

## Article

# Nine New Species of Ilyarachninae Hansen, 1916 (Crustacea: Isopoda: Munnopsidae) from Australia and New Zealand with an Updated Key of the Subfamily from the Southwest Pacific <sup>†</sup>

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**Abstract:** The Ilyarachninae are a diverse and widely distributed subfamily of the asellote family Munnopsidae. This paper describes nine new deep-sea species from two Ilyarachninae genera, *Ilyarachna* and *Notopais*, from the southwestern Pacific, namely from New Zealand and the east coast of Australia. *Ilyarachna aculeatus* n. sp., *Ilyarachna brucei* n. sp., *Ilyarachna franki* n. sp., *Ilyarachna mclayi* n. sp., *Ilyarachna pacifica* n. sp., *Ilyarachna sami* n. sp., *Ilyarachna taranui* n. sp. and *Notopais chathamensis* n. sp. are described from New Zealand waters, while *Notopais likros* n. sp. is described from off the east coast of Australia. Additionally, a redescription of *Notopais spinosa* from the Balleny Islands, Antarctica, and a revised key to the *Ilyarachna* and *Notopais* species from the southwest Pacific are included, and the distribution, affinities, and diagnostic characters of the new species are discussed.

**Keywords:** Antarctica; Australia; deep-sea; Isopoda; Munnopsidae; New Zealand



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## 1. Introduction

Within the asellote isopod family Munnopsidae Lilljeborg, 1864 [1], the Ilyarachninae Hansen, 1916 [2] is one of the largest subfamilies, with eight genera and seventy-three species [3]. The subfamily has a world-wide distribution and are found between the depths of 8 metres [4] to 7230 metres [5].

The first ilyarachnine species was described by Georg Ossian Sars (son of Michael, who described the first munnopsid) who had collected specimens from the Christiania Fjord in Norway. Sars described four of the earliest genera of the subfamily: *Aspidarachna* Sars, 1897 [6], *Echinozone* Sars, 1897 [6], and *Pseudarachna* Sars, 1897 [6], with the former three genera going through a pattern of being in and out of synonymy with each other over approximately the next eighty years. *Notopais* Hodgson, 1910 [7] was erected for the single female specimen of *Notopais spicatus* Hodgson, 1910 [7] from Antarctica and was placed in the family Munnopsidae. Four years later, the monotypic *Notopais* was synonymised with *Pseudarachna* by Vanhöffen [8]. Hessler and Thistle [9] reassessed the species of the then Ilyarachnidae, reinstating the four genera of Sars and reallocating several species. They established a new genus, *Bathybadistes* Hessler and Thistle, 1975 [9]. Merrin [10] brought *Notopais* out of synonymy and has established two additional genera: *Epikopais* Merrin, 2009 [11] and *Nyctobadistes* Merrin, 2011 [12]. Hansen [2] was the first to combine Sars' original four genera as a family. In his review of the munnopsid families, Wilson [13]

re-evaluated the taxonomic standing of the Ilyarachnidae and relegated this name to the subfamily level under the family of Munnopsidae.

Morphologically, the Ilyarachninae follow the munnopsid plan (see [13]), although many genera have their own specific variations. In general, however, the Ilyarachninae are defined by a broad and flat frontal arch, a calcareous mandible with an incisor process with no defined cusps, which are supported by large musculature in the cephalon; pereopods 3 and 4 basis short, their length near width; and their small, flattened leaf-like uropods. They are common components of deep-sea isopod samples (for example, see [14,15]) and are readily collected; however, their fragile nature and elongate appendages typically result in the collection of non-complete specimens.

Wolff [16] concluded that deep-sea benthic isopods were deposit feeders; however, more recent studies have highlighted that foraminivory is now thought to be more widespread amongst deep-sea isopods than previously thought [17,18]. While all the Ilyarachninae can crush foraminifera with their mandibular molar process, Gudmundsson et al. [17] found that observed differences in the Ilyarachninae molar can be related to diet preferences, with a species targeting certain foraminifera species or genera [17]. Hessler and Strömberg [19] studied the behaviour of several asellote species, including three species of Ilyarachninae. In this study, they found that: respiration was sporadic; brooding females ventilated the marsupium and redistributed the embryos inside by expanding and contracting the brood chamber; the flagellum of antenna 2 was kept clean by either the mouthpart endites (they do not specify which ones), the mandibular palp, or the first two pereopods; and that their pereopods were cleaned of detritus by the appendages of the mouth field [19].

The south western Pacific is the most diverse region in terms of representative genera for this subfamily, with six of the eight genera known. Prior to this paper, this region was known for 15 species of Ilyarachninae. This current paper describes seven new species of *Ilyarachnina* two new species of *Notopais*, *Notopais chathamensis* sp. n. from the Chatham Rise, east of New Zealand; and *Notopais likros* sp. n. from the east coast of Australia. Also presented is a redescription of *Notopais spinosa* (Hodgson, 1902) [20] collected from the Balleny Islands, Antarctica, which includes details of the ornamentation on the ventral surface of pereonites 6 and 7 for the first time.

## 2. Materials and Methods

### 2.1. Examination and Description Preparation

The material examined comes from museum collections that were collected from the east coast of Australia, New Zealand, and Antarctica (Figure 1).

Descriptions and illustrations were based on the type material as indicated in the figure captions and text. For specimen illustrations, a Nikon Optiphot-2 compound microscope and a Zeiss Stemi SV11 dissecting microscope were used, both fitted with a camera lucida.

Descriptions were prepared using the computer program Descriptive LAnguage for TAXonomists (DELTA; [21]). Maximum segment lengths and widths were used to calculate ratios unless otherwise stated in the text. With antennal articles, the most basal article is referred to as article 1, the next article as article 2 and so on. Directional information regarding pereopods follows Brusca et al. [22].

### 2.2. Depositories and Abbreviations

The material studied is from the following institutions, which are identified in the text by their abbreviations:

AM—Australian Museum, Sydney, Australia.

BMNH—Natural History Museum, London, England.

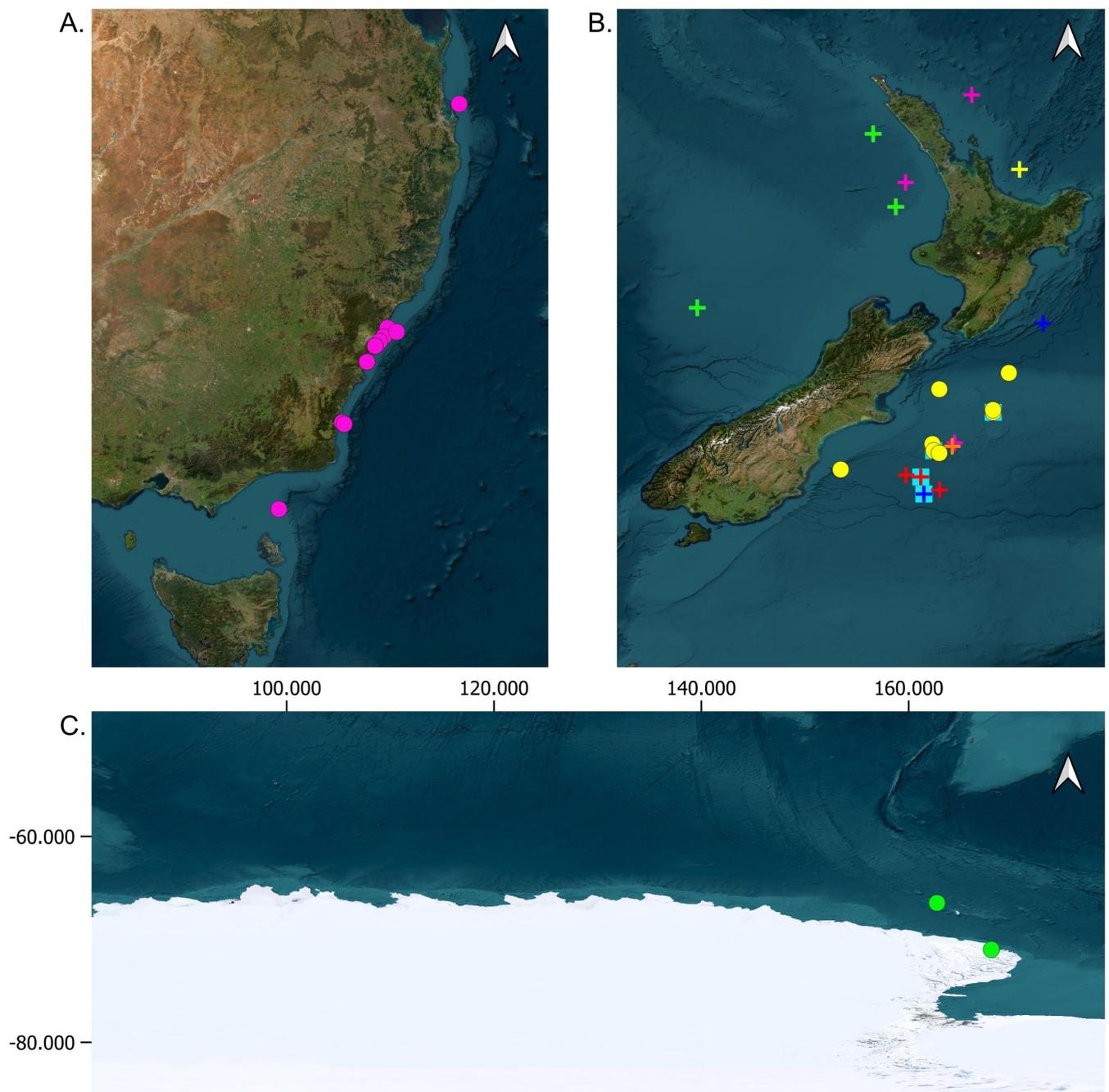
NIWA—National Institute of Water and Atmospheric Research, Wellington, New Zealand.

Additional abbreviations used in the text:

NSW—New South Wales

SS—simple seta/e

RS—robust seta/e



**Figure 1.** Maps from where samples studied in this paper were collected. (A) Australia. (B) New Zealand. (C) Antarctica. Latitude and longitude are represented on the Antarctica map for location context only and arrows represent north.

### 3. Results

#### Taxonomy

Order Isopoda Latreille, 1817

Suborder Asellota Latreille, 1802

Family Munnopsidae Lilljeborg, 1864 [1]  
Subfamily Ilyarachninae Hansen, 1916 [2]

*Ilyarachna* Sars, 1870 [23]

*Mestostenus* Sars, 1864: 211 (nom. preoccup.) [24].

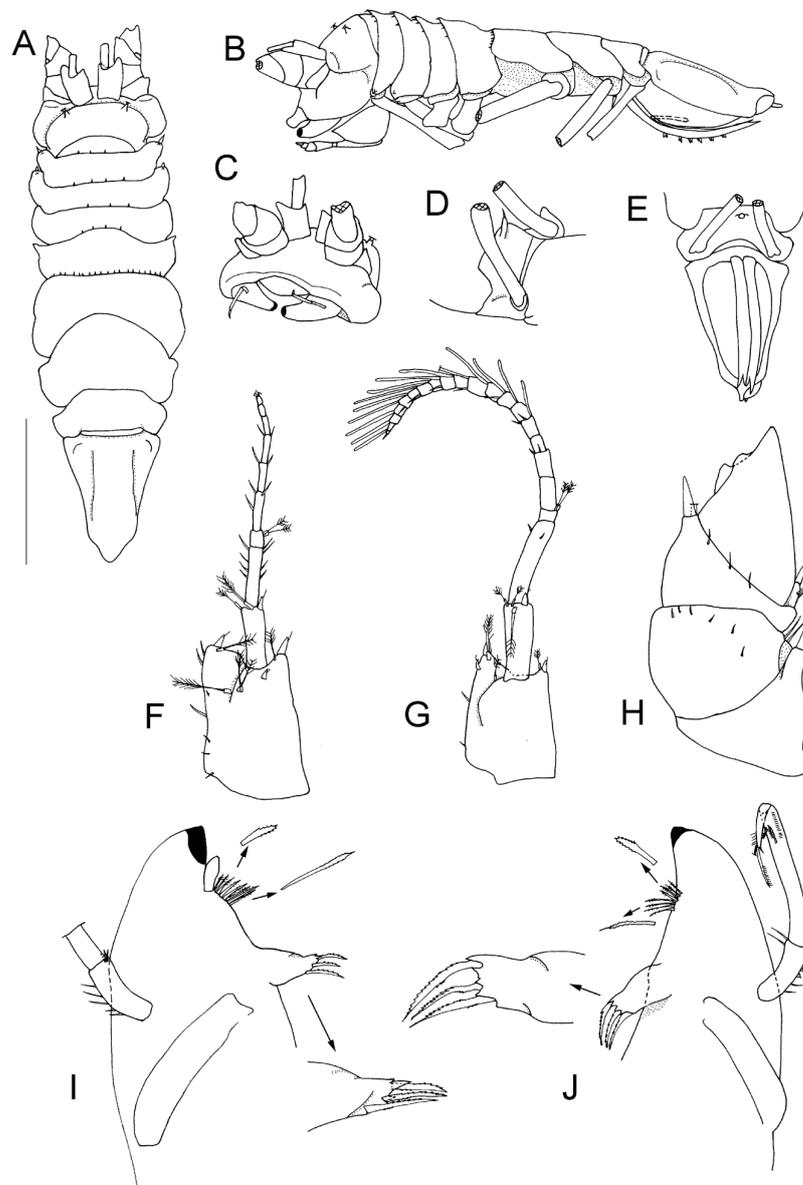
*Ilyarachna* Sars, 1870: 44 [23].—Sars, 1897: 134–135 [6].—Hansen, 1916: 121–122 [2].—Wolff, 1962: 94 [16].—Birstein, 1971: 217–218 [25].—Menzies and George, 1972: 9.76 [26].—Thistle, 1980: 116–117 [27].—Kussakin, 2003: 189–190 [28].—Merrin, 2016: 427–428 [29].

Type species. *Mesostenus longicornis* Sars, 1864 by monotypy [24].

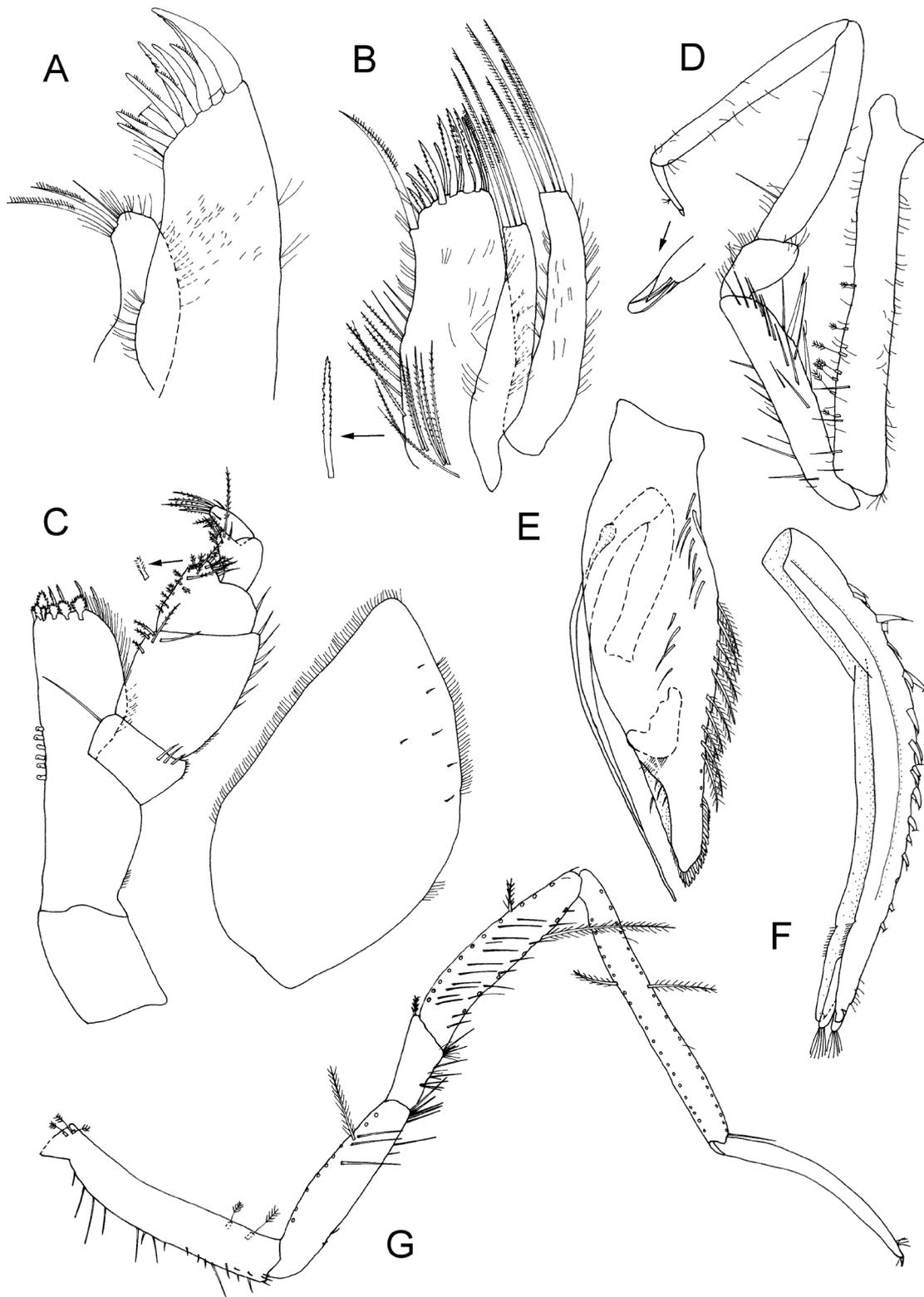
Diagnosis. See [24].

*Ilyarachna aculeatus* n. sp.

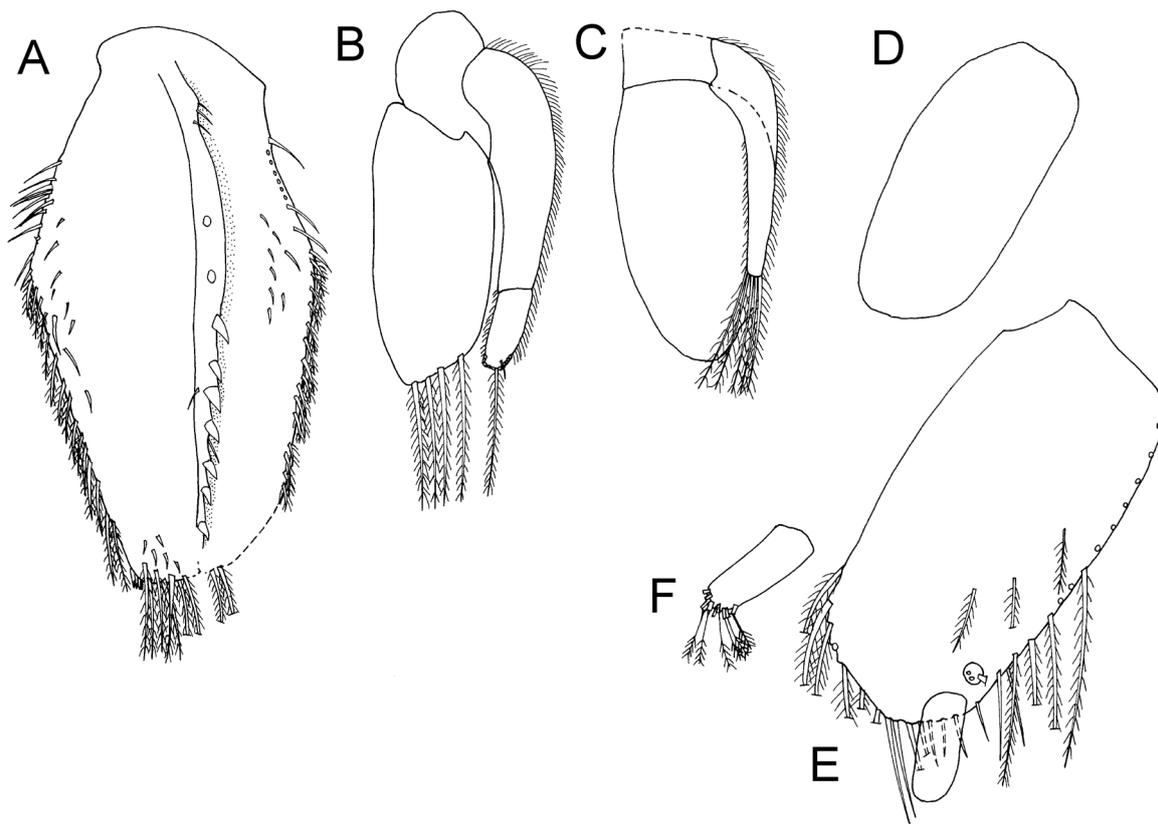
(Figures 2–4)



**Figure 2.** *Ilyarachna aculeatus* n. sp. (A–E), male holotype, 3.2 mm (NIWA 23793). (F,H–J), female paratype 3.5 mm (NIWA 23794). (G) Male paratype 3.5 mm (NIWA 23794). (A) Dorsal view. (B) Lateral view. (C) Cephalon. (D) Lateral view of the ventral surface of pereonite 7. (E) Ventral view of pereonite 7 and pleon. (F) Left antenna 1. (G) Left antenna 1. (H) Left antenna 2. (I) Left mandible. (J) Right mandible. Scale bar = 1 mm, for dorsal and lateral views only.



**Figure 3.** *Ilyarachna aculeatus* n. sp. (A–D,G), female paratype 3.5 mm (NIWA 23794). (E,F), male paratype 3.5 mm (NIWA 23794). (A) Left maxilla 1. (B) Left maxilla 2. (C) Left maxilliped. (D) Right pereopod 1. (E) Left pleopod 2. (F) Lateral view of pleopod 1. (G) Left pereopod 7.



**Figure 4.** *Ilyarachna aculeatus* n. sp. All figures from female paratype 3.5 mm (NIWA 23794). (A) Operculum. (B) Left pleopod 3. (C) Left pleopod 4. (D) Left pleopod 5. (E) Right uropod. (F) Endopod of right uropod.

**Material examined.**—All material New Zealand. Holotype. Male (3.2 mm), north-west slope, North Island, stn E892, 37°20' S, 173°35' E, Agassiz medium trawl, 24 March 1968, 1234–1224 m, MV *Taranui* (NIWA 23793). Paratypes: 3 females, 2 males, 6 fragments (1 female 4.5 mm, 1 male 3.5 mm; dissected), type locality (NIWA 23794).

**Additional material.**—2 males, northeast slope, North Island, stn F910, 34°56' S, 175°23' E, Menzies trawl, 10 October 1968, 1459–1470 m, RV *Taranui* (NIWA 92060). 1 female, Chatham Rise, South Island, stn S143, 44°28.0' S, 174°54.8' E, Agassiz medium trawl with fine mesh inside, 25 October 1979, 692 m, R.V *Tangaroa* (NIWA 92061). 1 female, north-west slope, North Island, stn E901, 38°00' S, 173°19' E, Agassiz medium trawl, 25–26 March 1968, 1247–1250 m, MV *Taranui* (NIWA 92062). 2 females, 1 male, Chatham Rise, South Island, stn S147, 44°30.1' S, 174°18.8' E, Agassiz medium trawl with fine mesh inside, 25 October 1979, 760 m, RV *Tangaroa* (NIWA 92063).

**Description of male.** Body length 3.4 times pereonite 2. Cephalon with 2 spines. Pereonites 1–5 anterior margins with robust setae; pereonites 1–2 with pair of small tubercles; pereonite 4 with small anterolateral lobes; pereonite 5 laterally with small indentation; pereonite 6 ventrally with no ornamentation; pereonite 7 ventrally with medial spine. Pleon length 1.4 times proximal width.

Antenna 1 of 22 articles; article 1 length 1.4 times width, lateral margin with 2 SS and 1 sensillate RS, surface with 1 penicillate seta, each distal corner with 1 sensillate RS and 1 penicillate seta; article 2 length 2.6 times width, distal margin with 3 penicillate setae and 1 sensillate RS; article 3 with 2 SS (in distal half); article 4 with 2 penicillate setae; article 6 with 2 SS; from article 8 onwards, each article with 1 aesthetasc and many with additional SS; terminal article with 1 SS.

Pleopod 1 length 12.6 times proximal height, lateral margins indent 0.3 from proximal end, ventral surface with 20 sensillate RS and 6 SS, distally with 12 SS (6 + 6). Pleopod

2 protopod length 3.6 times width, lateral margin with row of plumose setae, surface with 12 SS, mesial margin with 4 SS, distally with lamellar extension; exopod hooked, 0.1 times as long as protopod with fine SS; stylet hooked up into protopod, length 1.2 times protopod length, terminating to a point; sperm duct length 0.7 times stylet.

Female. Antenna 1 of 10 articles; article 1 length 1.4 times width, surface with 2 SS, 3 penicillate setae and 1 sensillate RS, lateral margin with 4 SS, each distal corner with 1 penicillate seta and 1 sensillate RS; article 2 length 0.4 times article 1, length 2.5 times width, distal end with 2 penicillate setae and 1 sensillate RS; article 3 with 8 SS; article 4 with 2 penicillate setae; article 5 with 3 SS; article 6 with 2 SS, article 7 with 2 SS, terminal article with 1 SS and 1 aesthetasc. Antenna 2 damaged; article 1 lateral margin with 1 RS; article 2 length 0.9 times article 1, distolateral margin with 2 SS, surface with 6 SS; article 3 length 0.7 times article 1, distal margin with 3 SS, scale with 1 RS and 2 SS, distomesial margin with 2 RS; article 4 length 1.3 times article 1.

Mandible lacinia mobilis reduced and truncate; spine row with 8 spines; molar small, with 3 serrate setae; mandibular palp extending beyond incisor, article 1 lateral margin with 5 SS, distomesial corner with 3 SS, article 2 with 2 small pectinate setae and cuticular scales, article 3 with 1 SS and 1 pectinate seta, cuticular scales present. Maxilla 1 with fine SS; lateral lobe width 2.0 times mesial lobe width, distal margin 6 RS, 1 dentate RS and 5 pectinate RS, mesial lobe distally with 2 long pectinate setae. Maxilla 2 with scattered fine SS, lateral lobe distally with 4 long pectinate setae; middle lobe width 1.1 times lateral lobe width, distally with 4 long pectinate setae; mesial lobe width 2.5 times lateral lobe width, proximally, mesial margin also with approximately 13 serrate setae, distally with 5 blunt SS, 7 toothed setae and 1 long pectinate seta. Maxilliped basis length 3.2 times width; endite with 6 coupling hooks, distally with 4 toothed setae, 7 fan setae, and many fine SS; palp article 1 cuticular scales present, surface with 3 SS, distomesial margin with 1 SS; article 2 length 2.3 times article 1, lateral margin with cuticular scales and 6 SS, surface with 1 SS, mesial margin with 4 distally pappose setae; article 3 length 1.2 times article 1, lateral margin with 1 SS, mesial margin with 2 SS and 18 distally pappose setae; article 4 length 0.8 times article 1, distomesial margin with 1 SS and 6 distally pappose setae; article 5 narrow, length 0.7 times article 1, distally with 2 SS and 6 distally pappose setae; epipod length 1.8 times width, margins with many cuticular scales and 6 SS.

Pereopod 1 basis-dactylus length to width ratios: 7.6; 4.6; 1.3; 5.8; 9.2; 4.3. Basis inferior margin with 30 SS, lateral surface with 17 SS, superior margin with 7 penicillate setae and 19 SS; ischium inferior margin with 10 SS, lateral surface with 13 SS, superior margin with 2 sensillate RS; merus inferior margin with 18 SS, lateral surface with 2 SS, distosuperior margin with 5 SS; carpus inferior margin with 10 SS, superior margin with 2 SS; propodus inferior margin with 3 SS (towards distal end), lateral surface with 5 SS, superior margin with 6 small SS; dactylus distosuperior margin with 3 SS.

Pereopod 7 basis-dactylus length to width ratios: 5.5; 4.2; 2.0; 2.0; 10.1; 11.2. Basis inferior margin with 20 SS, lateral surface with 5 penicillate setae; ischium inferior margin with 9 SS, lateral surface with 3 SS; merus inferior margin with 16 SS, distosuperior margin with 1 plumose seta; carpus lateral surface with 21 SS; propodus superior margin with 3 SS; dactylus distosuperior margin with 4 SS.

Operculum length 3.3 times proximal width, medial keel with row of RS and a few SS, surface with scattered SS and 3 distal plumose setae, margins anterolaterally with 21 SS (11 + 10), laterally with numerous plumose setae. Pleopod 3 exopod length 1.1 times endopod, distally with 12 long plumose setae and 1 SS; endopod length 2.3 times width, with 4 long plumose setae. Pleopod 4 exopod with 5 terminal long plumose setae; endopod oval, length 1.8 times width. Pleopod 5 length 2.3 times width.

Uropod protopod length 2.0 times width, distal end rounded, lateral margin with row of plumose setae and SS, distal margin with 5 plumose setae and 6 SS, mesial margin with 1 plumose seta, surface with 3 scattered plumose setae; exopod rudimentary, length 0.05 times protopod length, 0.2 times endopod length, with 3 setae (sockets remaining); endopod length 0.3 times protopod, with 10 penicillate setae.

Remarks. *Ilyarachna aculeatus* n. sp. is distinguished by a combination of pereonite 5 anterior margin with robust setae and lateral margin with indentations; pereopod 1 basis with no robust setae; and pereopod 7 carpus with numerous simple setae.

*I. aculeatus* is most similar to *Ilyarachna kermadecensis* Wolff, 1962 [16] but is distinguished by: having only two spines on the cephalon which are also bigger than those found in *I. kermadecensis*; pereopod 1 lacking robust setae on the basis inferior margin and the setae on the carpus inferior margin are concentrated in the proximal half in *I. aculeatus* rather than evenly spread as in *I. kermadecensis*; the operculum in *I. aculeatus* lacks the numerous plumose setae that are present on the distal surface in *I. kermadecensis*; and the uropod in *I. aculeatus* is biramous, not uniramous, and with fewer surface plumose setae than found in *I. kermadecensis*.

Distribution. *I. aculeatus* is known from the north-west slope of the North Island (Tasman Sea), New Zealand to the Chatham Rise, east of the South Island (Pacific Ocean) of New Zealand, at depths between 692–1470 metres.

Etymology. *Aculeatus* is Latin, meaning prickly or sharp-pointed, referring to the acute robust setae that adorn the anterior margins of pereonites 1–4.

*Ilyarachna brucei* n. sp.  
(Figures 5 and 6)

Material examined.—All material New Zealand. Holotype. Female (4.0 mm), Bounty Trough, South Island, stn S154, 45°24.2' S, 173°59.8' E, epibenthic sled, 27 September 1979, 1373 m, RV *Tangaroa* (NIWA 23795). Paratype: 1 female (3.5 mm), Bounty Trough, South Island, stn S152, 45°52.3' S, 174°04.9' E, epibenthic sled, 26 September 1979, 1676 m, RV *Tangaroa* (NIWA 23796).

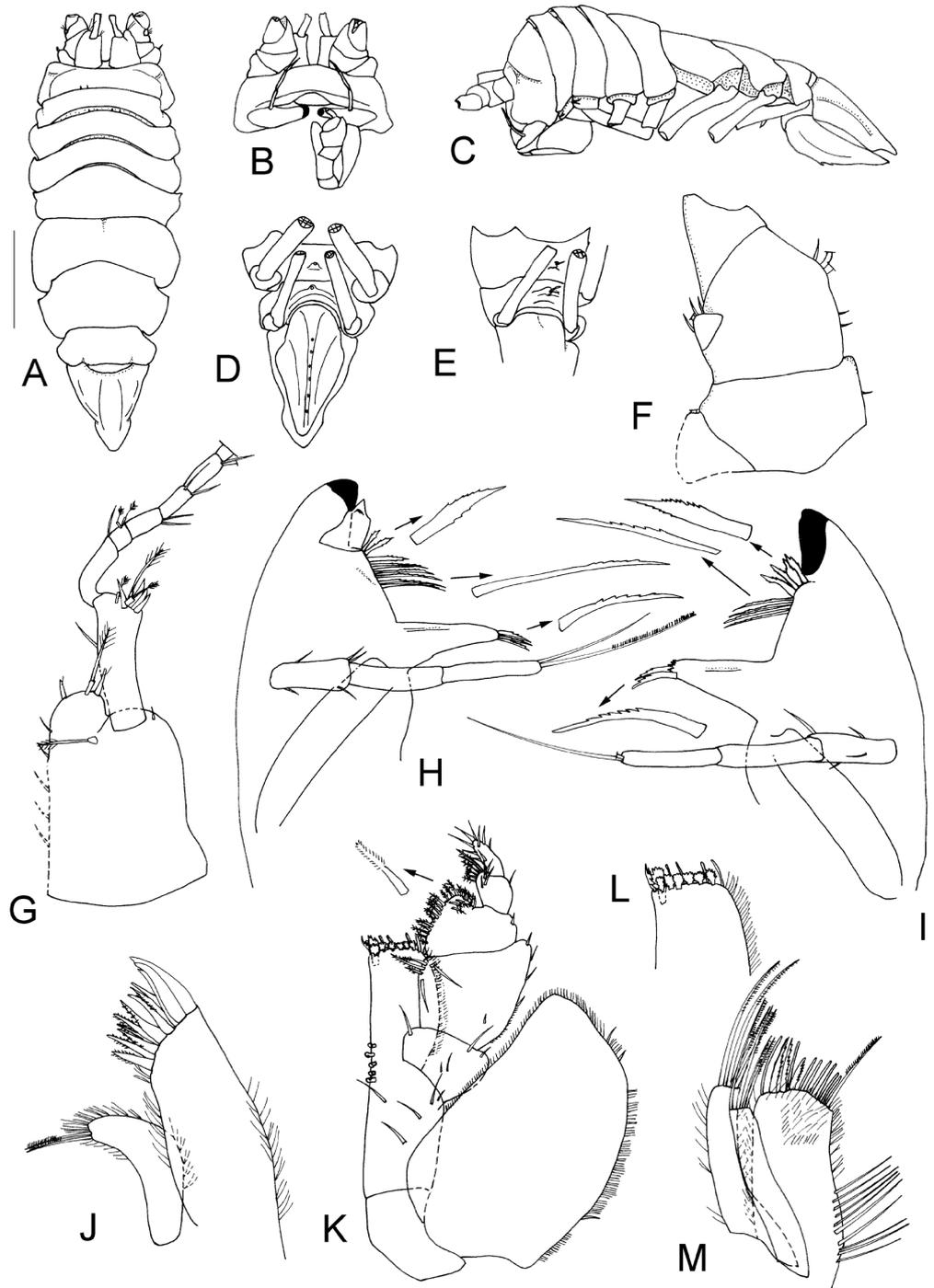
Additional material.—2 females, Chatham Rise, South Island, stn S132, 43°37.9' S, 175°58.0' E, Menzies trawl, 21 September 1979, 322 m RV *Tangaroa* (NIWA 92064). 2 females, 1 fragment, Chatham Rise, South Island, stn S148, 44°41.0' S, 174°20.9' E, Agassiz medium trawl with fine mesh inside, 25 September 1979, 859 m, RV *Tangaroa* (NIWA 92065).

Description of female. Body length 2.6 times greatest width of pereonite 2; Cephalon spines absent. Pereonites 1–2 anterior margins with few robust setae, setae on pereonites 3 and 4 not intact. Pereonite 5 anterior margin smooth; pereonites 6 and 7 ventrally each with medial spine. Pleon length 1.4 times proximal width.

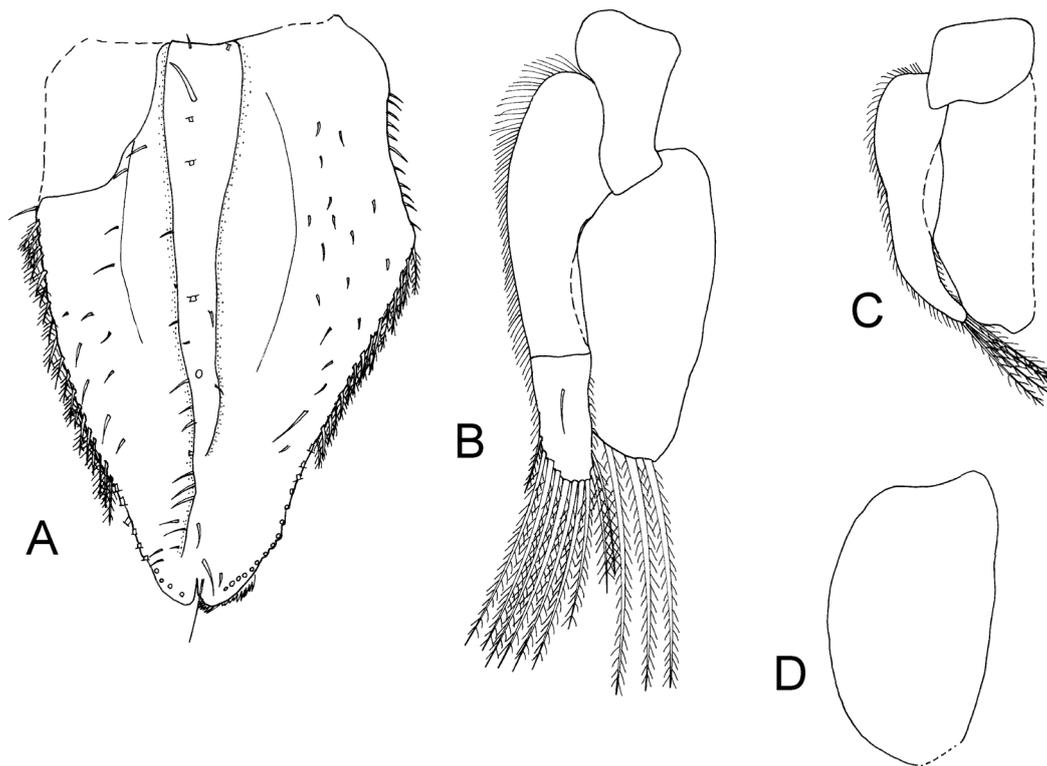
Antenna 1 damaged; article 1 length 1.3 times width, surface with 1 penicillate seta and 1 SS (both in distal half), lateral margin with 5 SS, distal margin with 2 sensillate RS and 1 penicillate seta; article 2 0.7 times as long article 1, length 3.7 times width, inferior margin with 1 SS, distally with 4 RS and 3 penicillate setae; article 3 with 1 SS; article 4 with 2 penicillate setae; article 5 with 2 SS; article 6 with 2 SS; article 7 with 2 SS. Antenna 2 damaged; articles 1–3 more or less triangular; article 1 lateral margin with 1 RS; article 2 length 1.4 times article 1, mesial margin with 1 SS; article 3 length 2.2 times article 1, scale with 3 SS and 1 RS, mesial margin with 3 SS and 2 RS; article 4 length 1.6 times article 1, with no ornamentation.

Mandible lacinia mobilis reduced, with distal point; spine row with 9 spines (on left mandible, 8 on right); molar small, terminated with 3 serrate setae (on left molar, 2 on right); mandibular palp extending beyond incisor, article 1 with 5 SS (on left mandibular palp, 4 on right), article 3 with 1 long SS and 1 long pectinate seta. Maxilla 1 with fine SS; lateral lobe width 2.0 times mesial lobe width, distal margin 5 RS, 3 dentate RS and 4 bi-serrate RS, mesial lobe distally with 2 long pectinate setae. Maxilla 2 with fine SS, lateral lobe distally with 4 long pectinate setae; middle lobe 0.9 times lateral lobe width, distally with 4 long pectinate setae; mesial lobe 2.3 times lateral lobe width, proximally, mesial margin also with 10 long SS, distally with 8 blunt SS, 3 toothed setae and 1 long pectinate seta. Maxilliped basis length 3.1 times width, with 6 scattered SS; endite with 5 coupling hooks, distally with 4 blunt SS, 8 fan setae and many fine SS; palp article 1 trapezoid, cuticular scales present, distolateral margin with 1 SS, surface with 3 SS, distomesial margin with 1 SS; article 2 length 2.0 times article 1, lateral margin with 3 SS and 1 RS, surface with 1 distally

pappose seta and 1 SS, mesial margin with 3 distally pappose setae and 1 SS; article 3 length equal to article 1, lateral margin with 1 RS, surface with 3 distally pappose setae, mesial margin with 1 SS and 17 distally pappose setae; article 4 length 0.6 times article 1, lateral margin with 1 SS, distal margin with 3 SS and 7 distally pappose setae; article 5 length 0.7 times article 1, with 9 terminal SS; epipod length 1.6 times width, margins with cuticular scales and few scattered SS.



**Figure 5.** *Ilyarachna brucei* n. sp. (A–E), female holotype, 4.0 mm (NIWA 23795) (F–M), female paratype 3.5 mm (NIWA 23796). (A) Dorsal view. (B) Cephalon. (C) Lateral view. (D) Ventral view of pereonites 6, 7 and pleon. (E) Angular view of pereonites 6 and 7. (F) Left antenna 2. (G) Left antenna 1. (H) Left mandible. (I) Right mandible. (J) Right maxilla 1. (K) Left maxilliped. (L) Left maxilliped endite. (M) Right maxilla 2. Scale bar = 1 mm, for dorsal and lateral views only.



**Figure 6.** *Ilyarachna brucei* n. sp. All figures from female paratype 3.5 mm (NIWA 23796). (A) Operculum. (B) Right pleopod 3. (C) Right pleopod 4. (D) Left pleopod 5.

Operculum approximately 2.1 times as long as proximal width, medial keel provided with a row of RS, proximally with 2 SS, distal surface with 8 plumose setae (4 + 4, sockets visible only), surface with scattered SS, margins anterolaterally with 13 SS (1 at least +12), laterally with numerous plumose setae. Pleopod 3 exopod, 1.2 times length of endopod, distally with 10 long plumose setae and 1 SS; endopod length 2.2 times width, with 3 long plumose setae. Pleopod 4 exopod with 4 terminal long plumose setae; endopod length 2.3 times width. Pleopod 5 length 1.9 times width.

Uropods missing.

Males are not known for this species.

Remarks. *Ilyarachna brucei* n. sp. is distinguished by the combination of pereonites 1–4 anterior margins with robust setae; pereonites 6 and 7 both with ventral spines; the cephalon with no ornamentation; the distolateral margin of antenna 1 is rounded; and the ventral surface of the operculum has many simple setae.

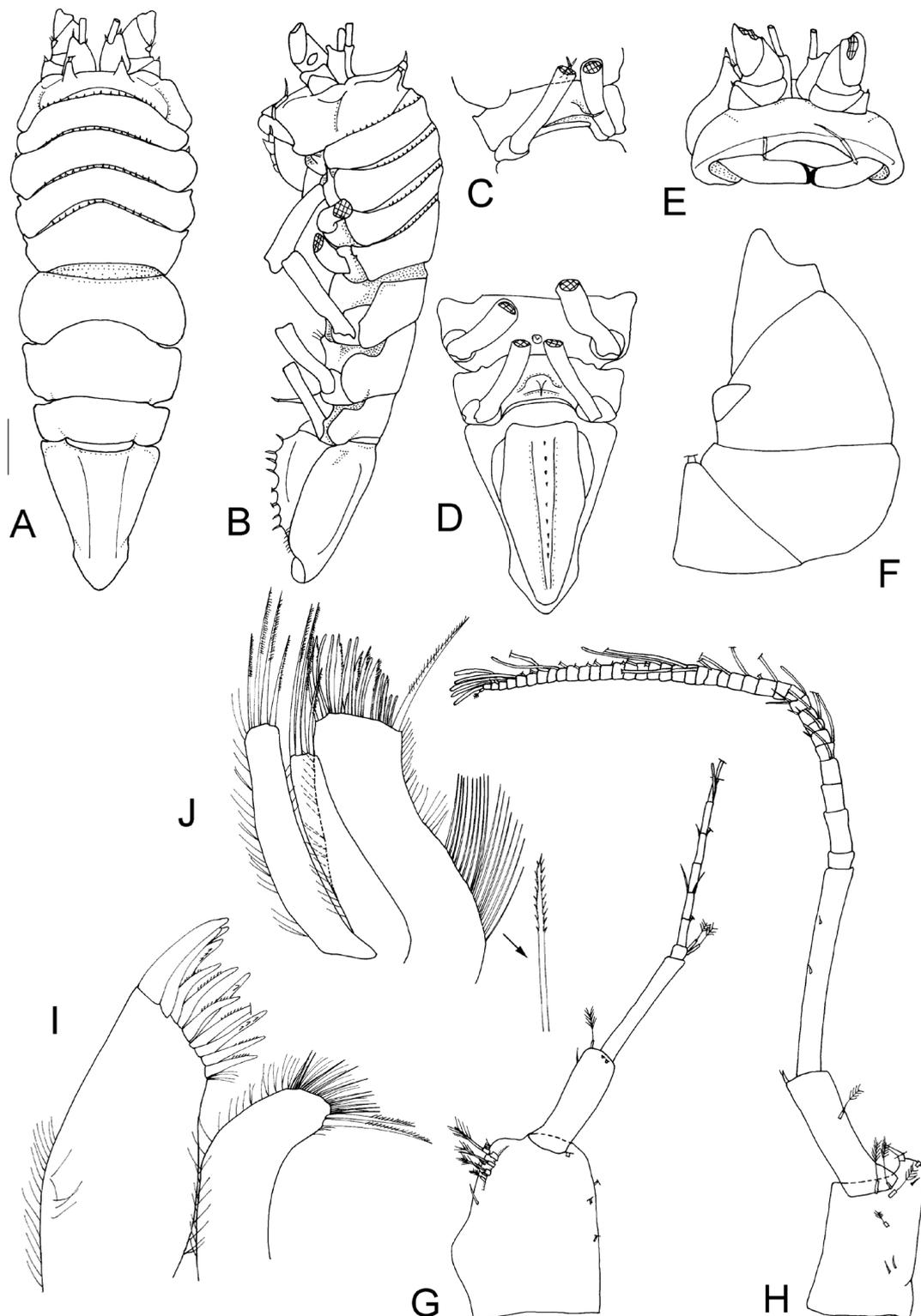
*I. brucei* closely resembles *Ilyarachna mokari* Merrin, 2016 [29] as both species have relatively fewer robust setae on the anterior margins of pereonites 1–4 than other species with robust setae on these margins, and have no robust setae on the cephalon. *I. brucei* differs from *I. mokari* in having a spine on the ventral side of pereonite 6, while in *I. mokari*, this spine is absent, and the distal margin of antenna 1 article 1 is rounded in *I. brucei*, while in *I. mokari* it has developed into two points, each with a robust seta. The maxilliped in *I. brucei* is more setose, both in terms of the endite having more fan setae and the palp with many more distally pappose setae than in *I. mokari*. Also, the operculum in *I. brucei* has many more simple setae on its ventral surface than in *I. mokari*.

Distribution. From the Chatham Rise to the Bounty Trough, east of the South Island, New Zealand between 322–1676 metres.

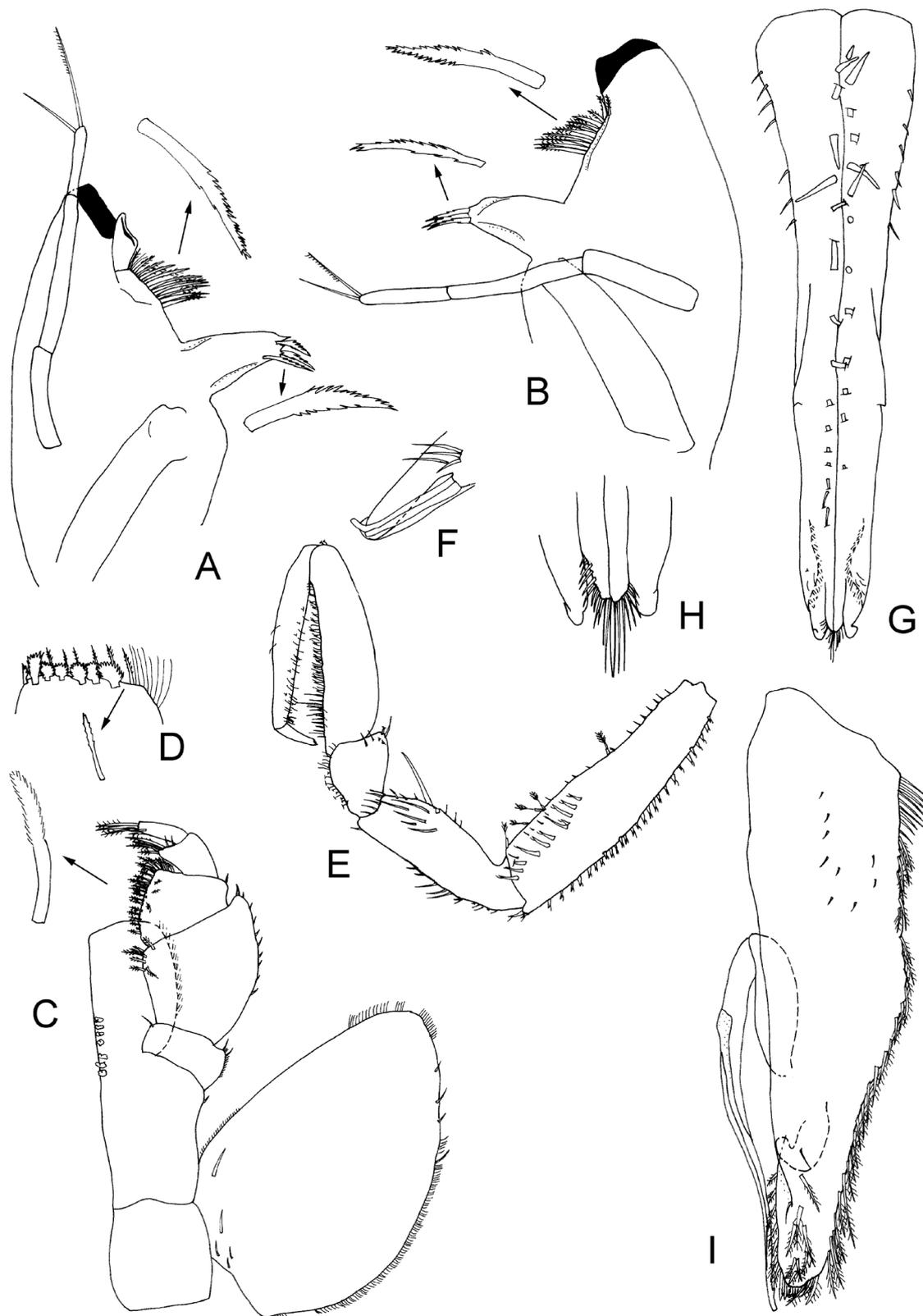
Etymology. *Ilyarachna brucei* is named after Niel Bruce in recognition of his contribution to isopod taxonomy and his support as the PhD supervisor of the author.

*Ilyarachna franki* n. sp.

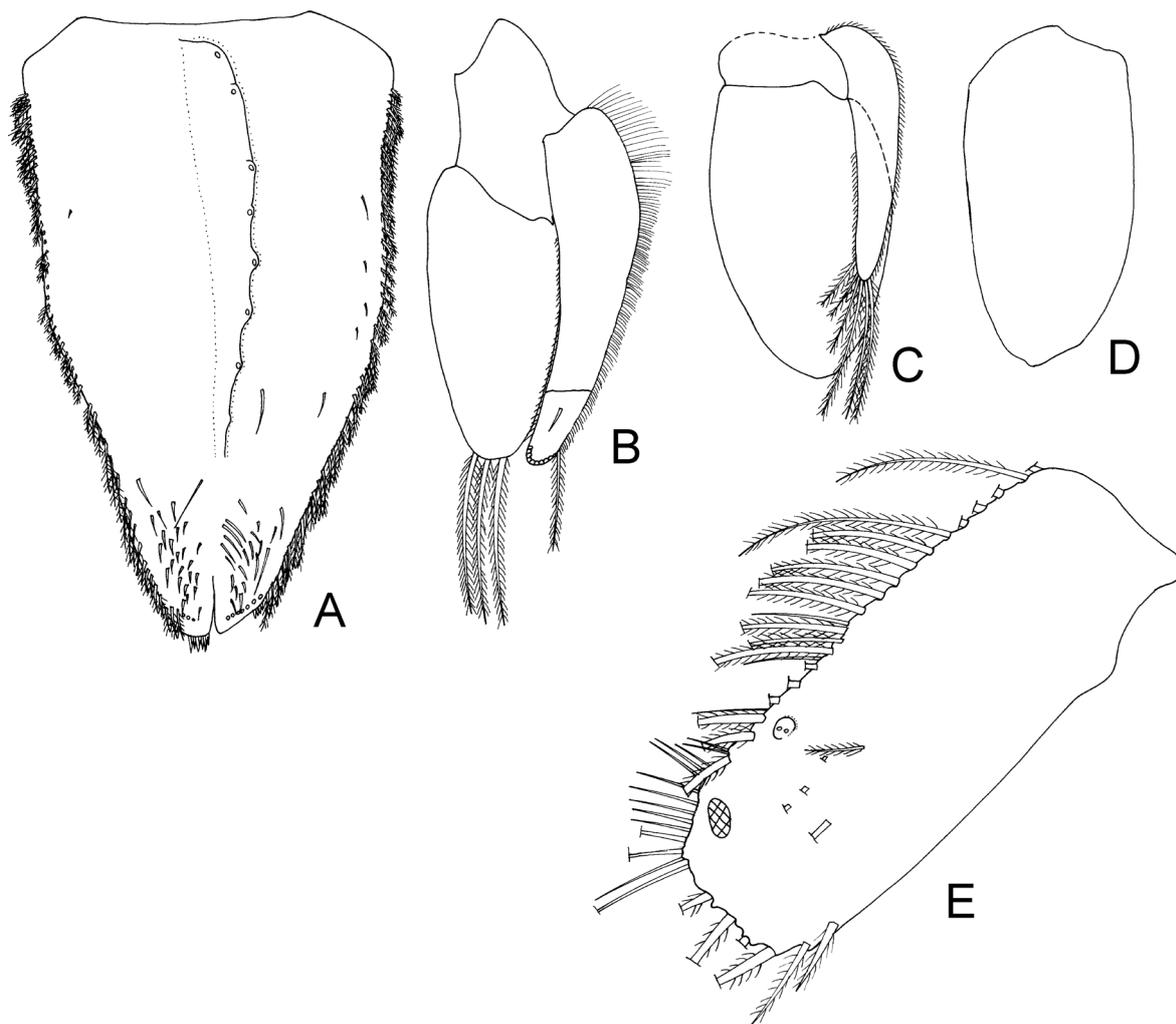
(Figures 7–9)



**Figure 7.** *Ilyarachna franki* n. sp. (A–E), female holotype, 9.5 mm (NIWA 23797). (F,G,I,J) Female paratype, 8.5 mm (NIWA 23798). (H) Male paratype, 6.0 mm (NIWA 23798). (A) Dorsal view. (B) Lateral view. (C) Angular view of pereonite 7. (D) Ventral view of pereonite 6, 7, and pleon. (E) Cephalon. (F) Left antenna 2. (G) Left antenna 1. (H) Right antenna 1. (I) Right maxilla 1. (J) Right maxilla 2. Scale bar = 1 mm, for dorsal and lateral views only.



**Figure 8.** *Ilyarachna franki* n. sp. (A–C), female paratype, 8.5 mm (NIWA 23798). (E,F) Female holotype, 9.5 mm (NIWA 23797). (G–I) Male paratype 6.0 mm (NIWA 23798). (A) Left mandible. (B) Right mandible. (C) Left maxilliped. (D) Left maxilliped endite. (E) Right pereopod 1. (F) Right pereopod 1 unguis. (G) Pleopod 1. (H) Distal end of pleopod 1. (I) Left pleopod 2.



**Figure 9.** *Ilyarachna franki* n. sp. All figures from female paratype, 8.5 mm (NIWA 23798). (A) Operculum. (B) Left pleopod 3. (C) Left pleopod 4. (D) Left pleopod 5. (E) Left uropod.

**Material examined.**—Holotype. Female (9.5 mm), Hikurangi Trough, North Island, New Zealand, stn P971, 41°11.9' S, 177°19.6' E, epibenthic sled, 18 June 1980, 2200–2328 m, RV *Tangaroa* (NIWA 23797). Paratypes: 1 female (8.5 mm), 1 male (6.0 mm), Bounty Trough, South Island, New Zealand, stn S151, 45°45.8' S, 174°30.5' E, epibenthic sled, 26 September 1979, 1586 m, RV *Tangaroa* (NIWA 23798).

**Additional material.**—1 Female, Bounty Trough, South Island, New Zealand, stn S152, 45°52.3' S, 174°04.9' E, epibenthic sled, 26 September 1979, 1676 m, RV *Tangaroa* (NIWA 92066).

**Description of female.** Body length 2.8 times greatest width of pereonite 2; Cephalon with 2 spines. Pereonites 1–4 anterior margins with robust setae; pereonite 5 anterior margin smooth; pereonites 6 and 7 ventrally each with medial spine. Pleon length 1.3 times proximal width.

Antenna 1 damaged; article 1 length 1.2 times width, mesial margin with 3 SS, surface with 1 RS, 2 SS and 5 long penicillate setae, lateral margin with 2 SS and 1 long penicillate seta; article 2 length 0.6 times article 1, length 3.0 times width, with 3 SS and 1 penicillate seta (all distal end); article 4 with 2 penicillate setae; article 5 distomesial margin with 1 SS; article 6 with 2 SS; from article 8, each article has and aesthetasc. Antenna 2 damaged; article 1 lateral margin with 1 RS; article 2 1.0 times as long as article 1, with no setae;

article 3 1.4 times as long as article 1; article 4 small, 1.3 times as long as article 1, with no ornamentation.

Mandible with few cuticular scales; lacinia mobilis reduced and truncate; spine row with 11 spines; molar small, with 3 serrate setae; mandibular palp extending beyond incisor, palp article 3 with 1 pectinate seta and 1 SS. Maxilla 1 with fine SS; lateral lobe as wide as mesial lobe, distal margin with 3 RS, 3 dentate RS, and 6 pectinate RS, mesial lobe distally with 10 SS and 2 long pectinate setae. Maxilla 2 with fine SS, distally with 4 long pectinate setae; middle lobe and lateral lobe equal width, distally with 4 long pectinate setae; mesial lobe width 2.9 times lateral lobe width, mesial margin with 17 long bi-serrate setae, distally with 11 blunt SS, 6 toothed setae and 1 long pectinate seta. Maxilliped basis length 2.7 times width (including endite), distolateral margin with 1 SS; endite with 7 coupling hooks, 6 bi-serrate setae, 8 fan setae and many fine SS; palp article 1 cuticular scales present, distolateral margin with 2 SS, distomesial margin with 1 SS; article 2 length 3.6 times article 1, lateral margin with 9 SS and 1 distal RS, mesial margin with 7 distally pappose setae; article 3 length 1.8 times article 1, lateral margin with 1 SS and 26 distally pappose setae; article 4 length 1.2 times article 1, distal margin with 2 SS and 4 distally pappose setae; article 5 length equal to article 1, with 4 distally pappose setae and 1 SS; epipod length 1.5 times width, 1.1 times as long as basis, margins with cuticular scales and few scattered SS.

Pereopod 1 basis-dactylus length to width ratios: 3.7; 3.0; 1.2; 3.6; 6.7; 2.5. Basis inferior margin with 29 sensillate RS, lateral surface with 11 sensillate RS and 5 small SS (all in distal half), superior margin with 5 penicillate setae and 12 small SS; ischium inferior margin with 13 SS, lateral surface with 9 SS (in distal half), superior margin with 2 RS and 7 SS; merus inferior margin with 19 RS, lateral surface with 4 SS, distosuperior margin with 1 SS and 1 sensillate RS; carpus inferior margin with 16 sensillate RS, 13 RS and 13 SS, distosuperior margin with 2 SS; propodus inferior margin with 31 SS (15 are sub-marginal), superior margin with 2 SS; dactylus superior margin with 4 SS (in distal clump).

Operculum 2.5 times as long as proximal width, medial keel provided with row of RS (although only sockets remain), distal surface with 2 plumose setae (and 11 sockets visible), numerous scattered SS, lateral margins with numerous plumose setae. Pleopod 3 exopod 1.2 times length of endopod, distally with 12 long plumose setae and 1 SS; endopod length 2.3 times width, with 3 long plumose setae. Pleopod 4 exopod with 6 terminal long plumose setae; endopod oval, length 1.6 times width. Pleopod 5 length 2.0 times width.

Uropod protopod length 2.6 times width, rectangular, lateral margin with 17 SS and 20 plumose setae, distal margin with 4 plumose setae, mesial margin with 2 plumose setae, surface with 5 scattered plumose setae; exopod rudimentary, with 2 setae (both broken, but most likely SS); endopod missing.

Description of male. Antenna 1 of 40 articles; article 1 length 1.7 times width, surface with 3 SS and 4 penicillate setae, distal margin with 3 RS; article 2 length 3.6 times width, lateral margin with 1 penicillate seta, distomesial margin with 1 sensillate RS; article 3 surface with 2 SS; from article 7 onwards, each article has an aesthetasc and many articles with additional setae; terminal article with 1 penicillate seta and an aesthetasc.

Pleopod 1 length 4.6 times proximal width, lateral margins indent 0.5 from proximal end, with 13 SS (7 + 6, all in proximal half), either side of central margin with 35 setae (15 + 13 RS and 3 + 4 SS), distally with 21 SS (13 + 8). Pleopod 2 protopod length 4.1 times width, lateral margin with 9 SS (in proximal half), and row of plumose setae, surface with 9 SS proximally, distally with 2 SS, 8 plumose setae and lamellar extension, mesial margin with 7 plumose setae; exopod hooked, 0.1 times as long as protopod, with fine SS; stylet 0.8 times as long as protopod, not hooked into protopod, terminating to a point; sperm duct 0.6 times as long as stylet.

Remarks. *Ilyarachna franki* n. sp. can be distinguished by: the large size; cephalon with pair of large dorsal spines; pereonites 1–4 anterior margins with robust setae; pereopod 1 with numerous robust setae on the inferior margins of the basis and carpus; pereonites

6 and 7 each with a medial spine; and male pleopod 2 stylet short, not hooking up into the proximal half of the protopod.

*I. franki* is most similar to *Ilyarachna aculeatus* and *Ilyarachna quorna* Merrin, 2016 [29] as all three species have robust setae on the first four pereonites and spines on the cephalon. *I. franki* however, has a shorter stylet on male pleopod 2 which does not hook up into the proximal part of the protopod as it does in the other two species. In addition, *I. franki* can be distinguished from *I. aculeatus* as *I. franki* has no robust setae on the anterior margin of pereonite 5, the pair of spines on the cephalon are larger in comparison to *I. aculeatus*, and pereopod 1 is more robust and has many robust sensillate setae on the basis and carpus which are absent in *I. aculeatus*. *I. franki* can be distinguished from *I. quorna* by only having one pair of spines on the cephalon instead of the two pairs as seen in *I. quorna*; the mandibular palp article 3 has only one pectinate seta, as opposed the many seen in *I. quorna*; pereopod 1 is more robust than in *I. quorna*, with many more sensillate robust setae present on the basis and carpus; male pleopod 1 ventral surface has less setae and male pleopod 2 stylet is short and does not hook up into the proximal half of the protopod as it does in *I. quorna*.

Distribution. From the Hikurangi Trough over the Chatham Rise to the Bounty Trough, east of New Zealand from 1586 to 2328 metres.

Etymology. This species is named after my husband Frank.

*Ilyarachna mclayi* n. sp.

(Figures 10–12)

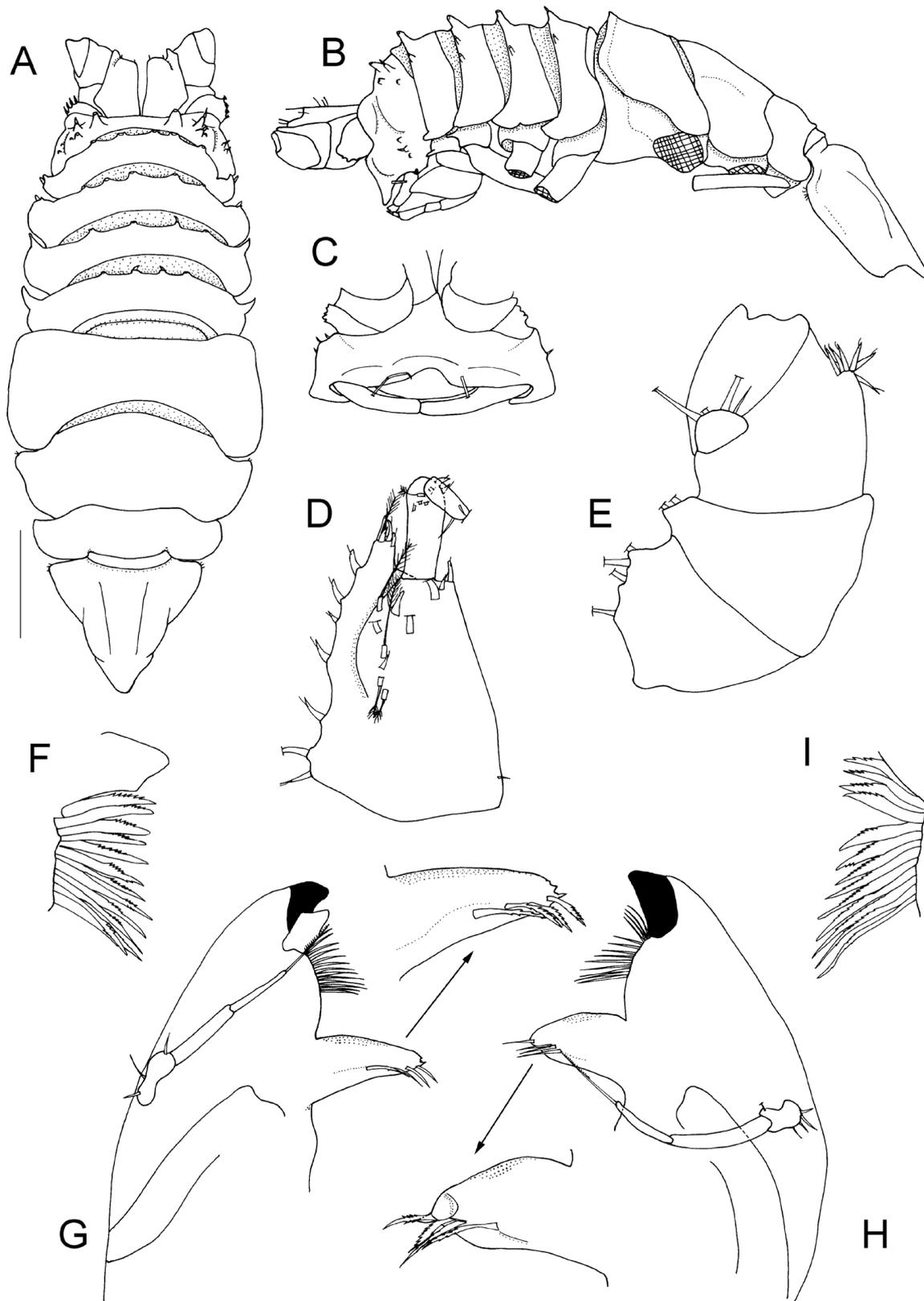
Material examined.—All material from Bounty Trough, South Island, New Zealand. Holotype. Male (6.0 mm), stn S151, 45°45.8' S, 174°30.5' E, epibenthic sled, 26 September 1979, 1586 m, RV Tangaroa (NIWA 23805). Paratypes. 8 females (6.5 mm, dissected), 1 male, stn S153, 45°21.1' S, 173°35.8' E, epibenthic sled, 27 September 1979, 1386 m, RV Tangaroa (NIWA 23806).

Additional material.—2 females, stn S154, 45°24.2' S, 173°59.8' E, epibenthic sled, 27 September 1979, 1373 m, RV Tangaroa (NIWA 92072).

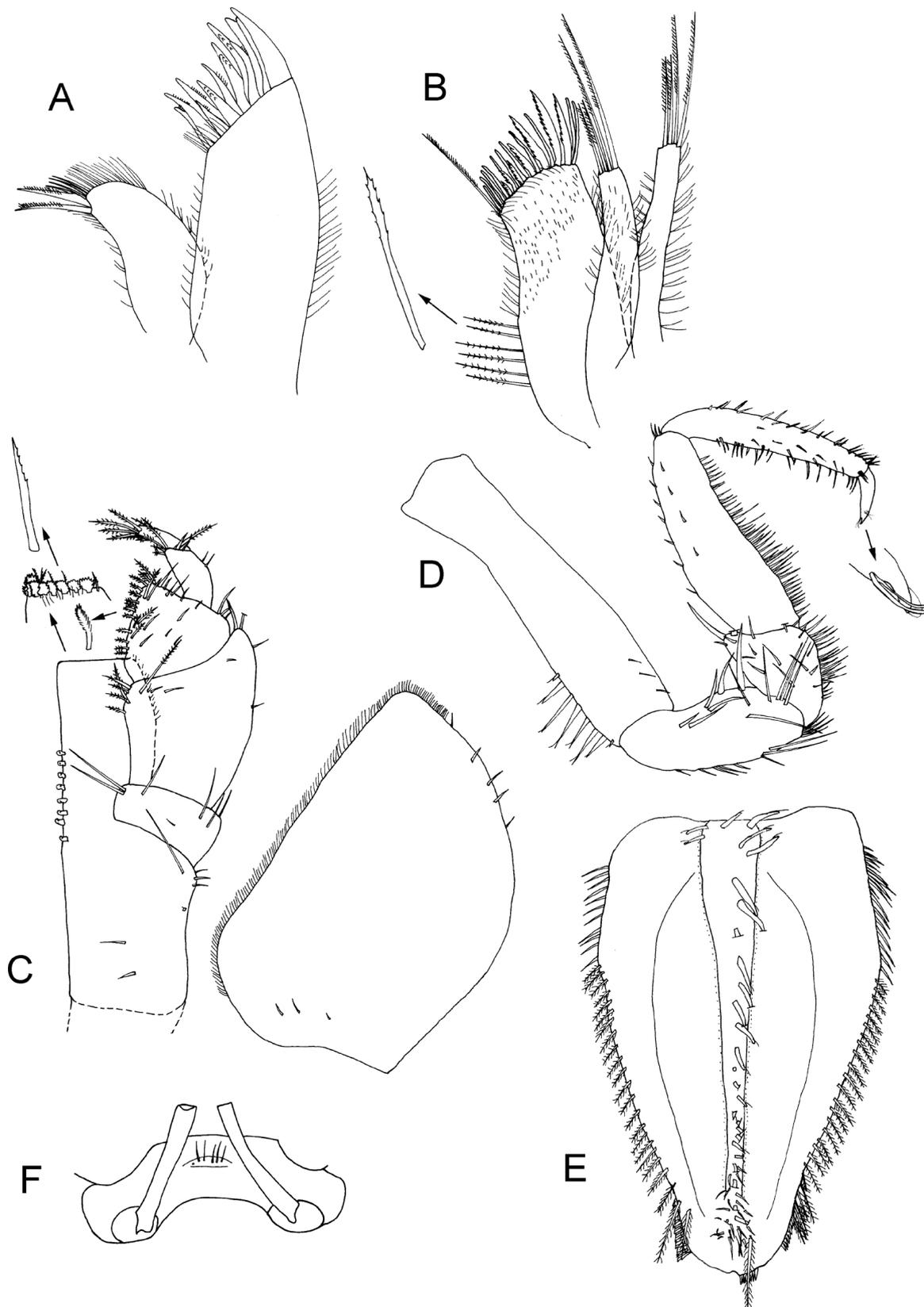
Description of male. Body 2.7 times pereonite 2 width, cuticle smooth. Cephalon with 4 pairs of dorsal spines and 3 pairs of small lateral spines; posterolateral margins broadly rounded. Pereonites 1 and 2 anterior margins with 5 small spines, pereonites 3 and 4 with 4 spines, pereonite 5 anterior margin smooth; anterolateral margins of pereonites 1–4 with lobes, 5 square, 6 and 7 rounded; pereonite 6 ventrally with no ornamentation; pereonite 7 ventrally with medial ridge with many setae. Pleon 1.1 times as long as proximal width, lateral sides indent and posterior end coming to a rounded point.

Pleopod 1 3.6 times as long as proximal width, lateral margins indent 0.5 from proximal end, ventral surface with 37 RS (17 + 20), distally with 17 SS (8 + 9). Pleopod 2 protopod length 3.1 times width, lateral margin with 16 SS (all in proximal half) and row of plumose setae, surface with 11 SS (2 at proximal end, 7 distally all in row), distally with lamellar extension, mesial margin 1 SS and 5 plumose setae; exopod hooked, 0.2 times as long as protopod with fine SS; stylet 0.7 times as long as protopod, does not hook up into proximal part of protopod; sperm duct 0.6 times as long as stylet.

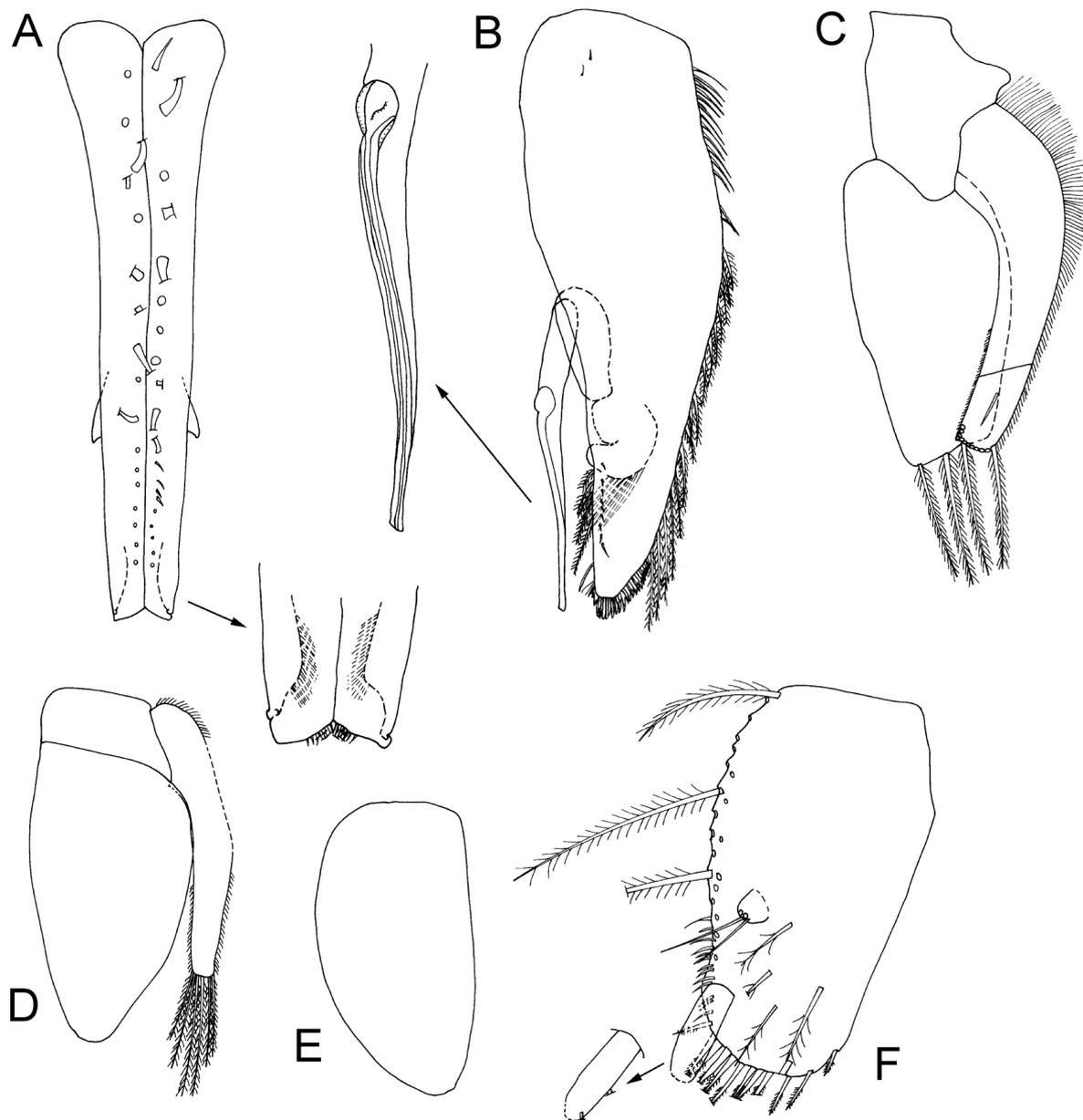
Description of female. Antenna 1 damaged; article 1 length 1.4 times width, mesial margin with 1 SS, distomesial margin with 1 sensillate RS, surface with 4 penicillate setae and 6 sensillate RS, lateral margin with 7 evenly spaced sensillate RS, distolateral corner with 4 sensillate RS and 1 penicillate seta in clump; article 2 length 0.4 times article 1 length, length 2.8 times width, with 6 sensillate RS and 1 penicillate seta (in distal half); article 3 (damaged) with 2 SS. Antenna 2 damaged; articles 1–3 more or less triangular; article 1 lateral margin with 4 RS; article 2 length 1.1 times article 1 length, distolateral margin with 2 RS; article 3 length 1.2 times article 1 length, scale with 3 RS and 1 SS, distomesial margin with 6 sensillate RS (in a clump); article 4 small, 1.0 times as long as article 1, with no ornamentation.



**Figure 10.** *Ilyarachna mclayi* n. sp. (A–C), male holotype, 6.0 mm (NIWA 23805). (D–I) Female paratype, 6.0 mm (NIWA 23806). (A) Dorsal view. (B) Lateral view. (C) Cephalon. (D) Left antenna 1. (E) Left antenna 2. (F) Spine row of the left mandible. (G) Left mandible. (H) Right mandible. (I) Spine row of right mandible. Scale bar = 1 mm, for dorsal and lateral views only.



**Figure 11.** *Ilyarachna mclayi* n. sp. (A–E), female paratype, 6.5 mm (NIWA 23806). (F) Male paratype, 5 mm, telson missing (NIWA 23806). (A) Left maxilla 1. (B) Left maxilla 2. (C) Left maxilliped. (D) Left pereopod 1. (E) Operculum. (F) Ventral view of pereonite 7.



**Figure 12.** *Ilyarachna mclayi* n. sp. (A,B), male holotype, 6 mm (NIWA 23805). (C–F) Female paratype, 6.5 mm (NIWA 23806). (A) Pleopod 1. (B) Left pleopod 2. (C) Left pleopod 3. (D) Left pleopod 4. (E) Left pleopod 5. (F) Left uropod.

Mandible without cuticular scales; lacinia mobilis smooth, square; spine row with 13 spines; molar small, with 4 bi-serrate setae; mandibular palp small, not extending beyond incisor, article 1 with 3 SS (right mandibular palp with 5 SS), article 3 with 1 elongate pectinate seta. Maxilla 1 lateral and mesial margins with fine SS; lateral lobe 1.5 times as wide as mesial lobe, distal margin with few fine SS, 3 RS, 5 dentate RS and 4 pectinate RS, mesial lobe distally with 4 SS, many fine SS and 2 long pectinate setae. Maxilla 2 lateral lobe margins with fine SS, distally with 4 long pectinate setae; middle lobe width 1.5 times lateral lobe width, distally with 4 long pectinate setae; mesial lobe 3.6 times as wide as lateral lobe, margins and surface with fine SS, proximally, mesial margin also with 6 serrate setae, distally with 11 blunt SS, 7 toothed setae and 1 pectinate seta. Maxilliped coxa damaged; basis length 2.7 times width (including endite), with 7 SS (3 on distolateral corner); endite with 8 coupling hooks, distally with 6 serrate setae, 9 fan setae and many

fine SS; palp article 1 length 0.4 times basal endite length, distolateral margin with 1 SS, surface with 4 SS, distomesial margin with 2 SS; article 2 3.5 times as long as and 1.2 as wide as article 1, 1.4 times as wide as basal endite, lateral margin with 4 SS (2 more robust than others), surface with 1 distally pappose seta and 3 SS, mesial margin with 5 distally pappose setae; article 3 2.0 times as long as and 0.9 times as wide as article 1, lateral margin with 3 SS, surface with 7 SS, mesial margin with 5 SS and 18 distally pappose setae; article 4 1.1 times as long as and 0.3 times as wide as article 1, lateral margin with 2 SS, distal margin with 2 SS and 5 distally pappose setae; article 5 narrow, 1.0 times as long as and 0.1 times as wide as article 1, with 7 terminal distally pappose setae; epipod length 1.5 times width and as long as basis, margins with many cuticular scales and 8 SS (5 on lateral margin, 3 on proximal surface).

Pereopod 1 basis-dactylus length to width ratios: 4.0; 2.4; 1.0; 3.1; 5.7; 2.5. Basis inferior margin with 8 sensillate RS (in distal half), lateral surface with 3 SS (in distal half, towards superior margin); ischium inferior margin with 12 SS, lateral surface with 4 RS and 6 SS, superior margin with 2 RS; merus inferior margin with 23 SS, lateral surface with 13 scattered SS, distosuperior margin with 2 RS and 2 SS; carpus inferior margin with 45 SS, lateral surface with 4 SS, superior margin with 10 SS; propodus inferior margin with 19 SS, lateral surface with 12 SS, superior margin with 25 SS; dactylus superior margin with 4 small SS (in distal clump).

Operculum length 2.1 times proximal width, medial keel provided with row of sensillate RS, distally with numerous SS, proximally with 6 long sensillate RS, distally with 1 plumose seta, margins anterolaterally with 27 SS (11 + 16), laterally with numerous plumose setae. Pleopod 3 exopod length 1.2 times endopod length, distally with 12 long plumose setae and with 1 SS; endopod length 2.0 times width, with 3 long plumose setae. Pleopod 4 exopod with 6 terminal long plumose setae; endopod length 1.8 times width. Pleopod 5 length 2.0 times width.

Uropod protopod length 1.9 times width, distal end rounded, lateral margin with 20 plumose setae and 13 SS, distal margin with 12 robust plumose setae, surface with 6 scattered plumose setae; exopod rudimentary, with 4 setae (at least 2 are SS); endopod 0.3 times as long as protopod, with 2 setae (type unknown, distal end of endopod damaged).

Remarks. *Ilyarachna mclayi* n. sp. is most easily distinguished by the combination of the numerous spines on the cephalon and anterior margins of pereonites 1–4; antenna 1 lateral margin with many robust setae; and pereonite 7 ventrally with medial ridge with many setae.

*I. mclayi* most closely resembles *I. pacifica*, but is distinguishable by the absence of spines on pereonites 5–7; the presence of additional robust setae on the lateral margin and dorsal surface of antenna 1 article 1; and the ventral side of pereonite 7 with a medial row of setae and not with a pair of spines as seen in *I. pacifica*.

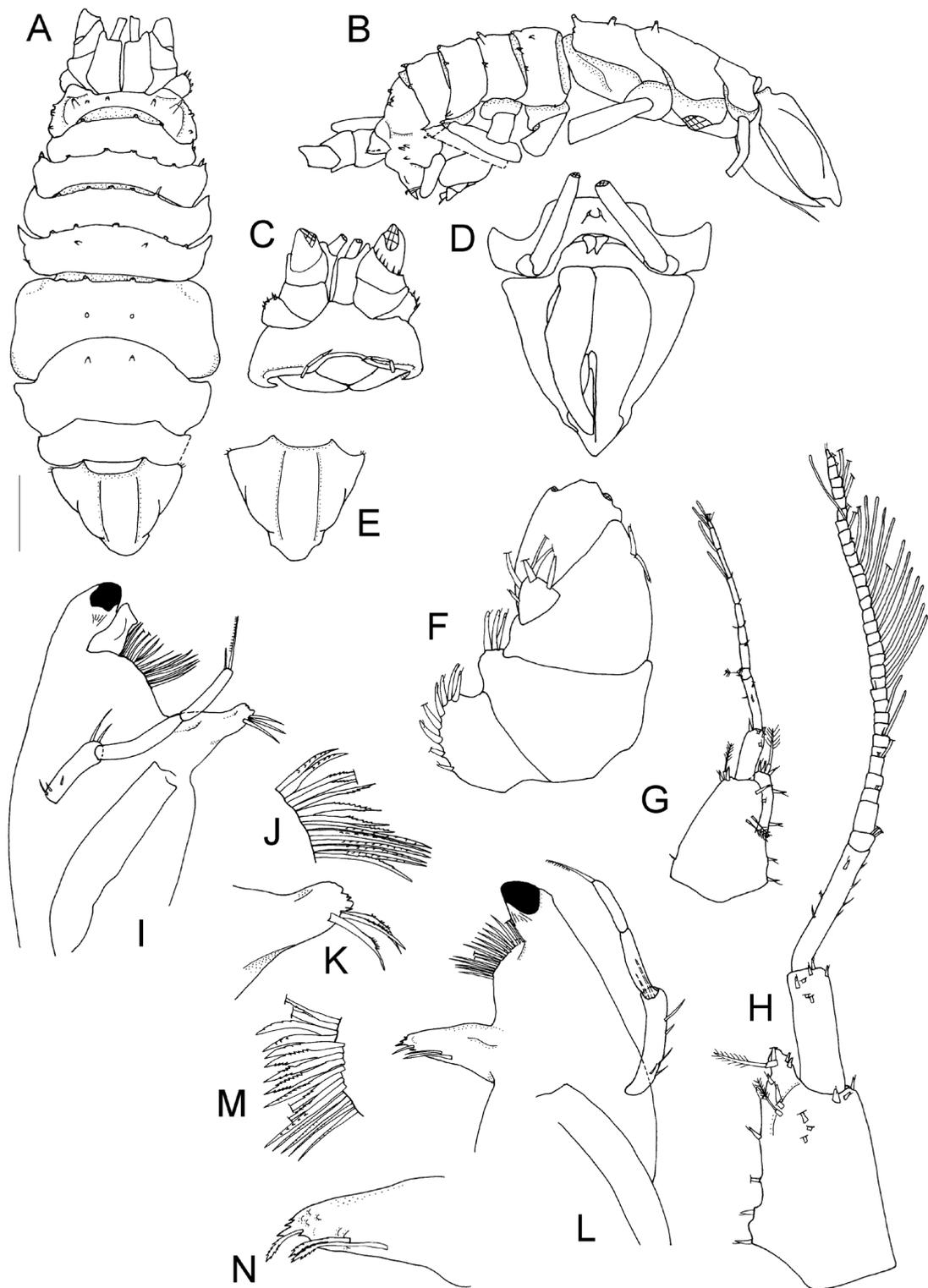
Distribution. Bounty Trough, South Island, New Zealand, between 1373–1586 metres.

Etymology. *Ilyarachna mclayi* is named after the late Colin McLay, in honour of his contribution to crustacean science and his support as the PhD supervisor of the author.

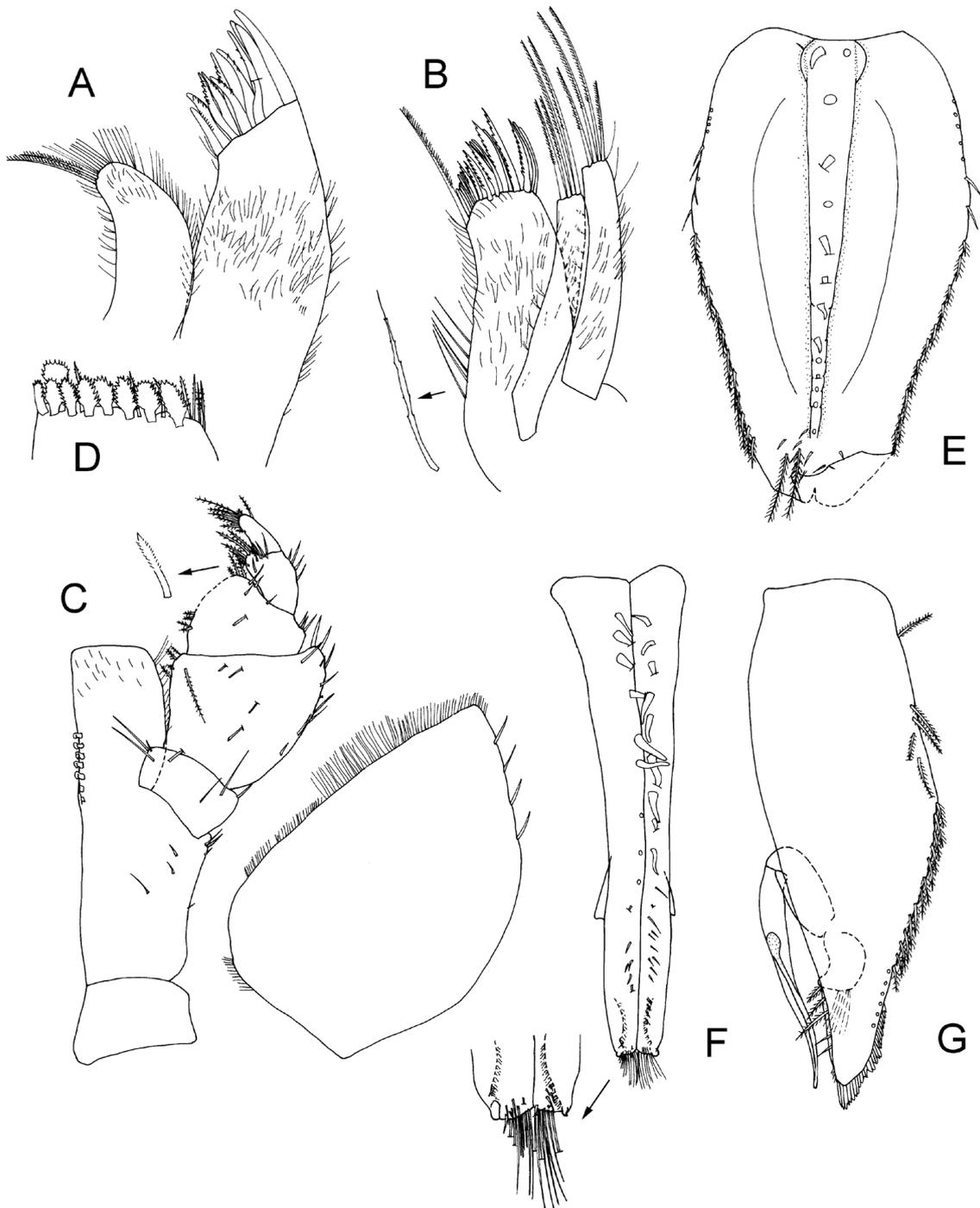
*Ilyarachna pacifica* n. sp.

(Figures 13–15)

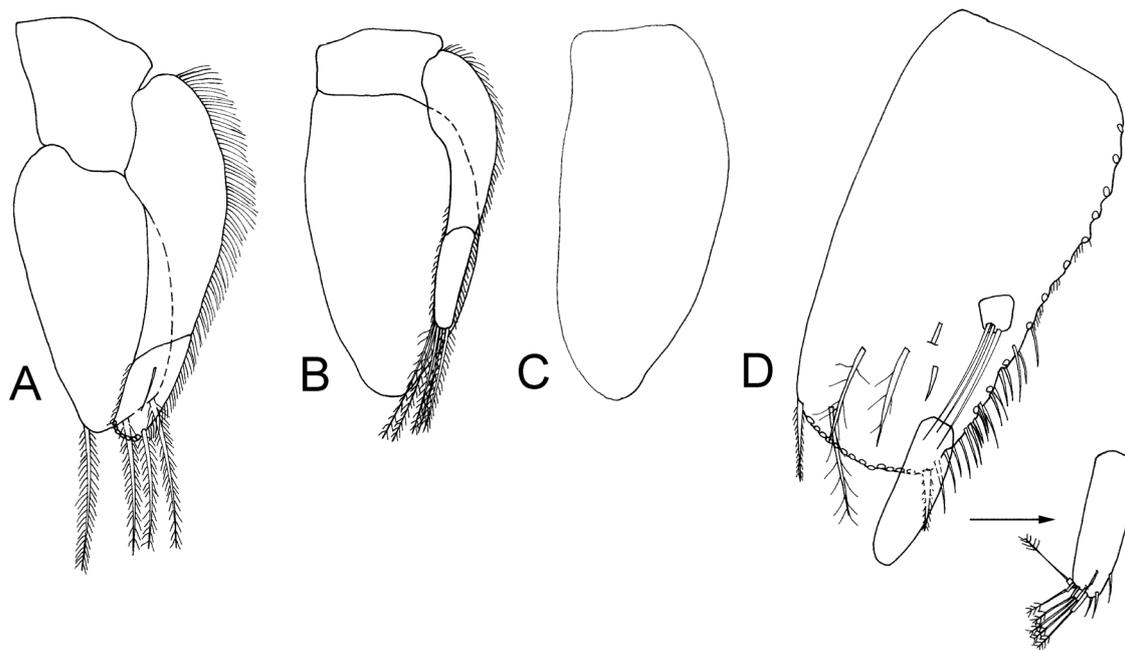
Material examined.—Holotype. Male (6.0 mm), northeast slope, North Island, New Zealand, stn F892, 36°58.5' S, 176°41' E, Agassiz medium trawl, 5 October 1968, 1278–1144 m, MV Taranui (NIWA 23801). Paratypes: 1 female (5.0 mm, dissected), 1 male (anterior half, 3.5 mm, dissected), 1 male (posterior half, 4.0 mm, dissected), type locality (NIWA 23802).



**Figure 13.** *Ilyarachna pacifica* n. sp. (A–C,E) male holotype, 6.0 mm (NIWA 23801). (D) Male paratype, 4.0 mm (posterior half only) (NIWA 23802). (F,H–N) Male paratype, 3.5 mm (anterior half only) (NIWA 23802). (G) Female paratype, 5 mm (NIWA 23802). (A) Dorsal view. (B) Lateral view. (C) Cephalon. (D) Ventral view of pereonite 7 and pleon. (E) Dorsal view of pleon. (F) Left antenna 2. (G) Right antenna 1. (H) Left antenna 1. (I) Left mandible. (J) Spine row of the left mandible. (K) Molar of left mandible. (L) Right mandible. (M) Spine row of right mandible. (N) Molar of right mandible. Scale bar = 1 mm, for dorsal and lateral views only.



**Figure 14.** *Ilyarachna pacifica* n. sp. (A–D), male paratype, 3.5 mm (anterior half only) (NIWA 23802). (E) Female paratype, 5.0 mm (NIWA 23802). (F,G) Male paratype, 4.0 mm (posterior half only) (NIWA 23802). (A) Left maxilla 1. (B) Left maxilla 2. (C) Left maxilliped. (D) Endite of left maxilliped. (E) Operculum. (F) Pleopod 1. (G) Left pleopod 2.



**Figure 15.** *Ilyarachna pacifica* n. sp. All figures from male paratype, 4.0 mm (posterior half only) (NIWA 23802). (A) Left pleopod 3. (B) Left pleopod 4. (C) Left pleopod 5. (D) Right uropod.

Description of male. Body about 3.0 times as long as greatest width (from lobe tip to lobe tip) of pereonite 2; widest at pereonite 4; cuticle not highly calcified, smooth. Cephalon with 2 pairs of spines and 1 additional spine on left, laterally with 3 pairs of small spines, 1 additional spine on left; posterolateral margins broadly rounded. Pereonite 1 anterior margin with 3 spines; pereonites 2–4 with 5 spines; pereonite 5 with pair of spines and pair of small protrusions; pereonite 4 laterally with additional spine on left; pereonites 4–6 each with pair of dorsal spines. Anterolateral margins of pereonites 1–4, 6 and 7 with lobes; pereonite 5 anterolateral margin square. Pereonite 6 ventrally with no ornamentation; pereonite 7 ventrally with two small spines. Pleon as long as proximal width, lateral sides indent and posterior end coming to a rounded point.

Antenna 1 of 36 articles; article 1 length 1.8 times width, surface with 6 sensillate RS and 1 penicillate seta, lateral margin with 5 sensillate RS, distal margin with 1 penicillate seta and 6 sensillate RS; article 2 length 0.5 times article 1 length, length 3.0 times width, with 7 sensillate RS (all in distal half); article 3 lateral margin with 2 SS, surface with 1 sensillate RS, mesial margin with 4 SS; article 4 mesial margin with 2 penicillate setae; article 6 with 1 SS; from article 8, each article has 1 aesthetasc, some articles with additional SS; terminal article with 2 SS. *Antenna 2* damaged, articles 1–3 more or less triangular; article 1 lateral margin with 8 sensillate RS; article 2 1.2 times as long as article 1, distolateral margin with 3 sensillate RS; article 3 1.7 times as long as article 1, scale with 6 sensillate RS, distomesial margin with 2 sensillate RS; article 4 length 1.4 times article 1 length, with no ornamentation.

Mandible lacinia mobilis reduced and truncate; spine row with 14 spines (on left mandible, 16 on right); molar small, with 3 serrate setae; mandibular palp not extending beyond incisor, article 1 with 5 SS (on left mandible and 7 on right), article 3 with 1 SS and 1 pectinate seta (on left mandible, 1 pectinate seta on right). Maxilla 1 with fine SS; lateral lobe width 1.8 times mesial lobe width, distal margin 4 RS (1 broken), 7 dentate RS and 1 pectinate RS, mesial lobe distally with 2 long pectinate setae. Maxilla 2 with fine SS, lateral lobe distally with 4 long pectinate setae; middle lobe width equals lateral lobe width, distally with 4 long pectinate setae; mesial lobe width 2.5 times lateral lobe width proximally, mesial margin with 5 long bi-serrate setae, distally with 11 blunt SS, 7 toothed setae and 1 long pectinate seta. Maxilliped basis length 2.6 times width (including endite),

surface with 3 SS, lateral margin with 1 SS, distolateral margin with 3 SS; endite with 7 coupling hooks, distally with 7 bi-serrate setae and 9 fan setae (distomesial one is longest); palp article 1 trapezoid, 0.4 times as long as basal endite, distolateral margin with 1 SS, surface with 4 SS, distomesial margin with 2 SS; article 2 2.8 times as long as and 1.5 as wide as article 1, 1.7 times as wide as basal endite, lateral margin with 10 SS surface with 5 SS and 1 distally pappose seta, mesial margin with 4 distally pappose setae; article 3 1.3 times as long as and 1.1 times as wide as article 1, lateral margin with 3 SS, surface with 3 SS, mesial margin with 2 SS and at least 7 distally pappose setae; article 4 0.9 times as long as and 0.4 as wide as article 1, lateral margin with 4 SS, surface with 4 SS and 6 distally pappose setae; article 5 narrow, 0.8 times as long as and 0.2 times as wide as article 1, with 8 terminal distally pappose setae; epipod length 1.5 times width, 2.6 times basis length, margins with cuticular scales and 4 SS.

Pleopod 1 length 3.7 times proximal width, lateral margins indent 0.6 from proximal end, either side of central margin with 18 RS (9 + 9) and 20 SS (6 + 14), distally with 30 SS (16 + 14). Pleopod 2 protopod length 2.7 times width, lateral margin with row of plumose setae (setae towards proximal margin have fine short setules), distally with lamellar extension, mesial margin with 2 SS and 3 plumose setae; exopod hooked, 0.1 times as long as protopod with fine SS; stylet short, 0.6 times as long as protopod, not hooking up into proximal part of protopod, terminating to a point; sperm duct 0.5 times as long as stylet. Pleopod 3 exopod 1.1 times length of endopod, distally with 8 long plumose setae and 1 SS; endopod length 2.1 times width, with 3 long plumose setae. Pleopod 4 exopod with 5 terminal long plumose setae; endopod length 1.8 times width. Pleopod 5 length 2.2 times width.

Uropod protopod length 1.9 times width, distal end rounded, margins with cuticular scales, lateral margin with 18 SS and row of plumose setae (damaged), distal margin with 15 short plumose setae, surface with 5 scattered plumose setae; exopod rudimentary, 0.1 times as long as protopod, 0.2 times as long as endopod, with 3 SS; endopod 0.3 times as long as protopod, with 3 SS and 7 penicillate setae.

Description of female. Antenna 1 of 11 articles; article 1 length 1.4 times width, mesial margin with 1 SS, distomesial margin with 2 sensillate RS and 1 penicillate seta, surface with 2 sensillate RS and 2 penicillate setae, lateral margin with 4 sensillate RS, distolateral margin with 3 sensillate RS and 1 penicillate seta; article 2 length 2.6 times width, lateral margin with 1 sensillate RS distal margin with 4 sensillate RS; article 3 with 3 SS; article 4 with 2 penicillate setae; article 5–7 with SS; from article 8 onwards, each article has 1 aesthetasc and many articles have additional SS; terminal article with 1 penicillate seta, 2 SS and 1 aesthetasc.

Operculum length 3.0 times proximal width, medial keel with a row of RS, proximally with 1 SS, distal surface with 2 plumose setae (at least, distal end damaged), and few SS, margins anterolaterally with 5 SS (3 + 2 SS, at least), laterally with numerous plumose setae.

Remarks. *Ilyarachna pacifica* n. sp. can be defined by a combination of its unique dorsal spine pattern, with dorsal spines present on all the anterior margins of pereonites 1–5 and non-marginal spines present on pereonite 6; pereonite 7 ventrally with two spines; and pleopod 2 stylet short, not hooking up into proximal part of the protopod

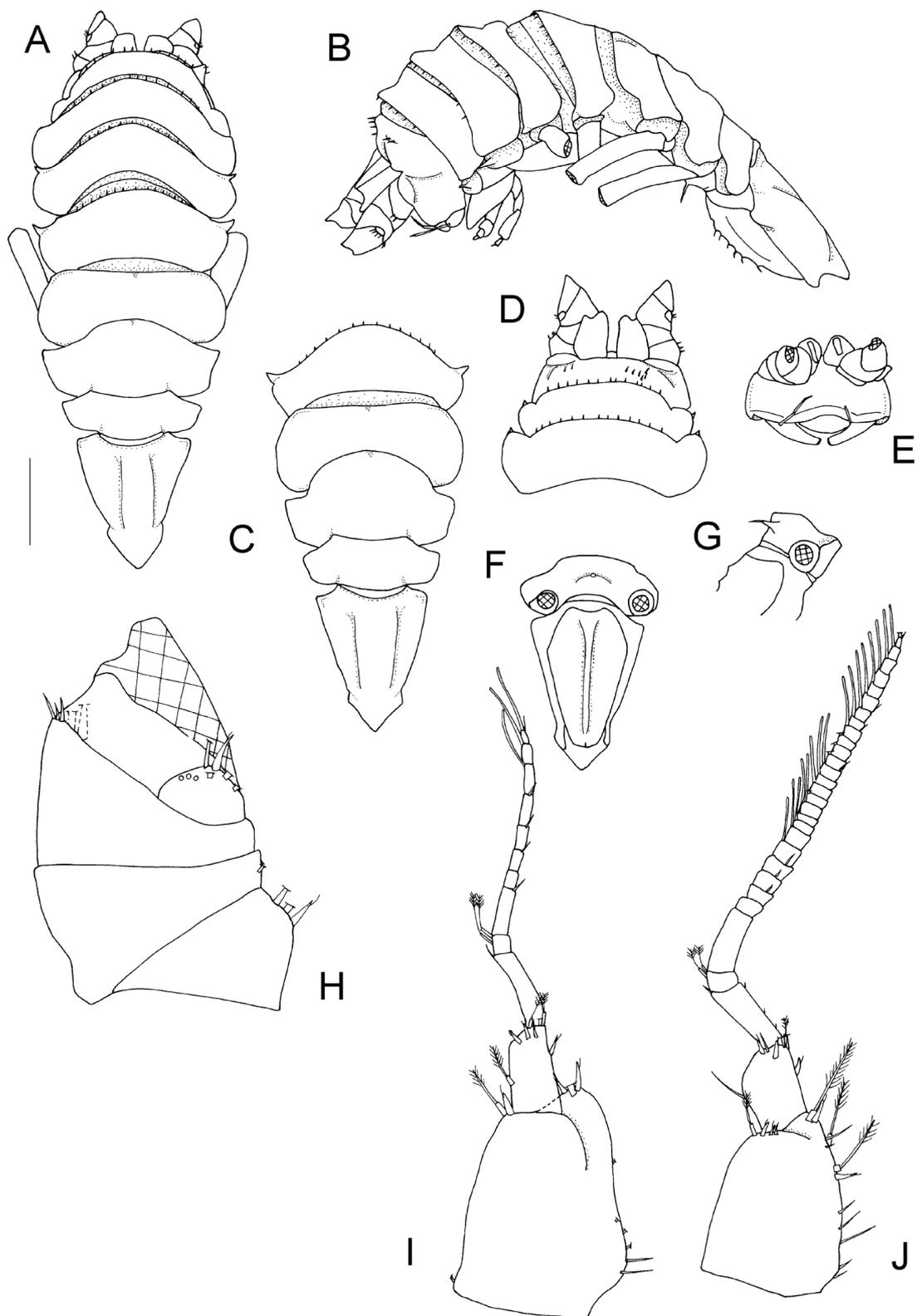
This pattern of spines on the pereonites differs from similar spiny species, such as *Ilyarachna mclayi* n. sp which has no spines on pereonites 5 or 6 and *Ilyarachna taranui* n. sp. which has no dorsal spines on pereonites 1 and 3.

Distribution. Known only from the type locality, the north-eastern slope of the North Island, New Zealand, between the depths of 1144–1278 metres.

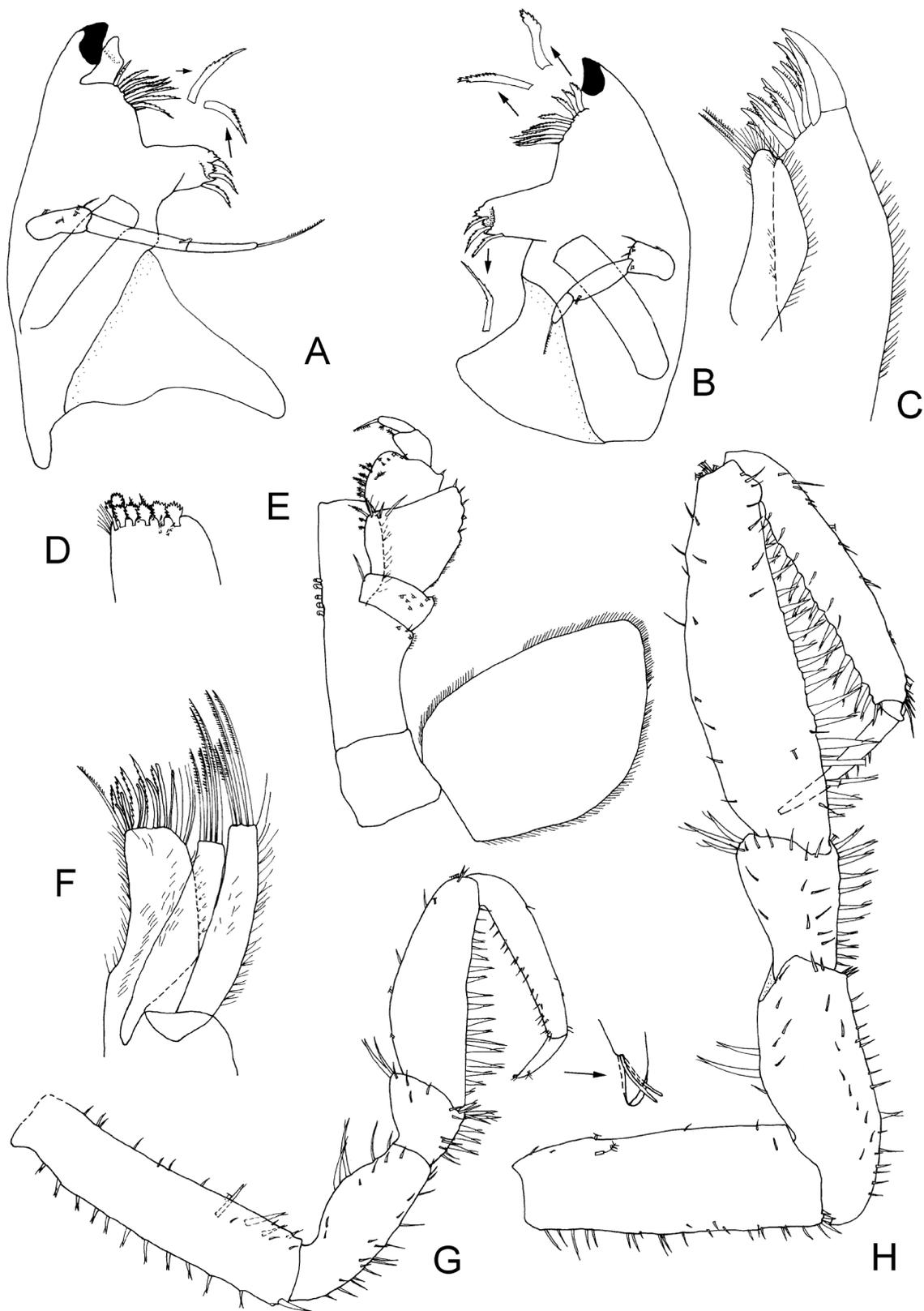
Etymology. *Ilyarachna pacifica* is named after the Pacific Ocean.

*Ilyarachna sami* n. sp.

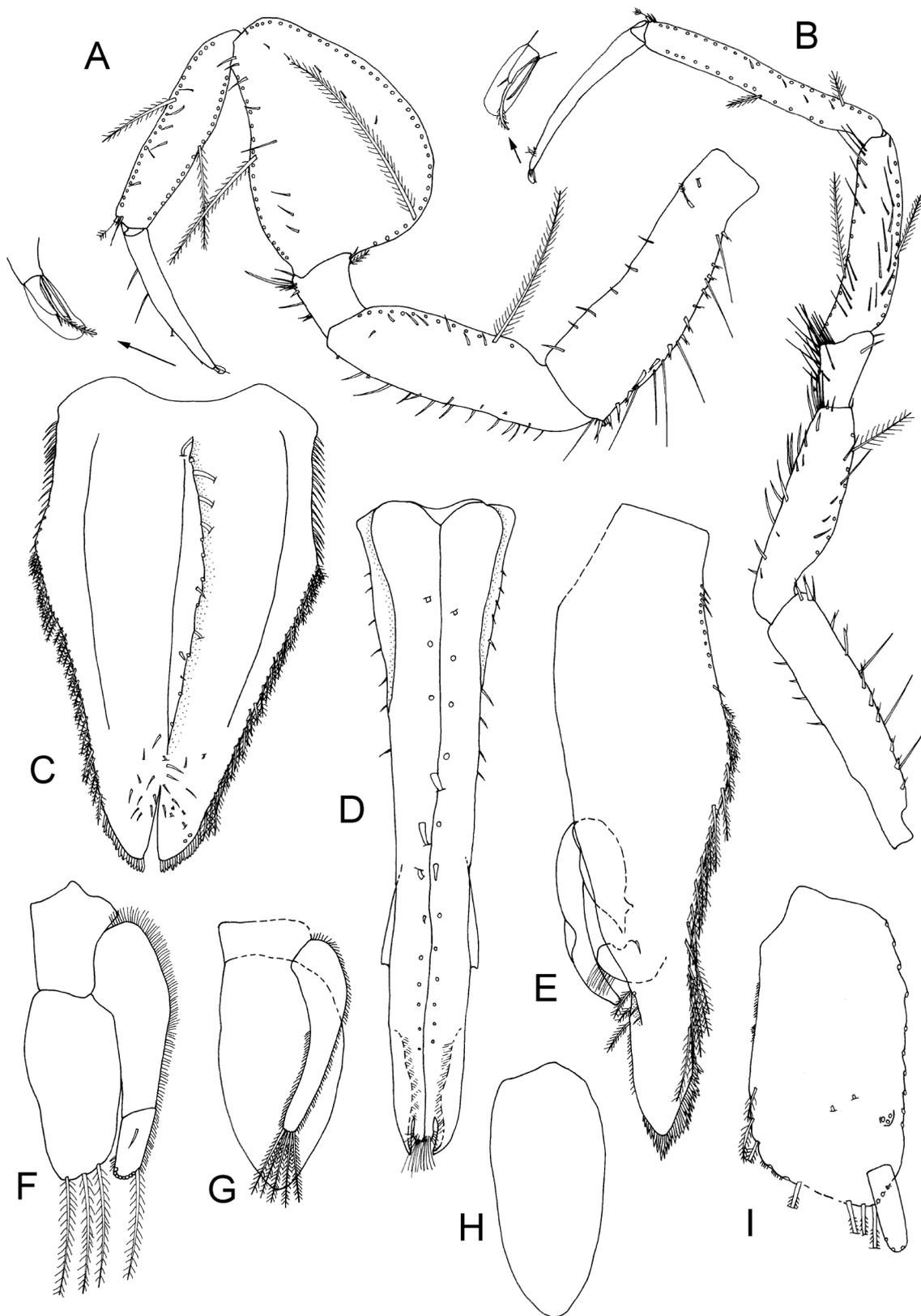
(Figures 16–18)



**Figure 16.** *Ilyarachna sami* n. sp. (A–G), female holotype, 6.0 mm (NIWA 23799). (H,I) Female paratype 5.5 mm (NIWA 23800). (J) Male paratype, 5.0 mm (NIWA 23800). (A) Dorsal view. (B) Lateral view. (C) Dorsal view of pereonites 4–7 and pleon. (D) Dorsal view of cephalon, pereonites 1 and 2. (E) Cephalon. (F) Ventral view of pereonite 7 and pleon. (G) Lateral view of pereonite 7. (H) Right antenna 2. (I) Right antenna 1. (J) Right antenna 1.



**Figure 17.** *Ilyarachna sami* n. sp. (A–F), female paratype, 5.5 mm (NIWA 23800). (G,H) Female holotype, 6.0 mm (NIWA 23799). (A) Left mandible. (B) Right mandible. (C) Left maxilla 1. (D) Distal end of left maxilliped endite. (E) Left maxilliped. (F) Left maxilla 2. (G) Right pereopod 1. (H) Right pereopod 2.



**Figure 18.** *Ilyarachna sami* n. sp. (A,B), female holotype, 6.0 mm (NIWA 23799). (C,F–I) Female paratype 5.5 mm (NIWA 23800). (D,E) Male paratype, 5 mm (NIWA 23800). (A) Right pereopod 6. (B) Right pereopod 7. (C) Operculum. (D) Pleopod 1. (E) Left pleopod 2. (F) Left pleopod 3. (G) Left pleopod 4. (H) Right pleopod 5. (I) Right uropod.

*Material examined.*—All material from South Island, New Zealand. Holotype. Female (6.0 mm), Chatham Rise, stn S148, 44°41.0' S, 174°20.9' E, Agassiz medium trawl with fine mesh inside, 25 September 1979, 859 m, RV *Tangaroa* (NIWA 23799). Paratypes: 3 females, 2 males, and 2 fragments (1 female 5.5 mm, 1 male 5.0 mm; dissected), Chatham Rise, stn S147, 44°30.1' S, 174°18.8' E, Agassiz medium trawl with fine mesh inside, 25 October 1979, 760 m, RV *Tangaroa* (NIWA 23800).

*Additional material.*—1 female, Chatham Rise, stn S140, 44°33.9' S, 174°51.2' E, Agassiz medium trawl with fine mesh in cod end, 24 October 1979, 750 m, RV *Tangaroa* (NIWA 92067). 2 females, 1 male, Chatham Rise, stn F753, 44°45' S, 174°30' E, Menzies trawl, 18 August 1966, 854–788 m, MV *Taranui* (NIWA 92068). 1 female, 4 fragments, Chatham Rise, stn F755, 43°00' S, 174°30' E, Menzies trawl, 19 August 1966, 721 m, MV *Taranui* (NIWA 92069).

**Description of female.** Body about 2.7 times as long as greatest width of pereonite 2; widest at pereonite 2; cuticle not highly calcified, smooth. Cephalon cuticle with many robust setae; posterolateral margins broadly rounded. Pereonites 1–4 anterior margins with robust setae; pereonite 5 anterior margin smooth; anterolateral margins of pereonites all rounded except pereonites 3 and 4 which have small lobes; pereonite 6 ventrally with no ornamentation; pereonite 7 ventrally with medial spine. Pleon 1.3 times as long as proximal width, lateral sides indent and posterior end coming to a rounded point.

Antenna 1 of 12 articles; article 1 length 1.4 times width, mesial margin with 1 SS, distomesial margin with 1 penicillate seta and 1 sensillate RS, lateral margin with 6 SS, distolateral margin with 3 sensillate RS; article 2 cylindrical, length 0.4 times article as 1 and 1.9 times width, mesial margin with 1 penicillate seta, lateral margin with 1 sensillate RS, distal margin with 2 penicillate setae and 4 sensillate RS; article 3 with 1 SS; article 4 with 2 penicillate setae; articles 5, 7, 8 and 9 each with 1 SS; from article 10, each article with 1 aesthetasc; terminal article with 1 aesthetasc and 1 SS. Antenna 2 damaged; articles

1–3 more or less triangular; article 1 lateral margin with 3 sensillate RS; article 2 1.3 times as long as article 1, distolateral margin with 2 RS; article 3 1.3 times as long as article 1, scale with 8 sensillate RS, distomesial margin with 5 sensillate RS; article 4 small, 1.5 times as long as article 1, with no ornamentation.

Mandible lacinia mobilis truncate; left mandible spine row with 1 small and 8 large spines, right mandible with 1 small and 10 large spines; molar large, with 3 serrate setae; mandibular palp extending beyond incisor, article 1 with 5 SS (on left mandible, right mandible with 6 SS), article 2 with 1 short pectinate seta, article 3 with 1 terminal pectinate seta. Maxilla 1 with fine SS; lateral lobe width 2.1 times mesial lobe width, distal margin with 3 RS, 3 dentate RS and 6 pectinate RS, mesial lobe terminated with 2 long pectinate setae. Maxilla 2 with scattered fine SS, lateral lobe distally with 4 long pectinate setae; middle lobe width equal to lateral lobe width, distally with 4 long pectinate setae; mesial lobe width 1.5 times lateral lobe width distally with 7 blunt SS, many fine SS, 5 toothed setae and 1 pectinate seta. Maxilliped basis length 2.7 times width (including endite), distolateral margin with 3 SS and cuticular scales; endite with 5 coupling hooks, distally with 4 toothed setae, 7 fan setae (distomesial one longest), and few fine SS; palp article 1 cuticular scales present, surface with 6 SS, distomesial margin with 1 SS; article 2 length 2.7 times article 1, lateral margin with cuticular scales and 5 SS, surface with 2 SS, mesial margin with 4 distally pappose setae; article 3 length 1.4 times article 1, lateral margin with 1 SS, mesial margin with 2 SS and 8 distally pappose setae (at least); article 4 length 0.9 times article 1, mesial margin with 1 distally pappose seta; article 5 length 0.8 times article 1, with 1 terminal pectinate seta and 1 medial distally pappose seta; epipod length 1.5 times width, length equals basis length, margins with cuticular scales and 5 SS.

Pereopod 1 basis-dactylus length to width ratios: 4.1:2.3:0.8:2.7:4.8:2.8. Basis inferior margin with 13 sensillate RS, lateral surface with 5 sensillate RS (on opposable surface) and 3 SS, superior margin with 8 SS; ischium inferior margin with 16 SS, lateral surface with 10 SS, superior margin with 2 sensillate RS at mid-point and 2 SS distally; merus inferior

margin with 6 sensillate RS and 4 SS, lateral surface with 9 SS, distosuperior margin with 1 sensillate RS and 1 SS; carpus inferior margin with 5 SS and 13 sensillate RS, superior margin with 9 SS; propodus inferior margin with 20 SS (both marginal and sub-marginal), superior margin with 5 SS; dactylus superior margin with distal 3 SS.

Pereopod 2 basis-dactylus length to width ratios: 2.9; 2.1; 1.3; 3.5; 5.1; 6.1. Basis inferior margin with 4 sensillate RS and 20 SS, lateral surface with 1 penicillate seta and 4 SS, superior margin with 3 SS and 1 sensillate RS; ischium inferior margin with 18 SS and 1 sensillate RS, lateral surface with 17 SS, superior margin with 2 sensillate RS and 1 SS (all at midpoint); merus inferior margin with 10 sensillate RS and 3 SS, lateral surface with 14 SS, distosuperior margin with 3 elongate sensillate RS; carpus inferior margin with 2 SS and 20 sensillate RS, lateral surface with 16 SS, superior margin with 10 SS (6 in distal clump); propodus inferior margin with 2 distal SS and 14 sensillate RS, lateral surface with 8 SS, superior margin with 1 distal penicillate seta and 17 SS; dactylus superior margin with 3 SS; unguis damaged.

Pereopod 6 basis-dactylus length to width ratios: 3.1; 3.1; 1.0; 1.3; 4.0; 7.5. Basis inferior margin with 8 long SS, 15 sensillate RS and 2 smaller SS, lateral surface with 2 penicillate setae and 8 SS (all in superior half); ischium lateral surface with 11 SS, superior margin with 14 SS; merus inferior margin with 10 SS, distosuperior margin with 1 SS and 1 small plumose seta; carpus lateral surface with 13 SS, distosuperior margin with 1 SS; propodus lateral surface with 6 SS, distosuperior margin with 2 SS and 1 penicillate seta; dactylus superior margin with 4 SS.

Pereopod 7 basis-dactylus length to width ratios: 4.6; 3.7; 1.5; 3.9; 8.5; 7.3. Basis inferior margin with 4 SS, superior margin with 4 SS and 10 sensillate RS; ischium inferior margin with 14 SS, lateral surface with 12 SS, distosuperior margin with 1 SS; merus inferior margin with 15 SS, lateral surface with 3 SS, distosuperior margin with 1 SS; carpus lateral surface with 21 SS; propodus lateral surface with 4 SS, distosuperior margin with 1 penicillate seta and 2 SS; dactylus distosuperior margin with 4 SS.

Operculum length 1.9 times proximal width, medial keel with a row of RS and SS, distally with numerous scattered SS, margins anterolaterally with 18 SS, laterally with numerous plumose setae. Pleopod 3 exopod length 1.2 times endopod length, distally with 9 long plumose setae and 1 SS; endopod length 2.1 times width, with 3 long plumose setae. Pleopod 4 exopod with 5 terminal long plumose setae; endopod length 1.8 times width. Pleopod 5 length 2.4 times width.

Uropod protopod length 2.5 times width, sub-rectangular, margins with cuticular scales, lateral margin with row of plumose setae (although only sockets remaining), distal margin with at least 4 robust plumose setae, mesial margin with 3 plumose setae, surface with 2 SS; exopod rudimentary, with 3 setae; endopod length 0.3 times protopod length, with at least 3 setae.

Description of male. Antenna 1 of 30 articles; article 1 length 1.4 times width, lateral margin with 7 SS, 1 sensillate RS and 2 penicillate setae, distolateral margin with 1 penicillate seta and 1 sensillate RS, distomesial margin with 3 sensillate RS and 1 penicillate seta; article 2 length 1.4 times width, mesial margin with 1 SS, lateral margin with 1 sensillate RS, distal margin with 3 sensillate RS, 1 SS and 1 penicillate seta; article 3 with 4 small SS; article 4 with 2 penicillate setae; articles 7–9 with 1 SS; from article 10 onwards, each article with 1 aesthetasc and several with an additional seta; terminal article with 1 SS and 1 aesthetasc.

Pleopod 1 length 4.2 times proximal width, lateral margins indent 0.6 from proximal end, lateral margins with 16 SS (7 + 9), either side of central margin with 24 SS (8 RS and 4 SS on each side), distally with 27 SS (13 + 14). Pleopod 2 protopod length 3.8 times width, lateral margin with 4 SS (at least), and row of plumose setae, surface with 1 SS, distally with lamellar extension, mesial margin with 3 plumose setae and 3 SS; exopod hooked, length 0.1 times protopod length, with fine SS; stylet length 0.4 times protopod length, not hooking up into proximal half of protopod, terminating to a rounded point; sperm duct length 0.4 times stylet.

Remarks. *Ilyarachna sami* n. sp. belongs to the group of *Ilyarachna* which have robust setae on the cephalon and the anterior margins of pereonites 1–4. This species is distinguished by the combination of: the numerous robust setae on the cephalon; the multiple sensillate robust setae on the anterolateral margin of antenna 1 article 1; the numerous sensillate robust setae on the inferior margin of the basis and carpus on pereopod 1; and the short stylet of the male pleopod 2.

*I. sami* is most similar to *Ilyarachna nordenstami* Wolff, 1962 [16] and *Ilyarachna crozetensis* Kensley, 1980 [30]. *I. sami* can be distinguished from both species by the short stylet of male pleopod 2 which does not hook up into the protopod. *I. sami* can be further distinguished from *I. nordenstami* by antenna 1 lateral margin with a row of simple setae, not robust setae as in *I. nordenstami* and by the sensillate robust setae seen on the inferior margin of the basis and carpus, which is not present in *I. nordenstami*. *I. sami* can be distinguished from *I. crozetensis* by the lack of fine simple setae on the anterior margin of pereonite 5 and the presence of a biramous uropod.

Distribution. *Ilyarachna sami* is known from the Chatham Rise, east of the South Island of New Zealand, from a depth range between 721–859 m.

Etymology. This species is named after my son, Sam.

*Ilyarachna taranui* n. sp.

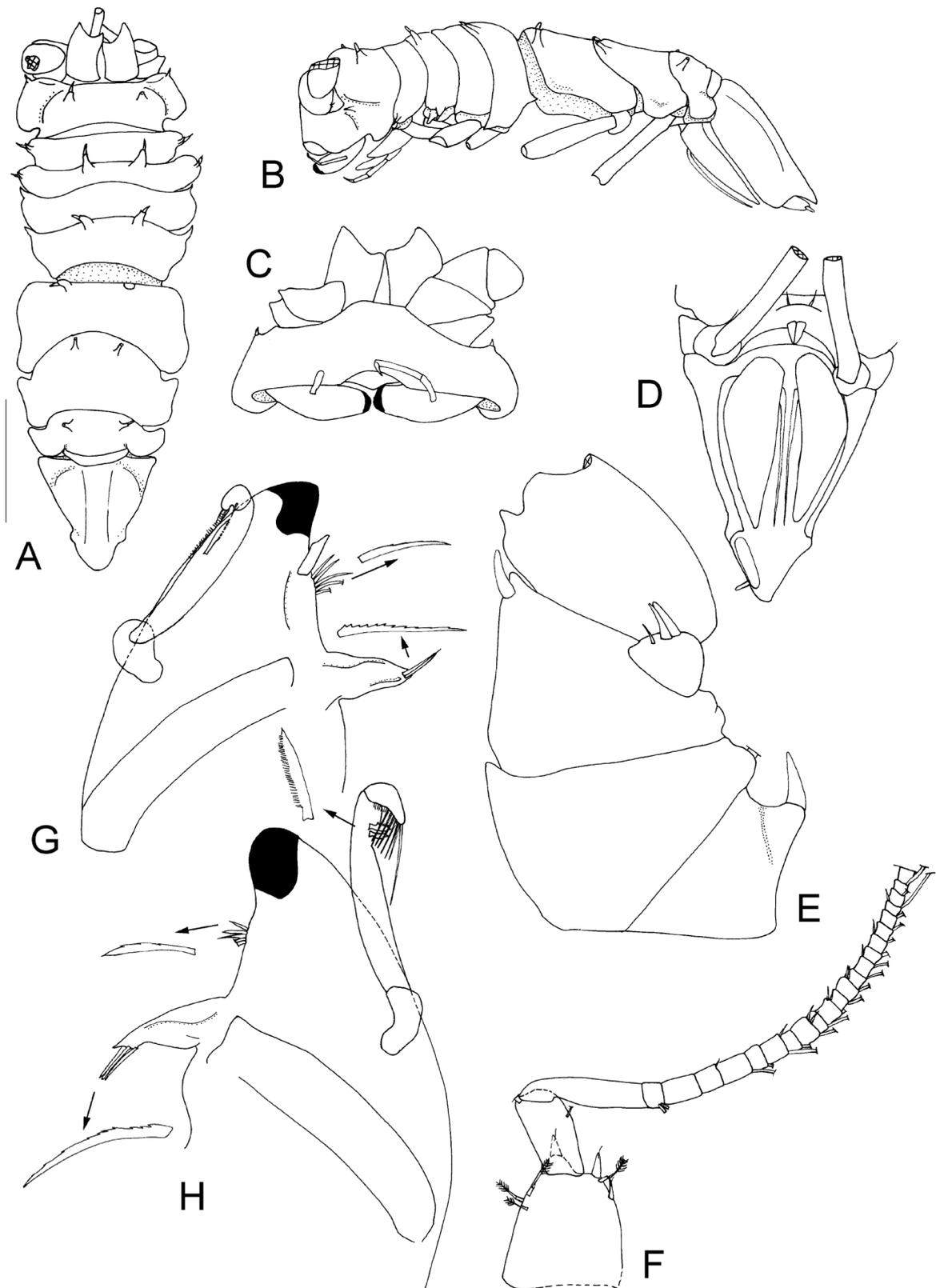
(Figures 19 and 20)

Material examined.—All material from North Island, New Zealand. Holotype. Male (4.0 mm), north-west slope, stn E882, 36°00' S, 172°42' E, Agassiz medium trawl, 22 March 1968, 1217 m, MV *Taranui* (NIWA 23803). Paratypes: 1 male (4.0 mm, dissected), 4 fragments, type locality (NIWA 23804).

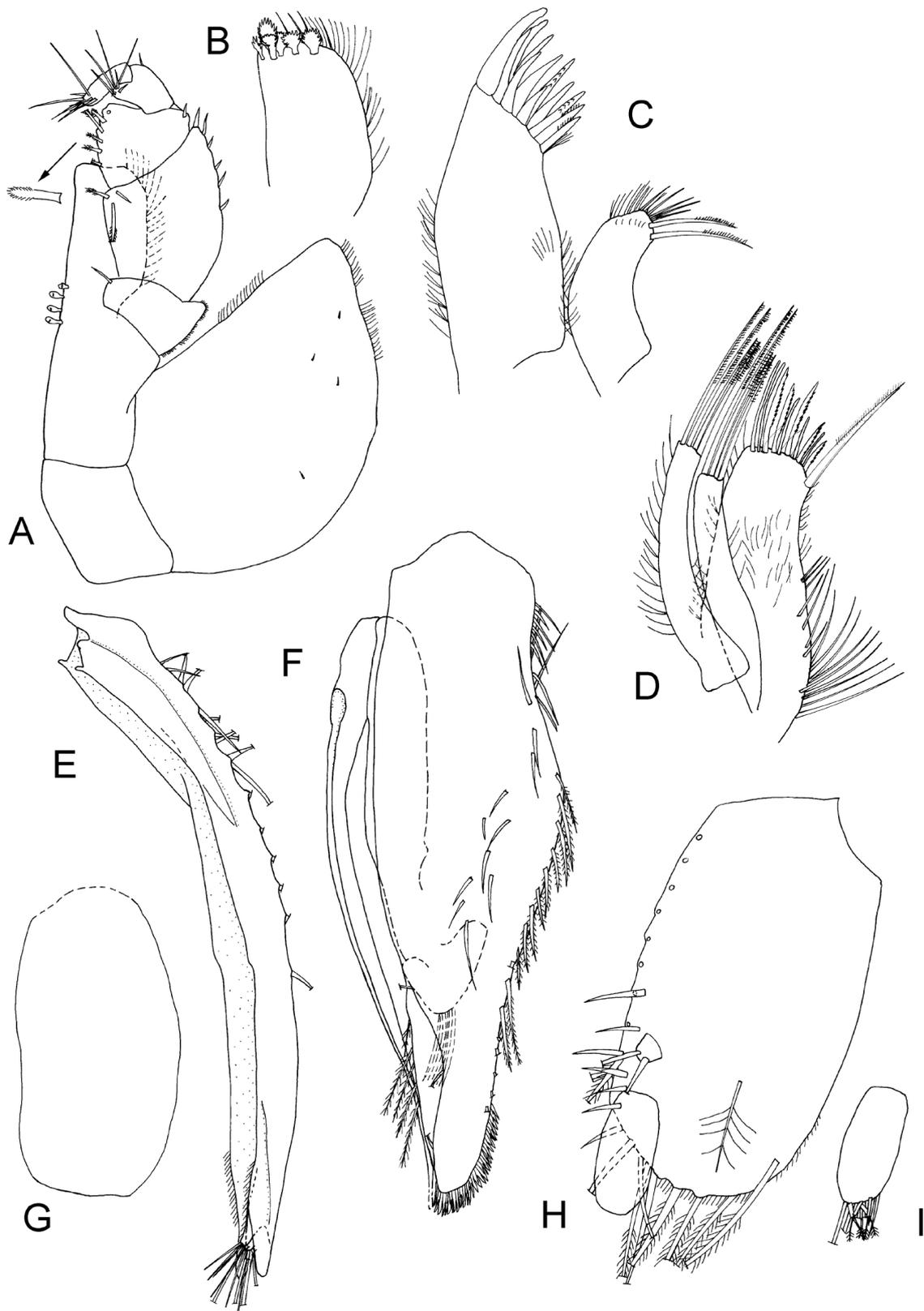
Additional material.—1 male, north-west slope, stn E901, 38°00' S, 173°19' E, Agassiz medium trawl, 25–26 March 1968, 1247–1250 m, MV *Taranui* (NIWA 92070). 1 male, Challenger Plateau, stn P928, 40°46.0' S, 167°54.9' E, epibenthic sled, 18 April 1980, 1029–1028 m, RV *Tangaroa* (NIWA 92071).

Description of male. Body length 3.1 times width of pereonite 2; widest at pereonite 2. Cephalon with 2 dorsal spines and pair of anterolateral spines; posterolateral margins rounded. Pereonites 1 and 3 anterior margins without spines, pereonites 2 and 4 each with pair of spines; pereonites 1–2 with pair of anterolateral spines; pereonite 5 anterior margin with pair of spines, pereonites 6 and 7 with pair of dorsal spines; anterolateral margins of pereonites 1 and 2 round, 3 and 4 with small lobes, 5 square and 6 and 7 with small lobes; pereonite 6 ventrally without ornamentation; pereonite 7 ventrally with medial ridge with pair of long setae. Pleon 1.3 times as long as proximal width, lateral sides indent and posterior end coming to a rounded point.

Antenna 1 damaged; article 1 length 1.1 times width, mesial margin with 3 penicillate setae, lateral margin with 2 sensillate RS and 1 penicillate seta, distal margin with 1 penicillate seta; article 2 length 0.7 times article 1 length, 1.9 times width, lateral margin with 1 SS, distomesial margin with 1 penicillate seta; article 4 lateral margin with 2 penicillate setae; article 6 with 1 SS; from article 7, each article has 1 aesthetasc, many articles with additional setae. Antenna 2 damaged, articles 1–3 more or less triangular; article 1 lateral margin with 1 RS on short distolateral extension; article 2 1.1 times as long as article 1, distolateral margin with 1 RS; article 3 1.4 times as long as article 1, scale with 2 RS and 1 SS, distomesial margin with 1 RS; article 4 1.3 times as long as article 1, with no ornamentation.



**Figure 19.** *Ilyarachna taranui* n. sp. (A–D), male holotype, 4.0 mm (NIWA 23803). (E–H) Male paratype, 4 mm (NIWA 23804). (A) Dorsal view. (B) Lateral view. (C) Cephalon. (D) Ventral view of pleon and pereonite 7. (E) Right antenna 2. (F) Right antenna 1. (G) Left mandible. (H) Right mandible. Scale bar = 1 mm, for dorsal and lateral views only.



**Figure 20.** *Ilyarachna taranui* n. sp. All figures from male paratype, 4.0 mm (NIWA 23804). (A) Left maxilliped. (B) Distal end of left maxilliped endite. (C) Right maxilla 1. (D) Right maxilla 2. (E) Lateral view of pleopod 1. (F) Left pleopod 2. (G) Left pleopod 5. (H) Left uropod. (I) Endopod of left uropod.

Mandible lacinia mobilis reduced with distal point; spine row with 5 spines; molar small, distally with 2 uni-serrate setae (on left mandible, 3 on right mandible); mandibular palp extending beyond incisor, article 2 with 1 pectinate seta (on left mandibular palp, right mandibular palp with 2 pectinate setae and cuticular scales, article 3 with cuticular scales and 7 setae (on right mandible, unable to tell what type; setae present on article 3 on left mandible, but unable to determine number). *Maxilla 1* with fine SS; lateral lobe width 1.9 times mesial lobe width, with 8 RS, 2 dentate RS and 2 pectinate RS, mesial lobe distally with 5 SS and 2 long pectinate setae. *Maxilla 2* with fine SS, lateral distally with 4 long pectinate setae; middle lobe 1.0 times as wide as lateral lobe, distally with 4 long pectinate setae; mesial lobe 2.8 times as wide as lateral lobe with 16 long SS, distally with 5 blunt SS, 5 toothed setae and 1 long pectinate seta. *Maxilliped* basis elongate, length 2.8 times width (including endite); endite with 4 coupling hooks, distally with 3 SS, 6 fan setae and many fine SS; palp article 1 length 0.4 times basal endite, cuticular scales present, distomesial margin with 1 SS; article 2 length 2.6 times and width 1.2 times article 1, 1.1 times as wide as basal endite, lateral margin with 6 RS, mesial margin with 2 distally pappose setae and 1 SS; article 3 length 1.3 times and width 1.0 times as article 1, lateral margin with 1 RS, mesial margin with at least 5 distally pappose setae; article 4 length 0.8 times and width 0.5 times article 1, lateral margin with 1 SS, distomesial margin with 7 SS; article 5 narrow, length 0.8 times and width 0.2 times article 1, with 7 terminal SS; epipod length 1.3 times width, length 1.0 times basis, margins with cuticular scales and surface with 4 scattered SS.

Pleopod 1 length 10.2 times proximal height, lateral margins indent 0.4 from proximal end, ventral surface with 17 RS, distally with 13 SS (7 + 6). Pleopod 2 protopod length 3.5 times width, lateral margin with 10 SS (proximal end) and row of plumose setae, surface with 11 scattered SS, distally with lamellar extension, mesial margin with 5 plumose setae (not as setose as ones on lateral margin) and 3 SS; exopod hooked, 0.2 times as long as protopod with fine SS; stylet length 1.3 times protopod, hooked up into proximal half of protopod; sperm duct length 0.6 times stylet. Pleopod 5 length 1.9 times width.

Uropod protopod length 1.8 times width, oval, distal end rounded, margins with cuticular scales, lateral margin with 1 plumose seta, 10 SS and 8 sockets (possibly where plumose setae were), distal margin with 6 plumose setae, surface with 1 plumose seta; exopod small, length 0.1 times protopod, 0.2 times as long as endopod, with 2 SS; endopod length 0.3 times protopod length, with 6 SS and 5 penicillate setae.

Females are not known for this species.

Remarks. *Ilyarachna taranui* n. sp. is identified by the combination of dorsal spines only present on pereonites 2, 4, 5–7 and absent on pereonites 1 and 3; and the pair of dorsal spines on the cephalon. Such a pattern is unique and not known from any other species in this genus.

Distribution. *I. taranui* n. sp. is known from west of the North Island of New Zealand, from the north-west slope to the Challenger Plateau, between 1028–1250 metres.

Etymology. *I. taranui* is named after the ship, the MV *Taranui* which collected the type material; noun in apposition.

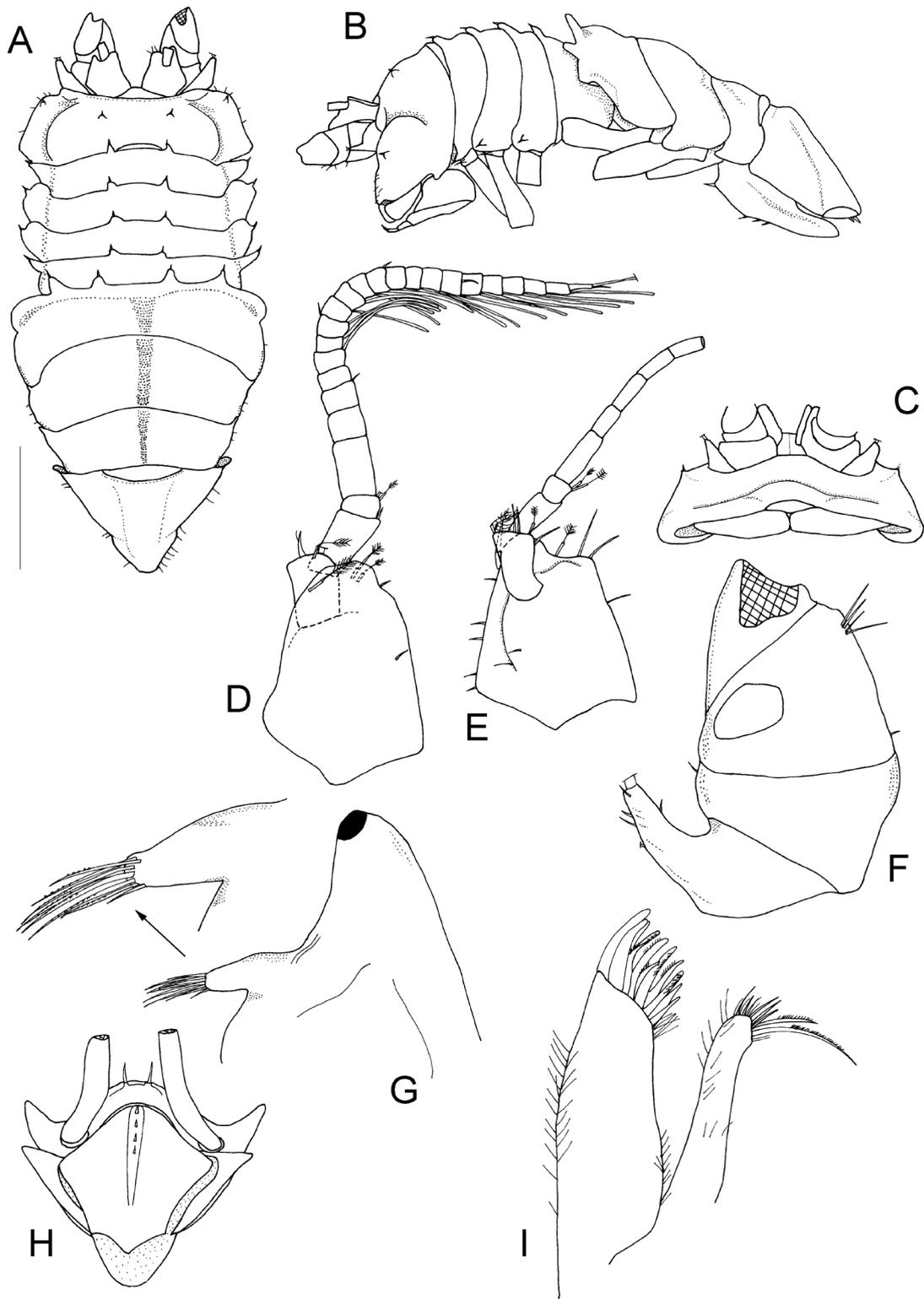
*Notopais* Hodgson, 1910 [7]

Hodgson, 1910: 69 [7].—Merrin, 2004: 3–4 [10].—Merrin and Bruce: 2006, 2 [31].

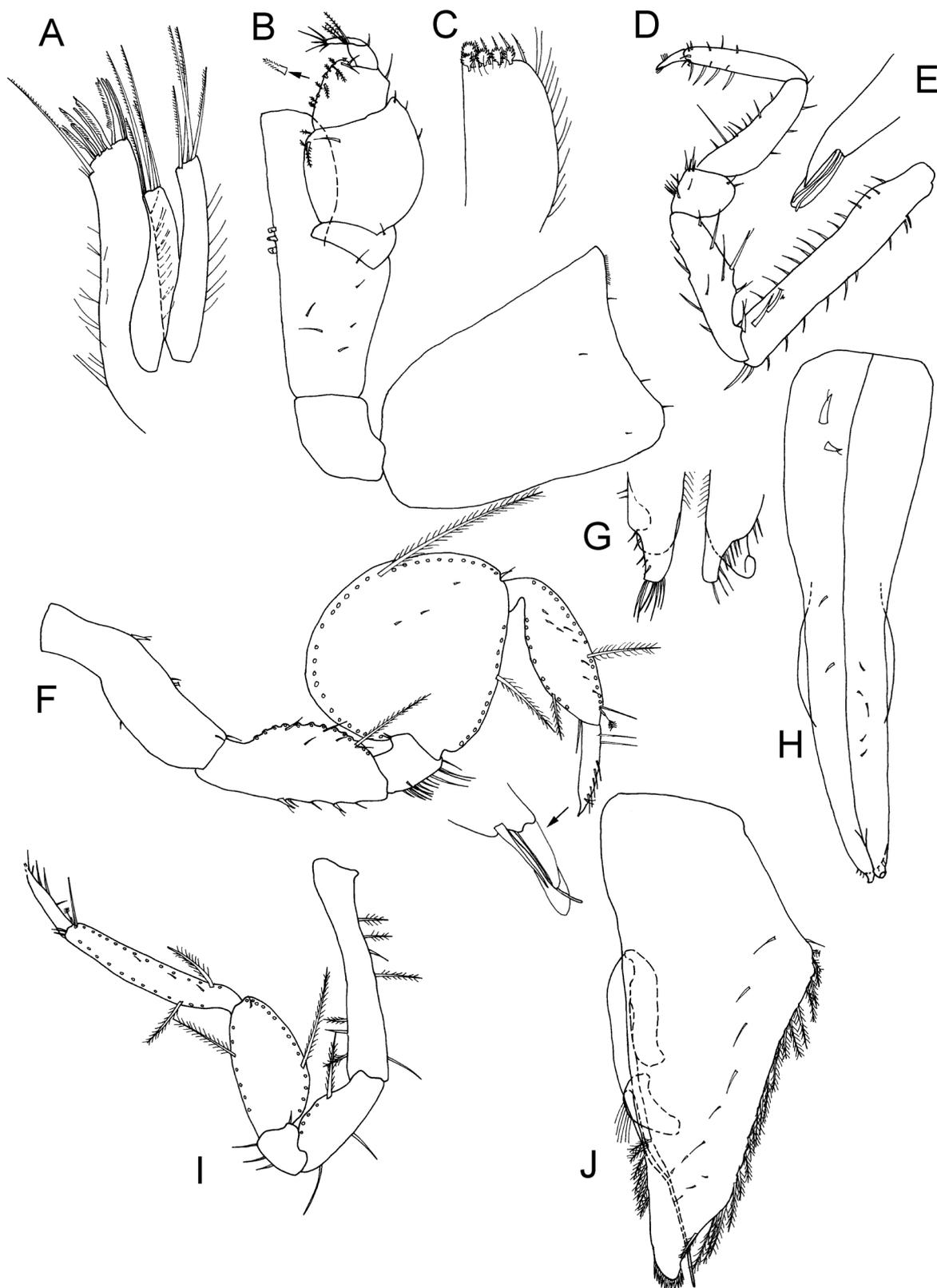
Diagnosis. See [10]

*Notopais chathamensis* sp. n.

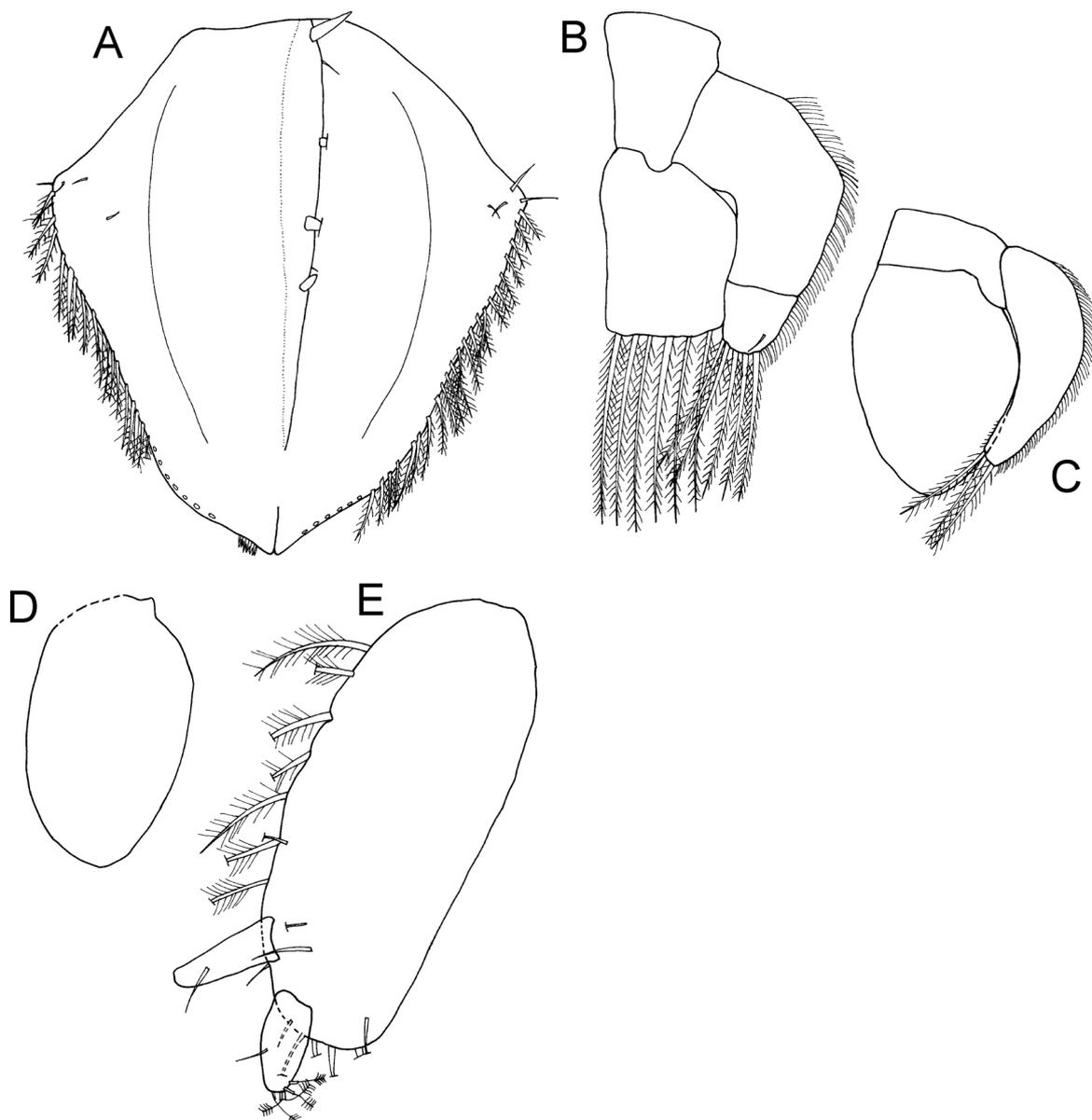
(Figures 21–23)



**Figure 21.** *Notopais chathamensis* sp. n. (A–C,H), female holotype, 4.0 mm (NIWA 23807). (D) Male paratype, 3.5 mm (NIWA 23809). (E–G,I) Female paratype, 3.0 mm (NIWA 23808). (A) Dorsal view. (B) Lateral view. (C) Cephalon. (D) Right antenna 1. (E) Left antenna 1. (F) Left antenna 2. (G) Left mandible. (H) Ventral view of pleon and pereonite 7. (I) Left maxilla 1. Scale bar = 1 mm, for dorsal and lateral views only.



**Figure 22.** *Notopais chathamensis* sp. n. (A–F,I), female paratype, 3.0 mm (NIWA 23808). (G,H,J) Male paratype 3.5 mm (NIWA 23809). (A) Left maxilla 1. (B) Left maxilliped. (C) Distal part of left maxilliped endite. (D) Right pereopod 1. (E) Unguis of right pereopod 1. (F) Left pereopod 5. (G) Distal ends (illustrated separately) of pleopod 1. (H) Pleopod 1. (I) Right pereopod 7. (J) Left pleopod 2.



**Figure 23.** *Notopais chathamensis* sp. n. All figures from female paratype, 3.0 mm (NIWA 23808). (A) Operculum. (B) Left pleopod 3. (C) Left pleopod 4. (D) Light pleopod 5. (E) Left uropod.

**Material examined.** All material from east of the South Island, New Zealand. Holotype. Female (4.0 mm), Chatham Rise, stn S147, 44°30.1' S, 174°18.8' E, Agassiz medium trawl with fine mesh inside, 25 October 1979, 760 m, RV *Tangaroa* (NIWA 23807). Paratypes: 9 females, 4 males (1 female, dissected, 3.0 mm), type locality (NIWA 23808). 4 males, 3 females (1 male dissected, 3.5 mm), Chatham Rise, stn S148, 44°41.0' S, 174°20.9' E, Agassiz medium trawl with fine mesh inside, 25 September 1979, 859 m, RV *Tangaroa* (NIWA 23809).

**Additional material.** 1 male, Bounty Trough, stn E417, 45°12' S, 171°49' E, Hurley isopod trawl, 13 October 1965, 860 m, MV *Taranui* (NIWA 97260). 1 female, Hikurangi Trough, stn F761, 42°33.2' S, 176°23.5' E, Agassiz medium trawl, 20 August 1966, 1234–1205 m, MV *Taranui* (NIWA 97261). 2 females, 1 male, Chatham Rise, stn S131, 43°35.6' S, 175°57.8' E, Menzies trawl, 21 September 1979, 355 m RV *Tangaroa* (NIWA 97262). 7 females, 7 fragments, Chatham Rise, stn F755, 43°00' S, 174°30' E, Menzies trawl, 19 August 1966, 721 m, MV *Taranui* (NIWA 97263). 1 male, Chatham Rise, stn S132, 43°37.9' S, 175°58.0' E, Menzies

trawl, 21 September 1979, 322 m RV *Tangaroa* (NIWA 97264). 1 male, Chatham Rise, stn S130, 43°34.0' S, 175°57.7' E, Menzies trawl, 21 September 1979, 335 m RV *Tangaroa* (NIWA 97265). 2 males, 1 female, Chatham Rise, stn F753, 44°45' S, 174°30' E, Menzies trawl, 18 August 1966, 854–788 m, MV *Taranui* (NIWA 97266).

Description of female. Body length 1.9 times pereonite 2 width. Cephalon with pair of dorsal and pair of anterolateral spines. Pereonites 1–4 anterior margins each with a pair of spines and pair of anterolateral spines; pereonite 5 anterior margin with 4 well-developed spines; ventrally pereonite 6 without ornamentation; pereonite 7 with two small spines. Pleon length 0.8 times proximal width.

Antenna 1 damaged; article 1 length 1.2 times width, mesial margin with 1 SS, surface with 2 SS, lateral margin with 1 penicillate seta and 5 SS, distal margin with 2 SS and 1 penicillate seta; article 2 length 0.4 times article 1 length, distally with 3 penicillate setae and 3 SS; article 4 with 2 penicillate setae. Antenna 2 damaged; article 1 with 5 SS; article 2 length 0.8 times article 1 length, distolateral margin with 1 SS; article 3 length 1.1 times article 1 length, mesial margin with 5 SS; article 4 length equal to article 1 length, with no ornamentation.

Mandible molar terminated with 1 SS and 7 serrate setae. Maxilla 1 with fine SS; lateral lobe width 2.1 times mesial lobe width, distal margin with 5 RS, 3 dentate RS and 4 pectinate RS, mesial lobe distally with 2 long pectinate setae. Maxilla 2 with fine SS, lateral lobe distally with 4 long pectinate setae; middle lobe width 1.2 times lateral lobe width, distally with 4 long pectinate setae; mesial lobe width 1.8 times lateral lobe width, distally with 4 SS, 4 toothed setae and 1 long pectinate seta. Maxilliped basis length 2.6 times width, with 6 SS; endite with 3 coupling hooks, distally with 5 toothed setae, 5 fan setae and few fine SS; palp article 1 rectangular, with 1 SS; article 2 length 2.8 times article 1, lateral margin with 3 SS, surface with 1 SS, mesial margin with 3 distally pappose setae; article 3 length 1.4 times article 1, lateral margin with 1 SS, surface with 1 SS, mesial margin with 3 SS and 9 distally pappose setae; article 4 length 0.6 times article 1, lateral margin with 1 SS, mesial margin with 3 distally pappose setae; article 5 narrow, length 0.8 times article 1, with 5 terminal SS; epipod length 1.4 times width, margins with cuticular scales and 5 SS.

Pereopod 1 basis-dactylus length to width ratios: 5.4; 3.8; 0.8; 3.6; 5.6; 2.6. Basis inferior margin with 11 SS, lateral surface with 3 sensillate RS, superior margin with 13 SS; ischium inferior margin with at least 4 SS, lateral surface with 2 SS, superior margin with 2 sensillate RS and 2 SS; merus inferior margin with 10 SS, lateral surface with 2 SS, distosuperior margin with 2 SS; carpus inferior margin with 9 SS, superior margin with 4 SS; propodus inferior margin with 6 SS, lateral surface with 3 SS, superior margin with 5 SS; dactylus distosuperior margin with 4 small SS.

Pereopod 5 basis-dactylus length to width ratios: 3.2; 2.5; 1.0; 1.1; 2.7; 4.3. Basis inferior margin with 1 SS, lateral surface with 1 SS, superior margin with 1 sensillate RS and 3 SS; ischium inferior margin with 2 sensillate RS and 3 SS, lateral surface with 5 SS; merus inferior margin with 12 SS, lateral surface with 1 SS, distosuperior margin with 2 SS; carpus lateral surface with 3 small SS, distosuperior margin with 1 sensillate RS; propodus distoinferior margin with 1 SS, lateral surface with 8 scattered SS, distosuperior margin with 1 SS and 1 penicillate seta; dactylus superior margin with 9 SS.

Pereopod 7 basis-dactylus length to width ratios: 5.3; 2.3; 1.3; 1.9; 6.5; 3.7. Basis inferior margin with 3 plumose setae and 2 SS, superior margin with 2 plumose setae and 1 SS; ischium inferior margin with 2 SS; merus inferior margin with 3 SS, distosuperior margin with 1 SS; carpus distolateral surface with 1 SS; propodus distoinferior margin with 2 SS, lateral surface with 3 SS, distosuperior margin with 1 penicillate seta and 1 SS; dactylus superior margin with 5 SS.

Operculum length 3 times proximal width, medial keel with a row of RS and SS, margins anterolaterally with SS, laterally with numerous plumose setae. Pleopod 3 exopod distally with 5 long plumose setae and 1 SS; endopod 1.4 times width, with 6 long plumose setae. Pleopod 4 exopod distally with 3 long plumose setae; endopod oval, 1.4 times width. Pleopod 5 1.7 times width.

Uropod protopod length 2.4 times width, lateral margin with 7 plumose setae, distal margin with 6 SS, surface with 4 SS; exopod length 0.2 times protopod, with 1 SS; endopod length 0.2 times protopod length, with 5 distal penicillate setae and 1 SS.

Description of male. Antenna 1 of 25 articles; article 1 length 1.4 times width, surface with 1 SS, distal margin with 3 penicillate setae and 1 SS; article 2 length 1.4 times width, distal margin with 2 sensillate RS and 1 penicillate seta; article 3 with 1 SS; article 4 with 2 penicillate setae; article 7 with 1 SS; from article 9 onwards, each article has 1 aesthetasc, many articles with additional SS; terminal article with 1 SS and 1 aesthetasc.

Pleopod 1 length 4 times proximal width, surface with 2 sensillate RS and 7 SS, distally with many SS. Pleopod 2 protopod length 2.5 times width, lateral margin with 1 SS and row of plumose setae, surface with 11 SS, distally with lamellar extension, mesial margin with 7 plumose setae; exopod hooked, 0.1 times as long as protopod, with fine SS; stylet length 0.9 times protopod length, not hooked up into proximal part of protopod, terminating to a point; sperm duct length 0.8 times stylet length.

Remarks. *Notopais chathamensis* sp. n. is distinguished by the combination of two spines on the anterior margins of pereonites 1–4, with four spines on the anterior margin of pereonite 5; and the more oblong shape of the epipod of the maxilliped.

The pattern of spines along the pereonites seen in *N. chathamensis* is unique as the other species with marginal spines all have at least four spines on each. *N. chathamensis* is somewhat similar to *Notopais quadrispinosa* (Beddard, 1886) [32], but it can be distinguished from this species by the unique spination pattern on pereonites 1–4 and the spines on pereonite 4 in *N. quadrispinosa* are not marginal, while these are in *N. chathamensis*.

Distribution. On and adjacent to the Chatham Rise, east of the South Island, New Zealand, from the Hikurangi Trough at latitude 42° South to the Bounty Trough, between 322–860 metres.

Etymology. Named for the type locality, the Chatham Rise, east of the South Island of New Zealand.

*Notopais likros* sp. n.

(Figures 24–27)

*Ilyarachna* sp. Monod, 1973: 287–291, Figures 1–22 [33].

Material examined. All material from eastern Australia. Holotype. Female (4.2 mm), Providential Head, NSW, stn 4-288, 34°08.00' S, 151°08.50' E, 3 January 1991, 65–70 m (AM P62646). Paratypes. 1 female (3.8 mm), type locality (AM P75566). 1 male (2.0 mm), Cape Banks, NSW, stn T4-371, 34°00.00' S, 151°16.00' E, 3 January 1991, 65–70 m (AM P62639). 1 female (4.0 mm), Bass Point, NSW, stn BP4-247, 34°36.00' S, 150°54.00' E, 3 January 1991, 65–70 m (AM P62634).

Additional material. 1 female and 4 slides, off Brisbane, Queensland, Australia, stn 25, Cr.1/68, 27° S, 153° 36' E, 28 July 1968, 136 m FV *Nimbus*, sediment fine gravel, substrate: fine gravel (AM P20196; Monod's material). 2 males and 4 females, east of Port Jackson, NSW, stn K80-20-11, 33°52' S, 151°23' E, 11 December 1980, 80 m (AM P32678). 6 females, 2 fragments, south-east of Broken Bay, NSW, stn K86-01-02, 33°36'–37' S, 151°30'–29' E 10 February 1986, 71–75 m, FRV *Kapala* (AM P38888). 13 females, 4 males and 6 fragments, east of Port Jackson, NSW, stn K80-20-11, 33°52' S, 151° 23' E, 11 December 1980, 80 m, FRV *Kapala* (AM P38890). 1 female, Bass Strait, stn SS05/94/59, 38°56.50' S, 148°19.30' E, 27 August 1994, 80–85 m, RV *Southern Surveyor* (AM P62621). 1 male, south-east of Bermagui, NSW, SS05/94/156, 36°23.30' S, 150°10.60' E, 5 September 1994, 76–79 m, RV *Southern Surveyor* (AM P62623). 1 female, south-east of Bermagui, NSW, SS05/94/155, 36°26.00' S, 150°14.10' E, 5 September 1994, 119–122 m RV *Southern Surveyor* (AM P62624). 1 female and 1 male, Bass Point, NSW, stn BP43, 34°36.00' S, 150°54.00' E, 25 June 1990, 45–50 m (AM P62625). 1 female, Bass Point, NSW, stn BP55, 34°36.00' S, 150°54.00' E, 25 June 1990, 65–70 m (AM P62626). 1 female, Bass Point, NSW, stn BP56, 34°36.00' S, 150°54.00' E, 25 June 1990, 65–70 m (AM P62627). 1 female, Bass Point, NSW, stn BP3-29,

34°36.00' S, 150°54.00' E, 29 October 1990, 45–50 m (AM P62629) 1 male, Bass Point, NSW, stn BP3-36, 34°36.00' S, 150°54.00' E, 29 October 1990, 45–50 m (AM P62630). 1 male, Bass Point, NSW, stn BP3-46, 34°36.00' S, 150°54.00' E, 29 October 1990, 65–70 m (AM P62632). 1 female, Bass Point, NSW, stn BP4-226, 34°36.00' S, 150°54.00' E, 3 January 1991, 45–50 m (AM P62633). 2 males, south-east of Bate Bay, NSW, stn C80, 34°05.90' S, 151°12.00' E, 25 June 1990, 65–70 m (AM P62635). 2 males, south-east of Bate Bay, NSW, stn C84, 34°06.80' S, 151°11.00' E, 25 June 1990, 65–70 m (AM P62636). 1 male, south-east of Bate Bay, NSW, stn T4-339, 34°05.90' S, 151°12.00' E, 3 January 1991, 65–70 m (AM P62637). 1 male, Cape Banks, NSW, stn T4-366, 34°00.00' S, 151°16.00' E, 3 January 1991, 65–70 m (AM P62638). 1 male, Cape Banks, NSW, stn T4-373, 34°00.00' S, 151°16.00' E, 3 January 1991, 65–70 m (AM P62640). 1 male, Providential Head, NSW, stn Mar-73, 34°08.00' S, 151°08.50' E, 29 October 1990, 45–50 m (AM P62641). 1 female, Providential Head, NSW, stn Mar-86, 34°08.00' S, 151°08.50' E, 29 October 1990, 65–70 m (AM P62642). 1 female, Providential Head, NSW, stn Mar-88, 34°08.00' S, 151°08.50' E, 29 October 1990, 65–70 m (AM P62643). 1 male, Providential Head, NSW, stn Mar-94, 34°08.00' S, 151°08.50' E, 29 October 1990, 65–70 m (AM P62644). 1 male, Providential Head, NSW, stn Mar-95, 34°08.00' S, 151°08.50' E, 29 October 1990, 65–70 m (AM P62645). 1 male, 3 females, Providential Head, NSW, stn 4-291, 34°08.00' S, 151°08.50' E, 3 January 1991, 65–70 m (AM P62647). 2 males, Providential Head, NSW, stn W63, 34°08.00' S, 151°08.50' E, 25 June 1990, 65–70 m (AM P62649). 1 male, Providential Head, NSW, stn W65, 34°08.00' S, 151°08.50' E, 25 June 1990, 65–70 m (AM P62650). 1 female, Providential Head, NSW, stn W66, 34°08.00' S, 151°08.50' E, 25 June 1990, 65–70 m (AM P62651). 1 male, east of Long Reef, NSW, stn K85-21-08, 33°43'–44' S, 151°46' E, 20 December 1985, 174 m FRV *Kapala* (AM P62655).

Description of female. Body length 2.7 pereonite 2 width, cuticle setose. Cephalon with 6 pairs of dorsal spines; laterally with 3 pairs of spines. Pereonites 1 and 2 with 6 marginal spines and 1 pair of lateral spines; pereonite 2 with additional pair of sub-lateral spines; pereonites 3 anterior margin with 8 spines, 2 pairs of lateral spines and 1 pair of sub-lateral spines; pereonite 4 anterior margin with 8 spines, 2 pairs of lateral spines and 4 dorsal spines; pereonites 5 and 6 dorsally with very long setae; ventrally pereonite 6 without ornamentation, pereonite 7 with medial ridge with many setae. Pleon length 0.9 times proximal width, with scattered SS.

Antenna 1 of 13 articles; article 1 length 1.1 times width, mesial margin with 3 SS, surface with 4 penicillate setae and 2 SS, lateral margin with 3 SS and 4 sensillate RS, distal margin with 3 sensillate RS and 2 penicillate setae; article 2 length 0.4 times article 1 length, distally with 4 sensillate RS and 3 penicillate setae; article 3 with 1 SS; article 4 with 2 penicillate setae; article 5 with 1 SS; from article 6, each article has 1 aesthetasc, many articles with an additional SS; terminal article with 1 SS and 1 penicillate seta. Antenna 2 damaged; article 1 with 2 sensillate RS and 2 SS; article 2 length 0.7 times article 1 length, with 2 SS; article 3 length 0.8 times article 1 length, with 1 SS and 5 sensillate RS, scale with 2 sensillate RS and 1 SS; article 4 length 0.7 times article 1 length, with no ornamentation; article 5 length 4.6 times article 1 length, mesial margin with 16 sensillate RS, surface with 3 sensillate RS, lateral margin with 11 sensillate RS; article 6 length 9.0 times article 1 length, mesial margin with 1 penicillate seta and 21 sensillate RS, lateral margin with 1 penicillate seta and 20 sensillate RS; flagellum of 41 articles (at least), proximally many articles with sensillate RS, more distally articles with SS.

Mandible molar terminated with 4 SS (on left mandible, 3 on right) and 3 serrate setae. Maxilla 1 with fine SS; lateral lobe width 2.0 times mesial lobe width, distal margin with 3 RS, 1 dentate RS, 2 pectinate dentate RS and 6 pectinate RS, mesial lobe terminated with 8 SS, and 2 long pectinate setae. Maxilla 2 with fine SS, distally with 4 long pectinate setae; middle lobe width equals lateral lobe width, distally with 4 long pectinate setae; mesial lobe width 2.2 times lateral lobe width, distally with 7 blunt SS, 3 toothed setae and 1 long pectinate seta. Maxilliped coxa with 2 SS; basis length 3.0 times width; endite with 4 coupling hooks, 10 toothed setae, 7 fan setae and many fine SS; palp article 1 rectangular, distolateral margin with 1 SS; article 2 length 6.7 times article 1 length lateral margin with

8 SS, surface with 2 distally pappose, mesial margin with 3 distally pappose setae; article 3 length 3.5 times article 1 length, lateral margin with 2 SS, mesial margin with 4 SS and 19 distally pappose setae; article 4 length 2.0 times article 1 length, lateral margin with 2 SS, distal margin with 7 SS; article 5 length 2.0 times article 1 length, with 4 terminal SS; epipod length 1.7 times width, margins with cuticular scales and 3 SS.

Pereopod 1 basis-dactylus length to width ratios: 6.2; 5.4; 1.3; 5.2; 7.3; 2.7. Basis distoinferior margin with 1 SS, lateral surface with 11 long SS, superior margin with 11 evenly spaced SS; ischium inferior margin with 5 long SS, lateral surface with 9 SS, superior margin with 4 long SS; merus inferior margin with 11 SS, distosuperior margin with 3 SS; carpus inferior margin with 5 SS, superior margin with 4 SS; propodus inferior margin with 10 SS, lateral surface with 1 SS, superior margin with 5 SS; dactylus superior margin with 1 SS.

Pereopod 2 basis-dactylus length to width ratios: 3.3; 3.6; 1.8; 6.9; 10.0; 11.5. Basis inferior margin with 12 long SS, lateral surface with 7 SS, superior margin with 2 SS and 3 sensillate RS; ischium inferior margin with 24 sensillate RS and 1 SS, lateral surface with 10 SS, superior margin with 12 sensillate RS and 5 SS; merus inferior margin with 11 sensillate RS, lateral surface with 4 SS and 2 sensillate RS, superior margin with 4 sensillate RS and 1 SS; carpus inferior margin with 14 sensillate RS, lateral surface with 5 sensillate RS and 2 SS, superior margin with 1 penicillate seta, 2 SS and 16 sensillate RS; propodus inferior margin with 9 sensillate RS, distoinferior corner with a clump of 3 SS, lateral surface with 8 SS, superior margin with 11 SS, 1 penicillate seta and 1 sensillate RS; dactylus with 23 SS.

Pereopod 5 basis-dactylus length to width ratios: 3.3; 2.6; 1.0; 1.2; 3.5; 5.3. Basis inferior margin with 13 sensillate RS and 6 penicillate setae, lateral surface with 31 scattered SS, and 3 sensillate RS; ischium inferior margin with 14 SS, lateral surface with 16 scattered SS; merus inferior margin with 15 SS, distosuperior margin with 1 SS; carpus lateral surface with 8 small scattered SS, distosuperior margin with 1 sensillate RS; propodus distoinferior margin with 1 SS, lateral surface with 8 scattered SS, distosuperior margin with 2 SS, 1 penicillate seta and 1 long SS; dactylus with 20 fine SS.

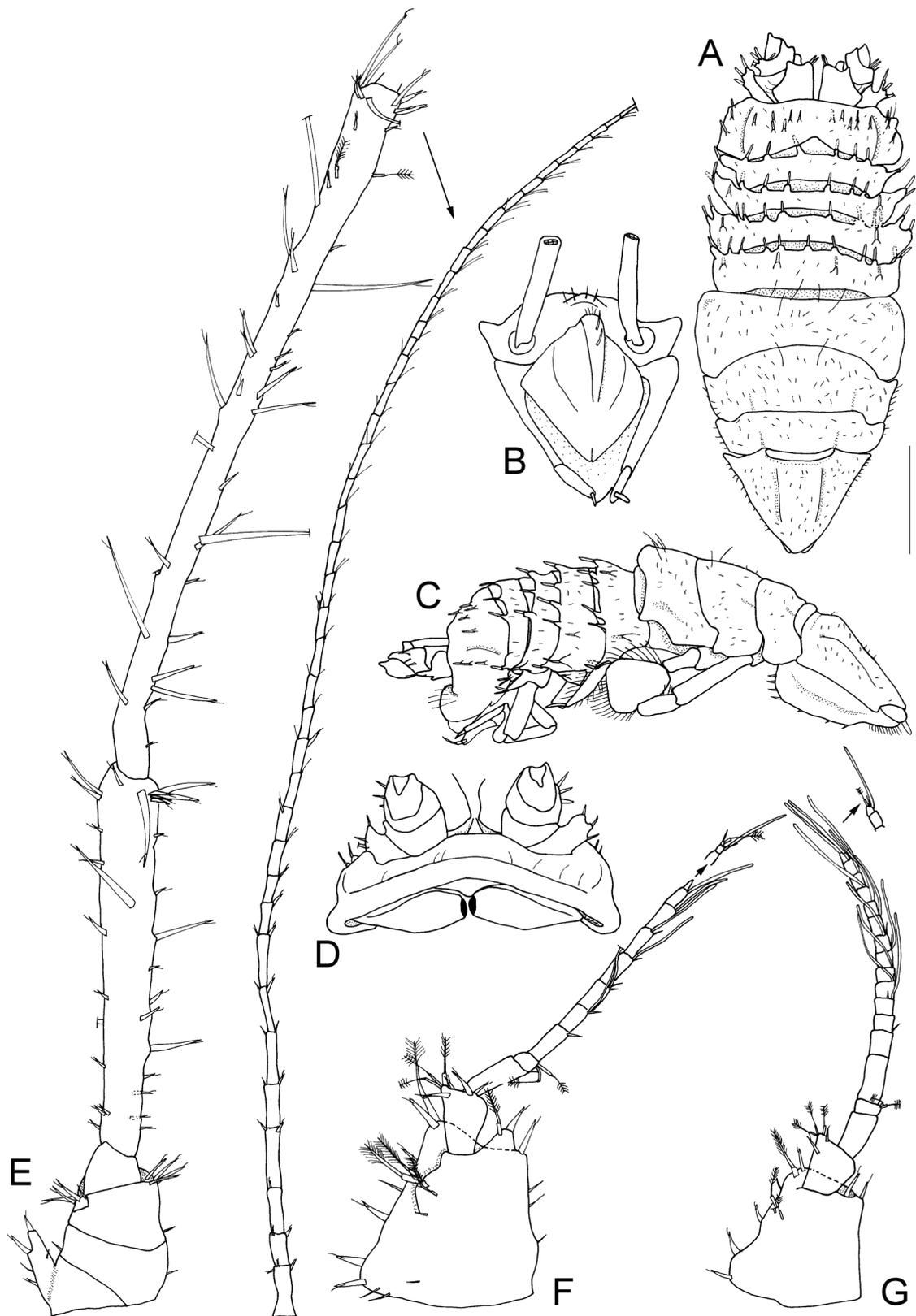
Pereopod 6 basis-dactylus length to width ratios: 4.2; 2.8; 1.0; 1.2; 4.3; 6.5. Basis inferior margin with 5 SS and 11 sensillate RS, lateral surface with 6 plumose setae and 1 sensillate RS, superior margin with 3 SS; ischium inferior margin with 19 SS, surface with 7 SS; merus inferior margin with 17 SS, distosuperior margin with 1 SS; carpus lateral surface with 9 scattered SS, distosuperior margin with 1 sensillate RS; propodus inferior margin with 2 SS, superior margin with 2 SS, 1 penicillate seta and 3 sub-marginal SS; dactylus with 22 scattered fine SS.

Pereopod 7 basis-dactylus length to width ratios: 4.4; 2.9; 1.0; 2.7; 7.9; 6.3. Basis inferior margin with 7 sensillate RS, 7 SS and 6 plumose setae, superior margin with 3 SS; ischium inferior margin with 15 SS, superior margin with 4 SS; merus inferior margin with 14 SS, distosuperior margin with 2 SS; carpus lateral surface with 20 SS, distosuperior margin with 1 sensillate RS; propodus distoinferior margin with 1 SS, lateral surface with 7 SS, distosuperior margin with 1 penicillate seta and 2 SS; dactylus with 33 fine SS.

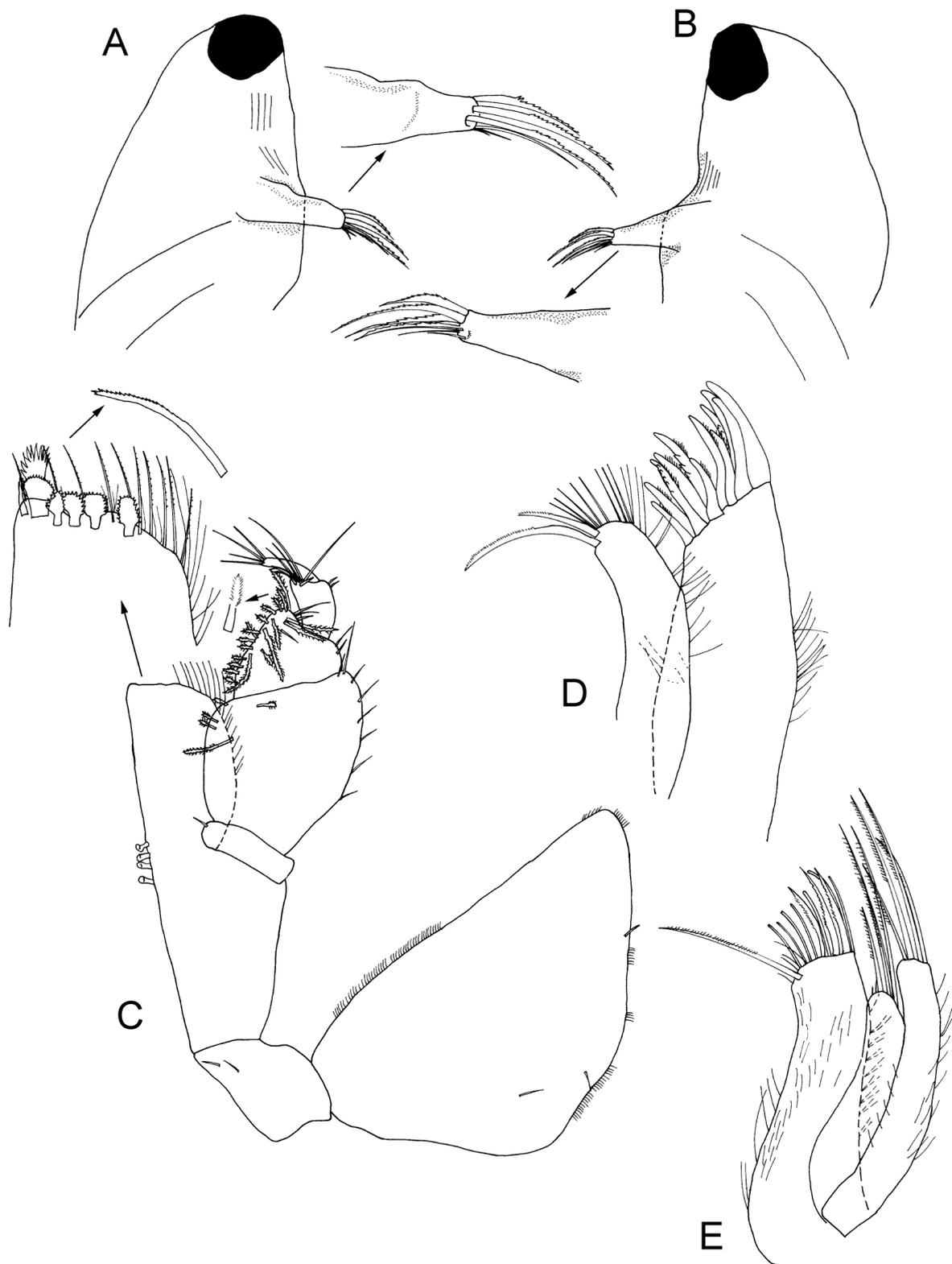
Operculum length 1.7 times proximal width, medial keel with a row of RS and SS, surface with scattered SS, anterolateral margins with some SS, laterally with numerous plumose setae. Pleopod 3 exopod distally with 5 long plumose setae and 1 SS; endopod length 2.0 times width, with 6 long plumose setae. Pleopod 4 exopod distally with 4 long plumose setae; endopod oval, 1.8 times width. Pleopod 5 1.9 times width.

Uropod protopod length 2.2 times width, lateral margin with 11 SS and 19 long plumose setae, distal margin with 3 long RS and 4 long plumose setae, surface with 20 SS; exopod length 0.1 times protopod length, with 4 SS; endopod length 0.3 times protopod length, with 5 penicillate setae and 5 SS.

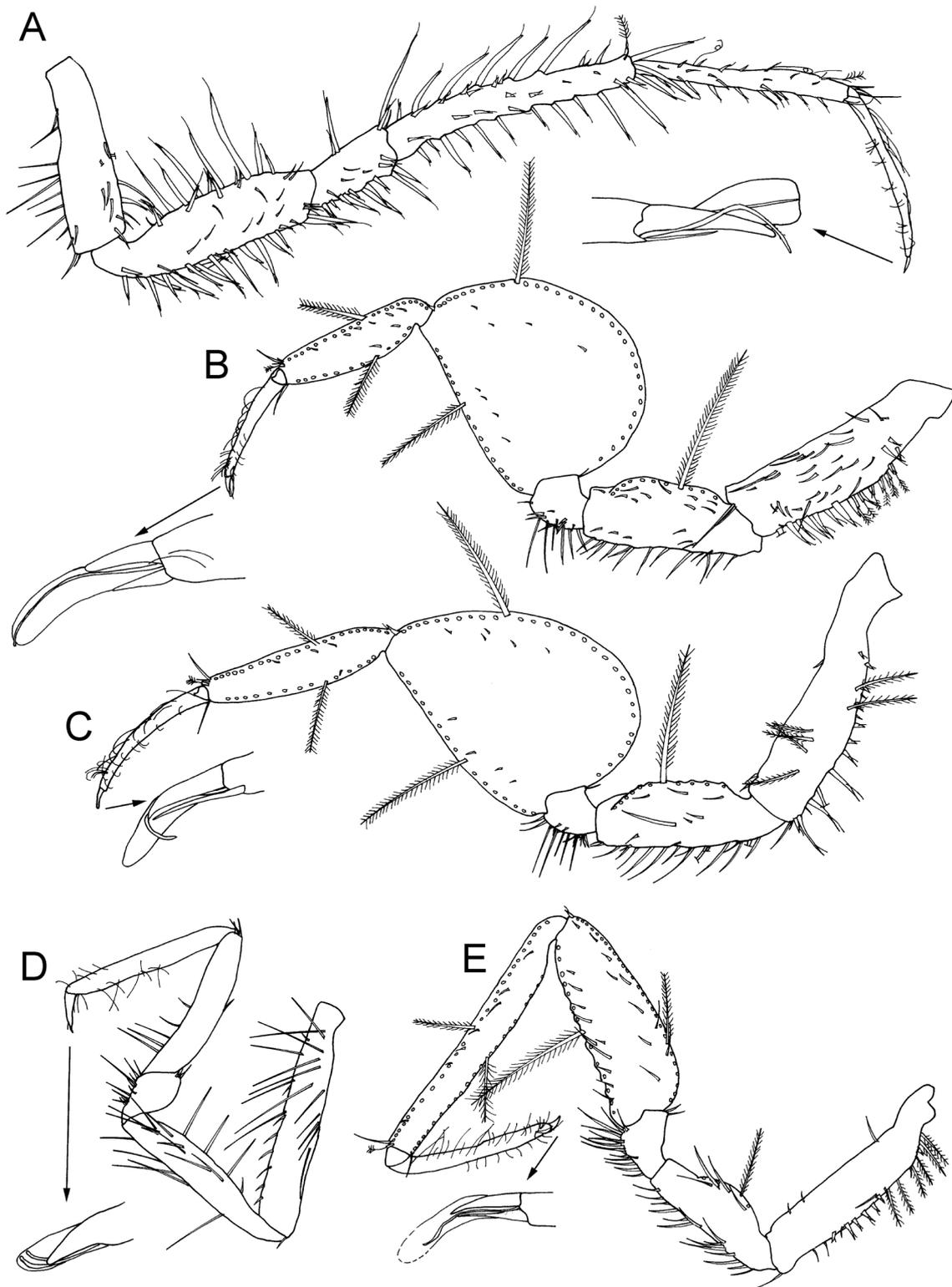
Male. Antenna 1 of 18 articles; articles 1 and 2 ratios similar to female; article 1 distal margin with 2 sensillate RS, surface with 2 penicillate setae, mesial margin with 4 sensillate RS, 2 penicillate setae and 1 SS; article 2 distal margin with 3 penicillate setae and 2 sensillate RS; article 4 with 2 penicillate setae; article 6 with 1 aesthetasc; from article 8 onwards, each article has 1 aesthetasc and many with additional SS.



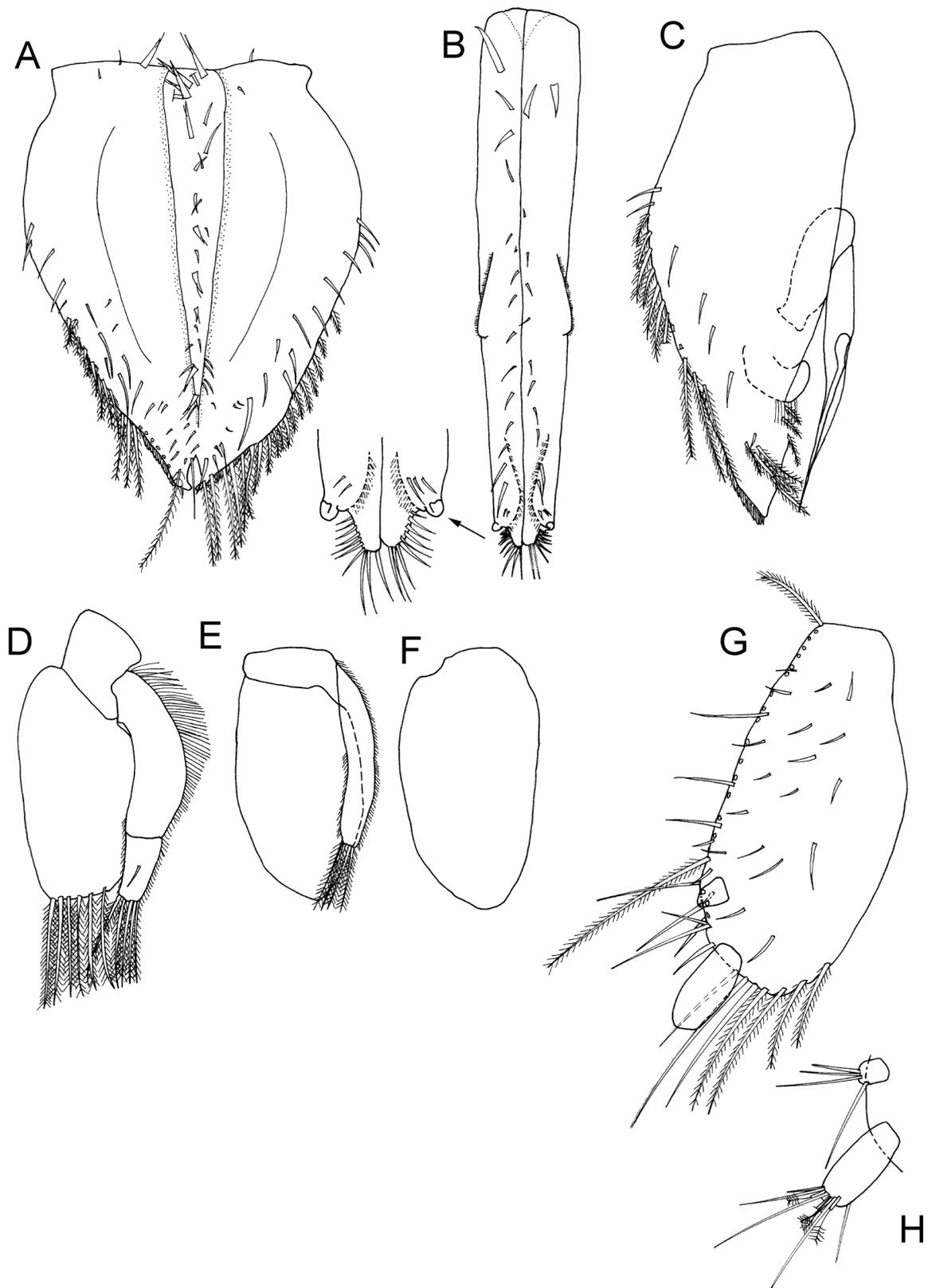
**Figure 24.** *Notopais likros* sp. n. (A,C,D), female holotype, 4.2 mm (AM P.62646). (B) Female paratype, 3.8 mm (AM P75566). (E,F) Female paratype, 3.4 mm (AM P62634). (G) Male paratype, 2.0 mm (AM P62639). (A) Dorsal view. (B) Ventral view of pereonite 7 and pleon. (C) Lateral view. (D) Cephalon. (E) Left antenna 2. (F) Left antenna 1. (G) Left antenna 1. Scale bar = 1 mm, for dorsal and lateral views only.



**Figure 25.** *Notopais likros* sp. n. All figures from female paratype, 3.4 mm (AM P62634). (A) Left mandible. (B) Right mandible. (C) Left maxilliped. (D) Left maxilla 1. (E) Left maxilla 2.



**Figure 26.** *Notopais likros* sp. n. All figures from female paratype, 3.4 mm (AM P62634). (A) Right pereopod 2. (B) Left pereopod 5. (C) Left pereopod 6. (D) Left pereopod 1. (E) Right pereopod 7.



**Figure 27.** *Notopais likros* sp. n. (A,D–H), female paratype, 3.4 mm (AM P62634). (B,C) Male paratype, 2.0 mm (AM P62639). (A) Operculum. (B) Pleopod 1. (C) Right pleopod 2. (D) Left pleopod 3. (E) Left pleopod 4. (F) Left pleopod 5. (G) Left uropod. (H) Endopod and exopod of left uropod.

Pleopod 1 length 5.9 times proximal width, ventral surface with 27 SS and 5 proximal RS, distally with 19 SS. Pleopod 2 protopod 2.5 times width, lateral margin with 3 SS and row of plumose setae, surface with 5 SS, distally with 5 plumose setae and lamellar extension, mesial margin with 3 plumose setae; exopod length 0.1 times protopod, with fine SS; stylet length 0.6 times protopod length, not hooking up into proximal part of protopod; sperm duct length 0.6 times stylet.

Remarks. *Notopais likros* sp. n. is distinguished by the combination of numerous dorsal spines on the cephalon and anterior margins of pereonites 1–4; pereonites 5 and 6 with elongate setae; and two robust setae on the coxae of pereopods 1 and 2.

*N. likros* resembles *Notopais magnifica* (Vanhöffen, 1914) [8] as this species also has numerous spines on pereonites 1–4, but *N. likros* can be easily distinguished from *N. magnifica* as it does not have two large dorsal spines on the cephalon, but rather many small spines. *N. likros* also has several sub-marginal spines on pereonite 4 which are absent in *N. magnifica*.

The material from Monod is in poor condition; however, comparing the material and figures from Monod's [33] work to the type material of *N. likros* sp. n., there are enough similarities to conclude that these are of the same species. The uropod featured in Monod's work was illustrated as uniramous (Figure 14, [33]); however, on closer inspection, it is biramous, where the socket of the missing exopod is visible.

Distribution. Eastern Australian continental slope from off Brisbane, Queensland to Bass Strait, between 45–174 metres.

Etymology. *Likros* is a Greek word meaning antler, alluding here to the spines with apical setae on antenna 2 article 1, which together are reminiscent of a stag's antlers.

*Notopais spinosa* (Hodgson, 1902) [20]

(Figures 28–31)

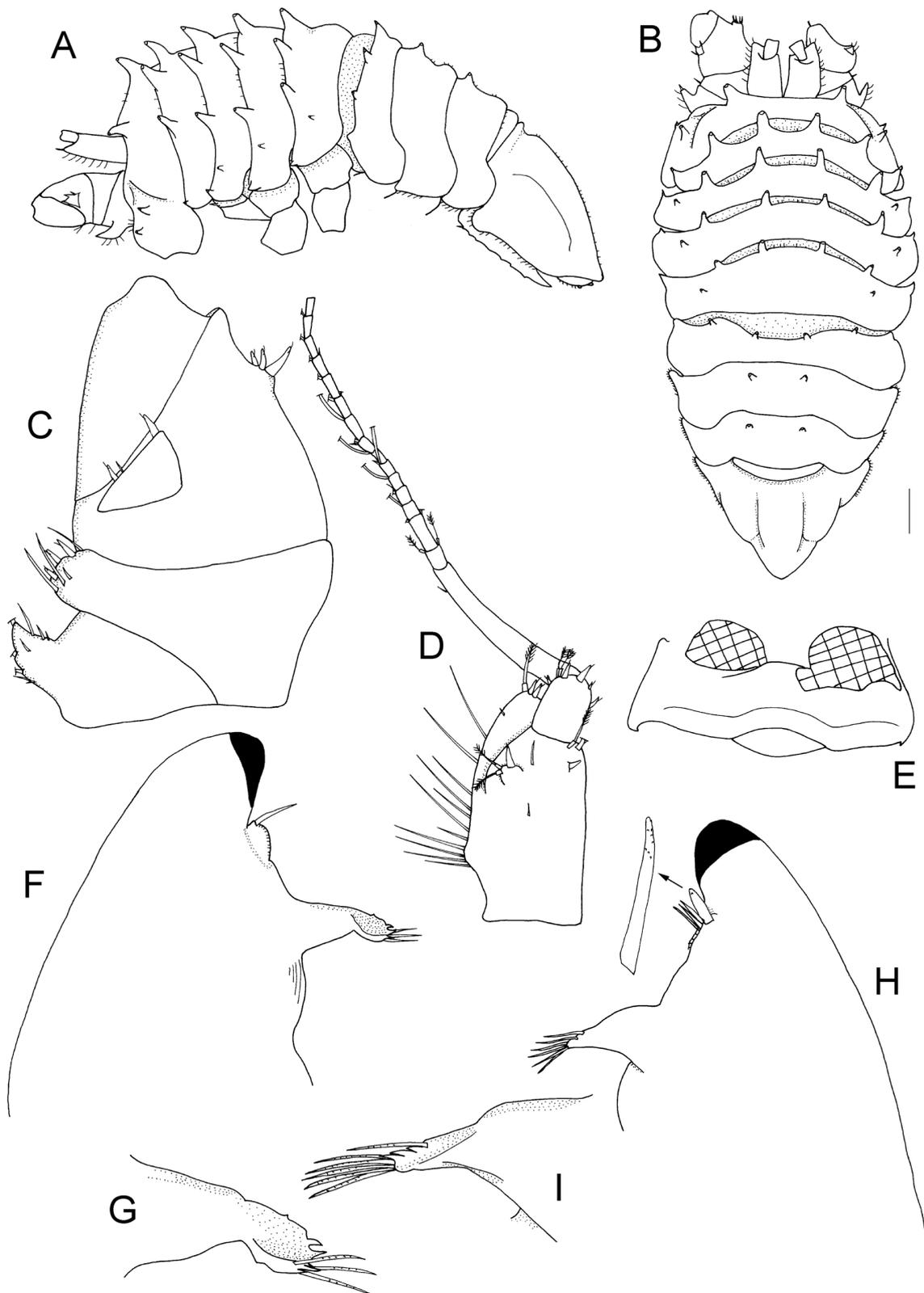
*Echinozone spinosa* Hodgson, 1902: 255–256, plates XXXVIII–XXXIX [20].—Monod, 1926: 23–25, Figures 16–18 [34].—Schultz, 1976: 5–8, Figures 1 and 2 [35].—Brandt, 1990: 216, Figure 2 [36].

Material examined. Female (10.0 mm, dissected), Balleny Islands, Antarctica, str E220b, 66°28.2' S, 162°45.5' E, 9 February 1965, small Agassiz trawl, 371 m, USS *Glacier* (NIWA 23814).

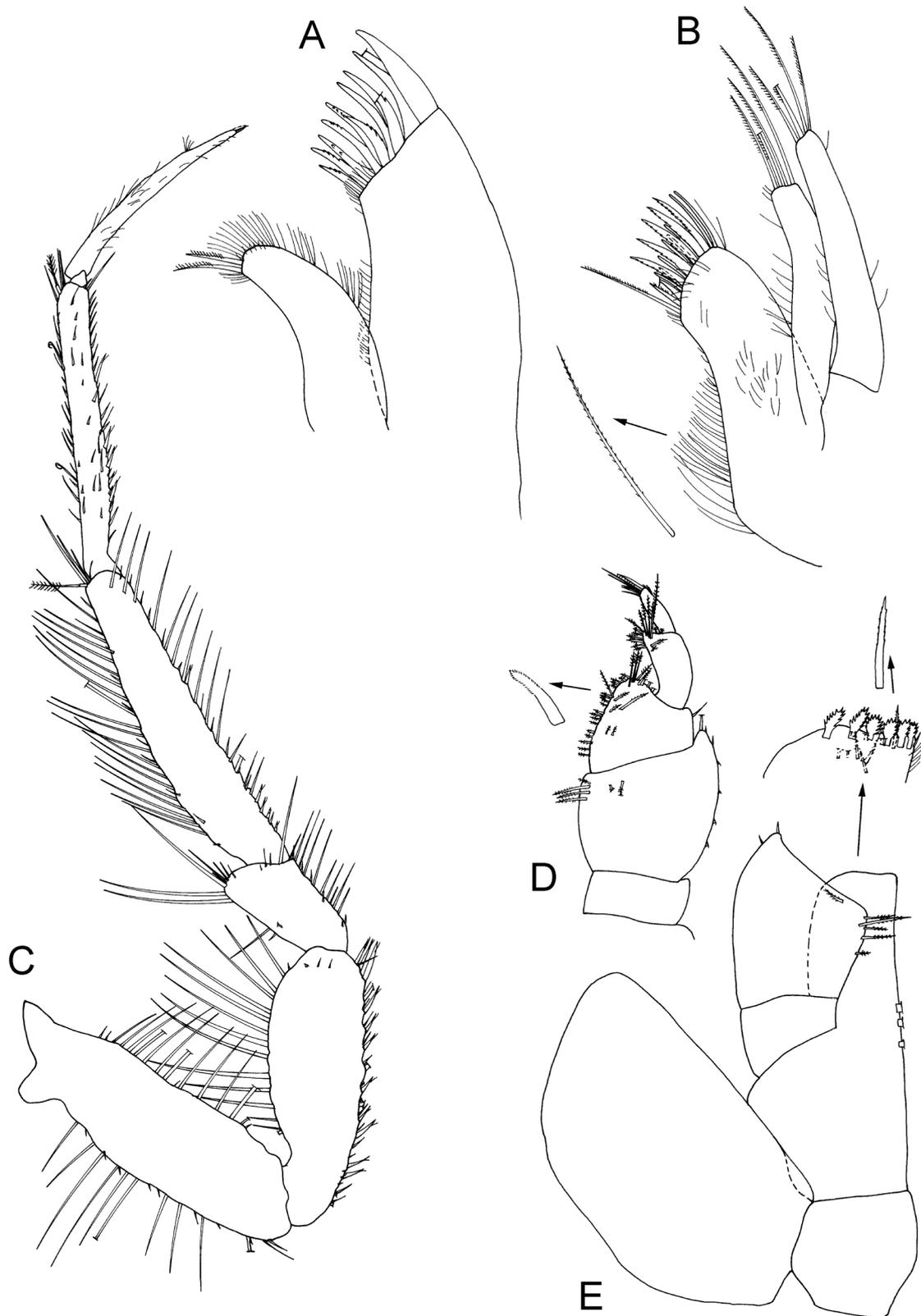
Syntype. Female (11.0 mm), off Cape Adare, Victoria Land, Antarctica, approximately 71° S, 168° E, 26 fathoms (47.5 metres), collected 1899, *Southern Cross* (BMNH 1901.12.13.7).

Description. Body length about 2.1 times greatest width of pereonite 2; cuticle lightly setose. Cephalon with 2 dorsal spines, anterolaterally with 2 pairs of small spines. Pereonites 1–5 anterior margins each with 4 spines; pereonites 2–4 each with pair of sub-lateral spines; pereonites 1–5 anterolateral margins with spines, pereonites 6–7 with pair of widely spaced, small dorsal spines; ventrally pereonite 6 without ornamentation, pereonite 7 with enlarged rounded medial rise with numerous long setae. Pleon length 0.9 times as long as proximal width, with scattered SS.

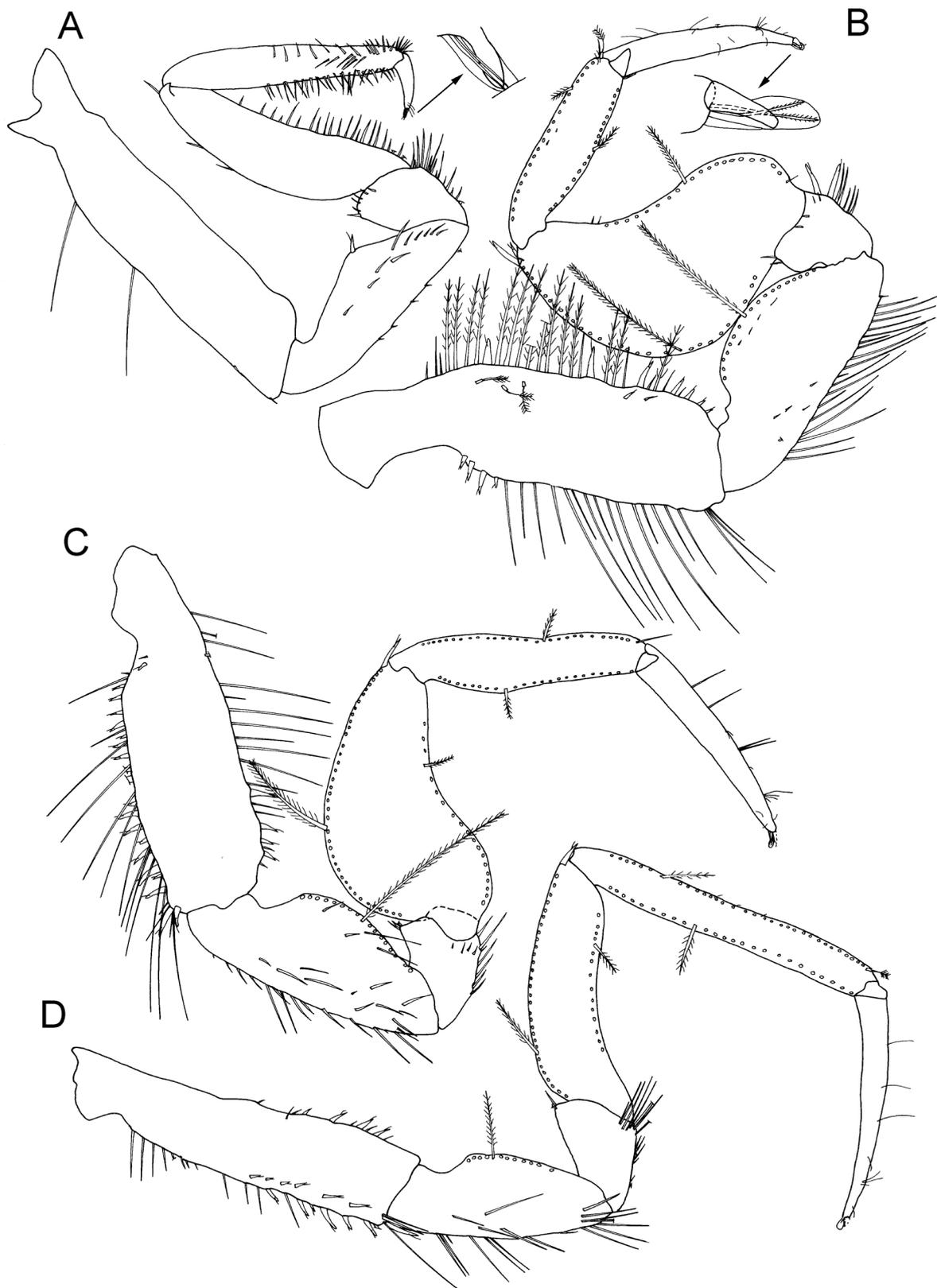
Antenna 1 damaged; article 1 length 1.9 times width, mesial margin with 1 sensillate RS, surface with 2 penicillate setae and 1 sensillate RS on protrusion, and 2 SS, 1 RS and 1 penicillate seta, lateral margin with 11 SS and 1 SS, distal margin with 1 penicillate seta and 2 sensillate RS; article 2 length 0.3 times article 1 length, with 2 penicillate setae and 5 sensillate RS; article 3 with 1 SS; article 4 with 2 penicillate setae; from article 6, each article has 1 aesthetasc, many articles with an additional SS. Antenna 2 damaged; article 1 lateral margin with 2 sensillate RS and with 6 SS; article 2 length 1.3 times article 1 length, distolateral margin with 3 sensillate RS, 3 long SS and 1 sub-marginal SS; article 3 length 2.2 times article 1 length, scale with 2 sensillate RS and 1 SS, distomesial margin with 3 sensillate RS; article 4 length 1.7 times article 1 length, with no ornamentation.



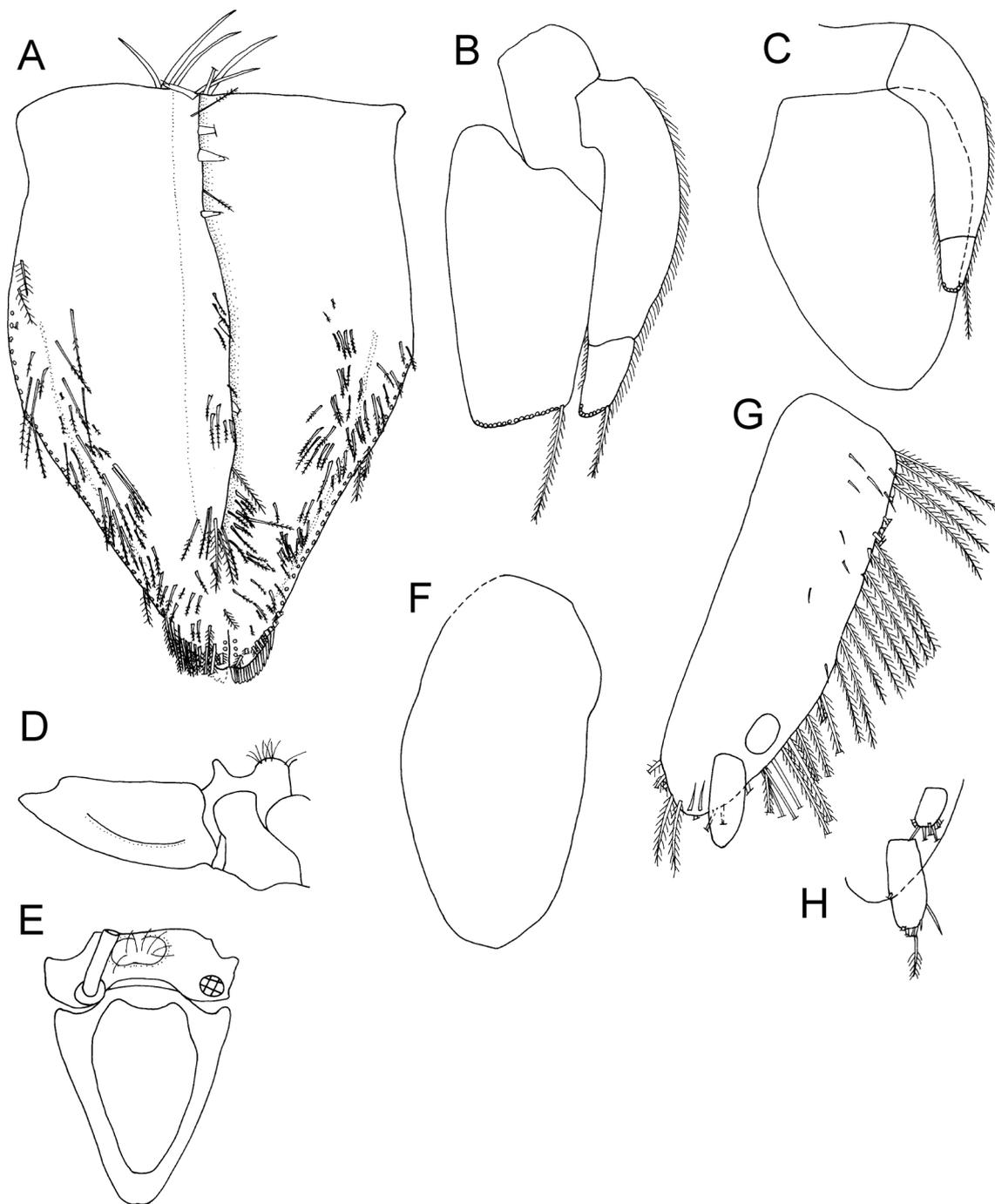
**Figure 28.** *Notopais spinosa* (Hodgson, 1902) [2]. (A,B) Female syntype, 11.0 mm (BMNH 1901.12.13.7). (C–I) Female, 10.0 mm (NIWA 23814). (A) Lateral view. (B) Dorsal view, (C) Left antenna 2. (D) Left antenna 1. (E) Cephalon. (F) Right mandible. (G) Right mandibular molar. (H) Left mandible. (I) Left mandibular molar. Scale bar = 1 mm, for dorsal and lateral views only.



**Figure 29.** *Notopais spinosa* (Hodgson, 1902) [2]. All figures from female, 10.0 mm (NIWA 23814). (A) Left maxilla 1. (B) Left maxilla 2. (C) Left pereopod 2. (D) Left maxilliped palp. (E) Right maxilliped.



**Figure 30.** *Notopais spinosa* (Hodgson, 1902) [2]. All figures from female, 10.0 mm (NIWA 23814). (A) Left pereopod 1. (B) Left pereopod 5. (C) Left pereopod 6. (D) Left pereopod 7.



**Figure 31.** *Notopais spinosa* (Hodgson, 1902) [2]. All figures from female, 10.0 mm (NIWA 23814). (A) Operculum. (B), Left pleopod 3. (C) Left pleopod 4. (D) Lateral view of pereonite 7 and pleon. (E) Ventral view of pereonite 7 and pleon. (F) Left pleopod 5. (G) Right uropod. (H) Endopod and exopod of right uropod.

Mandible spine row with 7 spines (on right mandible, unable to tell on left mandible); molar small, distally with 6 serrate setae (on left mandibular molar, 3 on right). Maxilla 1 with fine SS; lateral lobe width 2.0 times mesial lobe width, distal margin 5 RS and 7 dentate RS, mesial lobe distally with 2 long pectinate setae. Maxilla 2 with fine SS, lateral lobe distally with 4 long pectinate setae; middle lobe width 1.1 times lateral lobe width, distally with 4 long pectinate setae; mesial lobe width 2.3 times lateral lobe width, distally with 8 blunt SS, 6 toothed setae and 2 pectinate setae. Maxilliped basis length 2.1 times width;

endite with 3 coupling hooks, distally with 10 serrate setae, 6 fan setae and many fine SS; palp article 1 rectangular, article 2 length 3.1 times article 1 length, lateral margin with 7 SS, surface with 6 distally pappose setae; article 3 length 2.0 times article 1 length, lateral margin with 1 SS, surface with 6 distally pappose setae, mesial margin with 26 distally pappose setae; article 4 length 1.4 times article 1 length, distomesial margin with 16 distally pappose setae; article 5 length 1.1 times article 1 length, with 7 SS and 1 robust pectinate seta; epipod length 1.8 times width.

Pereopod 1 basis-dactylus length to width ratios: 4.6; 3.0; 1.0; 3.3; 5.8; 2.6. Basis inferior margin with 4 SS; ischium inferior margin with 5 SS, lateral surface with 10 SS, superior margin with 1 sensillate RS; merus inferior margin with 15 SS, distosuperior margin with 6 SS; carpus inferior margin with 22 SS, superior margin with 3 SS; propodus inferior margin with 30 SS, lateral surface with 18 SS, superior margin with 8 SS; dactylus superior margin with 3 SS, unguis damaged.

Pereopod 2 basis-dactylus length to width ratios: 3.2; 2.8; 1.4; 5.3; 8.2; 10.3. Basis inferior margin with 20 SS, superior margin with 16 SS; ischium inferior margin with 17 SS, 2 RS and 14 sensillate RS, lateral surface with 3 SS, superior margin with 15 SS; merus inferior margin with 20 SS, lateral surface with 5 SS, superior margin with 10 SS; carpus inferior margin with 20 RS, 4 SS and 5 sensillate RS, lateral surface with 2 SS, superior margin with 1 pectinate seta and 33 SS; propodus inferior margin with 5 sensillate RS, 16 RS and 3 SS, lateral surface with 18 SS, superior margin with 20 SS and 1 penicillate seta; dactylus with 25 SS, unguis damaged.

Pereopod 5 basis-dactylus length to width ratios: 3.6; 2.5; 1.0; 1.2; 3.7; 5.4. Basis inferior margin with 4 sensillate RS and 18 long SS, lateral surface with 3 penicillate setae, 1 sensillate RS and 1 SS, superior margin with 7 sensillate RS, 8 SS and 15 plumose setae; ischium inferior margin with 19 SS, lateral surface with 9 SS; merus inferior margin with 2 sensillate RS and 5 SS, lateral surface with 4 SS, superior margin with 2 SS; carpus inferior margin with 3 SS, distosuperior margin with 2 sensillate RS and 1 SS; propodus distoinferior margin with 1 SS, lateral surface with 2 SS, superior margin with 4 SS and 1 penicillate seta; dactylus with 14 SS.

Pereopod 6 basis-dactylus length to width ratios: 3.4; 2.6; 1.2; 1.8; 4.6; 6.4. Basis inferior margin with 17 SS and 19 sensillate RS, lateral surface with 1 SS and 1 sensillate RS, superior margin with 4 sensillate RS and 16 SS; ischium inferior margin with 15 SS, lateral surface with 15 SS; merus inferior margin with 8 SS, lateral surface with 4 SS, distosuperior margin with 3 SS; carpus distosuperior margin with 1 sensillate RS; propodus distosuperior margin with 1 long SS; dactylus with 14 SS, unguis damaged.

Pereopod 7 basis-dactylus length to width ratios: 4.3; 2.7; 1.1; 3.2; 7.9; 8.2. Basis inferior margin with 7 sensillate RS and 12 SS, distoinferior margin with 1 sensillate RS and 3 SS, lateral surface with 6 sensillate RS, superior margin with 6 SS and 4 sensillate RS; ischium inferior margin with 11 SS, lateral surface with 8 SS; merus inferior margin with 10 SS, lateral surface with 5 SS, distosuperior margin with 2 SS; carpus distosuperior margin with 1 sensillate RS; propodus superior margin with 4 SS, distosuperior margin with 1 penicillate seta; dactylus superior margin with 8 SS, unguis damaged.

Operculum length 1.5 times proximal width, medial keel with row of RS and few plumose setae, proximally with 6 RS, surface and lateral margins with numerous plumose setae. Pleopod 3 exopod distally with 10 plumose setae; endopod length 2.0 times width, with 18 long plumose setae. Pleopod 4 exopod with 8 long plumose setae; endopod length 1.4 times width. Pleopod 5 length 2.1 times width.

Uropod protopod length 3.3 times width, lateral margin with 14 SS and 23 plumose setae, mesial margin with 5 plumose setae, surface with 6 SS; exopod length 0.1 times protopod length, with 8 SS; endopod length 0.2 times protopod length, with 4 penicillate setae and 3 SS.

Remarks. *Notopais spinosa* is distinguished from all other *Notopais* species by a combination of pereonite 5 margin with 4 spines; pereonites 6 and 7 each with pair of dorsal spines;

ventral surface of pereonite 7 with enlarged rounded medial rise with numerous long setae; pereopod 5 basis with plumose setae; and the operculum covered in long plumose setae.

It is similar to *Notopais spicata* Hodgson, 1910 [7], but, can be distinguished from this species by the presence of spines on pereonites 6 and 7 which are not present in *N. spicata*. *N. spinosa* has plumose setae on the carpus and propodus inferior margins of pereopods 5 and 6, while in *N. spicata* plumose setae on these margins are absent. The operculum ventral surface has numerous plumose setae, while in *N. spicata*, the surface has only simple setae.

*N. spinosa* has been collected from several localities around the Antarctic and this is the first record of this species from the Balleny Islands, an area which is close to the type locality.

Distribution. *N. spinosa* is known from Antarctica, from the Balleny Islands and east to the Weddell Sea, between 18–569 metres.

#### 4. Discussion

With the new species described in this paper, the total number of Ilyarachninae known from the southwest Pacific is 22. The presence of an exclusively Southern Hemisphere genus, such as *Notopais*, is known in other marine isopod taxa (for example, see [37,38]). While *N. likros* has a large distribution along the east coast of Australia, the distribution of the New Zealand species from this paper are small and more likely to be an artefact of sampling effort rather than reflecting the real distribution of these species.

The depth range of the two new species of *Notopais* falls within the known range of the genus (36 m [7]–2542 m [31]). However, the emergence of this genus in shallower waters (less than 200 metres) typically occurs in Antarctic and sub-Antarctic waters. *N. likros* sp. n., however, is found from depths as shallow as 45 metres off the east coast of Australia. The discovery of this species also extends the known northern range of this genus, with its distribution extending to the waters off southern Queensland (northern most collection point, see Figure 1B). The depth range of the new *Ilyarachna* species falls within what is known of the genus.

Future sampling efforts in these regions of the southwest Pacific with modern techniques and a preservation technique focusing on collecting molecular data will provide valuable insight into the relationships of this fauna within these genera and the subfamily as a whole.

#### Key to the *Ilyarachna* and *Notopais* species of the South West Pacific

Modified after [10,29]

1. —Mandible with palp .....2  
—Mandible without palp .....14
2. —Pereonites 1–4 anterior margins either with spines or only some margins with spines .....3  
—Pereonites 1–4 anterior margins without spines, either smooth or with robust setae .....5
3. —Pereonites 1–4 anterior margins each with spines; antenna 2 article 1 with many robust setae .....4  
—Pereonites 2 and 4 anterior margins with spines, spines absent on pereonites 1 and 3; antenna 2 article 1 with single robust seta .....*Ilyarachna taranui* n. sp.
4. —Pereonite 5 anterior margin with spines; pereonites 5 and 6 with non-marginal dorsal spines. ....*Ilyarachna pacifica* n. sp.  
—Pereonites 5 and 6 without marginal and dorsal spines. ....*Ilyarachna mclayi* n. sp.

5. —Pereonites 1–4 anterior margins with robust setae; pereonites 7 ventrally with spine/s .....6  
 —Pereonites 1–4 anterior margins without robust setae; pereonites 7 ventrally with no spines ..... *Ilyarachna cheropin* Merrin, 2016 [29]
6. —Pereonite 7 ventrally with single medial spine .....7  
 —Pereonite 7 ventrally without single medial spine, instead with pair of small spines ..... *Ilyarachna crystallum* Merrin, 2016 [29]
7. —Cephalon dorsally without spines, tubercles and/or robust setae .....8  
 —Cephalon dorsally with either spines, tubercles and/or robust setae .....10
8. —Antenna 1 article 1 distally with two narrowing extensions .....9  
 —Antenna 1 article 1 distally with 1 wide, rounded extension ..... *Ilyarachna brucei* n. sp.
9. —Pereonite 4 with anterolateral lobes; pereonite 5 lateral margin with no indentation; male antenna 1 elongate, of about 25 articles, article 3 over two-thirds length of article 2; pereopod 1 basis inferior margin with row of robust setae ..... *Ilyarachna mokari* Merrin, 2016 [29]  
 —Pereonites 3 and 4 with anterolateral lobes; pereonite 5 lateral margins indent; male antenna 1 short, of about 14 articles, article 3 half the length of article 2; pereopod 1 basis inferior margin with robust setae at the distal end only ..... *Ilyarachna flindersi* Merrin, 2016 [29]
10. Male stylet pleopod 2 short, not hooking up into proximal half of protopod .....11  
 —Male stylet pleopod 2 long, hooking up into proximal half of protopod .....12
11. —Cephalon with single pair of dorsal spines; male pleopod 2 stylet extends beyond protopod ..... *Ilyarachna franki* n. sp.  
 —Cephalon without single pair of dorsal spines; male pleopod 2 stylet does not extend past protopod ..... *Ilyarachna sami* n. sp.
12. —Cephalon many small dorsal proturbances with robust setae or more than two spines; pereopod 1 carpus inferior margin with row of robust setae more evenly spread along margin .....13  
 —Cephalon with only 2 dorsal spines; pereopod 1 carpus inferior margin with few robust setae at proximal end ..... *Ilyarachna aculeatus* n. sp.
13. —Pereonite 5 with small lateral indent, pereonite 6 with small anterolateral processes; pleopod 3 endopod with 3 plumose setae ..... *Ilyarachna quorna* Merrin, 2016 [29]  
 —Pereonite 5 lateral margins rounded, with no lateral indent; pereonite 6 without anterolateral processes; pleopod 3 endopod with more than 3 plumose setae ..... *Ilyarachna kermadecensis* Wolff, 1962 [16]
14. —Cephalon with dorsal spines; pereonites 1–4 with dorsal spines .....15  
 —Cephalon with no dorsal spines; pereonites 1–5 anterior margins with robust setae only, large spines absent ..... *Notopais zealandica* Merrin, 2004 [10]
15. —Anterior margin of pereonite 5 with spines .....16  
 —Anterior margin of pereonite 5 either smooth or with setae, spines absent .....17

16. —Pereonites 6 and 7 with dorsal spines. ....18  
 —Pereonites 6–7 without dorsal spines. .... *Notopais chathamensis* n. sp.
17. —Cephalon with 4 spines, which are small enough to be regarded as tubercles; pereonites 2 and 3 anterior margin with 6 spines; pereonites 2–4 laterally with no spines; pereonite 5 anterior margin and dorsal surface smooth ..... *Notopais minya* Merrin, 2004 [10]  
 —Cephalon with many small spines; in addition to marginal spines, pereonites 2–4 also with non-marginal spines; pereonites 5 anterior margin with few long simple setae ..... *Notopais likros* n. sp.
18. —Pereonites 1–4 with large spines; pereonite 5 anterior margin with evenly spaced spines; antenna 1 article 3 with no robust setae; uropodal protopod with large distal extension ..... *Notopais echinatus* Merrin and Bruce, 2006 [31]  
 —Pereonites 1–4 with small spines; pereonite 5 anterior margin with spines spaced widely apart; antenna 1 article 3 with robust setae; uropodal protopod with small bulbous distal extension ..... *Notopais euaxos* Merrin and Bruce, 2006 [31]

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