovigerous female, NIWA 80732. A, pereopod 1; B, pereopod 2; C, pereopod 3; D, pereopod 4; E, pereopod 5; F, pleonite 6 and uropods.



**FIGURE 17.** *Cyclaspis zealandiaensis* n. sp. Paratype adult male, NIWA 80734. A, dorsal view; B, side view; C, antennule; D, antenna; E, mandible; F, maxilliped 3; G, pereopod 1.



**FIGURE 18.** *Cyclopsis zealandiaensis* n. sp. Paratype adult male, NIWA 80734. A, pereopod 2; B, pereopod 3; C, pereopod 4; D, pereopod 5; E, pleopod 1; F, pleopod 5; G, pleonite 6 and uropods.

Uropod peduncles 0.6 times pleonite 6 length, unarmed. Uropod endopod uniarticulate, 2.3 times peduncle length, medial margin serrate, with short stout seta. Uropod exopod of 2 articles, subequal to length of endopod; article 1 0.2 times article 2 length; article 2 with 3 microserrate setae medially, terminal seta short and simple (Figure 16F).

**Description of adult male.** Paratype adult male, 5.3 mm, NIWA 80734. . Carapace smooth; pseudorostral lobes 0.4 times carapace length; eye lobe 0.1 times carapace length, extending past anterior margin of pseudorostral lobes, without lenses; carapace 2 times length of pereonites together (Figures 17A–B).

Antennule peduncle article 1 longest, margins lined with fine hairlike setae, with 2 complex pedunculate setae; article 2 0.5 times length of article 1, with 2 complex pedunculate setae; article 3 0.9 times length of article 2, with complex pedunculate seta; main flagellum of 2 articles, first article slightly broadened with 3 aesthetascs, second article with 3 aesthetascs; accessory flagellum of 1 article, with 3 simple setae (Figure 17C).

Antenna peduncle articles 2–3 unarmed, article 4 with ranks of setae, article 5 longest, with ranks of setae; flagellum of short articles, extending to pleonite 5 (Figure 17B, D).

Mandible navicular, *lacinia mobilis* with 3 cusps (Figure 17E)

Maxilliped 3 basis 2.4 times length of all other articles together, produced as lobe distally, lateral lobe margin lined with fine hairlike setae, with 5 pappose setae distally and medially, lobe extending to merus–carpus border; ischium 0.07 times basis length, with simple seta; merus 1.2 times ischium length, with plumose seta distally; carpus 1.2 times merus length, with 3 simple setae; propodus 0.9 times carpus length, with 2 plumose setae medially; dactylus 0.9 times propodus length, with 4 simple setae and 4 simple setae terminally; exopod shorter than basis, flagellum with plumo–annulate setae (Figure 17F).

Pereopod 1 basis 2.1 times length of all other articles together, with 2 pappose setae distally; ischium 0.03 times basis length, unarmed; merus 3.3 times ischium length, with simple seta; carpus 1.5 times merus length, with 2 simple setae; propodus 1.1 times carpus length, with simple seta; dactylus 0.8 times propodus length, with 5 simple setae terminally; exopod shorter than basis, flagellum with plumo–annulate setae (Figure 17G).

Pereopod 2 basis 1.1 times length of all other articles together, unarmed; ischium 0.1 times basis length, with plumose seta; merus 2.8 times ischium length, with plumose seta; carpus 0.8 times merus length, with 3 microserrate setae with single subterminal setule; propodus 0.3 times carpus length, unarmed; dactylus 2.7 times propodus length, with 3 simple and 3 microserrate setae with single subterminal setule terminally (Figure 18A).

Pereopod 3 basis 1.4 times length of all other articles together, with 8 simple setae; ischium 0.1 times basis length, unarmed; merus 1.6 times ischium length, unarmed; carpus 1.4 times merus length, with 3 simple and 2 annulate setae; propodus 0.7 times carpus length, with 1 simple and 1 annulate setae; dactylus 0.5 times propodus length, with 2 simple setae terminally (Figure 18B).

Pereopod 4 basis with plumose seta; ischium with annulate seta; merus 1.8 times ischium length, with annulate seta; carpus 1.5 times merus length, with 3 annulate setae; propodus 0.4 times carpus length, with annulate seta; dactylus 0.7 times propodus length, with 3 simple setae terminally (Figure 18C).

Pereopod 5 basis 0.8 times length of all other articles together, with 3 simple and 1 plumose setae; ischium 0.2 times basis length, with annulate seta; merus 1.4 times ischium length, with 1 simple and 1 annulate setae; carpus 1.4 times merus length, with 1 simple and 3 annulate setae; propodus 0.6 times carpus length, with annulate seta; dactylus 0.8 times propodus length, with 3 simple setae terminally (Figure 18D).

Pleopod 1 longest; peduncle with plumose setae medially; endopod with weak process, exopod biarticulate, both lined with long plumose setae (Figure 18E).

Pleopod 5 shortest; peduncle with plumose setae medially; endopod with weak process, exopod biarticulate, both lined with plumose setae (Figure 18F).

Uropod peduncles 0.7 times pleonite 6 length, with plumose setae medially. Uropod endopod uniarticulate, 2 times peduncle length, with short plumose setae proximally and short, stout microserrate setae with single subterminal setule distally. Uropod exopod 0.9 times length of endopod; article 1 0.2 times length of article 2, unarmed; article 2 unarmed, without terminal seta (Figure 18G).

**Etymology.** The species is named for Zealandia, the ancient continent that makes up the current islands of New Zealand as well as the Chatham Rise, Challenger Plateau, Campbell Plateau, Lord Howe Rise and Norfolk Ridge.

**Remarks.** This species was the most commonly encountered, found at 18 of the 38 stations analyzed. Stations included both the Chatham Rise and the Challenger Plateau.

This species is most similar to the other New Zealand species that have no lateral ridges on the carapace, *C. levis*, *C. hayeae* and *C. petrescui*. Both *C. levis* and *C. petrescui* have distinct lenses in the eyelobe, unlike *C. zealandiensis*. *Cyclaspis zealandiaensis* can be differentiated from *C. hayeae* by the carapace being about 0.5 as high as long, and the female uropod exopod bearing 3 long microserrate setae medially. In comparison, *C. hayeae* has the carapace about 0.7 as high as long, and the female uropod exopod has no setae medially. In general, the carapace of *C. hayeae* is more rounded and globular than the carapace of *C. zealandiensis*.

### ***Pomacuma* Hale 1944**

**Type species.** *Pomacuma cognatum* Hale 1944.

**Diagnosis.** *Female.* Carapace with pseudorostral lobes extending in front of eyelobe; antennal notch closed slit, not open. Pereonite 1 visible dorsally. Fully developed exopods present on maxilliped 3 to pereopod 3, pereopod 4 with exopod reduced to minute single article. Pereopod 1 with brush of long setae on propodus and dactylus. Uropod endopod biarticulate, article 2 shorter than article 1. *Male.* Similar to female, pleon longer than in female. Exopods same as in female. 5 pairs of pleopods present.

**Remarks.** In the New Zealand fauna, the genus is readily identifiable from the brush of long setae on pereopod 1.

**New Zealand species.** *Pomacuma australiae* (Zimmer 1921).

### ***Pomacuma australiae* (Zimmer 1921)**

**Synonymy.** *Vaunthompsonia ? australiae* Zimmer 1921; *Leptocuma australiae* Hale 1936.

**Diagnosis.** *Female.* Carapace smooth, anterior half with sharp crest, depression between pseudorostral suture and dorsal crest; eyelobe with lenses, dark pigment in and around eyelobe. Pereonite 1 visible only dorsally.

**Remarks.** This species is the sole representative of *Pomacuma* recorded from New Zealand, and is unique within the New Zealand bodotriids in having a brush of long setae on the first pereopod.

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