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# ZOOTAXA

3524

## **New Zealand Ceratocumatidae and Nannastacidae (Crustacea: Cumacea)**

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**New Zealand Ceratocumatidae and Nannastacidae (Crustacea: Cumacea)**

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## Abstract

The cumacean fauna of New Zealand has been little studied, and recent collecting on the Chatham Rise and Challenger Plateau has yielded many new species and new genera. The first record of the family Ceratocumatidae is reported from New Zealand waters, *Cimmerius* sp. Within the Nannastacidae, there are only two previously described nannastacid species from New Zealand, *Campylaspis rex* Gerken & Ryder 2002 and *Scherocumella pilgrimi* (Jones 1963). The recent collections yielded one new nannastacid genus, *Aotearocumella* n. gen., and 22 new nannastacid species, *Aotearocumella acantha* n. sp., *A. echinoseta* n. sp., *A. watlingi* n. sp., *Atlantocuma confunda* n. sp., *Campylaspenis tangaroae* n. sp., *Campylaspis apheles* n. sp., *C. bituberculata* n. sp., *C. hatchae* n. sp., *C. macrosulcata* n. sp., *C. microsulcata* n. sp., *C. millsae* n. sp., *C. normani* n. sp., *C. rufus* n. sp., *C. schnabelae* n. sp., *C. sculptaspinosa* n. sp., *C. zealandiaensis* n. sp., *C. zimmeri* n. sp., *Procampylaspis chathamensis* n. sp., *P. rhyapakoceros* n. sp., *P. rhypakos* n. sp., *Schizocuma delicata* n. sp., and *Styloptocuma gordonii* n. sp. In addition, a neotype for *C. rex* is designated.

**Keywords:** Cumacea; Nannastacidae; Ceratocumatidae; New Zealand; *Aotearocumella*; *Atlantocuma*; *Campylaspis*; *Campylaspenis*; *Procampylaspis*; *Scherocumella*; *Schizocuma*; *Styloptocuma*

## Introduction

The cumacean fauna of New Zealand waters is largely unknown, with only 32 species recorded in Jones' (1963) volume on the Cumacea of New Zealand, including one nannastacid. In the intervening years, an additional five species were described, including a second nannastacid. Previous work by Calman (1907, 1908, 1911, 1917), Gerken & Loerz (2007), Jones (1960, 1963), Thomson (1892), and Zimmer (1902, 1921) represented shallow water, inshore collections. Jones (1960, 1963), Gerken (2001) and Gerken & Ryder (2002) described a few species from deeper waters offshore, especially Chatham Rise. The description of 22 new species in this work increases the described New Zealand cumacean fauna by 69%. However, during this work the author observed a total of at least 75 additional undescribed taxa in other cumacean families present in the collections at the New Zealand National Institute for Water and Atmosphere (NIWA), the majority from the Chatham Rise and Challenger Plateau.

The family Nannastacidae is currently composed of 25 genera and approximately 430 species. In Australia, nannastacid diversity is quite high, with 45 species in seven genera, with the majority of diversity described by Hale (1936, 1937, 1945, 1949) and Petrescu (2006). In comparison, Antarctic nannastacid diversity is lower, with only 11 species in two genera (Petrescu & Heard 2000, Petrescu & Wittman 2003, Petrescu 2006). The New Zealand fauna described herein with 23 species and seven genera is less diverse at the species level but equally diverse at the generic level relative to the Australian fauna, and more diverse at both the species and generic level than the currently described Antarctic fauna.

## Materials 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.

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. 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

### Ceratocumatidae Calman 1905

#### *Cimmerius* Jones 1973

#### *Cimmerius* sp.

Figure 1

**Diagnosis.** *Female.* Carapace vaulted, similar to *Campylaspis*. Fully developed exopods on pereopods 1–3, and rudimentary exopod on pereopod 4. *Male.* Fully developed exopods on pereopods 1–4 and five pairs of pleopods.

**Material examined.** 1 subadult male, 1 manca, NIWA 80726, 42.7778°S, 177.2110°W–42.7778°S, 177.2110°W, 994 m, 21 April 2007 (Figure 1).

**Remarks.** This is the first record of the family in New Zealand waters. The two specimens examined distinctly belong to the genus *Cimmerius*, but the material is insufficient for a full species description. The subadult male figured only has exopods on pereopods 1–3; however, based on the small pleopod buds and the developing antenna this is a very young male. Therefore, it is possible that it may develop an exopod on pereopod 4 as it matures, thus the generic diagnosis is not changed at this time

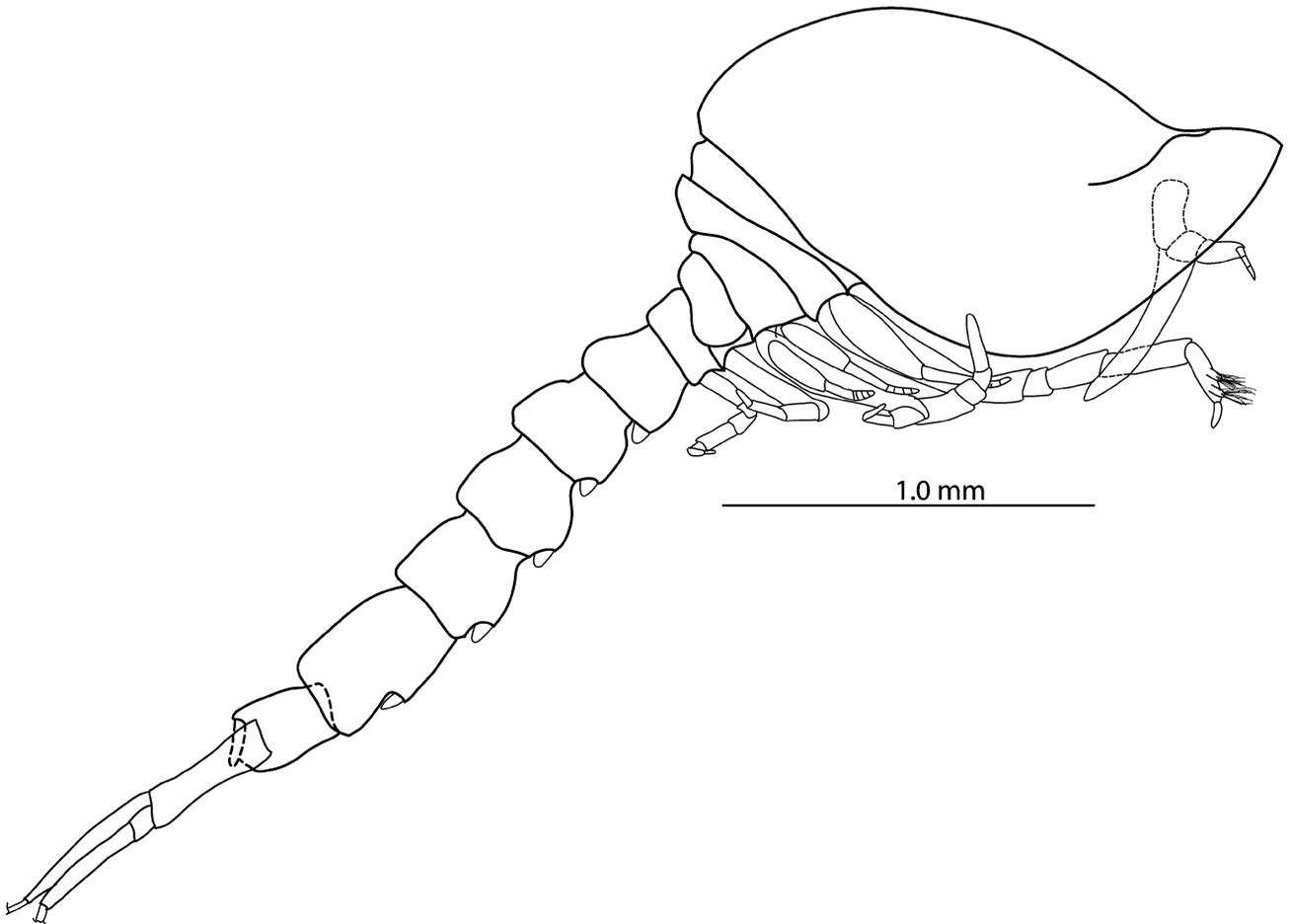


FIGURE 1. *Cimmerius* sp. NIWA 80726. Full body, subadult male.

## Nannastacidae Bate 1865

### Key to the genera

Note, this key is specific to the genera found in New Zealand waters, and is not a global key.

- |    |  |                       |
|----|--|-----------------------|
| 1. | Carapace vaulted. ....   | 2                     |
| -  | Carapace not vaulted. ....   | 4                     |
| 2. | Maxilliped 2 dactylus with 5 or more large teeth directed medially; maxilliped 1 of 5 articles. ....           | <i>Procampylaspis</i> |
| -  | Maxilliped 2 dactylus tridentate, teeth directed terminally; maxilliped 1 of 3 articles, dactylus minute. .... | 3                     |
| 3. | Male with penial lobes. ....   | <i>Campylaspensis</i> |
| -  | Male without penial lobes. ....  | <i>Campylaspis</i>    |
| 4. | Siphons divided. ....  | <i>Schizocuma</i>     |
| -  | Siphons united medially. ....  | 5                     |
| 5. | Eyelobe long, narrow, without lenses, extending nearly to tip of pseudorostral lobes. ....                     | <i>Styloptocuma</i>   |
| -  | Eyelobe short. ....  | 6                     |
| 6. | Females without exopods, males with exopods on maxilliped 3- pereopod 2. ....                                  | <i>Aotearocumella</i> |
| -  | Females with exopods on maxilliped 3-pereopod 1, males with exopods on maxilliped 3-pereopod 4. ....           | <i>Atlantocuma</i>    |

### *Aotearocumella* n. gen.

**Type species.** *Aotearocumella watlingi* n.sp.

**Diagnosis.** *Female.* Without exopods; uropod peduncles shorter than pleonite 6. *Male.* With exopods on maxilliped

3-pereopod 2; antennules with group of aesthetascs on peduncle article 3; antennae very short, modified for clasping with flagellum shorter than peduncle; uropod peduncles longer than pleonite 6.

**Species.** *Aotearocumella acantha* n. sp. *A. echinoseta* n. sp., *A. watlingi* n. sp.

**Etymology.** *Aotearo* from the Maori for New Zealand, Land of the Long White Cloud, in combination with *Cumella*, to indicate that the new genus resembles the *Cumella* in overall body form. Gender feminine.

**Remarks.** This genus is similar to *Cumella* G.O. Sars 1865, but the female is entirely without exopods, the male antennae are modified as clasping antennae, and the male has exopods only on maxilliped 3- pereopod 2, whereas in *Cumella*, females have exopods on maxilliped 3-pereopod 2 and males have long antennae and exopods on maxilliped 3- pereopod 4. *Elassocumella* Watling 1991 is a similar genus in which the females have no exopods, the uropod peduncles are also relatively short, and the pleon is shorter than the carapace and pereonites together. In *Aotearocumella* the length of the pleon is longer than the carapace and pereon together in *A. echinoseta* and *A. watlingi*. Also, the male of *Elassocumella* is unknown. *Styloptocumoides* Petrescu 2006 also lacks exopods in the female, but the eyelobe is long, narrow and reaches the end of the pseudorostral lobes, while in *Aotearocumella* the eyelobe is short or absent.

### Key to the New Zealand *Aotearocumella* and *Styloptocuma*.

1. Female with exopods. . . . . *Styloptocuma gordonii*
- Female without exopods . . . . . 2
2. Carapace, pereonites and pleonites with many fine spines and without setae . . . . . *Aotearocumella acantha*
- Carapace, pereonites and pleonites with long setae . . . . . 3
3. Carapace with single large spine dorsally. . . . . *Aotearocumella echinoseta*
- Carapace without single large spine dorsally . . . . . *Aotearocumella watlingi*

### *Aotearocumella acantha* n. sp.

Figures 2–3

**Type material.** Holotype subadult female, NIWA 80720, paratype subadult female, NIWA 80721, 40.1277°S, 170.2140°E–40.1352°S, 170.2090°E, 803–805 m, 5 June 2007. Paratype subadult male, dissected, NIWA 80722, 0705/160.

**Other material examined.** 5 subadult females, NIWA 79382, 44.4862°S, 177.1413°E–44.4841°S, 177.1416°E, 1235–1239 m, 6 April 2007. 1 ovigerous female, 1 subadult female, 1 juvenile, NIWA 79383, 44.4862°S, 177.1413°E–44.4841°S, 177.1416°E, 1235–1239 m, 6 April 2007.

**Diagnosis.** *Females and subadult males.* Carapace, pereonites and pleonites covered in fine spines, no setae; eyelobe absent; pseudorostral lobes not dorsally directed. Uropod peduncles 1.9 times pleonite 6 length. *Male.* Adult unknown.

#### Description of female.

Holotype subadult female, 2.5 mm, NIWA 80720. Paratype subadult female, 2.4 mm, NIWA 80721. Carapace covered in fine spines, no setae; pseudorostral lobes not dorsally directed, 0.8 times carapace length; eyelobe absent. Pereonites with spines. Pleonites with spines, some arranged in rows, including two rows laterally (Figures 2A–B).

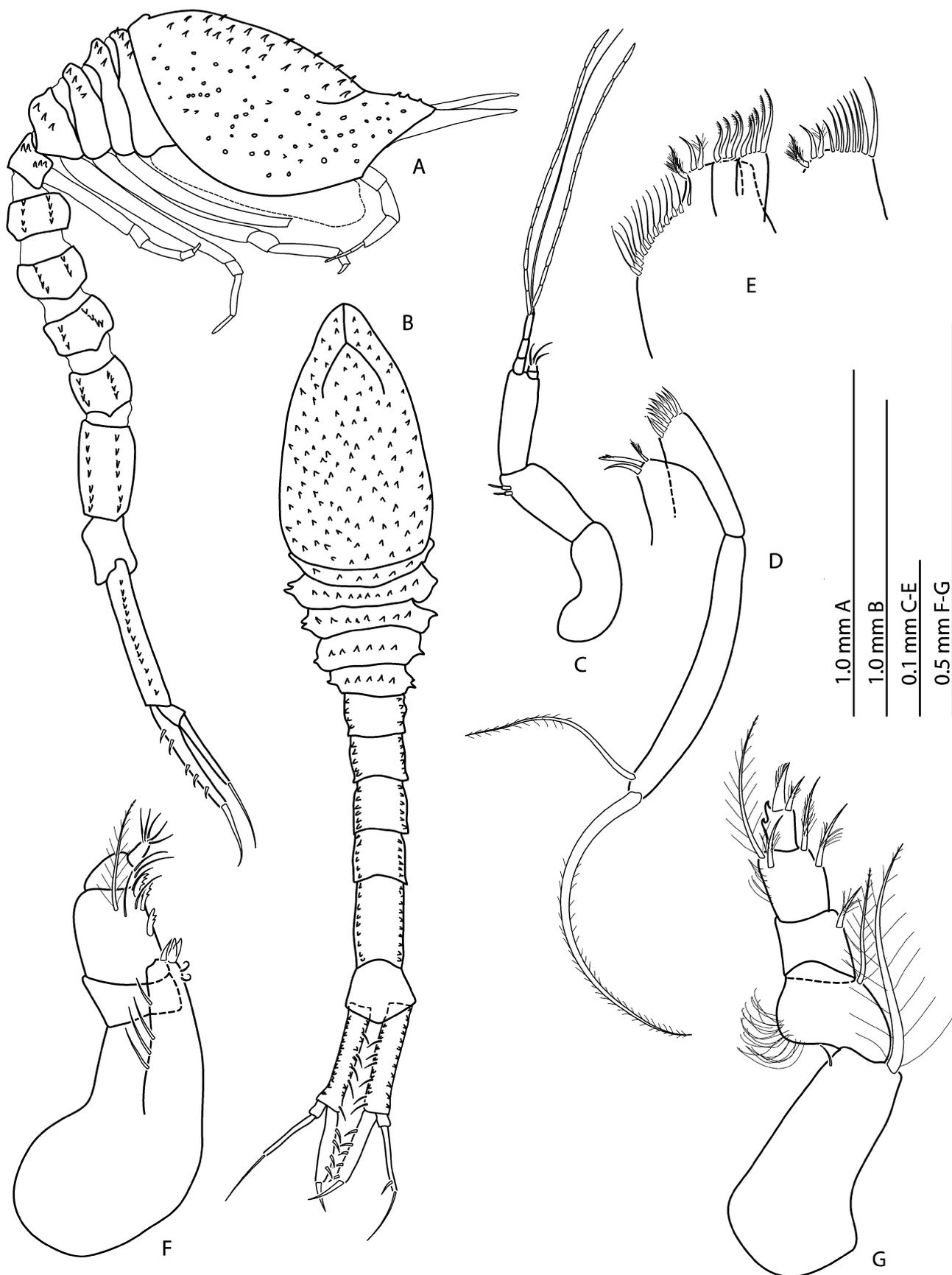
#### Description of subadult male.

Paratype subadult male, 2.5 mm, NIWA 80711. Carapace as in female.

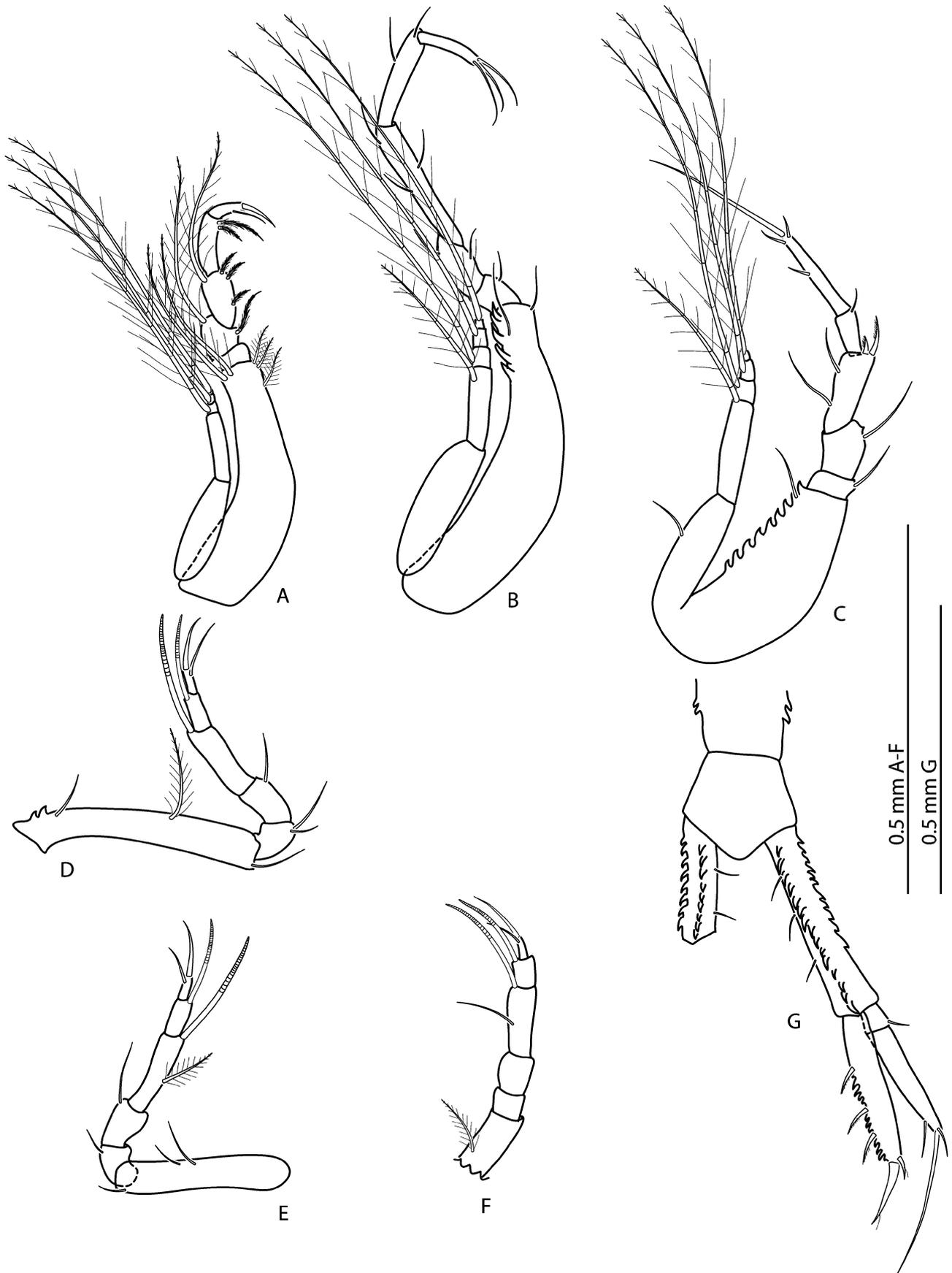
Antennule peduncle article 1 longest, unarmed; article 2 0.8 times article 1 length, with 2 pedunculate setae; article 3 1.1 times article 2 length, unarmed; main flagellum of 4 articles, with 2 aesthetascs and simple seta; accessory flagellum of 2 articles, with 3 simple setae (Figure 2C).

Maxillule with 2 endites; outer endite with double row of simple setae; inner endite with 1 simple, 1 microserrate and 1 dentate setae; palp with 2 microserrate setae (Figure 2D).

Maxilla with 3 endites; broad endite with row of simple setae distally, medial corner with 1 simple and 2 pappose setae, medial row of setae; medial narrow endite with 4 microserrate setae terminally; distal narrow endite with 5 microserrate setae terminally; both narrow endites extend only to distal margin of broad endite (Figure 2E).



**FIGURE 2.** *Aotearocumella acantha* n. sp. Holotype subadult female, NIWA 80720. A, side view. Paratype subadult female, NIWA 80721. B, dorsal view. Paratype subadult male, NIWA 80722. C, antennule; D, maxillule; E, maxilla; F, maxilliped 1; G, maxilliped 2.



**FIGURE 3.** *Aoteaacumella acantha* n. sp. Paratype subadult male, NIWA 80722. A, maxilliped 3; B, pereopod 1; C, pereopod 2; D, pereopod 3; E, pereopod 4; F, pereopod 5; G, pleonite 6 and uropod.

Maxilliped 1 basis produced as lobe, with 5 simple, 2 hook and 1 tricuspid setae; ischium absent; merus 0.1 times basis length, unarmed; carpus 2.6 times merus length, with 3 simple, 3 comb-like and 1 plumose setae; propodus 0.3 times carpus length, unarmed; dactylus 0.8 times propodus length, with 5 simple setae (Figure 2F).

Maxilliped 2 basis 0.8 times length of all other articles together, with 1 simple and 1 plumose setae, lateral margin lined with fine hair-like setae; ischium absent; merus 0.4 times basis length, with plumose seta; carpus 0.6 times merus length, with pappose seta; propodus 1.1 times carpus length, with 1 plumose and 3 pappose setae; dactylus 0.6 times propodus length, with pappose seta, terminal seta microserrate, lateral margin produced as 2 strong teeth (Figure 2G).

Maxilliped 3 basis 1.4 times length of all other articles together, with 3 plumose setae medially, 2 plumose setae at distal corner; ischium 0.06 times basis length, unarmed; merus 1.7 times ischium length, with pappose seta medially, plumose seta laterally; carpus 2.2 times merus length, with 3 pappose setae medially, plumose seta laterally; propodus 0.9 times carpus length, with 2 pappose setae; dactylus 0.6 times propodus length, with 2 simple setae terminally; exopod 0.8 times basis length, basal article unarmed, flagellum with plumo-annulate setae (Figure 3A).

Pereopod 1 basis 0.9 times length of all other articles together, with 2 simple setae, lateral margin produced as strong teeth distally; ischium 0.08 times basis length, with simple seta; merus 2.0 times ischium length, with sunoke seta; carpus 2.7 times merus length, with 3 simple setae; propodus 0.8 times carpus length, with 2 simple setae; dactylus 0.7 times propodus length, with 3 simple setae terminally; exopod 0.8 times basis length, basal article unarmed, flagellum with plumo-annulate setae (Figure 3B).

Pereopod 2 basis 0.8 times length of all other articles together, with simple seta, lateral margin produced as strong teeth; ischium 0.1 times basis length, with simple seta; merus 2.3 times ischium length, with simple seta; carpus 1.7 times merus length, with 2 simple and 2 microserrate setae; propodus 0.5 times carpus length, with simple seta; dactylus 2.5 times propodus length, with 3 simple setae, terminal seta simple; exopod 1.3 times basis length, basal article with simple seta, flagellum with plumo-annulate setae (Figure 3C).

Pereopod 3 basis 1.1 times length of all other articles together, with 2 simple and 1 plumose setae; ischium 0.1 times basis length, with 2 simple setae; merus 1.5 times ischium length, with simple seta; carpus 1.6 times merus length, with annulate seta; propodus 0.5 times carpus length, with annulate seta; dactylus 0.7 times propodus length, with 2 simple setae terminally (Figure 3D).

Pereopod 4 basis 0.8 times length of all other articles together, with 3 simple setae; ischium 0.2 times basis length, with simple seta; merus 1.3 times ischium length, with simple seta; carpus 2.0 times merus length, with 1 plumose and 1 annulate setae; propodus 0.5 times carpus length, with annulate seta; dactylus 0.6 times propodus length, with 2 simple setae terminally (Figure 3E).

Pereopod 5 with plumose seta; ischium unarmed; merus 1.8 times ischium length, unarmed; carpus 1.9 times merus length, with 1 simple and 1 plumose setae; propodus 0.4 times carpus length, with annulate seta; dactylus 0.8 times propodus length, with 2 simple setae terminally (Figure 3F).

Uropod peduncles 1.9 times pleonite 6 length, with 3 simple setae, with 2 rows of strong teeth. Uropod endopod uniarticulate, 0.8 times peduncle length, with 3 microserrate setae medially, medial margin produced as strong teeth, simple with single subterminal setule seta laterally, terminal seta simple with single subterminal setule. Uropod exopod of 2 articles, 0.9 times length of endopod; article 1 0.2 times article 2 length, with simple seta; article 2 with 2 simple setae, terminal seta simple (Figure 3G).

**Etymology.** The new species is named from the Latin *acanthus*, meaning prickles or thorns, in reference to the spines that cover the carapace, pereonites and pleonites.

**Remarks.** This species is unlike *Aotearocumella watlingi* and *A. echinoseta* in that there are no long setae on the carapace, pereon or pleon.

### ***Aotearocumella echinoseta* n. sp.**

Figures 4–5

**Type material.** Holotype ovigerous female, NIWA 80704, 44.4862°S, 177.1413°E–44.4841°S, 177.1416°E, 1235–1239 m, 6 April 2007. Paratype ovigerous female, NIWA 80705, 43.7967°S, 175.3158°E–43.8045°S, 175.3148°E, 418–422 m, 27 April 2007.

**Other material examined.** 2 ovigerous females, 1 subadult female, NIWA 79356, 44.4862°S, 177.1413°E–44.4841°S, 177.1416°E, 1235–1239 m, 6 April 2007. 3 ovigerous females, NIWA 79357, 44.4862°S, 177.1413°E–44.4841°S, 177.1416°E, 1235–1239 m, 6 April 2007. 3 ovigerous females, NIWA 79358, 43.9790°S, 179.6298°E–43.9850°S, 179.6218°E, 529–530 m, 9 April 2007. 4 subadult females, 2 subadult males, 1 juvenile, NIWA 46005, 44.5607°S, 178.4762°W–44.5592°S, 178.4830°W, 1076–1103 m, 10 April 2007. 2 subadult females, NIWA 46006, 43.2903°S, 175.5522°W–43.2933°S, 175.5630°W, 638–644, 15 April 2007. 1 subadult female, NIWA 79359, 40.1277°S, 170.2140°E–40.1352°S, 170.2090°E, 803–805 m, 5 June 2007. 8 ovigerous females, NIWA 79360, 40.8800°S, 170.8555°E–40.8883°S, 170.8565°E, 529–534 m, 6 June 2007.

**Diagnosis.** *Females and subadult males.* Carapace with many long setae and single large spine middorsally anteriorly; eyelobe short; pseudorostral lobes not dorsally directed. Uropod peduncles 0.9 times pleonite 6 length. *Male.* Adult unknown.

#### **Description of female.**

Holotype ovigerous female, 2.6 mm, NIWA 80704. Paratype ovigerous female, 2.5 mm, NIWA 80705. Carapace with many long setae, single large spine middorsally anteriorly, ventral margin produced as teeth, increasing in size anteriorly; pseudorostral lobes 0.3 times carapace length, weakly dorsally directed, ventral margin serrate; eyelobe 0.04 times carapace length. Pereonites 3–5 with spines, pereonite 2 with strong dorsal spine. Pleonites 1–4 with small spines (Figures 4A–B).

Antennule peduncle article 1 very short, with plumose seta; article 2 1.9 times article 1 length, with 2 simple setae; article 3 0.9 times article 2 length, with 2 simple setae; main flagellum of 3 articles, with 2 aesthetascs; accessory flagellum of 2 articles, with 2 simple and 2 pedunculate setae (Figure 4C).

Mandible navicular, 5–7 microserrate setae medially, lacinia mobilis with 3 cusps (Figure 4D).

Maxillule with 2 endites; outer endite with row of simple setae terminally, margin with simple seta, margin lined with fine hair-like setae; inner endite with 2 simple, 1 pappose and 1 tricuspid setae, margin lined with fine hair-like setae; palp with 2 microserrate setae (Figure 4E).

Maxilla with 3 endites; broad endite distal margin with row of simple setae and 2 plumose setae, medial corner with pappose seta, medial row of setae; medial narrow endite with 4 simple setae terminally; distal narrow endite with 5 simple setae terminally; both narrow endites extending only to distal margin of broad endite (Figure 4F).

Maxilliped 1 basis produced as lobe, with 4 simple, 2 hook and 2 dentate setae; ischium absent; merus 0.2 times basis length, unarmed; carpus 3.0 times merus length, with 8 simple and 5 comb-like setae; propodus 0.5 times carpus length, with 4 simple and 1 plumose setae; dactylus 0.6 times propodus length, with 3 simple setae (Figure 4G).

Maxilliped 2 basis 0.8 times length of all other articles together, with pappose seta; ischium compressed; merus with pappose seta; carpus 1.3 times merus length, with 2 plumose setae; propodus 0.6 times carpus length, with 2 simple and 3 plumose setae; dactylus 0.4 times propodus length, with 4 simple setae (Figure 4H).

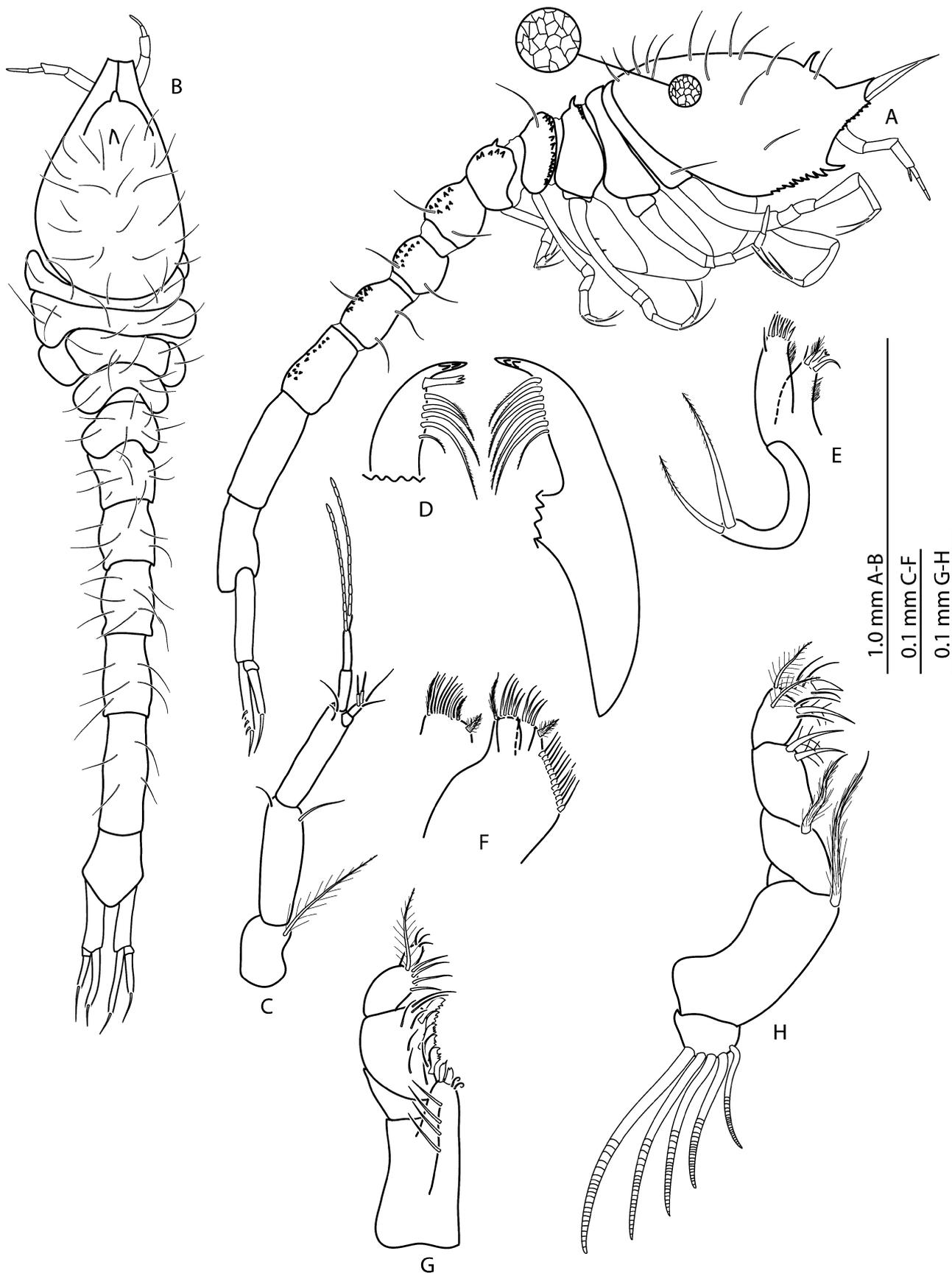
Pereopod 1 basis with 3 simple setae; ischium unarmed; merus 1.1 times ischium length, unarmed; carpus 2.0 times merus length, with 2 simple setae; propodus equal to carpus length, with 4 simple setae; dactylus 0.5 times propodus length, with 5 simple setae terminally (Figure 5A).

Pereopod 2 basis 1.3 times length of all other articles together, with 6 simple setae; ischium 0.05 times basis length, with simple seta; merus 2.0 times ischium length, with 2 simple setae; carpus 2.5 times merus length, with 2 simple setae; propodus 0.5 times carpus length, with simple seta; dactylus 1.7 times propodus length, with 3 simple setae, 5 simple setae terminally (Figure 5B).

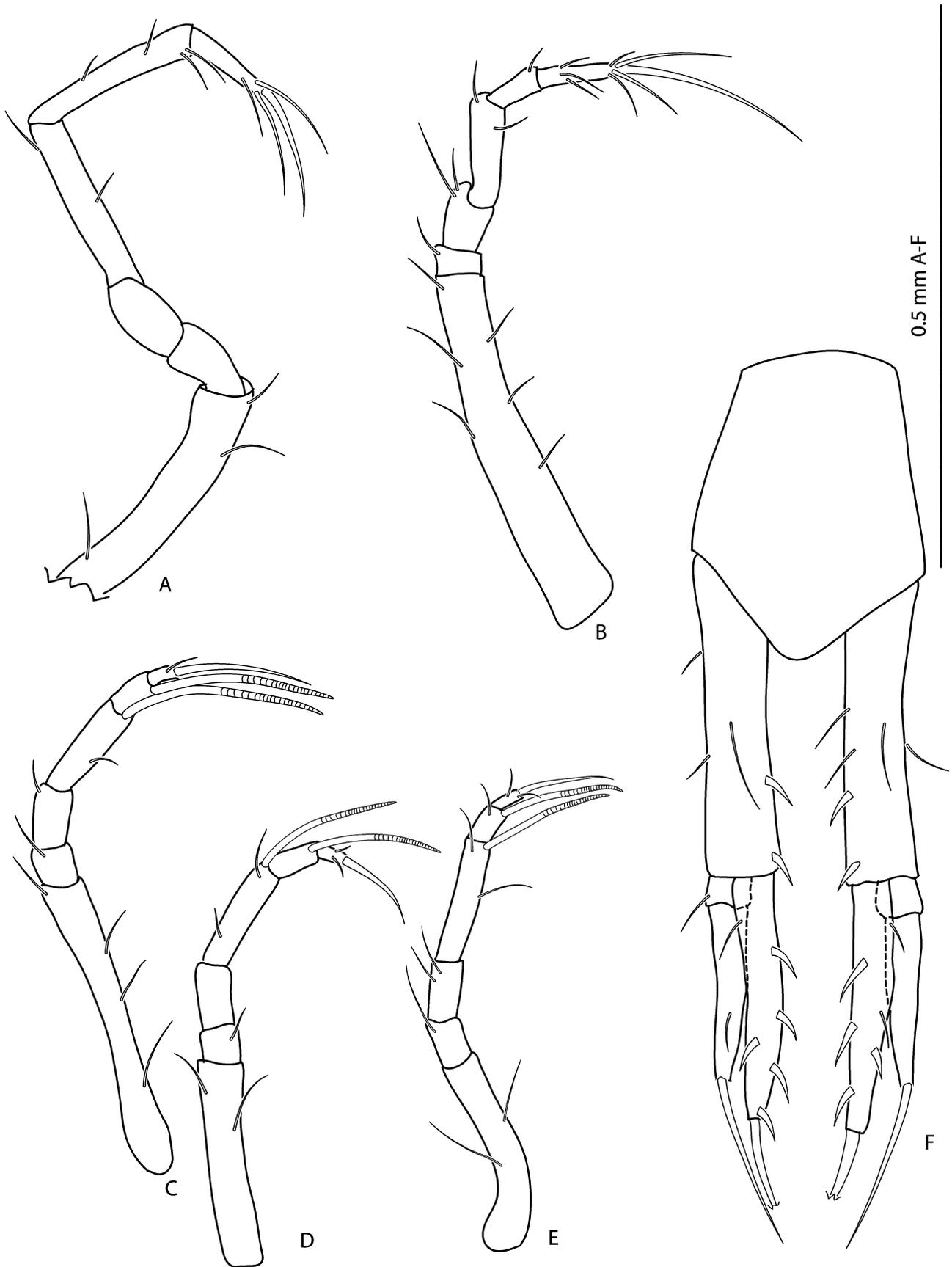
Pereopod 3 basis 1.2 times length of all other articles together, with 4 simple setae; ischium 0.1 times basis length, with simple seta; merus 1.4 times ischium length, with simple seta; carpus 1.7 times merus length, with 1 simple and 1 annulate setae; propodus 0.4 times carpus length, with annulate seta; dactylus 0.6 times propodus length, with 2 simple setae terminally (Figure 5C).

Pereopod 4 basis 0.7 times length of all other articles together, with 2 simple setae; ischium 0.2 times basis length, with simple seta; merus 1.7 times ischium length, unarmed; carpus 1.8 times merus length, with 2 simple and 1 annulate setae; propodus 0.4 times carpus length, with annulate seta; dactylus 0.5 times propodus length, with 3 simple setae terminally (Figure 5D).

Pereopod 5 basis 0.6 times length of all other articles together, with 2 simple setae; ischium 0.2 times basis length, with simple seta; merus 1.3 times ischium length, with 2 simple setae; carpus 2.0 times merus length, with 2 simple and 1 annulate setae; propodus 0.3 times carpus length, with 1 simple and 1 annulate setae; dactylus 0.6 times propodus length, with 3 simple setae terminally (Figure 5E).



**FIGURE 4.** *Aotearocumella echinoseta* n. sp. Holotype ovigerous female, NIWA, 80704. A, side view. Paratype ovigerous female, NIWA 80705. B, dorsal view; C, antennule; D, mandibles; E, maxillules; F, maxilla; G, maxilliped 1; H, maxilliped 2.



**FIGURE 5.** *Aotearocumella echinoseta* n. sp. Paratype ovigerous female, NIWA 80705. A, pereopod 1; B, pereopod 2; C, pereopod 3; D, pereopod 4; E, pereopod 5; F, pleonite 6 and uropods.

Uropod peduncles 0.9 times pleonite 6 length, with 2 stout and 3–4 slender simple setae. Uropod endopod uniaarticulate, 0.9 times peduncle length, with 4 stout and 0–1 slender simple setae, terminal seta broken. Uropod exopod of 2 articles, 0.7 times length of endopod; article 1 0.1 times article 2 length, with 0–1 simple setae; article 2 with 0–1 simple setae, terminal seta simple (Figure 5F).

**Etymology.** The species is named *echino* from the Greek, in combination with *seta*, in reference to the combination of spines and setae present on the carapace, pereon and pleon.

**Remarks.** The New Zealand species most similar to *Aotearocumella echinoseta* is *A. watlingi*, which shares the long setae on the body and the lack of exopods in the female. However, in *A. echinoseta* there is a single large spine dorsally on the carapace, and *A. watlingi* has no spines on the carapace. In addition, in *A. echinoseta* the first peduncle article of the antennule is short, while in *A. watlingi* the first peduncle article of the antennule is the longest peduncle article. The other species of *Aotearocumella*, *A. acantha*, has no setae on the carapace, pereon, or pleon, unlike *A. echinoseta*.

### *Aotearocumella watlingi* n. sp.

Figures 6–9

**Type material.** Holotype ovigerous female, NIWA 80723; paratype ovigerous female, dissected, NIWA 80724; paratype adult male, dissected, NIWA 80725; 44.4862°S, 177.1413°E–44.4841°S, 177.1416°E, 1235–1239 m, 6 April 2007.

**Other material examined.** 8 ovigerous females, 3 juveniles, NIWA 79384, 44.4862°S, 177.1413°E–44.4841°S, 177.1416°E, 1235–1239 m, 6 April 2007; 39 ovigerous females, 1 subadult female, NIWA 46010, 40.8800°S, 170.8555°E–40.8883°S, 170.8565°E, 529–534 m, 6 June 2007. 1 ovigerous female, NIWA 79385, 40.1277°S, 170.2140°E–40.1352°S, 170.2090°E, 803–805 m, 5 June 2007.

**Diagnosis.** *Female and subadult males.* Carapace, pereon and pleon with long setae, without spines. *Male.* Antenna short, clasping form.

#### **Description of female.**

Holotype ovigerous female, 2.8 mm, NIWA 80723. Paratype ovigerous female, 2.3 mm, NIWA 80724. Carapace, pereonites and pleonites with many long setae, pseudorostral lobes 0.4 times carapace length; eyelobe present, without lenses; carapace 1.5 times length of pereonites together (Figure 6A–B).

Antennule peduncle article 1 longest, with single spine and simple seta; article 2 0.8 times length of article 1, with 2 pedunculate setae; article 3 0.8 times length of article 2, with simple seta; main flagellum of 3 articles, with 3 aesthetascs and 4 simple setae; accessory flagellum of 2 articles, 0.6 times length of first article of main flagellum, with simple seta terminally (Figure 6C).

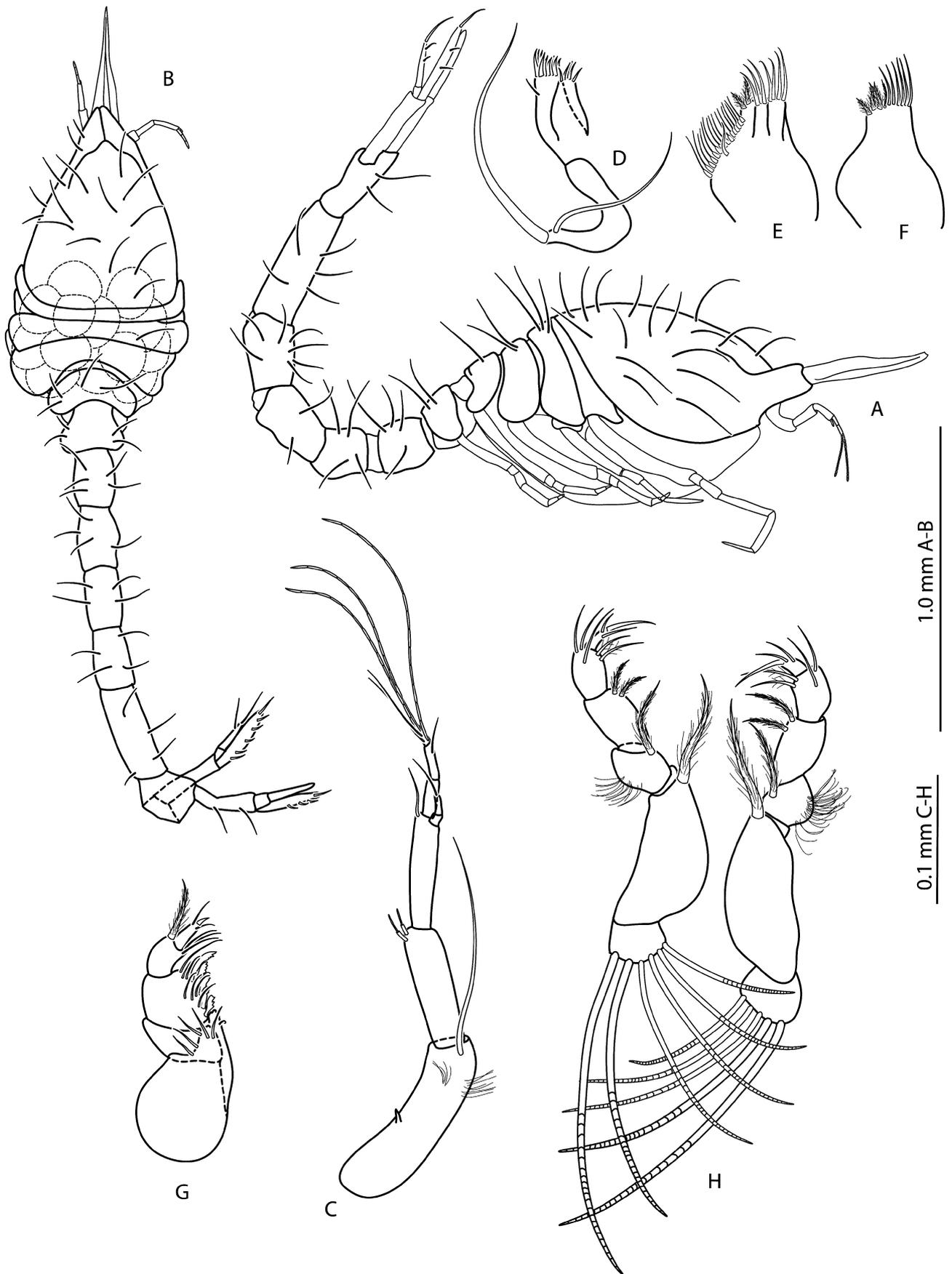
Maxillule with 2 endites; outer endite with double row of stout simple setae; inner endite with 5 setae; palp with 2 setae terminally (Figure 6D).

Maxilla with 3 endites; broad endite with 3 pappose and several simple setae terminally, medial row of pedunculate setae; medial narrow endite with 3 simple setae terminally; distal narrow endite with 4 simple setae terminally; both narrow endites not extending past distal margin of broad endite (Figures 6E, F).

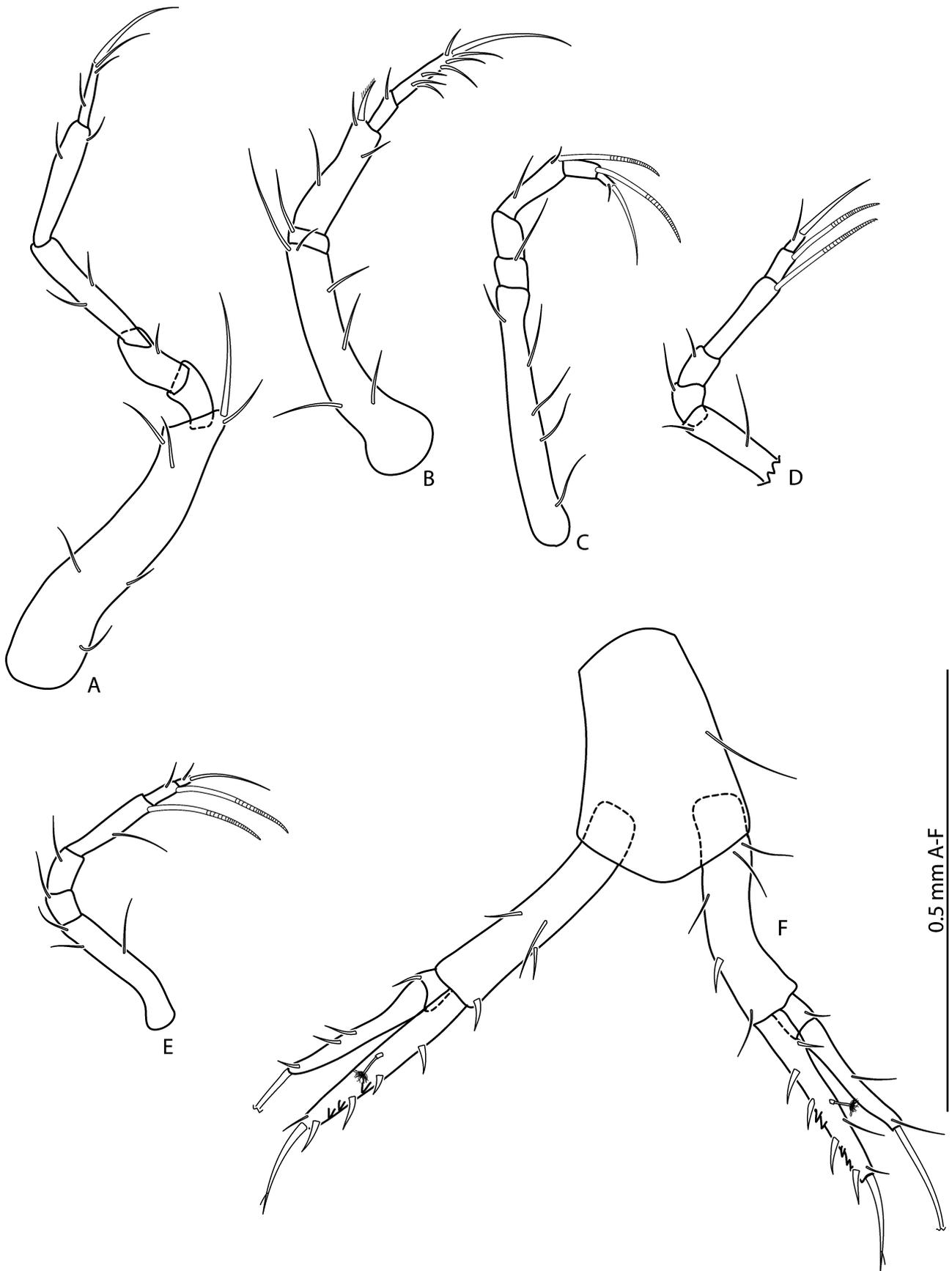
Maxilliped 1 basis as long as next three articles together, with simple and hook setae; ischium absent; merus unarmed; carpus twice merus length, with medial row of simple and comb-like setae; propodus 0.7 times carpus length, with 1 pappose and 3 simple setae; dactylus 0.9 times propodus length, with simple setae terminally, terminal seta very short (Figure 6G).

Maxilliped 2 basis 0.8 times length of all other articles together, with 1 pappose seta medially; ischium 0.04 times basis length, unarmed; merus 8.0 times ischium length, with medial pappose seta, lateral margin lined with fine hairlike setae; carpus 1.5 times merus length, with 2 pappose setae medially; propodus 0.8 times carpus length, with 2 plumose and 2 simple setae; dactylus 0.4 times propodus length, with 3 simple setae terminally (Figure 6H).

Pereopod 1 basis 0.8 times length of all other articles together, with 7 simple setae; ischium 0.1 times basis length, unarmed; merus 1.6 times ischium length, with simple seta; carpus 2.3 times merus length, with 2 simple setae; propodus equal to carpus length, with 2 simple setae; dactylus 0.5 times propodus length, with 3 simple setae terminally (Figure 7A).



**FIGURE 6.** *Aotearocumella watlingi* n. sp. Holotype ovigerous female, NIWA 80723. A, side view. Paratype ovigerous female, NIWA 80724. B, dorsal view; C, antennule; D, maxillules; E, maxilla; F, maxilla; G, maxilliped 1; H, maxilliped 2.



**FIGURE 7.** *Aotearocumella watlingi* n. sp. Paratype ovigerous female, NIWA 80724. A, pereopod 1; B, pereopod 2; C, pereopod 3; D, pereopod 4; E, pereopod 5; F, pleonite 6 and uropods.

Pereopod 2 basis equal to all other articles together, with 6 simple setae; ischium absent; merus 0.06 times basis length, with simple seta; carpus 7.7 times merus length, with 3 simple setae and 1 microserrate seta distally; propodus 0.3 times carpus length, with simple seta; dactylus 1.9 times propodus length, with 7 simple setae and 1 terminal seta (Figure 7B).

Pereopod 3 basis 1.3 times all other articles together, with 5 simple setae; ischium 0.1 times basis length, with simple seta; merus 1.3 times ischium length, unarmed; carpus 1.8 times merus length, with 2 simple and 1 annulate setae; propodus 0.1 times carpus length, with annulate seta; dactylus 0.5 times propodus length, with 1 seta terminally (Figure 7C).

Pereopod 4 basis with simple setae, broken; ischium with simple seta; merus 1.2 times ischium length, with simple seta; carpus 3.2 times merus length, with annulate seta; propodus 0.3 times carpus length, with annulate seta; dactylus 0.7 times propodus length, with 1 seta terminally (Figure 7D).

Pereopod 5 basis 0.7 times all other articles together, with 3 simple setae; ischium 0.2 times basis length, with simple seta; merus 1.6 times ischium length, with simple seta; carpus 2.1 times merus length, with 1 simple and 1 annulate setae; propodus 0.4 times carpus length, with 1 simple and 1 annulate setae; dactylus 0.3 times propodus length, with 1 seta terminally (Figure 7E).

Uropod peduncles 0.7–0.8 times pleonite 6 length, with 1 stout and 3–4 slender simple setae. Uropod endopod uniaarticulate, 0.9–1.0 times peduncle length, medial margin serrate, with 4 simple setae, lateral margin with 1–3 simple and 1 complex pedunculate setae, terminal seta with single subterminal setule. Uropod exopod of 2 articles, 0.8–0.9 length of endopod; article 1 with simple seta; article 2 with 2 simple setae, terminal seta long, broken (Figure 7F).

#### **Description of male.**

Paratype adult male, 2.6 mm, NIWA 80725. Carapace, pleonites and pereonites with long setae; pseudorostral lobes 0.4 times carapace length; eyelobe present, without lenses; carapace twice length of pereonites together (Figure 8A).

Antennule peduncle article 1 with simple seta; article 2 1.1 times length of article 1, with 2 simple setae; article 3 0.8 times length of article 2, lateral margin lined with aesthetascs, group of short simple setae terminally; main flagellum of 2 articles, with 4–5 aesthetascs, terminal seta plumose; accessory flagellum of 2 articles, with 2–3 aesthetascs (Figure 8B).

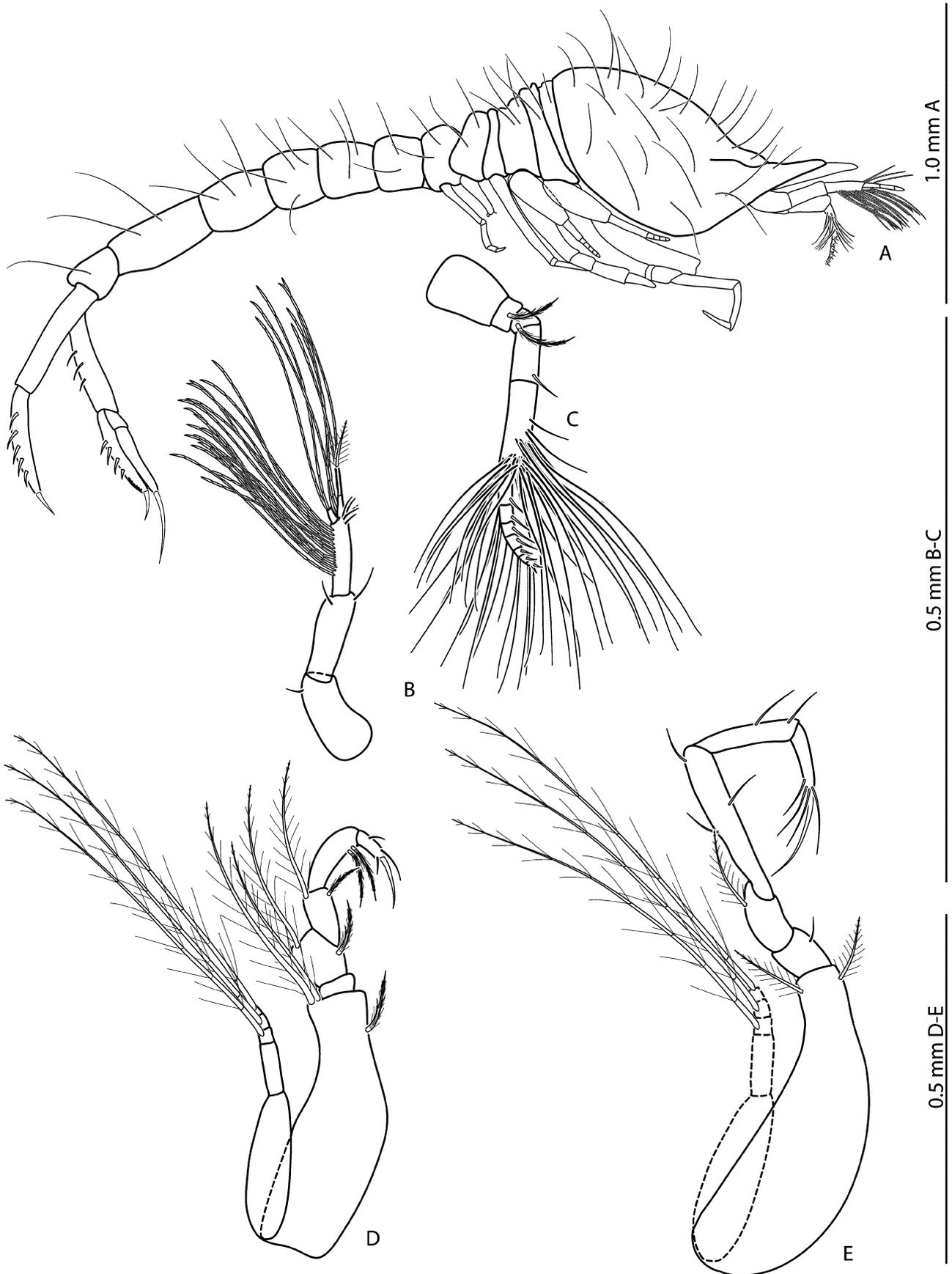
Antenna short, clasping form, not extending to posterior border of carapace; peduncle of 5 articles; articles 2–3 with 1 pappose seta each; article 4 with simple seta; article 5 with ranks of setae distally, incompletely circling article; flagellum shorter than peduncle, with 7 articles, each with 1–2 short setae (Figure 8C).

Maxilliped 3 basis 1.2 times all other articles together, with 2 plumose setae distally, pappose seta medially; ischium 0.06 times basis length, unarmed; merus 3.3 times ischium length, with plumose seta distally and pappose seta medially; carpus 0.9 times merus length, with plumose seta distally, pappose seta medially; propodus 1.6 times carpus length, with 2 pappose setae medially; dactylus 0.5 times propodus length, with 3 simple setae terminally; exopod 0.9 times basis length, basal article unarmed, flagellum with plumo-annulate setae (Figure 8D).

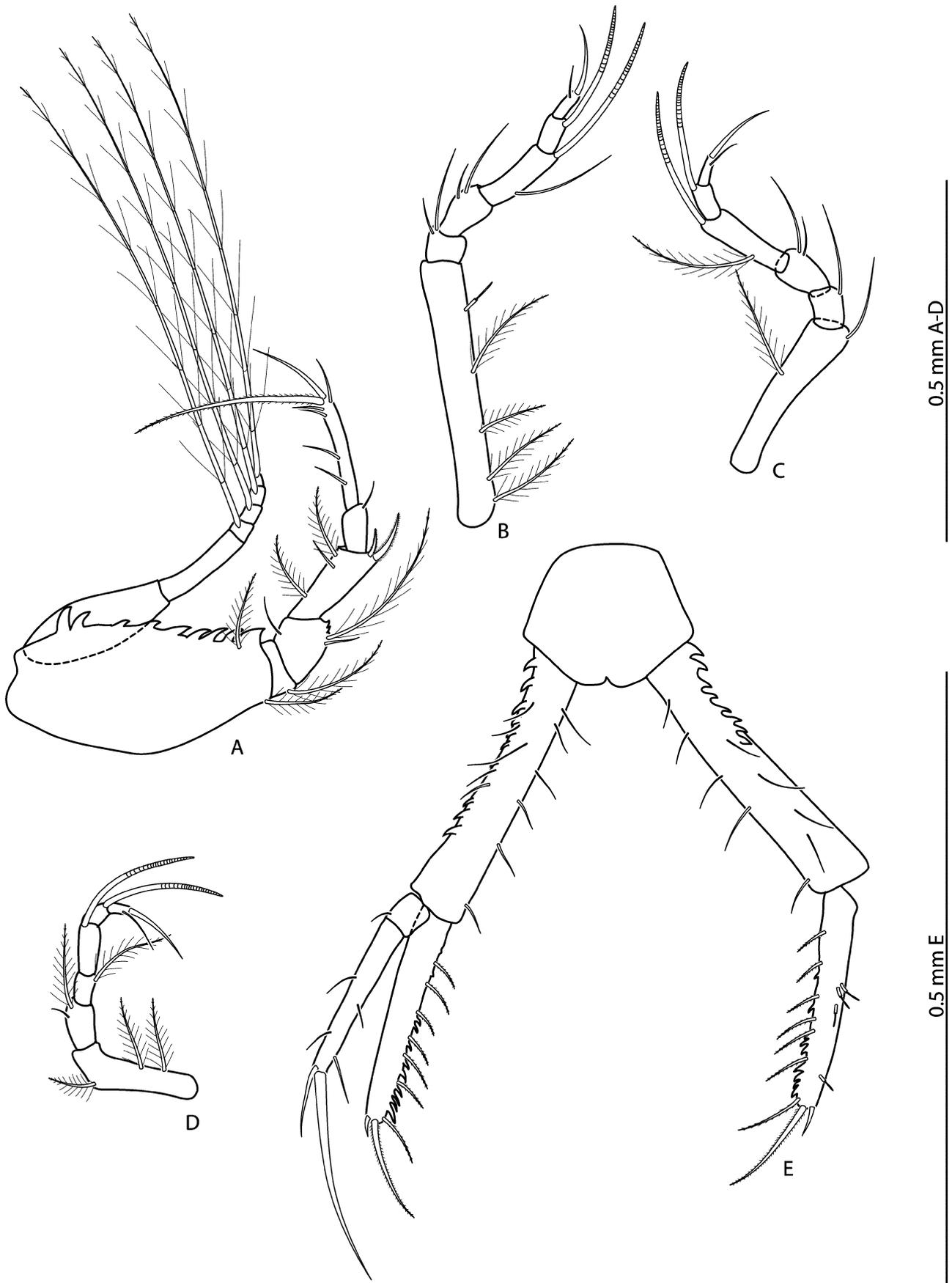
Pereopod 1 basis 0.8 times length of all other articles together, with 2 plumose setae; ischium 0.1 times basis length, with simple seta; merus 1.3 times ischium length, with plumose seta; carpus 3.6 times merus length, with 3 simple setae; propodus 0.6 times carpus length, with 2 simple setae; dactylus 0.7 times propodus length, with 5 simple setae terminally; exopod 0.9 times basis length, basal article unarmed, flagellum with plumo-annulate setae (Figure 8E).

Pereopod 2 basis 0.8 times length of all other articles together, margin with teeth, with 2 plumose setae; ischium 0.06 times basis length, with plumose seta; merus 3.3 times ischium length, with 2 simple and 1 plumose setae; carpus 1.6 times merus length, with 2 plumose and 1 simple setae, distal corner with 2 microserrate setae; propodus 0.5 times carpus length, with simple seta; dactylus 2.8 times propodus length, with 5 simple setae and 1 microserrate and 1 simple setae terminally; exopod 1.2 times basis length, basal article unarmed, flagellum with plumo-annulate setae (Figure 9A).

Pereopod 3 basis 1.2 times length of all other articles together, with 5 plumose and 1 pedunculate setae; ischium 0.3 times basis length, with 2 simple setae; merus 2.0 times ischium length, with 2 simple setae; carpus 1.5 times merus length, with 1 simple and 1 annulate setae; propodus 0.4 times carpus length, with annulate seta; dactylus equal to propodus length, with 1 seta terminally (Figure 9B).



**FIGURE 8.** *Aotearocumella watlingi* n. sp. Paratype adult male, NIWA 80725. A, side view; B, antennule; C, antenna; D, maxilliped 3; E, pereopod 1.



**FIGURE 9.** *Aotearocumella watlingi* n. sp. Paratype adult male, NIWA 80725. A, pereopod 2; B, pereopod 3; C, pereopod 4; D, pereopod 5; E, pleonite 6 and uropods.

Pereopod 4 basis 0.6 times length of all other articles together, with 1 plumose and 1 simple setae; ischium 0.4 times basis length, with simple seta; merus equal to ischium length, with 2 simple setae; carpus 1.2 times merus length, with 1 plumose and 1 annulate setae; propodus 0.4 times carpus length, with annulate seta; dactylus 0.9 times propodus length, with 1 seta terminally (Figure 9C).

Pereopod 5 basis 0.7 times length of all other articles together, with 3 plumose setae; ischium 0.3 times basis length, with 1 plumose and 1 simple setae; merus 0.8 times ischium length, with plumose seta; carpus 1.7 times merus length, with annulate seta; propodus 0.4 times carpus length, with annulate seta; dactylus equal to propodus length, with 1 seta terminally (Figure 9D).

Uropod peduncles 2.1–2.2 times pleonite 6 length, lateral margins with strong teeth, with 5–6 slender simple setae medially. Uropod endopod uniaarticulate, 0.8 times peduncle length, medial margin with teeth increasing in size distally, with 7 microserrate setae medially, pedunculate setae laterally, microserrate seta and simple seta terminally. Uropod exopod 0.9 times length of endopod; article 1 0.2 times length of article 2, with simple seta; article 2 with 4 simple setae and 2 simple setae terminally (Figure 9E).

**Etymology.** The new species is named *watlingi* in honor of Les Watling.

**Remarks.** *Aotearocumella watlingi* is similar to the other species of *Aotearocumella* and *Styloptocuma* from New Zealand waters, *S. gordonii*, *A. acantha* and *A. echinoseta*, in overall body form. *Aotearocumella echinoseta* is the most similar, in that there are long setae all over the body; however, *A. echinoseta* has a single large spine dorsally on the carapace and spines on the ventral margin of the carapace, which are both lacking in *A. watlingi*. *Aotearocumella acantha* is covered in small spines and has no long setae on the body or carapace, unlike *A. watlingi*. *Styloptocuma gordonii* has exopods to pereopod 2 in the female and pereopod 4 in the male, and there are many spines dorsally on the carapace, unlike *A. watlingi* which has no exopods in the female and exopods only to pereopod 2 in the male, and lacks any dorsal spination of the carapace.

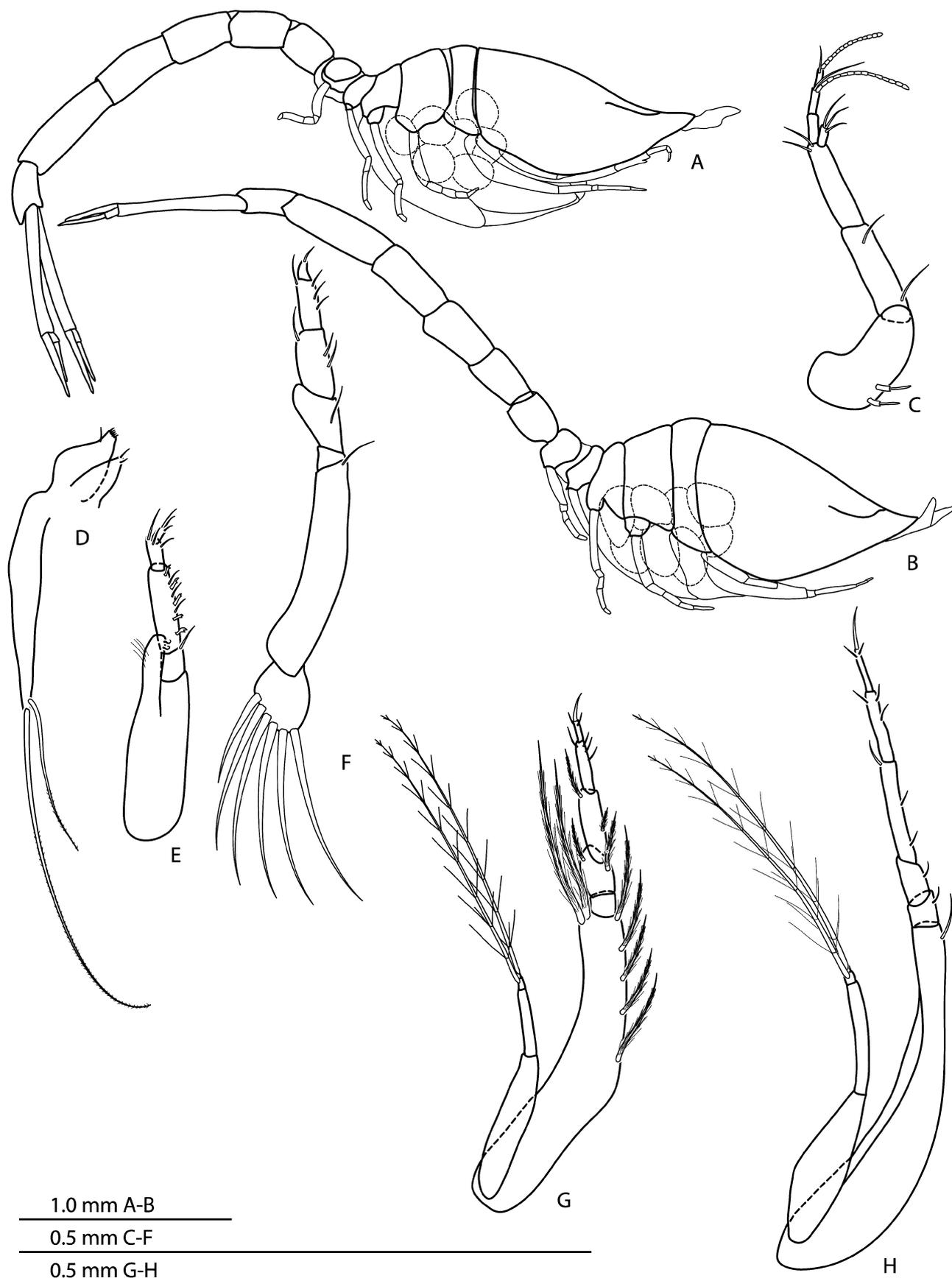
#### ***Atlantocuma* Băcescu & Muradian 1974**

**Type species.** *Atlantocuma benguelae* Băcescu & Muradian 1974

**Diagnosis after Akiyama 2012.** *Females and subadult males.* Carapace smooth, without ridges or carinae; pseudorostrum pointed. Pleon slender. Antennule main flagellum of 3 articles; accessory flagellum uniaarticulate. Mandibles navicular. Fully developed exopods present on maxilliped 3–pereopod 1. Uropod peduncles much longer than rami; endopod uniaarticulate. Ovigerous females may have a less arched carapace and degenerate mouthparts, decalcified and with few setae. *Male.* Pseudorostrum truncate or weakly pointed. Antennule main flagellum of 4 articles. Antenna short, flagellum of about 10 articles, not clasping form. Exopods present on maxilliped 3–pereopod 4.

**New Zealand species.** *Atlantocuma confunda* n. sp.

**Remarks.** *Atlantocuma* has been placed variously in the Bodotriidae and Nannastacidae (Akiyama 2012 and references therein). Haye's (2007) morphological phylogenetic analysis supported placement of *Atlantocuma* outside of the Bodotriidae, and in agreement with this phylogenetic study, I place *Atlantocuma* in the Nannastacidae. Within the New Zealand nannastacid fauna, this genus is readily distinguishable by the presence of exopods only on maxilliped 3–pereopod 1 in the female. The most likely confusion with this species is the familial placement, as superficially it resembles the members of the Bodotriinae, a subfamily of the Bodotriidae, in that the females have no exopods past pereopod 1. As the only genus of Bodotriinae currently known from New Zealand is *Cyclaspis*, confusion of female *Atlantocuma* with female *Cyclaspis* is likely. Females of the two genera can be differentiated by pseudorostrum: eyelobe proportions and the shape of maxilliped 3. In New Zealand *Cyclaspis*, the pseudorostral lobes meet at the anterior tip of the eyelobe, or do not meet, and the eyelobe in several species possesses lenses. Also, in *Cyclaspis* the basis of maxilliped 3 has a large distal expansion extending at least to the midpoint of the merus. In comparison, in *Atlantocuma* the pseudorostral lobes meet and extend well past the eyelobe, which is very small and without lenses; also, the basis of maxilliped 3 has no expansion.



**FIGURE 10.** *Atlantocuma confunda* n. sp. Holotype ovigerous female, NIWA 80728. A, side view. Paratype ovigerous female, NIWA 80729. B, side view; C, antennule; D, maxillule; E, maxilliped 1; F, maxilliped 2; G, maxilliped 3; H, pereopod 1.

*Atlantocuma confunda* n. sp.

Figures 10–11

**Type material.** Holotype ovigerous female, NIWA 80728; Paratype ovigerous female, dissected, NIWA 80729; Paratype ovigerous female, NIWA 80730; 42.9958°S, 178.9957°E–42.9910°S, 179.0052°E, 520–530 m, 24 April 2007.

**Other material examined.** 10 ovigerous females, 1 juvenile, NIWA 45997, 42.9958°S, 178.9957°E–42.9910°S, 179.0052°E, 520–530 m, 24 April 2007. 1 ovigerous female, 1 juvenile, NIWA 84452, 42.9958°S, 178.9957°E–42.9910°S, 179.0052°E, 520–530 m, 24 April 2007. 1 ovigerous female, 1 subadult male, NIWA 41811, 42.9958°S, 178.9957°E–42.9910°S, 179.0052°E, 520–530 m, 24 April 2007. 6 ovigerous females, NIWA 45996, 43.5300°S, 178.5048°E–43.5363°S, 178.5118°E, 346 m, 24 April 2007.

**Diagnosis.** *Females and subadult males.* Carapace smooth, not elevated in ovigerous females; antennal notch not present, anterolateral corner not present. Antennule geniculate. Uropod peduncles 2.3 times pleonite 6 length, 2.2 times endopod length; endopod with 10 microserrate setae with single subterminal setule medially. *Male.* Adult unknown.

**Description.** Holotype ovigerous female, 3.7 mm, NIWA 80728. Paratype ovigerous female, 3.7 mm, NIWA 80729. Carapace smooth, not arched; pseudorostral lobes 0.4 times carapace length, meet in front of eyelobe for 0.14 times carapace length; eyelobe 0.02 times carapace length, without lenses; carapace 1.5 times length of pereonites together. Pleon 1.1 times length of carapace and pereonites together (Figures 10A–B).

Antennule geniculate between peduncle article 1 and article 2; peduncle article 1 longest, with 2 pedunculate setae; article 2 0.8 times article 1 length, with 2 simple setae; article 3 1.1 times article 2 length, with 2 simple setae; main flagellum of 3 articles, with 2 aesthetascs and 2 simple setae; accessory flagellum of uniaarticulate, with 3 simple setae (Figure 10C).

Maxillule with 2 endites; outer endite broad, with 5 thin simple setae, 1 simple seta laterally; inner endite with 2 thin simple setae; palp with 2 microserrate setae (Figure 10D).

Maxilliped 1 basis equal to length of all other articles together, produced as lobe medially with 2 hook setae, few hairlike setae on margin; ischium absent; merus 0.2 times basis length, with simple seta; carpus 3.2 times merus length, with 5 beak and 3 simple setae medially; propodus 0.4 times carpus length, with 3 simple setae; dactylus 0.5 times propodus length, with 3 simple setae terminally (Figure 10E).

Maxilliped 2 basis 1.1 times length of all other articles together, with simple seta; ischium 0.07 times basis length, unarmed; merus 3.3 times ischium length, with simple seta; carpus 1.3 times merus length, with 3 simple setae; propodus 0.7 times carpus length, with 4 simple setae; dactylus 0.3 times propodus length, with simple seta terminally (Figure 10F).

Maxilliped 3 basis 1.7 times length of all other articles together, with 5 stout pappose setae medially, 2 pappose setae at distal corner; ischium 0.07 times basis length, unarmed; merus 1.3 times ischium length, with 2 pappose setae; carpus 2.6 times merus length, with 3 pappose setae; propodus 0.8 times carpus length, with 4 simple setae; dactylus 0.4 times propodus length, with 3 simple setae terminally; exopod shorter than basis, flagellum with plumo-annulate setae (Figure 10 G).

Pereopod 1 basis 1.3 times length of all other articles together, with simple seta; ischium 0.07 times basis length, with simple seta; merus 1.6 times ischium length, with simple seta; carpus 2.5 times merus length, with 3 simple setae; propodus 0.7 times carpus length, with 3 simple setae; dactylus 0.6 times propodus length, with 3 simple setae terminally; exopod shorter than basis, flagellum with plumo-annulate setae (Figure 10H).

Pereopod 2 basis 0.8 times length of all other articles together, with 2 setae proximally; ischium 0.09 times basis length, unarmed; merus 3 times ischium length, with 3 simple setae; carpus 1.1 times merus length, with 2 simple setae; propodus 0.7 times carpus length, unarmed; dactylus 2.1 times propodus length, with 2 simple setae, and 3 stout microserrate and 1 long simple setae terminally (Figure 11A).

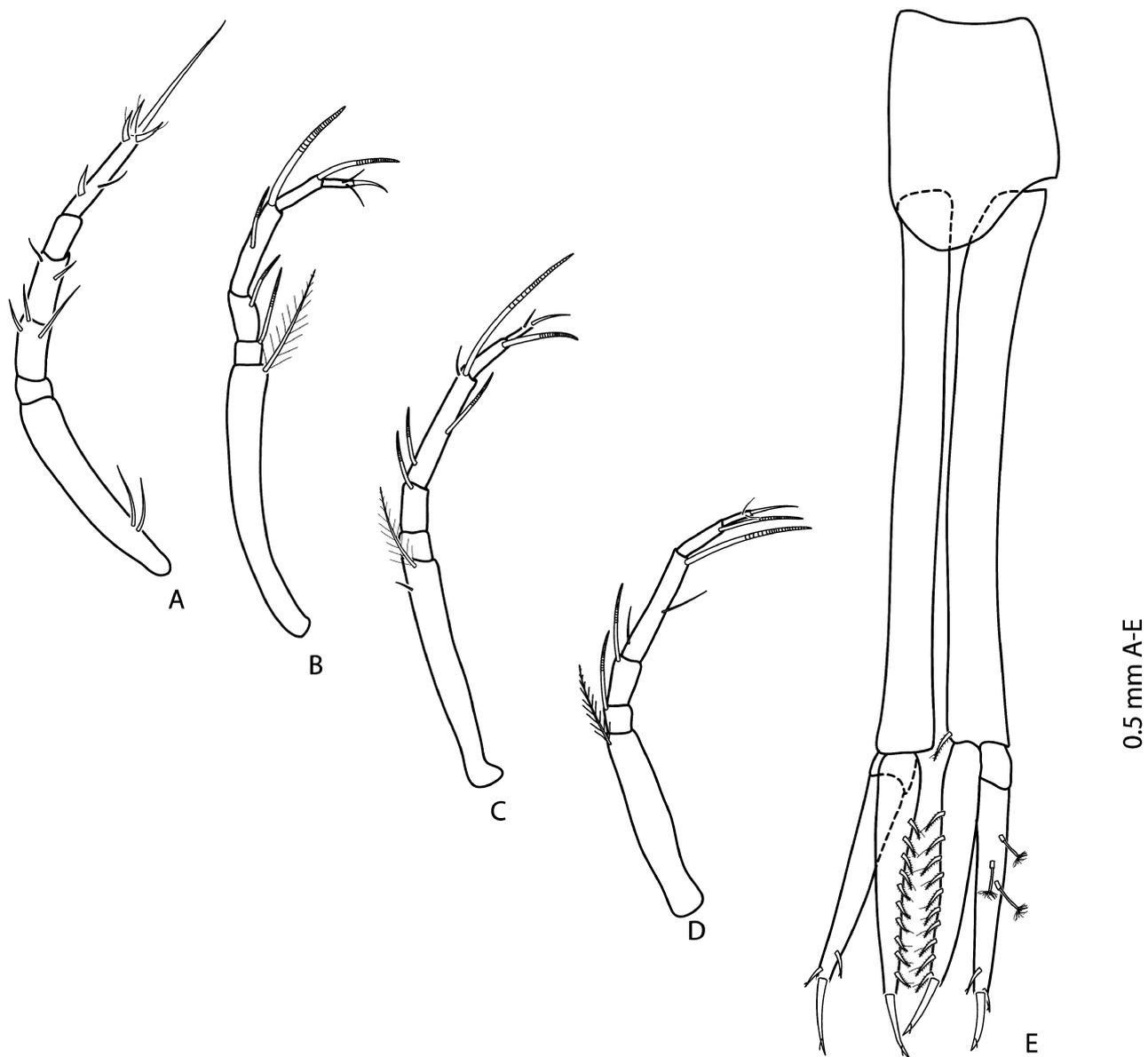
Pereopod 3 basis 1.2 times length of all other articles together, with plumose seta; ischium 0.07 times basis length, with annulate seta; merus 2.3 times ischium length, with annulate seta; carpus 2 times merus length, with 2 annulate setae; propodus 0.6 times carpus length, with annulate seta; dactylus 0.5 times propodus length, with 3 simple setae terminally (Figure 11B).

Pereopod 4 basis 0.9 times length of all other articles together, with 1 simple and 1 plumose setae; ischium 0.1 times basis length, unarmed; merus 1.8 times ischium length, with annulate seta; carpus 2.6 times merus length,

with 1 simple and 2 annulate setae; propodus 0.4 times carpus length, with annulate seta; dactylus 0.5 times propodus length, with 2 simple setae terminally (Figure 11C).

Pereopod 5 basis 0.7 times length of all other articles together, with plumose seta; ischium 0.1 times basis length, with annulate seta; merus 1.8 times ischium length, with annulate seta; carpus 2.6 times merus length, with 2 simple and 1 annulate setae; propodus 0.4 times carpus length, with annulate seta; dactylus 0.5 times propodus length, with 3 simple setae terminally (Figure 11D).

Uropod peduncles 2.3 times pleonite 6 length, with 0–1 micro serrate with single subterminal seta. Uropod endopod 0.4 times peduncle length, with 10 micro serrate with single subterminal setae medially, terminal seta with single subterminal setule. Uropod exopod of 2 articles, equal to length of endopod; article 1 0.1–0.2 times article 2 length, unarmed; article 2 with 0–3 complex pedunculate setae, 2 setae with single subterminal setule, terminal seta with single subterminal setule (Figure 11E).



**FIGURE 11.** *Atlantocuma confunda* n. sp. Paratype ovigerous female, NIWA 80729. A, pereopod 2; B, pereopod 3; C, pereopod 4; D, pereopod 4; E, pleonite 6 and uropods.

**Etymology.** The species is named *confunda*, in reference to the confusion possible with *Cyclaspis* in New Zealand waters.

**Remarks.** If only female specimens are available, superficial examination suggests *Cyclaspis*, in that exopods are only present on maxilliped 3-pereopod 1. However, the pseudorostral lobes meet in front of the

eyelobe for a distance of more than 10% of the total carapace length, unlike the New Zealand *Cyclaspis*, in which the pseudorostral lobes barely meet in front of the eyelobe, if at all. There is no other species in the New Zealand nannastacid fauna that is likely to be confused with this one, the exopod pattern of the female is unique within the New Zealand fauna, nor are there any species of *Atlantocuma* currently reported from Australian waters.

The mouthparts of the ovigerous female described resemble the degenerate mouthparts described for *Atlantocuma* and *Pseudopicrocuma* by Akiyama (2012), with few small setae present on the maxillule, maxilliped 1 and maxilliped 2, and few setae present on maxilliped 3 but with relatively stout pappose setae medially on the basis.

### ***Campylaspis* Băcescu & Muradian 1974**

**Type species.** *Campylaspis rowei* Băcescu & Muradian 1974.

**Diagnosis after Băcescu & Muradian 1974.** *Female.* Similar in appearance to *Campylaspis*, with the same maxilliped 1 and maxilliped 2 morphology. *Male.* With a pair of large penial lobes, wider than the diameter of pereopod 5 and longer than the basis of pereopod 5.

**New Zealand species.** *Campylaspis tangaroae* n. sp.

**Remarks.** It is not possible to distinguish females of this genus from *Campylaspis* except by comparison of species specific differences. Therefore, the key to New Zealand *Campylaspis* includes *Campylaspis*.

### ***Campylaspis tangaroae* n. sp.**

Figures 12–15

**Type material.** Holotype adult male, NIWA 80656, 42.6213°S, 175.9225°E–42.6203°S, 175.9335°E, 1194–1199 m, 26 April 2007. Paratype adult male, dissected, NIWA 80657; paratype subadult male, NIWA 80659, 44.4862°S, 177.1413°E–44.4841°S, 177.1416°E, 1235–1239 m, 6 April 2007. Paratype subadult female, dissected, NIWA 80658, 0705/160.

**Other material examined.** 3 subadult females, 3 subadult males, NIWA 79386, 43.8363°S, 176.7092°E–43.8330°S, 176.7127°E, 478–479 m, 5 April 2007. 1 ovigerous female, 2 subadult females, NIWA 79388, 44.4862°S, 177.1413°E–44.4841°S, 177.1416°E, 1235–1239 m, 6 April 2007. 3 subadult females, 3 juveniles, NIWA 79387, 44.4862°S, 177.1413°E–44.4841°S, 177.1416°E, 1235–1239 m, 6 April 2007. 1 specimen, NIWA 80663, 44.4862°S, 177.1413°E–44.4841°S, 177.1416°E, 1235–1239 m, 6 April 2007. 1 ovigerous female, 1 subadult female, NIWA 79389, 0705/160. 1 subadult male, NIWA 79390, 40.8800°S, 170.8555°E–40.8883°S, 170.8565°E, 529–534 m, 6 June 2007. 1 ovigerous female, 1 subadult female, NIWA 80664, 39.6373°S, 172.1532°E–39.6457°S, 172.1522°E, 264–266 m, 7 June 2007.

**Diagnosis.** *Females and subadult males.* Carapace with sulcus, scattered weak tubercles and scattered red chromatophores. *Male.* With penial lobes without setae terminally.

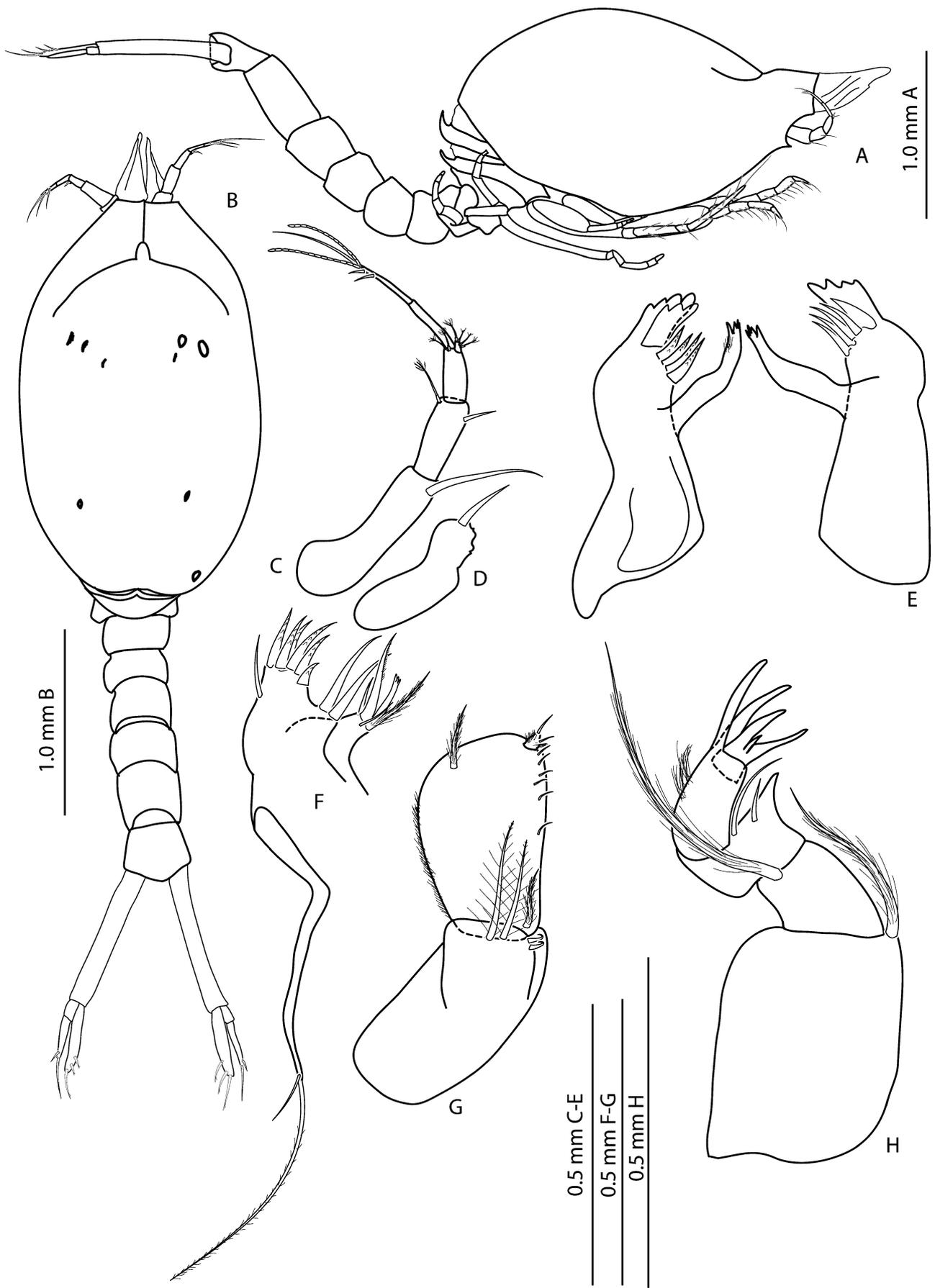
#### **Description of female.**

Paratype subadult female, 3.7 mm, NIWA 80658. Carapace with sulcus, not bounded by distinct carinae, scattered weak tubercles and sparsely scattered red chromatophores, longer than pereonites and pleonites together; pseudorostral lobes 0.3 times carapace length; eyelobe present, without lenses; pereonite 1 free only dorsally, with dorsally directed lappet; pereonite 2 with dorsally directed lappet (Figures 12A–B).

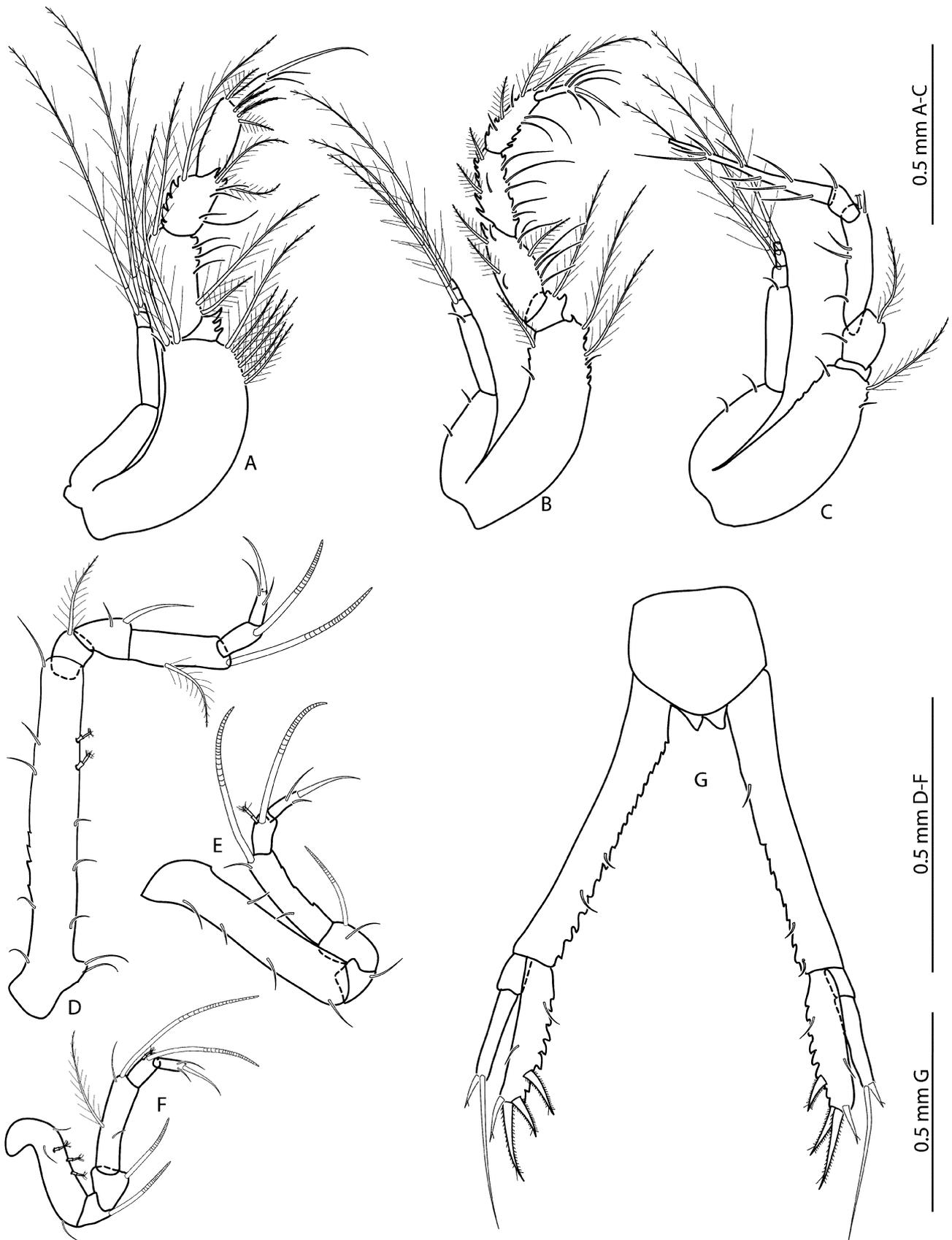
Antennule peduncle article 1 1.2 times length of articles 2 and 3 together, with simple seta; article 2 0.5 length of article 1, with 1 simple and 1 complex pedunculate setae; article 3 0.7 times length of article 2, with complex pedunculate setae distally; main flagellum of 3 articles, with 3 simple setae and 2 aesthetascs; accessory flagellum of 1 article, with complex pedunculate setae distally (Figure 12C).

Antenna of 1 article, 0.9 times the length of article 1 of antennule, with terminal simple seta (Figure 12D).

Mandible truncate, with 4–5 dentate setae medially, lacinia mobilis with 3 cusps, incisor slender, tip serrate, with fine hair-like setae (Figure 12E).



**FIGURE 12.** *Campylaspenis tangaroae* n. sp. Paratype preparatory female, NIWA 80658. A, side view; B, dorsal view; C, antennule; D, antenna; E, mandibles; F, maxillules; G, maxilliped 1; H, maxilliped 2.



**FIGURE 13.** *Campylaspenis tangaroae* s n. sp. Paratype preparatory female, NIWA 80658. A, maxilliped 3; B, pereopod 1; C, pereopod 2; D, pereopod 3; E, pereopod 4; F, pereopod 5; G, pleonite 6 and uropods.

Maxillule with 2 endites; outer endite with double row of stout dentate setae; inner endite with setae 5 setae; palp with 1 long microserrate seta and 1 short simple seta (Figure 12F).

Maxilliped 1 basis 0.9 times length of merocarpus, with 2 hook and 2 plumose setae; merocarpus with small simple setae medially, lateral margin lined with fine hair-like setae, with pappose seta distally; dactylus minute, margins lined with fine hair-like setae, with simple seta terminally (Figure 12G).

Maxilliped 2 basis 0.8 times length of all other articles together, with pappose seta medially; ischium absent; merus 0.4 times basis length, with pappose seta distally; carpus 0.6 times merus length, medial margin distal corner produced medially, with 2 simple setae; propodus 2.0 times carpus length, with hair-like setae laterally, distal margin produced as two long processes; dactylus 0.6 times propodus length, produced terminally as 3 processes, outer 2 long and inner process short (Figure 12H).

Maxilliped 3 basis 0.7 times length of all other articles together, with 2 long plumose setae at distal corner, medial margin with 6 plumose setae; ischium 0.07 times basis length, medial margin produced as 3 teeth; merus 6.3 times ischium length, with 3 plumose and 3 simple setae, medial margin produced as several teeth distally; carpus 0.7 times merus length, with 3 plumose and 2 simple setae, lateral margin produced as strong teeth; propodus 1.2 times carpus length, with 2 pappose and 2 plumose setae; dactylus 0.7 times propodus length, with 3 setae terminally; exopod extending to midpoint of merus, basal article unarmed, flagellum with plumo-annulate setae (Figure 13A).

Pereopod 1 basis 0.7 times length of all other articles together, with 3 plumose setae, margins produced as teeth distally; ischium 0.1 times basis length, with plumose seta, medial margin produced as tooth; merus 4.5 times ischium length, with 3 plumose and 8 simple setae, disto-lateral corner produced as tooth; carpus 0.8 times merus length, with 2 plumose and 6 simple setae, margins produced as teeth; propodus 0.9 times carpus length, with 3 plumose and 3 simple setae, margins produced as teeth; dactylus 0.5 times propodus length, with 6 setae terminally; exopod extending past ischium, basal article with 2 simple setae, flagellum with plumo-annulate setae (Figure 13B).

Pereopod 2 basis 0.6 times length of all other articles together, with 1 plumose and 2 simple setae, lateral margin produced as teeth distally; ischium 0.03 times basis length, unarmed; merus 9 times ischium length, with 1 plumose and 1 simple setae; carpus 2.2 times merus length, with 5 simple setae; propodus 0.3 times carpus length, with simple seta; dactylus 5.7 times propodus length, with 8 simple setae, terminal seta broken off; exopod extending merus, basal article with 2 simple setae, flagellum with plumo-annulate setae (Figure 13C).

Pereopod 3 basis 1.5 times length of all other articles together, with 10 simple and 2 complex pedunculate setae, produced proximally as bump; ischium 0.04 times basis length, with plumose seta; merus 3.3 times ischium length, with 2 simple setae; carpus 1.8 times merus length, with 1 plumose and 1 annulate setae; propodus 0.4 times carpus length, with annulate seta; dactylus 0.9 times propodus length, with 3 setae terminally; remnant exopod present as bump on basis, with 2 setae, no distinct articles (Figure 13D).

Pereopod 4 basis 0.8 times length of all other articles together, with 5 simple setae; ischium 0.09 times basis length, with simple seta; merus 2.4 times ischium length, with 1 simple and 1 annulate setae; carpus 1.8 times merus length, with 1 simple and 1 annulate setae; propodus 0.4 times carpus length, with 1 annulate and 1 complex pedunculate setae; dactylus 0.9 times propodus length, with 3 setae terminally; exopod absent entirely, no remnant (Figure 13E).

Pereopod 5 basis 0.5 times length of all other articles together, with 3 simple and 3 complex pedunculate setae; ischium 0.2 times basis length, with annulate seta; merus 1.8 times ischium length, with annulate seta; carpus 2.7 times merus length, with 1 plumose 2 simple and 1 annulate setae; propodus 0.3 times carpus length, with 1 annulate and 1 complex pedunculate setae; dactylus equal to propodus length, with 3 setae terminally (Figure 13F).

Uropod peduncles 2.4 times pleonite 6 length, medial margins serrate, with 2–3 simple setae. Uropod endopod uniarticulate, 0.5 times peduncle length, medial margin serrate, with 2 simple setae, 1 seta with single subterminal setule, and 3 microserrate setae with single subterminal setule. Uropod exopod of 2 articles, 0.9 times length of endopod; article 1 0.3 times length of article 2, unarmed; article 2 with seta with single subterminal setule and simple terminal seta, terminal seta 1.2 times exopod length (Figure 13G).

#### **Description of male.**

Holotype adult male, 3.8 mm, NIWA 80656, paratype adult male 3.9 mm, NIWA 80657. Carapace with sulcus, not bounded by distinct carinae, scattered weak tubercles and sparsely scattered red chromatophores, 0.7 times length of pereonites and pleonites together; pseudorostral lobes 0.3 times carapace length; eyelobe 0.05 times

carapace length, without lenses; pereonite 1 free only dorsally, with dorsally directed lappet; pereonite 2 with dorsally directed lappet; pereonite 5 with pair of penes ventrally, penes longer and broader than basis of pereopod 5; all pleonites with lateral depression for antennal flagellum (Figures 14A–D).

Antennule peduncle article 1 1.3 times length article 2, with 2 simple setae and fine hair-like setae proximally; article 2 0.8 times article 3 length, with complex pedunculate seta; article 3 0.8 times article 2 length, with 1 simple and 2 complex pedunculate setae distally; main flagellum of 3 articles, with 1 aesthetasc and 2 simple setae; accessory flagellum of 1 article, with 3 simple setae (Figure 14E).

Antenna extending past uropod peduncles; peduncle of 5 articles, broken off on paratype (Figure 14A).

Maxilla reduced to single endite, with 3 simple setae terminally (Figure 14F).

Maxilliped 1 basis broken, with 2 simple and 2 hook setae; merocarpus with 8 simple setae and lateral margin lined with fine hair-like setae; dactylus absent (Figure 14G).

Maxilliped 2 basis shorter than all other articles together, ischium 0.06 times basis length, unarmed; merus 5.5 times ischium length, unarmed; carpus 0.5 times merus length, produced as tooth distally on medial margin, with 3 simple setae; propodus 6 times carpus length, with 2 simple setae terminally; dactylus 0.5 times propodus length, produced as 4 stout teeth terminally (Figure 14H).

Maxilliped 3 basis equal to length of all other articles together, with 3 plumose setae at distal corner, and 2 plumose setae medially; ischium 0.2 times basis length, with simple seta; merus 1.2 times ischium length, with 6 simple setae medially, pappose seta distally, with large tooth on distal margin; carpus 0.8 times merus length, with 3 simple and 1 plumose setae medially, 1 pappose seta laterally, lateral margin produced as 3 strong teeth; propodus 1.1 times carpus length, with 3 plumose setae medially, plumose seta laterally; dactylus 0.7 times propodus length, with 5 simple setae terminally; exopod extending to distal margin of ischium, basal article with plumose seta, flagellum with plumo-annulate setae (Figure 15A).

Pereopod 2 basis 0.7 times length of all other articles together, with plumose seta laterally and plumose seta distally; ischium 0.04 times basis length, with plumose seta; merus 6.5 times ischium length, with plumose seta medially and 1 plumose and 1 simple setae laterally, lateral margin produced as teeth; carpus 1.2 times merus length, with 2 plumose and 2 simple setae medially and 1 plumose and 1 simple setae laterally; propodus 0.4 times carpus length, with complex pedunculate seta; dactylus 5.7 times propodus length, with 8 simple setae, terminal seta broken; exopod extending to distal margin of merus, basal article with 1 plumose and 1 simple setae, flagellum with plumo-annulate setae (Figure 15B).

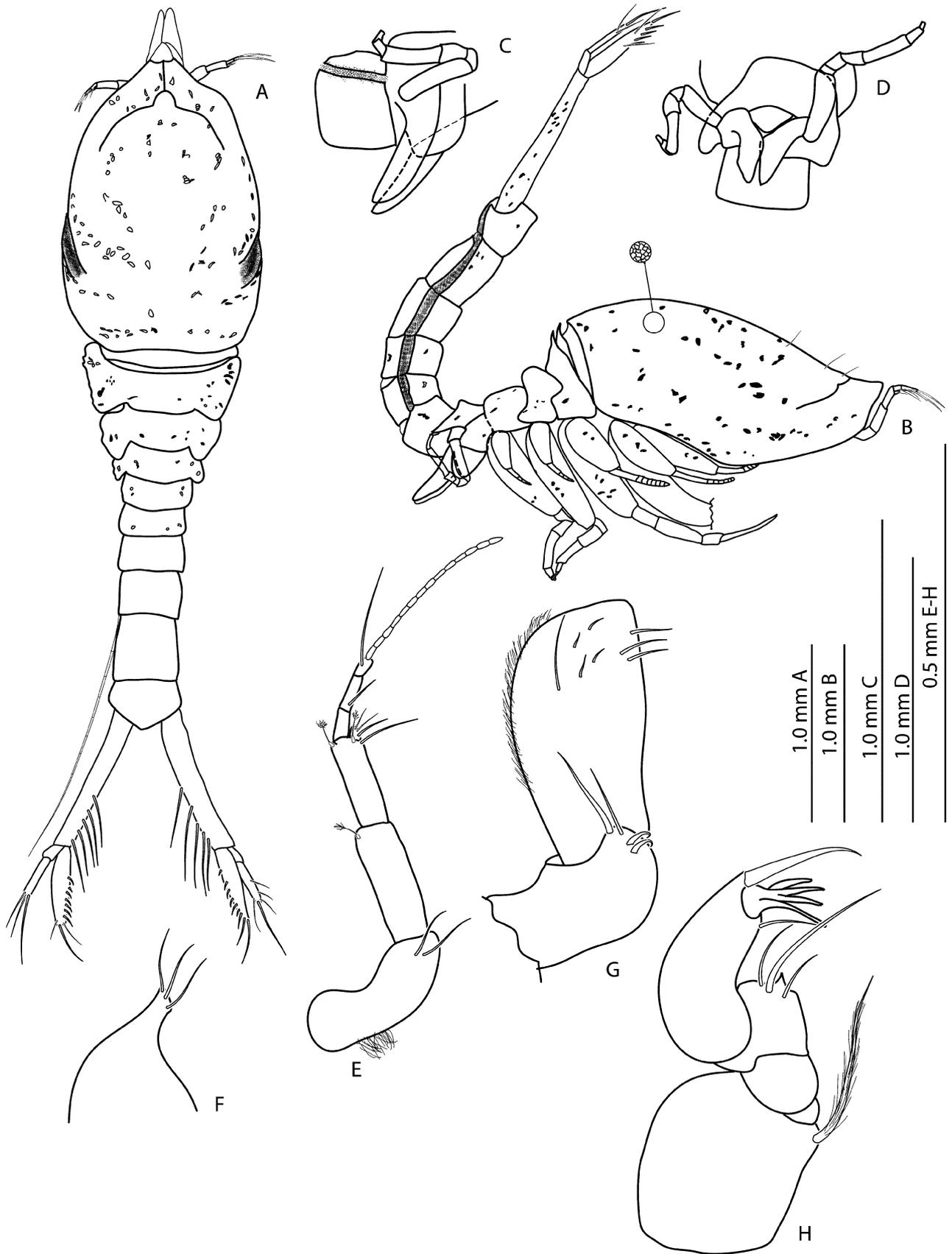
Pereopod 4 basis 1.4 times length of all other articles together, with simple seta; ischium 0.05 times basis length, with 2 simple setae; merus 3 times ischium length, with simple seta; carpus 2 times merus length, with 2 simple and 1 annulate setae; propodus 0.3 times carpus length, with annulate seta; dactylus 0.7 times propodus length, with 2 setae terminally; exopod extending past distal margin of ischium, basal article unarmed, flagellum with plumo-annulate setae (Figure 15C).

Pereopod 5 basis 0.8 times length of all other articles together, with 2 simple and 1 annulate setae, with penial lobe attached proximally; ischium 0.1 times basis length, with annulate seta; merus 1.6 ischium length, with 1 simple and 1 annulate setae; carpus 3 times merus length, with 1 simple and 1 annulate setae; propodus 0.3 times carpus length, with annulate seta; dactylus 0.5 times propodus length, with 3 setae terminally (Figure 14C–D, 15D).

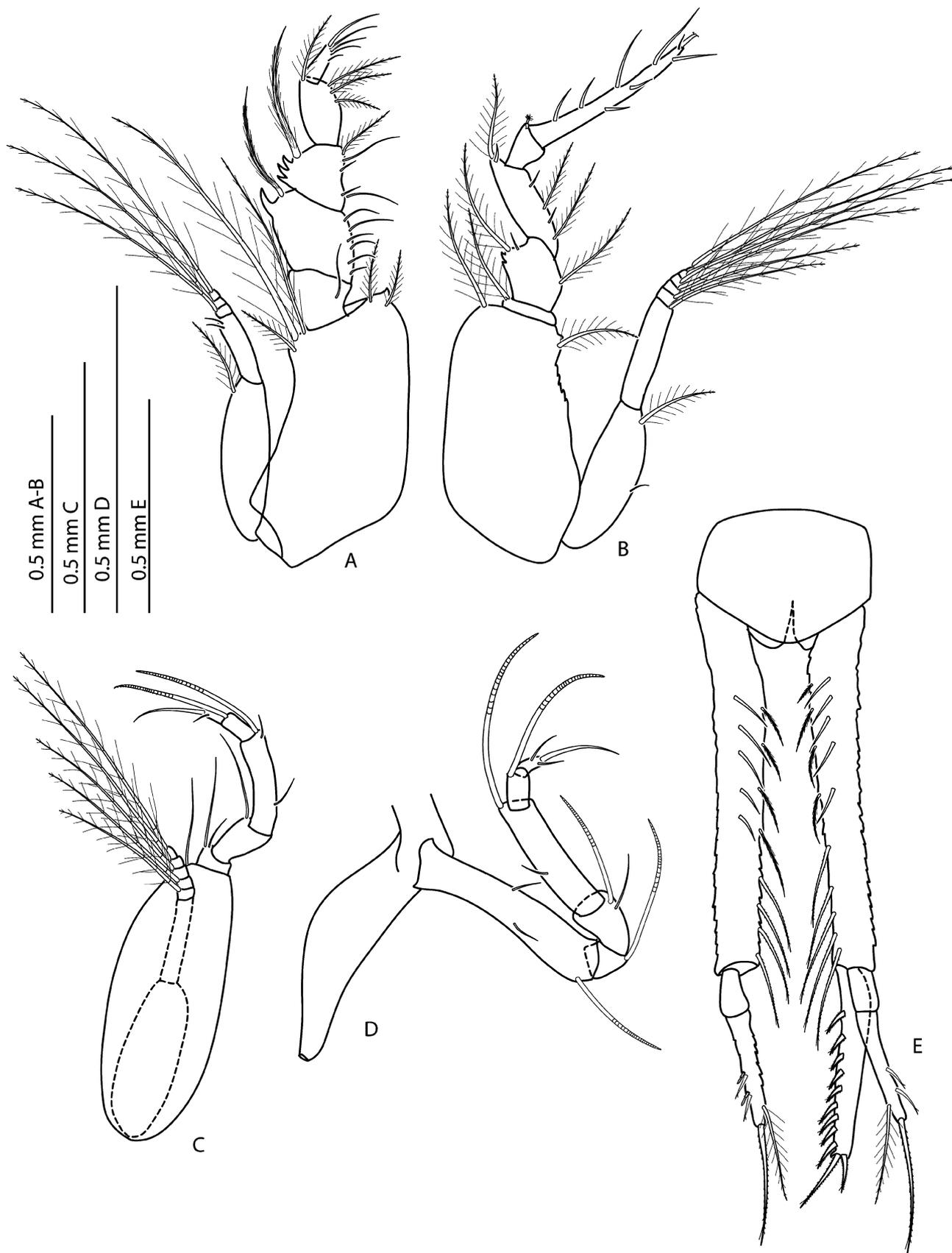
Uropod peduncles 2.7 times pleonite 6 length, with 4 pappose, 5 simple, and 4–5 microserrate with single subterminal setule setae medially, pappose and simple setae are in opposing pairs, margins weakly serrate. Uropod endopod uniarticulate, 0.5 times peduncle length, with 9 microserrate setae with single subterminal setules medially and 2 microserrate setae with single subterminal setules terminally. Uropod exopod 0.8 times length of endopod; article 1 0.4 times length of article 2, unarmed; article 2 with 1 plumose, 2 pedunculate and 2 microserrate with single subterminal setule setae, terminal seta microserrate with single subterminal setule (Figure 15E).

**Etymology.** The species is named *tangaroe*, for the vessel RV Tangaroe which undertook the Oceans 20/20 voyages that collected the specimens.

**Remarks.** The propodus and dactylus of maxilliped 2 vary a little between the male and the female. The female has two large setae terminally on the propodus, and one of these setae is reduced in the male to a slender seta. The dactylus is produced as 3 teeth in the female, with the central tooth smaller than the outer pair, while in the male the dactylus is produced as 4 equal teeth.



**FIGURE 14.** *Campylaspenis tangaroae* n. sp. Holotype adult male, NIWA 80656. A, dorsal view. Paratype adult male, NIWA 80657. B, side view; C, penial lobes side view; D, penial lobes ventral view; E, antennule; F, maxilla; G, maxilliped 1; H, maxilliped 2.



**FIGURE 15.** *Campylaspenis tangaroae* n. sp. Paratype adult male, NIWA 80657. A, maxilliped 3; B, pereopod 2; C, pereopod 4; D, pereopod 5 and penial lobe; E, pleonite 6 and uropods.

This species is easily differentiated from the only other species in the genus by the morphology of the penial lobes in the male. In *Campylaspenis rowei* the penial lobes have setae terminally, while in *C. tangaroae* the penial lobes are without setae. In addition, the description of *C. rowei* states that there are 4 lateral carinae on the carapace, while in *C. tangaroae* there are no carinae on the carapace.

The most similar species of *Campylaspenis* from New Zealand waters are *C. apheles* and *C. rufus*, which both possess a smooth carapace, unlike *C. tangaroae*, and *C. normani*, which has a weak sulcus. In *C. apheles*, the uropod rami are equal or subequal, while in *C. tangaroae* the uropod exopod is shorter than the endopod. In *C. rufus*, the female has many setae medially on the uropod exopod, and both males and females are entirely without a sulcus on the carapace, while in *C. tangaroae* the female has only 2 setae medially on the uropod endopod, and both have a distinct sulcus. Also, both sexes in *C. rufus* are covered in red chromatophores, giving the entire body and appendages a red appearance, while in *C. tangaroae* there are only scattered chromatophores in both sexes. In *C. normani*, the female has rudimentary exopods on pereopods 3–4, while there are no exopods on pereopods 3–4 in the female of *C. tangaroae*. The male of *C. normani* is unknown at present, but is expected not to have penial lobes, differentiating it from the male of *C. tangaroae*.

### ***Campylaspenis* G.O. Sars 1865**

**Type species.** *Cuma rubicunda* Liljeborg 1855.

**Diagnosis.** *Female.* Carapace vaulted; truncate mandible with acute pars molaris, broad pars incisiva; maxilliped 1 of three articles, merus and carpus fused into single broad article, propodus absent, dactylus minute; maxilliped 2 propodus frequently with 1 or more large spines or stout setae distally, dactylus tridentate. *Male.* Carapace less vaulted than in female, ornamentation usually less pronounced than in female.

**New Zealand species.** *Campylaspenis apheles* n. sp., *C. bituberculata* n. sp., *C. hatchae* n. sp., *C. macrosulcata* n. sp., *C. microsulcata* n. sp., *C. millsae* n. sp., *C. normani* n. sp., *C. rex* Gerken & Ryder 2002, *C. rufus* n. sp., *C. schnabelae* n. sp., *C. sculptaspinosa* n. sp., *C. zealandiaensis* n. sp., *C. zimmeri* n. sp.

**Remarks.** The New Zealand *Campylaspenis* diversity is greater than that recorded from Antarctic waters, from where only 11 species are known (Petrescu & Heard 2000, Petrescu & Wittmann 2003), although less than the 44 species known from Australian waters (Petrescu 2006).

### **Key to the New Zealand *Campylaspenis* and *Campylaspenis***

Note, *Campylaspenis* is included in the key, as females are impossible to differentiate from *Campylaspenis*.

1. Carapace smooth, without tubercles, spines or sulcus .....2
- Carapace ornamented .....3
2. Pereopod 2 dactylus longer than basis, with short setae ..... *Campylaspenis apheles*
- Pereopod 2 dactylus shorter than basis, with long setae ..... *Campylaspenis rufus*
3. Carapace with sulcus bounded by strong carinae .....4
- Carapace ornamented, sulcus if present not bounded by strong carinae .....5
4. Carapace with vertical carinae at posterior border of sulcus ..... *Campylaspenis microsulcata*
- Carapace without vertical carinae ..... *Campylaspenis macrosulcata*
5. Carapace covered in large tubercles .....6
- Carapace not covered in large tubercles .....7
6. Carapace without sulcus ..... *Campylaspenis zimmeri*
- Carapace with sulcus ..... *Campylaspenis schnabelae*
7. Carapace with pair of large tubercles dorsally near origin of pseudorostral lobes, no other spines or tubercles .....8
- Carapace without pair of large tubercles, or with spines and or tubercles in addition to pair of large tubercles .....9
8. Carapace with deep sulcus, pair of posterior carinae ..... *Campylaspenis zealandiaensis*
- Carapace with weak sulcus, no posterior carinae ..... *Campylaspenis bituberculata*
9. Carapace with strongly dorsally directed pseudorostrum, tubercles only on dorsal part of carapace ..... *Campylaspenis rex*
- Carapace with pseudorostrum weakly or not dorsally directed .....10
10. Carapace with sulcus, spines and tubercles .....11
- Carapace with sulcus and weak tubercles, no spines ..... *Campylaspenis tangaroae*
- Carapace with sulcus, no spines or tubercles ..... *Campylaspenis normani*

11. Carapace with few tubercles, few or no spines, no carinae. . . . . *Campylaspis hatchae*  
 - Carapace with large spines, pair of large tubercles dorsally near origin of pseudorostral lobes . . . . . 12  
 12. Carapace with tooth or teeth at anteroventral corner, female with eyelobe . . . . . *Campylaspis millsae*  
 - Carapace without teeth at anteroventral corner, female without eyelobe . . . . . *Campylaspis sculptaspinosa*

***Campylaspis apheles* n. sp.**

Figures 16–19

**Type material.** Holotype subadult female, NIWA 80673, paratype subadult female, dissected, NIWA 80674, paratype adult male, dissected, NIWA 80675 0705/160.

**Other material examined.** 3 juveniles, NIWA 79310, 43.8363°S, 176.7092°E–43.8330°S, 176.7127°E, 478–479 m, 5 April 2007. 1 ovigerous female, 1 subadult male, NIWA 79311, 44.0162°S, 178.5210°E–44.0143°S, 178.5175°E, 769–771 m, 7 April 2007. 2 juveniles, NIWA 46203, 44.5607°S, 178.4762°W–44.5592°S, 178.4830°W, 1076–1103 m, 10 April 2007. 1 subadult female, NIWA 79312, 43.0650°S, 174.9325°W – 43.0732°S, 174.9348°W, 933–940 m, 13 April 2007. 2 mancae, NIWA 46206, 43.2903°S, 175.5522°W–43.2933°S, 175.5630°W, 638–644, 15 April 2007. 1 juvenile, NIWA 79313, 0705/160. 4 subadult females, 2 mancae, NIWA 46210, 0705/160. 2 specimens, NIWA 79314, 0705/160. 8 juveniles, NIWA 79315, 43.5212°S, 178.6203°W–43.5228°S, 178.6315°W, 424–425 m, 18 April 2007. 9 subadult females, 4 juveniles, NIWA 46201, 42.9958°S, 178.9957°E–42.9910°S, 179.0052°E, 520–530 m, 24 April 2007. 1 subadult female, NIWA 79316, 42.9958°S, 178.9957°E–42.9910°S, 179.0052°E, 520–530 m, 24 April 2007. 1 subadult female, NIWA 79317, 43.5300°S, 178.5048°E–43.5363°S, 178.5118°E, 346 m, 24 April 2007. 3 juveniles, NIWA 46213, 43.5300°S, 178.5048°E–43.5363°S, 178.5118°E, 346 m, 24 April 2007. 1 ovigerous female, 2 subadult females, NIWA 79318, 43.7967°S, 175.3158°E–43.8045°S, 175.3148°E, 418–422 m, 27 April 2007. 1 subadult male, NIWA 79319, 38.6177°S, 168.9428°E–38.6258°S, 168.9490°E, 480–482 m, 29 May 2007. 1 ovigerous female, NIWA 79320, 38.6177°S, 168.9428°E–38.6258°S, 168.9490°E, 480–482 m, 29 May 2007. 1 adult male, 2 mancae, NIWA 46202, 36.9202°S, 167.5302°E–36.9120°S, 167.5325°E, 1207–1213 m, 30 May 2007. 2 subadult females, 10 juveniles, NIWA 46216, 40.8800°S, 170.8555°E–40.8883°S, 170.8565°E, 529–534 m, 6 June 2007.

**Diagnosis.** *Females and subadult males.* Carapace smooth; pseudorostrum not dorsally directed. Carapace, pereonites and pleonites with very few red chromatophores. Pereonites 1–3 free only dorsally. Pereopod 2 dactylus clublike, with short setae and no terminal seta. Uropod peduncles at least 3 times length of pleonite 6. *Male.* Carapace less vaulted than in female. Uropods much more setose than in female.

**Description of female.**

Holotype female, 3.0 mm, NIWA 80673. Carapace smooth, without sulcus or tubercles, with very few scattered red chromatophores; pseudorostral lobes 0.3 times carapace length; eyelobe 0.03 times carapace length, without lenses; carapace overhanging pereonites 1–4, pereonites 1–3 free only dorsally (Figures 16A–B).

Antennule peduncle article 1 1.1 times article 2 length, with pappose seta; article 2 0.9 times article 1 length, with 1 simple and 1 complex pedunculate setae; article 3 longest, 1.4 times article 2 length, with 1 simple and 1 complex pedunculate setae; main flagellum of 3 articles, with 2 aesthetascs and 1 simple setae; accessory flagellum of 1 article, with 2 simple and 1 complex pedunculate setae (Figure 16C).

Mandible truncate, with 3 microserrate setae medially, lacinia mobilis with 1 cusp (Figure 16D).

Maxillule with 2 endites; outer endite with double row of stout simple setae; inner endite with 5 simple setae; palp with single microserrate seta (Figure 16E).

Maxilliped 1 basis with 2 hook, 1 simple and 1 pappose setae; merocarpus with 5 simple setae medially, lateral margin lined with fine hair-like setae; dactylus minute with simple seta (Figure 16F).

Maxilliped 2 basis 0.9 times length of all other articles together, with plumose seta; ischium absent; merus 0.2 times basis length, with plumose seta; carpus 1.3 times merus length, with 2 plumose setae; propodus equal to carpus length, with 2 plumose setae medially and 1 plumose seta laterally; dactylus 1.1 times propodus length, produced as 3 equal teeth terminally (Figure 16G).

Maxilliped 3 basis 0.9 times length of all other articles together, with 3 plumose setae medially and 2 large and 2 small plumose setae at distal corner; ischium 0.08 times basis length, with 2 plumose setae medially; merus 6.7 times ischium length, with 7 simple setae medially, plumose seta laterally, medial margin serrate; carpus 0.5 times merus length, with 2 plumose and 1 simple setae medially, plumose seta laterally, medial and lateral margins

serrate; propodus 1.3 times carpus length, with 3 plumose setae medially, plumose seta laterally, medial margin serrate; dactylus 0.5 times propodus length, with 4 simple setae terminally; exopod equal to basis length, basal article unarmed, flagellum with plumo-annulate setae (Figure 16H).

Pereopod 1 basis equal to length of all other articles together, with 3 plumose setae; ischium 0.04 times basis length, with plumose seta; merus 6.5 times ischium length, with 6 plumose and 2 simple setae; carpus 0.9 times merus length, with 4 plumose and 2 simple setae; propodus 0.8 times carpus length, with 3 plumose and 1 simple setae; dactylus 0.9 times propodus length, with 3 simple and 1 plumose setae, and simple seta terminally; exopod 1.1 times basis length, basal article unarmed, flagellum with plumo-annulate setae (Figure 16I).

Pereopod 2 basis 0.4 times length of all other articles together, with pappose seta; ischium 0.1 times basis length, unarmed; merus 1.9 times ischium length, with 2 pappose setae; carpus 2.7 times merus length, with 3 simple and 1 plumose setae; propodus 0.4 times carpus length, with simple seta; dactylus 4.1 times propodus length, with 14 short simple setae, no terminal seta; exopod 1.5 times basis length, basal article with simple seta, flagellum with plumo-annulate setae (Figure 17A).

Pereopod 3 basis 1.7 times length of all other articles together, with 4 simple and 1 plumose setae; ischium 0.06 times basis length, with 1 simple and 1 plumose setae; merus 2.3 times ischium length, with plumose seta; carpus 1.9 times merus length, with 1 plumose and 2 annulate setae; propodus 0.4 times carpus length, with annulate seta; dactylus 0.6 times propodus length, with 3 setae terminally (Figure 17B).

Pereopod 4 basis equal to length of all other articles together, with 4 simple and 1 plumose setae; ischium 0.1 times basis length, with plumose seta; merus 1.7 times ischium length, with plumose seta; carpus 2.0 times merus length, with 1 plumose and 2 annulate setae; propodus 0.3 times carpus length, with annulate seta; dactylus 0.8 times propodus length, with 3 setae terminally; (Figure 17C).

Pereopod 5 basis 0.7 times length of all other articles together, with 3 simple setae; ischium 0.2 times basis length, with plumose seta; merus 1.2 times ischium length, with plumose seta; carpus 2.7 times merus length, with 1 simple, 1 plumose and 2 annulate setae; propodus 0.3 times carpus length, with annulate seta; dactylus 0.8 times propodus length, with 3 setae terminally (Figure 17D).

Uropod peduncles 3.0 times pleonite 6 length, with 0–3 simple setae medially, medial margin serrate. Uropod endopod uniarticulate, 0.5 times peduncle length, with 8 microserrate setae medially, 0–1 simple setae laterally, terminal seta simple. Uropod exopod of 2 articles, equal to length of endopod; article 1 0.3 times article 2 length, with 0–1 complex pedunculate seta; article 2 with 3 simple setae and simple terminal seta (Figure 17E).

#### **Description of male.**

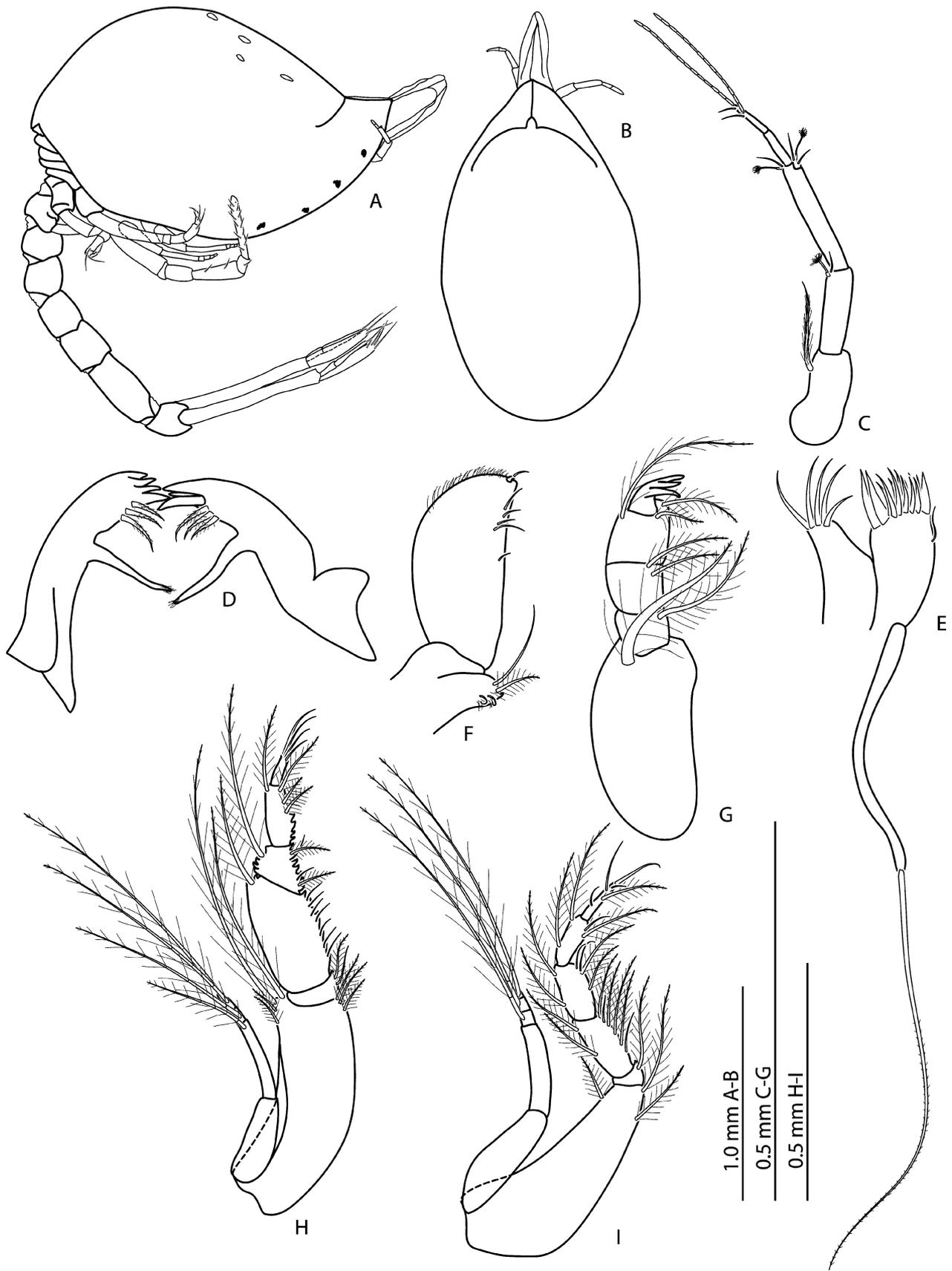
Paratype adult male, 3.1 mm, NIWA 80675. Carapace smooth, without chromatophores; pseudorostral lobes 0.2 times carapace length; eyelobe 0.04 times carapace length, without lenses; carapace overhanging pereonites 1–3, pereonites 1–2 only free dorsally (Figures 18A–B).

Antennule peduncle article 1 equal to article 2 length, with plumose seta; article 2 equal to article 1 length, with complex pedunculate seta; article 3 longest, 1.2 times article 2 length, with 1 simple and 1 complex pedunculate setae; main flagellum of 3 articles, with 2 aesthetascs and simple seta; accessory flagellum of 1 article, with 3 simple and 1 complex pedunculate setae (Figure 18C).

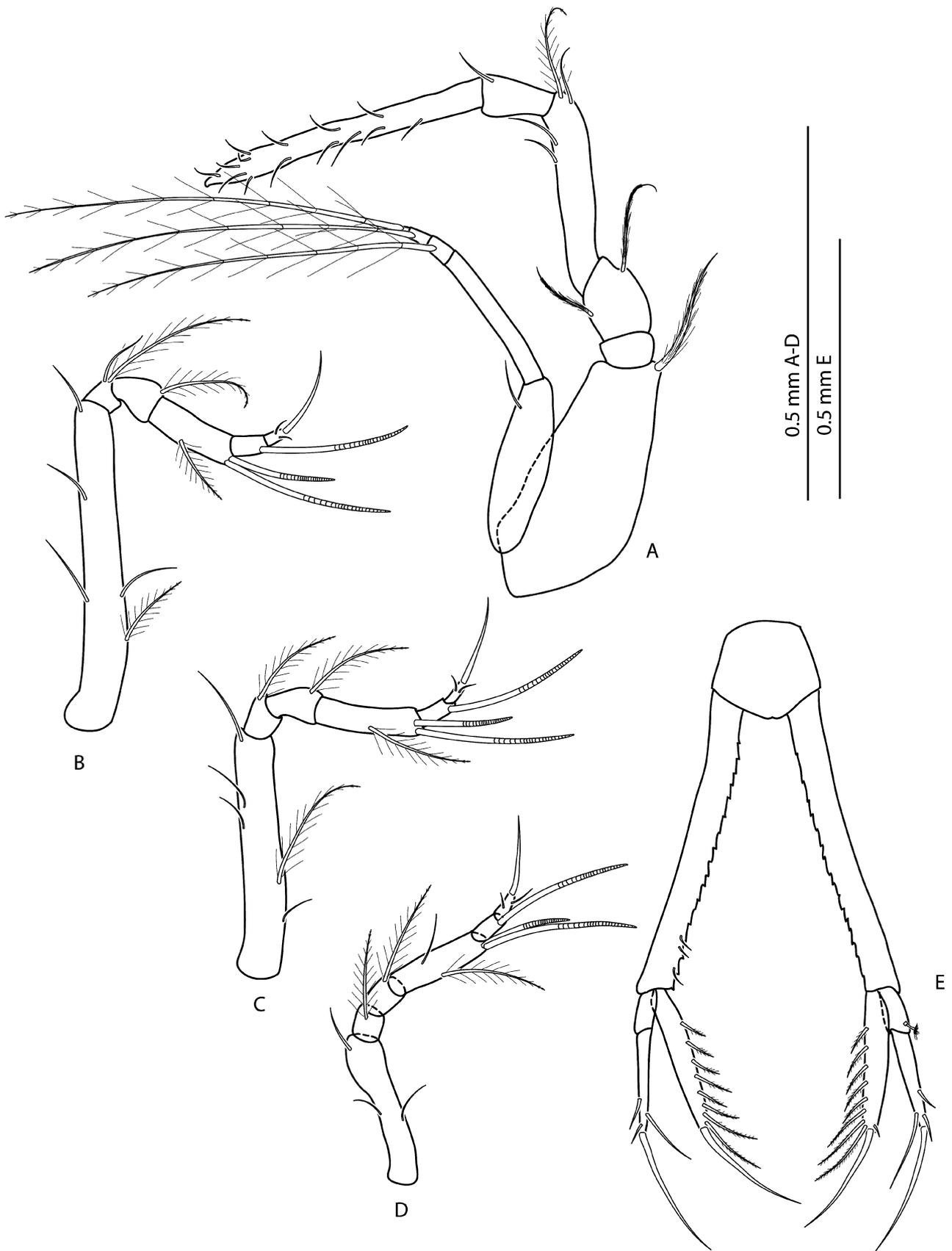
Antenna extending to posterior border of pleonite 6; peduncle of 5 articles, sparsely setose; articles 4–5 with ranks of setae, incompletely circling articles; flagellum broke with dissection, articles each with 2 setae (Figure 18D).

Maxilliped 3 basis 0.9 times length of all other articles together, with 2 pappose setae medially, 2 plumose setae at distal corner, medial margin lined with fine hair-like setae; ischium 0.05 times basis length, medial margin produced as single large tooth; merus 10 times ischium length, with 9 simple setae medially, plumose seta laterally, medial margin serrate; carpus 0.4 times merus length, with 2 simple and 2 pappose setae medially, plumose seta laterally, medial and lateral margins serrate; propodus 1.4 times carpus length, with 3 pappose setae medially and pappose seta laterally, medial margin produced as 4 strong teeth proximally; dactylus 0.5 times propodus length, with 4 simple setae terminally; exopod extending past distal margin of basis, basal article unarmed, flagellum with plumo-annulate setae (Figure 18E).

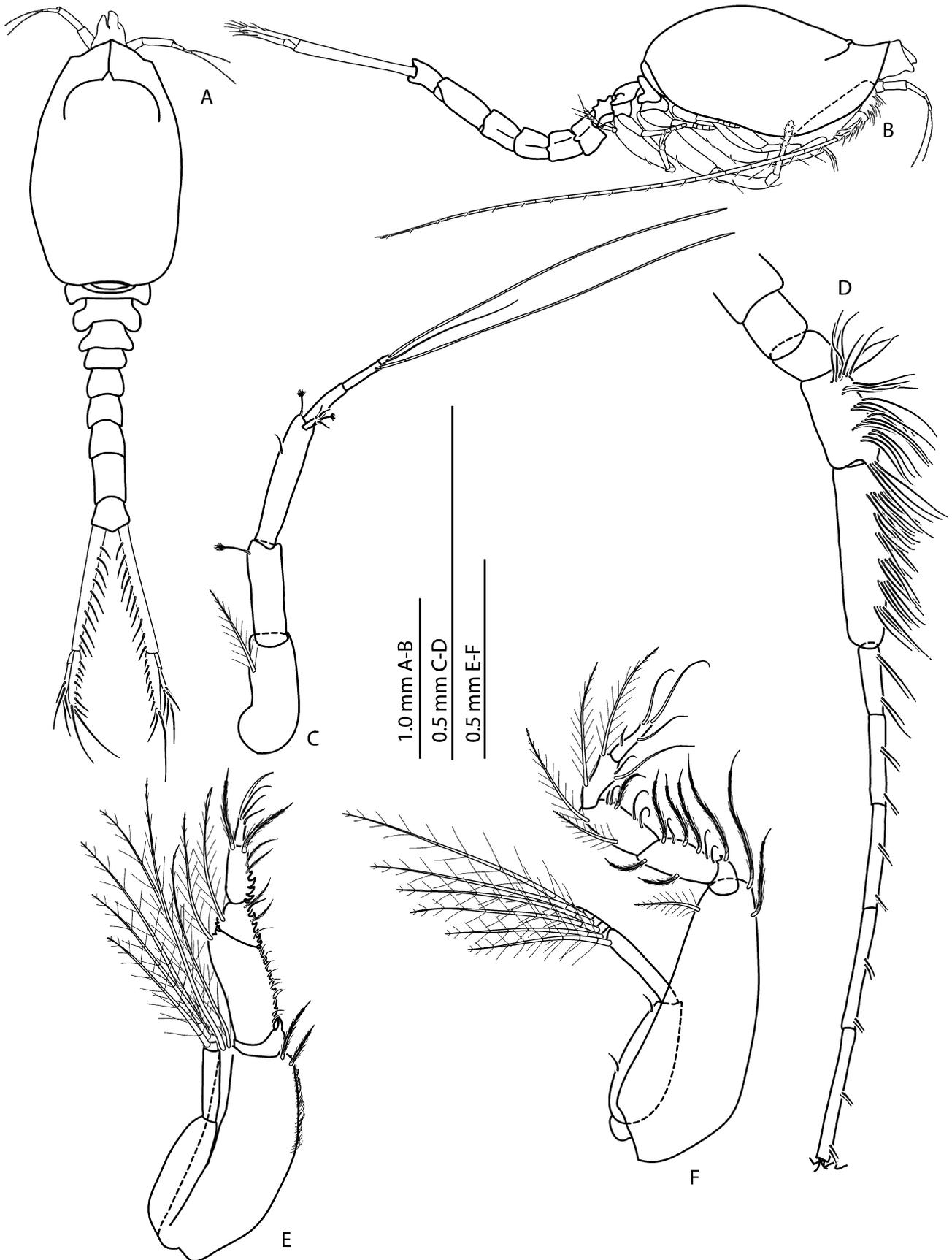
Pereopod 1 basis 1.1 times length of all other articles together, with 2 pappose and 1 plumose setae; ischium 0.1 times basis length, with pappose seta; merus 2.8 times ischium length, with 3 simple and 5 pappose setae; carpus 0.9 times merus length, with 4 simple, 1 pappose and 2 plumose setae; propodus 0.8 times carpus length, with 2 simple and 2 plumose setae; dactylus equal to propodus length, with 2 simple setae and 2 simple setae terminally; exopod 0.9 times basis length, basal article with 2 simple setae, flagellum with plumo-annulate setae (Figure 18F).



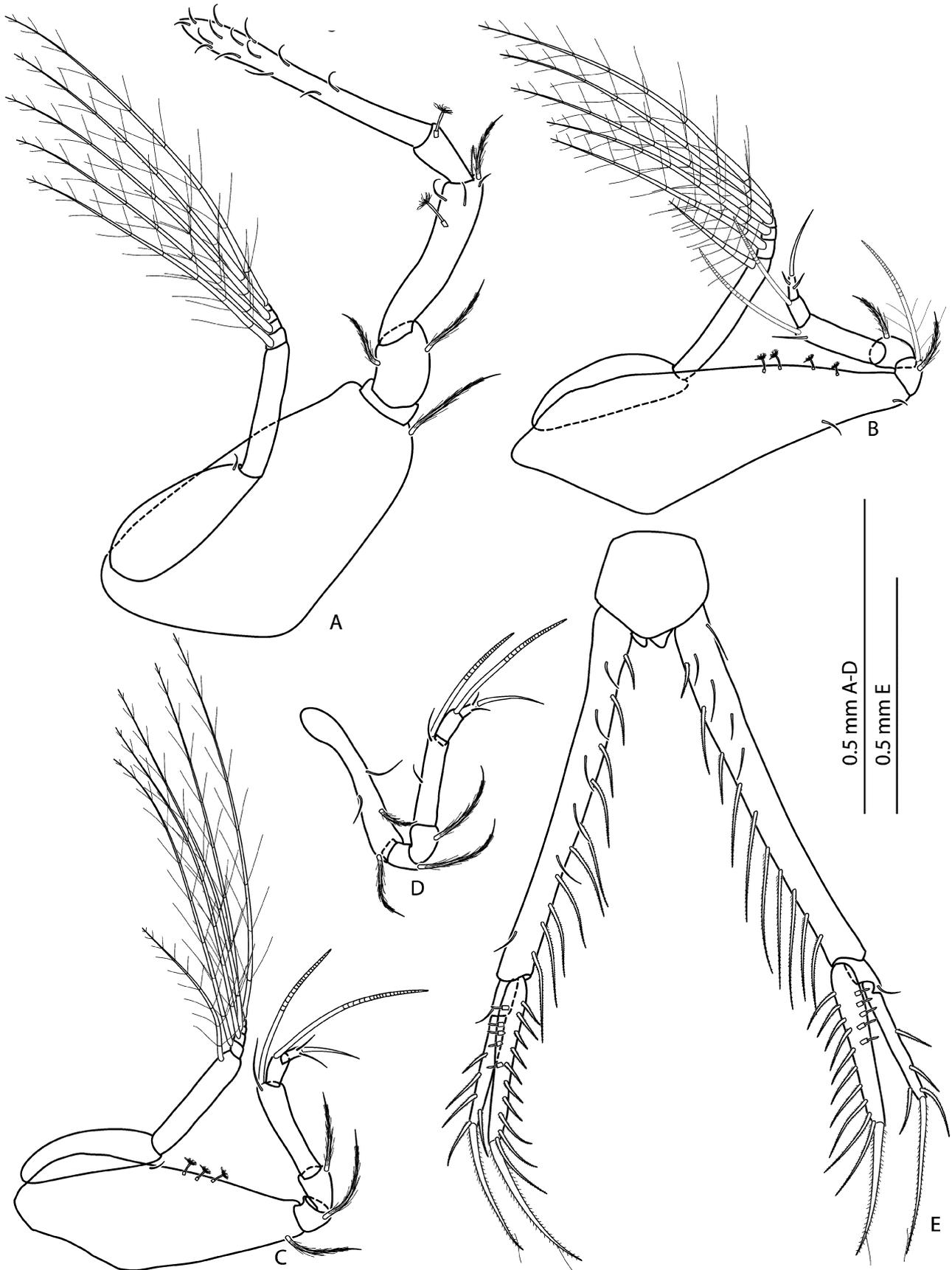
**FIGURE 16.** *Campylaspis apheles* n. sp. Holotype subadult female, NIWA 80673. A, side view. Paratype subadult female, NIWA 80674. B, dorsal view; C, antennule; D, mandibles; E, maxillules; F, maxilliped 1; G, maxilliped 2; H, maxilliped 3; I, pereopod 1.



**FIGURE 17.** *Campylaspis apheles* n. sp. Paratype subadult female, NIWA 80674. A, pereopod 2; B, pereopod 3; C, pereopod 4; D, pereopod 5; E, pleonite 6 and uropods.



**FIGURE 18.** *Campylaspis apheles* n. sp. Paratype adult male, NIWA 80675. A, dorsal view; B, side view; C, antennule; D, antenna; E, maxilliped 3; F, pereopod 1.



**FIGURE 19.** *Campylaspis apheles* n. sp. Paratype adult male, NIWA 80675. A, pereopod 2; B, pereopod 3; C, pereopod 4; D, pereopod 5; E, pleonite 6 and uropods.

Pereopod 2 basis 0.5 times length of all other articles together, with pappose seta; ischium 0.03 times basis length, unarmed; merus 6 times ischium length, with 2 pappose setae; carpus 2.9 times merus length, with 3 simple, 1 pappose, 1 microserrate and 1 complex pedunculate setae; propodus 0.3 times carpus length, with complex pedunculate seta; dactylus 4.9 times propodus length, with 14 simple setae, no terminal seta; exopod 1.2 times basis length, basal article with simple seta, flagellum with plumo-annulate setae (Figure 19A).

Pereopod 3 basis 2.3 times length of all other articles together, with 2 simple and 4 complex pedunculate setae; ischium 0.06 times basis length, with 1 pappose and 1 plumo-annulate setae; merus equal to ischium length, with pappose seta; carpus 3.2 times merus length, with 1 simple and 1 annulate setae; propodus 0.3 times carpus length, with annulate seta; dactylus equal to propodus length, with 3 setae terminally; exopod equal to basis length, basal article unarmed, flagellum with plumo-annulate setae (Figure 19B).

Pereopod 4 basis 1.4 times length of all other articles together, with 1 simple, 1 pappose and 3 complex pedunculate setae; ischium 0.07 times basis length, with pappose seta; merus 1.8 times ischium length, with pappose seta; carpus 2.7 times merus length, with 1 simple and 1 annulate setae; propodus 0.3 times carpus length, with annulate seta; dactylus 0.8 times propodus length, with 3 setae terminally; exopod equal to basis length, basal article unarmed, flagellum with plumo-annulate setae (Figure 19C).

Pereopod 5 basis 0.8 times length of all other articles together, with 2 simple and 2 pappose setae; ischium 0.1 times basis length, with pappose seta; merus 1.8 times ischium length, with pappose seta; carpus 2.4 times merus length, with 2 simple and 1 annulate setae; propodus 0.4 times carpus length, with annulate seta; dactylus 0/7 times propodus length, with 3 setae terminally (Figure 19D).

Uropod peduncles 3.6 times pleonite 6 length, with 10 microserrate and 4–5 simple setae medially, 0–1 simple seta laterally. Uropod endopod uniarticulate, 0.4 times peduncle length, with 10 microserrate setae medially, 5 pedunculate setae laterally, terminal seta microserrate with single subterminal setule. Uropod exopod 0.9 times length of endopod; article 1 0.3 times article 2 length, with simple seta; article 2 with 4–5 microserrate setae, terminal seta microserrate with single subterminal setule (Figure 19E).

**Etymology.** The name is from the Greek *apheles*, meaning smooth or simple, in reference to the smooth, untextured and unornamented carapace.

**Remarks.** *Campylaspis apheles* is most similar to *C. rufus*, but *C. rufus* is larger, covered in red chromatophores, and has shorter, more robust uropods. In addition, *C. apheles* is unique in the New Zealand *Campylaspis* fauna in possessing an unusual dactylus on pereopod 2, which is very long and robust with short setae and no terminal seta. In comparison, all other species of *Campylaspis* and *Campylaspenis* from New Zealand waters have the typical dactylus on pereopod 2, shorter and with long setae, including a long terminal seta.

### ***Campylaspis bituberculata* n. sp.**

Figures 20–21

**Type material.** Holotype ovigerous female, dissected, NIWA 80651, 43.8363°S, 176.7092°E–43.8330°S, 176.7127°E, 478–479 m, 5 April 2007. Paratype subadult male, dissected, NIWA 80652, 43.5300°S, 178.5048°E–43.5363°S, 178.5118°E, 346 m, 24 April 2007.

**Other material examined.** 1 subadult female, NIWA 79295, 44.1208°S, 174.8432°E–44.1242°S, 174.8448°E, 512–513 m, 4 April 2007. 1 subadult male, NIWA 79294, 43.8363°S, 176.7092°E–43.8330°S, 176.7127°E, 478–479 m, 5 April 2007. 1 manca, NIWA 79296, 42.6213°S, 175.9225°E–42.6203°S, 175.9335°E, 1194–1199 m, 26 April 2007. 1 subadult female, 1 manca, NIWA 79297, 43.7967°S, 175.3158°E–43.8045°S, 175.3148°E, 418–422 m, 27 April 2007. 2 mancae, NIWA 79298, 40.8800°S, 170.8555°E–40.8883°S, 170.8565°E, 529–534 m, 6 June 2007.

**Diagnosis.** *Females and subadult males.* Carapace textured, with sulcus not bounded by carinae, large tubercles at posterior corners of frontal lobe, no other tubercles present on carapace; pseudorostrum not dorsally directed. Carapace, pereonites and pleonites with scattered red chromatophores. Pereonites 1–2 not free dorsally. Pereopod 2 dactylus normal, terminal seta long. Uropod peduncles 1.8 times length of pleonite 6. *Male.* Adult unknown.

### **Description of female.**

Holotype ovigerous female, 4.0 mm, NIWA 80651. Carapace textured, with sulcus not bounded by carinae, large tubercles at posterior corners of frontal lobe, no other tubercles present on carapace; pseudorostral lobes 0.3

times carapace length; eyelobe 0.05 times carapace length, without lenses; carapace overhanging pereonites 1–3, pereonite 1 not visible, pereonite 2 only visible laterally. Carapace, pereonites, pereopods and pleonites with scattered red chromatophores (Figures 20A–B).

Antennule peduncle article 1 equal to article 2 length, with 4 simple and 2 pedunculate setae; article 2 equal to article 1 length, with 2 simple setae; article 3 0.8 times article 2 length, with pedunculate seta; main flagellum of 3 articles, with 2 aesthetascs and pedunculate seta; accessory flagellum of 1 article, with 3 pedunculate setae (Figure 20D).

Maxilliped 2 basis equal to length of all other articles together, unarmed; ischium absent; merus 0.3 times basis length, with 2 plumose setae; carpus 0.5 times merus length, with 4 plumose setae; propodus 1.6 times carpus length, with large seta distally; dactylus 1.3 times propodus length, produced as 3 teeth terminally, central tooth short, outer pair equal in length (Figure 20H).

Maxilliped 3 basis 1.2 times length of all other articles together, with plumose seta medially, 1 plumose and 1 simple setae at distal corner, medial margin serrate; ischium 0.07 times basis length, unarmed; merus 3.6 times ischium length, with 6 simple setae medially, plumose seta laterally, lateral margin distal corner produced as tooth, medial margin distal corner produced as tooth; carpus 0.7 times merus length, with 4 simple and 1 plumose setae medially, plumose seta laterally, medial margin lined with fine hair-like setae; propodus equal to carpus length, with 2 plumose setae medially and plumose seta laterally, medial margin lined with fine hair-like setae; dactylus 0.5 times propodus length, with 3 microserrate setae terminally; exopod 0.9 times basis length, basal article unarmed, flagellum with plumo-annulate setae (Figure 20I).

Pereopod 1 basis 1.1 times length of all other articles together, with 2 simple and 1 plumose setae, distal corner produced as strong tooth; ischium 0.04 times basis length, unarmed; merus 7.3 times ischium length, with 6 simple and 1 plumose setae; carpus 0.8 times merus length, with 4 simple setae; propodus 0.8 times carpus length, with 4 simple setae; dactylus 0.7 times propodus length, with simple seta and 6 simple setae terminally; exopod equal to basis length, basal article with 2 simple setae, flagellum with plumo-annulate setae (Figure 21A).

Pereopod 2 basis 0.5 times length of all other articles together, with simple seta; ischium 0.07 times basis length, unarmed; merus 5.3 times ischium length, with 2 simple and 1 plumose setae; carpus 1.9 times merus length, with 6 simple setae; propodus 0.3 times carpus length, with complex pedunculate seta; dactylus 4.1 times propodus length, with 6 simple and 3 plumose setae and 2 plumose setae terminally; exopod 1.5 times basis length, basal article with 2 simple setae, flagellum with plumo-annulate setae (Figure 21B).

Pereopod 3 basis 1.4 times length of all other articles together, with 2 simple setae; ischium 0.1 times basis length, with plumose seta; merus equal to ischium length, with plumose seta; carpus 2.4 times merus length, with 1 simple, 1 plumose and 1 annulate setae; propodus 0.4 times carpus length, with 1 annulate and 1 complex pedunculate setae; dactylus 0.6 times propodus length, with 2 simple setae terminally (Figure 21C).

Pereopod 4 basis 1.2 times length of all other articles together, with 4 simple setae; ischium 0.08 times basis length, with simple seta; merus 2.3 times ischium length, with 2 simple setae; carpus 2.0 times merus length, with 1 plumose and 1 annulate setae; propodus 0.4 times carpus length, with 1 annulate and 1 pedunculate setae; dactylus 0.4 times propodus length, with 3 simple setae terminally (Figure 21D).

Pereopod 5 basis 0.6 times length of all other articles together, with 2 simple setae; ischium 0.3 times basis length, with simple seta; merus 1.3 times ischium length, with simple seta; carpus 1.9 times merus length, with 1 plumose and 1 annulate setae; propodus 0.4 times carpus length, with annulate seta; dactylus 0.5 times propodus length, with 3 simple setae terminally (Figure 21E).

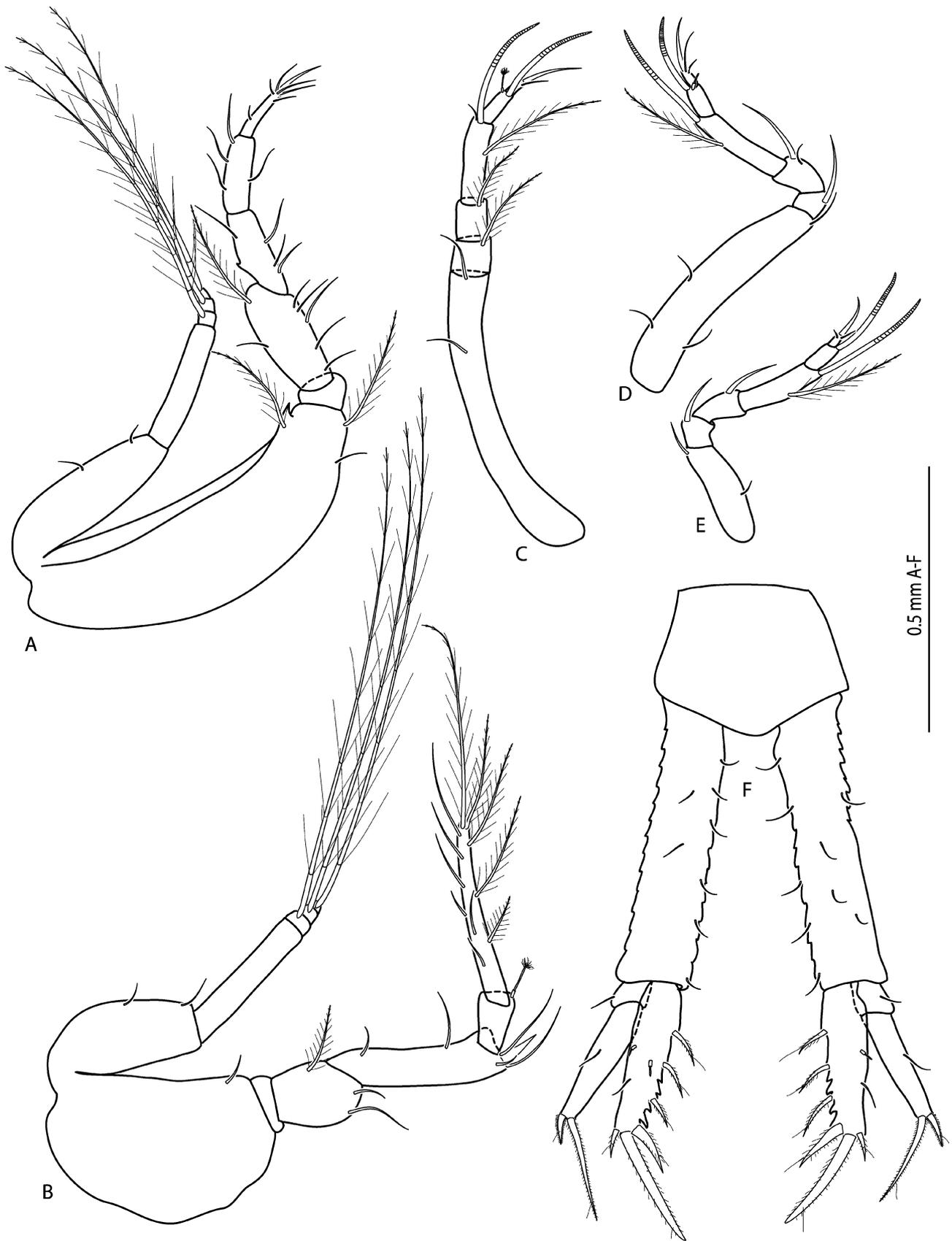
Uropod peduncles 1.8 times pleonite 6 length, with 8–9 simple setae, margins serrate. Uropod endopod uniaarticulate, 0.5 times peduncle length, with 4 microserrate setae with single subterminal setules medially, 1 simple, 1–2 pedunculate and 1 microserrate with single subterminal setule setae laterally, terminal seta microserrate with single subterminal setule. Uropod exopod of 2 articles, equal to length of endopod; article 1 0.2 times article 2 length, with simple seta; article 2 with 1 simple and 1 microserrate with single subterminal setule setae laterally, terminal seta microserrate with single subterminal setule (Figure 21F).

### **Description of juvenile male.**

Paratype juvenile male, 2.0 mm, NIWA 80652. Carapace textured, with sulcus not bounded by carinae, large tubercles at posterior corners of frontal lobe, no other tubercles present on carapace; pseudorostral lobes 0.3 times carapace length; eyelobe 0.08 times carapace length, without lenses; carapace overhanging pereonites 1–3. Carapace, pereonites, pereopods and pleonites with scattered red chromatophores (Figure 20C).



**FIGURE 20.** *Campylaspis bituberculata* n. sp. Holotype subadult female, NIWA 80651. A, side view; B, dorsal view; D, antenna; H, maxilliped 2; I, maxilliped 3. Paratype subadult male, NIWA 80652. E, mandibles; F, maxillule; G, maxilla.



**FIGURE 21.** *Campylaspis bituberculata* n. sp. Holotype subadult female, NIWA 80651. A, pereopod 1; B, pereopod 2, C, pereopod 3; D, pereopod 4; E, pereopod 5; F, pleonite 6 and uropods.

Mandible truncate, with 4–5 microserrate setae medially, lacinia mobilis with 4 cusps (Figure 20E).

Maxillule with 2 endites; outer endite with 5 simple and 3 dentate setae terminally, simple seta on margin; inner endite with 3 simple, 2 microserrate and 1 dentate setae; palp with 2 microserrate setae (Figure 20F).

Maxilla reduced to single endite with 5 simple setae terminally (Figure 20G).

**Etymology.** The species is named *bituberculata* in reference to the pair of large tubercles found at the corners of the frontal lobe, where the pseudorostral lobes begin.

**Remarks.** This species is most similar to *Campylaspis zealandiaensis*, which also possesses one pair of large tubercles dorsally. However, in *C. zealandiaensis* the large tubercles are not at the corners of the frontal lobe, they are lateral to the frontal lobe/ pseudorostral suture. Also, in *C. zealandiaensis* the carapace is much more sculptured than in *C. bituberculata*, with a distinct deep sulcus and a pair of posterior carinae. In comparison, *C. bituberculata* has a weak sulcus, and no posterior carinae.

The holotype was the only mature specimen of this species observed, all other specimens were much smaller juveniles.

### ***Campylaspis hatchae* n. sp.**

Figures 22–25

**Type material.** Holotype subadult female, NIWA 80702, paratype subadult female, dissected, NIWA 80703, paratype adult male, dissected, NIWA 80683, 44.4862°S, 177.1413°E–44.4841°S, 177.1416°E, 1235–1239 m, 6 April 2007.

**Other material examined.** 3 subadult females, NIWA 79343, 44.4862°S, 177.1413°E–44.4841°S, 177.1416°E, 1235–1239 m, 6 April 2007. 1 subadult, NIWA 79344, 44.1208°S, 174.8432°E–44.1242°S, 174.8448°E, 512–513 m, 4 April 2007.

**Diagnosis.** *Females and subadult males.* Carapace with sulcus, not bounded by carinae, with scattered tubercles and small spines, with medial carina dorsally on posterior part of carapace; pseudorostrum not dorsally directed. Carapace, pereonites and pleonites without red chromatophores. Pereonites 2–5 free, with spines dorsally. Pereopod 2 dactylus normal, terminal plumose seta long. Uropod peduncles 2.3 times length of pleonite 6. *Male.* Carapace without tubercles, less vaulted than in female, with red scattered red chromatophores on carapace, pereon and pleon. Uropod peduncles 3.6 times pleonite 6 length, more setose than in female.

#### **Description of female.**

Holotype subadult female, 4.5 mm, NIWA 80702. Paratype subadult female, 4.0 mm, NIWA 80703. Carapace with sulcus, not bounded by carinae, with scattered tubercles and small spines; pseudorostral lobes 0.3 times carapace length; eyelobe 0.03 times carapace length, without lenses; pereonites 2–5 free, with spines dorsally (Figures 22A–B).

Antennule peduncle article 1 longest, unarmed; article 2 0.7 times length of article 1, unarmed; article 3 0.9 times article 2 length, unarmed; main flagellum broken; accessory flagellum of 1 article, with 2 simple and 2 complex pedunculate setae (Figure 22C).

Mandible truncate, with 4 microserrate setae medially, lacinia mobilis with 2 cusps (Figure 22D).

Maxillule with 2 endites; outer endite with double row of stout simple setae; inner endite with 1 simple, 2 microserrate and 1 dentate setae; palp with 2 microserrate setae (Figure 22E).

Maxilla reduced to single endite, with 7 simple setae (Figure 22F).

Maxilliped 1 basis with plumose seta; merocarpus with 5 simple and 1 plumose setae, lateral margin lined with fine hair-like setae; dactylus with 2 simple setae terminally (Figure 22G).

Maxilliped 2 basis 0.8 times length of all other articles together, medial distal corner with unusual club like sensory organ; ischium absent; merus 0.3 times basis length, with plumose seta; carpus 1.2 times merus length, with plumose seta, medial margin produced as tooth; propodus 0.9 times carpus length, with plumose seta, distal corner produced as projections; dactylus 0.9 times propodus length, produced as 3 teeth terminally, central tooth short, outer pair equal in length (Figure 22H).

Maxilliped 3 basis 0.7 times length of all other articles together, with 2 plumose setae medially, distal corner with 2 plumose setae, medial margin produced as tooth distally and lined with fine hair-like setae; ischium 0.1

times basis length, unarmed; merus 5.8 times ischium length, with 5 plumose setae medially, plumose seta laterally, lateral margin produced as tooth distally; carpus 0.4 times merus length, with 3 simple and 2 plumose setae medially, plumose seta laterally medial margin serrate and lined with fine hair-like setae, lateral margin produced as tooth; propodus 0.9 times carpus length, with 2 plumose setae medially, plumose seta laterally; dactylus 0.9 times propodus length, with 3 simple setae terminally; exopod equal to basis length, basal article unarmed, flagellum with plumo-annulate setae (Figure 23A).

Pereopod 1 basis equal to length of all other articles together, with 3 simple and 4 plumose setae; ischium 0.09 times basis length, with plumose seta; merus 3.2 times ischium length, with 3 simple and 1 plumose setae, lateral distal corner produced as tooth; carpus 1.1 times merus length, with 2 simple setae, medial margin produced as 2 teeth proximally, lateral margin serrate; propodus 0.7 times carpus length, with 2 simple and 4 plumose setae; dactylus 0.9 times propodus length, with simple seta and 5 simple setae terminally; exopod 0.8 basis length, basal article with 3 simple setae flagellum with plumo-annulate setae (Figure 23B).

Pereopod 2 basis 0.7 times length of all other articles together, with 2 simple and 1 plumose setae, margins serrate; ischium 0.04 times basis length, unarmed; merus 4.0 times ischium length, with 2 plumose setae; carpus 2.5 times merus length, with 5 simple and 1 plumose setae; propodus 0.4 times carpus length, unarmed; dactylus 5.0 times propodus length, with 4 simple and 3 plumose setae, 4 plumose setae terminally; exopod 1.1 times basis length, basal article with 2 simple setae, flagellum with plumo-annulate setae (Figure 23C).

Pereopod 3 basis 1.5 times length of all other articles together, with 1 simple, 3 plumose and 2 complex pedunculate setae; ischium 0.08 times basis length, with plumo-annulate seta; merus 1.8 times ischium length, with plumo-annulate seta; carpus 2.0 times merus length, with 1 simple, 1 plumose and 1 annulate setae; propodus 0.4 times carpus length, with annulate seta; dactylus 0.5 times propodus length, with 3 simple setae terminally (Figure 23D).

Pereopod 4 basis 1.1 times length of all other articles together, with 6 simple and 2 complex pedunculate setae; ischium 0.1 times basis length, with plumose seta; merus 1.6 times ischium length, with annulate seta; carpus 2.4 times merus length, with 1 simple, 1 plumose and 1 annulate setae; propodus 0.4 times carpus length, with annulate seta; dactylus 0.9 times propodus length, with 3 simple setae terminally (Figure 23E).

Pereopod 5 basis 0.6 times length of all other articles together, with 1 simple and 2 complex pedunculate setae; ischium 0.1 times basis length, with plumose seta; merus 3.0 times ischium length, with plumose seta; carpus 2.0 times merus length, with 1 simple, 1 plumose and 1 annulate setae; propodus 0.4 times carpus length, with annulate seta; dactylus 0.6 times propodus length, with 3 simple setae terminally (Figure 23F).

Uropod peduncles 2.3 times pleonite 6 length, with 5–6 simple setae, margins strongly serrate. Uropod endopod uniaarticulate, 0.5 times peduncle length, margins strongly serrate, with 3 simple setae medially, terminal seta simple. Uropod exopod of 2 articles, equal to length of endopod; article 1 0.3 times article 2 length, unarmed; article 2 with 0–1 simple seta, terminal seta with single subterminal setule (Figure 23G).

#### **Description of male.**

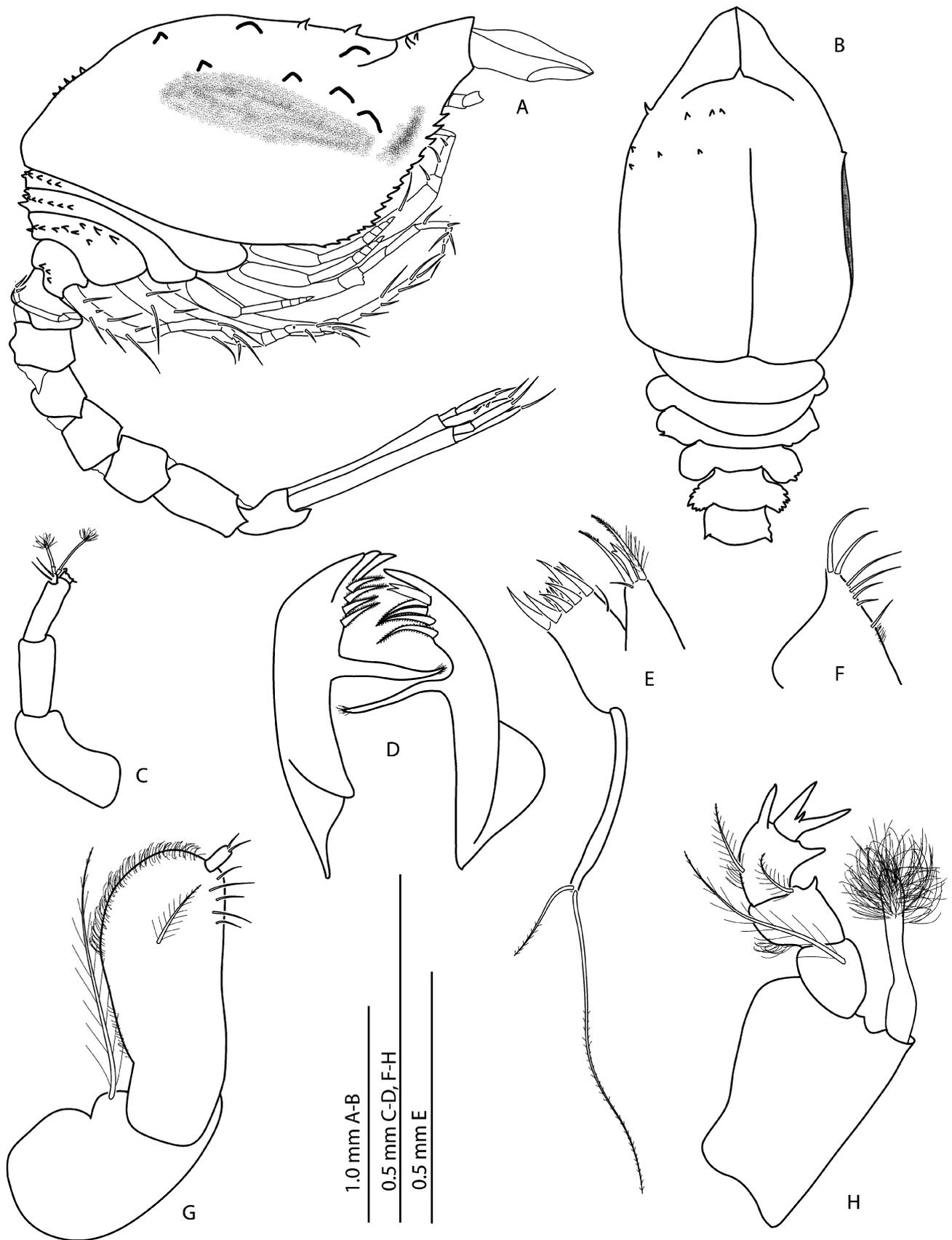
Paratype adult male, 3.8 mm, NIWA 80683. Carapace with weak sulcus, not bounded by carinae, with scattered weak tubercles and no spines; pseudorostral lobes 0.3 times carapace length; eyelobe absent. Pereonites 2–5 free, pereonite 3 with pair of spines dorsally. Carapace, pereonites and pleonites with scattered red chromatophores (Figures 24A–B).

Antennule peduncle article 1 longest, margin lined with fine hair-like setae; article 2 0.6 times article 1 length, with pedunculate seta; article 3 0.8 times article 2 length, with pedunculate seta; main flagellum of 2 articles, with 2 aethetascas, 3 simple and 1 pedunculate setae; accessory flagellum of 1 article, with 3 simple setae (Figure 24C).

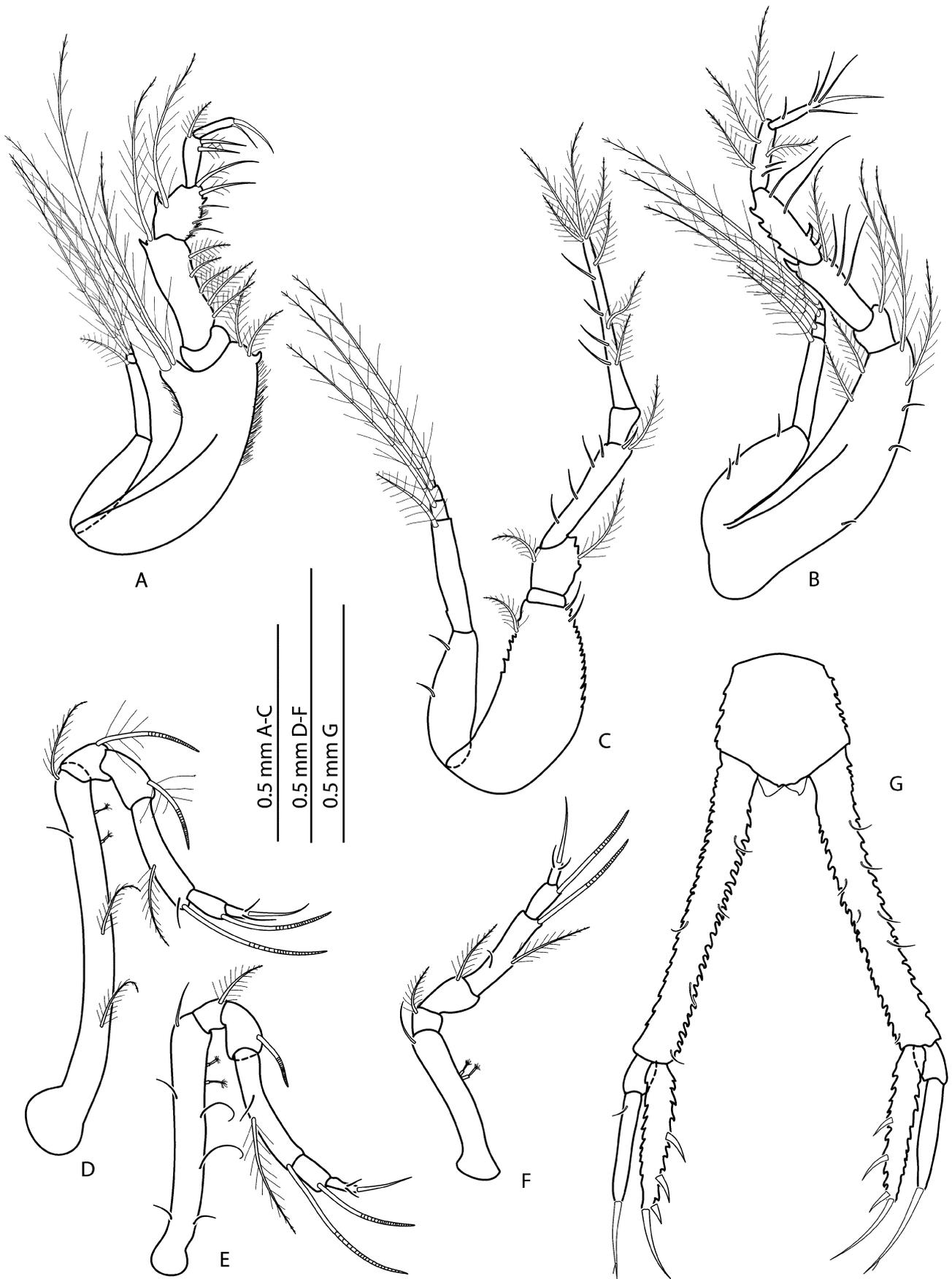
Antenna not extending to posterior border of carapace; peduncle of 5 articles; articles 4–5 very setose, with ranks of setae incompletely circling articles; flagellum with 15 articles, each with 3–4 setae (Figure 24D)

Maxilliped 1 basis with 3 simple setae; merocarpus with 4 simple setae and margins lined with fine hair-like setae; dactylus with 2 simple setae terminally (Figure 24E).

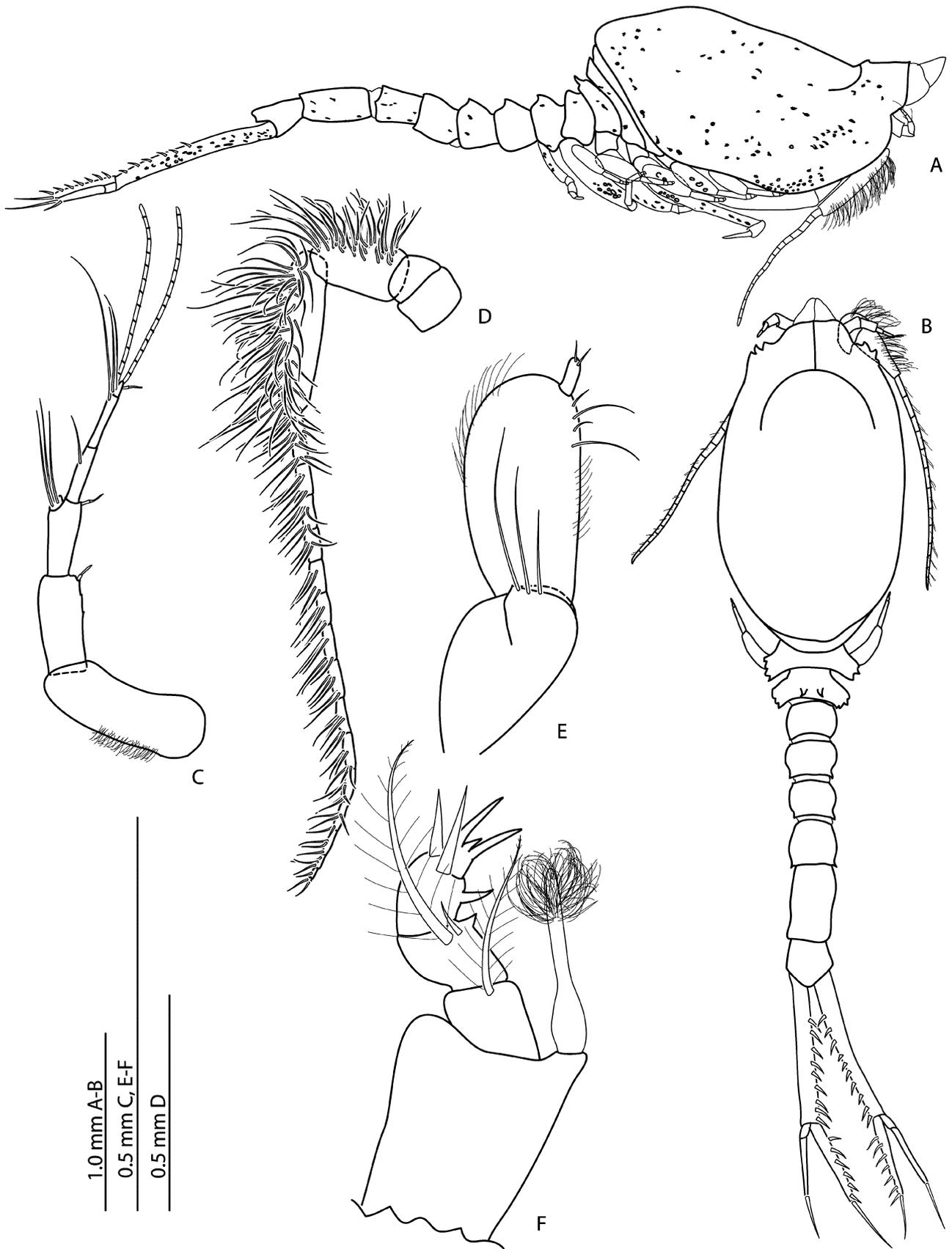
Maxilliped 2 basis with unusual club like sensory organ at distal medial corner, ischium absent; merus with plumose seta; carpus equal to merus length, with 1 simple and 1 plumose setae, medial margin produced as strong tooth; propodus 1.2 times carpus length, with 2 stout setae distally, medial margin produced as strong tooth; dactylus equal to propodus length, produced as 33 teeth terminally, central tooth short, outer pair equal in length (Figure 24F).



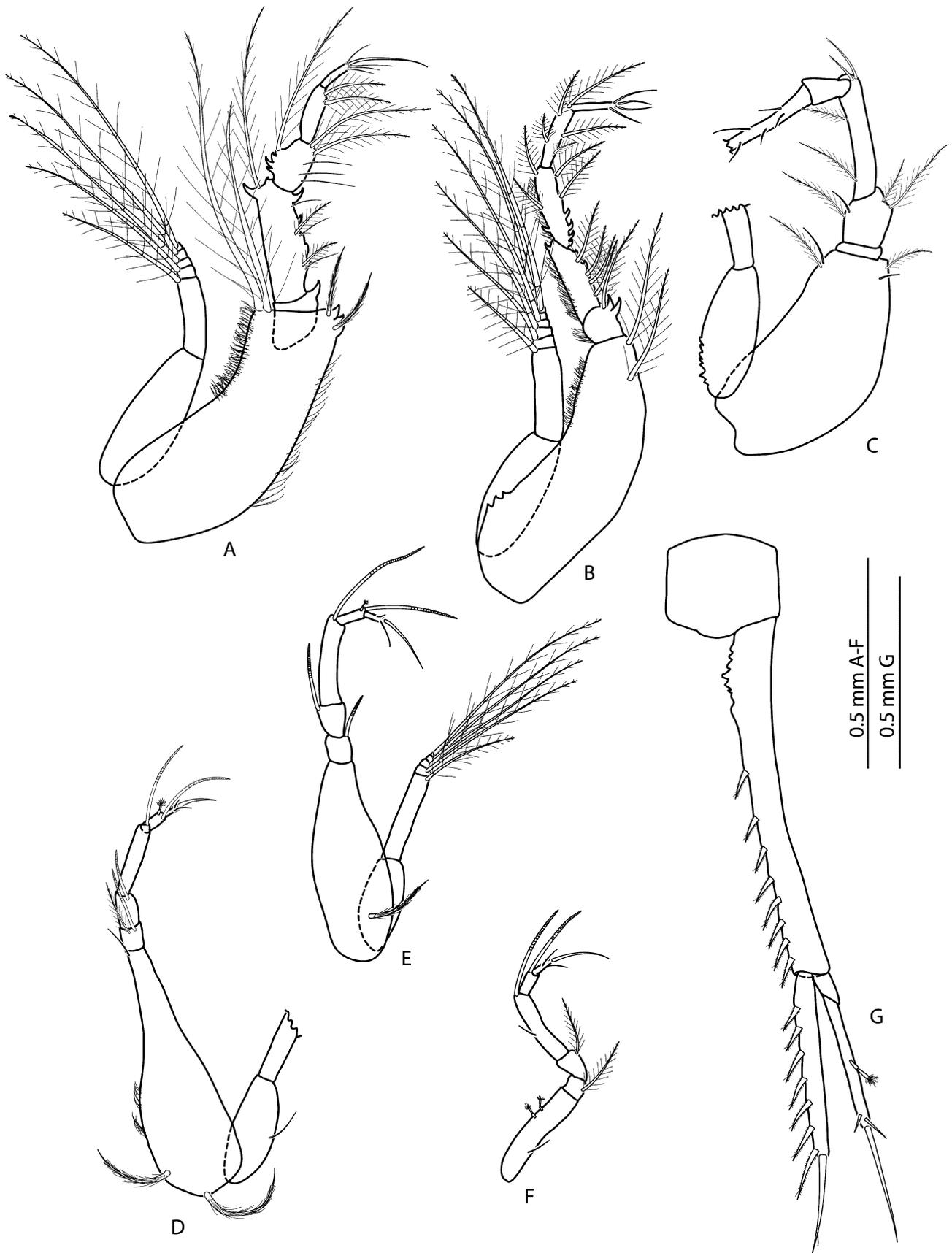
**FIGURE 22.** *Campylaspis hatchae* n. sp. Holotype subadult female, NIWA 80702. A, side view. Paratype subadult female, NIWA 80703. B, dorsal view; C, antennule; D, mandibles; E, maxillule; F, maxilla; G, maxilliped 1; h, maxilliped 2.



**FIGURE 23.** *Campylaspis hatchae* n. sp. Paratype subadult female, NIWA 80703. A, maxilliped 3; B, pereopod 1; C, pereopod 2; D, pereopod 3; E, pereopod 4; F, pereopod 5; G, pleonite 6 and uropods.



**FIGURE 24.** *Campylaspis hatchae* n. sp. Paratype adult male, NIWA 80683. A, side view; B, dorsal view; C, antennule; D, antenna; E, maxilliped 1; F, maxilliped 2.



**FIGURE 25.** *Campylaspis hatchae* n. sp. Paratype adult male, NIWA 80683. A, maxilliped 3; B, pereopod 1; C, pereopod 2; D, pereopod 3; E, pereopod 4; F, pereopod 5; G, pleonite 6 and uropods.

Maxilliped 3 basis equal to length of all other articles together, with 2 pappose setae medially, distal corner with 2 plumose setae, medial corner produced as 3 teeth; ischium 0.04 times basis length, medial margin produced as strong tooth; merus 11.5 times ischium length, with 3 simple and 2 plumose setae medially, plumose seta laterally, medial and lateral distal corners each produced as strong tooth; carpus 0.4 times merus length, with 3 simple and 2 plumose setae medially, plumose seta laterally, lateral margin serrate; propodus 1.2 times carpus length, with 2 plumose setae; dactylus 0.5 times propodus length, with 5 simple setae terminally; exopod 0.9 times basis length, basal article unarmed, flagellum with plumo-annulate setae (Figure 25A).

Pereopod 1 basis 0.9 times length of all other articles together, with 2 plumose setae, margin lined with fine hair-like setae; ischium 0.1 times basis length, with plumose seta, medial margin produced as 2 strong teeth; merus 2.0 times ischium length, with 4 plumose setae, distal lateral corner produced as tooth; carpus 1.1 times merus length, with 4 plumose setae, margins with strong teeth; propodus 0.9 times carpus length, with 5 plumose setae; dactylus 0.7 times propodus length, with 4 simple setae terminally; exopod 0.9 times basis length, basal article unarmed, flagellum with plumo-annulate setae (Figure 25B).

Pereopod 2 basis shorter than all other articles together, with 2 simple and 2 plumose setae; ischium 0.05 times basis length, unarmed; merus 4.5 times ischium length, with 1 simple and 3 plumose setae; carpus 2.3 times merus length, with 2 microserrate and 2 plumose setae; propodus 0.4 times carpus length, unarmed; dactylus broken; exopod broken (Figure 25C).

Pereopod 3 basis 1.6 times length of all other articles together, with 1 simple and 2 pappose setae; ischium 0.08 times basis length, with 1 plumose and 1 annulate setae; merus 1.5 times ischium length, with annulate seta; carpus 2.5 times merus length, with annulate seta; propodus 0.3 times carpus length, with 1 annulate and 1 complex pedunculate setae; dactylus 0.8 times propodus length, with 3 simple setae terminally; exopod broken (Figure 25D).

Pereopod 4 basis 1.1 times length of all other articles together, with pappose seta; ischium 0.1 times basis length, with annulate seta; merus 1.2 times ischium length, with annulate seta; carpus 2.7 times merus length, with annulate seta; propodus 0.3 times carpus length, with 1 annulate and 1 complex pedunculate setae; dactylus 0.8 times propodus length, with 3 simple setae terminally; exopod 1.1 times basis length, basal article unarmed, flagellum with plumo-annulate setae (Figure 25E).

Pereopod 5 basis 0.7 times length of all other articles together, with 1 simple and 2 complex pedunculate setae; ischium 0.1 times basis length, with plumose seta; merus 1.7 times ischium length, with plumose seta; carpus 2.8 times merus length, with 1 simple and 1 annulate setae; propodus 0.3 times carpus length, with annulate seta; dactylus equal to propodus length, 3 simple terminally (Figure 25F).

Uropod peduncles 3.6 times pleonite 6 length, with 8 microserrate setae with single subterminal setules medially, margin serrate proximally. Uropod endopod uniarticulate, 0.5 times peduncle length; with 7 microserrate setae with single subterminal setules medially, terminal seta simple with single subterminal setule. Uropod exopod 0.7 times length of endopod; article 1 0.2 times article 2 length, unarmed; article 2 with 2 simple and 1 complex pedunculate setae, terminal seta simple (Figure 25G).

**Etymology.** The species is named for Martha Hatch upon her retirement from the University of Alaska Anchorage in recognition of her tireless efforts to improve research and science teaching at the University.

**Remarks.** *Campylaspis hatchae* is most similar to *C. millsae* and *C. sculptaspinosa*, in that all three species have a sulcus and at least some spines dorsally on the carapace. However, *C. hatchae* has a weak sulcus, not bounded by carinae, and few spines dorsally on the carapace along with a few tubercles. *Campylaspis millsae* has a deep sulcus bounded by carinae, along with a pair of enlarged tubercles near the frontal lobe/ pseudorostral suture. *Campylaspis sculptaspinosa* also has a deep sulcus bounded by carinae and many spines all over the carapace. In addition, *C. hatchae* is unique among the New Zealand *Campylaspis* in possessing an unusual sensory organ on the basis of maxilliped 2, similar to *C. selvakumarani* (Băcescu & Muradian 1974).

### ***Campylaspis macrosulcata* n. sp.**

Figures 26–27

**Type material.** Holotype subadult female, NIWA 80699, paratype subadult female, dissected, NIWA 80700, 44.4862°S, 177.1413°E–44.4841°S, 177.1416°E, 1235–1239 m, 6 April 2007.

**Other material examined.** 1 subadult male, 1 manca, NIWA 79345, 44.4862°S, 177.1413°E–44.4841°S, 177.1416°E, 1235–1239 m, 6 April 2007. 8 subadult females, 10 mancae, NIWA 79346, 44.4862°S, 177.1413°E–44.4841°S, 177.1416°E, 1235–1239 m, 6 April 2007. 6 juveniles, NIWA 79347, 44.4862°S, 177.1413°E–44.4841°S, 177.1416°E, 1235–1239 m, 6 April 2007. 3 juveniles, NIWA 79348, 44.0162°S, 178.5210°E–44.0143°S, 178.5175°E, 769–771 m, 7 April 2007. 1 subadult male, 1 manca, NIWA 79349, 43.9790°S, 179.6298°E–43.9850°S, 179.6218°E, 529–530 m, 9 April 2007. 1 subadult female, 1 subadult male, 5 mancae, NIWA 79350, 43.9790°S, 179.6298°E–43.9850°S, 179.6218°E, 529–530 m, 9 April 2007. 2 subadult females, NIWA 79351, 44.5607°S, 178.4762°W–44.5592°S, 178.4830°W, 1076–1103 m, 10 April 2007. 1 subadult female, 1 subadult male, NIWA 79352, 42.6213°S, 175.9225°E–42.6203°S, 175.9335°E, 1194–1199 m, 26 April 2007. 3 subadult females, 1 subadult male, 3 juveniles, NIWA 79353, 40.1277°S, 170.2140°E–40.1352°S, 170.2090°E, 803–805 m, 5 June 2007. 2 mancae, NIWA 79354, 40.8800°S, 170.8555°E–40.8883°S, 170.8565°E, 529–534 m, 6 June 2007.

**Diagnosis.** *Females and subadult males.* Carapace with deep sulcus, bounded by strong carinae, dorsal carina bordering sulcus beginning on pseudorostral lobe, proceeding posteriorly and making continuous curve to other pseudorostral lobe, ventral carina bordering sulcus beginning very near anterior point of dorsal carina, proceeding ventrally and posteriorly, also continuous around carapace to other pseudorostral lobe; pseudorostrum not dorsally directed. Carapace, pereonites and pleonites with scattered red chromatophores. Pereonite 1 free only dorsally. Pereopod 2 dactylus normal, terminal seta long. Uropod peduncles 2.5 times length of pleonite 6. *Male.* Adult unknown.

#### **Description of female.**

Holotype subadult female, 7.4 mm, NIWA 80699. Paratype subadult female, 6.5 mm, NIWA 80700. Carapace with deep sulcus, bounded by strong carinae, dorsal carina bordering sulcus beginning on pseudorostral lobe, proceeding posteriorly and making continuous curve to other pseudorostral lobe, ventral carina bordering sulcus beginning very near anterior point of dorsal carina, proceeding ventrally and posteriorly, also continuous around carapace to other pseudorostral lobe; pseudorostrum not dorsally directed; pseudorostral lobes 0.2 times carapace length; eyelobe 0.04 times carapace length; carapace longer than pereonites and pleonites together; pereonite 1 free only dorsally (Figures 26A–B).

Antennule peduncle article 1 longest, unarmed; article 2 0.9 times article 1 length, with 3 complex pedunculate setae; article 3 0.7 times article 2 length, with complex pedunculate seta; main flagellum of 3 articles, with 1 simple and 1 complex pedunculate setae, broken; accessory flagellum of 1 article, with 3 complex pedunculate setae (Figure 26C).

Mandible truncate, with 4 microserrate setae medially, lacinia mobilis with 2 cusps (Figure 26D).

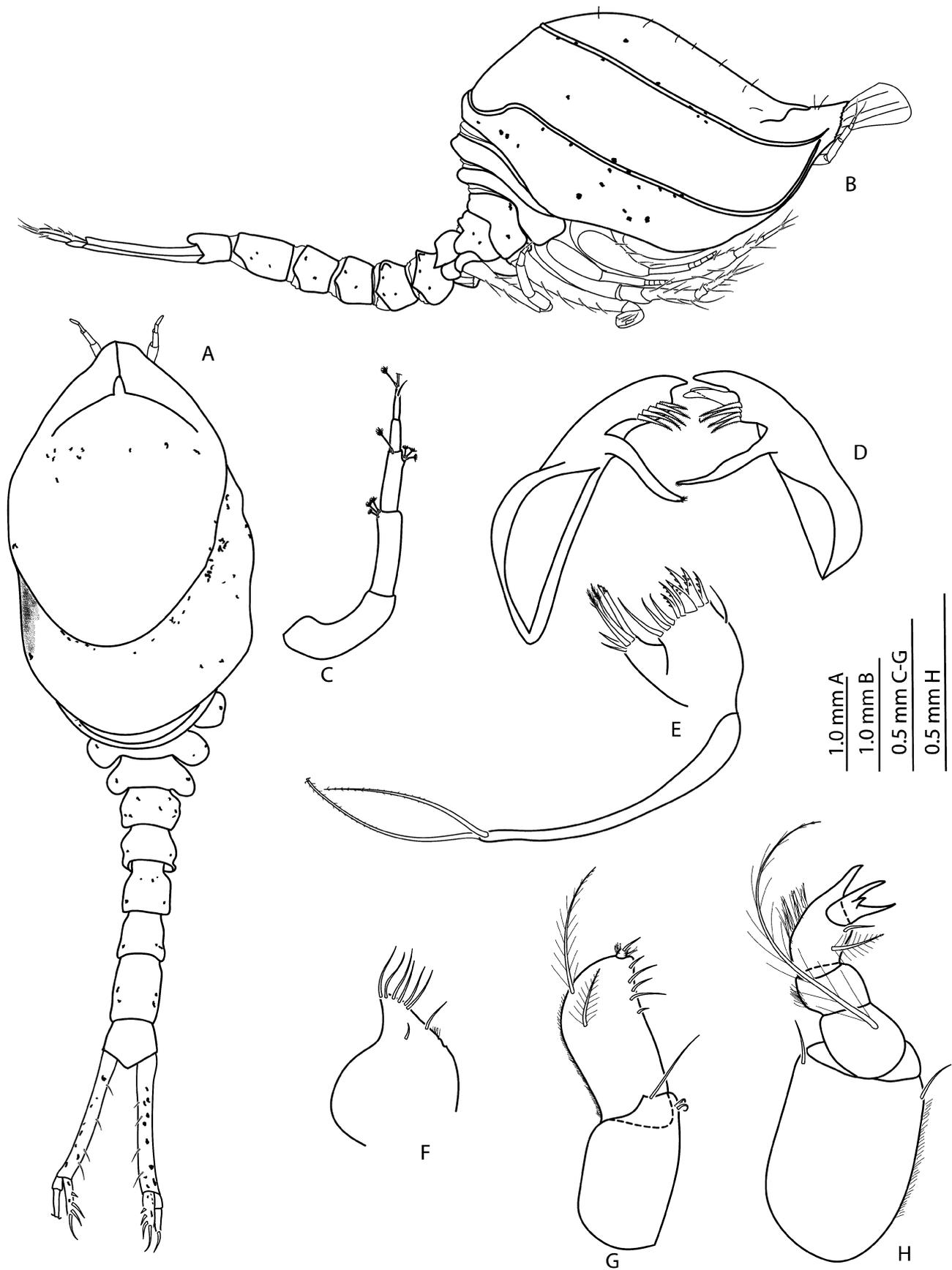
Maxillule with 2 endites; outer endite very broad, with 3 simple and 6 dentate setae terminally, simple seta marginally; inner endite with 2 simple, 2 microserrate and 1 dentate setae; palp with 2 microserrate setae (Figure 26E).

Maxilla reduced to single endite, with 8 simple setae (Figure 26F).

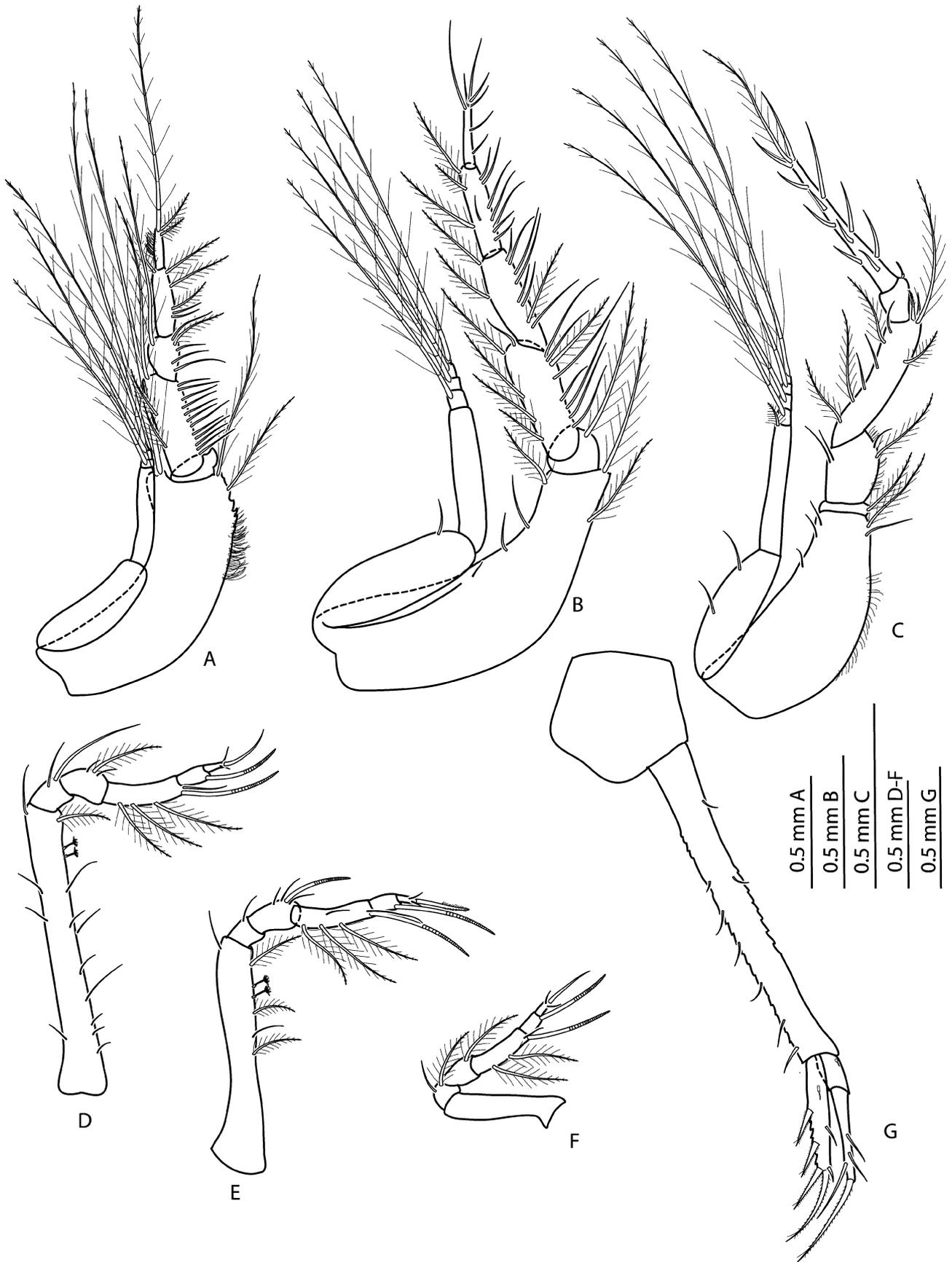
Maxilliped 1 basis with 1 simple and 2 hook setae; ischium absent; merocarpus 1.1 times basis length, with 5 simple and 2 plumose setae, lateral margin lined with fine hair-like setae; dactylus with simple seta, margins lined with fine hair-like setae (Figure 26G).

Maxilliped 2 basis 0.7 times length of all other articles together, with 2 simple setae, medial margin lined with fine hair-like setae; ischium absent; merus 0.4 times basis length, with plumose seta; carpus 0.9 times merus length, with lateral margin lined with fine hair-like setae; propodus 0.8 times carpus length, with 1 simple and 1 plumose setae, lateral margin lined with fine hair-like setae, produced as single finger-like projection terminally; dactylus 1.2 times propodus length, produced as 3 teeth terminally, central tooth short, outer pair long and equal in length (Figure 26H).

Maxilliped 3 basis 1.3 times length of all other articles together, with 2 plumose setae medially, distal corner with 2 plumose setae, medial margin serrate and lined with fine hair-like setae; ischium 0.02 times basis length, produced as large tooth medially; merus 9.0 times ischium length, with 12 simple setae medially and 3 plumose setae laterally; carpus 0.9 times merus length, with 4 simple and 1 plumose setae medially, plumose seta laterally; propodus 1.6 times carpus length, with 2 simple and 3 plumose setae medially, plumose seta laterally; dactylus 0.5 times propodus length, with 3 plumose setae terminally, lateral margin lined with fine hair-like setae; exopod 1.2 times basis length, basal article unarmed, flagellum with plumo-annulate setae (Figure 27A).



**FIGURE 26.** *Campylaspis macrosulcata* n. sp. Holotype subadult female, NIWA 80699. A, dorsal view. Paratype subadult female, NIWA 80700. B, side view; C, antennule; D, mandibles; E, maxillule; F, maxilla; G, maxilliped 1; H, maxilliped 2.



**FIGURE 27.** *Campylaspis macrosulcata* n. sp. Paratype subadult female, NIWA 80700. A, maxilliped 3; B, pereopod 1; C, pereopod 2; D, pereopod 3; E, pereopod 4; F, pereopod 5; G, pleonite 6 and uropod.

Pereopod 1 basis 0.8 times length of all other articles together, with 3 simple and 3 plumose setae; ischium 0.07 times basis length, with plumose seta; merus 5.8 times ischium length, with 8 simple and 5 plumose setae; carpus 0.9 times merus length, with 7 simple and 3 plumose setae; propodus 0.9 times carpus length, with 8 simple and 3 plumose setae; dactylus 0.7 times propodus length, with 5 simple setae terminally, 2 simple setae; exopod 1.2 times basis length, basal article with simple seta, flagellum with plumo-annulate setae (Figure 27B).

Pereopod 2 basis 0.6 times length of all other articles together, with 4 simple and 1 plumose setae, medial margin lined with fine hair-like setae; ischium 0.04 times basis length, with plumose seta; merus 6.0 times ischium length, with 3 simple and 1 plumose setae, medial margin lined with fine hair-like setae; carpus 2.2 times merus length, with 3 simple, 5 plumose and 2 microserrate setae; propodus 0.3 times carpus length, with pedunculate seta; dactylus 4.6 times propodus length, with 12 simple setae and plumose seta terminally; exopod 1.4 times basis length, basal article with 2 simple setae, flagellum with plumo-annulate setae (Figure 27C).

Pereopod 3 basis 1.5 times length of all other articles together, with 12 simple, 1 plumose and 2 complex pedunculate setae; ischium 0.1 times basis length, with 2 simple setae; merus 1.3 times ischium length, with 2 simple and 1 plumose setae; carpus 1.8 times merus length, with 1 simple, 3 plumose and 1 annulate setae; propodus 0.4 times carpus length, with annulate seta; dactylus 0.8 times propodus length, with 3 simple setae terminally (Figure 27D).

Pereopod 4 basis 1.2 times length of all other articles together, with 2 simple, 3 plumose and 2 complex pedunculate setae; ischium 0.09 times basis length, with simple seta; merus 2.0 times ischium length, with 3 simple and 1 annulate setae; carpus 2.0 times merus length, with 1 simple, 3 plumose and 1 annulate setae; propodus 0.4 times carpus length, with annulate seta; dactylus 0.7 times propodus length, with 2 simple and 1 microserrate setae terminally (Figure 27E).

Pereopod 5 basis 0.7 times length of all other articles together, unarmed; ischium 0.2 times basis length, with 1 simple and 1 plumose setae; merus 2.0 times ischium length, with plumose seta; carpus 2.0 times merus length, with 1 simple, 2 plumose and 1 annulate setae; propodus 0.3 times carpus length, with annulate seta; dactylus 0.8 times propodus length, with 3 simple setae terminally (Figure 27F).

Uropod peduncles 2.5 times pleonite 6 length, with 8 simple setae, margins serrate. Uropod endopod uniaarticulate, 0.3 times peduncle length, with 3 microserrate setae with single subterminal setule medially, 2 simple and 1 pedunculate setae laterally, terminal seta microserrate with single subterminal setule. Uropod exopod of 2 articles, 1.1 times length of endopod; article 1 0.4 times article 2 length, with pedunculate seta; article 2 with 3 simple setae, terminal seta microserrate with single subterminal setule (Figure 27G).

**Etymology.** The species is named *macrosulcata* for the large sulcus running around the entire carapace, bounded by distinct carinae.

**Remarks.** The most similar species in New Zealand waters is *Campylaspis microsulcata*, which also has a deep sulcus bounded by carinae. However, *C. microsulcata* is smaller than *C. macrosulcata*, and in *C. macrosulcata* the carinae that bound the sulcus are continuous around the entire carapace with no transverse carinae connecting them. In *C. microsulcata* the carinae that bound the sulcus are joined by a pair of transverse carinae posteriorly.

### ***Campylaspis microsulcata* n. sp.**

Figures 28–29

**Type material.** Holotype ovigerous female, NIWA 80671, paratype ovigerous female, dissected, NIWA 80672, 40.1277°S, 170.2140°E–40.1352°S, 170.2090°E, 803–805 m, 5 June 2007.

**Other material examined.** 6 specimens, NIWA 79307, 43.5212°S, 178.6203°W–43.5228°S, 178.6315°W, 424–425 m, 18 April 2007. 1 ovigerous female, NIWA 79309, 42.6213°S, 175.9225°E–42.6203°S, 175.9335°E, 1194–1199 m, 26 April 2007. 4 subadult females, 1 subadult male, 6 mancae, NIWA 79306, 44.0162°S, 178.5210°E–44.0143°S, 178.5175°E, 769–771 m, 7 April 2007. 2 specimens, NIWA 79306, 44.4862°S, 177.1413°E–44.4841°S, 177.1416°E, 1235–1239 m, 6 April 2007.

**Diagnosis.** *Females and subadult males.* Carapace with distinct deep sulcus, with lateral carinae outlining sulcus with transverse carinae connecting them posteriorly, lateral carinae anterior ends not close, both ventral and dorsal lateral carinae with dorsally directed peak at posterior midline; pseudorostrum weakly dorsally directed.

Carapace, pereonites and pleonites with scattered red chromatophores. Pereonites 1–5 entirely free. Pereopod 2 dactylus normal, terminal seta long. Uropod peduncles 2.4 times length of pleonite 6. *Male*. Adult unknown.

#### **Description of female.**

Holotype ovigerous female, 4.7 mm, NIWA 80671. Paratype ovigerous female, 6.0 mm, NIWA 80672. Carapace with distinct deep sulcus, with lateral carinae outlining sulcus with transverse carinae connecting them posteriorly, lateral carinae anterior ends not close, both ventral and dorsal lateral carinae with dorsally directed peak at posterior midline, anterior margin of carapace serrate; pseudorostrum weakly dorsally directed, pseudorostral lobes 0.3 times length of carapace; eyelobe 0.05 times length of carapace. Pereonites 1–5 free, pereonites 1–2 with bifurcated lappet dorsally. Pleonites rectangular in cross section, not rounded (Figures 28A–B).

Antennule peduncle article 1 longest, with simple seta, margins lined with fine hair-like setae; article 2 0.8 times article 1 length, with 1 simple and 1 complex pedunculate setae; article 3 0.9 times article 2 length, unarmed; main flagellum of 3 articles, with 2 aesthetascs and pedunculate seta; accessory flagellum of 1 article, with 2 simple and 2 complex pedunculate setae (Figure 28C).

Antenna 0.5 times length of peduncle of antennule, of 2 articles, with simple seta terminally (Figure 28D).

Mandible truncate, with 4–5 microserrate setae medially, lacinia mobilis with 4 cusps (Figure 28E).

Maxillule with 2 endites; outer endite broad, with 8 dentate setae; inner endite with 2 simple, 2 microserrate and 1 tricuspid setae; palp with 3 microserrate setae (Figure 28F).

Maxilla reduced to single endite, with 4 simple and 4 single subterminal setule setae (Figure 28G).

Maxilliped 1 basis with 3 simple and 2 hook setae; merocarpus 1.2 times length of basis, with 7 simple and 2 plumose setae, all margins lined with fine hair-like setae; dactylus with simple seta terminally, margins lined with fine hair-like setae (Figure 28H).

Maxilliped 2 basis 0.8 times length of all other articles together, with plumose seta; ischium absent; merus 0.4 times basis length, unarmed; carpus 0.3 times merus length, with pappose seta; propodus 2.8 times carpus length, terminal margin produced as single long projection; dactylus 0.8 times propodus length, produced as 3 teeth, all subequal in length (Figure 28I).

Maxilliped 3 basis 1.2 times length of all other articles together, with plumose seta medially, 1 simple and 2 plumose setae on distal corner, medial margin produced as 4 teeth; ischium 0.02 times basis length, medial margin produced as 2 teeth; merus 18 times ischium length, with 5 simple setae medially, plumose seta laterally; carpus 0.4 times merus length, with plumose seta, medial margin produced as 3 teeth; propodus 1.6 times carpus length, with 1 simple and 2 plumose setae medially, plumose seta laterally, medial margin produced as 3 teeth; dactylus 0.5 times propodus length, with 2 simple setae terminally; exopod equal to basis length, basal article unarmed, flagellum with plumo-annulate setae (Figure 29A).

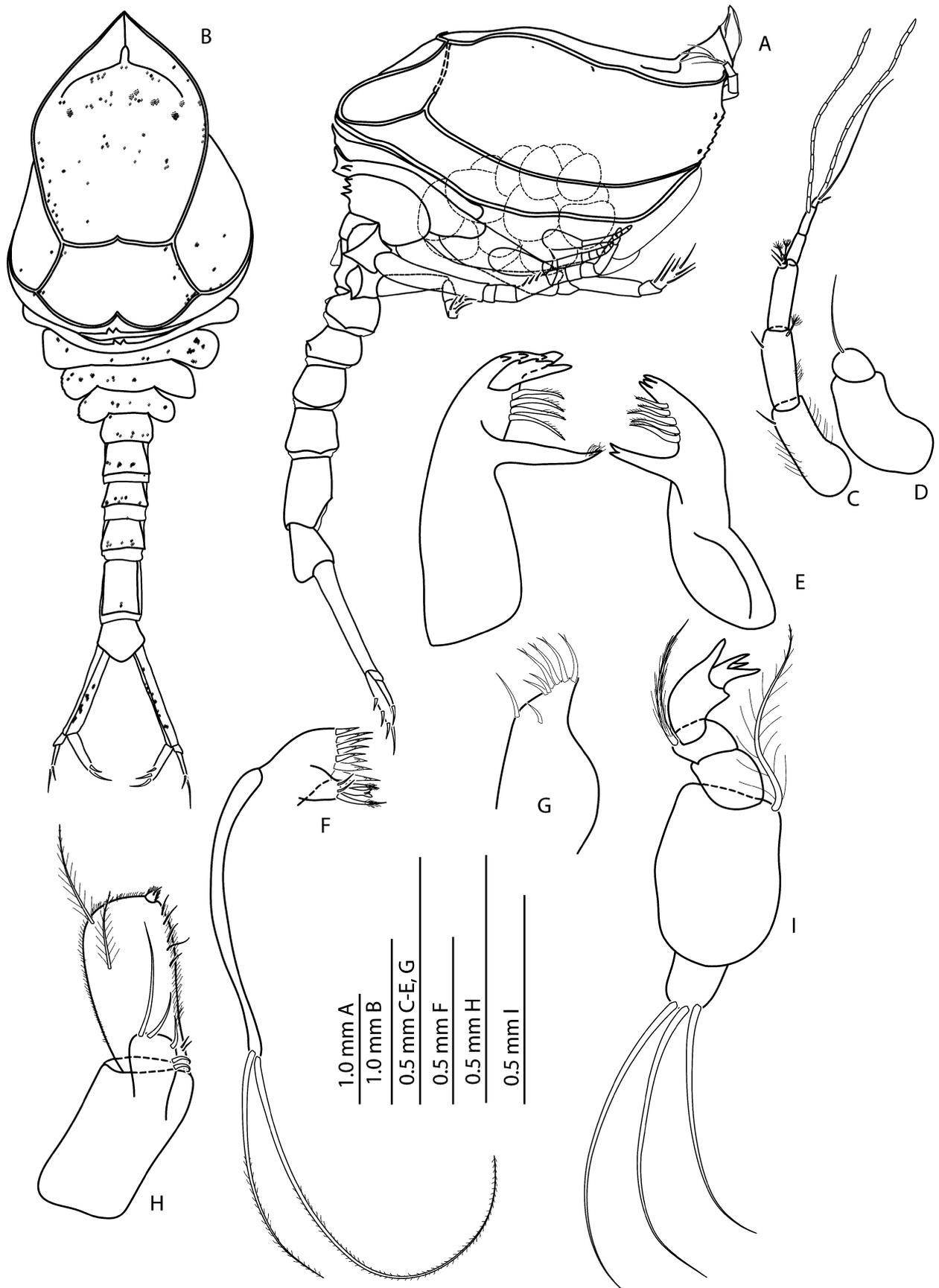
Pereopod 1 basis 1.2 times length of all other articles together, with 3 plumose setae; ischium 0.08 times basis length, with plumose seta; merus 3.0 times ischium length, with 4 simple and 4 plumose setae; carpus 0.9 times merus length, with 6 simple and 2 plumose setae; propodus 0.8 times carpus length, with 3 simple and 2 plumose setae; dactylus 0.5 times propodus length, with 6 simple setae terminally; exopod 0.9 times basis length, basal article unarmed, flagellum with plumo-annulate setae (Figure 29B).

Pereopod 2 basis 0.6 times length of all other articles together, unarmed; ischium 0.07 times basis length, unarmed; merus 3.7 times ischium length, with 2 simple and 1 plumose setae; carpus 2.4 times merus length, with 1 simple and 3 plumose setae; propodus 0.3 times carpus length, with simple seta; dactylus 3.1 times propodus length, with 6 simple and 1 plumose setae, 1 simple and 2 microserrate setae terminally; exopod 1.2 times basis length, basal article with 2 simple setae, flagellum with plumo-annulate setae (Figure 29C).

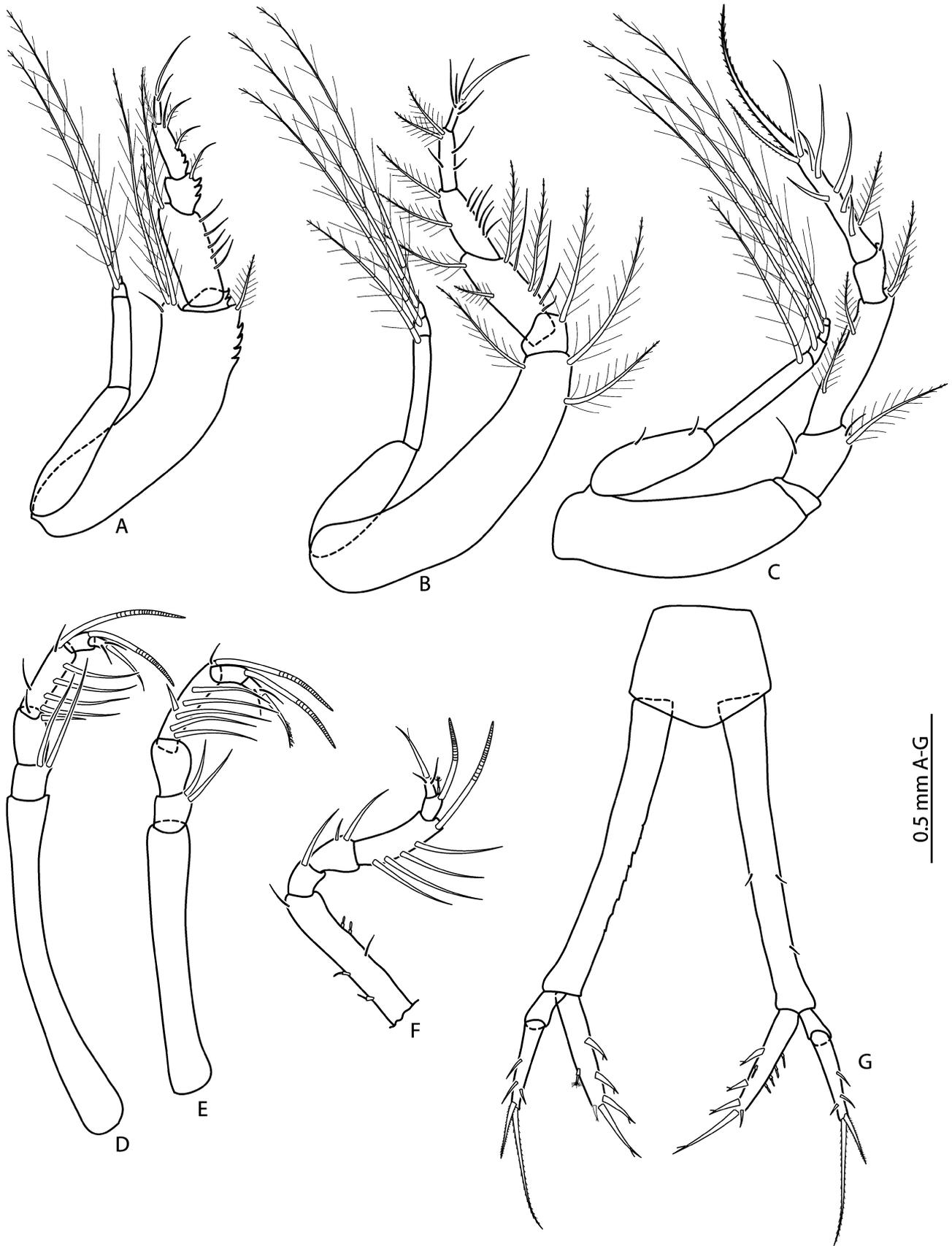
Pereopod 3 basis 1.8 times length of all other articles together, unarmed; ischium 0.1 times basis length, with 2 simple setae; merus 1.5 times ischium length, with 1 simple seta; carpus 1.7 times merus length, with 7 simple and 1 annulate setae; propodus 0.3 times carpus length, with annulate seta; dactylus 0.8 times propodus length, with 3 simple setae terminally (Figure 29D).

Pereopod 4 basis 1.2 times length of all other articles together, unarmed; ischium 0.1 times basis length, with 2 simple setae; merus 1.6 times ischium length, unarmed; carpus 1.3 times merus length, with 7 simple and 1 annulate setae; propodus 0.5 times carpus length, with annulate seta; dactylus 0.7 times propodus length, with 2 simple and 1 microserrate setae terminally (Figure 29E).

Pereopod 5 basis with 2 simple and 4 pedunculate setae; ischium with simple seta; merus 1.5 times ischium length, with 2 simple setae; carpus 1.7 times merus length, with 4 simple and 1 annulate setae; propodus 0.3 times carpus length, with 1 annulate and 1 complex pedunculate setae; dactylus equal to propodus length, with 2 simple and 1 simple with subterminal setule setae terminally (Figure 29F).



**FIGURE 28.** *Campylaspis microsulcata* n. sp. Holotype ovigerous female, NIWA 80671. A, side view. Paratype ovigerous female, NIWA 80672. B, dorsal view; C, antennule; D, antenna; E, mandibles; F, maxillule; G, maxilla; H, maxilliped 1; I, maxilliped 2.



**FIGURE 29.** *Campylaspis microsulcata* n. sp. Paratype ovigerous female, NIWA 80672. A, maxilliped 3; B, pereopod 1; C, pereopod 2; D, pereopod 3; E, pereopod 4; F, pereopod 5; G, pleonite 6 and uropods.

Uropod peduncles 2.4 times pleonite 6 length, with 0–3 simple setae, medial margin slightly serrate. Uropod endopod uniarticulate, 0.4 times peduncle length, with 3 simple with single subterminal setule setae medially, 1 simple seta with single subterminal setule and 1 complex pedunculate seta laterally, terminal seta simple with single subterminal setule. Uropod exopod of 2 articles, equal to length of endopod; article 1 0.3 times article 2 length; article 2 with 3 simple setae and 2 microserrate setae terminally (Figure 29G).

**Etymology.** The species is named *microsulcata* in reference to the distinct sulcus, bounded by carinae, and in reference to *Campylaspis macrosulcata* n. sp., a similar but larger, more robust species.

**Remarks.** In *Campylaspis macrosulcata* there are no transverse carinae connecting the carinae that bound the sulcus, but in *C. microsulcata* there is a pair of carinae posteriorly that connect the carinae bounding the sulcus. Also, *C. macrosulcata* is larger and more robust than *C. microsulcata*.

### ***Campylaspis millsae* n. sp.**

Figures 30–33

**Type material.** Holotype ovigerous female, NIWA 80668, paratype ovigerous female, dissected, NIWA 80669, paratype adult male, dissected, NIWA 80670, 43.9790°S, 179.6298°E–43.9850°S, 179.6218°E, 529–530 m, 9 April 2007.

**Other material examined.** 1 ovigerous female, 8 subadult females, 1 adult male, 1 subadult male, 6 mancae, NIWA 79332, 43.9790°S, 179.6298°E–43.9850°S, 179.6218°E, 529–530 m, 9 April 2007. 5 ovigerous females, 3 subadult females, 1 subadult male, 16 juveniles, NIWA 79333, 43.5212°S, 178.6203°W–43.5228°S, 178.6315°W, 424–425 m, 18 April 2007. 3 subadult females, 2 subadult males, NIWA 79334, 38.6177°S, 168.9428°E–38.6258°S, 168.9490°E, 480–482 m, 29 May 2007. 1 ovigerous female, 7 subadult females, 3 subadult males, NIWA 79335, 38.6177°S, 168.9428°E–38.6258°S, 168.9490°E, 480–482 m, 29 May 2007. 1 subadult female, NIWA 79336, 40.8800°S, 170.8555°E–40.8883°S, 170.8565°E, 529–534 m, 6 June 2007.

**Diagnosis.** *Females and subadult males.* Carapace with sulcus, not bounded by carinae, with scattered spines and tubercles, with pair of large tubercles at lateral corners of frontal lobe, with 3 parallel rounded carinae, ventral one most complete and meeting at midline posteriorly and turning anterior, carinae with several large teeth, large teeth and setae scattered on carapace, with 1–3 teeth on anterior margin of carapace; pseudorostrum weakly or not dorsally directed. Carapace, pereonites and pleonites with scattered red chromatophores. Pereonites 1–5 free, pereonites 1–2 with strong dorsal lappet in female. Pereopod 2 dactylus normal, terminal seta long. Uropod peduncles at least 2.8 times length of pleonite 6. *Male.* Carapace ornamentation less pronounced, less vaulted than in female. Uropods more setose than in female.

#### **Description of female.**

Holotype ovigerous female, 3.3 mm, NIWA 80668. Paratype ovigerous female, 2.9 mm, NIWA 80669. Carapace with sulcus, not bounded by carinae, with scattered spines and tubercles, with pair of large tubercles at lateral corners of frontal lobe, with 3 parallel rounded carinae, ventral one most complete and meeting at midline posteriorly and turning anterior, carinae with several large teeth, large teeth and setae scattered on carapace, with 1–3 teeth on anterior margin of carapace; pseudorostrum weakly or not dorsally directed; pseudorostral lobes 0.3 times carapace length; eyelobe 0.04 times carapace length. Carapace, pereonites and pleonites with scattered red chromatophores. Pereonites 1–5 free, pereonites 1–2 with strong dorsal lappet, pereonites 4–5 with spines dorsally (Figures 30A–B).

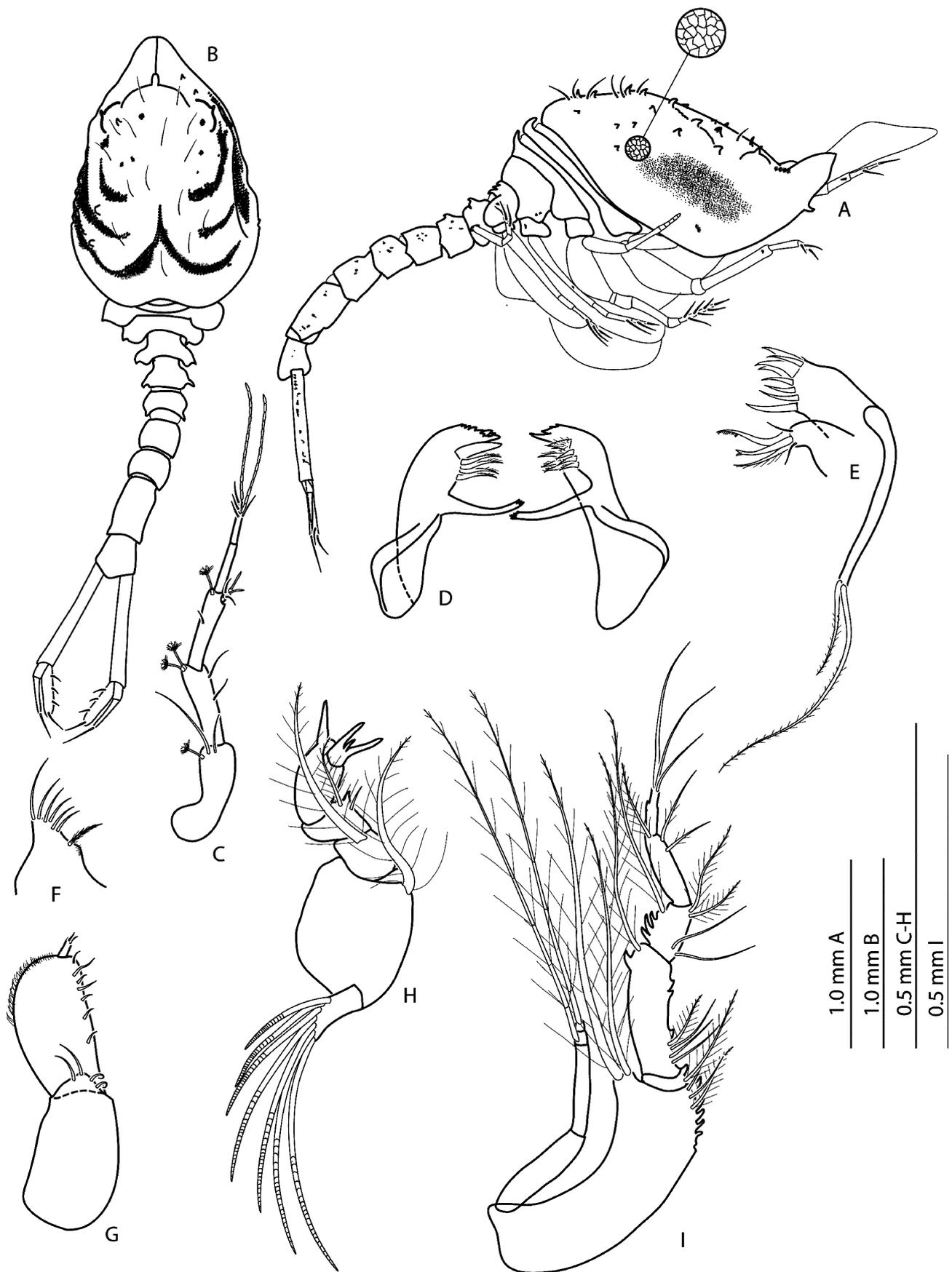
Antennule peduncle article 1 longest, with 2 simple and 1 complex pedunculate setae; article 2 0.8 times article 1 length, with 2 simple and 2 complex pedunculate setae; article 3 equal to article 2 length, with 1 simple and 1 complex pedunculate setae; main flagellum of 4 articles, with 2 aesthetascs and 4 simple setae; accessory flagellum of 1 article, with 2 simple and 2 pedunculate setae (Figure 30C).

Mandible truncate, with 3–7 microserrate setae medially, lacinia mobilis with 1 cusp (Figure 30D).

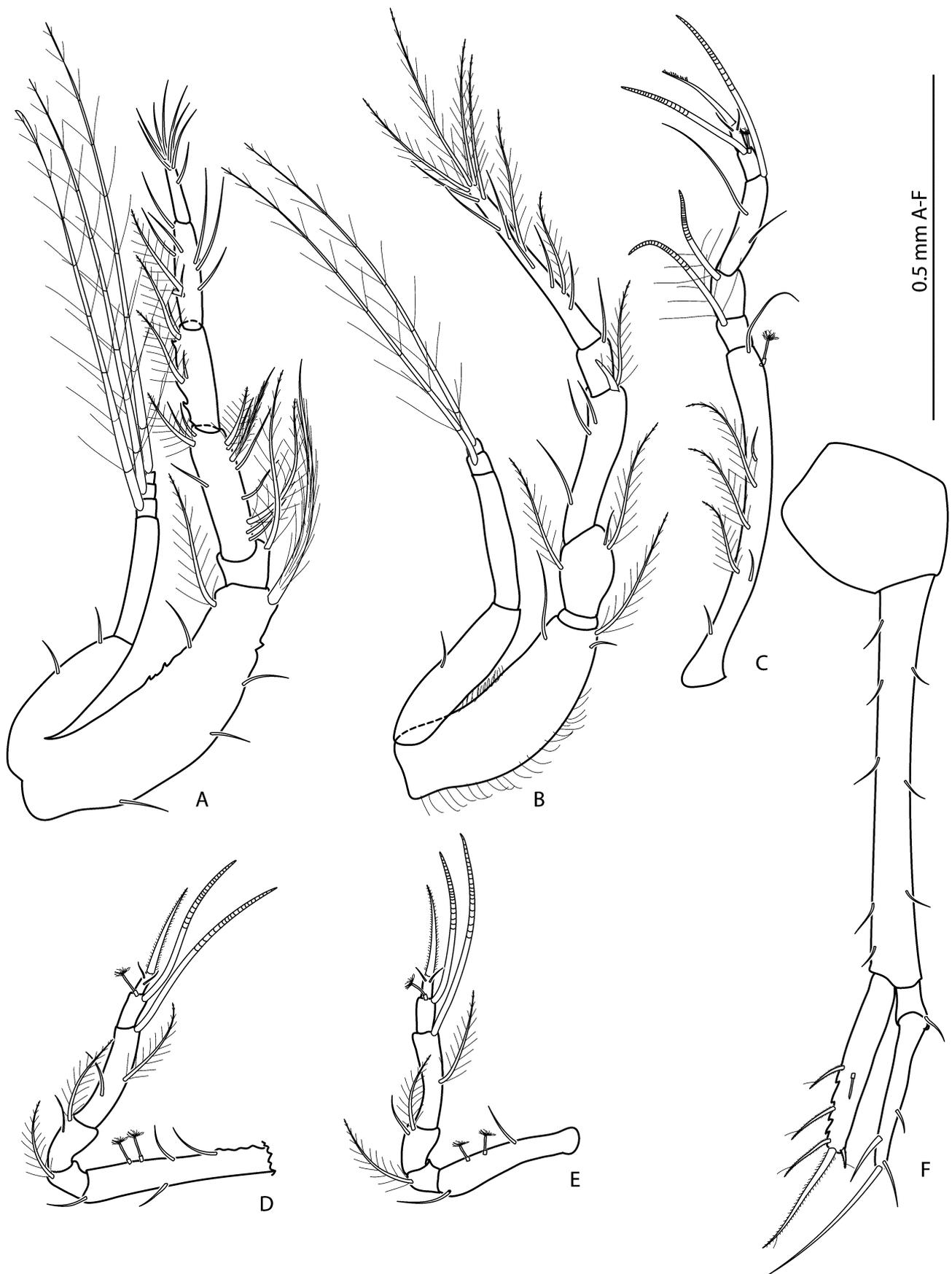
Maxillule with 2 endites; outer endite broad, with 8 simple setae; inner endite with 2 simple, 2 microserrate and 1 tricuspid setae; palp with 2 microserrate setae (Figure 30E).

Maxilla reduced to single endite, with 6 simple and 1 pappose setae (Figure 30F).

Maxilliped 1 basis with 2 simple and 2 hook setae; merocarpus equal to basis length, with 7 simple setae, lateral margin lined with fine hair-like setae (Figure 30G).



**FIGURE 30.** *Campylaspis millsae* n. sp. Holotype ovigerous female, NIWA 80668. A, side view. Paratype ovigerous female, NIWA 80669. B, dorsal view; C, antennule; D, mandibles; E, maxillule; F, maxilla; G, maxilliped 2; H, maxilliped 2; I, maxilliped 3.



**FIGURE 31.** *Campylaspis millsae* n. sp. Paratype ovigerous female, NIWA 80669. A, pereopod 1; B, pereopod 2; C, pereopod 3; D, pereopod 4; E, pereopod 5; F, pleonite 6 and uropod.

Maxilliped 2 basis 0.5 times length of all other articles together, with plumose seta; ischium absent; merus 0.5 times basis length, with plumose seta; carpus 0.7 times merus length, with 1 simple and 1 plumose setae, medial margin produced as tooth; propodus 1.7 times carpus length, distal margin produced as single long process; dactylus 0.8 times propodus length, produced as 3 teeth, central tooth short, outer pair subequal in length (Figure 30H).

Maxilliped 3 basis 0.7 times length of all other articles together, with 3 plumose setae medially, distal corner with 2 plumose setae, medial margin produced as large teeth distally; ischium 0.04 times basis length, with plumose seta, medial margin produced as tooth; merus 12 times ischium length, with 3 simple and 1 plumose setae medially, plumose seta laterally, medial margin produced as 3 teeth, lateral margin produced as single strong tooth distally; carpus 0.4 times merus length, with 2 simple and 2 plumose setae medially, plumose seta laterally, lateral margin produced as strong teeth; propodus 1.4 times carpus length, with 2 plumose setae medially, plumose seta laterally; dactylus 0.7 times propodus length, with 3 simple setae terminally; exopod 0.9 times basis length, basal article unarmed, flagellum with plumo-annulate setae (Figure 30I).

Pereopod 1 basis 0.6 times length of all other articles together, with 4 simple, 1 plumose and 1 pappose setae, margins weakly serrate; ischium 0.09 times basis length, with plumose seta; merus 5.2 times ischium length, with 8 simple, 3 plumose and 1 pappose setae; carpus 0.7 times merus length, with 2 plumose setae, lateral margin serrate; propodus equal to carpus length, with 6 simple and 1 plumose setae; dactylus 0.6 times propodus length, with simple seta and 7 simple setae terminally; exopod 1.1 times basis length, basal article with 2 simple setae, flagellum with plumo-annulate setae (Figure 31A).

Pereopod 2 basis 0.5 times length of all other articles together, with 2 simple and 1 plumose setae, margins lined with fine hair-like setae; ischium 0.04 times basis length, unarmed; merus 7.5 times ischium length, with 1 simple and 2 plumose setae; carpus 1.9 times merus length, with 3 simple, 1 plumose and 1 simple with single subterminal setule setae; propodus 0.3 times carpus length, with simple seta; dactylus 4.3 times propodus length, with 6 simple and 2 plumose setae, 5 plumose setae terminally; exopod 1.3 times basis length, basal article with simple seta, flagellum with plumo-annulate setae (Figure 31B).

Pereopod 3 basis 1.4 times length of all other articles together, with 4 simple, 3 plumose and 1 complex pedunculate setae; ischium 0.09 times basis length, with plumo-annulate seta; merus 1.5 times ischium length, with plumo-annulate seta; carpus 2.2 times merus length, with 1 simple and 1 annulate setae; propodus 0.3 times carpus length, with 1 annulate and 1 complex pedunculate setae; dactylus equal to propodus length, with 2 simple and 1 microserrate setae terminally (Figure 31C).

Pereopod 4 basis with 4 simple and 2 complex pedunculate setae; ischium with plumose seta; merus 2.5 times ischium length, with 1 simple and 1 plumose setae; carpus 2.1 times merus length, with 1 simple, 1 plumose and 1 annulate setae; propodus 0.3 times carpus length, with 1 annulate and 1 complex pedunculate setae; dactylus 0.7 times propodus length, with 2 simple and 1 microserrate setae terminally (Figure 31D).

Pereopod 5 basis 0.7 times length of all other articles together, with 2 simple and 2 complex pedunculate setae; ischium 0.1 times basis length, with plumose seta; merus 2.7 times ischium length, with 1 simple and 1 plumose setae; carpus 2.4 times merus length, with 1 plumose and 1 annulate setae; propodus 0.4 times carpus length, with 1 annulate and 1 complex pedunculate setae; dactylus 0.6 times propodus length, with 2 simple and 1 microserrate setae terminally (Figure 31E).

Uropod peduncles 3 times pleonite 6 length, with 8 simple setae. Uropod endopod uniarticulate, 0.5 times peduncle length, with 3 microserrate with subterminal setule setae medially, 1 pedunculate and 1 microserrate with subterminal setule setae laterally, terminal seta microserrate with subterminal setule, medial margin serrate. Uropod exopod of 2 articles, equal to length of endopod; article 1 0.1 times article 2 length, with simple seta; article 2 with 3 simple setae, terminal seta simple (Figure 31F).

#### **Description of male.**

Paratype adult male, 3.5 mm, NIWA 80670. Carapace elongate, with similar sculpturing as in female but less well developed, with few spines and tubercles scattered on carapace, pair of large tubercles at corners of frontal lobe, anterior margin with 3 large teeth; pseudorostral lobes very weakly dorsally tilted, 0.3 times carapace length; eyelobe 0.03 times carapace length, without lenses. Pereonite 1 covering posterior edge of carapace dorsally, pereonites 1–5 with dorsal spines (Figure 32A).

Antennule peduncle article 1 longest, with 3 simple setae and fine hair-like setae on margins; article 2 0.8 times article 1 length, with 3 simple and 2 complex pedunculate setae; article 3 0.9 times article 2 length, with complex

pedunculate seta; main flagellum of 3 articles, with 2 aesthetascs, 3 simple and 1 complex pedunculate setae; accessory flagellum of 1 article, with 3 simple and 2 complex pedunculate setae (Figure 32B).

Antenna extending to at least middle of uropod peduncles; peduncle of 4 articles; articles 4–5 with ranks of setae, incompletely circling articles; flagellum with 2–3 setae on each article (Figure 32C).

Maxilliped 3 basis 0.9 times length of all other articles together, with 1 simple and 1 plumose setae on medial margin, distal corner with 2 plumose setae, medial margin lined with fine hair-like setae, produced as tooth distally; ischium 0.1 times basis length, produced as tooth medially; merus 3.0 times ischium length, with 4 simple setae medially, plumose seta laterally, both margins produced as teeth; carpus 0.7 times merus length, with 1 simple and 2 plumose setae medially, plumose seta laterally, lateral margin produced as teeth; propodus 1.2 times carpus length, with 2 plumose setae medially; dactylus 0.6 times propodus length, with 4 simple setae terminally; exopod 1.1 times basis length, basal article unarmed, flagellum with plumo-annulate setae (Figure 32D).

Pereopod 1 basis 0.9 times length of all other articles together, with 1 simple and 3 pappose setae; ischium 0.06 times basis length, with pappose seta; merus 5.7 times ischium length, with 11 simple setae; carpus 0.8 times merus length, with 7 simple and 3 plumose setae; propodus 0.8 times carpus length, with 5 simple and 2 plumose setae, lateral margin lined with fine hair-like setae; dactylus 0.7 times propodus length, with 4 simple setae and 7 simple setae terminally; exopod 1.1 times basis length, margins serrate, basal article with 2 simple setae, flagellum with plumo-annulate setae (Figure 32E).

Pereopod 2 basis shorter than all other articles together, with 2 simple and 1 plumose setae; ischium 0.05 times basis length, unarmed; merus 4.5 times ischium length, with 1 simple and 2 plumose setae; carpus 2.2 times merus length, with 3 simple, 3 plumose and 1 microserrate setae; propodus 0.3 times carpus length, with simple seta; dactylus with simple setae, broken; exopod 1.2 times basis length, basal article with strongly serrate margin proximally, with 2 simple setae, flagellum with plumo-annulate setae (Figure 32F).

Pereopod 3 basis 1.8 times length of all other articles together, with 4 simple and 2 pappose setae, margin with fine hair-like setae proximally; ischium 0.06 times basis length, with 1 simple and 1 plumose setae; merus 2.7 times ischium length, with 1 simple and 1 plumose setae; carpus 1.4 times merus length, with 2 simple and 1 annulate setae; propodus 0.4 times carpus length, with annulate seta; dactylus 0.8 times propodus length, with 3 simple setae terminally; exopod 0.9 times basis length, basal article with 1 simple and 1 plumose setae, flagellum with plumo-annulate setae (Figure 32G).

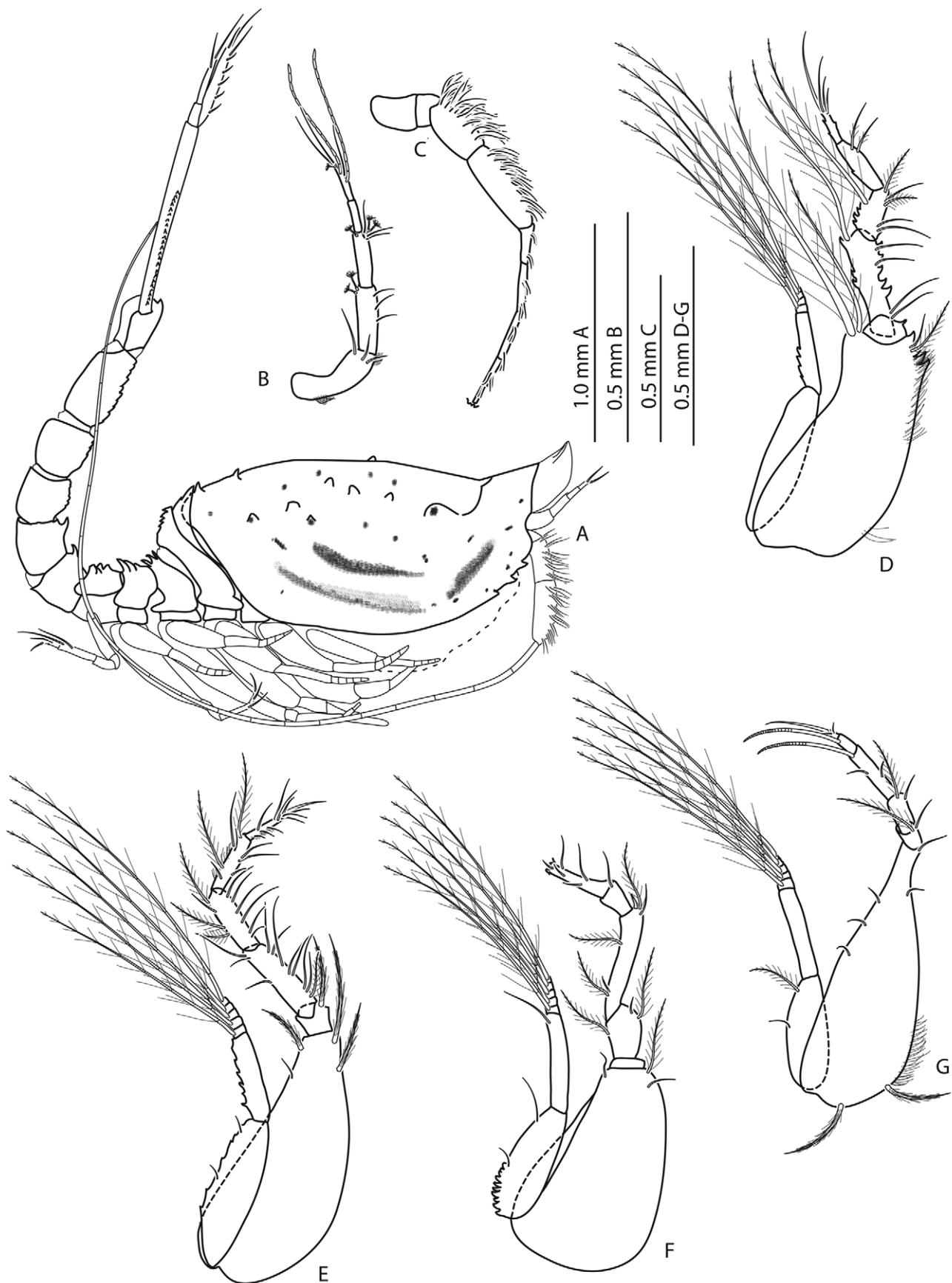
Pereopod 4 basis 1.4 times length of all other articles together, with 3 simple, 2 pedunculate, and 2 complex pedunculate setae; ischium 0.06 times basis length, with 1 simple and 1 plumose setae; merus 2.7 times ischium length, with 1 simple and 1 plumose setae; carpus 2.3 times merus length, with 2 simple and 1 annulate setae; propodus 0.3 times carpus length, with annulate seta; dactylus 0.6 times propodus length, with 2 simple and 1 microserrate setae terminally; exopod equal to basis length, basal article with 1 simple and 1 plumose setae, flagellum with plumo-annulate setae (Figure 33A).

Pereopod 5 basis 0.9 times length of all other articles together, with 1 simple, 2 plumose and 1 pedunculate setae; ischium 0.1 times basis length, with plumo-annulate seta; merus 1.5 times ischium length, with 1 simple and 1 plumo-annulate setae; carpus 3.0 times merus length, with 2 simple and 1 annulate setae; propodus 0.2 times carpus length, with 1 annulate and 1 complex pedunculate setae; dactylus equal to propodus length, with 2 simple setae terminally (Figure 33B).

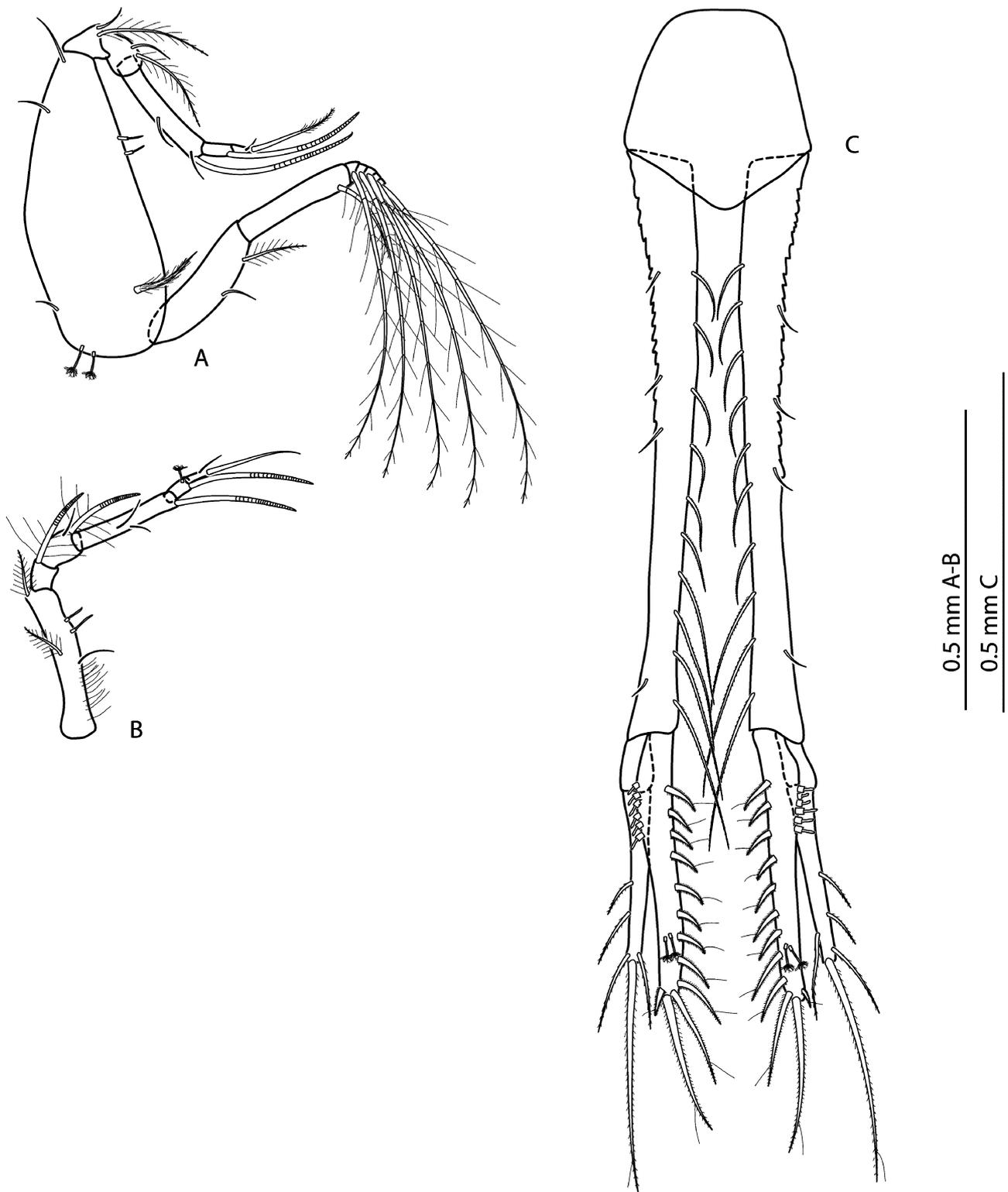
Uropod peduncles 2.8 times pleonite 6 length, with 10 microserrate setae medially, 4 simple setae laterally, lateral margins serrate proximally. Uropod endopod uniaarticulate, 0.5 times peduncle length, with 10 microserrate with subterminal setule setae medially, 6 pedunculate, 2 complex pedunculate, and 1 microserrate with subterminal setule setae laterally, terminal seta microserrate with subterminal setule. Uropod exopod 0.8 times length of endopod; article 1 0.3 times article 2 length, unarmed; article 2 with 4 microserrate with subterminal setule setae, terminal seta microserrate with subterminal setule (Figure 33C).

**Etymology.** The species is named in honor of Sadie Mills, in recognition of her work in the NIWA collections and her unfailingly helpful and pleasant nature.

**Remarks.** The most similar species is *Campylaspis sculptaspinosa*, which lacks an eyelobe in the female, and has no teeth at the anteroventral corner of the carapace in both sexes. In comparison, *C. millsae* has an eyelobe in the female, and a distinct tooth in the female and several teeth in the male at the anteroventral corner of the carapace.



**FIGURE 32.** *Campylaspis millsae* n. sp. Paratype adult male, NIWA 80670. A, side view; B, antennule; C, antenna; D, maxilliped 3; E, pereopod 1; F, pereopod 2; G, pereopod 3.



**FIGURE 33.** *Campylaspis millsae* n. sp. Paratype adult male, NIWA 80670. A, pereopod 4; B, pereopod 5; C, pleonite 6 and uropods.

***Campylaspis normani* n. sp.**

Figures 34–35

**Type material.** Holotype subadult female, NIWA 80681, paratype subadult female, dissected, NIWA 80682, 44.4862°S, 177.1413°E–44.4841°S, 177.1416°E, 1235–1239 m, 6 April 2007.

**Other material examined.** 2 juveniles, NIWA 80698, 0705/160.

**Diagnosis.** *Females and subadult males.* Carapace with weak sulcus; pseudorostrum not dorsally directed. Carapace, pereonites and pleonites with large red chromatophores. Pereonites 1–5 free. Pereopod 2 dactylus normal, terminal seta long. Uropod peduncles 2.0 times length of pleonite 6. *Male.* Adult unknown.

**Description of female.**

Holotype subadult female, 3.4 mm, NIWA 80681. Paratype subadult female, 3.4 mm, NIWA 80682. Carapace with weak sulcus, not bounded by carinae; pseudorostral lobes 0.3 times carapace length, not dorsally directed; eyelobe 0.5 times carapace length, without lenses. Pereonites 1–5 free. Carapace, pereonites and pleonites with large red chromatophores, specimens appear red (Figures 34A–B).

Antennule peduncle article 1 longest, with simple seta; article 2 0.9 times article 1 length, with complex pedunculate seta; article 3 0.8 times article 2 length, unarmed; main flagellum of 3 articles, with 2 aesthetascs and 3 simple setae; accessory flagellum of 1 article, with 3 simple and 2 complex pedunculate setae (Figure 34C).

Antenna of 3 articles, unarmed (Figure 34D).

Mandible truncate, with 3 microserrate setae medially, lacinia mobilis with 1 cusp (Figure 34E).

Maxillule with 2 endites; outer endite broad, with 9 microserrate setae; inner endite with 2 simple, 1 pappose and 2 microserrate setae; palp with 2 microserrate setae (Figure 34F).

Maxilliped 1 basis with 2 simple and 2 hook setae; merocarpus with 8 simple setae, lateral margin lined with fine hair-like setae; dactylus with simple seta (Figure 34G).

Maxilliped 3 basis 0.7 times length of all other articles together, with 1 simple and 1 plumose setae medially, lateral corner with plumose seta, medial distal corner produced as tooth, medial margin lined with fine hair-like setae; ischium 0.05 times basis length, unarmed; merus 12.5 times ischium length, with 7 simple setae medially, plumose seta laterally, medial margin serrate, lateral margin produced as large teeth; carpus 0.5 times merus length, with 3 simple setae medially, plumose seta laterally, medial margin produced as teeth; propodus equal to carpus length, with 2 plumose setae medially, plumose seta laterally, medial margin produced as strong teeth; dactylus 0.5 times propodus length, with 3 simple setae terminally; exopod 1.1 times basis length, basal article unarmed, flagellum with plumo-annulate setae (Figure 34H).

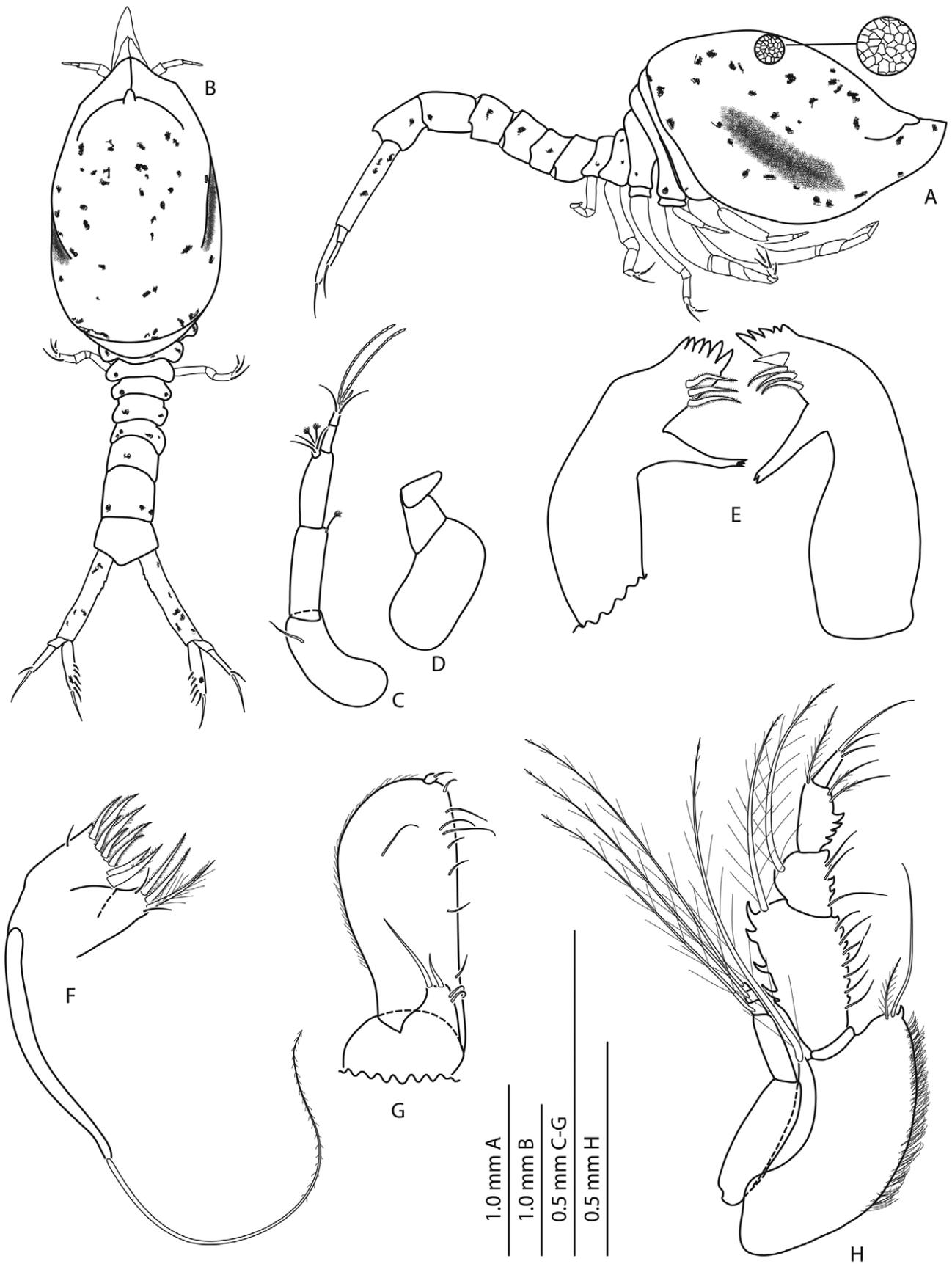
Pereopod 1 basis 0.8 times length of all other articles together, with 3 plumose setae; ischium 0.2 times basis length, with plumose seta; merus 1.9 times ischium length, with 1 simple and 6 plumose setae, lateral margin toothed distally; carpus 0.9 times merus length, with 1 simple and 4 plumose setae, margins produced as teeth; propodus 0.8 times carpus length, with 2 simple and 5 plumose setae; dactylus 0.8 times propodus length, with simple seta and 3 simple setae terminally; exopod 1.2 times basis length, basal article with 1 simple and 1 plumose setae, lateral margin toothed, flagellum with plumo-annulate setae (Figure 35A).

Pereopod 2 basis 0.6 times length of all other articles together, with 2 plumose setae; ischium 0.04 times basis length, with plumose seta; merus 5.5 times ischium length, with 2 simple and 2 plumose setae; carpus 1.8 times merus length, with 1 simple and 4 plumose setae; propodus 0.5 times carpus length, unarmed; dactylus 3.6 times propodus length, with 8 simple setae and plumose seta terminally; exopod 1.2 times basis length, basal article with 2 plumose setae, flagellum with plumo-annulate setae (Figure 35B).

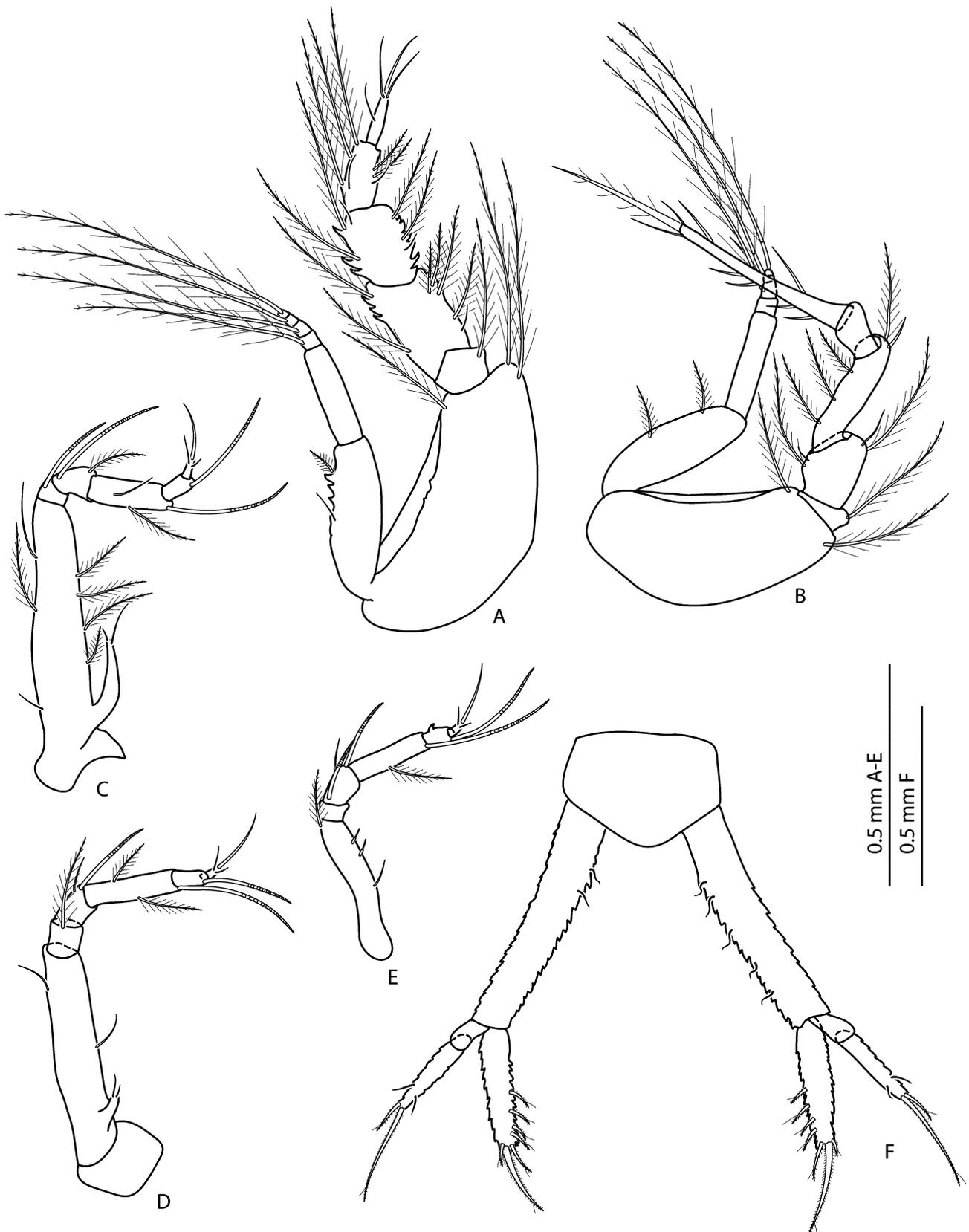
Pereopod 3 basis 1.8 times length of all other articles together, 2 simple and 5 plumose setae; ischium 0.05 times basis length, with annulate seta; merus 2.0 times ischium length, with 1 plumose and 1 annulate setae; carpus 2.3 times merus length, with 2 plumose and 1 annulate setae; propodus 0.4 times carpus length, with annulate seta; dactylus 0.8 times propodus length, with 3 simple setae terminally; exopod rudimentary, 0.3 times basis length, of 1 article with 2 simple setae (Figure 35C).

Pereopod 4 basis 1.1 times length of all other articles together, with 2 simple setae; ischium 0.1 times basis length, with plumose seta; merus equal to ischium length, with 1 simple and 1 annulate setae; carpus 2.8 times merus length, with 2 plumose and 1 annulate setae; propodus 0.4 times carpus length, with annulate seta; dactylus 0.4 times propodus length, with 3 simple setae terminally; exopod rudimentary, 0.1 times basis length, of 1 article with 2 simple setae (Figure 35D).

Pereopod 5 basis 0.8 times length of all other articles together, with 1 simple, 1 plumose and 2 pedunculate setae; ischium 0.1 times basis length, unarmed; merus 2.7 times ischium length, with 1 simple and 1 annulate setae; carpus 1.9 times merus length, with 1 plumose and 1 annulate setae; propodus 0.3 times carpus length, with annulate seta, margin produced as large tooth; dactylus 0.6 times propodus length, with 3 simple setae terminally (Figure 35E).



**FIGURE 34.** *Campylaspis normani* n. sp. Holotype subadult female, NIWA 80681. A, side view. Paratype subadult female, NIWA 80682. B, dorsal view; C, antennule; D, antenna; E, mandibles; F, maxillule; G, maxilliped 1; H, maxilliped 3.



**FIGURE 35.** *Campylaspis normani* n. sp. Paratype subadult female, NIWA 80682. A, pereopod 1; B, pereopod 2; C, pereopod 3; D, pereopod 4; E, pereopod 5; F, pleonite 6 and uropods.

Uropod peduncles 2.0 times pleonite 6 length, with 2–5 simple setae, margins strongly serrate. Uropod endopod uniarticulate, 0.6 times peduncle length, with 5 microserrate with subterminal setule setae medially, 1

microserrate with subterminal setule seta laterally, terminal seta microserrate with subterminal setule, margins strongly serrate. Uropod exopod of 2 articles, 0.8 times length of endopod; article 1 0.4 times article 2 length, unarmed; article 2 with 2 simple and 1 microserrate with subterminal setule setae, terminal seta microserrate with subterminal setule, margins serrate (Figure 35F).

**Etymology.** The species is named *normani* in honor of Norman S. Jones, in recognition of his work on the New Zealand cumacean fauna.

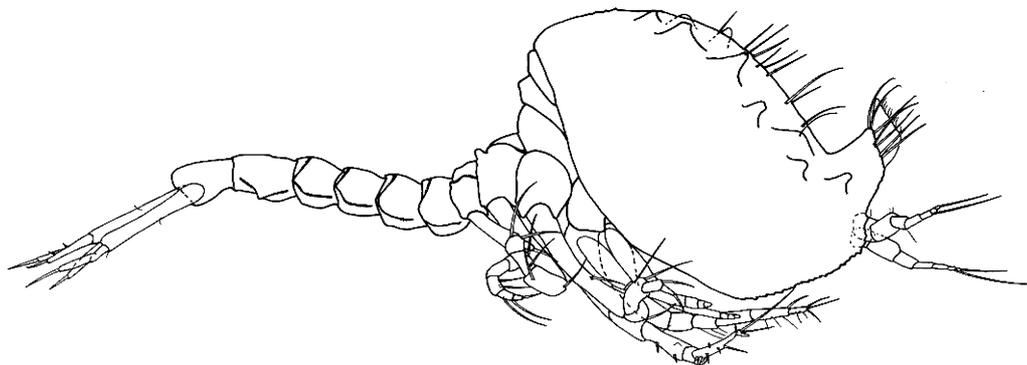
**Remarks.** *Campylaspis normani* is most likely to be confused with *C. apheles* and *C. rufus*. In *C. normani* there is a weak but definite sulcus on the carapace, while in *C. apheles* and *C. rufus* there is no sulcus. In addition, in the female *C. normani* there are rudimentary exopods on pereopods 3–4, while in both *C. apheles* and *C. rufus* the female is entirely without exopods on pereopods 3–4.

### ***Campylaspis rex* Gerken & Ryder 2002**

Figure 36

**Type material.** Type material (holotype and paratypes) was not registered by NIWA in 2002. Type material appears to have been lost, see remarks. Neotype ovigerous female, NIWA 70506, 43.8363°S, 176.7092°E–43.8330°S, 176.7127°E, 478–479 m, 5 April 2007 is hereby designated.

**Material examined.** 1 specimen, NIWA 13165, 45.2000°S, 171.8167°E, 860 m, 13 October 1965. 1 specimen, NIWA 46197, 42.7820°S, 176.7152°W – 42.7817°S, 176.7042°W, 1023–1026 m, 16 April 2007. 6 specimens, NIWA 70507, 43.5212°S, 178.6203°W–43.5228°S, 178.6315°W, 424–425 m, 18 April 2007. 1 specimen, NIWA 70501, 44.1208°S, 174.8432°E–44.1242°S, 174.8448°E, 512–513 m, 4 April 2007. 6 specimens, NIWA 46198, 42.9958°S, 178.9957°E–42.9910°S, 179.0052°E, 520–530 m, 24 April 2007. 3 specimens, NIWA 70500, 42.9958°S, 178.9957°E–42.9910°S, 179.0052°E, 520–530 m, 24 April 2007. 10 specimens, NIWA 46199, 43.5300°S, 178.5048°E–43.5363°S, 178.5118°E, 346 m, 24 April 2007. 5 specimens, NIWA 70498, 42.9758°S, 177.1698°E–42.9758°S, 177.1698°E, 376 m, 25 April 2007. 5 specimens, NIWA 70508, 43.7967°S, 175.3158°E–43.8045°S, 175.3148°E, 418–422 m, 27 April 2007. 6 specimens, NIWA 70504, 43.8298°S, 176.7102°E–43.8298°S, 176.7102°E, 479 m, 5 April 2007. 1 specimen, NIWA 81218, 43.8363°S, 176.7092°E–43.8330°S, 176.7127°E, 478–479 m, 5 April 2007. 2 specimens, NIWA 70502, 44.0162°S, 178.5210°E–44.0143°S, 178.5175°E, 769–771 m, 7 April 2007. 2 specimens, NIWA 70503, 44.0128°S, 178.5167°E–44.0128°S, 178.5167°E, 764 m, 8 April 2007. 1 specimen, NIWA 70499, 43.9790°S, 179.6298°E–43.9850°S, 179.6218°E, 529–530 m, 9 April 2007. 1 specimen, NIWA 70505, 43.9790°S, 179.6298°E–43.9850°S, 179.6218°E, 529–530 m, 9 April 2007. 3 specimens, NIWA 46217, 40.8800°S, 170.8555°E–40.8883°S, 170.8565°E, 529–534 m, 6 June 2007. 22 specimens, NIWA 46200, 40.8800°S, 170.8555°E–40.8883°S, 170.8565°E, 529–534 m, 6 June 2007.



**FIGURE 36.** *Campylaspis rex* from Gerken & Ryder 2002, side view.

**Diagnosis.** *Females and subadult males.* Carapace with u-shaped arrangement of large tubercles dorsally, shape is open anteriorly, with scattered setae; pseudorostrum strongly dorsally directed. Carapace, pereonites and pleonites without few scattered red chromatophores. Pereonites 1–2 free only dorsally. Pereopod 2 dactylus normal, terminal seta long. Uropod peduncles 2.0 times length of pleonite 6. *Male.* Adult unknown.

**Remarks.** *Campylaspis rex* is unique within the New Zealand *Campylaspis* fauna for the combination of the pattern of a single continuous line of large tubercles dorsally, dorsally directed pseudorostrum and no sulcus on the carapace. *Campylaspis macrosulcata* is the only other species in the New Zealand fauna with the uropod exopod longer than the endopod; however, *C. macrosulcata* has a distinct deep sulcus bounded with carinae on the carapace and no tubercles, while *C. rex* has no sulcus and large tubercles dorsally on the carapace. This species is readily identifiable on the basis of the original description.

The type material, holotype and paratypes, was returned to NIWA at the time of publication, in 2002. However, the collection manager at the time refused to register type material until after the paper was published, thus the material was not registered before publication, and no registration numbers could be included in the original publication. Communication with the current collections staff at NIWA indicates that the type material for this species was never registered, and despite searching both the type and general collections cannot be found. In addition, the laboratory in which the original material was described, the Darling Marine Center, has been searched for this type material and it has not been found. With the availability of material from the same region in good shape, examined by one of the original authors, a neotype is thus designated. As both the holotype and all paratypes have been lost, for the name to remain valid, new type material must be declared.

### ***Campylaspis rufus* n.sp.**

Figures 37–40

**Type material.** Holotype ovigerous female, NIWA 80676, 43.8363°S, 176.7092°E–43.8330°S, 176.7127°E, 478–479 m, 5 April 2007. Paratype ovigerous female, dissected, NIWA 80679, paratype adult male, dissected, NIWA 80680, paratype adult male, NIWA 80680, 43.5300°S, 178.5048°E–43.5363°S, 178.5118°E, 346 m, 24 April 2007. Paratype ovigerous female, NIWA 80671, 43.5212°S, 178.6203°W–43.5228°S, 178.6315°W, 424–425 m, 18 April 2007.

**Other material examined.** 1 manca, NIWA 79328, 44.1262°S, 178.8445°E–44.1262°S, 178.8445°E, 516 m, 4 April 2007. 3 juveniles, NIWA 78329, 43.9790°S, 179.6298°E–43.9850°S, 179.6218°E, 529–530 m, 9 April 2007. 1 ovigerous female, 5 juveniles, NIWA 79330, 43.5212°S, 178.6203°W–43.5228°S, 178.6315°W, 424–425 m, 18 April 2007. 1 specimen, NIWA 79331, 44.1208°S, 174.8432°E–44.1242°S, 174.8448°E, 512–513 m, 4 April 2007.

**Diagnosis.** *Females and subadult males.* Carapace smooth, without sculpturing; pseudorostrum not dorsally directed, pointed. Carapace, pereonites and pleonites covered in red chromatophores. Pereonites 1–2 free only dorsally, pereonite 1 with weak dorsal lappet. Pereopod 2 dactylus normal, terminal seta long. Uropod peduncles 2.1 times length of pleonite 6. *Male.* Carapace less vaulted than in female; pseudorostrum blunt. Uropod peduncles 2.9 times length of pleonite 6, more setose than in female.

#### **Description of female.**

Holotype ovigerous female, 4.2 mm, NIWA 80676. Paratype ovigerous female, 4.2 mm, NIWA 80679. Carapace smooth, without sculpturing; pseudorostral lobes 0.2 times carapace length; eyelobe 0.03 times carapace length, without lenses. Pereonites 1–2 free only dorsally, pereonite 1 with weak dorsal lappet. Carapace, pereonites and pleonites covered in red chromatophores, preserved organisms appear red (Figure 37A).

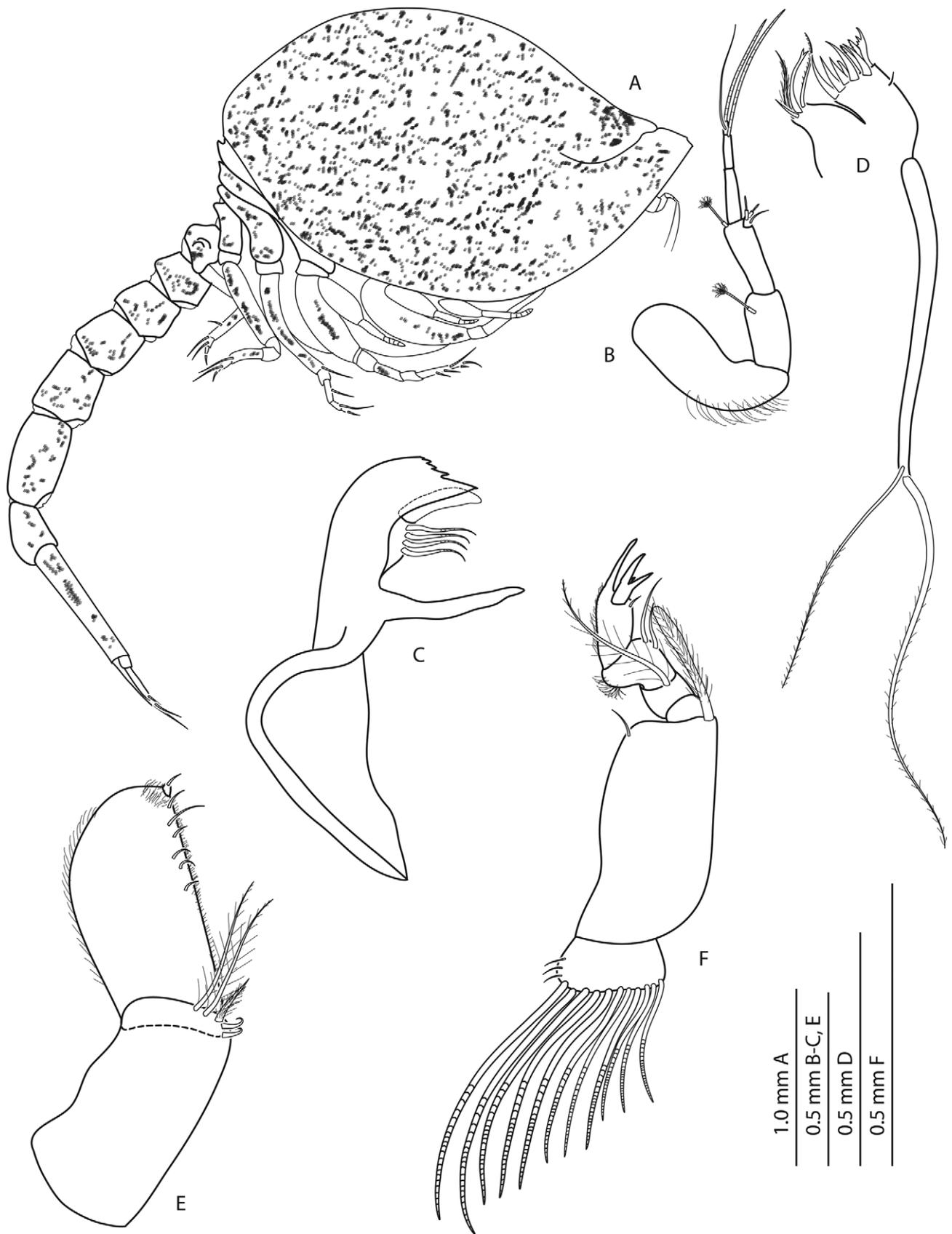
Antennule peduncle article 1 longest, margin lined with fine hair-like setae article 2 0.5 times article 1 length, with complex pedunculate seta; article 3 1.1 times article 2 length, with complex pedunculate seta; main flagellum of 3 articles, with 2 aesthetascs and simple seta; accessory flagellum of 1 article, with 1 simple and 2 pedunculate setae (Figure 37B).

Mandible truncate, with 4 microserrate setae medially, lacinia mobilis with 1 cusp (Figure 37C).

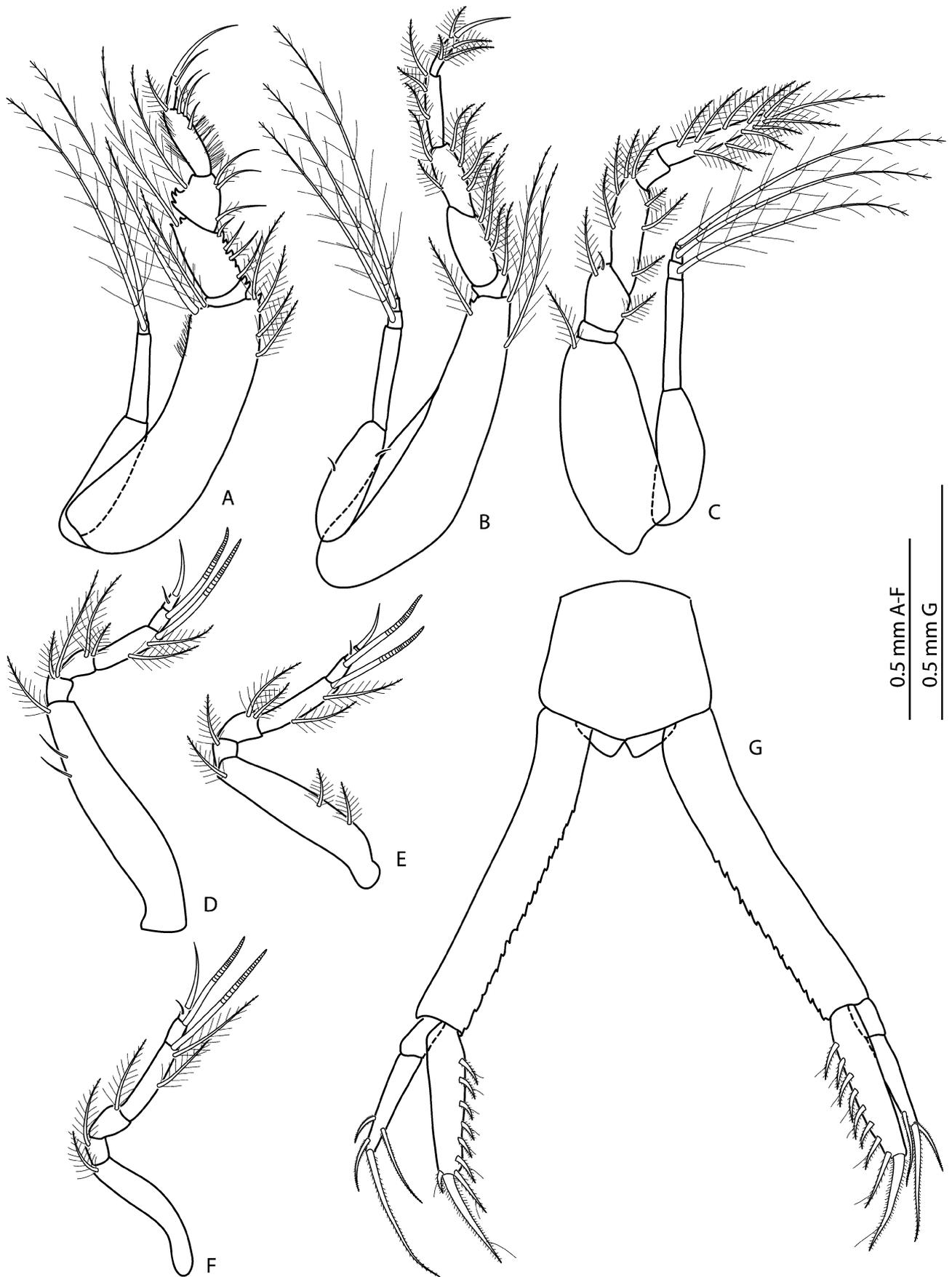
Maxillule with 2 endites; outer endite broad, with 6 simple and 4 dentate setae; inner endite with 1 simple, 1 pappose, 1 microserrate and 1 tricuspid setae; palp with 2 microserrate setae (Figure 37D).

Maxilliped 1 basis with 2 plumose, 1 pappose and 2 hook setae; merocarpus 0.9 times basis length, with 6 simple setae, margins lined with fine hair-like setae dactylus with simple seta (Figure 37E).

Maxilliped 2 basis 1.1 times length of all other articles together, with 1 simple and 1 pappose setae; ischium 0.09 times basis length, unarmed; merus equal to ischium length, with plumose seta; carpus 2.5 times merus length, with 2 simple setae medially, lateral margin lined with fine hair-like setae propodus 1.1 times carpus length, with simple seta, distal margin produced as long process, lateral margin lined with fine hair-like setae dactylus equal to propodus length, produced as 3 teeth, central tooth short, outer pair unequal (Figure 37F).



**FIGURE 37.** *Campylaspis rufus* n. sp. Holotype ovigerous female, NIWA 80676. A, side view. Paratype ovigerous female, NIWA 80679. B, antennule; C, mandible; D, maxillule; E, maxilliped 1; F, maxilliped 2.



**FIGURE 38.** *Campylaspis rufus* n. sp. Paratype ovigerous female, NIWA 80679. A, maxilliped 3; B, pereopod 1; C, pereopod 2; D, pereopod 3; E, pereopod 4; F, pereopod 5; G, pleonite 6 and uropods.

Maxilliped 3 basis 1.2 times length of all other articles together, with 4 plumose setae medially, distal corner with 2 plumose setae, medial corner produced as tooth; ischium 0.04 times basis length, medial margin produced as 2 teeth; merus 7.0 times ischium length, with 4 plumose setae medially, plumose seta laterally, medial margin produced as teeth, lateral margin produced as teeth distally; carpus 0.7 times merus length, with 3 plumose setae medially, plumose seta laterally, lateral margin expanded and produced as teeth; propodus 1.4 times carpus length, with 3 plumose setae medially, plumose seta laterally, margins lined with fine hair-like setae dactylus 0.5 times propodus length, with 2 simple setae terminally; exopod 0.9 times basis length, basal article unarmed, flagellum with plumo-annulate setae (Figure 38A).

Pereopod 1 basis 1.2 times length of all other articles together, with 3 plumose setae, lateral corner produced as tooth; ischium 0.05 times basis length, with plumose seta; merus 5.0 times ischium length, with 3 plumose setae; carpus 0.9 times merus length, with 6 plumose setae; propodus 1.1 times carpus length, with 3 plumose setae; dactylus 0.6 times propodus length, with 3 plumose setae and 1 simple and 1 plumose setae terminally; exopod 0.8 times basis length, basal article with 2 simple setae, flagellum with plumo-annulate setae (Figure 38B).

Pereopod 2 basis 0.6 times length of all other articles together, with plumose seta; ischium 0.08 times basis length, unarmed; merus 3.7 times ischium length, with 1 simple and 2 plumose setae; carpus 1.8 times merus length, with 6 plumose setae; propodus 0.3 times carpus length, unarmed; dactylus 3.8 times propodus length, with 10 plumose setae and plumose terminally; exopod 1.4 times basis length, basal article unarmed, flagellum with plumo-annulate setae (Figure 38C).

Pereopod 3 basis 1.5 times length of all articles together, with 2 simple and 1 plumose setae; ischium 0.1 times basis length, with 2 plumose setae; merus 1.4 times ischium length, with 2 plumose setae; carpus 1.9 times merus length, with 2 plumose and 1 annulate setae; propodus 0.4 times carpus length, with annulate seta; dactylus 0.6 times propodus length, with 2 simple setae terminally (Figure 38D).

Pereopod 4 basis 1.1 times length of all other articles together, with 3 plumose setae; ischium 0.1 times basis length, with plumose seta; merus 1.8 times ischium length, with 2 plumose setae; carpus 2.4 times merus length, with 2 plumose and 1 annulate setae; propodus 0.3 times carpus length, with annulate seta; dactylus 0.6 times propodus length, with 2 simple setae terminally (Figure 38E).

Pereopod 5 basis 0.7 times length of all other articles together, with plumose seta; ischium 0.2 times basis length, with plumose seta; merus 1.4 times ischium length, with plumose seta; carpus 2.4 times merus length, with 2 plumose and 1 annulate setae; propodus 0.3 times carpus length, with annulate seta; dactylus 0.6 times propodus length, with 2 simple setae terminally (Figure 38F).

Uropod peduncles 2.1 times pleonite 6 length, medial margin serrate. Uropod endopod uniarticulate, 0.5 times peduncle length, with 7–8 microserrate with single subterminal setule medially, 1 microserrate with single subterminal setule laterally, terminal seta microserrate with single subterminal setule. Uropod exopod of 2 articles, 0.8 times length of endopod; article 1 0.4 times article 2 length, unarmed; article 2 with 2 microserrate with single subterminal setule, terminal seta microserrate with single subterminal setule. (Figure 38G).

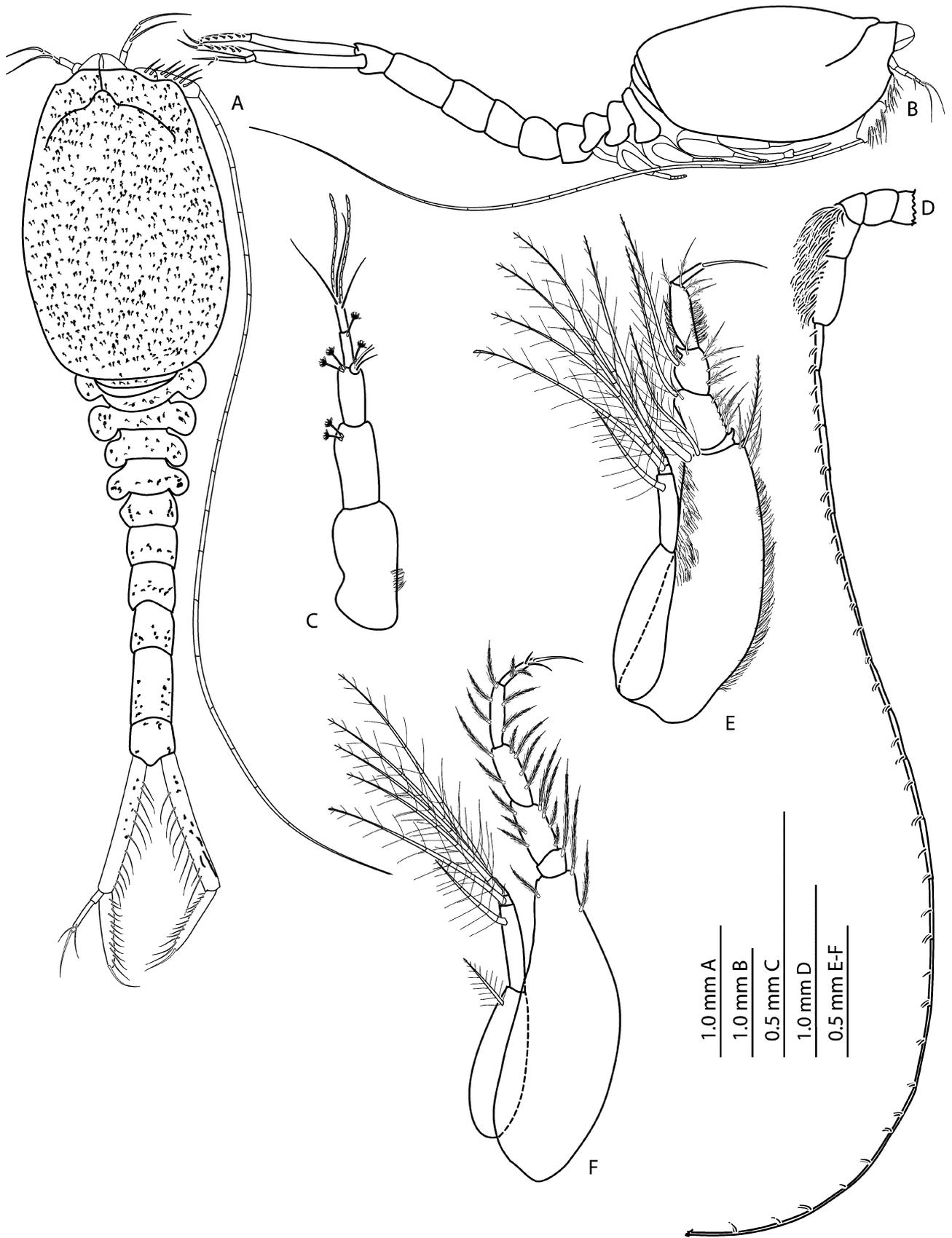
#### **Description of male.**

Paratype adult male, 5.4 mm, NIWA 80680. Carapace smooth, no sculpturing; pseudorostral lobes 0.2 times carapace length; eyelobe 0.05 times carapace length. Pereonites 1–2 only free dorsally. Carapace, pereonites and pleonites covered in red chromatophores, preserved specimen appears red (Figures 39A–B).

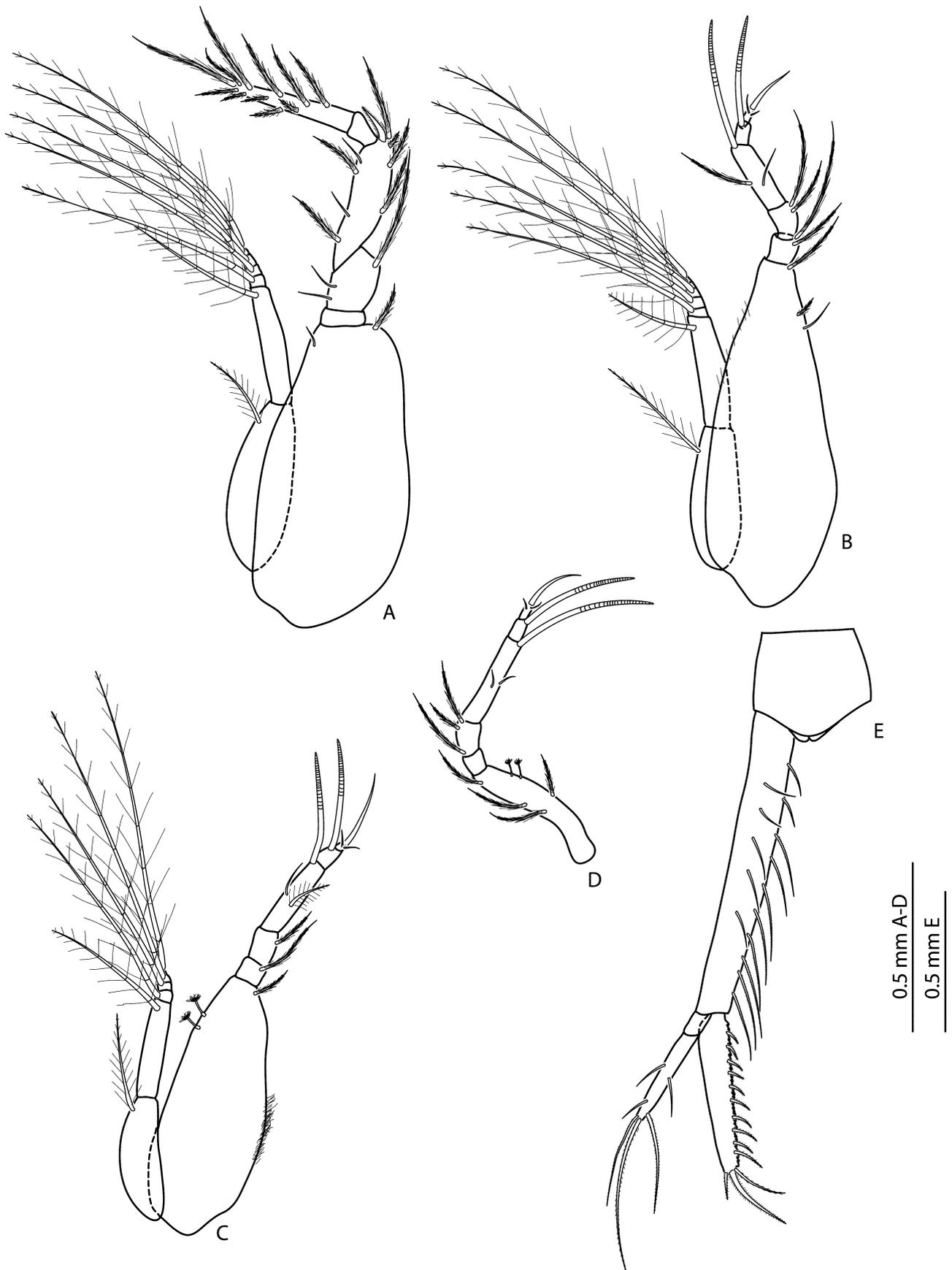
Antennule peduncle article 1 longest, margin with fine hair-like setae; article 2 0.6 times article 1 length, with 2 complex pedunculate setae; article 3 0.8 times article 2 length, with 2 complex pedunculate setae; main flagellum of 3 articles, with 2 aesthetascs and 3 simple setae; accessory flagellum of 1 article, with 3 simple and 1 complex pedunculate setae (Figure 39C).

Antenna extending past posterior border of uropod peduncles; peduncle of 5 articles, articles 4–5 with ranks of setae, incompletely circling articles; flagellum with more than 20 articles (Figure 39D).

Maxilliped 3 basis 1.3 times length of all other articles together, with 4 plumose setae medially, distal corner with 2 plumose setae, margins lined with fine hair-like setae ischium 0.02 times basis length, with medial margin produced as tooth; merus 11.0 times ischium length, with 5 plumose setae medially, 2 plumose setae laterally; carpus 0.8 times merus length, with 5 plumose setae medially, 3 plumose setae laterally, distal corner produced as tooth; propodus 1.4 times carpus length, with 3 plumose setae medially, plumose seta laterally, margins with fine hair-like setae dactylus 0.5 times propodus length, with simple seta terminally; exopod 0.9 times basis length, basal article unarmed, flagellum with plumo-annulate setae (Figure 39E).



**FIGURE 39.** *Campylaspis rufus* n. sp. Paratype adult male, NIWA 80680. A, dorsal view; B, side view; C, antennule; D, antenna; E, maxilliped 3; F, pereopod 1.



**FIGURE 40.** *Campylaspis rufus* n. sp. Paratype adult male, NIWA 80680. A, pereopod 2; B, pereopod 3; C, pereopod 4; D, pereopod 5; E, pleonite 6 and uropod.

Pereopod 1 basis 1.6 times length of all other articles together, with 3 pappose setae; ischium 0.08 times basis length, with pappose seta; merus 2.0 times ischium length, with 7 pappose setae; carpus 0.8 times merus length, with 6 pappose setae; propodus 0.9 times carpus length, with 5 pappose setae; dactylus 1.1 times propodus length, with 2 pappose setae and 3 simple setae terminally; exopod 0.8 times basis length, basal article with plumose seta, flagellum with plumo-annulate setae (Figure 39F).

Pereopod 2 basis 0.9 times length of all other articles together, with 1 simple and 1 pappose setae; ischium 0.05 times basis length, unarmed; merus 3.3 times ischium length, with 2 simple and 1 pappose setae; carpus 2.2 times merus length, with 2 simple, 5 pappose and 1 microserrate setae; propodus 0.2 times carpus length, unarmed; dactylus 4.8 times propodus length, with 10 pappose setae and pappose seta terminally; exopod 1.1 times basis length, basal article with plumose seta, flagellum with plumo-annulate setae (Figure 40A).

Pereopod 3 basis 2.0 times length of all other articles together, with 1 simple and 1 pappose setae; ischium 0.08 times basis length, with 2 pappose setae; merus 1.4 times ischium length, with 2 pappose setae; carpus 2.0 times merus length, with 1 simple, 1 pappose and 1 annulate setae; propodus 0.3 times carpus length, with annulate seta; dactylus 0.8 times propodus length, with 3 simple setae terminally; exopod 0.9 times basis length, basal article with plumose seta, flagellum with plumo-annulate setae (Figure 40B).

Pereopod 4 basis 1.6 times length of all other articles together, with 1 pappose and 2 complex pedunculate setae, margin with fine hair-like setae ischium 0.08 times basis length, with pappose seta; merus 1.5 times ischium length, with pappose seta; carpus 2.8 times merus length, with 1 simple, 1 plumose and 1 annulate setae; propodus 0.2 times carpus length, with annulate seta; dactylus 0.5 times propodus length, with 3 simple setae terminally; exopod equal to basis length, basal article with plumose seta, flagellum with plumo-annulate setae (Figure 40C).

Pereopod 5 basis 0.9 times length of all other articles together, with 4 pappose and 2 complex pedunculate setae; ischium 0.1 times basis length, unarmed; merus 1.5 times ischium length, with 3 pappose setae; carpus 2.2 times merus length, with 2 simple and 1 annulate setae; propodus 0.3 times carpus length, with annulate seta; dactylus 0.8 times propodus length, with 3 simple setae terminally (Figure 40D).

Uropod peduncles 2.9 times pleonite 6 length, with 5 simple and 10 microserrate setae medially. Uropod endopod uniaarticulate, 0.5 times peduncle length, with 11 microserrate setae medially, 1 microserrate seta laterally, terminal seta microserrate. Uropod exopod 0.8 times length of endopod; article 1 0.2 times article 2 length, unarmed; article 2 with 3 simple and 2 microserrate setae, terminal seta microserrate (Figure 40E).

**Etymology.** The species is named *rufus* from the Latin *rufus*, meaning red, in reference to the red chromatophores covering the entire body, such that the specimens appear red.

**Remarks.** The most similar species are *Campylaspis apheles* and *Campylaspenis tangaroae*. In *Campylaspis apheles* there are very few to no chromatophores on the body, and the species is smaller than *C. rufus*. Females of *C. tangaroae* have a sulcus on the carapace and only 2 setae medially on the uropod endopod, while females of *C. rufus* have no sulcus on the carapace and at least 7 setae medially on the uropod endopod. Males of *C. tangaroae* have a pair of large penial lobes ventrally on pereonite 5 and the carapace has a distinct sulcus, while males of *C. rufus* have no penial lobes and no sulcus.

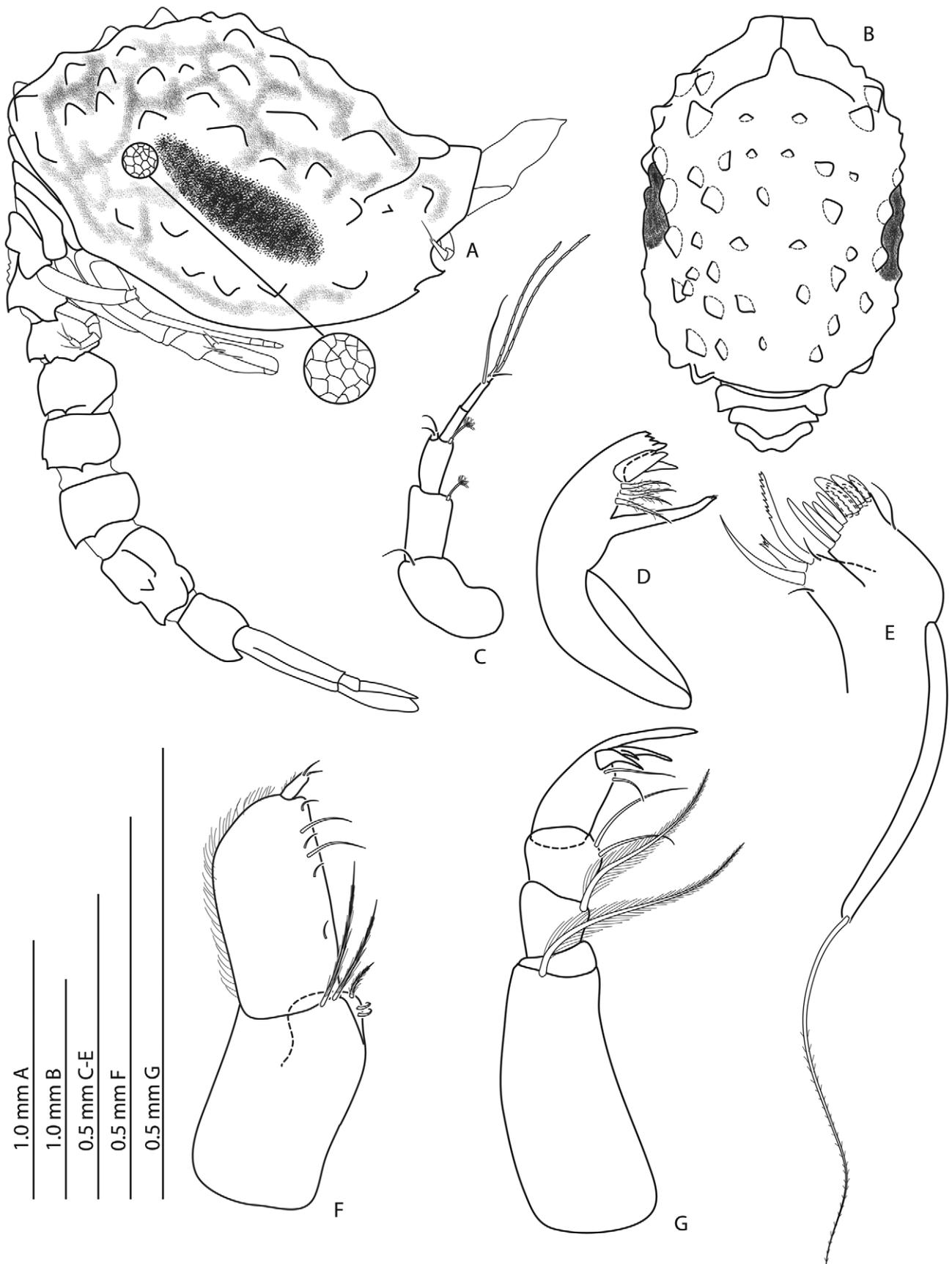
### ***Campylaspis schnabelae* n. sp.**

Figures 41–42

**Type material.** Holotype ovigerous female, NIWA 80701, paratype subadult male, dissected, NIWA 46209, 0705/160.

**Other material examined.** 2 subadult females, 2 subadult males, 1 manca, NIWA 79325, 44.5607°S, 178.4762°W–44.5592°S, 178.4830°W, 1076–1103 m, 10 April 2007. 1 subadult female, 13 mancae, NIWA 46205, 44.5607°S, 178.4762°W–44.5592°S, 178.4830°W, 1076–1103 m, 10 April 2007. 3 subadult females, NIWA 46212, 43.5300°S, 178.5048°E–43.5363°S, 178.5118°E, 346 m, 24 April 2007. 1 juvenile, NIWA 79326, 38.6177°S, 168.9428°E–38.6258°S, 168.9490°E, 480–482 m, 29 May 2007. 5 juveniles, NIWA 79327, 39.6373°S, 172.1532°E–39.6457°S, 172.1522°E, 264–266 m, 7 June 2007.

**Diagnosis.** *Females and subadult males.* Carapace with sulcus, covered in large tubercles except within sulcus; pseudorostrum not dorsally directed. Carapace, pereonites and pleonites without red chromatophores. Pereonites 1–2 free only dorsally. Pereopod 2 dactylus normal, terminal seta long. Uropod peduncles 1.5 times length of pleonite 6. *Male.* Adult unknown.



**FIGURE 41.** *Campylaspis schnabelae* n. sp. Holotype ovigerous female, NIWA 80701. A, side view. Paratype subadult female, NIWA 46209. B, dorsal view; C, antennule; D, mandible; E, maxillule; F, maxilliped 1; G, maxilliped 2.

### **Description of female.**

Holotype ovigerous female, 4.0 mm, NIWA 80701. Carapace with sulcus, covered in large tubercles except within sulcus; anteroventral corner produced as 2 teeth; pseudorostral lobes 0.2 times carapace length; eyelobe 0.05 times carapace length, without lenses. Pereonites 1–2 only free dorsally. Carapace, pereonites and pleonites without red chromatophores (Figure 41A).

### **Description of subadult male.**

Paratype subadult male, 3.8 mm, NIWA 46209. Carapace with sulcus, covered in large tubercles except within sulcus, tubercles may be curved forward; anteroventral corner produced as 2 teeth; pseudorostral lobes 0.2 times carapace length; eyelobe 0.08 times carapace length, without lenses. Pereonites 1–2 free only dorsally. Carapace, pereonites and pleonites without red chromatophores (Figure 41B).

Antennule peduncle article 1 longest, with simple seta; article 2 0.6 times article 1 length, with complex pedunculate seta; article 3 0.8 times article 2 length, with complex pedunculate seta; main flagellum of 3 articles, with 2 aesthetascs and 2 simple setae; accessory flagellum of 1 article, with 2 simple setae (Figure 41C).

Mandible truncate, with 4 microserrate setae medially, lacinia mobilis with 2 cusps (Figure 41D).

Maxillule with 2 endites; outer endite broad, with 11 simple setae, simple seta on margin; inner endite with 3 simple, 1 dentate and 1 tricuspid setae; palp with microserrate seta (Figure 41E).

Maxilliped 1 basis with 3 pappose and 2 hook setae; merocarpus 1.1 times basis length, with 6 simple setae, lateral margin with fine hair-like setae; dactylus with 2 simple setae, lateral margin with fine hair-like setae (Figure 41F).

Maxilliped 2 basis 0.8 times length of all other articles together, with plumose seta; ischium 0.1 times basis length, unarmed; merus 2.2 times ischium length, with plumose seta; carpus 1.3 times merus length, with 2 simple setae; propodus 1.1 times carpus length, with 2 simple setae, lateral margin produced as single long process; dactylus 0.9 times propodus length, produced as 3 teeth, central tooth short, outer pair unequal (Figure 41G).

Maxilliped 3 basis 1.2 times length of all other articles together, with 1 simple and 2 plumose setae at distal corner; ischium 0.1 times basis length, unarmed; merus 2.1 times ischium length, with 2 simple setae medially, plumose seta laterally, medial margin produced as teeth, lateral margin produced as 2 strong teeth; carpus 0.9 times merus length, with 3 simple seta medially, plumose seta laterally, medial margin produced as teeth, lateral margin produced as large teeth; propodus 0.9 times carpus length, with 2 simple and 1 plumose setae medially; dactylus 0.5 times propodus length, with 4 simple setae terminally; exopod 0.9 times basis length, basal article unarmed, flagellum with plumo-annulate setae (Figure 42A).

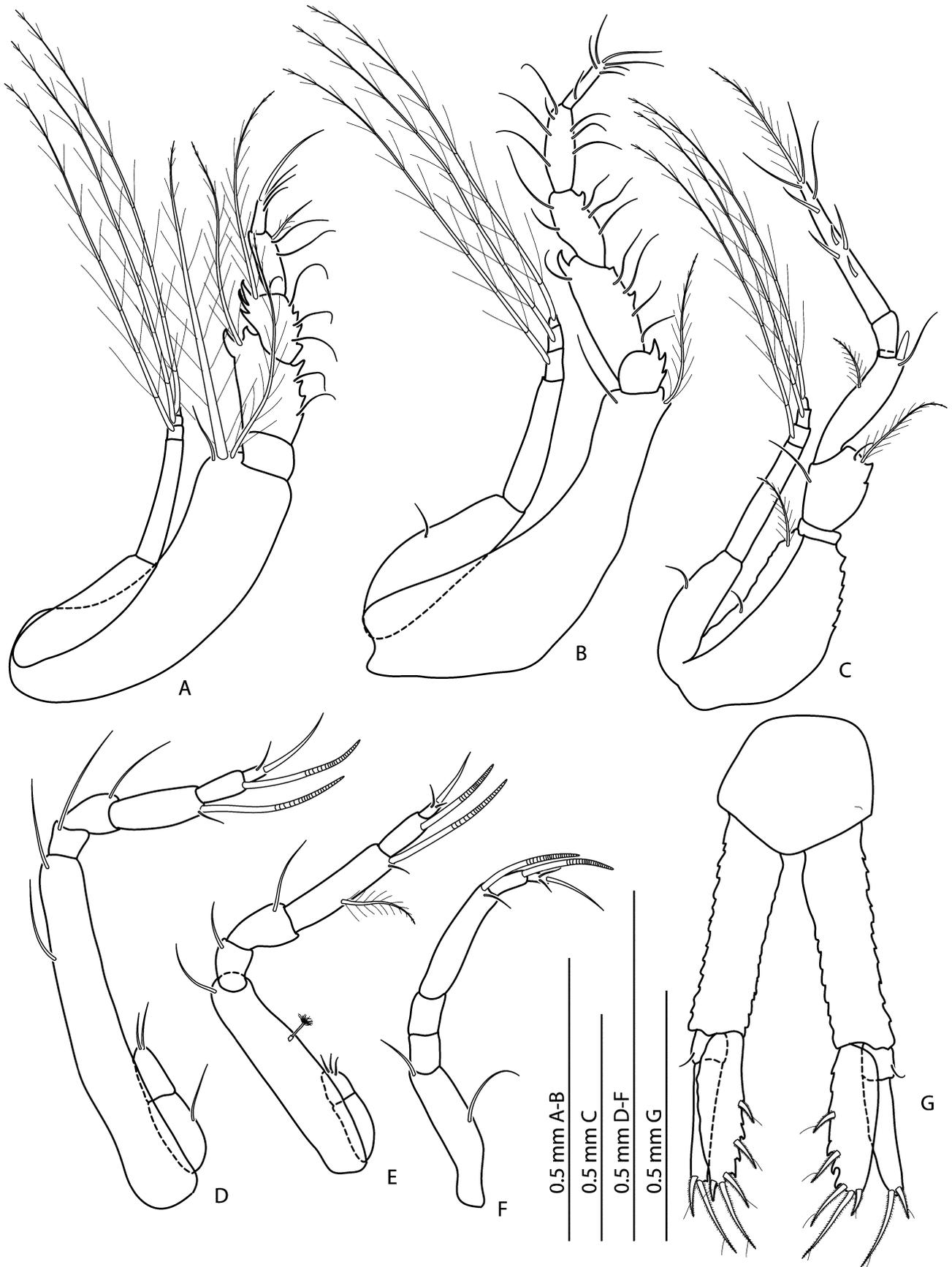
Pereopod 1 basis equal to length of all other articles together, with 1 simple and 1 plumose setae; ischium 0.1 times basis length, medial margin produced as large teeth; merus 2.5 times ischium length, with 5 simple setae, medial margin produced as 2 teeth, lateral margin produced as large tooth; carpus 0.8 times merus length, with 5 simple setae, medial margin produced as large tooth; propodus equal to carpus length, with 7 simple seta; dactylus 0.7 times propodus length, with 1 simple seta and 6 simple setae terminally; exopod equal to basis length, basal article with simple seta, flagellum with plumo-annulate setae (Figure 42B).

Pereopod 2 basis 0.5 times length of all other articles together, with 1 simple and 1 plumose setae; ischium 0.05 times basis length, unarmed; merus 7.5 times ischium length, with 2 simple and 1 plumose setae; carpus 1.5 times merus length, with 2 simple and 1 plumose setae; propodus 0.3 times carpus length, unarmed; dactylus 4.0 times propodus length, with 8 simple setae and plumose seta terminally; exopod 1.5 times basis length, basal article with simple seta, flagellum with plumo-annulate setae (Figure 42C).

Pereopod 3 basis 1.7 times length of all other articles together, with 2 simple setae; ischium 0.07 times basis length, with simple seta; merus 1.4 times ischium length, with simple seta; carpus 2.6 times merus length, with 1 simple and 1 annulate setae; propodus 0.5 times carpus length, with annulate seta; dactylus 0.4 times propodus length, with 2 simple setae terminally; exopod not fully developed (Figure 42D).

Pereopod 4 basis 0.8 times length of all other articles together, with 1 simple and 1 complex pedunculate setae; ischium 0.2 times basis length, with simple seta; merus 1.3 times ischium length, with simple seta; carpus 1.8 times merus length, with 1 simple, 1 plumose and 1 annulate setae; propodus 0.5 times carpus length, with annulate seta; dactylus 0.4 times propodus length, with 3 simple setae terminally; exopod not fully developed (Figure 42E).

Pereopod 5 basis 0.5 times length of all other articles together, with 2 simple setae; ischium 0.3 times basis length, unarmed; merus equal to ischium length, unarmed; carpus 3.0 times merus length, with 1 simple and 1 annulate setae; propodus 0.3 times carpus length, with annulate seta; dactylus 0.4 times propodus length, with 3 simple setae terminally (Figure 42F).



**FIGURE 42.** *Campylaspis schnabelae* n. sp. Paratype subadult female, NIWA 46209. A, maxilliped 3; B, pereopod 1; C, pereopod 2; D, pereopod 3; E, pereopod 4; F, pereopod 5; G, pleonite 6 and uropods.

Uropod peduncles 1.5 times pleonite 6 length, margins serrate. Uropod endopod uniarticulate, 0.8 times peduncle length, with 3 microserrate with single subterminal setule setae medially, 1 microserrate with single subterminal setule laterally, terminal seta microserrate with single subterminal setule. Uropod exopod of 2 articles, 0.9 times length of endopod; article 1 0.2 times article 2 length, with simple seta; article 2 with 2 microserrate with single subterminal setule setae terminally (Figure 42G).

**Etymology.** The species is named *schnabelae* in honor of Kareen Schnabel, collection manager at NIWA.

**Remarks.** The most similar species is *Campylaspis zimmeri*, which also has many large tubercles on the carapace. In *C. zimmeri*, the carapace does not have a sulcus, and there are many red chromatophores throughout the body, while in *C. schnabelae* the carapace has a distinct sulcus, and there few chromatophores.

### ***Campylaspis sculptaspinosa* n. sp.**

Figures 43–46

**Type material.** Holotype ovigerous female, NIWA 80665, paratype ovigerous female, dissected, NIWA 80666, paratype adult male, dissected, NIWA 80667, 43.5300°S, 178.5048°E–43.5363°S, 178.5118°E, 346 m, 24 April 2007.

**Other material examined.** 1 juvenile, NIWA 79299, 43.8363°S, 176.7092°E–43.8330°S, 176.7127°E, 478–479 m, 5 April 2007. 1 ovigerous female, NIWA 79300, 43.5300°S, 178.5048°E–43.5363°S, 178.5118°E, 346 m, 24 April 2007. 22 ovigerous females, 2 adult males, 48 juveniles, NIWA 46214, 43.5300°S, 178.5048°E–43.5363°S, 178.5118°E, 346 m, 24 April 2007. 2 ovigerous females, 1 subadult female, 2 adult males, NIWA 79301, 43.7967°S, 175.3158°E–43.8045°S, 175.3148°E, 418–422 m, 27 April 2007. 2 ovigerous females, 2 subadult females, 3 subadult males, 5 mancae, NIWA 79302, 39.6373°S, 172.1532°E–39.6457°S, 172.1522°E, 264–266 m, 7 June 2007. 2 ovigerous females, NIWA 79303, 39.6373°S, 172.1532°E–39.6457°S, 172.1522°E, 264–266 m, 7 June 2007.

**Diagnosis.** *Females and subadult males.* Carapace with sulcus bounded by carinae, distinct teeth all over carapace and dorsally to pleonite 2, with a pair of large tubercles at corners of frontal lobe, with spine on tubercle; pseudorostrum not dorsally directed. Carapace, pereonites and pleonites with scattered red chromatophores. Pereonites 1–5 free, pereonites 1–2 with strong dorsal lappets. Pereopod 2 dactylus normal, terminal seta long. Uropod peduncles 2.8–3.0 times length of pleonite 6. *Male.* Carapace less vaulted than in female, sulcus less pronounced, spines small. Pleonites 1–5 with lateral depression to accommodate antennal flagellum.

#### **Description of female.**

Holotype ovigerous female, 3.2 mm, NIWA 80665. Paratype ovigerous female, 3.0 mm, NIWA 80666. Carapace with sulcus bounded by carinae, distinct teeth all over carapace and dorsally to pleonite 2, with a pair of large tubercles at corners of frontal lobe, with spine on tubercle; pseudorostral lobes not dorsally directed, 0.3 times carapace length; eyelobe absent. Pereonites 1–5 free, with dorsal spines; pereonites 1–2 with strong dorsally directed lappets. Pleonites 1–2 with dorsal spines. Carapace, pereonites and pleonites with scattered red chromatophores (Figures 43A–B).

Antennule peduncle article 1 longest, with 2 simple setae; article 2 0.8 times article 1 length, with 3 simple setae; article 3 0.9 times article 2 length, with pedunculate seta; main flagellum of 3 articles, with 2 aesthetascs; accessory flagellum of 1 article, with 3 pedunculate setae (Figure 43C).

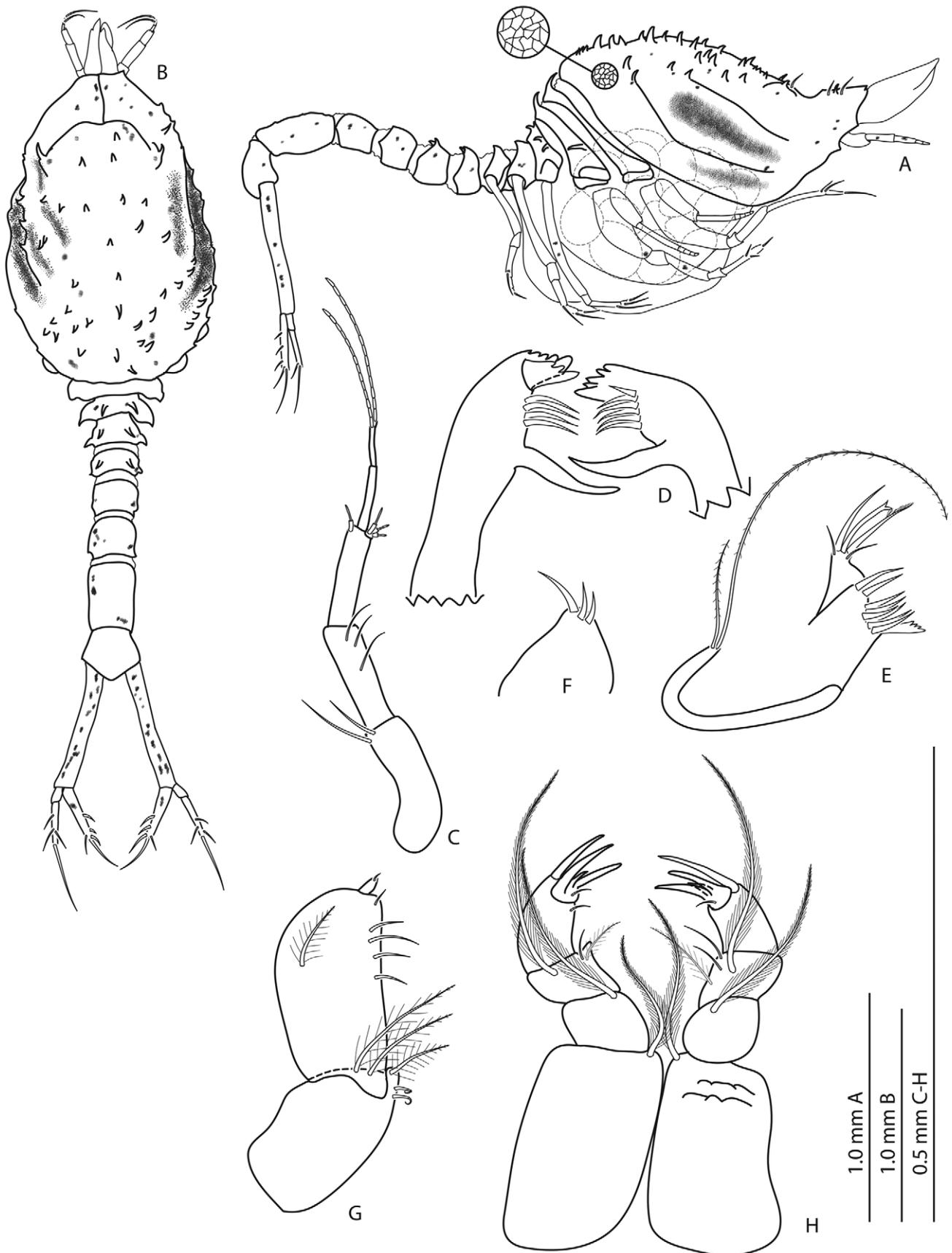
Mandible truncate, with 4–5 simple setae medially, lacinia mobilis with 3 cusps (Figure 43D).

Maxillule with 2 endites; outer endite broad, with 8 simple and 1 dentate setae; inner endite with 3 simple, 1 microserrate and 1 bicuspid setae; palp with 2 microserrate setae (Figure 43E).

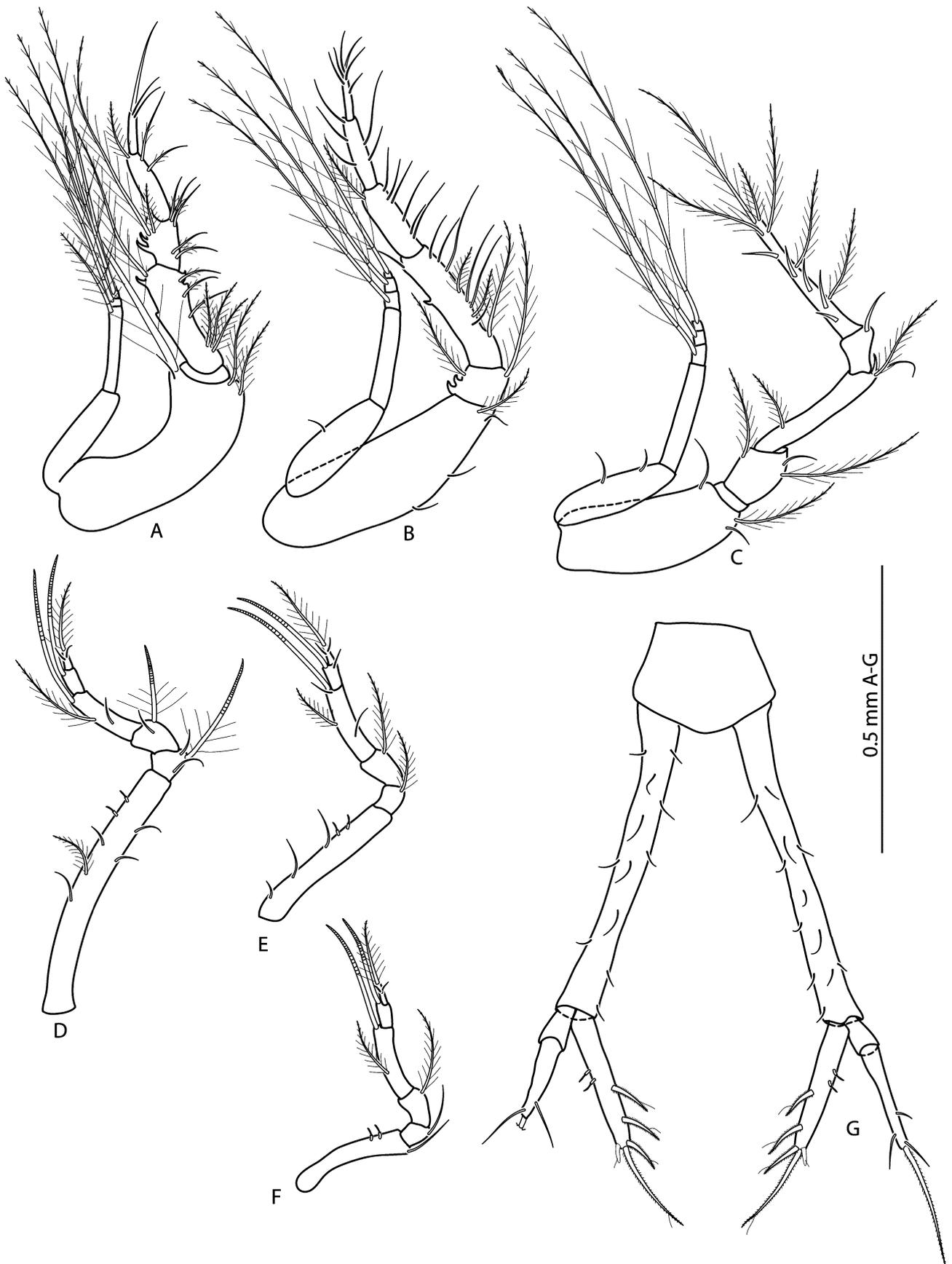
Maxilla reduced to single endite, with 3 simple setae terminally (Figure 43F).

Maxilliped 1 basis with 3 plumose and 2 hook setae; merocarpus 1.3 times basis length, with 5 simple and 1 plumose setae; dactylus with simple seta (Figure 43G).

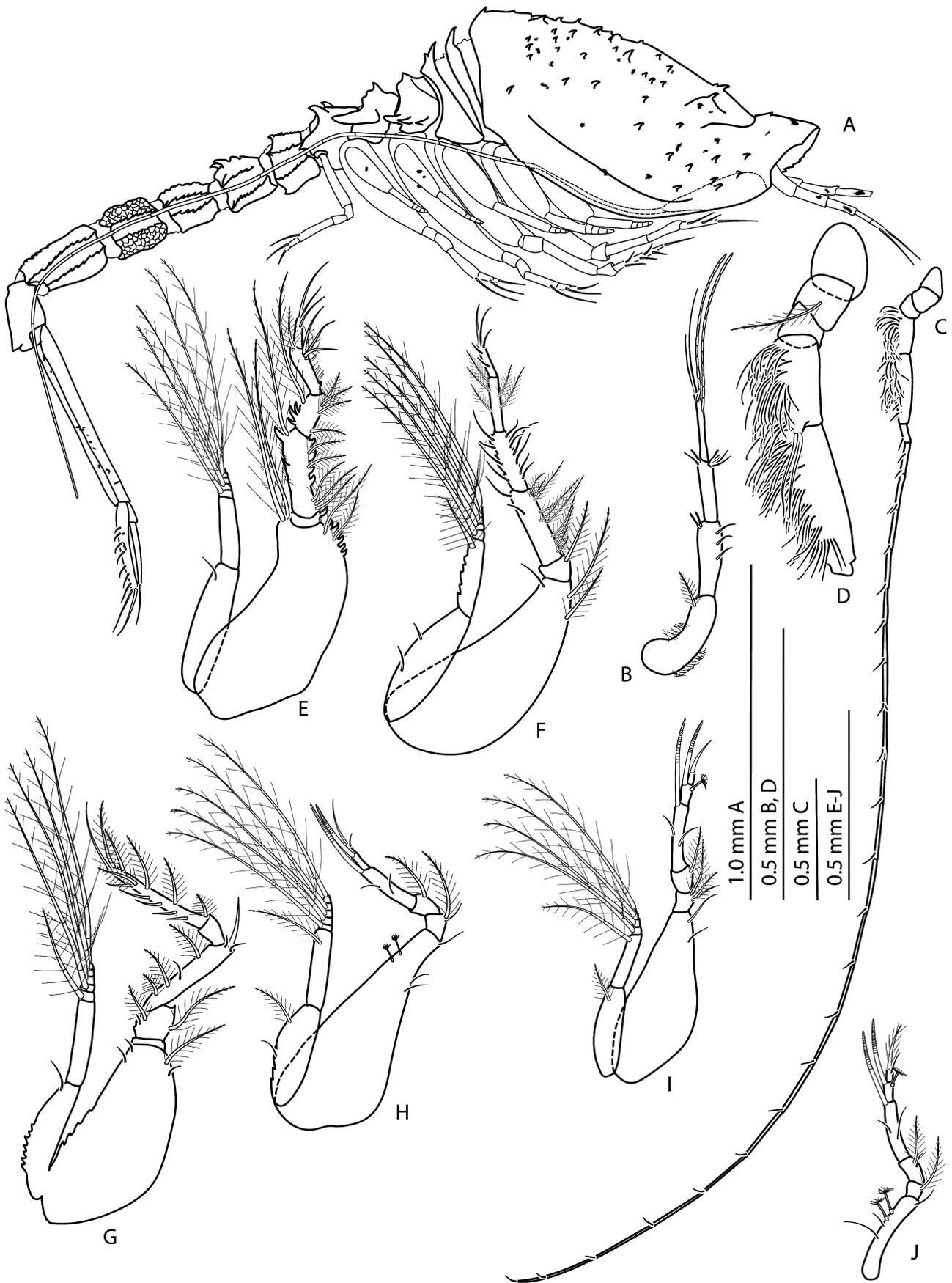
Maxilliped 2 basis 0.8 times length of all other articles together, with plumose seta; ischium absent; merus 0.3 times basis length, with plumose seta; carpus 0.8 times merus length, with 1 simple and 2 plumose setae, medial corner produced as tooth; propodus 1.2 times carpus length, with 1 simple seta, distal margin produced as long process; dactylus 1.5 times propodus length, produced as 3 teeth terminally, central tooth short (Figure 43H).



**FIGURE 43.** *Campylaspis sculptaspinosa* n. sp. Holotype ovigerous female, NIWA 80665. A, side view. Paratype ovigerous female, NIWA 80666. B, dorsal view; C, antennule; D, mandibles; E, maxillule; F, maxilla; G, maxilliped 1; H, maxilliped 2s.



**FIGURE 44.** *Campylaspis sculptaspinosa* n. sp. Paratype ovigerous female, NIWA 80666. A, maxilliped 3; B, pereopod 1; C, pereopod 2; D, pereopod 3; E, pereopod 4; F, pereopod 5; G, pleonite 6 and uropods.



**FIGURE 45.** *Campylaspis sculptaspinosa* n. sp. Paratype adult male, NIWA 80667. A, side view; B, antennule; C, antenna; D, antenna; E, maxilliped 3; F, pereopod 1; G, pereopod 2; H, pereopod 3; I, pereopod 4, J, pereopod 5.

Maxilliped 3 basis 0.7 times length of all other articles together, with 2 plumose setae medially, 1 simple and 1 plumose setae on distal corner; ischium 0.05 times basis length, unarmed; merus 11.5 times ischium length, with 6 plumose setae medially, plumose seta laterally, lateral margin produced as 2 strong teeth; carpus 0.4 times merus length, with 5 plumose setae medially, 2 plumose setae laterally, lateral margin produced as 2 strong teeth; propodus 1.6 times carpus length, with 3 plumose setae; dactylus 0.6 times propodus length, with 3 simple setae terminally; exopod 1.1 times basis length, basal article unarmed, flagellum with plumo-annulate setae (Figure 44A).

Pereopod 1 basis 0.7 times length of all other articles together, with 3 simple and 1 plumose setae; ischium 0.1 times basis length, with 2 plumose setae, lateral margin produced as 2 strong teeth; merus 3.9 times ischium length, with 7 simple and 3 plumose setae, lateral margin produced as single tooth; carpus 0.6 times merus length, with 6 simple and 1 plumose setae; propodus 0.9 times carpus length, with 5 simple setae; dactylus 0.6 times propodus length, with 6 simple setae terminally; exopod equal to basis length, basal article with simple seta, flagellum with plumo-annulate setae (Figure 44B).

Pereopod 2 basis 0.5 times length of all other articles together, with 2 simple and 1 plumose setae; ischium 0.06 times basis length, unarmed; merus 5.0 times ischium length, with 2 simple and 2 plumose setae; carpus 2.5 times merus length, with 2 simple and 2 plumose setae; propodus 0.3 times carpus length, with simple seta; dactylus 3.5 times propodus length, with 5 simple and 5 plumose setae, terminal seta plumose; exopod 1.4 times basis length, basal article with 2 simple setae, flagellum with plumo-annulate setae (Figure 44C).

Pereopod 3 basis 1.9 times length of all other articles together, with 4 simple, 1 plumose and 2 pedunculate setae; ischium 0.1 times basis length, with 2 simple and 1 plumo-annulate setae; merus 1.2 times ischium length, with 1 simple and 1 plumo-annulate setae; carpus 1.3 times merus length, with 1 simple, 1 plumose and 1 annulate setae; propodus 0.6 times carpus length, with annulate seta; dactylus 0.8 times propodus length, with 2 simple setae, terminal seta plumose (Figure 44D).

Pereopod 4 basis 0.9 times length of all other articles together, with 3 simple and 2 pedunculate setae; ischium 0.2 times basis length, with plumose seta; merus 1.4 times ischium length, with plumose seta; carpus 2.1 times merus length, with 2 simple, 1 plumose and 1 annulate setae; propodus 0.3 times carpus length, with annulate seta; dactylus 0.8 times propodus length, with 2 simple setae, terminal seta plumose (Figure 44E).

Pereopod 5 basis 0.8 times length of all other articles together, with 1 simple and 2 pedunculate setae; ischium 0.2 times basis length, with simple seta; merus 1.8 times ischium length, with plumose seta; carpus 1.3 times merus length, with 1 plumose and 1 annulate setae; propodus 0.4 times carpus length, with annulate seta; dactylus equal to propodus length, with 2 simple setae, terminal seta plumose (Figure 44F).

Uropod peduncles 2.8 times pleonite 6 length, with 12 simple setae. Uropod endopod uniarticulate, 0.4 times peduncle length, with 3 microserrate with single subterminal setule setae medially, simple seta with single subterminal setule laterally, terminal seta microserrate with single subterminal setule. Uropod exopod of 2 articles, equal to length of endopod; article 1 0.3 times article 2 length; article 2 with 3 simple setae, terminal seta microserrate (Figure 44G).

#### **Description of male.**

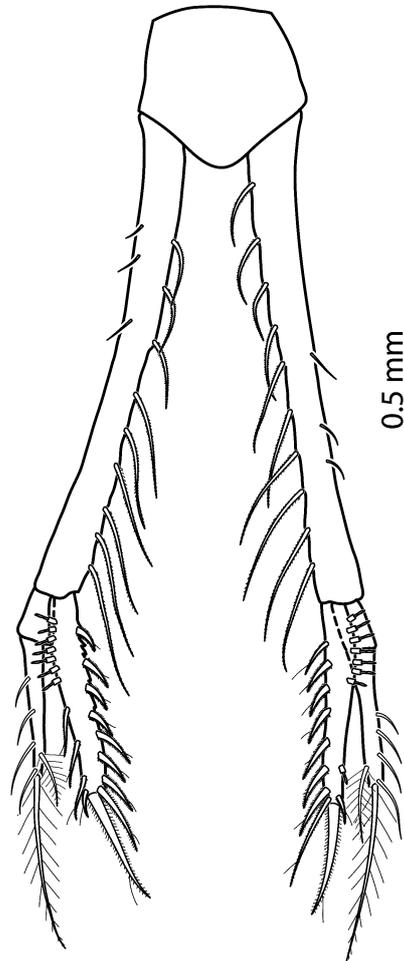
Paratype adult male, 3.1 mm, NIWA 80667. Carapace with weak sulcus, bounded ventrally by carina, covered in spines, with pair of large tubercles at corners of frontal lobe, with spine dorsally on tubercle; pseudorostral lobes not dorsally directed, 0.3 times carapace length; eyelobe absent. Pereonites 1–5 free, pereonites 1–2 with strong dorsal lappets, pereonites 3–5 expanded laterally, all with dorsal spines. Pleonites with lateral groove for antennal flagellum, pleonites 1–2 with dorsal spines. Carapace, pereonites and pleonites with sparsely scattered red chromatophores (Figure 45A).

Antennule peduncle article 1 longest, with plumose seta, margins lined with fine hair-like setae; article 2 0.8 times article 1 length, with 3 simple and 2 pedunculate setae; article 3 0.9 times article 2 length, with 1 simple and 1 pedunculate setae; main flagellum of 3 articles, with 2 aesthetascs and 2 simple setae; accessory flagellum of 1 article, with 4 simple and 1 pedunculate setae (Figure 45B).

Antenna extending to posterior border of uropod peduncles; peduncle of 5 articles, article 3 with plumose seta; articles 4–5 with ranks of setae, incompletely circling articles; flagellum with 22 articles, each with simple seta (Figures 45C–D).

Maxilliped 3 basis equal to length of all other articles together, with 2 plumose setae medially, distal corner with 2 plumose setae, medial margin produced as large teeth distally; ischium 0.05 times basis length, medial

margin produced as strong tooth; merus 8.0 times ischium length, with 5 plumose setae medially plumose seta laterally, lateral margin lined with fine hair-like setae, margins produced as strong teeth; carpus 0.4 times merus length, with 4 plumose setae medially, plumose seta laterally, lateral margin produced as strong teeth; propodus 1.3 times carpus length, with 3 plumose setae medially, plumose seta laterally, medial margin lined with fine hair-like setae; dactylus 0.5 times propodus length, with 3 simple setae terminally; exopod 1.1 times basis length, basal article with simple seta, flagellum with plumo-annulate setae (Figure 45E).



**FIGURE 46.** *Campylaspis sculptaspinosa* n. sp. Paratype adult male, NIWA 80667. Pleonite 6 and uropods.

Pereopod 1 basis equal to all other articles together, with 1 simple and 2 plumose setae; ischium 0.07 times basis length, with plumose seta; merus 5.0 times ischium length, with 2 simple and 10 plumose setae; carpus 0.8 times merus length, with 11 simple setae; propodus 0.8 times carpus length, with 5 plumose setae; dactylus 0.6 times propodus length, with 2 simple setae and 3 simple setae terminally; exopod equal to basis length, basal article with 2 simple setae, flagellum with plumo-annulate setae (Figure 45F).

Pereopod 2 basis 0.8 times length of all other articles together, with 3 simple and 1 plumose setae; ischium 0.03 times basis length, unarmed; merus 5.0 times ischium length, with 1 simple and 2 plumose setae; carpus 3.6 times merus length, with 4 simple and 3 plumose setae; propodus 0.2 times carpus length, unarmed; dactylus 5.3 times propodus length, with 5 simple and 4 simple setae, 1 simple and 1 plumose setae terminally; exopod 1.2 times basis length, basal article with plumose seta, flagellum with plumo-annulate setae (Figure 45G).

Pereopod 3 basis 2.0 times length of all other articles together, with 3 simple and 2 complex pedunculate setae; ischium 0.07 times basis length, with plumose seta; merus equal to ischium length, with plumose seta; carpus 3.7 times merus length, with 2 simple and 1 annulate setae; propodus 0.3 times carpus length, with annulate seta; dactylus 0.7 times propodus length, with 2 simple setae terminally; exopod equal to basis length, basal article with 1 simple and 1 plumose setae, flagellum with plumo-annulate setae (Figure 45H).

Pereopod 4 basis 1.7 times length of all other articles together, with 2 simple setae; ischium 0.09 times basis length, with 1 simple and 2 plumose setae; merus 1.3 times ischium length, with plumose seta; carpus 2.0 times merus length, with 2 simple and 1 annulate seta; propodus 0.5 times carpus length, with 1 annulate and 1 complex pedunculate setae; dactylus 0.5 times propodus length, with simple seta terminally; exopod equal to basis length, basal article with plumose seta, flagellum with plumo-annulate setae (Figure 45I).

Pereopod 5 basis 0.7 times length of all other articles together, with 3 simple and 2 complex pedunculate setae; ischium 0.2 times basis length, with plumose seta; merus 1.7 times ischium length, with 1 simple and 1 plumose setae; carpus 2.2 times merus length, with 2 simple and 1 annulate setae; propodus 0.4 times carpus length, with 1 annulate and 1 complex pedunculate setae; dactylus 0.5 times propodus length, with simple seta, terminal seta plumose (Figure 45J).

Uropod peduncles 3.0 times pleonite 6 length, with 3 simple and 9–10 microserrate setae. Uropod endopod uniarticulate, 0.4 times peduncle length, with 8 microserrate with single subterminal setule setae medially, 7 pedunculate and 4 microserrate with single subterminal setule setae laterally, terminal seta microserrate with single subterminal setule. Uropod exopod equal to length of endopod; article 1 0.3 times article 2 length, unarmed; article 2 with 4 simple and 1 plumose setae, terminal seta plumose (Figure 46).

**Etymology.** The species is named *sculptaspinosa* from the Latin *sculpta*, in reference to the sculptured carapace with a sulcus and carinae, in combination with the Latin *spinosa*, in reference to the spines that are found throughout the carapace.

**Remarks.** The most similar species is *Campylaspis millsae*, which has an eyelobe in the female, fewer spines dorsally on the carapace, and teeth at the anteroventral corner of the carapace, while *C. sculptaspinosa* has no eyelobe in the female, many large spines dorsally on the carapace, and no teeth at the anteroventral corner of the carapace in either sex.

### ***Campylaspis zealandiaensis* n. sp.**

Figures 47–50

**Type material.** Holotype subadult female, NIWA 80648, paratype ovigerous female, dissected, NIWA 80649, paratype adult male, dissected, NIWA 80650, 40.1277°S, 170.2140°E–40.1352°S, 170.2090°E, 803–805 m, 5 June 2007.

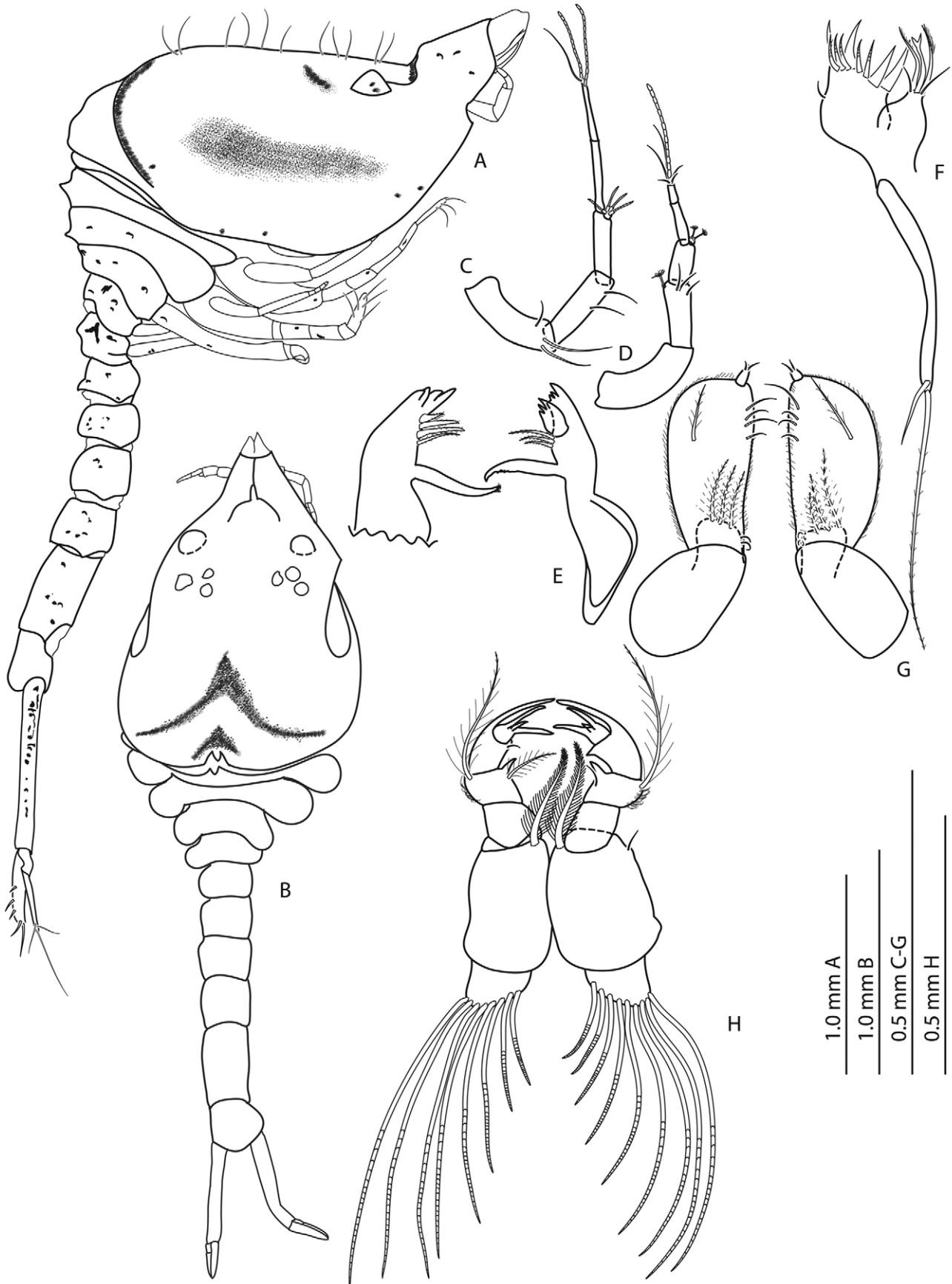
**Other material examined.** 1 ovigerous female, NIWA 79304, 44.5607°S, 178.4762°W–44.5592°S, 178.4830°W, 1076–1103 m, 10 April 2007. 2 subadult females, 2 subadult males, 1 manca, NIWA 46208, 43.2903°S, 175.5522°W–43.2933°S, 175.5630°W, 638–644, 15 April 2007. 3 subadult females, 1 adult male, 1 subadult male, 6 juveniles, NIWA 46211, 0705/160. 2 subadult females, 1 adult male, NIWA 79305, 40.1277°S, 170.2140°E–40.1352°S, 170.2090°E, 803–805 m, 5 June 2007.

**Diagnosis.** *Females and subadult males.* Carapace with deep sulcus, distinct ridge posteriorly bounding branchial region, with 1 pair of large tubercles posterior and lateral of corners of frontal lobe, with transparent areas posterior of tubercles, with pseudorostral lobes raised dorsally relative to carapace in side view; pseudorostrum weakly dorsally directed. Carapace, pereonites and pleonites with sparsely scattered red chromatophores. Pereonites 1–5 free, pereonite 1 with dorsally directed, bifurcated lappet. Pereopod 2 dactylus normal, terminal seta long. Uropod peduncles 3.2 times length of pleonite 6. *Male.* Carapace much less vaulted, sulcus extending farther posterior than in female, without setae. Pereonites 1–2 with anteriorly directed dorsal lappets. Uropod peduncles 3.8 times length of pleonite 6, more setose than in female.

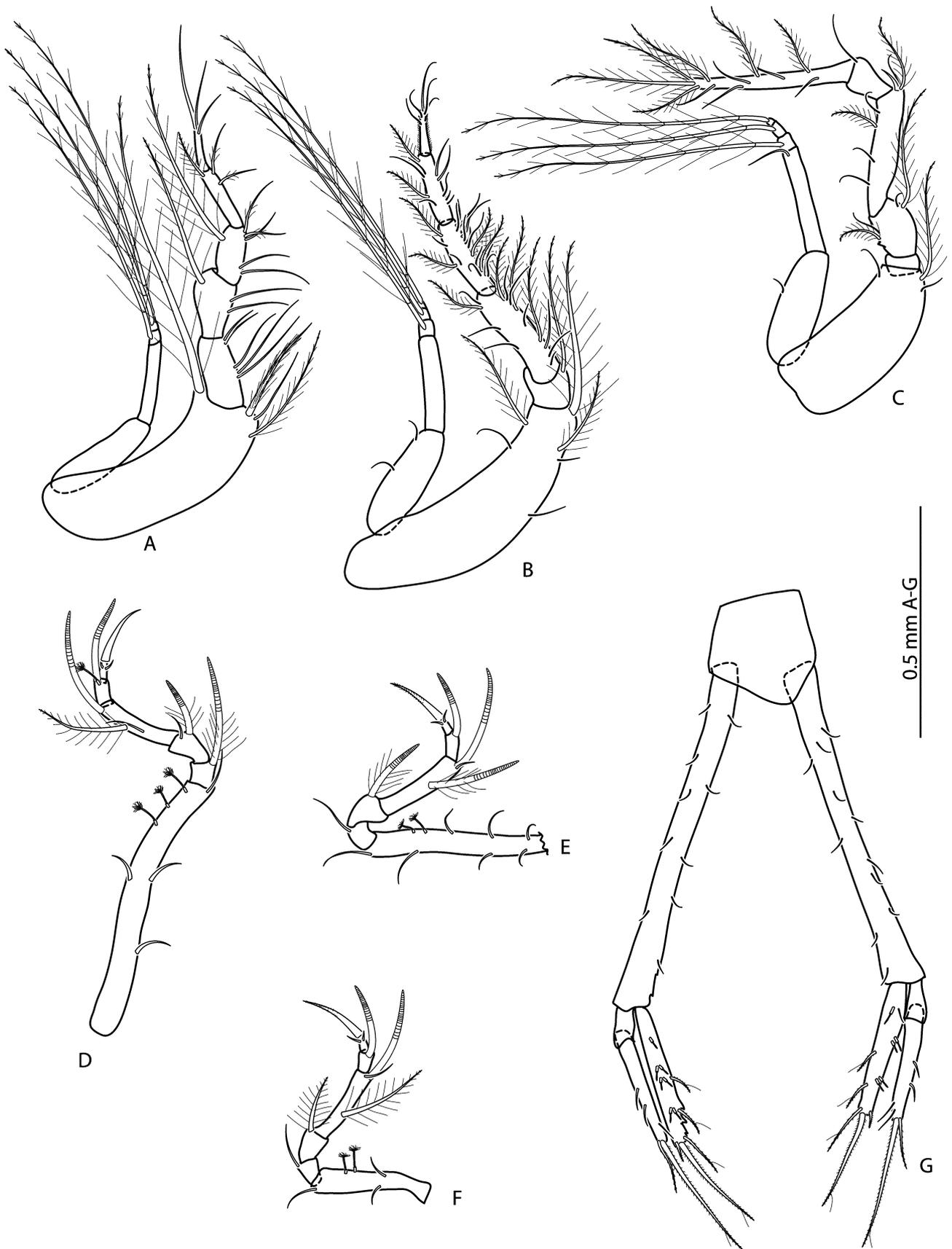
#### **Description of female.**

Holotype subadult female, 4.3 mm, NIWA 80648. Paratype ovigerous female, 3.1 mm, NIWA 80649. Carapace with deep sulcus, distinct ridge posteriorly bounding branchial region, with 1 pair of large tubercles posterior and lateral of corners of frontal lobe, with transparent areas posterior of tubercles, with pseudorostral lobes raised dorsally relative to carapace in side view; pseudorostral lobes weakly dorsally directed, 0.2 times carapace length; eyelobe 0.05 times carapace length, without lenses. Pereonites 1–5 free, pereonite 1 with dorsally directed, bifurcated lappet. Carapace, pereonites and pleonites with sparsely scattered red chromatophores (Figures 47A–B).

Antennule peduncle article 1 longest, with 3 simple setae; article 2 0.8 times article 1 length, with 2 simple setae; article 3 0.8 times article 2 length, unarmed; main flagellum of 3 articles, 1.2 times article 1 length, with 2 aesthetascs and simple seta; accessory flagellum of 1 article, with 4 pedunculate setae (Figure 47C).



**FIGURE 47.** *Campylaspis zealandiaensis* n. sp. Holotype subadult female, NIWA 80648. A, side view. Paratype subadult female, NIWA 80649. B, dorsal view; C, antennule; D, antennule; E, mandibles; F, maxillule; G, maxilliped 1s; H, maxilliped 2s.



**FIGURE 48.** *Campylaspis zealandiaensis* n. sp. Paratype subadult female, NIWA 80649. A, maxilliped 3; B, pereopod 1; C, pereopod 2; D, pereopod 3; E, pereopod 4; F, pereopod 5; G, pleonite 6 and uropods.

Other antennule peduncle article 1 longest, unarmed; article 2 0.7 times article 1 length, with 3 simple and 1 complex pedunculate setae; article 3 0.6 times article 2 length, unarmed; main flagellum of 3 articles, 0.7 times article 1 length, with 1 aesthetasc and 5 simple setae; accessory flagellum of 1 article, with 2 complex pedunculate setae (Figure 47D).

Mandible truncate, with 3–4 microserrate setae medially, lacinia mobilis with 3 cusps (Figure 47E).

Maxillule with 2 endites; outer endite broad, with 4 stout simple and 5 dentate setae; inner endite with 2 simple, 2 microserrate and 1 bicuspid setae; palp with 1 simple and 1 microserrate setae (Figure 47F).

Maxilliped 1 basis with 3 plumose and 2 hook setae; merocarpus 1.3 times basis length, with 4 simple and 1 plumose setae, margins lined with fine hair-like setae; dactylus with 2 simple setae (Figure 47G).

Maxilliped 2 basis 0.7 times all other articles together, with plumose seta; ischium absent; merus 0.4 times basis length, unarmed; carpus 0.7 times merus length, with plumose seta medially, plumose seta laterally, medial margin produced as large tooth, lateral margin lined with fine hair-like setae; propodus equal to carpus length, with simple seta, distal margin produced as long process; dactylus 1.5 times propodus length, terminal margin produced as teeth, central tooth short, outer pair equal (Figure 47H).

Maxilliped 3 basis 0.7 times length of all other articles together, with 1 simple, 1 plumose and 1 pappose setae medially, plumose seta at distal corner; ischium 0.4 times basis length, with 5 simple setae; merus 0.9 times ischium length, with 2 simple setae medially, plumose seta laterally; carpus equal to merus length, with 3 simple and 2 plumose setae medially, plumose seta laterally; propodus 1.2 times carpus length, with 3 plumose setae; dactylus 0.7 times propodus length, with 3 simple setae terminally; exopod equal to basis length, basal article unarmed, flagellum with plumo-annulate setae (Figure 48A).

Pereopod 1 basis 0.8 times length of all other articles together, with 3 simple and 3 plumose setae; ischium 0.1 times basis length, with plumose seta merus 3.5 times ischium length, with 9 simple and 4 plumose setae; carpus 0.8 times merus length, with 12 simple and 4 plumose setae; propodus 0.9 times carpus length, with 7 simple and 2 plumose setae; dactylus 0.6 times propodus length, with 5 simple setae terminally, margins lined with fine hair-like setae; exopod 0.9 times basis length, basal article with 2 simple setae, flagellum with plumo-annulate setae (Figure 48B).

Pereopod 2 basis 0.4 times length of all other articles together, with 2 simple and 1 plumose setae; ischium 0.06 times basis length, unarmed; merus 5.5 times ischium length, with 2 simple and 2 plumose setae; carpus 2.2 times merus length, with 5 simple and 2 plumose setae; propodus 0.3 times carpus length, with simple seta; dactylus 4.0 times propodus length, with 5 simple and 5 plumose setae, terminal seta plumose; exopod 1.5 times basis length, basal article with simple seta, flagellum with plumo-annulate setae (Figure 48C).

Pereopod 3 basis 1/6 times length of all other articles together, with 3 simple and 3 complex pedunculate setae; ischium 0.08 times basis length, with plumo-annulate seta; merus 1.8 times ischium length, with 1 simple and 1 plumo-annulate setae; carpus 2.1 times merus length, with 1 simple, 1 plumose and 1 annulate setae; propodus 0.3 times carpus length, with 1 annulate and 1 complex pedunculate setae; dactylus 0.8 times propodus length, with 3 simple setae terminally (Figure 48D).

Pereopod 4 basis with 7 simple and 2 complex pedunculate setae; ischium with simple seta; merus 1.8 times ischium length, with plumo-annulate seta; carpus 2.4 times merus length, with 1 simple, 1 plumo-annulate and 1 annulate setae; propodus 0.3 times carpus length, with annulate seta; dactylus 0.6 times propodus length, with 2 simple setae, terminal seta microserrate (Figure 48E).

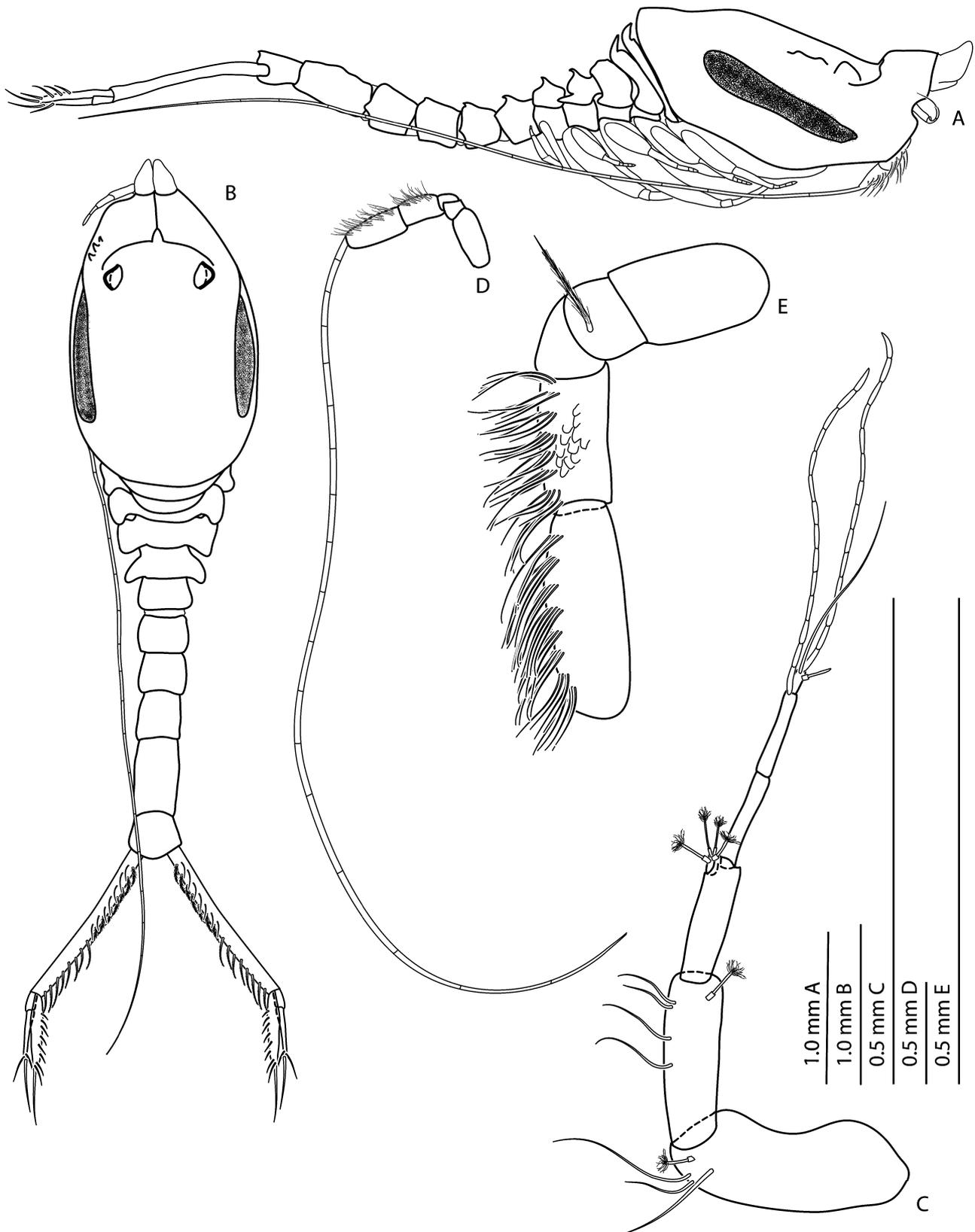
Pereopod 5 basis 0.7 times length of all other articles together, with 3 simple and 2 complex pedunculate setae; ischium 0.1 times basis length, with simple seta; merus 2.0 times ischium length, with plumose seta; carpus 2.5 times merus length, with 1 simple, 1 plumose and 1 annulate setae; propodus 0.3 times carpus length, with annulate seta; dactylus 0.8 times propodus length, with 2 simple setae, terminal seta microserrate (Figure 48F).

Uropod peduncles 3.2 times pleonite 6 length, with 10–11 simple setae. Uropod endopod uniarticulate, 0.4 times peduncle length, with 3 microserrate with single subterminal setule setae medially, microserrate with single subterminal setule seta laterally, 5 pedunculate setae, terminal seta microserrate with single subterminal setule. Uropod exopod of 2 articles, equal to length of endopod; article 1 0.3 times article 2 length, unarmed; article 2 with 3–4 simple and 1 microserrate setae, terminal seta microserrate with single subterminal setule (Figure 48G).

#### **Description of male.**

Paratype adult male, 4.4 mm, NIWA 80650. Carapace with deep sulcus, with pair of large tubercles posterior of corners of frontal lobe, few teeth on pseudorostral lobes, pseudorostral lobes raised dorsally of carapace in side

view, frontal lobe broader than in female; pseudorostral lobes not dorsally directed, 0.2 times carapace length; eyelobe 0.04 times carapace length, without lenses. Pereonites 1–5 free, pereonites 1–2 with strong dorsally directed lappets, pereonites 4–5 with dorsal spines. Pleonites 1–2 with dorsal spines (Figures 49A–B).



**FIGURE 49.** *Campylaspis zealandiaensis* n. sp. Paratype adult male, NIWA 80650. A, side view; B, dorsal view; C, antennule; D, antenna; E, antenna.

Antennule peduncle article 1 longest, with 3 simple and 1 complex pedunculate setae; article 2 0.8 times article 1 length, with 4 simple and 1 complex pedunculate setae; article 3 0.8 times article 2 length, unarmed; main flagellum of 3 articles, with 2 aesthetascs, 1 simple and 1 pedunculate setae; accessory flagellum of 1 article, with 4 complex pedunculate setae (Figure 49C).

Antenna extending past posterior border of uropod peduncles; peduncle of 5 articles; article 2 with pappose seta; articles 4–5 with ranks of setae, incompletely circling articles; flagellum with 18 articles (Figures 49D–E).

Maxilliped 3 basis 0.9 times length of all other articles together, with pappose seta medially, 2 plumose setae at distal corner, medial margin lined with fine hair-like setae; ischium 0.08 times basis length, with simple seta; merus 5.5 times ischium length, with 6 simple setae medially, plumose seta laterally, medial margin lined with fine hair-like setae, lateral margin produced as large tooth; carpus 0.4 times merus length, with 3 simple, 1 plumose and 2 pappose setae medially, plumose seta laterally; propodus 1.6 times carpus length, with 3 plumose setae medially; dactylus 0.6 times propodus length, with 4 simple setae terminally; exopod 1.1 times basis length, basal article with simple seta, flagellum with plumo-annulate setae (Figure 50A).

Pereopod 1 basis equal to all other articles together, with 3 plumose setae, medial margin lined with fine hair-like setae distally; ischium 0.1 times basis length, with plumose seta, medial margin lined with fine hair-like setae; merus 3.4 times ischium length, with 10 simple and 4 plumose setae, margins lined with fine hair-like setae; carpus 0.8 times merus length, with 6 simple and 2 plumose setae; propodus equal to carpus length, with 4 simple and 1 plumose setae; dactylus 0.6 times propodus length, with 7 simple setae terminally; exopod equal to basis length, basal article with 2 simple setae, serrate proximally, flagellum with plumo-annulate setae (Figure 50B).

Pereopod 2 basis 0.7 times length of all other articles together, with 3 simple and 1 pappose setae, margin lined with fine hair-like setae proximally; ischium 0.04 times basis length, unarmed; merus 4.0 times ischium length, with 1 simple and 2 pappose setae, medial margin produced as strong tooth; carpus 2.6 times merus length, with 5 simple and 1 plumose setae; propodus 0.3 times carpus length, with complex pedunculate seta; dactylus 3.6 times propodus length, with 7 simple and 5 plumose setae, terminal seta plumose; exopod 1.2 times basis length, basal article with plumose seta, serrate proximally, margin lined with fine hair-like setae distally, flagellum with plumo-annulate setae (Figure 50C).

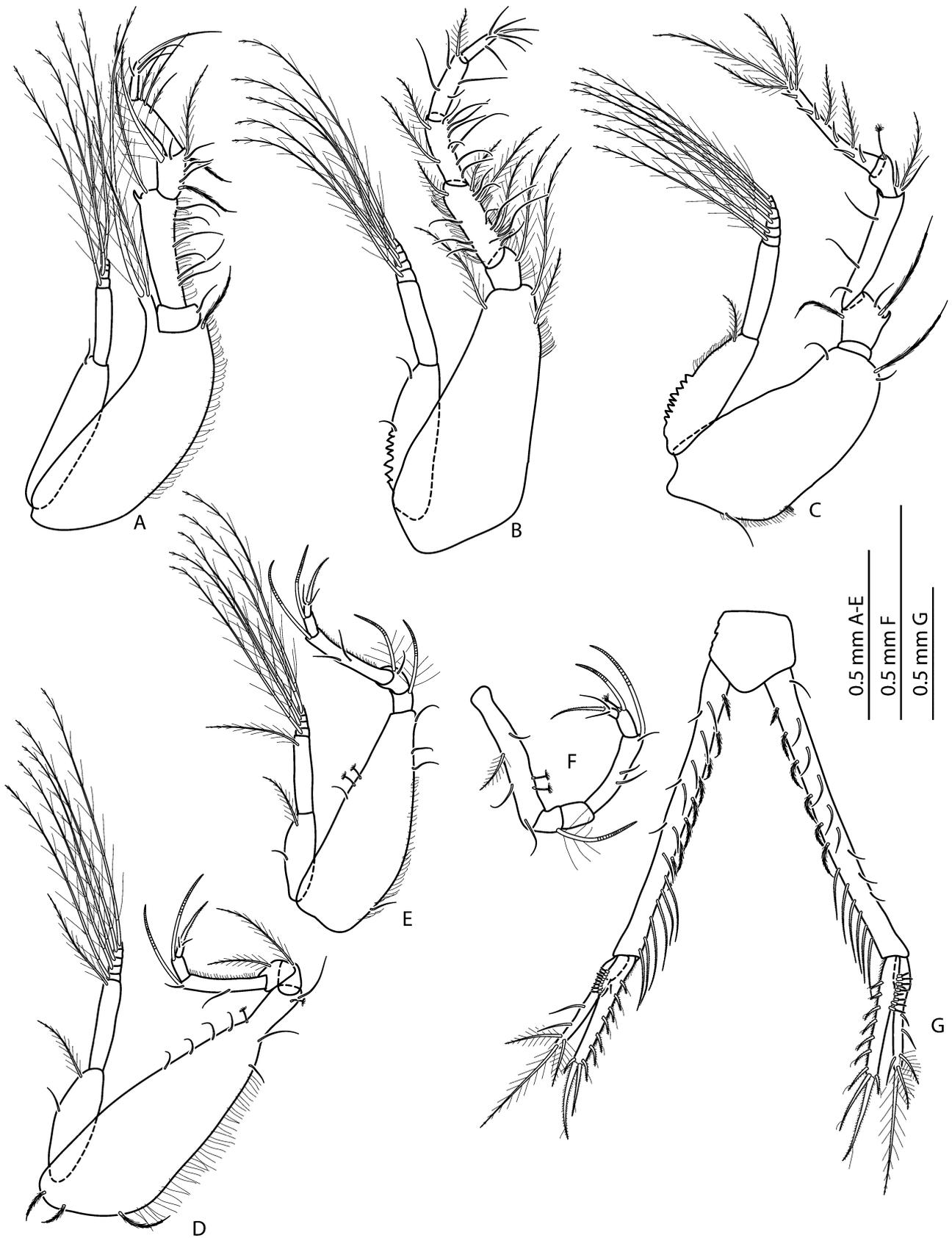
Pereopod 3 basis 1.9 times length of all other articles together, with 7 simple, 3 pappose and 2 complex pedunculate setae, medial margin lined with fine hair-like setae; ischium 0.1 times basis length, with plumose seta; merus equal to ischium length, with plumose seta; carpus 2.5 times merus length, with 2 simple and 1 annulate setae, medial margin lined with fine hair-like setae; propodus 0.3 times carpus length, with annulate seta; dactylus 0.8 times propodus length, with 2 simple setae, terminal seta microserrate; exopod 0.8 times basis length, basal article with 1 simple and 1 plumose setae, flagellum with plumo-annulate setae (Figure 50D).

Pereopod 4 basis 0.8 times length of all other articles together, with 4 simple and 2 complex pedunculate setae, medial margin lined with fine hair-like setae; ischium 0.07 times basis length, with plumo-annulate seta; merus 1.3 times ischium length, with 1 simple and 1 plumo-annulate setae; carpus 4.3 times merus length, with 2 simple and 1 annulate setae, medial margin lined with fine hair-like setae; propodus 0.2 times carpus length, with annulate seta; dactylus 0.8 times propodus length, with 2 simple setae, terminal seta microserrate; exopod 0.9 times basis length, basal article with 1 simple and 1 plumose setae, flagellum with plumo-annulate setae (Figure 50E).

Pereopod 5 basis equal to all other articles together, with 3 simple, 1 plumose and 2 complex pedunculate setae; ischium 0.1 times basis length, with plumo-annulate seta; merus 1.2 times ischium length, unarmed; carpus 2.4 times merus length, with 3 simple and 1 annulate setae; propodus 0.4 times carpus length, with 1 annulate and 1 complex pedunculate setae; dactylus 0.6 times propodus length, with 2 simple setae, terminal seta microserrate (Figure 50F).

Uropod peduncles 3.8 times pleonite 6 length, with 9 simple, 6–8 pappose and 6 microserrate setae. Uropod endopod uniarticulate, 0.4 times peduncle length, with 8 microserrate with single subterminal setule setae medially, 1 microserrate with single subterminal setule and 8 pedunculate setae laterally, terminal seta microserrate with single subterminal setule. Uropod exopod 0.9 times length of endopod; article 1 0.3 times article 2 length; article 2 with 2–3 simple and 2 plumose setae, terminal seta plumose (Figure 50G).

**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.



**FIGURE 50.** *Campylaspis zealandiaensis* n. sp. Paratype adult male, NIWA 80650. A, maxilliped 3; B, pereopod 1; C, pereopod 2; D, pereopod 3; E, pereopod 4; F, pereopod 5; G, pleonite 6 and uropods.

**Remarks.** The most similar species is *Campylaspis bituberculata*, which also has a pair of large tubercles dorsally on the carapace. In *C. bituberculata* the pair of tubercles are at the corners where the frontal lobe and pseudorostral lobes meet, and the uropods are much shorter, with the peduncles less than twice as long as pleonite 6. In comparison, in *C. zealandiaensis*, the pair of tubercles on the carapace are lateral to the corners where the frontal lobe and pseudorostral lobes meet, and the uropod peduncles are at least three times the length of pleonite 6.

The paratype female had antennules that were not equal. The antennule in Figure 47C is more similar to the proportions of the male antennule and has the more typical two aesthetascs, and is therefore more likely to be the normal antennule, while the antennule in Figure 47D is aberrant, with the distal articles of the peduncle and the main flagellum shortened and with only one aesthetasc.

***Campylaspis zimmeri* n. sp.**

Figures 51–52

**Type material.** Holotype subadult female, NIWA 80660, paratype subadult female, dissected, NIWA 80661, paratypes, 2 subadult females, 1 manca, NIWA 80662, 44.4862°S, 177.1413°E–44.4841°S, 177.1416°E, 1235–1239 m, 6 April 2007.

**Other material examined.** 6 juveniles, 12 mancae, NIWA 79391, 44.4862°S, 177.1413°E–44.4841°S, 177.1416°E, 1235–1239 m, 6 April 2007. 1 subadult male, 1 manca, NIWA 46215, 40.8800°S, 170.8555°E–40.8883°S, 170.8565°E, 529–534 m, 6 June 2007. 1 specimen, NIWA 79392, 43.0650°S, 174.9325°W – 43.0732°S, 174.9348°W, 933–940 m, 13 April 2007.

**Diagnosis.** *Females and subadult males.* Carapace without sulcus, covered with large tubercles; pseudorostrum not dorsally directed. Carapace, pereonites and pleonites covered with red chromatophores. Pereonite 1 free only dorsally. Pereopod 2 dactylus normal, terminal seta long. Uropod peduncles 1.6 times length of pleonite 6. *Male.* Adult unknown.

**Description of female.**

Holotype subadult female, 5.0 mm, NIWA 80660. Paratype subadult female, 4.0 mm, NIWA 80661. Carapace without sulcus, covered in large tubercles; pseudorostral lobes not dorsally directed, 0.2 times carapace length; eyelobe 0.05 times carapace length, without lenses. Pereonite 1 free only dorsally. Carapace, pereonites and pleonites covered in red chromatophores, specimens appear red (Figures 51A–B).

Antennule peduncle article 1 longest, with simple seta; article 2 0.8 times article 1 length, with 1 simple and 2 complex pedunculate setae; article 3 0.8 times article 2 length, with 2 complex pedunculate setae; main flagellum of 3 articles, with 2 aesthetascs, 1 simple and 1 complex pedunculate setae; accessory flagellum of 1 article, with complex pedunculate seta (Figure 51C).

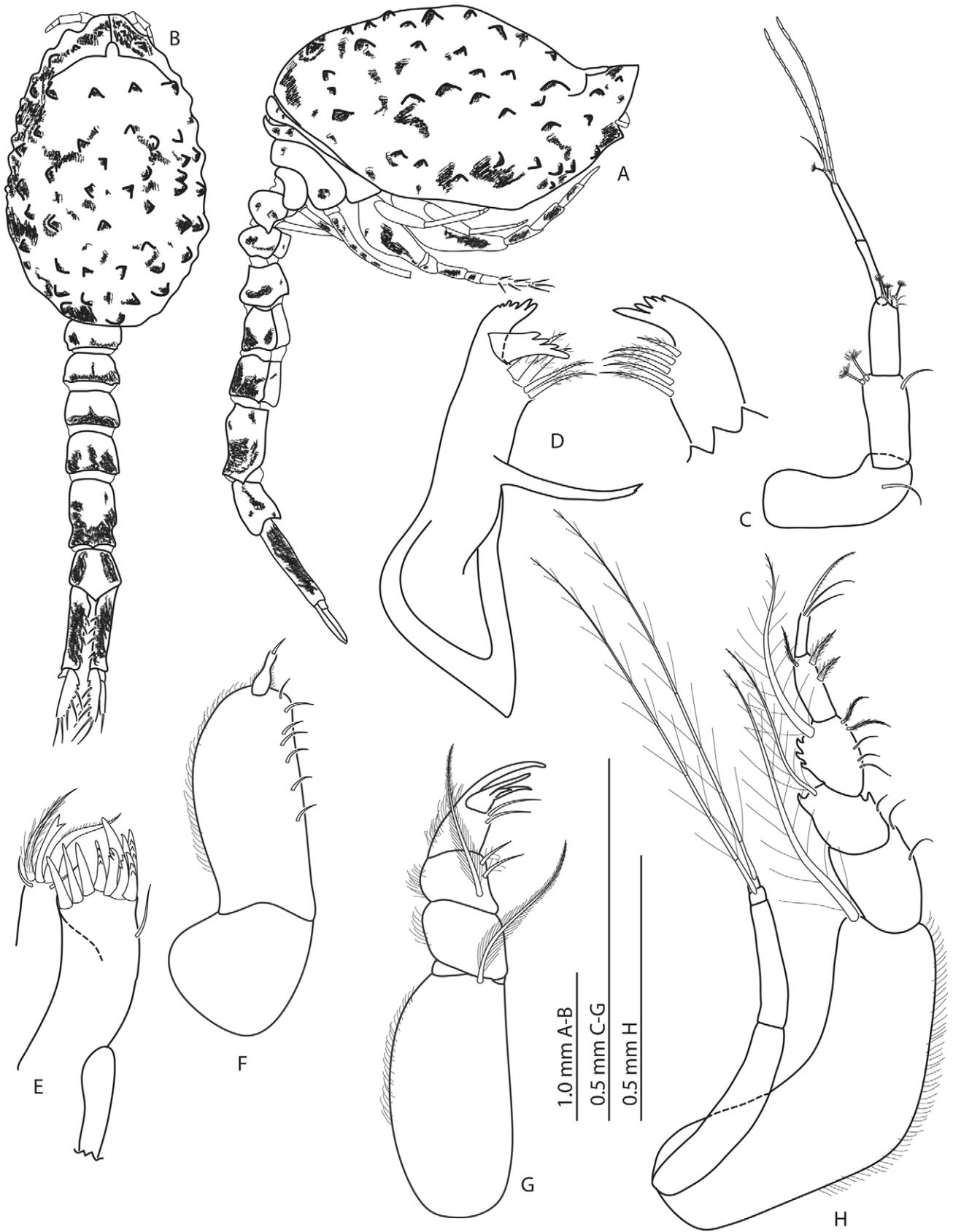
Mandible truncate, with 4–5 microserrate setae medially, lacinia mobilis with 4 cusps (Figure 51D).

Maxillule with 2 endites; outer endite broad, with 5 simple and 5 dentate setae terminally, with simple seta on margin; inner endite with 2 simple, 1 pappose, 1 microserrate and 1 bicuspid setae; palp broken (Figure 51E).

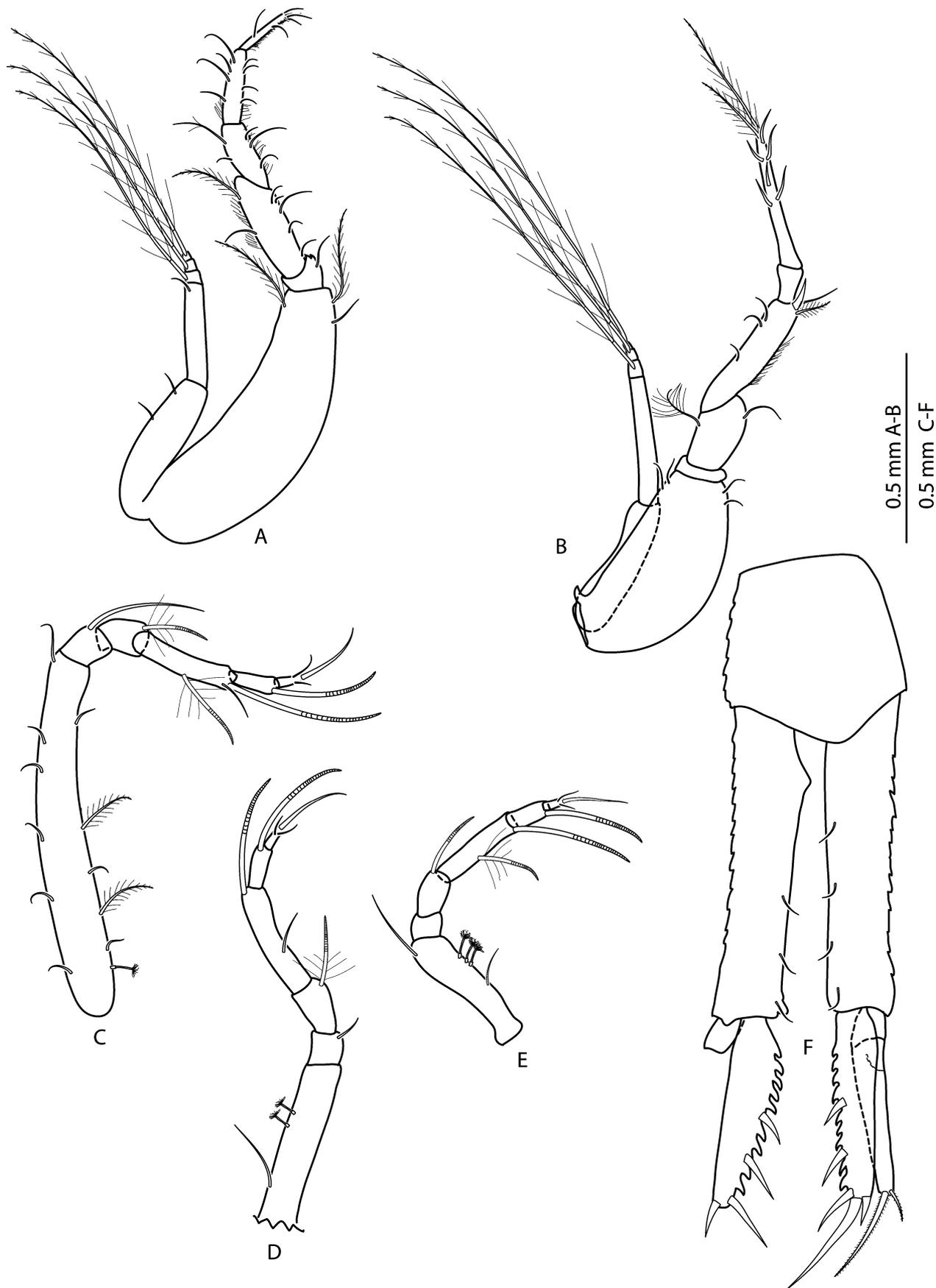
Maxilliped 1 basis unarmed; merocarpus 1.6 times basis length, with 7 simple setae, lateral margin lined with fine hair-like setae; dactylus 0.32 times merocarpus length, broad at base, narrowing distally, with simple seta, lateral margins lined with fine hair-like setae (Figure 51F).

Maxilliped 2 basis equal to all other articles together, with plumose seta, lateral margin lined with fine hair-like setae; ischium absent; merus 0.3 times basis length, lateral margin lined with fine hair-like setae; carpus 0.8 times merus length, with 3 plumose setae, lateral margin lined with fine hair-like setae; propodus 0.7 times carpus length, with 2 simple setae, distal margin produced as long process; dactylus 1.8 times propodus length, terminal margin produced as 3 teeth, central tooth short (Figure 51G).

Maxilliped 3 basis 1.1 times length of all other articles together, with plumose seta at distal corner, medial margin lined with fine hair-like setae; ischium 0.2 times basis length, with 2 simple setae; merus 0.7 times ischium length, with simple seta medially, plumose seta laterally, medial and lateral margins each produced as single strong tooth; carpus 1.3 times merus length, with 3 simple and 2 pappose setae medially, plumose seta laterally, lateral margin produced as strong teeth; propodus 0.8 times carpus length, with 3 pappose setae; dactylus 0.6 times propodus length, with 2 simple and 1 microserrate setae terminally; exopod equal to basis length, basal article unarmed, flagellum with plumo-annulate setae (Figure 51H).



**FIGURE 51.** *Campylaspis zimmeri* n. sp. Holotype subadult female, NIWA 80660. A, side view. Paratype subadult female, NIWA 80661. B, dorsal view; C, antennule; D, mandibles; E, maxillule; F, maxilliped 1; G, maxilliped 2; H, maxilliped 3.



0.5 mm A-B  
0.5 mm C-F

**FIGURE 52.** *Campylaspis zimmeri* n. sp. Paratype subadult female, NIWA 80661. A, pereopod 1; B, pereopod 2; C, pereopod 3; D, pereopod 4; E, pereopod 5; F, pleonite 6 and uropods.

Pereopod 1 basis 0.9 times length of all other articles together, with 1 simple and 2 plumose setae; ischium 0.07 times basis length, with simple seta, medial margin serrate; merus 4.8 times ischium length, with 6 simple and 1 plumose setae, lateral margin lined with fine hair-like setae; carpus 0.7 times merus length, with 4 simple and 1 plumose setae, medial margin lined with fine hair-like setae; propodus equal to carpus length, with 8 simple setae, margins lined with fine hair-like setae; dactylus 0.7 times propodus length, with 2 simple setae and 3 simple setae terminally; exopod equal to basis length, basal article with 2 simple setae, flagellum with plumo-annulate setae (Figure 52A).

Pereopod 2 basis 0.6 times length of all other articles together, with 4 simple setae; ischium 0.05 times basis length, unarmed; merus 6.0 times ischium length, with 1 simple and 1 plumose setae; carpus 2.0 times merus length, with 5 simple and 1 plumose setae, lateral margin lined with fine hair-like setae; propodus 0.3 times carpus length, unarmed; dactylus 3.9 times propodus length, with 6 simple and 1 plumose setae, terminal seta plumose; exopod 1.5 times basis length, basal article produced as large tooth proximally, unarmed, flagellum with plumo-annulate setae (Figure 52B).

Pereopod 3 basis 1.4 times length of all other articles together, with 9 simple, 2 plumose and 1 complex pedunculate setae; ischium 0.1 times basis length, with simple seta; merus equal to ischium length, with plumo-annulate seta; carpus 2.5 times merus length, with 1 simple, 1 plumo-annulate and 1 annulate setae; propodus 0.5 times carpus length, with annulate seta; dactylus 0.6 times propodus length, with 3 simple setae terminally (Figure 52C).

Pereopod 4 basis with 1 simple and 2 complex pedunculate setae; ischium with simple seta; merus 1.5 times ischium length, with plumo-annulate seta; carpus 2.3 times merus length, with 1 simple and 1 annulate setae; propodus 0.4 times carpus length, with annulate seta; dactylus 0.5 times propodus length, with 3 simple setae terminally (Figure 52D).

Pereopod 5 basis 0.6 times length of all other articles together, with 2 simple and 3 complex pedunculate setae; ischium 0.2 times basis length, unarmed; merus 2.0 times ischium length, with annulate seta; carpus 2.0 times merus length, with 1 plumo-annulate and 1 annulate setae; propodus 0.4 times carpus length, with annulate seta; dactylus 0.6 times propodus length, with 3 simple setae terminally (Figure 52E).

Uropod peduncles 1.6 times pleonite 6 length, with 3–4 simple setae, lateral margins serrate. Uropod endopod uniarticulate, 0.6 times peduncle length, with 3 simple setae medially, simple seta laterally, terminal seta simple, medial margin strongly toothed. Uropod exopod of 2 articles, 0.9 times length of endopod; article 1 0.1 times article 2 length; article 2 with microserrate seta laterally, terminal seta microserrate (Figure 52F).

**Etymology.** The species is named *zimmeri* in honor of the many contributions of Carl Zimmer to cumacean systematics.

**Remarks.** *Campylaspis schnabelae* is the most similar species. However, *C. schnabelae* has a distinct sulcus in the carapace and very few chromatophores, while *C. zimmeri* has no sulcus and the body is covered with chromatophores, giving the specimens a red appearance.

## *Procampylaspis* Bonnier 1896

**Type species.** *Procampylaspis armata* Bonnier 1896.

**Diagnosis after Petrescu 2006.** Carapace vaulted; mandible with acute pars molaris; maxilliped 1 of 5 articles; maxilliped 2 dactylus with multiple teeth directed medially, sometimes called “rake-like” (Petrescu 2006); pereopod 1 with ischium as long as merus.

**New Zealand species.** *Procampylaspis chathamensis* n. sp., *P. rhyphakoceros* n. sp., *P. rhyphakos* n. sp.

**Remarks.** *Procampylaspis* is readily distinguishable from all other nannastacids by the form of maxilliped 2. The single large dorsal spine on the carapace is a common feature in *Procampylaspis*, and is found in *P. chathamensis* and *P. rhyphakoceros* in New Zealand, but not all *Procampylaspis* species have the spine.

## Key to the *Procampylaspis* from New Zealand waters

1. Carapace with single large dorsal spine ..... 2
- Carapace without single large dorsal spine ..... *Procampylaspis rhyphakos*
2. Female uropod peduncle  $\leq$  twice length of pleonite 6 ..... *P. rhyphakoceros*
- Female uropod peduncle  $>$  twice length of pleonite 6 ..... *P. chathamensis*

***Procampylaspis chathamensis* n. sp.**

Figures 53–54

**Type material.** Holotype subadult female, NIWA 80715, paratype subadult female, dissected, NIWA 80716, 44.4862°S, 177.1413°E–44.4841°S, 177.1416°E, 1235–1239 m, 6 April 2007.

**Material examined.** 1 subadult female, NIWA 79374, 44.4845°S, 177.1425°E–44.4845°S, 177.1425°E, 1241 m, 6 April 2007. 2 juveniles, NIWA 79375, 44.4862°S, 177.1413°E–44.4841°S, 177.1416°E, 1235–1239 m, 6 April 2007. 9 subadult females, 11 juveniles, NIWA 79376, 44.4862°S, 177.1413°E–44.4841°S, 177.1416°E, 1235–1239 m, 6 April 2007. 3 subadult females, 1 subadult male, 5 juveniles, NIWA 79377, 44.4862°S, 177.1413°E–44.4841°S, 177.1416°E, 1235–1239 m, 6 April 2007.

**Diagnosis.** *Females and subadult males.* Carapace with single large dorsal spine; eyelobe absent. Female uropod peduncle more than twice as long pleonite 6. Specimens not coated in mucus and fine sediment. *Male.* Adult unknown.

**Description of female.**

Holotype subadult female, 4.7 mm, NIWA 80715. Paratype subadult female, 4.8 mm, NIWA 80716. Carapace smooth, untextured, shiny, with single large mid-dorsal spine; pseudorostral lobes 0.2 carapace length; eyelobe absent; carapace 3.33 times length of pereonites together (Figures 53A–B).

Antennule peduncle article 1 equal to articles 2 and 3 together, with 2 setae; article 2 1.4 times length of article 3, with 3 simple and 2 complex pedunculate setae; article 3 unarmed; main flagellum of 2 articles, broken, setae unknown; accessory flagellum of 1 article, with 4 complex pedunculate setae (Figure 53C).

Mandible navicular, with 5 microserrate setae medially, lacinia mobilis with 2 cusps (Figure 53D).

Maxillule with 2 endites; outer endite with 6 dentate and 4 simple setae; inner endite with 4 setae; palp with single seta (Figure 53E).

Maxilla with 3 endites; broad endite with few simple setae; medial narrow endite with 2 microserrate setae terminally; distal narrow endite with 3 microserrate setae terminally (Figure 53F).

Maxilliped 1 basis produced as lobe medially, with 3 pappose, 2 hook and 2 simple setae; ischium absent; merus with few simple setae; carpus 3.0x merus length, with 4 beak setae, few simple, and 1 plumose setae; propodus 0.4x carpus length, with 4 simple and 1 plumose setae; dactylus 0.3 propodus length, with 2 simple setae terminally (Figure 53G).

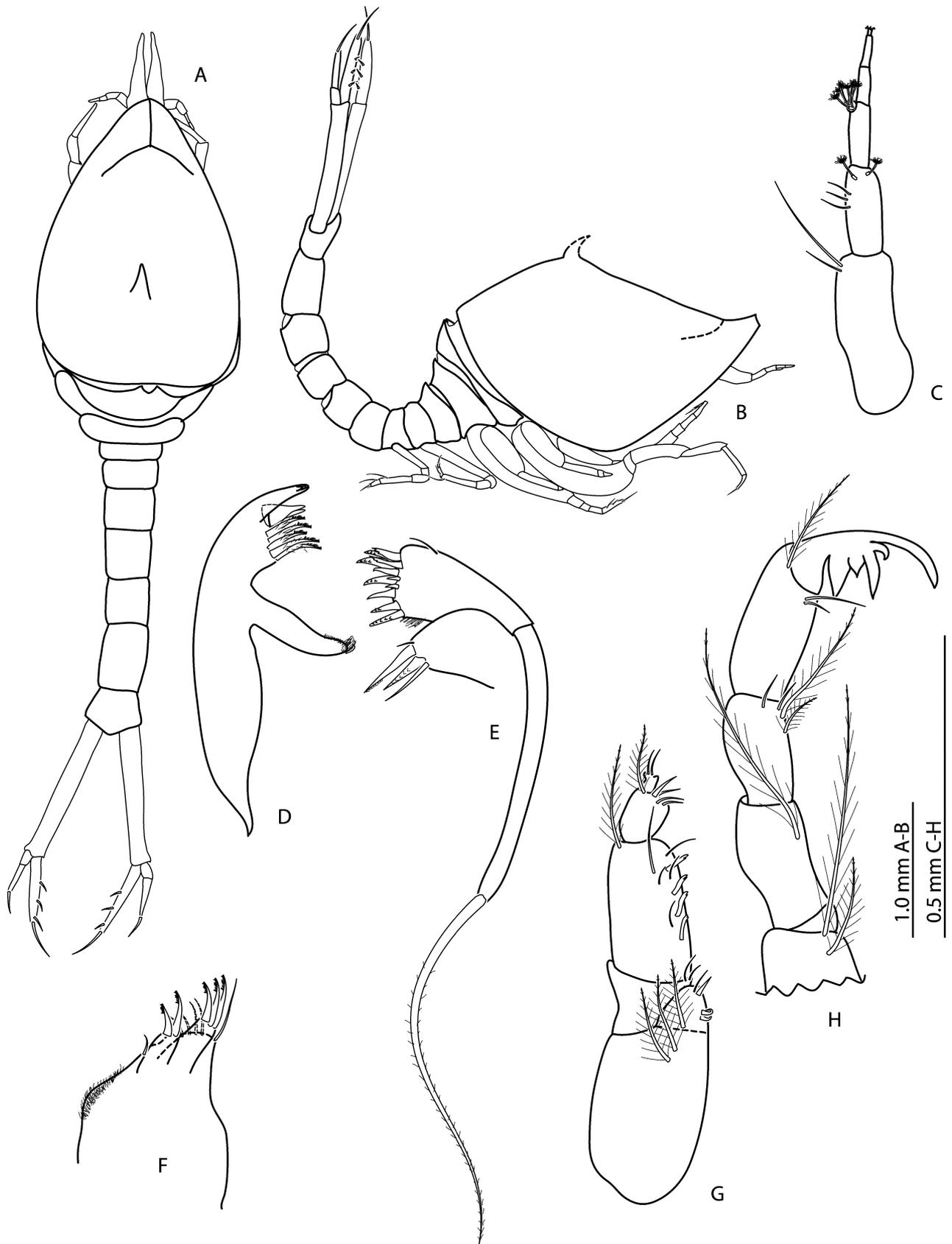
Maxilliped 2 basis broken, with 2 plumose setae; ischium without setae; merus with plumose seta; carpus 0.8x merus length, with 2 simple and 2 plumose setae; propodus 1.2x carpus length, with 2 simple and 1 plumose setae; dactylus 1.1x propodus length, with 4 medially oriented spines and terminal claw (Figure 53H).

Maxilliped 3 basis 1.3 times length of all other articles together, with plumose seta; ischium 0.07 times basis length, unarmed; merus 2.8 times ischium length, with plumose seta; carpus 0.9 times merus length, with plumose seta; propodus 1.5 times carpus length, unarmed; dactylus 0.5 times propodus length, with 3 setae terminally; exopod 0.8 times basis length, basal article unarmed, flagellum with plumo-annulate setae (Figure 54A).

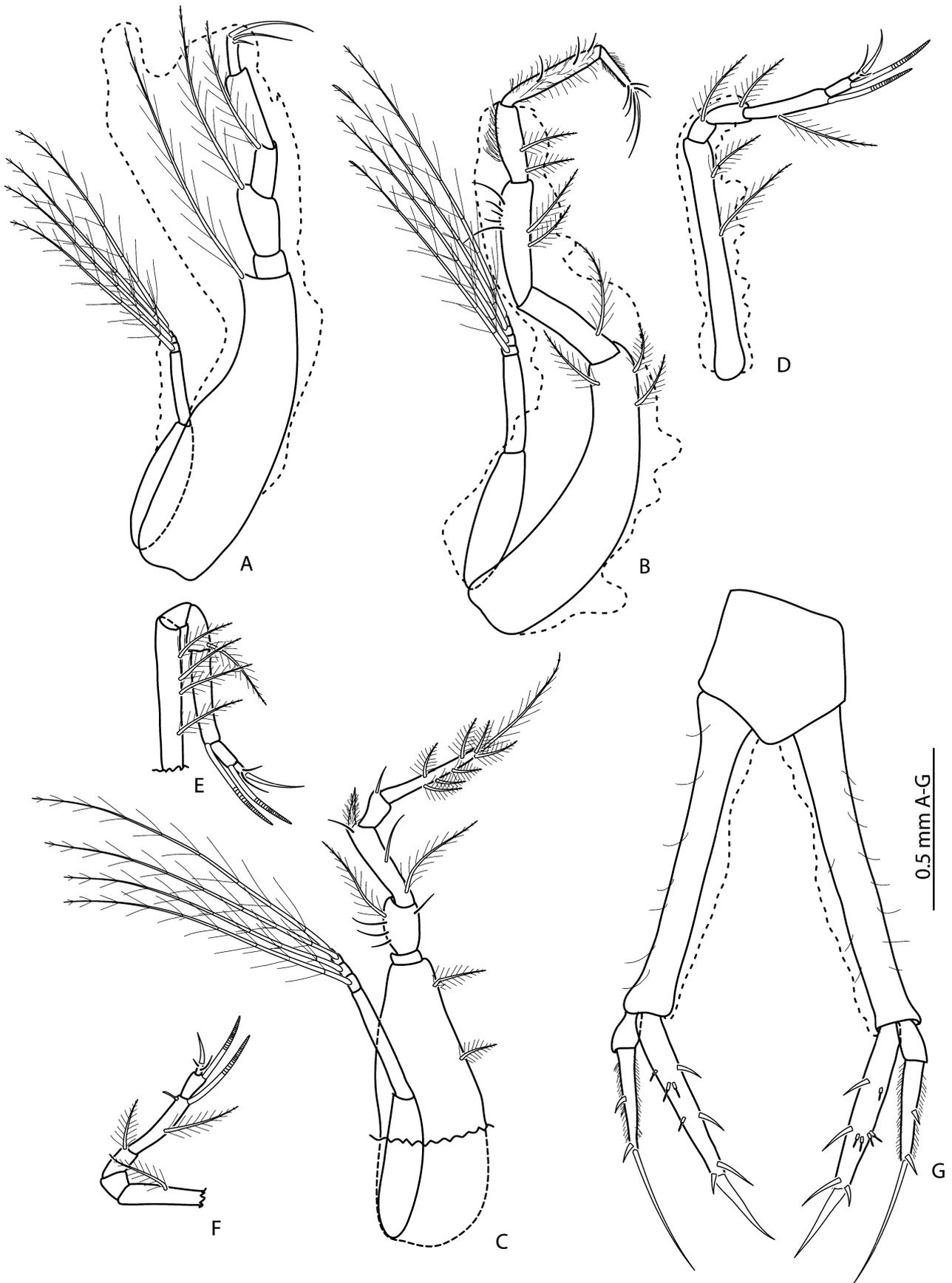
Pereopod 1 basis 0.7 times length of all other articles together, with 3 plumose setae; ischium 0.4 times basis length, with plumose seta; merus 1.1 times ischium length, with 4 simple and 2 plumose setae; carpus 0.7 times merus length, with 2 plumose setae, lateral margin lined with fine hair-like setae; propodus 1.3 times carpus length, with 3 simple setae, article covered in fine hair-like setae; dactylus 0.5 times propodus length, with 6 simple setae terminally, margins lined with fine hair-like setae; exopod equal to basis length, basal article unarmed, flagellum with plumo-annulate setae (Figure 54B).

Pereopod 2 basis equal to length of all other articles together, with 2 plumose setae; ischium 0.04 times basis length, unarmed; merus 4.5 times ischium length, with 4 simple and 1 plumose setae; carpus 1.9 times merus length, with 2 simple, 1 plumose and 1 pappose setae; propodus 0.4 times carpus length, with simple seta; dactylus 3.3 times propodus length, with 7 plumose setae and plumose seta terminally; exopod 1.1 times basis length, basal article with unarmed, flagellum with plumo-annulate setae (Figure 54C).

Pereopod 3 basis 1.3 times length of all other articles together, with 2 plumose setae; ischium 0.09 times basis length, with plumose seta; merus 1.8 times ischium length, with plumose seta; carpus 2.4 times merus length, with 1 plumose and 1 annulate setae; propodus 0.3 times carpus length, with annulate seta; dactylus 0.6 times propodus length, with 3 simple setae terminally (Figure 54D).



**FIGURE 53.** *Procampylaspis chathamensis* n. sp. Holotype subadult female, NIWA 80715. A, dorsal view. Paratype subadult female, NIWA 80716. B, side view; C, antennule; D, mandible; E, maxillule; F, maxilla; G, maxilliped 1; H, maxilliped 2.



**FIGURE 54.** *Procampylaspis chathamensis* n. sp. Paratype subadult female, NIWA 80716. A, maxilliped 3; B, pereopod 1; C, pereopod 2; D, pereopod 3; E, pereopod 4; F, pereopod 5; G, pleonite 6 and uropods. Note, dashed line indicates edge of mucus covering appendages.

Pereopod 4 basis broken, with 4 plumose setae; ischium unarmed; merus 1.6 times ischium length, with plumose seta; carpus 3.1 times merus length, with annulate seta; propodus 0.3 times carpus length, with annulate seta; dactylus 0.4 times propodus length, with 3 simple setae terminally (Figure 54E).

Pereopod 5 basis broken, with plumose seta; ischium unarmed; merus 1.3 times ischium length, with plumose seta; carpus 3.0 times merus length, with 1 plumose, 1 pedunculate and 1 annulate setae; propodus 0.3 times carpus length, with annulate seta; dactylus 0.4 times propodus length, with 3 simple setae terminally (Figure 54F).

Uropod peduncles 2.3 times pleonite 6 length, with fine hair-like setae. Uropod endopod uniaarticulate, 0.6 times peduncle length, with 3 simple setae medially, 4–5 pedunculate and 1 simple setae laterally, terminal seta simple. Uropod exopod of 2 articles, 0.8 times length of endopod; article 1 0.4 times article 2 length, unarmed; article 2 with 2 simple setae laterally, terminal seta simple, margins lined with fine hair-like setae (Figure 54G).

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

**Remarks.** There are two other species of *Procampylaspis* known from the waters of New Zealand, *P. rhypakos* and *P. rhypakoceros*. *Procampylaspis chathamensis* can easily be differentiated from the other two species. *Procampylaspis rhypakos* does not have a single dorsal spine on the carapace, while *P. chathamensis* has a single large dorsal spine on the carapace. *Procampylaspis rhypakoceros* does have a single large dorsal spine on the carapace; however, the length of the female uropod peduncle is less than or equal to twice the length of pleonite 6, while in *P. chathamensis* the female uropod peduncle is more than twice the length of pleonite 6. In addition, *P. chathamensis* is shiny and less likely to be covered in a thick layer of mucus and fine sediment than the other two species, and lacks an eyelobe.

### ***Procampylaspis rhypakoceros* n. sp.**

Figures 55–58

**Type material.** Holotype subadult female, NIWA 80710, paratype subadult female, dissected, NIWA 80711, paratype adult male, dissected, NIWA 80712, paratype adult male, NIWA 80713, paratype subadult female, NIWA 80714, 43.5300°S, 178.5048°E–43.5363°S, 178.5118°E, 346 m, 24 April 2007.

**Other material examined.** 1 ovigerous female, 1 subadult female, 1 adult male, 1 juvenile, NIWA 79368, 43.8363°S, 176.7092°E–43.8330°S, 176.7127°E, 478–479 m, 5 April 2007. 1 subadult female, 2 juveniles, NIWA 76369, 43.5212°S, 178.6203°W–43.5228°S, 178.6315°W, 424–425 m, 18 April 2007. 1 juvenile, NIWA 79370, 43.5300°S, 178.5048°E–43.5363°S, 178.5118°E, 346 m, 24 April 2007. 9 adult males, 81 mancae, NIWA 45134, 43.5300°S, 178.5048°E–43.5363°S, 178.5118°E, 346 m, 24 April 2007. 2 ovigerous females, 6 juveniles, NIWA 79371, 43.7967°S, 175.3158°E–43.8045°S, 175.3148°E, 418–422 m, 27 April 2007. 4 juveniles, NIWA 79372, 40.8800°S, 170.8555°E–40.8883°S, 170.8565°E, 529–534 m, 6 June 2007. 1 ovigerous female, 2 subadult females, NIWA 79373, 39.6373°S, 172.1532°E–39.6457°S, 172.1522°E, 264–266 m, 7 June 2007.

**Diagnosis.** *Females and subadult males.* Carapace with single large dorsal spine; eyelobe long. Uropod peduncle no more than twice as long as pleonite 6. Specimens coated in mucus and fine sediment. *Male.* Carapace less vaulted and dorsal spine shifted posteriorly relative to female; eyelobe with spine terminally. Uropod peduncle 3.4 times length of pleonite 6; uropods more setose than in female.

#### **Description of female.**

Holotype subadult female, 3.8 mm, NIWA 80710. Paratype subadult female, 4.3 mm, NIWA 80711. Carapace with single large mid-dorsal spine, otherwise unornamented; pseudorostral lobes 0.3 times carapace length; eyelobe 0.1 times carapace length, slender, without lenses. Pereonite 5 and pleonites with weak spines, few setae. Carapace, pereonites and pleonites coated in mucus and fine sediment (Figures 55A–B).

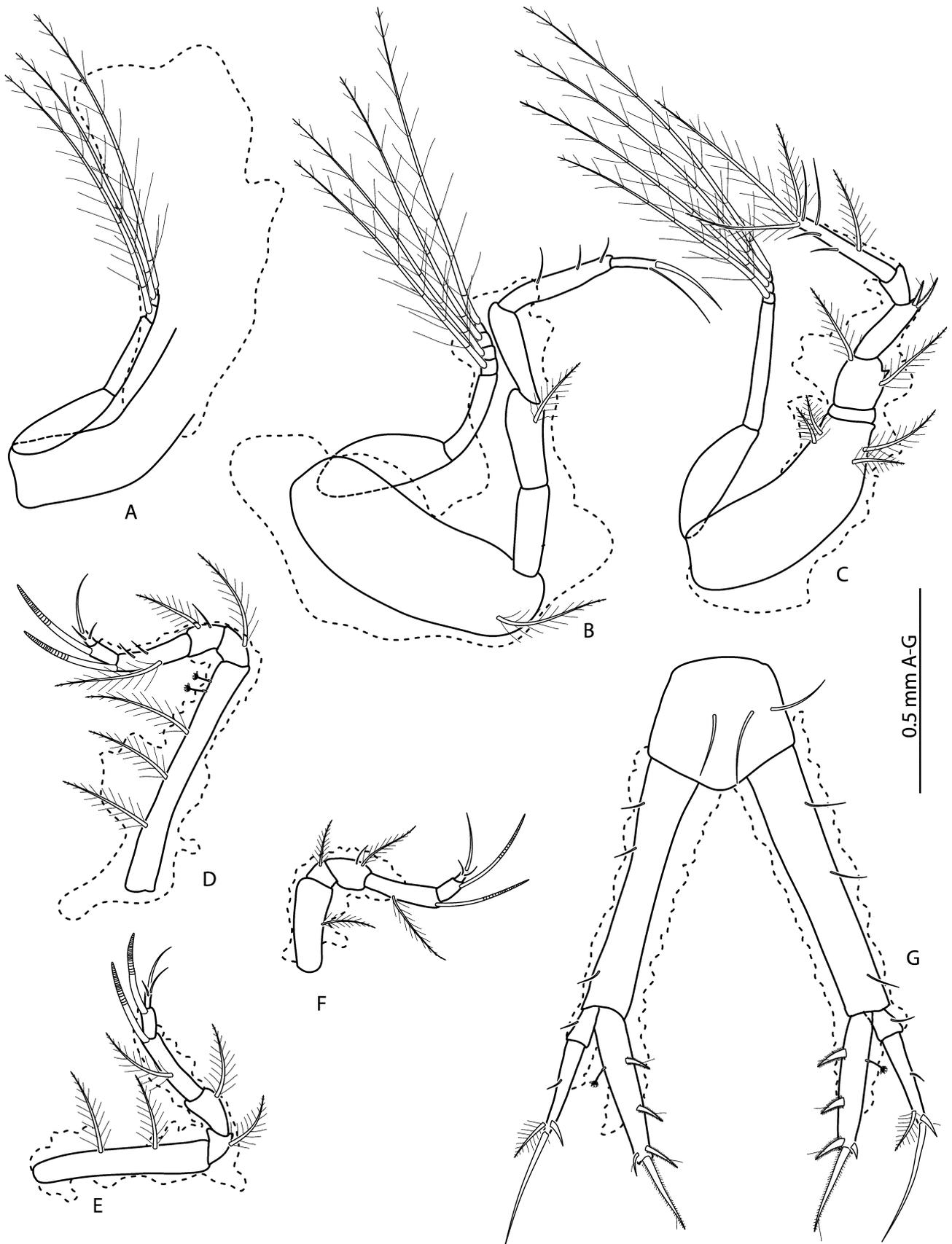
Antennule peduncle article 1 longest, produced as single large tooth, with plumose seta; article 2 0.5 times article 1 length, with simple seta; article 3 0.8 times article 2 length, with 2 simple setae; main flagellum of 3 articles, with 2 aesthetascs and 2 simple setae; accessory flagellum of 1 article, with 1 simple and 3 pedunculate setae (Figure 55C).

Mandible navicular, with 5 microserrate setae medially, lacinia mobilis with 2 cusps (Figure 55D).

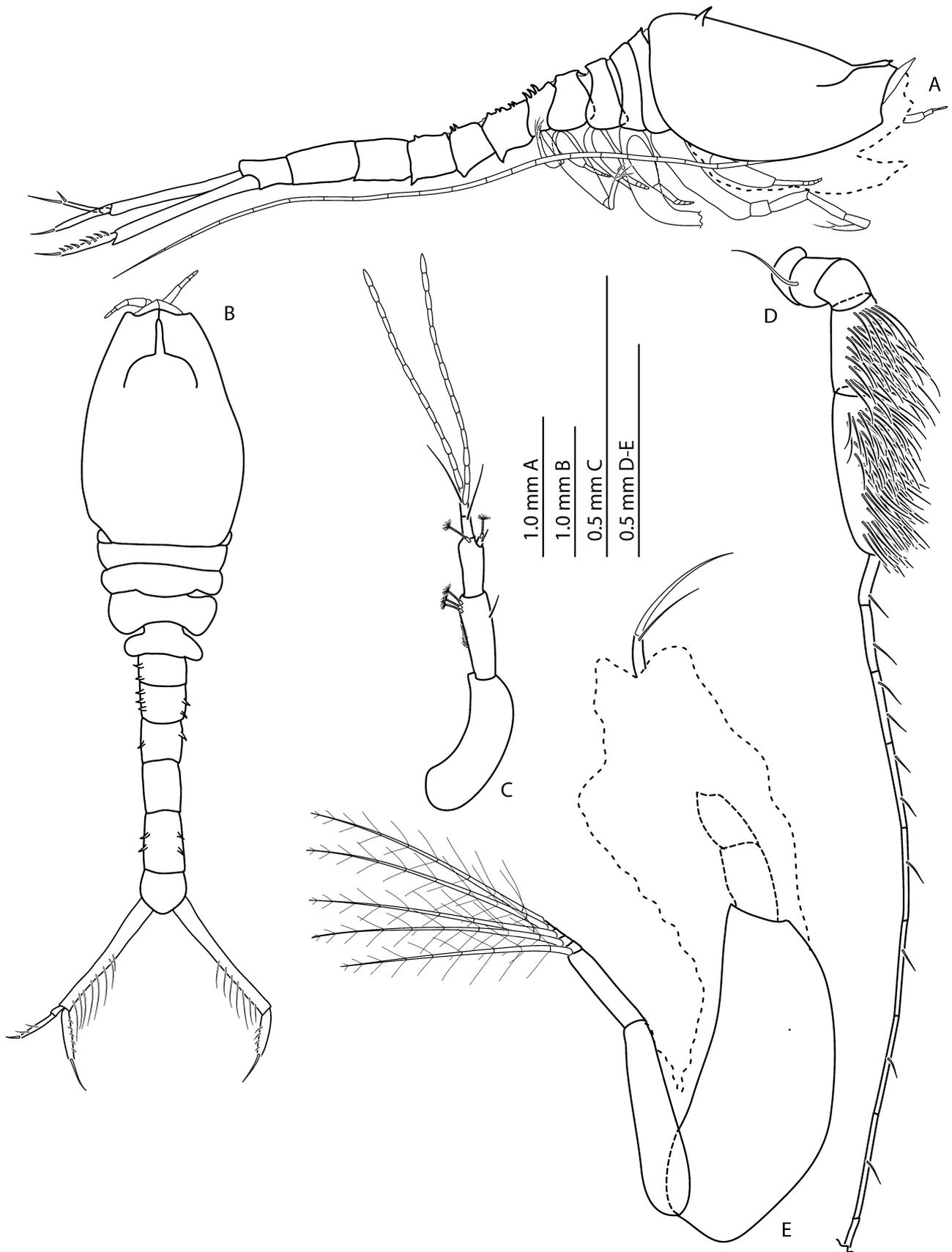
Maxillule with 2 endites; outer endite with 3 stout and 7 slender simple setae; inner endite with 3 simple and 1 tricuspid setae; palp with 2 microserrate setae (Figure 55E).



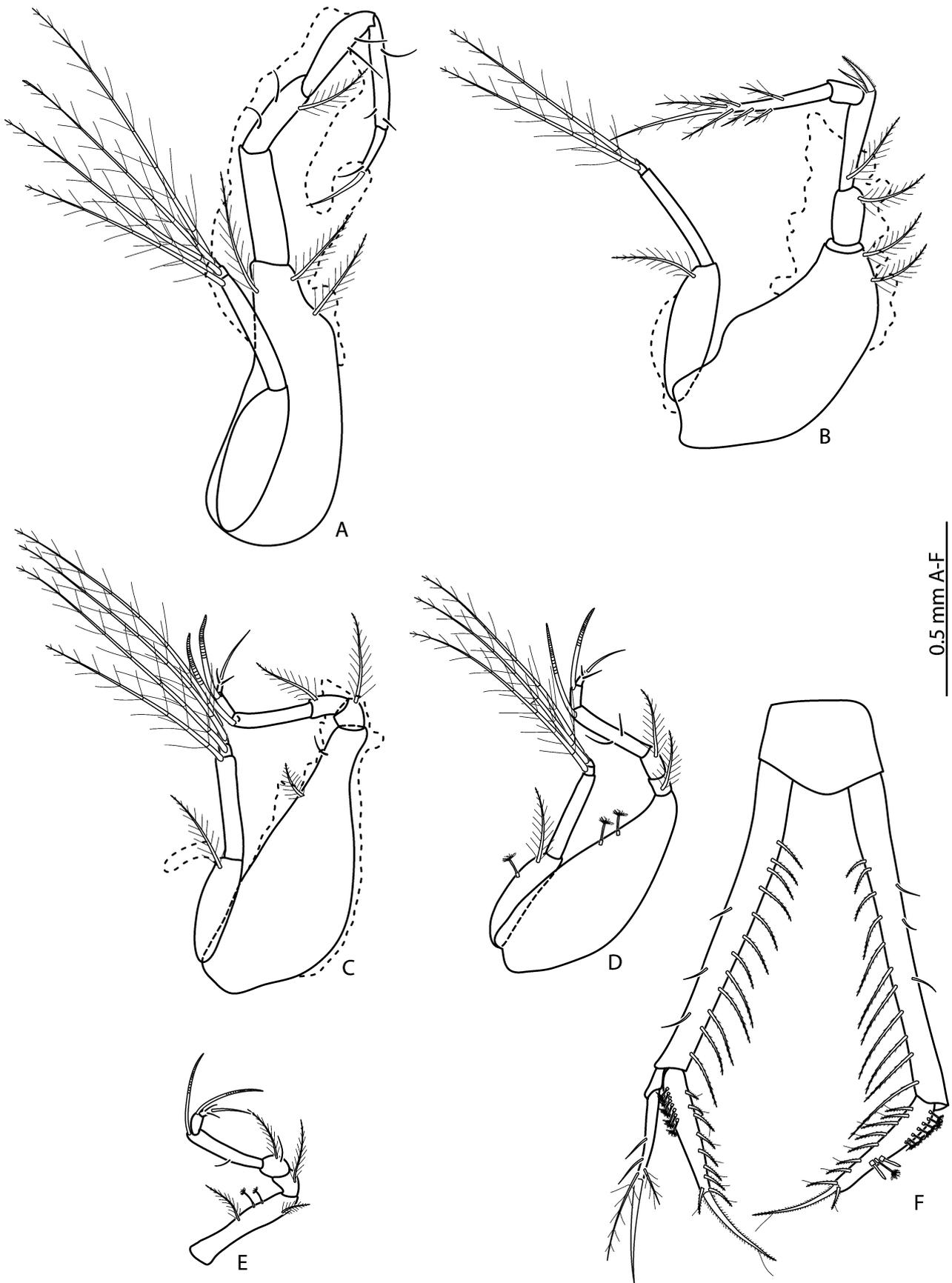
**FIGURE 55.** *Procampylaspis rhypakoceros* n. sp. Holotype subadult female, NIWA 80710. A, dorsal view. Paratype subadult female, NIWA 80711. B, side view; C, antennule; D, mandible; E, maxillule; F, maxilla; G, maxilliped 1; H, maxilliped 2. Note, dashed line indicates edge of mucus covering appendages.



**FIGURE 56.** *Procampylaspis rhypakoceros* n. sp. Paratype subadult female, NIWA 80711. A, maxilliped 3; B, pereopod 1; C, pereopod 2; D, pereopod 3; E, pereopod 4; F, pereopod 5; G, pleonite 6 and uropods. Note, dashed line indicates edge of mucus covering appendages.



**FIGURE 57.** *Procampylaspis rhyakoceros* n. sp. Paratype adult male, NIWA 80712. A, side view; B, dorsal view; C, antennule; D, antenna; E, maxilliped 3. Note, dashed line indicates edge of mucus covering appendages.



**FIGURE 58.** *Procampylaspis rhyphakoceros* n. sp. Paratype adult male, NIWA 80712. A, pereopod 1; B, pereopod 2; C, pereopod 3; D, pereopod 4; E, pereopod 5; F, pleonite 6 and uropods. Note, dashed line indicates edge of mucus covering appendages.

Maxilla with 3 endites; broad endite with 2 pappose and 4 simple setae distally, medial margin with 2 pappose setae, medial face lined with fine hair-like setae; medial narrow endite with 3 simple setae terminally; distal narrow endite with 3 simple setae terminally; both narrow endites extending past border of broad endite (Figure 55F).

Maxilliped 1 basis produced as lobe, with 4 plumose, 2 simple and 2 hook setae; ischium absent; merus 0.3 times basis length, unarmed; carpus 3.1 times merus length, with 10 simple and 3 plumose setae; propodus 0.4 times carpus length, with 4 simple setae; dactylus 0.4 times propodus length, with 2 simple setae terminally (Figure 55G).

Maxilliped 2 basis broken, with plumose seta; ischium unarmed; merus 4.3 times ischium length, with 2 plumose setae; carpus 1.2 times merus length, with simple seta; propodus 1.5 times carpus length, with 3 simple setae; dactylus 0.9 times propodus length, produced as 6 medially directed teeth (Figure 55H).

Maxilliped 3 coated in mucus (Figure 56A).

Pereopod 1 basis 0.6 times length of all other articles together, with plumose seta; ischium 0.3 times basis length, unarmed; merus equal to ischium length, with plumose seta; carpus equal to merus length, unarmed; propodus 1.3 times carpus length, with 3 simple setae; dactylus 0.4 times propodus length, with 2 simple setae terminally; exopod equal to basis length, basal article unarmed, flagellum with plumo-annulate setae (Figure 56B).

Pereopod 2 basis equal to length of all other articles together, with 4 plumose setae; ischium 0.05 times basis length, unarmed; merus 5.0 times ischium length, with 2 plumose setae, margin produced as tooth; carpus 1.3 times merus length, with 2 simple with single subterminal setule setae; propodus 0.4 times carpus length, unarmed; dactylus 4.4 times propodus length, with 4 simple and 3 plumose setae, plumose seta terminally; exopod 1.4 times basis length, basal article unarmed, flagellum with plumo-annulate setae (Figure 56C).

Pereopod 3 basis 1.4 times length of all other articles together, with 3 plumose and 2 complex pedunculate setae; ischium 0.1 times basis length, with plumose seta; merus equal to ischium length, with 1 simple and 1 plumose setae; carpus 2.5 times merus length, with 2 simple, 1 plumose and 1 annulate setae; propodus 0.3 times carpus length, with annulate seta; dactylus 0.6 times propodus length, with 3 simple setae terminally (Figure 56D).

Pereopod 4 basis 0.9 times length of all other articles together, with 2 plumose setae; ischium 0.1 times basis length, with plumose seta; merus 2.3 times ischium length, with plumose seta; carpus 1.6 times merus length, with 1 plumose and 1 annulate setae; propodus 0.4 times carpus length, with annulate seta; dactylus 0.7 times propodus length, with 3 simple setae terminally (Figure 56E).

Pereopod 5 basis 0.6 times length of all other articles together, with plumose seta; ischium 0.2 times basis length, with plumose seta; merus 2.3 times ischium length, with 1 simple and 1 plumose setae; carpus 2.1 times merus length, with 1 plumose and 1 annulate setae; propodus 0.3 times carpus length, with annulate seta; dactylus 0.5 times propodus length, with 3 simple setae terminally (Figure 56F).

Uropod peduncles 2.0 times pleonite 6 length, with 3 simple setae laterally. Uropod endopod uniarticulate, 0.5 times peduncle length, with 3 microserrate with single subterminal setule setae medially, 1 complex pedunculate and 1 simple with single subterminal setule setae laterally, terminal seta microserrate with single subterminal setule. Uropod exopod of 2 articles, 0.9 times length of endopod; article 1 0.4 times article 2 length, with simple seta; article 2 with 2 simple and 1 plumose setae, terminal seta simple (Figure 56G).

### **Description of male.**

Paratype adult male, 4.7 mm, NIWA 80712. Carapace with single dorsal spine, posterior of mid-body; pseudorostral lobes 0.3 times carapace length; eyelobe 0.1 times carapace length, slender, without lenses, with small spine terminally. Pereonite 5 and pleonites with spines. Carapace, pereonites and pleonites covered in mucus and sediment (Figures 57A–B).

Antennule peduncle article 1 longest, unarmed; article 2 0.6 times article 1 length, with 1 simple and 3 complex pedunculate setae, margin lined with fine hair-like setae; article 3 0.7 times article 2 length, with 1 complex pedunculate seta; main flagellum of 3 articles, with 2 aesthetascs and 2 simple setae; accessory flagellum of 1 article, with 1 simple and 1 complex pedunculate setae (Figure 57C).

Antenna extending past posterior margin of uropod peduncle; peduncle of 5 articles, article 2 with simple seta, articles 4–5 with ranks of setae, incompletely circling articles; flagellum articles each with seta (Figure 57D).

Maxilliped 3 covered in mucus and sediment (Figure 57E).

Pereopod 1 basis 0.6 times length of all other articles together, with 3 plumose setae; ischium 0.4 times basis length, unarmed; merus 0.7 times ischium length, with 2 simple and 1 plumose setae; carpus 1.3 times merus length, with 2 simple setae; propodus 1.1 times carpus length, with 3 simple setae; dactylus 0.5 times propodus

length, with 2 simple setae terminally; exopod equal to basis length, basal article unarmed, flagellum with plumo-annulate setae (Figure 58A).

Pereopod 2 basis 0.8 times length of all other articles together, with 2 plumose setae; ischium 0.05 times basis length, unarmed; merus 5.5 times ischium length, with plumose seta; carpus 1.5 times merus length, with 1 simple, 1 plumose and 1 microserrate setae; propodus 0.4 times carpus length, unarmed; dactylus 3.3 times propodus length, with 6 plumose setae and plumose seta terminally; exopod 1.1 times basis length, basal article with plumose seta, flagellum with plumo-annulate setae (Figure 58B).

Pereopod 3 basis 1.7 times length of all other articles together, with 1 simple and 1 plumose setae; ischium 0.07 times basis length, with plumose seta; merus 1.5 times ischium length, with plumose seta; carpus 2.5 times merus length, with annulate seta; propodus 3.8 times carpus length, with annulate seta; dactylus 0.8 times propodus length, with 3 simple setae terminally; exopod 0.8 times basis length, basal article with plumose seta, flagellum with plumo-annulate setae (Figure 58C).

Pereopod 4 basis 1.5 times length of all other articles together, with 2 complex pedunculate setae; ischium 0.07 times basis length, with plumose seta; merus 1.7 times ischium length, with plumose seta; carpus 3.2 times merus length, with 2 simple and 1 annulate setae; propodus 0.3 times carpus length, with annulate seta; dactylus 0.8 times propodus length, with 3 simple setae terminally; exopod 0.9 times basis length, basal article with 1 plumose and 1 complex pedunculate setae, flagellum with plumo-annulate setae (Figure 58D).

Pereopod 5 basis 0.7 times length of all other articles together, with 2 plumose and 2 complex pedunculate setae; ischium 0.2 times basis length, with plumose seta; merus equal to ischium length, with plumose seta; carpus 4.5 times merus length, with 1 simple and 1 annulate setae; propodus 0.2 times carpus length, with annulate seta; dactylus 0.5 times propodus length, with 3 simple setae terminally (Figure 58E).

Uropod peduncles 3.4 times pleonite 6 length, with 11–12 microserrate setae medially, 3 simple setae laterally. Uropod endopod uniarticulate, 0.4 times peduncle length, with 8 microserrate with single subterminal setule setae medially, 8 complex pedunculate, 2 pedunculate and 1 microserrate with single subterminal setule setae laterally, terminal seta microserrate with single subterminal setule. Uropod exopod 0.8 times length of endopod; article 1 0.2 times article 2 length, unarmed; article 2 with 2 simple and 2 plumose setae, terminal seta simple (Figure 58F).

**Etymology.** The new species is named from the Greek *rhyrax* meaning dirty, in combination with *ceros*, meaning horn, meaning the dirty horned one, in reference to the single large dorsal spine on the carapace in combination with the fact that all specimens encountered were covered in mucus and fine sediment.

**Remarks.** The most similar species is *Procampylaspis rhypakos*, because both species are commonly encountered covered in a layer of mucus and fine sediment. The species can be differentiated by the large dorsal spine present on the carapace in *P. rhypakoceros* and the lack of any dorsal spine on the carapace in *P. rhypakos*.

### ***Procampylaspis rhypakos* n. sp.**

Figures 59–62

**Type material.** Holotype ovigerous female, NIWA 80653, paratype ovigerous female, dissected, NIWA 80655, paratype adult male, dissected, NIWA 80654, paratype adult male, NIWA 46204, 44.5607°S, 178.4762°W–44.5592°S, 178.4830°W, 1076–1103 m, 10 April 2007.

**Other material examined.** 2 juveniles, NIWA 79361, 44.4862°S, 177.1413°E–44.4841°S, 177.1416°E, 1235–1239 m, 6 April 2007. 8 subadult females, 6 juveniles NIWA 79362, 44.4862°S, 177.1413°E–44.4841°S, 177.1416°E, 1235–1239 m, 6 April 2007. 6 specimens, in poor shape, NIWA 79363, 44.0162°S, 178.5210°E–44.0143°S, 178.5175°E, 769–771 m, 7 April 2007. 1 ovigerous female, 6 subadult females, 2 subadult males, NIWA 79364, 44.5607°S, 178.4762°W–44.5592°S, 178.4830°W, 1076–1103 m, 10 April 2007. 1 ovigerous female, 15 juveniles, NIWA 79365, 44.5607°S, 178.4762°W–44.5592°S, 178.4830°W, 1076–1103 m, 10 April 2007. 1 subadult female, 1 juvenile, NIWA 79366, 43.0650°S, 174.9325°W–43.0732°S, 174.9348°W, 933–940 m, 13 April 2007. 1 adult male, NIWA 79367, 42.6213°S, 175.9225°E–42.6203°S, 175.9335°E, 1194–1199 m, 26 April 2007.

**Diagnosis.** *Females and subadult males.* Carapace without single large dorsal spine; eyelobe present. Uropod peduncle more than twice as long as pleonite 6. Specimens coated in mucus and fine sediment, obscuring ornamentation of carapace, pereon and pleon. *Male.* Carapace, pereon and pleon covered in fine spines, without

single large dorsal spine; less vaulted than in female. Pleonites 1–5 with lateral depression to accommodate antennal flagellum. Uropod peduncle 3.6 times length of pleonite 6; uropods more setose than in female.

#### **Description of female.**

Holotype ovigerous female, 4.2 mm, NIWA 80653. Paratype ovigerous female, 3.8 mm, NIWA 80655. Carapace without single middorsal spine, small spines on frontal lobe and eyelobe; pseudorostral lobes 0.2 times carapace length; eyelobe 0.07 times carapace length, with spines. Pleonite 5 covered in small spines. Entire body covered in mucus and sediment, note it is possible that carapace, pereonites and pleonites are covered with small spines as in the male and as seen on pleonite 5, but it was impossible to determine with the mucus covering the body (Figures 59A–B).

Antennule peduncle article 1 longest, with 1 simple and 2 complex pedunculate setae, produced as 3 teeth distally, margin lined with fine hair-like setae; article 2 0.6 times article 1 length, with 1 simple and 1 complex pedunculate setae; article 3 0.9 times article 2 length, with pedunculate seta; main flagellum of 3 articles, with 2 aesthetascs, 1 simple and 1 pedunculate setae; accessory flagellum of 2 articles, with 5 long complex pedunculate setae (Figure 59C).

Mandible navicular, with 5 microserrate setae medially, lacinia mobilis with 2 cusps (Figure 59D).

Maxillule with 2 endites; outer endite with 11 simple setae terminally, simple seta laterally; inner endite with 1 simple, 1 pappose and 1 dentate setae; palp with 2 microserrate setae (Figure 59E).

Maxilla with 3 endites; broad endite terminal margin with simple setae, with 2 plumose setae medially; medial narrow endite with 2 simple setae terminally; distal narrow endite with 3 simple setae terminally; both narrow endites extending past margin of broad endite (Figure 59F).

Maxilliped 1 basis produced as lobe with 1 simple, 1 stout and 2 hook setae; ischium absent; merus 0.2 times basis length, unarmed; carpus 2.8 times merus length, with 12 simple and 2 plumose setae; propodus 0.4 times carpus length, with 3 simple setae; dactylus 0.4 times propodus length, with simple seta (Figure 59G).

Maxilliped 2 basis with 1 plumose and 1 pappose setae; ischium unarmed; merus 18 times ischium length, unarmed; carpus equal to merus length, with 2 plumose setae; propodus 1.3 times carpus length, with 3 simple and 1 plumose setae; dactylus 0.8 times propodus length, produced as 5 medially directed teeth, with simple seta (Figure 59H).

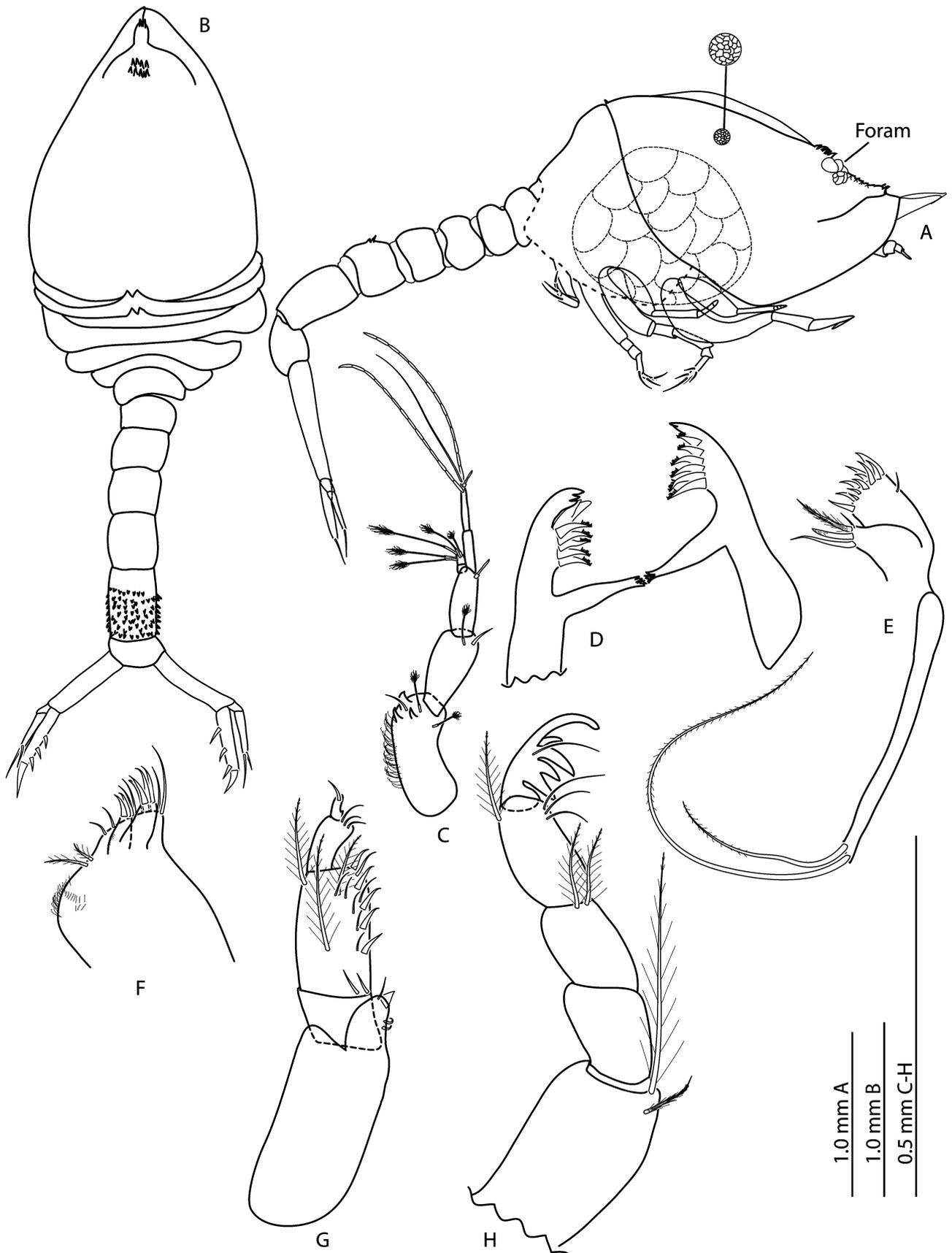
Maxilliped 3 basis 1.2 times length of all other articles together, with 2 plumose setae at distal corner; ischium 0.1 times basis length, unarmed; merus 2.2 times ischium length, with plumose seta; carpus 0.9 times merus length, with 3 plumose setae; propodus equal to carpus length, with 4 plumose setae; dactylus 0.7 times propodus length, with 3 simple setae terminally; exopod 0.8 times basis length, basal article unarmed, flagellum with plumo-annulate setae (Figure 60A).

Pereopod 1 basis 1.5 times length of all other articles together, with 3 plumose and 1 microserrate setae, produced as tooth proximally; ischium 0.3 times basis length, with 2 plumose setae; merus 1.1 times ischium length, with 2 simple and 1 plumose setae, lateral margin lined with fine hair-like setae and produced as small teeth; carpus 0.9 times merus length, with 5 simple setae, lateral margin lined with fine hair-like setae; propodus 1.1 times carpus length, with 5 simple setae, margins lined with fine hair-like setae; dactylus 0.4 times propodus length, with 5 simple setae terminally; exopod 0.9 times basis length, basal article unarmed, flagellum with plumo-annulate setae (Figure 60B).

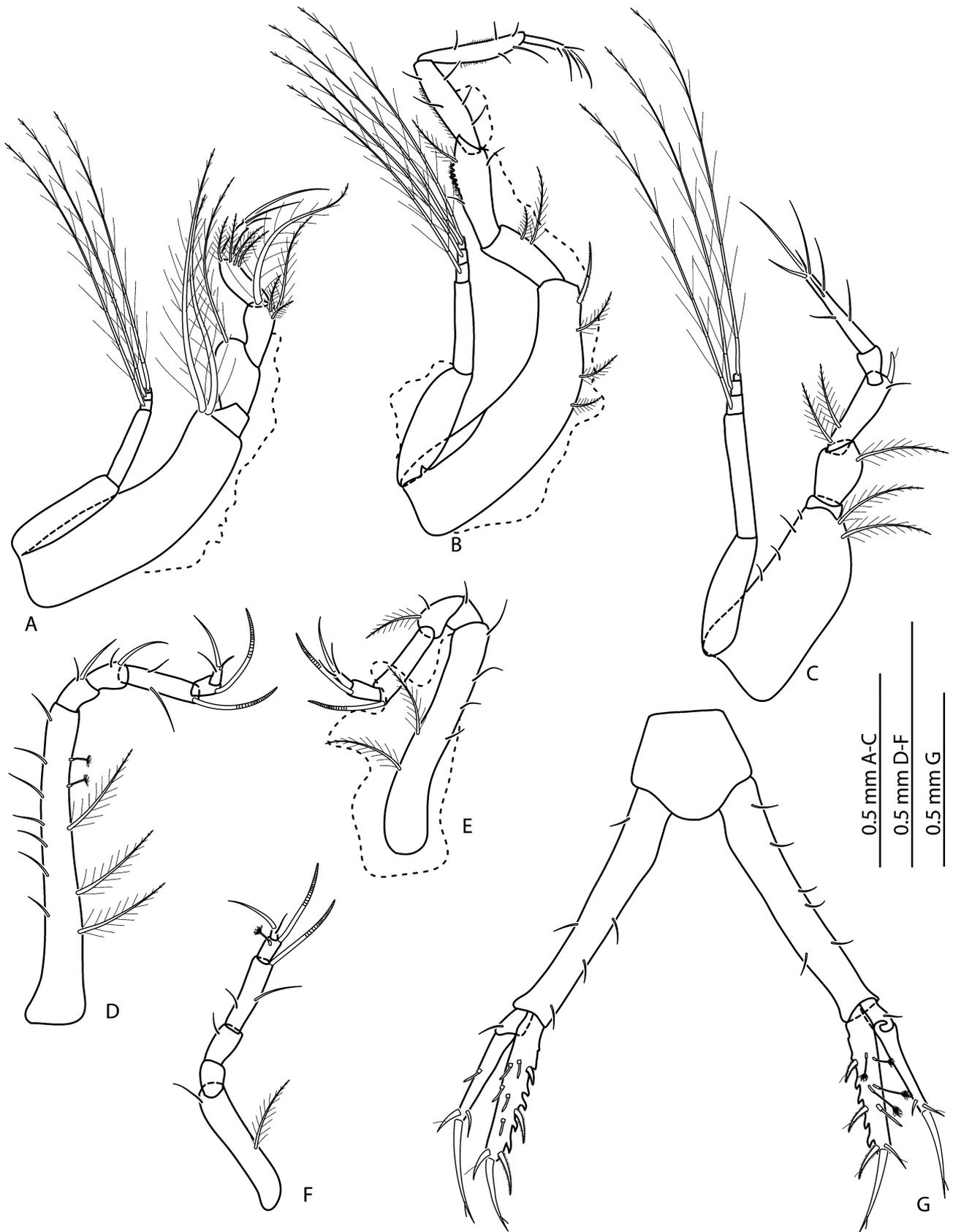
Pereopod 2 basis 0.7 times length of all other articles together, with 4 simple and 2 plumose setae; ischium 0.03 times basis length, unarmed; merus 12 times ischium length, with plumose seta; carpus 1.2 times merus length, with 1 simple, 2 plumose and 1 simple with single subterminal setule setae; propodus 0.5 times carpus length, unarmed; dactylus 2.7 times propodus length, with 7 simple setae, terminal seta simple; exopod 1.5 times basis length, basal article unarmed, flagellum with plumo-annulate setae (Figure 60C).

Pereopod 3 basis 1.8 times length of all other articles together, with 7 simple, 3 plumose and 2 complex pedunculate setae; ischium 0.1 times basis length, with 2 simple setae; merus 1.3 times ischium length, with 2 simple setae; carpus 1.6 times merus length, with 2 simple and 1 annulate setae; propodus 0.4 times carpus length, with annulate seta; dactylus 0.8 times propodus length, with 3 simple setae terminally (Figure 60D).

Pereopod 4 basis 1.3 times length of all other articles together, with 4 simple and 2 plumose setae; ischium 0.08 times basis length, with simple seta; merus 2.0 times ischium length, with 1 simple and 1 plumose setae; carpus 2.0 times merus length, with annulate seta; propodus 0.3 times carpus length, with annulate seta; dactylus 0.6 times propodus length, with 3 simple setae terminally (Figure 60E).



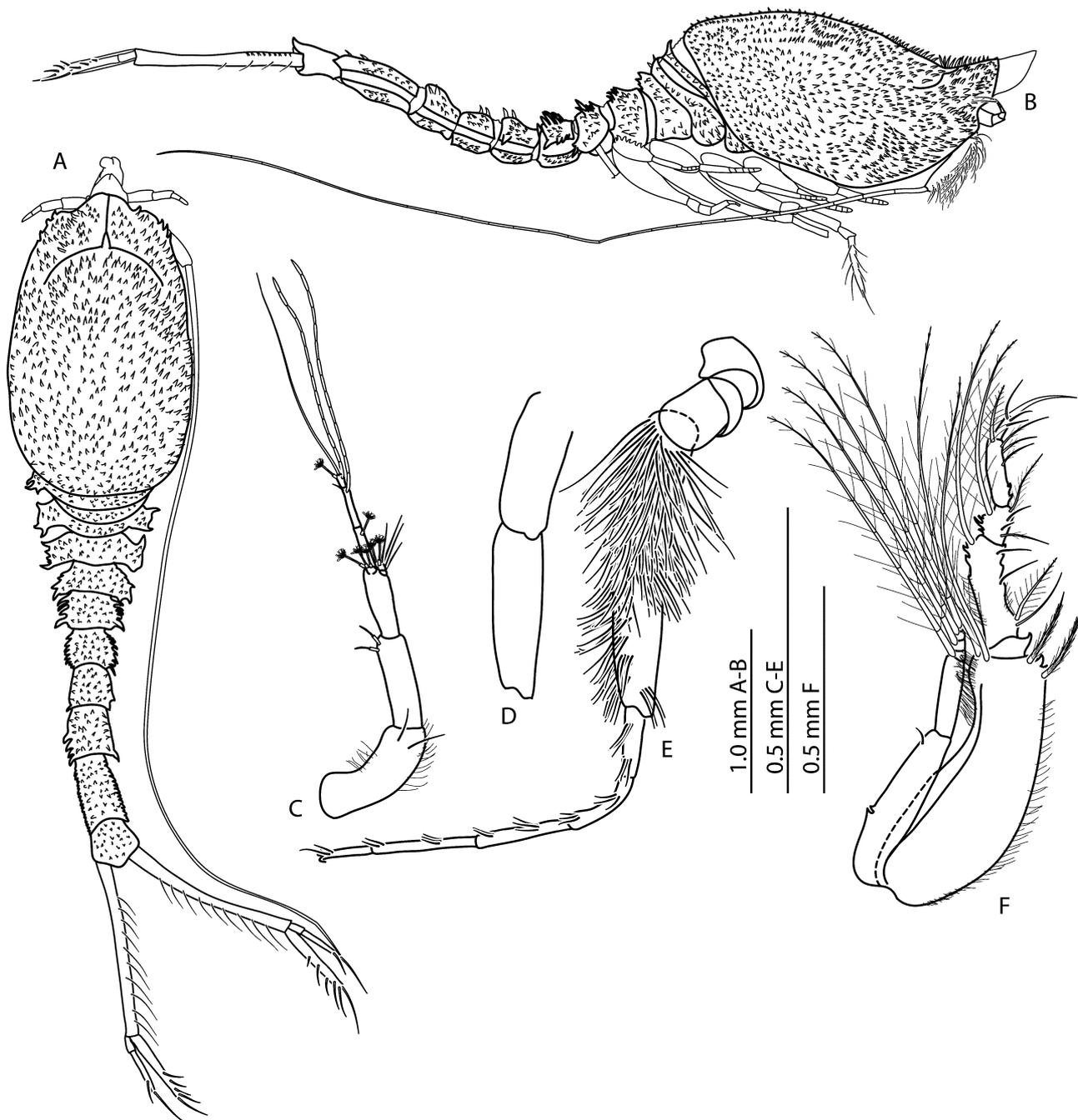
**FIGURE 59.** *Procampylaspis rhypakos* n. sp. Holotype ovigerous female, NIWA 80653. A, side view. Paratype ovigerous female, NIWA 80655. B, dorsal view; C, antennule; D, mandibles; E, maxillule; F, maxilla; G, maxilliped 1; H, maxilliped 2.



**FIGURE 60.** *Procampylaspis rhypakos* n. sp. Paratype ovigerous female, NIWA 80655. A, maxilliped 3; B, pereopod 1; C, pereopod 2; D, pereopod 3; E, pereopod 4; F, pereopod 5; G, pleonite 6 and uropods. Note, dashed line indicates edge of mucus covering appendages.

Pereopod 5 basis 0.7 times length of all other articles together, with 1 simple and 1 plumose setae; ischium 0.3 times basis length, unarmed; merus equal to ischium length, with simple seta; carpus 2.0 times merus length, with 2 simple and 1 annulate setae; propodus 0.4 times carpus length, with 1 annulate and 1 complex pedunculate setae; dactylus 0.4 times propodus length, with 2 simple setae terminally (Figure 60F).

Uropod peduncles 2.3 times pleonite 6 length, with 5–6 simple setae. Uropod endopod uniarticulate, 0.6 times peduncle length, with 3 microserrate with single subterminal setule setae medially, 1 simple with single subterminal setule, 1–5 pedunculate and 0–4 complex pedunculate setae laterally, terminal seta simple with single subterminal setule. Uropod exopod of 2 articles, 0.8 times length of endopod; article 1 0.3 times article 2 length, with simple seta; article 2 with 1 simple and 1 simple with single subterminal setule setae, terminal seta simple with single subterminal setule (Figure 60G).



**FIGURE 61.** *Procampylaspis rhypakos* n. sp. Paratype adult male, NIWA 80654. A, dorsal view; B, side view; C, antennule; D, antenna; E, antenna; F, maxilliped 3. Note, dashed line indicates edge of mucus covering appendages.

## Description of male.

Paratype adult male, 4.2 mm, NIWA 80654. Carapace, pereonites and pleonites thickly covered in fine spines; pseudorostral lobes 0.3 times carapace length; eyelobe 0.06 times carapace length. Pleonites 1–5 with lateral groove for antennal flagellum (Figures 61A–B).

Antennule peduncle article 1 longest, with 2 simple setae, margins lined with fine hair-like setae; article 2 0.8 times article 1 length, with 2 pedunculate setae; article 3 0.8 times article 2 length, with 3 complex pedunculate setae; main flagellum of 3 articles, with 2 aesthetascs, 2 simple and 2 complex pedunculate setae; accessory flagellum of 2 articles, with 4 simple and 1 complex pedunculate setae (Figure 61C).

Antenna extending past posterior border of uropod peduncles; peduncle of 5 articles, articles 1–3 unarmed; articles 4–5 with ranks of setae, incompletely circling articles; flagellum 2 groups of 2–3 setae on each article (Figures 61D–E)

Maxilliped 3 basis 1.1 times length of all other articles together, with 2 pappose setae medially, 2 plumose setae at distal corner, medial margin and distal lateral margin lined with fine hair-like setae; ischium 0.06 times basis length, unarmed, produced as tooth medially; merus 6.0 times ischium length, with 3 simple and 1 plumose setae medially, plumose seta laterally, lateral margin produced as tooth, margins lined with fine hair-like setae; carpus 0.3 times merus length, with 2 simple and 3 plumose setae, lateral margin produced as teeth; propodus 2.0 times carpus length, with 4 plumose setae; dactylus 0.3 times propodus length, with 4 simple setae terminally; exopod equal to basis length, basal article with simple seta, flagellum with plumo-annulate setae (Figure 61F).

Pereopod 1 basis 1.1 times length of all other articles together, with 2 simple and 2 plumose setae, lateral margin serrate; ischium 0.05 times basis length, with plumose seta; merus 4.7 times ischium length, with 8 simple and 2 plumose setae; carpus 1.1 times merus length, with 6 simple and 3 plumose setae; propodus 0.7 times carpus length, with 6 simple setae; dactylus 0.9 times propodus length, with 6 simple setae terminally; exopod equal to basis length, basal article with 2 simple setae, produced as strong teeth, flagellum with plumo-annulate setae (Figure 62A).

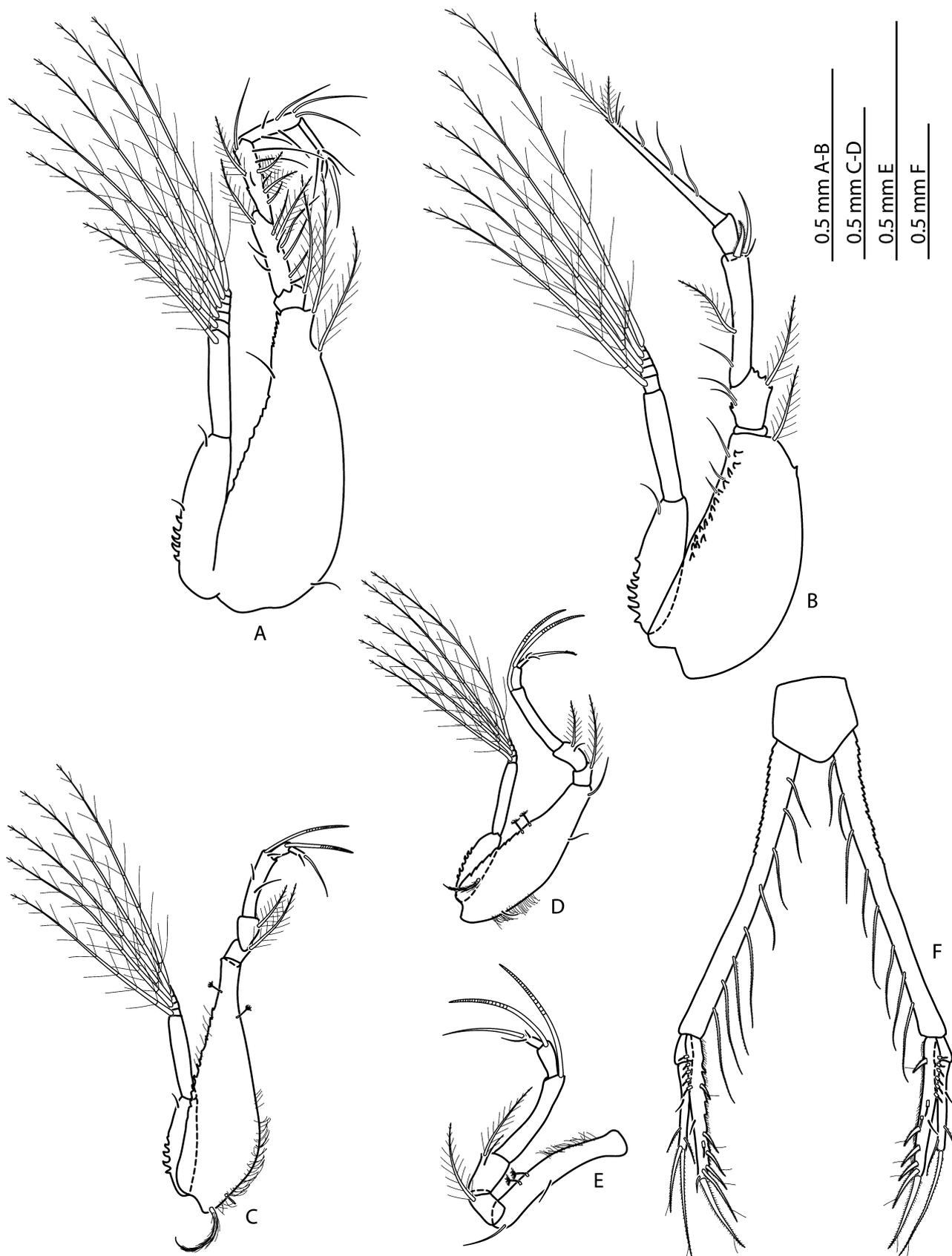
Pereopod 2 basis 0.7 times length of all other articles together, with 3 simple and 1 plumose setae, produced as teeth; ischium 0.02 times basis length, unarmed; merus 10 times ischium length, with 2 simple and 1 plumose setae, margin serrate; carpus 2.5 times merus length, with 3 simple, 1 plumose and 1 microserrate setae; propodus 0.2 times carpus length, unarmed; dactylus 5.2 times propodus length, with 6 simple and 1 plumose setae, terminal seta plumose; exopod 1.2 times basis length, basal article with simple seta, margin produced as teeth, flagellum with plumo-annulate setae (Figure 62B).

Pereopod 3 basis 1.7 times length of all other articles together, with 1 pappose and 2 complex pedunculate setae, margins serrate and lined with fine hair-like setae; ischium 0.04 times basis length, with plumose seta; merus 3.0 times ischium length, with plumose seta; carpus 2.2 times merus length, with 3 simple and 1 annulate setae; propodus 0.3 times carpus length, with annulate seta; dactylus equal to propodus length, with 2 simple setae terminally; exopod 0.9 times basis length, basal article with simple seta, margin produced as teeth, flagellum with plumo-annulate setae (Figure 62C).

Pereopod 4 basis 1.2 times length of all other articles together, with 3 simple, 1 pappose, 2 complex pedunculate setae, margin serrate, lined with fine hair-like setae; ischium 0.09 times basis length, with plumose seta; merus 2.0 times ischium length, with plumose seta; carpus 2.3 times merus length, with annulate seta; propodus 0.3 times carpus length, with annulate seta; dactylus 0.5 times propodus length, with 3 simple setae terminally; exopod equal to basis length, basal article unarmed, produced as teeth, flagellum with plumo-annulate setae (Figure 62D).

Pereopod 5 basis 0.7 times length of all other articles together, with 2 simple and 2 complex pedunculate setae, margin lined with fine hair-like setae; ischium 0.2 times basis length, with plumose seta; merus 1.3 times ischium length, with plumose seta; carpus 2.4 times merus length, with annulate seta; propodus 0.3 times carpus length, with annulate seta; dactylus 0.7 times propodus length, with 3 simple setae terminally (Figure 62E).

Uropod peduncles 3.6 times pleonite 6 length, with 8 microserrate setae medially, lateral margin serrate proximally. Uropod endopod uniaarticulate, 0.5 peduncle length, medial margin serrate, lined with fine hair-like setae, with 5 microserrate with single subterminal setule setae, lateral margin with 1–2 simple and 6–8 pedunculate setae, terminal seta microserrate with single subterminal setule. Uropod exopod 0.8 times length of endopod; article 1 0.3 times article 2 length, unarmed; article 2 with 1 simple, 2 microserrate, and 0–1 microserrate with single subterminal setule setae, terminal seta microserrate with single subterminal setule (Figure 62F).



**FIGURE 62.** *Procampylaspis rhypakos* n. sp. Paratype adult male, NIWA 80654. A, pereopod 1; B, pereopod 2; C, pereopod 3; D, pereopod 4; E, pereopod 5; F, pleonite 6 and uropods. Note, dashed line indicates edge of mucus covering appendages.

**Etymology.** The new species is named *rhypakos* from the Greek *rhyrax*, meaning dirty, in reference to the fact that all specimens encountered were covered in a thick layer of mucus and fine sediment.

**Remarks.** This species is most likely to be confused with *Procampylaspis rhypakoceros*, because both species are commonly encountered covered in mucus and fine sediment. However, *P. rhypakoceros* has a single large dorsal spine on the carapace, while *P. rhypakos* has no such spine. The spine in *P. rhypakoceros* can be broken off but the base of the spine is usually still apparent.

### *Scherocumella* Watling 1991

**Type species.** *Nannastacus longirostris* G.O. Sars 1879.

**Diagnosis after Watling 1991.** Ocular lobe divided, eyes dorsolateral; siphons united medially; pseudorostral lobe elongate; female with exopods on maxilliped 3-pereopod 2; male with exopods on maxilliped 3-pereopod 4; uropod peduncle longer than pleonite 6.

**New Zealand species.** *Scherocumella pilgrimi* (Jones 1963).

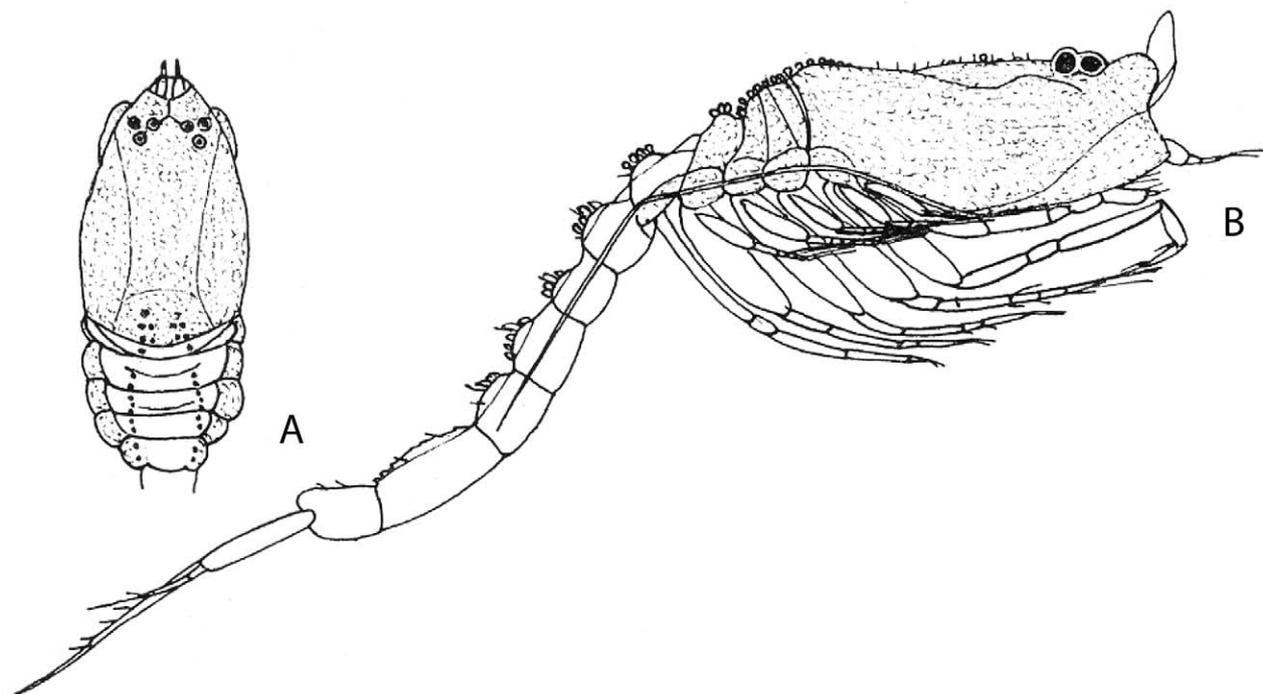
**Remarks.** This genus is unique among the nannastacid species known from New Zealand in possessing a split eye lobe with lenses on each side. This is the only nannastacid known from shallow, inshore waters, Menzies Bay and Lyttleton Harbour (Jones 1963).

### *Scherocumella pilgrimi* (Jones 1963)

Figure 63

**Diagnosis after Watling 1991.** *Female.* Carapace not vaulted; pseudorostral lobes and siphons united at midline; eyelobe divided, dorsolateral. Antennule peduncle article shorter than or equal to article 3. Exopods on maxilliped 3-pereopod 2. Uropod peduncle longer than pleonite 6; exopod basal article normal, terminal seta no longer than exopod. *Male.* With exopods on maxilliped 3-pereopod 4.

**Material examined.** None.



**FIGURE 63.** *Scherocumella pilgrimi* (Jones 1963) from Jones 1963. A, dorsal view; B, side view.

**Remarks.** This species is somewhat similar to the species of *Aotearocumella* in body form, but it can easily be distinguished by the eyelobe.

### *Schizocuma* Băcescu 1972

**Type species.** *Schizocuma vema* Băcescu 1972

**Diagnosis after Watling 1991.** Ocular lobe not divided, or incompletely divided; pseudorostral lobes and siphons separated; female with exopods on maxilliped 3-pereopod 2; male with exopods on maxilliped 3-pereopod 4; uropod peduncle much longer than pleonite 6.

**New Zealand species.** *Schizocuma delicata* n. sp.

**Remarks.** This genus is easily distinguishable from all other nannastacids from New Zealand waters by the split siphons.

### *Schizocuma delicata* n. sp.

Figures 64–67

**Type material.** Holotype ovigerous female, NIWA 80717, 42.6213°S, 175.9225°E–42.6203°S, 175.9335°E, 1194–1199 m, 26 April 2007. Paratype ovigerous female, dissected, NIWA 80718, paratype adult male, dissected, NIWA 80719, 44.5607°S, 178.4762°W–44.5592°S, 178.4830°W, 1076–1103 m, 10 April 2007.

**Other material examined.** 1 subadult male, NIWA 79378, 44.4862°S, 177.1413°E–44.4841°S, 177.1416°E, 1235–1239 m, 6 April 2007. 4 subadult females, NIWA 46195, 44.5607°S, 178.4762°W–44.5592°S, 178.4830°W, 1076–1103 m, 10 April 2007. 1 subadult female, 1 subadult male, NIWA 79379, 43.0650°S, 174.9325°W–43.0732°S, 174.9348°W, 933–940 m, 13 April 2007. 1 subadult male, NIWA 46196, 0705/160. 1 subadult female, NIWA 79380, 40.1277°S, 170.2140°E–40.1352°S, 170.2090°E, 803–805 m, 5 June 2007. 1 subadult female, NIWA 79381, 40.1277°S, 170.2140°E–40.1352°S, 170.2090°E, 803–805 m, 5 June 2007.

**Diagnosis.** *Females and subadult males.* Carapace with 3–4 large spines and 2 setae on mid-dorsal line; pseudorostral lobes directed upward; eyelobe absent. Carapace and pereonites together 0.4 times total body length. Antennule extending past siphons. *Male.* Carapace without spines or setae. Antennal flagellum extending to end of pereon. Uropods slightly more setose than in female.

#### **Description of female.**

Holotype ovigerous female, 3.7 mm, NIWA 80717. Paratype ovigerous female, 4.0 mm, NIWA 80718. Carapace with 3–4 large spines on middorsal line, with 2 long setae on frontal lobe; pseudorostral lobes and siphons divided, directed upwards; eyelobe absent; carapace and pereonites together 0.4 times total body length (Figures 64A–B).

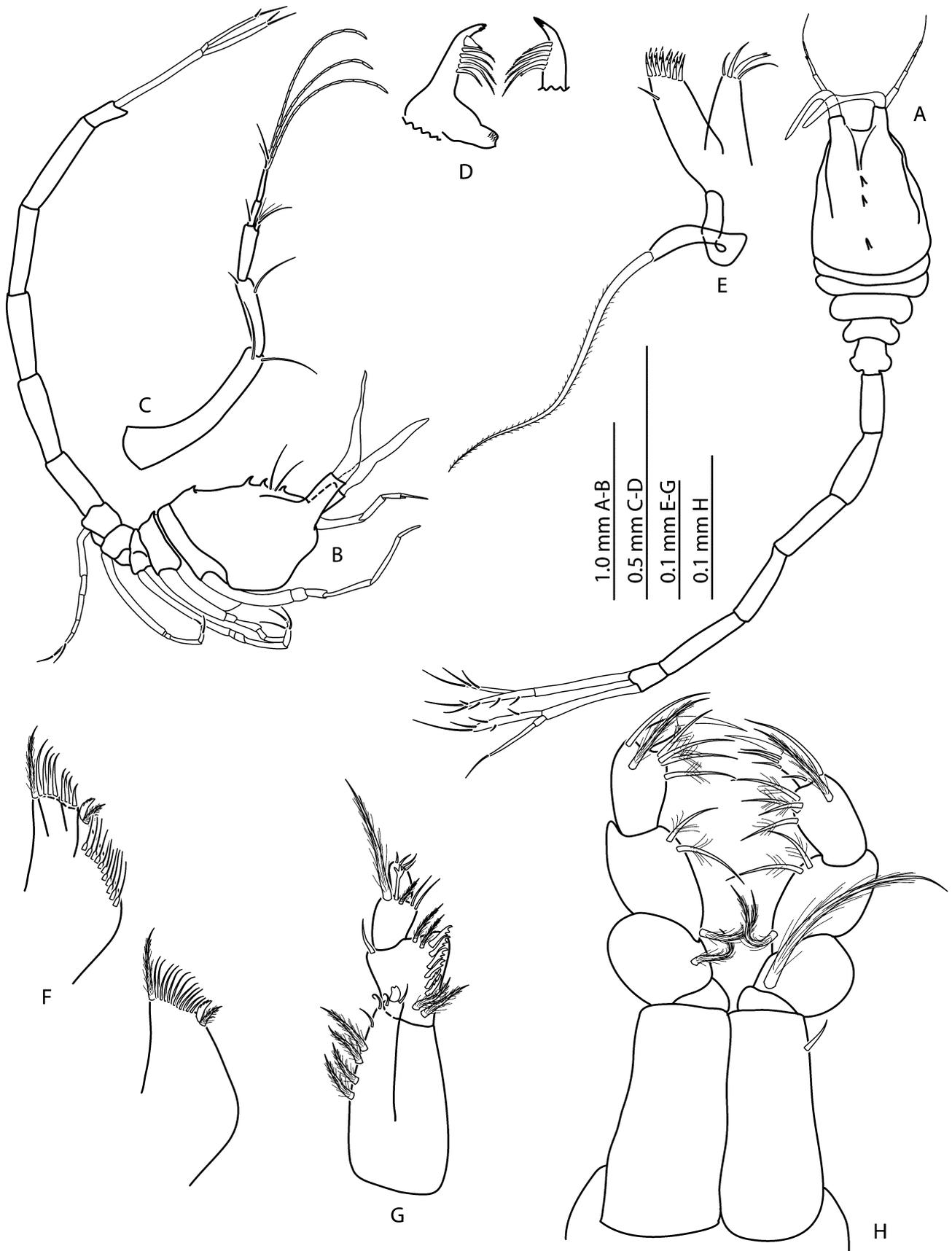
Antennule peduncle article 1 longest, with 2 simple setae; article 2 0.5 times article 1 length, with 2 simple setae; article 3 0.7 times article 2 length, unarmed; main flagellum of 2 articles, with 3 aethetasc and 3 simple setae; accessory flagellum of 1 article, with 4 simple setae (Figure 64C).

Mandible navicular, with 5–6 microserrate setae medially, lacinia mobilis with 2 cusps (Figure 64D).

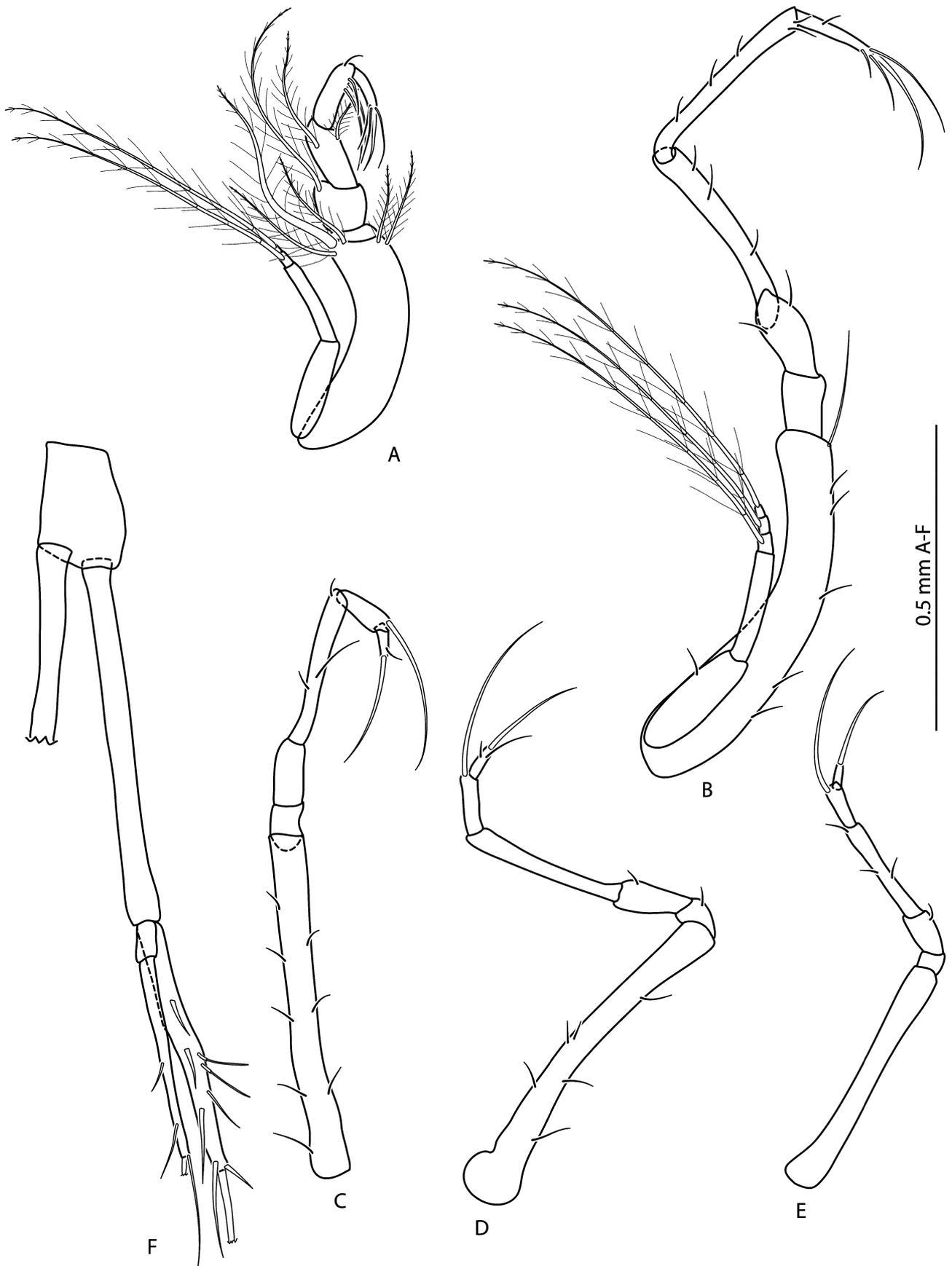
Maxillule with 2 endites; outer endite with double row of stout setae, margin with simple seta; inner endite with 3 simple and 1 bicuspid setae; palp with microserrate with single subterminal setule seta (Figure 64E).

Maxilla with 3 endites; broad endite with 13 simple and 1 pappose on terminal margin, medial distal corner with 1 dentate and 1 pappose setae, medial margin lined with pedunculate setae; medial narrow endite with 4 simple setae terminally; distal narrow endite with 4 simple setae terminally; both narrow endites extend only to margin of broad endite (Figure 64F).

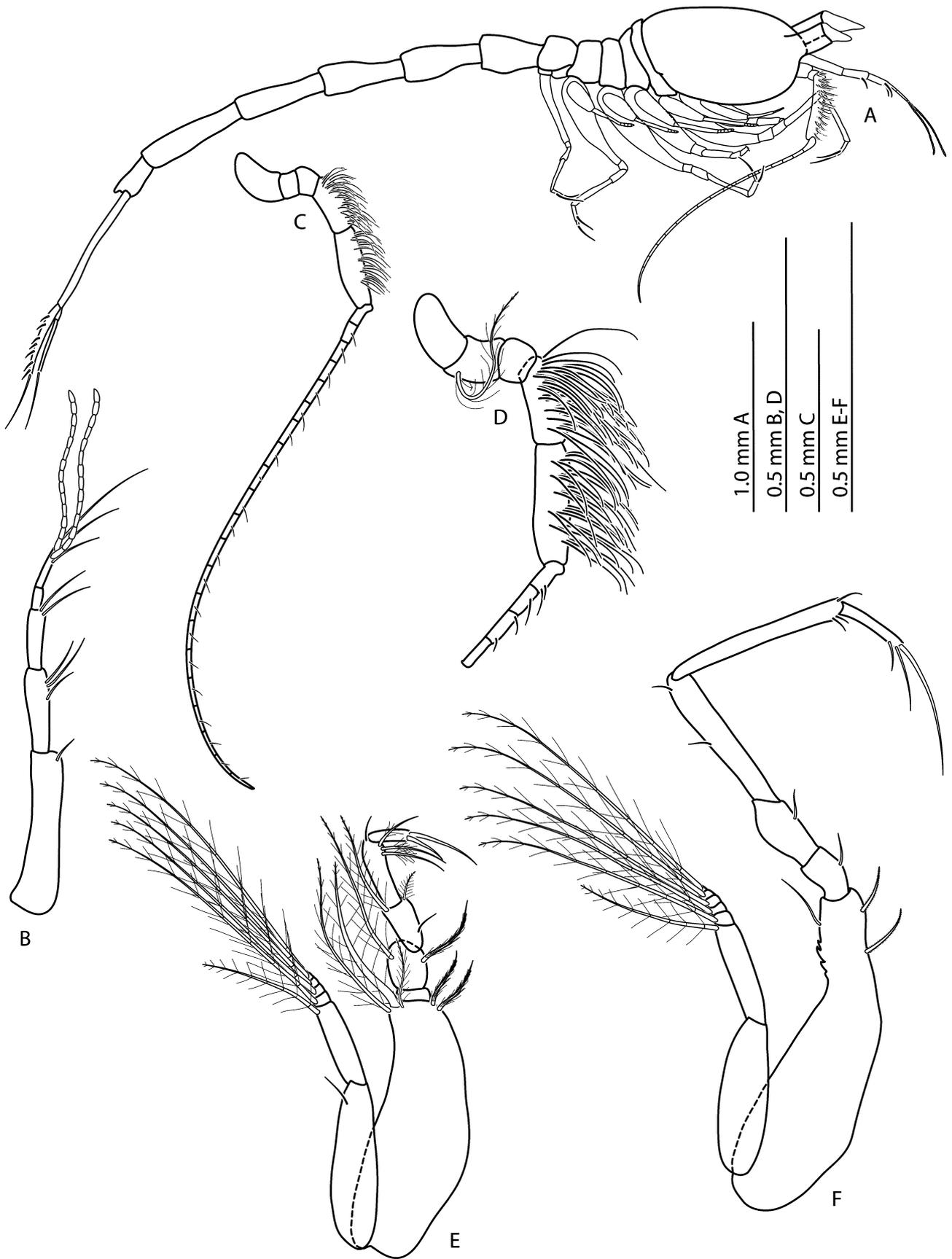
Maxilliped 1 basis produced as lobe, with 4 simple, 4 pappose and 1 bicuspid setae; ischium and merus absent; carpus 0.5 times basis length, with 1 simple, 4 pappose and 6 comb-like setae; propodus 0.7 times carpus length, with 2 simple, 2 pappose and 1 tricuspid setae; dactylus 0.7 times propodus length, with 4 simple setae (Figure 64G).



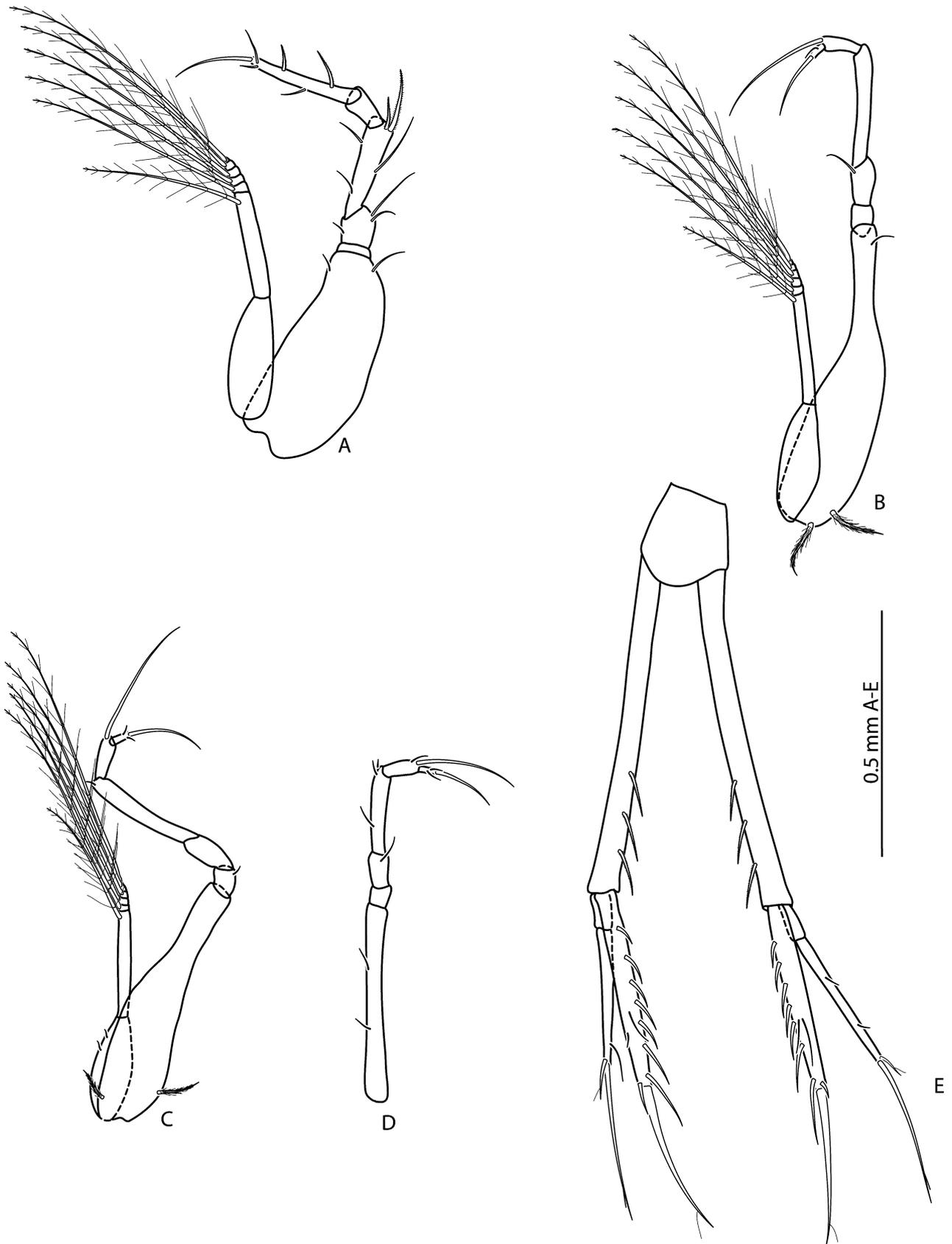
**FIGURE 64.** *Schizocuma delicata* n. sp. Holotype ovigerous female, NIWA 80717. A, dorsal view. Paratype ovigerous female, NIWA 80718. B, side view; C, antennule; D, mandibles; E, maxillule; F, maxilla; G, maxilliped 1; H, maxilliped 2s.



**FIGURE 65.** *Schizocuma delicata* n. sp. Paratype ovigerous female, NIWA 80718. A, maxilliped 3; B, pereopod 1; C, pereopod 3; D, pereopod 4; E, pereopod 5; F, pleonite 6 and uropod.



**FIGURE 66.** *Schizocuma delicata* n. sp. Paratype adult male, NIWA 80719. A, side view; B, antennule; C, antenna; D, antenna; E, maxilliped 3; F, pereopod 1.



**FIGURE 67.** *Schizocuma delicata* n. sp. Paratype adult male, NIWA 80719. A, pereopod 2; B, pereopod 3; C, pereopod 4; D, pereopod 5; E, pleonite 6 and uropods.

Maxilliped 2 basis 0.8 times length of all other articles together, with 0–1 simple setae; ischium 0.07 times basis length, unarmed; merus 5.0 times ischium length, with pappose seta; carpus equal to merus length, with 2 plumose setae; propodus 1.1 times carpus length, with 1 simple, 4 plumose and 1 pappose setae; dactylus 0.5 times propodus length, with 4 simple setae (Figure 64H).

Maxilliped 3 basis equal to length of all other articles together, with 2 plumose setae medially, distal corner with 3 plumose setae; ischium 0.05 times basis length, unarmed; merus 4.0 times ischium length, with plumose seta; carpus 1.5 times merus length, with 2 plumose setae; propodus equal to carpus length, with 4 simple setae; dactylus 0.8 times propodus length, with 4 simple setae terminally; exopod times basis length, basal article unarmed, flagellum with plumo-annulate setae (Figure 65A).

Pereopod 1 basis 0.7 times length of all other articles together, with 6 simple setae; ischium 0.1 times basis length, unarmed; merus 1.1 times ischium length, with 2 simple setae; carpus 2.7 times merus length, with 3 simple setae; propodus 1.2 times carpus length, with 5 simple setae; dactylus 0.4 times propodus length, with simple seta and 4 simple setae terminally; exopod 0.7 times basis length, basal article with simple seta, flagellum with plumo-annulate setae (Figure 65B).

Pereopod 3 basis 1.1 times length of all other articles together, with 8 simple setae; ischium 0.07 times basis length, unarmed; merus 2.4 times ischium length, unarmed; carpus 2.5 times merus length, with 3 simple setae; propodus 0.4 times carpus length, with simple seta; dactylus 0.5 times propodus length, with 2 simple setae terminally (Figure 65C).

Pereopod 4 basis equal to length of all other articles together, with 6 simple setae; ischium 0.06 times basis length, with simple seta; merus 4.5 times ischium length, with simple seta; carpus 1.7 times merus length, unarmed; propodus 0.4 times carpus length, with simple seta; dactylus 0.5 times propodus length, with 3 simple setae terminally (Figure 65D).

Pereopod 5 basis 1.1 times length of all other articles together, unarmed; ischium 0.06 times basis length, unarmed; merus 2.7 times ischium length, with simple seta; carpus 2.6 times merus length, with 3 simple setae; propodus 0.4 times carpus length, with simple seta; dactylus 0.4 times propodus length, with simple seta terminally (Figure 65E).

Uropod peduncles 2.9 times pleonite 6 length. unarmed. Uropod endopod uniarticulate, 0.7 times peduncle length, with 6 simple and 2 pedunculate setae, terminal seta broken. Uropod exopod of 2 articles, 0.9 length of endopod; article 1 0.2 times article 2 length, unarmed; article 2 with 3 simple setae, terminal seta broken (Figure 65F).

### **Description of male.**

Paratype adult male, 4.0 mm, NIWA 80719. Carapace without spines or setae; pseudorostral lobes and siphons divided, directed upwards; eye lobe absent. Carapace and pereon together 0.4 times total body length (Figure 66A).

Antennule peduncle article 1 longest, with simple seta; article 2 0.5 times article 1 length, with 3 simple setae; article 3 0.7 times article 2 length, with 2 simple setae; main flagellum of 2 articles, with 2 aesthetascs and 3 simple setae; accessory flagellum apparently absent (Figure 66B).

Antenna extending to posterior border of pereon; peduncle of 5 articles, article 2 with plumose seta, articles 4–5 with ranks of setae, incompletely circling articles; flagellum with 21 articles, each with single seta (Figures 66C–D).

Maxilliped 3 basis 1.3 times length of all other articles together, with 2 pappose setae medially, distal corner with 3 plumose setae; ischium 0.04 times basis length, unarmed; merus 3.5 times ischium length, with 1 plumose and 1 pappose setae; carpus 1.3 times merus length, with 1 simple and 2 plumose setae; propodus 1.4 times carpus length, with 1 simple and 3 plumose setae; dactylus 0.5 times propodus length, with 2 simple setae terminally; exopod 1.1 times basis length, basal article with simple seta, flagellum with plumo-annulate setae (Figure 66E).

Pereopod 1 basis 0.6 times length of all other articles together, with 1 simple and 2 microserrate setae, lateral margin serrate; ischium 0.2 times basis length, with simple seta; merus 1.4 times ischium length, with simple seta; carpus 2.1 times merus length, with 2 simple setae; propodus 1.2 times carpus length, with 3 simple setae; dactylus 0.4 times propodus length, with 3 simple setae terminally; exopod 0.9 times basis length, basal article unarmed, flagellum with plumo-annulate setae (Figure 66F).

Pereopod 2 basis 0.8 times length of all other articles together, with 2 simple setae; ischium 0.02 times basis length, unarmed; merus 6 times ischium length, with 3 simple setae; carpus 2.8 times merus length, with 3 simple and 2 microserrate setae; propodus 0.4 times carpus length, unarmed; dactylus 3.1 times propodus length, with 3

simple and 2 microserrate setae, terminal seta simple; exopod 1.2 times basis length, basal article unarmed, flagellum with plumo-annulate setae (Figure 67A).

Pereopod 3 basis 1.4 times length of all other articles together, with 1 simple and 2 pappose setae; ischium 0.07 times basis length, unarmed; merus 2.0 times ischium length, with simple seta; carpus 2.8 times merus length, unarmed; propodus 0.3 times carpus length, with simple seta; dactylus 0.4 times propodus length, with simple seta terminally; exopod 0.9 times basis length, basal article unarmed, flagellum with plumo-annulate setae (Figure 67B).

Pereopod 4 basis 1.1 times length of all other articles together, with 2 pappose setae; ischium 0.08 times basis length, with simple seta; merus 2.3 times ischium length, unarmed; carpus 2.3 times merus length, with simple seta; propodus 0.3 times carpus length, with simple seta; dactylus 0.4 times propodus length, with 3 simple setae terminally; exopod 0.9 times basis length, basal article with 2 simple setae, flagellum with plumo-annulate setae (Figure 67C).

Pereopod 5 basis equal to length of all other articles together, with 2 simple setae; ischium 0.09 times basis length, unarmed; merus 2.0 times ischium length, with simple seta; carpus 2.5 times merus length, with 3 simple setae; propodus 0.5 times carpus length, with 2 simple setae; dactylus 0.4 times propodus length, with 3 simple setae terminally (Figure 67D).

Uropod peduncles 3.7 times pleonite 6 length, with 3 microserrate setae medially. Uropod endopod uniaarticulate, 0.6 times peduncle length, 7 simple setae medially, 3 simple setae laterally, terminal seta simple with single subterminal setule. Uropod exopod 0.8 times length of endopod; article 1 0.3 times article 2 length, unarmed; article 2 with 1–2 simple setae, 1 simple with single subterminal setule, terminal seta simple with single subterminal setule (Figure 67E).

**Etymology.** The species is named *delicata* in reference to the long, slender and delicate pleon and appendages.

**Remarks.** There are no other nannastacids known from New Zealand waters with a split siphon. Therefore, this species is unlikely to be confused with any other species from New Zealand waters.

### ***Styloptocuma* Băcescu & Muradian 1974**

**Type species.** *Styloptocuma antipai* Băcescu & Muradian 1974.

**Diagnosis after Petrescu 2006.** *Female.* Eye lobe long, reaching to end of pseudorostral lobes, without lenses. Uropod peduncles at least twice as long as pleonite 6 length. Exopods present on maxilliped 3–pereopod 2. *Male.* With exopods on maxilliped 3–pereopod 4. Antennal flagellum long.

**New Zealand species.** *Styloptocuma gordonii* n. sp.

**Remarks.** *Styloptocuma* is distinguished among the *Cumella*-like genera by the long narrow eye lobe without lenses.

### ***Styloptocuma gordonii* n. sp.**

Figures 68–71

**Type material.** Holotype preparatory female, NIWA 80706, 43.2903°S, 175.5522°W–43.2933°S, 175.5630°W, 638–644 m, 15 April 2007. Paratype ovigerous female, dissected, NIWA 80707, 43.5300°S, 178.5048°E–43.5363°S, 178.5118°E, 346 m, 24 April 2007. Paratype adult male, dissected, NIWA 80708, 42.7820°S, 176.7152°W – 42.7817°S, 176.7042°W, 1023–1026 m, 16 April 2007. Paratype subadult female, NIWA 46008, 43.5300°S, 178.5048°E–43.5363°S, 178.5118°E, 346 m, 24 April 2007. Paratypes, 3 ovigerous females, NIWA 46007, 42.7820°S, 176.7152°W – 42.7817°S, 176.7042°W, 1023–1026 m, 16 April 2007.

**Other material examined.** 1 subadult female, NIWA 79355, 43.5300°S, 178.5048°E–43.5363°S, 178.5118°E, 346 m, 24 April 2007.

**Diagnosis.** *Females and subadult males.* Carapace with spines on dorsal midline, without setae; eye lobe extending to end of pseudorostral lobes; pseudorostral lobes dorsally directed. Uropod peduncles 2.6 times pleonite 6 length. *Male.* Carapace without spines. Uropod peduncles 3.7 times pleonite 6 length; uropods more setose than in female.

## Description of female.

Holotype preparatory female, 3.7 mm, NIWA 80706. Carapace with large spines all along dorsal midline; pseudorostral lobes 0.5 times carapace length, dorsally directed; eye lobe 0.1 times carapace length, extending to end of pseudorostral lobes. Carapace 1.8 times length of pereon. Pereonites with spines. Pleon longer than carapace and pereon together, pleonites with spines dorsally (Figure 68A).

Paratype ovigerous female, 2.5 mm, NIWA 80707. Carapace with large spines anteriorly along dorsal midline; pseudorostral lobes 0.4 times carapace length, dorsally directed; eye lobe 0.2 times carapace length, extending to end of pseudorostral lobes. Carapace 1.6 times length of pereon. Pleon longer than carapace and pereon together (Figures 68B–C).

Antennule peduncle article 1 longest, with 2 simple setae and margin lined with fine hair-like setae distally; article 2 0.5 times article 1 length, with 2 simple setae; article 3 0.8 times article 2 length, with 2 simple setae; main flagellum of 3 articles, with 2 aesthetascs; accessory flagellum of 1 articles, with simple seta (Figure 68D).

Mandible navicular, with 6 simple setae medially, lacinia mobilis with 2 cusps (Figure 68E).

Maxillule with 2 endites; outer endite with double row of simple setae terminally, margin with simple seta and lined with fine hair-like setae; inner endite with 3 simple and 1 microserrate setae; palp broken (Figure 68F).

Maxilla with 3 endites; broad endite with row of simple setae distally, 1 pappose and 1 simple seta at medial distal corner, medial row of setae; medial narrow endite with 4 simple setae terminally; distal narrow endite with 5 simple setae terminally; both narrow endites extending slightly past distal margin of broad endite (Figure 68G).

Maxilliped 1 basis produced as lobe with 8 simple, 2 pappose and 1 dentate setae; ischium absent; merus 0.2 times basis length, unarmed; carpus 3.1 times merus length, with 5 comb-like and 7 simple setae medially; propodus 0.7 times carpus length, with 3 simple with single subterminal setule and 1 pappose setae; dactylus 0.5 times propodus length, with 4 simple setae (Figure 68H).

Maxilliped 2 basis 0.7 times length of all other articles together, with plumose seta; ischium 0.05 times basis length, unarmed; merus 9.0 times ischium length, with plumose seta; carpus 0.8 times merus length, with 5 plumose setae; propodus 0.9 times carpus length, with 2 simple and 2 plumose setae; dactylus 0.5 times propodus length, with 3 simple setae (Figure 68I).

Maxilliped 3 basis 0.9 times length of all other articles together, with 3 plumose setae at distal corner, medial corner produced as teeth; ischium 0.08 times basis length, unarmed; merus 2.3 times ischium length, with 2 pappose setae medially and 2 plumose setae laterally; carpus 1.3 times merus length, with 2 pappose setae; propodus 1.6 times carpus length, with 3 simple setae; dactylus 0.6 times propodus length, with 2 simple setae terminally; exopod equal to basis length, basal article unarmed, flagellum with plumo-annulate setae (Figure 69A).

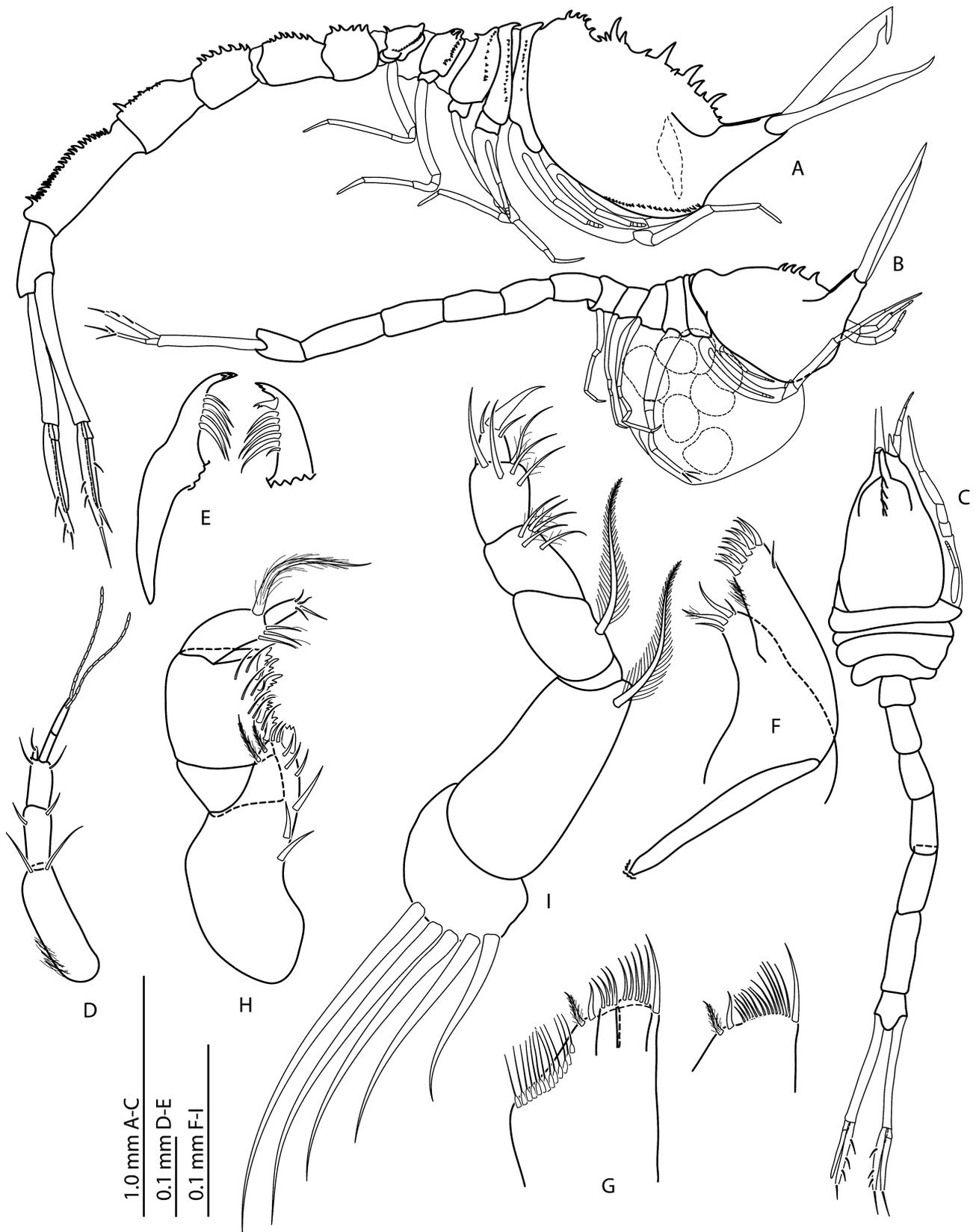
Pereopod 1 basis 0.5 times length of all other articles together, with 6 simple setae, distal corners produced as teeth; ischium 0.2 times basis length, with simple seta; merus 1.3 times ischium length, with 2 simple setae; carpus 2.5 times merus length, with 6 simple setae; propodus 0.9 times carpus length, with 4 simple setae; dactylus 0.5 times propodus length, with 3 simple setae and 3 simple setae terminally; exopod broken (Figure 69B).

Pereopod 2 basis 0.7 times length of all other articles together, unarmed; ischium 0.09 times basis length, unarmed; merus 2.7 times ischium length, with simple seta; carpus 1.9 times merus length, with 3 simple setae; propodus 0.3 times carpus length, unarmed; dactylus 4.2 times propodus length, with 3 simple setae and 2 microserrate setae terminally; exopod broken (Figure 69C).

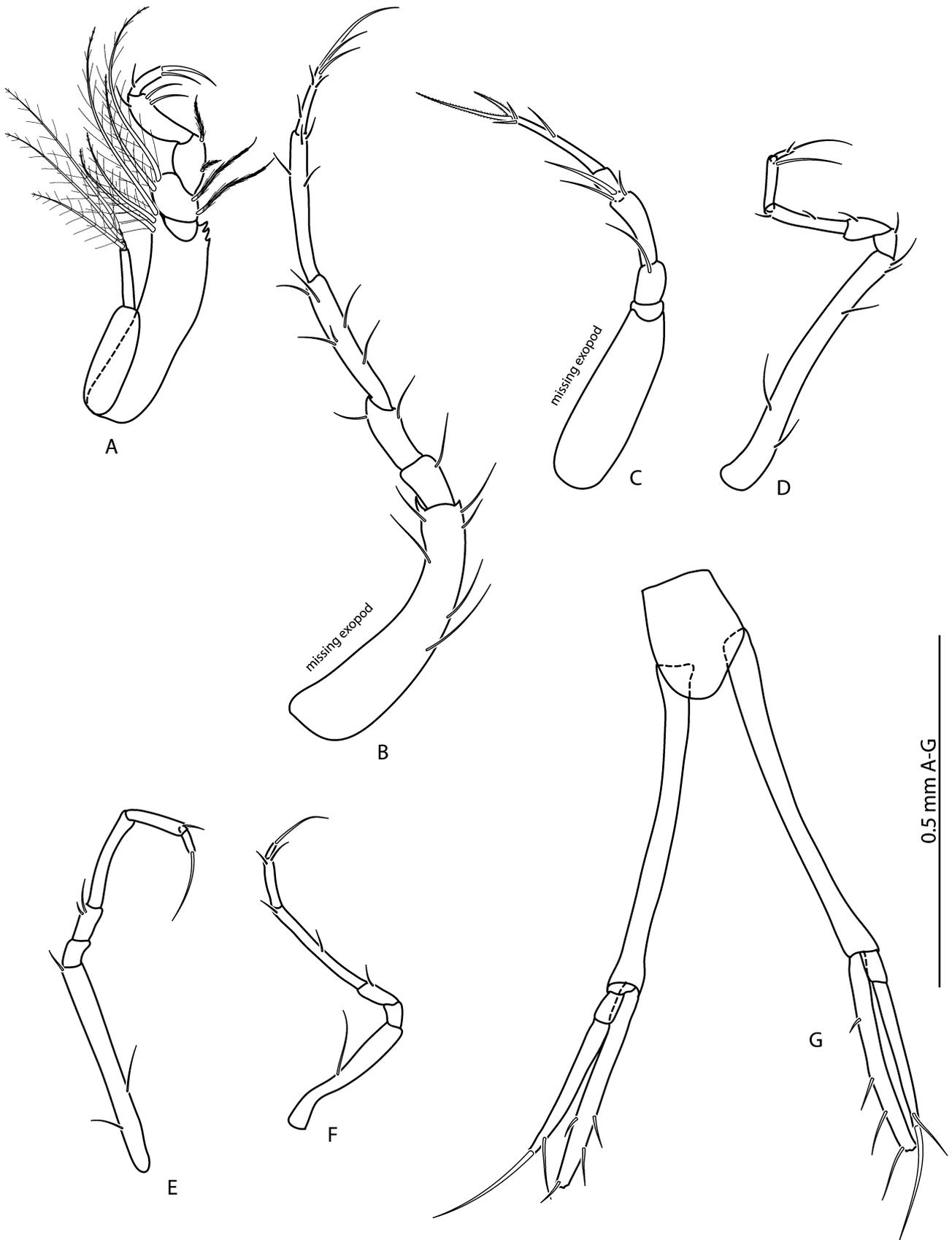
Pereopod 3 basis 1.4 times length of all other articles together, with 5 simple setae; ischium 0.07 times basis length, with simple seta; merus 2.0 times ischium length, with 2 simple setae; carpus 2.0 times merus length, with 2 simple setae; propodus 0.6 times carpus length, with simple seta; dactylus 0.3 times propodus length, with 2 simple setae terminally (Figure 69D).

Pereopod 4 basis 0.9 times length of all other articles together, with 2 simple setae; ischium 0.1 times basis length, unarmed; merus 1.4 times ischium length, with 2 simple setae; carpus 2.7 times merus length, unarmed; propodus 0.6 times carpus length, with simple seta; dactylus 0.3 times propodus length, with simple seta terminally (Figure 69E).

Pereopod 5 basis 0.6 times length of all other articles together, with simple seta; ischium 0.1 times basis length, unarmed; merus 1.8 times ischium length, with simple seta; carpus 3.1 times merus length, with 2 simple setae; propodus 0.4 times carpus length, with 2 simple setae; dactylus 0.3 times propodus length, with simple seta terminally (Figure 69F).



**FIGURE 68.** *Styloptocuma gordonii* n. sp. Holotype subadult female, NIWA 80706. A, side view. Paratype ovigerous female, NIWA 80707. B, side view; C, dorsal view; D, antennule; E, mandibles; F, maxillule; G, maxilla; H, maxilliped 1; I, maxilliped 2.



**FIGURE 69.** *Styloptocuma gordonii* n. sp. Paratype ovigerous female, NIWA 80707. A, maxilliped 3; B, pereopod 1; C, pereopod 2; D, pereopod 3; E, pereopod 4; F, pereopod 5; G, pleonite 6 and uropods.

Uropod peduncles 2.6 times pleonite 6 length, unarmed. Uropod endopod uniarticulate, 0.6 times peduncle length, with 4 simple setae, terminal seta broken. Uropod exopod of 2 articles, 0.9 times length of endopod; article 1 0.2 times article 2 length, unarmed; article 2 with simple seta, terminal seta simple (Figure 69G).

#### **Description of male.**

Paratype adult male, 3.4 mm, NIWA 80708. Carapace broken anteriorly, missing frontal lobe and anterior part of pseudorostrum (Figure 70A).

Antennule peduncle article 1 longest, with simple seta; article 2 0.5 times article 1 length, with 2 simple setae; article 3 0.7 times article 2 length, with 4 simple setae; main flagellum of 3 articles, with 2 aesthetascs and 2 simple setae; accessory flagellum of 1 article, with 2 simple setae (Figure 70B).

Antenna extending past posterior border of pleonite 6; peduncle of 5 articles; article 2 with pappose seta; articles 4–5 with ranks of setae, incompletely circling articles; flagellum with at least 18 articles (Figures 70C–D).

Maxilliped 3 basis 1.5 times length of all other articles together, with 2 simple setae medially, 2 plumose setae at distal corner, medial corner with tooth; ischium 0.05 times basis length, unarmed; merus 2.3 times ischium length, with simple seta medially, plumose seta laterally; carpus 1.6 times merus length, with simple seta medially, plumose seta laterally; propodus 1.2 times carpus length, with 1 simple and 2 plumose setae medially, 1 simple and 1 plumose setae laterally; dactylus 0.5 times propodus length, with 3 simple setae terminally; exopod equal to basis length, basal article unarmed, flagellum with plumo-annulate setae (Figure 70E).

Pereopod 1 basis equal to length of all other articles together, with 3 simple setae, margins produced as teeth distally; ischium 0.07 times basis length, with 2 simple setae; merus 1.5 times ischium length, with 2 simple setae; carpus 3.0 times merus length, with 4 simple setae; propodus equal to carpus length, with 5 simple setae; dactylus 0.5 times propodus length, with 4 simple setae and 2 simple setae terminally; exopod 0.8 times basis length, basal article unarmed, flagellum with plumo-annulate setae (Figure 70F).

Pereopod 2 basis 0.9 times length of all other articles together, with plumose seta; ischium 0.02 times basis length, with plumose seta; merus 6.0 times ischium length, with 1 simple and 1 plumose setae; carpus 3.3 times merus length, with 2 simple, 2 plumose and 2 microserrate setae; propodus 0.3 times carpus length, unarmed; dactylus 3.0 times propodus length, with 1 simple and 2 microserrate setae, 2 simple and 2 microserrate setae terminally; exopod 1.2 times basis length, basal article unarmed, flagellum with plumo-annulate setae (Figure 71A).

Pereopod 3 basis 1.5 times length of all other articles together, with 2 simple setae; ischium 0.07 times basis length, with simple seta; merus 1.5 times ischium length, with 2 simple setae; carpus 2.8 times merus length, with 2 simple setae; propodus 0.5 times carpus length, with simple seta; dactylus 0.4 times propodus length, with 3 simple setae terminally; exopod equal to basis length, basal article unarmed, flagellum with plumo-annulate setae (Figure 71B).

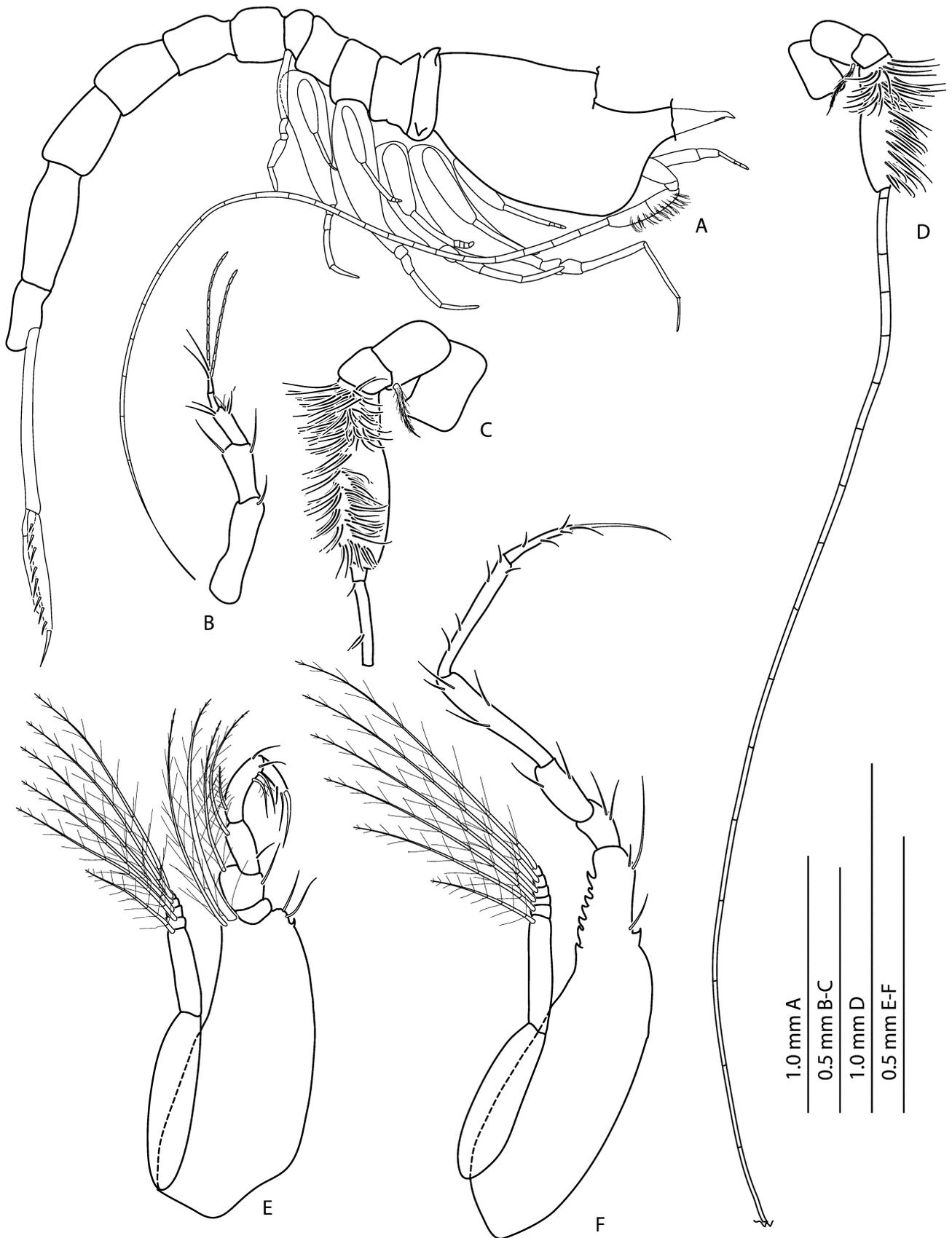
Pereopod 4 basis equal to length of all other articles together, with simple seta; ischium 0.07 times basis length, with simple seta; merus 2.3 times ischium length, with 2 simple setae; carpus 2.9 times merus length, with 2 simple setae; propodus 0.5 times carpus length, with simple seta; dactylus 0.3 times propodus length, with 3 simple setae terminally; exopod 1.1 times basis length, basal article unarmed, flagellum with plumo-annulate setae (Figure 71C).

Pereopod 5 broken (Figure 71D).

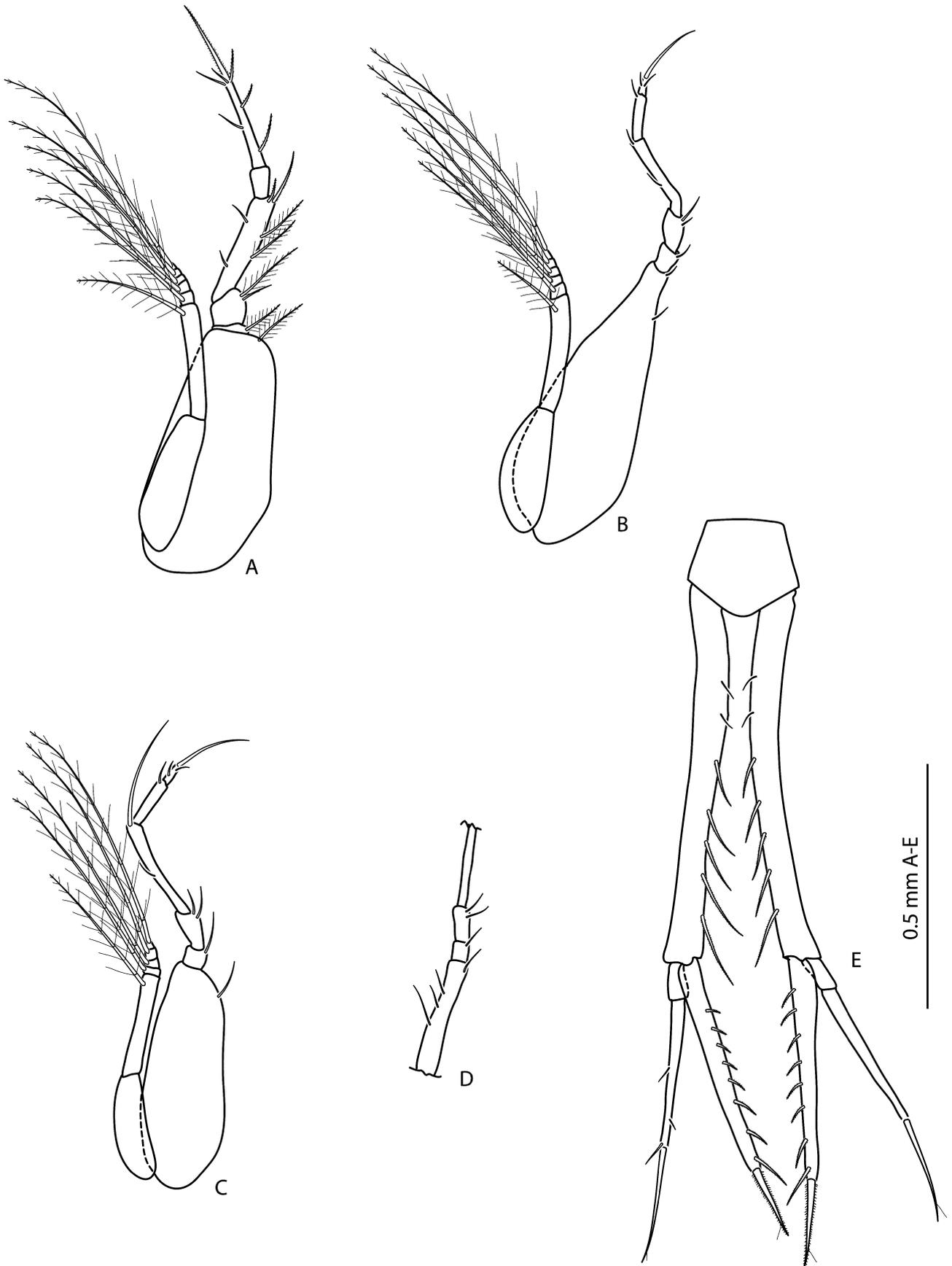
Uropod peduncles 3.7 times pleonite 6 length, with 2 simple and 5 microserrate setae. Uropod endopod uniarticulate, 0.6 times peduncle length, with 8 microserrate setae medially, terminal seta microserrate with single subterminal setule. Uropod exopod 0.9 times length of endopod; article 1 0.2 times article 2 length, unarmed; article 2 with 3 simple setae, terminal seta simple with single subterminal setule (Figure 71E).

**Etymology.** The species is named *gordoni* for Dennis Gordon, head of invertebrate collections at NIWA.

**Remarks.** The holotype preparatory female is quite a bit larger than the paratype ovigerous female, and well calcified so the ornamentation is more obvious. The ornamentation was not absent on the paratype ovigerous female, but it was much harder to see because the individual was so decalcified as to be soft and entirely transparent. Only the larger spines were obvious without repositioning the individual repeatedly, thus the figure only shows what was observable in two positions. However, the carapace, pereon and pleon size relationships, the upturned pseudorostrum, long siphons, and the posterior dorsal expansion of the carapace are the same, and I am confident the two specimens are of the same species.



**FIGURE 70.** *Styloptocuma gordonii* n. sp. Paratype adult male, NIWA 80708. A, side view; B, antennule; C, antenna; D, antenna; E, maxilliped 3; F, pereopod 1.



**FIGURE 71.** *Styloptocuma gordonii* n. sp. Paratype adult male, NIWA 80708. A, pereopod 2; B, pereopod 3; C, pereopod 4; D, pereopod 5; E, pleonite 6 and uropods.

The size difference between the ovigerous female and the preparatory female is not outside that observed within natural populations of cumaceans (pers. obs.). It is also possible that the females in this species produce multiple broods. When cumaceans produce multiple broods, after having a brood the females molt into the preparatory stage, and then molt again when eggs are laid to produce the full brood plates, and increase in size with each molt (pers. obs.).

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