



The Marine Fauna of New Zealand:

## Isopoda, Aegidae (Crustacea)

Niel L. Bruce

*NIWA Biodiversity Memoir 122*

COVER PHOTO:

*Aegiochus tara* sp. nov. Holotype, female, dorsal view, 31 mm long. Distinguished by large eyes narrowly separated and coxae conspicuous in dorsal view with coxae 6 and 7 being posteriorly produced and acute. Found on West Norfolk Ridge at depth of 1451–1478 m.

Photo: NIWA

NATIONAL INSTITUTE OF  
WATER AND ATMOSPHERIC RESEARCH (NIWA)

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## ABSTRACT

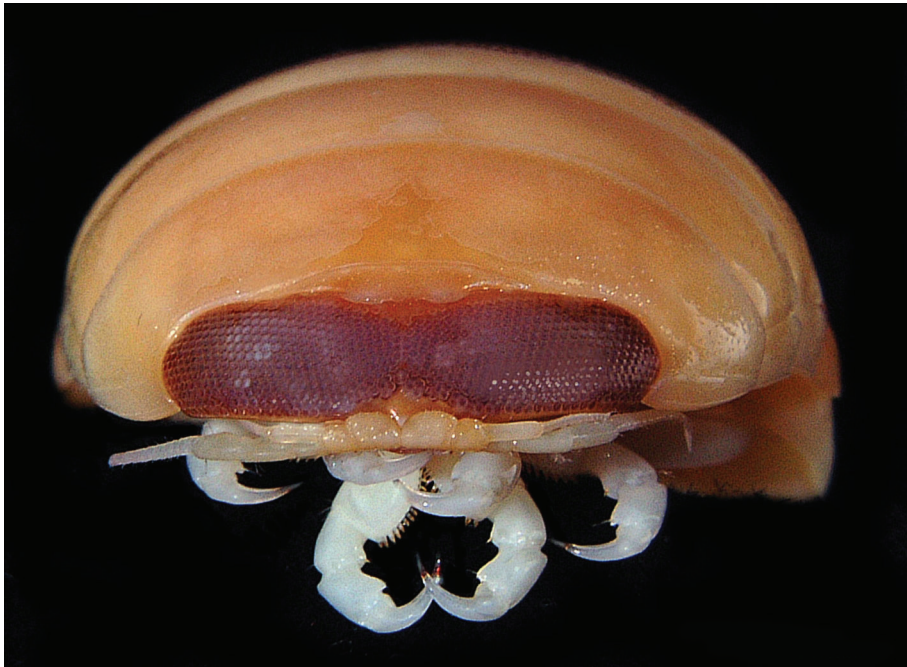
The isopod family Aegidae of the New Zealand Exclusive Economic Zone is monographed. Six genera are present in the region: *Aega* Leach, 1815 with eight species, *Aegapheles* gen. nov. with seven species, *Aegiochus* Bovallius, 1885 with 16, *Epulaega* gen. nov. with two, *Rocinela* Leach, 1818 with nine, and *Syscenus* Harger, 1880 with five species. Thirty-nine of the 45 species are named, including two new species of *Aega*, two new species of *Aegapheles*, nine new species of *Aegiochus*, six new species of *Rocinela*, and one each of *Epulaega* gen. nov. and *Syscenus*; all but seven species are new records for the New Zealand marine fauna. Sixteen of the named species, approximately 40%, are endemic, but that figure is likely to drop, as many other large species are known to have extended distributions. Three species are removed from the New Zealand fauna: *Aega novizealandiae* Dana, 1853 and *Aega cyclops* Haswell, 1881 are regarded as nomina dubia and or misidentifications; *Rocinela orientalis* Schioedte & Meinert, 1879b is regarded as an uncorroborated record. The Barybrotidae is reinstated to family rank.

A phylogenetic analysis of *Aega* was conducted using PAUP\*, and a new generic classification is proposed, with *Aegiochus* Bovallius, 1885 revalidated, the subgenus *Rhamphion* Brusca, 1983 placed in synonymy with *Aegiochus*, and two new genera, *Aegapheles* gen. nov. and *Epulaega* gen. nov., described.

To allow clear characterisation of certain New Zealand species, it was necessary to partially redescribe some Southern Ocean species: *Aegiochus crozetensis* (Kussakin & Vasina, 1982), *Aegiochus uschakovi* (Kussakin, 1967), and *Aega punctulata* Miers, 1881; descriptive notes and figures are also provided for *Aega angustata* Whitelegge, 1901, *Aegiochus plebeia* (Hansen, 1895) and *Syscenus intermedius* Richardson, 1910. Supplementary description and figures are given for the Antarctic species *Aegiochus antarctica* (Hodgson, 1910) and *Aegiochus glacialis* (Tattersall, 1921). Placed in synonymy are: *Aega edwardsii* Dollfus, 1891 (= *A. punctulata*), *Aega giganteoculata* Nunomura, 1988 (= *Aegiochus vigilans* (Haswell, 1881)), *Aega koltuni* Kussakin, 1967 (= *Aegiochus antarctica* (Hodgson, 1910)) and *Syscenus pacificus* Nunomura, 1981 (= *Syscenus latus* Richardson, 1909); *Aega tumida* Nunomura, 1988 is considered to be indistinguishable from *Aegiochus spongiophila* (Semper, 1867). Species brought out of synonymy are: *Aega punctulata* Miers, 1881 and *Aega urotoma* Barnard, 1914.

Keys are provided to the marine genera and to the named New Zealand species.

**Keywords:** Isopoda, Aegidae, *Aega*, *Aegapheles* gen. nov., *Aegiochus*, *Epulaega* gen. nov., *Rocinela*, *Syscenus*, systematics, taxonomy, new genera, new species, phylogenetic analysis, New Zealand Exclusive Economic Zone, Southwest Pacific, Southern Ocean, Antarctic



**Frontispiece:**

Upper left: *Aegapheles mahana* sp. nov. Upper right: *Aega monophthalma* Johnston, 1834.  
Lower: *Aegapheles mahana* sp. nov.

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## INTRODUCTION

The isopod fauna of New Zealand has received little attention over the previous two centuries (Bruce 2001; Poore & Bruce in press), with only two isopod families receiving monographic or revisionary treatment, the Sphaeromatidae by Hurley and Jansen (1977) and the Haploniscidae by Lincoln (1985). Within the Cymothoidea the Aegidae have perhaps received least attention. The only documentation following the earliest carcinological accounts of Dana (1852), Miers (1876a; 1876b) and Thomson and Chilton (1886) was the record of a beach specimen from the Kermadec Islands by Chilton (1911), the incidental mention of a species by Hale (1926: 233, of *Aega cyclops* 'in New Zealand area'), description of a single species of *Rocinela* by Hurley (1957), a misidentification by Stephenson (1980), and, most recently, popular accounts of the family (Bruce 2002, 2003).

Given the low number of previously recorded species (four) from New Zealand, and the relatively low number of marine species known from Australia (28) (excluding subantarctic island territories such as Macquarie Island – including Bruce *et al.* 2002; Bruce 2004a and those reported here) and South Africa (11) it comes as a surprise that the New Zealand EEZ, with 47 species, has the greatest number of aegid species of any region of the world (Australia can be said to have several regions such as Southern, Indian and Pacific Oceans, though only two species have been recorded from other than eastern coasts). The East Pacific (see Brusca 1983; Wetzer 1990; Brusca & France 1992) with 15 species and North Atlantic (see Kussakin 1979; Brand & Andres 2008; Bruce 1993a) with 18 species are relatively well documented and the recorded diversity is probably close to actuality. Australian aegids have received some attention (Bruce 1983; 1988; 1997a,b; 2004a; Bruce *et al.* 2002) and my own examination of museum collections in Australia has revealed numerous as yet undescribed species. In terms of area, New Zealand has the greatest diversity of Aegidae.

The area loosely termed the 'southwestern Pacific', stretching from eastern Papua New Guinea, through the island nations arc to New Zealand and westwards to the Australian coasts is the region of greatest known diversity for the family Aegidae. Including 'known undescribed' species, there are 72 aegid species\* from

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\* Trilles and Justine (2004) recorded three species of *Aega* from New Caledonia. Two of these are misidentifications, the third is not identified to species but is possibly one of the species described by Bruce (2004b). These species are not included in the species totals given here.

this region, some 60% [the figures change as new records and species are discovered] of the species recorded worldwide. Museum collections that I have examined (e.g. USNM, Smithsonian Institution; The Natural History Museum, London; Muséum national d'Histoire naturelle, Paris; and Zoologisk Museum, Copenhagen) do not indicate that other regions would have a diversity as great and as yet undocumented. Collections held at various Australian museums, and material collected around New Caledonia, indicate that many species remain to be described from the southwestern Pacific.

## SYMBIOSES

Aegidae are well-known associates of fishes, almost exclusively attaching temporarily to the external surfaces. A small number of species are associated with other invertebrates, notably sponges. Klitgaard (1995) found that *Aegiochus ventrosa* used only one of eleven examined species of sponge sampled in the northeastern Atlantic. *Aegiochus lethrina*, an associate of coral-reef fishes, has also been recorded from sponges (Bruce 1983). There is one record of an *Aegiochus* from the cloaca of an ascidian (Wetzer 1990). In New Zealand, *Aegiochus pihuka* sp. nov. is associated with hexactinellid sponges, and *Epulaega fracta* and *Aegiochus spongiophila* have also been recorded from hexactinellids (Nunomura 1988a). Records of aegids attached to squid (e.g. Bruce 1996) are regarded as unconfirmed at present.

## MICROPREDATORS OR PARASITES?

Aegidae are here regarded as micropredators rather than parasites (see Bruce 2003, 2004a; Brusca 1983). Parasites are, variously defined, symbionts (e.g. Rohde 1982, 2005), and are widely regarded as having some manner of perceived deleterious or harmful effect on the host. Generally a permanent trophic adult association is noted between the parasite and the host individual. Aegids do not fulfil these criteria, and while attacking and feeding on their victims they rarely form a permanent association with their 'host', but instead detach following their feed.

In a few instances it is known that a species forms a more long-term attachment (e.g. *Syscenus* – see Ross *et al.* 2001). Others, such as *Aegiochus lethrina*, appear to be feeding on fish mucus within the 'host' nasal passages, rather than blood or tissue. Wägele (1990) gave a brief and incidental description of the mode of

feeding of *Aegiochus antarctica* in aquaria feeding on provided prey species (namely North Atlantic plaice), noting that the isopod spent most of the time inactive in a burrow, emerging only to search for prey.

There is one reported instance of an aegid, *Rocinela signata* Schioedte and Meinert, 1879a, attaching to the gills and inside of the mouth of the host (de Lima *et al.* 2005). Salmon under aquaculture have been reported as being attacked and killed by *Rocinela bellicepts* by Novotny and Mahnken (1971), and Nair and Nair (1983) reported that fish attacked by *Alitropus* in aquarium conditions became anaemic. Wing and Moles (1995) showed that under aquarium conditions *Rocinela angustata* preferentially attacks some prey species.

There are few data available on the feeding habits of aegid isopods; they are here considered to be micro-predators, and the fish that they have been recorded from as prey.

## DISTRIBUTION

Aegidae are distributed throughout the world oceans, from the tropics to polar waters. Broadly, Aegidae are marine with a depth range from shallow or surface depths (such as species attaching to shallow-water coral-reef fishes) to a depth of 4609 metres, although most species (depth data are not available for a substantial number of species) are recorded from the continental shelf and rise at depths from less than 100 metres to approximately 1200 metres. Twenty species are known from depths in excess of 1200 metres, and of these six are from depths greater than 2000 metres.

The large genera (*Aega*, *Aegapheles*, *Aegiochus*, *Rocinela* and *Syscenus*) are found throughout the world oceans. The genus *Epulaega* gen. nov. has an Indo-Pacific range with one species from South Africa, the remainder from the western Pacific. The monotypic genus *Xenuraega* is known only from the North Atlan-

tic. *Alitropus*, also monotypic, is restricted to freshwater habitats in the Indo-Malaysian region, extending at least to eastern Australia (Bruce 1983). Two genera, *Syscenus* and *Xenuraega*, appear to be mesopelagic throughout their range.

There appear to be no obvious endemic groupings except within *Aega* where those species belonging to the two clades of species related to *Aega angustata* and to *Aega antennata* (Fig. 6, p. 19) are both restricted to the western Pacific, with both described and undescribed species occurring from Japan to southern Australia and eastwards to New Caledonia and New Zealand.

Individual species may be widely distributed, such as *Aega monophthalma*, occurring in the Atlantic, Indian and Pacific Oceans, and ranging from cold high-latitude water to the tropics, or *Aegapheles alazon*, which occurs from South Africa to New Zealand and north to tropical and subtropical locations in both the Indian and Pacific Oceans. While many species have restricted ranges such as the Tasman Sea or southwestern Pacific, local endemism is generally lower than for those families of free-living isopods such as the Cirolanidae or Sphaeromatidae.

In the genus *Rocinela* the distributional pattern is somewhat different from that of the genera *Aega*, *Aegapheles*, and *Aegiochus* in that no species occurs in all major oceans, and no species has both Northern and Southern Hemisphere ranges. Most species are regional endemics, being largely restricted to a region such as New Zealand (all New Zealand *Rocinela* are endemic, though it is probable that some extend towards New Caledonia), northern Pacific, or East Pacific, for example.

While species-level endemism of New Zealand's Aegidae sits at 50% it is probable that this would drop lower with more complete documentation of the Aegidae of eastern Australia and southwestern Pacific island nations.

## THE NEW ZEALAND AEGID FAUNA

The two large genera *Aega sensu lato* and *Rocinela* have dominated the family and collections of aegids worldwide. Although *Aega* is here restructured to four genera, the New Zealand fauna has most species here recorded belonging to *Rocinela* and those genera that form the *Aega* clade. All of these genera may be relatively well represented at high latitudes. The genus *Syscenus*, mesopelagic fish micropredators, while possibly common (Ross *et al.* 2001), is infrequently collected. Under the new classification presented here there are six genera occurring in New Zealand waters. The two remaining monotypic genera have not been recorded from New Zealand waters. *Alitropus* Milne Edwards, 1840 is a tropical freshwater genus known

from Indo-Australasia (Bruce 1983; Ho & Tonguthai 1992); *Xenuraega* Tattersall, 1909 is a blind, highly adapted bathypelagic genus, presently known only from the North Atlantic (Bruce 1993a). *Alitropus* is absent from New Zealand waters, but *Xenuraega* is best considered to be of uncertain distribution, particularly as some pelagic and mesopelagic isopods do have worldwide distributions [e.g. *Metacirolana caeca* (Hansen, 1916), Svavarsson & Bruce 2000], including some aegids such as *Aega monophthalma* Johnston, 1834; others, such as *Aegapheles alazon* Bruce, 2004 and several of the Southern Ocean species reported here, have extended Southern Hemisphere ranges.

## MATERIAL AND METHODS

### MATERIAL EXAMINED

Material examined includes that which was referred to in preparing descriptions (commenced in 2002). 'Also examined' is used for comparative material of other species. 'Additional material' includes specimens belonging to a species that was identified subsequent to the preparation of the description.

### GEOGRAPHIC LIMITS

The defining area for inclusion in this monograph is that of the New Zealand chart area, *NIWA Chart No 73* (CANZ 1997), extending beyond the recognised Exclusive Economic Zone (EEZ) (Fig. 1). The boundaries of this region lie at approximately 24–57°S and 157°E–167°W, and as such potentially include records from the vicinity of the Australian territories of Lord Howe Island, Norfolk Island, and Macquarie Island. Aegids rarely occupy restricted coastal ranges, often being wide-ranging, so it is pertinent to include records from beyond territorial waters and the EEZ.

### DESCRIPTIONS

All descriptions were prepared using DELTA (Descriptive Language for Taxonomy: Dallwitz *et al.* 1997). Separate data sets (suites of characters) are used for species within the *Aega* clade and the *Rocinela-Syscenus* clade and to diagnose the genera. Diagnoses are complementary to the description for higher taxa, and therefore the information is not repeated in the following description. Principal terms used in descriptions are shown in Figs 2 and 3.

For *integer numeric* character states, the description may include a zero (0) rather than the more usual 'without' or 'none'; similarly for some *real numeric* characters it may read '1.0 times as long as' rather than the simpler 'as long as'. Minor details qualifying a coded character state are retained within parentheses.

Colour has not been included in the descriptions owing to post-mortem changes and subsequent fading in preserved specimens. Live colour in aegids is rarely observed or photographed so there are few comparative data. Eye colour in aegids can be red, black, dark brown, light brown or bronze ('golden'). Eye colour is not always consistent within species. Some aegids have a noticeable white perimeter to each ommatidium, giving the eye a reticulate appearance, but in others the centre of the ommatidium is white.

The *uropodal endopod* of all Aegidae (and most families of Cymothoidea) has, on the lateral margin, a heavily plumose articulating seta that is set in a small

notch, usually at a position about the distal one-third of the length of the lateral margin. This seta defines the proximal and distal portions of the endopod lateral margin, and counts of robust setae are given in relation to this point.

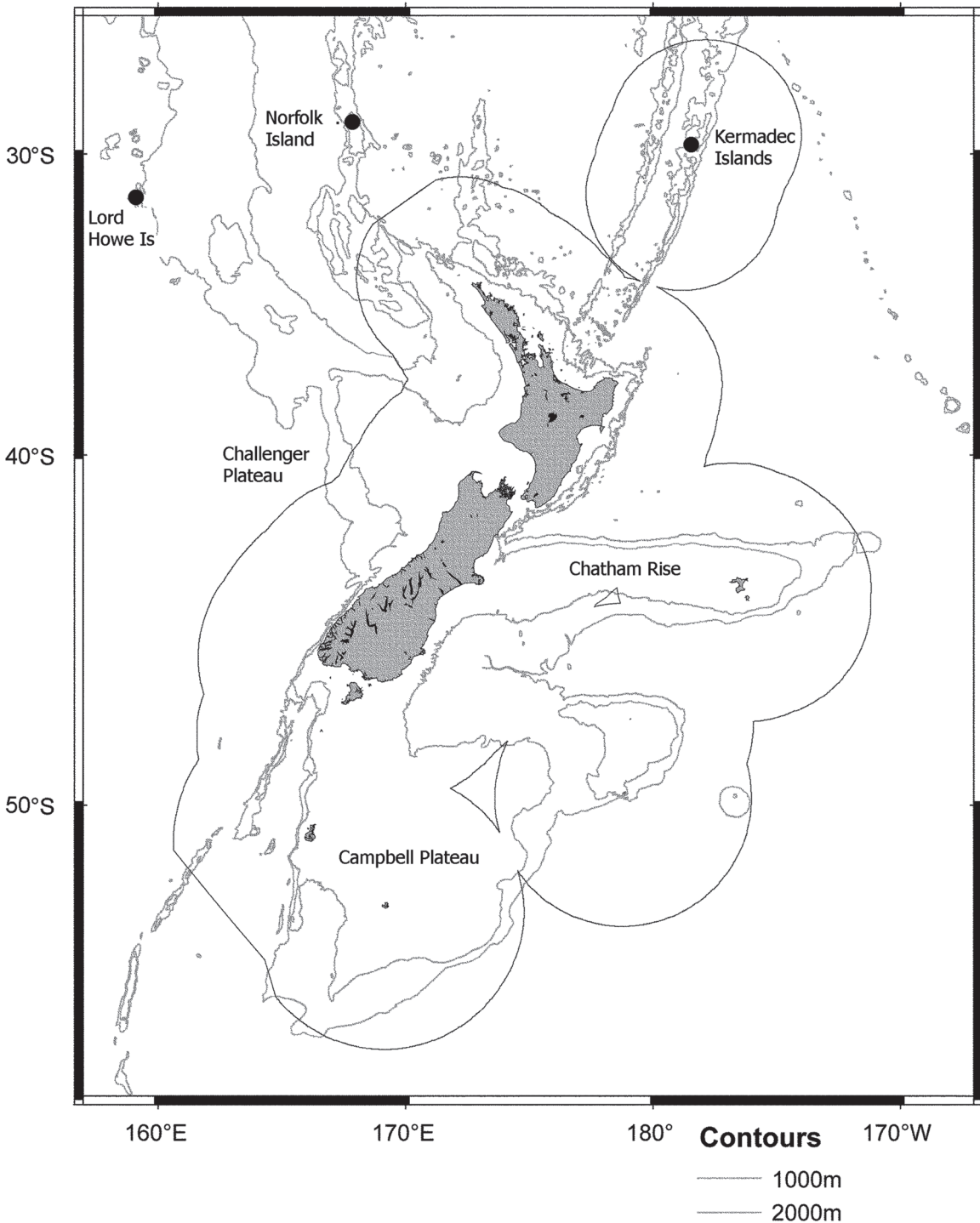
### DRAWINGS AND DISSECTIONS

Unless otherwise stated, all drawings except for the mouthparts were made using a Leica M12.5 stereomicroscope, using both reflected and transmitted light. All appendages were dissected from the right-hand side of the specimen unless otherwise stated. Appendages were drawn without being flattened, and while perspective has been kept as consistent as possible, allowances must be made for some differences in the drawings from measurements given. Mouthparts were dissected and mounted unstained in lactic acid (88%) and examined and drawn using a Zeiss Axioskop 2plus compound microscope. Mouthparts of some small species were remounted in 'Aquamount Improved' Gurr, all other dissected appendages were placed into micro-vials and stored with the dissected specimen. All drawings were made using a *camera lucida*.

Dissection of historical type material and fragile specimens was kept to a minimum (usually no dissection). Permission to dissect any material described wholly or in part by O. G. Kussakin was not granted, and the borrowed material was not accompanied by the dissected appendages.

In order to maintain a reasonable brevity of text, some reduction of drawings and of description has been undertaken. In general, pereopods 2 and 3 are similar to each other as are pereopods 5–7. Pereopod 4 is intermediate in form between anterior (1–3) and posterior (5–7) pereopods. For many species pereopods 1–3 and pereopods 6 and 7 are illustrated, but pereopods 3 and 6 are not described in detail. Similarly pleopods within genera are remarkably uniform, and for some species only pleopods 1 and 2 are illustrated.

The maxilliped palp is twisted obliquely and bent ventrally in relation to the plane of the base of the maxilliped. This makes it difficult to draw and to observe, in particular palp article 5 is often obscured. In small species the palp will flatten under a cover slip if cleared in lactic acid. In large species article 5 was observed directly and occasionally broken away from the palp itself. In most cases the number of robust setae is not critical in making a species identification and the accuracy of these counts, particularly for small setae, should not taken to be potentially indicative.



**Figure 1.** Map of the New Zealand Region (based on CANZ 1977) showing boundary of the Exclusive Economic Zone (EEZ) and major place names.

I do not consider the number of plumose marginal setae on the pleopods to be significant in differentiating species as it is likely to be size-dependent. For small species (<10 mm), these differences may be informative, but the extent of the PMS (where the setae start on each margin) is more useful. For all species of a length greater than 15 mm, I have not given counts for the pleopod marginal setae.

## MEASUREMENTS

Whole specimens were measured in lateral view using a micrometer eyepiece, along the axis of the joint between the coxae and pereonites. Owing to curvature of many specimens on fixation, dorsal views of specimens are often foreshortened. Many aegids are large, between 3 cm and 6 cm, and may stretch or

bend on preservation, rendering apparently precise measurements meaningless. Therefore, lengths for specimens of 20 mm or more are given to the nearest millimetre. Pereopod measurements were made along the axis of the articles for the basis of pereopods 1–3 and all articles for pereopod 7; for pereopods 1–3 the ischium, merus and carpus were measured along the inferior margin.

## TERMINOLOGY

Words used in descriptions are shown in Figs 2 and 3. Setae, unless stated otherwise, are simple (following Watling 1989).

## ABBREVIATIONS

### Institutional

AK – Auckland Institute and Museum, Auckland  
AM – Australian Museum, Sydney  
BMNH – The Natural History Museum, London  
LACM – Natural History Museum of Los Angeles County, Los Angeles  
MNHN – Muséum national d’Histoire naturelle, Paris  
MTQ – Queensland Museum, Museum of Tropical Queensland, Townsville  
NMV – Museum Victoria, Melbourne  
NIWA – National Institute of Water and Atmospheric Research Ltd, Wellington

NMNZ – National Museum of New Zealand, Te Papa Tongarewa, Wellington  
NTM – Museum and Art Gallery of the Northern Territory, Darwin  
QFS – Queensland Fisheries Service (now part of DPI, Brisbane)  
QM – Queensland Museum, Brisbane  
SAM – South Australian Museum, Adelaide  
SafM – South African Museum, Cape Town  
USNM – National Museum of Natural History, Smithsonian Institution, Washington DC  
ZIAS – Zoological Institute, Academy Sciences, Leningrad  
ZMA – Zoological Museum, Amsterdam  
ZMHA – Zoological Museum, Hamburg  
ZMUC – Zoologisk Museum, University of Copenhagen

### Morphological

BL – body length  
RS – robust seta/setae  
PMS – plumose marginal setae

## NAMES

Names for new taxa other than place names and honorifics are derived from Biggs (1990) for Māori names and Brown (1956) for traditional classical names.

Nomenclature for fishes has been sourced entirely from *FishBase* (Froese & Pauly 2002–07).

## MORPHOLOGY

### Body

Body lacking processes with rare exception, such as the males of *Aegiochus vigilans* (Haswell, 1881) (see Bruce 1983) and *Aegiochus webberi* (Nierstrasz, 1931).

### Rostral point

Present in all genera. In *Aega* this is usually a distinct, acute anteriorly directed process, in *Aegiochus* it is ventrally and posteriorly bent and in *Epulaeaga* gen. nov. it is minute and in dorsal view the head may appear to lack a rostral point. In *Rocinela* it is a large flat and anteriorly rounded process. In *Syscenus* and *Xenuraeaga* ranges from moderate to small in size.

### Eyes

Range in size from small (infrequent), cirolanid-like proportions as in *Aegiochus laevis* (Studer, 1884) to huge, filling the entire head as in many species illustrated here. It is notable that in many species the eyes are distinctly dorsal, with ommatidia not extending to the ventral surface, and not lateral as in cirolanids and many other Cymothoidea. In *Aega* the surface of the eye is smooth, while in *Rocinela* the surface of each

ommatidium is distinctly rounded giving a nodular appearance to the eyes.

### Pleon

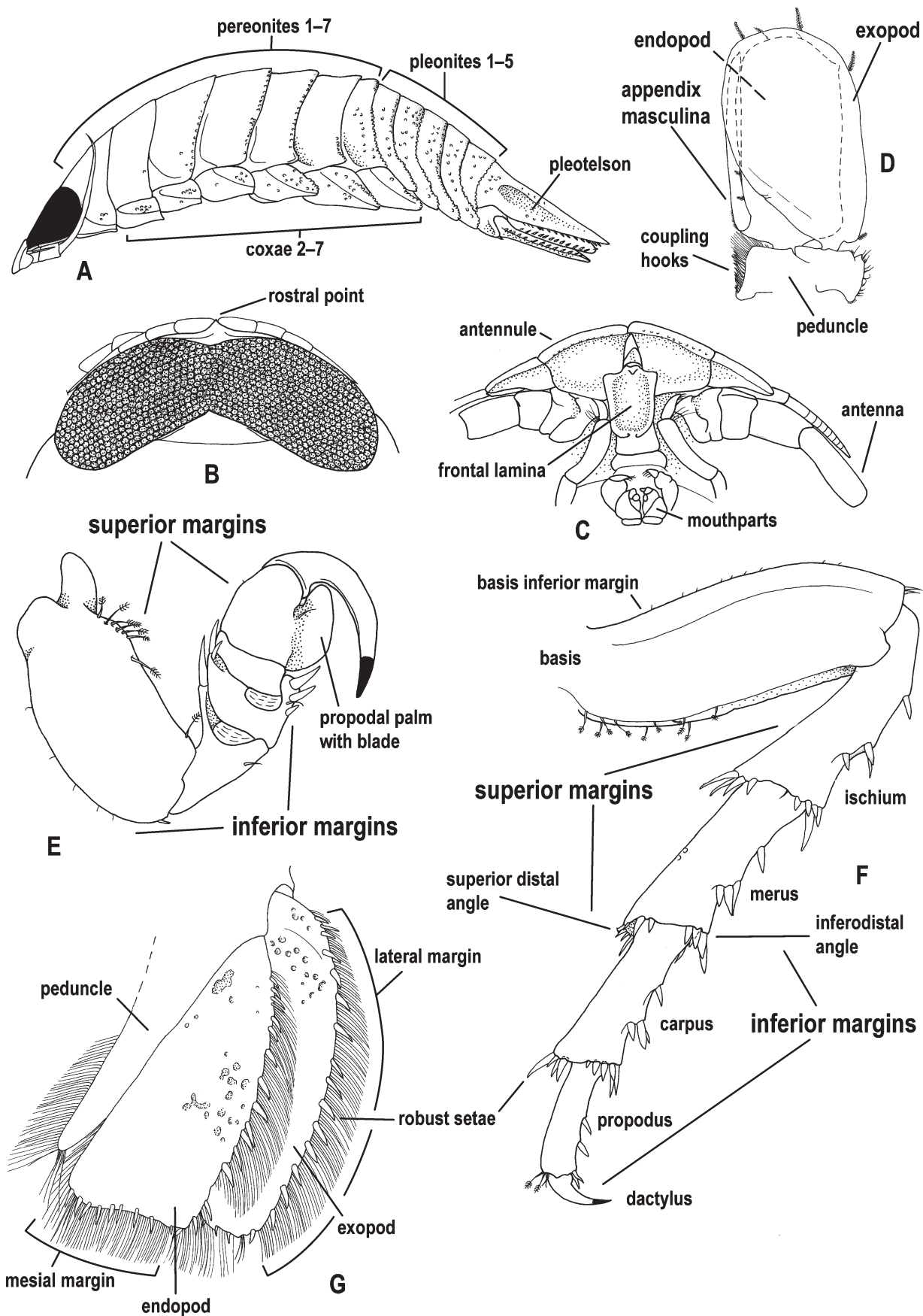
Relatively uniform throughout the family, all genera with five free (not fused) segments. Differences can be observed in the degree of prolongation of pleonite 4 in *Aega* and the extent to which the posterolateral margins are acute.

### Pleotelson

Varies with regard to shape of the margins, setation and ornamentation.

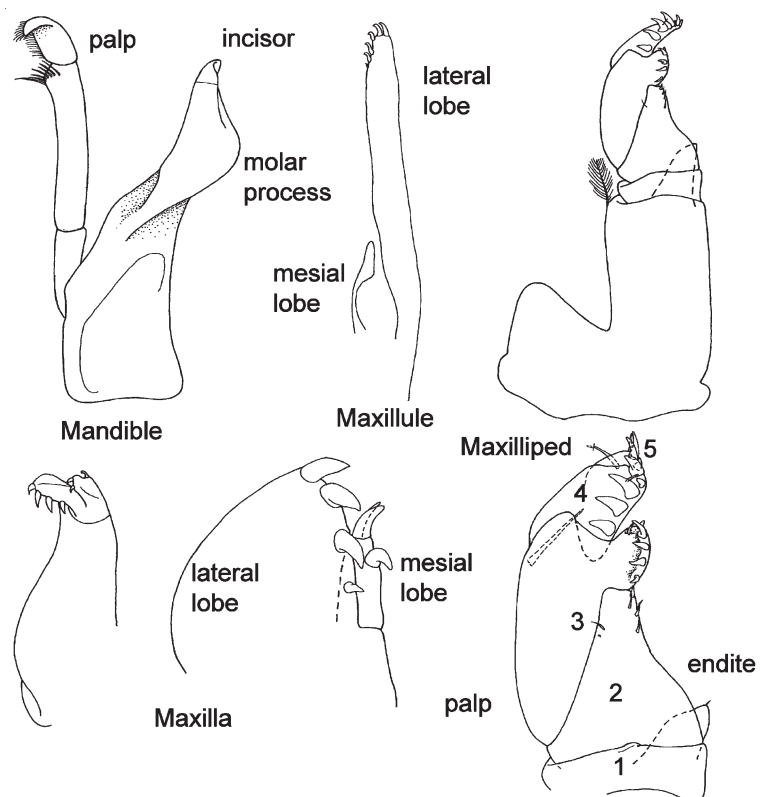
### Antennule and antenna

The antennule differs between genera in the degree of flattening of peduncular articles 1 and 2, the relative extension of the distolateral angle of peduncular article 2, and the relative proportions of peduncular article 3; the length of the flagellum may separate species. The antennal peduncle is relatively uniform, with the first two articles always short; in *Aega* and related genera, peduncular article 3 is also relatively short; in *Rocinela*



**Figure 2.** Terms and positions used in descriptions: A, lateral view; B, dorsal head; C, ventral head; D, pleopod; E, pereopod 1; F, pereopod 7; G, uropod.

**Figure 3.** Terms used in descriptions for mouthparts; maxilliped palp article numbered.



and *Syscenus*, this article is proportionally longer, about twice as long as the preceding article; flagellum length is variable, from longer than the body in *Xenuraega* to a little longer than the peduncle in some species.

### Mouthparts

The mandible is simple, with a narrow, distally acute uni- or bidentate incisor (occasionally weakly tridentate); the molar process is usually present as a small but distinct flat lobe, occasionally serrate (e.g. *Aega vigilans*, see Bruce 1983) and when small it is difficult to observe; the mandible palp is uniform throughout the family, but unusually seems to have the basal article arising from what appears to be a large articulated (non-cuticularised) area giving rise to the appearance of four distinct articles (as misinterpreted by Bruce 1983, 1988). This area is considered to be part of the mandible.

The maxillule is remarkably uniform, and consists of a short simple mesial lobe and the elongate lateral lobe which is provided with 5–10 robust setae. These setae vary from broad-based triangular in shape to slender, and may be hooked, hammer-head or falcate; they are always terminally acute. The mesial lobe is small and often lost in dissection, even from large specimens; this lobe appears to be absent from *Rocinela*, *Syscenus*, and *Xenuraega*, but present or absent in *Aega*, *Aegiochus*, and related genera.

The maxilla is elongate and flattened, with a small distomesial lobe (the basal endite of Brandt & Poore 2003). The distal margin is twisted and bent ventro-

laterally so that illustrations made from slide-mounted preparations never show the true shape. Setaion is uniform with the lateral lobe having 3–5 hooked robust setae, the mesial lobe with 2–4, one of which is usually straight.

The maxilliped palp varies in the number of articles, these differences being diagnostic for different genera. The palp is not flat, being twisted and bent ventrally. In *Aega* and *Aegapheles*, maxilliped palp article 5 is difficult to observe by light microscopy (as evidenced by frequent errors of interpretation in the literature) as it is either largely or wholly concealed by article 4, or can be viewed only from the side. A maxilliped endite is present in most genera, and is usually small, usually provided with small simple setae, occasionally larger with long circumplumose setae (e.g. *Aegiochus riwha* sp. nov.) similar to those of cirrolanids. Critical differences in the setation of maxilliped palp article 5 were observed by Brusca (1983), who used these differences in support of his proposed subgenera *Aega* (*Aega*) and *Aega* (*Rhamphion*). The subgenus *Aega* was defined as having 'stout recurved spines' on maxilliped article 5 with *Rhamphion* having 'long, stout, simple, setae, but rarely recurved spines.' However, these differences have not been found to be sustained on closer examination. Maxillipedal palp article 5 in some species of *Aega* and *Aegapheles* appears partially fused to article 4; in some species all the robust setae are elongate, in others article 5 has both elongate and hooked robust setae.

### Pereopods

These are characteristically robust, as is so for most Cymothoidea. The dactylus of the anterior pereopods (pereopods 1–3) is described as hooked or prehensile, and in most species the dactylus is strongly curved and 1.4 to 1.7 times as long as the propodus, but occasionally only as long as the propodus. In some species the dactylus is weakly prehensile (e.g. *Epulaega derkoma* sp. nov., *Aegiochus riwha* sp. nov. and *Rocinela leptopus* sp. nov.). The anterior pereopods generally have few slender and robust setae, the robust setae in some species being large. The propodus in both *Aega* and *Rocinela* may have a lobe or blade on the inferior margin, which in some species may be large. In *Rocinela* this lobe has prominent robust setae along the free margin. The posterior pereopods (pereopods 4–7) usually lack abundant slender setae and the inferior and distal margins are variously ornamented with robust setae.

### Brood pouch

Uniform throughout the family when details have been recorded, consisting of overlapping oostegites arising from coxae 2–5; without posterior pocket.

### Penes

Either sessile (i.e. opening flush with the surface of sternite 7) or in the form of low tubercles, only occasionally (e.g. *Aegiochus vigilans*) in the form of flat lobes as seen in many cirolanids or sphaeromatids. The penial openings are usually separate, occasionally adjacent to each other, occasionally united.

### Pleopods

Remarkably uniform throughout the family, with useful differences evident in the shape of the rami of pleopod 1, the extent to which the margins carry plumose setae and also the ornamentation of the peduncle; the margins of the rami are usually even or weakly serrate – in a few species there are prominent inter-setal serrations, referred to as digitate in descriptions. The appendix masculina is basal in the *Aega* group of genera, sub-basal in *Rocinela*, and usually simple and straight, often shorter than the endopod, but occasionally longer (notably *Aegiochus vigilans*); it is sometimes sinuate or armed with cuticular scales (e.g. *Aegiochus tiaho* sp. nov. and *Aegiochus kakai* sp. nov.).

### Uropods

Flat and lamellar in all genera except *Xenuraega* which has a filamentous exopod and the endopod reduced to a stub (Bruce 1993a). In most species the plane of the exopod and endopod are about the same, the exopod with the lateral margin weakly tilted dorsally; in *Rocinela* and species of *Aegapheles* gen. nov. the plane of the exopod can be strongly angled. Uropodal margins show a variety of setation patterns, with robust setae nearly always present on all margins in species of *Aega*, less evident in *Rocinela* and *Sysenus*.

## SEXUAL VARIATION IN THE AEGIDAE

In general, other than for the primary sexual characters (penial processes, appendix masculina, oostegites) there is remarkably little difference between males and females. In some species of *Aega*, females, particularly ovigerous females, may have wider body proportions than males, and the maxilla and maxilliped, in *Aega*, become covered in scale-setae, and the characteristic recurved or hooked robust setae are replaced by plumose setae; the characteristic shape of the male maxilliped article 5 is also not shown. For those species that have nodular or other such ornamentation it is more strongly developed in the male. The exception seems to be *Rocinela*, in which mature males may have a broader body shape, more setose maxilliped and, when it has been recorded, uropodal rami with dense marginal setae. *Rocinela* is also unusual that in some species eye size varies with maturity, small juveniles and manca having proportionally larger eyes than do mature specimens. In some females of both *Aega* and *Rocinela* the robust setae of the anterior pereopods become more slender than in the males.

## SIBLING SPECIES 'FLOCKS' WITHIN THE AEGIDAE

Species of Aegidae have often, in the past, been differentiated using conspicuous morphological characters, and sibling species or 'species swarms' such as those of the '*Cirolana parva*-group', or species of the sphaeromatid genus *Oxinasphaera* (e.g. Bruce 1997b, 2004b), have not previously been reported for the family. Many species of Aegidae have been considered to be both variable and widely distributed. Recently, Bruce (2004a) showed that the supposedly globally distributed species *Aegapheles deshaysiana* (Milne Edwards, 1840) was a group of some 21 species, many of which proved, once described, to be distinctive, with only a few of those species being sibling species in the sense of being near identical.

In describing species from the southwestern Pacific it has become increasingly apparent that groups of closely similar species exist within the genera of the Aegidae. It is implicit that an increasing level of fine morphological character discrimination will come into use in order to separate these species. Examples in the present work include the species pair of *Aegiochus beri* (Bruce, 1983) and *Aegiochus riwha* sp. nov., the closely similar species centring around *Aegapheles alazon* (Bruce, 2004), the sibling species related to *Aegiochus coroo* (Bruce, 1983) and *Aegiochus bertrandi* sp. nov., and species related to *Aegiochus plebeia* (Hansen, 1897) and *Aegiochus ventrosa* (M. Sars, 1859). These are some examples, but there are more species groups of this sort. Elucidation of such complexes of species is confounded



by the fact that while some species do have regionally localised ranges, others may be found throughout the major oceans, and sibling species may also be at least partly geographically sympatric.

Sibling species groups within the Aegidae have a characteristic near identical somatic morphology, antennules, antenna, frontal lamina and general appearance of the pleopods. Notwithstanding their overall similarity, these species can be discriminated and

characterised using morphological criteria. Consistent differences are to be found in: the details of pereopod proportions and setation; details, sometimes subtle, in the shape, proportions and setation (size and pattern) of the uropods; and the shape and setation of the posterior margins of the pleotelson. While some of these characters are of a finer resolution than previously used, they are usually found to be highly consistent and species-specific once identified.

## FOSSIL AEGIDAE

There are no unambiguous records of Aegidae in the fossil record. Recently Polz (2005) described and placed *Brunnaega* Polz, 2005 and the sole species *B. roeperi* Polz, 2005 into the Aegidae. The basis for assigning the specimen to the Aegidae appeared to be that the fossil specimen did not fit the diagnosis of *Palaega* Woodward, 1870 (Cirolanidae), but no explanation was given as to why the family Aegidae was considered more appropriate than the Cirolanidae, Corallanidae or Tridentellidae. Most recently described fossil isopods of the Cymothoidea that lack an obviously spinose pleo-

telson posterior margin have been placed in *Cirolana* (see Weider & Feldmann 1992 for a detailed discussion), and consequently most cymothoid genera are placed in the Cirolanidae (e.g. Feldmann & Goolaerts 2005; Wieder & Feldmann 1992), or as 'family uncertain' (Brandt *et al.* 1999). *Brunnaega* is better placed in the Cirolanidae as it agrees well with the form of both fossil and extant species of that family. At present the Aegidae is considered to be not known from the fossil record.

## PHYLOGENY

### ANALYSIS OF AEGA

The Aegidae is one of the large group of families now placed in the recognised paraphyletic Cymothoidea of Brandt and Poore (2003), this superfamily including those families generally known to associate with or parasitise fish during at least one phase of their life history (the Anuropidae being an exception). The relationship of the Aegidae to the other cymothoid families is not clear, some analyses (e.g. Brandt & Poore 2003) placing the family as the sister group to the Cymothoidea plus 'Epicaridea', while molecular analyses suggest the Aegidae could be the sister group to the Cirolanidae (Dreyer & Wägele 2002) or to the Cirolanidae and Corallanidae (Dreyer & Wägele 2001). Wägele (1989) also questioned the monophyly of the Aegidae, as the morphology of the maxilliped palp in the genera *Rocinela* and *Syscenus* is much the same as that of the Cymothoidea. The close relationship between the Cirolanoidea and several families of the Cymothoidea is emphasised by the several species of Aegidae, Corallanidae and Tridentellidae that retain the tridentate mandible incisor, one of the two identified apomorphic states for the Cirolanoidea. It is difficult to homologise lost or reduced morphological character states, and at

present I regard the relationships of families within the Cymothoidea and Cirolanoidea as equivocal.

Until this present revision, *Aega* was a large genus, comprising some 100 species including new species described here. In the course of preparing this monograph it was apparent that there were several 'species groups' within *Aega*. There is a large group of species related to *Aegapheles deshaysiana* (see Bruce 2004a) and a group of species related to *Aega angustata* and *Aega komai*; other perceived groups were those species with digitate pleopod margins (among other characters) such as *Aegiochus coroo* (Bruce, 1983).

Morphological observations suggested that there would be at least one major division within *Aega sensu lato* [as recognised by Brusca (1983) when he established two subgenera], but it was subjectively entirely unclear to what extent other groups within *Aega* could be identified as monophyletic. The monophyly of *Aega* was assumed, although somewhat uncertain as most of the distinguishing character states usually used to define or key the genus, such as the 5-articled maxilliped palp, would generally be regarded as plesiomorphic, as derived reductions of the number of articles to three or

two are known in the superfamily Cymothooidea only from the parasitic Cymothoidae, 'Epicaridea' and the presumably more derived genera of the Aegidae such as *Rocinela* and *Syscenus*. The sole unique apomorphy upholding the monophyly of *Aega* (*sensu lato*) was maxilliped palp articles 3 and 4 with large recurved (i.e. strongly hooked) robust setae.

Fifty-seven species were included in the analysis, being all those fully described for the purposes of this monograph and those described by Bruce (2004a) and Yu and Bruce (2006). Specimens of *Aega antennata*, *A. maxima*, *A. psora*, *A. serripes*, *Aegiochus arctica*, *Aegiochus plebeia*, *Aegiochus ventrosa*, and *Epulaega nodosa* were examined and coded directly to the data set. Species coded from the literature were: *Aegiochus francoisae* (Wetzer, 1990), *Aegiochus lethrina* (Bruce, 1983) (and one specimen), *Aegiochus leptonica* (Bruce, 1988); and *Aega falcata* Kensley and Chan, 2001. All other species were considered inadequately described for purposes of this analysis.

### Outgroup

A preliminary analysis of the genera of Aegidae, using key characters as character states, was run using the phylogenetic analysis program PAUP\* 4.0b10 (Swofford 2004) in order to assess potential sister-group relationships. Results indicated that *Aega sensu lato* was the sister group to all other genera, with *Rocinela* + *Alitropus* the sister group to *Syscenus* + *Xenuraega*, a plausible working hypothesis. The final analysis was executed with *Tridentella* as the outgroup, because that family is the sister group to the clade Aegidae-Cymothoidae-'Epicaridea' of Brandt and Poore (2003). A particular coding difficulty was that within the Aegidae only *Aega* (*sensu lato*) has a 5-articled maxilliped palp, and so the different maxilliped states for palp articles 4 and 5 could not be coded against any aegid genus.

### Cladistic analysis

The data set used was derived from the descriptive DELTA character set, and modified to code all characters as unordered (i.e. reversible); multistate characters were treated as polymorphic. Most proportional characters were omitted; details of robust setae on the posterior pereopods were largely omitted. Nexus files were generated using DELTA. The data set consisted of 58 taxa (including single outgroup taxon) and 75 characters. The analyses used PAUP\* (version 4.0b.10, Swofford 2004). A heuristic search was run using the treespace search method (hs addseq=random nchuck=3 chuckscore=1 nreps=500 randomize=trees). Resolution of the resultant trees was achieved through the use of the 'reweight' using the same constraints.

Parsimony jackknifing method in PAUP\* was used to assess relative support for major clades.

Characters are largely discussed in the section 'Morphology' (p. 10), and specific states given in the character list.

### Results

A total 15,042 equally parsimonious trees of tree length 608 was obtained, with a consistency index of 0.2122, homoplasy index of 0.7878 and retention index of 0.6617. The strict consensus tree (Fig. 4) and majority rule tree (Fig. 5) show two major clades, both with further resolution. The large number of trees generated is indicative of a high level of instability in the higher clades. The basal clades have a high level of stability with the three basal clades in the strict consensus (Fig. 4) tree having jackknife support values of 98% (*Aega* + *Aegapheles*) and 83% (*Aegiochus*) 70% (*Epulaega*) respectively. The 50% majority rule tree (Fig. 4) shows that the major groupings are maintained, with significant further structure. Use of the reweight method of PAUP\* resulted in a single fully resolved tree (Fig. 6), and the discussion of the clades focuses on the basal branches, the more terminal branches showing considerable instability.

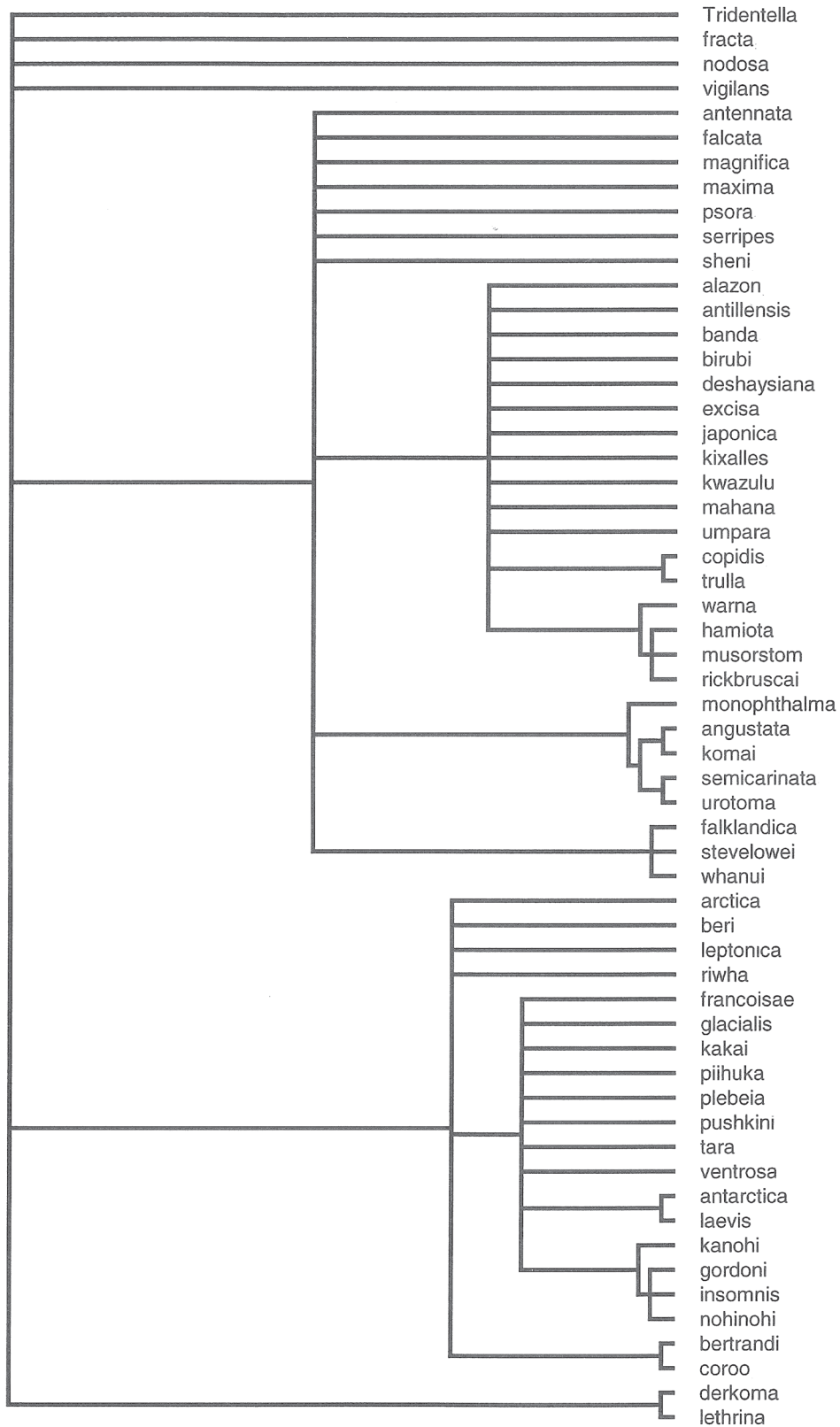
### Discussion of clades

There is a basal division (clades 1 and 2) of all species of *Aega sensu lato* that confirms the division recognised by Brusca (1983). These two clades each split into two clades that are here recognised as *Aega* (clade 4), *Aegapheles* gen. nov. (clade 3), *Aegiochus* (clade 5) and *Epulaega* gen. nov. (clade 6).

**Clade 1** is supported by four apomorphic states: the rostrum projecting anteriorly (Ch 3.2), antennule peduncle dorsoventrally flattened and expanded variously from weakly to strongly (Ch 18.2.3.4), maxilliped palp article 5 is wide (Ch 37.3) and pleopod 1 endopod 1 is subtruncate (Ch 53.2—with homoplasious occurrence in *Aegiochus vigilans* and *Epulaega fracta*). Most species in this clade lack a mandibular molar process (Ch 29.2) and have a relatively short antennule flagellum (Ch 21.2).

**Clade 2** has three defining apomorphies: the distal margin of the maxillule has three large robust setae and several small robust setae (Ch 30.3) with one homoplasious occurrence in *Aega magnifica*) and the principal robust setae are broad-based (Ch 31.2), and the uropodal rami are acute (Ch 67.3); most species have a straight lateral margin of the uropodal exopod.

**Clade 3** comprises the species here placed in the *Aegapheles* gen. nov., the defining apomorphies being the elongate point to the pleotelson apex (Ch 16.4) which also extends beyond the distal extremity of the uropodal rami. The uropodal rami are not coplanar (Ch



**Figure 4.** Clades in *Aega*: Strict consensus tree.

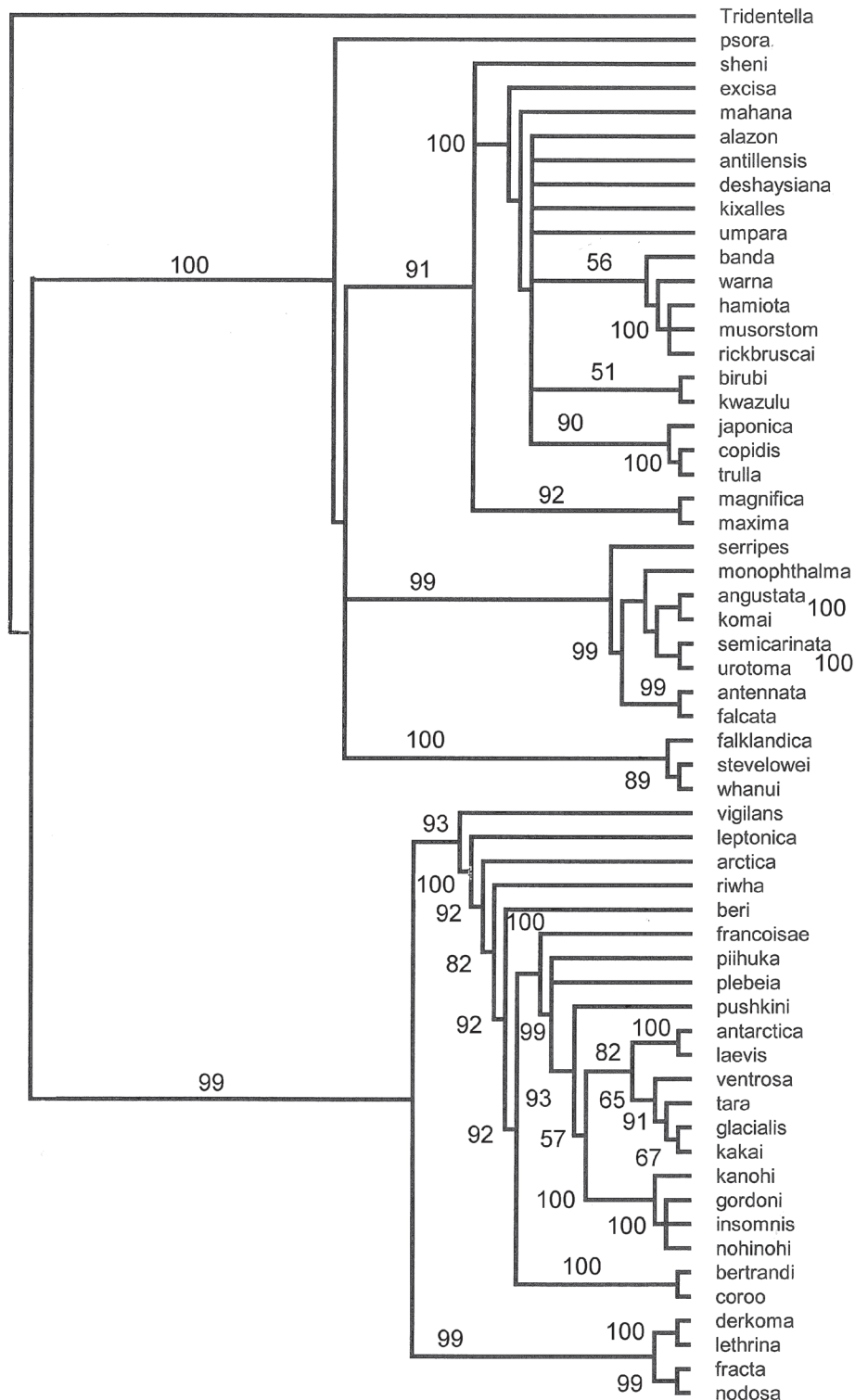


Figure 5. Clades in *Aega*: 50% majority rule; jackknife values.

64.2) with the plane of the exopod held at an oblique angle to the endopod (unique within clade 1, but with homoplasious occurrence with *Rocinela*). The uropodal endopod distolateral margin has 4 to 9 robust setae (Ch 73.3). In addition the uropodal endopod lateral margin is excised, varying from weakly to strongly or 'falcate'

(Ch 69 2.3), but this character state occurs in clade 11 (see discussion for clade 11).

**Clade 4** comprises the species here considered to belong to *Aega sensu lato*, the characterising apomorphies being the frontal lamina posterior margin not clearly defined (Ch 26.2) and having sub-

parallel lateral margins (Ch 28.2) or widest posteriorly (Ch 28.4). The former has some homoplasious occurrence in *Aegapheles*, namely in *A. excisa*, *A. mahana* sp. nov. and *A. umpara*. The latter character is reversed in the clade *Aega antennata*–*Aega falcata*. Clade 4 divides into three clades (clades 8, 9 and 10), and these are discussed in detail below; see also ‘general remarks’ (below).

**Clade 5** constitutes *Aegiochus sensu lato*, and is upheld by a single apomorphic character state—a serrate pleotelson posterior margin (Ch 15.3). Additional states are the carpus of pereopods 2 and 3 with 1 or 2 large robust setae (Ch 46.2), and most species have an acute appendix masculina (Ch 58.2) although there are five apparent reversals, possibly owing to the males not being fully mature.

Within clade 5 there is the single-species clade of *Aegiochus vigilans*, sister clade to *Aegiochus*. This clade could warrant the establishment of a monotypic genus for *A. vigilans*. The species shows the apparent retention of some cirolanid-like characters, such as the morphology of the frontal lamina and clypeus, a tridentate mandibular incisor and a relatively large molar process that has marginal teeth. The mature males develop three large processes, one being the rostrum, two arising from the anterior margin of pereonite 1. This character in conjunction with the extremely long appendix masculina set on a posteromesial lobe are two unique states within the family, but it is far from certain that they be considered as of generic level (rather than species-level). Cephalic and pereopodal processes in related families such as the Cirolanidae and Corallanidae have not generally proved to be of generic merit, and the appendix masculina is often of variable length within genera; these two characters are considered too weak to use as reliable generic apomorphies within the family Aegidae. There are numerous undescribed species of Aegidae, and the resolution of both major clades could change with further data; at this point a new genus is not proposed.

**Clade 6** is *Epulaega* gen. nov., which is upheld by maxilliped palp article 5 being minute (Ch 37.4) and fused penial processes (Ch 49.3).

**Clade 7** is *Aegiochus sensu strictu*, excluding *A. vigilans*, and is upheld by the rostrum separating the antennule bases in dorsal view (Ch 5.2) and maxilliped palp article 5 is subrectangular and longer than wide (Ch 37.2). In this clade the rostrum is either ventrally directed (Ch 3.1—*A. bertrandi*–*A. coroo* clade) or ventrally directed and posteriorly folded (Ch 3.3—all other species). All species within this clade have one small robust seta on the inferior margin of the merus.

**Clade 8 (and 9 and 10)** includes the species here considered as *Aega sensu strictu* (excluding the species of clade 11). The clade is upheld by one state, that of antennule peduncle article 3 being less than half as

wide as article 2 (Ch 20.2). Clade 9 lacks explicit apomorphies, but within this group there are two well-defined species pairs, each of which represent several more described and undescribed species. The clade *A. angustata*–*A. komai* is highly distinctive, and supported by several apomorphic states, these being the distal longitudinal carina on the pleotelson (Ch 12.3), the deeply serrate pleotelson posterior margin (Ch 15.4), pereopod 1 merus thickened (with one homoplasious occurrence in *A. falcata*) (Ch 39.2) and deeply serrate uropod margins (Ch 74.3); all species also have short, flat penial lobes, although this is not unique. One other named species (*Aega dofleini*) and several undescribed species belong to this clade on the basis of these recognised apomorphies. The clade *A. antennata*–*A. falcata* is supported by the unique antennule morphology, with peduncle article 1 being strongly anteriorly produced (Ch 19.2) and the rostrum not separating antennule bases (Ch 5.1) (the antennule bases are divergent). There are at least a further three undescribed species that belong to this clade. The sister clade to the *A. antennata*–*A. falcata* clade is the *A. semicarinata*–*urotoma*–*angustata*–*komai* clade, supported by the very large robust setae that oppose the dactylus of pereopod 2 or 2 and 3 (Ch 47.2).

**Clade 10** is weakly characterised, with only homoplasious states (Ch 2.2, 18.3, and 58.2).

**Clade 11** is potentially unstable—in all trees except for the reweighted tree (Fig. 6) clade 11 clades with clade 3 (*Aegapheles*; see Figs 3–5). The character state that is shared with clade 3 is the falcate or excised lateral margin of the uropodal endopod. The species in clade 11 lack the produced pleotelson apex (Ch 16.4), the posterior margin forming a caudomedial point (Ch 16.2); the uropodal rami are coplanar (Ch 64.1); and there are few robust setae on the uropodal endopod lateral margin (Ch 72.1, 73.1). In the reweighted tree these species clade as the sister group to *Aega*. On present data I regard the generic placement of the species in clade 11 as equivocal.

## General remarks

There is strong support for the basal clades, and for the genera here recognised. This analysis can be regarded only as a first assessment, based on a relatively limited data set. It is possible that with description of additional species within clade 4 (*Aega sensu lato*) a greater clarification of relationships within that clade may be achieved. In particular, the highly distinctive clades *A. antennata*–*A. falcata* and *A. angusta*–*A. komai* each have several undescribed species. Further data may allow more confident resolution of the position of clade 11. Further resolution of clade 5 may also allow for the establishment of a new genus for *Aegiochus vigilans* (no similar but undescribed species exist to my knowledge), although the unity of clade 7 (*Aegiochus*)

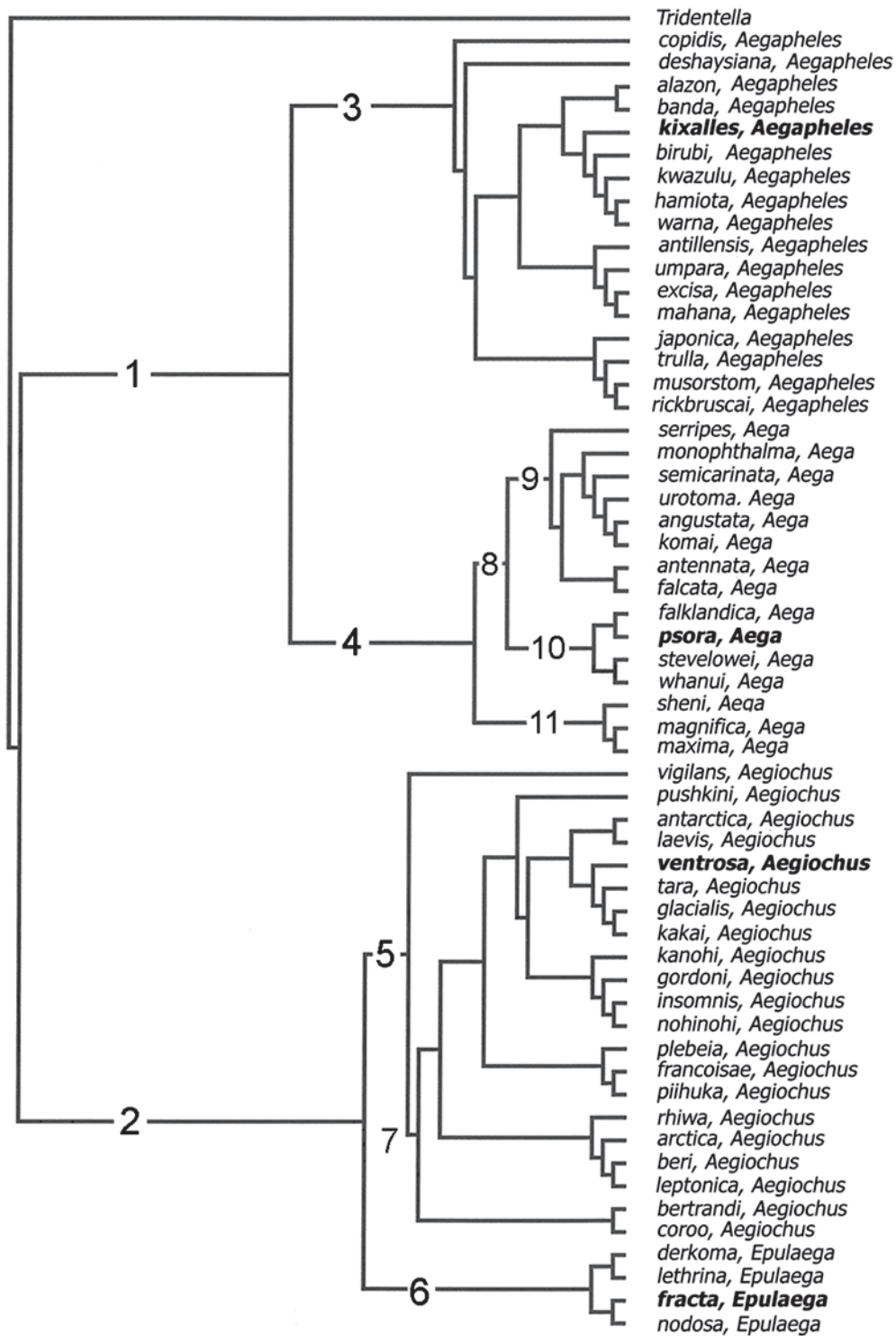


Figure 6. Clades in *Aega*: successively weighted; type species in bold.

## CHARACTER LIST FOR *AEGA*

### Body characters

1. *Dorsal surfaces*: 1. smooth or polished; 2. punctuate; 3. heavily pitted.
2. *Lateral margins*: 1. ovate; 2. subparallel.
3. *Rostral point*: 1. ventrally directed, not projecting, not folded; 2. projecting anteriorly, not ventrally folded; 3. folded ventrally and posteriorly.
4. *Rostral point*: 1. minute; 2. prominent.
5. *Rostral point*: 1. does not separate antennule bases (in dorsal view); 2. separates bases (in dorsal view).
6. *Eyes*: 1. small (separated by more than 40% width of head); 2. large, not medially united; 3. large, medially united.
7. *Pereonite 1 and coxae 2–3* each with posteroventral angle: 1. without produced point; 2. with small distinct produced point.
8. *Coxae 5–7*, posterior margins: 1. convex; 2. straight; 3. concave; 4. sinuate.
9. *Coxae 5–7*, posterolateral angle: 1. acute (less than 45°); 2. blunt (more than 45°); 3. rounded.
10. *Pleonite 4* posterolateral margins: 1. not extending to posterior margin of pleonite 5; 2. extending to but not beyond posterior margin of pleonite 5; 3. extending clearly beyond posterior margin of pleonite 5.
11. *Pleonite 5* posterolateral angles: 1. overlapped by lateral margins of pleonite 4; 2. free, not overlapped by lateral margins of pleonite 4.
12. *Pleotelson dorsal surface*: 1. with longitudinal carina only distally; 2. without longitudinal carina; 3. with longitudinal carina.
13. *Pleotelson dorsal surface*: 1. without submedian depressions; 2. anteriorly with 2 submedian depressions; 3. posteriorly with 2 submedian depressions.
14. *Pleotelson lateral margins*: 1. convex; 2. straight; 3. sinuate.
15. *Pleotelson marginal ornamentation*: 1. smooth; 2. crenulated; 3. serrate; 4. deeply serrate.
16. *Pleotelson posterior margin*: 1. evenly rounded; 2. converging to caudomedial point; 3. sub-truncate (including emarginate); 4. with elongate medial point; 5. with median excision.
17. *Pleotelson, maximal robust setae*: 1. without RS; 2. with 2 to 6 RS; 3. with 7 to 10 RS; 4. with 11 to 14 RS; 5. with 15 or more RS.

### Antennule and antenna

18. *Antennule peduncle articles 1 and 2*: 1. slender, cylindrical, article 2 without distal lobe; 2. flattened, article 2 without anterodistal lobe or weak lobe; 3. flattened, article 2 anterodistal lobe not extending beyond mid-point of article 3; 4. flattened, article 2 anterodistal lobe extending to end of article 3.
19. *Antennule peduncle articles 1 and 2*: 1. not anteriorly produced; 2. anteriorly produced.
20. *Antennule peduncle article 3*: 1. more than half as wide as article 2; 2. less than half as wide as article 2.
21. *Antennule flagellum*: 1. 'long', extending posteriorly beyond head; 2. 'short', not extending posteriorly beyond head.

22. *Antenna peduncle article 2* inferior surface: 1. without longitudinal suture; 2. with indistinct groove; 3. with distinct longitudinal suture.
23. *Antenna peduncle article 4*: 1. without deep longitudinal groove; 2. with deep longitudinal groove.
24. *Antenna peduncle article 5*: 1. not markedly wider or flatter than article 4; 2. flattened and expanded.
25. *Antenna flagellum*: 1. 'long', extending beyond pereonite 2; 2. 'short', not extending beyond pereonite 2.

### Frontal lamina and mouthparts

26. *Frontal lamina*: 1. slender, reduced or absent; 2. posterior margin not clearly defined; 3. posterior margin clearly defined; 4. posterior margin free, forming a projecting 'blade'.
27. *Frontal lamina posterior margin*: 1. posteriorly abutting clypeus; 2. not abutting clypeus; 2. with narrow posterior stem.
28. *Frontal lamina lateral margins*: 1. diverging towards anterior; 2. sub-parallel; 3. narrowing posteriorly; 4. widest posteriorly.
29. *Mandible molar process*: 1. present, small distinct flat lobe; 2. absent.
30. *Maxillule* with: 1. several (6–8) distally hooked robust setae progressively increasing in size laterally; 2. 1 large and several (3–5) small straight or weakly hooked robust setae; 3. 3 large and several (3–5) small robust setae.
31. *Maxillule principal RS*: 1. narrow-based, slender, distally hooked; 2. wide-based, broad, distally acute or weakly hooked.
32. *Maxilla mesial lobe setae*: 1. 1 robust seta; 2. 2 robust setae; 3. 3 robust setae; 4. 4 robust setae; 5. 5 robust setae.
33. *Maxilla mesial lobe setae*: 1. simple; 2. both simple and serrate; 3. serrate or plumose.
34. *Maxilliped article 3 robust setae*: 1. narrow-based, elongate, straight or weakly curved; 2. broad-based, hooked.
35. *Maxilliped palp article 4 hooked RS*: 1. all large or becoming progressively larger distally; 2. penultimate RS distinctly smaller than adjacent RS.
36. *Maxilliped palp article 5*: 1. articulating with article 4; 2. partly fused to article 4; 3. wholly fused to article 4.
37. *Maxilliped palp article 5 shape*: 1. longer than wide, distally rounded <basally wide>; 2. longer than wide, sub-rectangular <basally narrow>; 3. wider than long, distally convex; 4. small subcircular lobe.
38. *Maxilliped palp article 5 robust setae*: 1. serrate (or simple and serrate), elongate, appearing flexible; 2. simple, stiff, weakly curved or straight.

### Pereopods

39. *Pereopod 1 merus inferior margin*: 1. not convex and thickened; 2. convex and thickened.
40. *Pereopod 1 merus inferior margin*: 1. with robust setae; 2. without robust setae.
41. *Pereopods 2 and 3, merus inferior margin*: 1. with large RS; 2. with small RS; 3. RS absent.
42. *Pereopod 1 carpus inferodistal angle*: 1. with RS; 2. without RS.
43. *Pereopod 1 (2 and 3) propodus inferior margin (palm)*: 1. with 1 or more RS; 2. without RS.

44. *Pereopod 1 propodal palm*: 1. simple, without blade or distal lobe; 2. with small digitate distal lobe (no RS; rounded in sections); 3. with inferodistal margin produced (with RS); 4. with flat blade or broad lobe.
45. *Pereopod 2 merus inferior margin RS set as*: 1. two (or three) discontinuous groups; 2. single row or rows.
46. *Pereopods 2 and 3 carpus inferodistal angle*: 1. without RS or single small RS; 2. with 1 or 2 large RS.
47. *Pereopod 2 or 3 propodus*: 1. without large club-shaped distal robust seta; 2. with large club-shaped distal robust seta.
48. *Pereopods 5–7 inferior margins of ischium–carpus*: 1. with short robust setae; 2. with long acute robust setae.

### Penes

49. *Penial processes or openings*: 1. set apart; 2. mutually adjacent; 3. fused or united.
50. *Penes*: 1. low tubercles; 2. opening flush with surface of sternite 7; 3. short lobes.

### Pleopods

51. *Pleopod 1 exopod distally*: 1. broadly rounded; 2. narrowly rounded, mesial margin weakly to strongly oblique.
52. *Pleopod 1 exopod mesial margin with PMS*: 1. on distal one-third; 2. on distal half; 3. on distal two-thirds; 4. on entire margin.
53. *Pleopod 1 endopod distally*: 1. rounded; 2. subtruncate.
54. *Pleopod 1 endopod lateral margin with PMS from*: 1. on distal margin only; 2. distal one-third; 3. distal half.
55. *Pleopod 1 endopod mesial margin with PMS on*: 1. distal one-third; 2. distal half; 3. distal two-thirds; 4. entire margin; 5. distal margin only.
56. *Pleopod 2 appendix masculina*: 1. with straight margins; 2. basally swollen.
57. *Pleopod 2 appendix masculina*: 1. extending to or beyond distal margin of ramus; 2. not extending to distal margin of ramus.
58. *Pleopod 2 appendix masculina*: 1. distally bluntly or narrowly rounded; 2. distally acute; 3. distally obliquely truncate.
59. *Appendix masculina*: 1. without acute cuticular scales; 2. with acute cuticular scales.
60. *Exopods of pleopods 1–3 each with distolateral margin*: 1. not digitate; 2. digitate.
61. *Endopods of pleopods 3–5 each*: 1. without distolateral point; 2. with distolateral point.
62. *Pleopods 2–5 peduncle distolateral margin*: 1. without prominent acute RS; 2. with prominent acute RS.

### Uropods

63. *Uropod peduncle posterior lobe about*: 1. 'short' one-third as long as endopod; 2. one-half to two-thirds as long as endopod; 3. 'long' two-thirds or longer than endopod length.
64. *Uropod rami*: 1. with endopod and exopod co-planar; 2. not co-planar, exopod at angle of about 135° to endopod.

65. *Uropod rami*: 1. extending to pleotelson apex; 2. not extending beyond pleotelson; 3. extending beyond pleotelson.
66. *Uropod rami marginal setae*: 1. in single tier; 2. in two or three tiers; 3. dense, in several tiers.
67. *Uropod rami apices*: 1. narrowly rounded; 2. broadly rounded; 3. acute.
68. *Uropod rami apically*: 1. not bifid; 2. bifid.
69. *Uropod endopod lateral margin*: 1. without prominent excision; 2. falcate; 3. with prominent excision.
70. *Uropod endopod lateral proximal margin*: 1. convex; 2. straight.
71. *Uropod endopod lateral distal margin*: 1. convex; 2. straight; 3. concave.
72. *Uropod endopod proximal lateral margin with*: 1. 0 or 1 robust setae; 2. 2 to 6 (or more) robust setae.
73. *Uropod endopod distal lateral margin with*: 1. 0 or 1 robust setae; 2. 2 or 3 robust setae; 3. 4 to 9 robust setae.
74. *Uropod endopod mesial margin*: 1. even, weakly or strongly convex; 2. sinuate; 3. deeply serrate.
75. *Uropod exopod*: 1. not extending to end of endopod; 2. extending to end of endopod; 3. extending beyond end of endopod.

## ANALYSIS OF AEGIDAE

The Aegidae White, 1850, is a long established family, the unity of which has rarely been questioned. Brandt and Poore (2003, p. 898) rightly mention that '*though these families are relatively easily recognisable, undisputed synapomorphies are not revealed in the literature*'. Wägele (1989, fig. 93) suggested that the family might be paraphyletic, referring to a 'Gruppe Aega' (consisting solely of the genus *Aega*), that being the sister group to a clade containing 'Gruppe Rocinela' together with the Cymothoidae and the Epicaridea. Brusca and Wilson (1991) disagreed with that interpretation, which had been based on the reduction of the articles of the maxilliped palp, considering such reductions as a common homoplasious adaptation to parasitism. Brusca and Wilson's analysis and matrix equally failed to identify synapomorphies to uphold the Aegidae (I accept that this was not their intention), the Aegidae coding identically to the Cymothoidae in that analysis. In the more recent analysis of Brandt and Poore (2003), the only apomorphic state identified that separates the Aegidae from the Cymothoidae is the presence of marginal setae on both rami of pleopods 3 and 4; this is a relatively weak character given that this is the state for the large families Cirolanidae, Corallanidae and also the Tridentellidae, and also that the Aegidae is polymorphic for that character, with many species having the setae on endopods of pleopods 3 and 4 either reduced or absent. Loss of marginal setae on pleopods 3 and 4 is a highly homoplasious character in the Cymothoidae associated with both freshwater habitats (Cirolanidae) and commensal or symbiotic life history (other families).



Traditionally the Aegidae have been characterised in keys and diagnoses as having ‘prehensile’ pereopods 1–3, or pereopods 1–3 with hooked dactylus, and having ‘hooks’ or hooked ‘spines’ on the maxilliped palp (e.g. Bruce 1993b; Kensley & Schotte 1989; Wetzler & Brusca 1997), although Bruce (1993b) also referred to the bilobed maxilla with a small mesial lobe. This character, the maxilla being a simple broad plate with a distomesial lobe, is unique to the Aegidae and Cymothoidae, with a single homoplasious occurrence in the sphaeromatoid genus *Paravireia* Chilton, 1925 (see Brökeland *et al.* 2001). The Aegidae, Cymothoidae and Tridentellidae also share an elongate maxillule that is terminated by prominent, flat, incisory robust setae, these often being referred to as hooked though that is rarely the case.

What then does uphold the monophyly of the Aegidae? The Cymothoidae have prehensile dactyli on pereopods 1–7, but ambulatory pereopods 4–7 would generally be regarded as the plesiomorphic state within the Cymothoidae. A principal uniting character remains the maxilliped palp of five to three articles, with articles 2–4 provided with prominent and usually recurved robust setae. The Cymothoidae have maxilliped palp articles 1 and 2 indistinguishably fused, and the axis of palp article 2 is strongly oblique to article 1. In contrast the Aegidae have between 2 and 5 maxilliped palp articles, with *Syscenus* being polymorphic with 2 or 3 maxilliped palp articles (see figures in Bruce 2005).

Eye size was not a character considered in previous analyses (Wägele 1989, Brusca & Wilson 1991, Brandt & Poore 2003), but the Aegidae with few exceptions have large eyes, in *Aega* and *Aegiochus* these often being imperceptibly united medially. Eye reduction or loss is a common convergent state among parasites, cave and groundwater crustaceans, and deep-sea fauna. Enlargement of the eyes is, in contrast, rare and cannot be dismissed as a convergent or homoplasious character state. Although this condition occurs in some species of Corallanidae (see Delaney 1989) and Tridentellidae, it is most highly developed in the Aegidae, with those species with the smallest eyes having eyes considerably larger than, for example, those of cirolanids or sphaeromatids.

The character states that support the monophyly of the Aegidae are therefore the unique large eye size, in conjunction with a styliform maxillule with mesial robust setae (only terminal robust setae in the Cymothoidae) and the maxilla having one basal endite. The characters of ‘prehensile’ pereopods 1–3 and hooked robust setae on the maxilliped palp are accurate but not unique to the Aegidae (both states effectively occurring in the Cymothoidae).

## Results

A heuristic search was conducted, all characters unordered. The data set consisted of nine taxa (including single outgroup taxon) and 30 characters. A single fully resolved tree (Fig. 7) resulted.

*Epulaega* presents as the sister group to the remainder of the Aegidae, the genus being upheld by the vestigial maxilliped palp article 5 (Ch 23.3) and the autapomorphic fused penial processes; the remaining genera are defined by having a dorsal rostrum (Ch 3.2), and separate into two clades, the *Aegiochus*–*Aega*–*Aegapheles* clade, which is supported by a large and acute rostrum (Ch 5.3) and the *Alitropus* – *Xenuraega* clade, upheld by numerous apomorphic states, notably the unicuspid (or absent) mandible incisor (Ch 17.3), lack of maxilliped endite (Ch 20.2), maxilliped palp with articles 1 and 2 indivisibly fused, consisting of two or three articles (Ch 21.2/3) with the major terminal article oblique to the axis of the maxilliped basal article, sub-basal appendix masculina (Ch 26.2), endopods of pleopods 3 and 4 smaller than exopods (Ch 27.2) and uropod rami distally rounded (Ch 29.2).

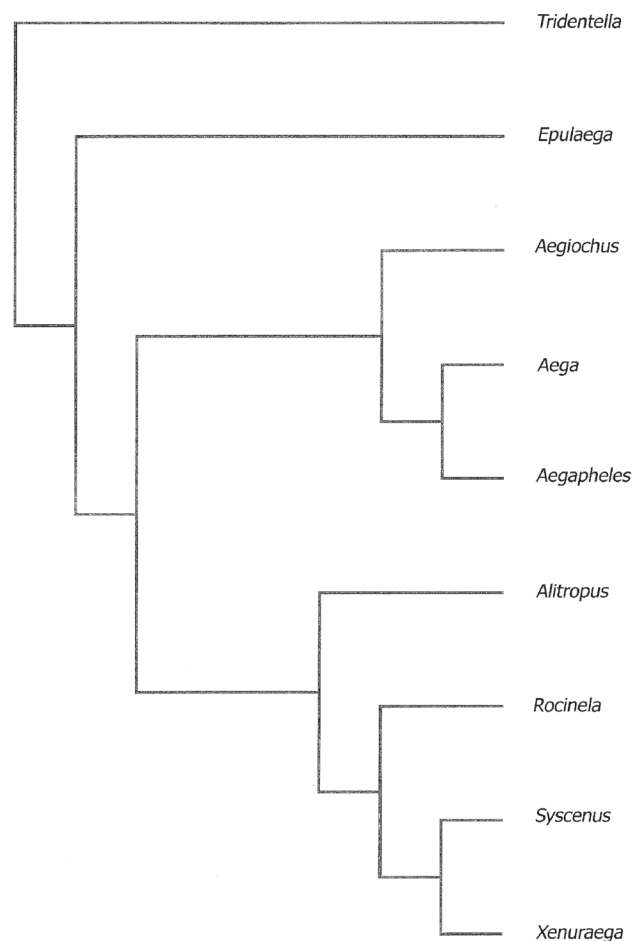


Figure 7. Cladogram of the genera of Aegidae with *Tridentella* as the outgroup.

The *Aega-Aegapheles* clade is upheld by the flattened antennule peduncle article (Ch 12.2), frontal lamina wide and posteriorly separate from the clypeus (Ch 16.2), and the endopods of pleopods 3 and 4 with few setae at the distomesial angle only (Ch 28.2). *Aegiochus* is characterised by the quadrate maxilliped palp article 5 (Ch 23.2) and the rostrum clearly separating the antennule bases (Ch 10.2).

The *Rocinela-Syscenus-Xenuraega* clade is supported by antennule peduncle articles 1 and 2 elongate (Ch 11.2), antenna peduncle article 5 longest (Ch 13.2), and the maxillule lacking small mesial robust setae (Ch 18.2). The clade *Syscenus-Xenuraega* is defined by the head not being laterally overlapped by pereonite 1 (Ch 2.2), the pleon distinctly narrower than the pereon and pleonite 5 with the lateral margins entirely free (Ch 7.2).

#### CHARACTER LIST FOR AEGIDAE

1. *Body*: 1. dorsally vaulted; 2. dorsally depressed.
2. *Head*: 1. overlapped laterally by anterior angles of pereonite 1; 2. not overlapped laterally by anterior angles of pereonite 1.
3. *Rostral point size*: 1. small, scarcely or not visible in dorsal view; 2. large, prominent in dorsal view.
4. *Rostral point position*: 1. anteroventral; 2. dorsal.
5. *Rostral point apex shape*: 1. narrowly rounded; 2. broadly rounded; 3. acute.
6. *Coxae 5-7*: 1. as long or longer than respective pereonite; 2. shorter than respective pereonite.
7. *Pleon*: 1. not distinctly narrower than pereonite 7; 2. distinctly narrower than pereonite 7.
8. *Pleonite 5*: 1. lateral margins largely or wholly overlapped by pleonite 4; 2. lateral margins free.
9. *Eyes*: 1. normal in size <cirolanid size>; 2. large, occupying 50% or more of head; 3. absent.
10. *Antennules, peduncle article 1*: 1. close set or together; 2. separated by rostrum.
11. *Antennule peduncle*: 1, articles 1 and 2 short <shorter than to as long as wide>; 2, articles 1 and 2 elongate <longer than wide>.
12. *Antennule peduncle articles 1 and 2*: 1. cylindrical; 2. dorsoventrally flattened.
13. *Antennal peduncle*: 1. articles 1-3 short, 4 and 5 longest; 2. articles 1 and 2 short, 5 longest.
14. *Antenna peduncle articles 4 or 4 and 5*: 1. without long plumose setae; 2. with long plumose setae.
15. *Frontal lamina*: 1. wide <3 × long as wide to wider than long>; 2. slender, elongate.
16. *Frontal lamina*: 1. posterior margin wide, against clypeus; 2. posteriorly wide, separate from clypeus; 3. posteriorly narrow, forming stem.
17. *Mandible incisor*: 1. tricuspid; 2. bicuspid; 3. unicuspid; 4. lacking incisor.
18. *Maxillule*: 1. with small and large mesial robust setae; 2. without small mesial robust setae.
19. *Maxillule distal setae*: 1. slender only; 2. broad-based triangular <and slender>.
20. *Maxilliped endite*: 1. present; 2. absent.
21. *Maxilliped palp articles*: 1. 5-articled; 2. 3-articled; 3. 2-articled.
22. *Maxilliped palp articles 3 and 4*: 1. without hooked RS; 2. with hooked RS.
23. *Maxilliped palp article 5*: 1. rectangular, longer than wide; 2. distally rounded, wider than long; 3. vestigial, short lobe.
24. *Maxilliped palp*: 1. article 1 present; 2. article 1 indivisibly fused.
25. *Penial processes*: 1. flat lobes; 2. flush <includes 'papillae'>.
26. *Pleopod 2 appendix masculina*: 1. inserted basally; 2. inserted sub-basally.
27. *Pleopods 3 and 4 endopods*: 1. same size as exopod; 2. smaller than exopod.
28. *Pleopods 3 and 4 endopods*: 1. with PMS; 2. with few PMS at distolateral angle only; 3. without PMS.
29. *Uropodal rami*: 1. with distinct apex; 2. rounded, without distinct apex.
30. *Uropod rami <orientation>*: 1. coplanar; 2. exopod at oblique angle to endopod.

## TAXONOMY

### SUBORDER CYMOTHOIDA WÄGELE, 1989

Brandt and Poore (2003) provided a new classification for the non-asellotan isopods (the 'former Flabellifera') based on a thorough character analysis, and recognised the subordinal separation of, among others, the Cymothoidea Wägele, 1989 from the Sphaeromatidea Wägele, 1989, as had earlier been proposed by Wägele (1989). That classification is followed here.

### REVALIDATION AND DIAGNOSIS TO BARYBROTIDAE HANSEN, 1890

#### *Barybrotidae* Hansen, 1890

*Barybrotidae* Hansen, 1890: 166.– Monod, 1934: 10.

**DIAGNOSIS:** Body evenly vaulted. Eyes dorso-lateral, large. Antennae and antennule well developed; division between peduncle and flagellum distinct; flagellae multi-articulate. Antennule shorter than antenna. Frontal lamina present, abutting clypeus; clypeus and labrum present. Mouthparts forming buccal cone. Mandible incisor broad, incisor tridentate; molar process present, lamellar; lacinia mobilis and spine row absent, represented by 1 or 2 setae. Maxillule styliform, with flattened terminal RS. Maxilla a simple minute lobe, lacking RS. Maxilliped endite absent; palp with 4 articles, article 2 elongate, about 2.9 times proximal width, articles 2–4 with hooked RS. Pereopods robust; pereopods 1–3 with prehensile dactylus, about as long or longer than propodus; superior distal angles of ischium and merus strongly produced and setose. Pereopods 4–7 'natatory', with flattened basis, with superior and inferior margins provided with continuous row of long plumose setae. Pleon with 5 free pleonites plus pleotelson. Pleopod rami lamellar, without ridges or folding, with plumose marginal setae on both rami of pleopods 1 and 2, setation reduced or absent on endopods of pleopods 3 and 4; pleopod 5 endopod without setae.

**COMPOSITION:** The family has one monotypic genus *Barybrotetes* Schioedte & Meinert, 1879a, the type species of which is *Barybrotetes indus* Schioedte & Meinert, 1879a; other named species are junior synonyms of the type species.

**REMARKS:** There are several character states that prevent *Barybrotetes* Schioedte & Meinert, 1879a, being placed in the Aegidae, and that require the reinstatement of Hansen's (1890) family. Prime among these is that the mouthparts, while reduced and probably used to feed from fish prey, do not show homologous character states with that of the Aegidae, nor the Corallanidae and Tridentellidae. In particular the maxilla is a minute single lobe lacking robust setae (similar to that seen in the Corallanidae), not wide and flat with a distomesial basal endite, and both maxilla lobes with hooked robust setae as occurs in all Aegidae and also Cymothoidea; the maxilliped is of a different form to that of the Aegidae, notably with only four palp articles, with article 2 elongate; and the mandible incisor retains the cirolanid form, being wide and tridentate, though somewhat narrower than seen in Cirolanidae. In the past the genus has been referred to the nominate family (e.g. Richardson 1910; Thielemann 1910; Monod 1934) or subfamily (Nierstrasz 1931), to the Corallanidae (Barnard 1936) and more recently to the Aegidae (Pillai 1954, 1967; Brandt & Poore 2003; Kensley *et al.* 2007). I have been unable to discover any published justification for placing *Barybrotetes* in the Aegidae.

There are numerous character states that strongly suggest that *Barybrotetes* has evolved from a *Natanolana*-like cirolanid ancestor (*Natanolana* Bruce, 1981; see Keable 2006), including the proportions of the peduncular articles of the antennule (articles 1 and 2 short, 3 long) and antenna (articles 3 and 4 subequal in length), presence of a prominent pappose robust seta at the distal margin of antennular peduncle article 2, flagellum of the antennule with short ('ring-like') articles that may form a callynophore in males, elongate frontal lamina, wide and tridentate mandible incisor (though narrower than in the Cirolanidae), pereopods 1–3 with the superior distal angles of the ischium and merus produced and provided with long slender setae, pereopods 5–7 with a flattened basis provided with long plumose setae on superior and anterior margins and along the mid-lateral margin. All these character states are typical of *Natanolana*.

The diagnosis is based on an examined series of specimens from the Zoological Museum, Natural History Museum of Denmark, listed in Appendix 3.

**DISTRIBUTION:** Indian Ocean from East Africa (present material) to Thailand; in the Pacific from Vietnam, Indonesia and Philippines.

## Aegidae White, 1850

Aegidae White, 1850: 68.– Dana, 1852<sup>1</sup>: 304; 1853: 765.– Hansen, 1890: 315, 405.– Richardson, 1905a: 166.– Menzies & Glynn, 1968: 44.– Menzies & George, 1972: 9.9.– Kussakin, 1979: 231.– Brusca, 1980: 229; 1983: 6.– Menzies & Kruczynski, 1983: 61.– Kensley & Schotte, 1989: 115.– Bruce, 1993: 154.– Wetzler & Brusca, 1997: 30.– Roman & Dalens, 1999: 228.– Bruce, Lew Ton & Poore, 2002: 159.– Keable, Poore & Wilson, 2002: unpaginated.  
Aeginae.– Menzies, 1962: 117.

**DIAGNOSIS:** Eyes large, often medially united. Mouthparts forming buccal cone; maxillule styliform, with terminal and mesial robust setae; maxilla with single distomesial basal endite; maxilliped palp with conspicuous recurved ('hooked') RS. Pereopods 1–3 robust, with dactylus as long as or longer than propodus, usually strongly recurved.

**DESCRIPTION:** Body evenly vaulted or dorsally depressed. Eyes lateral or dorso-lateral, usually large, sometimes contiguous or nearly so; occasionally absent. Antennae and antennule well developed; division between peduncle and flagellum distinct; flagellae multi-articulate; antennule shorter than antenna, peduncle 4-articled; antennal peduncle 5-articled. Frontal lamina present, varied in shape, occasionally absent, usually not abutting clypeus; clypeus and labrum present, often indistinct. Mouthparts forming buccal cone. Mandible incisor narrow, small molar process present, occasionally absent, lamellar and triangular when present; lacinia mobilis and spine row absent. Maxillule styliform, with flattened terminal RS, may be distally hooked; mesial lobe present or absent. Maxilla with small distomesial basal endite joined to larger mesial lobe; each lobe with 1 or more broad, usually apically curved (hooked) RS. Maxilliped endite present (*Aega* group of genera and *Rocinela*) or absent (*Syscenus* and *Xenuraega*); palp with 3–5 articles, at least articles 3 and 4 with large hooked RS. Pereopods robust; pereopods 1–3 with strongly curved dactylus (i.e. prehensile), about as long or longer than propodus (occasionally weakly curved or shorter than propodus); with few slender setae. Pereopods 4–7 ambulatory, articles not compressed or flattened, basis without long plumose marginal setae; ischium to propodus inferior and distal margins with RS. Pleopod rami lamellar, without ridges or folding, with plumose marginal setae on both rami of pleopods 1 and 2, setation variously reduced or absent on endopods of pleopods 3–5; pleopod 5 endopod without setae.

**REMARKS:** There are few unique character states that can be used to define the Aegidae (see 'Analysis' p. 22).

<sup>1</sup> There is a pagination error in this publication, with page 304 printed as 204.

Within the Cymothoidea the styliform maxillule, with terminal robust setae is a character shared with both the Tridentellidae and Cymothoidea, and a maxillule that has mesial (i.e. subterminal) as well as terminal robust setae is shared only with the Tridentellidae. The maxilla with a single distomesial endite is a character shared only with the Cymothoidea. The Tridentellidae have ambulatory pereopods 1–3 and lack hooked robust setae on the maxilliped, and are further characterised by having an elongate maxilliped endite. The Aegidae is the only family in which all but a very few species have greatly enlarged eyes, a state that is in general rare within the Isopoda. There are some Corallanidae that have large eyes, but in most species the eyes are similar in size to those of the Cirolanidae. The Corallanidae lack hooked robust setae on the maxilliped, pereopods 1–3 are ambulatory, and the family has the unique character states of strongly hooked maxillule and vestigial maxilla with no endites. The Aegidae, lack of wholly unique characters notwithstanding, can be readily identified by the combination of characters listed in the diagnosis.

### KEY TO THE MARINE GENERA OF AEGIDAE

A key to all genera was provided by Bruce (1993a), which included the only estuarine and freshwater genus *Alitropus* (known only from tropical Australia and Asia). Regional keys have been given to the East Pacific by Brusca (1983), the Caribbean (Kensley & Schotte 1989), and to northern cold-water seas by Kussakin (1979, in Russian).

Although the marine genus *Xenuraega* Tattersall, 1909 has not been recorded from New Zealand it is included in this key. The true extent of the distribution of this genus is far from certain, but mesopelagic and pelagic isopods often have extensive distributions, sometimes in all oceans (e.g. *Metacirolana caeca*, see Svavarsson and Bruce 2000, and *Aega monophthalma* herein). For this reason it is considered entirely possible that *Xenuraega* could be taken in New Zealand waters.

- 1 Pleonite 1 abruptly narrower than pereonite 7; pleonite 5 lateral margins entirely free; eyes usually absent .....2
- Pleonite 1 not abruptly narrower than pereonite 7; pleonite 5 lateral margins partly or entirely overlapped by pleonite 4; eyes present, often large .3
2. Frontal lamina present; maxilliped palp 3-articled; both uropod rami lamellar .....*Syscenus* [p. 198]
- Frontal lamina absent; maxilliped palp 2-articled; uropodal rami with endopod stub-like, exopod filamentous..... *Xenuraega* [p. 215]

3. Body dorsally compressed; frontal lamina slender, shield-shaped or lanceolate; rostrum anteriorly widely rounded or truncate; maxilliped palp 3-articled ..... *Rocinela* [p. 161]
  - Body dorsally moderately to strongly vaulted; frontal lamina wide; rostrum narrowly rounded or acute; maxilliped palp 5-articled.....4
4. Rostrum anteriorly directed, acute; frontal lamina ventrally flat, antennule peduncle articles 1 and 2 flattened; maxilliped palp article 5 wider than long, partly or entirely fused to 4 .....5
  - Frontal lamina with free posterior margin and/or posteriorly narrow; antennule peduncle articles 1 and 2 not flattened or expanded .....6
5. Uropod rami co-planar; uropodal rami to or beyond pleotelson apex; uropodal endopod lateral margin without distinct excision; pleotelson lacking distinct, usually produced point..... *Aega*
  - Plane of uropod endopod at oblique angle to exopod, uropodal rami not extending to pleotelson apex; uropodal endopod lateral margin usually distinct excision; pleotelson apex forming distinct, usually produced point..... *Aegapheles* [p. 65]
6. Rostrum bent ventrally or ventrally and posteriorly; maxilliped palp article 5 longer than wide, not fused to article 4 ..... *Aegiochus* [p. 83]
  - Rostrum minute, not projecting, not visible in dorsal view; maxilliped palp article 5 minute, less than 0.3 width of article 4..... *Epulaega* [p. 151]

### Genus *Aega* Leach, 1815

*Aega* Leach, 1815: 369; 1818: 549; Desmarest, 1825.- Milne Edwards, 1840: 238.- Dana, 1852: 304\*; 1853: 747.- Gosse, 1855: 134.- Harger, 1880: 383.- Haswell, 1882: 284.- Bate & Westwood, 1861-1868: 276.- Miers, 1876b: 108.- Schioedte & Meinert, 1879b: 334.- Hansen, 1890: 316.- Sars, 1897: 58.- Richardson, 1905a: 167.- Stebbing, 1905: 20.- Hodgson, 1910: 17.- Stephensen, 1948: 36.

*Aega*.- Gerstaecker, 1882: 227.- Barnard, 1914: 361; 1936: 157.- Hale, 1925: 168.- Wahrberg, 1930: 18.- Nierstrasz & Schuurmans Stekhoven Jr, 1930: e74.- Gurjanova, 1933: 429; 1936: 70.- Holthuis, 1956: 41.- Menzies, 1962: 117.- Schultz, 1969: 189.- Menzies & George, 1972: 17.- Kensley, 1978: 56.- Kussakin, 1979: 231.- Brusca, 1983: 7.- Menzies & Kruczynski, 1983: 62.- Bruce, 1983: 757; 1996: 129.- Brusca & Iverson, 1985: 40.- Kensley & Schotte, 1989: 116.- Bruce, Lew Ton & Poore, 2002: 160.

*Pterelas* Guérin-Méneville, 1836: VII.- Dana, 1852: 204; Dana, 1853: 748.

*Aegacylla* Dana, 1854: 176.

*Aega* (*Aega*).- Brusca, 1983: 10.

\* There is a pagination error in this publication, with page 304 printed as 204.

TYPE SPECIES: *Oniscus psora* Linnaeus, 1758 (= *Aega psora* (Linnaeus, 1758); original orthography was *Oniscus Pforá*; by subsequent designation, Menzies (1962). *Aega emarginata* (Leach, 1815) is a junior synonym. *Aega affinis* Milne Edwards, 1840 was regarded as a synonym of *A. psora* by Kussakin (1979).

DIAGNOSIS: Body moderately to strongly dorsally vaulted. Rostral point acute, anteriorly produced between antennule peduncles. Eyes present, often large, usually separate. Pleon not distinctly narrower than pereonite 7, pleonite 1 not abruptly narrower than pleonite 2. Antennule peduncle articles 1 and 2 flattened, often expanded with anterodistal angle of article 2 forming lobe, article 3 less than 0.3 × width of article 2. Frontal lamina wide, posterior margin not clearly defined, lateral margins usually straight. Maxilliped palp 5-articled; article 5 wide, often fused to article 4, distal margin convex, with slender setae; endite present. Coxae 5-7 as long as or longer than respective pereonite. Pereopods 1-3 merus inferior margin with large robust setae, usually set as one or more rows.

DESCRIPTION: Pleon not abruptly narrower than pereon; pleonites all visible, not posteriorly widest, pleonite 5 laterally overlapped by pleonite 4; pleonites 3-5 posteriorly produced to an acute point. Pleotelson large, about as long as longer pleon, usually with PMS and RS.

Mandible with uni- or bicuspid incisor; molar process present, reduced or absent. Maxillule with 5-8 elongate, flat, narrow-based terminal and mesial RS. Maxilliped 5-articled, article 1 wider than long, articles 3 and 4 each with 2-6 stout recurved RS, article 5 with 2-7 occasionally hooked RS; endite present, usually with 1-2 terminal setae.

REMARKS: Under the revised concept *Aega sensu strictu* contains those species with a prominent, acute and anteriorly projecting rostrum, the antennule peduncle with articles 1 and 2 strongly dorsoventrally compressed, sometimes with an anterolateral lobe, a slender peduncle article 3 (less than one-third as wide as article 2), and the uropod peduncle with an elongate mesial lobe that stretches most of the length of the uropodal endopod. Species within *Aega sensu strictu* lack a falcate uropodal endopod, although this is weakly expressed in the type species; most species have matte, punctate or pitted dorsal body surfaces.

Three species, *A. magnifica* (Dana, 1854), *A. maxima* Hansen, 1897 and *A. sheni* Yu & Bruce, 2006 lack the slender antennule peduncle article 3 and have a clearly falcate uropodal endopod, and approach some *Aegapheles* in the appearance of the antennule and uropodal endopod. These species are here regarded as incertae sedis (see discussion of clades, p. 16-19).

*Aega antennata* Richardson, 1910 and *A. falcata* Kensley & Chan, 2001 are immediately distinguished from all other species (and all other Aegidae) by having antennule peduncle article 1 strongly anteriorly produced. There are several other undescribed species similar to these two species that also have this unique character state.

Thirty-six named species are included in the genus, those below, and those listed under 'Species included ...' (p.212). The genus is represented in all oceans from shallow waters to a depths of 2148 metres (*Aega maxima*).

ETYMOLOGY: The name could be derived from Greek mythology (e.g. Aega being described as a nursemaid to Zeus, and variously as the daughter of Olenos, of King Melisseus of Crete and of Helios). Alternatively the name could be derived from the Greek *aegis* or the Latin *aegis*, meaning shield or cover. Another possibility is that the name was in allusion to the relatively large eyes of many species and is derived from Middle or Old English *ēage*. Leach (1815) gave no clues as to his choice of name, and as it seems not to relate directly to mythological history, geographical location nor morphological attributes, the basis for his choice remains a mystery.

**KEY TO THE NEW ZEALAND SPECIES OF AEGA**

- 1 Eyes large, medially united .....2
- Eyes separate .....3
- 2. Posterior margins of pereonites 6 and 7 and pleonites nodular; surfaces heavily pitted; pleotelson dorsally with distinct median longitudinal carina, posterior margin with distinct apical point; margins of pleotelson and uropods with conspicuous acute RS ..... *Aega monophthalma* (p. 37)
- Posterior margins of pereonites 6 and 7 and pleonites smooth; surfaces finely setose; pleotelson dorsally without median carina, posterior margin without distinct apical point; margins of pleotelson and uropods RS small ..... *Aega stevelowei* (p. 50)
- 3. Pereopod 2 or 2 and 3 propodus with large club-shaped RS opposite base of dactylus; uropodal endopod lateral margin even .....4
- Pereopod 2 or 2 and 3 propodus without large club-shaped RS opposite base of dactylus; uropodal endopod lateral margin falcate .....6
- 4. Pleotelson and uropods deeply serrate; body elongate, more than 3 times as long as greatest width ..... *Aega komai* (p. 34)
- Pleotelson and uropods not deeply serrate; body less than 3 times as long as greatest width .....5

- 5. Pleotelson dorsally with two sub-median depressions, posterior margin strongly concave; eyes narrowly separated ( by ~9% width of head) ..... *Aega semicarinata* (p. 44)
- Pleotelson dorsally without depression, posterior margin subtruncate; eyes widely separated (by ~29% width of head) ..... *Aega urotoma* (p. 55)
- 6. Body very wide (1.6 times as long as greatest width), dorsal surfaces distinctly pitted; eyes small, widely separated (by ~38% width of head) pereopods 1-3 dactylus about as long as propodus ..... *Aega whanui* (p. 61)
- Body wide (1.8 times as long as greatest width), dorsal surfaces smooth; eyes large, narrowly separated ( by ~10% width of head) pereopods 1-3 dactylus about 1.5 as long as propodus ..... *Aega falklandica* (p. 28)

***Aega falklandica* Kussakin, 1967 (Figs 8-11)**

*Aega falklandica* Kussakin, 1967: 227, figs 3, 4.- Kensley, 1980: 159; 2001: 227.- Branch, Griffiths, Kensley & Sieg, 1991: 12, fig. (not numbered).  
*Aega (Aega) falklandica*.- Brusca, 1983: 11.

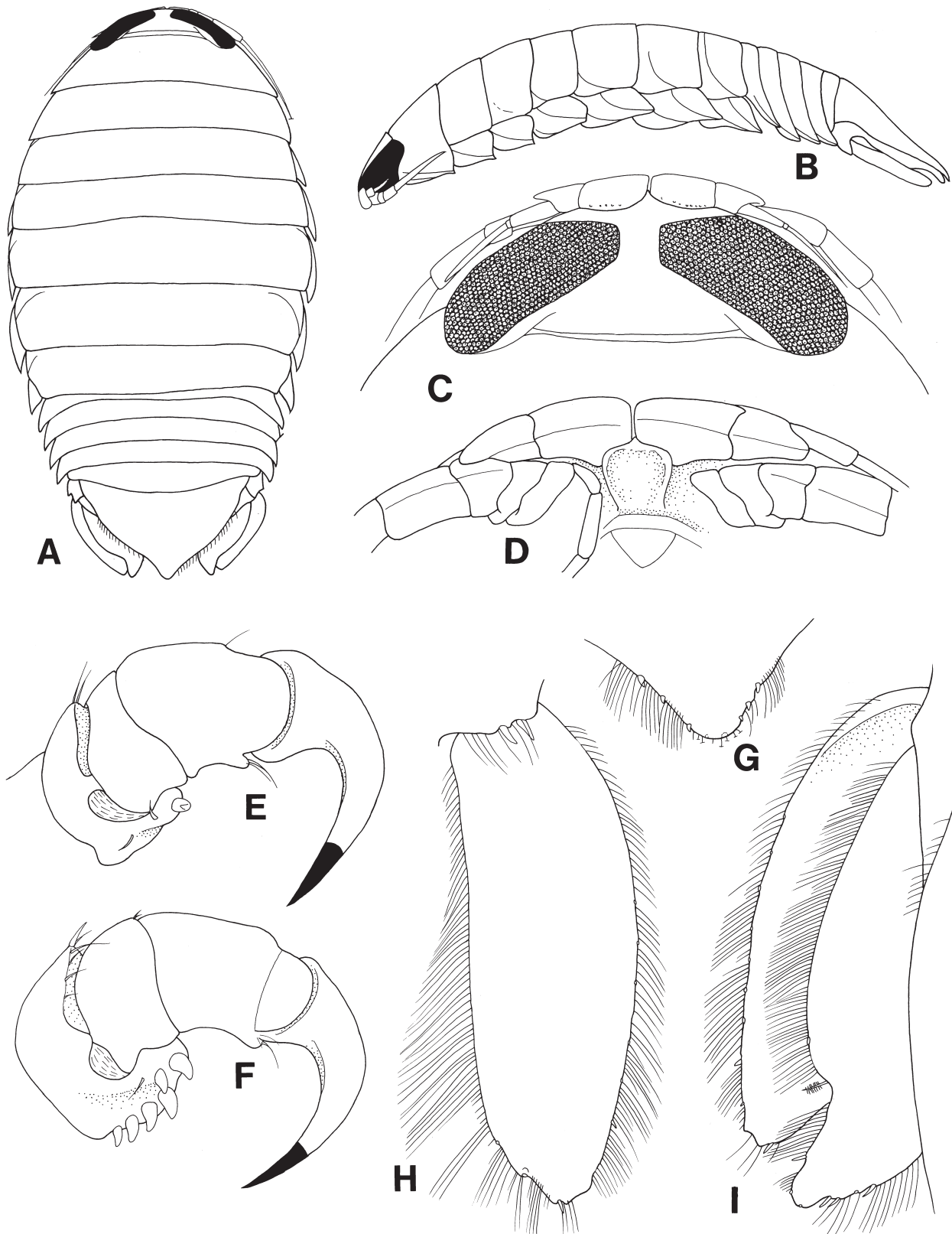
MATERIAL EXAMINED: Holotype of *Aega falklandica*: ♀ (non-ovig. 31 mm), New Island, Falkland Islands, 2 April 1959, 10 m, coll. Slava. Zool Inst, Acad. Science, Leningrad RAN 1/46405.

*Non-type*. ♂ (31 mm), Macquarie Ridge, 54°30'-28'S, 159°00'E, 15 February 1967, Cr 27, stn 1975, 443-549 m, coll. RV *Eltanin* (USNM 1099250).

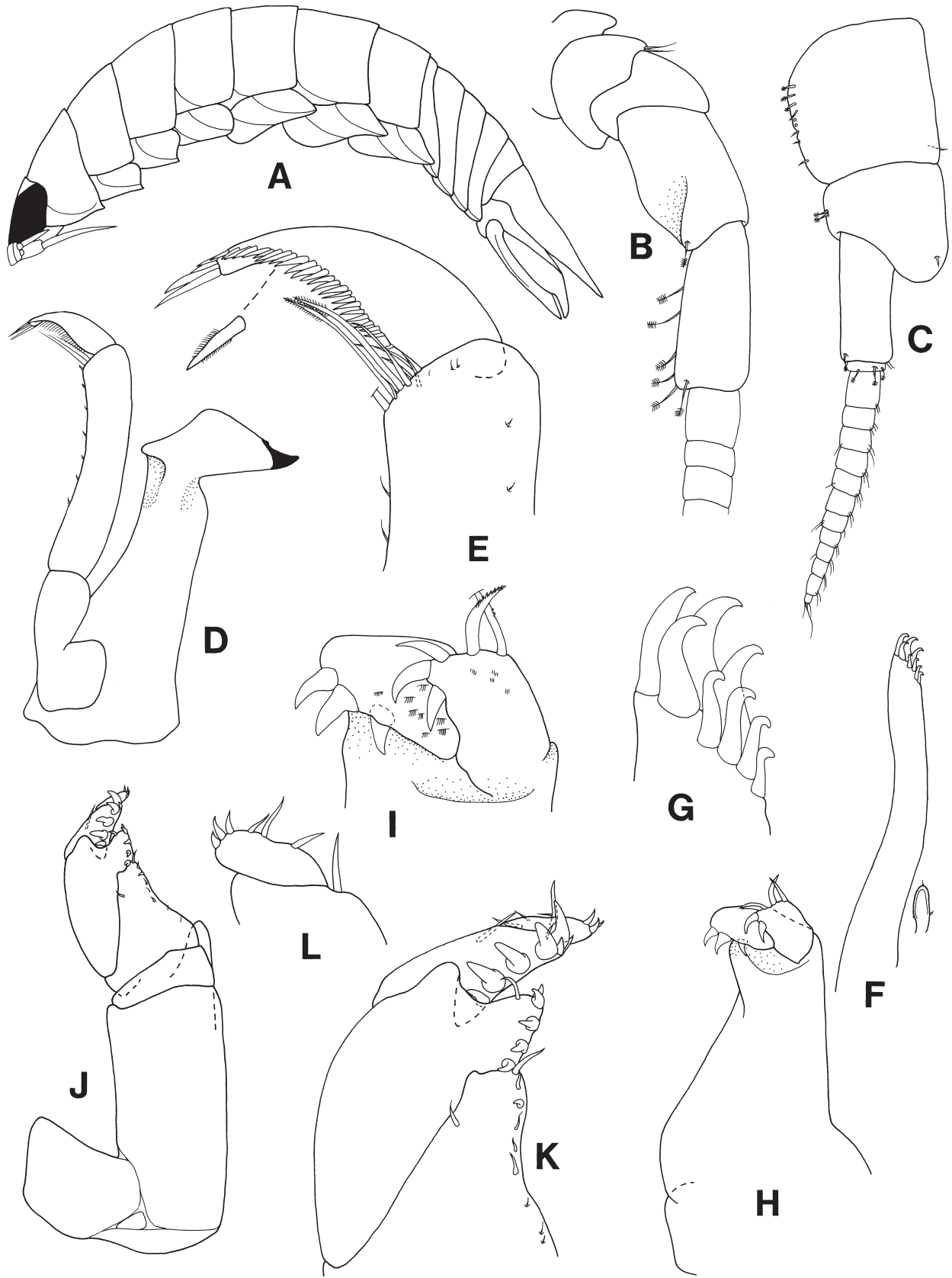
*Also examined*: Holotype of *Aega maxima* Hansen, 1897, ♀ (non-ovig. 54 mm), off Cocos Island, off Panama, East Pacific, 26 February 1891, *Albatross* stn 3362, 2056 m [as 1125 fms] (USNM 20727).

DESCRIPTION: *Body* 1.8 times as long as greatest width, dorsal surfaces smooth and sparsely punctate, widest at pereonite 5, lateral margins ovate. *Eyes* large, not medially united, separated by about 10% width of head; each eye made up of ~27 transverse rows of ommatidia, each row with ~15-17 ommatidia; eye colour dark brown. *Pereonite 1 and coxae* 2-3 each with posteroventral angle with small distinct produced point. *Coxae* 5-7 with entire oblique carina; posterior margins sinuate, posterolateral angle acute (less than 45°). *Pleon* with pleonite 1 visible in dorsal view; pleonite 4 with posterolateral margins extending clearly beyond posterior margin of pleonite 5; pleonite 5 with posterolateral angles overlapped by lateral margins of pleonite 4. *Pleotelson* 0.8 times as long as anterior width, dorsal surface without longitudinal carina; lateral margins sinuate, smooth, posterior margin converging to caudomedial point, with 6-8 RS.



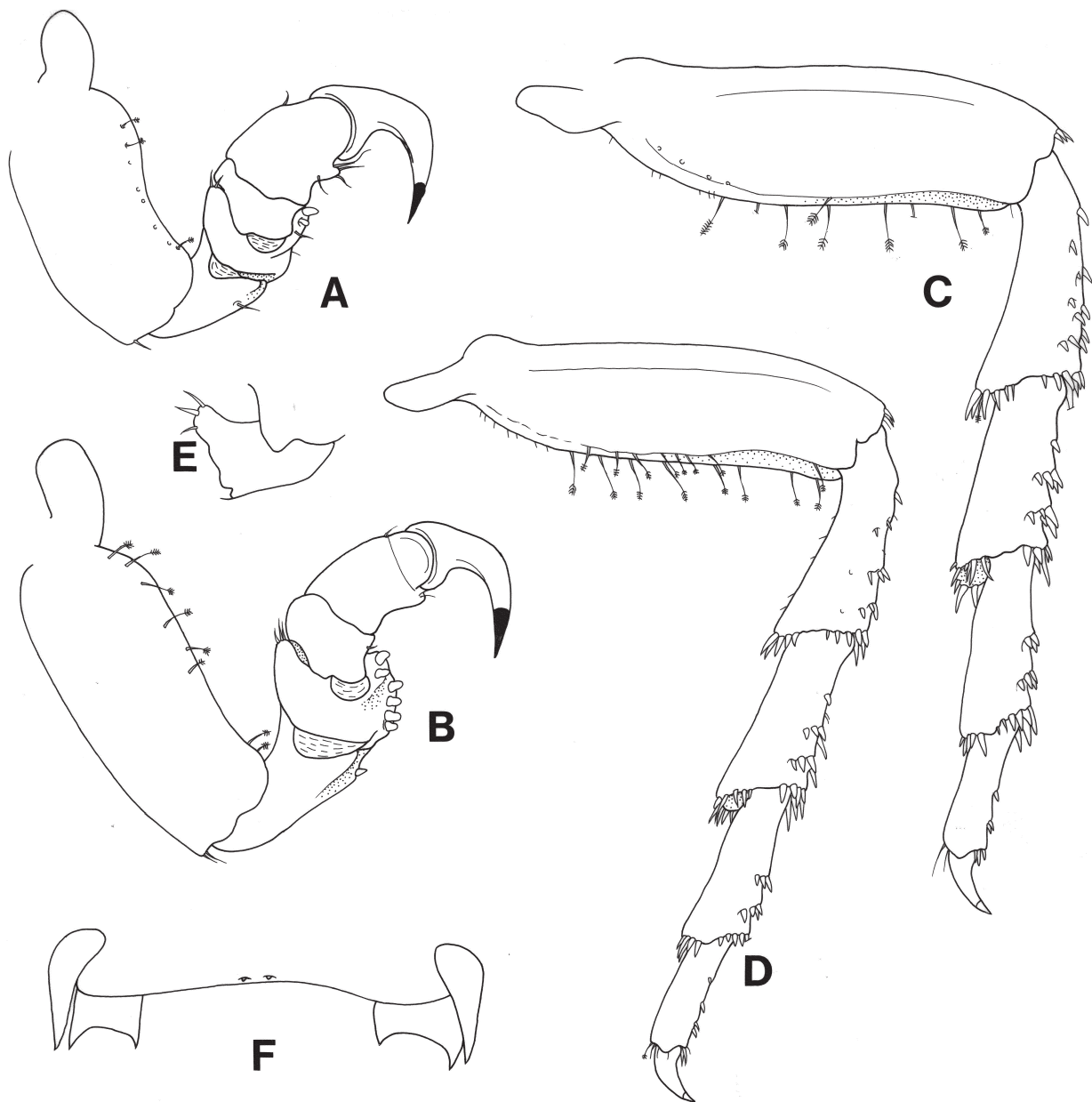


**Figure 8.** *Aega falklandica* Kussakin, 1967. Holotype; all appendages drawn in situ (Leningrad, RN1/46405). A, dorsal view, holotype; B, lateral view; C, head; D, frons; E, pereopod 1, distal articles; F, pereopod 2, distal articles; G, pleotelson posterior margin apex; H, uropod endopod, ventral view; I, left uropod, dorsal view.



**Figure 9.** *Aega falklandica* Kussakin, 1967. *Eltanin* specimen (USNM 1099250). A, lateral view; B, antenna peduncle; C, antennule; D, mandible; E, mandible palp article 3; F, maxillule; G, maxillule apex; H, maxilla; I, maxilla apex; J, maxilliped; K, maxilliped palp; L, maxilliped palp article 5 (Leica); peduncle, dorsal view.





**Figure 10.** *Aega falklandica* Kussakin, 1967. *Eltanin* specimen (USNM 1099250). A-D, pereopods 1, 2, 6 and 7 respectively; E, pereopod 1 ischium, mesial surface; F, sternite 7 showing penial papillae.

*Antennule* peduncle article 2 anterodistal lobe not extending beyond mid-point of article 3; articles 3 and 4 0.5 times as long as combined lengths of articles 1 and 2, article 3 2.6 times as long as wide; flagellum with 12 articles, extending to posterior margin of eye. *Antenna* peduncle article 2 inferior surface without distinct longitudinal suture; article 4 1.6 times as long as wide, 0.9 times as long as combined lengths of articles 1–3, with deep longitudinal groove, inferior margin 1 plumose seta, and 0 short slender setae; article 5 not markedly wider or flatter than article 4, 1.1 times as long as article 4, 2.2 times as long as wide, inferior margin with 6 palmate setae; flagellum with 17 articles, extending to middle of pereonite 1.

*Frontal lamina* flat, as wide as long, lateral margins converging posteriorly, anterior margin rounded, with small median point, posterior margin not abutting clypeus.

*Mandible* molar process present, minute; palp article 2 with 7 distolateral setae (3 large biserrate, remainder smaller, simple), palp article 3 with 27 setae. *Maxillule* with 8 terminal RS (falcate). *Maxilla* mesial lobe with 5 RS (3 stout, 2 distally biserrate); lateral lobe with 3 RS. *Maxilliped* endite with 0 apical setae; palp article 2 with 6 RS (1 hooked; with further fine marginal setae); article 3 with 6 recurved RS (5 hooked, 1 long straight); article 4 with 7 hooked RS (5 large, 2 small); article 5

articulating with article 4, distally convex, with 6 RS (5 straight, 1 curved).

*Pereopod 1* basis 1.9 times as long as greatest width; ischium 0.5 times as long as basis, inferior margin with 0 RS, superior distal margin with 2 RS (and 1 simple seta); merus inferior margin with 1 RS (or 2), set as distal group, superior distal angle with 0 RS (2 slender setae); carpus 0.5 as long as merus, inferior margin with 0 RS; propodus 1.3 times as long as proximal width, inferior margin with 0 RS, propodal palm with small distal lobe, dactylus abruptly hooked, 1.5 as long as propodus. *Pereopod 2* ischium inferior margin with 1 RS, superior distal margin with 3 RS (and 1 slender seta); merus inferior margin with 6 RS (set as 4 + 2), set as two groups, superior distal margin with 0 acute RS (4 slender setae); carpus longer than that of pereopod 1, with inferodistal lobe, inferodistal angle with 0 RS, propodus without large club-shaped distal RS. *Pereopod 3* similar to pereopod 2 (7 or 9 RS); propodus without large club-shaped distal RS. *Pereopods 5–7* inferior margins of ischium–carpus with short RS. *Pereopod 6* similar to pereopod 7 (slightly larger, inferior margins with more RS). *Pereopod 7* basis 3.3 times as long as greatest width, inferior margins with 15 palmate setae (or more); ischium 0.5 as long as basis, inferior margin with 9 RS (set as 1, 2, 3 and 3), superior distal angle with 6 RS, inferior distal angle with 7 RS; merus 0.8 as long as ischium, 1.9 times as long as wide, inferior margin with 9 RS (set as 1, 4 and 4), superior distal angle with 10 RS (and 2 slender setae), inferior distal angle with 8 RS; carpus 0.8 as long as ischium, 2.6 times as long as wide, inferior margin with 7 RS (set as 3 and 4), superior distal angle with 10 RS, inferior distal angle with 10 RS; propodus 0.6 as long as ischium, 3.0 as long as wide, inferior margin with 5 RS (set as 1, 2 and 2), superior distal angle with 2 slender setae, inferior distal angle with 3 RS.

*Penes* low tubercles; penial openings separated by 4% of sternal width.

*Pleopod 1* exopod 1.9 times as long as wide, distally narrowly rounded, mesial margin weakly oblique, lateral margin straight, mesial margin strongly convex, with PMS on distal two-thirds; endopod 2.5 times as long as wide, distally subtruncate, lateral margin strongly concave, with PMS on distal margin only, mesial margin with PMS on distal half; peduncle 1.9 times as wide as long, mesial margin with 8 coupling hooks. *Pleopod 2 appendix masculina* with straight margins, 0.8 times as long as endopod, distally narrowly rounded (with small apical point). Exopods of pleopods 1–3 each with distolateral margin not digitate; endopods of pleopods 3–5 each with distolateral point; pleopods 2–4 peduncle distolateral margin without prominent acute RS.

*Uropod* peduncle ventrolateral margin with 2 RS, posterior lobe about three-quarters as long as endo-

pod. Uropod rami with endopod and exopod weakly oblique, rami extending to pleotelson apex, marginal setae in single tier (dense), apices narrowly rounded. *Endopod* apically not bifid, lateral margin proximally convex, with prominent excision (shallow), positioned about three-quarters along ramus, proximal lateral margin with 1 RS, distal lateral margin with 3 RS, mesial margin weakly convex, with 6 RS. *Exopod* not extending to end of endopod, 3.3 times as long as greatest width, apically not bifid; lateral margin weakly convex, with 12 RS; mesial margin sinuate, proximally concave, with 3 RS.

FEMALE: Similar to the male, but for the sexual characters; no ovigerous females present.

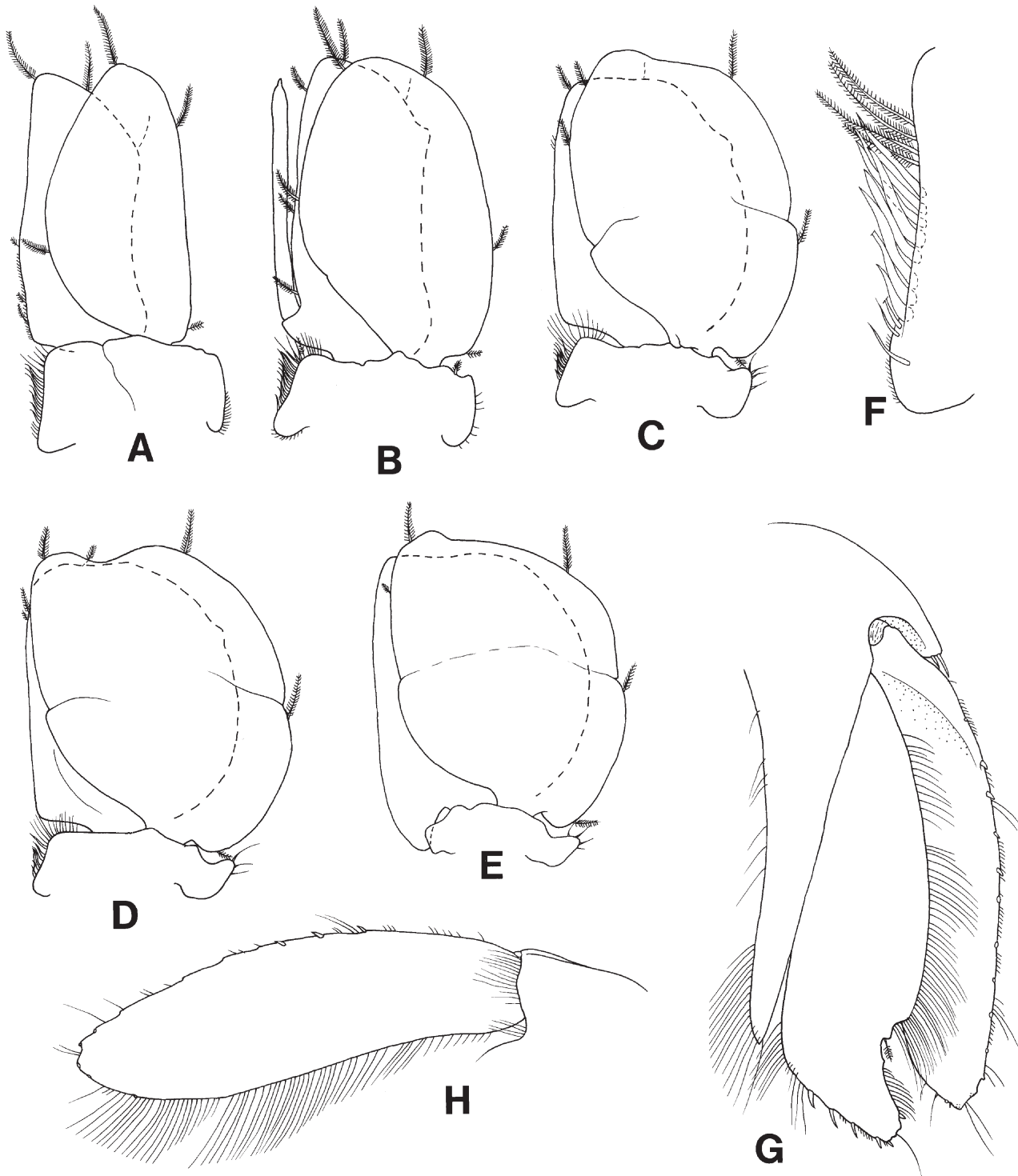
SIZE: Present material 31 mm.

VARIATION: The two specimens differ in a number of details, though without more material it is impossible to say whether this is regional variation or potentially specific differences. The robust setae on the merus of pereopods 1–3 present a constant pattern, although the number of robust setae varied with the holotype having only 1 RS on the pereopod 1 merus and the New Zealand specimen having 2, the merus of pereopod 2 has 4+2 but pereopod 3 merus had 5+2 (holotype) or 6+3 (New Zealand).

The shape and proportions of the uropod are the same between the two specimens but there is a difference in the number of robust setae, notably on the uropodal endopod lateral margin with the holotype having a pattern of 1+3, the New Zealand specimen 1+2. Both specimens had somewhat damaged uropods so these numbers may be an artefact of that damage.

REMARKS: *Aega falklandica* can be identified by the antennule peduncle articles 1 and 2 being flattened and expanded, uropodal endopod lateral margin being medially indented with the anterior portion conspicuously convex, by the short propodus with a simple palm and small distal lobe, and by the pattern and number of robust setae on pereopods 1–3. Similar species include *Aega magnifica* which is readily separated by pereopods 1–3 having a conspicuous blade on the palm of the propodus.

There are two similar Pacific species: *Aega acuminata* Hansen 1897 and *Aega maxima* Hansen, 1897. The former has far smaller eyes than *A. falklandica*, the propodal lobe on pereopod 1 is larger and the uropodal exopod is proportionally longer, extending just beyond the apex of the endopod (Brusca 1983; Hansen 1897). The principle differences between *A. falklandica* and *A. maxima* are, in *A. maxima*, slightly smaller eyes, the palm of pereopods 1–3 without any trace of a distal lobe, and the uropodal endopod distal margin appear-



**Figure 11.** *Aega falklandica* Kussakin, 1967. *Eltanin* specimen (USNM 1099250). A–E, pleopods 1–5 respectively; F, pleopod 1 peduncle mesial margin; G, uropod; H, uropod exopod, ventral view.

ing distinctly truncate and with only a weak excision on the lateral margin. The only known specimen of *Aega maxima* was taken at a depth 2148 metres off Cocos Island, off Pacific Panama (Hansen 1897), considerably deeper than the holotype of *A. falklandica* (10 m) or the New Zealand specimen (maximum depth of 549 m). Kensley's records are from 185 to 270 m.

PREY: No records.

DISTRIBUTION: Falkland Islands, South Atlantic, Marion Island, southern Indian Ocean and off southwestern New Zealand. At depths of 10 m (Falkland Islands) otherwise 185–270 m (Marion Islands) and 549 metres (New Zealand).

*Aega komai* Bruce, 1996: 129, figs 1–4.

*Aega angustata*. — Stephenson, 1980: 153, figs 1–5.

[misidentification, not *Aega angustata* Whitelegge, 1901].

**MATERIAL:** ♀ (non-ovig., 26 mm), off Taranaki Bight region, 39°02.5'S, 173°55.5'E, 2 March 1990, 86 m, on spiny dogfish snout, coll. J.B. Jones (NMNZ Cr.12000). 2 ♂ (16.5, 18.0 mm), between Fannel Island and Barrier Island, Hauraki Gulf, 22 November 1976, 86–97 m, *Squalus blainvillei*, off skin behind pectoral fins, coll. RV *Ikatere* (AK 4855).

**Additional material:** ♀ (non-ovig., 23 mm), Taiwan, 22°18.6'N, 119°14.8'E, 28 July 2000, stn CP11, 262 m, coll. Bouchet, Richer de Forges and Chan (MNHN Is.5860). ♂ (29 mm), off Great Barrier Island, North Island, January 2006, old longline gear at ~500 m, coll. Steve Lowe (NIWA 23777).

**Also examined:** Holotype of *Aega angustata* Whitelegge, 1901. ♂ (14.3 mm), 5.5–6.5 km off Wattamolla, NSW, 34°10'S, 151°11'E, 22 March 1898, stn 57, 108 m, coll. E.R. Waite on HMCS *Thetis* (AM G2160).

**DESCRIPTION OF NEW ZEALAND SPECIMENS:** *Body* 3.4 times as long as greatest width, dorsal surfaces polished in appearance, widest at pereonite 5, lateral margins subparallel. Rostral point projecting anteriorly, not ventrally folded. *Eyes* large, not medially united, separated by about 36% width of head; each eye made up of ~16 transverse rows of ommatidia, each row with ~9 ommatidia; eye colour pale brown. *Pereonite 1 and coxae* 2–3 each with posteroventral angle with small distinct produced point (ventral); coxae 5–7 with incomplete oblique carina. *Pleon* with pleonite 1 visible in dorsal view; pleonite 4 with posterolateral margins extending to but not beyond posterior margin of pleonite 5; pleonite 5 with posterolateral angles free, not overlapped by lateral margins of pleonite 4. *Pleotelson* 0.7 times as long as anterior width, dorsal surface with longitudinal carina on distal third; lateral margins weakly convex, deeply serrate (with 13–15 flat marginal spines), posterior margin subtruncate, with 13–15 RS.

*Antennule* peduncle article 2 anterodistal lobe extending to end of article 3; article 3 0.3 times as long as combined lengths of articles 1 and 2, 3.0 as long as wide; flagellum with 6 articles, extending to mid-point of eye. *Antenna* peduncle article 2 inferior surface without distinct longitudinal suture; article 4 0.8 times as long as wide, 0.8 times as long as combined lengths of articles 1–3, with deep longitudinal groove, inferior margin 0 plumose setae, and 0 short simple setae; article 5 flattened and expanded, 2.4 times as long as article 4, 1.7 times as long as wide, inferior margin with 2 pappose setae, anterodistal angle with cluster of 5 short simple

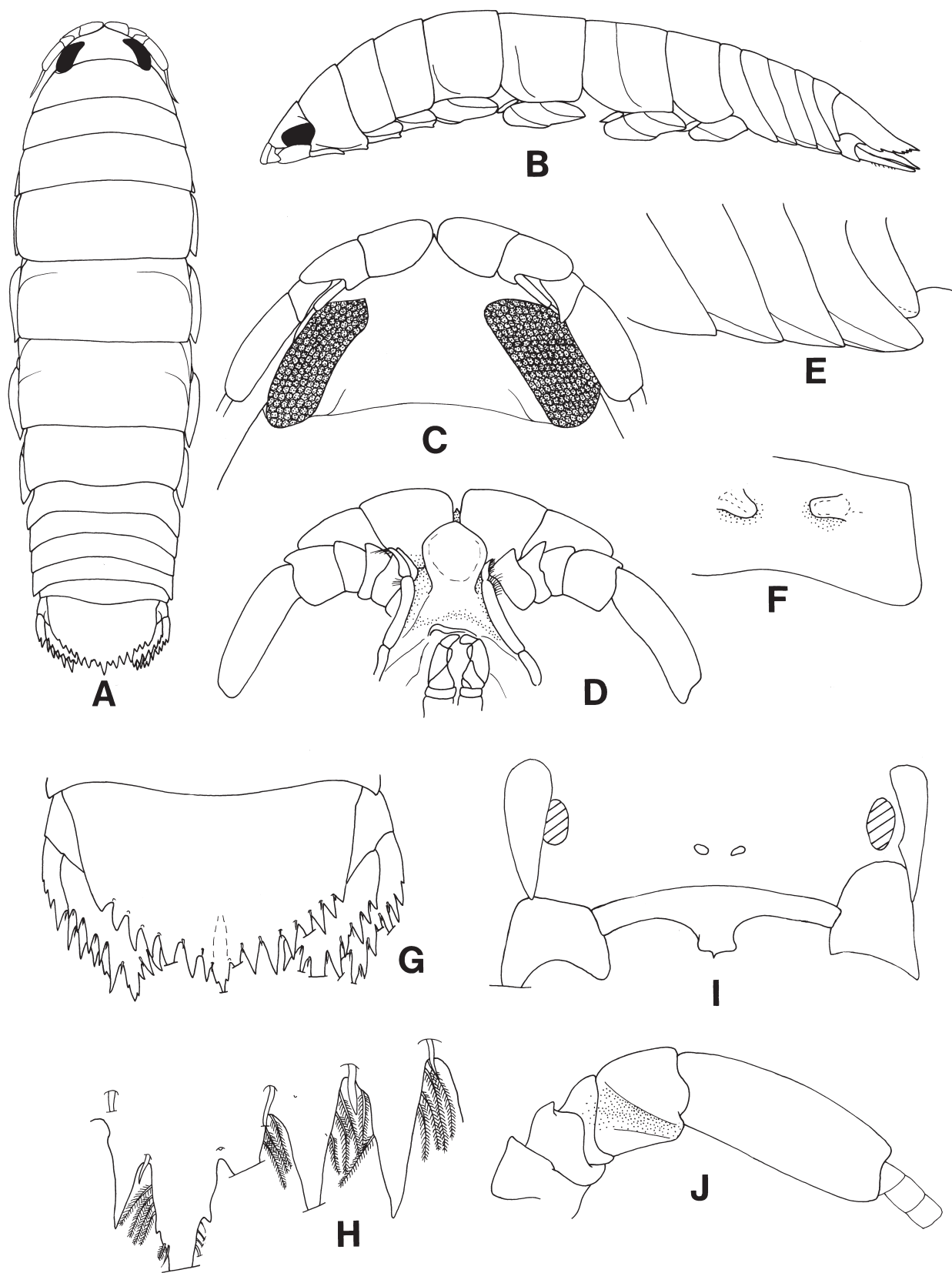
setae; flagellum with 9 articles, extending to posterior of pereonite 1.

*Frontal lamina* flat, as wide as long, lateral margins converging posteriorly, anterior margin rounded, forming median angle, posterior margin not abutting clypeus.

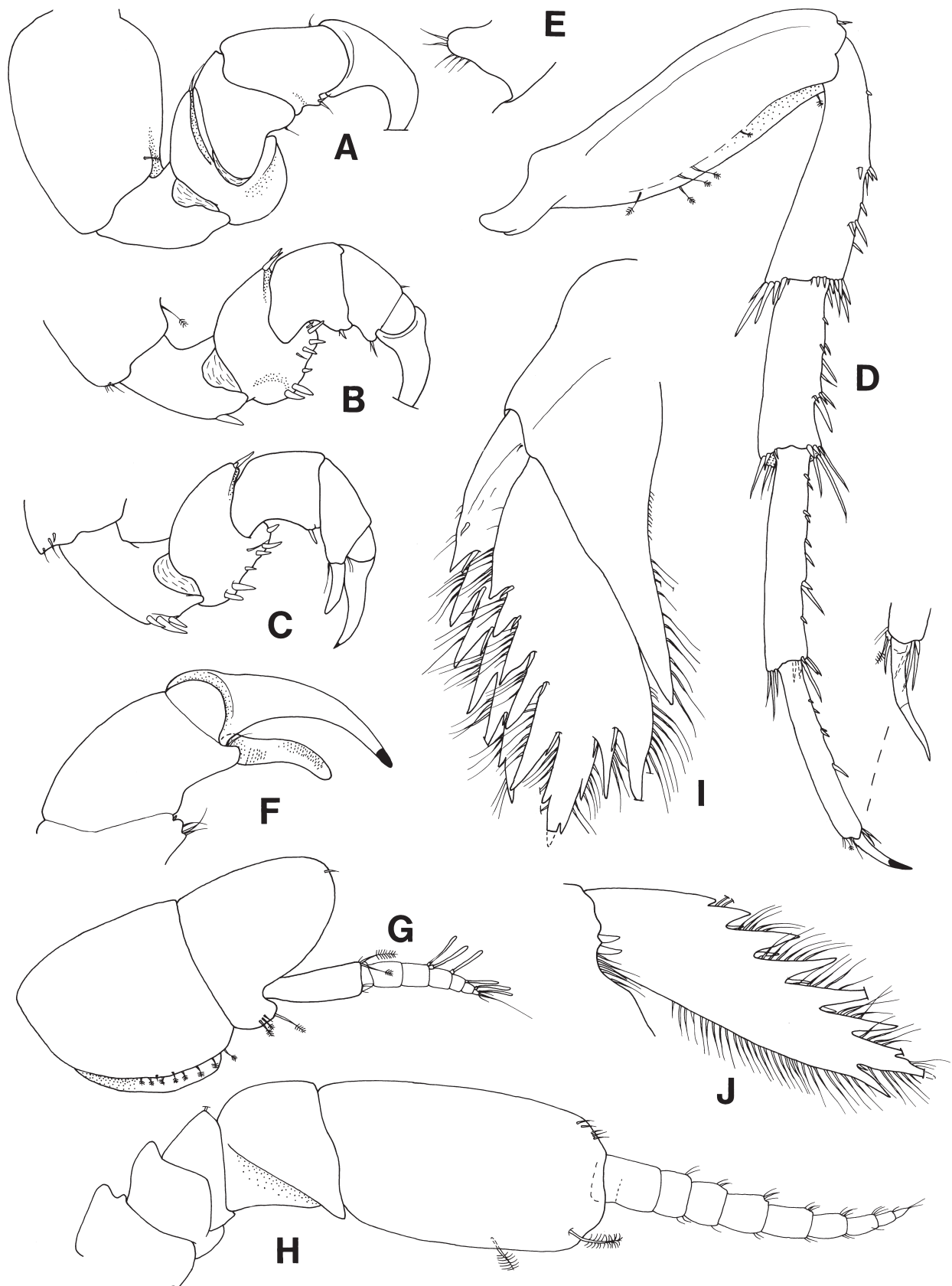
*Pereopod 1* basis 1.4 times as long as greatest width; ischium 0.5 times as long as basis, inferior margin with 0 RS, superior distal margin with 2 RS (acute); merus inferior margin convex and thickened, with 0 RS, superior distal angle with 2 RS; carpus 0.9 as long as merus; inferior margin with 0 RS; propodus 1.4 times as long as proximal width, inferior margin with 0 RS, propodal palm with small distal lobe (concave), dactylus abruptly hooked, 1.0 as long as propodus. *Pereopod 2* ischium inferior margin with 1 RS (stout), superior distal margin with 2 RS; merus inferior margin with 6 RS (and 2 slender setae), set as two groups (ill-defined), superior distal margin with 2 acute RS; carpus longer than that of pereopod 1, with inferodistal lobe, inferodistal angle with 1 RS, propodus without large club-shaped distal robust seta. *Pereopod 3* not similar to pereopod 2 (dactylus slender and claw-like); propodus with large club-shaped distal robust seta. *Pereopod 6* similar to pereopod 7 (but more robust with longer RS on inferior margins). *Pereopod 7* basis 3.2 times as long as greatest width, inferior margins with 6 palmate setae (many missing); ischium 0.7 as long as basis, inferior margin with 9 RS (set loosely as 1, 4 and 4), superior distal angle with 5 RS, inferior distal angle with 10 RS; merus 0.7 as long as ischium, 2.7 times as long as wide, inferior margin with 9 RS (set loosely as 1, 4 and 4), superior distal angle with 6 RS, inferior distal angle with 6 RS; carpus 0.9 as long as ischium, 5.3 times as long as wide, inferior margin with 9 RS (set as 2, 2, 1, 1, 2 and 1), superior distal angle with 3 RS, inferior distal angle with 7 RS; propodus 0.8 as long as ischium, 7.4 times as long as wide, inferior margin with 5 RS (set as 1, 1, 2 and 1), superior distal angle with 1 slender setae, inferior distal angle with 4 RS.

*Penes* low tubercles; penial openings separated by 10% of sternal width.

*Uropod* peduncle ventrolateral margin with 2 RS (and ~5 plumose setae), posterior lobe about three-quarters as long as endopod. Uropod rami extending beyond pleotelson (lateral and mesial margins deeply serrate), marginal setae in single tier, apices acute. *Endopod* apically not bifid, lateral margin straight (deeply serrate), without prominent excision, proximal lateral margin with 5 RS (margin not divided, with 5 prominent flat spines), mesial margin straight (deeply serrate), with 2 RS (and 2 prominent flat spines). *Exopod* not extending to end of endopod, 3.2 times as long as greatest width, apically not bifid; lateral margin straight (deeply serrate), with 5 RS (and 5 prominent flat spines); mesial margin straight, with 1 RS.



**Figure 12.** *Aega komai* Bruce, 1996. NMNZ female, except F and I. A, dorsal view; B, lateral view; C, head; D, frons; E, pleonites, lateral view; F, penial process; G, pleotelson and uropods; H, apex of pleotelson; I, sternite 7; J, antenna peduncle, showing deep groove.



**Figure 13.** *Aega komai* Bruce, 1996. NMNZ female. A–D, pereopods 1–3 and 7 respectively (pereopods 2 and 3 basis omitted); E, pereopod 2, mesial surface of ischium; F, dactylus, pereopod 3; G, antennule; H, antenna; I, uropod; J, uropodal exopod, ventral view.

SIZE: Female 26 mm, two males 16.5 and 18 mm; male holotype (Japan) 20.5 mm.

VARIATION: There are only three specimens, and therefore the details here are of range only. Pleotelson RS 13–15, with parallel variation in the spines. Uropod endopod mesial margin 2 RS (1 once), lateral margin always 5 RS; uropod exopod mesial margin 1, lateral margin 6–8 RS.

Pereopod 1 always without RS; inferior margin of merus of pereopods 2 and 3 each with 5–7 RS (these robust setae are difficult to observe without dissection, so the range may be narrower or greater than given here).

The material from New Zealand agrees well with the description of the holotype, but there are a number of small differences. The lateral margin of the uropodal exopod in the holotype has a shorter proportion of the lateral margin serrate (56% of the length of the ramus) than the New Zealand material (64% of length of ramus). The holotype has partly damaged uropods, and without additional material is not possible to be certain if this is a consistent difference between the two populations. The proportions and setation of pereopod 7 also vary slightly, suggesting the possibility that these are separate populations.

REMARKS: *Aega komai* is can be identified by the following combination of characters: elongate body, antennule peduncle articles 1 and 2 strongly compressed and expanded, antenna article 5 conspicuously flattened, deeply serrate uropod rami which extend beyond the posterior margin of the pleotelson and a deeply serrate subtruncate pleotelson posterior margin.

There are three other similar species: *Aega angustata* Whitelegge, 1901, *Aega dofleini* Thielemann, 1920, and an undescribed species from southern Australian waters. *Aega angustata* is readily distinguished by the produced pleotelson posterior margin, the uropod rami falling well short of the pleotelson posterior margin and the uropod exopod lateral margin not being serrate and provided with prominent robust setae on both margins. *Aega dofleini* has a produced pleotelson margin, with uropodal rami extending to the pleotelson apex; and the pleotelson and uropodal rami are figured as being weakly and irregularly serrate. The as-yet-undescribed species from southern Australia has the uropods extending to the pleotelson apex and the posterior margins of the pleotelson are distinctly angled and with smaller serrations and spines than *A. komai*.

PREY: The holotype was recorded from the mantle of the squid *Loligo bleekeri* Keferstein, although this may be a capture artefact. *Squalus blainvillei* (Risso, 1827), Squalidae; dogfish and longnose spurdog (UK usage), grey-spiny or spiny dogfish (New Zealand usage).

DISTRIBUTION: Previously recorded from Japan. In New Zealand from Taranaki Bight and Hauraki Gulf, western and northeastern North Island respectively; also Taiwan; at depths of 86–262 metres.

*Aega monophthalma* Johnston, 1834 (Figs 14–18)

*Aega monophthalma* Johnston, 1834: 233, fig. 43a–b.– Milne Edwards, 1840: 244.– Lütken, 1859: 75.– Bate & Westwood, 1867\*: 286, figure.– Sars, 1897: 62, pl. 26, fig. 1.– Norman, 1904: 434; 1905a: 94; 1905b: 13.– Hansen, 1916: 171.– Stephensen, 1948: 38, fig. 7 (8–9).

*Rocinela monophthalma*.– White, 1850: 80; 1857: 253, pl. 14, fig. 7.– Gosse, 1855: 134, fig. 233.

*Aega monophthalma*.– Schioedte & Meinert, 1879b: 365 (lapsus).

*Aega monophthalma*.– Gerstaecker, 1882: 254.– Barnard, 1914: 362, pl. 31B.– Nierstrasz & Schuurmans Stekhoven, 1930: 77, fig. 14.– Nierstrasz, 1931: 183.– Gurjanova, 1933: 430.– Stephensen, 1937: 7, 17.– Kussakin, 1979: 235: figs 104, 105.– Ellis, 1981: 123.– Hemmingsen & MacKenzie, 1996: 137; 2001: 9.– Bruce, 2001: 12, photo.– Bruce, Lew Ton & Poore, 2002: 161.– Tracey et al., 2005: 107, colour fig.

*Aega monophthalma*.– Moreira & Sadowsky, 1979: 108. – Treat, 1980: 912, fig. 1 (lapsus).

*Aega monophthalmus*.– Kensley, 1978: 57, fig. 24G–H; 2001: 227.

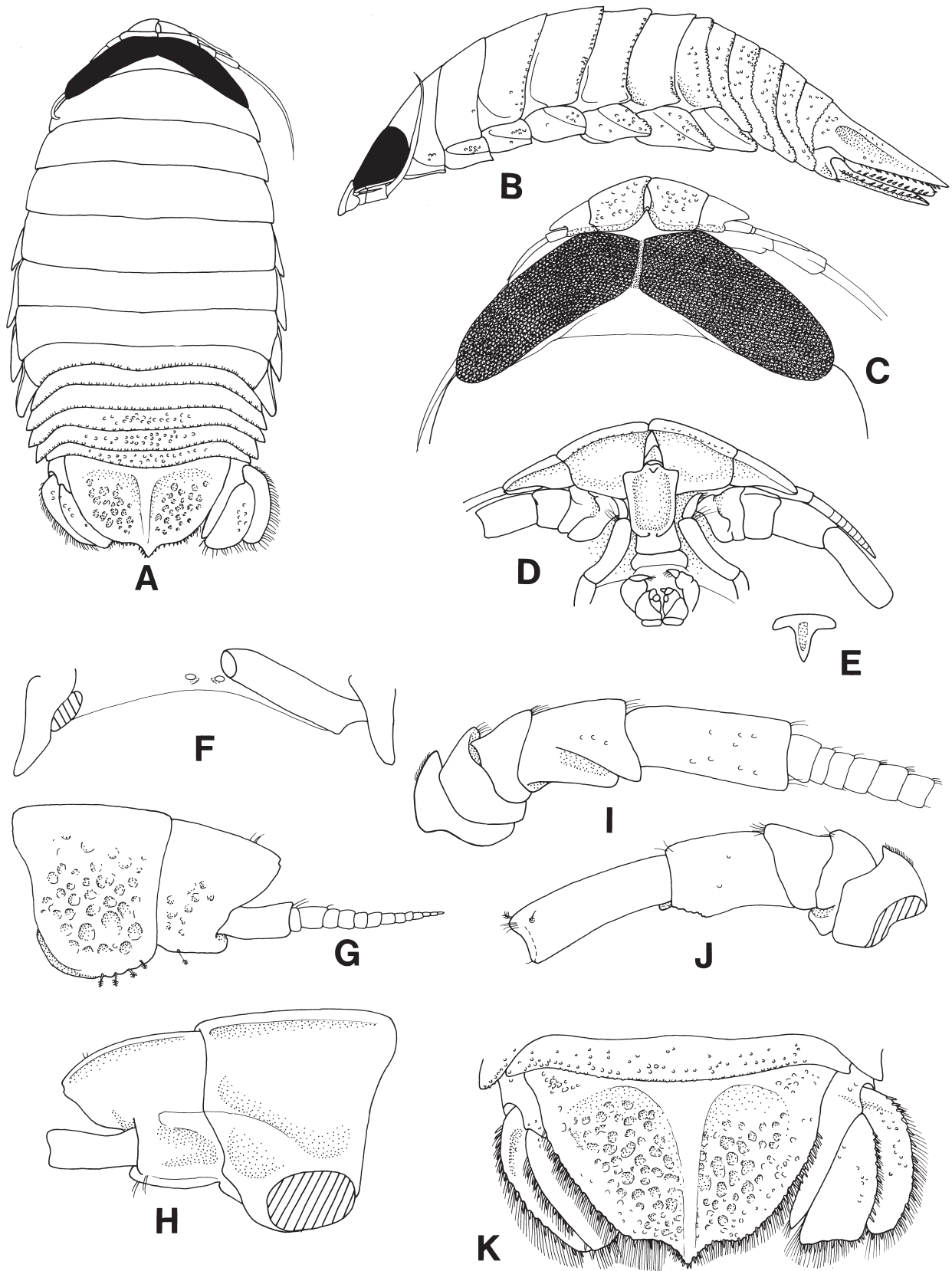
*Aega (Aega) monophthalma*.– Brusca, 1983: 11.

TYPE LOCALITY: “Berwick on Tweed” (Johnston 1834), Berwick Bay, Northumberland. Johnston had two specimens and two species, and stated that he described the larger specimen which is now in The Natural History Museum, London (holotype, BMNH 1979:299:1). The smaller specimen is *Aega stroemii* Lütken, 1859 [= *A. bicarinata* Rathke, 1837, not *A. bicarinata* Leach, 1818, according to Brusca (1983)].

MATERIAL EXAMINED: Holotype, ♂ (50 mm), Berwick on Tweed, Northumberland, on large codfish, White MS cat. No. 972a, coll. G. Johnston (BMNH 1979.299.1) [penes close set but apart and not projecting.].

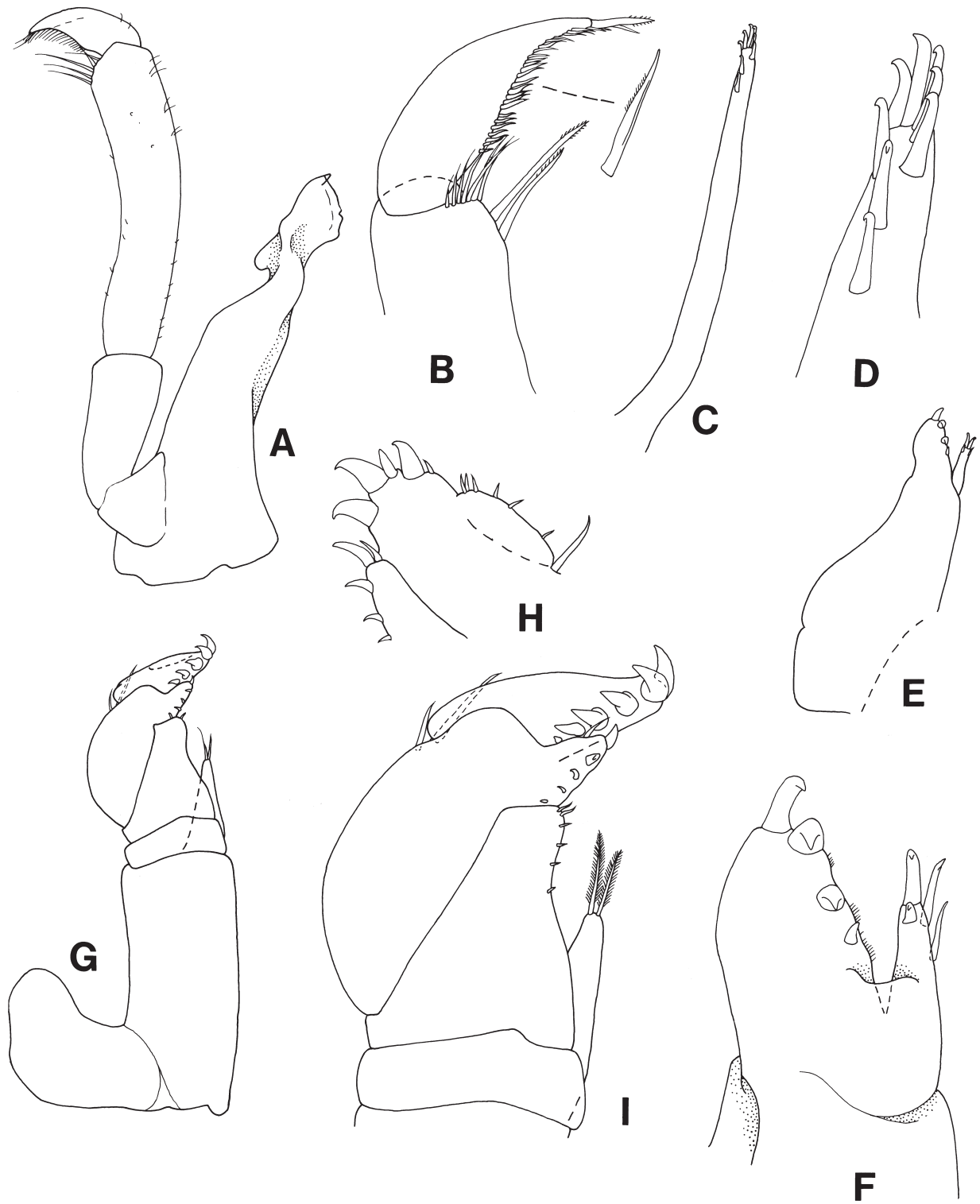
*Non-type. New Zealand*: ♂ (49 mm), Chatham Rise, 42°45.68'S, 179°59.33'W, 21 April 2001, 920–771 m, coll. RV *Tangaroa* (NIWA 23755). ♀ (non-ovig. 62 mm), New Zealand, in fish pound after fish processed, Fisheries Research Division stn CO2/102/88 (NIWA 23756). ♀ (ovig. 63 mm), South Norfolk Ridge, 33°22.61'S, 170°12.70'E, 1 June 2003, 514–540 m, coll. NORFANZ, RV *Tangaroa* (NIWA 23757). Immature (28 mm), manca (18.5 mm), North Norfolk Ridge, 28°51.21'S, 167°42.53'E, 5 May 2003, 690–812 m, coll. NORFANZ, RV *Tangaroa* (NIWA 23758, 23759). *Australia*: ♂ (40 mm), ♀ (48 mm), 758–841 m, east of Kiama, NSW, 34°42–38'S, 151°16–18'E, 3 December 1987, 760–855 m,

\* See Holthuis (1977) for details of the dates of publication of Bate and Westwood's book.



**Figure 14.** *Aega monophthalma* Johnston, 1834. NIWA 23755. A, dorsal view; B, lateral view; C, head; D, frons; E, anterior view of frontal lamina; F, penial openings; G, antennule, dorsal view; H, antennule, ventral view; I, antenna, dorsal view; J, antenna, ventral view; K, pleotelson and uropods.





**Figure 15.** *Aega monophthalma* Johnston, 1834. NIWA 23755. A, mandible; B, mandible palp article 3; C, maxillule; D, maxillule apex; E, maxilla; F, maxilla apex; G, maxilliped; H, maxilliped palp articles 4 and 5 (Leica); I, maxilliped palp articles 1-5.

coll. FRV *Kapala* (AM P43978). ♂ (56 mm), off Broken Bay, NSW, 33°26–29'S, 152°06–04'E, 15 July 1980, 440 m, coll. FRV *Kapala* (AM P31918).

**Additional material. New Zealand region:** ♀ (non-ovig 72 mm), off Great Barrier Island, North Island, 24 April 2004, from *Hyperoglyphe antarctica*, longline at ~500 m, coll. Steve Lowe (NIWA 23760). ♀ (non-ovig 47 mm), off Great Barrier Island, North Island, October–November 2004, from *Hyperoglyphe antarctica*, longline at ~500 m, coll. Steve Lowe (NIWA 23761). ♀ (non-ovig 63 mm), vicinity of West Norfolk Rise, 33°41'S, 167°14'E, 600 m, FV *Jacquiline*, stn 69, coll. D. Smith (NMNZ Cr.11335). ♀ (non-ovig 73 mm), Chatham Rise, 44°32.19–34.04'S, 175°27.95–27.94'W, 13 November 2005, 880–1022 m, commercial trawl, stn SWA0501/70, coll. P. McMillan (NIWA 23762). **New Caledonia:** Manca (24 mm), 23°19'S, 168°00'E, 2 October 1992, BERYX 11, stn. CP60, 590–600 m, coll. B. Richer de Forges (MNHN Is.5861).

**DESCRIPTION:** *Body* 1.9 times as long as greatest width, dorsal surfaces punctate (coarsely pitted, posterior margins of pleonites with coarse granules approaching nodular), widest at pereonite 6, lateral margins weakly ovate. *Rostral point* projecting anteriorly, not ventrally folded. *Eyes* large, medially united, anterior clear field 8% length of head, posterior clear field 33% length of head; each eye made up of ~36 transverse rows of ommatidia, each row with ~18 ommatidia; eye colour black. *Pereonite 1* and coxae 2–3 each with postero-ventral angle right-angled (small produced point; coxae 3 and 4 posteriorly rounded). *Coxae 5–7* with entire oblique carina; posterior margins straight, postero-lateral angle rounded. *Pleon* with pleonite 1 largely concealed by pereonite 7; pleonite 4 with posterolateral margins extending to but not beyond posterior margin of pleonite 5; pleonite 5 with posterolateral angles overlapped by lateral margins of pleonite 4. *Pleotelson* 0.6 times as long as anterior width (with deep reticulated pits), dorsal surface with longitudinal carina and with 2 sub-medial depressions; lateral margins weakly convex, smooth, posterior margin subtruncate or with distinct short median point (somewhat sinuate), with 44–48 RS.

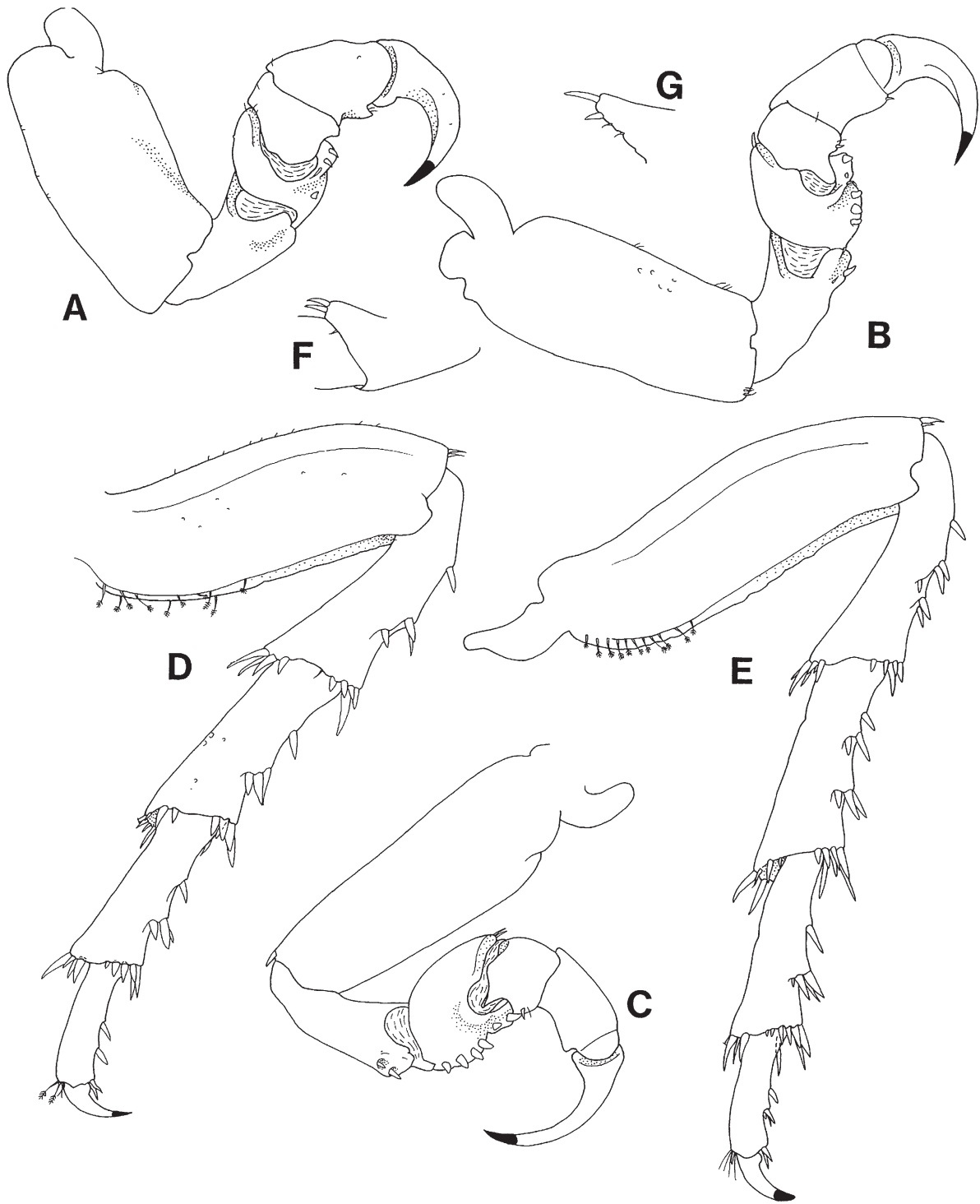
*Antennule* peduncle article 2 anterodistal lobe extending to end of article 3; articles 3 and 4 0.25 times as long as combined lengths of articles 1 and 2, article 3 2.3 times as long as wide; flagellum with 12 articles, extending to mid-point of eye. *Antenna* peduncle article 2 inferior surface with distinct longitudinal suture; article 4 1.5 times as long as wide, 0.8 times as long as combined lengths of articles 1–3, with deep longitudinal groove, inferior margin 1 plumose setae, and 2 short simple setae; article 5 not markedly wider or flatter than article 4, 1.5 times as long as article 4, 2.3 times as long as wide, inferior margin with 1 palmate

seta (distal), anterodistal angle with cluster of five short simple setae; flagellum with 22 articles, extending to posterior of pereonite 1.

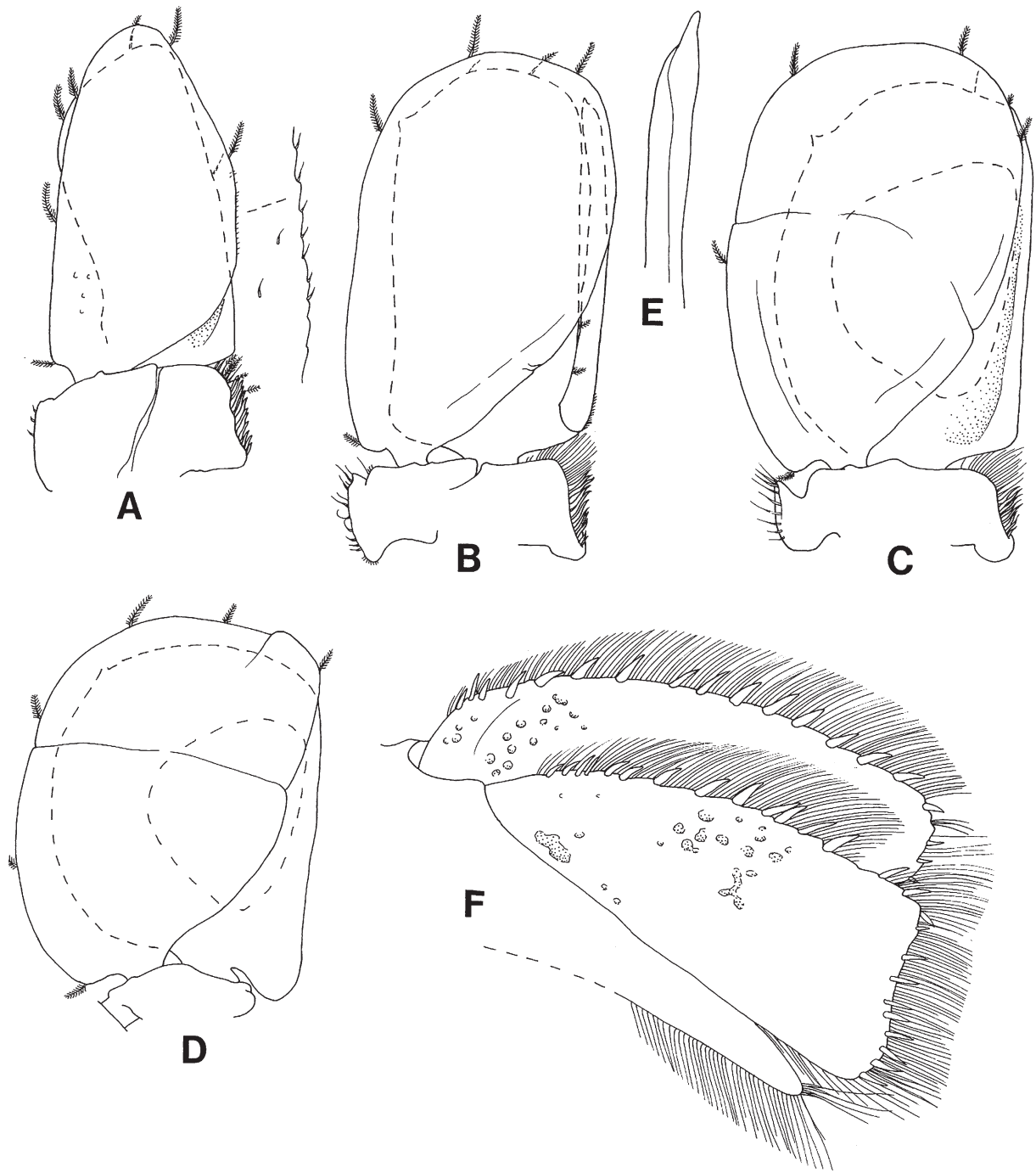
*Frontal lamina* flat, longer than greatest width, rectangular (lateral margins weakly concave, ridged), anterior margin with median point (downwardly directed, anteriorly recessed process), with prominent median point, posterior margin abutting clypeus.

*Mandible* molar process present, minute; palp article 2 with 8 distolateral setae. *Maxillule* with 8 terminal and subterminal RS. *Maxilla* mesial lobe with 4 RS (2 hooked, 2 weakly curved); lateral lobe with 4 RS. *Maxilliped* endite with 2 apical setae (long weakly CP); palp article 2 with 8 RS (small stiff setae/slender RS); article 3 with 6 recurved RS (and 1 simple straight RS); article 4 with 7 hooked RS (4 large, 3 small); article 5 partly fused to article 4, distally convex, with 5 RS (partly fused with article 4; all setae short and simple).

*Pereopod 1* basis 1.9 times as long as greatest width; ischium 0.5 times as long as basis, inferior margin with 0 RS, superior distal margin with 2 RS (and 2 slender simple setae); merus inferior margin with 3 RS, set as two groups (of 1, 2 and 1 distal simple setae), superior distal angle with 0 RS (2 simple setae); carpus 0.6 as long as merus, inferior margin with 0 RS; propodus 1.1 times as long as proximal width, inferior margin with 0 RS (distally with 2 small simple setae), propodal palm with small distal lobe, dactylus smoothly curved, 1.5 as long as propodus. *Pereopod 2* ischium inferior margin with 1 RS, superior distal margin with 2 RS (and 2 simple setae); merus inferior margin with 5 RS (set as 3 + 2 setae and 1 distal simple seta), set as two groups, superior distal margin with 1 acute RS; carpus similar in size to that of pereopod 1, inferodistal angle with 1 RS, propodus without large club-shaped distal RS. *Pereopod 3* similar to pereopod 2 (but longer, ischium inferior distal angle with 2 RS; dactylus markedly more slender than that of pereopods 1 and 2); propodus without large club-shaped distal RS. *Pereopods 5–7* inferior margins of ischium–carpus with short RS. *Pereopod 6* similar to pereopod 7 (with fewer RS on inferior margins of ischium–propodus). *Pereopod 7* basis 3.2 times as long as greatest width, inferior margins with 10 palmate setae; ischium 0.6 as long as basis, inferior margin with 6 RS (set as 1, 2 and 3), superior distal angle with 6 RS, inferior distal angle with 6 RS; merus 0.9 as long as ischium, 2.1 times as long as wide, inferior margin with 6 RS (set as 1, 3 and 2), superior distal angle with 11 RS, inferior distal angle with 9 RS; carpus 0.9 as long as ischium, 2.6 times as long as wide, inferior margin with 5 RS (set as 1 and 4), superior distal angle with 9 RS, inferior distal angle with 10 RS; propodus 0.6 as long as ischium, 3.5 times as long as wide, inferior margin with 4 RS (set as 1 and 4), superior distal angle with 4 slender setae (1 acute RS and 2 simple and 1 palmate setae), inferior distal angle with 3 RS.



**Figure 16.** *Aega monophthalma* Johnston, 1834. NIWA 23755. A–E, pereopods 1–3, 6, 7 respectively; F and G, pereopod 1 and 2, ischium superior distal angle, mesial side.

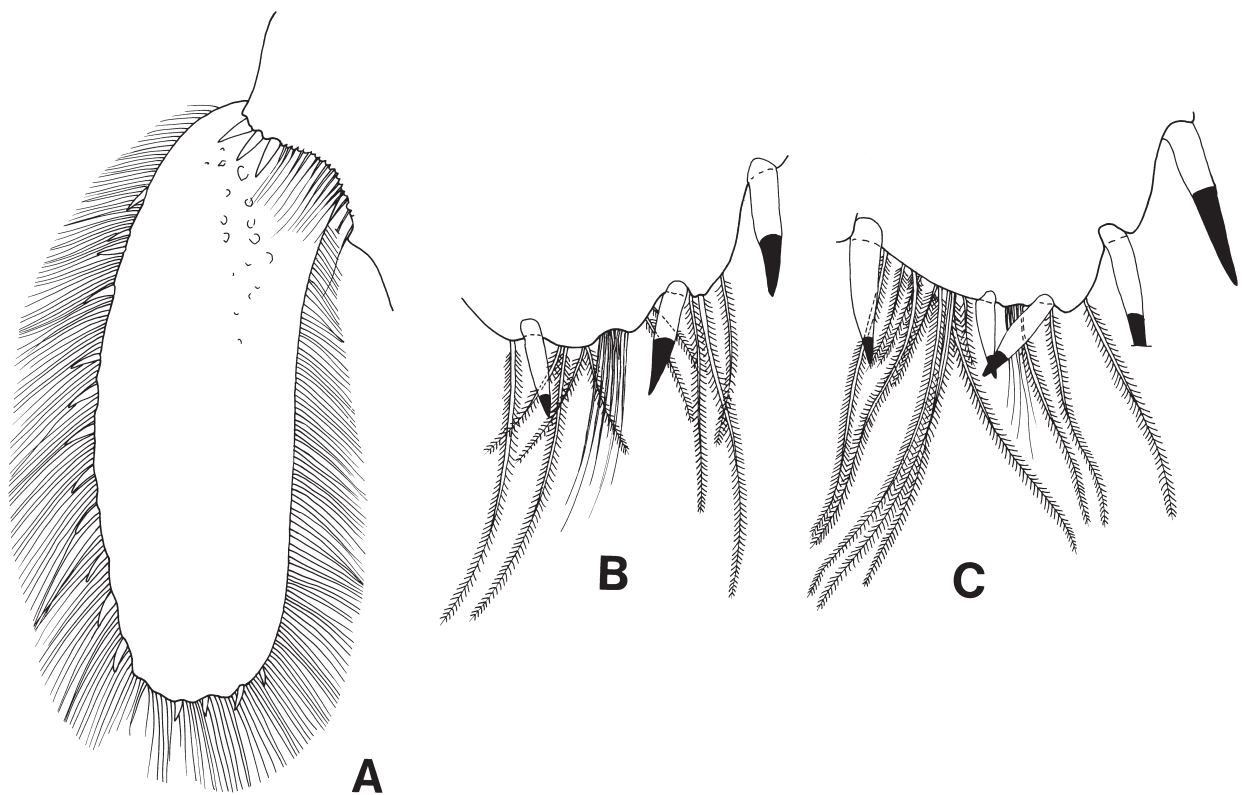


**Figure 17.** *Aega monophthalma* Johnston, 1834. NIWA 23755. A-D, pleopods 1-3, 5 respectively; E, appendix masculina apex; F, uropod.

*Penes* low tubercles; penial openings separated by 7% of sternal width.

*Pleopod 1* exopod 1.9 times as long as wide, distally narrowly rounded, mesial margin weakly oblique, lateral margin straight, mesial margin strongly convex (finely crenulate with minute simple setae present), with PMS on distal one-third; endopod 2.2 times as long as wide, distally subtruncate, lateral margin

strongly concave, with PMS on distal one-third, mesial margin with PMS on distal margin only; peduncle 2 times as wide as long, mesial margin with 11 coupling hooks. *Pleopod 2* appendix masculina with straight margins, 0.9 times as long as endopod, distally acute (with narrowed apical point; basally with lateral groove). *Exopods* of pleopods 1-3 each with distolateral margin not digitate; *endopods* of pleopods 3-5 each with dis-



**Figure 18.** *Aega monophthalma* Johnston, 1834. NIWA 23755. A, uropod exopod, ventral view; B, uropod exopod, apex; C, uropod endopod, apex.

tolateral point; *pleopods 2–4 peduncle* distolateral margin with prominent acute RS.

*Uropod* peduncle ventrolateral margin with 3 RS (and continuous PMS), posterior lobe about as long as endopod. Uropod rami extending to pleotelson apex, marginal setae dense, in several tiers, apices broadly rounded. *Endopod* apically not bifid, lateral margin proximally convex, without prominent excision, proximal lateral margin with 13 RS, distal lateral margin with 2 RS, mesial margin strongly convex or concave, with 7–10 RS. *Exopod* extending to end of endopod, 2.9 times as long as greatest width, apically not bifid; lateral margin convex, with 17–18 RS; with 3–4 RS.

**FEMALE:** Eyes narrowly separated; ovigerous female ocular surface depressed, dorsal body surfaces not as nodular as male; uropodal margins lacking prominent RS; non-ovigerous female similar to male with the exception of sexual characteristics.

**SIZE:** Specimens from the southwestern Pacific: males from 40 to 49 mm, females 48 to 73 mm; single manca 18.5 mm.

**VARIATION:** Only a small number (5) of specimens were available at the time of writing the description for this species, and the fact that the uropod and pleotelson apices are mostly damaged means that it is not possible to precisely detail the variation present. The pleotelson has from about 44 to 48 (22+22 to 24+24) robust setae. The uropod endopod lateral margin has 12–17 RS, the mesial margin 7–10 RS; the exopod lateral margin has 16–18 RS, the mesial margin 3–5 RS. The robust setae on the merus of pereopods 1–3 are constant: pereopod 1 merus with 1+2, pereopod 2 merus with 3+2 and pereopod 3 merus to 4+2.

The extent to which the antennule peduncle articles 1 and 2 are produced varies, with the large specimen from off Great Barrier Island being less strongly produced; in some specimens the dorsal pitting is weaker than in others, and the robust setae on the uropods and pleotelson are not always as prominent as illustrated; uropod apices are also frequently damaged and regrowth may appear more rounded than in undamaged specimens.

**REMARKS:** This spectacular and large isopod, at the time of first description only the seventh in the genus, is im-

mediately recognisable by the highly textured dorsal surface, heavily 'spined' pleotelson and uropods, the subtruncate pleotelson posterior margin with a well-defined median point, the pleotelson with a prominent longitudinal ridge, the antennule peduncle articles being flattened and expanded, the huge eyes which appear to be medially united and the characteristic shape of the frontal lamina. Juvenile specimens are not as nodular, and can be identified by the characteristic shape of the frontal lamina, and the shape, ornamentation and setation of the pleotelson and uropodal rami. The ovigerous female is slightly wider in body shape, and the prominent robust setae are missing from the margins of the pleotelson and uropods; the frontal lamina is the same as in the male, and the appendages are otherwise similar. Although the distribution is vast, there is no doubt that all the material identified here is the one species, and furthermore such a distribution is not unique (e.g. *Metacirolana caeca* (Hansen, 1916), see Svavarsson & Bruce 2000), possibly influenced by the Great Global Conveyor currents (e.g. see Manighetti 2001).

A rather similar *Aega* sp. collected east of Heron Island, Queensland (NTM, unregistered, see p. 244) can be distinguished by the far smaller antennule peduncle articles 1 and 2, flat frontal lamina, more anteriorly rounded head, more and larger robust setae on pereopods 1–3, lack of large robust setae on the pleotelson and uropods, more rounded uropodal exopod, and by the different nature of the robust pitting on the pereon and pleotelson.

PREY: There are no recent prey identifications. *Gadus morrhua* and *Scymnum microcephalum* (= *Scymno microcephalo*), *Somniosus microcephalus* (= Greenland shark, Dalatiidae) (Schioedte & Meinert 1879b); *Centrophorus squamosus* (gulper shark, Centrophoridae) (Kussakin 1979); *Hyperoglyphe antarctica* [bluenose and matiri (New Zealand) or Antarctic butterfly, Centrolophidae].

DISTRIBUTION: North Atlantic, South Africa and south-western Pacific. Localities: Schioedte and Meinert (1879b) cite Iceland, Bergen, Florø, Lodshagen and Farsun (all Norway), German Sea (= German Bight?) and Herne, Skagerak. South Africa (Barnard, 1914); Bahamas (Treat 1980); Hansen (1916) cites the Færoe Islands and Jutland (Denmark) as regional records; Moray Firth and Shetland, Scotland (Norman 1904). Present material is from the Chatham Rise, New Zealand, New Caledonia and from southeastern Australia off the mid- and southern New South Wales coast.

Previously recorded at depths of 460–730 m, present material at depths between 440 and 1022 metres.

*Aega semicarinata* Miers, 1875 (Figs 19–22)

*Aega semicarinata* Miers, 1875: 115.– 1879: 201, pl. 11, figs. 1–1d.– Dollfus, 1891: 57, pl. 8, figs 2–2a.– Bouvier, 1911: 39, pl. 2, fig. 1.

*Aega semicarinata*.– Barnard, 1916: 106.– Nierstrasz, 1931: 183.– Hale, 1937: 19.– Barnard, 1940: 401.– Stephensen, 1947: 23.– Menzies, 1962: 118, fig. 38A–C.– Moreira & Sadowsky, 1979: 109.– Kensley, 1978: 57, fig. 24I–J; 1980b: 159; 2001: 227.– Kussakin & Vasina, 1982: 264.– Branch, Griffiths, Kensley & Sieg, 1991: 26.– Bruce, Lew Ton & Poore, 2002: 162.

*Aega semicarinata*.– Stebbing, 1920: 334.

*Aega bicavata* Nordenstam, 1930, 547, fig. 11, Pl. 20, fig. 11.

*Aega (Aega) bicavata*.– Brusca, 1983: 10.

*Aega (Aega) semicarinata*.– Brusca, 1983: 11.

TYPE LOCALITY: Kerguelen, southern Indian Ocean (Miers 1875).

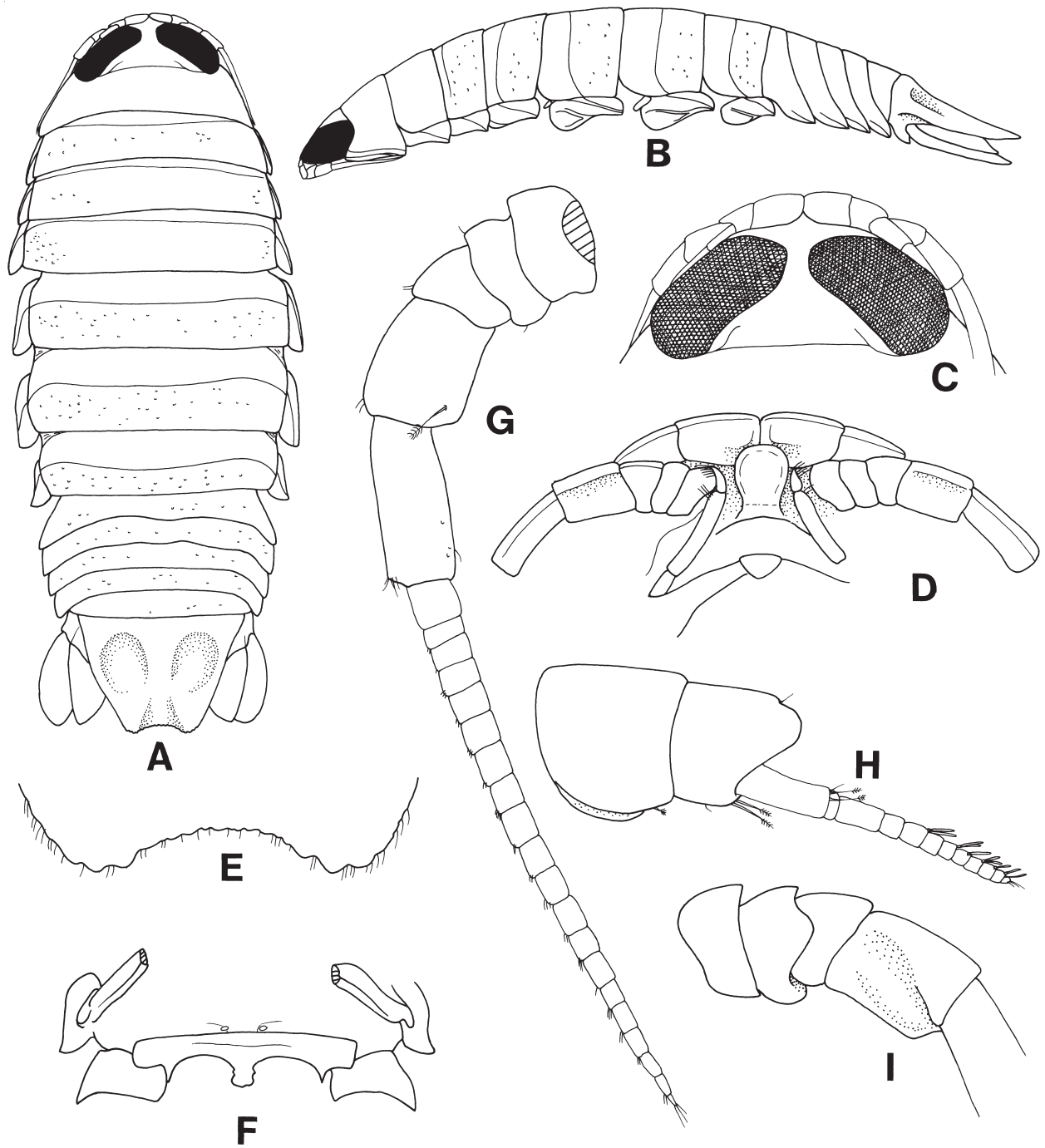
TYPES: At the then British Museum of Natural History, London, according to Miers (1875). Not listed by Ellis (1981), though one unregistered specimen, labelled as 'type' is held at The Natural History Museum, London. The type information states: 'outside label destroyed at Godstone' and the only other data is 'HMS *Sylvia*'.

MATERIAL EXAMINED: *Holotype*(?), ♀ (non-ovig 27 mm), 'outside label destroyed at Godstone', HMS *Sylvia* (BMNH).

*New Zealand material*: ♀ (74 mm ovig, previously dissected), I685, vicinity of Bounty Plateau, 48°19.50'–17.20'S, 179°29.50'–40'W, 16 March 1979, dredged, 722 m and ♂ (35 mm), stn Z3, labels in tube: "Z3, 40F, A, 8/63"; "John Graham, Oamaru, "♂ of giant I685"; therefore presumably same data as I685 (NIWA 23771 ♀, 23772 ♂). ♂ (38 mm), Chatham Rise, 42°43.95'S, 179°53.91'W, 18 April 2001, 1076–990 m, coll. S. O'Shea on RV *Tangaroa* (NIWA 23773). ♂ (31 mm), Chatham Rise, 43°49.605'S, 178°29.284'E, 6 October 2001, 454 m, Agassiz trawl, coll. RV *Tangaroa* (NIWA 23774). ♂ (31 mm), North Otago, 27.5 m, 1962, coll. John Graham (NMNZ Cr.12016). ♀ (~4–5 cm, ovig, broken, two pieces), 44°41.35'S, 172°34.0'E, 390–360 m, RV *James Cook* (NMNZ Cr.4969).

*Additional material*: ♀ (63 mm, non-ovig), Juan Fernandez Islands, Chile, 1920, A1463 (LACM 20-12.1). 2♀ (44, 38 mm), off Table Bay, South Africa (BMNH 1931.11.10.18-20, part). ♂ (39 mm), Chatham Rise, 42.7160–71.08°S, 180.0390–02.97°E, 28 May 2006, 935–1210 m, coll. RV *Tangaroa* (NIWA 25658).

DESCRIPTION: *Body* 2.6 times as long as greatest width, dorsal surfaces punctate, widest at pereonite 6, lateral margins subparallel. Rostral point projecting anteriorly, not ventrally folded. *Eyes* large, not medially united, separated by about 9% width of head; each eye made up of ~36 transverse rows of ommatidia,

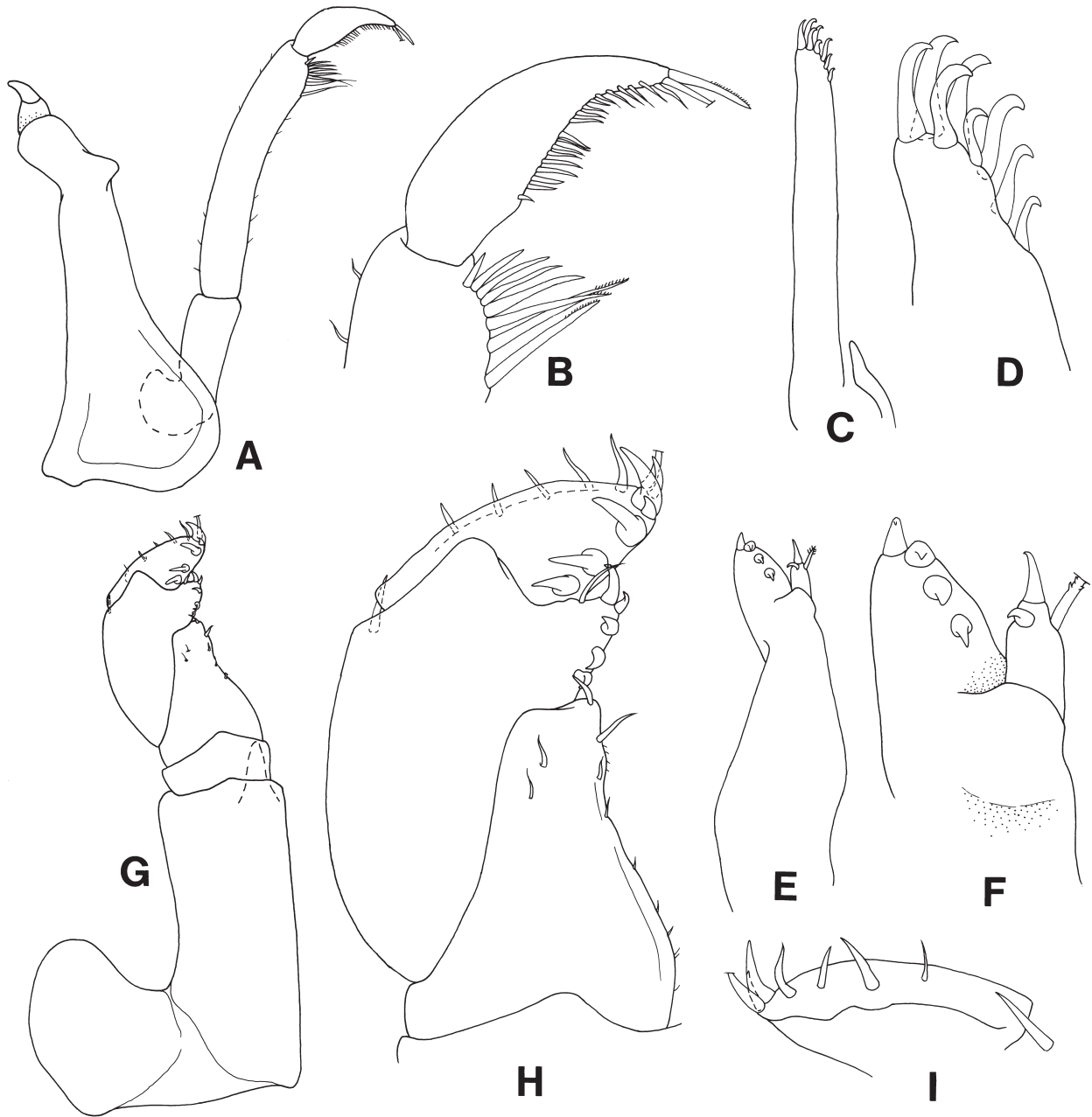


**Figure 19.** *Aega semicarinata* Miers, 1875. NIWA 23773. A, dorsal view; B, lateral view; C, head; D, frons; E, pleotelson posterior margin; F, penial openings; G, antenna; H, antennule; I, antenna peduncle, dorsal view.

each row with ~18 ommatidia; eye colour dark brown. *Pereonite 1* and *coxae 2-3* each with posteroventral angle rounded. *Coxae 5-7* with entire oblique carina (raised, forming distinct ridge); posterior margins convex, posterolateral angle blunt (more than 45°). *Pleon* with pleonite 1 visible in dorsal view; pleonite 4 with posterolateral margins extending to but not beyond posterior margin of pleonite 5; pleonite 5 with posterolateral

angles overlapped by lateral margins of pleonite 4. *Pleotelson* 0.7 times as long as anterior width, dorsal surface with 2 sub-median depressions (and posterior median depression); lateral margins straight, crenulate, posterior margin emarginate, with 0 RS.

*Antennule* peduncle article 2 anterodistal lobe not extending beyond mid-point of article 3; articles 3 and 4 0.4 times as long as combined lengths of articles



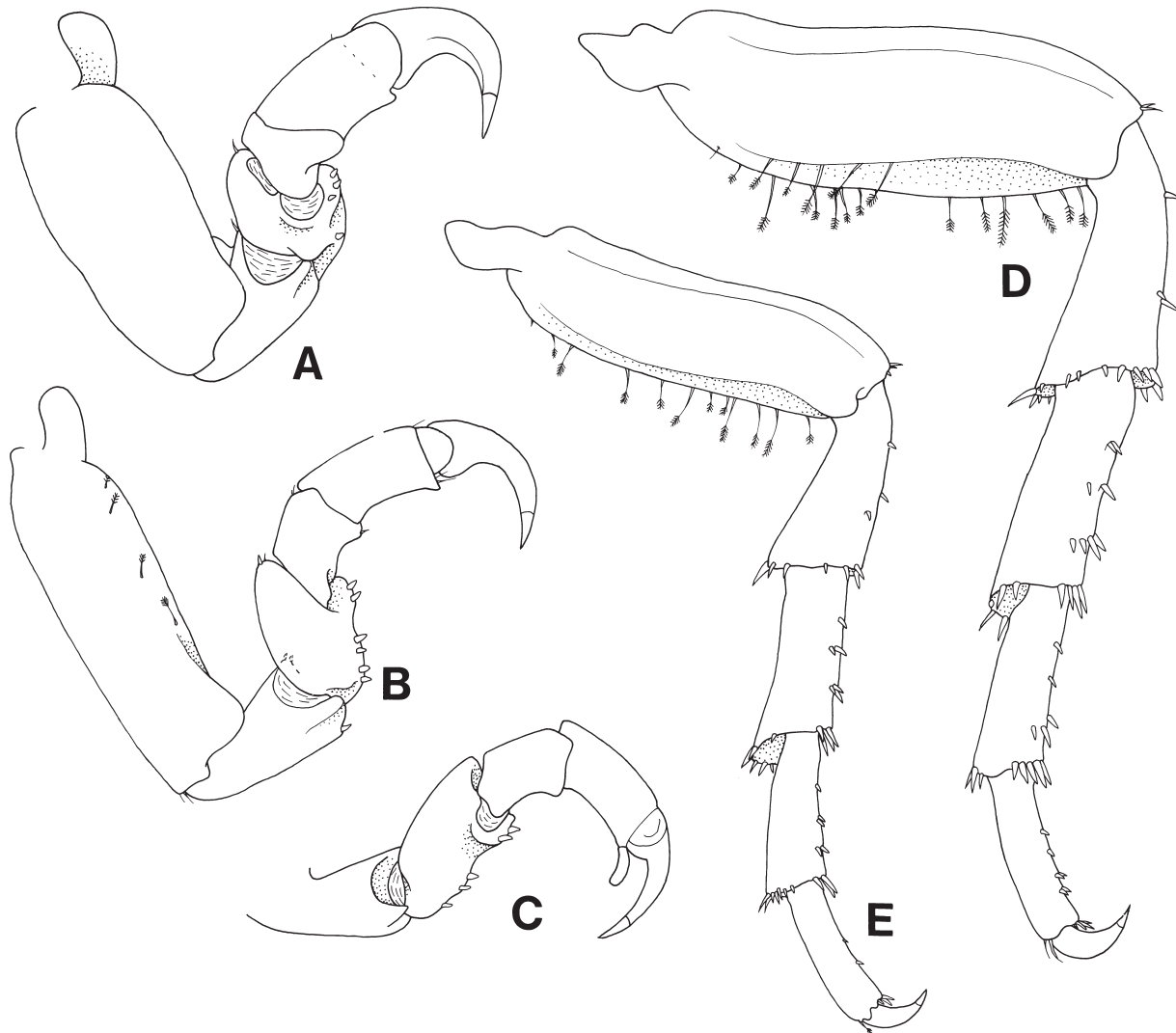
**Figure 20.** *Aega semicarinata* Miers, 1875. NIWA 23773. A, mandible; B, mandible palp article 3; C, maxillule; D, maxillule apex; E, maxilla; F, maxilla apex; G, maxilliped; H, maxilliped articles 2-5; I, maxilliped article 5 (Leica).

1 and 2, article 3 2.8 times as long as wide; flagellum with 9 articles, extending to mid-point of eye. *Antenna* peduncle article 2 inferior surface without distinct longitudinal suture; article 4 1.2 times as long as wide (dorsally with wide longitudinal depression), 0.8 times as long as combined lengths of articles 1-3, with deep longitudinal groove, inferior margin 1 plumose setae, and 0 short simple setae; article 5 not markedly wider or flatter than article 4, 1.5 times as long as article 4, 2.7 times as long as wide, inferior margin with 0 palmate setae, anterodistal angle with cluster of 5 short simple setae; flagellum with 20 articles, extending to posterior of pereonite 1.

*Frontal lamina* flat, longer than greatest width, lateral margins converging posteriorly, anterior margin rounded, without small median point, posterior margin abutting clypeus.

*Mandible* molar process absent; palp article 2 with 8 distolateral setae, palp article 3 with 20 setae (proximally smooth, distally finely serrate). *Maxillule* with 8 terminal and subterminal RS (proximal 3 falcate). *Maxilla* mesial lobe with 3 RS (1 hooked 2 straight); lateral lobe with 4 RS (large). *Maxilliped* endite with 0 apical setae; palp article 2 with 3 RS (with further fine marginal setae); article 3 with 5 recurved RS (and 1 slender); article 4 with 5 hooked RS; article 5 partly





**Figure 21.** *Aega semicarinata* Miers, 1875. NIWA 23773. A-E, pereopods 1-3, 6 and 7, respectively.

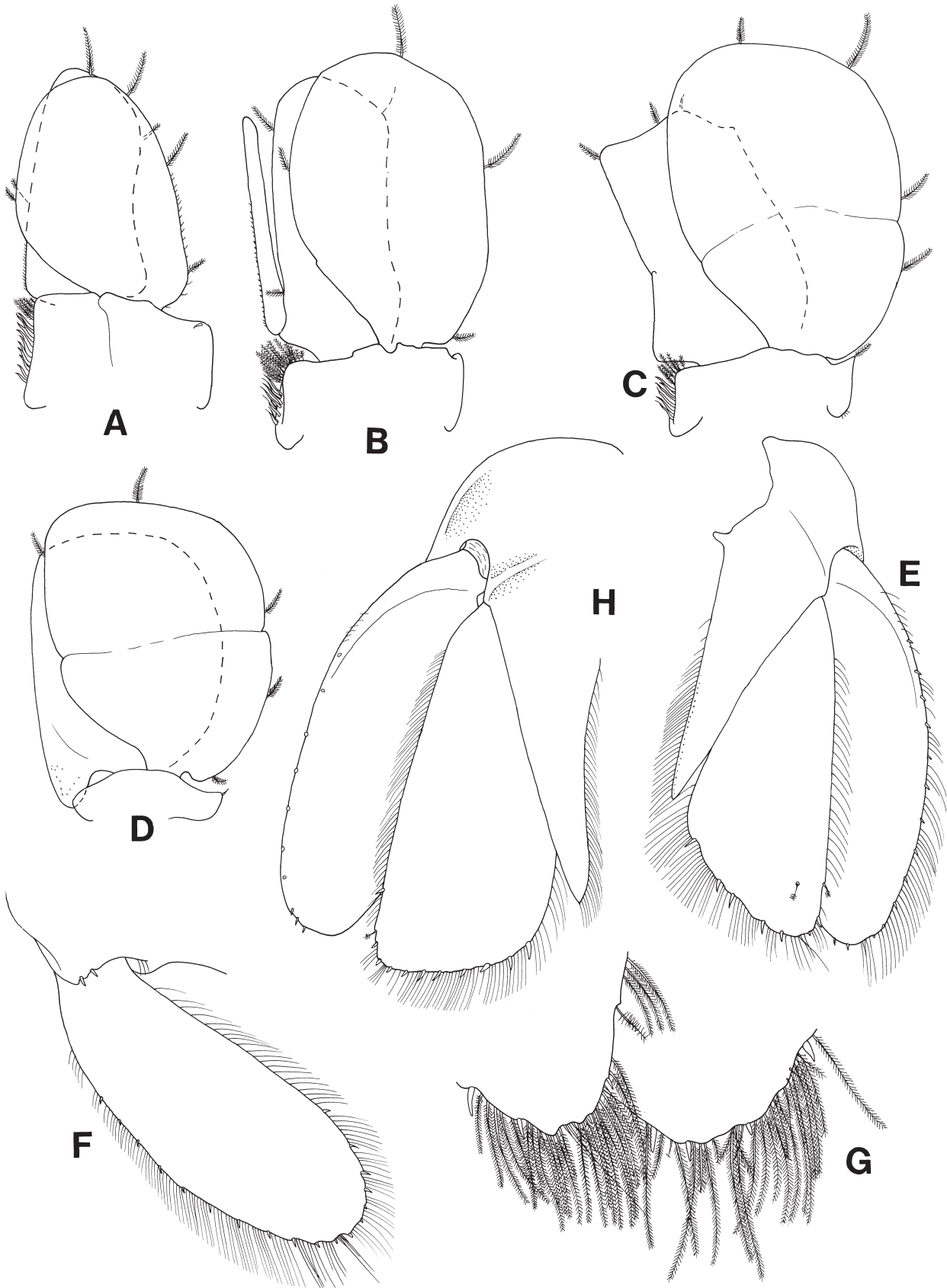
fused to article 4, distally convex, with 7 RS (straight, 2 lateralmost curved).

*Pereopod 1* basis 2.2 times as long as greatest width; ischium 0.5 times as long as basis, inferior margin with 0 RS, superior distal margin with 1 RS (acute); merus inferior margin with 4 RS, set as two groups (of 1 and 3), superior distal angle with 1 RS (small, acute); carpus 0.7 as long as merus, inferior margin with 0 RS; propodus 1.8 times as long as proximal width, inferior margin with 0 RS, propodal palm with small distal lobe, dactylus smoothly curved, 1.2 as long as propodus. *Pereopod 2* ischium inferior margin with 0 RS, superior distal margin with 2 RS (acute); merus inferior margin with 6 RS (set as 4 and 2), set as two groups, superior distal margin with 2 acute RS (short); carpus similar in size to that of pereopod 1, inferodistal angle with 0 RS, propodus without large club-shaped distal RS. *Pereopod 3* not similar to pereopod 2; propodus with large club-shaped distal RS. Pereopods 5-7 inferior margins of ischium-carpus with short RS. *Pereopod 6* similar to

*pereopod 7* (but larger and more robust, basis 2.8 times as long as wide). *Pereopod 7* basis 3.4 times as long as greatest width, inferior margins with 11 palmate setae; ischium 0.5 as long as basis, inferior margin with 3 RS (set singly), superior distal angle with 3 RS, inferior distal angle with 4 RS; merus 0.9 as long as ischium, 2 times as long as wide, inferior margin with 6 RS (set as 1, 2 and 3), superior distal angle with 6 RS, inferior distal angle with 5 RS; carpus 1.1 as long as ischium, 3.0 as long as wide, inferior margin with 5 RS (set as 1, 2 and 3), superior distal angle with 8 RS, inferior distal angle with 3 RS; propodus 0.9 as long as ischium, 3.8 times as long as wide, inferior margin with 3 RS (set as 1 and 2), superior distal angle with 1 slender setae (palmate), inferior distal angle with 3 RS.

*Penes* opening flush with surface of sternite 7; penial openings separated by 10% of sternal width.

*Pleopod 1* exopod 1.4 times as long as wide, distally broadly rounded, lateral margin weakly convex, mesial margin strongly convex, with PMS on distal half; endo-



**Figure 22.** *Aega semicarinata* Miers, 1875. NIWA 23773. except H. A–D, pleopods 1–3, 5 respectively; E, uropod; F, uropod exopod, ventral view; G, uropod apices (exopod to right); H, uropod, NMNZ Cr.4969.

pod 2.2 times as long as wide, distally subtruncate, lateral margin strongly concave, with PMS on distal one-third, mesial margin with PMS on distal half; peduncle 1.6 times as wide as long, mesial margin with 10 coupling hooks. Pleopod 2 *appendix masculina* with straight margins, 0.73 times as long as endopod, distally bluntly rounded. Exopods of pleopods 1–3 each with distolateral margin not digitate; endopods of pleopods 3–5 each with distolateral point (minute); pleopods 2–4 peduncle distolateral margin with prominent acute RS.

*Uropod* peduncle ventrolateral margin with 2 RS, posterior lobe about two-thirds as long as endopod. Uropod rami not extending beyond pleotelson, marginal setae dense, in several tiers, apices broadly rounded. *Endopod* apically not bifid, lateral margin straight, without prominent excision, proximal lateral margin with 0 RS, distal lateral margin with 2 RS, mesial margin weakly convex, with 5 RS. *Exopod* extending beyond end of endopod (slightly), 2.7 times as long as greatest width, apically not bifid; lateral margin weakly convex, with 12 RS; mesial margin straight or convex (distally convex), with 7 RS.

**FEMALE:** Pereopod 3 lacks the distal robust seta on the propodus. Oostegites arising from the coxae of pereonites 1–5. Eggs are large, 2.8–3.5 mm diameter. Present data indicate that females may grow to a far larger size than do the males.

**SIZE:** Up to 75 mm for the largest female examined here making it the largest aegid species. Males are smaller, present material measuring from 27 to 38 mm.

**VARIATION:** The small number (five entire) of specimens, the fact that the uropod apices are mostly damaged with the robust setae rubbed off and the presence of a dense fringe of plumose setae means that it is not possible to precisely detail the variation present. The robust setae on the merus of pereopods 1–3 present a constant pattern of two rows, although the number of robust setae varies: pereopod 1 merus with 1+2 to 1+3, pereopods 2 and 3 merus with 4+2 to 5+2, one pereopod 3 with 3+2. Pereopod 3 has a large robust seta adjacent to the base of the dactylus on males NIWA23773, 23772 but this seta is absent or reduced in females and absent in the male NMNZ Cr.9269. It is not possible to say whether or not the absence of this robust seta is due to damage, although the presence or absence of such a prominent character would generally be considered to be significant.

There is some variation in the shape of the uropod endopod with some specimens having a distinctly oblique mesial margin (Fig. 22E) in others it is subtruncate (Fig. 22H). The robust setae vary: uropod exopod lateral margin 10–12, mesial margin 5–8; endopod lateral margin 2–3, mesial margin 5–8.

The specimen from Juan Fernandez agrees well with the description presented here with the exception that the frontal lamina is shorter and wider, the mesial margin of the uropodal exopod is slightly more convex than illustrated and the RS on pereopod 2 form a single row rather than two groups. The pleotelson indentation is a little shallower but this may be due to damage as it is clearly eroded and rubbed. Counts for the RS on the merus of pereopods 1 and 2: P1: 1+3, 1+2; P2: 5+2 (both). The uropod endopod mesial margins both have 9 RS, slightly higher than for New Zealand specimens.

**REMARKS:** *Aega semicarinata*, one of the largest species of Aegidae, may be identified by the widely excavate and crenulated posterior margin of the pleotelson, the dorsal surface of which has two shallow submedian depressions and one median posterior depression. These depressions can give the impression of a weakly defined longitudinal ridge, presumably after which Miers named the species. The moderately expanded antennule, large but separate eyes, coxae prominent in dorsal view, simple propodus on pereopods 1–3 and pereopod 3 propodus usually with a large club-like robust seta all serve to further distinguish the species.

A number of names have been placed in synonymy with this species — *Aega bicavata* Nordenstam, 1930, *A. punctulata* Miers, 1881 and *Aega urotoma* Barnard, 1914. Material from New Zealand provisionally identified as *Aega semicarinata* proved to belong to two similar but distinct species, here identified as *Aega semicarinata* and *Aega urotoma*, the latter proving to be the same as specimens of that species from South Africa.

The synonymy of *Aega bicavata* with *A. semicarinata* was first proposed by Menzies (1962), and the figures and description provided by Nordenstam agree well with Miers' (1879) description as well with the specimens examined here, and that species is retained as a junior synonym.

*Aega punctulata* should never have been placed in synonymy as Miers' (1881) description and figures more than adequately describe the critical points of difference between the two species, including the smaller eyes and evenly rounded pleotelson posterior margin.

The similar *Aega urotoma*, first placed into synonymy by Stebbing (1920), has the antennule peduncle articles 1 and 2 far more widely expanded, antenna peduncle article 5 flattened and expanded, smaller eyes, subtruncate or shallowly indented pleotelson which also lacks the prominent sub-lateral and posterior depressions seen in *A. semicarinata* (Table 1).

Another similar and very poorly characterised species is *Aega webbii* (Guérin-Méneville, 1836) which is similar to *A. semicarinata* in eye size and in the emarginate shape of the posterior margin of the pleotelson. It

**Table 1.** Comparison of *Aega semicarinata* with similar species of *Aega*.

Species	References	Eyes	A2, articles 4 and 5	Pereopod 2 propodus	Pleotelson shape
<i>A. semicarinata</i>	Present study	Large, not medially united	Regular	Without club-seta	Emarginate, without median point
<i>A. urotoma</i>	Present study	Medium, widely separate	Flat, expanded	With club-seta	Subtruncate, without median point
<i>A. chelipous</i> Barnard, 1960	Barnard 1960	Large, not medially united	?	Without club-seta	Subtruncate, with median point
<i>A. concinna</i> Hale, 1940	Hale 1940	Small, widely separate	Regular	With club-seta	Rounded
<i>A. crenulata</i> Lütken, 1859	Kussakin 1979	Eyes in contact	Regular	With club-seta	Subtruncate
<i>A. stroemii</i> Lütken, 1859	Kussakin 1979	Eyes narrowly separated	Regular	?	Emarginate
<i>A. webbii</i> Guérin-Méneville, 1836	Schioedte & Meinert 1979b	Medium, widely separate*	Flat?	With club-seta	Rounded, with median indentation

is difficult to make detailed comparisons, but *A. webbii* differs in having antennule peduncle article 2 more strongly produced and a large robust seta opposing the dactylus of pereopod 2, character states lacking in both male and females of *A. semicarinata*.

PREY: The only record is that of *Polyprion prognatus* (Nordenstam 1930).

DISTRIBUTION: Straits of Magellan eastwards to New Zealand, all records are south of about 35° latitude. Localities: Straits of Magellan, Kerguelen; Falkland Islands (Stebbing 1920 – record not confirmed); Chile (Menzies 1962); Juan Fernandez Islands (Nordenstam 1930); South Africa (Kensley 1978); Kerguelen, and off the Crozet Islands in the southern Indian Ocean (Stephenson 1947 – record not confirmed), Marion Island (Kensley 1980; Kussakin & Vasina 1982); Macquarie Island (Hale 1937).

At depths between 11 metres ('amongst kelp' – Hale 1937) and 400 metres, material from New Zealand 27.5 to 1076 metres.

*Aega stevelowei* sp. nov. (Figs 23–26)

MATERIAL EXAMINED: *Holotype*: ♀ (non-ovig. 48 mm), off Great Barrier Island, North Island [~ 36.3°S, 175.5°E], October 2004, from *Hyperoglyphe antarctica*, longline at ~500 m, coll. Steve Lowe (NIWA 17973).

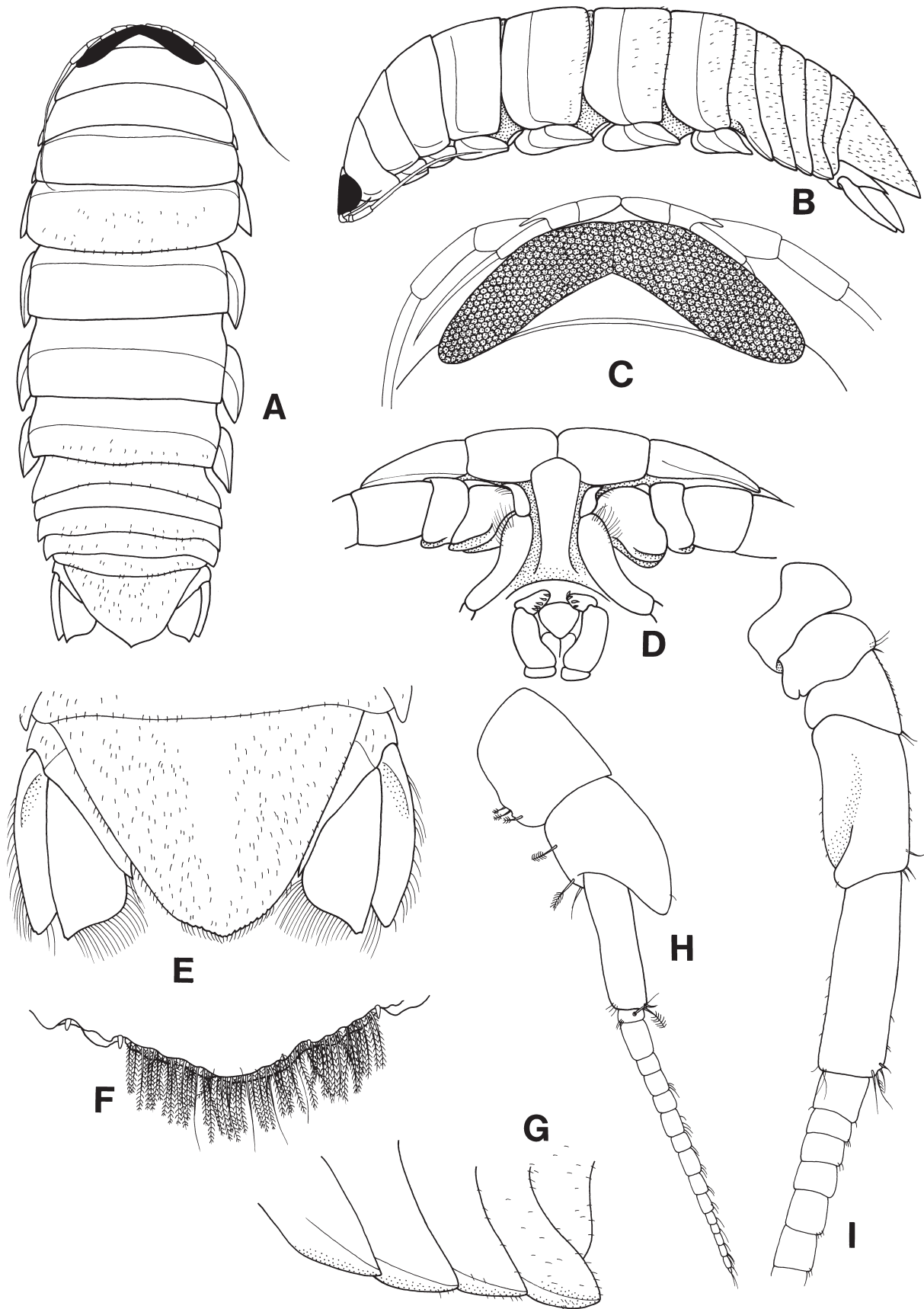
*Paratypes*: ♀ (non-ovig. 40 mm), same data as holotype (NIWA 17974). ♂ (31 mm), 45 km southwest of Beachport, Victoria, Australia, 37°45.00'S, 139°41.00'E, 24 October 1981, 390 m (NMV J27714).

DESCRIPTION: *Body* 2.8 times as long as greatest width, dorsal surfaces punctate, widest at pereonite 5, lateral margins subparallel. Rostral point projecting anteriorly,

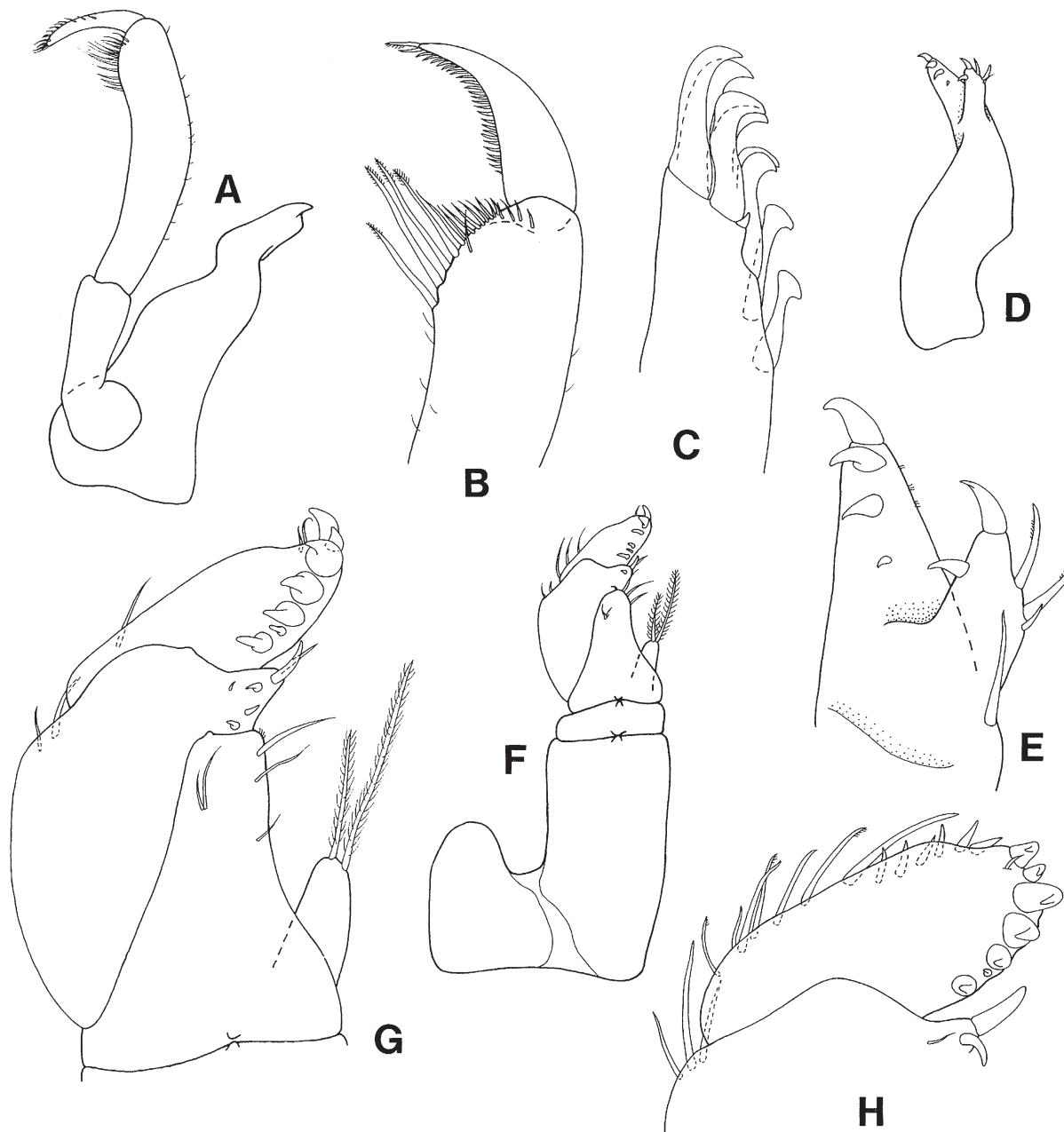
not ventrally folded. *Eyes* large, medially united, anterior clear field 15% length of head, posterior clear field 43% length of head; each eye made up of ~24 transverse rows of ommatidia, each row with ~8–10 ommatidia; eye colour black. *Pereonite 1 and coxae 2–3* each with posteroventral angle rounded, or right-angled (pereonite 1 rounded, coxae 2 and 3 quadrate). *Coxae 5–7* with entire oblique carina; posterior margins straight, posterolateral angle acute (less than 45°). *Pleon* with pleonite 1 visible in dorsal view; pleonite 4 with posterolateral margins extending to but not beyond posterior margin of pleonite 5; pleonite 5 with posterolateral angles overlapped by lateral margins of pleonite 4. *Pleotelson* 0.7 times as long as anterior width, dorsal surface without longitudinal carina; lateral margins weakly convex, crenulate (weakly), posterior margin at angle to lateral margins and converging to caudo-medial point, with 13 RS.

*Antennule* peduncle article 2 anterodistal lobe not extending beyond mid-point of article 3; articles 3 and 4 0.6 times as long as combined lengths of articles 1 and 2, article 3 3.9 times as long as wide; flagellum with 15 articles, extending to anterior of pereonite 1. *Antenna* peduncle article 2 inferior surface with distinct longitudinal suture; article 4 1.8 times as long as wide, 0.8 times as long as combined lengths of articles 1–3, with deep longitudinal groove, inferior margin 0 plumose setae, and 1 short simple setae (minute, distal); article 5 not markedly wider or flatter than article 4, 1.3 times as long as article 4, 3.0 as long as wide, inferior margin with 0 palmate setae, anterodistal angle with cluster of 3 short simple setae (plus 1 palmate seta); flagellum with 27 articles, extending to pereonite 4.

*Frontal lamina* flat, longer than greatest width, rectangular, anterior margin rounded, forming median angle, posterior margin abutting clypeus.



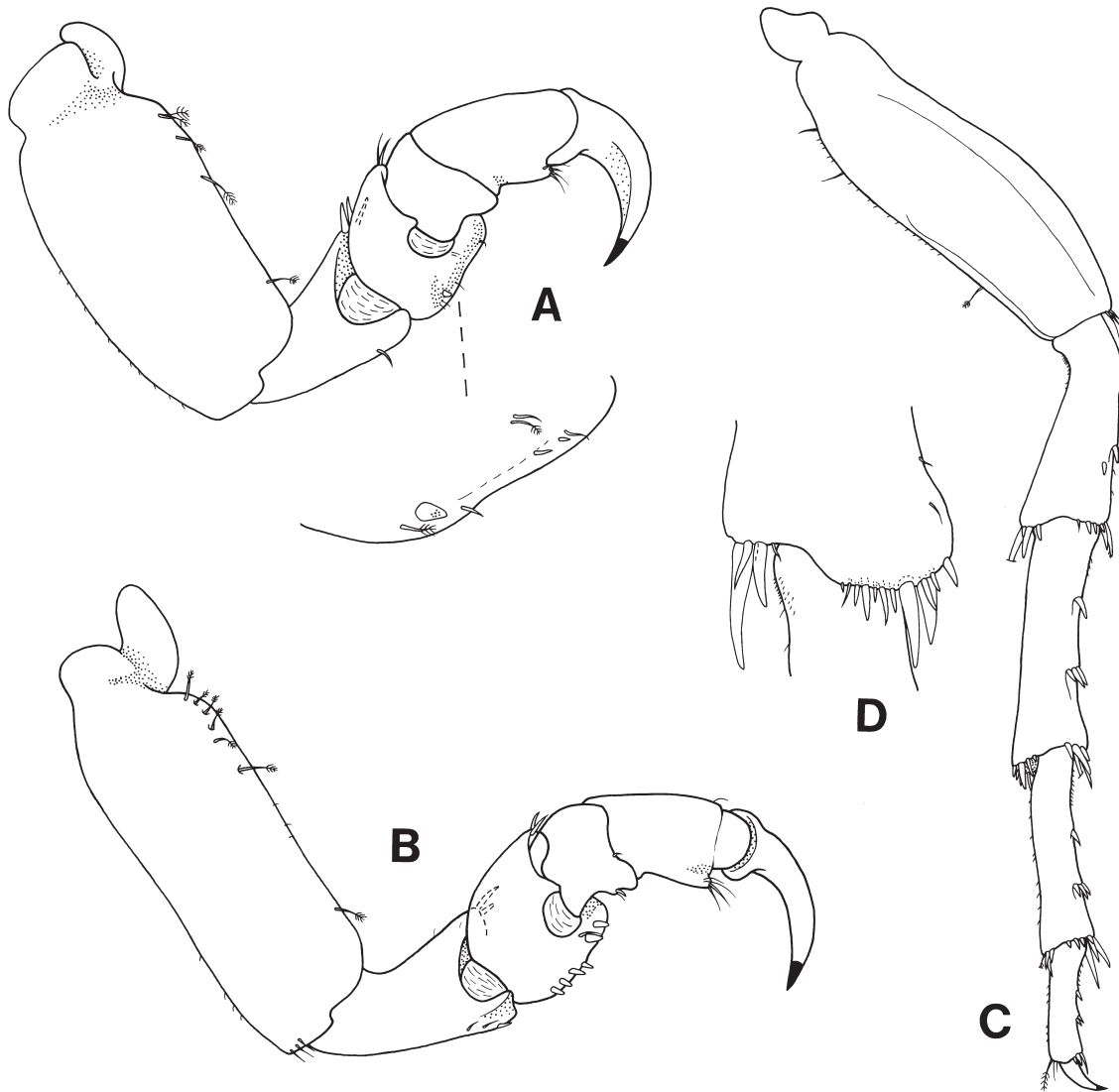
**Figure 23.** *Aega stevelowei* sp. nov. Holotype, except H and I, paratype NIWA 17974. A, dorsal view; B, lateral view; C, head; D, frons; E, pleotelson; F, pleotelson, posterior margin; G, pleonites, alteral view; G, antenna; H, antennule; I, antenna peduncle, dorsal view.



**Figure 24.** *Aega stevelowei* sp. nov. Paratype NIWA 17974. A, mandible; B, mandible palp article 3; C, maxillule apex; D, maxilla; E, maxilla apex; F, maxilliped; G, maxilliped articles 2-5; H, I, maxilliped articles 4 and 5.

*Mandible* molar process absent; palp article 2 with 13 distolateral setae (proximal 4 longest), palp article 3 with 25 setae. *Maxillule* with 8 terminal and subterminal RS (proximal 2 hammer-head). *Maxilla* mesial lobe with 5 RS (2 lateral hooked, 3 mesial weakly curved); lateral lobe with 4 RS (proximal RS minute). *Maxilliped* endite with 2 apical setae (long CP); palp article 2 with 0 RS (with 2 long straight simple setae); article 3 with 3 recurved RS (small; and 1 large curved RS); article 4 with 7 hooked RS (5 large, 2 small; lateral margin with 5 long straight RS); article 5 wholly (imperceptibly) fused to article 4, distally convex, with 6 RS.

*Pereopod 1* basis 1.9 times as long as greatest width; ischium 0.5 times as long as basis, inferior margin with 0 RS, superior distal margin with 3 RS; merus inferior margin with 1 RS (proximal), superior distal angle with 2 RS; carpus 0.6 as long as merus, inferior margin with 0 RS; propodus 1.4 times as long as proximal width, inferior margin with 0 RS, propodal palm with small distal lobe, dactylus smoothly curved, 1.0 as long as propodus. *Pereopod 2* ischium inferior margin with 1 RS, superior distal margin with 2 RS; merus inferior margin with 6 RS, set as two rows (of 4 + 2), superior distal margin with 2 acute RS (and 2 simple setae);



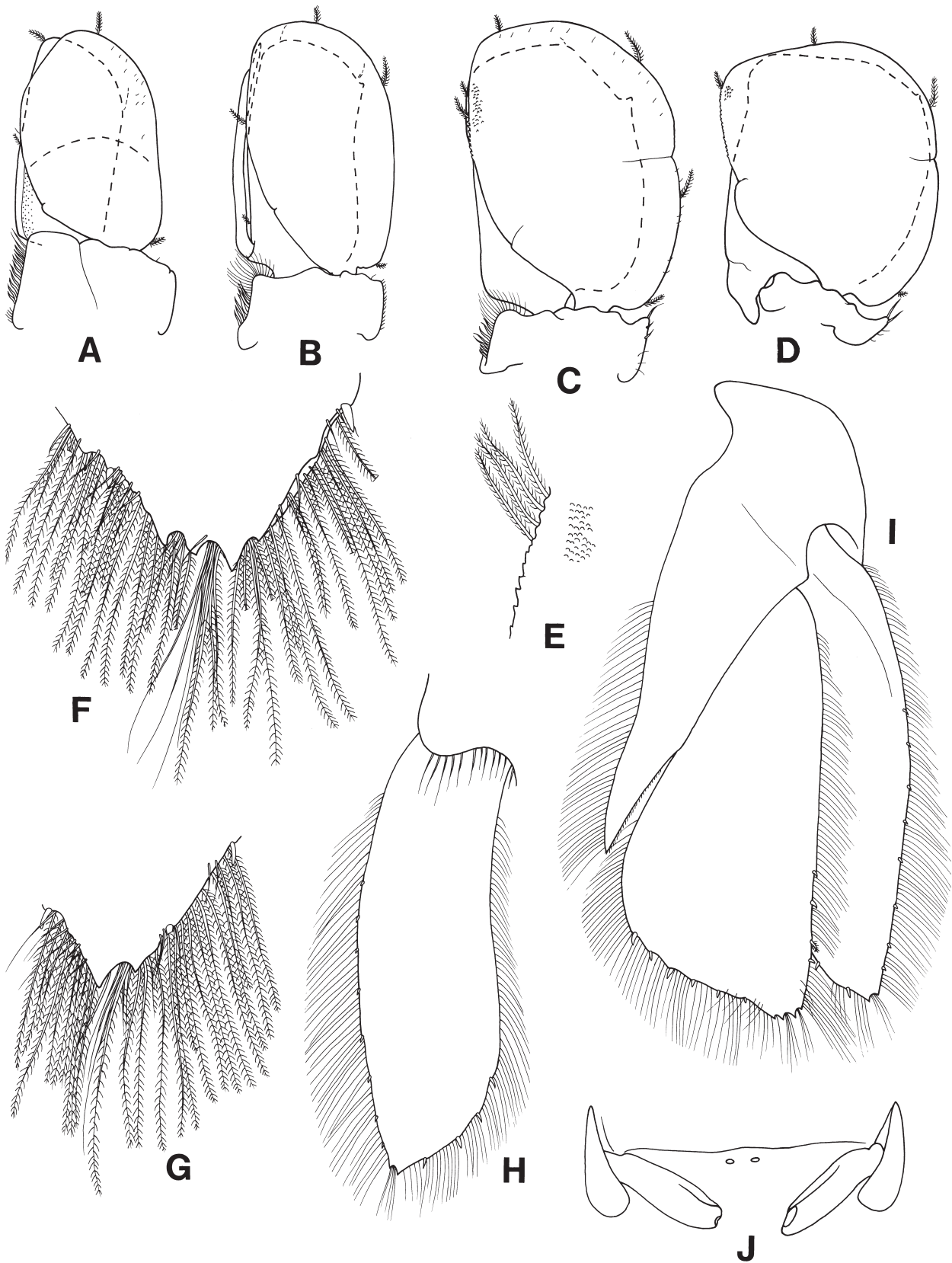
**Figure 25.** *Aega stevelowei* sp. nov. Holotype. A-E, pereopods 1, 2 and 7 respectively; D, distomesial margin, pereopod 7 carpus.

carpus similar in size to that of pereopod 1, inferodistal angle with 1 RS, propodus without large club-shaped distal RS. *Pereopod 3* similar to pereopod 2; propodus without large club-shaped distal RS. Pereopods 5–7 inferior margins of ischium–carpus with short RS. *Pereopod 6* similar to pereopod 7. *Pereopod 7* basis 3.3 times as long as greatest width, inferior margins with 3 palmate setae; ischium 0.5 as long as basis, inferior margin with 4 RS (set as 1, and 2, plus 1 submarginal), superior distal angle with 6 RS, inferior distal angle with 8 RS; merus 1.3 as long as ischium, 3.5 times as long as wide, inferior margin with 4 RS (set as 1 and 3), superior distal angle with 14 RS, inferior distal angle with 5 RS; carpus 1.0 as long as ischium, 3.7 times as long as wide, inferior margin with 4 RS (set as 1 and 3), superior distal angle with 9 RS, inferior distal angle with 11 RS; propodus 0.6 as long as ischium, 3.7 times as long as wide, inferior margin with 4 RS (set as 1, 1

and 2), superior distal angle with 4 slender setae (1 distally plumose), inferior distal angle with 3 RS.

*Pleopod 1* exopod 1.6 times as long as wide, distally broadly rounded, lateral margin weakly concave, mesial margin strongly convex, with PMS on distal half; endopod 2.1 times as long as wide, distally subtruncate, lateral margin straight, with PMS on distal margin only, mesial margin with PMS on distal half; peduncle 1.5 times as wide as long, mesial margin with 10 coupling hooks. Exopods of pleopods 1–3 each with distolateral margin not digitate; endopods of pleopods 3–5 each with distolateral point; pleopods 2–4 peduncle distolateral margin without prominent acute RS.

*Uropod* peduncle ventrolateral margin with 0 RS, posterior lobe about three-quarters as long as endopod. Uropod rami extending to pleotelson apex, marginal setae in two or three tiers, apices acute. *Endopod* apically deeply bifid, lateral process prominent (apex with



**Figure 26.** *Aega stevelowei* sp. nov. Female paratype NIWA 17974, except B and J, male paratype, NMV J27714. A–D, pleopods 1–3, 5 respectively; E, distomesial margin, pleopod 3 exopod; F, uropod endopod apex; G, uropod exopod, apex; H, uropod endopod, ventral view; I, uropod; J, sternite 7 showing penial openings.



4 teeth), lateral margin straight, without prominent excision, proximal lateral margin with 2 RS, distal lateral margin with 2 RS, mesial margin sinuate, with 7 RS. *Exopod* not extending to end of endopod, 3.0 as long as greatest width, apically sub-bifid, mesial process prominent; lateral margin weakly convex, with 8 RS; mesial margin sinuate, proximally concave, with 4 RS.

**MALE:** Similar to female. Maxilliped palp setation similar, but line of fusion on palp article 5 is visible, and the distal margin of palp article 5 has 6 RS as does the female. *Penes* low tubercles; penial openings separated by 8% of sternal width. Pleopod 2 *appendix masculina* with straight margins, 0.9 times as long as endopod, distally narrowly rounded.

**SIZE:** Holotype 48 mm; paratypes female 40 mm, mature male 31 mm.

**VARIATION:** Pleotelson with 13–17 RS as 6+7 or 8+7; the specimen with 17 RS had one margin with 10 RS, an asymmetric distribution of RS, which is probably aberrant. Uropod exopod mesial margin with 4 RS, lateral margin with 6–9 RS; uropod endopod mesial margin 7 (6 once) lateral margin with 2+2 (2+1 once). Pereopod merus inferior margin all with single proximal RS, distally with 2 or 3 simple setae; pereopods 2 and 3 merus inferior margin with 4+2 RS. The uropodal and pleotelson RS are generally small, difficult to observe, and if missing a socket is hard to detect.

The maxilliped palp has article 5 wholly fused in the female, but a faint trace of the line of fusion (or former articulation) is visible in the male.

The dorsal setae are easily rubbed away, and are far less evident in the older net-caught male specimen from southern Australia.

**PREY:** *Hyperoglyphe antarctica* [bluenose, matiri (New Zealand) or Antarctic butterflyfish, Centrolophidae].

**REMARKS:** This distinctive species can be recognised by the finely setose dorsal body surfaces in conjunction with large, medially united eyes, ventrally flat and elongate frontal lamina, apically bifid uropod apices (when entire), uropod endopod with a distinctly sinuate mesial margin, and the weakly crenulated pleotelson posterior margins being angled towards a median point of inflexion (but without a produced point).

Pereopod 1 is unusual in that the merus inferior margin is largely devoid of robust setae, with only a single proximal robust seta in comparison to pereopods 2 and 3 which have 6. Similarly reduced setation occurs in *Aega falklandica* but in that species the pereopod 1 merus has a single distal robust seta on the inferior margin. The maxilliped is also unusual

within the genus in having numerous setae along the mesial margin of palp article 4, and two prominent circumplumose setae on the endite, in both the male and the female. The robust setae of the uropodal and pleotelson margins are relatively small, and those of the pleotelson set in a marginal groove (as for species of *Aegapheles*), and are often obscured by setae rendering them difficult to observe.

Only one other species of *Aega*, *A. punctulata* (see Appendix 2) has setose body surfaces, but that species is otherwise abundantly distinct, with small well-separated eyes, short anteriorly rounded frontal lamina, pereopod 1 merus with large robust setae, and rounded pleotelson posterior margin. The form of the dorsal setae of *A. punctulata* differs from those of *A. stevelowei*, the former with prominent stiff setae, the latter with fine flexible setae.

**DISTRIBUTION:** Off Great Barrier Island, northeastern New Zealand, and Victoria, southern Australia; recorded depths of 390 and 500 metres.

**ETYMOLOGY:** Named for Mr Steve Lowe of Leigh, Auckland, who collected and donated significant material to this study.

*Aega urotoma* Barnard, 1914 (Figs 27–30)

*Aega urotoma* Barnard, 1914: 367, pl. 32A.–Kensley, 2001: 227.

*Aega semicarinata*.–Barnard, 1916: 106 (not *A. semicarinata* Miers, 1875).

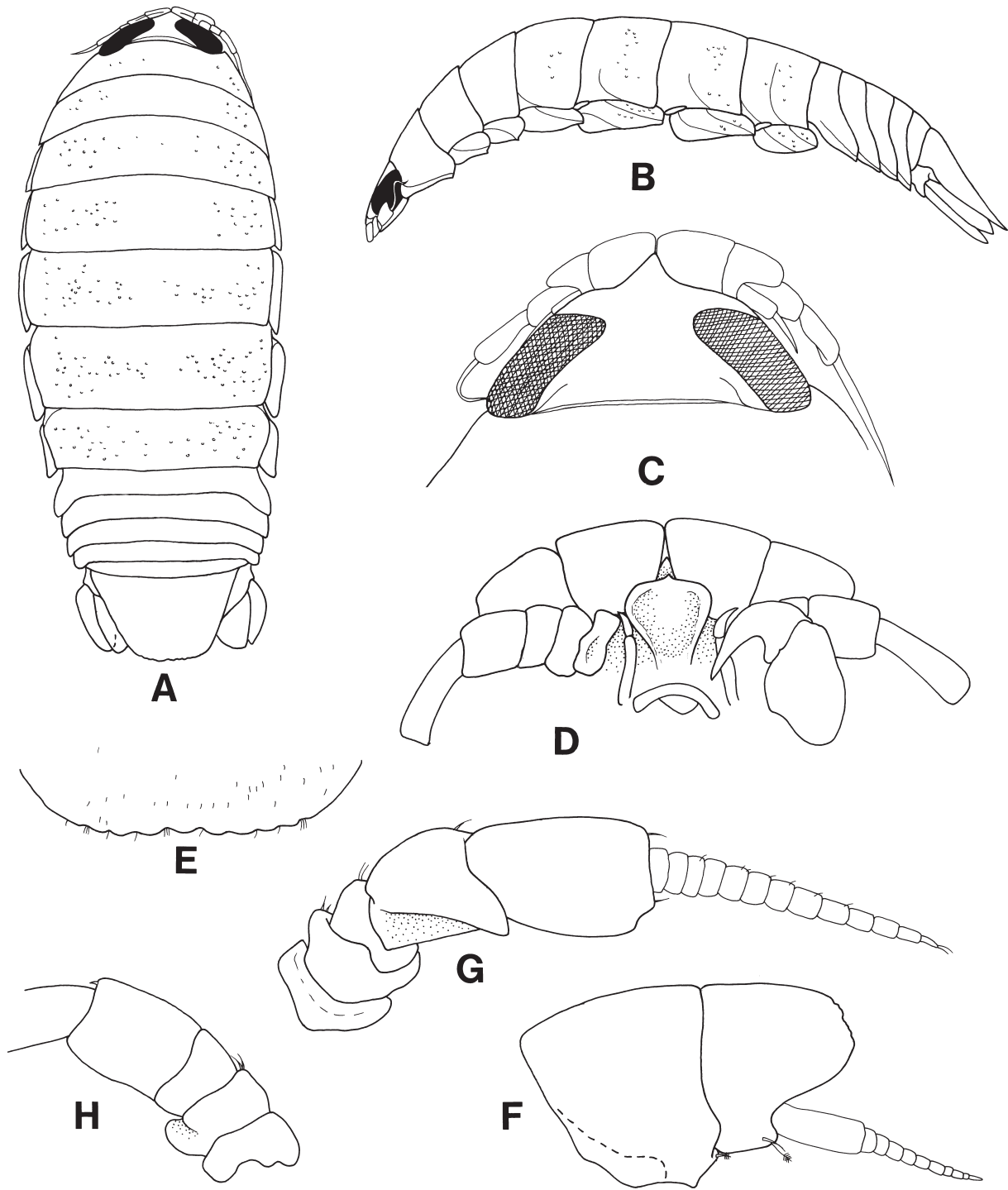
*Aega webbi*.–Trilles & Justine, 2004: 228, figs 9, 10 (misidentification, not *A. webbi* Guérin-Ménéville, 1836).

**MATERIAL EXAMINED:** ♀ (non-ovig. 34 mm), off southwestern South Island, 46°29.8'S, 166°02.3'E, 20 November 1986, stn AB1/097/86 155 m, on 'wing' of *Raja nasuta*, trawl catch (NMNZ Cr. 12017).

*Also examined:* South Africa. ♀ (non-ovig. 44 mm), 34°07'S, 25°54'E, 9 May 1993, 110 m, coll. RV *Africana* (SafM A43116). 2♀ (non-ovig. 36, 38 mm), south of Still Bay, 35°17'S, 21°32'E, 27 May 1993, 116 m, coll. RV *Africana* (SafM exA43113). ♂ (21 mm), off Table Bay, coll. S. African Mus. (BMNH 2003.23).

*Additional material:* **New Caledonia.** ♀ (non-ovig. 30 mm), 22°55.7'S, 167°17.0'E, 28 September 1985, MUSORTOMIV, stn 1215, 485–520 m, coll. B. Richer de Forges (MNHN Is.5913). ♀ (non-ovig. 20 mm), HALICAL 2, récolté sure un requin, *Squalus melanurus*, pêche a la palangre, coll. Menon; (MNHN Is.5914).

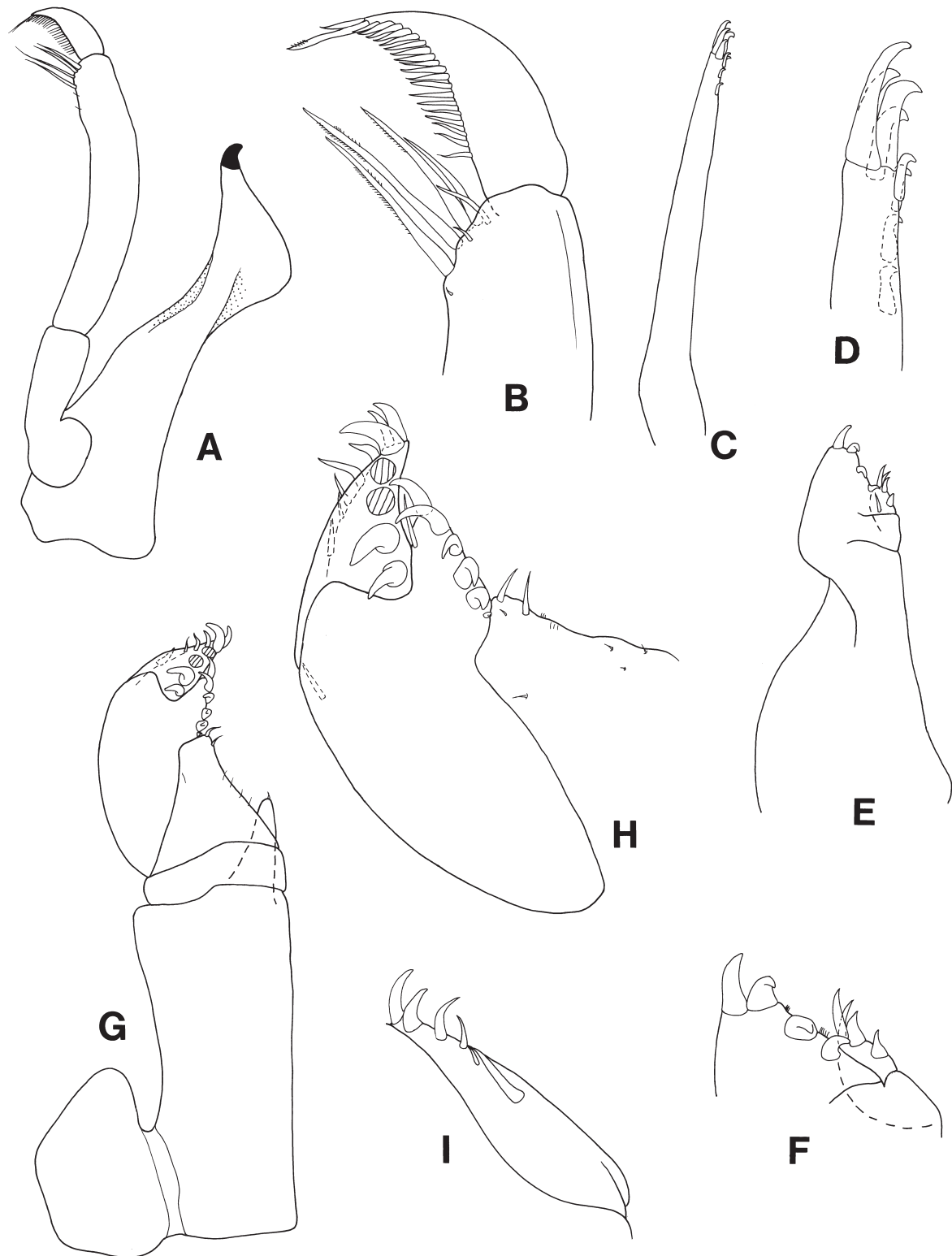
**DESCRIPTION (OF NEW ZEALAND SPECIMEN):** *Body* 2.8 times as long as greatest width, dorsal surfaces punctate, widest at pereonite 5, lateral margins subparallel. Rostral point projecting anteriorly, not ventrally folded. *Eyes* small, combined widths less than 50% width of head,



**Figure 27.** *Aega urotoma* Barnard, 1914. Female 32 mm (NMNZ Cr.9268). A, dorsal view, holotype; B, lateral view; C, head; D, frons; E, pleotelson posterior margin; F, antennule; G, antenna; H, antenna peduncle article 1–4, ventral view, ventral view; uropod.

separated by about 29% width of head; each eye made up of ~18 transverse rows of ommatidia, each row with ~10 ommatidia; eye colour dark brown. *Pereonite 1 and coxae 2–3* each with posteroventral angle rounded, or with small distinct produced point (rounded with a small ventral point). Coxae 5–7 with entire oblique carina; posterior margins convex, posterolateral angle blunt (more than 45°). *Pleon* with pleonite 1 visible in

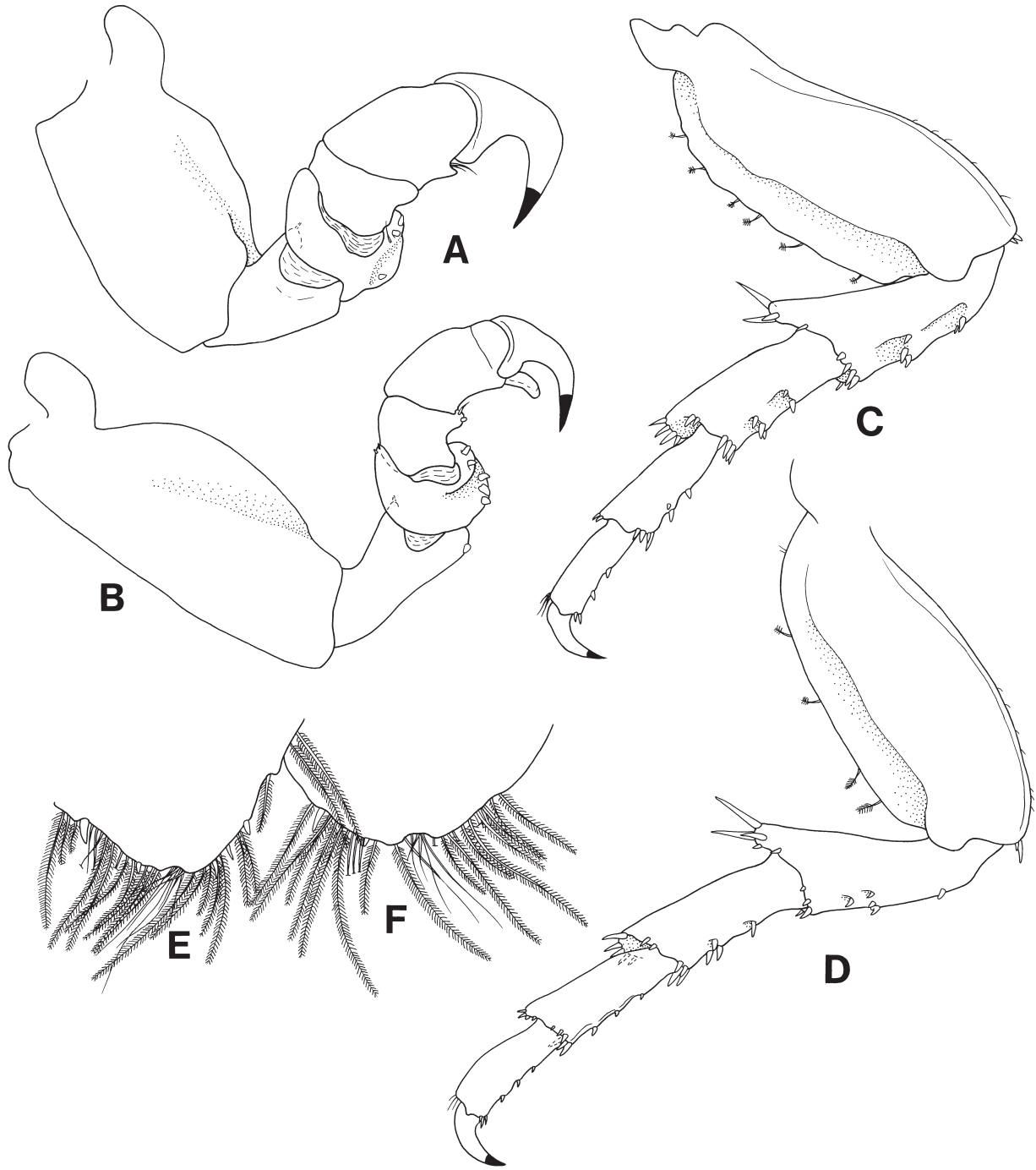
dorsal view; pleonite 4 with posterolateral margins extending to but not beyond posterior margin of pleonite 5; pleonite 5 with posterolateral angles overlapped by lateral margins of pleonite 4. *Pleotelson* 0.8 times as long as anterior width, dorsal surface without longitudinal carina; lateral margins straight, crenulate, posterior margin subtruncate, with 0 RS.



**Figure 28.** *Aega urotoma* Barnard, 1914. Female 32 mm (NMNZ Cr.9268). A, mandible; B, mandible palp, article 3; C, maxillule; D, maxillule apex; E, maxilla; F, maxilla apex; G, maxilliped; H, maxilliped palp; I, maxilliped palp article 5 (Leica).

*Antennule* peduncle article 2 anterodistal lobe extending to end of article 3; articles 3 and 4 0.36 times as long as combined lengths of articles 1 and 2, article 3 2.8 times as long as wide (posterior margin with blade-like edge); flagellum with 8 articles, extending to mid-point

of eye. *Antenna* peduncle article 2 inferior surface with distinct longitudinal suture; article 4 1.0 as long as wide, 0.8 times as long as combined lengths of articles 1–3, with deep longitudinal groove, inferior margin 0 plumose setae, and 0 short simple setae; article 5 flat-



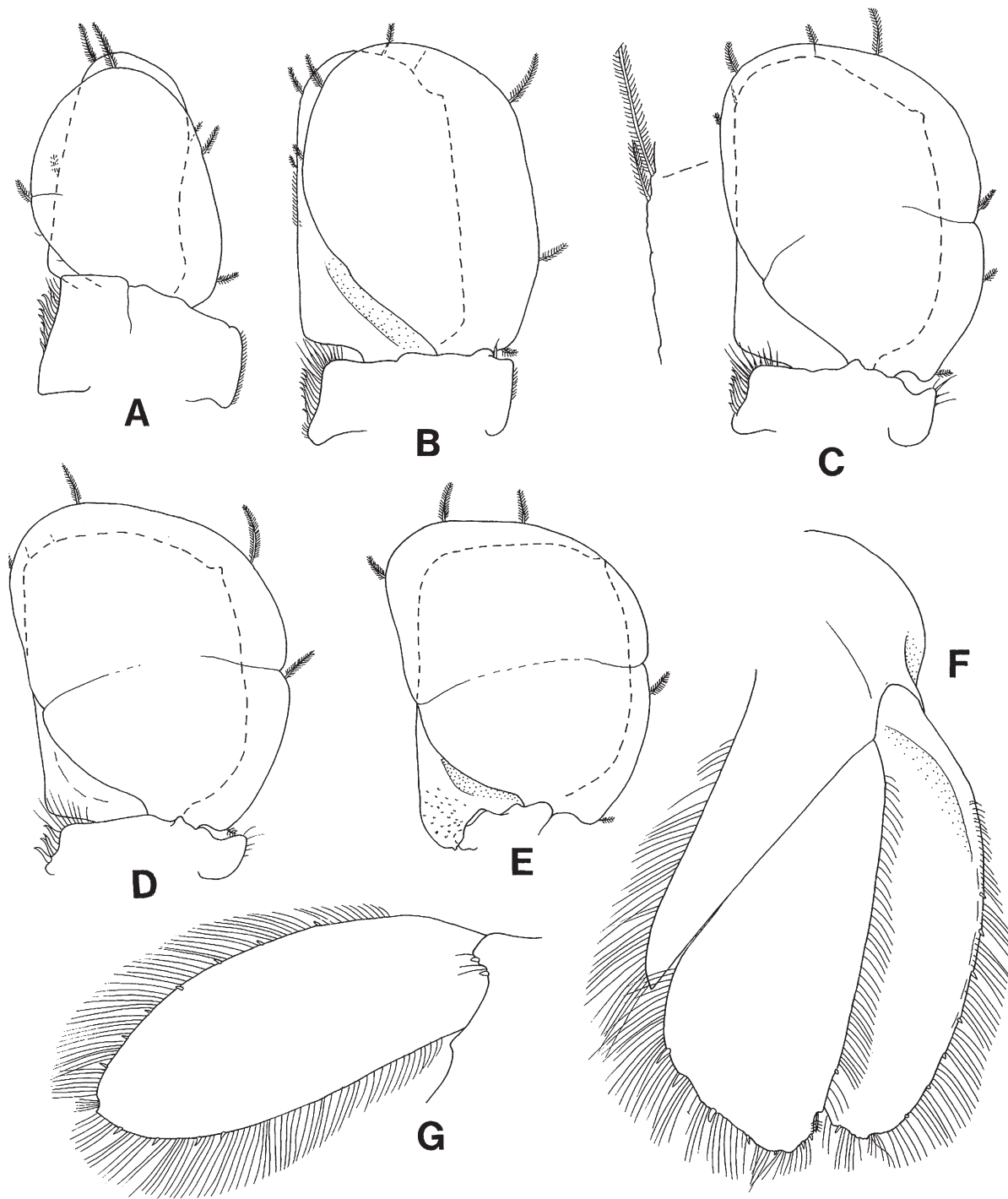
**Figure 29.** *Aega urotoma* Barnard, 1914. Female 32 mm (NMNZ Cr.9268). A–D, pereopods 1, 2, 6 and 7 respectively; E, uropod endopod, apex; F, uropod exopod, apex.

tened and expanded, 1.6 times as long as article 4, 1.5 times as long as wide, inferior margin with 0 palmate setae, anterodistal angle with cluster of 1 short simple seta; flagellum with 13 articles, extending to posterior of pereonite 1.

*Frontal lamina* flat (lateral margins bent ventrally), as wide as long, lateral margins converging posteriorly, anterior margin rounded, with small median point, posterior margin not abutting clypeus.

*Mandible* molar process absent; palp article 2 with

5 distolateral setae (4 large, 1 small), palp article 3 with 24 setae. *Maxillule* with 8 terminal and subterminal RS (proximal 4 hammer-head). *Maxilla* mesial lobe with 4 RS (2 recurved, 2 straight); lateral lobe with 4 RS (large hooked). *Maxilliped* endite with 1 apical seta; palp article 2 with 2 RS; article 3 with 6 recurved RS (1 being minute; with single simple seta); article 4 with 6 hooked RS; article 5 partly fused to article 4, distally convex, with 6 RS (mesial 2 being hooked, remainder straight).



**Figure 30.** *Aega urotoma* Barnard, 1914. Female 32 mm (NMNZ Cr.9268). A-E, pleopods 1-5 respectively; F, uropod; G, uropod exopod, ventral view.

*Pereopod 1* basis 1.6 times as long as greatest width (basis with prominent lateral carina); ischium 0.4 times as long as basis, inferior margin with 0 RS, superior distal margin with 1 RS (small acute); merus inferior margin with 3 RS (with inferior lobe), set as two groups (of 1 and 2), superior distal angle with 1 RS (minute); carpus 1.0 as long as merus, inferior margin with 0 RS; propodus 1.1 times as long as proximal width, inferior margin with 0 RS, propodal palm with small

distal lobe, dactylus abruptly hooked, 1.3 as long as propodus. *Pereopod 2* ischium inferior margin with 1 RS (round), superior distal margin with 1 RS; merus inferior margin with 5 RS (set as 3 + 2), set as two groups, superior distal margin with 2 acute RS; carpus similar in size to that of pereopod 1, inferodistal angle with 1 RS, propodus with large club-shaped distal RS. *Pereopod 3* similar to pereopod 2; ischium inferior margin with 2 RS, propodus with large club-

shaped distal RS. Pereopods 5–7 inferior margins of ischium–carpus with short RS. *Pereopod 6* similar to *pereopod 7* (more robust, with fewer RS on inferior margins). *Pereopod 7* basis 2.4 times as long as greatest width (inferolateral margin strongly carinate), inferior margins with 5 palmate setae; ischium 0.5 as long as basis, inferior margin with 5 RS (set as 1, 3 and 1), superior distal angle with 5 RS, inferior distal angle with 4 RS; merus 0.8 as long as ischium, 2.2 times as long as wide, inferior margin with 4 RS (set as 1, 3), superior distal angle with 6 RS, inferior distal angle with 4 RS; carpus 0.7 as long as ischium, 2.2 times as long as wide, inferior margin with 3 RS (set singly), superior distal angle with 4 RS (short), inferior distal angle with 7 RS (short); propodus 0.6 as long as ischium, 2.9 times as long as wide, inferior margin with 4 RS (set as 1, 1 and 2), superior distal angle with 3 slender setae, inferior distal angle with 3 RS.

*Pleopod 1* exopod 1.1 times as long as wide, distally broadly rounded, lateral margin straight, mesial margin strongly convex, with PMS on distal half; endopod 1.8 times as long as wide, distally subtruncate, lateral margin strongly concave, with PMS on distal one-third, mesial margin with PMS on distal half; peduncle 1.8 times as wide as long, mesial margin with 9 coupling hooks. Exopods of pleopods 1–3 each with distolateral margin not digitate; endopods of pleopods 3–5 each with distolateral point; pleopods 2–4 peduncle distolateral margin with prominent acute RS.

*Uropod* peduncle ventrolateral margin with 2 RS, posterior lobe about three-quarters as long as endopod. Uropod rami not extending beyond pleotelson, marginal setae dense, in several tiers, apices broadly rounded. *Endopod* apically not bifid, lateral margin straight, without prominent excision, proximal lateral margin with 1 RS, distal lateral margin with 2 RS, mesial margin weakly convex, with 5 RS. *Exopod* not extending to end of endopod, 2.5 times as long as greatest width, apically not bifid (both rami with apical concavity); lateral margin convex, with 7 RS; mesial margin weakly convex, with 4 RS.

**VARIATION:** The small number of specimens, only one from New Zealand waters, precludes precisely detailing the variation. The smaller specimens have the robust setae on the inferodistal angle of the ischium more acute than on large specimens.

**MALE.:** Similar to the female. The single male specimen (South Africa, BMNH) was too brittle to dissect, but the penial openings are close-set but separate, and the appendix masculina is similar to that of *Aega semicarinata*.

**SIZE:** Present material 34 to 38 mm; Barnard's specimen 53 mm.

**REMARKS:** *Aega urotoma* bears a strong but superficial resemblance to *Aega semicarinata*, and has indeed been placed in synonymy with that species following the suggestion by Barnard (1916) in a 'Corrigenda' that the two species were the same [followed by Stebbing (1920) and later authors]. The two species, with overlapping distributions, are similar in general body shape and appearance, in the pattern of robust setae on the anterior pereopods and have similarly shaped uropods. Close examination shows numerous points of difference between the two species, and there is no doubt that *Aega urotoma* should be regarded as valid. Notably, in *A. urotoma*, the pleotelson posterior margin is not emarginate and the dorsal surface lacks the submedian depressions; the antennule and antenna of *A. urotoma* are markedly dorso-ventrally compressed and expanded, particularly antenna peduncle article 5 and this last character can be used to easily separate the two species. Further points of distinction are *A. urotoma* having smaller eyes, a prominent blade-like carina on the basis of all pereopods, pereopods 2 and 3 are similar to each other, both bearing a club-like robust seta on the propodus, and the robust setae of pereopods 6 and 7 are noticeably shorter and stouter than in *Aega semicarinata*.

Trilles and Justine (2004) recorded, and described in part, specimens that they misidentified as *Aega webbia* (Guérin-Méneville, 1836). During a visit to the Muséum national d'Histoire naturelle in Paris, the specimens examined by Trilles and Justine (2004) could not be located, but I examined further material from New Caledonia which agrees entirely with material here being identified as *A. urotoma*. *Aega webbia* has never been described in detail, but the figures given by Guérin-Méneville (1836) show clearly that the eyes are far larger than of the present material, and that the posterior margin of the pleotelson is emarginate, character states that *A. webbia* shares with *A. semicarinata*. Digital images of the holotype (ANSP CA2779; kindly provided by Paul Callomon) also support these differences.

**PREY:** The only records to date are from *Squalus melanurus* the black-eared spurdog (Squalidae) in New Caledonia and a trawl-caught *Raja nasuta* (Rajidae), the New Zealand rough skate (Rajidae).

**DISTRIBUTION:** Cape Point (Barnard 1914) and Cape Province (present material), South Africa; distribution is here extended to the southwestern Pacific, off South Island, New Zealand and off New Caledonia. The species has long been placed in synonymy with *Aega semicarinata* and it is possible that some records of that species may be of *A. urotoma*. It is likely that *A. urotoma*, recorded here for the first time beyond South African waters, will have a Southern Ocean distribution. At depths of 110 to 329 metres.

*Aega whanui* sp. nov.

(Figs 31–33)

MATERIAL EXAMINED: *Holotype*. ♀ (ovig. 59 mm), Lord Howe Rise, 27°50.03'S, 162°48.06'E, 5 May 1989, 1250 m, coll. FRV *Franklin* (AM P43982).

*Additional material*. ♀ (non-ovig. 49 mm.), Iles Tanimbar, Indonesia, Timor Sea, 08°39'S, 131°08'E, 5 November 1991, 1084–1058 m, KARUBAR stn CP89, coll. *RV Baruna Jaya* (MNHN Is.5862).

DESCRIPTION: *Body* 1.6 times as long as greatest width, dorsal surfaces coarsely punctate, widest at pereonite 5, lateral margins weakly ovate. Rostral point projecting anteriorly, not ventrally folded. *Eyes* moderate, combined widths 50–65% width of head, separated by about 38% width of head; eye colour red (ommatidia not distinct). *Pereonite 1 and coxae 2–3* each with posteroventral angle right-angled. *Coxae 5–7* with entire oblique carina; posterior margins straight, posterolateral angle blunt (more than 45°). *Pleon* with pleonite 1 largely concealed by pereonite 7; pleonite 4 with posterolateral margins extending clearly beyond posterior margin of pleonite 5; pleonite 5 with posterolateral angles overlapped by lateral margins of pleonite 4. *Pleotelson* 0.6 times as long as anterior width, dorsal surface with 2 sub-medial depressions; lateral margins convex, serrate, posterior margin with distinct short median point, with 12 RS.

*Antennule* peduncle article 2 anterodistal lobe not extending beyond mid-point of article 3; articles 3 and 4 0.7 times as long as combined lengths of articles 1 and 2, article 3 2.7 times as long as wide; flagellum with 23 articles, extending to anterior of pereonite 1. *Antenna* peduncle article 2 inferior surface without distinct longitudinal suture; article 4 1.6 times as long as wide, 0.9 times as long as combined lengths of articles 1–3, with deep longitudinal groove, inferior margin 0 plumose setae, and 0 short simple setae; article 5 not markedly wider or flatter than article 4, 1.0 as long as article 4, 2.3 times as long as wide, inferior margin with 4 palmate setae, anterodistal angle with cluster of 3 short simple setae; flagellum with 24 articles, extending to posterior of pereonite 2.

*Frontal lamina* flat, longer than greatest width, lateral margins parallel, anterior margin rounded, without small median point, posterior margin not abutting clypeus.

*Mandible* molar process absent; palp article 2 with 14 distolateral setae (plus row of 4 submarginal and scattered small simple setae; all finely biserrate), palp article 3 with 35 setae (all finely biserrate; distal 2 markedly longer than remainder). *Maxillule* with 8 terminal and subterminal RS (proximal 3 falcate). *Maxilla* lateral lobe with 3 RS.

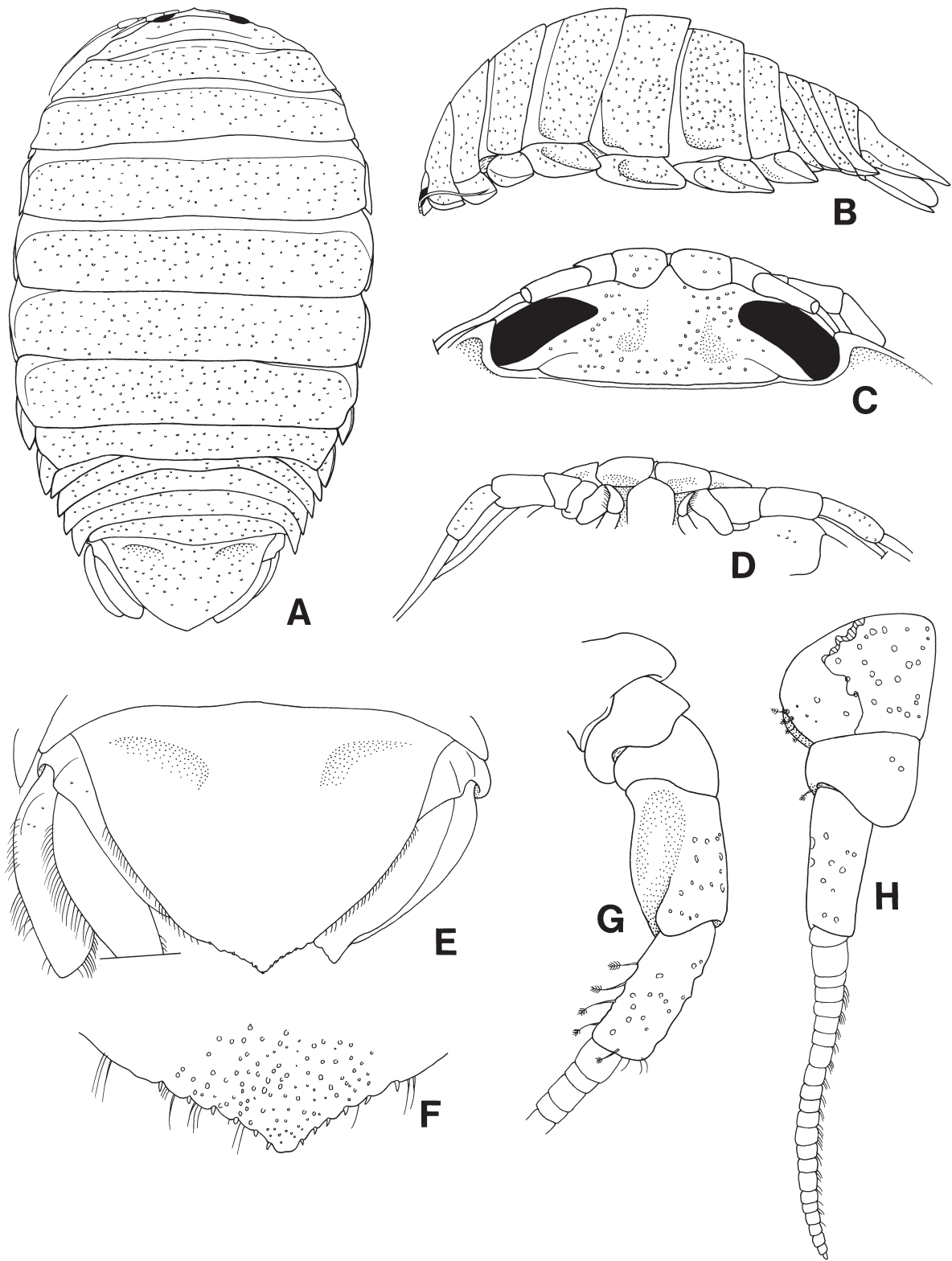
*Pereopod 1* basis 1.9 times as long as greatest width; ischium 0.3 times as long as basis, inferior margin with

1 RS (minute), superior distal margin with 0 RS (1 slender seta); merus inferior margin with 0 RS, superior distal angle with 0 RS (4 slender setae); carpus 0.6 as long as merus, inferior margin with 0 RS; propodus 1.5 times as long as proximal width, inferior margin with 0 RS, propodal palm simple, without blade or process (concave), dactylus smoothly curved, 1.1 as long as propodus. *Pereopod 2* ischium inferior margin with 1 RS, superior distal margin with 1 RS; merus inferior margin with 8 RS, set as single row, superior distal margin with 1 acute RS; carpus similar in size to that of pereopod 1, inferodistal angle with 0 RS, propodus without large club-shaped distal RS. *Pereopod 3* similar to pereopod 2; propodus without large club-shaped distal RS. *Pereopods 5–7* inferior margins of ischium–carpus with short RS. *Pereopod 6* similar to pereopod 7. *Pereopod 7* basis 3.2 times as long as greatest width, inferior margins with 4–8 palmate setae; ischium 0.5 as long as basis, inferior margin with 9 RS (set as 1, 2, 1, 1 and 4), superior distal angle with 5 RS, inferior distal angle with 7 RS; merus 0.8 as long as ischium, 1.9 times as long as wide, inferior margin with 8 RS (set as 1, 3 and 4), superior distal angle with 13 RS, inferior distal angle with 9 RS; carpus 0.8 as long as ischium, 2.3 times as long as wide, inferior margin with 6 RS (set as 3 and 3), superior distal angle with 9 RS, inferior distal angle with 10 RS; propodus 0.6 as long as ischium, 3.6 times as long as wide, inferior margin with 5 RS (set as 1, 2 and 2), superior distal angle with 3 slender setae, inferior distal angle with 3 RS.

*Pleopod 1* exopod 1.8 times as long as wide, distally narrowly rounded, mesial margin weakly oblique, lateral margin straight, mesial margin strongly convex, with PMS on distal two-thirds; endopod 2.0 times as long as wide, distally subtruncate, lateral margin weakly concave, with PMS on distal margin only, mesial margin with PMS on entire margin; peduncle 1.8 times as wide as long, mesial margin with 13 coupling hooks. Exopods of pleopods 1–3 each with distolateral margin not digitate; endopods of pleopods 3–5 each with distolateral point; pleopods 2–4 peduncle distolateral margin without prominent acute RS.

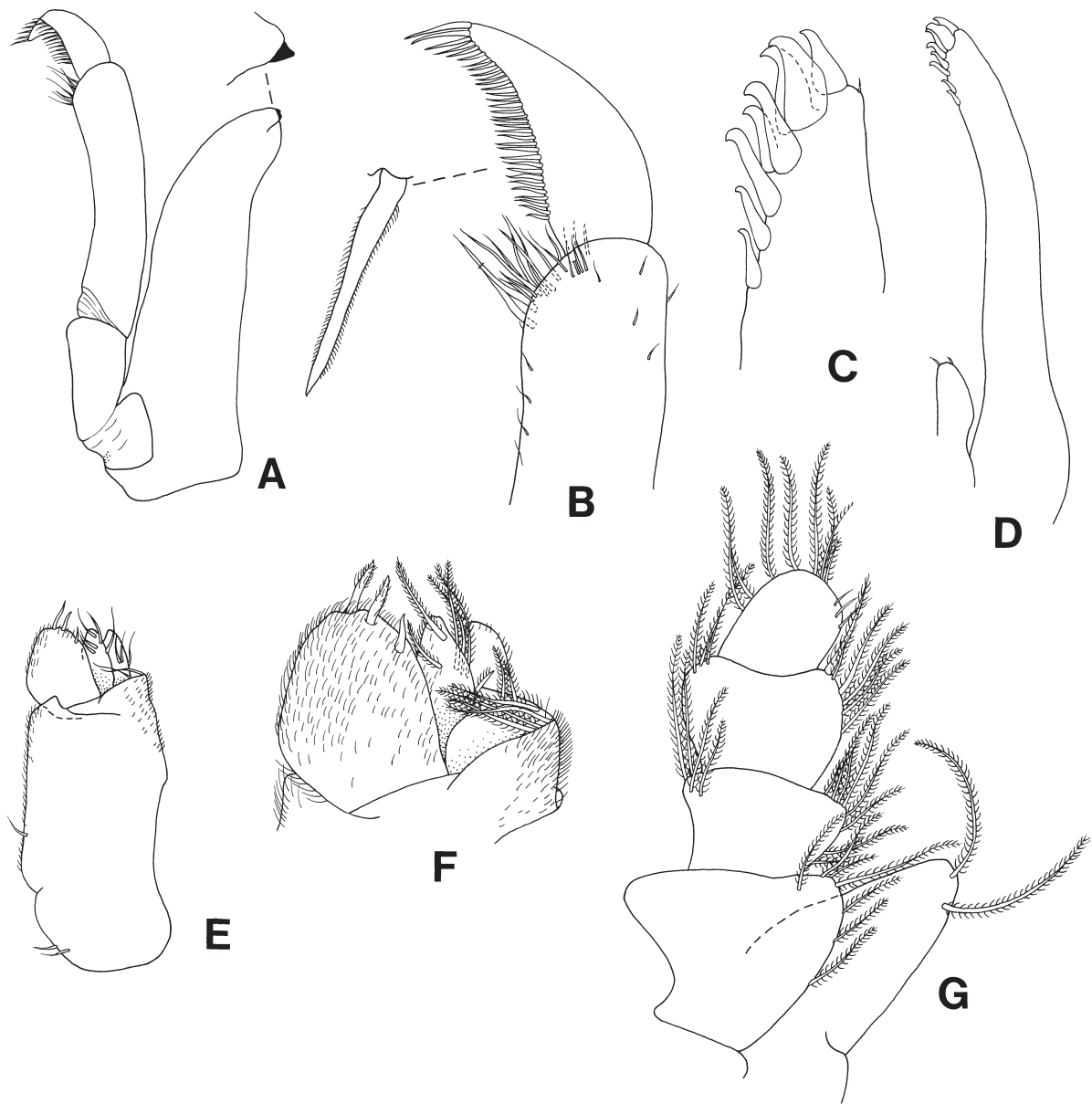
*Uropod* peduncle ventrolateral margin with 2 RS, posterior lobe about as long as endopod. Uropod rami extending to pleotelson apex, marginal setae in single tier, apices narrowly rounded. *Endopod* apically not bifid, lateral margin proximally convex and distally concave, without prominent excision, proximal lateral margin with 3 RS, distal lateral margin with 3 RS, mesial margin weakly convex, with 6–7 RS. *Exopod* extending to end of endopod, 3.2 times as long as greatest width, apically not bifid; lateral margin weakly convex, with 12 RS; mesial margin sinuate, proximally concave, with 5 RS (or 6).

MALE: Not known.



**Figure 31.** *Aega whanui* sp. nov. Holotype. A, dorsal view; B, lateral view; C, head; D, frons; E, pleotelson and uropods; F, pleotelson, distal margin; G, antenna peduncle; H, antennule.





**Figure 32.** *Aega whanui* sp. nov. Holotype. A, mandible; B, mandible palp article 3; C, maxillule apex; D, maxillule; E, maxilla; F, maxilla apex; G, maxilliped articles 2-5.

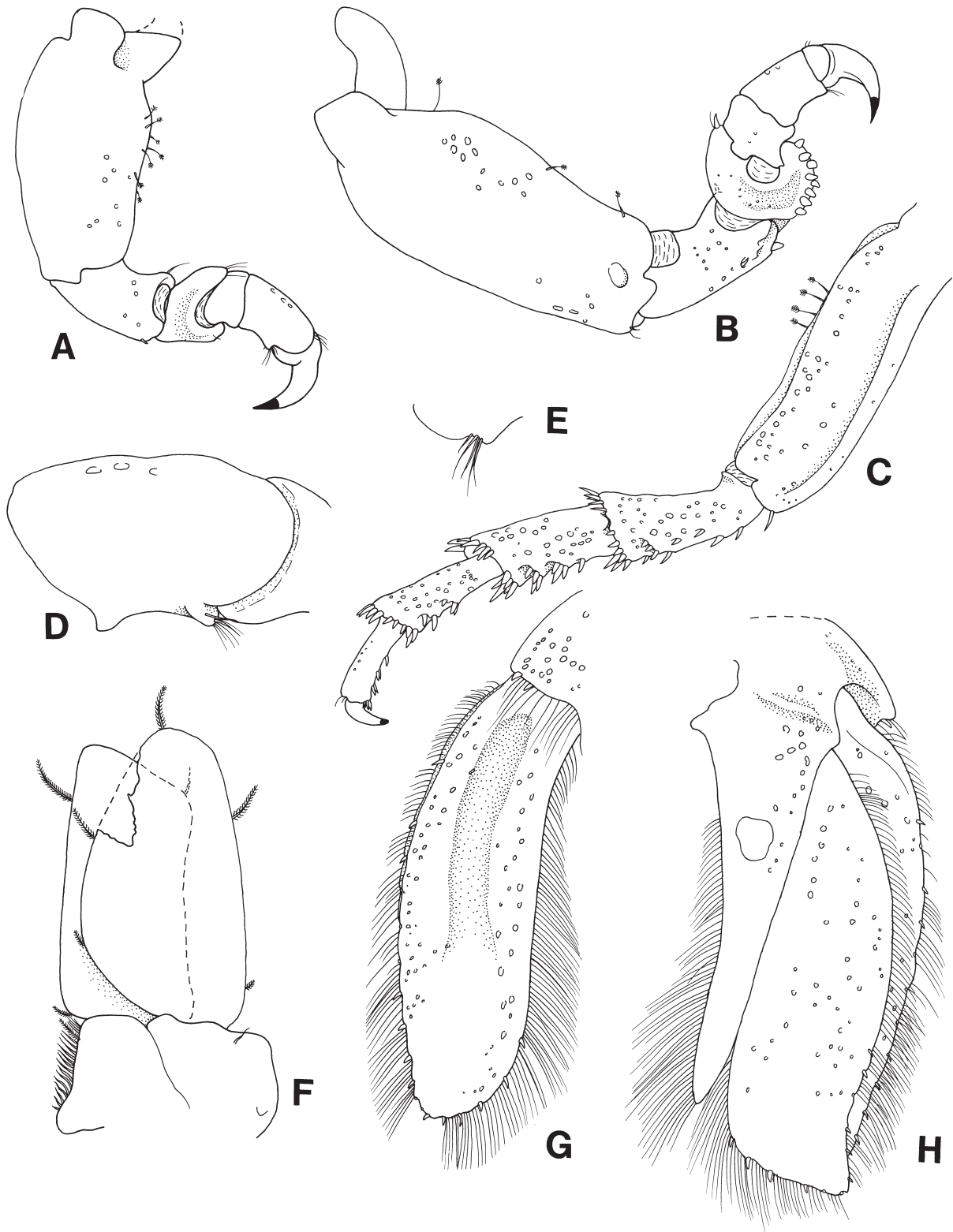
SIZE: Females at 49 to 59 mm.

VARIATION: The specimen from the Timor sea is less wide (1.9 times as long as wide) than the holotype, has black eyes, and the frontal lamina has a small median point; each eye with ~18 transverse rows of ommatidia, each row with ~12-14 ommatidia.

REMARKS: *Aega whanui* sp. nov. is a large and notably wide-bodied species, easily identified by the small eyes, ovate body shape, long antennule flagellum, short dactylus on pereopods 1-3 (about as long as

propodus), proportionally long basis on pereopods 1-3 and setation of the pereopods and uropods. There are no closely similar species. *Aega whanui* has an unusual mandible morphology, with a near truncate distal portion which has the incisor reduced to a small triangular point. Whether this is also the case for the male is unknown, but the mandible incisor has not been shown to be sexually variable for any other aegid species. The weakly developed eyes of the holotype is presumably a preservation artefact.

PREY: Not known.



**Figure 33.** *Aega whanui* sp. nov. Holotype. A-C, pereopods 1, 2 and 7 respectively; D, pereopod 1 propodus, later view; D, pereopod 1 propodus, mesiodistal angle; F, pleopod 1; G, uropod exopod, ventral view; H, uropod.

DISTRIBUTION: Lord Howe Rise to the northwest of New Zealand, and Timor Sea, off the Tanimbar Islands, Indonesia; at depths from 1084 to 1250 m.

ETYMOLOGY: Whanui (pronunciation: 'phanui') is a Māori word that means wide or broad (alluding to body shape).

*Aega* sp.

MATERIAL EXAMINED: 2 manca (4.5, 5.0 mm), Wanganella Bank, Norfolk Ridge, 32°34.4'S, 167°31.0'E, 29 January 1981, 113 m, NIWA stn 0.631 (NMNZ Cr.4871).

REMARKS: The eyes are widely separate, the antenna is notably short, being only a little longer than the antennule, the body shape is elongate (similar to that of *Aega alazon*), the uropods are slender, with the distal margin of the exopod serrate. These two small manca cannot be identified as any named species. The specimens are of uniform appearance, but given that many Aegidae will grow from four times to 10 times larger, it is not possible to be confident that apparent species-specific characters will not change with maturity.

#### *Aegapheles* gen. nov.

TYPE SPECIES: *Aega kixalles* Bruce, 2004; here designated.

DIAGNOSIS: Body moderately to strongly dorsally vaulted. Rostral point acute, projecting anteriorly. Eyes present, large, usually medially united. Pleonite 1 not abruptly narrower than pereonite 7; pleonite 4 with lateral margins extending beyond posterior margin of pleonite 5. Pleotelson produced to an acute, often elongate point. Antennule peduncle articles 1 and 2 weakly flattened, not expanded; anterodistal article 2 weakly or not produced. Maxillule with 1–3 large broad-based RS, several small RS. Maxilliped palp article 5 wider than longer; endite present. Pereopods 1–3 merus inferior margin with large RS, usually set in one or more rows, pereopods 4–7 with long acute RS. Uropodal endopod lateral margin with weak to prominent excision; plane of endopod oblique, at angle of about 135° to that of pleotelson and exopod.

DESCRIPTION: Body moderately to strongly vaulted, about 2 to 4 times as long as wide. Head with eyes, often large, may meet at midpoint; anterior margin with median rostral point. Coxae of pereonites 4–7 longer than respective segment, posteriorly produced. Pleon not abruptly narrower than pereon; pleonite 5 laterally

overlapped by pleonite 4; pleonites 3–5 posteriorly produced to an acute point.

Frontal lamina with posterior margin not abutting clypeus. Mandible with uni- or bicuspid incisor; molar process present, reduced or absent. Maxilliped palp 5-articled, article 1 shorter than wide, articles 3 and 4 each with 2–6 stout recurved RS, article 5 subrectangular, with long flexible terminal setae; endite present, usually with 1–2 terminal setae. Uropodal rami with marginal setae in single tier.

ETYMOLOGY: From the Greek *apheles* (smooth, even – all species are smooth-bodied) in conjunction with *Aega* – indicating family affinity; alludes to the blood-feeding micropredator genus of mosquito. Gender feminine.

REMARKS: The group of species, referred to as the '*Aega deshaysiana*-group' by Bruce (2004a) forms a well-supported clade and is here established as the new genus *Aegapheles*. The unique apomorphy is the pleotelson posterior margin forming an extended point and the uropodal rami not reaching the posterior margin of the pleotelson. The genus is further characterised by all species having very large eyes either meeting at the midline or separated by the width of only one or two ommatidia, the posterior pereopods with elongate robust setae, the uropodal exopod lateral margin with a usually very distinct excision (very weakly present in some species of *Aega*), the robust setae on the inferior margins of the merus of pereopods 1 and 2 forming one or more continuous rows and the plane of the uropodal exopod is at an oblique angle to the endopod (this state also occurring in *Rocinela*). The frontal lamina of species of *Aegapheles* is usually flat, often not distinctly defined posteriorly and does not abut against the clypeus; in a few species the posterior border is clearly defined.

Seventeen named species are included in the genus, those below and under 'Species included ...' (p.213).

#### KEY TO THE NEW ZEALAND SPECIES OF AEGAPHELES

Although not directly used to key the species of *Aegapheles*, the number of marginal robust setae on the uropodal and pleotelson margins are useful to confirm identity. The number of pleotelson robust setae is given in parentheses for each species at the end of the couplet.

- 1 Uropodal exopod extending posterior to endopod (i.e. longer than endopod) .....3
- Uropodal exopod not extending posterior to endopod (i.e. as long as or shorter than endopod).. .....2

2. Pereopod 1 with propodal blade about as long as palm; frontal lamina anteriorly rounded, posteriorly narrow; pleotelson apex with distinct apical point (pleotelson with 8 RS).....  
..... *Aegapheles copidis* (p. 70)
- Pereopod 1 without distal propodal blade or lobe; frontal lamina quadrate; pleotelson apex produced, without distinct apical point; (pleotelson with 8–10 RS).....  
..... *Aegapheles umpara* (p. 81)
3. Eyes entirely united medially .....4
- Eyes narrowly separate (pleotelson with 6–8 RS) .....*Aegapheles birubi* (p. 68)
4. Pereopods 5–7 superior margins of ischium to carpus without long setae.....5
- Pereopods 5–7 superior margins of ischium to carpus with long setae (pleotelson with 11–16 RS) .....*Aegapheles hamiota* (p. 73)
5. Frontal lamina ovate; pereopod 1 propodal palm with prominent distal lobe; inferior margin of pereopods 2 and 3 merus with near continuous row of 12–15 RS (pleotelson with 0 RS) .....  
.....*Aegapheles rickbruscai* (p. 79)
- Frontal lamina anteriorly rounded; pereopod 1 propodal palm with or without small distal lobe; inferior margin of pereopods 2 and 3 merus with 4–6 widely spaced RS .....6
6. Frontal lamina lateral margins posteriorly narrowed; uropodal endopod with 2–4 RS proximal to lateral notch (pleotelson with 8–10 RS) .....  
..... *Aegapheles alazon* (p. 66)
- Frontal lamina lateral margins sub-parallel; uropodal endopod with 6 or 7 RS proximal to lateral notch (pleotelson with 14–18 RS).....  
.....*Aegapheles mahana* (p. 75)

*Aegapheles alazon* (Bruce, 2004) comb. nov. (Fig. 34)

*Aega alazon* Bruce, 2004: 156, figs 12–15, 62.– Poore, 2005: 6.

MATERIAL EXAMINED: **New Zealand:** ♀ (non-ovig 31 mm), vicinity of the Snares, 47°20.0'S, 167°02.00'E, 10 October 1962, 174 m, stn B0571 (NIWA 17930). ♀ (non-ovig 28 mm), vicinity of the Snares, 48°46.00'S, 167°04.99'E, 13 October 1962, 143 m, stn B0591 (NIWA 17931). ♂ (25 mm), vicinity of the Snares, 48°43.00'S, 167°31.99'E, 13 October 1962, 161 m, stn B0593 (NIWA 17932). ♀ (40 mm), west of Snares, 48°03.39'S, 166°45.12'E, 27 Feb 1993, 141–144 m, on fin of gemfish, coll. *Tangaroa* (NMNZ Cr.12002). ♀ (non-ovig 21 mm), stn ABI/003/86, 46°00.0'S 170°42.1'E, 77 m, 5 November 1986, on gills of school shark, coll. B. Jones (NMNZ Cr.12018). ♀ (non-ovig. 58 mm), NW of McCauley Island, Kermadec Islands, 30°01.5'S, 178°42.8'W, 30 Sept

1993, 110 m, dropline (prey not recorded), coll. R Win on FV *Te Maru 18* (AK 84218). ♀ (non-ovig 28 mm), Z6115, ex ling (dried at some point) (NIWA 17936). 2 ♀ (non-ovig 23, 33 mm), 17°25.00'S, 178°10.00'E, 46 m (as 25 fms), 4/63, on horse mackerel, stn Z2 LH (NIWA 17963). ♀ (non-ovig 35 mm), 17°25.00'S, 178°10.00'E, 79 m (as 43 fms), off 'groper', Z3 1/64 (NIWA 17964). ♂ (32 mm), 17°25.00'S, 178°10.00'E, 42 m (as 23 fms) Z2 12/63, coll. J. Graham (NIWA 17965). ♀ (non-ovig 38 mm), Z2/63, J. Graham (NIWA 17966). ♂ (31 mm), 17°25.00'S, 178°10.00'E [vicinity of Fiji], on gurnard, Z2, 5/62, 436, coll. Graham (NIWA 17967). **Note:** There is some considerable doubt over the data for the specimens apparently taken at 17°S, the vicinity of Fiji (see comment *Rocinela garricki*, p. 169), as the host names are of New Zealand fishes.

**Additional material:** **South Atlantic:** ♂ (14.2 mm), Discovery Expedition, Stn 1187, from 2.2–0.8 miles S 65°E of South Hill, Inaccessible Is, Tristan Group, 18 November 1933, 135–134 m (BMNH unreg). **South-western Pacific:** Tonga: 1, (26 mm), 2°11'S, 175°27'W, 16 June 2000, BORDAU 2, stn. CH1609, 385–405 m, coll. Bouchet *et al.* (MNHN Is.5879). New Caledonia: 1, 18°55.48'S, 163°22.11'E, 7 August 1992, BATHUS 4, stn. CP927, 452–444 m, coll. B. Richer de Forges (MNHN Is.5865). 1 (27 mm) New Zealand, off Great Barrier Island, North Island, January 2006, old longline gear at ~500 m, coll. Steve Lowe (NIWA 23778).

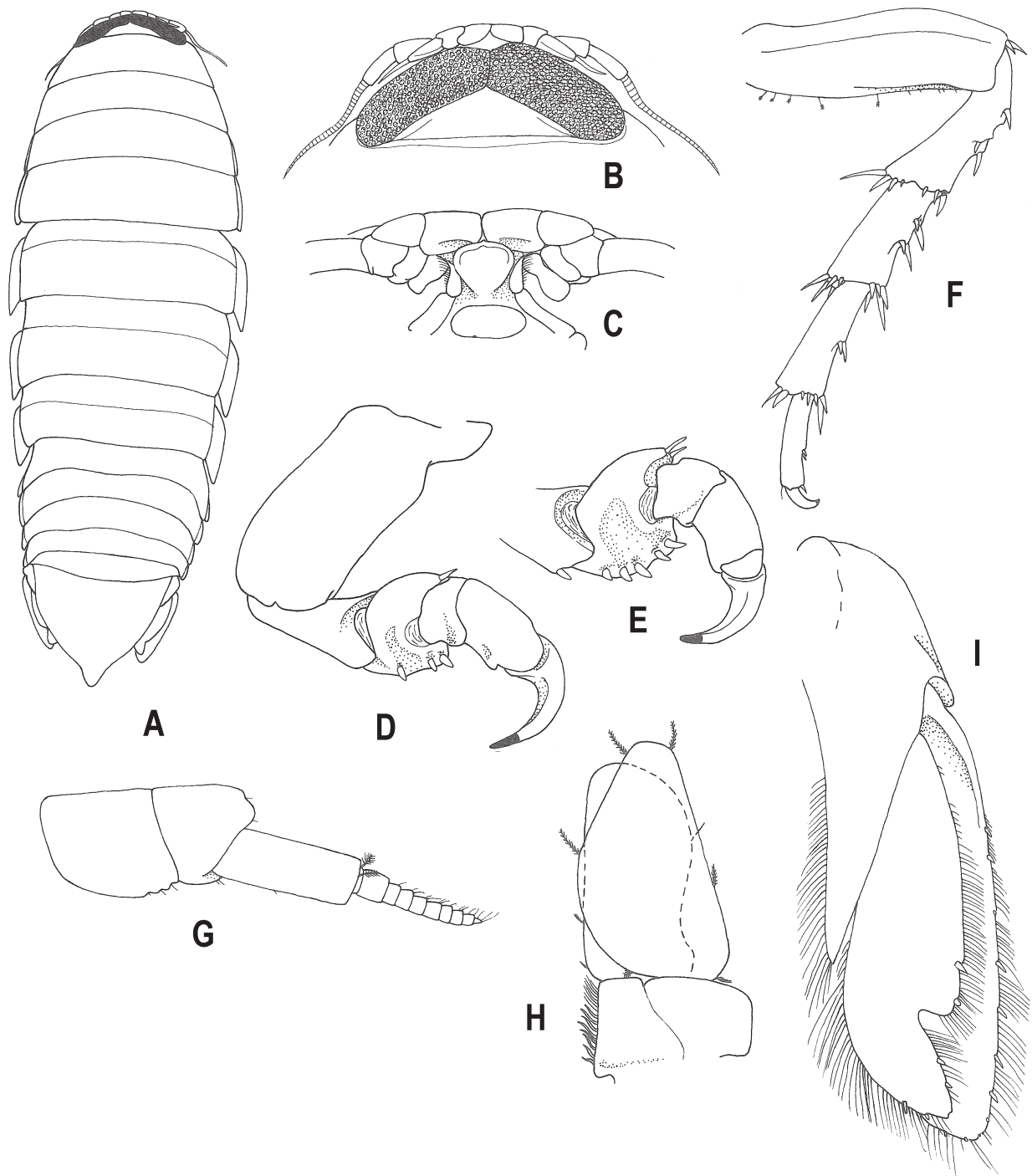
TYPE LOCALITY: Off Port Elizabeth, South Africa (Bruce 2004a).

DIAGNOSIS (from Bruce 2004a): *Eyes* large, medially united, anterior clear field 21% length of head, posterior clear field 46% length of head; eye colour dark brown. *Pleonite* 4 with posterolateral margins extending clearly beyond posterior margin of pleonite 5; pleonite 5 with posterolateral angles overlapped by lateral margins of pleonite 4. *Pleotelson* 1.0–1.2 times as long as anterior width, dorsal surface without longitudinal carina; lateral margins convex, smooth, posterior margin with 6–10 RS.

*Antennule* peduncle article 2 anterodistal lobe not extending beyond mid-point of article 3; flagellum extending to posterior margin of eye. *Antenna* peduncle article 2 inferior surface with indistinct groove; flagellum extending to posterior of pereonite 1.

*Frontal lamina* flat, wider than long, lateral margins converging posteriorly, anterior margin rounded, with small median point, posterior margin not abutting clypeus.

*Pereopod* 1 merus inferior margin with 3 RS, set as two groups (of 1 and 2), superior distal angle with 2 RS (slender); carpus inferior margin with 0 RS; propodus 1.8 times as long as proximal width, inferior margin with 0 RS, propodal palm with small distal lobe, dac-



**Figure 34.** *Aegapheles alazon* (Bruce, 2004). A, dorsal view; B, head, dorsal view; C, frons; D, pereopod 1; E, pereopod 2 (distal articles); F, pereopod 7; G, antennule; H, pleopods 1; I, uropod.

tylus smoothly curved, 1.2 as long as propodus. *Pereopod 2* merus inferior margin with 5 RS (set as 3 and 2), set as two groups. *Pereopods 5–7* inferior margins of ischium–carpus with long acute RS. *Pereopod 3* similar to *pereopod 2*. *Pereopod 7* basis 2.9 times as long as greatest width, inferior margins with 6 palmate setae (or more); ischium 0.6 as long as basis, inferior margin

with 5 RS (set as 1, 2 and 2), superior distal angle with 7 RS, inferior distal angle with 5 RS; merus 0.9 as long as ischium, 2.6 times as long as wide, inferior margin with 4 RS (set as 1, 1 and 2), superior distal angle with 5 RS, inferior distal angle with 7 RS; carpus 0.8 as long as ischium, 2.9 times as long as wide, inferior margin with 2 RS (set as single cluster), superior distal angle

with 3 RS, inferior distal angle with 6 RS; propodus 0.7 as long as ischium, 5.8 times as long as wide, inferior margin with 2 RS (set as single cluster), superior distal angle with 2 slender setae (1 simple, 1 palmate), inferior distal angle with 2 RS.

*Penes* opening flush with surface of sternite 7; penial openings separated by 5% of sternal width.

*Uropod* peduncle posterior lobe about one-half as long as endopod. *Uropod* rami with apices narrowly rounded. *Endopod* apically not bifid, lateral margin proximally convex, with prominent excision, positioned about four-fifths along ramus, proximal lateral margin with 2 RS, distal lateral margin with 4 RS, mesial margin strongly convex, with 3 RS. *Exopod* extending beyond end of endopod, 2.8 times as long as greatest width, apically not bifid; lateral margin weakly convex, with 10 RS; mesial margin sinuate, proximally concave, with 3 RS.

**SIZE:** Previously recorded to 58 mm, the size of the largest specimen examined here.

**VARIATION:** Most specimens examined were in relatively poor condition, and the indicative range for robust setae on the pleotelson appears to be from 5+5 to 7+7. *Uropod* exopod ( $n = 19$ ) mesial margin with 3–5, with 3 (74%) or 4 (21%) most frequent, lateral margin with 9–12 RS with 10 (84%) most frequent; *uropod* endopod mesial margin ( $n = 21$ ) with 4 (71%) or 5 (19%) most frequent (7 occurred on one specimen only), the lateral margin ( $n = 20$ ) with the proximal RS at 2–4, distal RS 3 or 4, with 3+4 (52%), 2+3 (14%) and 3+3 most frequent (4+3, 4+4 and 2+4 all occurred once).

*Pereopod* 1 setation of the merus is highly consistent across its range with 1+2 RS (95%), 2+2 occurring only once; *pereopod* 2 merus with 4+2 RS (73%) or 3+2 (27%) most frequent and *pereopod* 3 with 4+2 (95%) most frequent (not included are NMNZ Cr.9265 and AK 84218, identified after counts were made).

This is less variation, particularly for the *uropodal* endopod, than was recorded by Bruce (2004a) for the species across its entire range, suggesting that if good data can be obtained, consistent regional variation or cryptic species may be found to exist.

**REMARKS:** *Aegapheles alazon* is most similar to *A. birubi*, the differentiating characters being that *A. alazon* has medially united eyes and lacks a propodal lobe on the palm of *pereopods* 1–3. Most of the NIWA specimens are in poor condition, several having dried out at some time in the past. In many of the specimens the eyes seem to have shrunk and drawn away from the cuticle, making it impossible to see if the eyes are medially united. All specimens identified here lack a significant propodal lobe on the palm of *pereopods* 1–3.

**PREY:** In New Zealand — Carangidae, probably *Trachurus novaezelandiae* Richardson, 1843 [as horse mackerel]; Serranidae [as groper]; *Rexea solandri* (Cuvier, 1832) (Gempylidae) [as gemfish]; Triglidae [as gurnard]; and Ophidiidae, probably *Genypterus blacodes* (Forster, 1801) [as ling].

**DISTRIBUTION:** Throughout New Zealand waters, extending north to New Caledonia, and northeast to Tonga. Previously recorded (Bruce 2004a) from South Africa (type locality), Tristan da Cunha, Seychelles, St Paul Is., southeastern Australia. Maximum recorded depth 550 metres.

*Aegapheles birubi* (Bruce, 2004) comb. nov. (Fig. 35)

*Aega birubi* Bruce, 2004: 166, figs 18–21, 63.–Poore, 2005: 7.

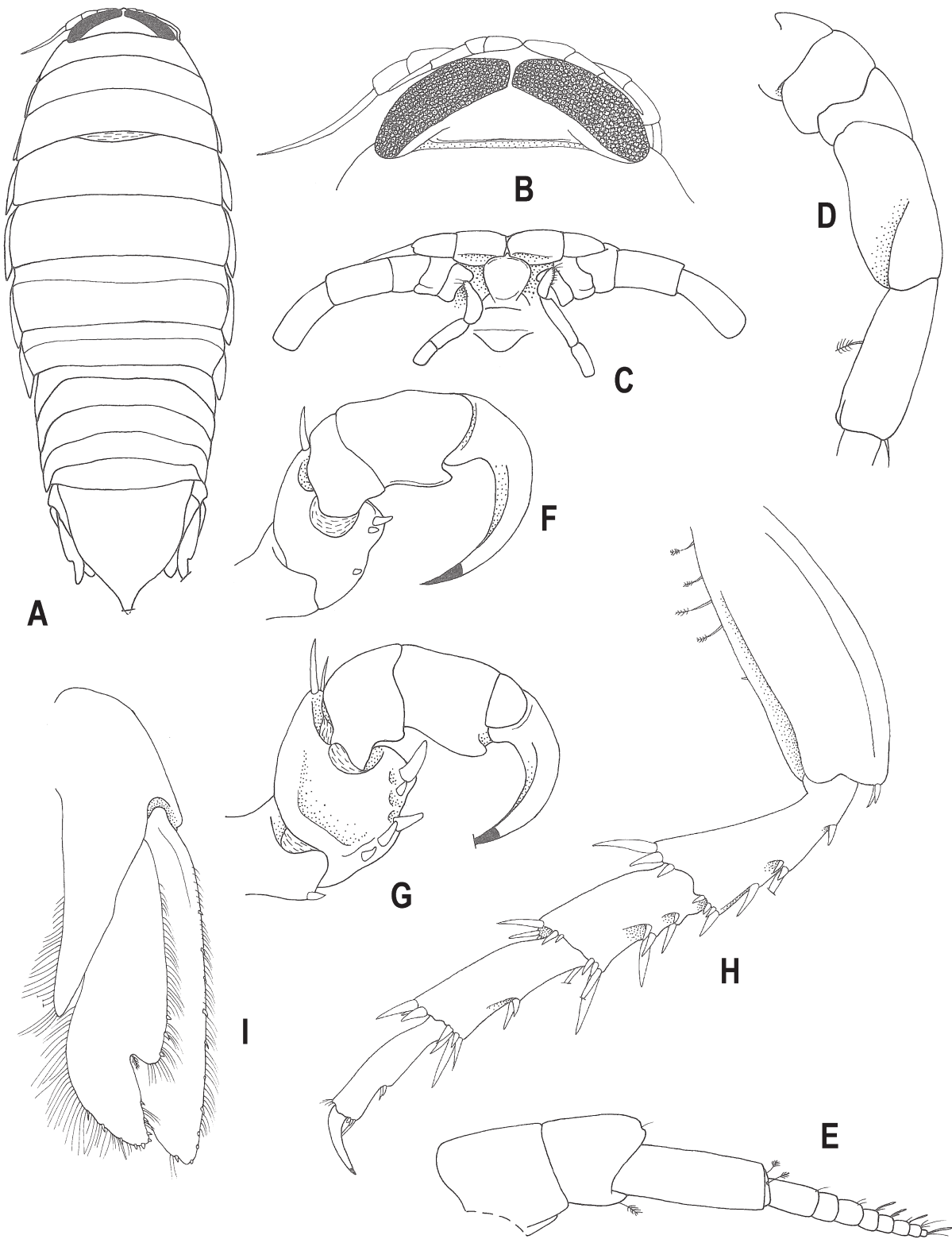
**MATERIAL EXAMINED:** ♀ (non-ovig. 34 mm), Cook Strait, 14 February 2000, 165 m, from cheek of barracouta, coll. Pierce Black (NMNZ Cr.9949). Manca (11.5 mm), outside Wellington Harbour, 20 May 1979, on pectoral fin of *Polyprion oxygeneios*, coll. C. Roberts (AK 4978).

**DIAGNOSIS** (from Bruce 2004a): *Eyes* large, not medially united, separated by less than 1% width of head; eye colour pale brown. *Pleonite* 4 with posterolateral margins extending clearly beyond posterior margin of *pleonite* 5; *pleonite* 5 with posterolateral angles overlapped by lateral margins of *pleonite* 4. *Pleotelson* 1.0 as long as anterior width, dorsal surface without longitudinal carina; lateral margins convex, smooth, posterior margin with 6–8 RS.

*Antennule* peduncle article 2 without anterodistal lobe; flagellum extending to mid-point of eye. *Antenna* peduncle article 2 inferior surface without distinct longitudinal suture; flagellum extending to middle of *pereonite* 1.

*Frontal lamina* flat, as wide as long, lateral margins converging posteriorly, anterior margin rounded, with small median point, posterior margin not abutting clypeus.

*Pereopod* 1 merus inferior margin with 3 RS, set as two groups (of 1 and 2), superior distal angle with 2 RS (acute); carpus 0.5 as long as merus, inferior margin with 0 RS (with small lobe); propodus 1.4 times as long as proximal width, inferior margin with 0 RS, propodal palm with large distal lobe, dactylus smoothly curved, 1.7 as long as propodus. *Pereopod* 2 merus inferior margin with 6 RS (distal 2 on low lobe), set as single row, superior distal margin with 2 acute RS; carpus similar in size to that of *pereopod* 1, inferodistal angle with 0 RS. *Pereopod* 3 similar to *pereopod* 2. *Pereopods* 5–7 inferior margins of ischium–carpus with long acute RS. *Pereopod* 7 basis 2.8 times as long as greatest width, inferior margins with 7 palmate setae; ischium 0.6 as



**Figure 35.** *Aegapheles birubi* (Bruce, 2004). A, dorsal view; B, head, dorsal view; C, frons; D, antenna peduncle; E, antennule; F, pereopod 1 (distal articles); G, pereopod 2 (distal articles); H, pereopod 7; I uropod.

long as basis, inferior margin with 6 RS (set as 1, 1, 3 and 1), superior distal angle with 3 RS, inferior distal angle with 3 RS; merus 0.8 as long as ischium, 1.9 times as long as wide, inferior margin with 4 RS (set as 2 and 2), superior distal angle with 5 RS, inferior distal angle with 5 RS; carpus 0.8 as long as ischium, 2.6 times as long as wide, inferior margin with 2 RS (single cluster), superior distal angle with 4 RS, inferior distal angle with 6 RS; propodus 0.7 as long as ischium, 4.5 times as long as wide, inferior margin with 2 RS (single cluster), superior distal angle with 3 slender setae (2 simple, 1 palmate), inferior distal angle with 4 RS.

*Penes* opening flush with surface of sternite 7; penial openings separated by 11% of sternal width.

*Uropod* peduncle ventrolateral margin with 1 RS, posterior lobe about two-thirds as long as endopod. Uropod rami with apices narrowly rounded. *Endopod* apically not bifid, lateral margin proximally convex and distally straight, with prominent excision, positioned about three-quarters along ramus, proximal lateral margin with 3 RS, distal lateral margin with 4 RS, mesial margin weakly convex, with 5 RS. *Exopod* extending beyond end of endopod, 3.0 as long as greatest width, apically not bifid; lateral margin weakly convex, with 10 RS; mesial margin sinuate, proximally concave, with 4 RS.

REMARKS: The characteristic setation of the anterior pereopods, which has the distal robust seta on the merus notably longer than the preceding robust seta, allows ready identification; the sub-rectangular frontal lamina, lack of a lobe on the propodal palm of pereopods 1–3, uropodal exopod not extending beyond the endopod and number of robust setae on the uropods are further characters by which the species can be identified.

PREY: Recorded from hapuku, *Polyprion oxygeneios* Schneider & Forster, 1801 (Polyprionidae); previously from barracouta (*Thyristes atun*) (Bruce 2004a).

DISTRIBUTION: From the eastern Australia coast at Broken Bay to Tasmania, eastwards to the Cook Strait; at depths between 120–731 metres.

*Aegapheles copidis* sp. nov. (Figs 36, 37)

MATERIAL EXAMINED: *Holotype*, ♂ (22 mm), West Norfolk Ridge, 34°37.20'S, 168°57.03'E, 3 June 2003, 521–539 m, coll. NORFANZ, RV *Tangaroa* (NIWA 23768).

DESCRIPTION: *Body* 2.3 times as long as greatest width, dorsal surfaces polished in appearance or sparsely punctate, widest at pereonite 5, lateral margins weakly ovate. Rostral point projecting anteriorly, not ventrally folded. *Eyes* large, medially united, anterior clear field

20% length of head, posterior clear field 27% length of head; each eye made up of ~20 transverse rows of ommatidia, each row with ~13 ommatidia; eye colour dark brown. *Pereonite 1 and coxae 2–3* each with posterodorsal angle right-angled. *Coxae 5–7* with entire oblique carina; posterior margins concave, posterolateral angle acute (less than 45°). *Pleon* with pleonite 1 largely concealed by pereonite 7; pleonite 4 with posterolateral margins extending to but not beyond posterior margin of pleonite 5; pleonite 5 with posterolateral angles free, not overlapped by lateral margins of pleonite 4. *Pleotelson* 1.0 times as long as anterior width, dorsal surface without longitudinal carina; lateral margins sinuate, smooth, posterior margin with 8 RS.

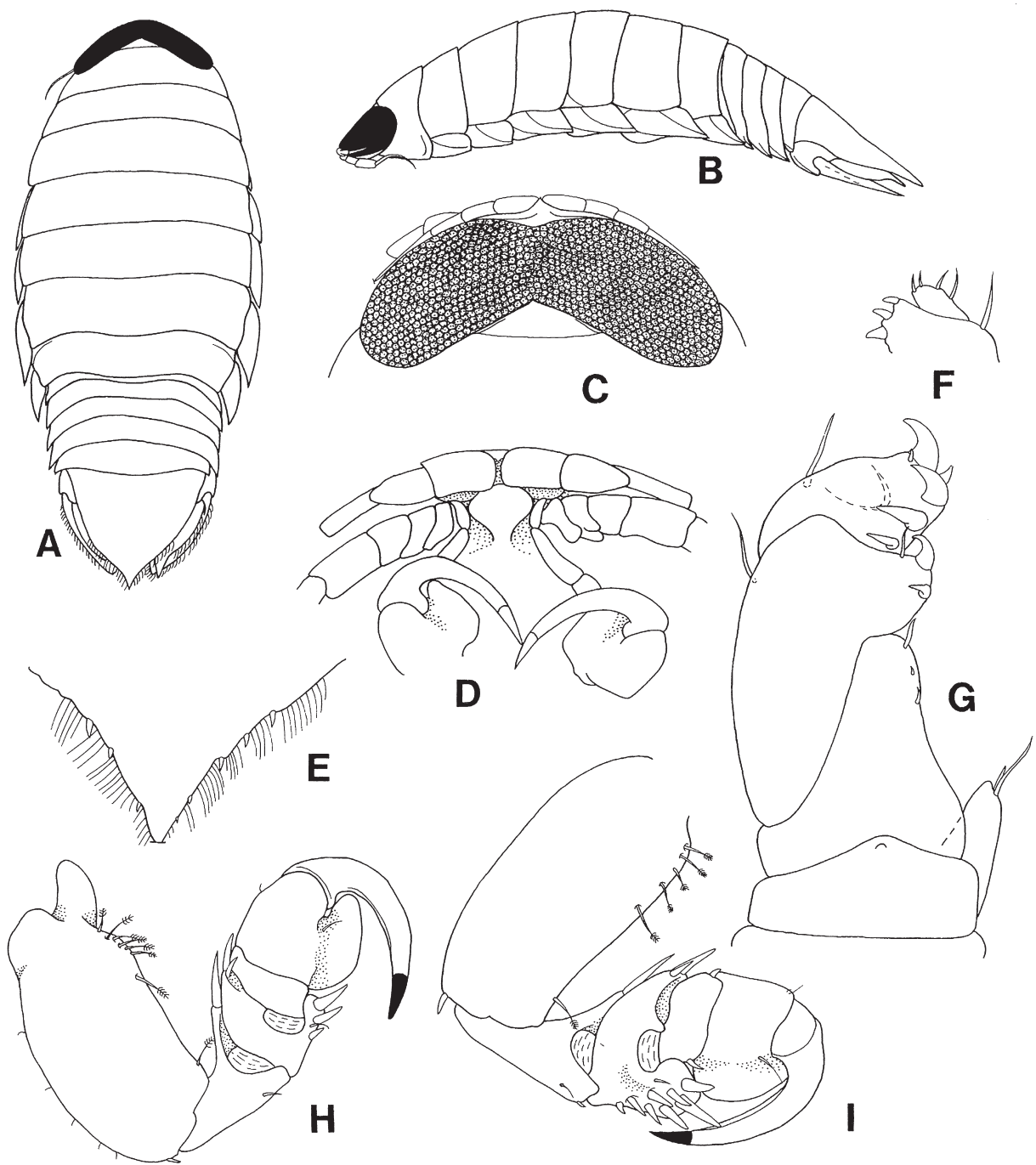
*Antennule* peduncle article 2 without anterodistal lobe; flagellum extending to mid-point of eye. *Antenna*, flagellum extending to posterior of pereonite 1.

*Frontal lamina* flat, wider than long, lateral margins converging posteriorly, anterior margin rounded, without small median point, posterior margin not abutting clypeus.

*Maxilliped* endite with 1 apical setae; palp article 2 with 3 RS; article 3 with 3 recurved RS; article 4 with 5 hooked RS (4 large and 1 small); article 5 articulating with article 4, longer than wide, sub-rectangular, with 4 RS (all straight).

*Pereopod 1* basis 2.0 times as long as greatest width; ischium 0.4 times as long as basis, inferior margin with 0 RS, superior distal margin with 2 RS; merus inferior margin with 3 RS, set as distal group, superior distal angle with 2 RS; carpus 0.4 as long as merus, inferior margin with 0 RS; propodus 1.2 times as long as proximal width, inferior margin with 0 RS, propodal palm with wide blade, dactylus smoothly curved, 2.2 as long as propodus. *Pereopod 2* ischium inferior margin with 1 RS, superior distal margin with 2 RS; merus inferior margin with 8 RS, set as two rows (distal paired rows of 3+3), superior distal margin with 2 acute RS; carpus similar in size to that of pereopod 1, inferior distal angle with 1 RS. *Pereopod 3* similar to pereopod 2. *Pereopods 5–7* inferior margins of ischium–carpus with long acute RS. *Pereopod 6* similar to pereopod 7. *Pereopod 7* basis 2.9 times as long as greatest width, inferior margins with 12 palmate setae; ischium 0.5 as long as basis, inferior margin with 7 RS (set 1, 2, 1 and 3), superior distal angle with 4 RS, inferior distal angle with 4 RS; merus 0.7 as long as ischium, 2.6 times as long as wide, inferior margin with 5 RS (set as 1, 1 and 3), superior distal angle with 7 RS, inferior distal angle with 6 RS; carpus 1.0 as long as ischium, 3.4 times as long as wide, inferior margin with 4 RS (set as 1 and 3), superior distal angle with 7 RS, inferior distal angle with 8 RS; propodus 0.8 as long as ischium, 4 times as long as wide, inferior margin with 3 RS (set as 1 and 2), superior distal angle with 1 slender seta, inferior distal angle with 3 RS.



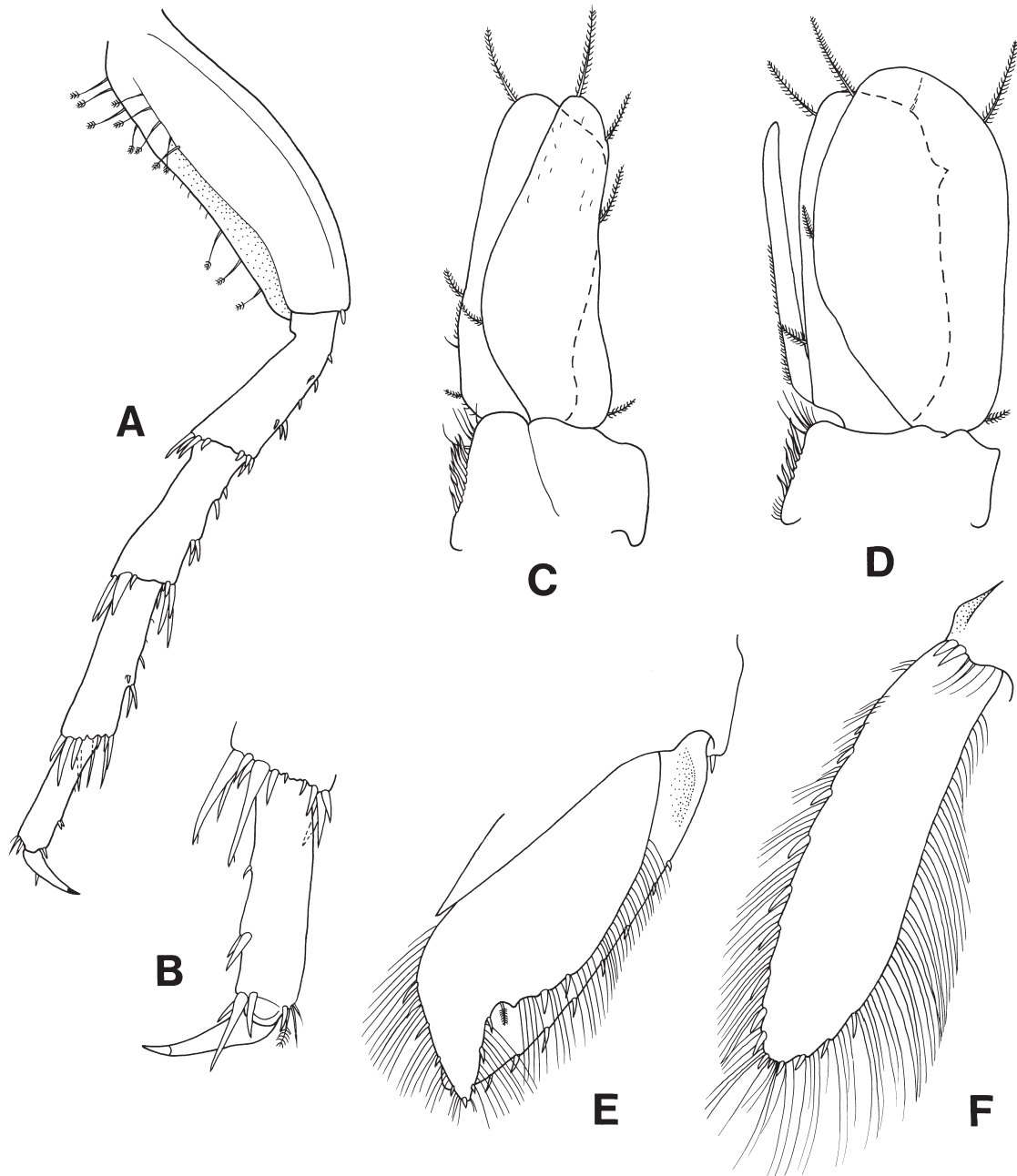


**Figure 36.** *Aegapheles copidis* sp. nov. Holotype. A, dorsal view; B, lateral view; C, head, dorsal view; D, frons; E, pleotelson posterior margin, dorsal view; F, maxilliped palp, article 5; G, maxilliped; H, pereopod 1; I, pereopod 2.

*Penes* low tubercles; penial openings separated by 11% of sternal width.

*Pleopod 1* exopod 2.7 times as long as wide, distally narrowly rounded with strongly oblique mesial margin, lateral margin weakly concave, mesial margin strongly convex, with PMS on distal one-third; endopod 2.6 times as long as wide, distally subtruncate, lateral

margin weakly concave, with PMS on distal margin only, mesial margin with PMS on distal two-thirds; peduncle 1.2 times as wide as long, mesial margin with 8 coupling hooks. *Pleopod 2 appendix masculina* with straight margins, 0.9 times as long as endopod, distally narrowly rounded. Exopods of pleopods 1–3 each with distolateral margin not digitate; endopods of pleopods



**Figure 37.** *Aegapheles copidis* sp. nov. Holotype. A, pereopod 7; B, pereopod 7, propodus and distal margin of carpus, mesial side; C, pleopod 1; D, pleopod 2; E, uropod, in situ; H, uropod exopod, ventral view, in situ.

3–5 each with distolateral point; pleopods 2–4 peduncle distolateral margin without prominent acute RS.

*Uropod* peduncle ventrolateral margin with 2 RS, posterior lobe about one-half as long as endopod. Uropod rami with apices narrowly rounded. *Endopod* apically not bifid, lateral margin proximally convex, with prominent excision, positioned about three-quarters of the way along ramus, proximal lateral margin with 2 RS, distal lateral margin with 4 RS, mesial margin weakly convex, with 6 RS. *Exopod* extending

to end of endopod, 3.9 times as long as greatest width, apically not bifid; lateral margin weakly convex, with 11 RS; mesial margin sinuate, proximally concave, with 4 RS.

FEMALE: Not known.

SIZE: Holotype 22 mm, a mature male; females probably larger.

VARIATION: The left and right uropodal exopod lateral margins had 10 and 11 robust setae. The robust setae on the posterior margin of the pleotelson are apparently uneven though some may be missing; the probable number is 10 or 12.

REMARKS: *Aegapheles copidis* sp. nov. can be identified by the prominent propodal blade on pereopods 1–3 together with the wide frontal lamina, and the relatively slender uropodal endopod, the lateral margin of which is weakly excavate; in addition the pleotelson apex extends only a little way beyond the posterior of the uropods. There are three species of *Aegapheles* that have a propodal blade on pereopods 1–3. *Aegapheles copidis* has a longer propodal blade, shorter uropod exopod and weakly excised endopod lateral margin in comparison to *A. kixalles* Bruce, 2004; *A. musorstom* Bruce, 2004 has a symmetrically ovate frontal lamina, wide uropodal exopod which is longer than the endopod, pereopods 2 and 3 with a single continuous row of robust setae on the inferior margin of the merus, and longer robust setae on pereopods 5–7. The tropical *Aegapheles trulla* Bruce, 2004 has a similar number of robust setae on the merus of pereopods 1–3 but these are not arranged in two rows; in addition the uropodal endopod lateral margin is weakly excised, uropodal exopod is very wide and the frontal lamina sub-circular.

The single specimen was minimally dissected as, though very recently collected, high-grade absolute ethanol preservation had rendered it exceptionally brittle and fragile. The antenna, antennule, mouthparts and pleopods show few differences at species level, and direct observation suggests that these appendages are generally similar to those of other species of the genus (see Bruce 2004a).

PREY: No records.

DISTRIBUTION: West Norfolk Ridge, northeastern New Zealand; 521–539 metres.

ETYMOLOGY: The epithet is the Latin *copidis* (cleaver, kitchen knife), alluding to the wide propodal blade on the anterior pereopods.

*Aegapheles hamiota* (Bruce, 2004) comb. nov. (Fig. 38)

*Aega hamiota* Bruce, 2004: 171, figs 22–25, 63.– Poore, 2005: 7.

MATERIAL EXAMINED: ♂ (24 mm), West Norfolk Ridge, 32°36.49'S, 167°43.98'E, 29 May 2003, 699–707 m, coll. NORFANZ, RV *Tangaroa* (NIWA 23769).

DIAGNOSIS (from Bruce 2004a): *Eyes* large, medially united, anterior clear field 9% length of head, posterior clear field 34% length of head; eye colour dark brown. *Pleonite* 4 with posterolateral margins extending clearly beyond posterior margin of pleonite 5; pleonite 5 with posterolateral angles overlapped by lateral margins of pleonite 4. *Pleotelson* 1.1 times as long as anterior width, dorsal surface without longitudinal carina; lateral margins convex, smooth, posterior margin with 11–16 RS.

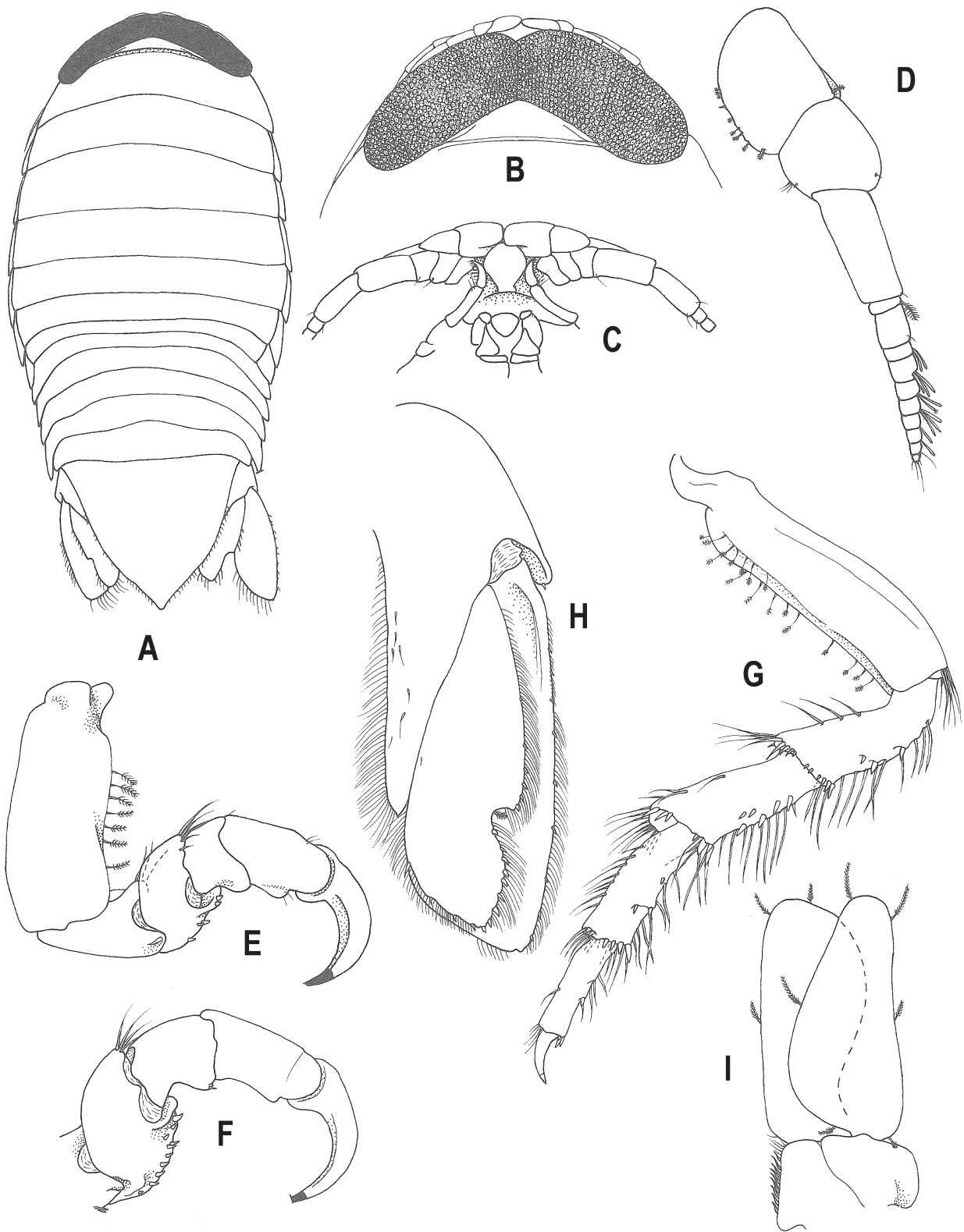
*Antennule* peduncle article 2 without anterodistal lobe; flagellum extending to mid-point of eye. *Antenna* peduncle article 2 inferior surface with distinct longitudinal suture; flagellum extending to posterior of pereonite 1.

*Frontal lamina* flat, longer than greatest width, oval, anterior margin rounded, without small median point, posterior margin not abutting clypeus.

*Pereopod* 1 merus inferior margin with 5 RS, set as three groups (of 1, 2 and 2), superior distal angle with 7 RS (long acute); carpus 0.6 as long as merus, inferior margin with 0 RS; propodus 1.9 times as long as proximal width, inferior margin with 0 RS, propodal palm with small distal lobe, dactylus smoothly curved, 1.3 as long as propodus. *Pereopod* 2 merus inferior margin with 9 RS, set as single row (with separation of distal 2), superior distal margin with 5 acute RS (long acute); carpus longer than that of pereopod 1, with inferodistal lobe, inferodistal angle with 1 RS. *Pereopod* 3 similar to pereopod 2. Pereopods 5–7 inferior margins of ischium–carpus with long acute RS, superior margins of ischium–carpus with long, stiff, acute setae. *Pereopod* 7 basis 3.3 times as long as greatest width, inferior margins with 16 palmate setae; ischium 0.5 as long as basis, inferior margin with 10 RS (7 long and 3 short), superior distal angle with 10 RS (5 stout lateral and 5 long mesial), inferior distal angle with 10 RS (6 stout lateral and 4 long mesial); merus 1.0 as long as ischium, 1.9 times as long as wide, inferior margin with 15 RS (9 long and 6 short), superior distal angle with 15 RS (3 stout lateral and 12 long mesial), inferior distal angle with 8 RS (3 stout lateral and 5 long mesial); carpus 1.0 as long as ischium, 3.0 as long as wide, inferior margin with 10 RS (7 long and 3 short), superior distal angle with 10 RS (3 stout lateral and 7 long mesial), inferior distal angle with 11 RS (4 stout lateral and 7 long mesial); propodus 0.8 as long as ischium, 3.5 times as long as wide, inferior margin with 6 RS (4 long and 2 short), superior distal angle with 6 slender setae (1 plumose), inferior distal angle with 4 RS.

*Penes* low tubercles; penial openings separated by 6% of sternal width.

*Uropod* peduncle ventrolateral margin with 2 RS (short), posterior lobe about three-quarters as long as



**Figure 38.** *Aegapheles hamiota* (Bruce, 2004). A, dorsal view; B, head, dorsal view; C, frons; D, antennule; E, pereopod 1 (distal articles); F, pereopod 2 (distal articles); G, pereopod 7; H, uropod; I, pleopod 1.

endopod. Uropod rami with apices broadly rounded. *Endopod* apically not bifid, lateral margin proximally convex and distally convex, with prominent excision, positioned about two-thirds along ramus, proximal lateral margin with 6 RS, distal lateral margin with 9 RS, mesial margin weakly convex, with 4 RS. *Exopod* extending beyond end of endopod, 1.9 times as long as greatest width, apically not bifid; lateral margin weakly convex, with 11 RS; mesial margin convex, with 4 RS.

REMARKS: Agrees well with the description given by Bruce (2004a). The species is immediately recognised by the united eyes, broad uropodal exopod and, uniquely within *Aegapheles*, by pereopods 6 and 7 with long setae on the superior margin of the merus and carpus.

DISTRIBUTION: Newly recorded from the vicinity of New Zealand; previously New Caledonia and Queensland. At depths between approximately 500 to 700 metres.

*Aegapheles mahana* sp. nov. (Figs 39–41)

MATERIAL EXAMINED: All material from New Zealand.

*Holotype*: ♂ (37 mm), Rumble V Sea Mount, 36°8.38'S, 178°11.77'E, 23 May 2001, 603–365 m, coll. RV *Tangaroa* (NIWA 17939).

*Paratypes*: Broken (pleon and pleotelson missing, estimated size 6 cm), Rumble V Sea Mount, 36°8.35'S, 178°11.74'E, 24 May 2001, 520–367 m, coll. RV *Tangaroa* (NIWA 17940). ♀ (non-ovig., broken c. 35 mm, dissected), Rumble V Sea Mount, 36°8.07'S, 178°12.07'E, 24 May 2001, 1140–698 m, coll. RV *Tangaroa* (NIWA 17941).

*Additional material*. ♂ (31 mm), vicinity of Chatham Island, 43°04.00'S, 178°38.99'W, 13 September 1963, 549 m, stn A0910 (NIWA 17942). Manca (22 mm), South Norfolk Ridge, 33°22.61'S, 170°12.70'E, 1 June 2003, 514–540 m, coll. NORFANZ, RV *Tangaroa* (NIWA 17943). ♀ (non-ovig. 28 mm), South Norfolk Ridge, 33°20.51'S, 170°13.98'E, 1 June 2003, 614–675 m, coll. NORFANZ, RV *Tangaroa* (NIWA 17944). ♀ (non-ovig. 35 mm; all anterior pereopods broken), South Norfolk Ridge, 33°23.60'S, 170°12.38'E, 1 June 2003, 469–490 m, coll. NORFANZ, RV *Tangaroa* (NIWA 17945). 2 ♂ (32, 42 mm), West Norfolk Ridge, 34°37.20'S, 168°57.03'E, 3 June 2003, 521–539 m, coll. NORFANZ, RV *Tangaroa* (NIWA 17946).

DESCRIPTION: *Body* 3.0 times as long as greatest width, dorsal surfaces polished in appearance and sparsely punctate, widest at pereonite 4, lateral margins subparallel. Rostral point projecting anteriorly, not ventrally folded. *Eyes* large, medially united, anterior clear field 8% length of head, posterior clear field 35% length of head; each eye made up of ~22 transverse rows of

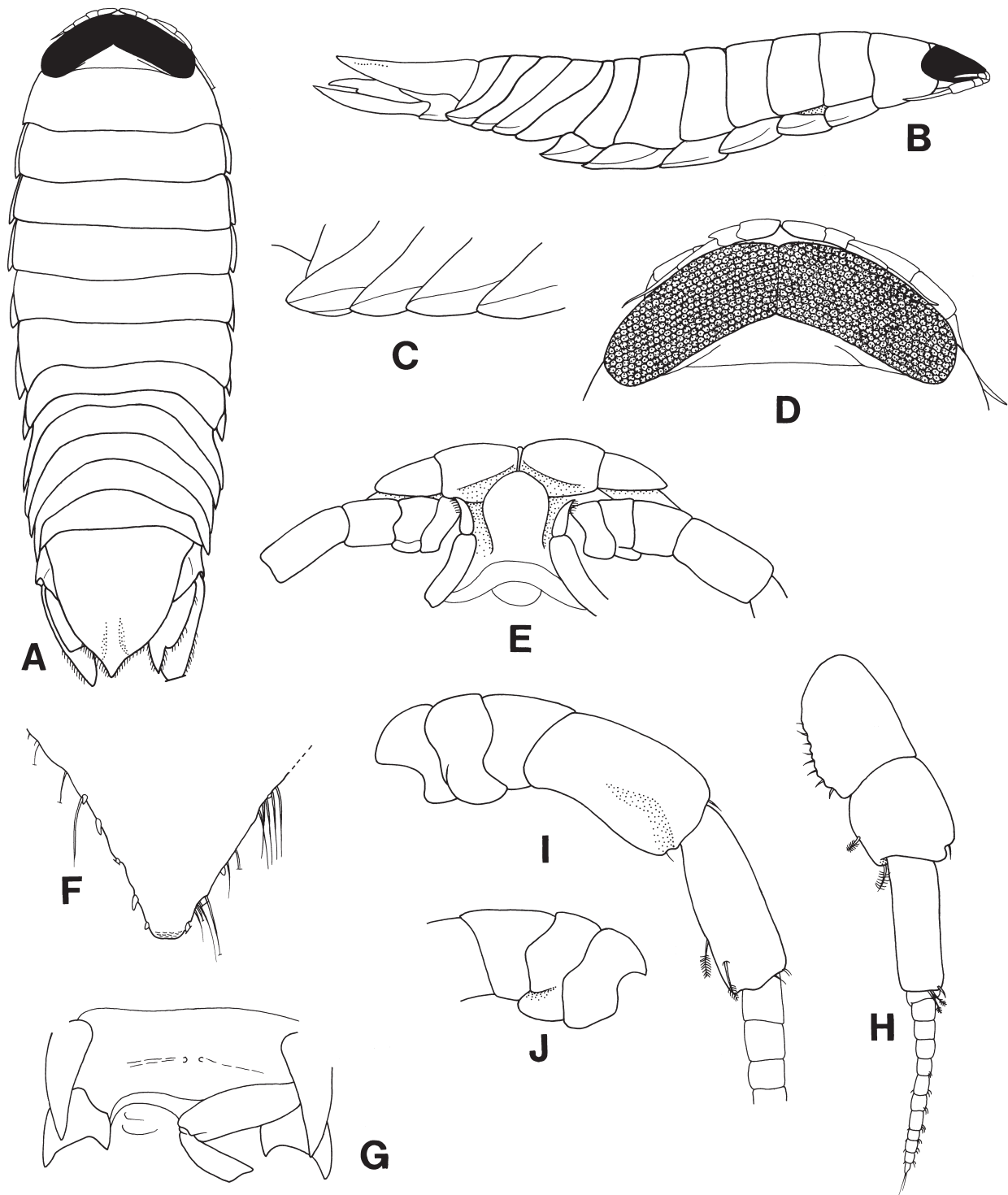
ommatidia, each row with ~10 ommatidia; eye colour dark brown. *Pereonite 1 and coxae 2–3* each with posteroventral angle rounded. *Coxae 5–7* with entire oblique carina; posterior margins concave, posterolateral angle acute (less than 45°). *Pleon* with pleonite 1 visible in dorsal view; pleonite 4 with posterolateral margins extending clearly beyond posterior margin of pleonite 5; pleonite 5 with posterolateral angles overlapped by lateral margins of pleonite 4. *Pleotelson 1.0* as long as anterior width, dorsal surface with longitudinal carina; lateral margins sinuate, smooth, posterior margin with 16 RS.

*Antennule* peduncle article 2 without anterodistal lobe; articles 3 and 4 0.7 times as long as combined lengths of articles 1 and 2, article 3 3.2 times as long as wide; flagellum with 11 articles, extending to posterior margin of eye. *Antenna* peduncle article 2 inferior surface with distinct longitudinal suture; article 4 1.9 times as long as wide, 1.2 times as long as combined lengths of articles 1–3, without deep longitudinal groove, inferior margin 0 plumose setae, and 1 short simple seta; article 5 0.9 times as long as article 4, 2.4 times as long as wide, inferior margin with 2 palmate setae, anterodistal angle with cluster of 4 short simple setae; flagellum with 16 articles, extending to middle of pereonite 1.

*Frontal lamina* flat, longer than greatest width, lateral margins converging posteriorly, anterior margin rounded, without small median point, posterior margin not abutting clypeus.

*Mandible* molar process present, minute; palp article 2 with 6 distolateral setae (plus scattered small simple setae), palp article 3 with 24 setae. *Maxillule* with 8 terminal RS (large, falcate). *Maxilla* mesial lobe with 2 RS (1 hooked, 1 straight); lateral lobe with 3 RS (hooked). *Maxilliped* endite with 1 apical seta; palp article 2 with 2 RS (1 small); article 3 with 5 recurved RS (plus 1 distal serrate slender seta); article 4 with 5 hooked RS (4 large, 1 small); article 5 articulating with article 4, distally convex, with 3 RS (2 curved, 1 straight, plus 3 stiff slender setae).

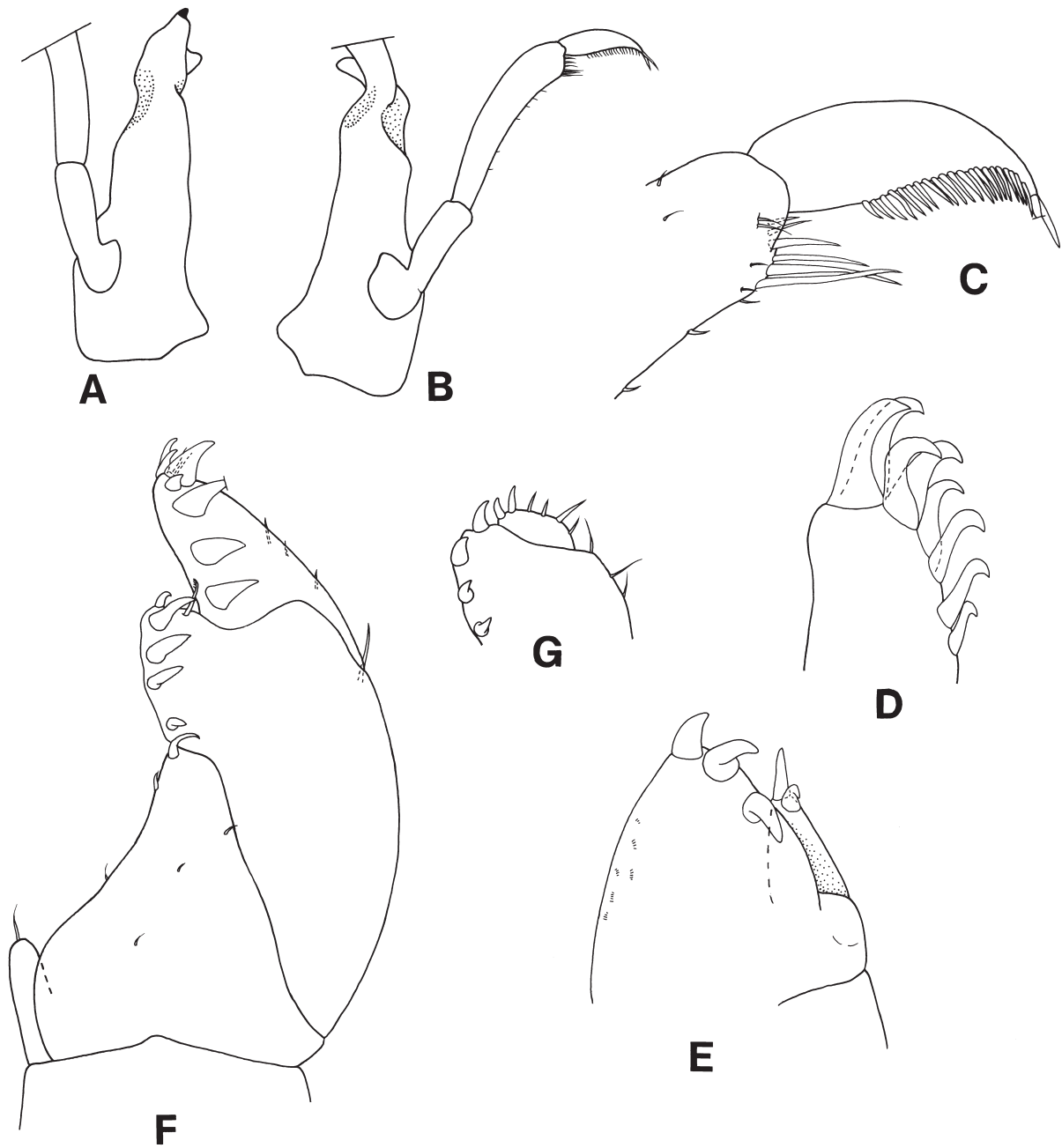
*Pereopod 1* basis 2 times as long as greatest width; ischium 0.5 times as long as basis, inferior margin with 0 RS; merus inferior margin with 5 RS, set as two groups (of 3 and 2), superior distal angle with 2 RS; carpus 0.4 as long as merus, inferior margin with 0 RS; propodus 1.7 times as long as proximal width, inferior margin with 0 RS, propodal palm with small distal lobe, dactylus smoothly curved, 1.5 as long as propodus. *Pereopod 2* ischium inferior margin with 2 RS; merus inferior margin with 6 RS, set as single row (weak separation of 4 and 2), superior distal margin with 2 acute RS; carpus longer than that of pereopod 1, with inferodistal lobe, inferodistal angle with 1 RS. *Pereopod 3* similar to pereopod 2. Pereopods 5–7 inferior margins of ischium–carpus with long acute RS.



**Figure 39.** *Aegapheles mahana* sp. nov. Holotype, A–G, H–I, paratype NIWA 17941. A, dorsal view; B, lateral view; C, pleonites, lateral margin; D, head, dorsal view; E, frons; F, pleotelson, posterior margin, dorsal view; G, sternite 7 showing penial papillae; H, antennule; I, antenna; J, antenna peduncle articles 1–3, ventral view.

*Pereopod 6* similar to *pereopod 7*. *Pereopod 7* basis 2.9 times as long as greatest width, inferior margins with 13 palmate setae; ischium 0.6 as long as basis, inferior margin with 7 RS (loosely set 1, 3 and 3), superior distal angle with 3 RS, inferior distal angle with 4 RS; merus

0.8 as long as ischium, 2.4 times as long as wide, inferior margin with 6 RS (as 2 close-set groups of 3 and 3), superior distal angle with 8 RS, inferior distal angle with 7 RS; carpus 1.0 as long as ischium, 3.1 times as long as wide, inferior margin with 5 RS (set as 1 and



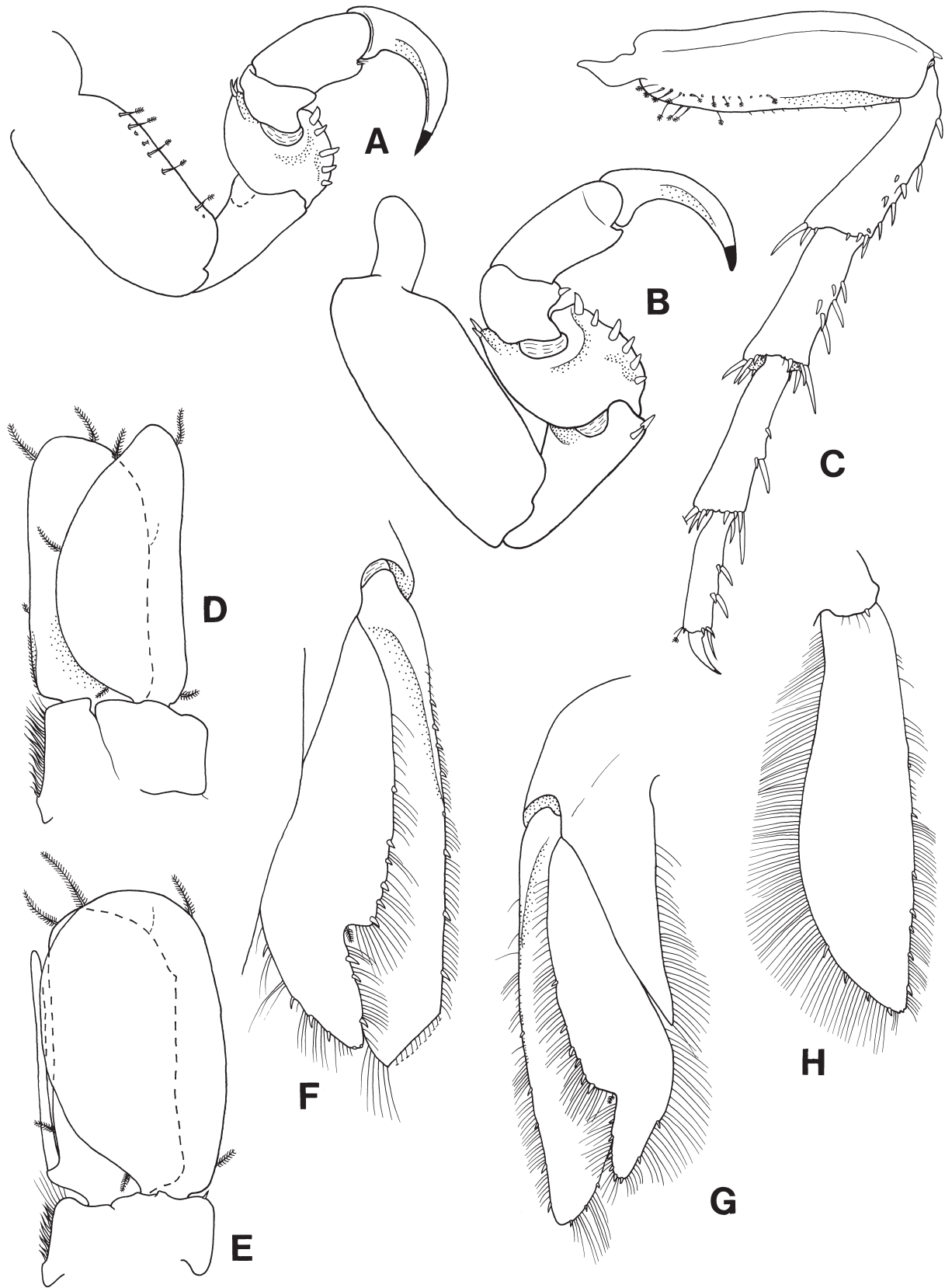
**Figure 40.** *Aegapheles mahana* sp. nov. Paratype NIWA 17941. A, left mandible (broken); B, right mandible (broken) C, mandible palp article 3; D, maxillule apex; E, maxilla apex; F, maxilliped articles 2-5; G, maxilliped article 5 (Leica).

2), superior distal angle with 6 RS, inferior distal angle with 6 RS; propodus 0.7 as long as ischium, 4.5 times as long as wide, inferior margin with 4 RS (set as 2 and 2), superior distal angle with 1 small slender seta, inferior distal angle with 3 RS.

*Penes* opening flush with surface of sternite 7; penial openings separated by 6% of sternal width.

*Pleopod 1* exopod 2.2 times as long as wide, distally narrowly rounded with strongly oblique mesial mar-

gin, lateral margin weakly concave, mesial margin strongly convex, with PMS on distal half; endopod 2.3 times as long as wide, distally subtruncate, lateral margin weakly concave, with PMS on distal half, mesial margin with PMS on distal two-thirds; peduncle 1.4 times as wide as long, mesial margin with 11 coupling hooks. *Pleopod 2 appendix masculina* with straight margins, 0.7 times as long as endopod, distally narrowly rounded. Exopods of pleopods 1-3 each with distola-



**Figure 41.** *Aegapheles mahana* sp. nov. Holotype, except G and H, paratype NIWA 17941. A-C, pereopods 1, 2 and 7 respectively; D, pleopod 1; E, pleopod 2; F, uropod; G, uropod; H, uropod exopod, ventral view.



teral margin not digitate; endopods of pleopods 3–5 each with distolateral point; pleopods 2–4 peduncle distolateral margin without prominent acute RS.

*Uropod* peduncle ventrolateral margin with 1 RS, posterior lobe about one-half as long as endopod. Uropod rami apices narrowly rounded. *Endopod* apically not bifid, lateral margin proximally convex and distally straight, with prominent excision, positioned about three-quarters along ramus, proximal lateral margin with 6 RS, distal lateral margin with 4 RS, mesial margin weakly convex, with 3 RS. *Exopod* extending beyond end of endopod, 3.5 times as long as greatest width, apically not bifid; lateral margin straight, with 9 RS; mesial margin sinuate, proximally concave, with 4 RS.

**FEMALE:** Similar to the male, but for the sexual characters; no ovigerous females present.

**SIZE:** Males 31 to 42 mm (mean = 35.5); female 28 to 25 mm; single manca (with pereopod 7 present but undeveloped) 22 mm; from a large damaged specimen the species may reach an estimated size of up to 6 cm.

**VARIATION:** All four type specimens have received at least some damage so it is not possible to quantify the range in number of the robust setae. The shape and proportion of the uropod rami is consistent between specimens. Pleotelson RS potentially ranging from 14 to 18 (counted as 8+9, 7+9). Uropod exopod mesial margin with 4 or 5 RS, lateral margin 8 or 9; uropod endopod mesial margin varied from 3 to 6 RS, lateral margin 6+3–6, once 7+5.

The robust setae on the merus of pereopods 1–3 present a constant pattern, with pereopod 1 with 3+2 (all) pereopod 2 4+2 (all) and pereopod 3 merus had 4+2, 4+3 and 5+2; in the largest specimen (NIWA 17940) the RS on pereopod 3 form a continuous row.

Fresh colour is a rich orange–brown, with dark brown eyes; chromatophores not apparent. A conspicuous feature of all the freshly caught specimens was the dark brown colour of the robust setae on the pereopods, uropodal rami and pleotelson.

**REMARKS:** *Aegapheles mahana* sp. nov. can be identified by the following combination of characters: large eyes, entirely united and extending almost fully to the anterior margin of the head; anteriorly rounded frontal lamina; pereopods 1–3 propodus palm without blade, with small distal lobe; inferior margin of pereopod 1 merus with 3+2 robust setae, that of pereopods 2 and 3 with 4+2 robust setae; and the relatively slender and distally acute uropodal rami with the exopod extending distinctly beyond the posterior of the endopod; and the lateral margin of the uropodal endopod with 6 or 7 setae proximal (or anterior) to the lateral notch.

Similar species in the region include *Aegapheles alazon* Bruce, 2004, *A. kixalles* Bruce, 2004 and *A. warna* Bruce, 2004. *Aegapheles kixalles*, known from the vicinity of New Caledonia, is most similar in eye size and shape, and in the shape and setation of the pereopods and uropods, but is immediately distinguished by having a narrow propodal blade on pereopods 1–3. *Aegapheles alazon* is a widely distributed and sympatric species which differs in having smaller eyes with a much larger anterior clear field, pereopod 1 usually with 1+2 robust setae on the merus (compared to 3+2) and the uropodal endopod has only 2–4 robust setae anterior to the lateral notch; in addition the lateral margins of the frontal lamina are more strongly convex in *A. alazon*. *Aegapheles warna* presents a similar pattern of setation to the uropods, but the robust setae are larger, more numerous and the exopod is wider than that of *A. mahana*, extending only slightly beyond the endopod while in *A. mahana* the exopod extends well beyond the endopod apex and is noticeably more slender (3.5 times as long as wide) than that of *A. warna* (2.9 times as long as wide).

**PREY:** No records.

**DISTRIBUTION:** Northeastern New Zealand and in the vicinity of the Chatham Islands; potentially at depths between 365 and 1140 metres (some dredge samples covered substantial depth ranges up the sides of the seamounts).

**ETYMOLOGY:** The epithet, *mahana*, is a Māori word meaning warm, in reference to the volcanic activity of these sea mounts.

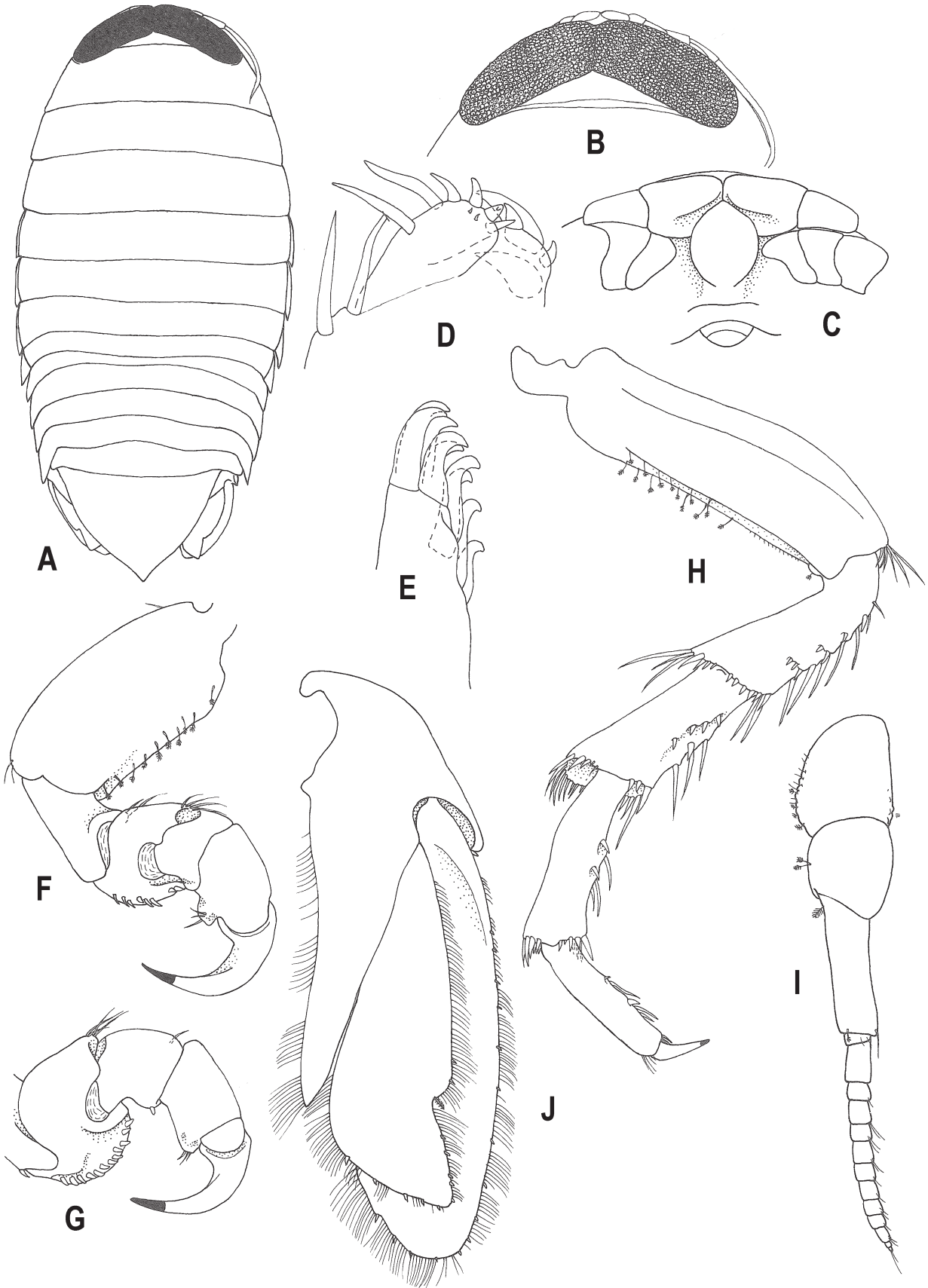
*Aegapheles rickbruscai* (Bruce, 2004) comb. nov.  
(Fig. 42)

*Aega rickbruscai* Bruce, 2004: 196, figs 40–44, 64.

**MATERIAL EXAMINED:** ♂ (44 mm), Cavalli Sea Mount, off northern North Island, 34°07.21'S, 174°05.64'E, 16 April 2002, 554–549 m, NZOI stn Z11055, coll. S. O'Shea on RV *Kaharoa* (NIWA 3444).

**DIAGNOSIS** (from Bruce 2004a): *Eyes* large, medially united, anterior clear field 11% length of head, posterior clear field 34% length of head; eye colour dark brown. *Pleonite* 4 with posterolateral margins extending clearly beyond posterior margin of pleonite 5; pleonite 5 with posterolateral angles overlapped by lateral margins of pleonite 4. *Pleotelson* 0.9 times as long as anterior width, dorsal surface without longitudinal carina; lateral margins convex, smooth, posterior margin with 0 RS.

*Antennule* peduncle article 2 without anterodistal lobe; flagellum extending to mid-point of eye. *An-*



**Figure 42.** *Aegapheles rickbruscai* (Bruce, 2004). A, dorsal view; B, head, dorsal view; C, frons; D, maxilliped palp article 5; E, maxilla apex; F, pereopod 1(distal articles); G, pereopod 2 (distal articles); H, pereopod 7; I, antennule; J, uropod.

*tenna* peduncle article 2 inferior surface with distinct longitudinal suture; flagellum extending to posterior of pereonite 1.

*Frontal lamina* flat, longer than greatest width, oval (rounded-ovate in shape), anterior margin rounded, with small median point, posterior margin not abutting clypeus.

*Pereopod 1* merus inferior margin with 8 RS, set as two groups (of 6 and 2), superior distal angle with 6 RS (long acute); carpus 0.5 as long as merus, inferior margin with 0 RS (with distal flange); propodus 1.3 times as long as proximal width, inferior margin with 0 RS, propodal palm with large distal lobe, dactylus smoothly curved, 1.6 as long as propodus. *Pereopod 2* merus inferior margin with 12 RS, set as single row, superior distal margin with 1 acute RS; carpus similar in size to that of pereopod 1, inferodistal angle with 0 RS. *Pereopod 3* similar to pereopod 2. *Pereopods 5–7* inferior margins of ischium–carpus with long acute RS. *Pereopod 7* basis 3.2 times as long as greatest width, inferior margins with 14 palmate setae (mesial and lateral margins with 5 and 9 respectively); ischium 0.6 as long as basis, inferior margin with 11 RS (set as row of 7 long and 5 short marginal RS), superior distal angle with 7 RS, inferior distal angle with 9 RS (2 long and 7 short); merus 0.8 as long as ischium, 1.7 times as long as wide, inferior margin with 8 RS (3 long acute and 1 short RS and 4 short submarginal RS), superior distal angle with 8 RS, inferior distal angle with 7 RS (3 short, 4 slender and long); carpus 0.9 as long as ischium, 2.8 times as long as wide, inferior margin with 5 RS (set as 3 long and 2 short), superior distal angle with 9 RS, inferior distal angle with 10 RS; propodus 0.8 as long as ischium, 4.3 times as long as wide, inferior margin with 5 RS (3 long and 2 short), superior distal angle with 7 slender setae (simple and palmate, including 1 RS), inferior distal angle with 4 RS.

*Penes* opening flush with surface of sternite 7; penial openings separated by 7% of sternal width.

*Uropod* peduncle ventrolateral margin with 2 RS, posterior lobe about three-quarters as long as endopod. *Uropod* rami apices with endopod narrowly rounded and exopod broadly rounded. *Endopod* apically not bifid, lateral margin proximally convex, with prominent excision, positioned about three-quarters along ramus, proximal lateral margin with 2 RS, distal lateral margin with 5 RS, mesial margin weakly convex (appearing straight), with 5 RS. *Exopod* extending beyond end of endopod, 2.5 times as long as greatest width, apically not bifid; lateral margin weakly convex, with 11 RS; mesial margin convex, with 6 RS.

REMARKS: *Aegapheles rickbruscai* can be identified by the huge eyes, with very little anterior free space on the head, the ovate and anteriorly acute frontal lamina and the continuous row of 6+2 robust setae on the inferior

margin of pereopod 1, 12–15 robust setae on the inferior margins of the merus of pereopods 2 and 3; pereopods 5–7 have easily observed long robust setae, the uropodal exopod is relatively broad and the posterior margins of the pleotelson lack robust setae.

The most similar species in New Zealand waters is *A. hamiota*, that species being readily distinguished by having long, acute robust setae on the superior margins of the ischium, merus and carpus of pereopods 5–7. *A. musorstom*, presently known only from the vicinity of New Caledonia but may occur more widely, is also similar but readily separated by the presence of a conspicuous blade on the propodus of pereopods 1–3.

DISTRIBUTION: Previously known from the vicinity of New Caledonia, the range is here extended southwards to New Zealand.

*Aegapheles umpara* (Bruce, 2004) comb. nov.

(Fig. 43)

*Aega umpara* Bruce, 2004: 208, figs 49–52, 64.– Poore, 2005: 7.

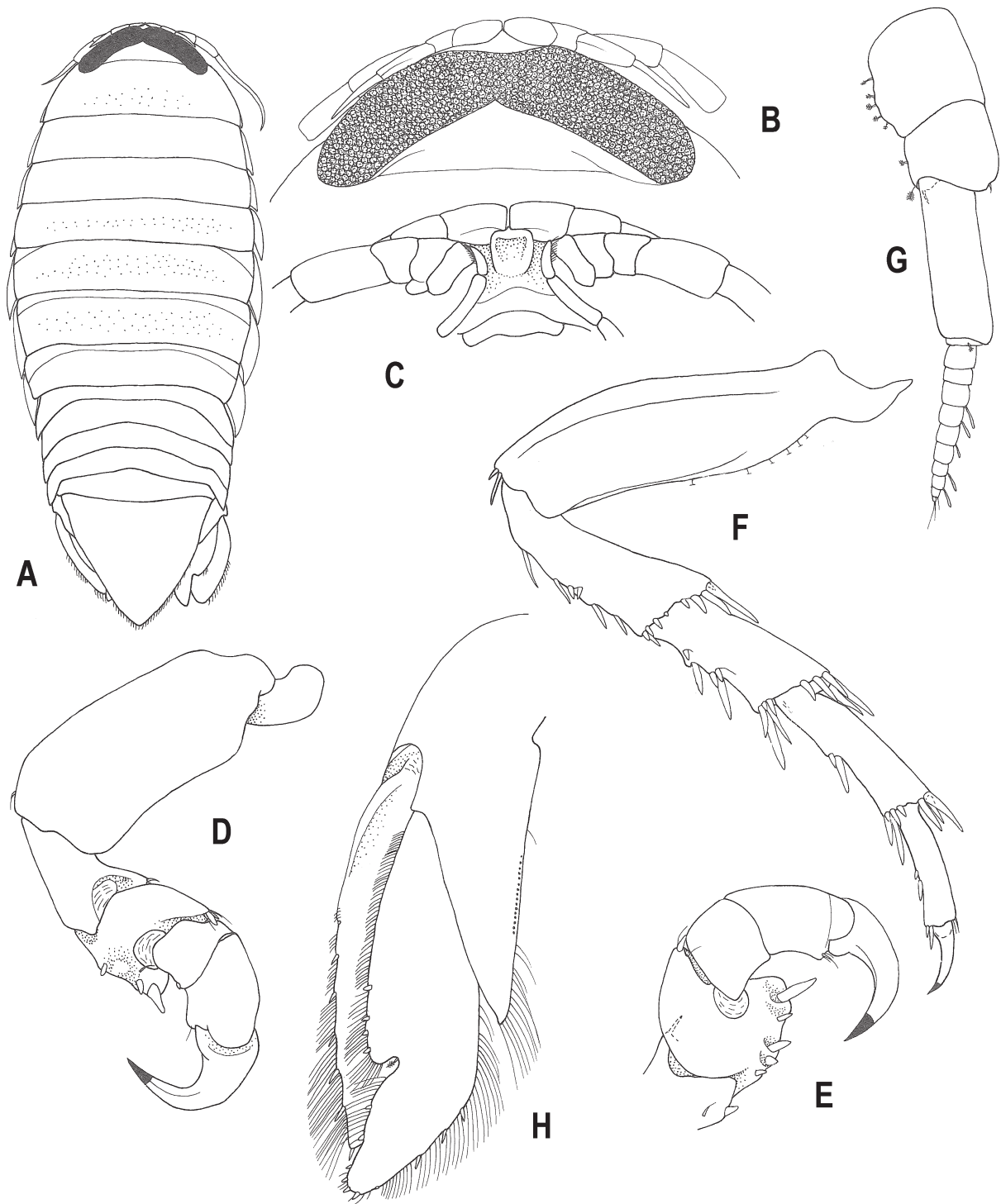
MATERIAL EXAMINED: Specimen, vicinity of Kermadec Islands, 30.2530°S, 178.4033°W, 90 m, *Challenger Centenary*, 1 May 1994, stn K0837 (NIWA 3479). ♂ (29 mm), Lord Howe Rise, 31°52.28'S, 159°16.61'E, 23 May 2003, on *Carcharhinus galapagensis*, 68–91 m, coll. NORFANZ, RV *Tangaroa* (NIWA 23770).

DIAGNOSIS (from Bruce 2004a): *Eyes* large, medially united, anterior clear field 17% length of head, posterior clear field 48% length of head; eye colour dark brown. *Pleonite 4* with posterolateral margins extending clearly beyond posterior margin of pleonite 5; pleonite 5 with posterolateral angles free, not overlapped by lateral margins of pleonite 4. *Pleotelson* 1.1 times as long as anterior width, dorsal surface without longitudinal carina; lateral margins weakly convex (very), smooth, posterior margin with 8 RS.

*Antennule* peduncle article 2 without anterodistal lobe; flagellum extending to posterior margin of eye. *Antenna* peduncle article 2 inferior surface without distinct longitudinal suture; flagellum extending to middle of pereonite 2.

*Frontal lamina* flat, longer than greatest width, rectangular, anterior margin anteriorly truncate, with small median point, posterior margin not abutting clypeus.

*Pereopod 1* merus inferior margin with 3 RS, set as two groups (set as 1 and 2), superior distal angle with 1 RS (and 2 simple setae); propodus 1.3 times as long as proximal width, inferior margin with 0 RS, propodal palm simple, without blade or process, dactylus smoothly curved (but strongly recurved), 1.5 as long



**Figure 43.** *Aegapheles umpara* (Bruce, 2004). A, dorsal view; B, head, dorsal view; C, frons; D, pereopod 1; antennule; E, pereopod 2 (distal articles); F, pereopod 7; G, antennule; H, uropod.

as propodus. *Pereopod 2* merus inferior margin with 5 RS (set as 3 and 2), set as two groups, superior distal margin with 2 acute RS; carpus inferodistal angle with 1 RS (minute). *Pereopod 3* similar to pereopod 2. *Pereopods 5–7* inferior margins of ischium–carpus

with long acute RS. *Pereopod 7* basis 3.5 times as long as greatest width, inferior margins with 6–8 palmate setae; ischium 0.5 as long as basis, inferior margin with 6 RS (set as 1, 3, 1 and 1), superior distal angle with 5 RS, inferior distal angle with 6 RS; merus 0.7 as long

as ischium, 1.8 times as long as wide, inferior margin with 5 RS (set as 2 and 3), superior distal angle with 6 RS, inferior distal angle with 6 RS; carpus 0.9 as long as ischium, 3.3 times as long as wide, inferior margin with 2 RS (single cluster), superior distal angle with 4 RS, inferior distal angle with 7 RS; propodus 0.7 as long as ischium, 4.2 times as long as wide, inferior margin with 2 RS, superior distal angle with 2 slender setae (palmate), inferior distal angle with 2 RS.

*Penes* opening flush with surface of sternite 7; penial openings separated by 3.3% of sternal width.

*Uropod* peduncle ventrolateral margin with 1 RS (and 3 short setae), posterior lobe about two-thirds as long as endopod. *Uropod* rami apices narrowly rounded. *Endopod* apically not bifid, lateral margin proximally convex (weakly), with prominent excision, positioned about two-thirds along ramus, proximal lateral margin with 4 RS, distal lateral margin with 5 RS, mesial margin weakly convex, with 5 RS. *Exopod* not extending to end of endopod, 2.8 times as long as greatest width; lateral margin weakly convex, with 8 RS; mesial margin sinuate, proximally concave, with 4 RS.

**REMARKS:** The characteristic setation of the anterior pereopods, which has the distal robust setae on the merus notably longer than the preceding robust seta, allows ready identification; the sub-rectangular frontal lamina, lack of a lobe on the propodal palm of pereopods 1–3, the uropodal exopod not extending beyond the endopod and number of robust setae on the uropods are further characters by which the species can be identified.

**PREY:** Previously recorded from bony fish, sharks and rays (Bruce 2004a); here recorded from the Galapagos shark, *Carcharhinus galapagensis* (Snodgrass & Heller, 1905) (Carcharhinidae).

**DISTRIBUTION:** From eastern Australia at Moreton Bay and the Solitary Islands to Elizabeth Reef, Norfolk Island and the Kermadec Islands; here recorded from Lord Howe Rise; depth range is relatively shallow, from a few metres to 175 metres, considerably shallower than most related species.

### Genus *Aegiochus* Bovallius, 1885

*Aegiochus* Bovallius, 1885: 4.

*Aega* (*Ramphion*) Brusca, 1983: 11.– Kensley & Schotte, 1989: 116 (key) [type species *Aega plebeia* Hansen, 1897; by original designation].

**TYPE SPECIES:** Type species is *Aega nordenskjoldii* Bovallius, 1885, by monotypy; junior synonym of *A. ventrosa* M. Sars, 1859. Four specimens of *A. ventrosa* (ZMUC) were examined.

**DIAGNOSIS:** Body moderately to strongly dorsally vaulted. Rostral point separating antennule peduncles, appearing truncate in dorsal view, ventrally or ventrally and posteriorly directed. Eyes present, often large, sometimes medially united. Pleonite 1 not abruptly narrower than pereonite 7; pleonite 4 with lateral margins extending to or beyond posterior margin of pleonite 5. Antennule peduncle articles 1 and 2 cylindrical, not flattened or expanded. Maxillule with 1–3 large broad-based RS, several small RS. Maxilliped palp article 5 longer than wide, subtruncate, with long setae; endite present. Pereopods 1–3 merus inferior margin with small RS, usually set as two groups.

**DESCRIPTION:** Body moderately to strongly vaulted, about 2 to 4 times as long as wide. Head with eyes, often large, may meet at midpoint; anterior margin with median (rostral) point. Coxae 4–7 longer than respective segment, posteriorly produced. Pleon not abruptly narrower than pereon; pleonites all visible, not posteriorly widest, pleonite 5 laterally overlapped by pleonite 4.

Frontal lamina present, with free posterior margin or with posterior stem. Mandible with uni- or bicuspid incisor; molar process present, reduced or absent. Maxillule with single large, flat, broad-based RS, several small RS. Maxilliped palp 5-articled, article 1 shorter than wide, articles 3 and 4 each with 2–6 stout recurved RS; endite present, usually with 1–2 terminal setae.

*Uropod* rami with endopod and exopod co-planar, rami extending to or slightly beyond pleotelson apex, marginal setae in single tier, apices acute.

**REMARKS:** The genus *Aegiochus* was established by Bovallius (1885) on the basis of a biological misinterpretation. The holotype of *Aegiochus nordenskjoldii* was an intermoult specimen, this fact being quickly recognised by subsequent workers (e.g. Hansen 1890; Sars 1899) who placed the genus into synonymy with *Aega*. The species was also quickly recognised to be a junior synonym of *Aegiochus ventrosa* (as *Aega ventrosa*).

Brusca (1983) recognised that there were two large 'groups' within *Aega*, and established the subgenera *Ramphion* and the nominate subgenus. Brusca's subgeneric assignments were based on direct examination of 23 species and literature for a further 30 species (of a then total of about 60 species), with the primary basis for distinguishing the two subgenera being the presence (or absence) of expanded peduncular articles on the antennule, presence or absence of a distinct rostrum, and presence or absence of recurved 'spines' (robust setae) on the 'apex of the maxilliped palp'. Some workers initially followed the use of the subgenera (e.g. Bruce 1983; Wetzler 1990; Kensley & Schotte 1989) but later found that critical characters were inconsistently present within

the subgenera and could not apply the subgeneric concepts (e.g. Bruce 1988, 1996, 2004a; Kensley & Chan 2001). Notwithstanding, Brusca had recognised an evident division within the genus, one that the present analysis supports and validates, albeit using different and rather more character states.

Brusca (1983) was apparently unaware of some of the several older and available names that were in synonymy with *Aega*. *Aega plebeia*, the type species of *Rhamphion* falls within the genus concept and within the major clade that contains *Aegiochus*, so that name takes priority.

Thirty-seven named species are included in the genus, those below, and those listed under 'Species included ...' (p.213).

**KEY TO THE NEW ZEALAND SPECIES OF AEGIOCHUS**

- 1. Eyes large, medially united .....4
  - Eyes separate .....2
- 2. Pleotelson entire .....4
  - Pleotelson with quadrate median excision .....3
- 3. Pereopod 1 dactylus 1.4 times as long as propodus; coxae 5-7 dorsally weakly concave, posteriorly produced and acute .....
  - .....*Aegiochus beri* (p. 85)
  - Pereopod 1 dactylus 1.0 times as long as propodus; coxae 5-7 dorsally convex, posteriorly weakly rounded .....*Aegiochus riwha* (p. 141)
- 4. Rostrum folded ventrally and posteriorly, appearing truncate in dorsal view; in contact with or overlapping anterior margin of frontal lamina ...
  - .....7
  - Rostrum ventral or ventrally directed, not folded posteriorly, appearing subtruncate or absent in dorsal view, not overlapping anterior margin of frontal lamina .....5
- 5. Frontal lamina ventrally flat, pentagonal ('cirolanid-like'); adult males with rostrum extended to form prominent process and pereonite 1 with paired sub-lateral processes giving tri-horned appearance; eyes huge, largely occupying anterior margin of head .....*Aegiochus vigilans* (p. 150)
  - Frontal lamina short, with posterior stem, not ventrally flat; males and females without processes on head or pereonite 1; eyes narrowly joined medially .....6
- 6. Eye join medially narrowly (2 or 3 ommatidia); pereopods 2 and 3 carpus inferior margin distinctly lobed with 1 prominent RS; average size approx. 14 mm.....*Aegiochus bertrandi* (p. 88)
  - Eye join moderately wide (3-5 ommatidia); pereopods 2 and 3 carpus inferior margin not lobed, with only small RS; average size approx. 11 mm ..... *Aegiochus coroo* (p. 93)

- 7. Eyes separate .....9
  - Eyes medially united .....8
- 8. Eyes moderate in size, occupying less than 40% head length; frontal lamina posterior margin concave; posteroventral angles of pereonite 1 and coxae 2 and 3 acute, each with posteroventral point; appendix masculina straight.....
  - .....*Aegiochus kakai* (p. 109)
  - Eyes large in size, occupying more than 60% head length; frontal lamina posterior margin straight; posteroventral angles of pereonite 1 and coxae 2 and 3 truncate, each without posteroventral point; appendix masculina sinuate.....
    - ..... *Aegiochus kanohi* (p. 114)
- 9. Frontal lamina with distinct posterior blade; pereopod 1 dactylus as long as or longer than propodus .....10
  - Frontal lamina without distinct posterior blade; pereopod 1 dactylus slightly shorter (0.9) than propodus ..... *Aegiochus insomnis* (p. 103)
- 10. Pereopods 1-3 without distinct, triangular distal blade.....11
  - Pereopods 1-3 with distinct, triangular distal blade.....*Aegiochus piihuka* (p. 128)
- 11. Pleotelson without RS .....12
  - Pleotelson with 2 or more RS .....13
- 12. Adult size 'small' (average 7.7 mm males, about 12.4 mm females); eyes separated by 7% head width; uropod endopod mesial margin usually with 3 RS; dactylus 1.4 times as long as propodus ..... *Aegiochus gordonii* (p. 97)
  - Adult size 'tiny' (average 5.4 mm males, about 8.0 mm females); eyes separated by 16% head width; uropod endopod mesial margin with 1 or 2 RS; dactylus 1.2 times as long as propodus .....
    - .....*Aegiochus nohinohi* (p. 123)
- 13. Eyes large, separated by less than 15% head width; pleotelson with 10 or more RS .....14
  - Eyes small, separated by 32% head width; pleotelson with 2 RS.....*Aegiochus laevis* (p. 120)
- 14. Eyes separated by 12% head width; anterior pereopods stout, propodus 1.7 times as long as wide; coxae not conspicuous in dorsal view, not posteriorly produced.....
  - .....*Aegiochus pushkini* (p. 134)
  - Eyes separated by 4% head width; anterior pereopods slender, propodus 2.9 times as long as wide; coxae conspicuous in dorsal view; coxae 6 and 7 posteriorly produced, acute.....
    - ..... *Aegiochus tara* (p. 146)



*Aegiochus beri* (Bruce, 1983), comb. nov. (Figs 44, 45)

*Aega* (*Rhamphion*) *beri* Bruce, 1983: 773, figs 11, 12.

*Aega beri*. – Bruce, Lew Ton & Poore, 2002: 160. – Springthorpe and Lowry, 1994: 39.

MATERIAL EXAMINED: 3 ♂ (32, 23, 18 mm), imm. ♀ (19 mm), east of Lord Howe Island, Tasman Sea, 30°31.0–19.4'S, 161°54.2–40.6'E, 29 December 1975, 1210 m, coll. J.E. Watson on RV *Dmitry Mendeleev* (NMV J8885). ♂ (27 mm), 32°26.70'S, 161°46.95'E, 25 May 2003, 1130–1147 m, coll. NORFANZ, R.V. *Tangaroa* (NIWA 23766). ♀ (non-ovig. 21 mm), 34°12.18'S, 162°41.18'E, 26 May 2003, 748–772 m, coll. NORFANZ, R.V. *Tangaroa* (NIWA 23767). ♀ (19 mm, non-ovig.), off Queensland, 17°19'S, 147°11'E, 21 May 1986, 1406 m, stn 30-2, coll. CIDARIS (QM W13393).

TYPE LOCALITY: East of Port Jackson, NSW, 33°38.36'S, 152°15.09'E, at a depth of 945–972 m.

DESCRIPTION: *Body* 2.9 times as long as greatest width, dorsal surfaces polished in appearance, sparsely punctate, widest at pereonite 5, lateral margins weakly ovate. Rostral point folded ventrally and posteriorly. *Eyes* large, not medially united, separated by about 10% width of head; each eye made up of ~16 transverse rows of ommatidia, each row with ~8 ommatidia; eye colour dark brown. *Pereonite 1 and coxae* 2–3 each with posteroventral angle with small distinct produced point. *Coxae* 5–7 with entire oblique carina; posterior margins convex (weakly), posterolateral angle acute (less than 45°). *Pleon* with pleonite 1 largely concealed by pereonite 7; pleonite 4 with posterolateral margins extending to but not beyond posterior margin of pleonite 5; pleonite 5 with posterolateral angles free, not overlapped by lateral margins of pleonite 4. *Pleotelson* 0.8 times as long as anterior width, dorsal surface without longitudinal carina; lateral margins convex, serrate, posterior margin with truncate median excision, with 13 RS.

*Antennule* peduncle extending to posterior of pereonite 1. *Antenna* flagellum extending to middle of pereonite 3.

*Frontal lamina* flat, as wide as long, diamond shaped, anterior margin acute, forming median angle, posterior margin forming narrow stem.

*Pereopod 1* basis 2.6 times as long as greatest width; ischium 0.5 times as long as basis, inferior margin with 0 RS (3 small submarginal simple setae), superior distal margin with 1 RS; merus inferior margin with 3 RS, set as two groups (minute, set as 2 and 1), superior distal angle with 0 RS (and 1 simple and 1 plumose setae); carpus 0.9 as long as merus, inferior margin with 1 RS (minute); propodus 2.3 times as long as proximal width, inferior margin with 0 RS, propodal palm

simple, without blade or process (concave), dactylus smoothly curved, 1.4 as long as propodus. *Pereopod 2* ischium inferior margin with 1 RS, superior distal margin with 1 RS; merus inferior margin with 4 RS (set as 2+2), set as two groups, superior distal margin with 0 acute RS; carpus longer than that of pereopod 1, with inferodistal lobe (lobe weak), inferodistal angle with 2 RS. *Pereopod 3* similar to pereopod 2. *Pereopods 5–7* inferior margins of ischium–carpus with long acute RS. *Pereopod 6* similar to pereopod 7. *Pereopod 7* basis 3.0 as long as greatest width, inferior margins with 2 palmate setae; ischium 0.5 as long as basis, inferior margin with 4 RS (set loosely as 2, 1 and 1), superior distal angle with 7 RS, inferior distal angle with 5 RS; merus 1.2 as long as ischium, 2.2 times as long as wide, inferior margin with 4 RS (set singly), superior distal angle with 15 RS, inferior distal angle with 8 RS; carpus 1.1 as long as ischium, 2.5 times as long as wide, inferior margin with 3 RS (set as 1 and 2), superior distal angle with 14 RS, inferior distal angle with 8 RS; propodus 0.9 as long as ischium, 3.8 times as long as wide, inferior margin with 3 RS (set singly), superior distal angle with 3 slender setae, inferior distal angle with 4 RS.

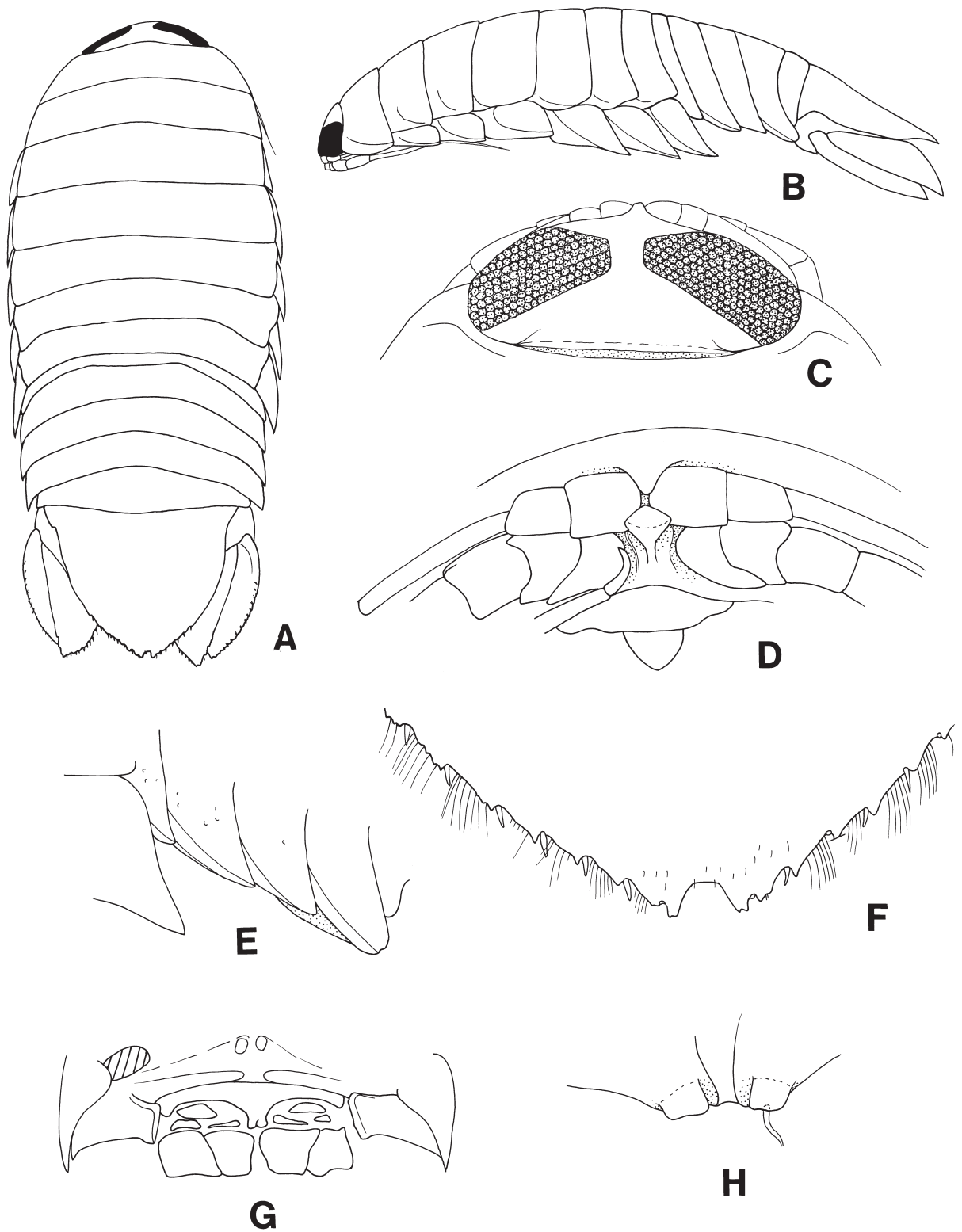
*Penes* opening flush with surface of sternite 7, or short rectangular lobes; penial openings separated by 4% of sternal width, penial process 0.9 times as long as basal width.

*Pleopod 1* exopod 1.6 times as long as wide, distally broadly rounded, lateral margin weakly convex, mesial margin strongly convex, with PMS on distal one-third; endopod 2 times as long as wide, distally rounded, lateral margin straight, with PMS on distal one-third, mesial margin with PMS on distal one-third; peduncle 1.9 times as wide as long, mesial margin with 11 coupling hooks. *Pleopod 2 appendix masculina* with straight margins, 0.8 times as long as endopod. Exopods of pleopods 1–3 each with distolateral margin not digitate; pleopods 2–4 peduncle distolateral margin without prominent acute RS.

*Uropod* peduncle ventrolateral margin with 2 RS, posterior lobe about one-half as long as endopod. *Endopod* apically not bifid, lateral margin straight, without prominent excision, proximal lateral margin with 0 RS, distal lateral margin with 2 RS, mesial margin weakly convex, with 10 RS. Exopod 2.8 times as long as greatest width, apically not bifid; lateral margin weakly convex, with 13 RS; mesial margin sinuate, proximally concave, with 5 RS.

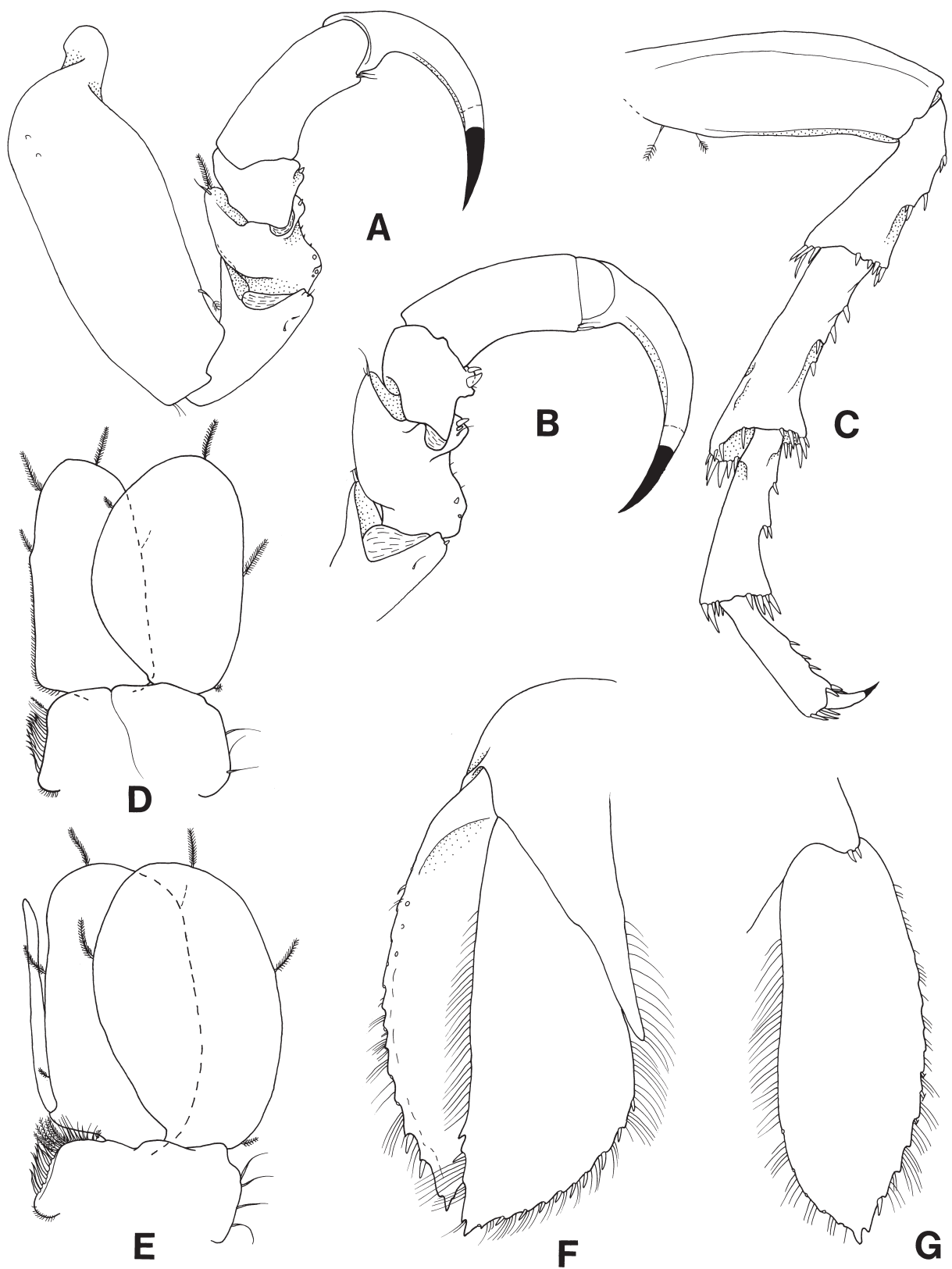
SIZE: Males 18–32 mm, female 19 mm; male holotype 45.3 mm.

VARIATION: The number of robust setae on the pleotelson and mesial margin of the uropodal endopod are relatively inconsistent, including between the two



**Figure 44.** *Aegiochus beri* (Bruce, 1983). A, male 32 mm (NMV J8885). A, dorsal view; B, lateral view; C, head; D, frons; E, pleonites, lateral view; F, pleotelson posterior margin; G, sternite 7 showing penial position; H, penes.





**Figure 45.** *Aegiochus beri* (Bruce, 1983). All figs NMNZ Cr.9260. A-C, pereopods 1, 2 and 7 respectively; D, pleopod 1; E, pleopod 2; F, uropod; G, uropod exopod, ventral view.

sides of the one specimen. The pleotelson has 11–16 RS (with the largest male having the least setae). Uropod endopod mesial margin 7–12 RS (mean 9), lateral margin always 2 RS; uropod exopod mesial margin 5 or 6 RS, lateral margin 12 or 15 RS.

The robust setae on the inferior margin of the merus are minute, and it was not possible to obtain accurate counts under the stereomicroscope.

The holotype, the largest known specimen, was described as having the penial openings flush with sternite 7. There are three males in the present material, the largest of these with the penes forming short rectangular lobes, as illustrated. The smaller males have the penial openings flush. Whether this is related to age or sexual maturity is unclear.

REMARKS: *Aegiochus beri* is one of two species in the region that have the apex of the pleotelson with a distinct rectangular notch. *Aegiochus beri* is further characterised by the following combination of characters: large but separate eyes, elongate coxae on pereonites 6 and 7, the diamond-shaped frontal lamina with a distinct posterior stem, the relatively long dactylus on pereopods 1–3 (pereopod 1 dactylus is 1.4 times as long as the propodus) and the straight appendix masculina which has a narrowly rounded blunt apex.

The most similar species is *Aegiochus riwha* sp. nov. (p. 141), which is easily distinguished by having a much shorter dactylus on pereopods 1–3 (pereopod 1 dactylus is 1.0 times as long as the propodus v. 1.4 times as long for *A. beri*), coxae without acute points, the shorter coxae on pereonites 5–7 and males with a weakly spatulate appendix masculina.

PREY: Not known.

DISTRIBUTION: Previously recorded off southeastern Australia. Present material from the Tasman Sea, east of Lord Howe Island and from the Coral Sea off Queensland. At depths between 748 and 1406 metres.

*Aegiochus bertrandi* sp. nov. (Figs 46–48)

MATERIAL EXAMINED: All material from southwest of New Caledonia, vicinity of Norfolk Ridge.

*Holotype*: ♂ (16.0 mm), Norfolk Ridge, 19°04.0'S, 163°27.50'E, 18 September 1985, 260 m, MUSORSTOM IV, stn 0184 (MNHN Is. 5903).

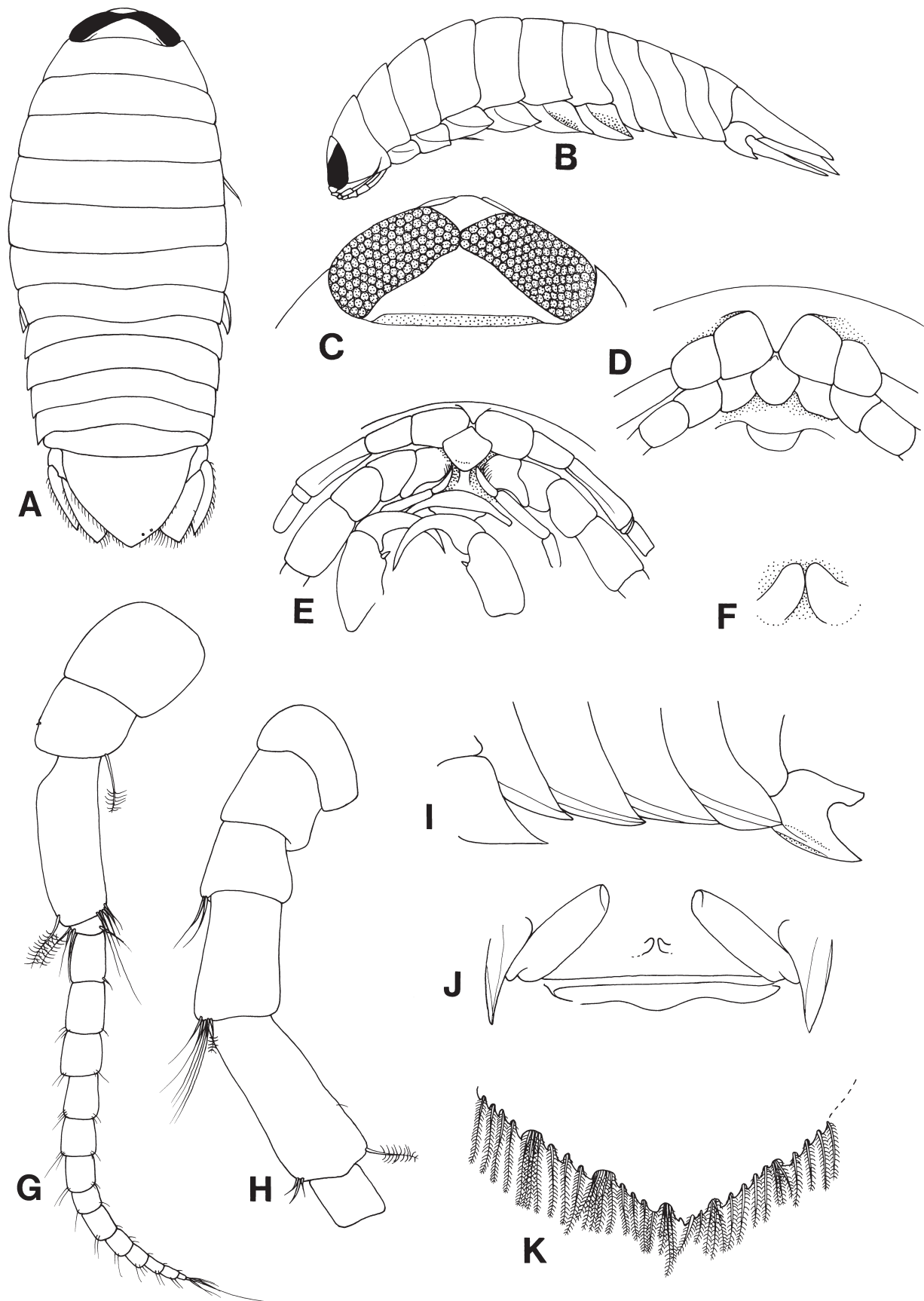
*Paratypes*: 2 ♂ (12.3, 14.8 [dissected] mm), Norfolk Ridge, 24°42.26'S, 168°09.52'E, 27 October 1986, 230 m, CHALCAL II, DW71, coll. B. Richer de Forges (MNHN Is.5907). ♂ (15.1 mm), 20°41.80'S, 167°00.20'E, 14 February 1989, 282 m, MUSORSTOM VI, DW399, coll. B. Richer de Forges (MNHN Is.5906). ♂ (13.4 mm), Banc Kaimon–Maru, Norfolk Ridge, 24°43'S, 168°09'E, 22 June 2001, 227–232 m, NORFOLK 1, DW1676, coll.

Lazouet, Bouchet, Richer de Forges, N.O. *Alis* (MNHN Is.5902). ♀ (non-ovig. 12.8 mm), Banc Kaimon–Maru, Norfolk Ridge, 24°44'S, 168°10'E, 22 June 2001, 228–240 m, NORFOLK 1, CP1681, coll. Lazouet, Boisselier, Richer de Forges, N.O. *Alis* (MNHN Is.5900). ♂ (18.0 mm), Norfolk Ridge, 22°56.0'S, 167°20.0'E, 30 August 1985, 300 m, MUSORSTOM IV, 0227 (MNHN Is. 5905). ♀ (ovig. 16.0 mm), Norfolk Ridge, 22°48.03'S, 167°29.03'E, 12 May 1993, 299–302 m, BATHUS 2, DW727, coll. B. Richer de Forges, N.O. *Alis* (MNHN Is.5899). 2 ♂ (14.4, 15.8 [telson damaged] mm), Norfolk Ridge, 23°41.2'S, 168°00.5'E, 7 September 1989, 280 m, SMIB 5, DW76, coll. B. Richer de Forges (NIWA 24007). ♀ (non-ovig. 15.2 mm), Norfolk Ridge, 23°38'S, 167°42'E, 22 May 1989, 448 m, SMIB 3, DW13, coll. B. Richer de Forges (MNHN Is.5904). ♀ (ovig. 15.4 mm), Norfolk Ridge, 23°41.5'S, 167°59.4'E, 23 May 1989, 338 m, SMIB 3, DW18, coll. B. Richer de Forges, N. *Vauban* (MNHN Is.5901).

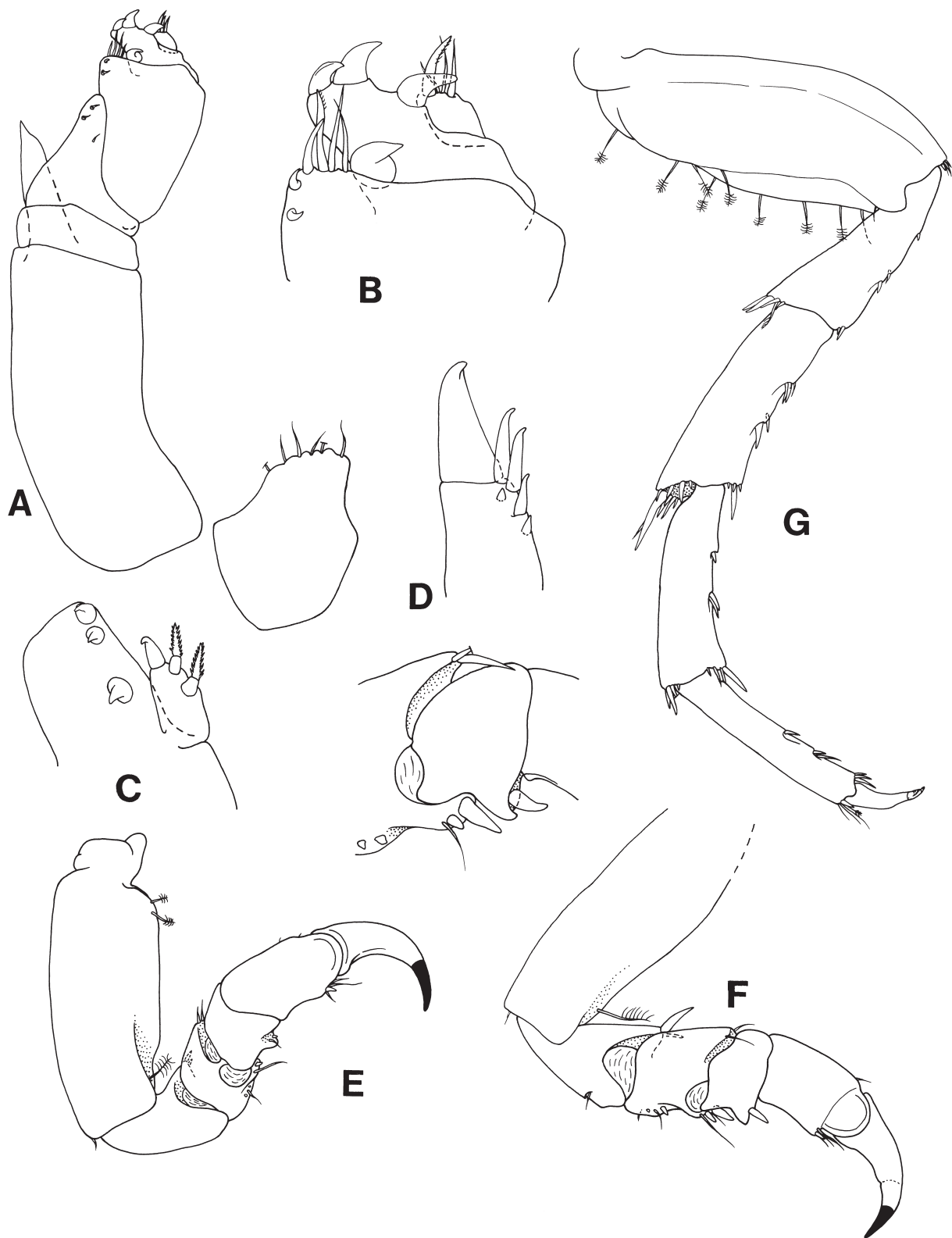
*Other material (equivocal)*: ♀ (ovig. 15.6 mm), Norfolk Ridge, 22°20.0'S, 168°42.3'E, 13 September 1989, 255 m, SMIB 5, DW93, coll. B. Richer de Forges (MNHN Is.5908). 2, Lagon du nord, DW1074, 19°50.8'S, 164°00.6'E, 28 m (MNHN Is.5909).

DESCRIPTION: *Body* dorsal surfaces smooth or polished in appearance, widest at pereonite 5, lateral margins weakly ovate. Rostral point ventrally directed. *Eyes* large, medially united, anterior clear field 21% length of head, posterior clear field 79% length of head; each eye made up of ~12 transverse rows of ommatidia, each row with ~7 ommatidia; eye colour pale brown. *Pereonite 1 and coxae 2–3* each with posteroventral angle right-angled. *Coxae 5–7* with entire oblique carina; posterior margins concave, posterolateral angle acute (less than 45°). *Pleon* with pleonite 1 visible in dorsal view; pleonite 4 with posterolateral margins extending to but not beyond posterior margin of pleonite 5; pleonite 5 with posterolateral angles free, not overlapped by lateral margins of pleonite 4. *Pleotelson* 0.9 times as long as anterior width, dorsal surface without longitudinal carina; lateral margins weakly convex, serrate, posterior margin converging to caudomedial point, with 0 RS.

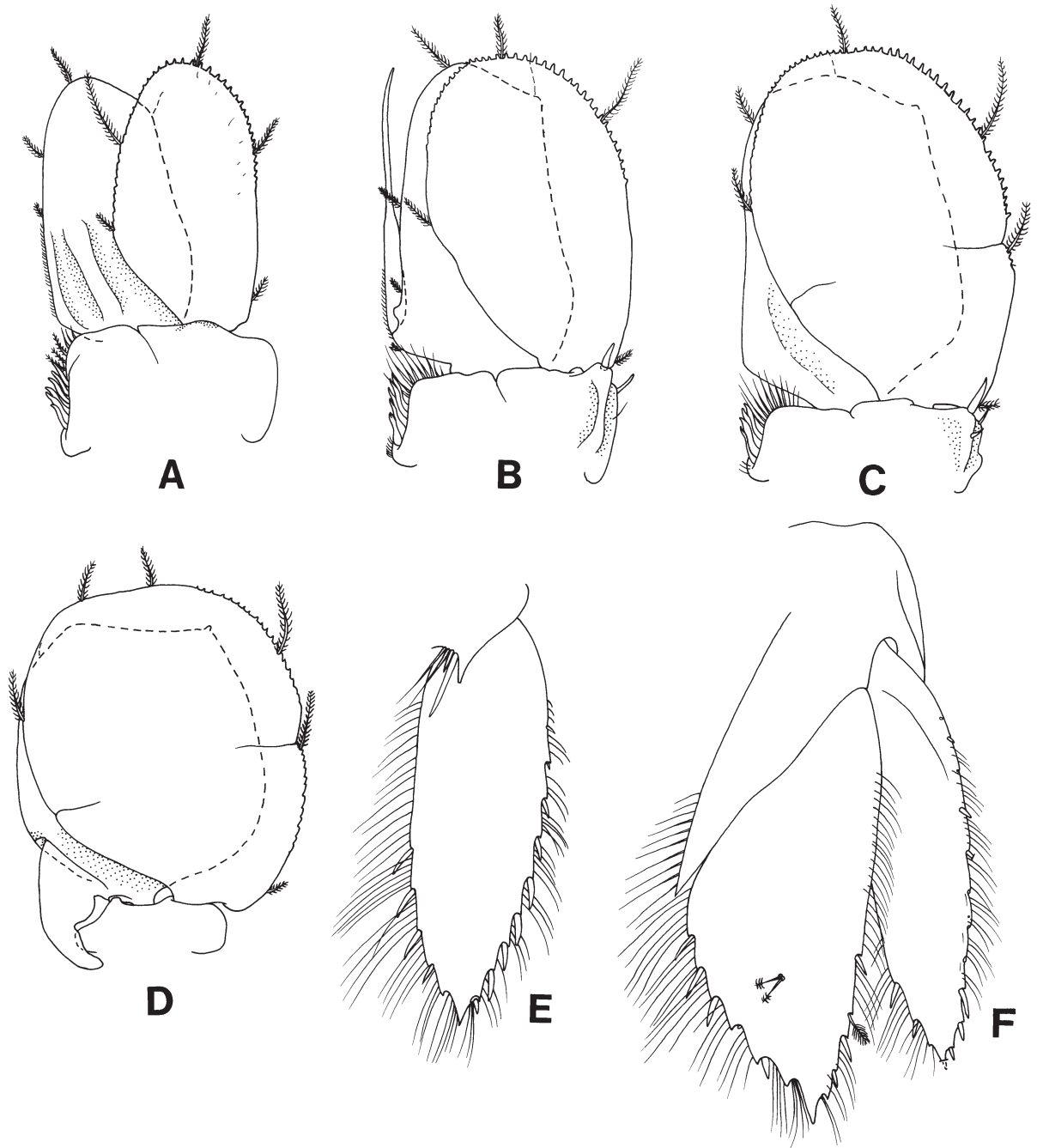
*Antennule* peduncle articles 3 and 4 1.03 times as long as combined lengths of articles 1 and 2, article 3 2.7 times as long as wide; flagellum with 13 articles, extending to posterior of pereonite 1. *Antenna* peduncle article 4 1.5 times as long as wide, 0.7 times as long as combined lengths of articles 1–3, inferior margin 0 plumose setae, and 0 short simple setae (anterodistal angle 5 simple + 1 plumose); article 5 1.5 times as long as article 4, 2.3 times as long as wide, inferior margin with 1 palmate seta (at distal angle), anterodistal angle with cluster of 3 short simple setae; flagellum with 19 articles, extending to pereonite 4.



**Figure 46.** *Aegiochus bertrandi* sp. nov. A–H, holotype, remainder male paratype (14.8 mm, MNHN Is. 5907). A, dorsal view; B, lateral view; C, head; D, frons, anterior view; E, frons, ventral view; F, penial processes; G, antennule; H, antenna peduncle; I, pleonites, lateral view; J, sternite 7; K, pleotelson posterior margin.



**Figure 47.** *Aegiochus bertrandi* sp. nov. Male paratype (14.8 mm, MNHN Is. 5907). A, maxilliped; B, maxilliped articles 3-5; C, maxilla apex; D, maxillule apex; E, pereopod 1; F, pereopod 2; G, pereopod 7.



**Figure 48.** *Aegiochus bertrandi* sp. nov. Male paratype (14.8 mm, MNHN Is. 5907). A–D, pleopods 1–3, 5 respectively; E, uropod exopod, ventral view; F, uropod, dorsal view.

*Frontal lamina* flat, as wide as long, diamond shaped or posteriorly rounded, anterior margin acute, without small median point, posterior margin not abutting clypeus or forming narrow stem.

*Mandible* molar process present, small distinct flat lobe. *Maxillule* with 4 terminal RS (1 large, 3 slender; small triangular spines proximal to RS). *Maxilla* mesial

lobe with 3 RS (1 hooked; 2 straight, serrate); lateral lobe with 3 RS. *Maxilliped* endite with 0 apical setae; palp article 2 with 2 RS (small); article 3 with 2 recurved RS (and 4 straight RS); article 4 with 4 hooked RS; article 5 with 3 RS (all straight; 1 serrate, 2 simple).

*Pereopod 1* basis 2.5 times as long as greatest width; ischium 0.4 times as long as basis, inferior margin with

0 RS, superior distal margin with 2 RS; merus inferior margin with 2 RS, set as two groups, superior distal angle with 0 RS (2 simple setae); carpus 1.1 as long as merus, inferior margin with 1 RS; propodus 1.8 times as long as proximal width, inferior margin with 1 RS (distal), propodal palm simple, without blade or process, dactylus smoothly curved, 1.1 as long as propodus. *Pereopod 2* ischium inferior margin with 0 RS, superior distal margin with 2 RS; merus inferior margin with 4 RS, set as two groups, superior distal margin with 0 acute RS (3 simple setae); inferodistal angle with 1 RS. *Pereopod 3* similar to pereopod 2. Pereopods 5–7 inferior margins of ischium–carpus with short RS. *Pereopod 6* similar to pereopod 7. *Pereopod 7* basis 2.9 times as long as greatest width, inferior margins with 9 palmate setae; ischium 0.5 as long as basis, inferior margin with 3 RS (set as 1 and 2), superior distal angle with 4 RS, inferior distal angle with 2 RS; merus 1.2 as long as ischium, 2.7 times as long as wide, inferior margin with 4 RS (set as 2 and 2), superior distal angle with 9 RS, inferior distal angle with 5 RS; carpus 1.0 as long as ischium, 3.1 times as long as wide, inferior margin with 3 RS (set as 1 and 2), superior distal angle with 12 RS, inferior distal angle with 8 RS; propodus 1.0 as long as ischium, 5.7 times as long as wide, inferior margin with 6 RS (set as 1, 1, 2 and 2), superior distal angle with 2 slender setae (and 1 RS and 1 palmate seta), inferior distal angle with 3 RS.

*Penes* low tubercles; penial openings separated by 2% of sternal width.

*Pleopod 1* exopod 1.9 times as long as wide, distally broadly rounded, lateral margin straight, mesial margin weakly convex (proximally angled), with PMS on distal two-thirds; endopod 1.8 times as long as wide, distally rounded, lateral margin straight, with PMS on distal margin only, mesial margin with PMS on distal half; peduncle 1.8 times as wide as long, mesial margin with 6 coupling hooks. *Pleopod 2 appendix masculina* basally swollen, 0.9 times as long as endopod, distally acute. Exopods of pleopods 1–3 each with distolateral margin digitate (prominent, acute); endopods of pleopods 3–5 each with distolateral point; pleopods 2–4 peduncle distolateral margin with prominent acute RS.

*Uropod* peduncle ventrolateral margin with 2 RS, posterior lobe about two-thirds as long as endopod. *Endopod* apically not bifid, lateral margin straight, without prominent excision, proximal lateral margin with 1 RS, distal lateral margin with 2 RS, mesial margin weakly convex, with 5 RS. *Exopod* not extending to end of endopod, 3.0 as long as greatest width, apically not bifid; lateral margin weakly convex, with 10 RS; mesial margin straight, distally convex, with 4 RS.

**FEMALE:** As for the male, but lacking sexual characters.

**SIZE:** Males 12.3–18.0 mm (mean = 15.0,  $n = 8$ ), ovigerous females 15.4–16.0 mm, non-ovigerous 12.8 and 15.2 mm.

**VARIATION:** Pleotelson ( $n = 12$ ) always without RS. Uropod ( $n = 24$ , all margins) exopod mesial margin usually with 3 (8%) or 4 (92%) RS, lateral margin with 9 (each 42%) or 10 (each 50%) RS (11 occurring on one specimen); uropod endopod mesial margin with 4 (17%) or 5 (83%) RS (one specimen with 3), lateral margin with 1+1 (100%) RS.

**REMARKS:** *Aegiochus bertrandi* sp. nov. is best identified by the narrowly united eyes, weak rostral point in dorsal view, anteriorly acute frontal lamina, small robust setae on pereopod 1, the inferior margin of the carpus of pereopods 2 and 3 distinctly lobed with one prominent robust seta, pleopodal exopods with digitate margins, relatively wide and serrated pleotelson that lacks robust setae, pleotelson posterior margins converging to a distinct sub-acute apical point, and the characteristic shape and setation of the uropodal rami.

This species is very similar to the sympatric *Aegiochus coroo* Bruce, 1983, but differs consistently in a number of characters, including larger robust setae on pereopods 1–3, a distinct lobe on the inferior margin of the carpus of pereopods 2 and 3, narrower eye join (as few as two ommatidia), narrower pleotelson posterior margin, narrower (or more acute) uropod endopod which extends beyond the pleotelson, the uropodal endopod mesial margin has five robust setae (three or four in *A. coroo*) and the most distal notch on the uropodal exopod lateral margin always has a robust seta (slender setae only in *A. coroo*); *A. bertrandi* is also larger (male average length 15.0 mm) than *A. coroo* (male average length 11.4 mm). The counts for uropodal robust setae do not differ much between the two species but the differences are consistent.

**DISTRIBUTION:** Not recorded from New Zealand near-shore waters to date, but is present within the northern New Zealand chart area (CANZ 1997). The most southerly record is at 24°44'S on the Norfolk Ridge, most northerly at 19°S in the vicinity of New Caledonia; it is quite probable that the species is more widespread in the region. At depths of 230 to 448 metres.

**ETYMOLOGY:** Named for Dr Bertrand Richer de Forges, recognising his superb efforts in developing collections of marine invertebrates from the southwestern Pacific and his contribution to taxonomy of the decapod crustaceans.

*Aegiochus coroo* (Bruce, 1983), comb. nov.  
(Figs 49–51)

*Aega* (*Rhamphion*) *coroo* Bruce, 1983: 770, figs 9, 10.  
*Aega coroo*. Springthorpe & Lowry, 1994: 43. – Bruce, Lew  
Ton & Poore, 2003: 161.

MATERIAL EXAMINED: **New Zealand.** ♂ (12.0 mm), ♀ (ovig. 12.5 mm), northwest of Taranaki, 38°37.99'S, 172°40.99'E, 28 March 1968, E908, 256 m (NIWA 24006). **New Caledonia and Norfolk Ridge.** 4 ♂ (8.5, 10.3, 11.7 [drawn dissected], 13.0 mm), 4 ♀ (ovig. 12.5, non-ovig. 14.2, 14.1, 10.4 mm), Banc Eponge, Norfolk Ridge, 24°56'S, 168°22'E, 23 June 2001, 533–545 m, NORFOLK 1, DW1688, coll. Lazouet, Boisselier, Richer de Forges, N.O. *Alis* (MNHN Is.5925). ♀ (non-ovig. 14.5 mm), Coral Sea, 20°06.084–0.6.185'S, 160°23.544–22.835'E, 20 October 2005, 490–550 m, DW2619, (MNHN Is.5919). ♂ (9.0 mm), Norfolk Ridge, 24°06.960–0.6.112'S, 159°41.270–41.500'E, 8 October 2005, 350–400 m, DW2520, coll. (MNHN Is.5918). ♂ (12.8 mm), Norfolk Ridge, 22°53'S, 167°12'E, 28 June 2001, 403–429 m, NORFOLK 1, DW1734, coll. Lazouet, Bouchet, Richer de Forges, N.O. *Alis* (MNHN Is.5927). ♂ (11.5 mm), ♀ (ovig. 13.5 mm), Banc Eponge, Norfolk Ridge, 24°55'S, 168°22'E, 23 June 2001, 508–541 m, NORFOLK 1, DW1684, coll. Lazouet, Bouchet, Richer de Forges, N.O. *Alis* (MNHN Is.5926 [small tube with female]). ♂ (11.0 mm), Banc Branchiopode, Norfolk Ridge, 234°28'S, 167°51'E, 21 October 2003, 371 m, NORFOLK 2, stn 2024 (MNHN Is. 5915). ♂ (11.5 mm), 24°56'S, 168°21'E, 21 May 1987, 505 m, SMIB 3, DW6, coll. Richer de Forges, N.O. *Vauban* (MNHN Is. 5944). **Solomon Islands.** ♂ (~13 mm), 09°46.4'S, 160°52.3'E, 7 October 2001, 254–281 m, SALOMON 1, DW1856, coll. N.O. *Alis* (MNHN Is.5920). **Indonesia.** ♂ (12.5 mm), (non-ovig. 12.2 mm), Tanimbar Islands, 07°59'S, 133°02'E, 20 October 1991, 184–186 m, KARUBAR, DW50, coll. N.O. *Baruna Jaya* (MNHN Is.5922). ♂ (11.5 mm), Kai Islands, 057°18'S, 132°38'E, 24 October 1991, 246 m, KARUBAR, DW14, coll. N.O. *Baruna Jaya* (MNHN Is. 5921).

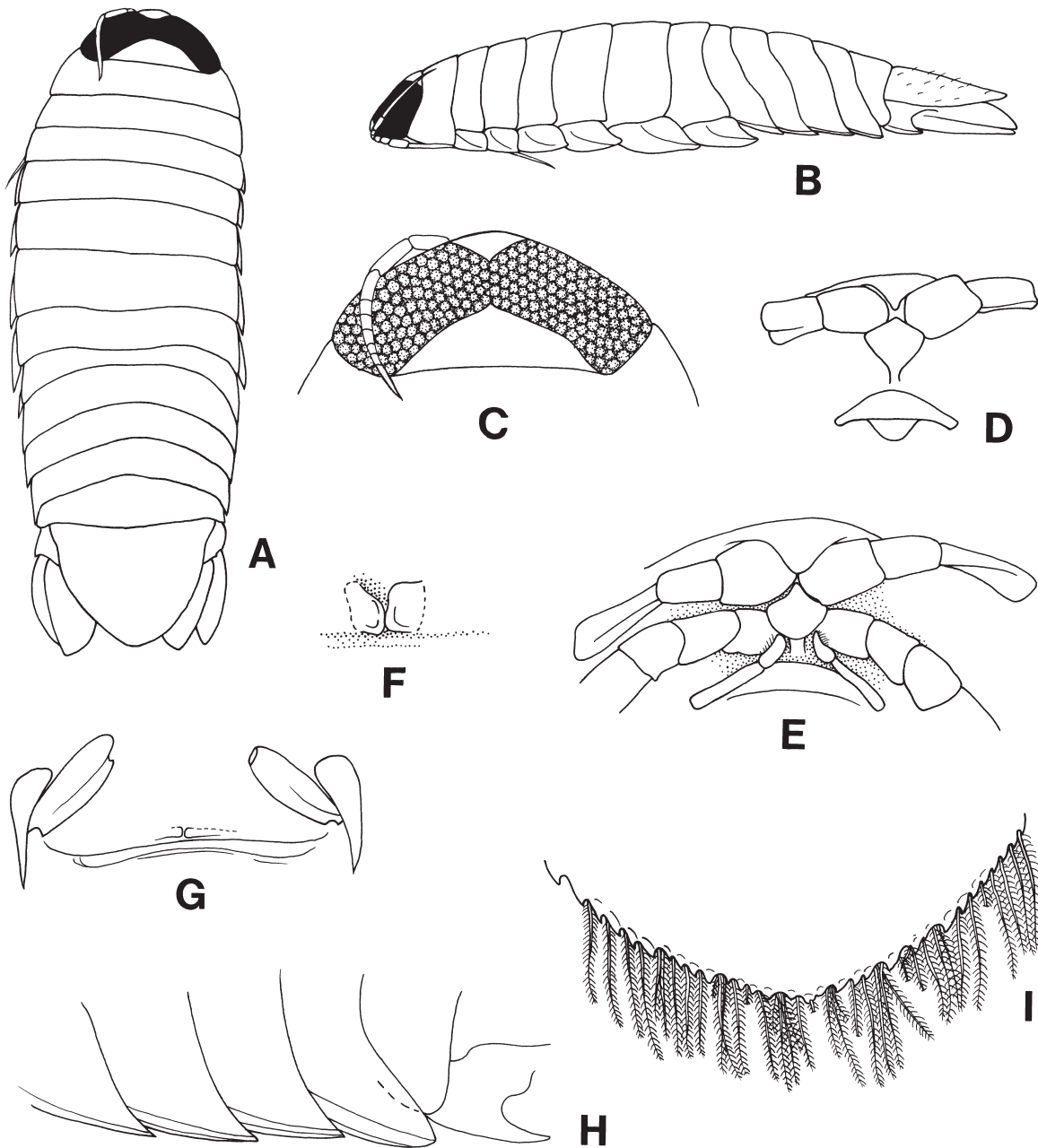
*Additional material.* Southwest of New Caledonia, vicinity of **Norfolk Ridge.** 5, 24°55'S, 168°22'E, 505–515 m, BIOCAL, DW66 (MNHN Is.5937). 1, 22°15'S, 167°15'E, 440 m, BIOCAL, DW77 (MNHN Is.5936). 3, 20°35'S, 166°54'E, 460 m, BIOCAL, DW83 (MNHN Is.5938). 1, 22°49.32'S, 166°44.68'E, 300–370 m, BATHUS 2, DW731 (MNHN Is.5952). 1, 24°54'S, 168°21'E, 540–570 m, BERYX 11, CP08 (MNHN Is.5951). 1, 24°52'S, 168°22'E, 635–680 m, BERYX 11, DW09 (MNHN Is.5949). 4, 24°53'S, 168°21'E, 565–600 m, BERYX 11, DW10 (MNHN Is.5950). 1, 24°44.6'S, 168°09.3'E, 230 m, CHALCAL II, CP20 (MNHN Is.5917). 1, 24°54.00'S, 168°21.01'E, 500 m, CHALCAL II, CP21 (MNHN Is.5916). 20, 24°54.5'S, 168°22.3'E, 527 m. CHALCAL II, DW72 (NIWA 24005). 1, 19°04.0'S, 163°27.5'E,

260 m, MUSORSTOM IV, 0184 (MNHN Is.5932). 1, 22°51.3'S, 167°12.0'E, 405–430 m, MUSORSTOM IV, 0213 (MNHN Is.5933). 1, 22°52.5'S, 167°11.8'E, 390–420 m, MUSORSTOM IV, 0230 (MNHN Is.5934). 5, 24°56'S, 168°22'E, 520 m, SMIB 3, DW1 (MNHN Is.5943). 1, 24°53'S, 168°22'E, 530–537 m, SMIB 3, DW2 (MNHN Is.5945). 2, 24°55'S, 168°22'E, 513 m, SMIB 3, DW3 (MNHN Is.5946). 1, 24°55'S, 168°22'E, 502–512 m, SMIB 3, DW5 (MNHN Is.5941). 1, 24°55.2'S, 168°21.7'E, 511–522 m, SMIB 8, DW146 (MNHN Is.5947). 2, 24°55.1'S, 168°21.6'E, 510 m, SMIB 8, DW148 (MNHN Is.5948). 11 further lots from the region, not listed individually, MNHN, not registered). **Eastern Australia.** 1, northern Queensland, 17°53'S, 146°53'E, 196 m (QM W18823). 1, southern Queensland, 28°17.47'S, 158°37.89'E, 419 m (AM P74739). 5, East of Nobby's Head, NSW, 32°53'S, 152°35'E, 175 m, (AM P37503). 1, east of Long Reef, NSW, K85-12-08, 19 December 1985, 174 m, (AM P43977). 1, east of Long Reef Point, NSW, 33°46'S, 151°43'E, 175 m, (AM P37510). 7, East of Long Reef Point, NSW, 33°43–44'S, 151°46'E, 174 m, (AM P37506). 1, southeast of Moruya Point, NSW, 35°58'–36°03'S, 150°30–27'E, 384 m, (AM P37522). 3, off Merimbula, NSW, 36°52.5'S, 150°18.1'E, 152 m (AM P45309). 1, east of Bermagui coast, NSW, 37°26.5'S, 150°17.0'E, coll. CSIRO (AM P37513). 4, '7-5150 (AM P37519). 1, off Bermagui, SS 05/94/156, 5 September 1994, 146 m (AM P43969). 4, east of Bermagui, NSW, 37°25.2'S, 150°18.5'E, 220 m (AM P45310). 1, transect east of Bermagui, NSW, 36°22.6'S, 150°14.9'E, 8 September 1994, 277 m (AM P44150).

TYPE LOCALITY: Off Sydney, New South Wales, 33°59'S, 151°35'E.

DESCRIPTION: *Body* 2.8 times as long as greatest width, dorsal surfaces polished in appearance, widest at pereonite 5, lateral margins subparallel. Rostral point ventrally directed. *Eyes* large, medially united, anterior clear field 23% length of head, posterior clear field 45% length of head; each eye made up of ~12 transverse rows of ommatidia, each row with ~8 ommatidia; eye colour dark brown, or pale brown. *Pereonite 1 and coxae* 2–3 each with posteroventral angle right-angled. *Coxae* 5–7 with entire oblique carina; posterior margins concave, posterolateral angle acute (less than 45°). *Pleon* with pleonite 1 visible in dorsal view; pleonite 4 with posterolateral margins extending to but not beyond posterior margin of pleonite 5; pleonite 5 with posterolateral angles free, not overlapped by lateral margins of pleonite 4. *Pleotelson* 0.8 times as long as anterior width, dorsal surface without longitudinal carina; lateral margins convex, serrate, posterior margin converging to caudomedial point, with 0 RS.

*Antennule* peduncle extending to posterior of pereonite 1. *Antenna* flagellum extending to pereonite 4.



**Figure 49.** *Aegiochus coroo* (Bruce, 1983). Male (11.7 mm, MNHN Is. 5925). A, dorsal view; B, lateral view; C, head; D, frontal lamina, anterior view; E, frons, ventral view; F, penial processes; G, sternite 7; H, pleonites, lateral view; I, pleotelson posterior margin.

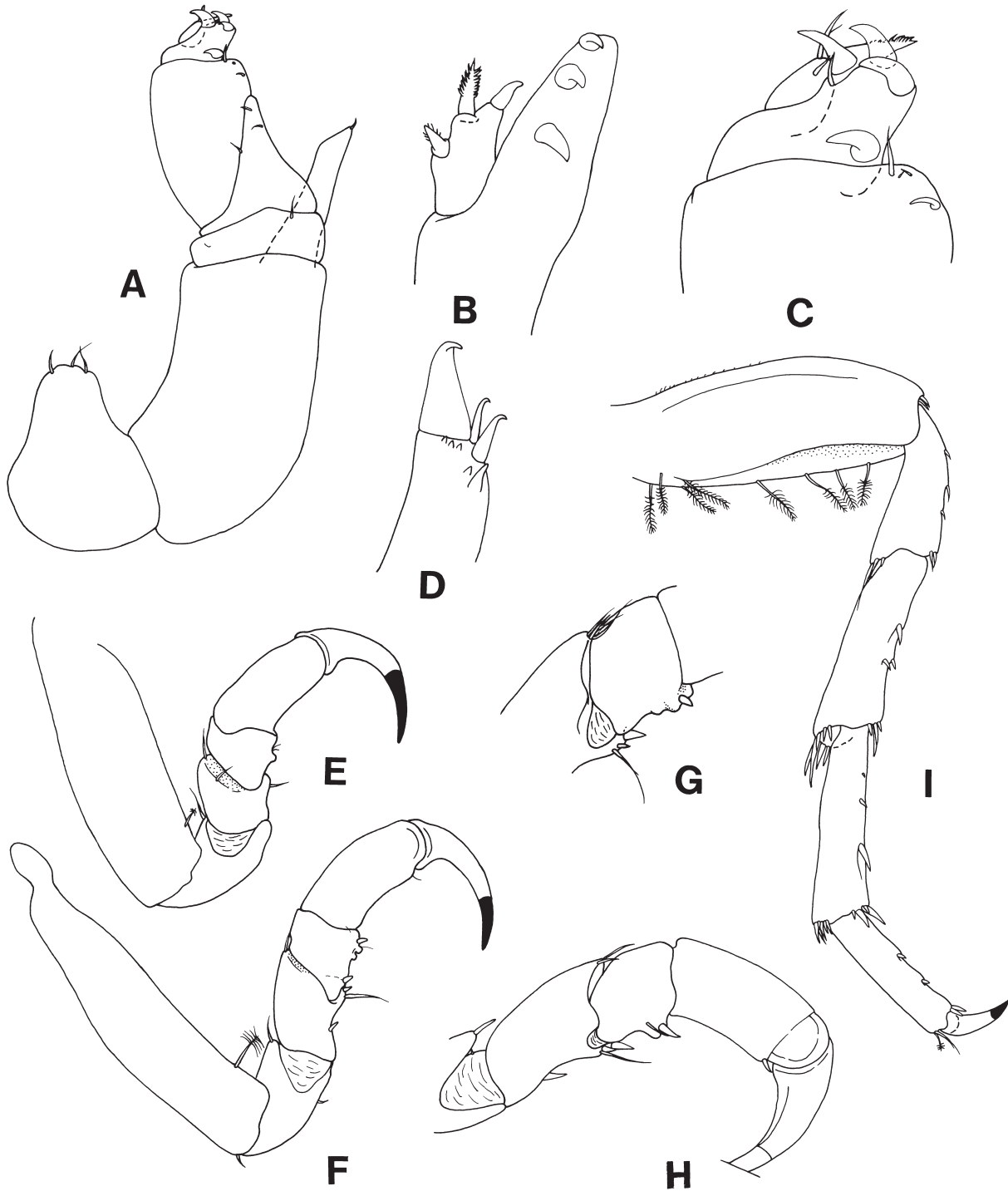
Frontal lamina flat, as wide as long, diamond shaped or posteriorly rounded (depending on perspective), anterior margin acute, without small median point, posterior margin forming narrow stem.

Mandible molar process present, minute. Maxillule with 3 terminal RS (1 large, 2 slender; small triangular spines proximal to RS). Maxilla mesial lobe with 3 RS (2 serrate, 1 simple); lateral lobe with 3 RS. Maxilliped endite with 1 apical seta; palp article 2 with 2 RS (straight); article 3 with 1 recurved RS (weakly recurved and 2

straight RS); article 4 with 4 hooked RS; article 5 with 2 RS (1 large, serrate; 1 slender, simple).

Pereopod 1 basis 3.2 times as long as greatest width; ischium 0.4 times as long as basis, inferior margin with 0 RS, superior distal margin with 0 RS (1 slender seta); merus inferior margin with 0 RS, superior distal angle with 0 RS (1 slender seta); carpus 1.0 as long as merus, inferior margin with 0 RS (2 small nodules); propodus 1.8 times as long as proximal width, inferior margin with 0 RS, propodal palm simple, without blade or

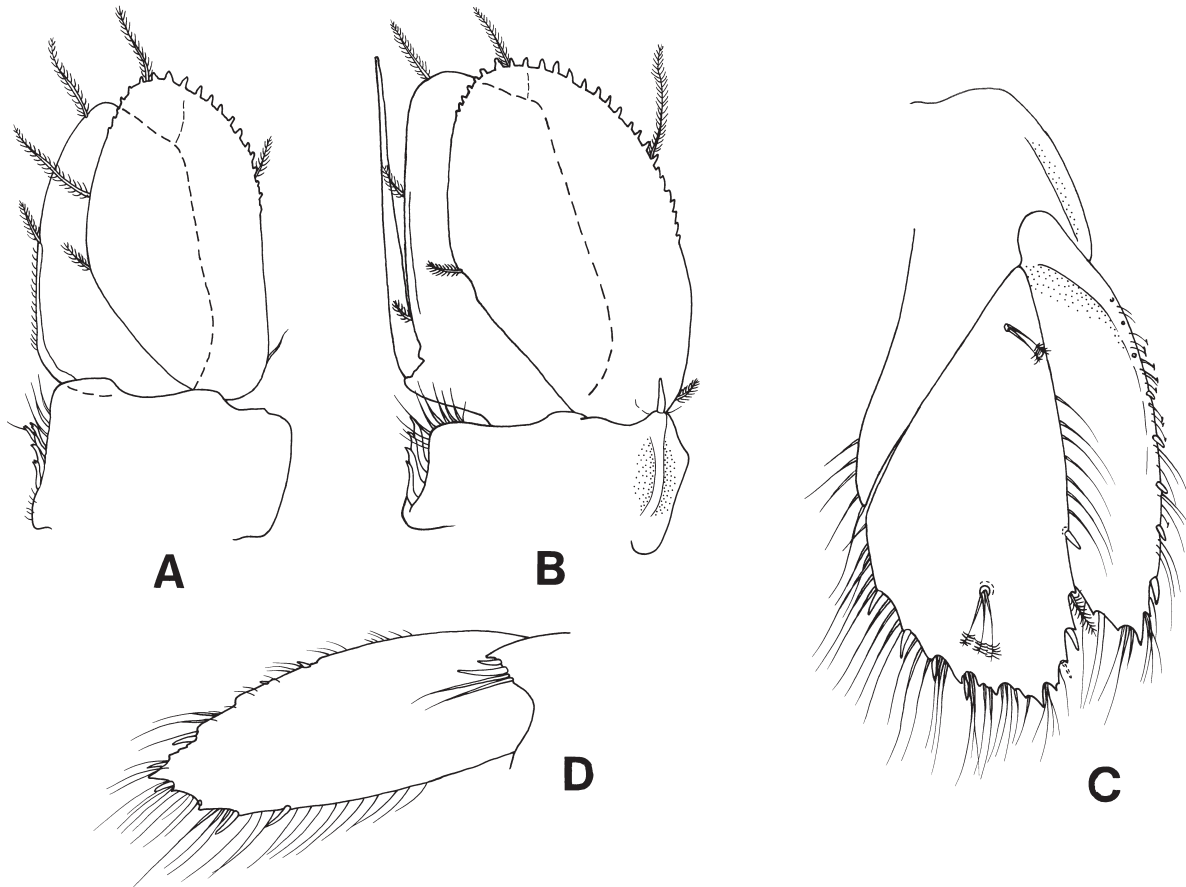




**Figure 50.** *Aegiochus coroo* (Bruce, 1983). Male (11.7 mm, MNHN Is. 5925). A, maxilliped; B, maxilla apex; C, maxilliped articles 3–5; D, maxillule apex; E, pereopod 1; F, pereopod 2; G, pereopod 2 merus; H, pereopod 3, distal articles; I, pereopod 7.

process, dactylus smoothly curved, 1.3 as long as propodus. *Pereopod 2* ischium inferior margin with 0 RS, superior distal margin with 0 RS (1 stiff seta); merus inferior margin with 3 RS, set as two groups (1+2),

superior distal margin with 0 acute RS (2 stiff setae); carpus similar in size to that of pereopod 1, inferodistal angle with 1 RS (and 2 distinct nodules). *Pereopod 3* similar to pereopod 2. Pereopods 5–7 inferior margins



**Figure 51.** *Aegiochus coroo* (Bruce, 1983). Male (11.7 mm, MNHN Is.5925). A, pleopods 1; B pleopod 2; C, uropod, dorsal view; D, uropod exopod, ventral view.

of ischium–carpus with short RS. *Pereopod 6* similar to *pereopod 7*. *Pereopod 7* basis 2.5 times as long as greatest width, inferior margins with 8 palmate setae; ischium 0.4 as long as basis, inferior margin with 3 RS (set singly), superior distal angle with 3 RS, inferior distal angle with 2 RS; merus 1.6 as long as ischium, 2.9 times as long as wide, inferior margin with 3 RS (set as 1 and 2), superior distal angle with 8 RS, inferior distal angle with 5 RS; carpus 1.6 as long as ischium, 3.2 times as long as wide, inferior margin with 2 RS (set singly), superior distal angle with 8 RS, inferior distal angle with 5 RS; propodus 1.3 as long as ischium, 4.2 times as long as wide, inferior margin with 2 RS (set singly), superior distal angle with 1 slender seta, inferior distal angle with 3 RS.

*Penes* low tubercles; penial openings separated by 2% of sternal width.

*Pleopod 1* exopod 1.9 times as long as wide, distally broadly rounded, lateral margin straight, mesial margin strongly convex, with PMS from distal half; endopod 1.6 times as long as wide, distally rounded,

lateral margin straight, with PMS on distal margin only, mesial margin with PMS on distal half; peduncle 1.7 times as wide as long, mesial margin with 5 coupling hooks. *Pleopod 2 appendix masculina* with straight margins, 0.8 times as long as endopod, distally narrowly rounded. Exopods of pleopods 1–3 each with distolateral margin digitate; endopods of pleopods 3–5 each with distolateral point; pleopods 2–5 peduncle distolateral margin with prominent acute RS.

*Uropod* peduncle ventrolateral margin with 2 RS, posterior lobe about two-thirds as long as endopod. Uropod rami extending beyond pleotelson (just a little). *Endopod* apically sub-bifid, mesial process prominent, lateral margin straight, without prominent excision, proximal lateral margin with 1 RS, distal lateral margin with 2 RS, mesial margin weakly convex, with 4 RS. *Exopod* not extending to end of endopod, 2.4 times as long as greatest width, apically sub-bifid, lateral process prominent; lateral margin weakly convex, with 9 RS; mesial margin straight, distally convex, with 3 RS.

SIZE: Males 8.5–13.0 mm (mean = 11.4,  $n = 13$ ), ovigerous females 12.5–13.50 mm, non-ovigerous 12.2–14.5 mm (mean = 13.8,  $n = 5$ ).

VARIATION: Pleotelson ( $n = 16$ ) always without RS. Uropod ( $n = 32$ , all margins) exopod mesial margin usually with 2 (16%) or 3 (81%) RS (4 once), lateral margin with 8 or 9 (each 47%) RS (7 and 10 each occurring once); uropod endopod mesial margin with 4 (94%) RS (one specimen with 3), lateral margin with 1+1 (31%) or 1+2 (69%) RS.

REMARKS: *Aegiochus coroo* is a wide-ranging species, apparently common, at first glance similar to several other small species of the genus. The digitate pleopod exopods immediately separate it from most other *Aegiochus* species. Within that group of small-sized species that have digitate pleopods *A. coroo* is readily identified by the medially united eyes, lack of a rostral point in dorsal view, anteriorly acute frontal lamina, pereopod 1 devoid of robust setae, small robust setae on pereopods 2 and 3, relatively wide serrated pleotelson posterior margin which lacks robust setae, and the characteristic shape and setation of the uropodal rami. The pleotelson is evenly serrated and typically there are, on either side, two sub-lateral notches that are a little wider than the remainder, each bearing three setae within the notch. Care is needed in assessing the shape of the frontal lamina, which can appear posteriorly rounded or diamond-shaped depending on perspective.

There are a few points of difference to the description given by Bruce (1983). The present description corrects these and provides more detail for the pereopods, some mouthparts and the uropods. Bruce (1983) stated that the vasa deferentia opened flush with the ventral surface of sternite 7; on the larger males examined here it is evident that a pair of low papillae is present. The figure of maxilliped palp (Bruce 1983, fig. 9k) omits article 5, and that is here fully illustrated. There are some minor differences in details of setation, attributable to perspective and differences in microscope resolution. In all significant characters, the present material agrees well with the description and figures of Bruce (1983) and the species presents a consistent appearance throughout its geographical range.

The sympatric species, *Aegiochus bertrandi* sp. nov., is very similar, but has noticeably narrower join between the eyes, more slender uropodal endopod, more strongly angular pleotelson, larger robust setae on the inferior margins of pereopod 1–3, the inferior margin of the carpus of pereopods 2 and 3 is lobate, and the mesial margin of the uropodal endopod consistently has five robust setae (as opposed to consistently four

in *A. coroo*). The two species are otherwise nearly identical, and care is needed in identification. Other similar species in the New Zealand region are *A. kakai* sp. nov. and *A. kanohi* sp. nov., both of similar size to *A. coroo*, both with large, medially united eyes. Both these species have a blade-like frontal lamina, robust setae on the pleotelson and pleopods 1–3 exopods are not digitate. Those other New Zealand species which do have digitate pleopods all have separate eyes.

PREY: Not known.

DISTRIBUTION: Northern New Zealand, New Caledonia, Solomon Islands, eastern Australia, also Indian Ocean, Arafura Sea at Kei and Tanimbar Islands; potentially widespread in the western Pacific; recorded depths of 230 to 600 metres in the Pacific; most shallow at 184 metres in Indonesia.

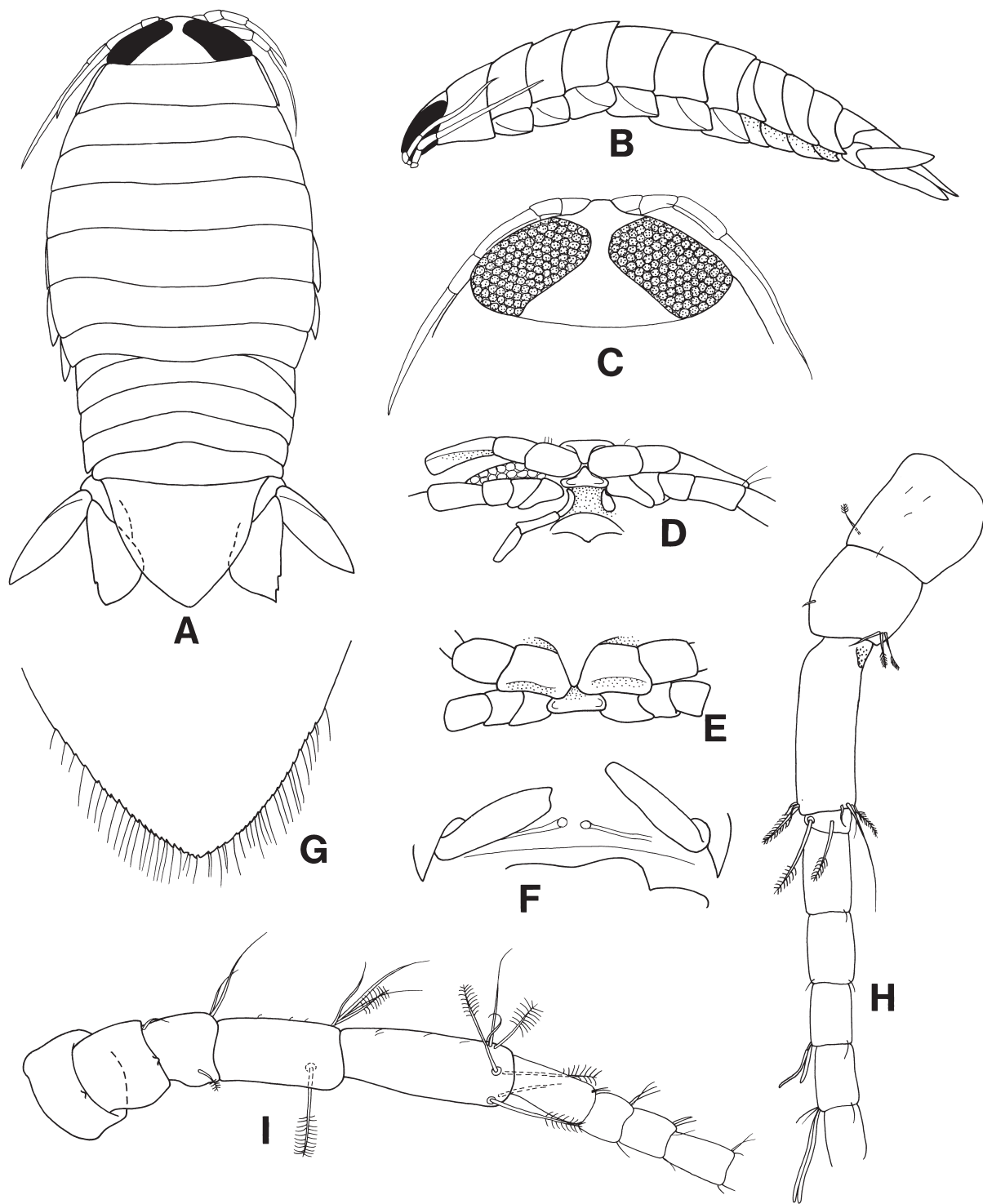
*Aegiochus gordonii* sp. nov. (Figs 52–55)

MATERIAL: *Holotype*: ♂ (7.6 mm), Chatham Rise, 42°45.89'S, 179°59.16'W, 19 April 2001, 800–757 m, coll. RV *Tangaroa* (NIWA 23872).

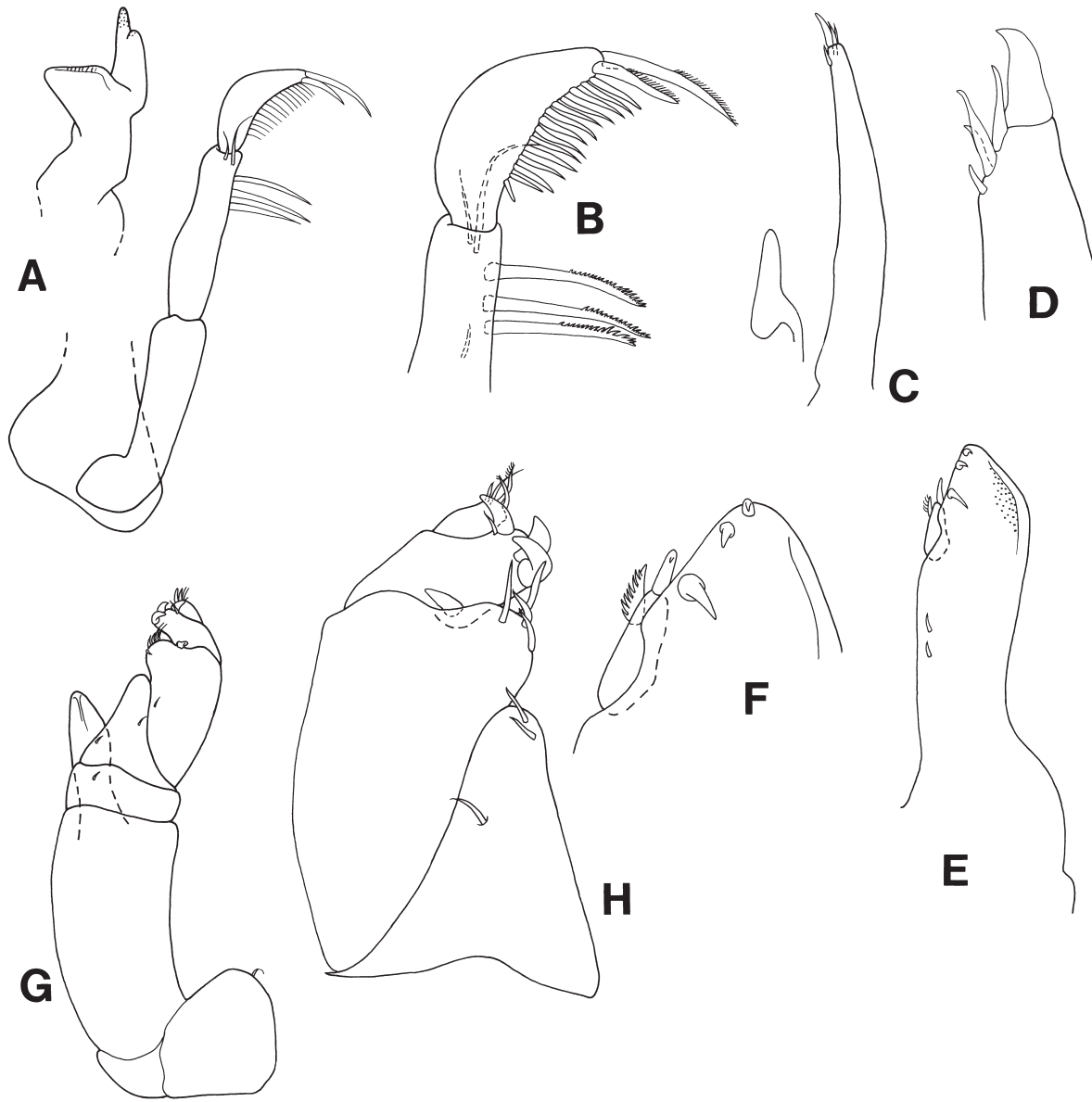
*Paratypes*: 4 ♂ (7.5, 8.0, 8.1 dissected, 12.5 mm), 35 ♀ (13 ovig 11.0–13.3 mm, 22 non-ovig. 8.0–15.0 mm), same data as holotype (NIWA 23873). ♂ (7.5 mm), 7 ♀ (ovig. 10.5, 11.5, 12.2, 12.5 broken, non-ovig 11.0, 12.5 mm), manca (6.5 mm), Chatham Rise, 42°45.76'S, 179°59.29'W, 16 April 2001, 1064–750 m, coll. RV *Tangaroa* (NIWA 23874).

*Unmeasured*. 1, Rumble V Sea Mount, 36°8.48–79'S, 178° 11.70–53'E, 24 May 2001, 755–360 m, coll. RV *Tangaroa* (NIWA 23878); 2, Rumble V sea mount, 24 May 2001, 36°8.07–40'S, 178° 12.07–11.81'E, 1140–698 m, coll. RV *Tangaroa* (NIWA 23879). **Chatham Rise**: 1, 42°45.93'S, 179°59.34'W, 15 April 2001, 875–757 m, coll. R.V *Tangaroa* (NIWA 23875); 1, 42°45.68'S, 179°59.33'W, 21 April 2001, 920–771 m, coll. RV *Tangaroa* (NIWA 23876); 4, 42°42.84'S, 179°57.51'W, 18 April 2001, 980–893 m, coll. RV *Tangaroa* (NIWA 23877); 1, J12/7/85, rock cavities (NMNZ Cr.12020); 1, 42.7158–7152°S, 180.0378–0352°E, 4 June 2006, 985–1050 m, (NIWA 25667).

DESCRIPTION: *Body* 2.3 times as long as greatest width, dorsal surfaces polished in appearance, widest at pereonite 5, lateral margins ovate. Rostral point folded ventrally and posteriorly. *Eyes* large, not medially united, separated by about 7% width of head; each eye made up of ~12 transverse rows of ommatidia, each row with ~8 ommatidia; eye colour dark brown. *Pereonite 1 and coxae* 2–3 each with posteroventral angle right-angled. *Coxae* 5–7 with entire oblique carina;



**Figure 52.** *Aegiochus gordonii* sp. nov. A–F, holotype, remainder male paratype (8.1 mm, NIWA 23873). A, dorsal view; B, lateral view; C, head; D, frons, ventral view; E, frontal lamina and rostrum, anterior view; pleotelson, posterior margin; F, sternite 7 showing penial openings; G, pleotelson margins; H, antennule (distal flagellar articles missing); I, antenna peduncle.



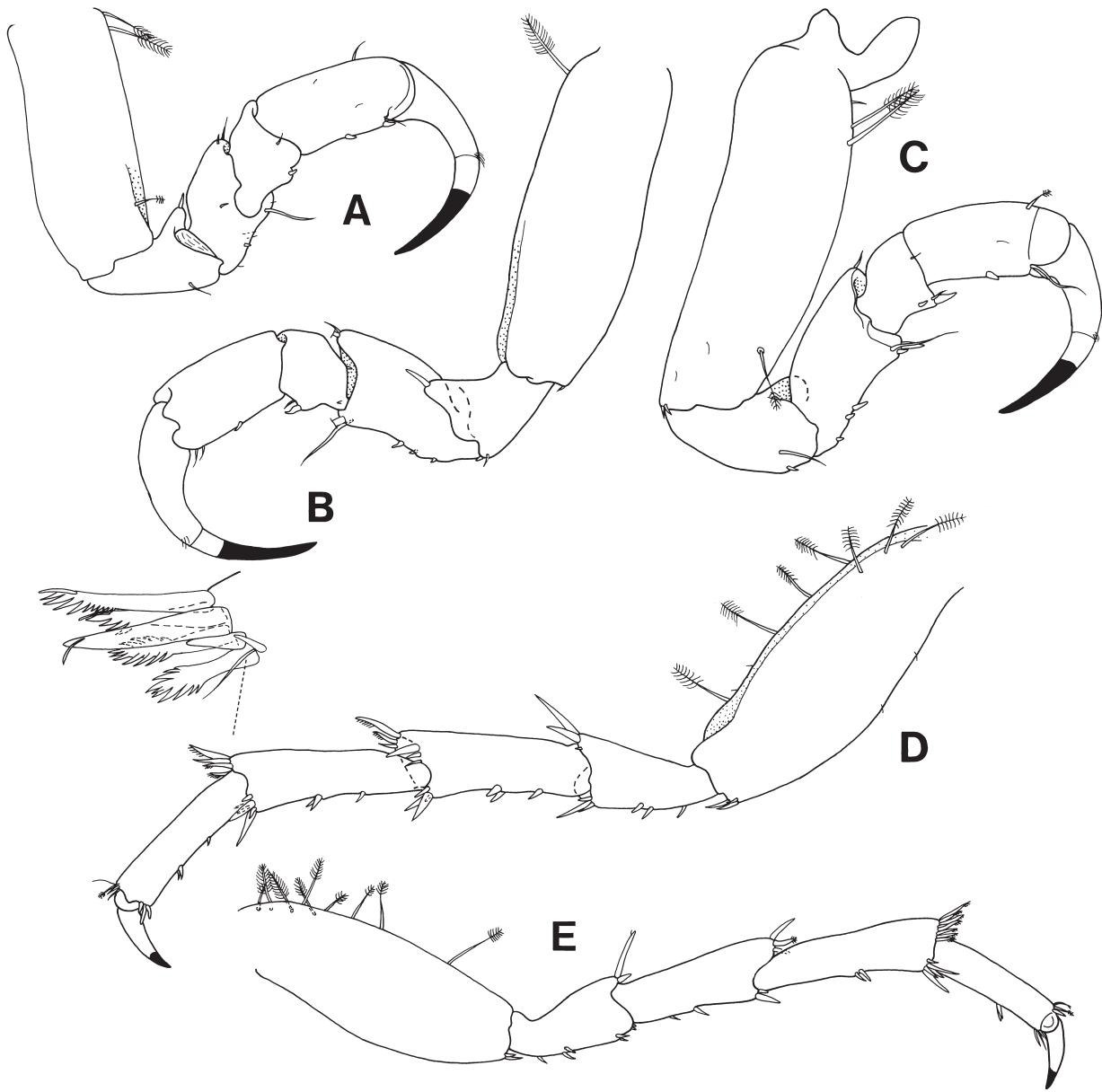
**Figure 53.** *Aegiochus gordoni* sp. nov. Male paratype (8.1 mm, NIWA 23873). A, mandible (broken); B, mandible palp article 3; C, maxillule; D, maxillule apex; E, maxilla; F, maxilla apex; G, maxilliped; H, maxilliped articles 2-5.

posterior margins straight, posterolateral angle blunt (coxae 5 and 6, more than  $45^\circ$ ) and acute (coxa 7, acute less than  $45^\circ$ ). *Pleon* with pleonite 1 largely concealed by pereonite 7; pleonite 4 with posterolateral margins not extending to posterior margin of pleonite 5; pleonite 5 with posterolateral angles free, not overlapped by lateral margins of pleonite 4. *Pleotelson* 0.7 times as long as anterior width, dorsal surface without longitudinal carina; lateral margins convex, serrate (finely), posterior margin converging to caudomedial point, with 0 RS.

*Antennule* peduncle articles 3 and 4 1.0 times as long as combined lengths of articles 1 and 2, article 3

3.0 times as long as wide; flagellum with 10 articles, extending to pereonite 2. *Antenna* peduncle article 4 1.9 times as long as wide, 0.7 times as long as combined lengths of articles 1-3, inferior margin 2 plumose setae, and 4 short simple setae; article 5 1.4 times as long as article 4, 2.8 times as long as wide, inferior margin with 3 palmate setae, anterodistal angle with cluster of 2 short simple setae (and 2 pappose setae); flagellum with 11 articles, extending to posterior of pereonite 3.

*Frontal lamina* posterior margin free, downwardly projecting, blade-like, wider than long, triangular, anterior margin acute, forming median angle, posterior margin not abutting clypeus.

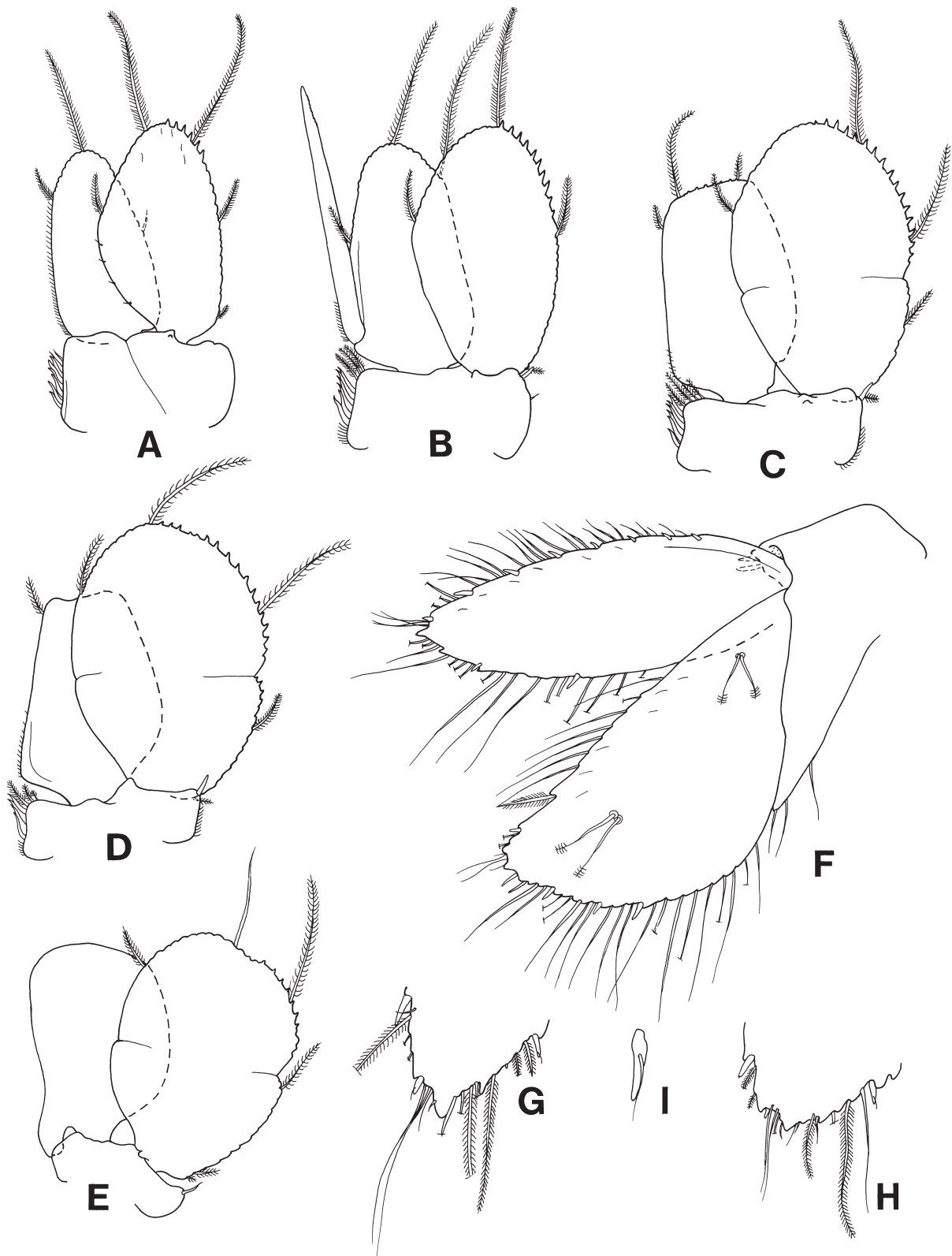


**Figure 54.** *Aegiochus gordonii* sp. nov. Male paratype (8.1 mm, NIWA 23873). A-E, pereopods 1-3, 6 and 7 respectively.

*Mandible* molar process present, small distinct flat lobe; palp article 2 with 3 distolateral setae (large serrate and 2 simple), palp article 3 with 16 setae (all serrate). *Maxillule* with 5 terminal RS (4 slender, 1 large). *Maxilla* mesial lobe with 2 RS (1 strongly serrate, 1 hooked); lateral lobe with 3 RS. *Maxilliped* endite with 0 apical setae; palp article 2 with 2 RS; article 3 with 3 recurved RS (slender); article 4 with 4 hooked RS (and 1 small slender; unevenly spaced with 1 proximal 3 distal); article 5 with 4 RS (straight, 1 of which serrate).

*Pereopod 1* basis 2.5 times as long as greatest width; ischium 0.5 times as long as basis, inferior margin with 0 RS, superior distal margin with 1 RS; merus

inferior margin with 1 RS (proximal, and 1 long distal seta), superior distal angle with 0 RS (2 slender setae); carpus 0.9 as long as merus, inferior margin with 1 RS; propodus 2.1 times as long as proximal width, inferior margin with 2 RS (small, close-set), propodal palm simple, without blade or process, dactylus smoothly curved, 1.4 as long as propodus. *Pereopod 2* ischium inferior margin with 0 RS, superior distal margin with 1 RS; merus inferior margin with 4 RS (distal RS large, remainder minute), set as two groups, superior distal margin with 2 acute RS; carpus longer than that of pereopod 1, with inferodistal lobe, inferodistal angle with 1 RS. *Pereopod 3* similar to pereopod 2 (RS on merus



**Figure 55.** *Aegiochus gordonii* sp. nov. Male paratype (8.1 mm, NIWA 23873). A-E, pleopods 1-5 respectively; F, uropod; G uropod endopod apex; H, uropod exopod apex; I, proximal robust seta, uropod endopod mesial margin.

and carpus larger, 5 RS on inferior margin of carpus). Pereopods 5–7 inferior margins of ischium–carpus with short RS. *Pereopod* 6 similar to pereopod 7 (shorter, with more and longer RS; carpus inferior margin with 1 + 2 RS). *Pereopod* 7 basis 2.8 times as long as greatest width, inferior margins with 9 palmate setae; ischium 0.4 as long as basis, inferior margin with 5 RS (set as 1, 2 and 2), superior distal angle with 2 RS, inferior distal angle with 2 RS (small); merus 1.3 as long as ischium, 2.5 times as long as wide, inferior margin with 2 RS (set as 1 and 1), superior distal angle with 3 RS, inferior distal angle with 2 RS; carpus 1.5 as long as ischium, 3.3 times as long as wide, inferior margin with 2 RS (single cluster), superior distal angle with 9 RS (many biserrate), inferior distal angle with 6 RS; propodus 1.3 as long as ischium, 4.0 times as long as wide, inferior margin with 2 RS (single cluster), superior distal angle with 4 slender setae (1 RS, 1 plumose and 2 simple), inferior distal angle with 3 RS.

*Penes* opening flush with surface of sternite 7; penial openings separated by 8% of sternal width.

*Pleopod* 1 exopod 1.6 times as long as wide, distally narrowly rounded, mesial margin weakly oblique, lateral margin weakly convex, mesial margin strongly convex, with PMS on distal half, with ~36 PMS; endopod 1.9 times as long as wide, distally rounded, lateral margin convex, with PMS on distal half, mesial margin with PMS on distal one-third, endopod with ~21 PMS; peduncle 1.9 times as wide as long, mesial margin with 7 coupling hooks. *Pleopod* 2 exopod with ~43 PMS, endopod with ~27 PMS; *appendix masculina* with straight margins, 1.2 times as long as endopod (extending beyond distal margin of ramus), distally narrowly rounded. *Pleopod* 3 exopod with ~48 PMS, endopod with ~13 PMS. *Pleopod* 4 exopod with ~42 PMS, endopod with ~8 PMS. *Pleopod* 5 exopod with ~38 PMS. Exopods of pleopods 1–3 each with distolateral margin digitate; endopods of pleopods 3–5 each without distolateral point; pleopods 2–4 peduncle distolateral margin with prominent acute RS.

*Uropod* peduncle ventrolateral margin with 2 RS, posterior lobe about one-half as long as endopod. *Endopod* apically shallowly bifid, lateral margin proximally convex, without prominent excision, proximal lateral margin with 0 RS, distal lateral margin with 1 RS, mesial margin straight, with 3–4 RS. *Exopod* extending to end of endopod, 2.8 times as long as greatest width, apically sub-bifid, mesial process prominent; lateral margin convex, with 8 RS; mesial margin convex, with 3 RS.

**FEMALE:** Similar to males, but wider (2.1 times as long as greatest width at pereonite 6); the pleon is proportionally shorter (18% BL) than in the male (21% BL).

**SIZE:** Average lengths of type material: males 7.7 mm ( $n = 6$ ), ovigerous females 12.0 mm ( $n = 16$ ), non-ovigerous females 12.8 mm ( $n = 22$ ); emergent mancas measured 3.0–4.3 mm, and eggs measured 1.4–1.6 mm.

**VARIATION:** *Robust setae:* ( $n = 15$ ) pleotelson always without RS. Uropod exopod mesial margin 3 (50%) or 4 (40%), 2 and 5 occurring, lateral margin 9 (83%), 10 RS occurring once, 8 RS 3 times (possibly owing to damage); uropod endopod mesial margin with 2 (20%) or 3 (73%) 4 and 5 occurring once each, lateral margin with only 1 large RS distal to the pappose seta. There is no discernable difference between males and females. The most distal robust setae are often very fine and occasionally absent, accounting for most of the observed variation.

The lateral margin of the uropodal endopod has a small robust seta set inside the bifid apex. This seta is largely obscured by the apical slender setae, and proved to be too small to observe by light microscopy and was not counted.

The small size of the robust setae on pereopods 1 and 2 precluded making accurate direct counts of pereopod robust setae using light microscopy.

**REMARKS:** *Aegiochus gordonii* is characterised by having large but well-separated eyes, the antennule flagellum extending to pereonite 2 and a shield-shaped pleotelson, which is finely serrate and totally lacking robust setae or notches; the uropods are provided with small and fine robust setae, the smallest of which are difficult to observe under light microscopy; the uropodal endopod lateral margin is markedly straight. The anterior pereopods are weakly ‘spined’ with the small robust setae close-set to the inferior margin, particularly on the propodus; the pleopods have the exopod distolateral margin with digitate serrations, and the appendix masculina extends well beyond the distal margin of the endopod.

There are three Southern Ocean species which appear similar. All of these species are described from single specimens only, and most descriptions lack sufficient detail for accurate comparisons to be made. These species are *Aegiochus crozetensis* (Kussakin & Vasina, 1982) (Crozet Islands, southern Indian Ocean, 280 metres), *Aegiochus pushkini* Kussakin and Vasina, 1982 (Ob’ Bank, southern Indian Ocean, 410 m; here recorded from New Zealand) and *Aegiochus uschakovi* Kussakin, 1967 (Drake Passage, Argentina, 95–120 m). All species share a similar appearance, but were described as having pleotelson ‘denticles’, taken here to mean robust setae.

*Aegiochus pushkini*, redescribed herein, is nearly twice the size of *A. gordonii*, has narrower eyes, the pleopod rami lack marginal serrations and the pleotelson and uropods are provided with robust setae.



New figures of the holotypes of *Aegiochus crozetensis* and *A. uschakovi* are given (Appendix 2; Figs 141, 145 respectively). *A. pushkini* has a far shorter antennule flagellum, figured as extending only to the anterior of pereonite 1. *Aegiochus uschakovi*, at 18 mm, is substantially larger than *A. gordonii*, and is figured as having the posterior coxae far more strongly produced, the antennule flagellum with 15 articles (10 in *A. gordonii*), antennal flagellum with 19 articles (11 in *A. gordonii*) and the propodal palm as lacking setae. Examination of the type material of these Southern Ocean species confirms that they are all distinct from *A. gordonii*.

The deeply serrate pleopod 1 exopod is not unique to *A. gordonii*, and has been figured for several other New Zealand species, the most similar being *Aegiochus coroo* and *Aegiochus laevis*. *Aegiochus coroo* has the eyes united, and a more rounded and notched posterior margin to the pleotelson. There are further similarities between these three species in the unarmed pleotelson, a large molar process on the mandible, maxillule lateral lobe which has one prominently large and several small robust setae (in contrast to the more usual three large and several small terminal setae) and the anterior pereopods with very few and small robust setae. *Aegiochus laevis* is small, and readily separated from *A. gordonii* by having small eyes, somewhat similar in size to those of cirrolanids.

PREY: Not known.

DISTRIBUTION: Recorded from the Chatham Rise to the east of South Island and Brothers Sea Mounts to the northeast of North Island; at depths from 360 to 1140 metres (the minimum depth was recorded from a haul that ran from 360 to 755 metres, all other records are from 698 metres or greater).

ETYMOLOGY: Named for Dennis Gordon, scientist, natural historian, biological enthusiast and untiring advocate for taxonomic research in New Zealand—in recognition of his huge direct and indirect contribution to knowledge of the New Zealand marine fauna.

*Aegiochus insomnis* sp. nov. (Figs 56–60)

MATERIAL: *Holotype*: ♂ (6.9 mm) Poor Knights Islands, pass south of landing, 19 May 1969, 33–37 m, from sponge and [bryozoa], SCUBA (AK 73308).

*Paratypes*: 12 ♀ (ovig. 7.2, 7.8, 8.0 [dissected], 8.4, 9.0, 9.5; non-ovig. 6.5, 6.8, 7.0, 7.5, 8.4, 9.0 [dissected] mm), same data as holotype (AK 73309; NIWA 28462 [2]).

DESCRIPTION: *Body* 2.2 times as long as greatest width, dorsal surfaces polished in appearance and sparsely punctate, widest at pereonite 5, lateral margins ovate. Rostral point folded ventrally and posteriorly. *Eyes*

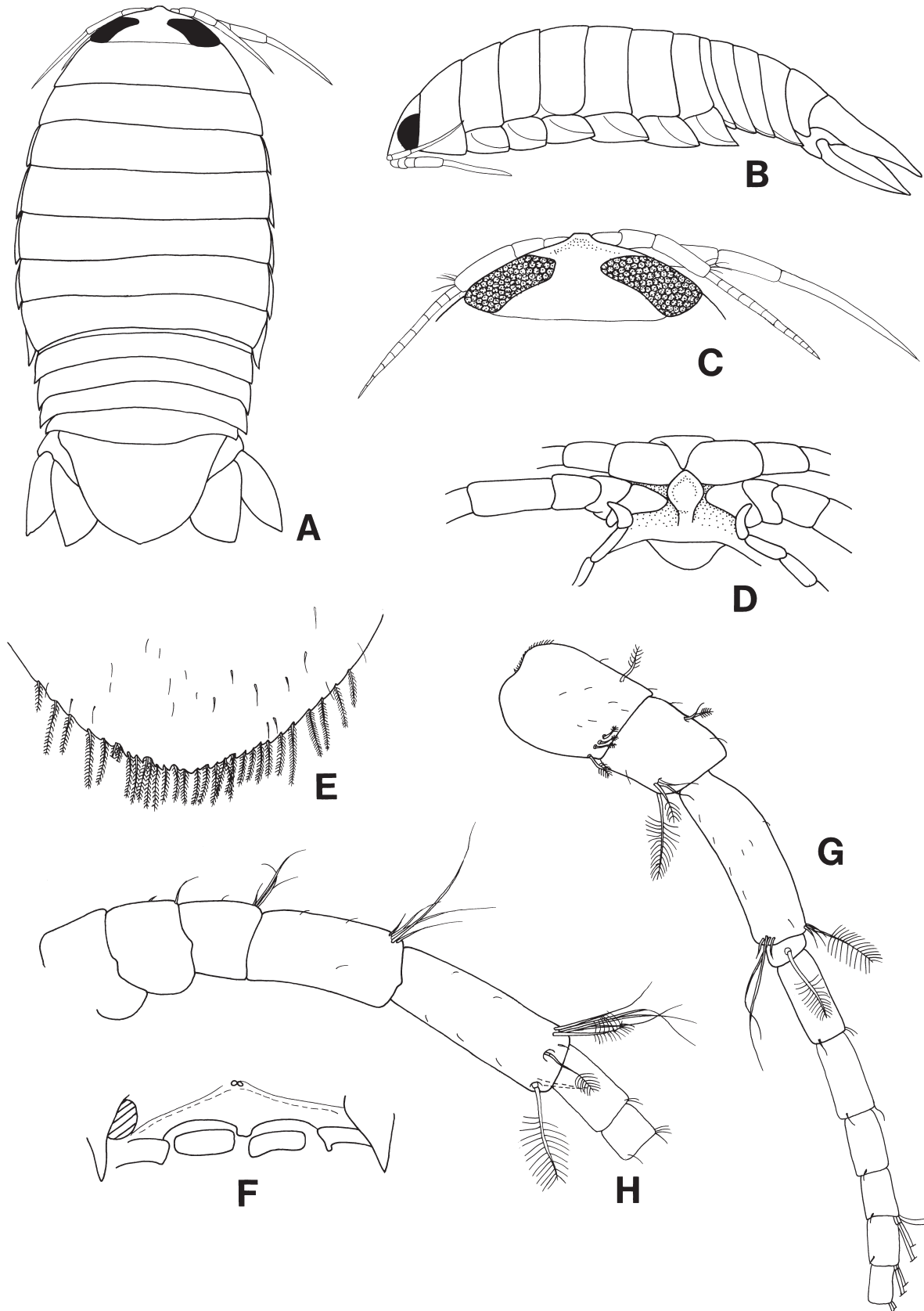
large, not medially united, separated by about 23% width of head; each eye made up of ~10 transverse rows of ommatidia, each row with ~8 ommatidia; eye colour red. *Pereonite 1 and coxae 2–3* each with poster-ventral angle right-angled (point soft, not abrupt). *Coxae 5–7* with entire oblique carina; posterior margins straight and sinuate (coxa 7 is sinuate), posterolateral angle acute (less than 45°) (coxa 5 not acute). *Pleon* with pleonite 1 largely concealed by pereonite 7; pleonite 4 with posterolateral margins not extending to posterior margin of pleonite 5; pleonite 5 with posterolateral angles free, not overlapped by lateral margins of pleonite 4. *Pleotelson* 0.8 times as long as anterior width, dorsal surface without longitudinal carina; lateral margins convex, serrate, posterior margin evenly rounded, with 0 RS.

*Antennule* peduncle articles 3 and 4 1.1 times as long as combined lengths of articles 1 and 2, article 3 3.1 times as long as wide; flagellum with 8 articles, extending to posterior of pereonite 1. *Antenna* peduncle article 4 2.0 times as long as wide, 0.8 times as long as combined lengths of articles 1–3, inferior margin 0 plumose setae, and 0 short simple setae (anterodistal angle with 5 long simple setae); article 5 1.2 times as long as article 4, 2.6 times as long as wide, inferior margin with 2 palmate setae (at distal angle), anterodistal angle with cluster of 4 short simple setae (long simple setae, and 1 pappose seta); flagellum with 13 articles, extending to posterior of pereonite 2.

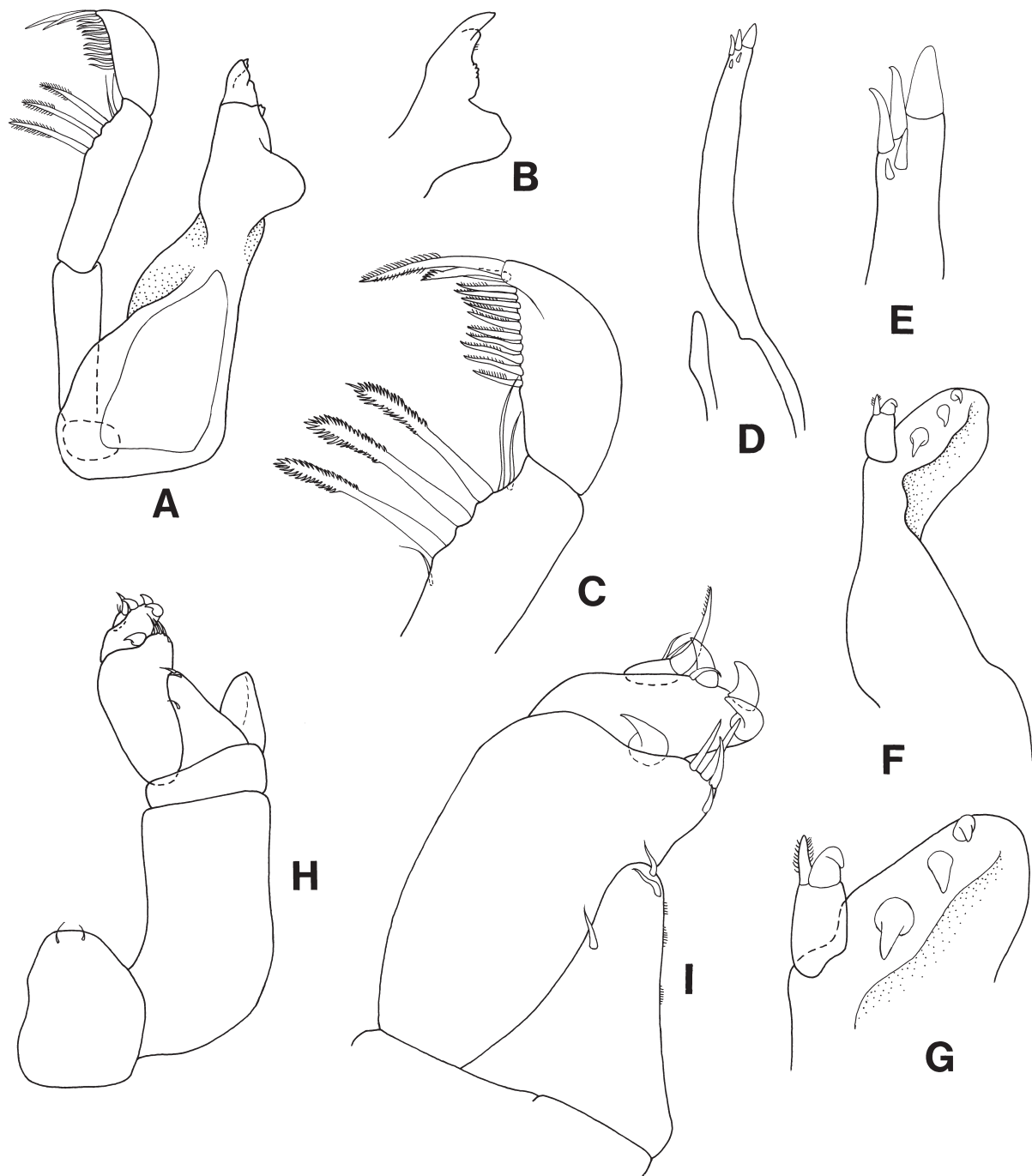
*Frontal lamina* flat, longer than greatest width, diamond shaped, anterior margin acute, without small median point or forming median angle, posterior margin not abutting clypeus.

*Mandible* molar process present, small distinct flat lobe; palp article 2 with 5 distolateral setae (3 biserrate, 2 simple), palp article 3 with 13 setae (serrate; distal 3 markedly longer than remainder). *Maxillule* with 5 terminal RS (1 large, 4 slender). *Maxilla* mesial lobe with 2 RS (1 biserrate); lateral lobe with 3 RS. *Maxilliped* endite with 0 apical setae; palp article 2 with 2 RS (slender); article 3 with 4 straight RS; article 4 with 4 hooked RS (and 1 simple seta); article 5 with 3 RS (1 large, and 2 small slender).

*Pereopod 1* basis 2.6 times as long as greatest width; ischium 0.3 times as long as basis, inferior margin with 0 RS, superior distal margin with 1 RS; merus inferior margin with 1 RS (plus 2 short and 1 long simple setae), set as distal group, superior distal angle with 0 RS (1 simple seta); carpus 0.8 as long as merus, inferior margin with 1 RS; propodus 2.6 times as long as proximal width, inferior margin with 2 RS (set as 1 minute and 1 distally), propodal palm simple, without blade or process, dactylus smoothly curved, 0.9 as long as propodus. *Pereopod 2* ischium inferior margin with 0 RS, superior distal margin with 1 RS; merus inferior margin with 3 RS (set as 1 and 2; 2 simple setae), set



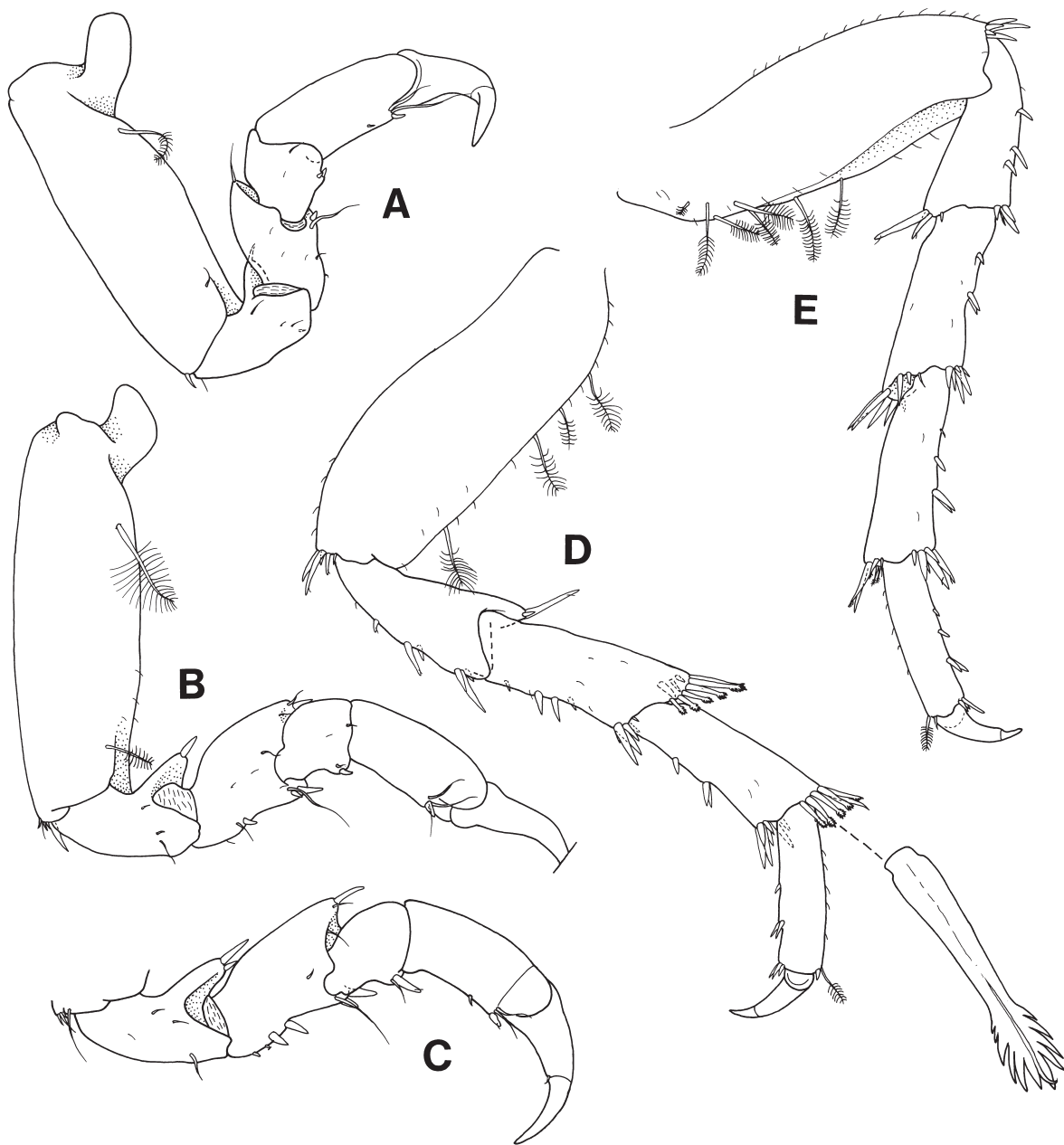
**Figure 56.** *Aegiochus insomnis* sp. nov. A-F, holotype, remainder female paratype (9.0 mm). A, dorsal view; B, lateral view; C, head; D, frons, ventral view; E, pleotelson, posterior margin; F, penial openings; G, antennule (terminal flagellar articles missing); H, antenna peduncle.



**Figure 57.** *Aegiochus insomnis* sp. nov. Female paratype (9.0 mm). A, mandible; B, right mandible, incisor and molar process; C, mandible palp article 3; D, maxillule; E, maxillule apex; F, maxilla; G, maxilla apex; H, maxilliped; I, maxilliped articles 2-5.

as two groups, superior distal margin with 1 acute RS (and 2 simple setae); carpus similar in size to that of pereopod 1, inferodistal angle with 1 RS (and 1 simple seta). *Pereopod 3* similar to pereopod 2 (but merus inferior margin with 5 RS, and RS larger). Pereopods 5-7 inferior margins of ischium-carpus with short RS. *Pereopod 6* similar to pereopod 7 (but more robust, distal

margins of merus and carpus with more numerous biserrate RS). *Pereopod 7* basis 3.0 as long as greatest width, inferior margins with 7 palmate setae; ischium 0.4 as long as basis, inferior margin with 3 RS (set singly), superior distal angle with 4 RS, inferior distal angle with 4 RS; merus 1.1 as long as ischium, 2.2 times as long as wide, inferior margin with 3 RS (set as 1 and

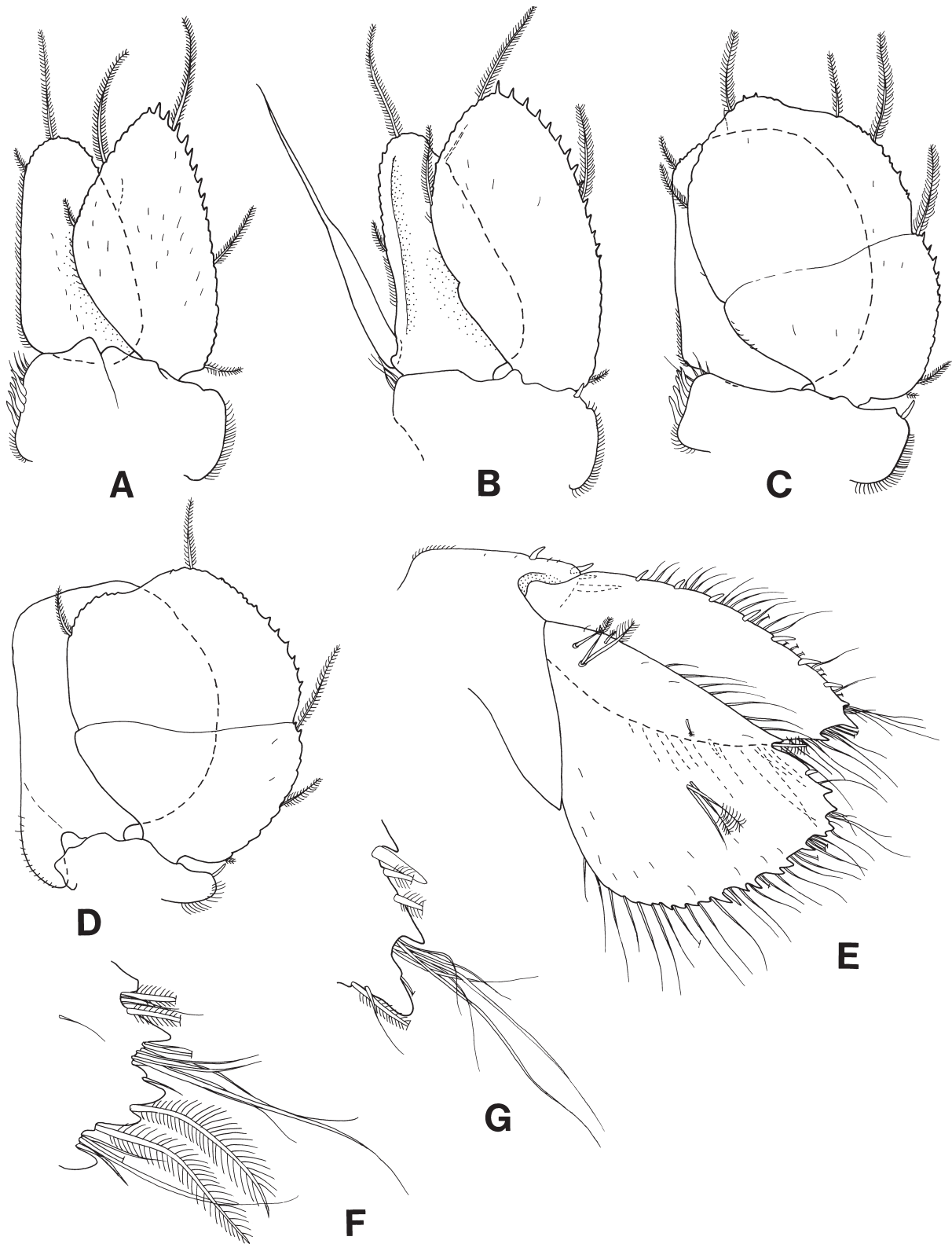


**Figure 58.** *Aegiochus insomnis* sp. nov. Female paratype (9.0 mm). A-E, pereopods 1-3, 6 and 7 respectively.

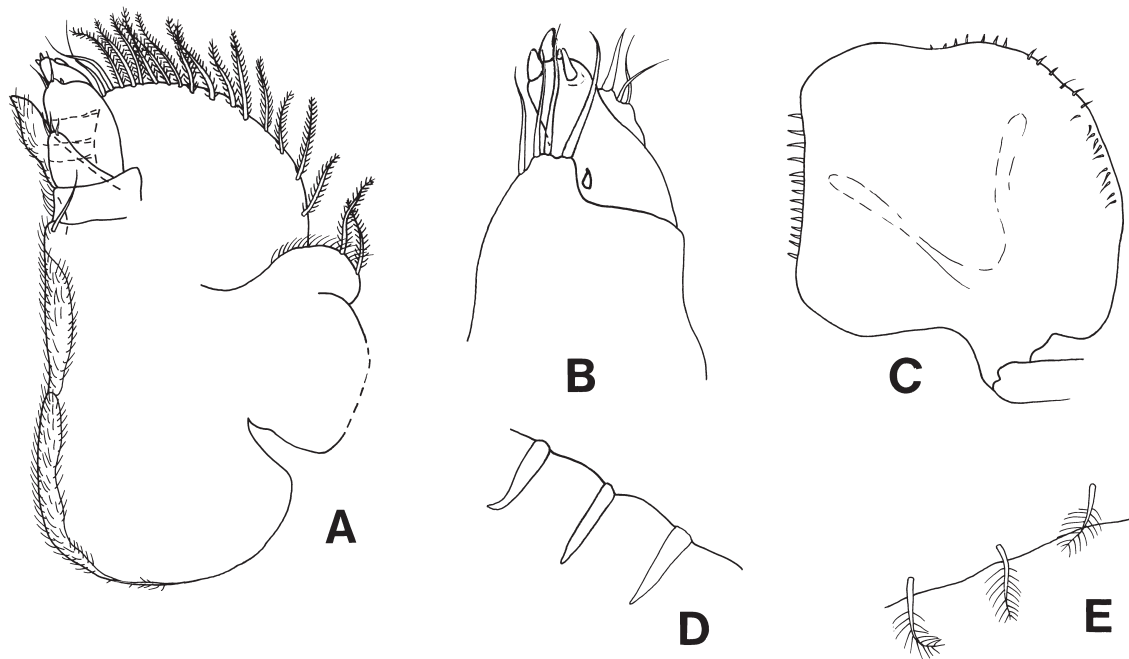
2), superior distal angle with 7 RS, inferior distal angle with 6 RS; carpus 1.3 as long as ischium, 2.8 times as long as wide, inferior margin with 4 RS (set as 1, 1 and 2), superior distal angle with 8 RS (5 biserrate), inferior distal angle with 6 RS; propodus 1.0 as long as ischium, 3.6 times as long as wide, inferior margin with 4 RS (set as 1, 1 and 2), superior distal angle with 3 slender setae (1 RS, 1 plumose and 2 simple), inferior distal angle with 4 RS.

*Penes* low tubercles; penial openings separated by 1% of sternal width.

*Pleopod 1* exopod 1.9 times as long as wide, distally narrowly rounded, mesial margin weakly oblique, lateral margin weakly convex, mesial margin strongly convex, with PMS on distal half, with ~36 PMS; endopod 1.9 times as long as wide, distally rounded, lateral margin straight, with PMS on distal one-third, mesial margin with PMS on distal margin only, endopod with ~16 PMS; peduncle 1.9 times as wide as long, mesial margin with 5 coupling hooks. *Pleopod 2* exopod with ~37 PMS, endopod with ~18 PMS; *appendix masculina* basally swollen, 1.3 times as long as endopod, distally



**Figure 59.** *Aegiochus insomnis* sp. nov. A, B, holotype, remainder female paratype (9.0 mm). A–D pleopods 1–3, 5 respectively; E, uropod; F, uropod endopod, apex; G, uropod exopod, apex.



**Figure 60.** *Aegiochus insomnis* sp. nov. Ovigerous female paratype 8.0 mm. A, maxilliped; B, maxilliped palp articles 3-5; C, oostegite, sternite 5 (anterior to top of page); D, setae from mesial margin of oostegite; E, setae from anterolateral margin of oostegite.

acute. *Pleopod 3* exopod with ~40 PMS, endopod with ~6 PMS. *Pleopod 4* exopod with ~37 PMS, endopod with ~5 PMS. *Pleopod 5* exopod with ~37 PMS. Exopods of pleopods 1-3 each with distolateral margin digitate; endopods of pleopods 3-5 each without distolateral point; pleopods 2-4 peduncle distolateral margin with prominent acute RS.

*Uropod* peduncle ventrolateral margin with 3 RS, posterior lobe about one-half as long as endopod. *Endopod* apically deeply and equally bifid, lateral margin straight, without prominent excision, proximal lateral margin with 0 RS, distal lateral margin with 1 RS, mesial margin weakly convex, with 3 RS. *Exopod* not extending to end of endopod, 2.4 times as long as greatest width, apically deeply bifid, mesial process prominent; lateral margin convex, with 7 RS; mesial margin convex, with 3 RS.

**FEMALE:** Similar to males, ovigerous females slightly wider and slightly larger. Brood pouch composed of 5 pairs of oostegites arising from sternites 1-5, becoming progressively larger towards the posterior, oostegite 5 extending to the posterior of sternite and bearing plumose seta on the mesial margin, stout simple setae along the posterior margin.

**SIZE:** The single male measured 6.9 mm; ovigerous females 7.2-9.5 mm (mean = 8.3 mm); non-ovigerous females 6.5-9.0 mm (mean = 7.5 mm).

**VARIATION:** Pleotelson ( $n=12$ ) always without RS. Uropod exopod mesial ( $n=22$ ) margin usually with 3 (82%), or 2 (18%) RS, lateral margin ( $n=24$ ) with 7 (88%) or 8 (12%) RS; uropod endopod mesial margin ( $n=24$ ) with 0 (38%), 1 (33%) or 2 (29%) RS, lateral margin with only 1 (88%) or 0 (12%) RS distal to the pappose seta. There is no discernable difference between males and females. The distal robust setae are frequently small and fine.

The relatively small size of the species precluded making accurate direct counts of the robust setae on pereopods 1 and 2 although of the specimens examined the pattern, number and size appears consistent.

**REMARKS:** *Aegiochus insomnis* sp. nov. is readily identified by the relatively small eyes, diamond-shaped and flat ('*Metaciroлана-like*') frontal lamina, short pereopod dactylus (about as long as the propodus), deeply serrated pleopod exopods and the long acute appendix masculina. There are two similar species in New Zealand: *Aegiochus nohinohi* sp. nov. and *Aegiochus gordonii* sp. nov. Both of those species have larger eyes, blade-like posterior margin on the frontal lamina and have a much longer dactylus on pereopod 1 (1.2-1.4 times as long as the propodus).

**PREY:** Not known.

DISTRIBUTION: Known only from the Poor Knights Islands, northern New Zealand.

ETYMOLOGY: The epithet *insomnis* (from the L. meaning sleepless; noun in apposition) is a play on the name of the type locality.

*Aegiochus kakai* sp. nov. (Figs 61–64)

MATERIAL EXAMINED: *Holotype*. ♂ (14.2 mm), Chatham Rise, 42°43.20'S, 179°57.63'W, 21 April 2001, 1012–890 m, coll. RV *Tangaroa* (NIWA 23863).

*Paratypes*. All Chatham Rise. 4 ♂ (12.5 [damaged], 13.6, 14.5 dissected, 16.0 mm), 5 ♀ (ovig. 15.0, 15.5; non-ovig. 12.5, 15.5, 24.5), same data as holotype (NIWA 23864). 6 ♂ (11.0, 11.2, 12.2, 12.8, 13.5, 14.5 mm), 4 ♀ (ovig. 13.8, 15.0, 16.5; non-ovig. 16.5 mm), 15 April 2001, 42°42.84'S, 179°57.51'W, 980–893 m, coll. RV *Tangaroa* (NIWA 23865). ♀ (non-ovig. 18.5 mm), Chatham Rise, 15 April 2001, 42°45.93'S, 179°59.34'W, 875–757 m, coll. RV *Tangaroa* (NIWA 23866); 2 ♀ (ovig. 14.5, 15.0 mm), 16 April 2001, 42°47.17'S, 179°59.12'W, 993–900 m, coll. RV *Tangaroa* (NIWA 23867).

*Non-type material, some not measured*. ♀ (non-ovig.), 17 April 2001, 42°48.24'S, 179°59.27'E, 1013–931 m (NIWA 23868). 2 ♀ (ovig.), 21 April 2001, 42°42.76'S, 179°54.45'W, 1080–1008 m (NIWA 23869). ♀ (ovig.), 18 April 2001, 42°47.27'S, 179°59.81'W, 1042–880 m (NIWA 23870). ♀ (ovig. 15.7 mm) 6 July 1994, 43°51.47'S, 174°17.08'W, 754 m (NIWA 23870). 2, 42.7275–7307°S, 180.1010–0973°E, 7 June 2006, 1000–1107 m, (NIWA 25670, 25671). 1, 42.7158–7132°S, 180.1432–0480°E, 4 June 2006, 950–1070 m (NIWA 25668). 1, 42.7627–7575°S, 180.0748–0773°E, 28 May 2006, 1019–1081 m (NIWA 25656).

DESCRIPTION: *Body* 2.1 times as long as greatest width, dorsal surfaces polished in appearance, widest at pereonite 5, lateral margins weakly ovate. Rostral point folded ventrally and posteriorly. *Eyes* large, medially united, anterior clear field 27% length of head, posterior clear field 44% length of head; each eye made up of ~16 transverse rows of ommatidia, each row with ~9 ommatidia; eye colour red, or dark brown. *Pereonite 1 and coxae* 2–3 each with posteroventral angle with small distinct produced point. *Coxae* 5–7 with entire oblique carina; posterior margins concave, posterolateral angle acute (less than 45°). *Pleon* with pleonite 1 visible in dorsal view; pleonite 4 with posterolateral margins extending clearly beyond posterior margin of pleonite 5; pleonite 5 with posterolateral angles overlapped by lateral margins of pleonite 4. *Pleotelson* 0.7 times as long as anterior width, dorsal surface without longitudinal carina; lateral margins convex, serrate or

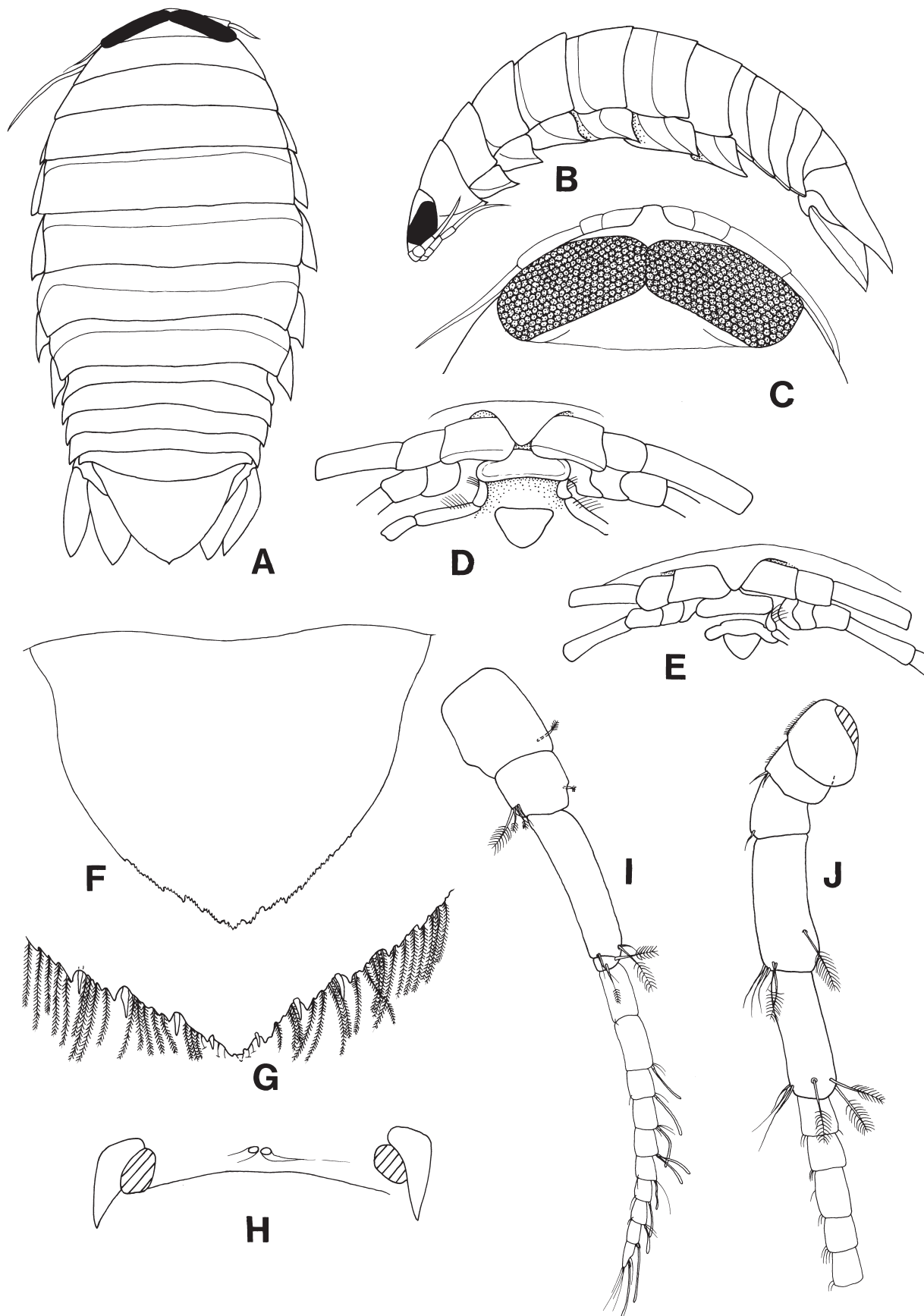
notched, posterior margin converging to caudomedial point, with 8–10 RS.

*Antennule* peduncle articles 3 and 4 1.1 times as long as combined lengths of articles 1 and 2, article 3 4.1 times as long as wide; flagellum with 10 articles, extending to posterior of pereonite 1. *Antenna* peduncle article 4 2.9 times as long as wide, 0.9 times as long as combined lengths of articles 1–3, inferior margin with 1 plumose seta, and 4 short simple setae (anterodistal 3 simple + 1 plumose); article 5 1.0 times as long as article 4, 2.7 times as long as wide, inferior margin with 3 palmate setae, anterodistal angle with cluster of 3 short simple setae; flagellum with 15 articles, extending to posterior of pereonite 3.

*Frontal lamina* posterior margin free, downwardly projecting, blade-like, wider than long, posterior margin concave, anterior margin anteriorly truncate (narrowly), forming median angle, posterior margin not abutting clypeus.

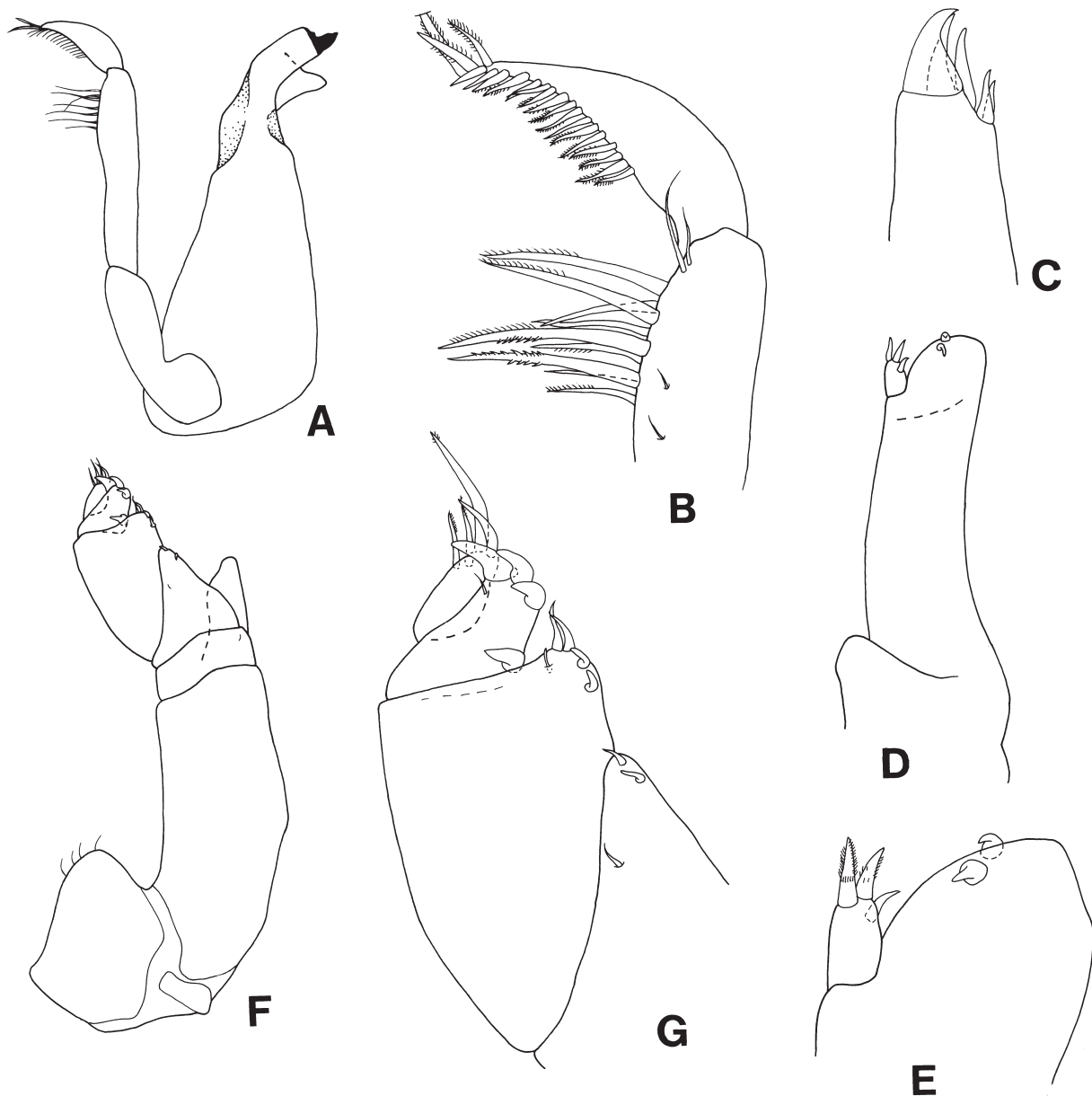
*Mandible* molar process present, small distinct flat lobe; palp article 2 with 11 distolateral setae (4 large and 5 small biserrate, 2 simple distally), palp article 3 with 20 setae (all biserrate). *Maxillule* with 5 terminal RS (1 large, 4 slender). *Maxilla* mesial lobe with 3 RS (1 straight, 2 biserrate); lateral lobe with 2 RS (hooked). *Maxilliped* endite with 0 apical setae; palp article 2 with 2 RS; article 3 with 4 recurved RS (2 slender, 2 hooked); article 4 with 4 hooked RS; article 5 with 4 RS (straight).

*Pereopod 1* basis 2.7 times as long as greatest width; ischium 0.4 times as long as basis, inferior margin with 0 RS, superior distal margin with 1 RS; merus inferior margin with 2 RS (minute), set as two groups, superior distal angle with 0 RS (2 short slender setae); carpus 0.7 as long as merus, inferior margin with 1 RS; propodus 2.3 times as long as proximal width, inferior margin with 0 RS, propodal palm simple, without blade or process, dactylus smoothly curved, 1.4 as long as propodus. *Pereopod 2* ischium inferior margin with 0 RS, superior distal margin with 1 RS; merus inferior margin with 4 RS (distalmost large, remainder minute), set as two groups, superior distal margin with 1 acute RS (small plus 2 slender setae); carpus longer than that of pereopod 1, with inferodistal lobe, inferodistal angle with 1 RS. *Pereopod 3* similar to pereopod 2. *Pereopods 5–7* inferior margins of ischium–carpus with short RS. *Pereopod 6* similar to pereopod 7 (but longer, with slightly more RS). *Pereopod 7* basis 3.6 times as long as greatest width, inferior margins with 11 palmate setae; ischium 0.4 as long as basis, inferior margin with 3 RS (set as 1, 1 and 1), superior distal angle with 2 RS, inferior distal angle with 4 RS; merus 1.2 as long as ischium, 2.5 times as long as wide, inferior margin with 3 RS (set as 1 and 2), superior distal angle with 7



**Figure 61.** *Aegiochus kakai* sp. nov. A–G, holotype, remainder male paratype NIWA 23864. A, dorsal view; B, lateral view; C, head; D, frons; E, frons, anterior view; F, pleotelson; G, pleotelson, posterior margin; H, sternite 7 showing penial openings; I, antennule; J, antenna peduncle.





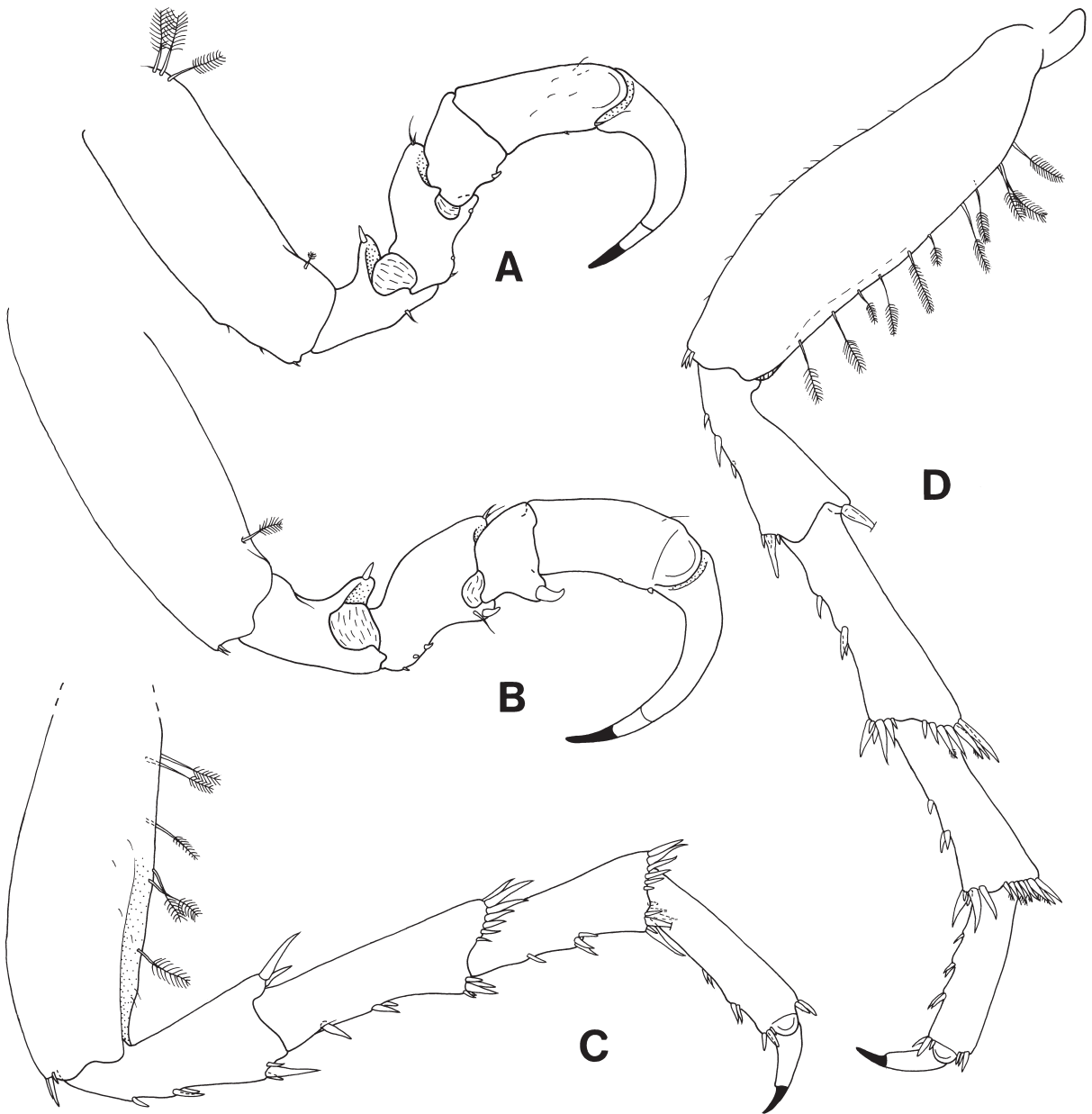
**Figure 62.** *Aegiochus kakai* sp. nov. Male paratype 14.5 mm, NIWA 23864. A, mandible; B, mandible palp, article 3; C, maxillule apex; D, maxilla; E, maxilla apex; F, maxilliped; G, maxilliped articles 2-5.

RS, inferior distal angle with 6 RS; carpus 1.0 as long as ischium, 2.6 times as long as wide, inferior margin with 3 RS (set as 1 and 2), superior distal angle with 9 RS (6 of which are biserrate), inferior distal angle with 5 RS; propodus 1.0 as long as ischium, 4 times as long as wide, inferior margin with 5 RS (seta as 1, 2 and 2), superior distal angle with 3 slender setae, inferior distal angle with 3 RS.

*Penes* opening flush with surface of sternite 7, mutually adjacent.

*Pleopod 1* exopod 2.0 as long as wide, distally narrowly rounded, mesial margin weakly oblique, lateral

margin straight, mesial margin strongly convex, with PMS on distal half, with ~54 PMS; endopod 2.2 times as long as wide, distally rounded, lateral margin straight, with PMS on distal half, mesial margin with PMS on distal one-third, endopod with ~33 PMS; peduncle 1.8 times as wide as long, mesial margin with 7 coupling hooks. *Pleopod 2* exopod with ~66 PMS, endopod with ~43 PMS; *appendix masculina* basally swollen, 1.1 times as long as endopod (middle part with prominent cuticular scales), distally acute. *Pleopod 3* exopod with ~75 PMS, endopod with ~15 PMS. *Pleopod 4* exopod with ~70 PMS, endopod with ~10 PMS. *Pleopod 5* exopod



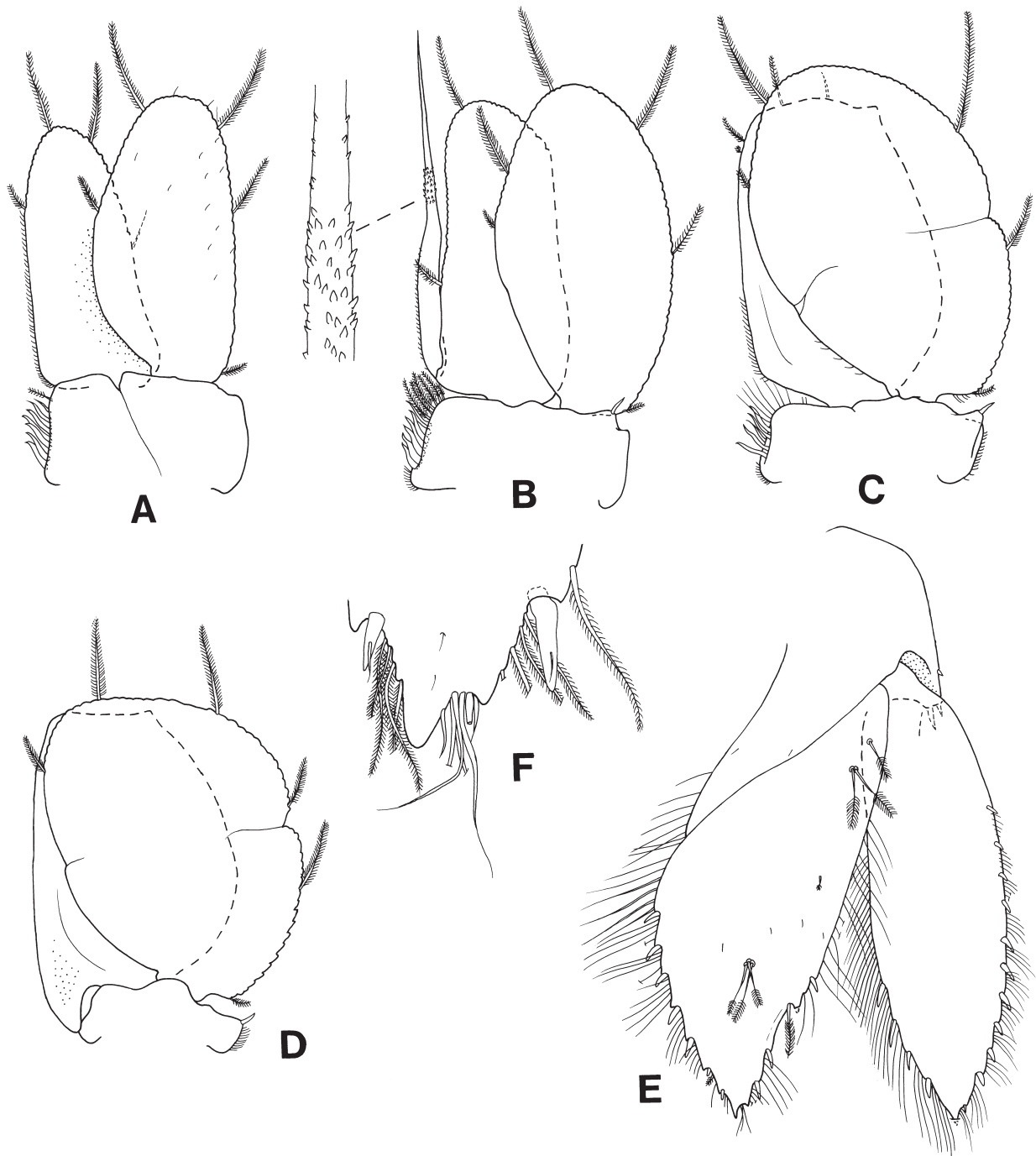
**Figure 63.** *Aegiochus kakai* sp. nov. Male paratype 14.5 mm, NIWA 23864. A–E, pereopods 1, 2, 6 and 7 respectively.

with ~60 PMS. Exopods of pleopods 1–3 each with distolateral margin not digitate; endopods of pleopods 3–5 each with distolateral point; pleopods 2–4 peduncle distolateral margin with prominent acute RS.

*Uropod* peduncle ventrolateral margin with 2 RS (and 1 lateral), posterior lobe about one-half as long as endopod. *Endopod* apically sub-bifid, mesial process prominent, lateral margin straight, without prominent excision, proximal lateral margin with 1 RS, distal lateral margin with 2 RS, mesial margin weakly convex, with 7 RS. *Exopod* extending beyond end of endopod

(slightly), 3.5 times as long as greatest width, apically sub-bifid, mesial process prominent; lateral margin convex, with 11 RS; mesial margin straight, distally convex, with 4 RS.

**FEMALE:** Ovigerous females have the BL 1.8 times as long as the greatest width, with ovate lateral margins; otherwise similar in appearance to males other than for the sexual characters. Brood pouch of oostegites arising from the coxae/sternite of pereopods 1–5.



**Figure 64.** *Aegiochus kakai* sp. nov. Male paratype 14.5 mm, NIWA 23864. A-D, pleopods 1-3, 5 respectively; E, uropod endopod apex; F, uropod.

**SIZE:** Males 11.0–16.0 mm (mean = 13.3 mm,  $n=11$ ); ovigerous females 13.8–16.5 mm (mean = 15.0 mm,  $n=7$ ); non-ovigerous females 12.5–24.5 mm (mean = 17.5 mm,  $n=5$ ).

**VARIATION:** *Robust setae:* pleotelson RS ( $n=18$ ) varies from 4+4 (22%) or 4+5 (39%) and 5+5 (28%) with 4+6 and 6+6 each occurring once. Uropod exopod ( $n=36$ ) mesial margin most often with 4 (25%) or 5 (64%) or

3 and 6 each occurring twice; lateral margin 11 (11%) or 12 (61%) or 13 (28%); uropod endopod ( $n = 36$ ) mesial margin varied from 5 to 8 RS with 5 (14%), 6 (25%) and 7 (58%) the most frequent, 8 occurring once, lateral margin with 1+2 (83%) with occasional damage-induced variations of 1+1 and 0+1; one specimen had 2+2. There is no discernable difference between males and females.

Pereopods present a constant appearance, but no detailed counts were made owing to the difficulty of observing small setae under light microscopy without dissection.

Recently (2006) collected and fresh material of this species from the Chatham Rise (NIWA 25656, 25668, 25670, 25671) had bronze coloured eyes which are very narrowly (less than the width of an ommatidium) separated, this separation being less or not apparent in long-preserved specimens.

**REMARKS:** The united eyes, acute and produced posterior margins of coxal plates 2–4, wide frontal lamina with the posterior margin forming a distinctly concave blade, distinctive long and straight appendix masculina in the males and the setation of robust setae on the uropods and pleotelson all allow ready identification of this species.

*Aegiochus kakai* sp. nov. shares a great many characters with *Aegiochus kanohi* sp. nov., including the general appearance and setation of the antennule, antenna, pereopods, pleopods, uropods and posterior margin of the pleotelson. In particular the general morphology of the appendix masculina of the two species is similar, both being basally swollen and distally slender. Despite the overall similarity of appearance there are numerous clear-cut points of difference and the two species are easy to distinguish. *Aegiochus kakai* has the eyes meeting medially, but the eyes themselves are far smaller than in *A. kanohi*; the frontal lamina is far wider than in *A. kanohi* and the posterior margin is concave; the posteroventral angles of pereonite 1 and coxae 2 and 3 are acute and produced (truncate in *A. kanohi*); and the appendix masculina is straight (sinuate in *A. kanohi*). There are further differences in the setation of the uropods and posterior margin of the pleotelson, which is detailed in the 'variation' section for each species.

Other superficially similar species from the southern Indian Ocean are *Aegiochus crozetensis* Kussakin and Vasina, 1982 and *A. uschakovi* Kussakin, 1967, but these both have widely separated eyes.

**PREY:** Not known. One sample (NIWA 23864) had sponge tissue tangled up with the specimens suggesting the possibility of at least temporary association with hexactinellid sponges.

**DISTRIBUTION:** Recorded only from the Chatham Rise region, off eastern South Island, New Zealand; at depths from 757 to 1080 metres.

**ETYMOLOGY:** Kakai is a Māori word meaning to nibble or bite frequently; noun in apposition.

*Aegiochus kanohi* sp. nov. (Figs 65–68)

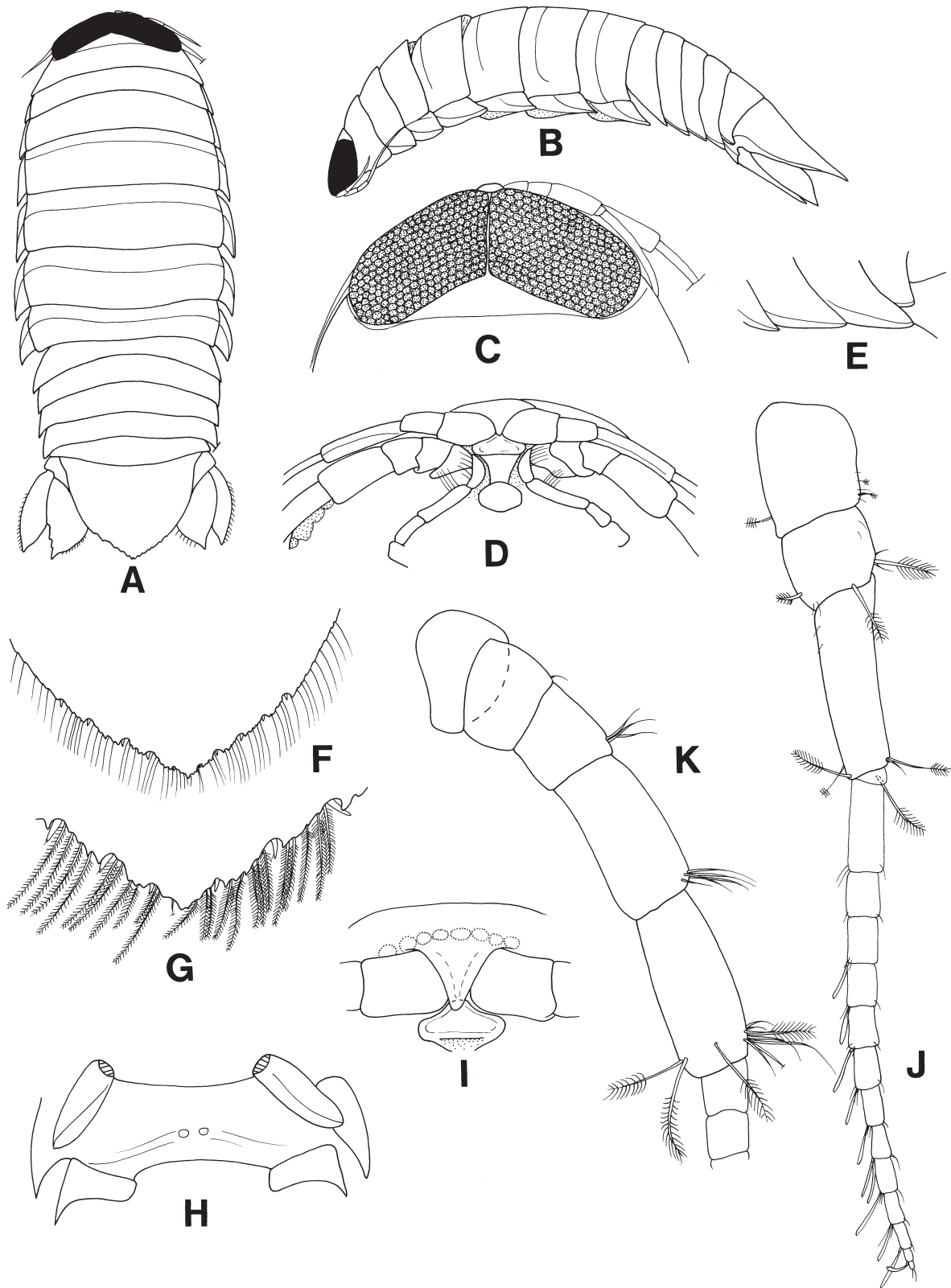
**MATERIAL EXAMINED:** *Holotype:* ♂ (14.8 mm), Chatham Rise, 42°45.89'S, 179°59.16'W, 19 April 2001, 800–757 m, coll. RV *Tangaroa* (NIWA 24019).

*Paratypes:* 7 ♂ (10.5, 11.0, 11.5, 12.0, 12.5 dissected, 12.5, 13.0 mm), 12 ♀ (ovig. 14.0, 14.0, 15.0, 15.5, 15.5, 15.6, 16.0; non-ovig. 11.6, 12.5, 15.0, 15.0, 16.0 mm), same data as holotype (NIWA 24020). ♀ (non-ovig 10.5 mm), Chatham Rise, 16 April 2001, 42°45.76'S, 179°59.29'W, 1064–750, coll. RV *Tangaroa* (NIWA 24021). ♂ (12.0 mm), Chatham Rise, 15 April 2001, 42°45.93'S, 179°59.34'W, 875–757 m, coll. RV *Tangaroa* (NIWA 24022).

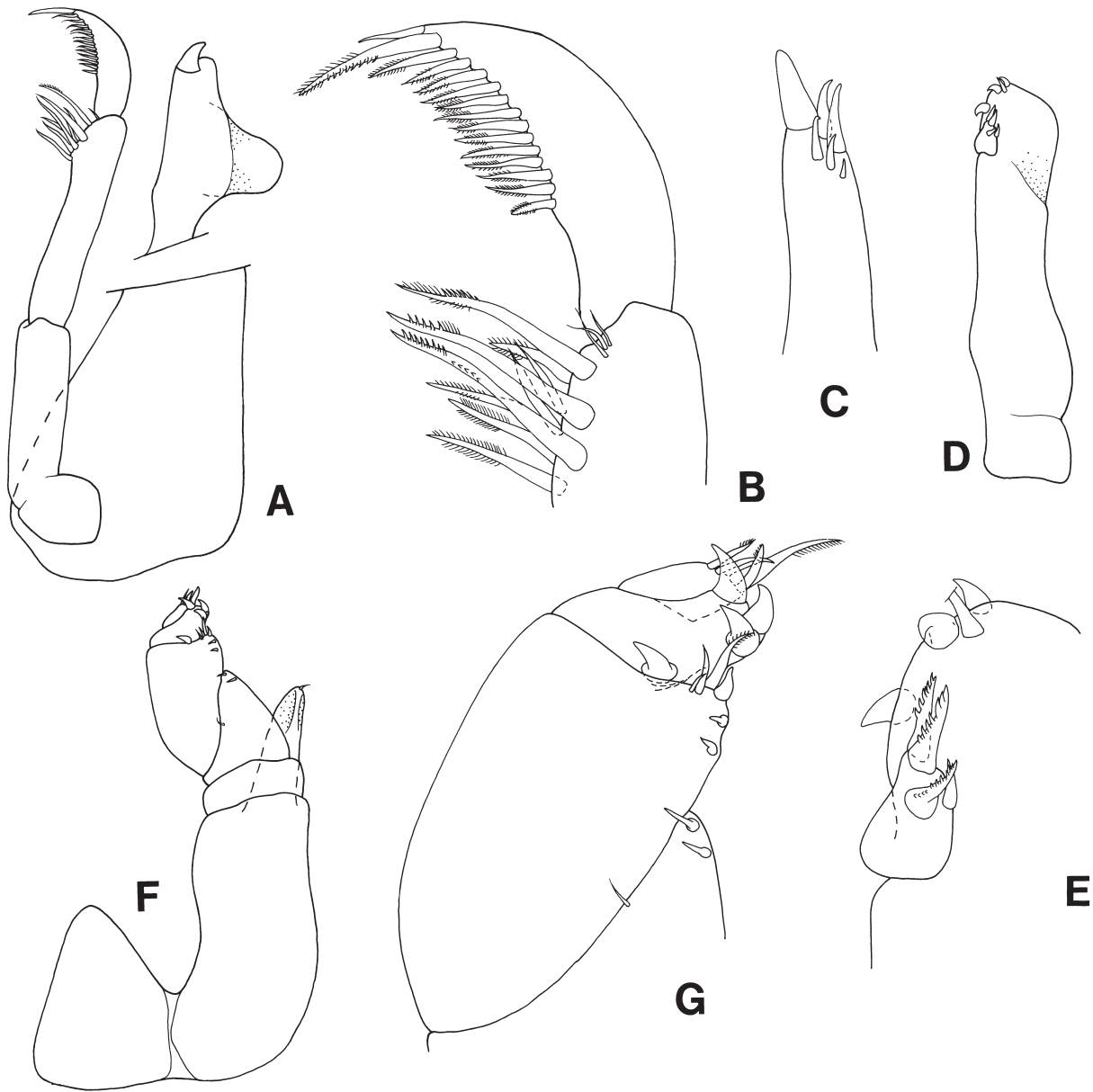
*Additional material:* ♂ (9.5 mm), ♀ (13.0 mm ovig), manca (7.5 mm), north of Chatham Rise, 13 September 1963, 43°04.00'S, 178°38.99'W, 549 m, stn. A910 (two tubes) (NIWA 24023). ♀ (15.8 mm, ovig, v. poor condition), vicinity of Hikurangi Trough, 15 September 1987, 39°51.90'S, 177°25.19'E, 413 m (NIWA 24024). **New Caledonia:** 2 ♀ (ovig. 12.0, 13.2 mm), 24°39.31'S, 168°39.67'E, 29 October 1986, 600 m, CHALCAL II, stn DW75 (MNHN Is.5911). 2 ♀ (non-ovig. 9.9, 12.9 mm), New Caledonia, 24°54.5'S, 168°22.3'E, 28 October 1986, 527 m, CHALCAL II, stn DW72 (MNHN Is.5912).

**DESCRIPTION:** *Body* 2.5 times as long as greatest width, dorsal surfaces smooth, widest at pereonite 5, lateral margins weakly ovate. Rostral point folded ventrally and posteriorly. *Eyes* large, medially united (very narrow gap present), anterior clear field 5% length of head, posterior clear field 28% length of head; each eye made up of ~15 transverse rows of ommatidia, each row with ~9 ommatidia; eye colour black. *Pereonite 1 and coxae* 2–3 each with posteroventral angle right-angled. *Coxae* 5–7 with entire oblique carina (coxae 5–7 dorsal margin concave); posterior margins straight, postero-lateral angle acute (less than 45°). *Pleon* with pleonite 1 visible in dorsal view; pleonite 4 with posterolateral margins not extending to posterior margin of pleonite 5; pleonite 5 with posterolateral angles free, not overlapped by lateral margins of pleonite 4. *Pleotelson* 0.9 times as long as anterior width, dorsal surface without longitudinal carina; lateral margins convex, serrate or notched, posterior margin converging to caudomedial point, with 8–10 RS.

*Antennule* peduncle articles 3 and 4 1.0 as long as combined lengths of articles 1 and 2, article 3 3.4 times as long as wide (narrowing distally); flagellum



**Figure 65.** *Aegiochus kanohi* sp. nov. J, K, male paratype 12.5 mm NIWA 24020, remainder holotype. A, dorsal view; B, lateral view; C, head; D, frons; E, pleonite, lateral view; F, pleotelson, setation on posterior margin; G, pleotelson apex; H, sternite 7 showing penial openings; I, frons, anterior view; J, antennule; K, antenna peduncle.



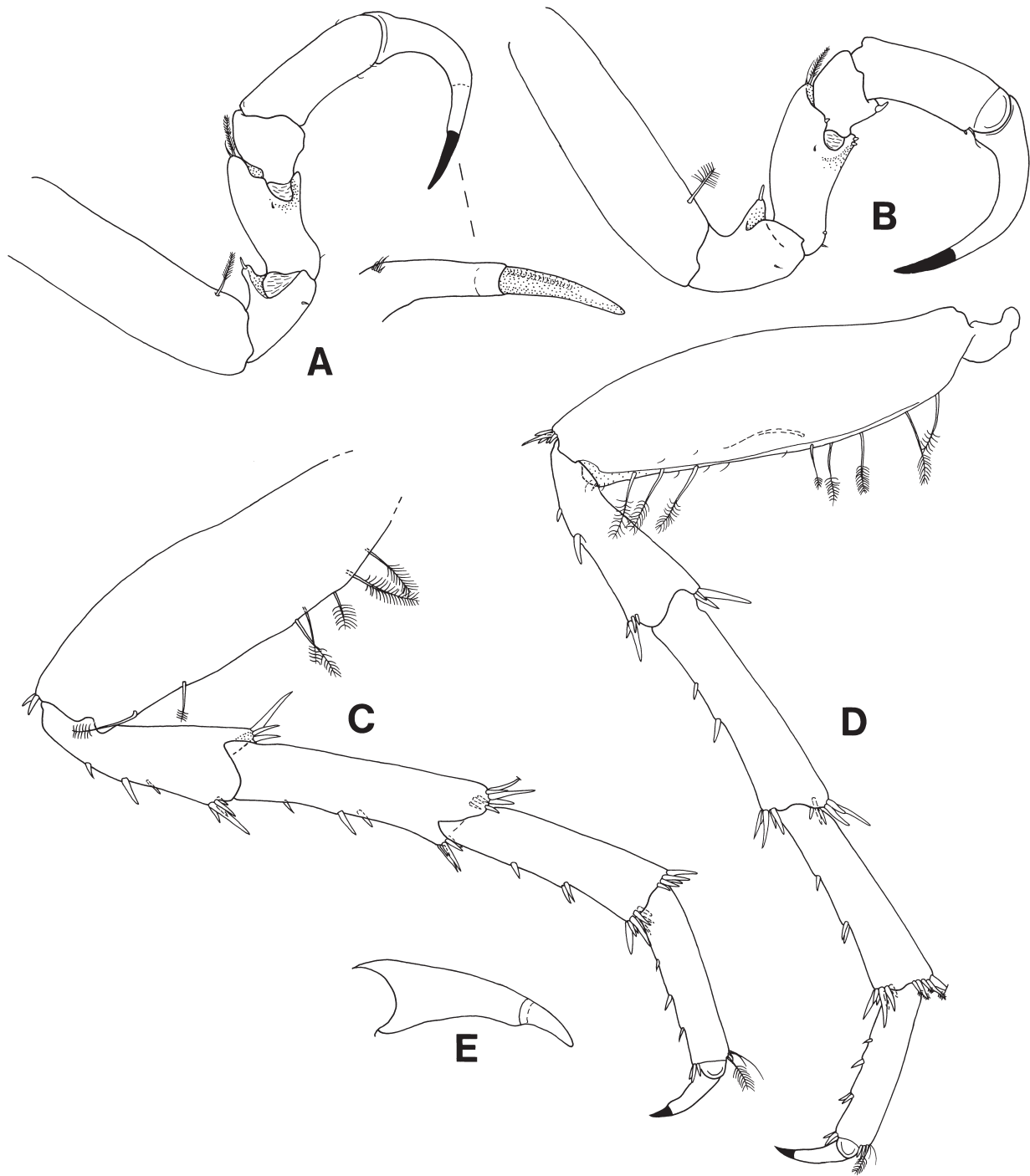
**Figure 66.** *Aegiochus kanohi* sp. nov. Male paratype 12.5 mm NIWA 24020. A, mandible; B, mandible palp, article 3; C, maxillule; D, maxilla; E, maxilla apex; F, maxilliped; G, maxilliped articles 2-5.

with 13 articles, extending to posterior of pereonite 1. *Antenna* peduncle article 4 1.9 times as long as wide, 0.8 times as long as combined lengths of articles 1-3, inferior margin 0 plumose setae, and 5 short simple setae (anterodistal angle); article 5 1.1 times as long as article 4, 2.2 times as long as wide, inferior margin with 2 palmate setae (at distal angle), anterodistal angle with cluster of 6 short simple setae (simple and 2 pappose); flagellum with 16 articles, extending to posterior of pereonite 3.

*Frontal lamina* posterior margin free, downwardly projecting, blade-like (weakly blade-like, not flat),

wider than long, diamond shaped, anterior margin acute, forming median angle, posterior margin not abutting clypeus.

*Mandible* molar process present, small distinct flat lobe; palp article 2 with 9 distolateral setae (large biserrate, 3 short simple), palp article 3 with 16 setae. *Maxillule* with 6 terminal RS (5 slender, 1 large). *Maxilla* mesial lobe with 4 RS (3 serrate, 1 simple); lateral lobe with 4 RS (3 hooked, 1 straight). *Maxilliped* endite with 1 apical seta; palp article 2 with 2 RS (hooked); article 3 with 6 recurved RS (3 recurved, 2 simple, 1 biserrate);

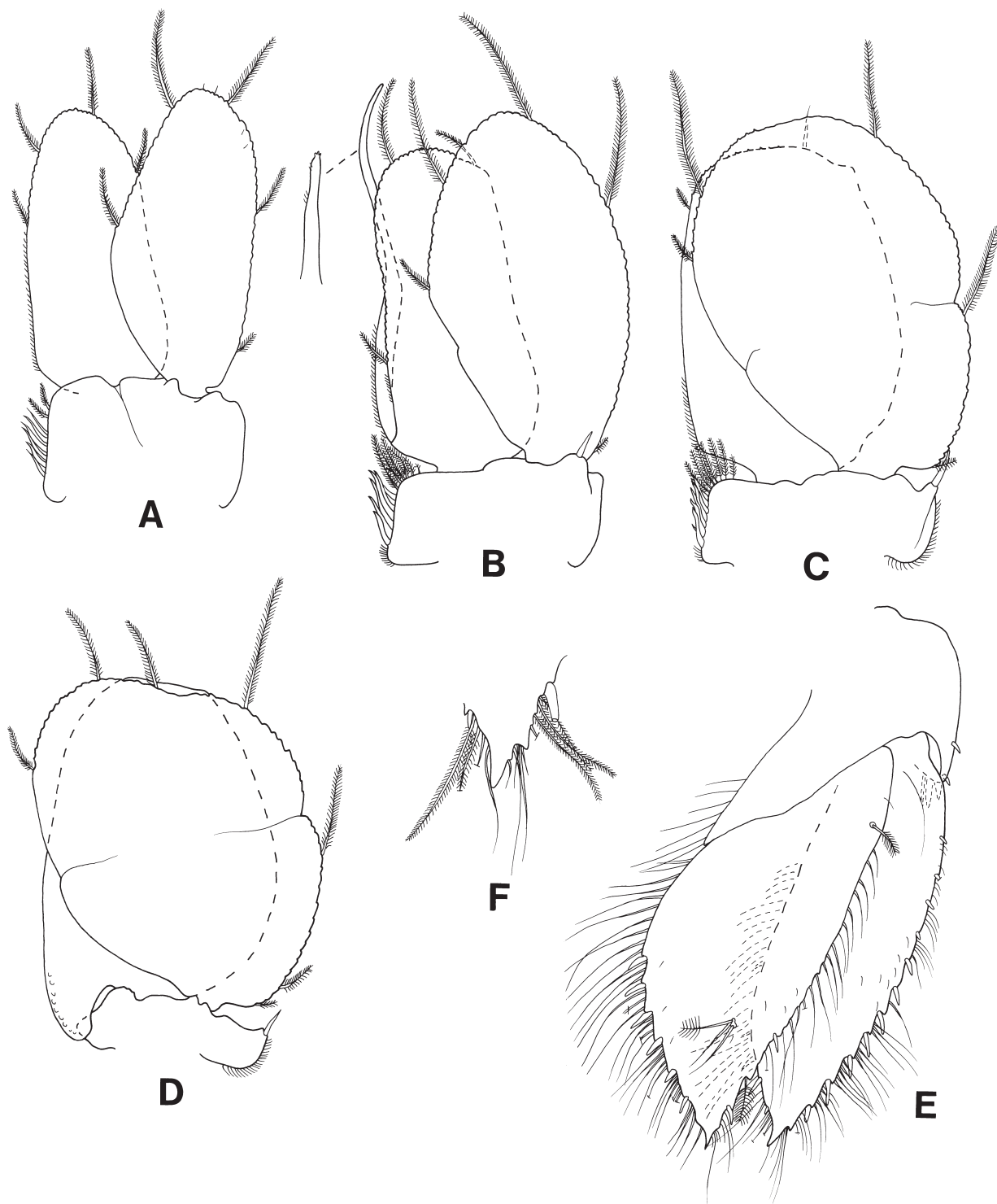


**Figure 67.** *Aegiochus kanohi* sp. nov. A, B, holotype, remainder paratype 12.5 mm NIWA 24020. C, male paratype, remainder holotype. A-D, pereopods 1, 2, 6 and 7 respectively; E, pereopod 6, dactylus.

article 4 with 4 hooked RS; article 5 with 4 RS (straight, 3 short, 1 long and serrate).

*Pereopod 1* basis 3.5 times as long as greatest width; ischium 0.3 times as long as basis, inferior margin with 0 RS, superior distal margin with 1 RS; merus inferior

margin with 0 RS, superior distal angle with 0 RS (1 simple and 1 plumose slender setae); carpus 0.6 as long as merus, inferior margin with 0 RS; propodus 2.7 times as long as proximal width, inferior margin with 0 RS, propodal palm simple, without blade or



**Figure 68.** *Aegiochus kanohi* sp. nov. A, B, holotype, remainder paratype 12.5 mm NIWA 24020. A–D, pleopods 1–3, 5, respectively; E, uropod; F, uropod exopod, apex.

process, dactylus abruptly hooked, 1.4 as long as propodus. *Pereopod 2* ischium inferior margin with 0 RS, superior distal margin with 1 RS; merus inferior margin with 2 RS (minute, set as 1 and 1), set as two groups,

superior distal margin with 0 acute RS (1 simple and 1 plumose slender setae); carpus similar in size to that of pereopod 1, inferodistal angle with 1 RS. *Pereopod 3* similar to pereopod 2. Pereopods 5–7 inferior margins



of ischium–carpus with short RS. *Pereopod* 6 similar to pereopod 7 (slightly longer with slightly more RS). *Pereopod* 7 basis 2.9 times as long as greatest width, inferior margins with 8 palmate setae; ischium 0.5 as long as basis, inferior margin with 2 RS (as 1 and 1), superior distal angle with 3 RS, inferior distal angle with 4 RS; merus 1.2 as long as ischium, 3.6 times as long as wide, inferior margin with 2 RS (set as 1 and 1), superior distal angle with 6 RS, inferior distal angle with 5 RS; carpus 1.1 as long as ischium, 3.5 times as long as wide, inferior margin with 3 RS (set as 1 and 2), superior distal angle with 6 RS, inferior distal angle with 7 RS; propodus 0.9 as long as ischium, 4.7 times as long as wide, inferior margin with 3 RS (set as 1 and 2), superior distal angle with 3 slender setae (2 slender, 1 plumose), inferior distal angle with 3 RS.

*Penes* opening flush with surface of sternite 7; penial openings separated by 5% of sternal width.

*Pleopod* 1 exopod 2.2 times as long as wide, distally narrowly rounded, mesial margin weakly oblique, lateral margin straight, mesial margin strongly convex, with PMS on distal half, with ~50 PMS; endopod 2.1 times as long as wide, distally rounded, lateral margin weakly concave, with PMS on distal one-third, mesial margin with PMS on distal one-third, endopod with ~30 PMS; peduncle 1.6 times as wide as long, mesial margin with 6 coupling hooks (and 2 PMS). *Pleopod* 2 exopod with ~65 PMS, endopod with ~38 PMS; *appendix masculina* basally swollen (sinuate), 1.2 times as long as endopod, distally acute. *Pleopod* 3 exopod with ~68 PMS, endopod with ~18 PMS. *Pleopod* 4 exopod with ~65 PMS, endopod with ~13 PMS. *Pleopod* 5 exopod with ~55 PMS. Exopods of pleopods 1–3 each with distolateral margin not digitate; endopods of pleopods 3–5 each with distolateral point; pleopods 2–4 peduncle distolateral margin with prominent acute RS.

*Uropod* peduncle ventrolateral margin with 3 RS (and single slender seta), posterior lobe about one-third as long as endopod. *Endopod* apically not bifid, lateral margin straight, without prominent excision, proximal lateral margin with 1 RS, distal lateral margin with 1 RS, mesial margin weakly convex, with 7 RS. *Exopod* not extending to end of endopod, 3.0 as long as greatest width, apically not bifid; lateral margin weakly convex, with 11 RS; mesial margin weakly convex, with 5 RS.

**FEMALE:** Ovigerous females' BL is twice as long as the greatest width, with ovate lateral margins; otherwise similar in appearance to males other than for the sexual characters. Brood pouch of oostegites arising from the coxae/sternite of pereopods 1–5.

**SIZE:** Males 9.5–14.8 mm (mean = 12.2 mm,  $n=8$ ); ovigerous females 13.0–16.0 mm (mean = 15.1 mm,

$n=7$ ); non-ovigerous females 11.6–16.0 mm (mean = 14.0 mm,  $n=5$ ).

**VARIATION:** *Robust setae:* ( $n=20$ ) pleotelson RS 4+4 (60%) or 5+5 (30%) with 4+5 occurring twice; apical pair of setae small; the pleotelson apex is often damaged. Uropod exopod ( $n=37$ ) mesial margin with 4 (27%), 5 (49%) or 6 (19%) with 3 twice; lateral margin 11 (27%) or 12 (68%), one specimen with 13; uropod endopod mesial ( $n=38$ ) margin varied from 5 to 8 RS with 6 (45%) or 7 (36%) the most frequent, lateral margin with 1+1 on all but one specimen. There is no discernable difference between males and females, nor does the number of RS increase with the size of the specimen.

**REMARKS:** The united eyes, truncate posterior margins of coxal plates 2 and 3, noticeably slender pereopods, relatively narrow frontal lamina with the posterior margin forming a transverse ridge rather than a distinct blade, distinctive long and sinuate appendix masculina in the males and the setation of robust setae on the uropods and pleotelson all allow ready identification of *A. kanohi*.

The only similar New Zealand species with large eyes is *Aegiochus kakai* sp. nov., and that species is immediately distinguished by having far smaller eyes, a wider frontal lamina, the clear space distal to the palmate seta on the uropod endopod lateral margin is straight (concave in *A. kakai*), the posteroventral angles of pereonite 1 and coxae 2–4 each with prominent and acute points, and a straight appendix masculina.

Other similar species are *Aegiochus coroo* (Bruce, 1983) from southeastern Australia and *Aegiochus synophthalma* (Richardson, 1909) from Japan. The former lacks robust setae on the pleotelson, has more robust pereopods, pleopodal exopods are strongly digitate and the appendix masculina is shorter and straight. The latter species, known only from the female holotype, has a longer frontal lamina, the uropod endopod lateral margin has 4 robust setae (compared to 2 in *A. kanohi* sp. nov.) as well as having fewer robust setae on the uropodal exopod lateral margin (8 v. 12).

**PREY:** Not known.

**DISTRIBUTION:** Recorded from the Chatham Rise, off eastern South Island, and east of Hawkes Bay, North Island, New Zealand; also off southern New Caledonia; at depths from to 413 to 1064 metres.

**ETYMOLOGY:** Kanohi is a Māori word for 'eye'; noun in apposition.

*Aegiochus laevis* (Studer, 1884), comb. nov.  
(Figs 69, 70)

*Cirolana laevis* Studer, 1884\*: 21, pl. II, fig. 8.- Hale, 1925: 145.- Nierstrasz, 1931: 157.- Bruce, 1981: 961.  
*Aega novi-zealandiae*.- Tattersall, 1921: 213, pl. IV, figs 11-14.- Hurlley, 1961: 268 [misidentification].  
*Aega (Ramphion) laevis*.- Brusca, 1983: 11.- Bruce, 1983: 763, figs 5, 6.  
*Aega laevis*.- Bruce, Lew Ton & Poore, 2003: 161.

MATERIAL EXAMINED: ♀ (ovig. 10.2 mm), off North Cape, 21 March 1968, 34°39.00'S, 172°13.99'E, 216 m (NIWA 23763). ♀ (ovig. 13.5 mm), 7 miles east of North Cape, New Zealand, bottom fauna, 128 m (as 70 fathoms), Terra Nova stn 96 (BMNH 1921.11.29.149 [Tattersall's 1921 specimen]).

TYPE LOCALITY: 'Ostlich von Queensland' (Studer 1884).

DESCRIPTION: *Body* 2.0 as long as greatest width, dorsal surfaces smooth, widest at pereonite 5, lateral margins weakly ovate or ovate. Rostral point folded ventrally and posteriorly. *Eyes* moderate, combined widths 50-65% width of head, separated by about 32% width of head; each eye made up of ~9 transverse rows of ommatidia, each row with ~7 ommatidia; eye colour black. *Pereonite 1 and coxae* 2-3 each with posteroventral angle right-angled. *Coxae* 5-7 with entire oblique carina; posterior margins concave, posterolateral angle acute (less than 45°). *Pleon* with pleonite 1 largely concealed by pereonite 7; pleonite 4 with posterolateral margins extending to but not beyond posterior margin of pleonite 5; pleonite 5 with posterolateral angles overlapped by lateral margins of pleonite 4. *Pleotelson* 0.7 times as long as anterior width, dorsal surface without longitudinal carina; lateral margins convex, serrate, posterior margin converging to caudomedial point, with 2 RS.

*Antennule* peduncle extending to posterior of pereonite 1. *Antenna* flagellum extending to posterior of pereonite 3 or pereonite 4.

*Frontal lamina* posterior margin free, downwardly projecting, blade-like, wider than long, triangular, anterior margin with median point, posterior margin not abutting clypeus.

*Mandible* molar process present, minute.

*Pereopod 1* basis 2.1 times as long as greatest width; ischium 0.4 times as long as basis, inferior margin with 0 RS (1 long simple seta), superior distal margin with 1 RS; merus inferior margin with 1 RS, set as distal group, superior distal angle with 0 RS; carpus 0.8 as long as merus, inferior margin with 1 RS (large); propodus

1.7 times as long as proximal width, inferior margin with 2 RS, propodal palm simple, without blade or process, dactylus smoothly curved, 1.2 as long as propodus. *Pereopod 2* ischium inferior margin with 0 RS, superior distal margin with 2 RS; merus inferior margin with 6 RS, set as two groups, superior distal margin with 2 acute RS; carpus similar in size to that of pereopod 1, inferodistal angle with 1 RS. *Pereopod 3* similar to pereopod 2. *Pereopods 5-7* inferior margins of ischium-carpus with short RS. *Pereopod 6* similar to pereopod 7. *Pereopod 7* basis 2.7 times as long as greatest width, inferior margins with 6 palmate setae; ischium 0.4 as long as basis, inferior margin with 3 RS (set as 1, 2), superior distal angle with 3 RS, inferior distal angle with 3 RS; merus 1.0 as long as ischium, 2.2 times as long as wide, inferior margin with 2 RS (single cluster), superior distal angle with 10 RS, inferior distal angle with 6 RS; carpus 1.1 as long as ischium, 2.7 times as long as wide, inferior margin with 3 RS (set as 1, 2), superior distal angle with 9 RS, inferior distal angle with 7 RS; propodus 1.0 as long as ischium, 3.8 times as long as wide, inferior margin with 3 RS (set as 1, 2), superior distal angle with 2 slender setae (and 1 RS), inferior distal angle with 3 RS.

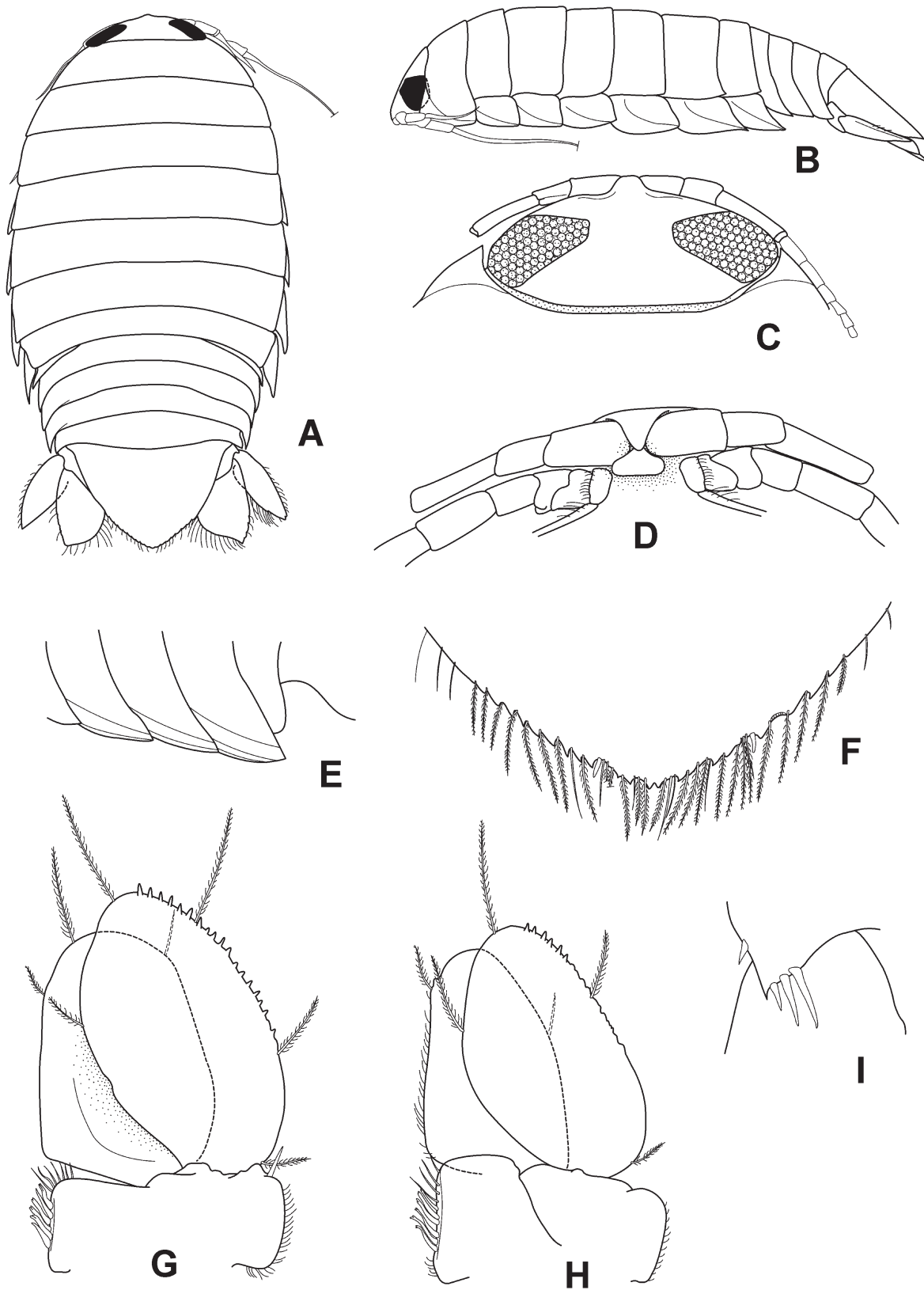
*Pleopod 1* exopod 1.7 times as long as wide, distally broadly rounded, lateral margin straight, mesial margin strongly convex, with PMS from distal one-third, with ~50 PMS; endopod 1.6 times as long as wide, distally rounded, lateral margin convex, with PMS from distal half, mesial margin with PMS on distal margin only, endopod with ~24 PMS; peduncle 1.9 times as wide as long, mesial margin with 6 coupling hooks. *Exopods of pleopods 1-3* each with distolateral margin digitate; endopods of pleopods 3-5 each with distolateral point; pleopods 2-5 peduncle distolateral margin with prominent acute RS.

*Uropod* peduncle ventrolateral margin with 3 RS, posterior lobe about three-quarters as long as endopod. *Endopod* apically not bifid, lateral margin weakly convex, without prominent excision, proximal lateral margin with 0 RS, distal lateral margin with 2 RS, mesial margin weakly convex, with 4 RS. *Exopod* not extending to end of endopod, 2.3 times as long as greatest width, apically not bifid; lateral margin convex, with 8 RS; mesial margin convex, with 4 RS.

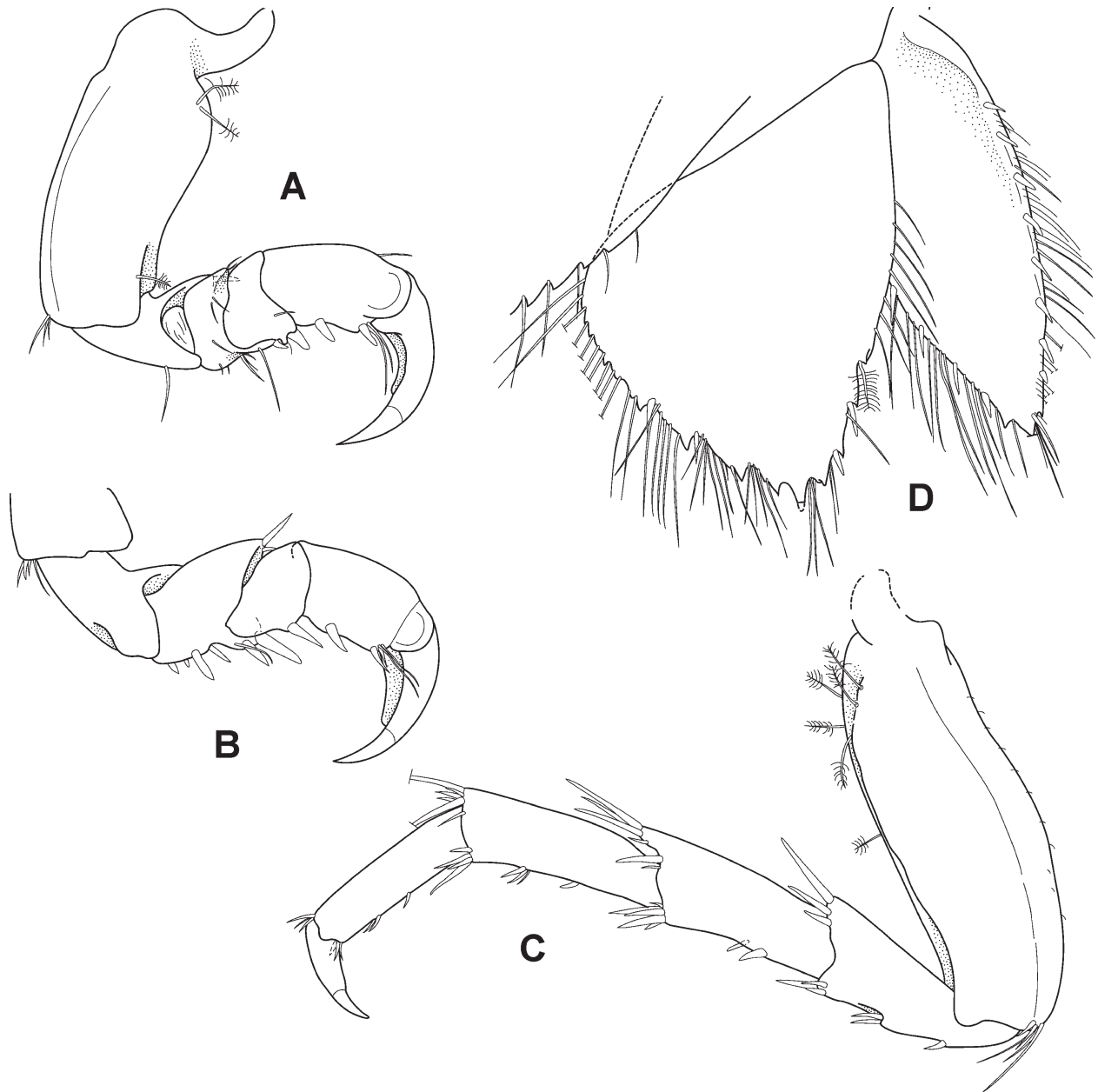
REMARKS: *Aegiochus laevis* can be identified by the relatively small eyes, triangular frontal lamina with free posterior margin, relatively prominent robust setae on the inferior margins of pereopods 1-3, and the pattern of robust setae on the uropodal rami and posterior margin of the pleotelson. *A. laevis* is further characterised by the distolateral margins of the pleopod exopods, particularly pleopods 1-3, being digitate.

The New Zealand specimens agree entirely with the redescription of the holotype given by Bruce (1983),

\* The date for this publication is usually cited as 1883, but the library volume held at the ZMUC had the date of publication as 1884.



**Figure 69.** *Aegiochus laevis* (Studer, 1883). NIWA 23763. A, dorsal view; B, lateral view; C, head, dorsal view; D, frons; E, pleonites, lateral margin; F, pleotelson, posterior margin; G, pleopod 1; H, pleopod 2; I, uropod peduncle, distolateral angle.



**Figure 70.** *Aegiochus laevis* (Studer, 1883). NIWA 23763. A-C, pereopods 1, 2 and 7 respectively; D, uropod.

with close correspondence of the frontal lamina, antennule, antenna, pereopods, pleopods and uropods. The holotype was described as lacking robust setae on the posterior margin of the pleotelson, whereas one New Zealand specimen has two robust setae; it is common for such setae to be missing from old specimens and this is not here regarded as being definitive in the holotype. The North Cape specimen (BMNH) has a 'rubbed' pleotelson that lacks robust setae, though indentations suggest that it too may have had two robust setae. An abbreviated description is given here to allow ready identification.

There are four other New Zealand species with digitate pleopods – *A. insomnis* sp. nov., *A. nohinohi*

sp. nov., *A. gordonii* sp. nov. and *A. coroo* (Bruce, 1983) (and also *Aegiochus bertrandi* sp. nov., which is within the northern reaches of the New Zealand chart area). Of these, *A. coroo* has large medially united eyes, and all except *A. nohinohi* have relatively weak or minute robust setae on pereopods 1–3. *Aegiochus nohinohi* has a more slender body shape, larger eyes, the robust setae on pereopods 1–3 are smaller and the posterior margin of the pleotelson lacks robust setae.

PREY: Not known.

DISTRIBUTION: Northern New Zealand, northwards to Queensland, Australia; potentially widespread in the

southwestern or western Pacific; recorded depths of 126 to 216 metres.

*Aegiochus nohinohi* sp. nov. (Figs 71–74)

MATERIAL EXAMINED: *Holotype*. ♀ (non-ovig. 9.0 mm), Rumble III Sea Mount, 35°44.51–44.35'S, 178°30.20–29.75'E, 19 May 2001, 470–260 m, on scoria rubble, coll. RV *Tangaroa* (NIWA 24009).

*Paratypes*. 4 ♂ (4.9, 5.0, 5.2, 6.7 mm), 4 ♀ (non-ovig. 6.4, 6.9 [dissected], 8.6 [dissected], 9.0 mm), manca (4.4 mm), same data as holotype (all at least slightly damaged; NIWA 24010). ♀ (non-ovig. 7.0 mm), Rumble III Sea Mount, 35°44.38–44.35'S, 178°29.85–29.44'E, 19 May 2001, 420–200 m, on scoria rubble, coll. RV *Tangaroa* (NIWA 24011). ♀ (non-ovig. 7.1 mm), Rumble III Sea Mount, 35°44.40–44.71'S, 178°29.85–30.02'E, 19 May 2001, 196–415 m, on scoria rubble, coll. RV *Tangaroa* (NIWA 24012). ♀ (ovig. 7.5 mm), Rumble III Sea Mount, 35°44.28–43.98'S, 178°29.89–30.03'E, 20 May 2001, 340–300 m, on scoria rubble, coll. RV *Tangaroa* (NIWA 24013). ♂ (5.2 mm), manca (3.4 mm), Rumble III Sea Mount, 35°44.34–44.24'S, 178°29.74–29.53'E, 23 May 2001, 200–500 m, on scoria rubble, coll. RV *Tangaroa* (NIWA 24014). 2 ♀ (ovig. 10.2; non-ovig. 9.0 mm), Rumble V Sea Mount, 36°08.70–40'S, 178°12.07–11.81'E, 24 May 2001, 1140–690 m, on scoria rubble, coll. RV *Tangaroa* (NIWA 24015).

*Non-type*. ♀ (ovig. 6.5 mm, crushed), Rumble III Sea Mount, 35°44.49–44.52'S, 178°29.84–29.40'E, 19 May 2001, 1426–270 m, on scoria rubble, coll. RV *Tangaroa* (NIWA 24016). 2 ♀ (ovig 7.7; non-ovig. 9.3 mm), coll. RV *Kaharoa* (NIWA 24017). ♂ (6.4 mm), ♀ (ovig. 8.5, 8.6, non-ovig. 6.0 mm), manca (3.8 mm), 43.0667°S, 178.6500°E, September 1963, 549 m (NIWA 24018). ♂ (6.2 mm), manca (5.0 mm), off Three Kings Island, 34°13.0'S, 174°11.5'E, 19 Feb 1974, BS 396, 256 m, coll. RV *Acheron* (AK 4604).

?♂ (6.9 mm), east of Bermagui, New South Wales, Australia, 36°25.2'S, 150°18.5'E, 5 September 1994, 220 m, coll. *Southern Surveyor* (AM P74738).

DESCRIPTION: *Body* 2.8 times as long as greatest width, dorsal surfaces polished in appearance, widest at pereonite 6, lateral margins subparallel. *Rostral point* present, folded ventrally and posteriorly. *Eyes* large, not medially united (just under 50%), separated by about 16% width of head; each eye made up of ~7 transverse rows of ommatidia, each row with ~9 ommatidia; eye colour red. *Pereonite 1 and coxae* 2–3 each with posteroventral angle rounded. *Coxae* 5–7 with entire oblique carina; posterior margins convex, posterolateral angle blunt (more than 45°). *Pleon* with pleonite 1 visible in dorsal view; pleonite 4 with posterolateral margins not extending to posterior margin of pleonite 5; pleonite 5 with posterolateral angles

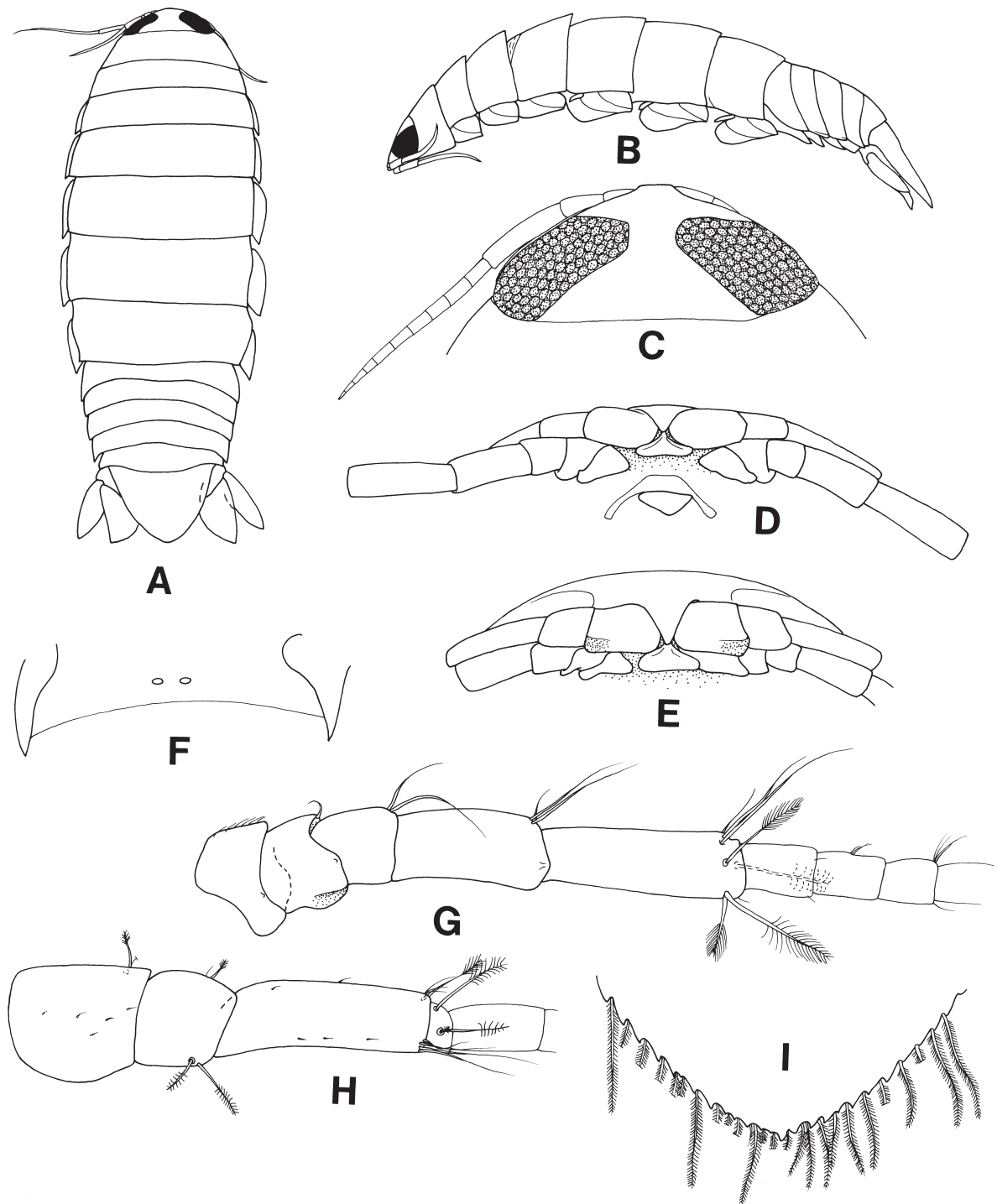
free, not overlapped by lateral margins of pleonite 4. *Pleotelson* 0.8 times as long as anterior width, dorsal surface without longitudinal carina; lateral margins convex, serrate (weakly), posterior margin converging to caudomedial point, with 0 RS.

*Antennule* peduncle articles 3 and 4 1.0 times as long as combined lengths of articles 1 and 2, article 3 2.9 times as long as wide; flagellum with 11 articles, extending to posterior of pereonite 1. *Antenna* peduncle article 4 2.2 times as long as wide, 0.8 times as long as combined lengths of articles 1–3, inferior margin with 0 plumose setae, and 0 short simple setae (anterodistal angle with 4 long simple setae); article 5 1.3 times as long as article 4, 2.8 times as long as wide, inferior margin with 2 pappose setae, anterodistal angle with cluster of 5 short simple setae (long SS, and 2 pappose setae); flagellum with 14 articles, extending to posterior of pereonite 3.

*Frontal lamina* posterior margin free, downwardly projecting, blade-like, wider than long, posterior margin concave; anterior margin with median point, posterior margin not abutting clypeus.

*Mandible* molar process present, small distinct flat lobe; palp article 2 with 4 distolateral setae (2 serrate, 2 simple), 3 with 13 setae. *Maxillule* with 6 terminal RS (1 large, 5 slender). *Maxilla* mesial lobe with 2 RS (1 biserrate); lateral lobe with 3 RS. *Maxilliped* endite with 0 apical setae; palp article 2 with 2 RS; article 3 with 4 recurved RS (all slender); article 4 with 4 hooked RS (and 1 small slender; unevenly spaced with 1 proximal 3 distal); article 5 articulating with article 4, with 4 hooked/straight RS (2 large, one of which is serrate, and 2 small slender).

*Pereopod 1* basis 2.5 times as long as greatest width; ischium 0.5 times as long as basis, inferior margin with 0 RS, superior distal margin with 1 RS; merus inferior margin with 0 RS (1 long and 1 short simple setae), superior distal angle with 0 RS (1 simple seta); carpus 0.6 as long as merus; inferior margin with 1 RS (large); propodus 1.9 times as long as proximal width, inferior margin with 2 RS (set as 1 and 1 distally), propodal palm simple, without blade or process, dactylus smoothly curved, 1.2 as long as propodus. *Pereopod 2* ischium inferior margin with 0 RS, superior distal margin with 1 RS; merus inferior margin with 3 RS (set as 1 and 2 plus distal large simple seta), set as in two groups, superior distal margin with 0 acute RS (1 simple seta); carpus similar in size to that of pereopod 1 or longer than that of pereopod 1, with inferodistal lobe, inferodistal angle with 1 RS. *Pereopod 3* similar to pereopod 2. *Pereopods 5–7* superior margins of ischium–carpus without setae. *Pereopod 6* similar to pereopod 7 (with larger RS). *Pereopod 7* basis 2.6 times as long as greatest width, inferior margin with 4 palmate setae; ischium 0.5 as long as basis, inferior margin with 3 RS (set singly), superior distal angle with

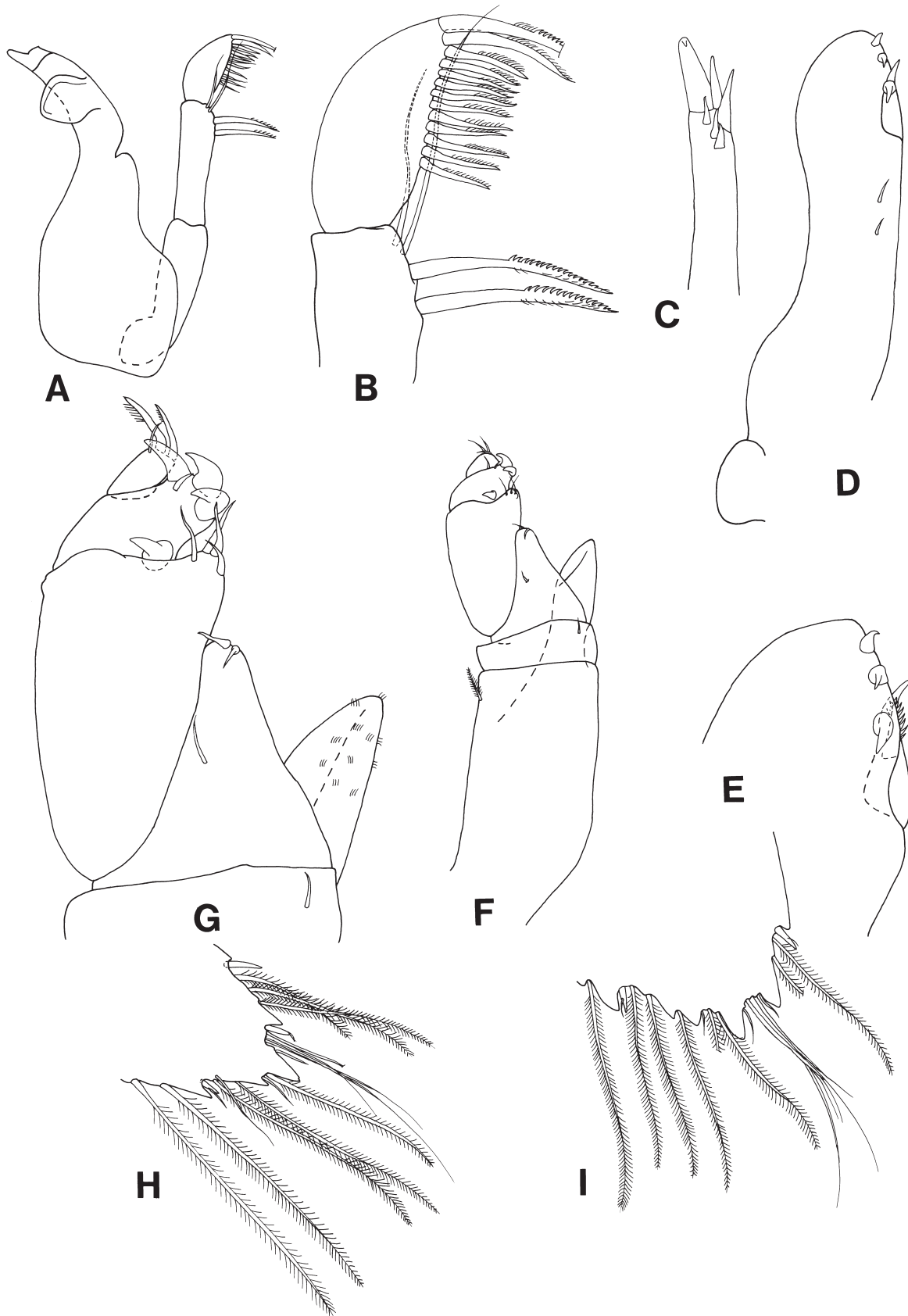


**Figure 71.** *Aegiochus nohinohi* sp. nov. G, H, female paratype (8.6 mm, NIWA 24010), remainder holotype. A, dorsal view; B, lateral view; C, head; D, frons, ventral view; E, frons, anterior view; F, penial openings; G, antenna peduncle; H, antennule peduncle.

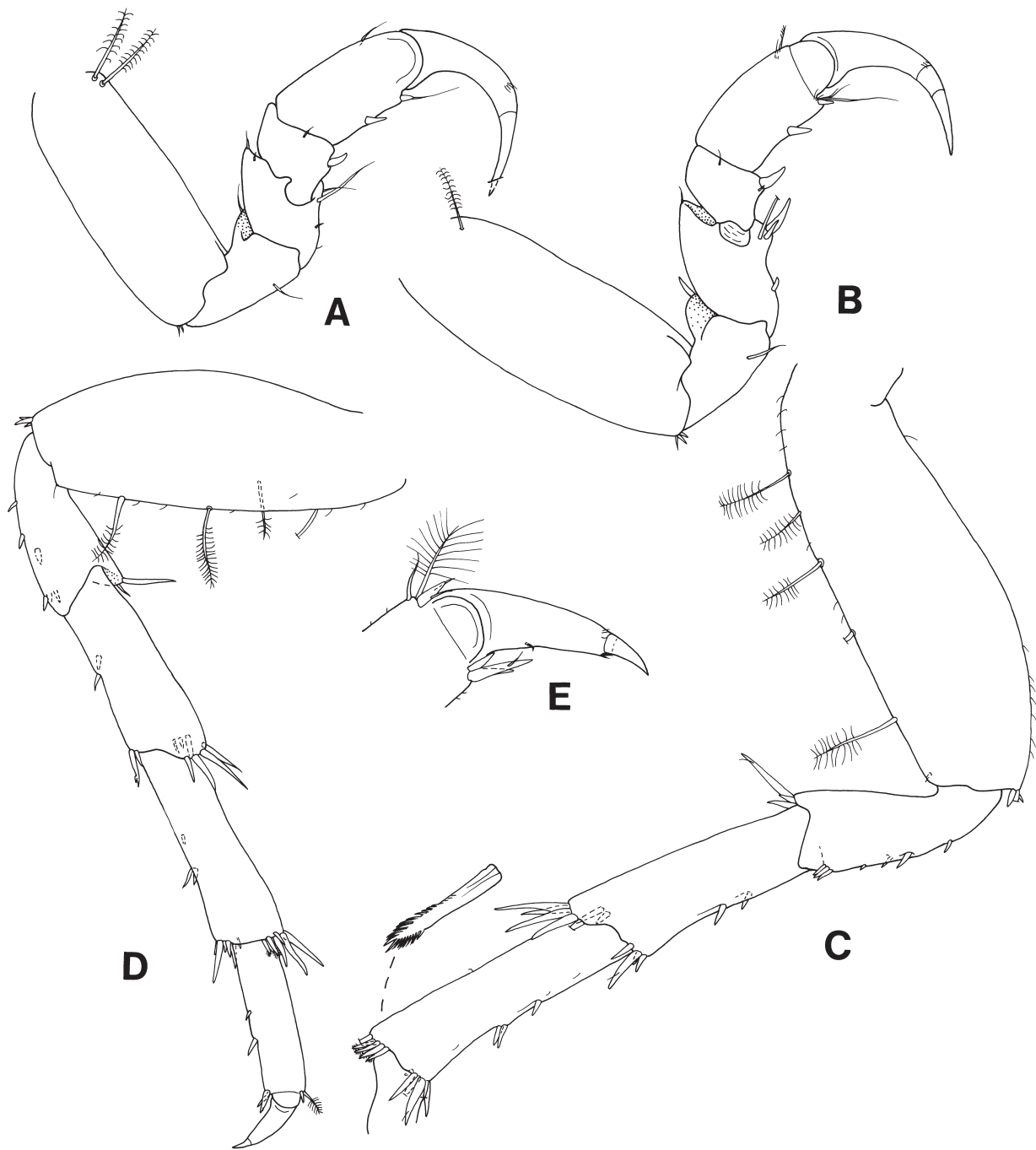
2 RS, inferior distal angle with 3 RS; merus 1.3 as long as ischium, 2.4 times as long as wide, inferior margin with 2 RS (single pair), superior distal angle with 7 RS, inferior distal angle with 4 RS; carpus 1.2 as long as ischium, 3.0 as long as wide, inferior margin with 3 RS (set as 1 and 2), superior distal angle with 6 RS (2 biserrate), inferior distal angle with 6 RS; propodus 1.1

as long as ischium, 4.3 times as long as wide, inferior margin with 2 RS (set singly), superior distal angle with 1 slender seta (2 small simple and 1 plumose setae), inferior distal angle with 3 RS.

*Penes* opening flush with surface of sternite 7; penial openings separated by 6% of sternal width.



**Figure 72.** *Aegiochus nohinohi* sp. nov. Female paratype (8.6 mm, NIWA 24010). A, mandible; B, mandible palp article 3; C, maxillule apex; D, maxilla ; E, maxilla apex; F, maxilliped; G, maxilliped articles 2-5; H, uropod exopod apex; I, uropod endopod apex.



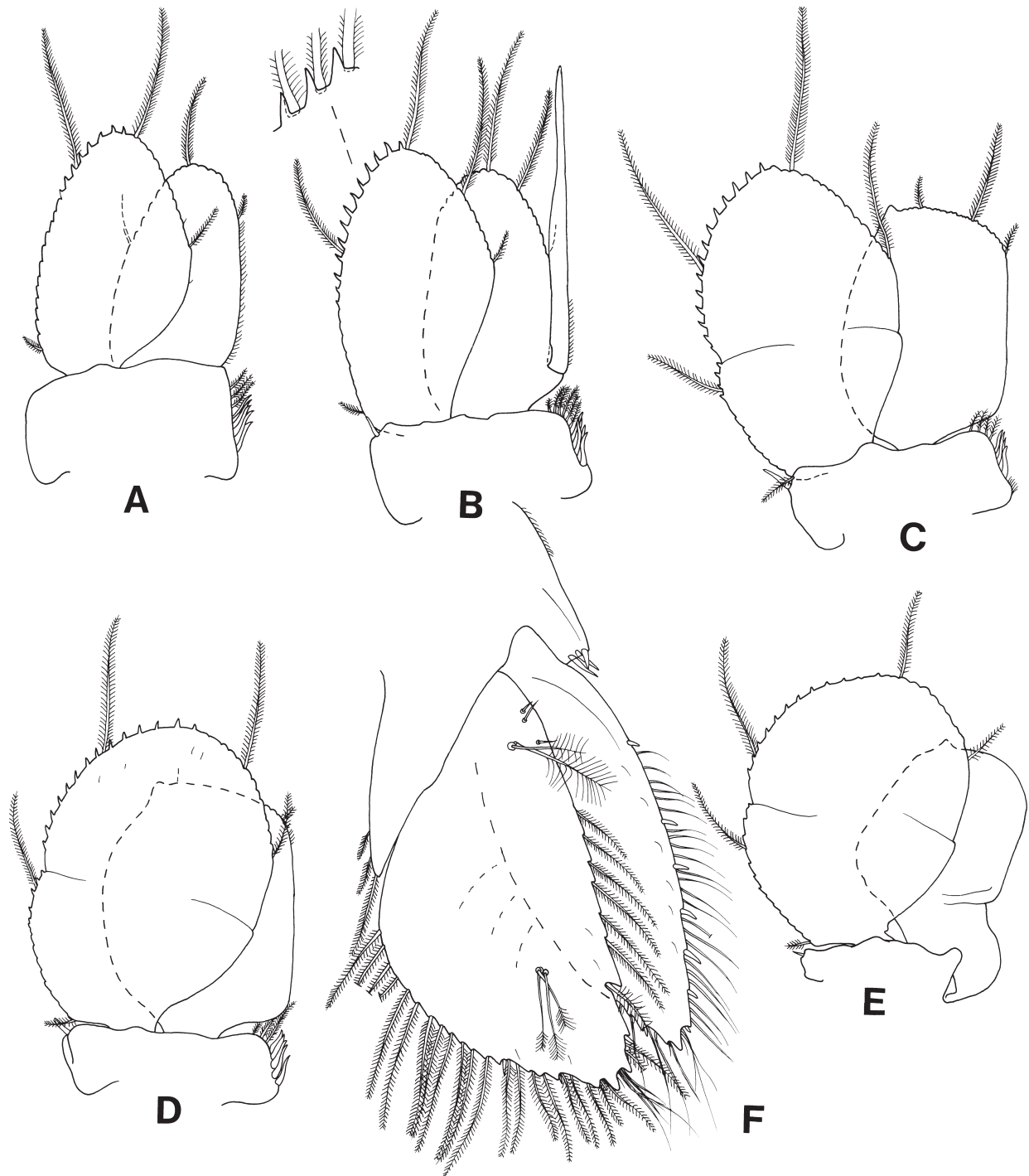
**Figure 73.** *Aegiochus nohinohi* sp. nov. Female paratype (6.9 mm, NIWA 24010). A-D, pereopods 1, 2, 6 and 7 respectively; E, dactylus unguis, pereopod 6; E, dactylus, pereopod 7.

*Pleopod 1* exopod 1.5 times as long as wide, lateral margin weakly convex, mesial margin strongly convex, with ~35 PMS; endopod 1.6 times as long as wide, lateral margin convex, mesial margin straight, endopod with ~17 PMS; peduncle 1.8 times as wide as long, peduncle mesial margin with 5 coupling hooks. *Pleopod 2* exopod with ~36 PMS, endopod with ~18 PMS; *appendix masculina* 1.2 times as long as endopod, distally acute. *Pleopod 3* exopod with ~49 PMS, endo-

pod with ~11 PMS. *Pleopod 4* exopod with ~40 PMS, endopod with ~10 PMS. *Pleopod 5* exopod with ~37 PMS. Exopods of pleopods 1-3 each with distolateral margin digitate; endopods of pleopods 3-5 each with distolateral point; pleopods 2-4 peduncle distolateral margin with prominent acute RS.

*Uropod* peduncle ventrolateral margin with 3 RS, posterior lobe about one-half as long as endopod. *Endopod* apically deeply bifid, mesial process promi-





**Figure 74.** *Aegiochus nohinohi* sp. nov. B holotype, remainder female paratype ([dissected] NIWA 24010). A-E, pleopods 1-5 respectively; E, uropod exopod, ventral view; F, uropod.

ment, lateral margin straight, without prominent excision, lateral margin with 1 RS, mesial margin weakly convex, with 2 RS (small). *Exopod* extending to end of endopod, 3.6 times as long as greatest width, apically deeply bifid, mesial process prominent; lateral margin weakly convex, lateral margin with 6 RS; mesial margin weakly convex, with 2 RS (small).

**FEMALE:** Similar to males, ovigerous females proportionally wider (2.1 times as long as greatest width).

**SIZE:** Males 4.9–6.7 mm (mean 5.4 mm,  $n = 5$ ); ovigerous females 6.5–10.2 mm, (mean 8.9 mm,  $n = 3$ ), non-ovigerous females 6.4–9.0 mm, (mean 7.7 mm,  $n = 7$ ); one manca measured 4.4 mm, and eggs measured 1.0–1.2 mm.

VARIATION: Most specimens were damaged with uropods crushed or broken. *Robust setae*: ( $n=13$ ) pleotelson always without RS. Uropod exopod mesial ( $n=19$ ) margin 0 (16%), 2 (42%) or 3 (36%), lateral margin 6 (56%) or 7 (44%); uropod endopod mesial margin ( $n=19$ ) with 0 (42%), 1 (37%) or 2 (21%), lateral margin with only 1 large RS distal to the pappose seta, twice without RS, possibly owing to damage. There is no discernable difference between males and females. The robust setae are small and fine.

The small size of the species precluded making accurate direct counts of the robust setae on pereopods 1 and 2 although of the specimens examined the pattern, number and size appears consistent.

REMARKS: *Aegiochus nohinohi* sp. nov., at an average length of 5.4 mm for males, about 8 mm for females, is the smallest species of the genus in New Zealand waters. *Aegiochus gordonii* sp. nov. is similar in many aspects, but is distinctly larger (on average 43–66% longer BL than *A. nohinohi*). There are numerous morphological differences between these two species, including the eyes being smaller and more widely separated in *A. nohinohi*, uropod endopod mesial margin with fewer (1 or 2) and smaller RS (usually 3 in *A. gordonii*); pereopods 1–3 with more and much larger RS on the merus, carpus and propodus than does *A. gordonii*; pereopods 1–3 with a relatively shorter dactylus (1.2 as long as propodus for *A. nohinohi* v. 1.4 as long for *A. gordonii*), and the pereopods are in general more robust. These two species are distinguished from all other species in New Zealand by their small size, separate eyes, serrate pleopod exopods and weakly serrate shield-shaped pleotelson that totally lacks robust setae.

*Aegiochus perulis* (Menzies & George, 1972), known only from the female holotype from the East Pacific off Chile, is similar in appearance and size (9.2 mm), with relatively small and widely separated eyes, a similar frontal lamina and similar uropod and pleotelson shape. It differs in the body shape being more ovate and in having 12 robust setae on the posterior margin of the pleotelson. The brief description (Menzies & George 1972) precludes further comparisons.

A single specimen from off Bermagui, New South Wales (AM P74738) is provisionally included under this name. It agrees well with the New Zealand material, differing only in having the antennule and antenna proportionally longer (extending to the posterior of pereonites 2 and 3 respectively).

PREY: Not known.

DISTRIBUTION: Recorded from the Chatham Rise to the east of South Island, the Brothers Sea Mounts to the northeast of North Island and off Three Kings Island; possibly also southeastern Australia.

At depths from 360 to 1140 metres (the minimum depth was recorded from a haul that ran from 360 to 755 metres, all other records are from 698 metres or greater).

ETYMOLOGY: *Nohinohi* is a Māori word that means small, this species being one of the smallest of those that occur New Zealand waters (noun in apposition).

*Aegiochus pihuka* sp. nov. (Figs 75–78)

MATERIAL EXAMINED: *Holotype*, ♂ (22 mm), northeast of Hawkes Bay, North Island, New Zealand, 37°01.39'S, 176°43.09'E, 20 Jul 1998, 972–1207 m, Z9181, from hexactinellid sponge (NIWA 23775).

*Paratypes*. **New Zealand**: ♀ (28 mm, dissected), Z9181, same data as holotype (NIWA 23776). ♂ (18.5 mm), off Hawkes Bay, 40°01.5'S, 178°03.3'E, 28 August 1986, from trawled sponge, 935 m (NMNZ Cr.5953). ♂ (17.0 mm), off White Island, 37°23.7'S, 177°39.5–36.6'E, 23 November 1981, 1075–1100 m, FV USSR *Kalinovo* (NMNZ Cr.12019).

*Non-type material*: **Australia, NSW**: 5 ♂ (17.0, 17.5, 18.0, 19.0, 19.5 mm), 6 ♀ (ovig. 27, 28, 29, 31; non-ovig. 26, 30 mm) east of Cape Hawke, NSW, 32°06.02'S, 153°08.09'E, 2 February 1983, from sponge, 940–980 m, coll. FRV *Kapala* (AM P34713). 2 ♂ (20, 21 mm), east of Broken Bay, NSW, 33°32–39'S, 152°09–12'E, 23 August 1983, 955 m, coll. FRV *Kapala* (AM P34709). 3 ♂ (20, 21, 28 mm), east of Broken Bay, NSW, 33°39–37'S, 152°06–07'E, 6 December 1983, 1006 m, coll. FRV *Kapala* (AM P34705). ♀ (ovig. 30 mm), many manca (9.5–10.5 mm), east of Broken Bay, NSW, 33°39–37'S, 152°06–07'E, 6 December 1979, 1006 m, coll. FRV *Kapala* (AM P34706). **Queensland**: 3 ♂ (17.0, 18.5, 19.0 mm), 2 ♀ (ovig. 23, 24 mm), Coral Sea, 17°01.8'S, 151°20.1'E, 6 December 1985, 800 m, coll. P.J.F. Davie on RV *Soela* (QM W18829). **New Caledonia**: ♀ (non-ovig. 34 mm), 21°15.01'S, 157°51.33'E, 14 October 1986, 970 m, MUSEORSTOM V (MNHN unreg). **Taiwan**: ♂ (20 mm), 22°20.98'N, 120°6.73'E, 21 November 2001, 690–700 m, Otter Trawl (Le Drézén type JUNEUX), stn CD132, coll. RV *Ocean Researcher* (MTQ W13680).

*Unmeasured*: **Eastern Australia**. 3 ♀ (ovig.), east of Cape Hawke, NSW, 32°09'S, 153°09'E, 18 July 1984, 1052–1125 m, coll. FRV *Kapala* (AM P43976). ♂, east of Long Reef Point, NSW, 32°45–41'S, 152°00–03'E, 11 October 1984, 1115–1005 m, coll. FRV *Kapala* (AM P37504). ♂, east of Broken Bay, NSW, 33°32–29'S, 152°09–12'E, 23 August 1983, 955 m, coll. FRV *Kapala* (AM P34708). ♂, east of Broken Bay, NSW, 33°32–24'S, 152°09–12'E, 23 August 1983, 955 m, coll. FRV *Kapala* (AM P34707, photographed). 2 ♀ (ovig), southeast of Newcastle, NSW, 33°05–04'S, 152°33–36'E, 5 May 1988, from glass sponge, 900–950 m, coll. FRV *Kapala* (AM P43980). 2 ♀ (ovig), east of Broken Bay, NSW,

33°47–44'S, 151°59'–152°01'E, from sponge, 987–1005 m, coll. FRV *Kapala* (AM P43979). 2♀ (non-ovig), north-east of Tuncurry, NSW, 32°08'S, 153°09'E, 1989, with bits of hexactinellid sponge attached, 1034–1079 m (AM P43981). 94 specimens, off Tuncurry, NSW, 32°09–05'S, 153°09'E, 21 June 1988, 'from tall sponge', 1066–1100 m, coll. FRV *Kapala* (AM P43973).

**Additional material:** **Vanuatu:** MUSORSTOM, 8, coll. B. Richer de Forges: 3, 15°57.30'S, 167°27.73'E, 5 October 1994, stn. CP1080, 799–850 m (MNMN Is.5868); 2, 18°57.70'S, 168°54.40'E, 29 September 1994, stn. CP1037, 1058–1086 m, (MNMN Is.5869); 3, 18°01.00'S, 168°48.20'E, 20 September 1994, stn. CP1036, 920–950 m (MNMN Is.5870); 3, 15°52.62'S, 167°20.36'E, 22 September 1994, stn. CP1082, 492–520 m, in sponge (MNMN Is.5871); 3, 16°00.73'S, 166°39.94'E, 10 October 1994, stn. CP1129, 1014–1050 m, (MNMN Is.5872). **New Caledonia:** 1, 21°42.81'S, 166°41.95'E, 20 March 1994, HALIPRO 1 stn. CP858, 1000–1120 m, coll. B. Richer de Forges (MNHN Is.5873). 2, 25°17'S, 170°24'E, 11 November 1996, HALIPRO 2, stn. BT25, 1000–1348 m, from hexactinellid sponge, coll. B. Richer de Forges (MNHN Is.5874). 3, 21°41.80'S, 166°40.10'E, 11 March 1993, BATHUS 1 stn. CP651, 1080–1118 m, coll. B. Richer de Forges (MNHN Is.5875). 1, 24°44.24'S, 170°0.01'E, 24 Feb 1993, BATHUS 3 St. DW776, 770–830 m, coll. B. Richer de Forges (MNHN Is.5877). 3, 24°43.49'S, 170°07.07'E, 24 November 1993, BATHUS 3 stn. DW778, 750–760 m, coll. B. Richer de Forges (MNHN Is.5878).

**Also examined:** Comparative material of *Aegiochus plebeia*, see Appendix 2.

**DESCRIPTION:** *Body* 2.5 times as long as greatest width, dorsal surfaces sparsely punctate, widest at pereonite 5, lateral margins weakly ovate. Rostral point folded ventrally and posteriorly. *Eyes* large, not medially united, separated by about 8–10% width of head; each eye made up of ~8–9 transverse rows of ommatidia, each row with ~18 ommatidia; eye colour dark brown. *Pereonite 1 and coxae 2–3* each with posteroventral angle with small distinct produced point. *Coxae 5–7* with entire oblique carina; posterior margins straight and sinuate (coxa 6 sinuate, 7 straight), posterolateral angle acute (less than 45°). *Pleon* with pleonite 1 visible in dorsal view; pleonite 4 with posterolateral margins extending to but not beyond posterior margin of pleonite 5; pleonite 5 with posterolateral angles overlapped by lateral margins of pleonite 4. *Pleotelson* 0.8 times as long as anterior width, dorsal surface without longitudinal carina; lateral margins convex, notched, posterior margin converging to caudomedial point, with 12 RS.

*Antennule* peduncle articles 3 and 4 1.1 times as long as combined lengths of articles 1 and 2, article 3 3.3 times as long as wide (narrowing distally); flagellum with 19 articles, extending to anterior of pereonite 1. *Antenna* peduncle article 4 2.0 as long as wide, 0.8 times as long as combined lengths of articles 1–3,

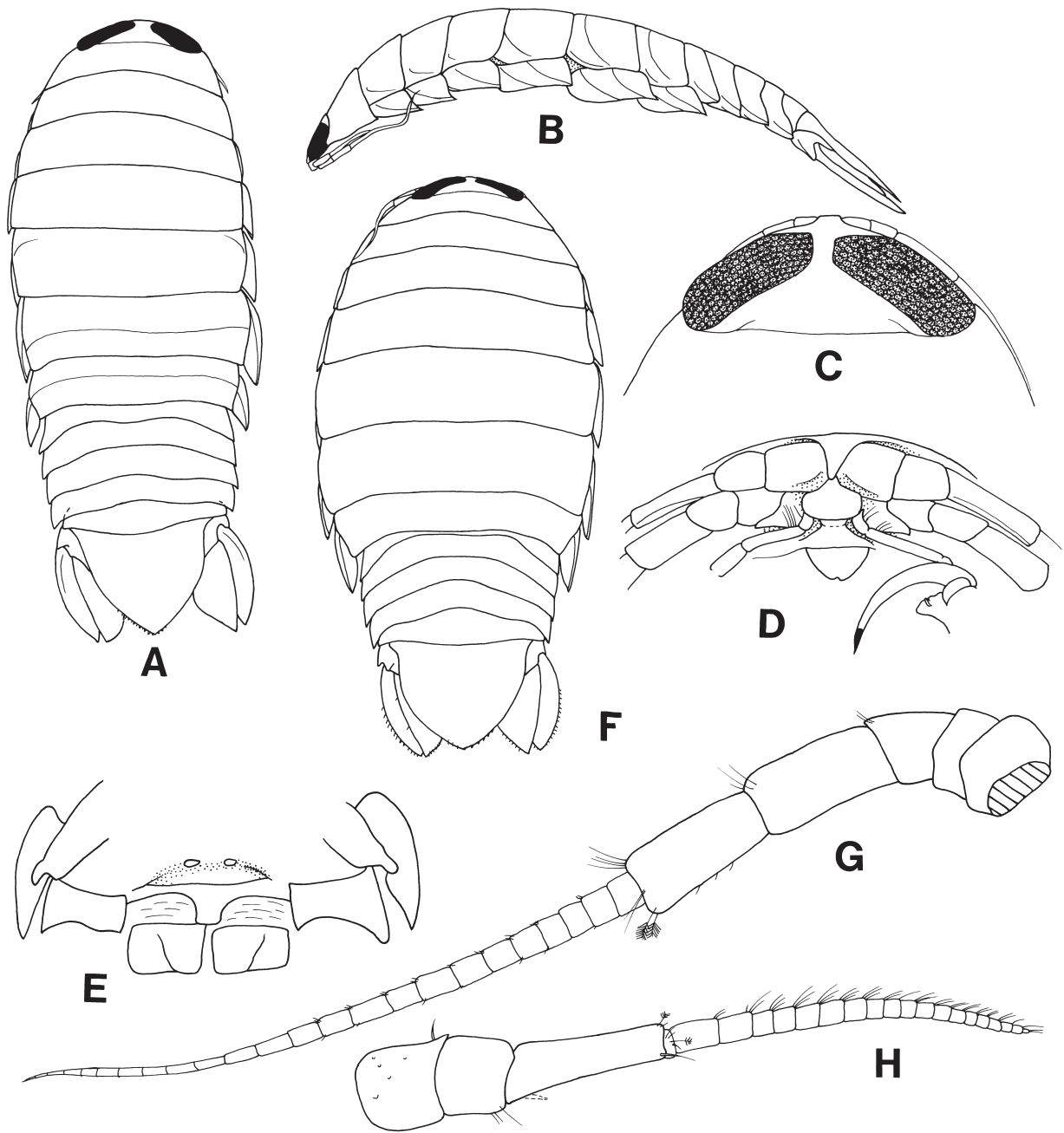
inferior margin 0 plumose setae, and 4 short simple setae; article 5 1.0 times as long as article 4, 2.2 times as long as wide, inferior margin with 2 palmate setae, anterodistal angle with cluster of 5 short simple setae; flagellum with 21 articles, extending to posterior of pereonite 2.

*Frontal lamina* posterior margin free, downwardly projecting, blade-like, wider than long, posteriorly rounded, anterior margin acute, forming median angle, posterior margin not abutting clypeus.

*Mandible* molar process present, small distinct flat lobe; palp article 2 with 18 distolateral setae (biserrate), palp article 3 with 25 setae (simple; distal 3 markedly longer than remainder). *Maxillule* with 7 terminal RS (three largest being weakly hooked). *Maxilla* mesial lobe with 3 RS (straight); lateral lobe with 4 RS. *Maxilliped* endite with 2 apical setae (minute); palp article 2 with 2 RS; article 3 with 5 recurved RS (straight or weakly recurved); article 4 with 4 hooked RS; article 5 with 6 RS (as 2 stout and 2 pairs of slender).

*Pereopod 1* basis 3.0 as long as greatest width; ischium 0.5 times as long as basis, inferior margin with 0 RS, superior distal margin with 1 RS (and one short simple seta); merus inferior margin with 1 RS (minute), superior distal angle with 0 RS (1 simple seta); carpus 0.7 as long as merus, inferior margin with 1 RS (set on weak lobe); propodus 2.6 times as long as proximal width, inferior margin with 1 RS, propodal palm with large distal lobe (with distal margin at right angles to axis of propodus), dactylus smoothly curved, 1.5 as long as propodus. *Pereopod 2* ischium inferior margin with 0 RS, superior distal margin with 1 RS (and 1 simple seta); merus inferior margin with 4 RS (concave, distally lobed), set as single row or two groups, superior distal margin with 1 acute RS; carpus longer than that of pereopod 1, with inferodistal lobe, inferodistal angle with 2 RS. *Pereopod 3* similar to pereopod 2. *Pereopods 5–7* inferior margins of ischium–carpus with short RS. *Pereopod 6* similar to pereopod 7 (but longer). *Pereopod 7* basis 3.2 times as long as greatest width, inferior margins with 12 palmate setae; ischium 0.4 as long as basis, inferior margin with 3 RS (set as 1, 1 and 1), superior distal angle with 3 RS, inferior distal angle with 3 RS; merus 1.3 as long as ischium, 2.6 times as long as wide, inferior margin with 5 RS (set as 4 clusters of 1, 2, 1 and 1), superior distal angle with 10 RS, inferior distal angle with 5 RS; carpus 0.9 as long as ischium, 2.9 times as long as wide, inferior margin with 4 RS (set as 1, 2 and 1 submarginal), superior distal angle with 9 RS, inferior distal angle with 6 RS; propodus 1.0 as long as ischium, 4.1 times as long as wide, inferior margin with 6 RS (set as 3 loose clusters of 2 each), superior distal angle with 3 slender setae, inferior distal angle with 3 RS.

*Penes* low tubercles; penial openings separated by 10% of sternal width.

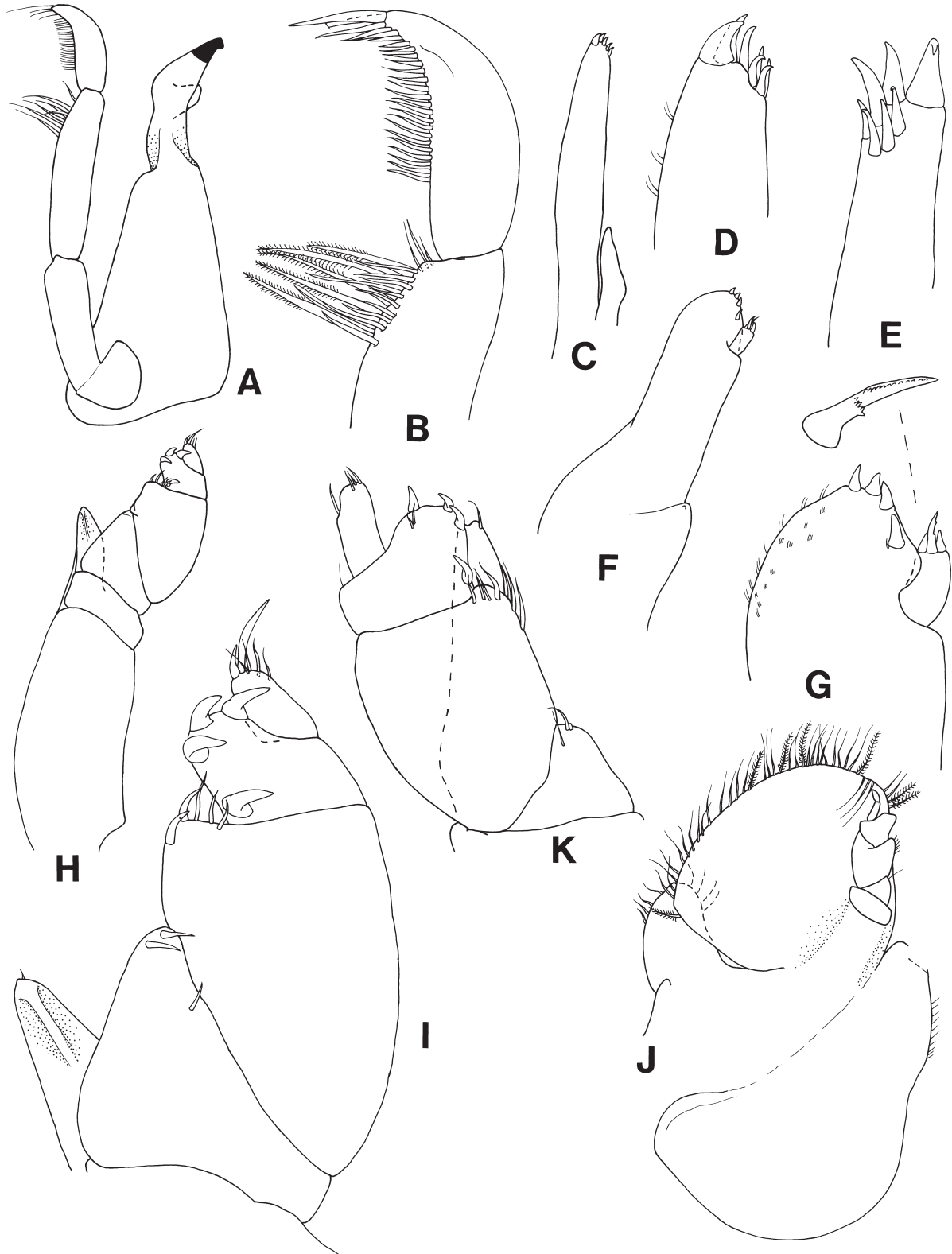


**Figure 75.** *Aegiochus pihuka* sp. nov. A–E, holotype; F, ovigerous female; remainder female NIWA 23776. A, dorsal view; B, lateral view; C, head; D, frons; E, penial openings; F, dorsal view; G, antenna; H, antennule.

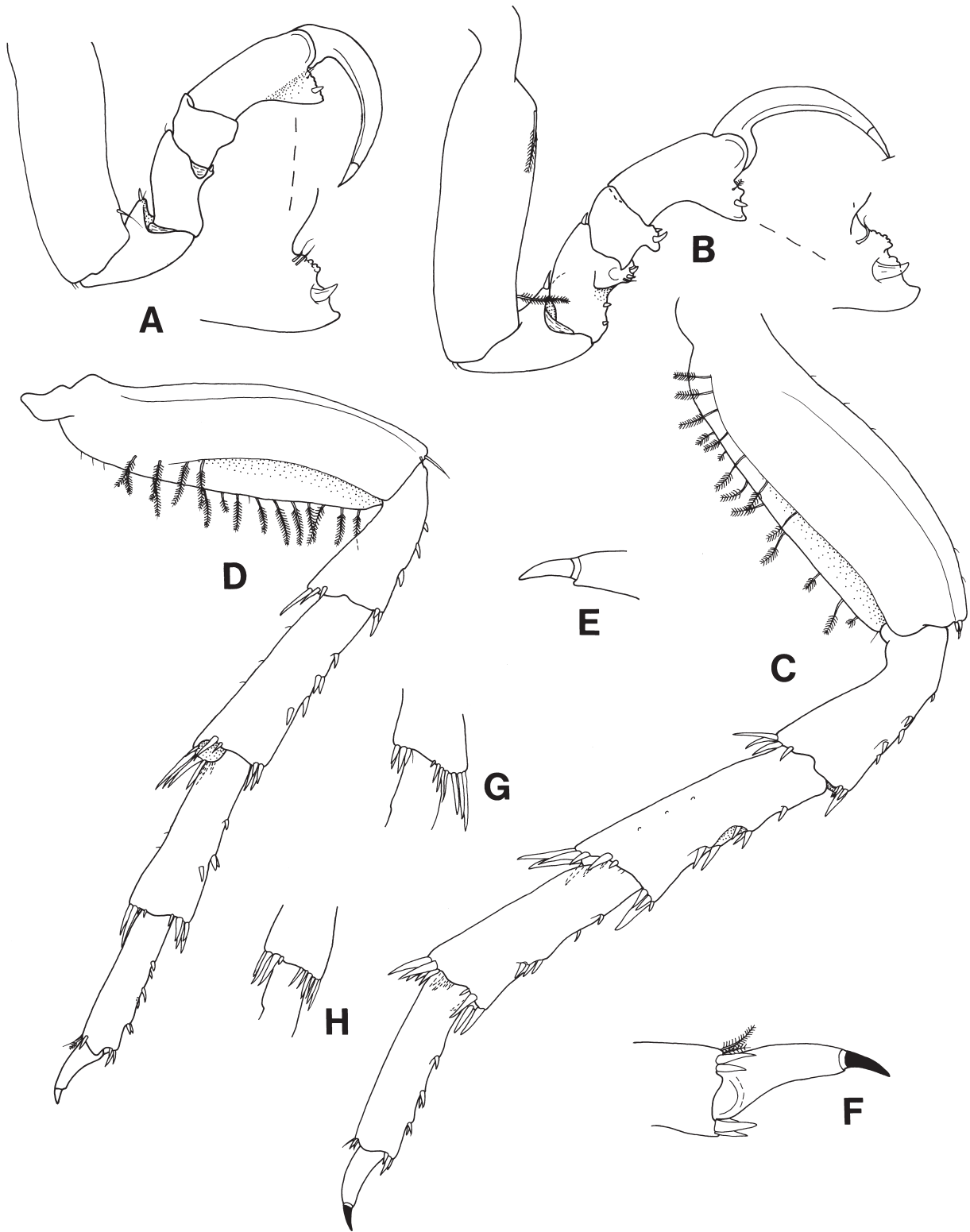
*Pleopod 1* exopod 2.0 as long as wide, distally narrowly rounded, mesial margin weakly oblique, lateral margin distally concave, mesial margin strongly convex, with PMS on distal two-thirds; endopod 2.0 as long as wide, distally rounded, lateral margin weakly concave, with PMS on distal margin only, mesial margin with PMS on distal half; peduncle 1.4 times as wide as long, mesial margin with 6 coupling hooks. *Pleopod 2 appendix masculina* basally swollen (weakly), 1.0 as long as endopod, distally bluntly rounded. Exopods of pleopods 1–3 each with distolateral margin not digitate; endopods of pleopods 3–5 each with distolateral

point; pleopods 2–4 peduncle distolateral margin with prominent acute RS.

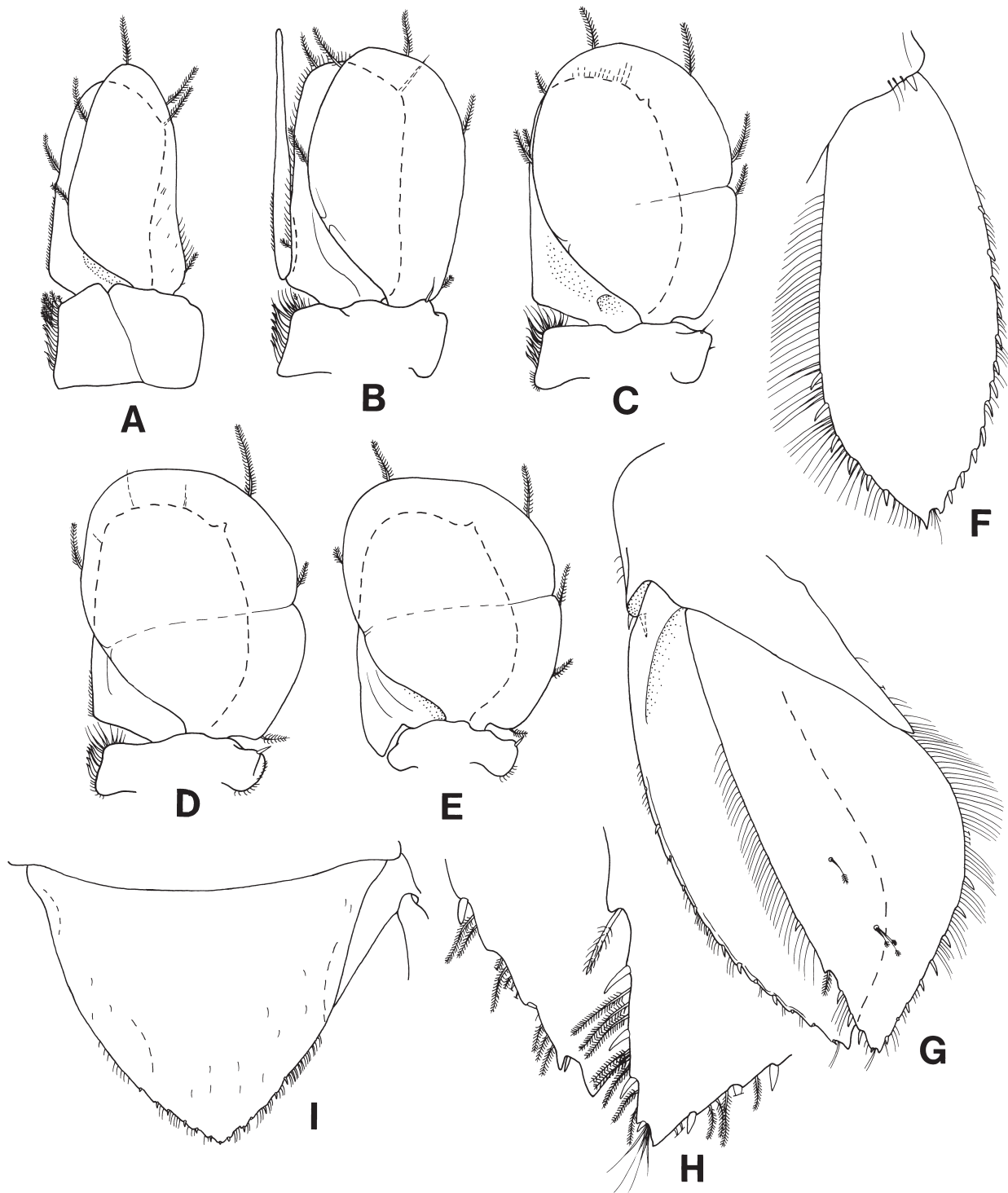
*Uropod* peduncle ventrolateral margin with 1 RS, posterior lobe about two-thirds as long as endopod. *Endopod* apically sub-bifid, mesial process prominent, lateral margin straight, without prominent excision, proximal lateral margin with 1 RS, distal lateral margin with 3 RS, mesial margin weakly convex, with 7 RS. *Exopod* not extending to end of endopod, 2.4 times as long as greatest width, apically sub-bifid, mesial process prominent; lateral margin convex, with 13 RS; mesial margin convex, with 5–7 RS.



**Figure 76.** *Aegiochus pihuka* sp. nov. A, B, E, H I, male NMNZ Cr.5953, remainder female paratype NIWA 23776; A, mandible; B, mandible palp article 3; C, maxillule; D, maxillule apex; E, maxillule apex, oblique view; F, maxilla; G, maxilla apex; H, maxilliped; I, maxilliped articles 2-5; J, female maxilliped; K, female maxilliped articles 2-5.



**Figure 77.** *Aegiochus puihuka* sp. nov. Holotype. A-D, pereopods 1, 2, 6 and 7 respectively; E, dactylus unguis, pereopod 6; F, dactylus, pereopod 7; G, distolateral margin, pereopod 6 merus; H, distolateral margin, pereopod 6 carpus.



**Figure 78.** *Aegiochus pihuka* sp. nov. F, female paratype NIWA 23776; remainder holotype. A-E pleopods 1-5 respectively; F, uropod exopod, ventral view; G, uropod; H, uropod rami, apices; I, pleotelson, dorsal view.

**FEMALE:** Body 2.0 as long as greatest width, lateral margins ovate; otherwise similar to male.

**SIZE:** Males 17–28 mm (mean = 20 mm,  $n = 17$ ); ovigerous females 23–31 mm (mean = 27 mm,  $n = 7$ ); non-ovigerous females 26–34 mm (mean = 28 mm,  $n = 4$ ).

**VARIATION:** *Robust setae:* ( $n = 14$ ) pleotelson RS 6+6 (50%), 5+6 (36%) and 5+5 (14%). Uropod exopod mesial margin 5 (25%), 6 (50%), 7 (21%) and 8 once, lateral margin 12 (39%) or 13 (57%); uropod endopod mesial margin varied from 5 to 10 RS with 7 (26%), 8 (34%) or 9 (34%) the most frequent, lateral margin with 1+2 (10%), 1+3

(64%). 2+3 (14%), and 2+2 (7%). There is no discernable difference between males and females, nor does the number of RS increase with the size of the specimen. The most distal RS on the uropodal endopod lateral margin (see Fig. 78H) is small and is usually lost with damage to the apex — this RS has not been included in the numbers given here. The most proximal RS on the uropodal exopod lateral margin is minute and could often be missed, and therefore the maximum number of RS could be one more than here stated.

**REMARKS:** The morphology of pereopods 1–3 is unique. No other species has a similarly shaped distal lobe on the propodus, nor the inferodistal lobes of the merus and carpus of pereopods 2 and 3. This character is consistent for males, females and manca, and serves to identify the species. The specimen from Taiwan agrees entirely with material from the southwestern Pacific, notably in the details of the propodus of pereopods 1–3, eye size, coxal shape, shape of the frontal lamina and the counts for the marginal robust setae on the pleotelson and uropods. The distribution of this species from New Zealand and Australia to Japan suggests that some records of *Aegiochus plebeia* may be of this species.

*Aegiochus plebeia* (Hansen, 1897), from the North and East Pacific (see Brusca 1983), is perhaps the most similar species. Compared to *Aegiochus pihuka* sp. nov. *A. plebeia* (Appendix 2, Figs 143, 144) has a weak distal lobe provided with a prominent and large robust seta on the propodus of pereopods 1–3; has larger eyes, each with a wider mesial margin; the coxae are more truncate, scarcely extending posteriorly; and the lateral margins of the pleotelson are more strongly convex with 8–10 robust setae. Brusca's (1983) figures and description of pereopod 1 are not in mutual agreement — being described as having a propodal plate but figured without such. Brusca's figures agree well with those of Hansen (1897) but there is the possibility that more than one species is being identified under the name of *A. plebeia* (note — this epithet is frequently misspelled, e.g. *plebeja* — Brandt & Poore 2003; Gurjanova 1936; Nierstrasz 1931; *plebia* — Wetzer 1990). Other similar species are *Aegiochus symmetrica* (Richardson, 1905b) (northwestern Pacific) and *Aegiochus ventrosa* (Sars, 1859) (North Atlantic), but both of these species lack the propodal lobe on the anterior pereopods. See Appendix 2 for supplementary description of *Aegiochus plebeia*.

**PREY:** Not known.

**DISTRIBUTION:** Widespread in the western Pacific. Off northeastern North Island, New Zealand; also eastern Australia, New Caledonia, Vanuatu and Taiwan, frequently recorded from 'glass sponges' (Hexactinellidae). Most records are at depths from 700 to 1125

metres in the southwestern Pacific, with single record of 492–520 metres off New Caledonia and 690–700 metres off Taiwan. Frequency of collection suggests that this widespread species is common in the southwestern Pacific

**ETYMOLOGY:** The epithet, *pihuka*, a Māori word meaning hook, alluding to the hooked anterior legs.

*Aegiochus pushkini* (Kussakin & Vasina, 1982),  
comb. nov. (Figs 79–83)

*Aega pushkini* Kussakin & Vasina, 1982: 265, figs 7, 8. — Kensley, 2001: 227.

**MATERIAL EXAMINED:** *Holotype*, ♀ (non-ovig. 15.3 mm), Ob' Bank, southern Indian Ocean, Stn 2634/412 (inner label states 659/412). 52°17.8'S, 41°41.9'E, 410 m, coll. *Skif* (ZIAS RAN No 1/71625).

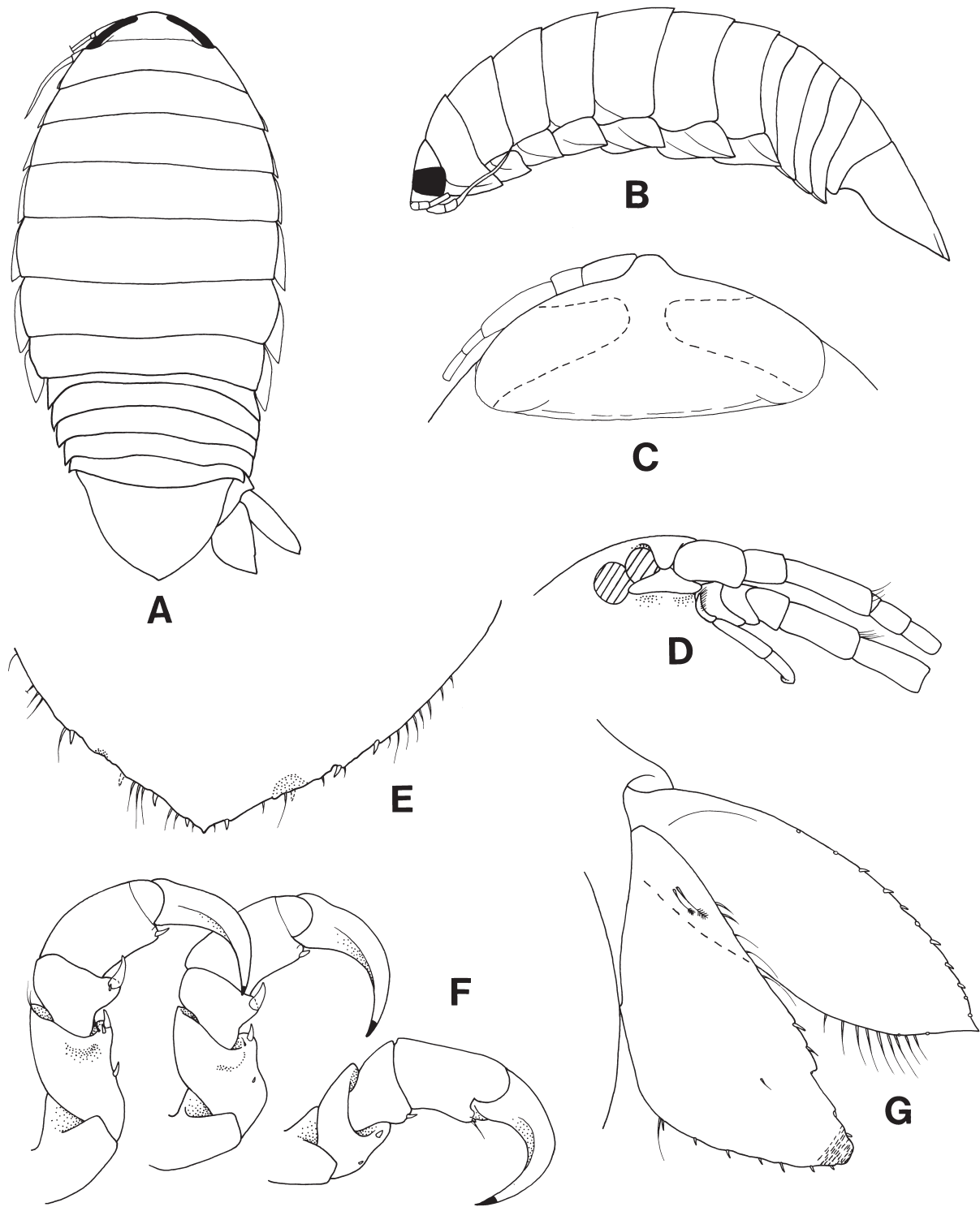
**New Zealand:** ♂ (16.5 mm [dissected]), southwest of New Zealand, 53.9167°S, 158.9167°E, 25 November 1961, 366 m, stn C734 (NIWA 24008). ♀ (non-ovig. 17.0 mm), manca (crushed), also C734 (NMNZ Cr.12003).

**South Atlantic:** ♀ (ovig. 25 mm, non-ovig. 17.5, 16.0 mm), off Bouvet Island, 54°22.49–54'S, 03°17.58–21'E, 25 November 2003, 134–122 m, coll. ANT21/2 BENDEX (ZMH K-41228).

**DESCRIPTION (OF NEW ZEALAND SPECIMEN):** *Body* 2.2 times as long as greatest width, dorsal surfaces smooth and sparsely punctate, widest at pereonites 5 and 6, lateral margins weakly ovate. Rostral point folded ventrally and posteriorly. *Eyes* large, not medially united, separated by about 12% width of head; each eye made up of ~17 transverse rows of ocelli, each row with ~10 ocelli; eye colour pale brown. *Pereonite 1 and coxae* 2–3 each with posteroventral angle right-angled. *Coxae* 5–7 with entire oblique carina; posterior margins straight posterolateral angle blunt (more than 45°). *Pleon* with pleonite 1 visible in dorsal view; pleonite 4 with posterolateral margins extending to but not beyond posterior margin of pleonite 5; pleonite 5 with posterolateral angles free, not overlapped by lateral margins of pleonite 4. *Pleotelson* 0.7 times as long as anterior width, dorsal surface without longitudinal carina; lateral margins convex, serrate, posterior margin converging to caudomedial point, with 10 RS.

*Antennule* peduncle article 3 and 4 1.0 times as long as combined lengths of articles 1 and 2, article 3 3.3 times as long as wide; flagellum with 12 articles (articles 2–11 with distal margin widest), extending to anterior of pereonite 1. *Antenna* peduncle article 4 2.1 times as long as wide, inferior margin with 1 plumose seta (?); article 5 0.9 times as long as article 4, 2.6 times as long as wide (widest distally), inferior margin with 1 pappose seta (?); extending to middle of pereonite 2.

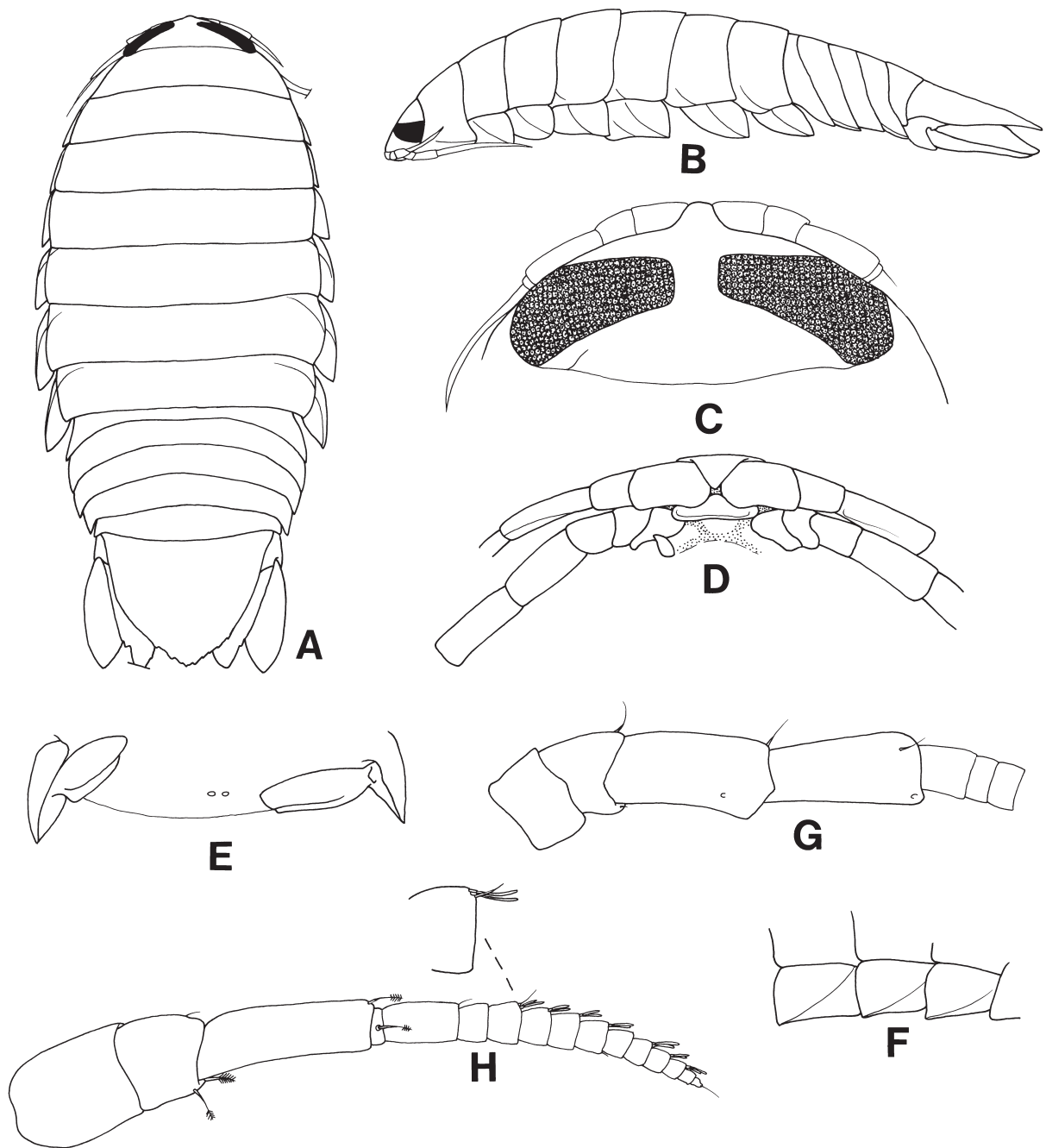




**Figure 79.** *Aegiochus pushkini* (Kussakin & Vasina, 1982). Holotype. A, dorsal view; B, lateral view (coxa of pereonite 3 damaged); C, head; D, frons, ventral view; E, pleotelson posterior margin; F, pereopods 3-1, left to right, in situ; G, uropod, in situ.

*Frontal lamina* posterior margin free, downwardly projecting, blade-like, wider than long, posterior margin concave, anterior margin with median point, posterior margin not abutting clypeus.

*Mandible* molar process present, small distinct flat lobe; palp article 2 with 12 distolateral setae (all but 1 biserrate), palp article 3 with 22 setae. *Maxillule* with 7 terminal RS (1 large, 1 moderate and 5 slender). *Maxilla* mesial lobe with 3 RS (1 straight, 2 biserrate); lateral

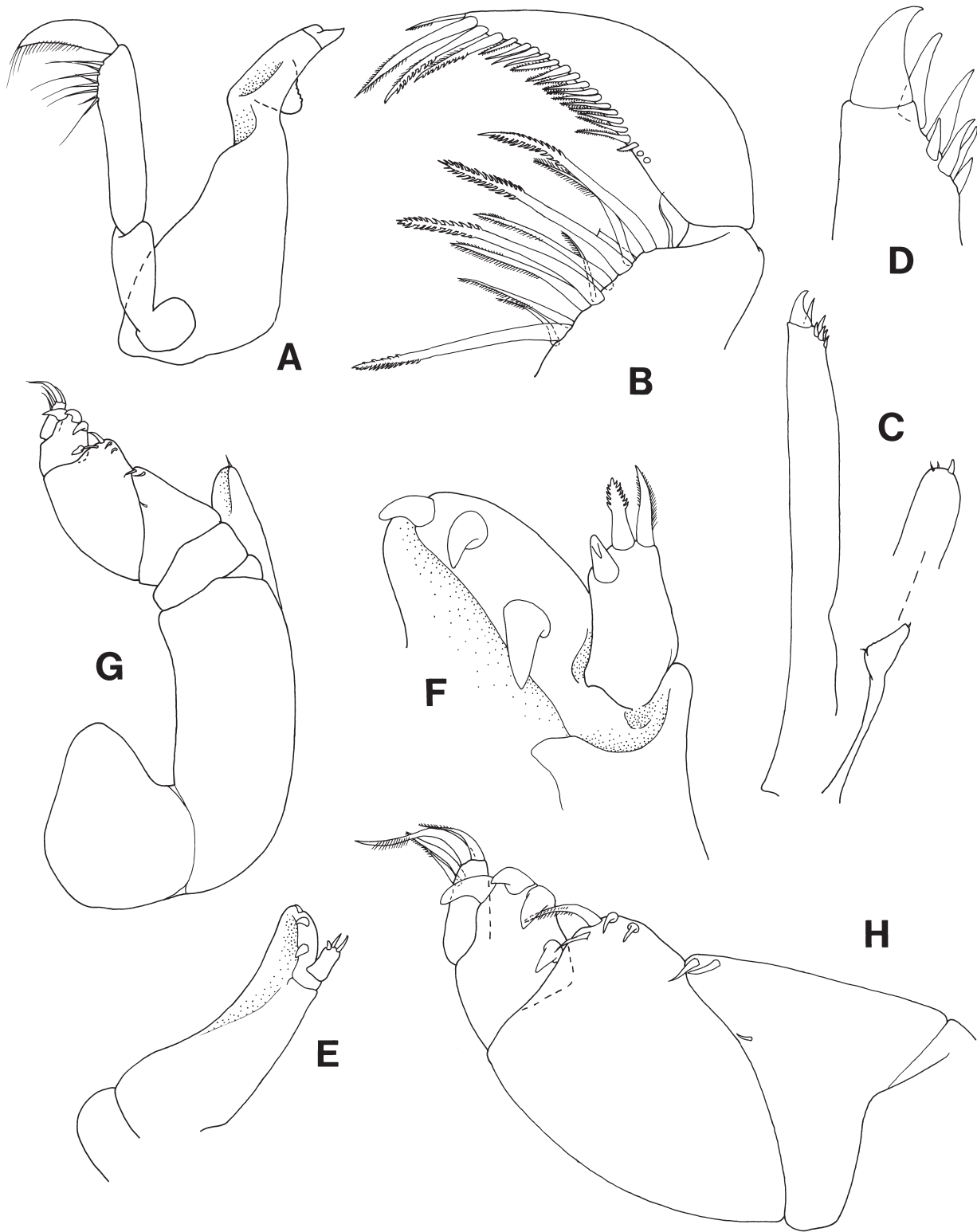


**Figure 80.** *Aegiochus pushkini* (Kussakin & Vasina, 1982). Male, NIWA 24008. A, dorsal view; B, lateral view; C, head; D, frons, ventral view; E, penial openings; F, coxae 2–4, right side; G, antenna peduncle; H, antennule peduncle.

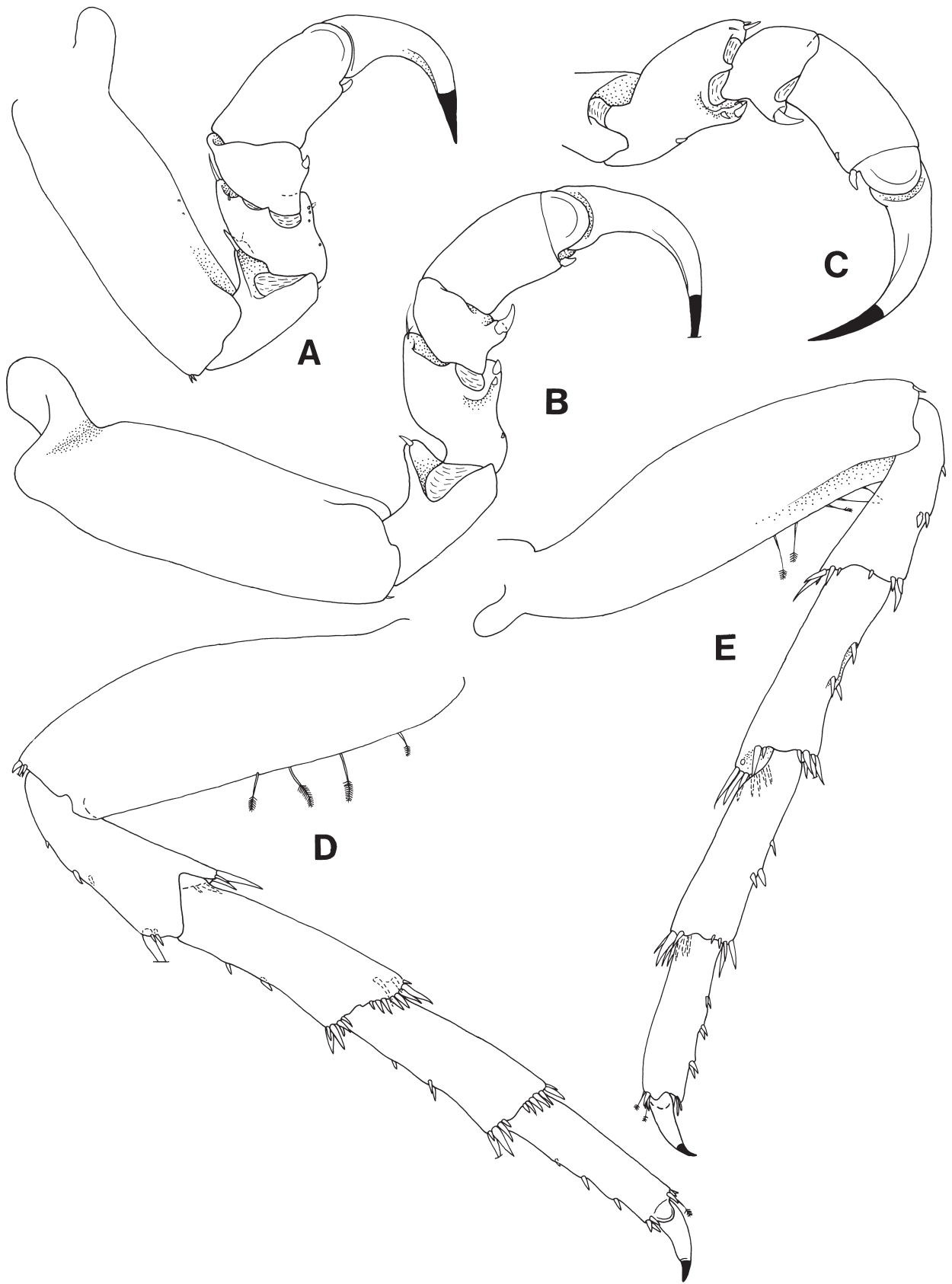
lobe with 3 RS. *Maxilliped* endite with 1 apical seta; palp article 2 with 2 RS (straight); article 3 with 2 recurved RS (and 1 large serrate and 1 straight setae); article 4 with 4 hooked RS; article 5 with 4 RS (long serrate).

*Pereopod 1* basis 2.8 times as long as greatest width; ischium 0.4 times as long as basis, inferior margin with 0 RS, superior distal margin with 1 RS; merus inferior margin with 2 RS, set as two groups, superior distal angle with 0 RS (1 slender seta); carpus 1.2 as long as merus; inferior margin with 1 RS; propodus 1.7 times

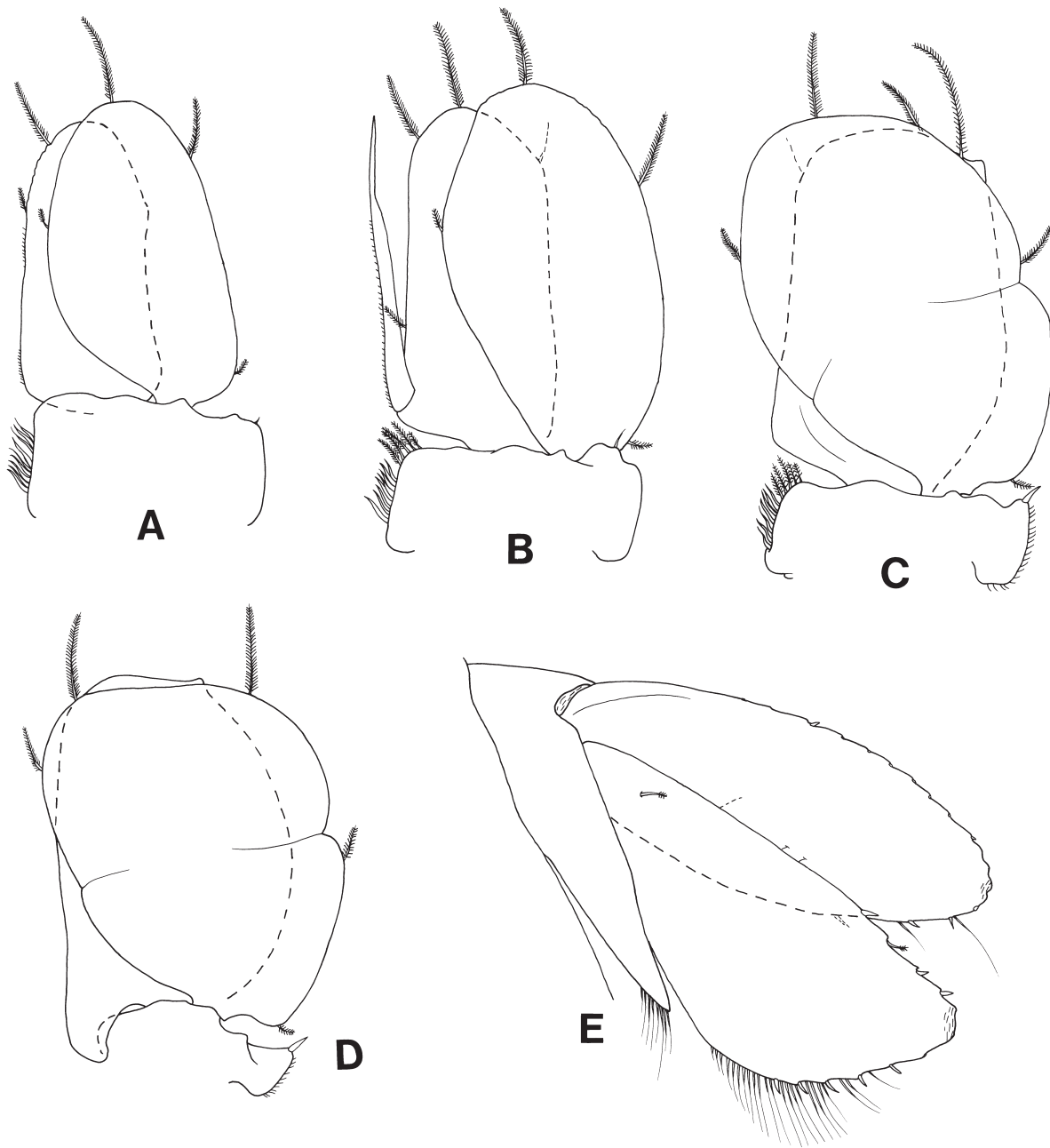
as long as proximal width, inferior margin with 1 RS (distal), propodal palm simple, without blade or process, dactylus smoothly curved, 1.2 as long as propodus. *Pereopod 2* ischium inferior margin with 0 RS, superior distal margin with 1 RS; merus inferior margin with 3 RS (set as 1+2, proximal seta minute), set as two groups, superior distal margin with 0 acute RS (3 slender setae); carpus similar in size to that of pereopod 1, inferodistal angle with 1 RS (large). *Pereopod 3* similar to pereopod 2 (but with single RS on propodal palm).



**Figure 81.** *Aegiochus pushkini* (Kussakin & Vasina, 1982). Male, NIWA 24008. A, mandible; B, mandible palp article 3; C, maxillule; D, maxillule apex; E, maxilla; F, maxilla apex; G, maxilliped; H, maxilliped articles 2-5.



**Figure 82.** *Aegiochus pushkini* (Kussakin & Vasina, 1982). Male, NIWA 24008. A-E, pereopods 1-3, 6, and 7 respectively.



**Figure 83.** *Aegiochus pushkini* (Kussakin & Vasina, 1982). Male, NIWA 24008. A-D, pleopods 1-3, 5 respectively; E, uropod, in situ.

*Pereopod 6* similar to *pereopod 7*. *Pereopod 7* basis 3.3 times as long as greatest width, inferior margins with 5 palmate setae; ischium 1.4 as long as basis, inferior margin with 3 RS (set as 1 and 2), superior distal angle with 5 RS, inferior distal angle with 3 RS; merus 1.4 as long as ischium, 2.8 times as long as wide, inferior margin with 3 RS (set as 1 and 2), superior distal angle with 10 RS, inferior distal angle with 6 RS; carpus 1.3 as long as ischium, 3.2 times as long as wide, inferior margin with 3 RS (set as 1 and 2), superior distal angle with 9 RS, inferior distal angle with 5 RS; propodus 1.1 as long as ischium, 3.6 times as long as wide, inferior

margin with 6 RS (set as 2, 2 and 2), superior distal angle with 2 slender setae (and 1 robust seta), inferior distal angle with 3 RS.

*Penes* low tubercles; penial openings separated by 2% of sternal width.

*Pleopod 1* exopod 1.7 times as long as wide, distally broadly rounded, lateral margin straight, mesial margin strongly convex, with PMS from distal two-thirds, with ~60 PMS; endopod 2.2 times as long as wide, distally rounded, lateral margin weakly concave, with PMS from distal one-third, mesial margin with PMS from distal one-third, endopod with ~28 PMS; pedun-

cle 2.0 as wide as long, mesial margin with 7 coupling hooks. *Pleopod 2* exopod with ~75 PMS, endopod with ~50 PMS (24 short PMS on mesial margin); *appendix masculina* basally swollen, 0.96 times as long as endopod, distally acute. *Pleopod 3* exopod with ~78 PMS, endopod with ~18 PMS. *Pleopod 4* exopod with ~76 PMS, endopod with ~14 PMS. *Pleopod 5* exopod with ~67 PMS. Exopods of pleopods 1–5 each with distolateral margin not deeply serrate; endopods of pleopods 3–5 each with mediolateral point; pleopods 2–5 peduncle distolateral margin with prominent acute RS.

Uropod peduncle posterior lobe about one-half as long as endopod. Uropod rami extending beyond pleotelson. *Endopod* apically not bifid, lateral margin straight, without prominent excision, proximal lateral margin with 1 RS, distal lateral margin with 2 RS, mesial margin weakly convex, with 7 RS. *Exopod* not extending to end of endopod, 2.3 times as long as greatest width, apically not bifid; lateral margin convex, with 13 RS; mesial margin convex, with 5 RS.

**FEMALE:** The single female, taken at the same station as the New Zealand male, differs in a number of minor characters, and its identity is here regarded as provisional (see 'Remarks').

**SIZE:** New Zealand material examined here 16.5–17.0 mm; specimens from Bouvet Island, 16.0–25 mm.

**VARIATION:** *Robust setae:* pleotelson RS 4+4 (holotype) and 5+5 (New Zealand). The holotype had only one uropod, so no assessment was possible for uropodal robust setae. The robust setae of the pereopods were consistent between specimens, as illustrated (Figs 79F, 82). The Bouvet Island specimens are in good condition, and have variable counts for robust setae: pleotelson RS 4+4, 5+5 and 7+7; uropodal endopod mesial margin 7 (three times), 9 (twice) and 10 (once), lateral margin 1+2 (all); uropodal exopod lateral margin with 10–12 RS, mesial with 5 (twice) or 6 (four times). The coxae of pereonites 5–7 on the Bouvet Island specimens have a weakly concave posterior margin, while this is straight in the New Zealand specimens and the holotype.

Bouvet Island specimens dorsally brown, laterally with patches of white chromatophores on all or some of pereonites 4–6.

**REMARKS:** The mesially narrow eyes, rectangular posterior margins of coxal plates 2–4, wide and short frontal lamina with the posterior margin forming a distinctly concave blade, close-set penial openings in the males and the presence (and pattern and number) of robust setae on the uropods and pleotelson all allow identification of this species.

*Aegiochus pushkini* belongs with a group of *Aegiochus* species characterised by their relatively small size, the posterior margin of the frontal lamina forming a blade and relatively slender pereopods armed with small robust setae. Two of these, *Aegiochus nohinohi* sp. nov. and *A. gordonii* sp. nov., can be distinguished by the rami of pleopod 1 and 2 being deeply serrate and lacking robust setae on the pleotelson. The remaining species with similar pereopodal, uropodal and pleotelson morphology can be separated by having the eyes united (*Aegiochus kakai* sp. nov. and *A. kanohi* sp. nov.) or by having the distal margin of the propodal palm of pereopods 1–3 expanded (*A. piuhuka* sp. nov.).

Other superficially similar species from the southern Indian Ocean are *Aegiochus crozetensis* (Kussakin & Vasina, 1982), see p. 237, and *A. uschakovii* (Kussakin, 1967) see p. 241. The former has far larger eyes and a narrower frontal lamina which has a convex posterior margin, while the latter also has a narrower frontal lamina and also has a far wider uropod endopod.

The specimens from three widely distant locations show a degree of variation not usually observed within a species. The holotype and male New Zealand specimen agree closely, differing principally in the male having a wider frontal lamina and two distal robust setae on pereopod 2 merus. The female New Zealand specimen is in good condition and shows rather more differences that can be ascribed to sexual dimorphism. These differences include a more strongly serrated and posteriorly wider pleotelson margin, the antennal flagellum extending to the posterior of pereonite 3 (it is more usual in dimorphic species that the male has the longer antennal flagellae), coxae 7 are slightly more acute. The specimens from Bouvet Island are in close agreement with the New Zealand female, but show considerable variation in pleotelson robust setae (from 8 to 14), the large female has the posterior margin of coxae 5–7 weakly concave and the small specimen is similar to the New Zealand material; the pereopod and uropod morphology seems identical in all of these specimens. Without a larger series of specimens from one location it is not possible to further assess the consistency of such differences. In view of these differences I consider the New Zealand male to be the same as the holotype, but the remaining specimens to be only provisionally determined as this species.

**PREY:** Not known.

**DISTRIBUTION:** Recorded from the southern Indian Ocean (Kussakin & Vasina 1982); in the New Zealand region off southern South Island, Macquarie Ridge; off Bouvet Island (to Norway), South Atlantic; all localities between 52° and 54° South. At depths from 122 to 410 metres.

MATERIAL EXAMINED: *Holotype*. ♂ (27 mm), west of North Island, New Caledonia Trough, 37°30.55'S, 172°13.60'E, 23 April 2000, sea mount, 1000 m, coll. RV *Kaharoa* (NIWA 17933).

*Paratype*. ♀ (33 mm), west of North Island, New Caledonia Trough, 37°30.31'S, 172°13.68'E, 24 April 2000, sea mount, 1060 m, coll. RV *Kaharoa* (NIWA 17934).

*Additional material*: **Tasman Sea**: Crushed specimen, west of North Island, New Caledonia Trough, 37°30.31'S, 172°13.68'E, 24 April 2000, sea mount, 1060 m, (NIWA-17935). ♀ (non-ovig. 28 mm), West Norfolk Ridge, 34°17.84'S, 168°25.82'E, 2 June 2003, 1251–1268 m, coll. NORFANZ (NIWA 17937). ♀ (non-ovig. 38 mm), West Norfolk Ridge, 34°14.33'S, 168°21.18'E, 3 June 2003, 1195–1202 m, coll. NORFANZ (NIWA 17938). **Pacific New Zealand**: ♀ (crushed ovig.), Chatham Rise, Shipley Sea Mount, 41.8012–8005°S, 180.5065–4967°E, 6 June 2006, 1240–1275 m (NIWA 25672). **Taiwan**: ♂ (31 mm), off Taiwan, 22°16.56'N, 120°6.11'E, 22 November 2001, 736–1040 m, Otter Trawl (Le Drézén type JUNEUX), stn CD134, coll. RV *Ocean Researcher* (MTQW13681). **New Caledonia**, HALIPRO 2, coll. B. Richer de Forges: 2♀ (34 mm non-ovig, 1 damaged ~25 mm), 25°20'S, 168°55'E, 12 November 1996, stn. BT32, 697–1340 m (MNHN Is.5858); ♀ (ovig, 40 mm), 25°04'S, 168°44'E, 17 November 1966, stn. BT55, 1098–1480 (MNHN Is.5859); ♂ (30 mm), ♀ (42 mm, non-ovig.), 25°52'S, 168°44'E, 18 November 1996, stn. BT60, 1133–1280 m (MNHN Is.5857).

DESCRIPTION: *Body* 2.2 times as long as greatest width, dorsal surfaces smooth, sparsely punctate (finely pilose), widest at pereonite 5, lateral margins subparallel. Rostral point ventrally directed. *Eyes* large, not medially united, separated by about 10% width of head; each eye made up of ~22 transverse rows of ommatidia, each row with ~9 ommatidia; eye colour black. *Pereonite 1 and coxae 2–3* each with posteroventral angle rounded. *Coxae 5–7* with entire oblique carina; posterior margins convex, posterolateral angle blunt (more than 45°). *Pleon* with pleonite 1 visible in dorsal view; pleonite 4 with posterolateral margins extending to but not beyond posterior margin of pleonite 5; pleonite 5 with posterolateral angles free, not overlapped by lateral margins of pleonite 4. *Pleotelson* 0.7 times as long as anterior width, dorsal surface without longitudinal carina; lateral margins convex, serrate (weakly), posterior margin with truncate median excision, with 11–12 RS (each set within serration).

*Antennule* peduncle articles 3 and 4 1.2 times as long as combined lengths of articles 1 and 2, article 3 3.4 times as long as wide; flagellum with 17 articles,

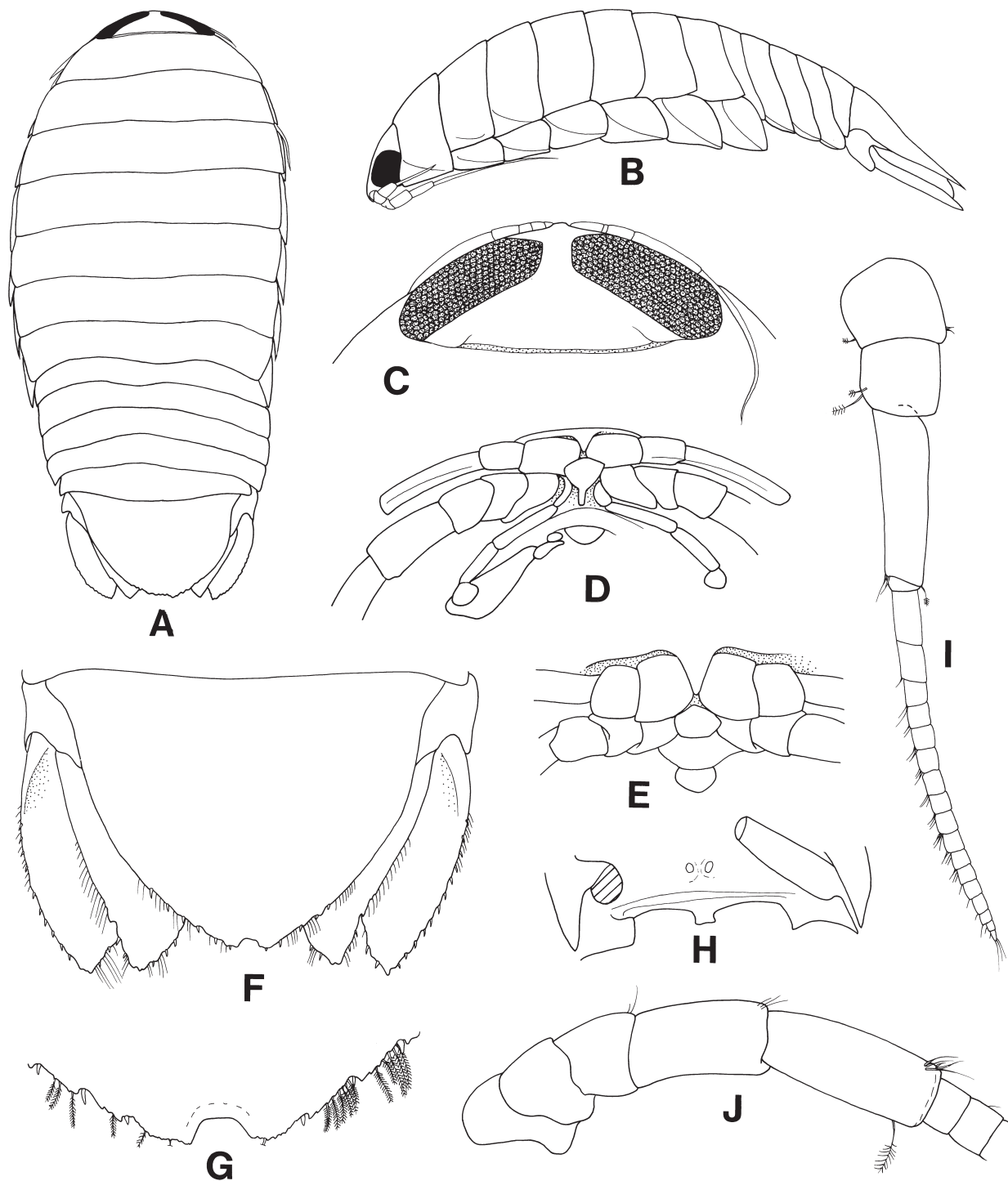
extending to anterior of pereonite 1. *Antenna* peduncle article 4 1.3 times as long as wide, 0.8 times as long as combined lengths of articles 1–3, inferior margin 0 plumose setae, and 0 short simple setae; article 5 1.3 times as long as article 4, 2.6 times as long as wide, inferior margin with 1 palmate seta, anterodistal angle with cluster of 3 short simple setae (and 1 palmate); flagellum with 27–30 articles, extending to pereonite 4.

*Frontal lamina* flat, as wide as long, diamond shaped, with lateral margins converging posteriorly, anterior margin acute, forming median angle, posterior margin forming narrow stem.

*Mandible* molar process present, small distinct flat lobe; palp article 2 with 12 distolateral setae (1 long, remainder short), palp article 3 with 34 setae. *Maxillule* with 10 terminal RS (1 large, 9 slender). *Maxilla* mesial lobe with 3 RS (2 hooked, 1 straight); lateral lobe with 3 RS (hooked). *Maxilliped* endite with 4 apical setae (flat, blade-like, with CPS); palp article 2 with 4 RS (small hooked); article 3 with 8 recurved RS (4 hooked lateral and 4 long slender distal); article 4 with 4 hooked RS; article 5 with 4 RS (3 straight, 1 hooked).

*Pereopod 1* basis 2.4 times as long as greatest width; ischium 0.4 times as long as basis, inferior margin with 0 RS, superior distal margin with 2 RS (acute); merus inferior margin with 2 RS (minute), set as proximal group, superior distal angle with 0 RS (2 slender setae); carpus 0.9 as long as merus, inferior margin with 1 RS (minute); propodus 2.1 times as long as proximal width, inferior margin with 0 RS, propodal palm simple, without blade or process, dactylus smoothly curved, 1.0 as long as propodus. *Pereopod 2* ischium inferior margin with 0 RS, superior distal margin with 1 RS; merus inferior margin with 4 RS, set as single row (widely spaced series), superior distal margin with 1 acute RS; carpus similar in size to that of pereopod 1, inferodistal angle with 2 RS. *Pereopod 3* similar to pereopod 2. *Pereopods 5–7* inferior margins of ischium–carpus with short RS. *Pereopod 6* similar to pereopod 7. *Pereopod 7* basis 2.3 times as long as greatest width, inferior margins with 12 palmate setae; ischium 0.5 as long as basis, inferior margin with 3 RS (set as 1 and 2), superior distal angle with 3 RS, inferior distal angle with 4 RS; merus 1.1 as long as ischium, 2.0 as long as wide, inferior margin with 4 RS (set as 3 and 1), superior distal angle with 10 RS, inferior distal angle with 8 RS; carpus 1.0 as long as ischium, 2.2 times as long as wide, inferior margin with 3 RS (set as 1 and 2), superior distal angle with 14 RS, inferior distal angle with 8 RS; propodus 0.9 as long as ischium, 3.1 times as long as wide, inferior margin with 3 RS (set as 2 and 1), superior distal angle with acute 1 RS (plus 3 slender setae), inferior distal angle with 2 RS.

*Penes* low tubercles; penial openings separated by 6% of sternal width.

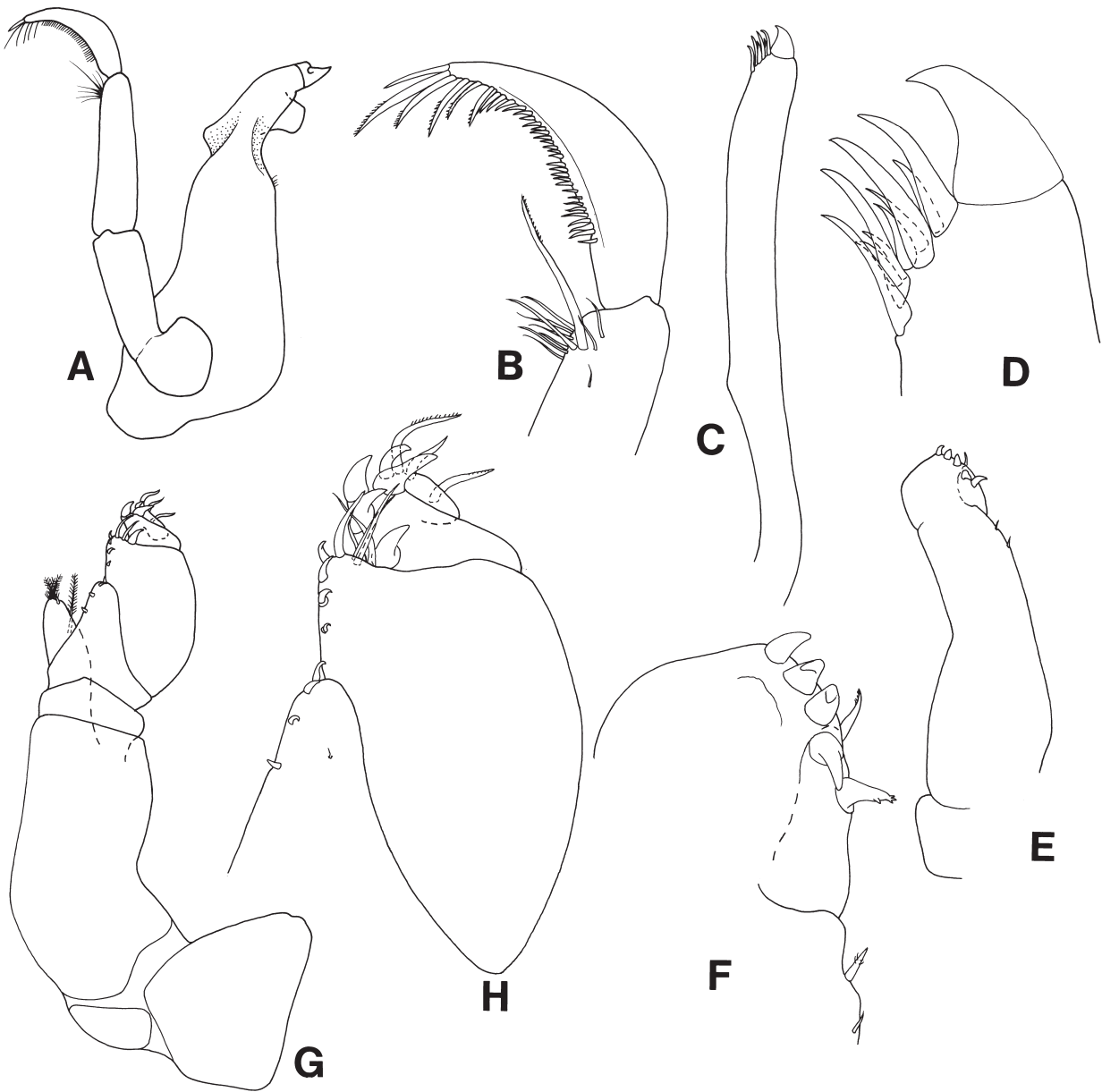


**Figure 84.** *Aegiochus riwha* sp. nov. I, J male paratype, NIWA 17934; remainder holotype. A, dorsal view; B, lateral view; C, head; D, frons; E, frons, anterior view; F, pleotelson; G, pleotelson, posterior margin; H, sternite 7 showing penial openings; I, antennule; J, antenna peduncle.

*Pleopod 1* exopod 1.5 times as long as wide, distally broadly rounded, lateral margin weakly convex, mesial margin strongly convex, with PMS on distal one-third; distally rounded, lateral margin strongly concave, with PMS on distal one-third, mesial margin

with PMS on distal one-third; peduncle 1.6 times as wide as long, mesial margin with 9 coupling hooks. *Pleopod 2 appendix masculina* distally widest, 0.9 times as long as endopod, distally bluntly rounded. Exopods of pleopods 1–3 each with distolateral margin not digi-





**Figure 85.** *Aegiochus riwha* sp. nov. Male paratype, NIWA 17934. A, mandible; B, mandible palp, article 3; C, maxillule; D, maxillule apex; E, maxilla; F, maxilla apex; G, maxilliped; H, maxilliped articles 2-5.

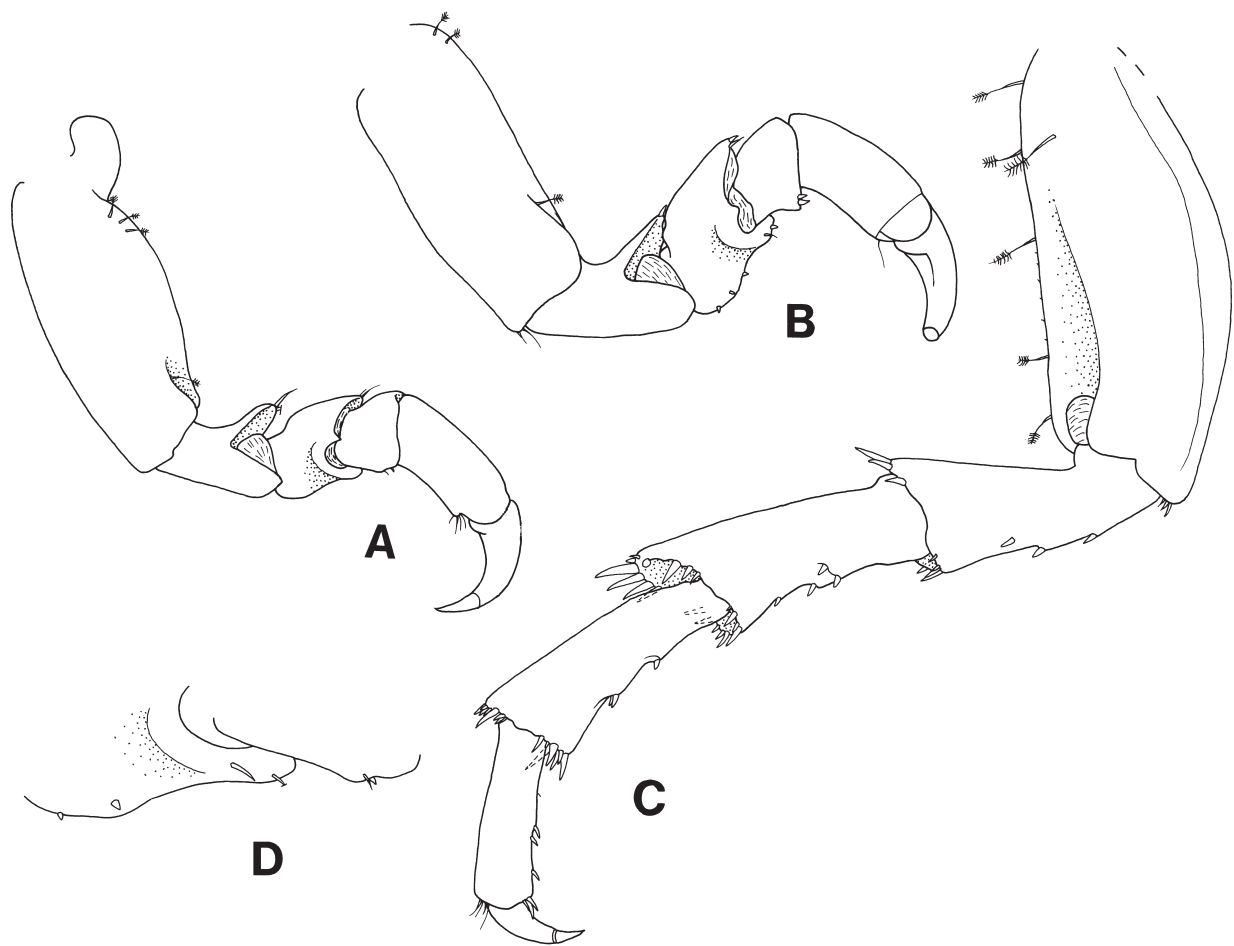
tate; endopods of pleopods 3-5 each with distolateral point; pleopods 2-4 peduncle distolateral margin with prominent acute RS.

*Uropod* peduncle ventrolateral margin with 2 RS, posterior lobe about three-quarters as long as endopod. *Uropod* rami extending beyond pleotelson. *Endopod* apically deeply bifid, mesial process prominent, lateral margin sinuate (very weakly sinuate), without prominent excision, proximal lateral margin with 0 RS, distal lateral margin with 2 RS, mesial margin strongly convex, with 9-10 RS. *Exopod* extending beyond end of

endopod (slightly), 2.7 times as long as greatest width, apically deeply bifid, mesial process prominent; lateral margin weakly convex, with 12-13 RS; mesial margin straight (or very weakly concave, distally convex), with 5 RS.

FEMALE: Similar to male.

SIZE: Specimens from the New Zealand region: males 27-33 mm, non-ovigerous females 28-33 mm; largest size a 42 mm female from New Caledonia.



**Figure 86.** *Aegiochus riwaha* sp. nov. C, male paratype, NIWA 17934; remainder holotype. A-C, pereopods 1, 2 and 7, respectively; D, pereopod 1, inferior margin of merus and carpus.

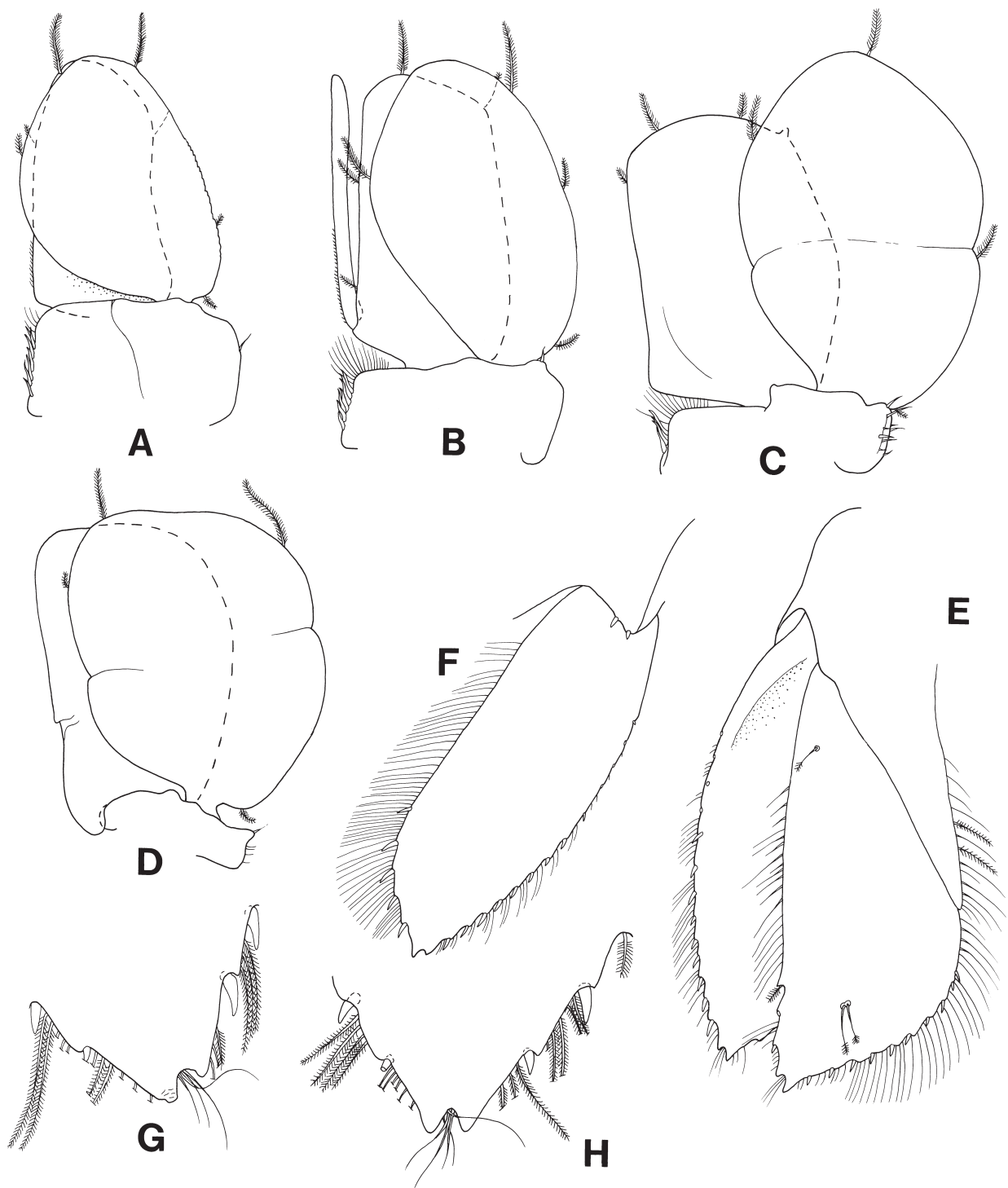
**VARIATION:** There were only two intact specimens available at time of description, therefore the details here are of range only. Robust setae on the pleotelson ranged from 10 or 11. Uropod endopod mesial margin 8–12 RS, lateral margin always 2 RS; uropod exopod mesial margin 5 or 6 RS, lateral margin 12 or 13 RS. In both specimens there were 3 minute RS set within the apical notch.

**REMARKS:** *Aegiochus riwaha* sp. nov. is most similar to *A. beri*, but has coxae that are more blunt, more robust pereopods with a shorter dactylus (1.0 times as long as propodus *v.* 1.4 times as long in *A. beri*), ventral surface of frontal lamina is flat (angled in *A. beri*), the uropod rami and pleotelson margins are weakly serrate (strongly serrate in *A. beri*), the appendix masculina is weakly spatulate and as long as the endopod (terminally acute and shorter than the endopod in *A. beri*) and the apices of the uropodal rami are more widely bifid than in *A. beri* (narrowly bifid). In addition *A. riwaha* has all dorsal body surfaces covered by brown chro-

matophores (*A. beri* is without such both in holotype and Lord Howe material), although without access to fresh or freshly preserved material it is not possible to place much reliance on colour difference. Given the proximity of the locations for the two species and the possibility of their being sympatric in part, these differences are considered to be of species-specific value.

The difference in coxal shape readily and easily distinguishes *Aegiochus riwaha* from *Aegiochus beri*. The anteriorly truncate notch on the pleotelson posterior margin separates these two species from all other southwestern Pacific and Southern Ocean species. *Aegiochus quadratisinus* (Richardson, 1903) (Bruce 1983) is known only from Hawai'i but, while similar to *A. riwaha*, has smaller eyes and the anterior margins of the frontal lamina are concave.

The maxilla appears to have the mesial lobe fused to the larger lateral lobe, and I could not distinguish the point of join under stereomicroscopy nor compound microscopy using DIC light interference.



**Figure 87.** *Aegiochus riwha* sp. nov. C-E, male paratype, NIWA 17934; remainder holotype. A-D, pleopods 1-3, 5 respectively; E, uropod; F, uropod endopod, ventral view; G, exopod apex; H, endopod apex.

**PREY:** There are no records.

**DISTRIBUTION:** Northwestern New Zealand, and the southern West Norfolk Ridge; also off New Caledonia, and in the northwestern Pacific from off Taiwan. Potentially at depths of 697-1480 metres.

**ETYMOLOGY:** Riwha is a Māori word meaning cleft or notch, in reference to the excision in the pleotelson (noun in apposition).

*Aegiochus tara* sp. nov.

(Figs 88–90)

MATERIAL EXAMINED: *Holotype*, ♀ (non-ovig, 31 mm), West Norfolk Ridge, 33°42.45'S, 167°27.03'E, 28 May 2003, 1451–1478 m, coll. NORFANZ, RV *Tangaroa* (NIWA 17947).

*Paratype*. ♀ (non-ovig, 22 mm), Tasmania, 48 km east of Cape Toureville, 42°00.25'S, 148°43.55'E, 30 October 1980, 1264 m, gravel with sandy mud, G.C.B. Poore & co. (NMV J27712).

*Other material*: Comparative material of *Aegiochus plebeia*, see Appendix 2.

DESCRIPTION: *Body* 1.6 times as long as greatest width, dorsal surfaces polished in appearance and sparsely punctate, widest at pereonite 5, lateral margins weakly ovate. Rostral point folded ventrally and posteriorly. *Eyes* large, not medially united, separated by about 4% width of head; each eye made up of ~12 transverse rows of ommatidia, each row with ~22 ommatidia; eye colour dark brown. *Pereonite 1 and coxae* 2–3 each with posteroventral angle acute, posteriorly produced. *Coxae* 5–7 with incomplete oblique carina; posterior margins concave, posterolateral angle acute (less than 45°). *Pleon* with pleonite 1 visible in dorsal view; pleonite 4 with posterolateral margins extending to but not beyond posterior margin of pleonite 5; pleonite 5 with posterolateral angles free, not overlapped by lateral margins of pleonite 4. *Pleotelson* 0.9 times as long as anterior width, dorsal surface without longitudinal carina; lateral margins sinuate (posteriorly weakly concave), smooth, posterior margin converging to caudomedial point, with 14 RS (estimated).

*Antennule* peduncle articles 3 and 4 1.1 times as long as combined lengths of articles 1 and 2, article 3 3.3 times as long as wide (narrowing distally); flagellum with 19 articles, extending to posterior of pereonite 1. *Antenna* peduncle article 4 2.5 times as long as wide, 1.2 times as long as combined lengths of articles 1–3, inferior margin 0 plumose setae, and 1 short simple seta; article 5 1.0 times as long as article 4, 3.0 times as long as wide, inferior margin with 0 palmate setae, anterodistal angle with cluster of 2 short simple setae; flagellum with 20 articles (terminal article/s missing), extending to middle of pereonite 3.

*Frontal lamina* posterior margin free, downwardly projecting, blade-like, wider than long, posteriorly rounded, anterior margin acute, forming median angle, posterior margin not abutting clypeus.

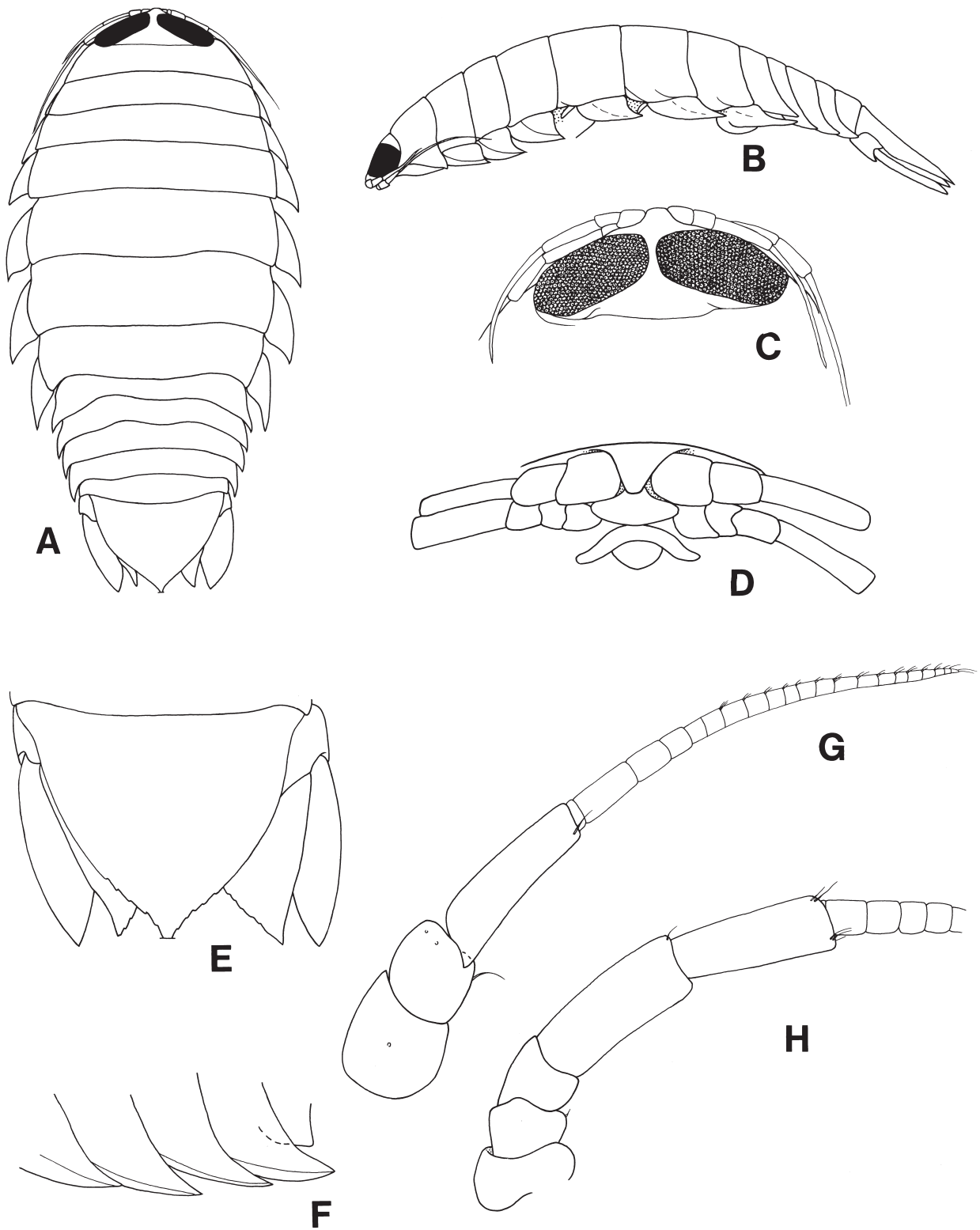
*Mandible* molar process present, small distinct flat lobe; palp article 2 with 17 distolateral setae (simple and biserrate; with distal submarginal row 7 simple setae), palp article 3 with 25 setae (simple; distal most short, next 3 markedly longer than remainder). *Maxillule* with 6 terminal RS (three largest being weakly hooked).

*Maxilla* mesial lobe with 3 RS (2 simple, 1 serrate); lateral lobe with 7 RS (4 hooked, 3 short and straight). *Maxilliped* endite with 0 apical setae; palp article 2 with 3 RS; article 3 with 8 recurved RS (straight or weakly recurved); article 4 with 4 hooked RS; article 5 with 4 RS (two longest of which are biserrate).

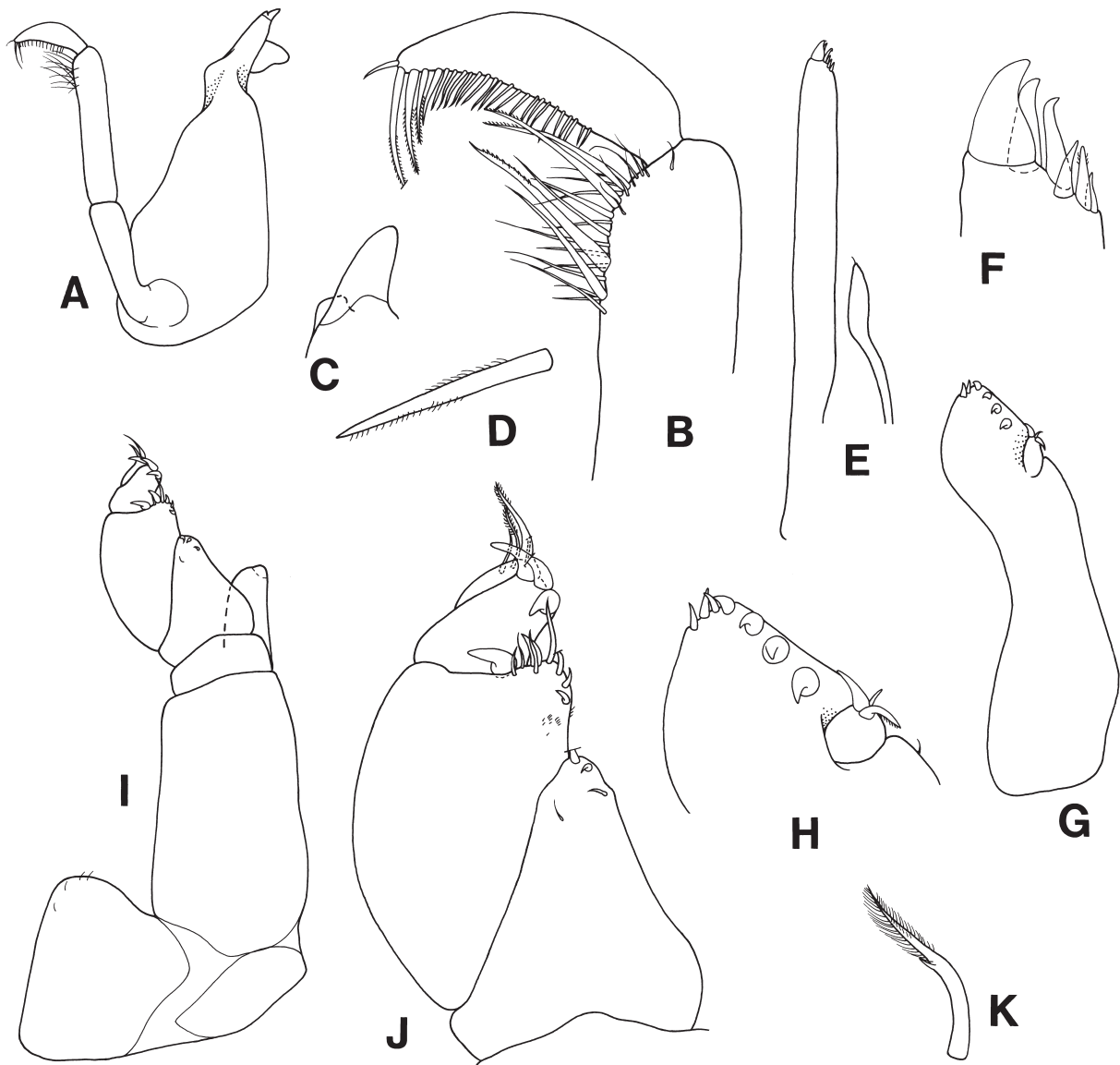
*Pereopod 1* basis 2.8 times as long as greatest width (narrowing distally); ischium 0.3 times as long as basis, inferior margin with 0 RS, superior distal margin with 1 RS; merus inferior margin with 0 RS, superior distal angle with 0 RS (1 simple seta); carpus 0.7 as long as merus, inferior margin with 0 RS; propodus 2.9 times as long as proximal width, inferior margin with 1 RS, propodal palm with small distal lobe, dactylus smoothly curved, 1.0 as long as propodus. *Pereopod 2* ischium inferior margin with 0 RS, superior distal margin with 1 RS; merus inferior margin with 3 RS (all small), set as two groups, superior distal margin with 0 acute RS (2 simple setae); carpus similar in size to that of pereopod 1, inferodistal angle with 1 RS (large weakly curved). *Pereopod 3* similar to pereopod 2. *Pereopods 5–7* inferior margins of ischium–carpus with short RS. *Pereopod 6* similar to pereopod 7. *Pereopod 7* basis 4.4 times as long as greatest width, inferior margins with 23 palmate setae; ischium 0.4 as long as basis, inferior margin with 1 RS, superior distal angle with 4 RS, inferior distal angle with 5 RS; merus 1.7 as long as ischium, 3.5 times as long as wide, inferior margin with 5 RS (set as 2, 2 and 1), superior distal angle with 14 RS, inferior distal angle with 6 RS; carpus 1.3 as long as ischium, 3.7 times as long as wide, inferior margin with 3 RS (set singly), superior distal angle with 11 RS, inferior distal angle with 5 RS; propodus 1.0 as long as ischium, 4.6 times as long as wide, inferior margin with 4 RS (set as 1, 1 and 2), superior distal angle with 1 slender seta (and 1 RS), inferior distal angle with 2 RS.

*Pleopod 1* exopod 1.7 times as long as wide, distally narrowly rounded, mesial margin weakly oblique, lateral margin weakly convex, mesial margin strongly convex, with PMS on distal one-third; lateral margin strongly concave, with PMS on distal one-third, mesial margin with PMS on distal half; peduncle 1.7 times as wide as long, mesial margin with 9 coupling hooks. Exopods of pleopods 1–3 each with distolateral margin not digitate; endopods of pleopods 3–5 each with distolateral point; pleopods 2–4 peduncle distolateral margin with prominent acute RS.

*Uropod* peduncle ventrolateral margin with 2 RS, posterior lobe about one-half as long as endopod. Uropod rami extending beyond pleotelson. *Endopod* apically not bifid, lateral margin straight, without prominent excision, proximal lateral margin with 1 RS, distal lateral margin with 2 RS, mesial margin weakly convex, with 7 RS. *Exopod* extending to end of endopod, 3.0 as long as greatest width, apically not bifid; lateral



**Figure 88.** *Aegiochus tara* sp. nov. Holotype. A, dorsal view; B, lateral view; C, head; D, frons, ventral view; E, pleotelson; F, pleonites, lateral margins; G, antennule; H, antenna peduncle.



**Figure 89.** *Aegiochus tara* sp. nov. Holotype. A, mandible; B, mandible palp article 3; C, mandible incisor; D, robust seta, mandible palp article 2; E, maxillule; F, maxillule apex; G, maxilla; H, maxilla apex; I, maxilliped; J, maxilliped articles 2-5; K, largest seta, maxilliped palp article 5.

margin weakly convex, with 12 RS; mesial margin weakly convex, with 4 RS.

MALE: Not known.

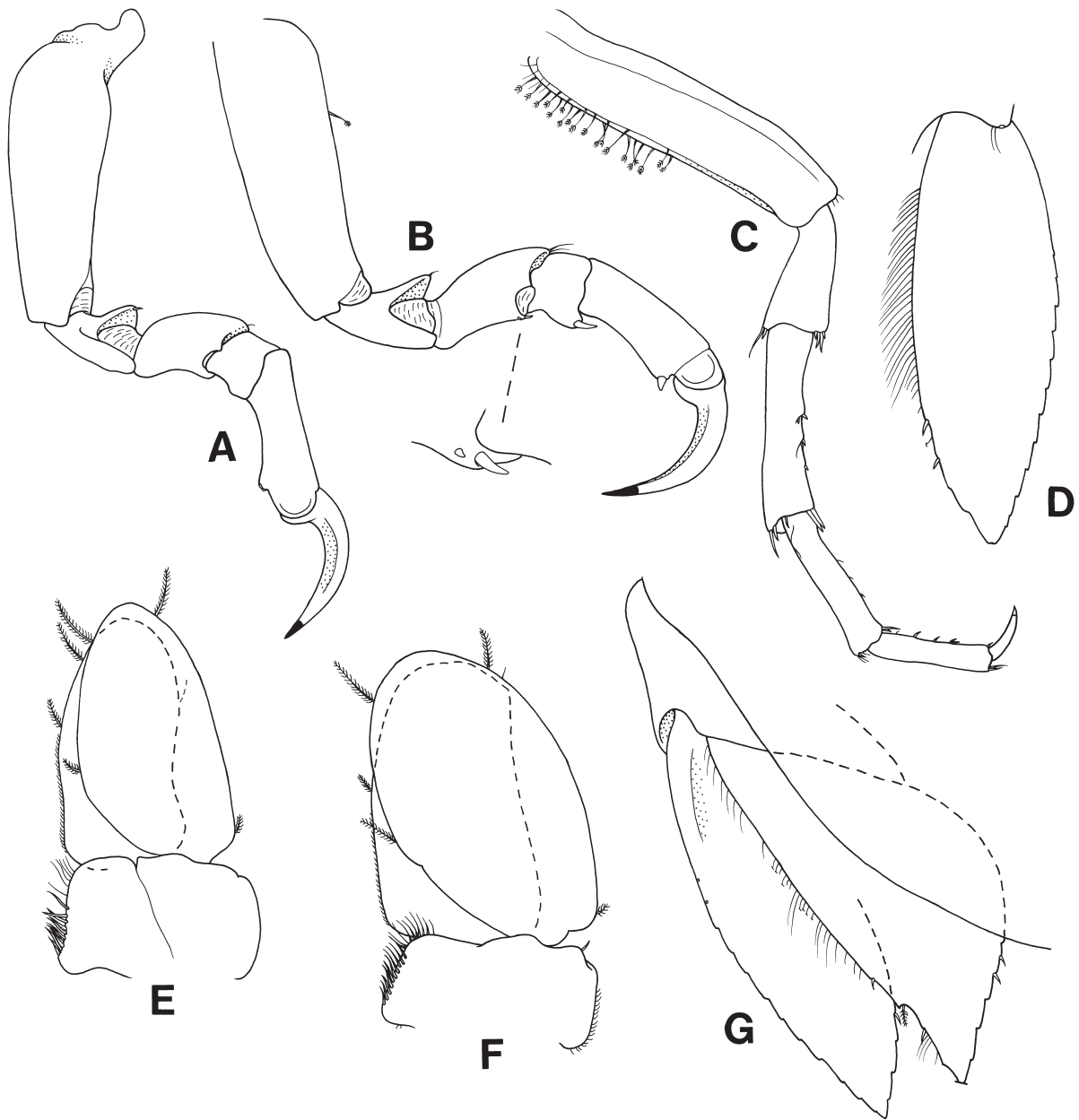
SIZE: Female 31 mm.

VARIATION: Most pleotelson robust setae are missing although the sockets are clearly distinct. The apices of the uropodal rami and the pleotelson are all damaged, and while counts appeared the same for all margins, the numbers can be regarded only as estimates.

REMARKS: Although similar to the sympatric *Aegiochus pihuka* sp. nov., *Aegiochus tara* sp. nov. is readily iden-

tified by the large but separate eyes, small distal lobe on the propodus of pereopods 1-3, that lobe bearing a prominent robust seta, the acute and laterally expressed coxal plates, the sinuate margins to the pleotelson, the apex of which is relatively strongly produced, and also the proximal one-third of the lateral margin of the uropodal exopod is devoid of setae.

*Aegiochus plebeia* (Hansen, 1890), a species of uncertain distribution (see p. 238), is also similar. Examination of the types shows that *A. tara* has a much narrower uropod exopod, terminally more acute pleotelson apex, smaller distal robust seta on the propodus of pereopods 1-3 and the coxae are strongly splayed and acute (not splayed and posteriorly produced as in *A. plebeia*).



**Figure 90.** *Aegiochus tara* sp. nov. Holotype. A, pereopod 1; B, pereopod 2; C, pereopod 7; D, uropod exopod, ventral view; E, pleopod 1; F, pleopod 2; G, uropod.

*Aegiochus ventrosa* (Sars, 1859), a North Atlantic species (see 'Remarks' for *A. plebeia*, see p. 238) is another similar species. *A. ventrosa* has been figured both with and without a prominent robust seta and weak propodal lobe on the palm of the propodus of pereopods 1–3, but pereopods 1–3 are more robust (propodus twice as long as wide) than those of *Aegiochus tara* (three times as long as wide).

PREY: Not known.

DISTRIBUTION: Tasman Sea; east of Cape Toureville, Tasmania and the West Norfolk Ridge to the west of northern New Zealand; 1264–1478 metres.

ETYMOLOGY: The epithet, *tara*, is a Māori word meaning spine or spiny in relation to marine animals.

*Aegiochus vigilans* (Haswell, 1881), comb. nov.  
(Fig. 91)

RESTRICTED SYNONYMY:

*Aega ommatophylax* Stebbing, 1905: 12, pls IV, VA.

*Aega dubia* Richardson, 1910: 12, fig. 2.

*Aega* (*Rhamphion*) *vigilans*. – Bruce, 1993: 762, figs 3, 4 (citations therein).

*Aega giganteoculata* Nunomura, 1988a: 19, figs 1, 2 (**new synonymy**).

TYPE LOCALITY: Holborn Island, near Port Dennison, Queensland (Springthorpe & Lowry, 1994: 64).

MATERIAL EXAMINED: Manca (7.0 mm), off Great Barrier Island, North Island, January 2006, old longline gear at ~500 m, coll. Steve Lowe (NIWA 23779). ♀ (non-ovig. 13 mm), New Caledonia, 21°03.680–03.997'S, 160°44.766–44.874'E, 21 October 2005, DW2636, 254–271 m, coll. B. Richer de Forge (MNH Is.5910).

Also examined: ♀ (non-ovig. 16.5 mm), northwest of Bluff Point, Geraldton, Western Australia, 27°40'S,

113°03'E, 22 March 1963, 128 m, CSIRO stn 131 (WAM 2293-86). 4, 93 km west of Dongara, Western Australia, 20°07'S, 113°57'E, 19 February 1976, 110 m, stn 30 (WAM 2282-86). Paratypes of *Aega giganteocula*, two lots, heavily dissected (body no longer intact), off Ito-man, Okinawa, Japan, July 1985, coll. Hideo Sekiguchi (TSM Cr7649, Cr7650). 1, off Singapore, 31 May 1951, 39 m, coral, *Galathea* stn 355 (ZMUC unreg).

REMARKS: A detailed redescription of this widely distributed species was given by Bruce (1983). As the sole specimen from New Zealand waters is a manca, a detailed redescription is not given, particularly as mature adult males possess two large forward-projecting processes on pereonite 1, and the rostrum is also produced, giving these animals a striking 'three-horned' appearance, abundantly different from all other species in the genus. Females and immature specimens can be identified by the huge, black, united eyes filling the head in dorsal view, the characteristic scalloping of the posterior margin of the pleotelson, shape of the

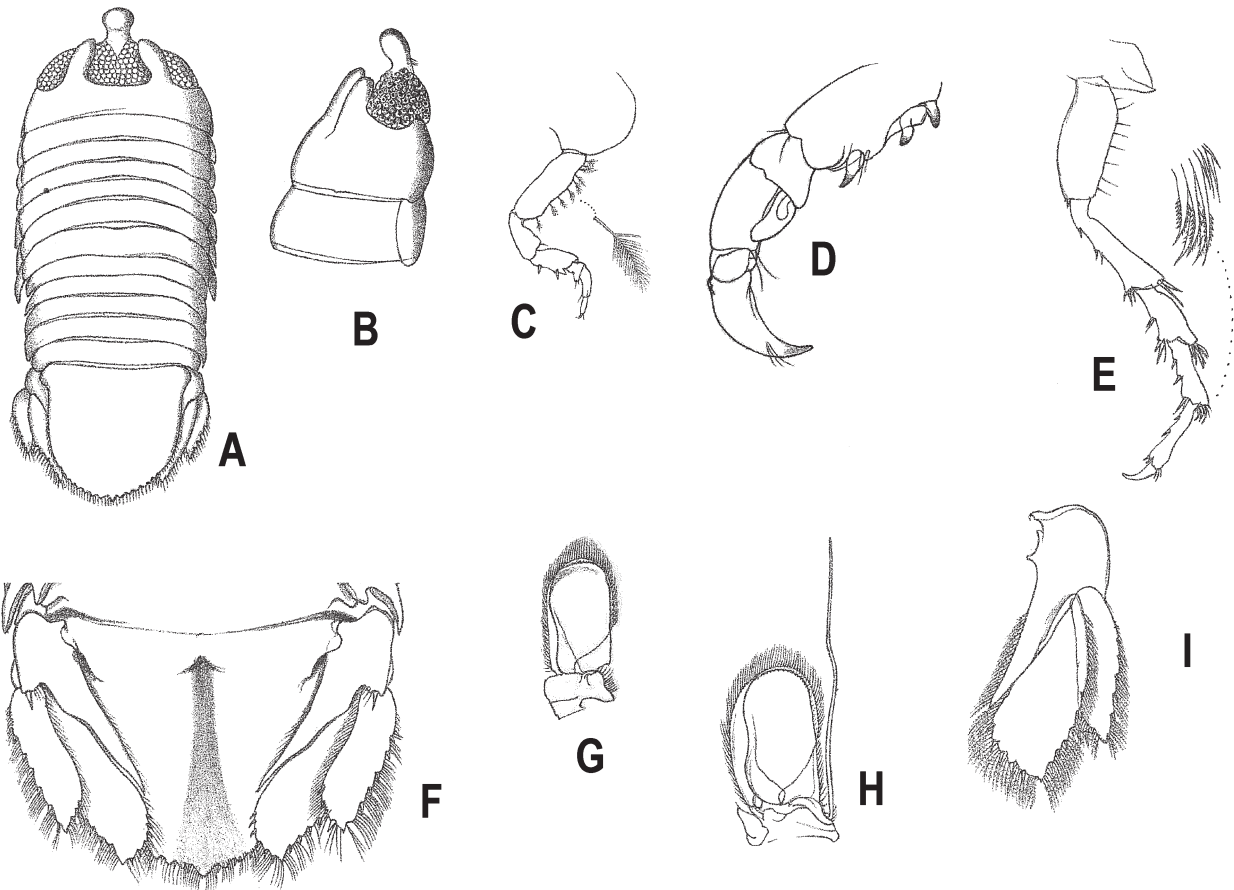


Figure 91. *Aegiochus vigilans* (Haswell, 1881). From Stebbing (1905). A, dorsal view; B, head, lateral view; C–E, pereopods 1, 2 and 7 respectively; F, pleotelson and uropods, ventral view; G, pleopod 1; H, pleopod 2; I, uropod.



uropods, and the elongate and flat ('cirolanid-like') frontal lamina. Comparison with specimens from tropical Australia (Australian Museum, Western Australian Museum) confirm the identity of this immature specimen, the most southerly record for the species.

*Aegiochus vigilans* shows a number of unique character states these being, in addition to the strongly dimorphic ornamentation of the mature males, a flat and elongate frontal lamina, cirolanid-like spination of the mandibular molar process, large blunt robust seta at the inferodistal margin of the carpus of pereopods 2 and 3, an extremely long appendix masculina (more than twice as long as the endopod), and paired narrow penial processes; the maxilliped palp differs from others in that article 4 is comparatively small.

Examination of paratypic material of *Aega giganteocula* Nunomura, 1998, shows that it agrees entirely with the description of *Aegiochus vigilans* given by Bruce (1983); I have no hesitation in making the synonymy.

**DISTRIBUTION:** One record from northeastern New Zealand. Commonly recorded within the tropics from India to eastern Australia and the Philippines (Bruce 1983); from shallow water on coral reefs to a depth of 271 m, possibly deeper. Collections examined at the Muséum national d'Histoire naturelle in Paris indicate that the species is common in New Caledonian waters.

#### *Aegiochus* sp.

**MATERIAL EXAMINED:** 1 ♂ (damaged, 9.5 mm), Parengarenga Harbour, 21 Feb 1974, *Zostera* and sand, 6–9 m, coll. RV *Acheron* (AK 4607).

**REMARKS:** This specimen, unfortunately in very poor condition, appears most similar to *Aegiochus nohinohi* sp. nov. Both species have relatively small eyes, similar pattern of setation on the pereopods, serrate pleopodal endopods, and the pleotelson without robust setae. A number of differences suggest that this specimen may be a distinct species: the frontal lamina appears to be a ventrally flat triangle (similar to that of *Aegiochus pushkini*), pereopods 2 and 3 have prominent robust setae on the inferior margin of the merus, and the uropod exopod and endopod each have two prominent robust setae on the mesial margins. Given the very different habitats of the two species (Parengarenga Harbour is a largely enclosed marine estuary, while *A. nohinohi* is known from oceanic shelf habitats, 360 to 1140 metres) it seems very unlikely that this specimen is *A. nohinohi*. Unfortunately the specimen is too badly damaged to describe, and additional specimens would be necessary to adequately characterise the species.

#### *Aegiochus* sp.

**MATERIAL EXAMINED:** ♀ (ovig. 12.9 mm), Rumble 3 sea mount, 178°29.79'E, 35°44.30'S, 20 May 2001, scoria rubble, 939–250 m, coll. RV *Tangaroa* (NIWA 34807).

**REMARKS:** This specimen is very similar to *Aegiochus kanohi* sp. nov., but differs notably in the shape of the frontal lamina, which does not have a blade-like posterior margin, pereopod 2 which has one robust seta on the propodal palm, and in having robust setae on the pleotelson posterior margins. These are diagnostic characters, but without more specimens, including mature males, the species cannot adequately be characterised, nor differentiated from other similar sympatric species. Until further material is available it remains identified as *Aegiochus* sp.

#### *Epulaega* gen. nov.

**TYPE SPECIES:** *Aega fracta* Hale, 1940, here designated.

**SPECIES INCLUDED:** In addition to type species – *Epulaega derkoma* sp. nov., *Epulaega nodosa* (Schioedte & Meinert, 1879), **comb. nov.**, *Epulaega lethrina* (Bruce, 1983) **comb. nov.** and *E. monilis* (Barnard, 1914) **comb. nov.**

**DIAGNOSIS:** Rostrum minute, not visible in dorsal view. Eyes large, united. Antennule and antenna peduncle articles not expanded or produced. Maxillule with single large broad-based and several small RS. Maxilliped palp 5-articled, article 1 shorter than wide, article 5 minute. Penial processes medially fused, with separate openings.

**DESCRIPTION:** Body moderately to strongly vaulted, about 2 to 4 times as long as wide. Eyes large, medially united. Rostral point ventral or anteroventral, minute. Coxae 4–7 longer than respective segment, posteriorly produced. Pleon not abruptly narrower than pereon; pleonites all visible, pleon not widest posteriorly, pleonite 5 laterally overlapped by pleonite 4; pleonites 3–5 posteriorly produced to an acute point.

Frontal lamina present, ovate, not in contact with labrum. Mandible with uni- or bicuspid incisor. Maxillule with 1 large flat terminal broad-based RS, several small RS. Maxilla lateral lobe with 3–5 terminal hooked RS, endite with 2–3 hooked RS. Maxilliped palp 5-articled, article 1 shorter than wide, articles 3 and 4 each with 2–6 stout recurved RS, article 5 minute, vestigial.

**REMARKS:** All species of *Epulaega* gen. nov. have large medially united eyes, lack an obvious rostrum in dorsal view, maxilliped palp article 5 is a vestigial lobe, and the penial papillae are medially fused. The latter three states are defining apomorphies for the genus.

Most species are loosely associated with sponges, but *Epulaega lethrina* is unambiguously but not exclusively a commensal of coral reef fishes (principally Serranidae and Lethrinidae) on the Great Barrier Reef (Bruce 1983). On present records the genus has an Indo-West Pacific distribution to approximately 42° South in New Zealand.

ETYMOLOGY: From the Latin *epulo* (guest at a banquet or feast), in combination with *Aega* to indicate the family affinity. Gender feminine.

#### KEY TO THE NEW ZEALAND SPECIES OF *EPULAEGA*

- 1 Posterior margin of pereonites without nodules; dorsal surfaces of pleotelson smooth.....  
.....*E. derkoma* sp. nov.
- Posterior margin of pereonites with small nodules; dorsal surface of pleotelson with scattered small spines .....*E. fracta* (p. 156)

*Epulaega derkoma* sp. nov. (Figs 92–95)

MATERIAL: *Holotype*: ♀ (ovig. 7.7 mm), South Norfolk Basin, 25 July 1975, 32°10.80'S, 167°21.19'E, 356 m, DR Stn I96 (NIWA 23862).

DESCRIPTION: *Body* 1.4 times as long as greatest width, dorsal surfaces polished in appearance, widest at pereonite 5, lateral margins weakly ovate. Rostral point ventrally directed. *Eyes* large, medially united (line of separation present), anterior clear field 17% length of head, posterior clear field 20% length of head; each eye made up of ~9 transverse rows of ommatidia, each row with ~7–8 ommatidia; eye colour dark brown (chestnut). *Pereonite 1 and coxae* 2–3 each with posteroventral angle right-angled; posterior margins of pereonites not ornamented (posterior of pereonites 2 and 3 with weak submarginal transverse ridge). *Coxae* 5–7 with entire oblique carina (weakly defined) posterior margins convex, posterolateral angle blunt (more than 45°). *Pleon* with pleonite 1 largely concealed by pereonite 7; pleonites with lateral margin of pleonites 4–5 plate-like and flattened; pleonite 4 with posterolateral margins not extending to posterior margin of pleonite 5; pleonite 5 with posterolateral angles free, not overlapped by lateral margins of pleonite 4. *Pleotelson* 0.7 times as long as anterior width, dorsal surface without longitudinal carina; lateral margins convex, smooth, posterior margin converging to caudomedial point, with RS rubbed off, only 1 remaining.

*Antennule* peduncle articles 3 and 4 1.1 times as long as combined lengths of articles 1 and 2, article 3 3.4 times as long as wide; flagellum with 9 articles (article 1 0.9 times as long as peduncle), extending to anterior of pereonite 1. *Antenna* peduncle article 4 2.3 times as

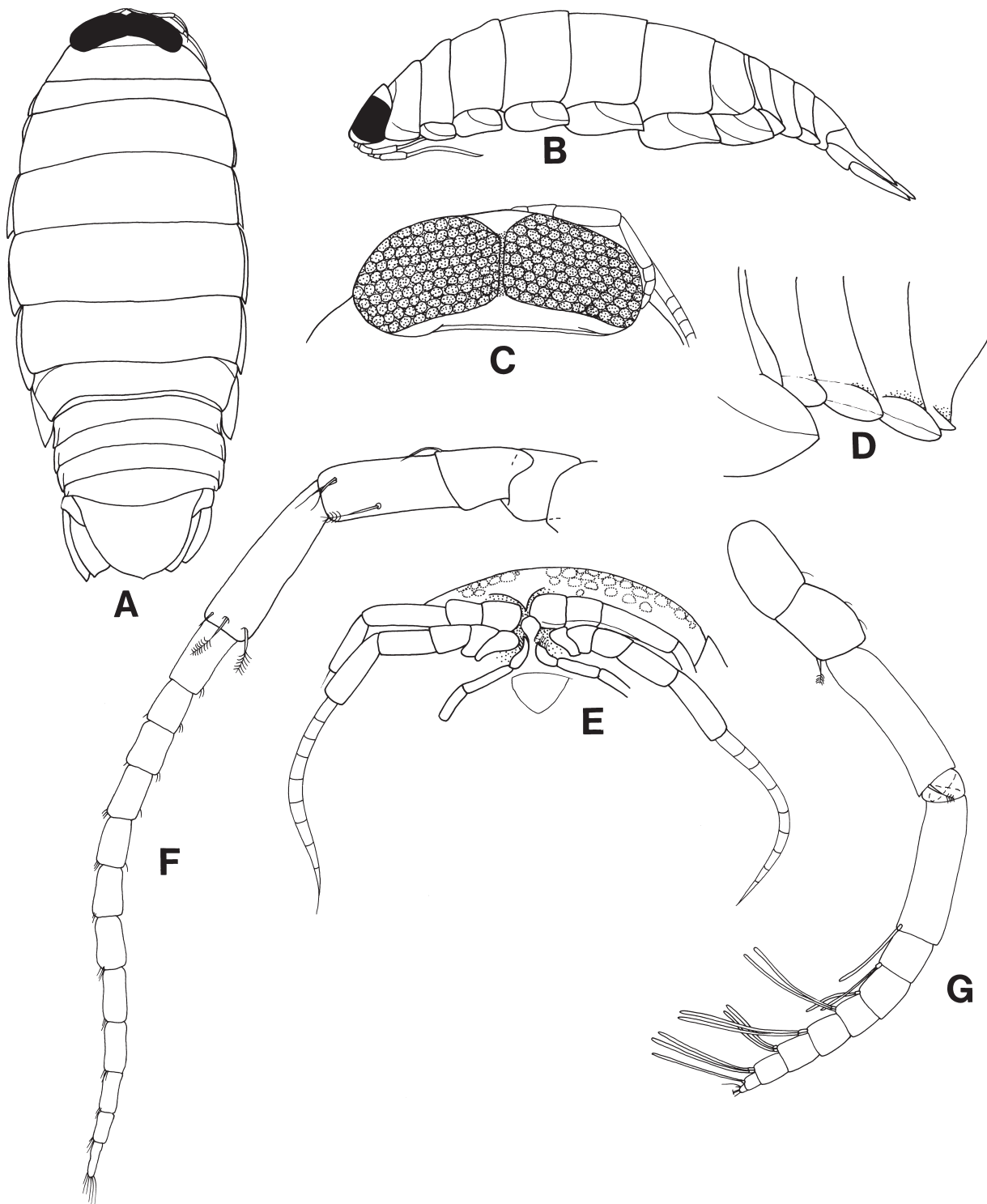
long as wide, 0.9 times as long as combined lengths of articles 1–3, inferior margin with 1 plumose seta and 2 short simple setae (distal); article 5 1.4 times as long as article 4, 4.3 times as long as wide, inferior margin with 1 pappose seta, anterodistal angle with cluster of 1 short simple seta (and 1 pappose seta); flagellum with 12 articles, extending to posterior of pereonite 3.

*Frontal lamina* flat, longer than greatest width, lateral margins converging posteriorly, anterior margin rounded, without small median point, posterior margin not abutting clypeus.

*Mandible* molar process present, small distinct flat lobe; palp article 2 with 10 distolateral setae (in two tiers, 4 biserrate, 4 stout simple, 2 slender simple), palp article 3 with 20 setae (terminal less than twice as long as remainder). *Maxillule* with 6 terminal RS (1 large, 3 slender, 2 minute). *Maxilla* mesial lobe with 2 RS (circumplumose); lateral lobe with 2 RS (curved). *Maxilliped* palp article 2 fused to article 3; article 3 with 3 straight RS; article 4 with 2 straight RS; article 5 wholly fused to article 4, with 1 RS.

*Pereopod 1* basis 3.9 times as long as greatest width; ischium 0.5 times as long as basis, inferior margin with 1 RS (small), superior distal margin with 1 RS; merus inferior margin with 1 RS (plus 2 slender setae), set as distal group, superior distal angle with 1 RS (small); carpus 0.4 as long as merus; inferior margin with 0 RS; propodus 2.1 times as long as proximal width, inferior margin with 0 RS, propodal palm simple, without blade or process, dactylus smoothly curved, 1.0 as long as propodus. *Pereopod 2* ischium inferior margin with 1 RS (large blunt), superior distal margin with 1 RS; merus inferior margin with 5 RS (large, blunt; set as 1, 2 and 2), set as three groups, superior distal margin with 2 acute RS; carpus similar in size to that of pereopod 1, inferodistal angle with 0 RS. *Pereopod 3* similar to pereopod 2. *Pereopod 6* similar to pereopod 7. *Pereopod 7* basis 3.0 as long as greatest width, inferior margins with 4 palmate setae; ischium 0.4 as long as basis, inferior margin with 2 RS (set as 1 and 1), superior distal angle with 3 RS, inferior distal angle with 3 RS; merus 0.9 as long as ischium, 1.7 times as long as wide, inferior margin with 2 RS (set as 1 and 1), superior distal angle with 6 RS, inferior distal angle with 3 RS; carpus 1.0 as long as ischium, 2.0 times as long as wide, inferior margin with 1 RS, superior distal angle with 8 RS (5 biserrate), inferior distal angle with 4 RS; propodus 1.1 as long as ischium, 4.0 times as long as wide, inferior margin with 2 RS (set as single cluster), superior distal angle with 1 slender seta, inferior distal angle with 2 RS.

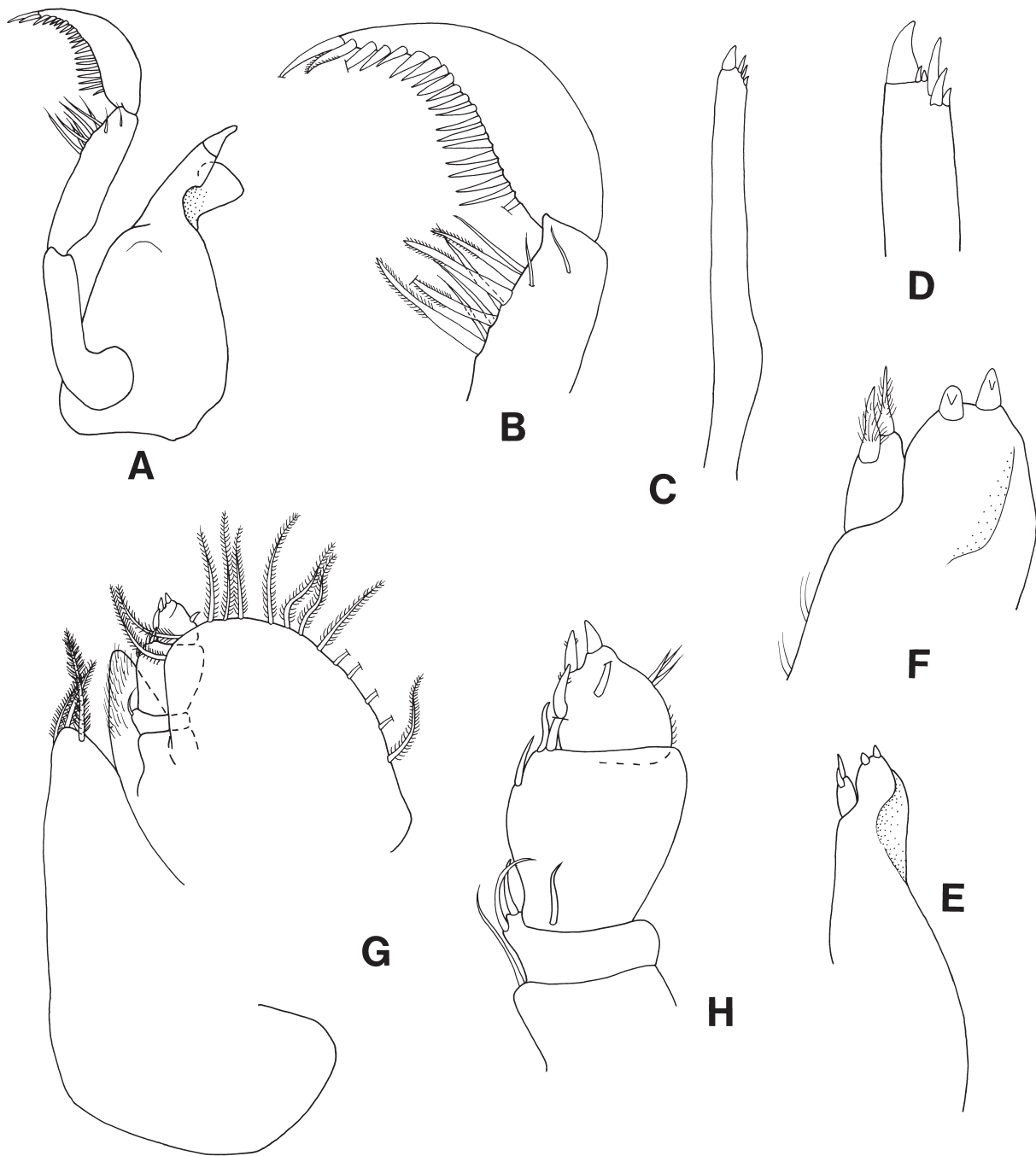
*Pleopod 1* exopod 2.0 times as long as wide, lateral margin weakly convex, mesial margin strongly convex, with PMS from distal half, with ~34 PMS; endopod 2.1 times as long as wide, distally rounded, lateral margin straight, with PMS from on distal margin only, mesial



**Figure 92.** *Epulaega derkoma* sp. nov. Holotype. A, dorsal view; B, lateral view; C, head; D, pleonites, lateral view; E, frons; F, antenna; G, antennule peduncle.

margin with PMS from distal one-third, endopod with ~17 PMS; peduncle 1.8 times as wide as long, mesial margin with 6 coupling hooks. *Pleopod 2* exopod with ~46 PMS, endopod with ~19 PMS. *Pleopod 3* exopod

with ~53 PMS, endopod with ~12 PMS. *Pleopod 4* exopod with ~52 PMS, endopod with ~12 PMS. *Pleopod 5* exopod with ~48 PMS. Exopods of pleopods 1–3 each with distolateral margin not digitate; endopods of



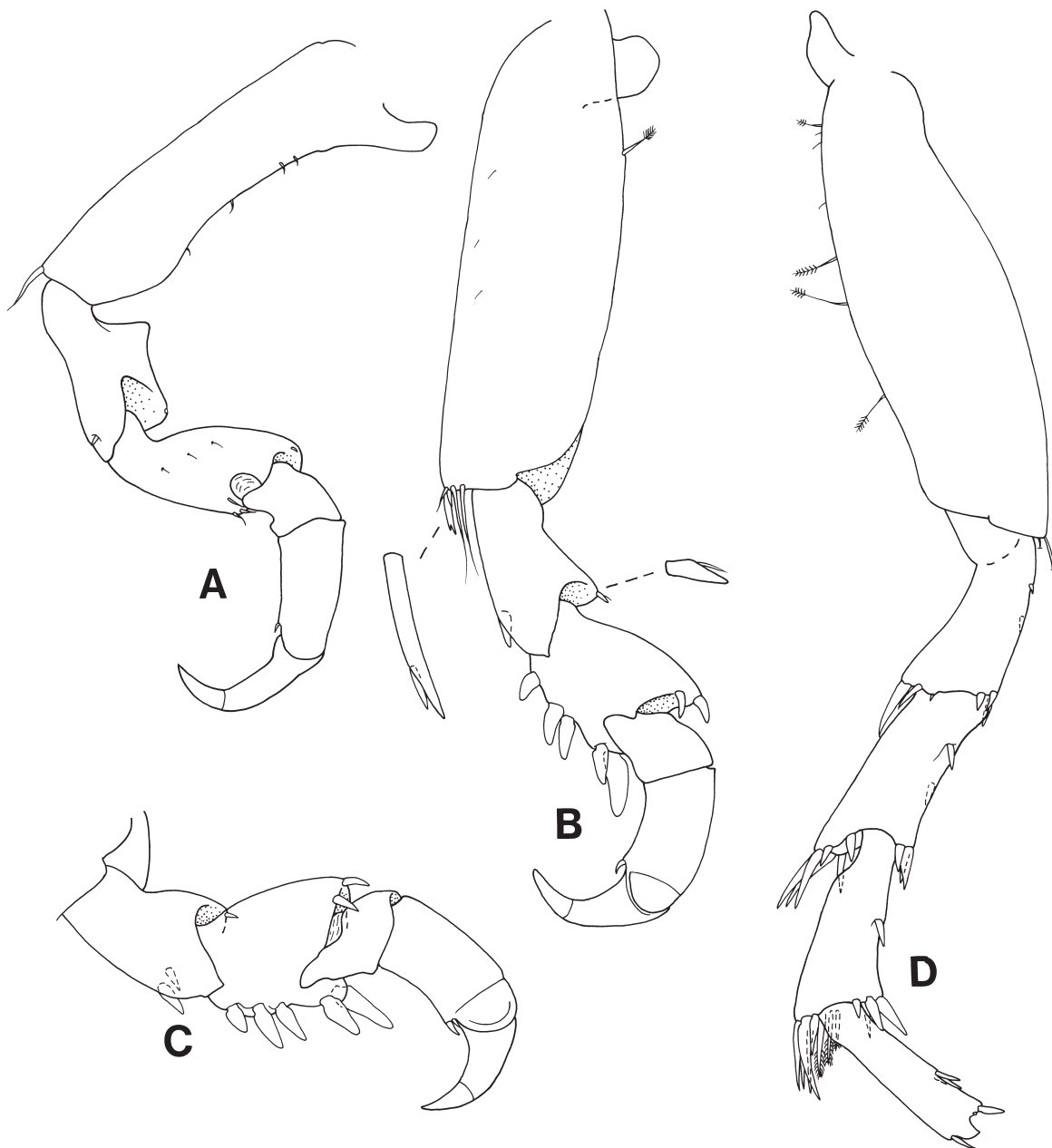
**Figure 93.** *Epulaega derkoma* sp. nov. Holotype. A, mandible; B, mandible palp article 3; C, maxillule; D, maxillule apex; E, maxilla; F, maxilla apex; G, maxilliped; H, maxilliped articles 2-5.

pleopods 3-5 each with distolateral point; pleopods 2-5 peduncle distolateral margin with prominent acute RS.

*Uropod* peduncle ventrolateral margin with 2 RS (and 2 plumose slender setae), posterior lobe about two-thirds as long as endopod. *Endopod* apically not bifid, lateral margin straight, without prominent excision, proximal lateral margin with 0 RS, distal lateral

margin with 1 RS, mesial margin strongly convex, with 3 RS. *Exopod* not extending to end of endopod, 3.2 times as long as greatest width, apically not bifid; lateral margin weakly convex, with 7 RS; mesial margin weakly convex, with 1 RS.

MALE: Not known.



**Figure 94.** *Epulaega derkoma* sp. nov. Holotype. A–D, pereopods 1–3 and 7, respectively (pereopod 3 basis omitted; pereopod 7 dactylus missing).

**VARIATION:** There being but a single specimen, variation remains unknown.

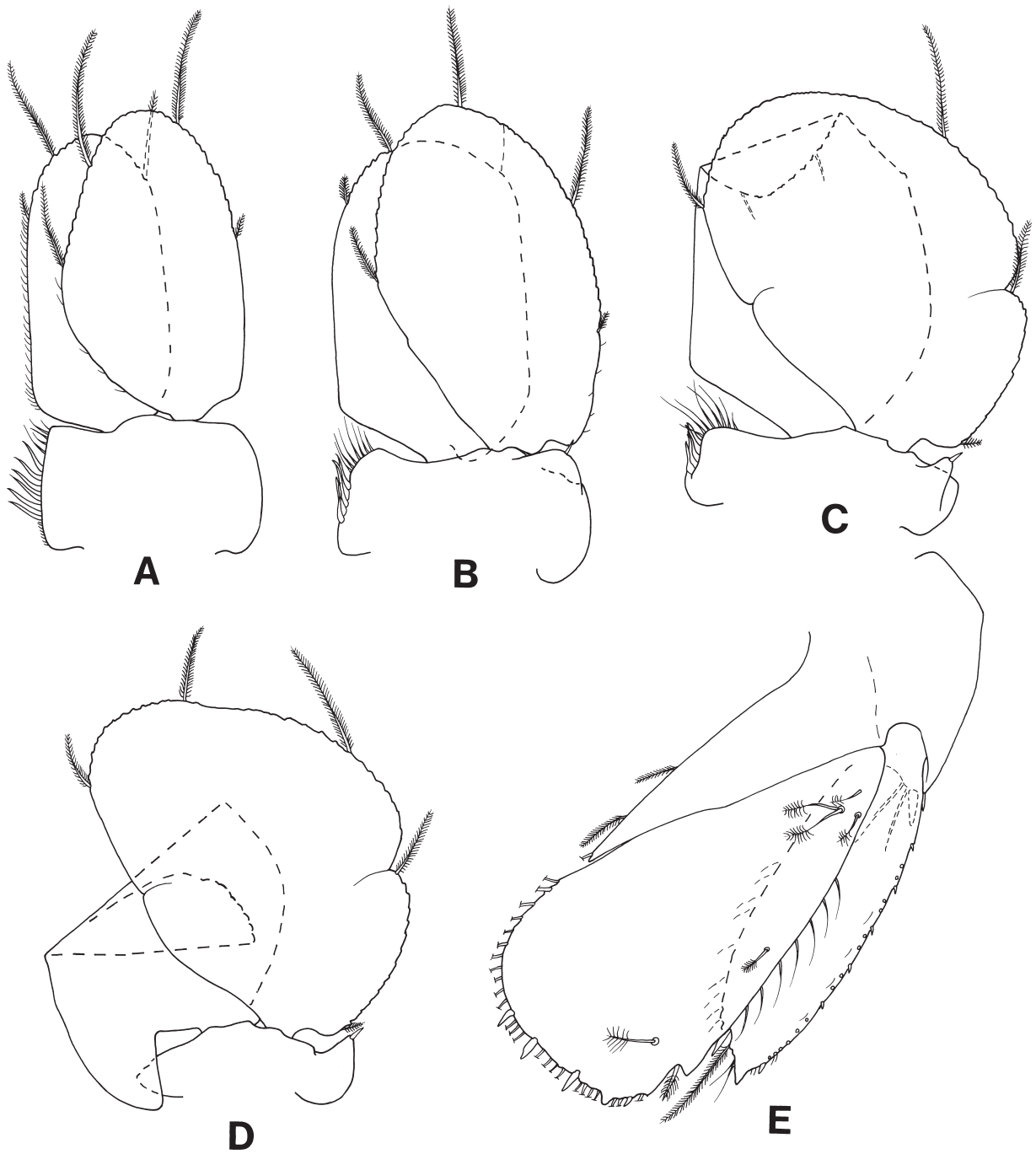
**REMARKS:** *Epulaega derkoma* sp. nov. is a distinctive species, readily identified by the large and united eyes, antennule flagellum article 1 being as long as peduncle article 3, flattened and plate-like lateral margins of the epimera, short dactylus on pereopods 1–3, and pereopods 2 and 3 with conspicuously large robust setae. The maxilliped of ovigerous females is usually similar to that of males, with the robust setae usually being more slender. As with most species of the Aegidae the

shape and pattern and number of robust setae on the pleotelson and uropods is also diagnostic.

**PREY:** Not known.

**DISTRIBUTION:** Known only from the South Norfolk Basin, north of North Island, New Zealand.

**ETYMOLOGY:** Adapted from the Greek *derkomai*, meaning to see clearly (in allusion to the huge eyes).



**Figure 95.** *Epulaega derkoma* sp. nov. Holotype. A-D, pleopods 1-3, 5, respectively; E, uropod.

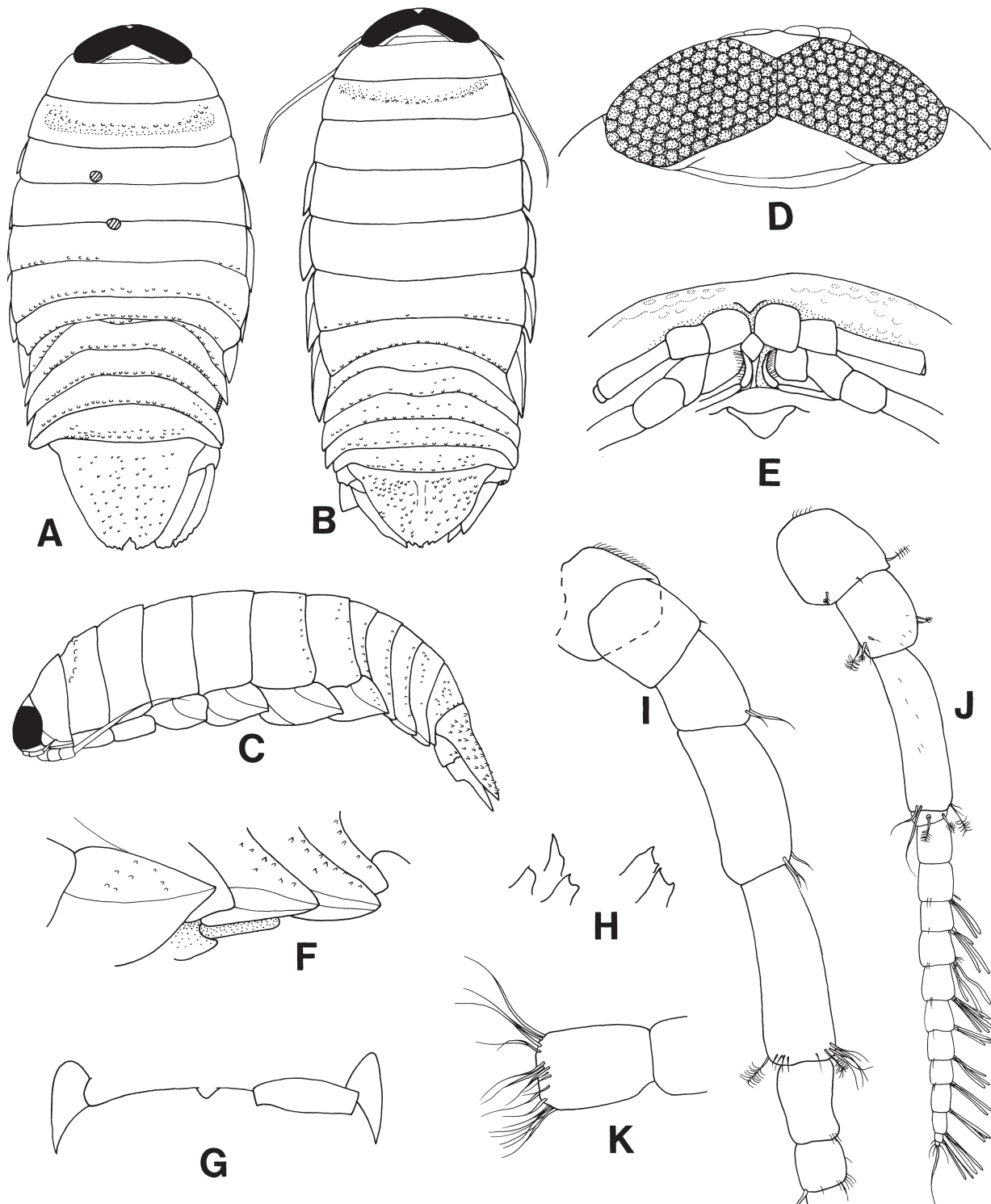
*Epulaega fracta* (Hale, 1940), comb. nov. (Figs 96-99)

*Aega fracta* Hale, 1940: 296, fig. 4.- Bruce, Lew Ton & Poore, 2002: 161.

*Aega* (*Ramphion*) *fracta*.- Brusca, 1983: 11.

**MATERIAL EXAMINED:** Holotype, ♂ (14.9 mm), off the Tasmanian coast, Australia, coll. FIS *Endeavour* (AM E6747). Specimen may have been dried at some point as pin holes are evident.

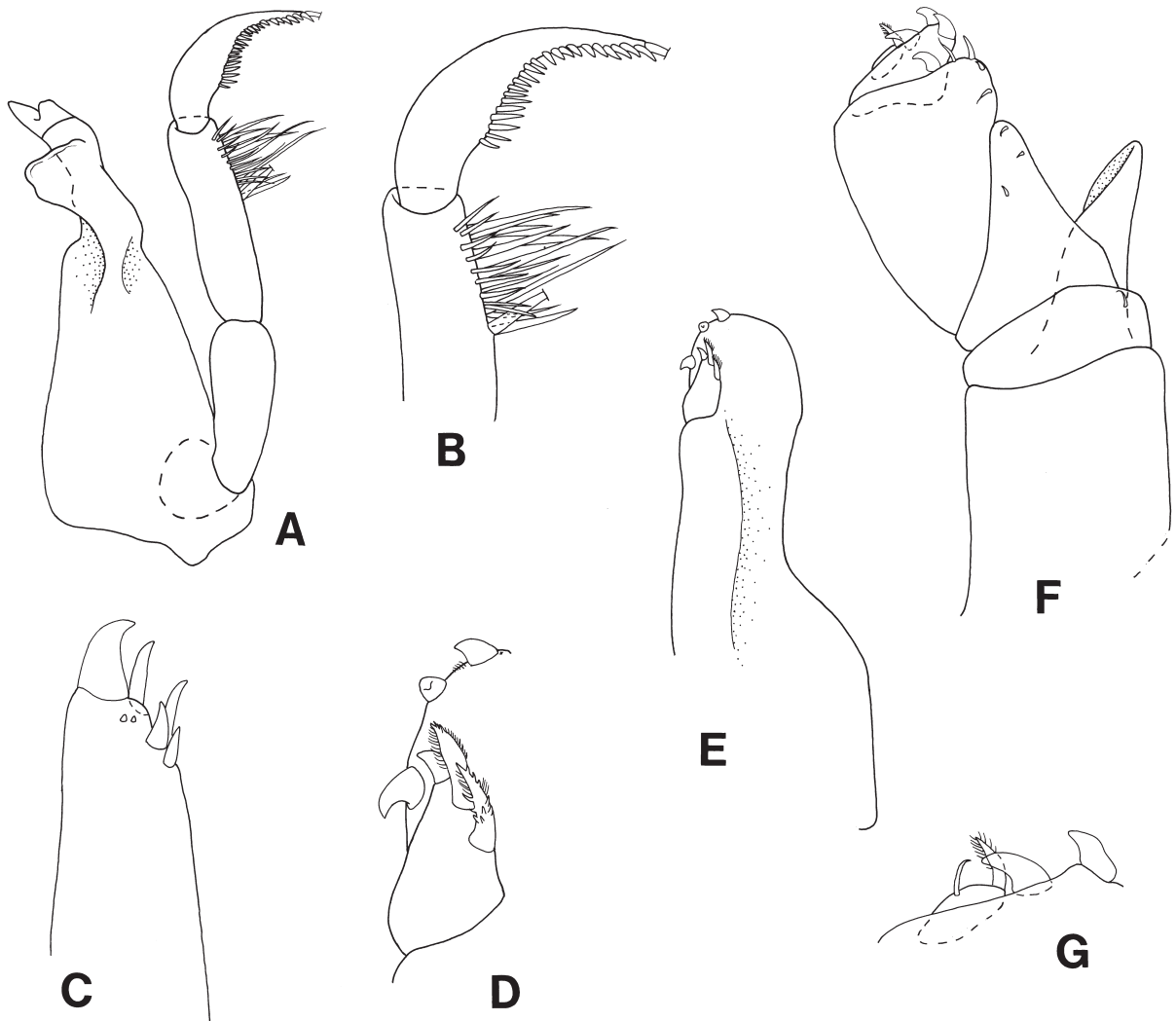
**Non-type material.** ♂ (15.5 mm), off Great Barrier Island, North Island, October 2004, from *Hyperoglyphe antarctica*, longline at ~500 m, coll. Steve Lowe (NIWA 34806). ♂ (14.4 mm), Conway Rise, off Kaikoura, 13 May 1987, in *Symplectella*, 400 m, coll. E. Barbarel (NMNZ Cr.12015). ♀ (non-ovig 15.5 mm), Conway Rise, off Kaikoura, 2 September 1984, in 'organ pipe' sponge, 400 m, coll. Ted Forbes on F.V. *Bar-K-Lin* (NMNZ Cr.4970). Imm. ♂ (10.6 mm), manca (6.0 mm), J/16/28/84, inside



**Figure 96.** *Epulaega fracta* (Hale, 1940). A, holotype AM E6747, remainder NMNZ Cr.9260. A, dorsal view, holotype; B, dorsal view, NMNZ Cr.9260; C, lateral view; D, head; E, frons; F, pleonites, lateral view; G, sternite 7 showing penial openings; pleotelson; H, spines, dorsal surface of pleotelson; I, antenna peduncle; J, antennule; K, antenna flagellum, article 11.

large orange sponge (NMNZ Cr.12001). ♂ (18.0 mm), New Zealand, stn J679 [station could not be traced] (NIWA 23764). ♂ (17.0), off Great Barrier Island, North Island, January 2006, old longline gear at ~500 m, coll.

Steve Lowe (NIWA 23765). **Queensland:** ♀ (ovig. 13.0 mm), Marion Plateau, 22°14.1–10.1'S 158°31.7–29.1'E, 303–333 m, 19 November 1985, stn 0685/15/6, from *Hexactinella*, coll. *Soela* (NTM Cr14926).



**Figure 97.** *Epulaega fracta* (Hale, 1940). NMNZ Cr.9260. A, mandible; B, mandible palp, article 3; C, maxillule apex; D, maxilla apex; E, maxilla; F, maxilliped; G, maxilliped palp article 5.

*Also examined:* 24 specimens (5 mature adults) of *Aega monilis* Barnard, 1914, 31°35'S, 16°30'E, 24 January 1995, 331 m, in sponge, coll. SAFRI *Africana* (SafM A43117).

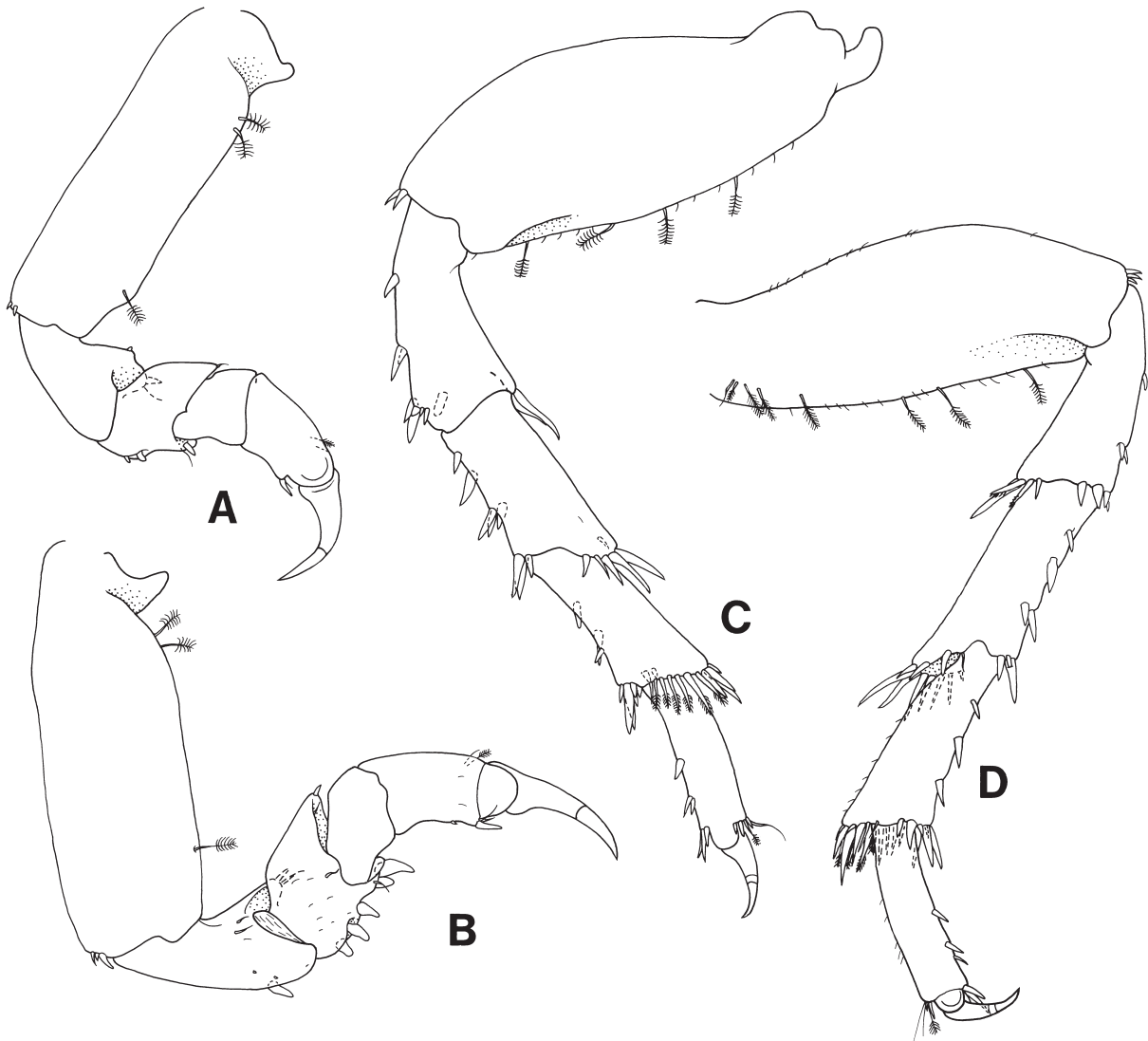
**TYPE LOCALITY:** 'Off Tasmanian coast' (Hale 1940), south-eastern Australia.

**DESCRIPTION:** *Body* 2.3 times as long as greatest width, dorsal surfaces sparsely punctate, widest at pereonite 5, lateral margins subparallel. Rostral point ventrally directed. *Eyes* large, medially united, anterior clear field 14% length of head, posterior clear field 44% length of head; each eye made up of ~13 transverse rows of ommatidia, each row with ~7 ommatidia; eye colour black. *Pereonite 1 and coxae 2–3* each with posteroventral angle rounded; pereonite 2 with median curved transverse nodulose ridge; posterior margins of pereonites with

small nodules. *Coxae 5–7* with entire oblique carina; posterior margins convex, posterolateral angle blunt (more than 45°). *Pleon* with pleonite 1 visible in dorsal view; pleonites with small nodules along posterior margin; pleonite 4 with posterolateral margins extending clearly beyond posterior margin of pleonite 5; pleonite 5 with posterolateral angles free, not overlapped by lateral margins of pleonite 4. *Pleotelson* 0.7 times as long as anterior width, dorsal surface without longitudinal carina, with short acute spines; lateral margins convex, smooth, posterior margin with distinct short median point, with 4–6 RS.

*Antennule* peduncle articles 3 and 4 1.1 times as long as combined lengths of articles 1 and 2, article 3 3.8 times as long as wide; flagellum with 12 articles, extending to posterior of pereonite 1. *Antenna* peduncle article 4 2.1 times as long as wide, 0.7 times as long as combined lengths of articles 1–3, inferior margin 0





**Figure 98.** *Epulaega fracta* (Hale, 1940). NMNZ Cr.9260. A-D, pereopods 1, 2, and 7, respectively.

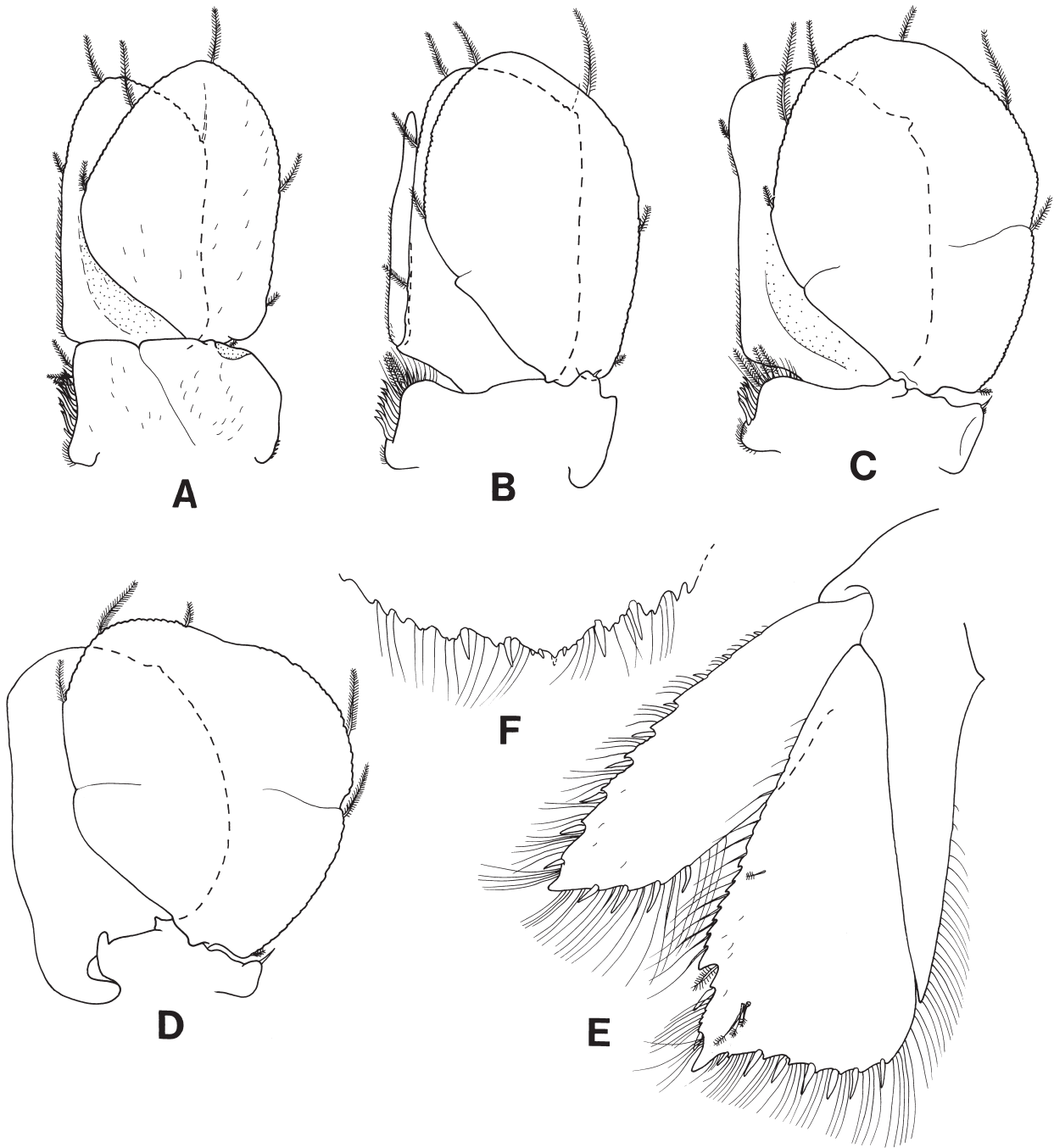
plumose setae, and 0 short simple setae; article 5 1.3 times as long as article 4, 2.8 times as long as wide, inferior margin with 0 palmate setae, anterodistal angle with cluster of 8 short simple setae (and 1 palmate); flagellum with 18 articles, extending to pereonite 4.

*Frontal lamina* flat, as wide as long, diamond shaped, anterior margin acute, forming median angle, posterior margin forming narrow stem.

*Mandible* molar process present, small distinct flat lobe; palp article 2 with 23 distolateral setae (stiff), palp article 3 with 22 setae. *Maxillule* with 5 terminal RS (1 large, 4 slender, plus 2 stubs). *Maxilla* mesial lobe with 3 RS (1 straight, 2 biserrate); lateral lobe with 3 RS (recurved). *Maxilliped* endite with 0 apical setae (endite large); palp article 2 with 2 RS (curved, slender); article 3 with 4 RS (all slender, weakly recurved); article

4 with 4 hooked RS; article 5 partly fused to article 4, small subcircular lobe, with 1 RS (biserrate; plus 1 simple seta).

*Pereopod 1* basis 3.0 as long as greatest width; ischium 0.4 times as long as basis, inferior margin with 0 RS, superior distal margin with 2 RS (one stub-like); merus inferior margin with 3 RS, set as two groups (of 2 and 1), superior distal angle with 0 RS (1 short simple seta); carpus 0.9 as long as merus, inferior margin with 0 RS; propodus 1.3 times as long as proximal width, inferior margin with 1 RS (opposite base of dactylus), propodal palm simple, without blade or process, dactylus smoothly curved, 1.0 as long as propodus. *Pereopod 2* ischium inferior margin with 1 RS, superior distal margin with 2 RS; merus inferior margin with 5 RS, set as two groups, superior distal



**Figure 99.** *Epulaega fracta* (Hale, 1940). NMNZ Cr.9260. A-D, pleopods 1-3, 5 respectively; E, uropod; F, pleotelson posterior margin.

margin with 1 acute RS; carpus similar in size to that of pereopod 1, inferodistal angle with 0 RS. *Pereopod 3* similar to pereopod 2. Pereopods 5-7 inferior margins of ischium-carpus with short RS. *Pereopod 6* similar to pereopod 7 (slightly larger). *Pereopod 7* basis 2.8 times as long as greatest width, inferior margins with 8 palmate setae; ischium 0.4 as long as basis, inferior margin with 3 RS (set as 1 and 2), superior distal angle with 4

RS, inferior distal angle with 4 RS; merus 1.1 as long as ischium, 1.9 times as long as wide, inferior margin with 4 RS (set as 1, 1 and 2), superior distal angle with 11 RS, inferior distal angle with 5 RS; carpus 1.2 as long as ischium, 2.3 times as long as wide, inferior margin with 3 RS (set as 1, 1 and 1), superior distal angle with 14 RS (simple and biserrate setae), inferior distal angle with 7 RS; propodus 1.2 as long as ischium, 4.3 times

as long as wide, inferior margin with 3 RS (set as 1 and 2), superior distal angle with 2 slender setae, inferior distal angle with 3 RS.

*Penes* medially united; penial process 0.4 times as long as basal width.

*Pleopod 1* exopod 1.4 times as long as wide, distally broadly rounded, lateral margin straight, mesial margin strongly convex, with PMS on distal half, with ~58 PMS; endopod 1.9 times as long as wide, distally subtruncate, lateral margin weakly concave, with PMS on distal margin only, mesial margin with PMS on distal one-third, endopod with ~40 PMS; peduncle 1.7 times as wide as long, mesial margin with 8 coupling hooks. *Pleopod 2* exopod with ~88 PMS, endopod with ~60 PMS; *appendix masculina* basally swollen, 0.7 times as long as endopod, distally acute. *Pleopod 3* exopod with ~100 PMS, endopod with ~27 PMS. *Pleopod 4* exopod with ~90 PMS, endopod with ~25 PMS. *Pleopod 5* exopod with ~72 PMS. Exopods of pleopods 1–3 each with distolateral margin not digitate; endopods of pleopods 3–5 each with distolateral point; pleopods 2–4 peduncle distolateral margin with prominent acute RS.

*Uropod* peduncle posterior lobe about three-quarters as long as endopod. Uropod rami extending to pleotelson apex, apices acute. *Endopod* apically not bifid, lateral margin straight, without prominent excision, proximal lateral margin with 0 RS, distal lateral margin with 2 RS, mesial margin sinuate, with 7 RS. *Exopod* not extending to end of endopod, 3.0 times as long as greatest width, apically not bifid; lateral margin weakly convex, with 9 RS; mesial margin straight, distally convex, with 4 RS.

**FEMALE:** More ovate than male; lacks the transverse ridge on pereonite 2; lacks dorsal nodules except on the pleotelson, where they are present though smaller than in the male.

**SIZE:** Adults measure between 14.4 and 18.0 mm; the single manca was 6.0 mm.

**VARIATION:** The small number (4) of mature adult specimens means that it is not possible to precisely detail the variation. The pleotelson has from about 4 to 6 RS. The uropod endopod lateral margin has 2 distal RS, the mesial margin 6 or 7 RS for adults (5 in the manca); the exopod lateral margin has 9 or 10 RS (8 and 9 in the manca), the mesial margin 4 RS (3 in the manca). The RS on the merus of pereopods 1–3 appear to be constant but could not be readily discerned in the two smallest specimens.

Body shape varies a little, with the adult male from New Zealand having subparallel lateral margins (2.4 times as long as wide), while the male holotype and non-ovigerous female were both wider and more ovate (2.3 times as long as wide).

**REMARKS:** This is a distinctive species, males being readily recognised by the fine nodules along the posterior margins of the posterior pereonites and pleonites, presence of numerous small spines on the dorsal surface of the pleotelson and medially fused penial processes. Females can be recognised by the presence of reduced spines on the pleotelson and the characteristic setation and shape of the uropod rami and posterior margin of the pleotelson.

The shape of the eyes is unusual within the genus in that they are noticeably anterior in position (rather than ventral), appearing somewhat bulbous and almost entirely filling the anterior margin of the head in dorsal view. The propodus of pereopod 1 is distinctive in having a prominent and acute robust seta opposing the base of the dactylus. In most Aegidae there is no such seta at this position.

*Epulaega monilis* (Barnard, 1914) is closely similar to *Epulaega fracta*, but can be distinguished by lacking spines on the dorsal surface of the pleotelson in both males and females, the nodules on the posterior margins of the pleonites are larger (particularly the median nodules) and extend to the anterior pereonites, and the uropodal exopod is as long as the endopod (a little shorter in *E. fracta*).

**PREY:** One specimen from *Hyperoglyphe antarctica* (Carmichael, 1819) [bluenose and matiri (New Zealand) or Antarctic butterflyfish, Centrolophidae].

**DISTRIBUTION:** Southwestern Pacific, off Tasmania and southern Queensland; off Great Barrier Island, North Island and Kaikoura, South Island, both on the east coast of New Zealand; at a recorded depth of 400–500 metres.

### Genus *Rocinela* Leach, 1818

*Rocinela* Leach, 1818: 349.– Desmarest, 1825:304.– Milne Edwards, 1840: 243.– Dana, 1852: 304\*.– Bate & Westwood, 1867:289.– Schioedte & Meinert: 1879b: 380.– Gerstaecker, 1882: 227.– Haswell, 1882: 285.– Stebbing, 1893: 348; 1905: 23.– Sars, 1897: 65.– Richardson, 1898: 8; 1905a: 190.– Barnard, 1914: 368; 1936: 159.– Hale, 1925: 182.– Menzies, 1962: 118.– Menzies & Glynn, 1968: 45.– Menzies & George, 1972: 12.– Kensley, 1978: 59.– Kussakin, 1979: 251.– Menzies & Kruczynski, 1983: 62.– Brusca, 1980: 229.– Bruce, 1983: 778.– Brusca & Iverson, 1985: 42.– Brusca & France, 1992: 236.– Kensley & Schotte, 1989: 119.– Bruce, Lew Ton & Poore, 2002: 163.

*Acherusia* Lucas, 1849: 78.– Dana, 1852: 304\* (type species *Acherusia dumerilii* Lucas, 1849).

*Acherousia*.– Schioedte & Meinert, 1879b: 380 (lapsus).

*Rocinella*.– Bate, 1878: 65 (lapsus).

Not *Rocinela*.– Bovallius 1885: 4 (= *Syscenus* Harger, 1880).

**TYPE SPECIES:** *Rocinela danmoniensis* Leach, 1818, by monotypy.

\* There is a pagination error in this publication, with page 304 printed as 204.

DIAGNOSIS: Body weakly dorsally vaulted. Head with posterolateral margins contained by anterolateral angles of pleonite 1; rostral point blunt, overriding antenna and antennule peduncles; eyes present, often large, sometimes united, occupying more than 50% width of the head. Pleonite 1 not abruptly narrower than pereonite 7. Frontal lamina present, small, narrow. Antennule much shorter than antenna, usually shorter than antenna peduncle. Maxilliped palp 3-articled; endite present. Pleopods 3–4 endopods without PMS. Uropodal peduncle mesial margin produced; rami lamellar, plane of exopod at strongly oblique angle to plane of endopod; pleotelson posteriorly rounded.

DESCRIPTION: Body moderately vaulted, about 2 to 4 times as long as wide. Head with eyes, often large, may meet at midpoint; anterior margin with broad median (rostral) point. Coxae of pereonites 4–7 longer than respective segment, posteriorly produced. Pleon not abruptly narrower than pereon; pleonites all visible, not posteriorly widest, pleonites 2–4 with free lateral margins, pleonite 5 laterally overlapped by pleonite 4; pleonites 3–5 laterally produced to an acute point. Pleotelson large, about as long or longer pleon, usually with PMS and RS. Pleonal sternite absent.

Antenna peduncle articles 4 and 5 usually with long setae.

Mandible with uni- or bicuspid incisor; molar process present, conspicuous; two scaled lobes present at base of incisor. Maxillule with 5–8 flat terminal robust setae; mesial lobe reduced or absent. Maxilla lateral lobe with 2–5 terminal hooked RS, mesial with 1–3 straight or hooked RS. Maxilliped 3-articled, article 2 with 2 or 3 stout recurved RS and article 3 each with 1 or 2 stout recurved RS; endite present.

Pleopods 3–5 endopods smaller than exopods, usually with thickened ridge; coupling setae present on peduncles of pleopods 1–4. Pleopods not extending beyond lateral margins of pleon.

REMARKS: *Rocinela* is rather uniform in appearance, typically flat-bodied, relatively wide with a prominent wide and flat rostrum (or this could be interpreted as the rostrum absent and the anterior part of the head being produced and forming a process). Most species have large or very large eyes, in a few species the eyes meeting medially. Many species have a flat lobe or blade on the palm of pereopod 1–3 propodus, this blade always being provided with robust setae. *Rocinela* appears to have highest diversity in high latitudes with only 12 of the 42 species occurring within the tropics. The high-latitude diversity of the genus is maintained by the nine species present in New Zealand waters. These figures are probably due to under reporting as museum collections in Australia and those held at the Muséum national d'Histoire naturelle in Paris do have

significant numbers of undescribed species, notably from the tropical western Pacific region.

*Rocinela* is one of the very few isopod genera, other than some cirrolanids, known to attack humans (Garzon-Ferreira 1990).

#### KEY TO THE NEW ZEALAND SPECIES OF *ROCINELA*

1. Pereopod 1 propodus slender, 4.4 times as long as proximal width, without distinct propodal blade; eyes small, separated by 40% head width.....2
  - Pereopod 1 propodus robust, less than 2.0 times as long as proximal width, with distinct propodal blade or lobe; eyes large separated by less than 30% head width.....3
2. Rostrum subtruncate, anterior margin of the head 'stepped'; pereopod 1 propodal palm with 2 small distal RS, with small distal lobe; dactylus weakly curved, 0.8 times as long as propodus.....
  - ..... *Rocinela leptopus* (p. 174)
  - Rostrum smoothly narrowed, rounded; pereopod 1 propodal palm with 1 minute RS, without distal lobe; dactylus distally curved, 1.0 times as long as propodus ..... *Rocinela runga* (p. 189)
3. Pereopod 1 propodal blade wide, approximately as long (0.9–1.1) as palm, with more than 8 marginal RS,.....4
  - Pereopod 1 propodal blade narrow, 0.5–0.7 as long as propodal palm, with 6 or less marginal RS.....5
4. Rostrum tri-cornered; eyes moderate, separated by about 31% width of head; pereopod 1 propodal blade with 8 or 9 marginal RS; mesial surface with numerous stiff simple setae .....
  - ..... *Rocinela garricki* (p. 169)
  - Rostrum evenly narrowing to subtruncate anterior margin; eyes large, separated by about 12.5% width of head; pereopod 1 propodal blade with 12 or 13 marginal RS; mesial surface with single simple seta..... *Rocinela pakari* (p. 178)
5. Pereopod 1 blade about 0.7 as long as propodal palm, with 5 or 6 marginal RS, with abundant slender setae on mesial surface.....
  - ..... *Rocinela satagia* (p. 193)
  - Pereopod 1 blade about 0.5 as long as propodal palm, with less than 6 marginal RS, without abundant slender setae on mesial surface..... 6
6. Rostrum subtruncate; eyes large, separated by about 14% width of head; pereopod 1 propodal blade with 4 marginal RS.....
  - ..... *Rocinela bonita* (p. 163)
  - Rostrum anteriorly truncate, turned upwards; eyes moderate, separated by about 28% width of head; pereopod 1 propodal blade with 3 marginal RS..... *Rocinela resima* (p. 184)

*Rocinela bonita* sp. nov.

(Figs 100–104)

MATERIAL EXAMINED: *Holotype*, ♀ (31 mm, non-ovig.), Bounty Trough, 44°26.89'S, 174°54.79'E, 25 October 1979, Stn S144, 676 m, epibenthic sled (NIWA 23881).

*Paratypes*. 3 ♂ (35, 22 mm and large male pleon and pleotelson), ♀ (22 mm, non-ovig.), 7 manca (11–22 mm, further 8 not measured), same data as holotype (NIWA 23882).

DESCRIPTION: Body 2.0 times as long as greatest width, dorsal surfaces smooth and polished in appearance, widest at pereonite 5, lateral margins ovate. *Rostral point* anteriorly subtruncate. *Eyes* not medially united, separated by about 14% width of head; each eye made up of ~17 transverse rows of ommatidia, each row with ~10 ommatidia; eye colour dark brown. *Pereonite 1 and coxae* 2–3 each with posteroventral angle rounded; coxae 5–7 with incomplete oblique carina (on coxae 5–7). *Pleon* with pleonite 1 largely concealed by pereonite 7; pleonite 4 with posterolateral margins extending clearly beyond posterior margin of pleonite 5; pleonite 5 with posterolateral angles free, not overlapped by lateral margins of pleonite 4. *Pleotelson* 0.8 times as long as anterior width, anterior dorsal surface without 2 sub-medial depressions, dorsal surface with short setae; lateral margins convex, posterior margin evenly rounded, with 16 RS.

*Antennule* peduncle article 3 1.0 times as long as combined lengths of articles 1 and 2, 3.0 as long as wide; flagellum with 6 articles, extending to posterior margin of eye. *Antenna* peduncle article 3 1.5 times as long as article 2, 1.1 times as long as wide; article 4 1.5 times as long as article 3, 1.6 times as long as wide, inferior margin with 2 plumose setae, and 8 simple setae; article 5 1.3 times as long as article 4, 2.9 times as long as wide, inferior margin with 7 setae (2 plumose), anterodistal angle with cluster of 1 short simple seta; flagellum with 17 articles, extending to posterior of pereonite 1.

*Frontal lamina* longer than greatest width, anteriorly acute.

*Mandible* molar process distinct flat lobe; palp article 2 with 14 short marginal distolateral setae and 2 long distolateral setae; palp article 3 with 30 setae. *Maxillule* with 6 RS (1 large, 5 slender, serrate). *Maxilla* mesial lobe with 2 RS; lateral lobe with 2 RS. *Maxilliped* palp article 1 distomesial angle with 3 RS (short; 2 curved, 1 straight); article 2 with 3 hooked RS; article 3 with 2 hooked RS.

*Pereopod 1 basis* 2.7 times as long as greatest width; *ischium* 2.7 times as long as basis, inferior margin with 0 RS, superior distal margin with 7 setae (1 robust seta); *merus* inferior margin with 3 RS (set as 1+2), set as two groups, superior distal angle with 6 setae; *carpus* 0.7 as long as *merus*, inferior margin with 1 RS (minute); *propodus* 1.6 times as long as proximal width, propodal

palm with blade, propodal blade 0.5 times as wide as palm, inferior margin with 4 RS; *dactylus* 2.0 times as long as propodus. *Pereopods 2 and 3* similar to pereopod 1 (but RS on merus longer). *Pereopod 6* similar to pereopod 7. *Pereopod 7 basis* 3.9 times as long as greatest width, inferior margins with 10 palmate setae; *ischium* 0.7 as long as basis, inferior margin with 7 RS (set as 1, 3, 2 and 1), superior distal angle with 5 RS (and 2 setae), inferior distal angle with 3 RS; *merus* 0.6 times as long as ischium, 2.3 times as long as wide, inferior margin with 3 RS (set as 1 and 2), superior distal angle with 3 RS, inferior distal angle with 4 RS; *carpus* 0.6 as long as ischium, 2.8 times as long as wide, inferior margin with 3 RS (set as 1 and 2), superior distal angle with 12 RS, inferior distal angle with 6 RS; *propodus* 0.5 as long as ischium, 4.0 as long as wide, inferior margin with 2 RS (set singly), superior distal angle with 4 slender setae, inferior distal angle with 1 RS.

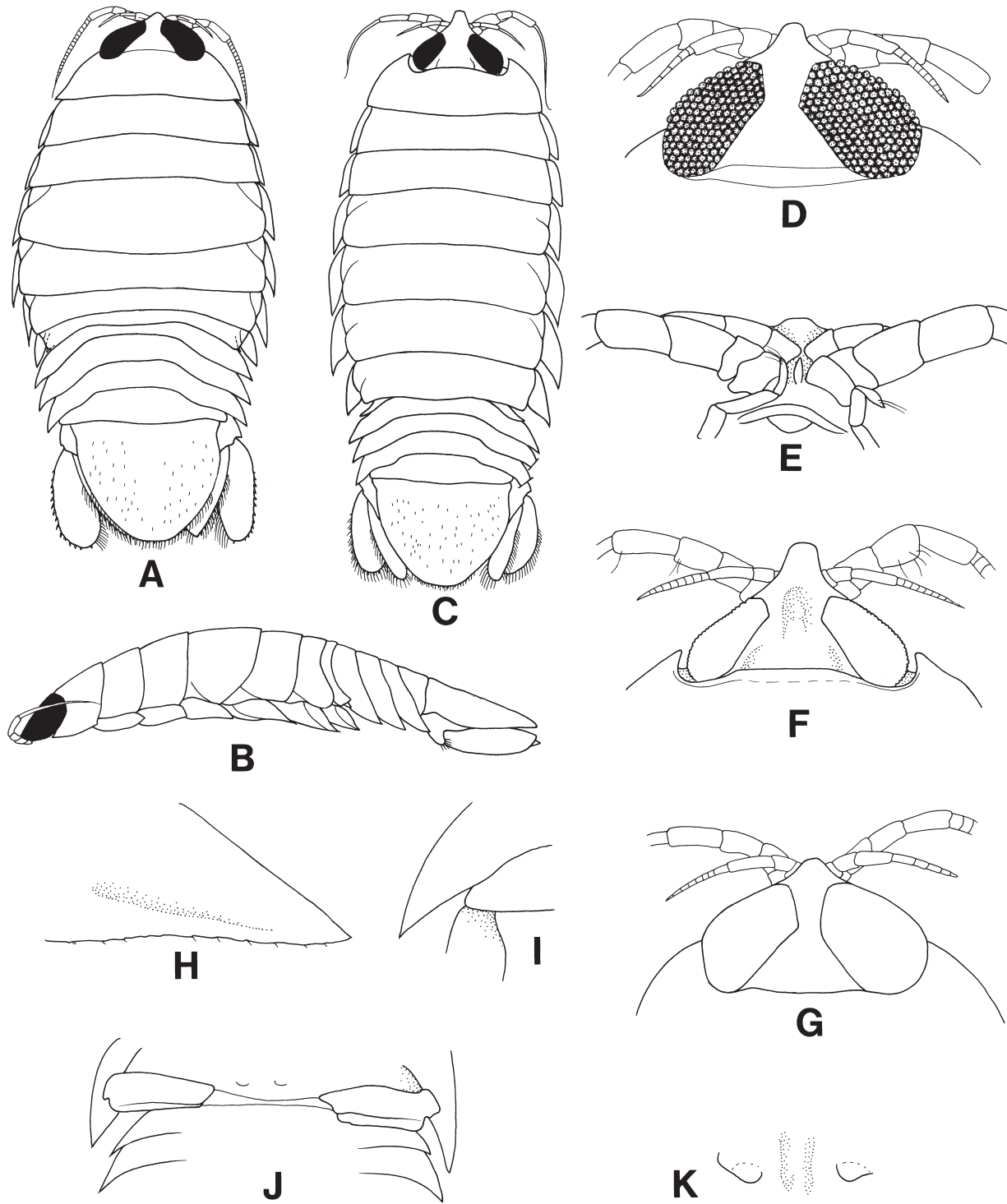
*Pleopod 1 exopod* 1.9 times as long as wide, lateral margin straight, mesial margin weakly convex, with PMS from distal two-thirds; endopod 2.6 times as long as wide, lateral margin weakly concave, with PMS from on distal margin only, mesial margin with PMS from distal one-third; peduncle mesial margin with 6 coupling hooks. Pleopods 2–5 peduncle distolateral margin with acute RS.

*Uropod* peduncle ventrolateral margin with 0 RS, posterior lobe about one-third as long as endopod. Exopod at angle of about 135° to endopod, rami extending to pleotelson apex, marginal setae in two tiers. *Endopod* lateral margin weakly sinuate, lateral margin with 8 RS, mesial margin weakly convex, with 4 RS. *Exopod* not extending to end of endopod, 2.4 times as long as greatest width; lateral margin weakly convex, with 12 RS; mesial margin sinuate, proximally concave, with 1 RS; distal margin rounded.

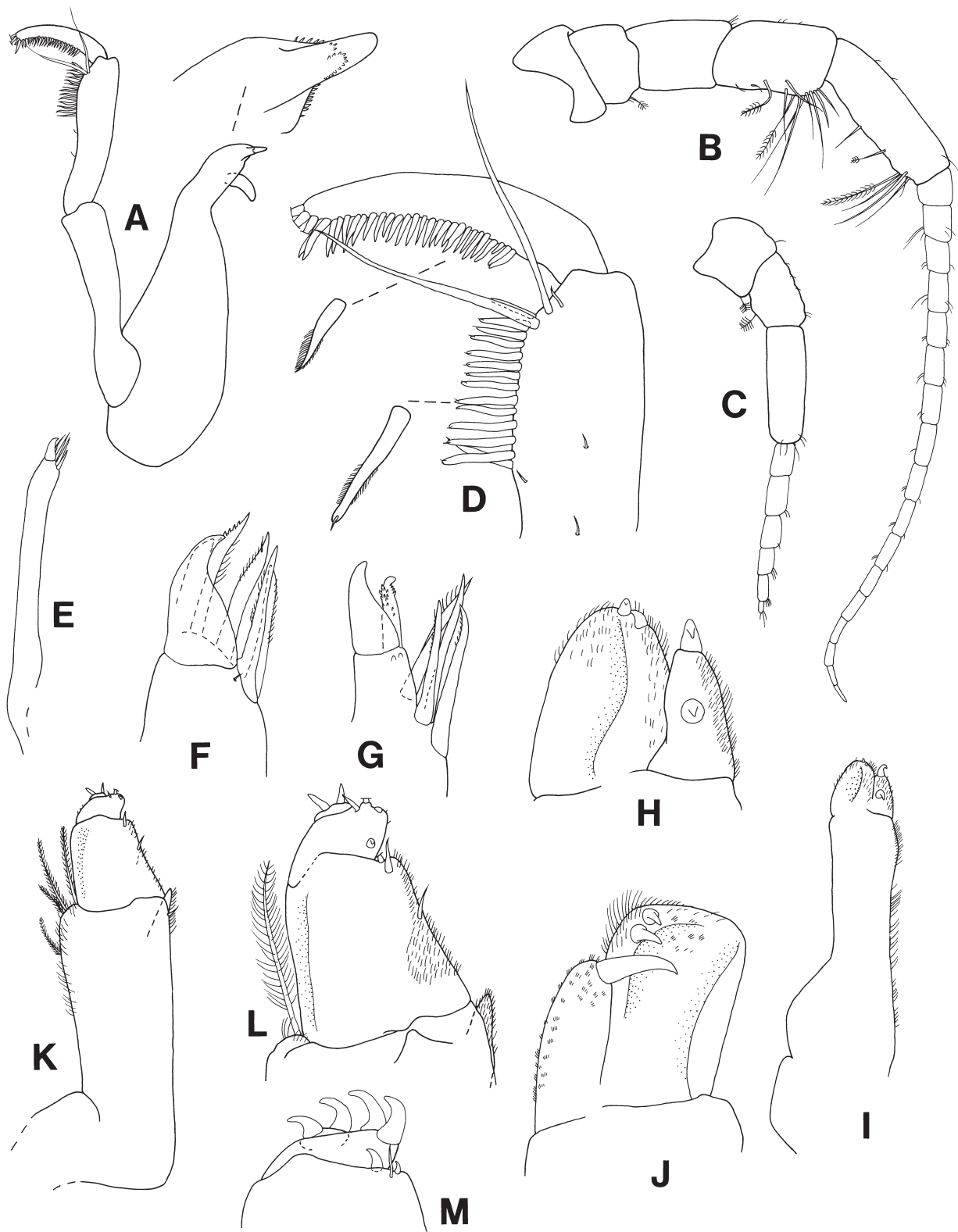
MALE: Pleopod 2 *appendix masculina* with straight margins, 0.9 times as long as endopod, distally narrowly rounded. Otherwise similar to female, but with a more elongate body shape (as do immature specimens and manca); the rostrum is more strongly produced than in the female, the robust setae on the pereopod palm of pereopods 1–3 are more slender and acute, and the lateral margins of the uropodal rami are more densely setose.

SIZE: Males 22 and 35 mm; females 22 and 31 mm; manca 11–22 mm (mean = 8.3 mm,  $n = 8$ ); the large pleon and pleotelson indicate that this species will reach a greater size than indicated here.

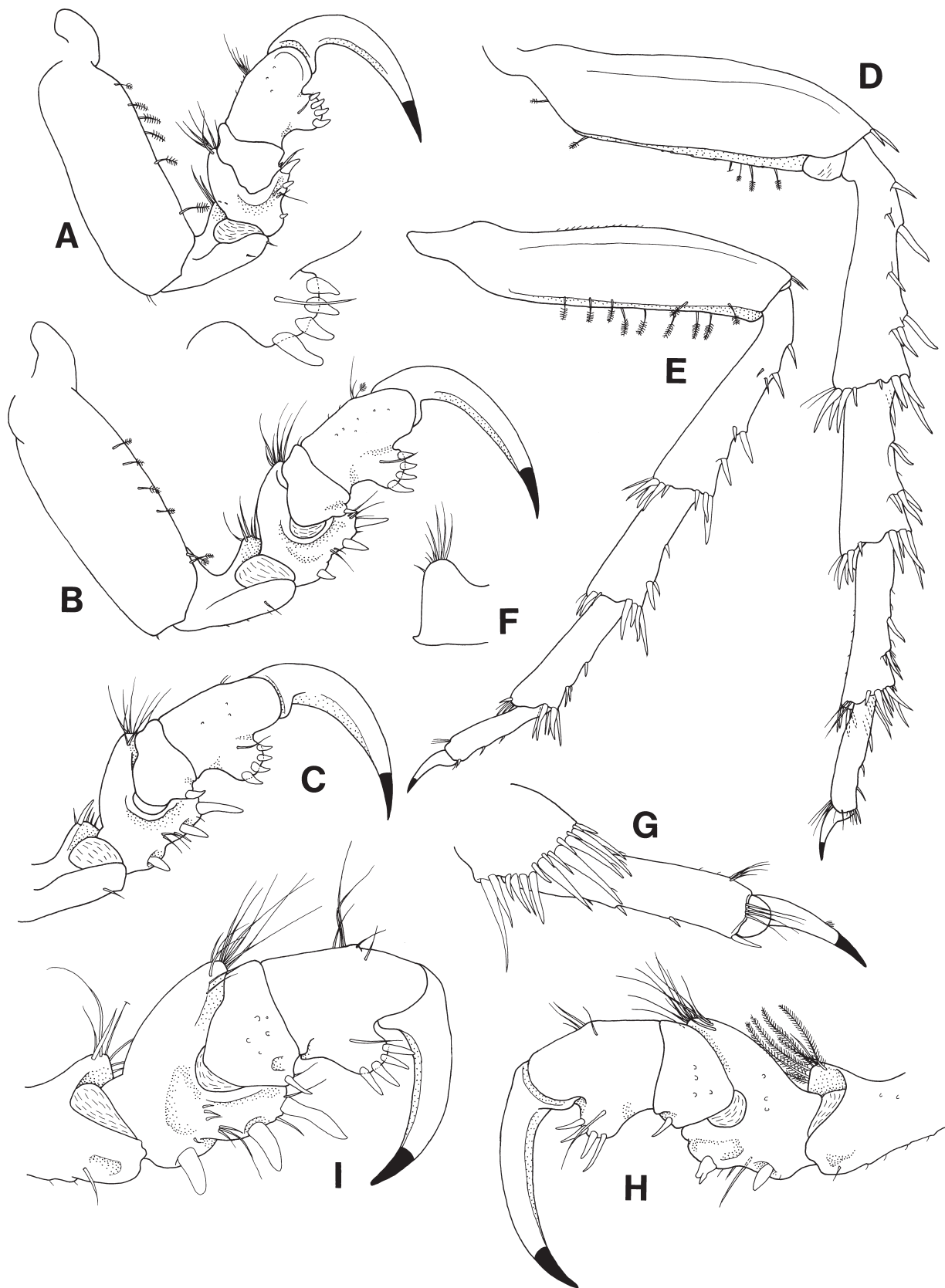
VARIATION: *Robust setae*: Pleotelson ( $n = 12$ ) RS 13–17, with 14, 15 and 16 each at 25%. Uropod exopod ( $n = 24$ ) mesial margin with 1 (71%) most frequent, 0 and 2 each occurring three times; lateral margin 11–14 with 12



**Figure 100.** *Rocinela bonita* sp. nov. Holotype; C, F, male paratype 35 mm, others as indicated. A, dorsal view; B, lateral view; C, dorsal view, male; D, head; E, frons; F, head, paratype; G, head, manca, 20 mm; H, coxa 7; I, pleonites 4 and 5, lateral margins; J, sternite 7; K, penial processes.

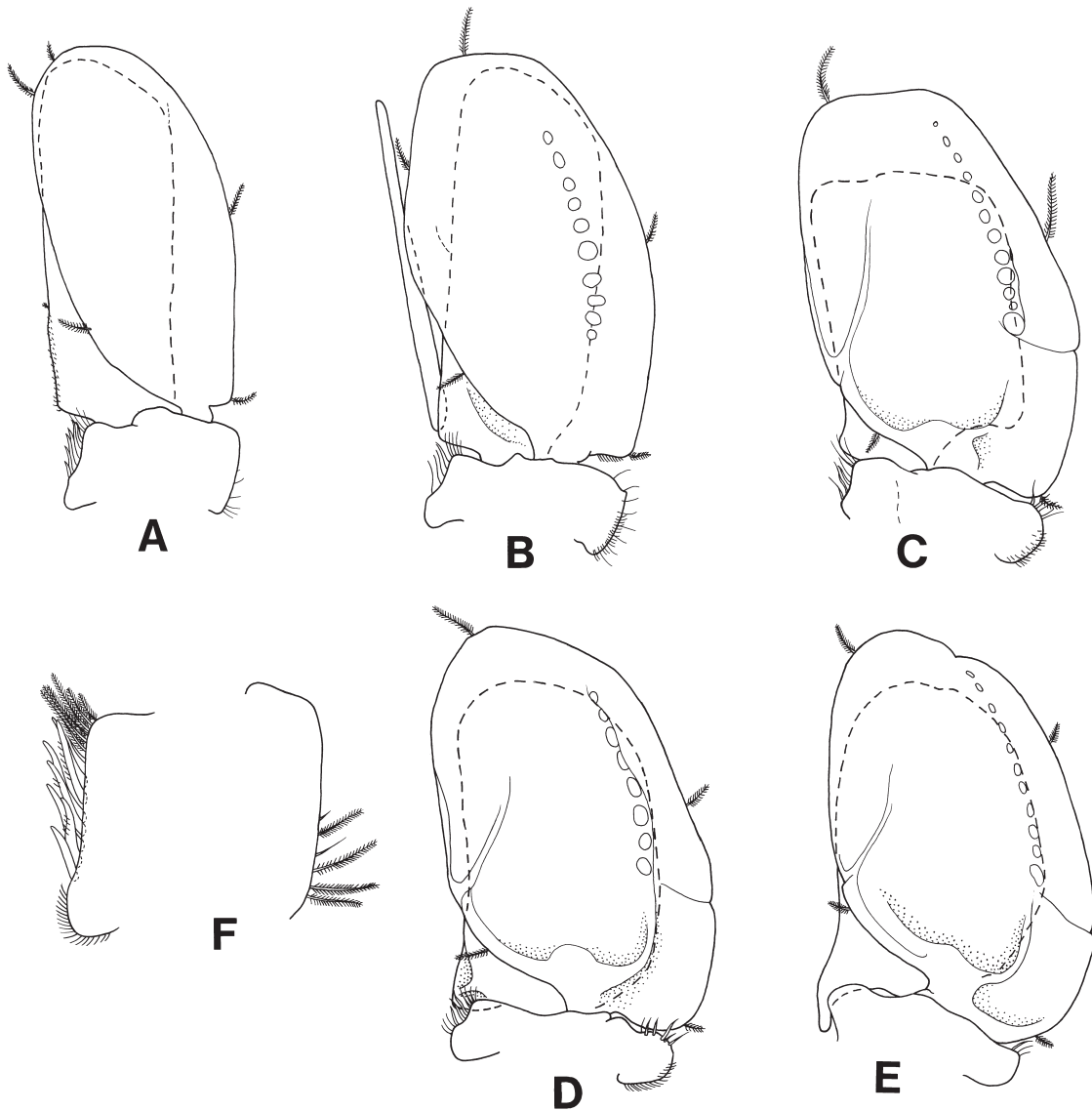


**Figure 101.** *Rocinela bonita* sp. nov. Male paratype 35 mm, others as indicated. A, mandible; B, antenna; C, antennule; D, mandible palp article 3; E, maxillule; F, maxillule apex; G, maxillule apex, non-ovig female, 22 mm; H, maxilla apex; I, maxilla; J, maxilla apex, non-ovig female, 22 mm; K, maxilliped; L, maxilliped palp; M, maxilliped palp articles 2 and 3, non-ovig female, 22 mm.



**Figure 102.** *Rocinela bonita* sp. nov. Holotype, others as indicated. A-E, pereopods 1-3, 6, and 7, respectively; F, pereopod 1 ischium, mesial surface; G, distal margin of carpus and propodus, mesial surface; H, I, male 35 mm: H, pereopod 1; I, pereopod 2.





**Figure 103.** *Rocinela bonita* sp. nov. Male paratype 35 mm. A-E, pleopods 1-5 respectively; F, pleopod 1 peduncle mesial and lateral margins.

(38%), 13 (33%) and 14 (20%) most frequent. Uropod endopod mesial margin varied from 2 to 5, with 4 (76%) the most frequent, 3 and 5 each occurring twice and 2 once; lateral margin with 6-8, with 7 (48%) and 8 (43%) most frequent, 6 occurring twice.

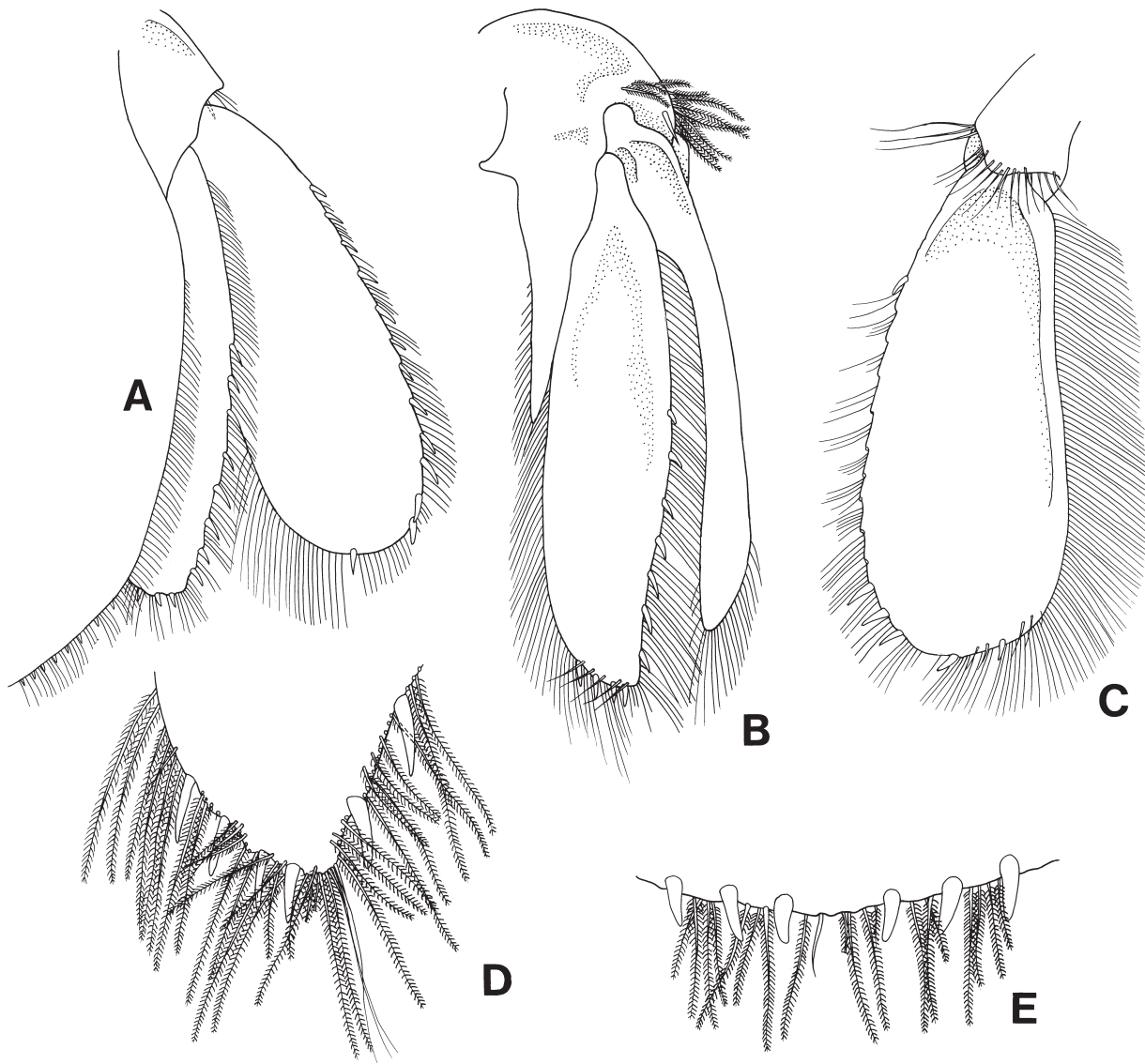
The setation of the pereopod palm is highly consistent with 4 robust setae on pereopods 1-3 with only one exception with 3 robust setae; no specimen had more than four robust setae on the palm. The robust setae count on the inferior margin of the merus was consistently 1+2, although some of these were missing and there may be some variation.

There is no discernable difference in the number of robust setae between males and females, nor in relation to size—the smallest male (15.5 mm) and female

(16.5 mm) had similar counts for robust setae: pleotelson RS (11), pereopods 1-3 (8 and 9) and uropods (endopod mesial with 2 and 3, lateral with 3).

Eye size varies with size, small specimens having proportionally larger eyes than adult specimens; the eyes are separated by 12.5%, 15% and 24% in the manca (Fig. 100G), female holotype (Fig. 100D) and adult male (Fig. 100F) respectively.

**REMARKS:** *Rocinela bonita* sp. nov. can be identified by the large but well-separated eyes, relatively narrow rostrum, narrow sub-rectangular blade on the palm of pereopods 1-3 that is consistently provided with four robust setae (stout in juveniles and females, slender in the mature male), evenly rounded pleotelson, pleotel-



**Figure 104.** *Rocinela bonita* sp. nov. A, E, holotype, remainder male paratype. A, pleotelson and uropod; B, uropod; C, uropod endopod ventral view; D, uropod endopod, apex; E, pleotelson posterior margin.

son anterior dorsal surface without submedian depressions, posterior margin of the pleotelson with 14–16 robust setae, uropodal endopod extending posterior to the exopod, broadly rounded uropod exopod and the uropod rami not extending significantly beyond the posterior margin of the pleotelson. In females the rostrum is anteriorly rounded, in the male it is more strongly produced and anteriorly subtruncate.

*Rocinela resima* sp. nov. is the most similar species in New Zealand waters. *R. bonita* can be distinguished by pereopods 1–3 having more strongly produced propodal blade with four robust setae, longer and more slender robust setae on the merus, and the uropodal endopod lateral margin being sinuate with a narrowly

rounded distal point, whereas in *R. resima* the uropodal endopod lateral margin is evenly convex, the distal margin being broadly rounded.

*Rocinela juvenalis* Menzies & George, 1972 appears similar, but that species differs in having the uropodal exopod exceeding the posterior of the endopod, pereopod 1 propodus palm being wider and in being much smaller in size (the holotype and presumably adult female of *R. juvenalis* measured 11 mm, the manca of *R. bonita* sp. nov. measure 11–22 mm).

*Rocinela modesta* Hansen, 1897 has a similar pereopod morphology (Brusca & France 1992) but has an anteriorly rounded rostrum, smaller eyes, four robust setae on the inferior margin of the merus of pereopod

3, more strongly produced uropod peduncle posterior lobe (half as long as endopod versus one-third as long in *R. bonita*) and an evenly convex uropodal endopod lateral margin (sinuate in *R. bonita*).

*Rocinela cornuta* Richardson, 1898 is a poorly known species, superficially similar to both the present species and to *Rocinela hawaiiensis* Richardson, 1903. Brusca and France (1992) illustrated the dorsal view for the species but descriptive data otherwise rests with the original description. *R. bonita* differs in having a less ovate body shape and the propodal blade of pereopods 1–3 provided with four (rather than three) robust setae.

*Rocinela major* Brocchi, 1877, is the only species that could not be specifically excluded as no figures exist and the description is not adequate by modern standards of species description. The species should be regarded as *species inquirenda* as, in addition to the lack of descriptive data, the location of the types is uncertain. If there is found to be no type material the species will have to be relegated to *nomen dubium*. Kensley (1976) considered it as probably the same species as *Epulaega monilis* Barnard, 1914. All other species are excluded by varying combinations of differences among the differential characters.

PREY: Not known.

DISTRIBUTION: Known only from the type locality, Bounty Trough, eastwards from the mid-coast of South Island; 676 metres.

ETYMOLOGY: From the Latin origin for bounty (as in the Bounty Trough) – *bonitas*, meaning good, plentiful.

***Rocinela garricki* Hurley, 1957 (Figs 105–109)**

*Rocinela garricki* Hurley, 1957: 11, figs 39–49; 1961: 268.– Hicks et al., 1991: 16.

MATERIAL EXAMINED: *Holotype*: ♂ (~15 mm, previously dissected, pleotelson missing), Cook Strait, 41°31.5'S, 174°48.0'E, 19 January 1956, 128–146 m, beam trawl, station BOL, Vuz 43 (NMNZ Cr.3651).

*Other material*: ♂ (15.5 mm, dissected), Camp Bay, Endeavour Inlet, Queen Charlotte Sound, South Island, 41°08'S, 174°08.45'E, 10 May 1967, off jetty, stn. Z15113, coll. Maria van Dooren (NIWA 23855). ♀ (22 mm, ovig.; poor condition, dried out at some point), southern Bounty Trough, 46.0°S, 170.72°E, 75 m, 8 October 1962, NIWA stn B568 (NIWA 23854). ♀ (~22 mm, broken, poor condition), off northeastern South Island, 42.7533°S, 173.5017°E, 4 November 1979, canyon coral, 79 m (NIWA 23849). ♀ (non-ovig. 20, 19.5, 16.5 mm), New Zealand, without locality, Z2, ex groper, 22F, 11/63 (poor condition, possibly dried or in formalin for a long time) (NIWA 23852). ♂ (19.5 mm), Dunedin,

South Island, 21 January 1957, wharves, at night light, coll. R.K. Dell & J. Moreland (NMNZ Cr.12004). Manca (5.5 mm), Cape Turakirae, 18 June 1966, 42 m (NMNZ Cr.12006).

*Not measured*: ♀ (ovig.), New Zealand, no locality, Z2\*, in poor condition (NIWA 23853). ♂ (~23 mm, pleotelson damaged), midway between Cape Jackson & Mana Island, North Island (Cook Strait), 41°02'S, 174°33'E, 6 March 1976, 256–186 m, RV *Acheron* (NMNZ Cr.12005). ♂, off Kaikoura, South Island, 42.4384°S, 174.7600°E, 20 June 1961, 100 m (NIWA 23848). ♀ (ovig., very damaged), south of The Snares, 48.0033°S, 166.9500°E, 12 October 1962, 155 m (NIWA 23847). ♀ (ovig., poor condition), Chatham Rise, 44°30'S, 176°00'W, 17 October 1964, 192 m (NIWA 23850). ♂ (poor condition) (16.5 mm), New Zealand, no locality data, stn Z6114 (NIWA 23851).

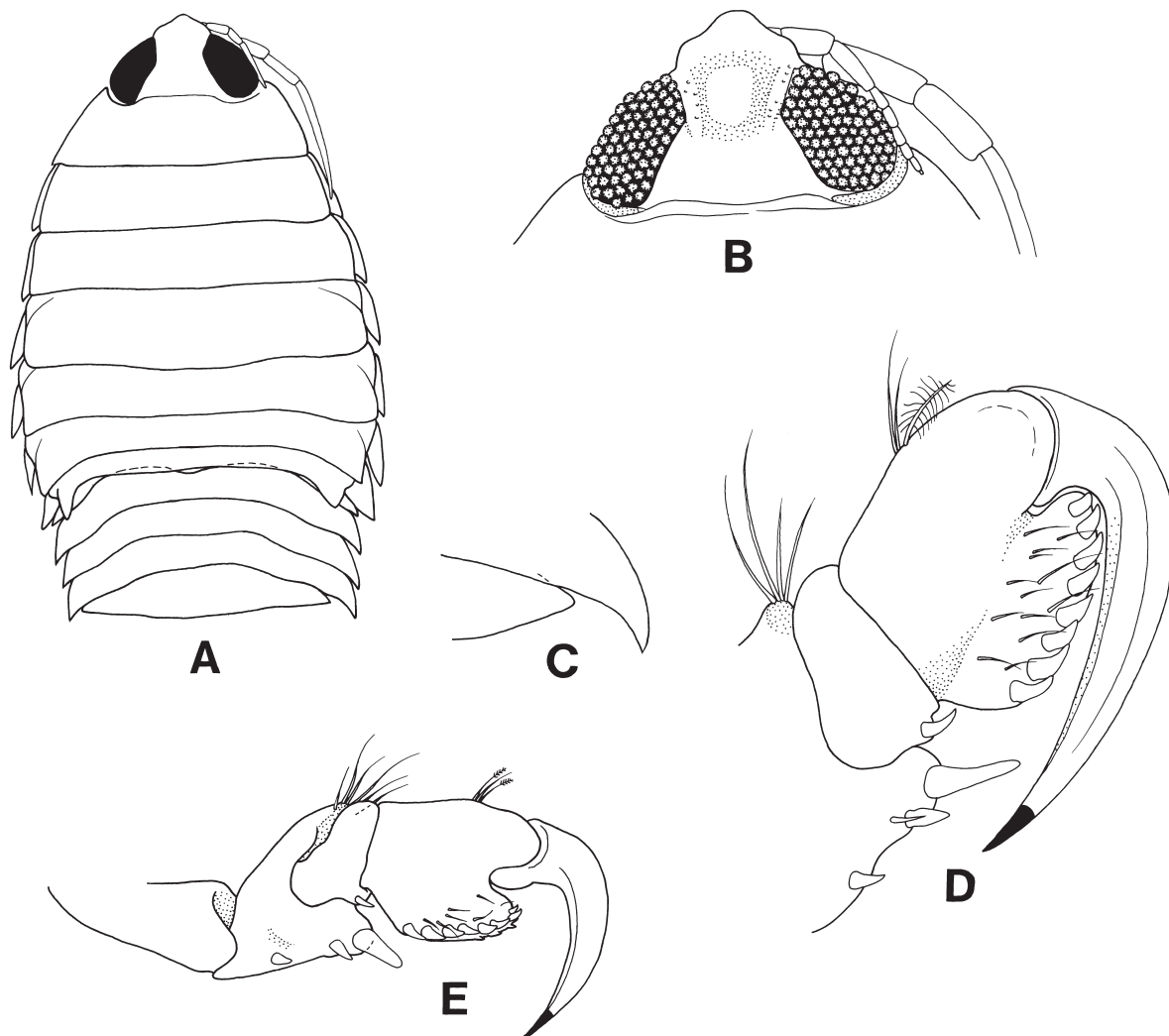
DESCRIPTION: *Body* 2.3 times as long as greatest width, dorsal surfaces smooth, widest at pereonite 5, lateral margins ovate. *Rostrum* basally expanded, anteriorly rounded and tri-cornered. *Eyes* not medially united, separated by about 31% width of head; each eye made up of ~11 transverse rows of ommatidia, each row with ~8 ommatidia; eye colour pale brown. *Coxae* 2–3 each with posteroventral angle rounded; 5–7 without oblique carina. *Pleon* with pleonite 1 visible in dorsal view; pleonite 4 with posterolateral margins extending clearly beyond posterior margin of pleonite 5; pleonite 5 with posterolateral angles rounded. *Pleotelson* 0.9 times as long as anterior width, anterior dorsal surface without 2 sub-median depressions, dorsal surface with short setae (posteriorly); lateral margins convex, posterior margin evenly rounded, with 11 RS.

*Antennule* peduncle article 3 0.7 times as long as combined lengths of articles 1 and 2, 2.9 times as long as wide; flagellum with 6 articles (articles 1 and 2 longest), extending to anterior of pereonite 1. *Antenna* peduncle article 3 1.4 times as long as article 2, 1.2 times as long as wide; article 4 1.3 times as long as article 3, 1.6 times as long as wide, inferior margin with 0 plumose setae, and 2 simple setae (stiff); article 5 1.5 times as long as article 4, 2.8 times as long as wide, inferior margin with 1 seta (palmate), anterodistal angle with cluster of 3 short simple setae; flagellum with 11 articles, extending to posterior of pereonite 2.

*Frontal lamina* longer than greatest width, anteriorly acute.

*Mandible* molar process distinct flat lobe; palp article 2 with 10 marginal distolateral setae (finely biserrate),

\* Station 'Z2' (= Z0002) lists eight lots, mostly Aegidae, according to coordinates from the Fiji region. One lot includes an unpublished manuscript name of 'timaruensis'. The data are clearly wrong for the material and the material is regarded as being New Zealand, no locality.



**Figure 105.** *Rocinela garricki* Hurley, 1957. Holotype. A, dorsal view; B, head; dorsal view; C, pleonites 3 and 5, lateral margin; D, pereopod 1, in situ; E, pereopod 2, in situ.

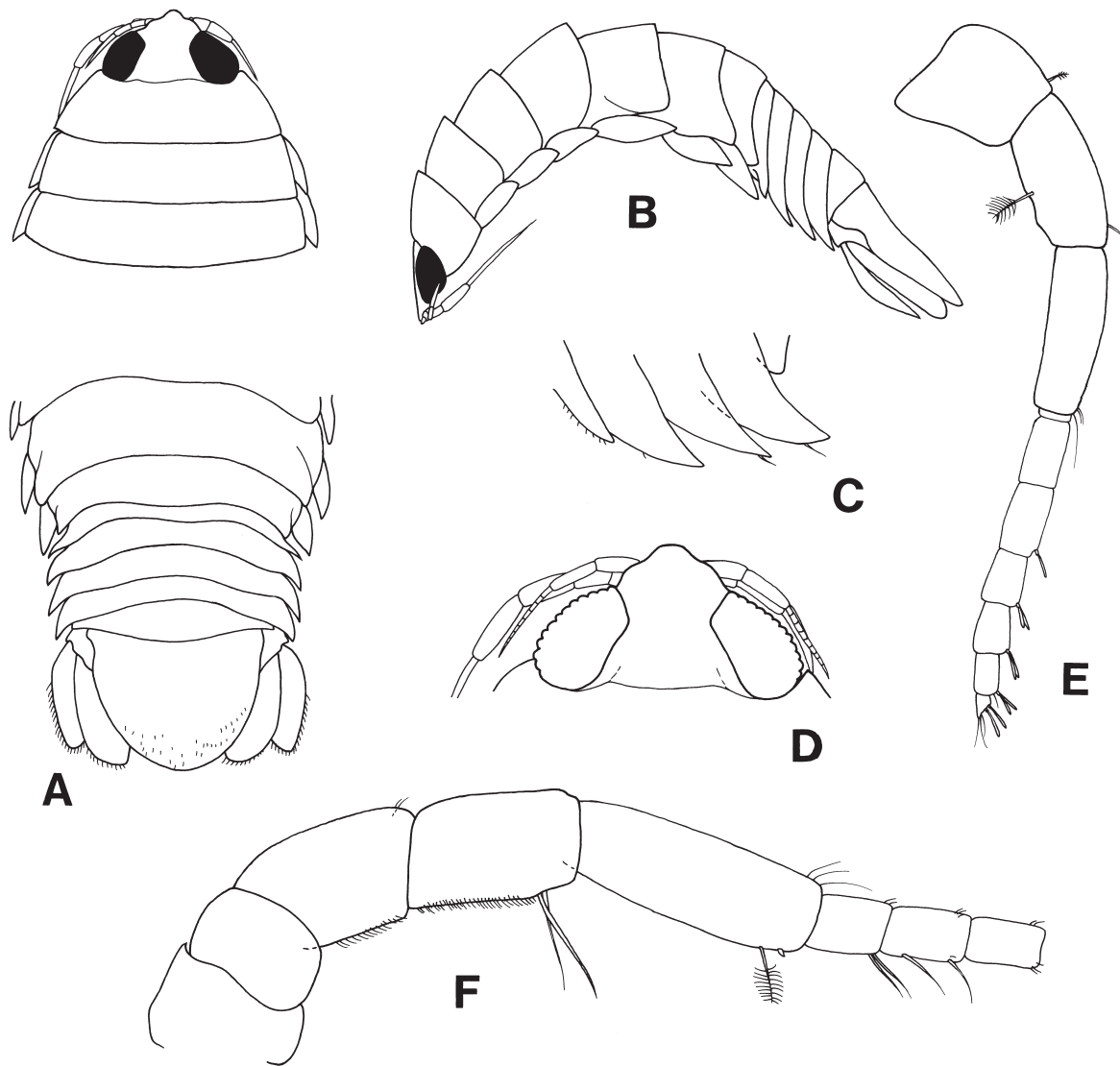
and 3 long distolateral setae; palp article 3 with 15 setae (terminal 2 short, conical). *Maxillule* with 5 RS (1 large; 4 slender, of which 2 weakly serrate). *Maxilla* mesial lobe with 1 hooked RS; lateral lobe with 2 hooked RS. *Maxilliped* palp article 1 distomesial angle with 1 RS (straight); article 2 with 3 hooked RS; article 3 with 1 hooked RS.

*Pereopod 1* basis 2.3 times as long as greatest width; *ischium* 0.5 times as long as basis, inferior margin with 0 RS, superior distal margin with 5 setae (1 robust seta); *merus* inferior margin with 3 RS (set as 1 + 2), set as two rows, superior distal angle with 6 setae (all stiff); *carpus* 0.7 times as long as *merus*, inferior margin with 1 RS; *propodus* 1.6 times as long as proximal width, propodal palm with blade, propodal blade 0.9 times as wide as palm, with numerous setae, inferior margin with 8 RS; *dactylus* 1.6 times as long as *propodus*. *Pereopods 2 and 3* similar to *pereopod 1* (RS on *merus* longer). *Pereopod*

*6* similar to *pereopod 7*. *Pereopod 7* basis 4.0 as long as greatest width, inferior margins with 2 palmate setae; *ischium* 0.8 as long as basis, inferior margin with 6 RS (set singly), superior distal angle with 4 RS, inferior distal angle with 7 RS; *merus* 0.5 times as long as *ischium*, 2.1 times as long as wide, inferior margin with 1 RS, superior distal angle with 5 RS, inferior distal angle with 6 RS; *carpus* 0.6 times as long as *ischium*, 2.9 times as long as wide, inferior margin with 2 RS (set singly), superior distal angle with 7 RS, inferior distal angle with 12 RS; *propodus* 0.5 as long as *ischium*, 3.9 times as long as wide, inferior margin with 3 RS (set singly), superior distal angle with 3 slender setae (1 palmate), inferior distal angle with 3 RS.

*Penes* opening flush with surface of sternite 7.

*Pleopod 1* exopod 2.6 times as long as wide, lateral margin weakly convex, with PMS on distal one-third; endopod 2.6 times as long as wide, lateral margin



**Figure 106.** *Rocinela garricki* Hurley, 1957. Male, 15.5 mm, Camp Bay, NIWA 23855. A, dorsal view; B, lateral view; C, pleonites 1-5, lateral margin; D, head, dorsal view; E, antennule; F, antenna peduncle.

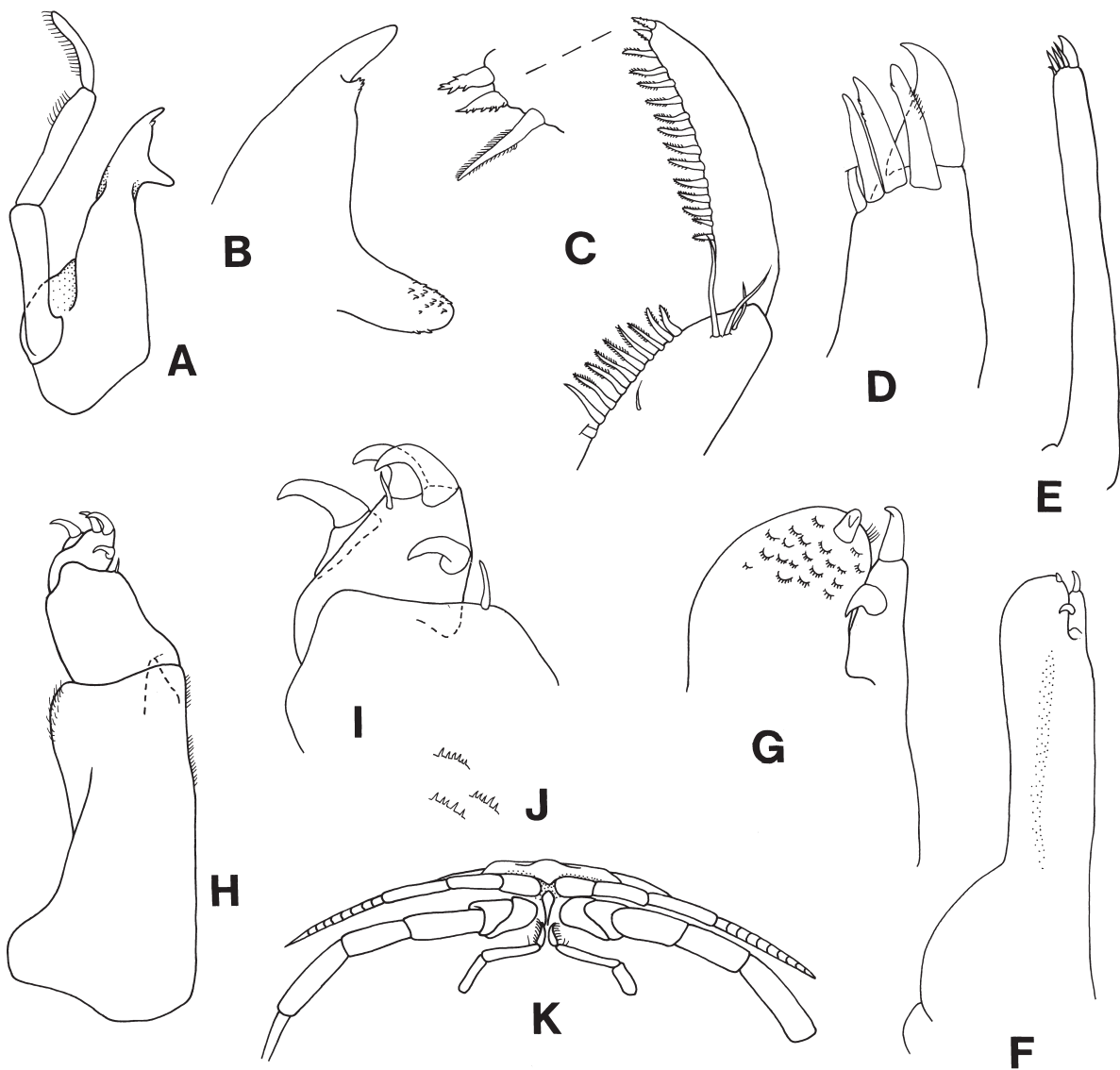
straight, with PMS on distal margin only, mesial margin with PMS on distal two-thirds; peduncle mesial margin with 6 coupling hooks. Pleopod 2 *appendix masculina* with straight margins, 0.5 times as long as endopod (basally fused), distally bluntly rounded. Pleopods 2-5 peduncle distolateral margin without acute RS.

*Uropod* peduncle ventrolateral margin with 2 RS, posterior lobe about one-third as long as endopod. *Exopod* at angle of about 135° to endopod, rami extending to pleotelson apex, marginal setae in two tiers. *Endopod* lateral margin weakly convex, lateral margin with 3 RS, mesial margin straight and distally rounded, with 3 RS. *Exopod* not extending to end of endopod, 2.4 times as long as greatest width; lateral margin weakly convex (weakly serrate), with 8 RS; mesial margin convex, with 0 RS; distal margin with distinct distal point.

**SIZE:** Males from 15.5 to 19.5 mm; ovigerous females 16.5-22.0 mm (mean 20 mm,  $n = 5$ ); single manca 5.5 mm.

**FEMALE:** Generally similar to the male, with the rostrum less strongly produced.

**VARIATION:** The figures here include the holotype, therefore the uropod and pleotelson details are taken from the original description. Pleotelson ( $n = 8$ ) RS 9-12, with 10 and 11 most frequent, each at 38%. Uropod exopod ( $n = 14$ ) mesial margin without RS in all specimens; lateral margin 7-9 RS with 8 (57%) most frequent, 7 occurring 3 times and 9 once. Uropod endopod mesial margin ( $n = 13$ ) varied from 0-5 to with 2 (31%) and 3 (39%) the most frequent, 0 occurring twice, 4 and 5 each occurring once; lateral margin ( $n = 14$ ) with 2-5 with



**Figure 107.** *Rocinela garricki* Hurley, 1957. Male, 15.5 mm, Camp Bay, NIWA 23855. A, mandible; B, mandible molar and incisor; C, mandible palp article 3; D, maxillule apex; E, maxillule; F, maxilla; G, maxilla apex; H, maxilliped; I, maxilliped articles 2 and 3; scales, mesial margin palp article 1; K, frons.

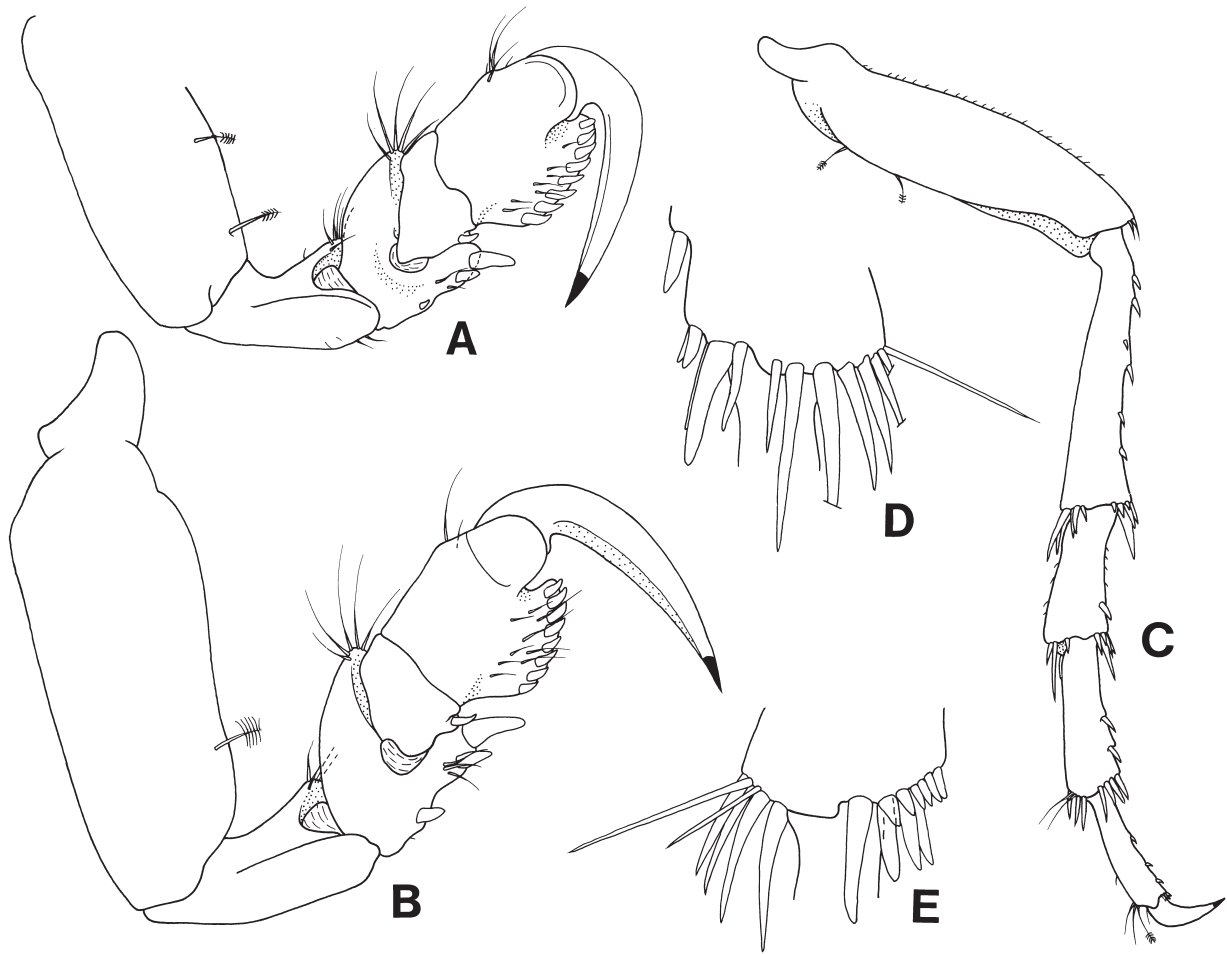
3 (36%) and 4 (43%) most frequent, 2 and 5 occurring once and twice respectively.

The setation of the palms of pereopods 1–3 is highly consistent with 8 RS being the most frequent; pereopod 1 palm ( $n = 14$ ) with 8 (60%) or 9 (40%) RS, pereopod 2 palm ( $n = 14$ ) with 7 (27%) or 8 (73%) RS and pereopod 3 ( $n = 13$ ) palm 8 (93%), 7 RS occurring once. The RS on the inferior margin of the merus was consistently 1+2, although some of these were missing and there may be some variation.

There is no discernable difference in the number of robust setae between males and females, nor in relation to size—the smallest male (15.5 mm) and female (16.5 mm) had similar counts for robust setae: pleotelson RS (11), pereopods 1–3 (8 and 9) and uropods

(endopod mesial with 2 and 3, lateral with 3 and 4, exopod mesial without, lateral 8). The characteristic shape of the rostrum is only evident in larger presumably mature specimens.

**REMARKS:** A combination of characters serves to readily identify *Rocinela garricki*: the eyes are relatively widely separated, mature specimens have a distinctly tri-cornered rostrum, the anterior margin of which is often bent ventrally, the anterior pereopods usually have 8 or 9 robust setae, the propodal blade is provided with numerous stiff simple setae (in contrast to the more usual single seta), the uropodal exopod has 8 robust setae on the lateral margin, none on the mesial margin, the uropodal endopod is relatively broad with 2 or 3



**Figure 108.** *Rucinela garricki* Hurley, 1957. Male, 15.5 mm, Camp Bay, NIWA 23855. A–C, pereopods 1, 2 and 7 respectively; D, pereopod 7, distal margin of carpus, mesial RS; E, pereopod 7, distal margin of carpus, lateral RS.

setae on the mesial margin, 3 or 4 setae on the lateral margin and the posterior margin of the pleotelson usually has 10 or 11 robust setae. In addition, in mature specimens the anterior part of the head is depressed and there is an oblique longitudinal ridge that runs along the anteromesial margin of the eye.

The most similar species is the potentially sympatric *Rucinela satagia* sp. nov., which has in common with *R. garricki* a tri-cornered rostrum and the blade of the anterior pereopods with numerous setae. Several differences allow separation of the two species, *Rucinela satagia* having eye-ridges on the posteromesial part of the eyes, the eyes being close-set, the pereopod blades are smaller with no more than 6 robust setae and a narrower uropodal endopod.

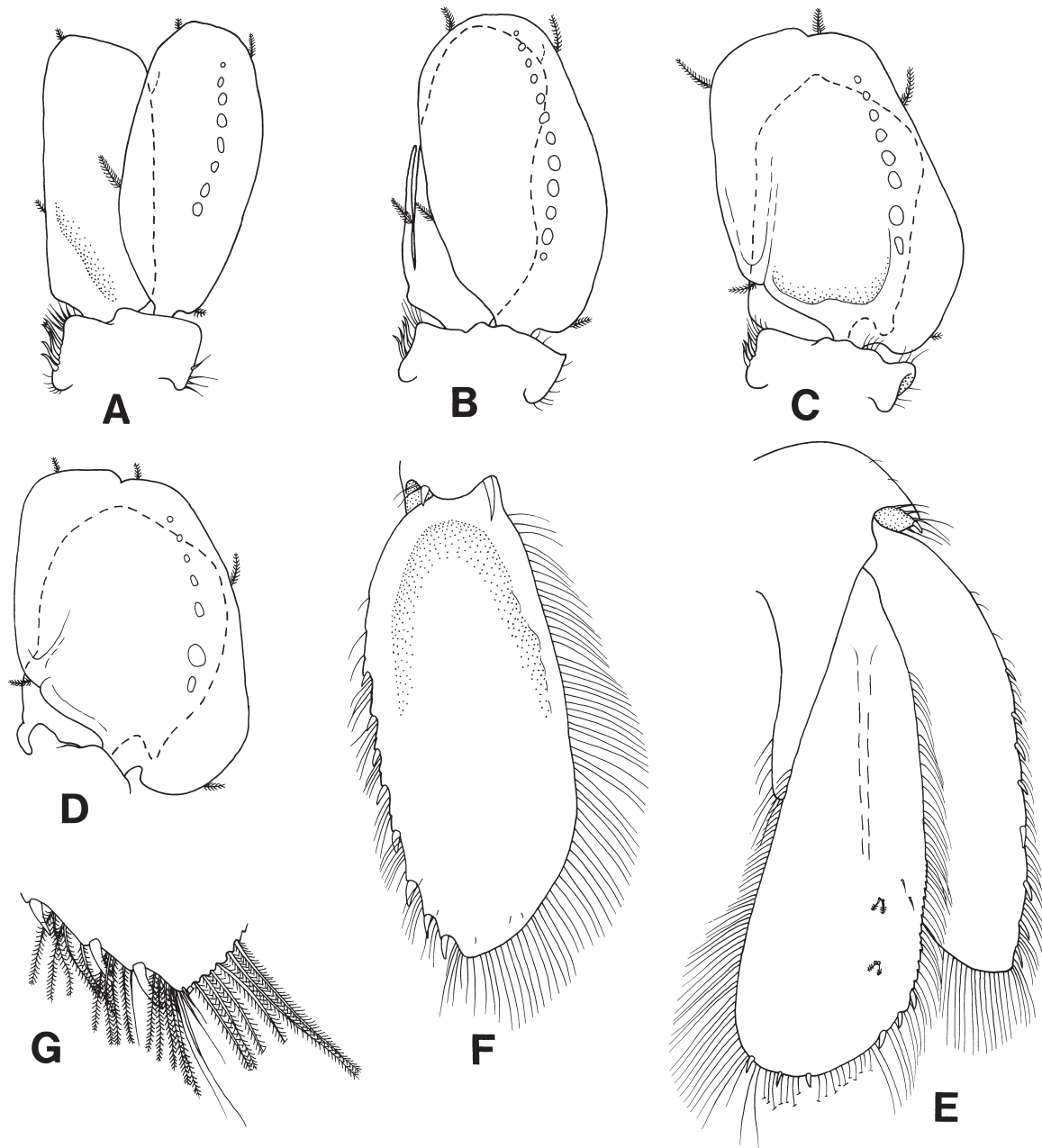
One large specimen, in poor condition, from 'North Otago' (a 32 mm non-ovig. female; NMNZ Cr.4966) is provisionally identified as *R. garricki*, but excluded

from the material examined as it is in poor condition with most pereopods incomplete.

Hicks *et al.* (1991) listed one syntype (NMNZ Cr.3651) held at Te Papa. Hurley (1957) examined only one specimen and, as the Victoria University label states 'type', that specimen is here regarded as the holotype. The specimen itself is heavily dissected, with the pleotelson and pereopods from one side all missing. The five slides mentioned in Hurley's (1957) description have not been located and are presumed lost.

**DISTRIBUTION:** Cook Strait and off the eastern coast of South Island to Dunedin; most locations are inshore and shallow, with recorded depths from the surface (at a night light) to 256 metres.

**ETYMOLOGY:** Named for Mr J. A. Garrick, presumably a productive collector at that time (Hurley 1957).



**Figure 109.** *Rocinela garricki* Hurley, 1957. Male, 15.5 mm, Camp Bay, NIWA 23855. A-D, pleopods 1-3, 5 respectively; E, uropod; F, uropod exopod, ventral view; G, uropod exopod apex.

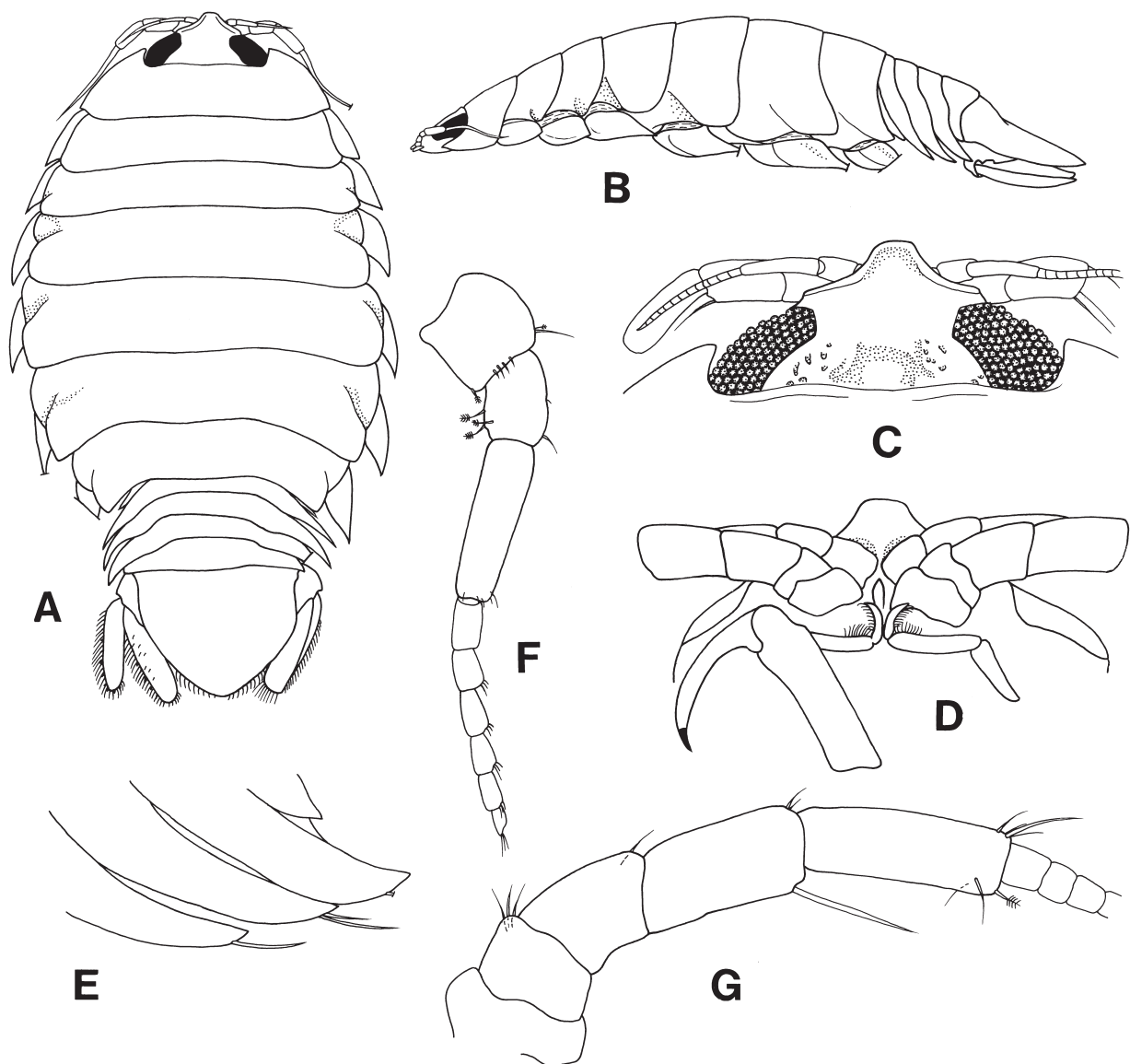
*Rocinela leptopus* sp. nov. (Figs 110-113)

**MATERIAL EXAMINED:** *Holotype:* ♀ (34 mm, ovig.), off Pegasus Bay, South Island, 43°14'S, 175°39'E, 27 September 1976, off steep wall, coral, 1006-512 m, stn. S5559 (NMNZ Cr.12010).

**DESCRIPTION:** *Body* 1.8 times as long as greatest width, dorsal surfaces smooth or sparsely punctate, widest at pereonite 5, lateral margins ovate. *Rostrum* simple,

anteriorly subtruncate. *Eyes* not medially united, separated by about 40% width of head; each eye made up of ~12 transverse rows of ommatidia, each row with ~7 ommatidia; eye colour black. *Coxae* 2-3 each with posteroventral angle rounded; 5-7 without oblique carina. *Pleon* with pleonite 1 largely concealed by pereonite 7; pleonite 4 with posterolateral margins extending clearly beyond posterior margin of pleonite 5; pleonite 5 with posterolateral angles acute. *Pleotelson* 0.8 times as long as anterior width, anterior dorsal





**Figure 110.** *Rocinela leptopus* sp. nov. Holotype. A, dorsal view; B, lateral view; C, head, dorsal view ; D, frons; E, pleonites 2-5, lateral margin; F, antennule; G, antenna peduncle.

surface without 2 sub-median depressions, dorsal surface smooth; lateral margins convex, posterior margin narrowly rounded, with 14 RS (distalmost RS ventrally directed).

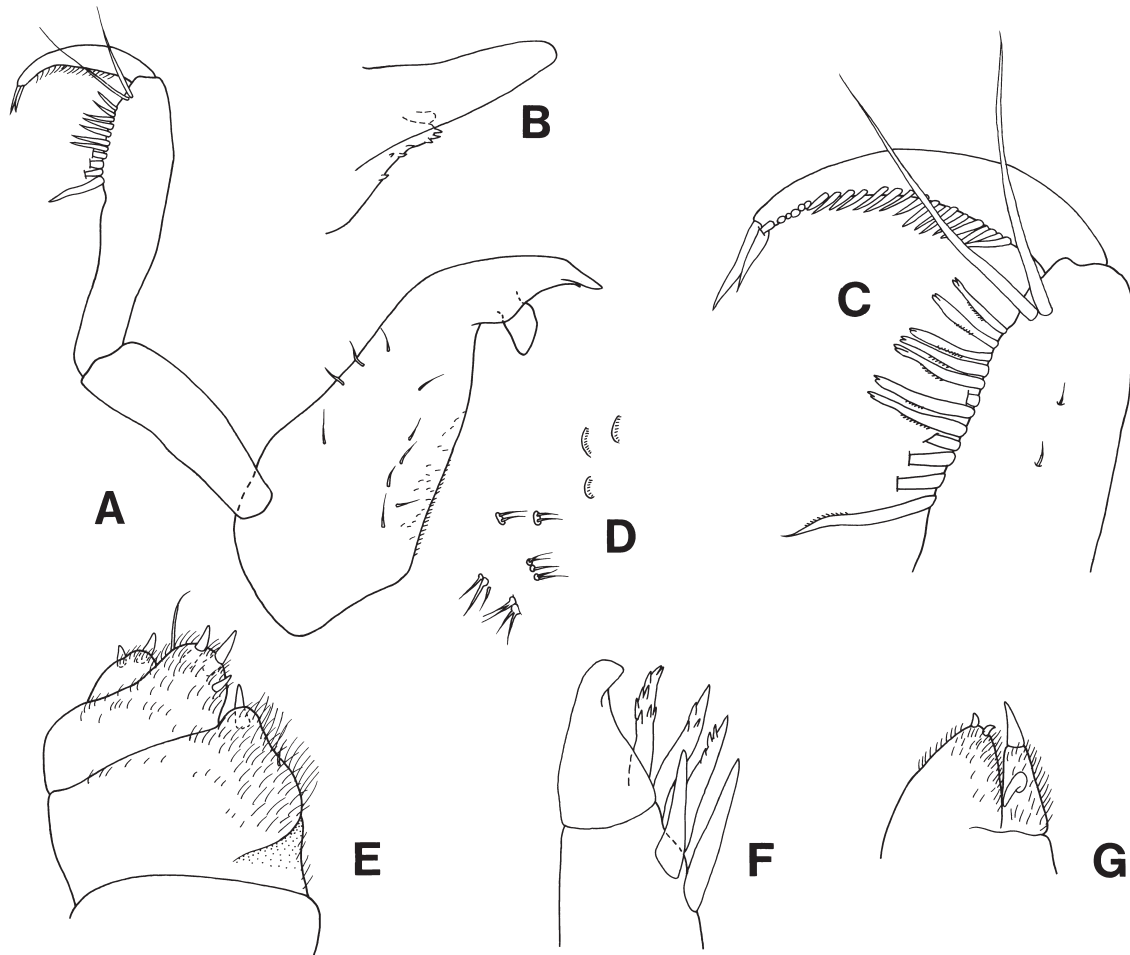
*Antennule* peduncle article 3 1.1 times as long as combined lengths of articles 1 and 2, 3.5 times as long as wide; flagellum with 6 articles, extending to anterior of pereonite 1. *Antenna* peduncle article 3 1.4 times as long as article 2, 1.1 times as long as wide; article 4 1.7 times as long as article 3, 1.9 times as long as wide, inferior margin with 0 plumose setae, and 1 simple seta (possibly with more setae as some are clearly missing); article 5 1.2 times as long as article 4, 3.0 times as long as wide, inferior margin with 3 setae, anterodistal angle

with cluster of 4 short simple setae; flagellum with 13 articles, extending to middle of pereonite 1.

*Frontal lamina* longer than greatest width, anteriorly acute.

*Mandible* molar process distinct flat lobe; palp article 2 with 12 marginal distolateral setae, and 2 long distolateral setae; palp article 3 with 24 setae. *Maxillule* with 6 RS (1 large, 5 slender, serrate). *Maxilla* mesial lobe with 2 hooked RS; lateral lobe with 2 hooked RS. *Maxilliped* palp article 1 distomesial angle with 1 RS; article 2 with 3 hooked RS; article 3 with 2 hooked RS.

*Pereopod 1 basis* 3.2 times as long as greatest width; *ischium* 0.6 times as long as basis, inferior margin with 0 RS, superior distal margin with 12 setae; *merus* inferior



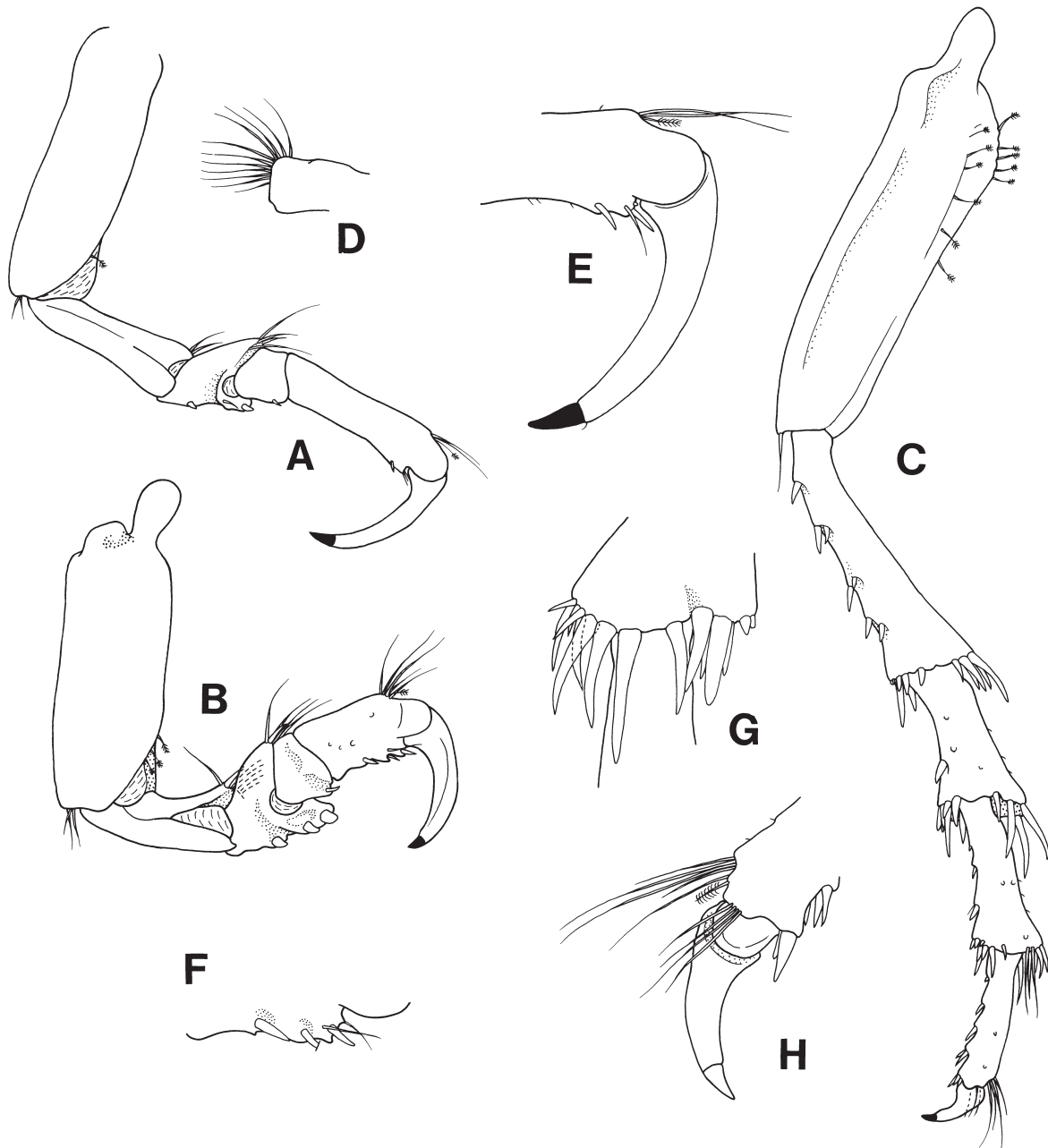
**Figure 111.** *Rocinela leptopus* sp. nov. Holotype. A, mandible; B, mandible incisor; C, mandible palp article 3; D, scales, mandible mesial margin; E, maxilliped palp articles 1-3; F, maxillule apex; G, maxillule apex.

margin with 2 RS, set as two groups, superior distal angle with 5 setae (1 RS, 4 simple); *carpus* 0.6 times as long as merus, inferior margin with 1 RS; *propodus* 4.4 times as long as proximal width, propodal palm with small distal lobe, inferior margin with 2 RS (distal); *dactylus* 0.8 times as long as propodus (weakly curved). *Pereopods 2 and 3* not similar to pereopod 1 (far more robust, with 1+2 RS on inferior margin of merus; propodus 2.0 times as long as proximal width, with 3 RS; dactylus about as long as propodus, weakly curved). *Pereopod 6* similar to pereopod 7. *Pereopod 7* basis 3.4 times as long as greatest width, inferior margins with 11 palmate setae; ischium 0.7 as long as basis, inferior margin with 7 RS (set as 1, 2, 2 and 2), superior distal angle with 5 RS, inferior distal angle with 6 RS; merus 0.5 times as long as ischium, 1.6 times as long as wide, inferior margin with 1 RS, superior distal angle with 6 RS, inferior distal angle with 7 RS; *carpus* 0.6 times as long as ischium, 2.3 times as long as wide, inferior margin with 3 RS (set singly), superior distal angle

with 10 RS (and 2 setae), inferior distal angle with 6 RS; propodus 0.5 as long as ischium, 3.6 times as long as wide, inferior margin with 5 RS (set as 1, 1, 1 and 2), superior distal angle with 6 slender setae, inferior distal angle with 2 RS.

*Pleopod 1* exopod 2.3 times as long as wide, lateral margin straight, mesial margin weakly convex, with PMS on distal two-thirds; peduncle mesial margin with 6 coupling hooks.

*Uropod* peduncle ventrolateral margin with 2 RS, posterior lobe about three-quarters as long as endopod. *Exopod* at angle of about 135° to endopod, rami extending to pleotelson apex, marginal setae in two tiers. *Endopod* lateral margin weakly convex, lateral margin with 7 RS, mesial margin straight, with 3 RS. *Exopod* not extending to end of endopod, 4.0 times as long as greatest width; lateral margin straight, with 8 RS; mesial margin straight, distally convex, with 0 RS; distal margin with indistinct apex.

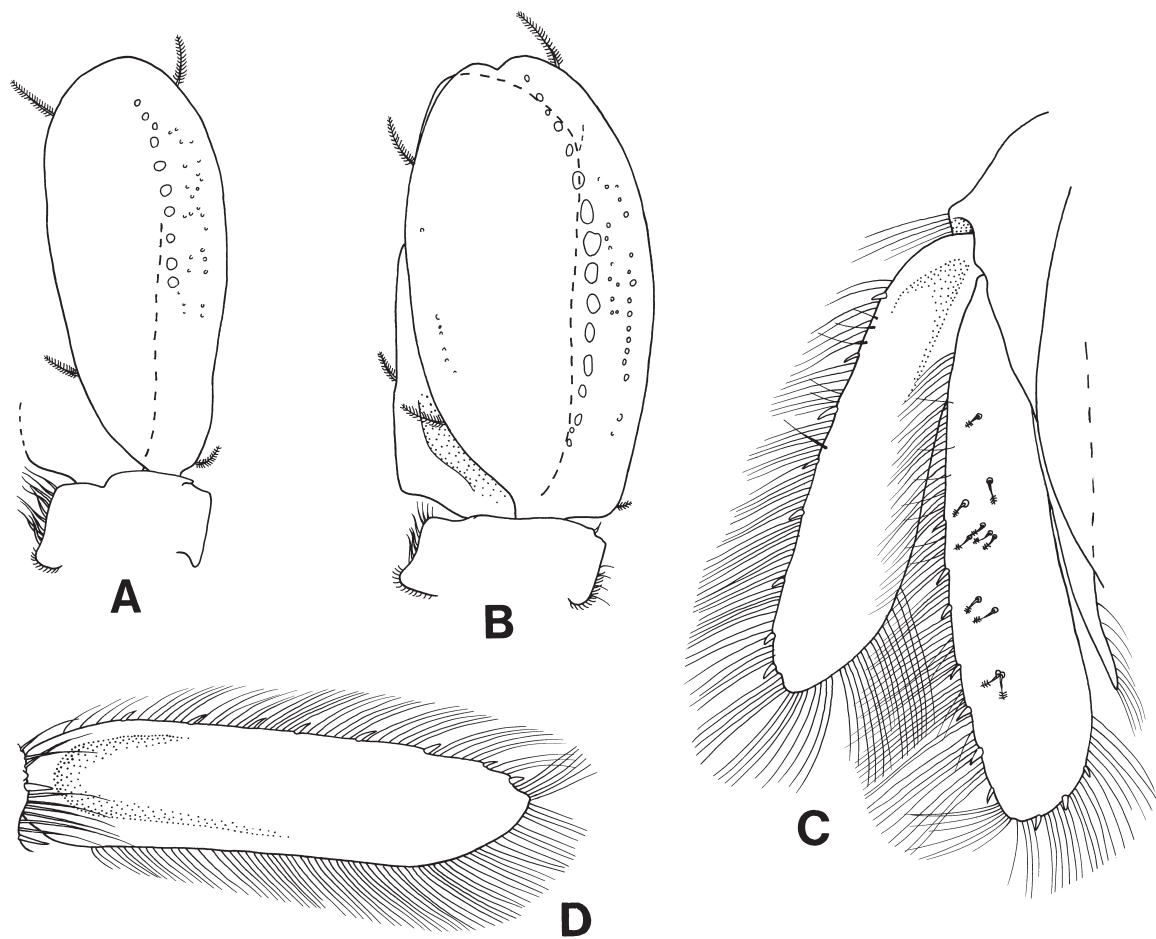


**Figure 112.** *Rocinela leptopus* sp. nov. Holotype. A–C, pereopods 1, 2 and 7 respectively; D, pereopod 1, distomesial margin of carpus; E, pereopod 1, dactylus and distal margin of propodus; F, pereopod 2, inferior margin of propodal palm; G, pereopod 7, distal margin of carpus, mesial RS; H, pereopod 7, dactylus and distal margin of propodus.

**SIZE:** The single specimen measures 34 mm.

**REMARKS:** *Rocinela leptopus* sp. nov. is readily identified by the widely separated eyes, subtruncate rostrum, ‘stepped’ anterior margin of the head, slender pereopod 1 with an elongate propodus, pereopods 1–3 propodal palm without a blade, the propodal palm of pereopod 1 lacking robust setae, that of pereopods 2 and 3 with widely spaced short robust setae and the dactylus of pereopods 1–3 being only weakly curved.

Nearly all other species of *Rocinela* have pereopods 1–3 with a propodal blade and the propodal blade or palm with prominent robust setae. The Caribbean *Rocinela signata* Schioedte and Meinert, 1879a lacks robust setae on the pereopod 1 palm, as does *Rocinela media* Nierstrasz, 1931, known only from Indonesia, but in both these species the propodus is short and robust. Only *Rocinela runga* sp. nov., from the relatively nearby Antipodes Islands, has an elongate and unarmed propodus, and that species may be distinguished by the



**Figure 113.** *Rocinela leptopus* sp. nov. Holotype. A, pleopod 1; B, pleopod 2; C, left uropod, dorsal view; D, uropodal exopod, ventral view.

longer propodus on pereopods 1–3, the broad, anteriorly rounded rostrum and the pleonite lateral margins being less produced and acute.

The holotype, while in good condition, is somewhat brittle, the pleopods breaking up on dissection. *In situ* examination indicates that they are similar to others of the genus.

PREY: Not known.

DISTRIBUTION: Known only from the type locality, off the northeastern coast of South Island.

ETYMOLOGY: Adapted from the Greek words *leptos* (thin, slender, delicate) and *pous* (foot) alluding to the slender first pereopods.

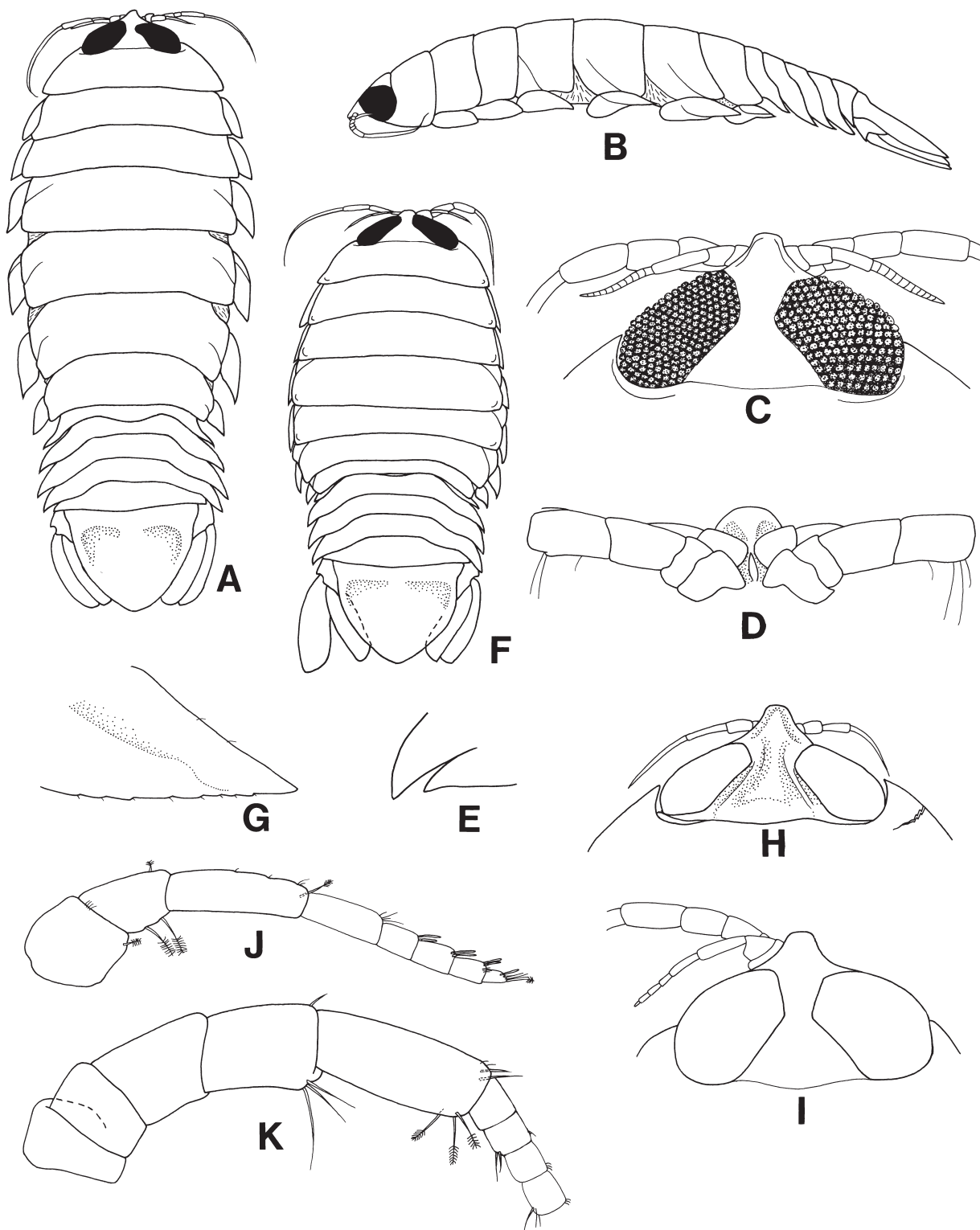
***Rocinela pakari* sp. nov.** (Figs 114–118)

MATERIAL EXAMINED: Holotype, ♀ (28 mm, non-ovig.), Chatham Rise, 25 October 1979, 44°26.89'S, 174°54.79'E, 676 m (NIWA 23888).

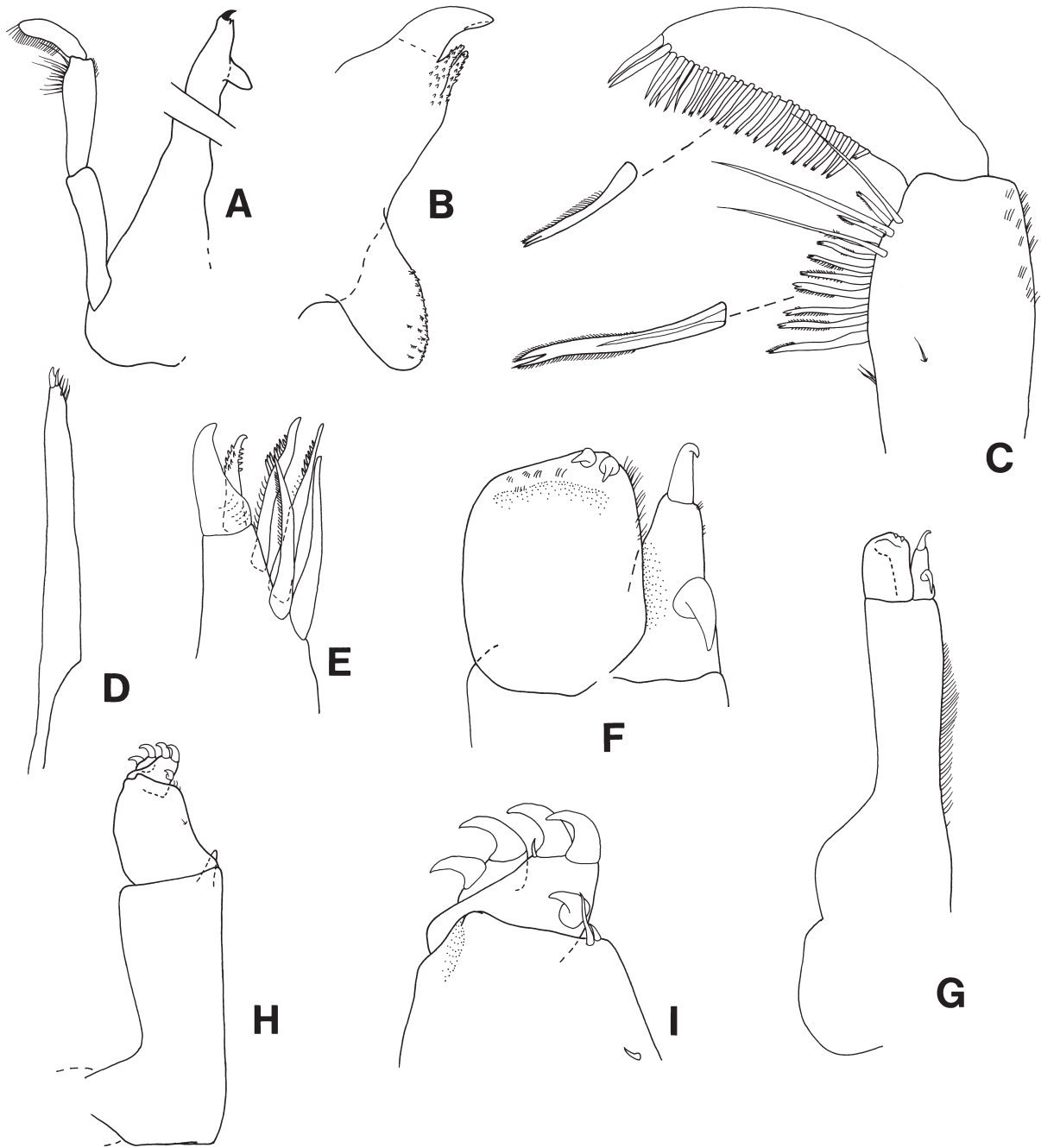
Paratypes. 4♀ (each 20 mm, non-ovig.), 8 manca (13, 14 mm, 6 unmeasured), same data as holotype (NIWA 23889).

Additional material: ♀ (39 mm, non-ovig, poor condition, all but one anterior pereopod missing), (Fisheries Research Division) (NIWA 23890). ♀ (33 mm, ovig, poor condition, uropods and pleotelson largely absent), Chatham Rise, 44°34.00'S, 174°06.49'E, 29 October 1979, 863–910 m (NIWA 23891).

DESCRIPTION: *Body* 2.5 times as long as greatest width, widest at pereonite 4, lateral margins subparallel. *Rostral point* anteriorly subtruncate. *Eyes* not medially united, separated by about 12.5% width of head; each eye made up of ~16 transverse rows of ommatidia, each row with ~11 ommatidia; eye colour black. *Pereonite 1 and coxae 2–3* each with posteroventral angle rounded; coxae 5–7 without oblique carina. *Pleon* with pleonite 1 largely concealed by pereonite 7, or visible in dorsal view; pleonite 4 with posterolateral margins extending clearly beyond posterior margin of pleonite 5; pleonite



**Figure 114.** *Rocinela pakari* sp. nov. A-E, holotype, F, G, I, J and K, 20 mm paratype, others as indicated. A, dorsal view; B, lateral view; C, head; dorsal view, male; D, frons; E, pleonites 4 and 5, lateral margins; F, dorsal view; head, paratype; G, coxa 7; H, head, 33 mm ovigerous female, S164; I, head; J, antennule; K, antenna.

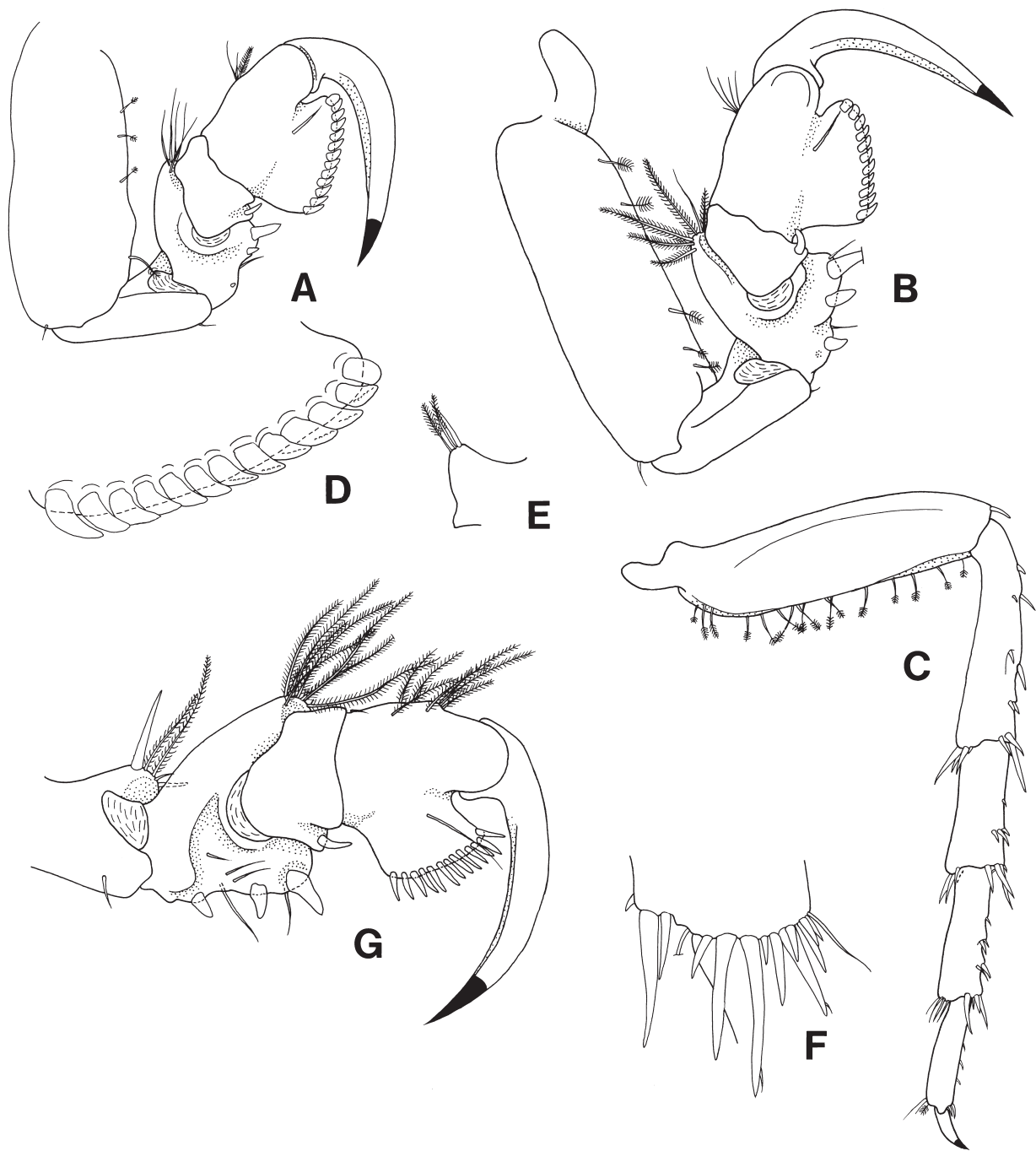


**Figure 115.** *Rocinela pakari* sp. nov. Paratype 20 mm. A, mandible; B, mandible molar and incisor; C, mandible palp article 3; D, maxillule; E, maxillule apex; F, maxilla apex; G, maxilla; H, maxilliped; I, maxilliped palp articles 2 and 3.

5 with posterolateral angles acute. *Pleotelson* 0.8 times as long as anterior width, anterior dorsal surface with 2 sub-medial depressions, dorsal surface smooth; lateral margins weakly convex, posterior margin narrowly rounded, with 15 robust setae.

*Antennule* peduncle article 3 0.9 times as long as combined lengths of articles 1 and 2, 3.3 times as long as wide; flagellum with 5 articles (article 1 elongate),

extending to anterior of pereonite 1. *Antenna* peduncle article 3 1.7 times as long as article 2; article 4 1.3 times as long as article 3, 1.4 times as long as wide, inferior margin with 0 plumose setae, and 3 simple setae; article 5 1.5 times as long as article 4, 2.5 times as long as wide, inferior margin with 3 setae (palmate), anterodistal angle with cluster of 4 short simple setae; flagellum with 19 articles, extending to middle of pereonite 2.



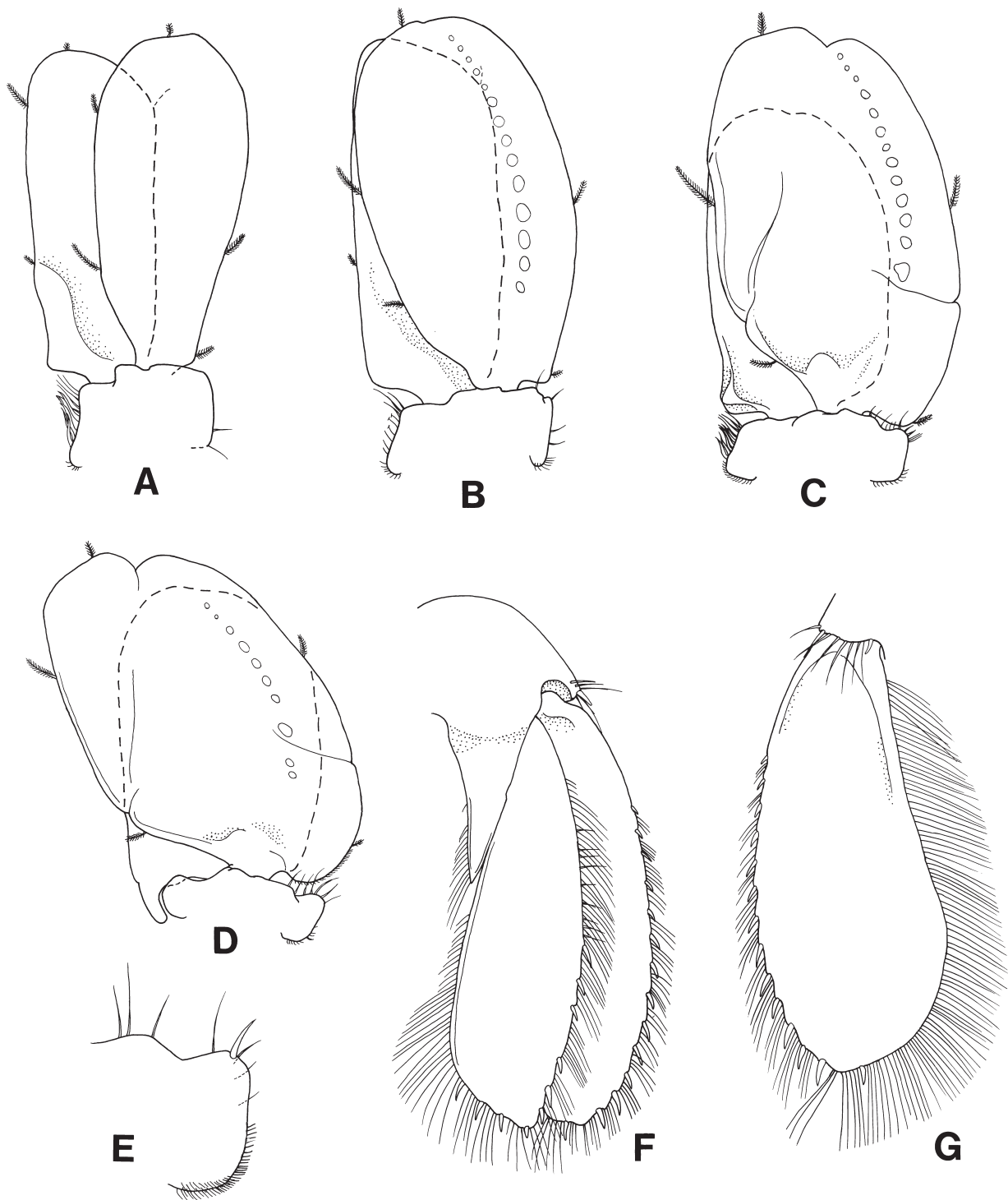
**Figure 116.** *Rocinela pakari* sp. nov. Holotype. A–C, pereopods 1, 2 and 7 respectively; D, robust setae on pereopod 1 blade; E, pereopod 1 ischium, mesial surface; F, pereopod 7 distal margin of carpus, mesial surface; G, pereopod 1, 33 mm ovigerous female, NIWA 23891.

*Frontal lamina* longer than greatest width, anteriorly acute.

*Mandible* molar process distinct flat lobe; palp article 2 with 10 short, marginal distolateral setae, and 3 long distolateral setae; palp article 3 with 25 setae. *Maxillule* with 6 RS (1 large, 5 slender, serrate). *Maxilla* mesial lobe with 2 hooked RS (small); lateral lobe with 2 hooked RS. *Maxilliped* palp article 1 distomesial angle

with 2 robust setae (straight); article 2 with 3 hooked RS; article 3 with 2 hooked RS.

*Pereopod 1* basis 2.4 times as long as greatest width; *ischium* 0.5 times as long as basis, inferior margin with 0 RS, superior distal margin with 1 seta (and 2 plumose setae); *merus* inferior margin with 3 RS, set as two groups, superior distal angle with 6 setae (plumose); *carpus* 0.7 as long as *merus*, inferior margin with 1 RS;

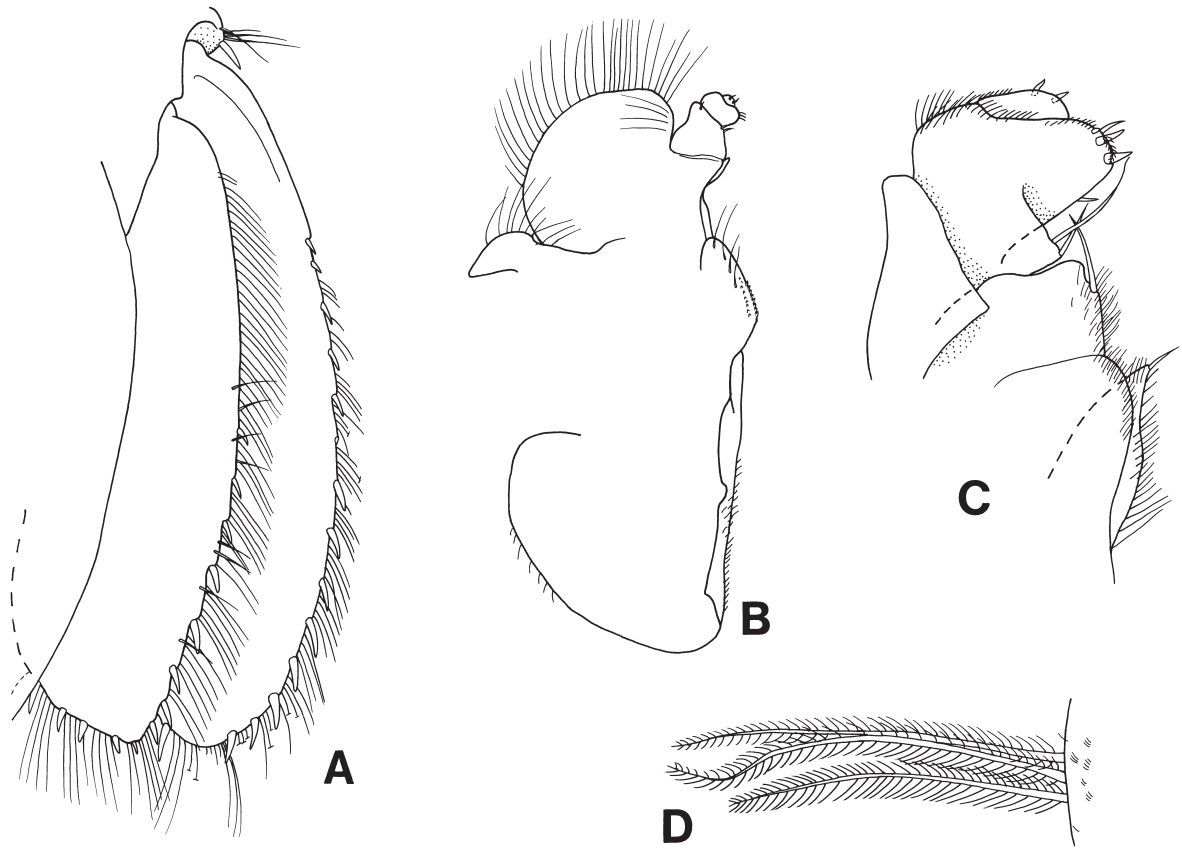


**Figure 117.** *Rocinela pakari* sp. nov. Paratype 20 mm. A–D, pleopods 1–3, 5 respectively; E, pleopod 3 peduncle lateral margin; F, uropod; G, uropod exopod, ventral view.

*propodus* 1.7 times as long as proximal width, propodal palm with blade, propodal blade 1.1 times as wide as palm, inferior margin with 13 RS; *dactylus* 1.8 times as long as propodus. *Pereopods 2 and 3* similar to pereopod 1 (RS on merus longer). *Pereopod 6* similar to pereopod

7. *Pereopod 7* basis 3.7 times as long as greatest width, inferior margins with 16 palmate setae; ischium 0.7 as long as basis, inferior margin with 7 RS (set as 1, 2, 2 and 2), superior distal angle with 4 RS, inferior distal angle with 4 RS; merus 0.6 times as long as ischium, 2.2





**Figure 118.** *Rocinela pakari* sp. nov. A, holotype, uropod in situ; B–D, ovigerous female, 33 mm: B, maxilliped; C, maxillipedal palp; D, plumose setae, distal margin of lamina vibrans.

times as long as wide, inferior margin with 4 RS (set as 1 and 3), superior distal angle with 5 RS, inferior distal angle with 4 RS; carpus 0.6 times as long as ischium, 2.9 times as long as wide, inferior margin with 5 RS (set as 1, 2 and 2), superior distal angle with 9 RS, inferior distal angle with 5 RS; propodus 0.6 as long as ischium, 4.1 times as long as wide, inferior margin with 3 RS (set singly), superior distal angle with 3 slender setae (1 palmate), inferior distal angle with 2 RS.

*Pleopod 1* exopod 2.3 times as long as wide, lateral margin weakly convex, mesial margin weakly convex, with PMS from distal one-third; endopod 2.6 times as long as wide, lateral margin weakly concave, with PMS on distal margin only, mesial margin with PMS from distal one-third; peduncle mesial margin with 6 coupling hooks. Pleopods 2–5 peduncle distolateral margin with acute RS.

*Uropod* peduncle ventrolateral margin with 2 RS, posterior lobe about one-third as long as endopod. *Exopod* at angle of about 135° to endopod, rami extending to pleotelson apex, marginal setae in two tiers. *Endopod* lateral margin convex, lateral margin with 8 RS, mesial

margin strongly convex, with 4 RS. *Exopod* extending to end of endopod, 2.3 times as long as greatest width; lateral margin convex, with 14 RS; mesial margin sinuate, proximally concave, distally convex, with 4 RS; distal margin rounded.

MALE: Not known

SIZE: Females 20 and 39 mm; manca 13–14 mm.

VARIATION: Based on measured types only. *Robust setae*: Pleotelson ( $n=7$ ) RS 13–17, with 14 (twice) and 15 (three times) most frequent. Uropod exopod ( $n=14$ ) mesial margin with 0–4 with 1 (21%) and 2 (43%) most frequent, 0 and 4 each occurring twice, 3 once; lateral margin 12–14 with 13 (50%) and 14 (36%) most frequent. Uropod endopod ( $n=14$ ) mesial margin varied from 4 to 6 with 4 (50%) and 5 (36%) most frequent, 6 occurring twice (one specimen); lateral margin with 6–8 with 6 (21%) and 7 (64%) most frequent, 8 occurring twice.

The setation of the pereopod palm is highly consistent with robust setae on pereopods 1–3, ranging from

11 to 14, with the following numbers ( $n = 14$ ): pereopod 1 with 12 (43%) or 13 (50%), 11 once (smallest manca); pereopod 2 with 12 (50%), 11 (three times), or 13 and 14, each twice; pereopod 3 12 (64%) or 13 (three times) and 14 once; pereopod 1 never had more than 13 robust setae on the propodal palm and no specimen had less than 11 robust setae on any pereopod palm. The robust setae on the inferior margin of the merus were consistently 1+2.

There was no difference between adults and mancas in the number of robust setae on the anterior pereopods. The rostrum is longer and straight in adult specimens whereas in mancas and small specimens it is bent slightly to the ventral.

The single damaged ovigerous female had oostegites on sternites 1–5. The robust setae on the propodal palm of pereopods 1–3 are notably more slender and longer than those of immature specimens or non-ovigerous females; the number of robust setae on the palm of pereopods 1–3 is 13, as the most frequent number for the other specimens.

REMARKS: *Rocinela pakari* sp. nov. can be identified by the wide propodal blade on pereopods 1–3 which is provided with 11–14 robust setae in conjunction with well-separated eyes and a gently narrowed pleotelson posterior margin; in mature specimens the rostrum is relatively short, anteriorly rounded, and the lateral margins are very weakly stepped.

Only four species of *Rocinela* have pereopods 1–3 with propodal blade as wide as the palm and provided with more than eight robust setae. Of those that do, three have eyes that meet in the middle (these being *R. affinis*, *R. kapala* and *R. oculata*) and all of these have fewer than 10 robust setae on the pereopod palm; the fourth species, *Rocinela niponia* Richardson, 1909, a species in need of redescription, has separate eyes, fewer robust setae on the pereopod blade (10, 8 and 8 on pereopods 1 to 3 respectively) and more robust setae (5) on the inferior margin of the merus.

PREY: Not known.

DISTRIBUTION: Known only from the Chatham Rise, eastwards from the mid-coast of South Island.

ETYMOLOGY: Pakari is a Māori word that means strong (noun in apposition).

*Rocinela resima* sp. nov. (Figs 119–122)

MATERIAL EXAMINED: *Holotype*, ♂ (29 mm), Christabel sea mount, northeastern Macquarie Ridge, 51°04.34'S, 164°36.37'E, 14 April 2003, 1065–1030 m, rubble, (NIWA 23883).

*Paratypes*: ♂ (20 mm, dissected), Chatham Rise, 42°43.95'S, 179°53.91'W, 18 April 2001, 1076–990 m (NIWA 23884). ♀ (non-ovig. 34 mm), 42°46.99'S,

179°59.64'E, 21 April 2001, 1000–870 m (NIWA 23885). ♂? (24 mm), Chatham Rise, 42° 46.07'E, 179°55.31'W, 20-April 2001, 955–890 m (NIWA 23886).

*Non-type material*. ♀ (30 mm, non-ovig.), same data as holotype (NIWA 23887).

*Additional material*. Chatham Rise. ♀ (24 mm, non-ovig.), 42.7597–7557°S, 179.0105–0112°W, 28 May 2006, 765–845 m (NIWA 25655). ♀ (21 mm, ovig.), 42.7885–7992°S, 179.9985–9982°E, 30 May 2006, 1020–1054 m (NIWA 25665). 2♀ (21 mm, one damaged, ovig.), 42.7170–7165°S, 179.0420–0440°E, 31 May 2006, 957–985 m (NIWA 25666).

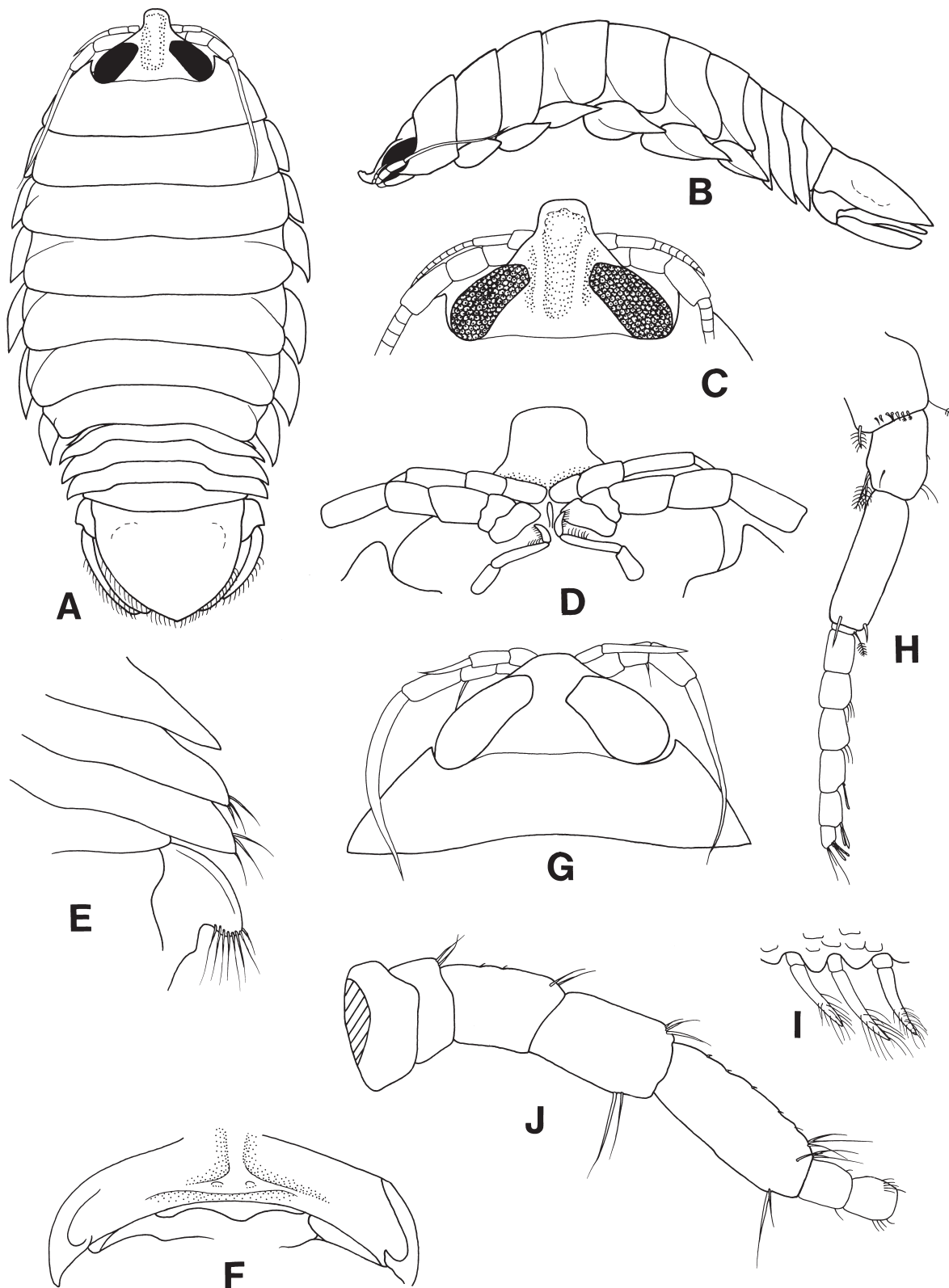
DESCRIPTION: *Body* 2.1 times as long as greatest width, dorsal surfaces smooth, sparsely punctate, widest at pereonite 5, lateral margins weakly ovate. *Rostrum* turned upwards, anteriorly truncate (margins thickened). *Eyes* not mesially united, separated by about 28% width of head; each eye made up of ~13 transverse rows of ommatidia, each row with ~9 ommatidia; eye colour dark brown (bronze). *Coxae* 2–3 each with posteroventral angle acute, posteriorly produced; 5–7 without oblique carina. *Pleon* with pleonite 1 largely concealed by pereonite 7; pleonite 4 with posterolateral margins extending to, but not beyond, posterior margin of pleonite 5; pleonite 5 with posterolateral angles rounded. *Pleotelson* 1.2 times as long as anterior width, anterior dorsal surface without 2 sub-median depressions, dorsal surface with short setae; lateral margins convex, posterior margin with distinct median point, with 14 RS.

*Antennule* peduncle article 3 0.9 times as long as combined lengths of articles 1 and 2, 3.1 times as long as wide; flagellum with 6 articles, extending to anterior of pereonite 1. *Antenna* peduncle article 3 2.3 times as long as article 2, 1.2 times as long as wide; article 4 1.2 times as long as article 3, 1.4 times as long as wide, inferior margin with 0 plumose setae, and 2 simple setae (stiff); article 5 1.6 times as long as article 4, 2.3 times as long as wide, inferior margin with 2 setae, anterodistal angle with cluster of 6 short simple setae; flagellum with 17 articles, extending to posterior of pereonite 2.

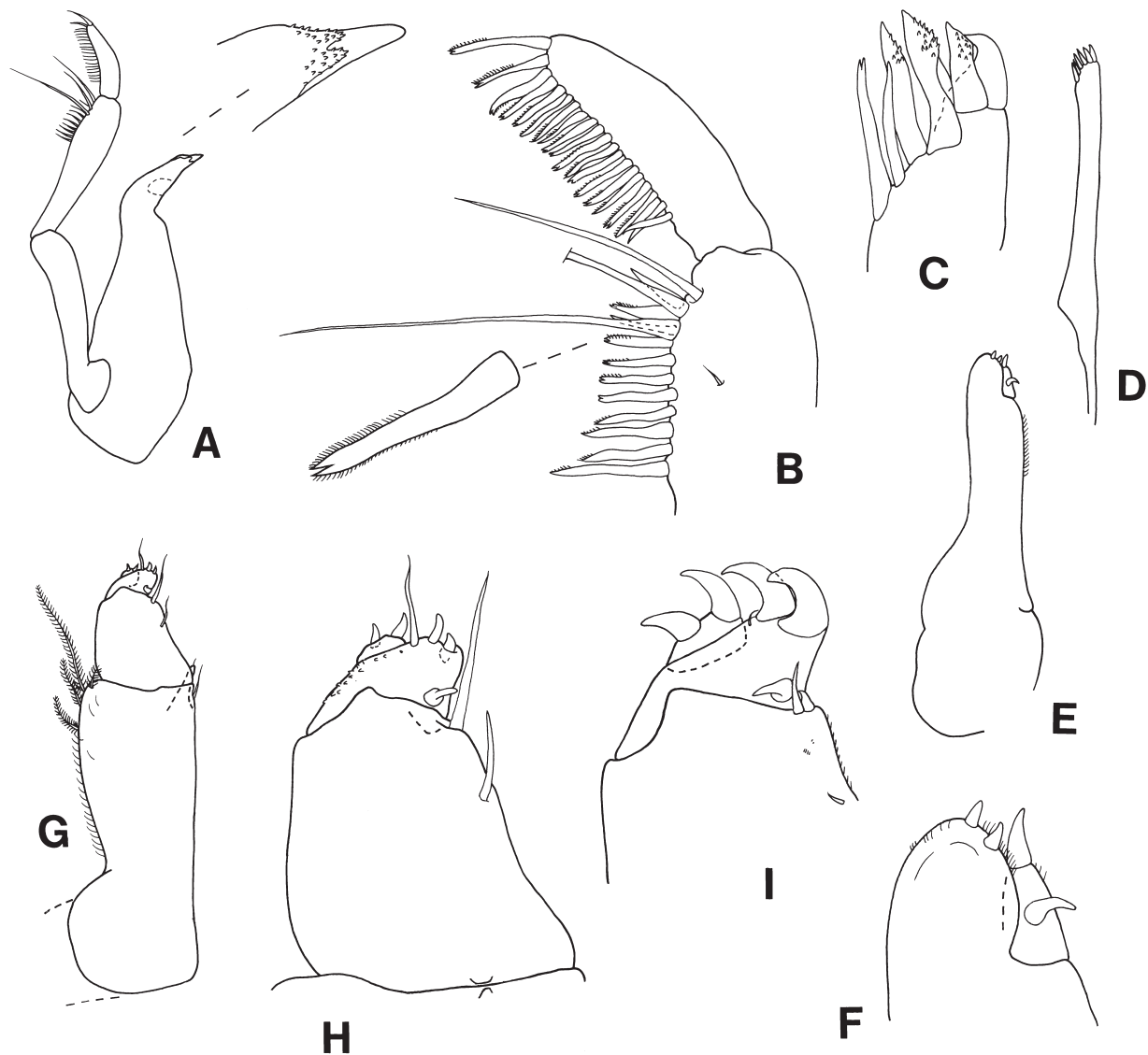
*Frontal lamina* longer than greatest width, anteriorly acute.

*Mandible* molar process distinct flat lobe; palp article 2 with 11 marginal distolateral setae, and 3 long distolateral setae; palp article 3 with 20 setae (all distally bifurcate except distalmost 2 setae). *Maxillule* with 6 RS (1 large, 5 slender, serrate). *Maxilla* mesial lobe with 2 hooked RS; lateral lobe with 2 hooked RS. *Maxilliped* palp article 1 distomesial angle with 0 RS (with 1 long seta and 1 less long seta mid-margin); article 2 with 3 hooked RS (2 distal, 1 proximal and 1 straight, stiff seta); article 3 with 2 hooked RS.

*Pereopod 1 basis* 2.9 times as long as greatest width; *ischium* 0.4 times as long as basis, inferior margin with



**Figure 119.** *Rocinela resima* sp. nov. A-F, holotype; G, female NIWA 23885; H-J, male paratype NIWA 23884. A, dorsal view; B, lateral view; C, head; dorsal view; D, frons; E, pleonites 2-5 and uropod peduncle, lateral margins; F, sternite 7 showing penial papillae; G, head, pereonite 1; H, antennule; I, setae, distal margin antennule peduncle article 1; J, antenna.



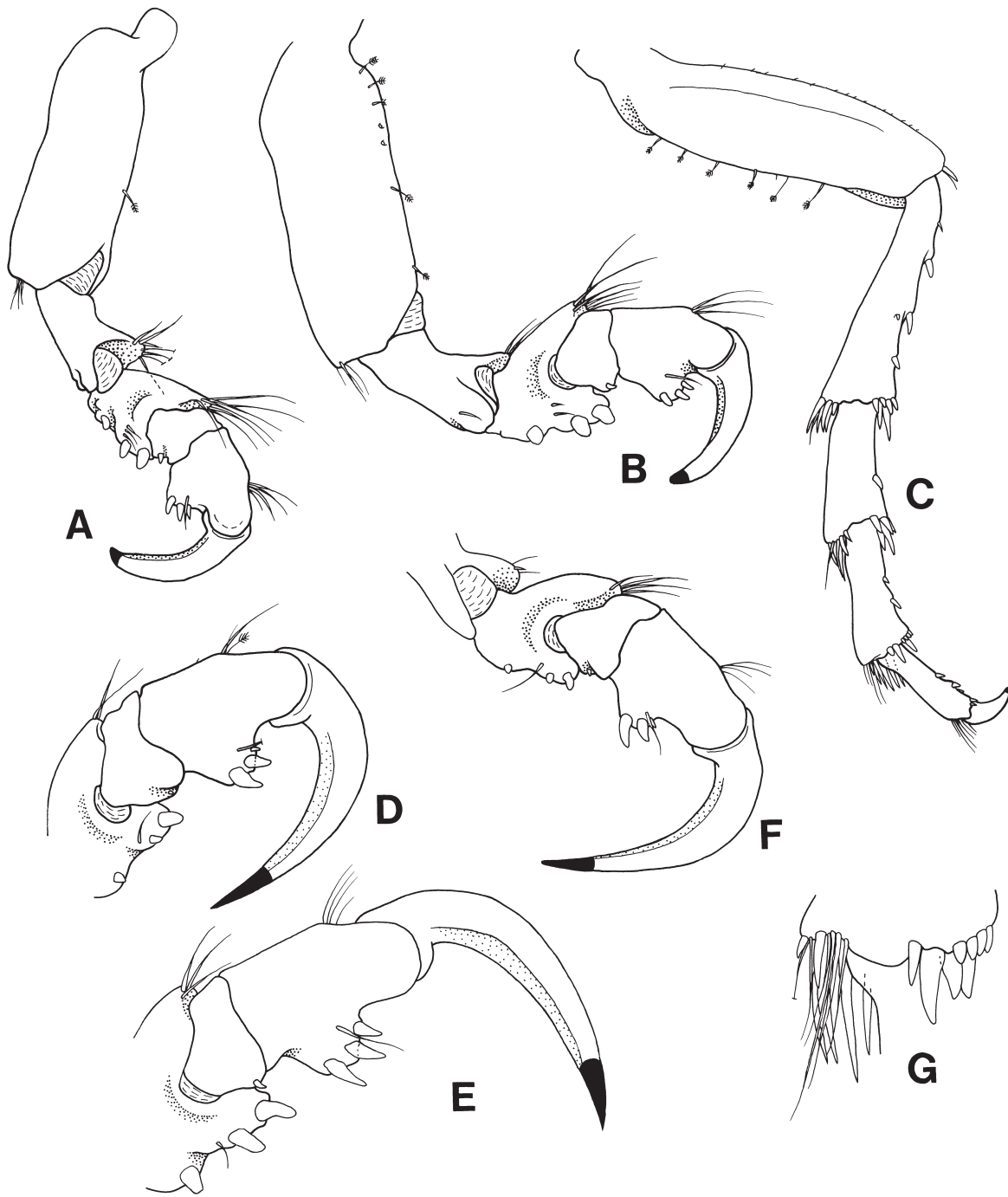
**Figure 120.** *Rocinela resima* sp. nov. Paratype NIWA 23884. A, mandible; B, mandible palp article 3; C, maxillule apex; D, maxillule; E, maxilla; F, maxilla apex; G, maxilliped; H, maxilliped palp articles 2 and 3; I, maxilliped palp articles 2 and 3, NIWA 23885.

0 RS, superior distal margin with 7 setae (including 1 acute RS); *merus* inferior margin with 3 RS, set as two rows (of 1 and 2), superior distal angle with 7 setae (long); *carpus* 0.6 times as long as *merus*, inferior margin with 1 RS; *propodus* 1.6 times as long as proximal width, propodal palm with blade, propodal blade 0.5 times as wide as palm, with single seta, inferior margin with 3 RS; *dactylus* 1.1 times as long as *propodus*. *Pereopods* 2 and 3 similar to pereopod 1 (but larger, meral RS larger). *Pereopod* 6 similar to pereopod 7. *Pereopod* 7 basis 3.5 times as long as greatest width, inferior margins with 8 palmate setae; *ischium* 0.7 as long as basis, inferior margin with 5 RS (set as 1, 1, 2 and 1), superior distal angle with 6 RS, inferior distal angle with 6 RS; *merus* 0.5 times as long as *ischium*, 1.9 times

as long as wide, inferior margin with 1 RS, superior distal angle with 7 RS, inferior distal angle with 6 RS; *carpus* 0.6 times as long as *ischium*, 2.4 times as long as wide, inferior margin with 2 RS (set as 1 and 1), superior distal angle with 10 RS, inferior distal angle with 14 RS; *propodus* 0.5 as long as *ischium*, 3.5 times as long as wide, inferior margin with 3 RS (set as 1 and 2), superior distal angle with 6 slender setae, inferior distal angle with 3 RS.

*Penes* low tubercles; penial openings separated by 6% of sternal width.

*Pleopod* 1 exopod 2.2 times as long as wide, lateral margin straight, mesial margin weakly convex, with PMS on distal two-thirds; endopod 2.6 times as long as wide, lateral margin straight, with PMS on on dis-

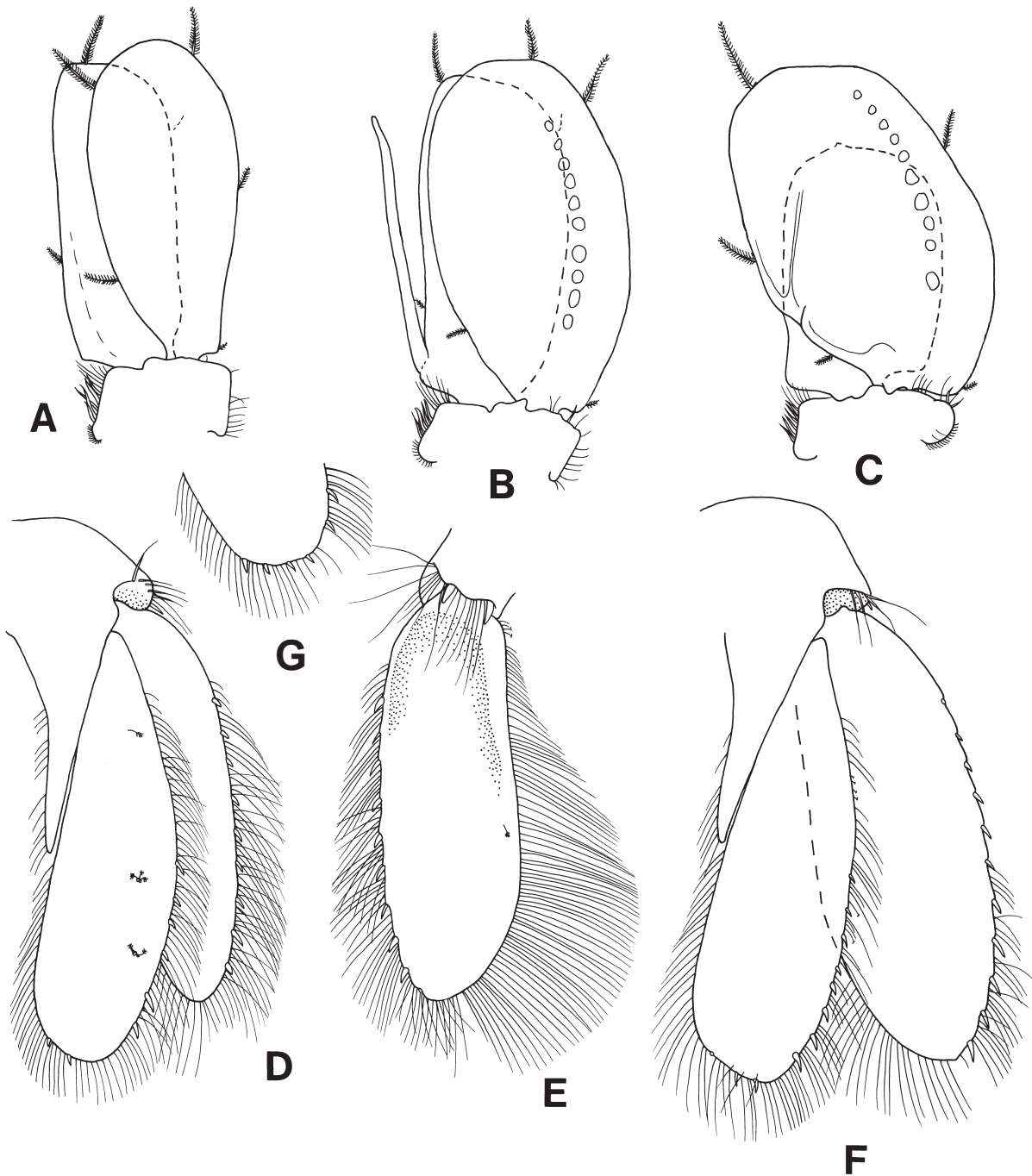


**Figure 121.** *Rocinela resima* sp. nov. A, pereopod 1, holotype; B, pereopod 2, holotype; C, pereopod 7, holotype; D, pereopod 1, NIWA 23885; E, pereopod 2, NIWA 23885; F, pereopod 1, holotype; G, robust setae, carpus mesial margin, pereopod 7.

tal margin only, mesial margin with PMS on distal two-thirds; peduncle mesial margin with 7 coupling hooks. Pleopod 2 *appendix masculina* with straight margins, 0.8 times as long as endopod, distally bluntly rounded. Pleopods 2-5 peduncle distolateral margin with acute RS.

*Uropod* peduncle ventrolateral margin with 2 RS, posterior lobe about one-half as long as endopod.

*Exopod* at angle of about  $135^\circ$  to endopod, rami extending to pleotelson apex. *Endopod* lateral margin convex, with 6 RS; mesial margin weakly convex, with 2 RS. *Exopod* not extending to end of endopod, 3.0 as long as greatest width; lateral margin weakly convex, with 10 RS; mesial margin sinuate, proximally concave, distally convex, with 0 RS; distal margin with indistinct apex.



**Figure 122.** *Rocinela resima* sp. nov. Paratype NIWA 23884. A–C, pleopods 1–3, respectively; D, holotype, uropod; E, holotype, uropodal endopod, ventral view; F, uropod, female paratype NIWA 23887; G, uropod endopod apex, female paratype NIWA 23885.

**FEMALE:** Non-ovigerous specimens similar to the male but: body more elongate (2.5 times as long as wide), rostrum shorter, anteriorly narrowly rounded; all females and specimens of indeterminate sex with uropod exopod extending to just short of endopod apex; marginal setae less dense. Pereopods 1–3 palm with 2 large and 1 small RS or 3 RS of approximately equal size (as in males); dactylus longer (1.4–1.7 times

as long as propodus) than in males (1.1 times as long as propodus); eyes larger, separated by 16% width of head; maxillule RS more slender than in mature male; maxilliped lacking mesial plumose setae, with more strongly hooked RS on palp articles 1 and 2.

**SIZE:** Males 20–29 mm; female 34 mm.

VARIATION: Based on the four type specimens. *Robust setae*: Pleotelson RS 14–17. Uropod exopod mesial margin with 0 (all); lateral margin 10–12. Uropod endopod mesial margin varied from 2–4; lateral margin ( $n=10$ ) with 5–8.

The setation of the pereopod palm is consistent with 3 robust setae on pereopods 1–3; variation occurs in the distal robust seta on the palm which in the mature males is equal in size to the other robust setae, but in the immature male and some of the females it is less than half the size of the other robust setae (this can vary within the individual). The robust setae on the inferior margin of the merus were consistently 1+2.

REMARKS: *Rocinela resima* sp. nov. can be identified by the ovate body shape, strongly produced and upturned rostrum, relatively widely separated eyes, pereopods 1–3 with three robust setae on a small, rounded propodal blade, and relatively narrow uropodal rami with posteriorly rounded uropodal endopod. Males have upturned and truncate rostrum, and relatively short and robust dactyli on pereopods 1–3.

In New Zealand waters *Rocinela bonita* sp. nov. is the most similar species. *R. resima* can be distinguished from that species by a number of characters including pereopods 1–3 having a less produced and more rounded propodal blade with three robust setae (v. sub-rectangular with four robust setae in *R. bonita*), shorter and more robust dactylus in mature males (1.0 times as long as propodus v. 2.0 times as long as propodus in *R. bonita*), shorter and more stout robust setae on the merus, shorter robust setae on the inferior margins of pereopod 7, and the uropodal endopod with an evenly convex lateral margin and smoothly rounded distal margin (v. sinuate lateral margin, apex with distinct apical point), and a narrower uropodal exopod (3.0 times as long as wide v. 2.4 times as long as wide in *R. bonita*).

There are two northern Pacific species, both showing some similarity to *Rocinela resima* sp. nov. *Rocinela hawaiiensis* Richardson, 1903 is known from only two specimens (from Hawai'i and Pacific Mexico) and the adult male has not been described (Brusca & France 1992). The female of *R. resima* differs in having the distalmost robust seta on the propodal palm of pereopods 1–3 small, whereas in *R. hawaiiensis* all three robust setae are of equal length, and the pleotelson posterior margin of *R. resima* has a distinct median point while in *R. hawaiiensis* it is evenly rounded (Brusca & France 1992). The other similar species is *Rocinela cornuta* Richardson, 1898, known from Alaska and Arctic waters (Kussakin 1979; Rafi 1985), a poorly known species for which few descriptive data are available. While the anterior margin of the head is similarly produced in mature males of both species, *R. resima* lacks the anterolateral projections on pereonite 1 and has only

three robust setae on the propodal palm of pereopods 1–3 rather than the four in *R. cornuta*; in addition Richardson (1898) figured the uropods of *R. cornuta* as extending well beyond the posterior margin of the pleotelson, whereas in *R. resima* the uropods reach only to that margin. Kussakin (1979) gave additional figures for the species, which correspond to neither those of Richardson (1898) nor any other species.

PREY: Not known.

DISTRIBUTION: All records from off southeastern South Island in the region of the Chatham Rise and south to Christabel Sea Mount on the northern Macquarie Ridge; at depths of 870–1076 m.

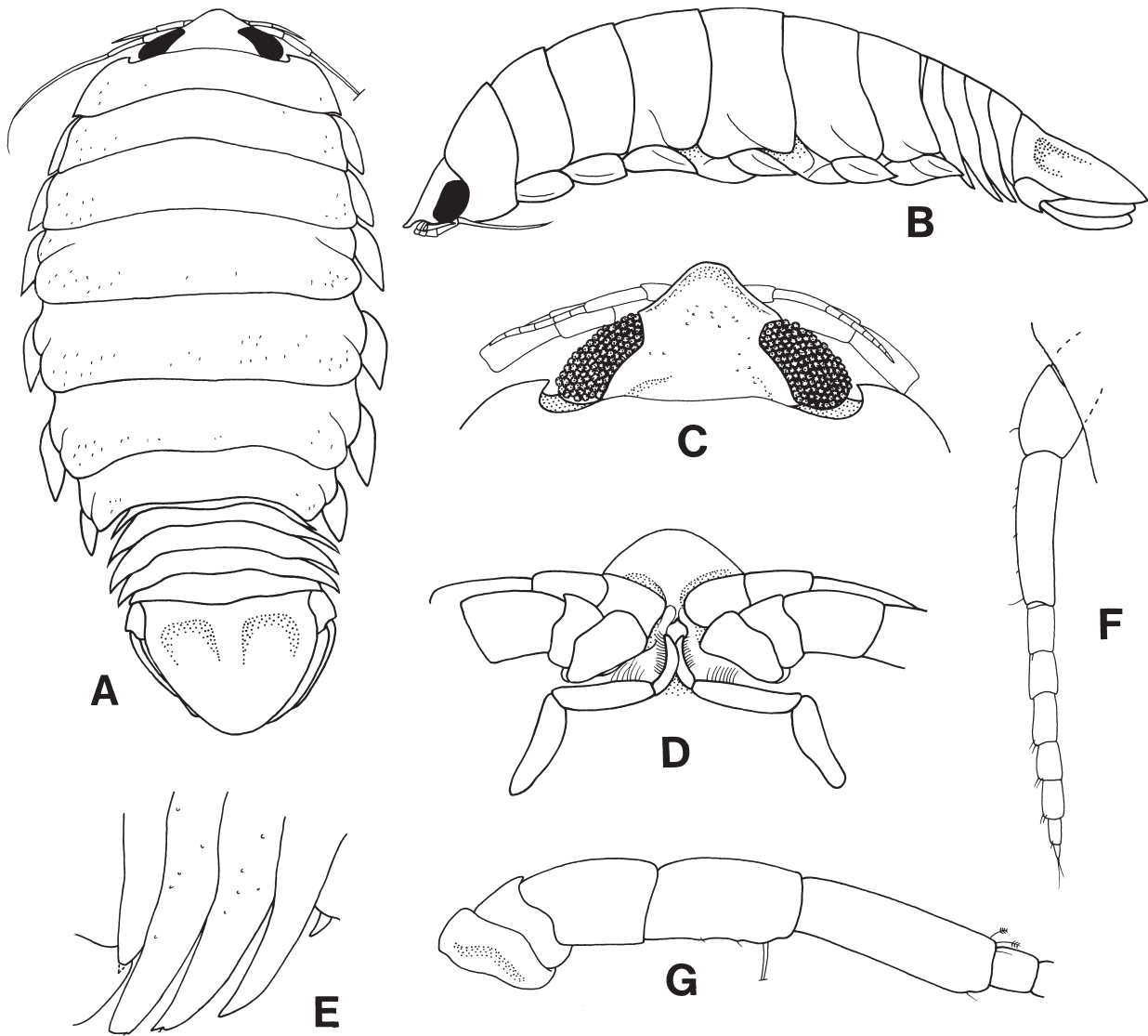
ETYMOLOGY: Adapted from the Latin *resimus* (turned-up nose; *simus* = pug-nosed) and alluding to the prominent, somewhat upturned rostrum in the adult males.

*Rocinela runga* sp. nov. (Figs 123–125)

MATERIAL EXAMINED: *Holotype*, ♀ (35 mm, non-ovig.), 49°38.10–04'S, 178°47.51–26'E, off Antipodes Islands, 23 April 2003, 103–108 m (NIWA 23845).

DESCRIPTION: *Body* 2.0 times as long as greatest width, dorsal surfaces smooth and sparsely punctate, widest at pereonite 5, lateral margins weakly ovate. *Rostrum* simple, anteriorly rounded. *Eyes* not medially united, separated by about 40% width of head; each eye made up of ~12 transverse rows of ommatidia, each row with ~9 ommatidia; eye colour dark brown. *Pereonite 1 and coxae* 2–3 each with posteroventral angle rounded; coxae 5–7 with incomplete oblique carina (weak). *Pleon* with pleonite 1 largely concealed by pereonite 7; pleonite 4 with posterolateral margins extending to, but not beyond, posterior margin of pleonite 5; pleonite 5 with posterolateral angles acute. *Pleotelson* 1.1 times as long as anterior width, anterior dorsal surface with 2 sub-median depressions, dorsal surface with short setae; lateral margins weakly convex, posterior margin narrowly rounded, with 16–18 RS (many missing).

*Antennule* peduncle article 3 0.8 times as long as combined lengths of articles 1 and 2 (in situ), 3.5 times as long as wide; flagellum with 6 articles, extending to anterior of pereonite 1. *Antenna* peduncle article 3 2.8 times as long as article 2, 1.3 times as long as wide; article 4 1.5 times as long as article 3, 1.9 times as long as wide, inferior margin with 0 plumose setae, and 1 simple setae; article 5 1.3 times as long as article 4, 3.2 times as long as wide, inferior margin with 4 setae (minute, widely spaced), anterodistal angle with cluster of 2 short simple setae (and 2 plumose setae); extending to posterior of pereonite 2.



**Figure 123.** *Rocinela runga* sp. nov. Holotype. A, dorsal view; B, lateral view; C, head, dorsal view; D, frons; E, pleonites, oblique lateral view; F, antennule, in situ (dorsal view); G, antenna, in situ (ventral view).

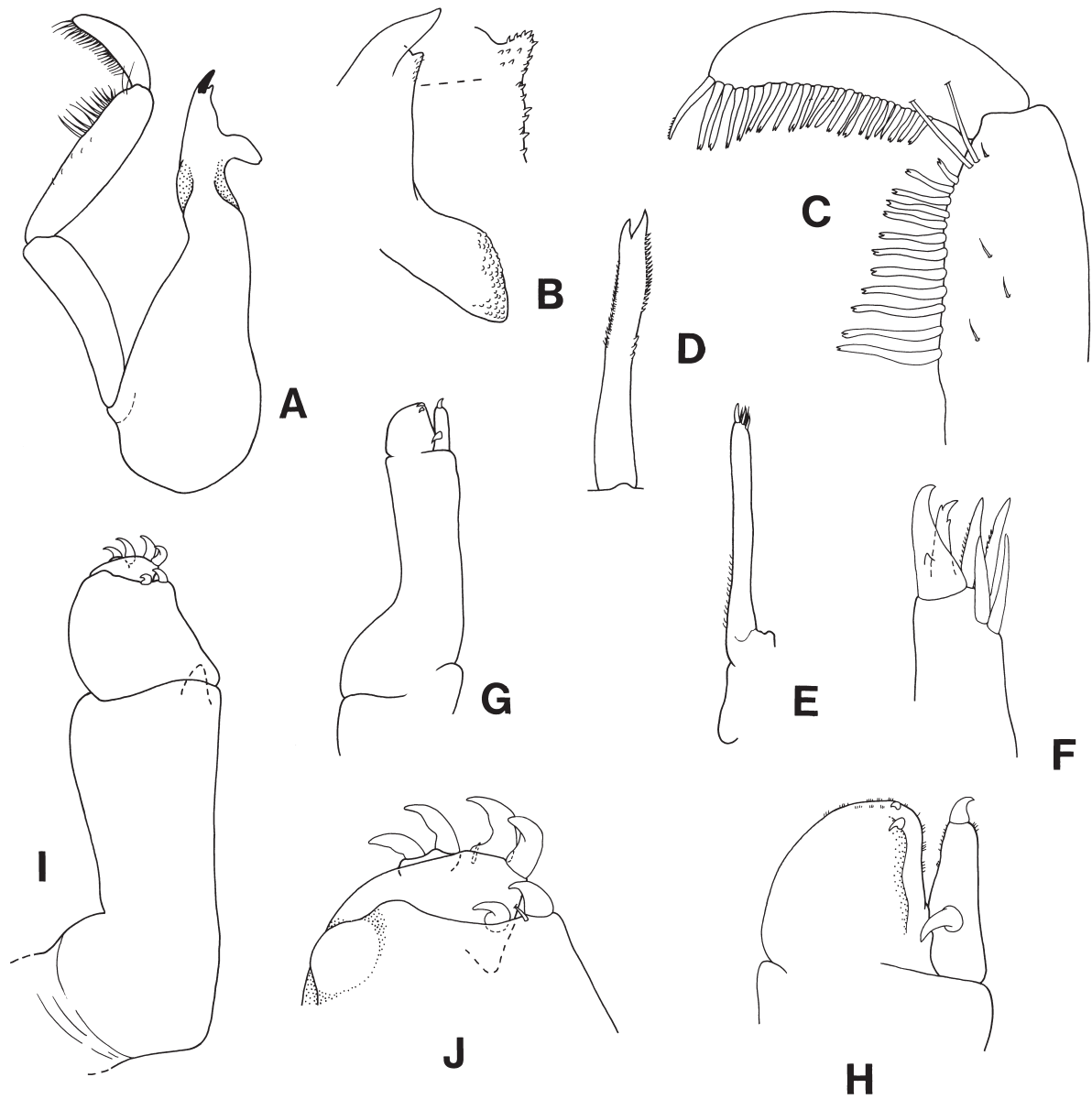
*Frontal lamina* as wide as long, anteriorly acute.

*Mandible* molar process distinct flat lobe; palp article 2 with 12 marginal distolateral setae (all with distinctly bifurcate tips), and 2 long distolateral setae; palp article 3 with 22 setae (all distally bifurcate except distalmost seta). *Maxillule* with 6 RS (1 large, 5 slender, 2 of which serrate). *Maxilla* mesial lobe with 2 hooked RS; lateral lobe with 2 hooked RS. *Maxilliped* palp article 1 distomesial angle with 2 RS (1 short, straight, 1 hooked); article 2 with 2 hooked RS; article 3 with 2 hooked RS (article 3 proximally fused to article 2).

*Pereopod 1* basis 3.2 times as long as greatest width; *ischium* 0.6 times as long as basis, inferior margin with 0 RS, superior distal margin with 7 setae (and 1 acute RS); *merus* inferior margin with 2 RS (minute), set as two

groups, superior distal angle with 6 setae (all simple); *carpus* 0.7 times as long as *merus*, inferior margin with 0 RS; *propodus* 4.4 times as long as proximal width, propodal palm simple, without blade or process, inferior margin with 1 RS (distal; minute); *dactylus* 1.0 times as long as *propodus* (curved distally). *Pereopods 2 and 3* not similar to *pereopod 1* (more robust, with 1+2 RS on inferior margin of *merus*; *propodus* 2.6 times as long as proximal width, with 2 small RS; *dactylus* slightly longer (1.03) than *propodus*, weakly curved). *Pereopod 6* similar to *pereopod 7* (but longer). *Pereopod 7* basis 3.7 times as long as greatest width, inferior margins with 7 palmate setae; *ischium* 0.7 as long as basis, inferior margin with 7 RS (set as 1, 2, 2 and 2), superior distal angle with 4 RS, inferior distal angle with 6 RS; *merus*



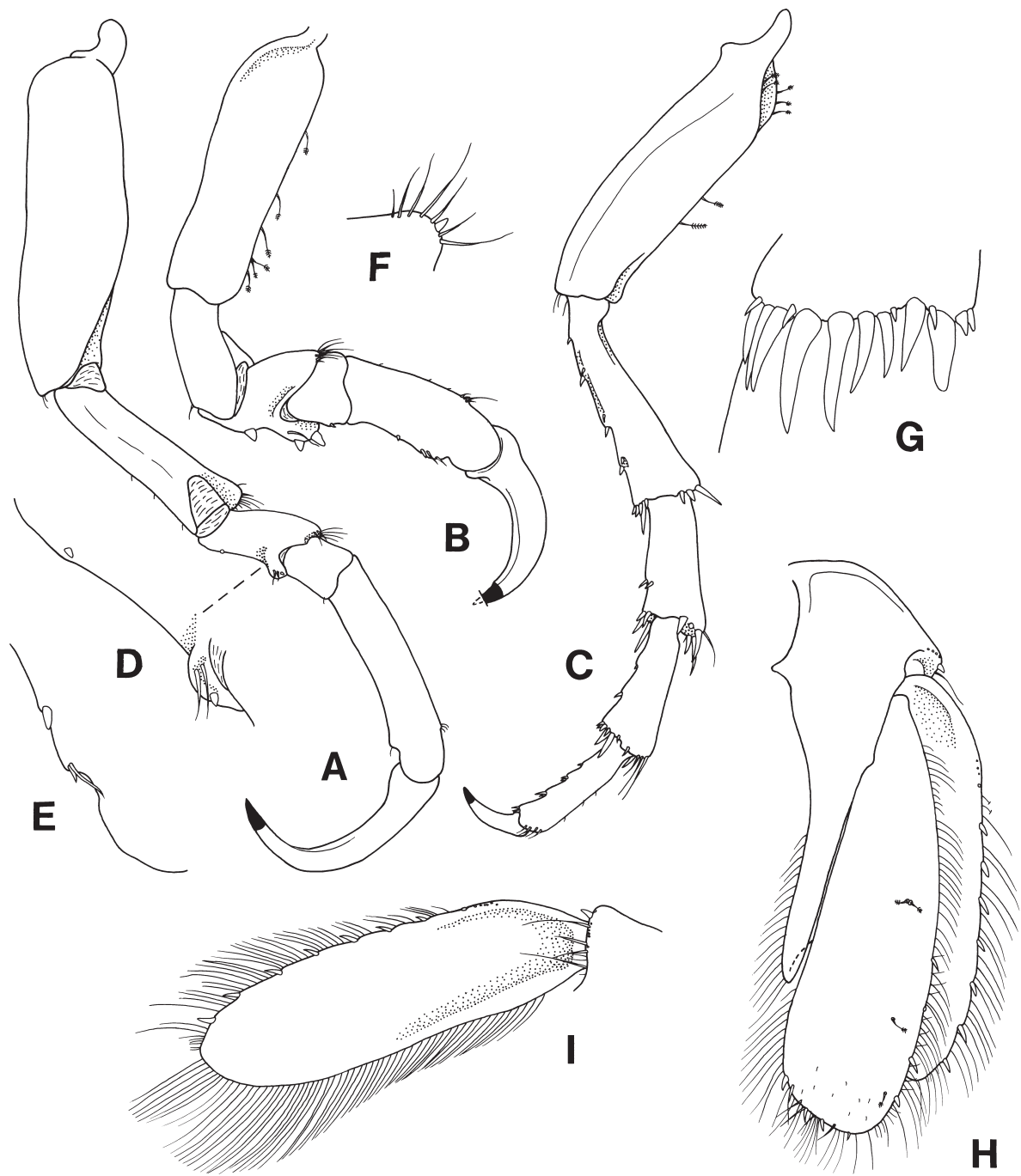


**Figure 124.** *Rocinela runga* sp. nov. Holotype. A, mandible; B, mandible molar and incisor; C, mandible palp article 3; D, robust seta, mandible palp article 2; E, maxillule; F, maxillule apex; G, maxilla; H, maxilla apex; I, maxilliped; J, maxilliped, palp articles 1–3.

0.6 times as long as ischium, 1.9 times as long as wide, inferior margin with 2 RS (paired), superior distal angle with 9 RS, inferior distal angle with 5 RS; carpus 0.6 times as long as ischium, 2.4 times as long as wide, inferior margin with 1 RS (and 1 minute proximal seta), superior distal angle with 9 RS (4 short), inferior distal angle with 8 RS; propodus 0.6 as long as ischium, 3.6 times as long as wide, inferior margin with 5 RS (set as 1, 2 and 2), superior distal angle with 5 slender setae, inferior distal angle with 3 RS.

*Pleopods* swollen and distended, not described; examined *in situ*, appearing similar to those of *Rocinela leptopus* sp. nov.

*Uropod* peduncle ventrolateral margin with 2 RS, posterior lobe about three-quarters as long as endopod. *Exopod* at angle of about 135° to endopod, rami not extending to pleotelson apex, marginal setae in two tiers. *Endopod* lateral margin weakly convex, lateral margin with 4 RS, mesial margin distally rounded, with 4 RS. *Exopod* not extending to end of endopod, 3.4 times as long as greatest width; lateral margin weakly convex, with 8 RS; mesial margin straight, distally convex, with 0 RS; distal margin with indistinct apex.



**Figure 125.** *Rocinela runga* sp. nov. Holotype. A–C, pereopods 1, 2 and 7 respectively; D, pereopod 1, merus, distal inferior margin; E, pereopod 1, propodus, distal inferior margin; F, pereopod 2 ischium, mesial angle; G, pereopod 7, distal margin of carpus, mesial RS; H, uropod; I, uropodal exopod, ventral view.

**VARIATION:** The uropodal endopod mesial margin had 4 and 6 robust setae, lateral margin 4 and 5 robust setae.

**REMARKS:** *Rocinela runga* sp. nov. can be identified by the ovate body shape, relatively small and widely separated eyes, smoothly narrowed rostrum, very long (longer than pereopod 7) and slender pereopod

1, pereopods 1–3 without a propodal blade and by the relatively narrow uropodal rami.

*Rocinela leptopus* sp. nov. is the only other similar species, with a similar pereopodal, pleotelson and uropod morphology. The two species are readily separated by *R. runga* having a more elongate pereopod 1, pereopod 1 dactylus distally curved (proximally curved in *R. leptopus*), more slender pereopods 2 and

3, and uropodal rami that are relatively wider (exopod 3.4 times as long as wide) than in *R. leptopus* (exopod 4.0 times as long as wide) and which fail to exceed the posterior margin of the pleotelson (just exceeding the posterior margin of the pleotelson in *R. leptopus*).

PREY: Not known.

DISTRIBUTION: Known only from off the Antipodes Islands, eastern Campbell Plateau, southeast of New Zealand.

ETYMOLOGY: Runga is a Māori word meaning south (location) alluding to the southern location (noun in apposition).

*Rocinela satagia* sp. nov. (Figs 126–129)

MATERIAL EXAMINED: *Holotype*, ♂ (25 mm) Chatham Rise, 43°49.605'S, 178°29.284'E, 9 October 2001, 454 m, coll. RV *Tangaroa* (NIWA 23856).

*Paratypes*: 2♀ (non-ovig. 21 [dissected], 18.5 mm), same data as holotype (NIWA 23857). ♀ (21 mm, non-ovig.), Chatham Rise, 43.7033°S, 179.9117°E, no date, stn. Q4a, 398 m, medium Agassiz trawl (NIWA 23858). ♂ (20 mm), eastern Chatham Rise, 44°09.60'S, 179°14.20'W, 17 March 1978, 320 m, stn Q20 (NIWA 23859). ♂ (21 mm), off East Otago coast, South Island, 45°45.4'S, 171°05.0'E, 16 August 1955, 584 m, canyon B, M.V. *Alert* (NMNZ Cr.12007). ♂ (18.5 mm), ♀ (ovig 24 mm), manca (7.5 mm), eastern Chatham Rise, 43°44.92'–44°01.60'S, 179°00.34–01.60'W, 8 September 1989, 397–399 m, stn V365, (NIWA 23860). Manca (12.0 mm), eastern Chatham Rise, 44°05.50'S, 179°06.00'W, 1 February 1968, 322 m, stn G0327 (NIWA 23861).

*Other material*: ♀ (19 mm, ovig., poor condition), c. 43 km southeast of Cape Campbell, 41°55.9'S, 141°43.2'E, 14 January 1979, 454–424 m, stn BS668 (= NZOI stn R26), RV *Tangaroa* (NIWA 23880). ♀ (18 mm, ovig.), 43.5328–53.48°S, 179.6280–62.57°E, 6 June 2006, 375–381 m (NIWA 25669). ♀ (13.0 mm, non-ovig), Pegasus Canyon, Pegasus Bay, 43°14'S, 173°39'E, 29 September 1976, BS559, 1006–512 m, coral, coll. RV *Acheron* (NMNZ Cr.12008). Manca? (8.5 mm, poor condition), Pegasus Canyon, Pegasus Bay, 43°30.0'S, 173°31.3'E, 27 September 1976, BS558, 446 m, mud, coll. RV *Acheron* (NMNZ Cr.12009).

DESCRIPTION: *Body* 2.0 times as long as greatest width, dorsal surfaces smooth, widest at pereonite 5, lateral margins weakly ovate. *Rostrum* basally expanded, tri-cornered. *Eyes* not medially united, separated by about 27% width of head; each eye made up of ~10 transverse rows of ommatidia, each row with ~8 ommatidia; eye colour dark brown. *Coxae* 2–3 each with posteroventral angle right-angled (coxae 3 rounded); 5–7 without

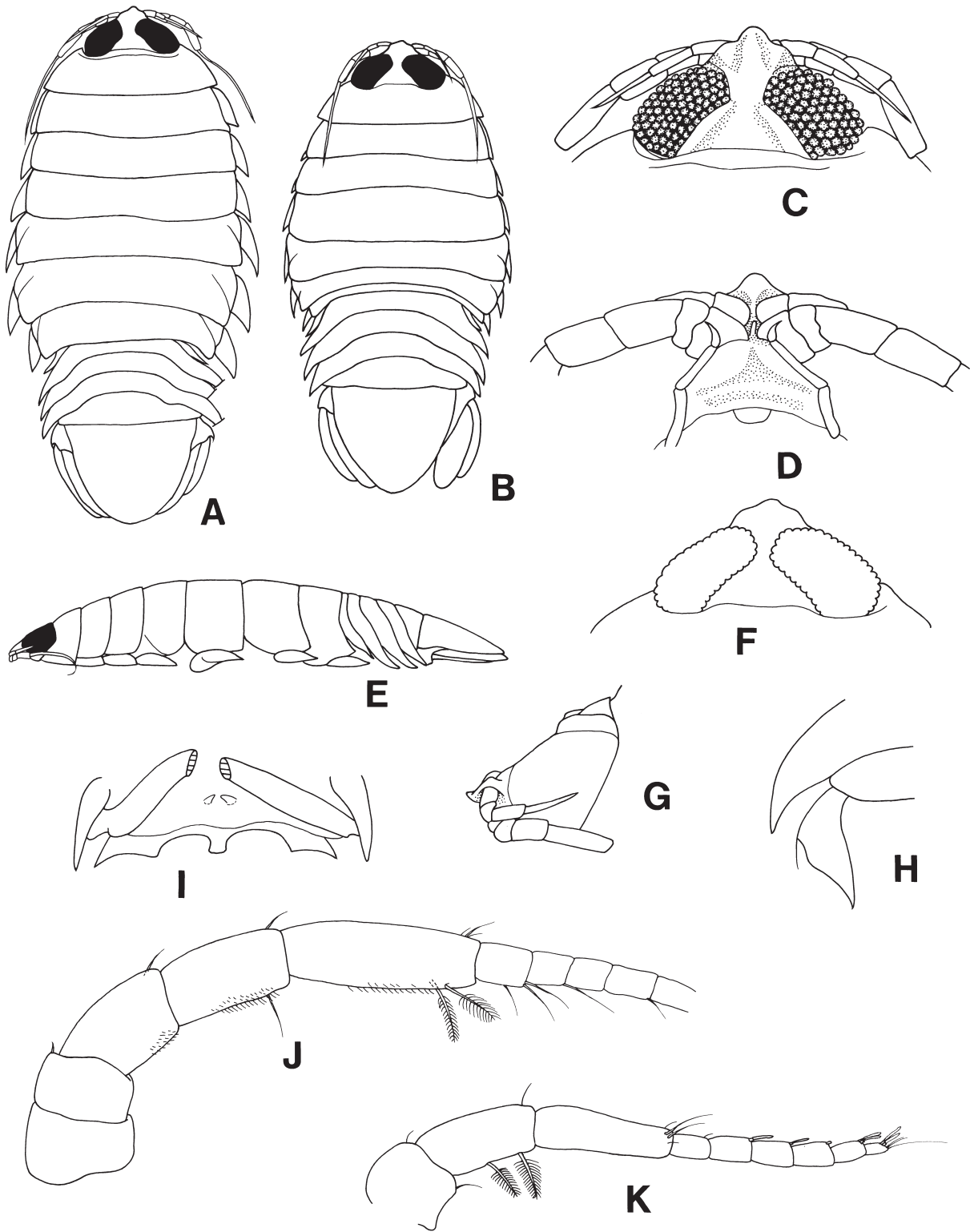
oblique carina. *Pleon* with pleonite 1 largely concealed by pereonite 7; pleonite 4 with posterolateral margins extending clearly beyond posterior margin of pleonite 5; pleonite 5 with posterolateral angles rounded. *Pleotelson* 0.8 times as long as anterior width, anterior dorsal surface without 2 sub-median depressions, dorsal surface smooth; lateral margins convex, posterior margin narrowly rounded, with 8–10 RS.

*Antennule* peduncle article 3 0.8 times as long as combined lengths of articles 1 and 2, 3.4 times as long as wide; flagellum with 6 articles, extending to anterior of pereonite 1. *Antenna* peduncle article 3 1.3 times as long as article 2, 1.2 times as long as wide; article 4 1.5 times as long as article 3, 1.8 times as long as wide, inferior margin with 0 plumose setae, and 1 simple setae; article 5 1.5 times as long as article 4, 2.9 times as long as wide, inferior margin with 2 setae (palmate), anterodistal angle with cluster of 3 short simple setae; flagellum with 14 articles, extending to middle of pereonite 2.

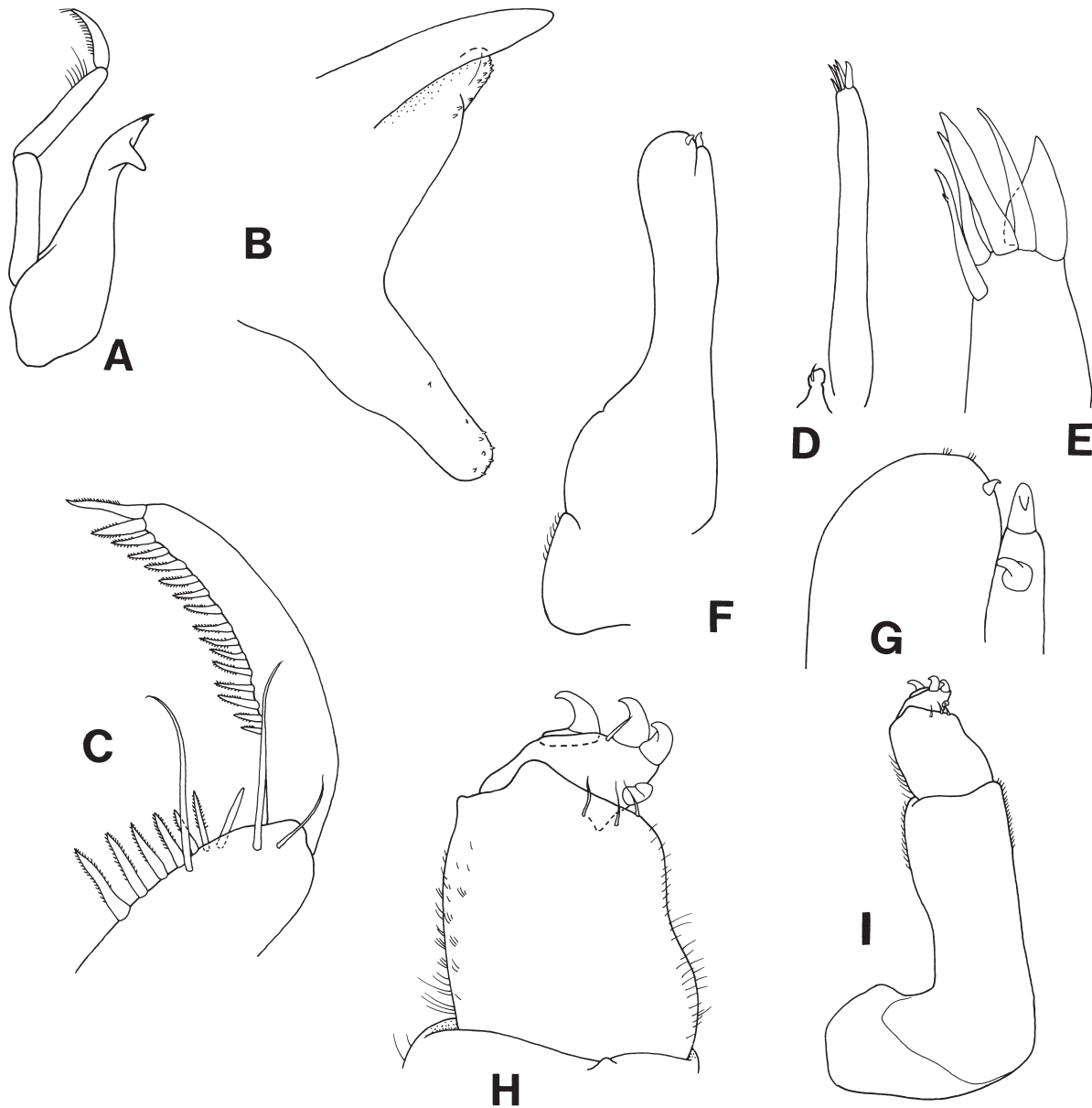
*Frontal lamina* longer than greatest width, anteriorly rounded.

*Mandible* molar process distinct flat lobe; palp article 2 with 7 marginal distolateral setae (finely biserrate), and 3 long distolateral setae; palp article 3 with 16 setae (terminal 2 longest). *Maxillule* with 5 RS (1 large, 4 slender). *Maxilla* mesial lobe with 2 hooked RS; lateral lobe with 1 hooked RS. *Maxilliped* palp article 1 distomesial angle with 3 RS (slender, straight); article 2 with 3 hooked RS; article 3 with 1 hooked RS.

*Pereopod 1 basis* 2.8 times as long as greatest width; *ischium* 0.5 times as long as basis, inferior margin with 0 RS, superior distal margin with 2 setae (and 1 RS); *merus* inferior margin with 3 RS (set as 1 + 2), set as two groups, superior distal angle with 4 setae (including 1 RS); *carpus* 0.6 times as long as merus, inferior margin with 1 RS; *propodus* 1.7 times as long as proximal width, propodal palm with blade, propodal blade 0.7 times as wide as palm, with numerous setae, inferior margin with 5 RS; *dactylus* 1.3 times as long as propodus. *Pereopods 2 and 3* similar to pereopod 1. *Pereopod 6* similar to pereopod 7. *Pereopod 7 basis* 3.9 times as long as greatest width, inferior margins with 2 palmate setae (most rubbed away); *ischium* 0.8 as long as basis, inferior margin with 6 RS (set as 1, 1, 1, 2, 1), superior distal angle with 6 RS, inferior distal angle with 5 RS; *merus* 0.5 times as long as *ischium*, 2.0 as long as wide, inferior margin with 2 RS (set singly), superior distal angle with 7 RS, inferior distal angle with 5 RS; *carpus* 0.5 times as long as *ischium*, 2.4 times as long as wide, inferior margin with 2 RS (set singly), superior distal angle with 11 RS, inferior distal angle with 7 RS; *propodus* 0.4 as long as *ischium*, 3.5 times as long as wide, inferior margin with 2 RS (set singly), superior distal angle with 3 slender setae (1 palmate), inferior distal angle with 3 RS.



**Figure 126.** *Rocinela satagia* sp. nov. A, C, D, H-I, holotype, remainder paratype 18.5 mm. A, dorsal view; B, dorsal view, paratype; C, head, dorsal view; D, frons; E, lateral view; F, pleonites 4 and 5, lateral margins; G, head, lateral view; I, sternite 7 showing penial papillae; J antenna peduncle; K, antennule.



**Figure 127.** *Rocinela satagia* sp. nov. Paratype 18.5 mm. A, mandible; B, mandible molar and incisor; C, mandible palp article 3; D, maxillule; E, maxillule apex; F, maxilla; G, maxilla apex; H, maxilliped palp articles 1-3; I, maxilliped scales.

*Penes* low tubercles; penial openings separated by 5% of sternal width.

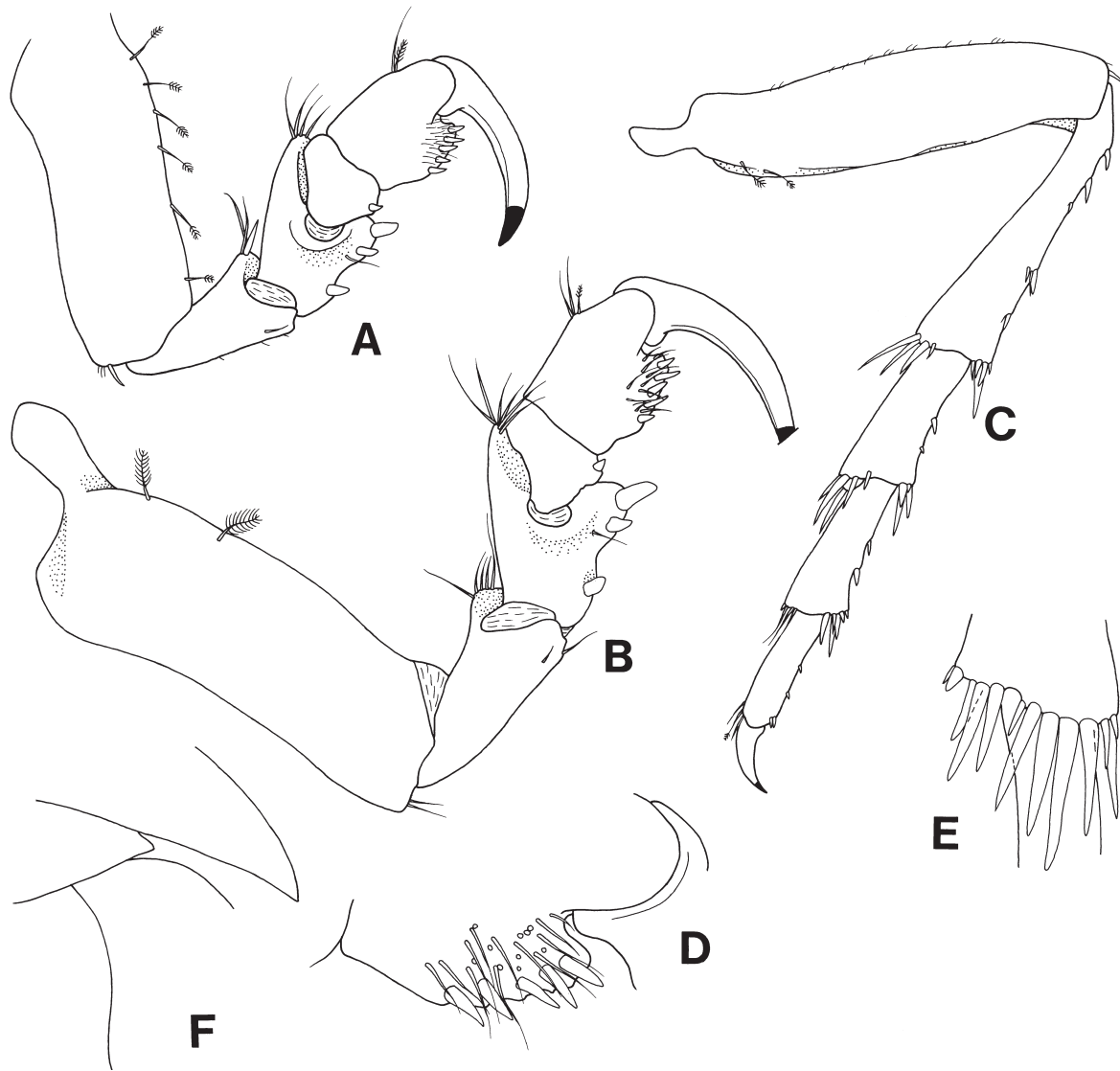
*Pleopod 1* exopod 2.4 times as long as wide, lateral margin weakly convex, mesial margin weakly convex, with PMS on distal two-thirds; endopod 2.9 times as long as wide, lateral margin straight; peduncle mesial margin with 6 coupling hooks. *Pleopod 2 appendix masculina* with sinuate margins, 0.8 times as long as endopod, distally acute. *Pleopods 2-5* peduncle distolateral margin without acute RS.

*Uropod* peduncle posterior lobe about one-half as long as endopod. *Exopod* at angle of about 135° to endopod, rami extending to pleotelson apex, marginal setae in two tiers. *Endopod* lateral margin weakly con-

vex, with 1-3 RS, mesial margin straight or distally rounded, with 3 RS. *Exopod* not extending to end of endopod, 2.6 times as long as greatest width; lateral margin weakly convex, with 9 RS; mesial margin convex, with 0 RS; distal margin rounded.

**SIZE:** Males 19-25.0 mm; ovigerous females 19-24 mm, non-ovigerous females 13-21 mm; manca 7.5-12 mm.

**VARIATION:** Pleotelson frequently damaged or rubbed ( $n=8$ ): RS 9-10, with 10 most frequent at 50%. *Uropod* exopod lateral margin ( $n=23$ ) with 8 (8%), 9 (70%) or 10 (22%) RS; mesial margin ( $n=24$ ) without RS with



**Figure 128.** *Rocinela satagia* sp. nov. A, B, and D holotype, remainder paratype 18.5 mm. A–C, pereopods 1, 2, and 7, respectively; D, pereopod 1, propodal blade; E, pereopod 7, distal margin of carpus, mesial RS; F, pleonites 4 and 5, lateral margins.

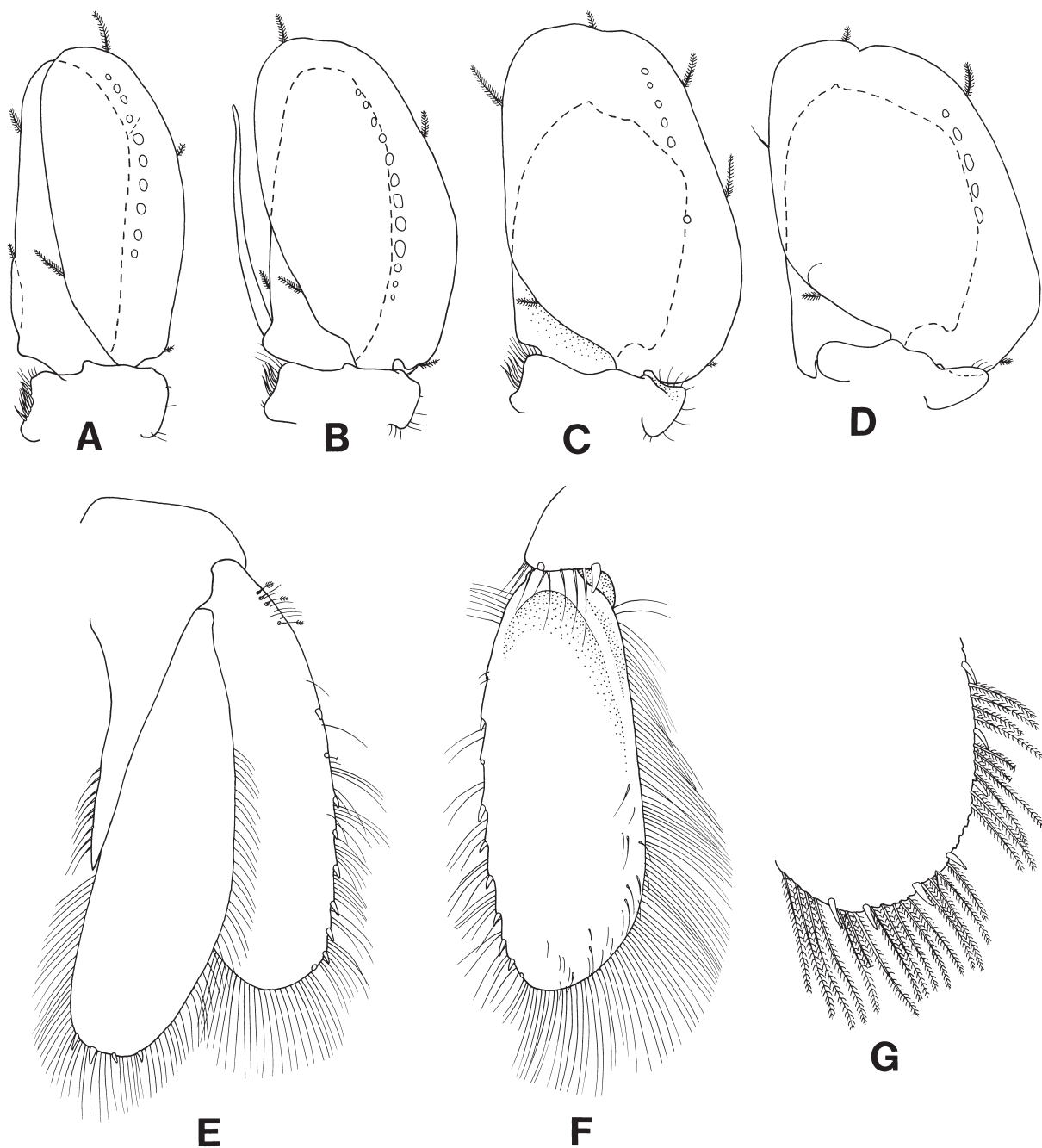
one instance of 1 RS. Uropod endopod mesial margin ( $n = 23$ ) varied from 1–4 RS with 3 (57%) and 4 (35%) most frequent, 1 and 2 each occurring once; lateral margin ( $n = 24$ ) with 3 (92%) RS most frequent, 4 occurring twice.

The setation of the palms of pereopods 1–3 is highly consistent with 5 RS being the most frequent; pereopod 1 palm ( $n = 23$ ) with 5 (70%) or 6 (30%), pereopod 2 palm ( $n = 24$ ) with 5 (75%) or 6 (25%) and pereopod 3 ( $n = 22$ ) palm 5 (86%) or 6 (9%), 4 occurring once. The robust setae on the inferior margin of the merus was consistently 1+2. There is considerable variation in the presence of setae on the face of the propodal blade, some specimens having only one seta (as is common to nearly all species of the genus) other with a mass of

setae; the differences do not seem to be connected with the sex or size of the specimens.

There is no discernable difference in number of robust setae between males and females, nor in relation to size—the smallest measured here (a manca) had similar counts to adults for robust setae. The characteristic ornamentation of the dorsal surface of the head is most developed in larger specimens, both males and females.

**REMARKS:** *Rocinela satagia* sp. nov. can be identified by the following combination of characters: rostrum broad, strongly produced, eyes narrowly separated, adult specimens with prominent ridge along the posterior mesial margin of each eye, pereopods 1–3 with



**Figure 129.** *Rocinela satagia* sp. nov. A, B, E and F holotype, remainder paratype 18.5 mm. A–D, pleopods 1–3, 5 respectively; E, uropod; F, uropod exopod, ventral view; G, uropod exopod distal margin.

5 or 6 robust setae on propodal blade and, in adult specimens, propodal blade with numerous setae.

The most similar species is *Rocinela garricki*, which also has numerous setae on the propodal blade of pereopods 1–3. That species being readily distinguished from *R. satagia* by the far more widely separated eyes, a greater number of robust setae on the blade of pereopods 1–3 (8 v. 5 in *R. satagia*), and having propor-

tionally wider uropodal rami, the exopod of which in *R. garricki* has a distinct distal point.

**DISTRIBUTION:** Primarily off the eastern coast of South Island from the Cook Strait to off the Otago coast, and eastwards on the Chatham Rise; 330 to 584 metres.

**ETYMOLOGY:** Adapted from the Latin *satagi* (anxious, worried) alluding the ‘worry lines’ between the eyes.

### *Rocinela* sp.

MATERIAL EXAMINED: ♂ (~28 mm), vicinity of Bounty Islands, 47°30'S, 178°45'E, 21 March 1973, 39 m, stn I705 (NIWA 23846).

REMARKS: This specimen is similar to *Rocinela leptopus* sp. nov., but differs in having a short rostrum with an upturned anterior margin, pereopods 1–3 with three prominent robust setae on the palm, each seta set on a small lobe giving the inferior margin an irregular appearance. The single specimen lacks evident penial openings, but pleopod 2 has a short appendix masculina. The specimen is intact, and an undescribed species, but the pleon, pleotelson, posterior pereopods and uropods are all badly crushed, so the specimen is unsuitable for description.

### *Rocinela* sp.

MATERIAL EXAMINED: ♀ (15 mm, non-ovig.), Thompson Sound, Fiordland, South Island, 45°13.00'S, 166°57.96'E, 28 May 1997, 350 m, gravel, sand, coral and mud, coll. RV *Munida* (NMNZ Cr.12011).

REMARKS: The single specimen is most similar to *Rocinela satagia* sp. nov., but differs notably in having eyes that meet medially and the posterior margin of the pleotelson being narrowed. The setation of the uropods is similar to that of *R. satagia* but the propodal blade of pereopods 1–3 all have only four acute robust setae.

### Genus *Syscenus* Harger, 1880

*Syscenus* Harger, 1880: 387.– Sars, 1897: 66.– Richardson, 1905a: 212.– Stebbing, 1924: 9.– Wahrberg, 1930: 24.– Nierstrasz & Schuurmans Steckhoven jr., 1930: 77.– Schultz, 1969: 196.– Menzies & George, 1972: 12.– Kussakin, 1979: 269.– Bruce, 1997: 113.– Bruce, Lew Ton & Poore, 2002: 163.

*Harponyx* Sars, 1882: 60 (type species *Harponyx pranizoides* Sars, 1882).

*Rocinela*.– Bovallius, 1885 (not *Rocinela* Leach, 1818).

*Syscenus*.– Stephenson, 1948: 41.

TYPE SPECIES: *Syscenus infelix* Harger, 1880; by monotypy.

DIAGNOSIS: Body dorsally vaulted. Head laterally free of pereonite 1; rostral point weak; eyes absent or present. Pleonite 1 abruptly narrower than pereonite 7. Frontal lamina present, slender, elongate. Maxilliped palp 2- or 3-articled. Uropodal peduncle mesial margin not produced; rami lamellar. Coxae 5–7 shorter than respective pereonite.

DESCRIPTION: Body elongate, 3 to 4 times as long as wide. Head anterior margin with small median (ros-

tral) point. Eyes usually absent (present in two species). Coxae of pereonites 4–7 shorter than respective segment, not posteriorly produced. Pleon abruptly narrower than pereon, approx. 30% to 60% maximum body width; pleonites all visible, all with free lateral margins; pleonites 3–5 posteriorly produced. Pleotelson large, as long as or longer than pleon, usually with blunt or narrow caudomedial point (never acute or truncate). Pleonal sternite present anterior to pleopod 1 peduncles.

Antennule short, not exceeding antenna peduncle in length. Antenna peduncle articles 4 and 5 (or, either 4 or 5) and proximal flagellum provided with long setae (most species).

Frontal lamina usually present; labrum present. Mandible with unicuspid incisor; molar process and spine row absent. Maxillule with terminal RS. Maxilliped 3- or 4-articled, article 3 with 2–3 recurved RS, article 4 with 1 recurved RS; endite absent.

Pleopod 3 endopod usually without PMS, pleopods 4 and 5 endopods without PMS; endopod 3–5 usually not distinctly smaller than exopods; coupling setae present on peduncles of pleopods 1–5; pleopod 5 without proximomesial lobe. Pleopods not extending beyond lateral margins of pleon. Uropods flat, both rami lamellar, endopod longer than exopod.

REMARKS: *Syscenus* is best recognised by the coxae of pereonites 5–7 being shorter than the respective pereonite, pleon evidently narrower than the pereon, pleonite 5 with free (not overlapped) lateral margins, and lack of a dorsal rostrum. Most species lack any trace of eyes, but two species, *Syscenus karu* Bruce, 2005 from Vanuatu and *Syscenus peruanus* Menzies and George, 1972 from off Peru, do have eyes.

*Syscenus* is a small genus known from all oceans except the Southern Ocean. There are six named species (following *S. pacificus* Nunomura, 1981 being here placed in synonymy), with a further two unnamed species from New Zealand recorded here. Most species are superficially similar in appearance. It is known that at least one species, *Syscenus infelix* Harger, 1880, is a fish predator and possibly more host-dependent (Ross *et al.* 2001) than noted for *Aega* or *Rocinela*.

Most species of the genus are known from only a few locations. The exception is *Syscenus infelix*, which has been recorded from the North Atlantic, Mediterranean, northern and southwestern Pacific, and South Africa (Kensley 2004; Kensley & Cartes 2003). Kensley & Cartes (2003) considered that many of the records for *S. infelix* were 'open to doubt', and Kensley (2004) more specifically rejected Pacific records of *S. infelix* as misidentifications, an opinion with which I agree. However given that some isopod mesopelagic species are known to have an enormous range (e.g. Svavarsson & Bruce 2000), and that several species of the related



genus *Aega* (e.g. *A. falklandica*, *A. monophthalma*, *A. komai* and *A. urotoma* and others; all this study) also have extensive ranges, the possibility that some of those records are correct cannot be excluded.

As most species are known from single or a few specimens, the range and pattern of character variation is not known. Despite the large amount of material recorded by Kensley and Cartes (2003) for *Syscenus infelix* and *Syscenus atlanticus* Kononenko, 1988, no assessment was made of character variation in those two species, although variation in pleotelson and uropod shape was illustrated by Kensley and Cartes (2003). Most of the remaining species of the genus are in need of further revision.

The genus is likely to be found in all tropical and temperate oceans, and has been recorded from depths as shallow as 70 metres in the North Atlantic (Kensley 2004) to 4609 metres off northern Peru (Menzies & George 1972); most records are between approximately 500 and 2000 metres.

#### KEY TO THE NEW ZEALAND SPECIES OF *SYSCENUS*

1. Pereopods with blunt RS and numerous slender setae; pleotelson with caudomedial point.....  
.....*S. springthorpei* (p. 208)
- Pereopods without numerous slender setae, without prominent blunt RS; pleotelson posteriorly rounded or subtruncate .....2
2. Body wide, ovate; pleonite 5 with dorsal median spine (female) or point (male); rostrum weak, blunt..... *S. latus* (p. 202)
- Body elongate, margins subparallel; pleonite 5 without point or spine; rostrum narrow, projecting anteriorly, then ventrally .....3
3. Antennal flagellum extending to pereonite 3; uropodal rami without RS.....  
.....*Syscenus kapoo* (p. 199)
- Antennal flagellum extending to pereonite 6; uropodal rami with RS.....  
.....*Syscenus moana* (p. 206)

*Syscenus kapoo* sp. nov. (Figs 130, 131)

MATERIAL EXAMINED: *Holotype*: ♀ (non-ovig. 21 mm), Norfolk Ridge, 26°25.94'S, 167°10.87'E, 18 May 2003, 750–774 m, NORFANZ (NIWA 23780).

DESCRIPTION: *Body* 2.8 times as long as greatest width, dorsal surfaces smooth, widest at pereonite 5, lateral margins subparallel. *Eyes* absent. *Rostrum* simple or anteriorly narrow. *Coxae* 2–3 each with posteroventral angle with small distinct produced point; 5–7 without oblique carina. *Pleon* with pleonite 1 largely concealed by pereonite 7; pleonite 4 with posterolateral margins

not extending to posterior margin of pleonite 5; pleonite 5 with posterolateral angles rounded. *Pleotelson* 1.0 as long as anterior width, anterior dorsal surface with 2 sub-median depressions (weak), dorsal surface smooth; lateral margins convex, posterior margin narrowly rounded, with 0 RS.

*Antennule* peduncle as for the genus; flagellum with 13 articles, extending to middle of pereonite 1. *Antenna* peduncle as for the genus; flagellum with 35 articles, extending to middle of pereonite 3.

*Frontal lamina* longer than greatest width, anteriorly acute.

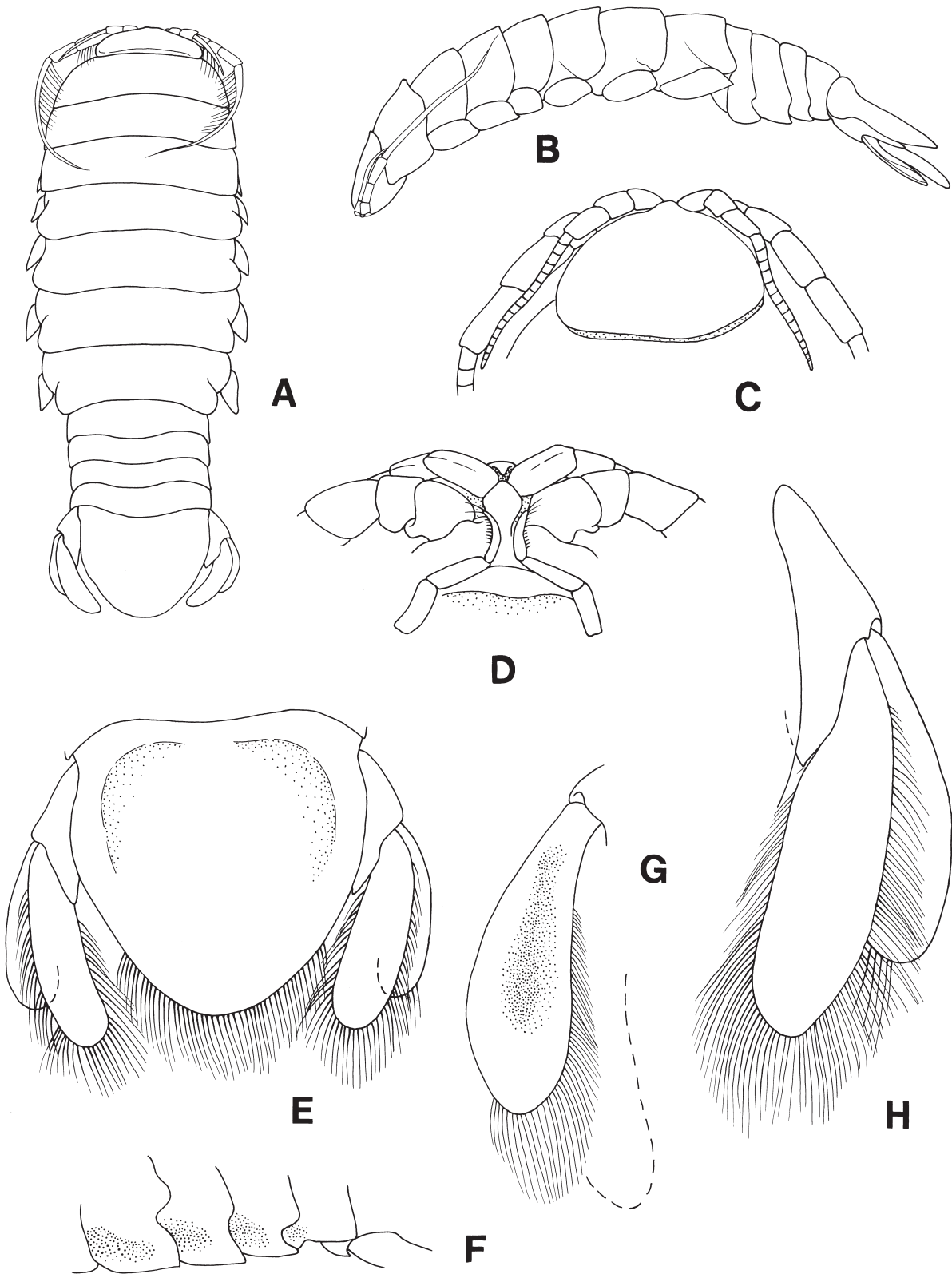
*Mouthparts* as for the genus.

*Pereopod 1* basis 2.4 times as long as greatest width; *ischium* 0.6 times as long as basis, inferior margin with 0 RS, superior distal margin with 0 setae (4 simple and 2 plumose setae); *merus* inferior margin with 0 RS, superior distal angle with 12 setae; *carpus* 1.3 times as long as *merus*, inferior margin with 0 RS; *propodus* 1.7 times as long as proximal width, propodal palm simple, without blade or process, without setae, inferior margin with 0 RS; *dactylus* 1.4 times as long as *propodus*. *Pereopods 2 and 3* similar to pereopod 1. *Pereopod 6* similar to pereopod 7. *Pereopod 7* basis 3.5 times as long as greatest width, inferior margins with 5 palmate setae; *ischium* 0.9 as long as basis, inferior margin with 0 RS, superior distal angle with 6 RS (and 1 seta), inferior distal angle with 4 RS; *merus* 0.6 times as long as *ischium*, 2.3 times as long as wide, inferior margin with 5 RS (set as 2, 1, 1 and 1), superior distal angle with 22 RS (in two ranks of 6 major and ~16 slender), inferior distal angle with 6 RS; *carpus* 1.0 as long as *ischium*, 6.4 times as long as wide, inferior margin with 8 RS (set as 2, 1, 3, 1 and 1), superior distal angle with 25 RS (in two ranks of 7 major and ~18 slender and robust setae), inferior distal angle with 6 RS; *propodus* 0.9 as long as *ischium*, 7.3 times as long as wide, inferior margin with 0 RS (2 minute submarginal), superior distal angle with 0 slender setae, inferior distal angle with 2 RS. *Pereopods* distal margins of *ischium* to *carpus* without setae; without strong carina on basis.

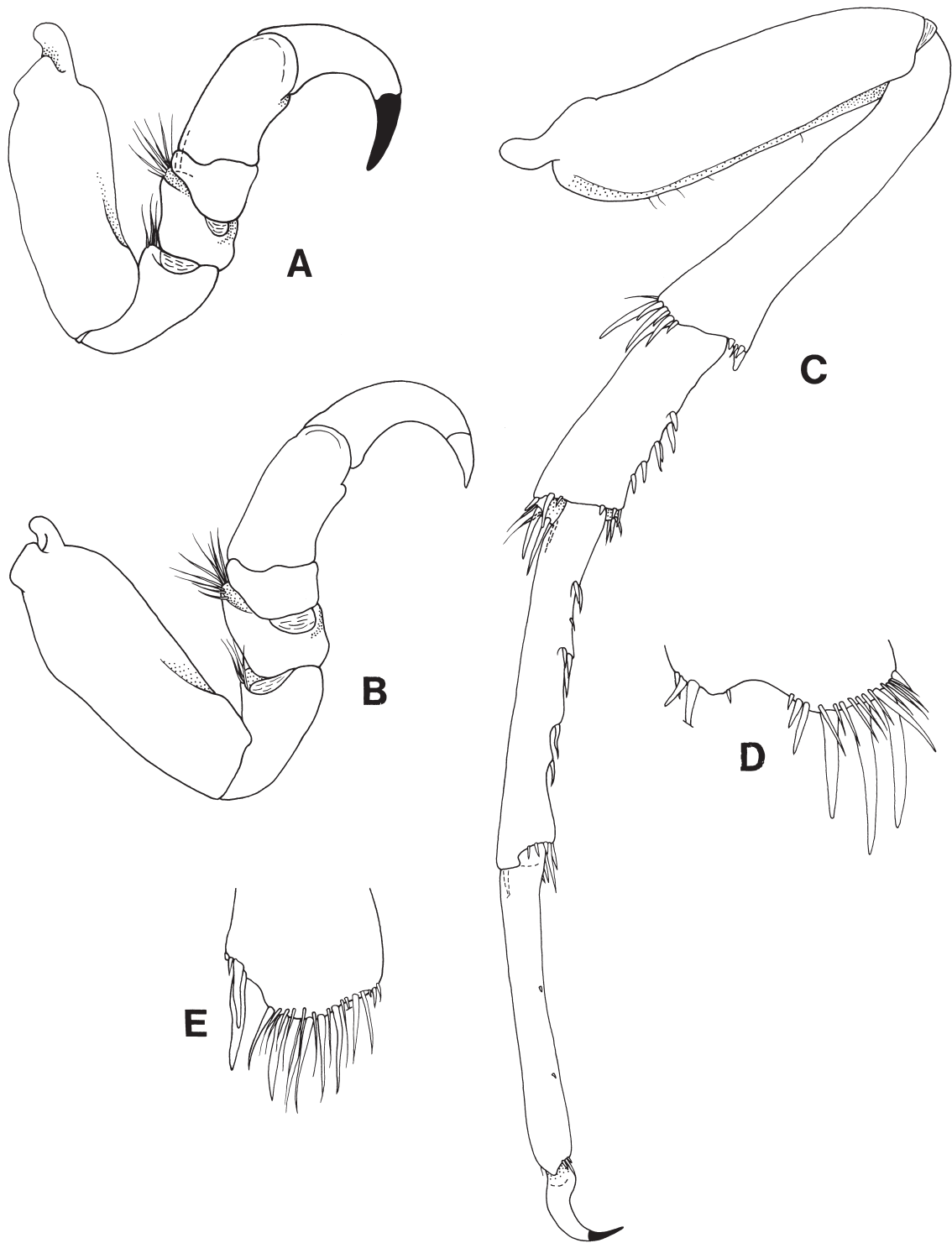
*Pleopods 1* as for the genus.

*Uropod* peduncle ventrolateral margin with 0 RS, posterior lobe about one-third as long as endopod. *Uropod* rami with endopod and exopod co-planar, rami extending beyond pleotelson, marginal setae in single tier. *Endopod* lateral margin weakly convex, lateral margin with 0 RS, mesial margin straight, with 0 RS. *Exopod* not extending to end of endopod, 2.8 times as long as greatest width; lateral margin convex, with 0 RS; mesial margin sinuate, proximally concave, distally convex, with 0 RS; distal margin rounded.

REMARKS: The single specimen, though adult, is of uncertain maturity, and could not be identified as any of



**Figure 130.** *Syscenus kapoo* sp. nov. Holotype. A, dorsal view; B, lateral view; C, head, dorsal view; D, frons; E, pleotelson and uropods; F, pleonites, lateral view; G, uropod exopod, ventral view; H, uropod.



**Figure 131.** *Sycsenus kapoo* sp. nov. Holotype. A–C, pereopods 1, 2 and 7 respectively; D, mesial margin of merus; E, mesial margin of carpus.

the five other species known from the southwestern Pacific. *Sycsenus kapoo* sp. nov. can be identified by the shape of the head which has convex lateral margins and a relatively weak rostrum, the acute coxae, evenly

rounded pleotelson posterior margin, antennal flagellum extending to pereonite 3, elongate pereopods 5–7 with pereopod 7 extending posteriorly beyond the posterior margin of the pleotelson, and the uropods

which extend beyond the pleotelson, the exopod of which is shorter than the endopod and is proximally narrow.

Comparison with the holotype of *S. intermedius* (see Appendix 2) shows that, in *S. intermedius*, the frontal lamina is narrower, the posterior legs are more robust, the uropod rami are roughly subequal in length, the coxae are posteriorly rounded and the pleotelson lateral margin has a distinct inflexion. *Syscenus kapoo* is also similar to the potentially sympatric *S. moana*, from which it differs in having a far shorter antennal flagellum (to pereonite 3 v. pereonite 6 in *S. moana*), the robust setae on the merus and carpus of pereopod 7 are larger, and the uropods differ in lacking robust setae, the endopod being more slender, and the exopod is shorter than that of *S. moana*, and different in shape being wider distally as well as narrower proximally.

PREY: Not known.

ETYMOLOGY: The epithet is a Māori word meaning blind or without sight.

DISTRIBUTION: Known only from the type locality, on the Norfolk Ridge.

*Syscenus latus* Richardson, 1909 (Figs 132–134)

*Syscenus latus* Richardson, 1909: 85, fig. 11.– Bruce, 1997: 114.– Saito, Itani & Nunomura, 2000: 61.

*Syscenus pacificus* Nunomura, 1981: 15, fig 1.– Bruce, 1997: 114.– Saito, Itani & Nunomura, 2000: 61 (**new synonymy**).

MATERIAL EXAMINED: *Lectotype* (**here designated**): ♀ (ovig. 42 mm), at Tsurikake Saki Light, off Koshika Islands, Sea of Japan, Japan, 31°39.5'N, 129°24.0'E, 11 August 1906, 742 metres (USNM 39502). *Paralectotype*: ♂? (19 mm), at Tsurikake Saki Light, off Koshika Islands, Sea of Japan, Japan, 31°39.0'N, 129°20.5'E, 11 August 1906, 742 metres (USNM 39906 – former syntype).

*New Zealand specimen*: ♀ (non-ovig. 38 mm), Challenger Plateau, 40°19.65'S, 170°13.80'E, 9 March 1981, 805–822 m, RV *James Cook* (NMNZ Cr.12012).

*Additional material*: **New Caledonia**, HALIPRO 2, coll. B. Richer de Forges: 1 (27 mm, non-ovig, sex uncertain), 23°59'S, 161°55'E, 25 November 1996, stn. BT96, 1034–1056 m (MNHN Is.5881); 1 (21 mm, non-ovig, sex uncertain), 24°00'S, 161°49'E, 25 November 1996, stn. BT97, 964–1031 m (MNHN Is.5882). **Indonesia**, KARUBAR: ♀ (33 mm, non-ovig.), region of Kei and Tanimbar Islands, Banda Sea, 05°14'S, 133°00'E, 25 October 1991, stn. CP21 688–694, coll. *Baruna Jaya* (MNHN Is.5883).

DESCRIPTION (based on lectotype and New Zealand female): *Body* 2.1 times as long as greatest width,

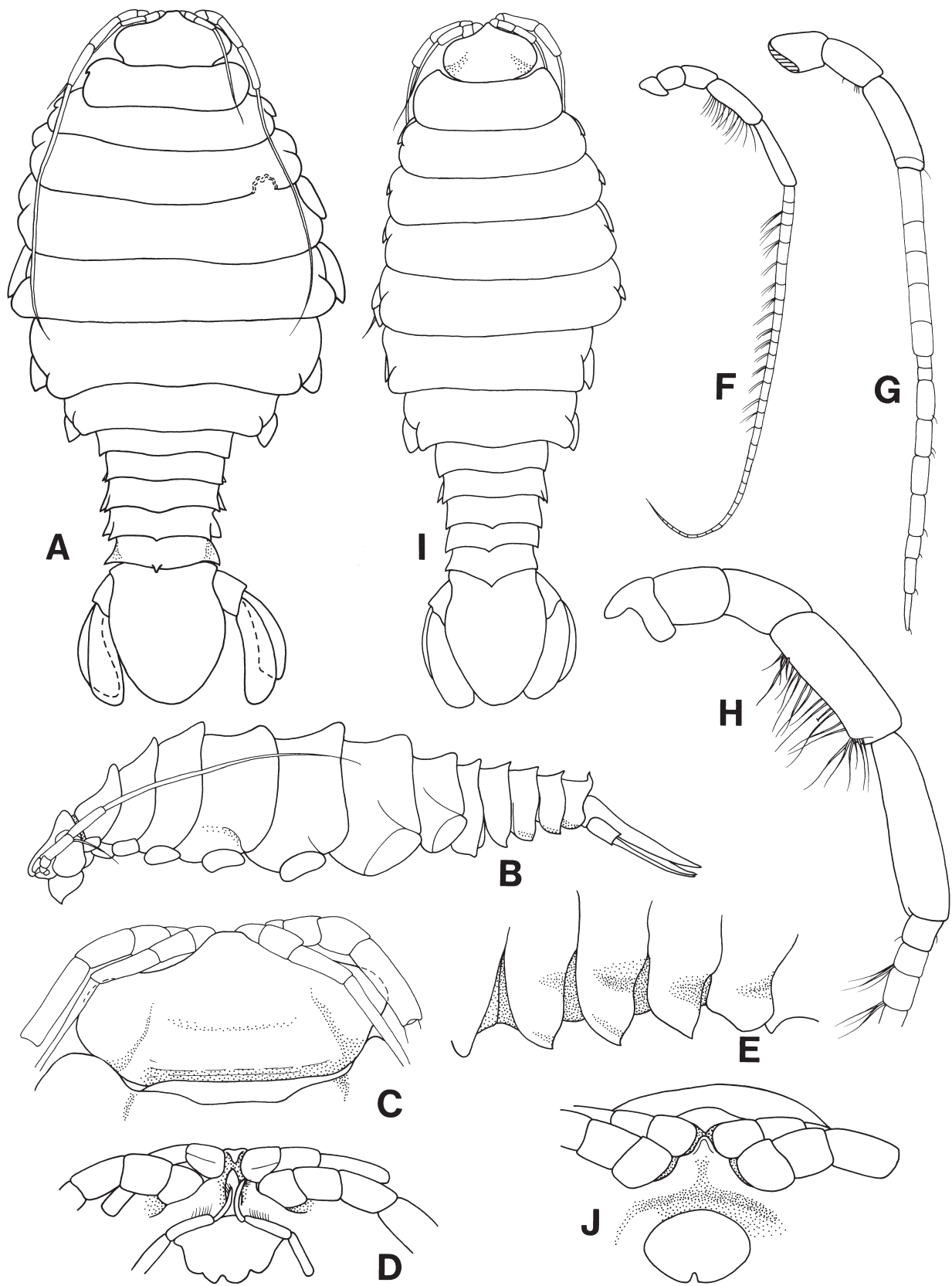
dorsal surfaces smooth, widest at pereonite 5, lateral margins ovate. *Eyes* absent. *Rostrum* simple, anteriorly subtruncate. *Coxae* 2–3 each with posteroventral angle rounded; 5–7 without oblique carina. *Pleon* with pleonite 1 visible in dorsal view; pleonite 4 with posterolateral margins not extending to posterior margin of pleonite 5; pleonite 5 with posterolateral angles acute (in dorsal view). *Pleotelson* 1.2 times as long as anterior width, dorsal surface smooth; lateral margins convex, posterior margin evenly rounded, with 0 RS.

*Antennule* peduncle article 3 0.9 times as long as combined lengths of articles 1 and 2, 3.7 times as long as wide; flagellum with 14 articles, extending to pereonite 2. *Antenna* peduncle article 3 1.0 times as long as article 2, 1.3 times as long as wide; article 4 2.4 times as long as article 3, 3.0~ times as long as wide, inferior margin with 21 plumose setae (probably simple, but may have dried at some point); article 5 1.2 times as long as article 4, 4.0 as long as wide, inferior margin with 0 setae, anterodistal angle with cluster of 0 short simple setae; flagellum with 32 articles (articles 2–15 with conspicuous cluster of setae at distal angle), extending to pereonite 6.

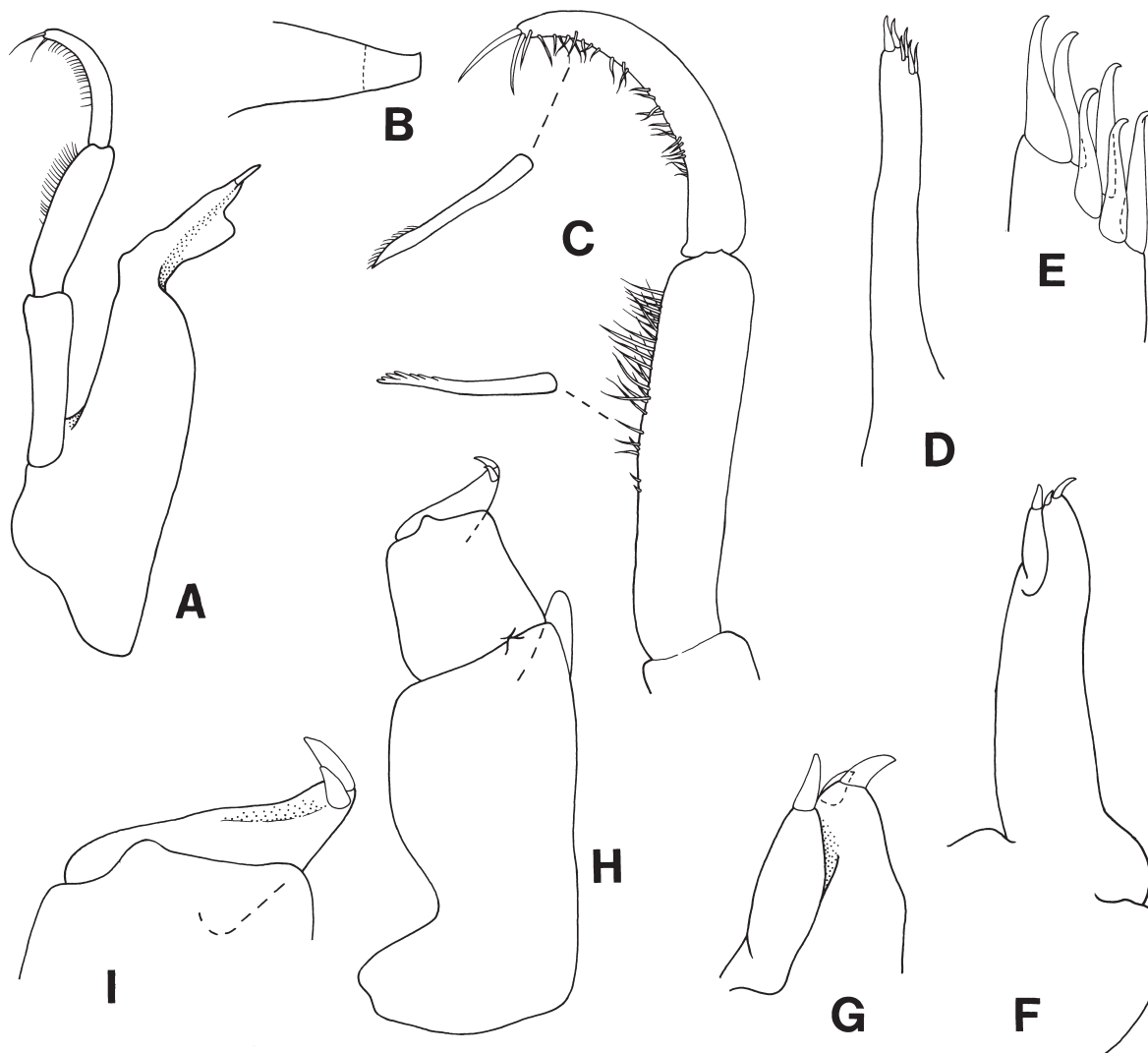
*Frontal lamina* longer than greatest width, anteriorly acute.

*Mandible* molar process present, minute; palp article 2 with ~30 marginal distolateral setae (setae multi-tiered); palp article 3 with 29 setae (distal 2 longest; marginal setae irregularly spaced). *Maxillule* with 6 RS (2 large, 4 slender). *Maxilla* mesial lobe with 1 hooked RS (weakly hooked); lateral lobe with 2 hooked RS. *Maxilliped* palp article 3 with 2 hooked RS; article 3.

*Pereopod 1 basis* 2.9 times as long as greatest width; *ischium* 0.3 times as long as basis, inferior margin with 0 RS, superior distal margin with 0 setae; *merus* inferior margin with 0 RS, superior distal angle with 4 setae; *carpus* 0.3 times as long as merus, inferior margin with 0 RS; *propodus* 2.4 times as long as proximal width, propodal palm simple, without blade or process, without setae, inferior margin with 0 RS; *dactylus* 1.6 times as long as propodus. *Pereopod 6* similar to pereopod 7. *Pereopod 7 basis* 3.3 times as long as greatest width, inferior margins with 0 palmate setae; *ischium* 0.8 as long as basis, inferior margin with 0 RS, superior distal angle with 1 RS (and 2 simple setae), inferior distal angle with 0 RS; *merus* 0.8 times as long as *ischium*, 3.4 times as long as wide, inferior margin with 7 RS (submarginal; short, slender, acute), superior distal angle with 0 RS (with about 16 slender setae in several tiers), inferior distal angle with 8 RS (acute); *carpus* 0.95 times as long as *ischium*, 5.3 times as long as wide, inferior margin with 1 RS (minute, submarginal), superior distal angle with several; setae missing, inferior distal angle with 5 RS; *propodus* 1.2 as long as *ischium*, 8 times as long as wide, inferior margin with 2 RS (minute; submarginal), superior distal angle with 0 slender setae (possibly



**Figure 132.** *Syscenus latus* Richardson, 1909. A-E, holotype, remainder NMNZ Cr.12012. A, dorsal view; B, lateral view; C, head, dorsal view; D, frons; E, pleonites, lateral view; F, antenna; G, antennule; H, antenna peduncle; I, dorsal view; J, frons.



**Figure 133.** *Syscenus latus* Richardson, 1909. NMNZ Cr.12012. A, mandible; B, mandible incisor; C, mandible palp articles 2 and 3; D, maxillule; E, maxillule apex; F, maxilla; G, maxilla apex; H, maxilliped; I, maxilliped palp article 2.

missing), inferior distal angle with 1 RS. Pereopods distal margins of ischium to carpus without setae; without strong carina on basis.

*Pleopod 1* exopod 2.3 times as long as wide, lateral margin straight, mesial margin weakly convex, with PMS on distal margin only; endopod 2.8 times as long as wide, lateral margin straight, with PMS on distal margin only, mesial margin with PMS on distal two-thirds; peduncle mesial margin with 11 coupling hooks. Pleopods 2–5 peduncle distolateral margin each without acute RS.

*Uropod* peduncle ventrolateral margin with 0 RS, posterior lobe about absent. Uropod rami with endopod and exopod co-planar, rami extending beyond pleotelson. *Endopod* lateral margin convex, lateral margin with 0 RS, mesial margin straight, with 0 RS. *Exopod* not extending to end of endopod, 3.3 times as

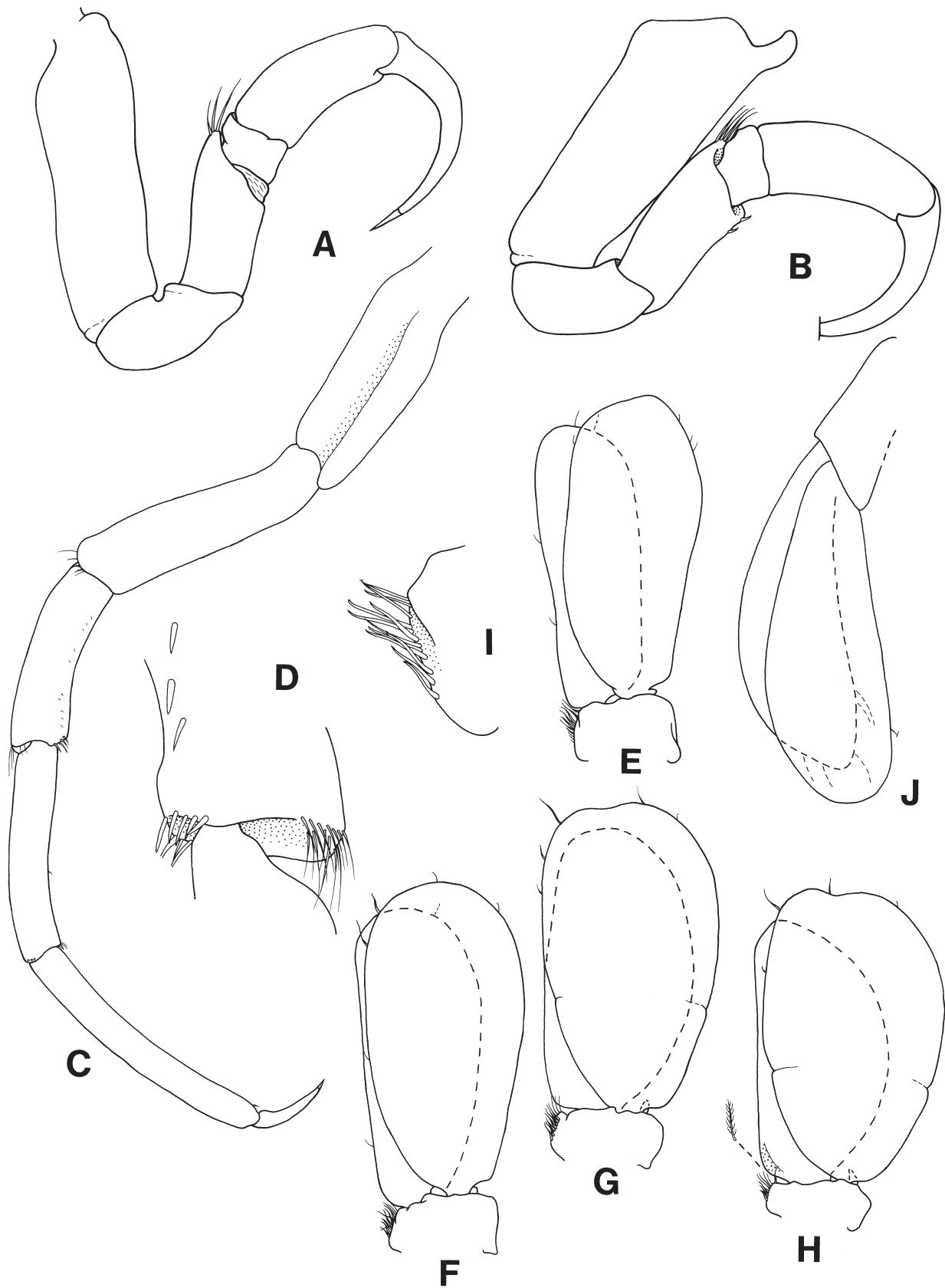
long as greatest width; lateral margin convex, with 0 RS; mesial margin sinuate, proximally concave, distally convex, with 0 RS.

MALE: No male had been positively identified.

SIZE: From 19–42 mm; Nunomura (1981) recorded females up to 46 mm.

VARIATION: The New Zealand specimen has a frontal lamina, more strongly defined than in the lectotype, but similar to that of the paralectotype. The antennule flagellum extends to the middle of pereonite 2, the antennal flagellum to pereonite 6.

REMARKS: *Syscenus latus* is readily identified by the prominent ocular lobes, pleonite 4 posterior margin



**Figure 134.** *Syscenus latus* Richardson, 1909. NMNZ Cr.12012 except J, holotype. A–C, pereopods 1, 2 and 7 respectively; D, mesial margin of merus; E–H, pleopods 1, 2, 4 and 5 respectively; I, pleopod 1 peduncle, mesial margin; J, uropod (holotype), in situ.

with a distinct median point, pleonite 5 with a distinct median point or in the ovigerous female a short dorsally directed spine, slender dactylus on pereopods 1–3, slender distal articles on pereopods 5–7, all pereopods having few and small robust setae, the broadly rounded pleotelson posterior margin and the broadly rounded uropodal rami. No other species has an acute median point or dorsally directed spine on the posterior margin of pleonite 5.

Nunomura (1981), when describing *Syscenus pacificus* clearly believed that he was describing the second species of the genus, stating that 'the genus *Syscenus* had hitherto been represented by the single species *S. infelix*'. Bruce (1997a) questioned the validity of *S. pacificus*. Examination of the type material of *Syscenus latus*, also from Japan, and comparison with the description given by Nunomura (1981) now confirm the synonymy.

The large female is designated as lectotype. The smaller of the two syntypic specimens, both from the same locality, is in poor condition, with the posterior half appearing decomposed, and remains as paralectotype. While pleonite 5 has a short spine and the frons, antennule, pleotelson and uropods are similar to those of the larger specimen, the antennal flagellum is shorter in length, extending to pereonite 4 (rather than 6).

PREY: Not known.

DISTRIBUTION: In New Zealand known only from the single specimen from the Challenger Plateau to the west of northern North Island; here also recorded from New Caledonia, Lord Howe Rise and the Banda Sea, Indonesia; previous records from Japan; at depths of 688–1056 metres (all records).

*Syscenus moana* Bruce, 2005 (Fig. 135)

*Syscenus moana* Bruce, 2005: 32, figs 1–4.

DIAGNOSIS (from Bruce 2005): *Body* 2.7 times as long as greatest width. *Rostrum* anteriorly narrow, anteriorly truncate in dorsal view (apically bent ventrally). *Eyes* absent. *Coxae* 2 and 3 each with posteroventral angle with small distinct produced point; 5–7 without oblique carina. *Pleonite* 4 with posterolateral margins not extending to posterior margin of pleonite 5; pleonite 5 with posterolateral angles acute. *Pleotelson* 0.9 times as long as anterior width, anterior dorsal surface without 2 sub-median depressions; lateral margins convex, posterior margin evenly rounded, without RS.

*Antennule* flagellum with 8 articles, extending to anterior of pereonite 1. *Antenna* flagellum with 32 articles, extending to middle of pereonite 6.

*Frontal lamina* wider than long, anteriorly acute.

*Pereopod 1 basis* 2.1 times as long as greatest width; *ischium* 0.5 times as long as basis, inferior margin without RS, superior distal margin with 2 simple setae; *merus* inferior margin without RS, superior distal angle with 11 simple setae; *carpus* 1.0 as long as merus, inferior margin without RS; *propodus* 1.3 times as long as proximal width, propodal palm simple, without blade or process, without setae, inferior margin without RS; *dactylus* 1.8 times as long as propodus. *Pereopod 7 basis* 2.7 times as long as greatest width, inferior margins with 12 palmate setae; *ischium* 0.9 as long as basis, inferior margin without RS, superior distal angle with 11 RS, inferior distal angle with 5 RS; *merus* 0.6 times as long as ischium, 2.0 as long as wide, inferior margin with 8 RS (set as 2, 2, 2, 1 and 1), superior distal angle with 19 RS, inferior distal angle with 6 RS; *carpus* 0.8 times as long as ischium, 3.0 as long as wide, inferior margin with 8 RS (set as 2, 1, 2, 1, 1 and 1), superior distal angle with 20 RS, inferior distal angle with 5 RS; *propodus* 1.0 as long as ischium, 5.7 times as long as wide, inferior margin with 3 RS (very small, sub-marginal), superior distal angle with 3 slender setae (plumose), inferior distal angle with 1 RS. Pereopods distal margins of ischium to carpus without abundant simple setae; without strong carina on basis.

*Penes* opening flush with surface of sternite 7.

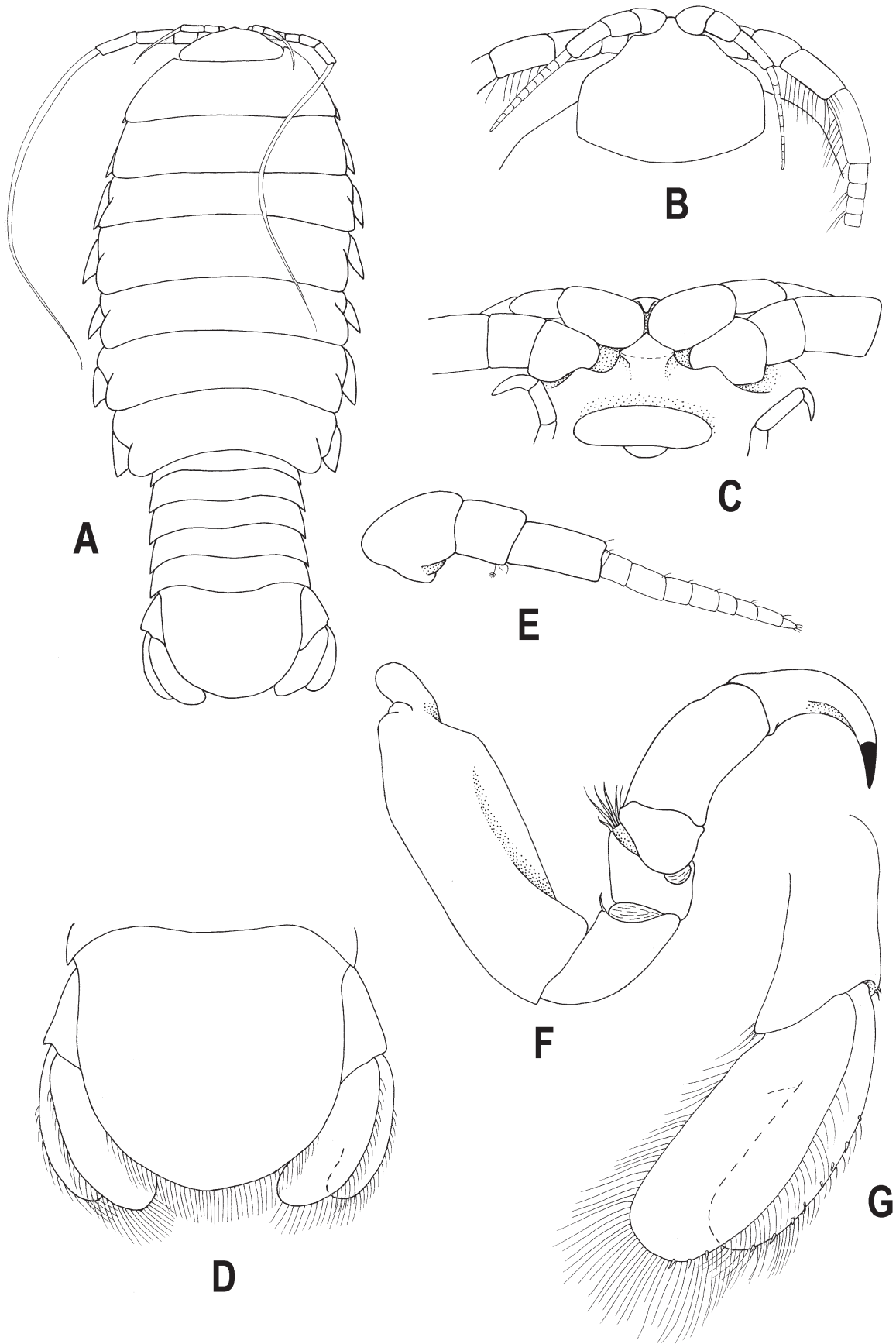
*Pleopod 1 exopod* 2.0 as long as wide, lateral margin straight, mesial margin strongly convex, with PMS on distal one-third; endopod 2.5 times as long as wide, lateral margin weakly convex, with PMS on distal margin only, mesial margin with PMS on distal three-quarters. *Pleopod 2 appendix masculina* with straight margins, 0.5 times as long as endopod, distally bluntly rounded.

*Uropod peduncle* ventrolateral margin with 1 RS, posterior lobe absent. Uropod rami with endopod and exopod co-planar, rami extending beyond pleotelson. *Endopod* lateral margin weakly convex, distolateral margin with 3 RS, mesial margin straight, without RS. *Exopod* not extending to end of endopod, 3.9 times as long as greatest width; lateral margin convex, with 8 RS; mesial margin evenly concave, without RS; distal margin rounded.

REMARKS: *Syscenus moana* can be recognised by the acute coxae, antennal flagellum extending to pereonite 6 (not pereonite 3 as stated incorrectly in the original description), rounded margin to the pleotelson and uropods with robust setae.

DISTRIBUTION: Single record from northern Norfolk Ridge. Species of *Syscenus* are mesopelagic fish predators or parasites, and it is quite likely that this species will occur more widely in northern New Zealand waters.





**Figure 135.** *Syscenus moana* Bruce, 2005. A, dorsal view; B, head, dorsal view; C, frons; D, pleotelson and uropods, dorsal view; E, antennule; pereopod 1; F, pereopod 1; G, uropod.

*Syscenus springthorpei* Bruce, 1997 (Fig. 136)

*Syscenus springthorpei* Bruce, 1997: 114, figs 1–4. – Bruce, Lew Ton & Poore, 2002: 163.

MATERIAL EXAMINED: ♂? (39 mm), Tui Oceanographic Cruise, Auckland University Zoology, AUZ 098 41, locality not known, probable New Zealand EEZ; previously dissected (label in Hurley's handwriting: "ex Kussakin: 231, 269"); dissected appendages in fair condition but specimen seems to have subsequently deteriorated (NIWA 2378).

DESCRIPTION (after Bruce 1997a): *Body* 3.0 as long as greatest width, dorsal surfaces smooth, widest at pereonite 5, lateral margins subparallel. *Eyes* absent. *Rostrum* simple, anteriorly rounded. *Coxae* 2–3 each with posteroventral angle rounded; 5–7 without oblique carina. *Pleon* with pleonite 1 visible in dorsal view; pleonite 4 with posterolateral margins not extending to posterior margin of pleonite 5; pleonite 5 with posterolateral angles acute. *Pleotelson* 1.2 times as long as anterior width, dorsal surface smooth; lateral margins weakly convex, posterior margin with distinct median point, with 0 RS.

*Antennule* peduncle article 3 0.6 times as long as combined lengths of articles 1 and 2, 1.6 times as long as wide; flagellum with 7 articles, extending to anterior of pereonite 1. *Antenna* peduncle article 3 2.5 times as long as article 2, 1.5 times as long as wide; article 4 1.3 times as long as article 3, 1.8 times as long as wide, inferior margin with 13 plumose setae (long), and 0 simple setae; 2.7 times as long as wide, inferior margin with 10 setae (long, plumose); flagellum with 20 articles (approximately), extending to posterior of pereonite 3.

*Frontal lamina* longer than greatest width, anteriorly acute.

*Mandible* molar process absent; palp article 2 with 12 marginal distolateral setae, and 3 long distolateral setae; palp article 3 with 9 setae. *Maxillule* with 5 RS (4 large, apically curved, 1 slender, straight). *Maxilla* mesial lobe with 0 hooked RS; lateral lobe with 2 hooked RS. *Maxilliped* palp article 1 distomesial angle with 1 RS; article 2 with 3 hooked RS; article 3 with 1 hooked RS (and two short simple setae).

*Pereopod 1* basis 2.3 times as long as greatest width; *ischium* 0.4 times as long as basis, inferior margin with 0 RS, superior distal margin with 5 setae; *merus* inferior margin with 1 RS (large, distal), superior distal angle with 12 setae; *carpus* 1.0 as long as *merus*, inferior margin with 1 RS (with numerous simple setae); *propodus* 1.6 times as long as proximal width, propodal palm simple, without blade or process, inferior margin with 1 RS (distal); *dactylus* 1.3 times as long as *propodus*. *Pereopods 2 and 3* similar to *pereopod 1*. *Pereopod 6*

similar to *pereopod 7*. *Pereopod 7* basis 2.4 times as long as greatest width; *ischium* 0.8 as long as basis, inferior margin with 0 RS, superior distal angle with 2 RS (and numerous simple setae), inferior distal angle with 4 RS (and numerous simple setae); *merus* 0.6 times as long as *ischium*, 1.7 times as long as wide, inferior margin with 2 RS, superior distal angle with 6 RS (and ~5 simple setae), inferior distal angle with 4 RS (and ~4 simple setae); *carpus* 1.3 times as long as *ischium*, 2.7 times as long as wide, inferior margin with 2 RS, superior distal angle with 8 RS, inferior distal angle with 4 RS; *propodus* 0.9 as long as *ischium*, 3.7 times as long as wide, inferior margin with 1 RS, superior distal angle with 0 slender setae, inferior distal angle with 1 RS. *Pereopods* distal margins of *ischium* to *carpus* with abundant simple setae; without strong carina on basis.

*Penes* low tubercles; penial openings separated by 11% of sternal width.

*Pleopod 1* exopod 2.0 as long as wide, lateral margin weakly convex, mesial margin weakly convex, with PMS on distal three-quarters; endopod 2.5 times as long as wide, lateral margin weakly convex, with PMS on distal margin only, mesial margin with PMS on distal three-quarters; peduncle mesial margin with 9 coupling hooks. *Pleopod 2 appendix masculina* distally narrow, 0.9 times as long as endopod, distally acute. *Pleopods 2–5* peduncle distolateral margin each with acute RS.

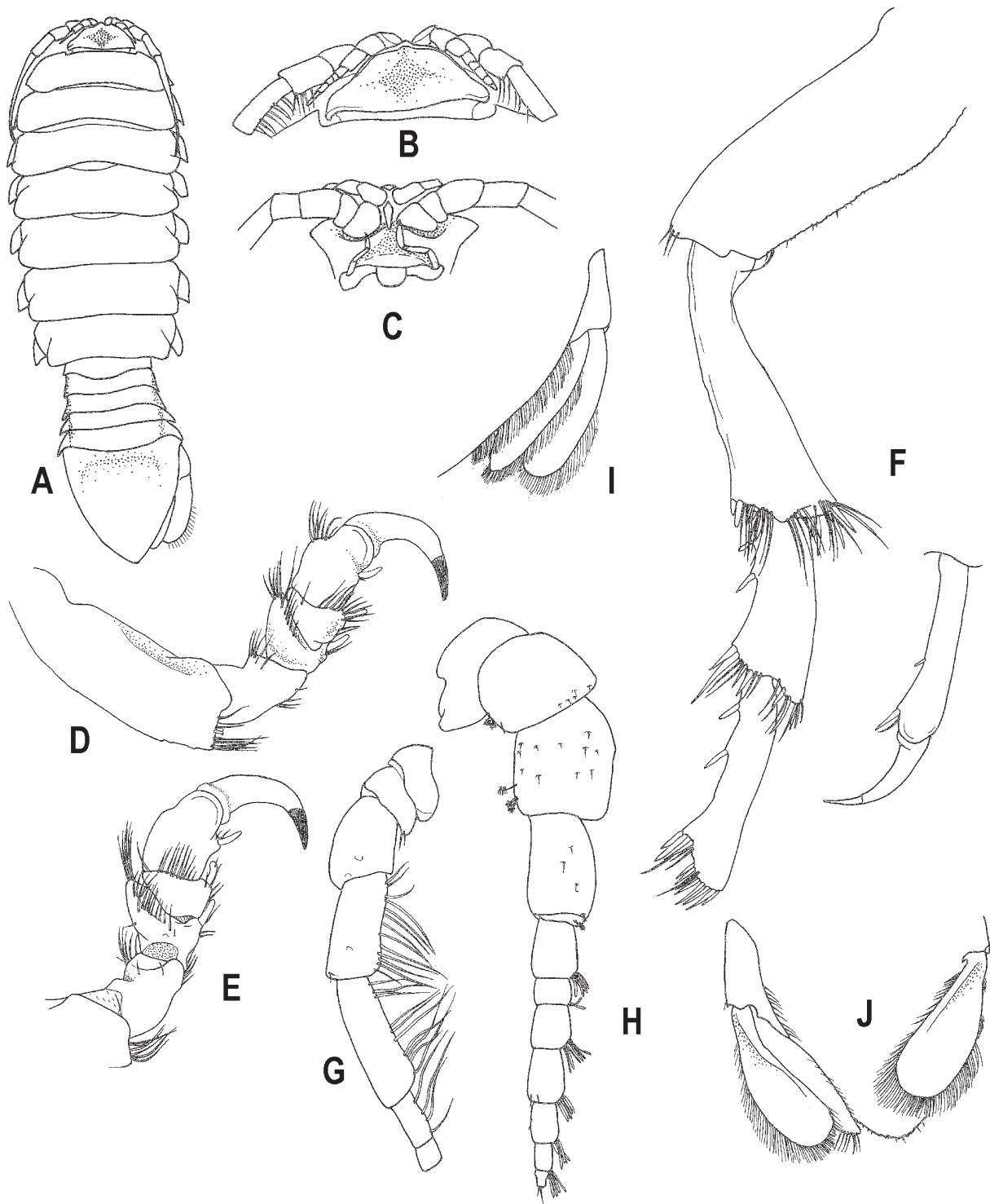
*Uropod* peduncle ventrolateral margin with 0 RS, posterior lobe about one-third as long as endopod. *Uropod rami* with endopod and exopod co-planar, rami not extending to *pleotelson* apex. *Endopod* lateral margin weakly convex, lateral margin with 0 RS, mesial margin weakly convex, with 0 RS. *Exopod* not extending to end of endopod, 3.7 times as long as greatest width; lateral margin weakly convex, with 0 RS; mesial margin convex, with 0 RS; distal margin rounded.

FEMALE: No female had been positively identified.

SIZE: Holotype 36 mm; New Zealand specimen 39 mm.

VARIATION: The New Zealand specimen is in poor condition and meaningful assessment is not possible.

REMARKS: The single specimen is in very poor condition, appearing to have dried out at some point after it was dissected (the dissected appendages are in adequate condition) and also having suffered a mould infection. In addition, the locality of the specimen is not known, although, having been collected by the RV *Tui*, it will have been within the New Zealand region. For these reasons the descriptions and figures are taken from Bruce (1997a).



**Figure 136.** *Syscenus springthorpei* Bruce, 1997. A, dorsal view; B, head, dorsal view; C, frons; D, pereopod 1 E, pereopod 2 (distal articles); F, pereopod 7; G, antenna peduncle; H, antennule; I, uropod, in situ, dorsal view; J, pleotelson and uropods, ventral; view.

*Syscenus springthorpei* can be identified by the relatively slender body shape, antennal flagellum extending to the posterior of pereonite 3, posterior margin of the pleotelson having a distinct median point, the uropodal rami not extending to the posterior margin

of the pleotelson, and the robust and setose pereopods that have conspicuous, blunt robust setae on the inferior margins.

Characters separating this species from *Syscenus infelix* Harger, 1880 are the pleotelson margins being

smoothly curved rather than sinuate (as figured by Harger 1883), the presence of a blunt distinct caudo-medial point (v. acute), and the uropods not extending beyond the posterior margin of the pleotelson (v. extending beyond the posterior of the pleotelson). The figures given by Kensley and Cartes (2003) show considerable variation in these characters, some of which appear similar to those of *S. springthorpei*, and furthermore the shape of the uropodal rami is near identical in both species. The pereopods differ in *S. springthorpei* having robust setae on the inferior margins of pereopods 4–7, these being absent in *S. infelix* (Kensley 2004).

The type locality for *S. infelix* is Cape Cod, Massachusetts, northwestern North Atlantic, and without detailed reassessment of *S. infelix* based on the type material and from specimens collected geographically nearby, it is not possible to say if the western Atlantic species is the same as the eastern Atlantic material recorded under that name by Kensley and Cartes (2003), although the figured shapes of the pleotelson of western Atlantic and Mediterranean specimens do differ considerably.

PREY: Not known.

DISTRIBUTION: In New Zealand known only from the single specimen of uncertain locality; previous record from off New South Wales, Australia.

#### *Syscenus* sp.

MATERIAL EXAMINED: ♂ (23 mm), east of Mahia Peninsula, 29 September 1989, 39°40.5–43.5'S, 178°09.2–07.2'E, 764–843 m, coll. RV *James Cook* (NMNZ Cr.12013).

REMARKS: This specimen has one conspicuous and unique character – the superior distal angle of the ischium of pereopods 4–6 is strongly produced, overriding the merus. Other character states include: dactylus of pereopods 1–3 longer than in *S. springthorpei*. The pleotelson and uropods are damaged, but the uropods do exceed the posterior margin of the pleotelson. The anterior of the head is 'short', the frontal lamina is anteriorly rounded; the antennule flagellum extends to anterior of pereonite 1, with a robust flagellum, the antennal flagellum extends to the posterior of pereonite 4 (or anterior of 5) and the dorsum vaulted. The specimen is clearly an undescribed species, but is in poor condition, and at least one undamaged specimen is needed before it can be adequately characterised.

## UNCERTAIN STATUS OR RECORDS

### *Aega cyclops* Haswell, 1881

*Aega cyclops* Haswell, 1881: 192; 1882: 285.– Hale, 1925: 180, fig. 26; 1926: 233, fig. 20; 1937: 18; 1940: 298.– Bruce, 1983: 769, fig. 70.– Springthorpe & Lowry, 1994: 43.– Bruce, Lew Ton & Poore, 2002: 161.  
*Aega (Rhamphion) cyclops*.– Brusca, 1983: 11.

MATERIAL EXAMINED: "Possible syntype"; labelled as type by A.R. McCulloch, 1905. ♂ (10.3 mm), Port Jackson, NSW, Australia (AM G5326).

[Roger Springthorpe (Australian Museum, Sydney) states, in correspondence, that this specimen cannot be identified as the holotype with any degree of certainty. Haswell (1881) did not designate types and did not mention how many specimens he used in the original description. Hale (1925) redescribed this specimen and assumed that it was the 'type' probably because McCulloch, in his somewhat cavalier fashion, had labelled it as such. Haswell's original description lacks detail, for example it not mentioning the damaged pleotelson that Hale described. This specimen is similar in length to the original and may be a syntype. The origin of much of the *Old Collection* labelled as type material is confounded. It cannot be shown that this material was used by Haswell in his original descriptions. Material from Port Jackson, and some Queensland localities, for example, may have been collected after the date of publication by others such as Whitelegge, McCulloch, and Hedley.]

REMARKS: Despite being relatively widely recorded (Hale 1925, 1926, 1937, 1940) off the coast of southeastern Australia the species remains poorly known and characterised. The holotype, a dry and dissected specimen, is held at the Australian Museum. All pereopods have lost their distal articles, and the uropods and pleotelson had been damaged and regrown prior to collection. There are two slides with an entire pereopod 1, pereopod 7, maxilliped and appendix masculina (detached from the pleopod). From this material there are several characteristics which distinguish *Aega cyclops*, these being the medially fused penial processes (a defining character state for *Epulaega*), the huge eyes with a very small posterior clear field, the short and smoothly curved dactylus on pereopod 1 and the small, ovate frontal lamina. No other species has this combination of characters.

Hale (1926) reported the species from 'South-east of Sydney, in "New Zealand area," 75 faths.' However, that species seems more likely to be *Aegiochus coroo* (Bruce, 1983) given the large posterior clear field on the head (Hale, 1926, figure 20), and that the record was provisionally included in the synonymy for that species by Bruce (1983). Hale (1940) later reported several more localities in southeastern Australia for *A. cyclops*, but those records are here regarded as unconfirmed. A

revision of the species based on good-quality material that can be identified by comparison to the holotype and existing slide material will clearly establish the identity of the species, but until that time I regard *Aega cyclops* as *species inquirenda*.

*Aega cyclops* is not regarded as occurring in New Zealand.

*Aega novizealandiae* Dana, 1853, nomen dubium

*Aega novi-zealandiae* Dana, 1853: 767, pl. 51, fig 2a-c.

*Aega novae Zelandiae*.- Lütken, 1859: 77.

*Aega neo-zelanica*.- Thomson & Chilton, 1886: 153.

*Aega novae-zealandiae*.- Hutton, 1904: 262.

*Aega novae-zealandiae*.- Miers, 1876b: 108; Thomson, 1913: 246.

*Aega novae-zeelandiae*.- Nierstrasz, 1931:182.

*Aega novi-zealandiae*.- Tattersall, 1921: 213, pl. 4, figs 11-14; Hurley, 1961: 268.

*Aega neozelandia*.- Brusca, 1983: 11.

TYPE LOCALITY: Bay of Islands, New Zealand.

REMARKS: The identity of *Aega novizealandiae* Dana, 1853 (the spelling of the species name has been impressively inconsistent over time) is impossible to establish. It is uncertain that the family and generic placement are correct, this being noted by Dana himself. There are numerous Southern Ocean species of *Aegiochus* that are both characterised and distinguished by details of the frontal lamina, shape of the anterior pereopods together with details of the number and orientation of robust setae, and also details of the number and arrangement of robust setae on the pleotelson and uropodal rami. None of this information is available for *Aega novizealandiae*. Dana's personal notes (unpublished; copy from the Smithsonian Institution) record the loss of the collections on the bar of the Colombia River, a notoriously dangerous crossing, as well as further accidental losses to the material in shipment and unpacking, so in the absence of types there is no chance to obtain data by which this species might be characterised. There are at least two small-sized and small-eyed species of *Aegiochus* in northern New Zealand waters, either of which may be *Aega novizealandiae*. Equally *A. novizealandiae* could belong to the Cirolanidae, Corallanidae or Tridentellidae.

It seems that the identity of *Aega novizealandiae* can never be resolved and it is here placed in the category **nomen dubium** and henceforth excluded from the New Zealand fauna.

*Rocinela orientalis* Schioedte & Meinert, 1879

*Rocinela orientalis* Schioedte & Meinert, 1879b: 395, pl 13, figs 1-2.- Gerstaecker, 1882: 260.- Miers, 1884: 304.- Stebbing, 1905: 25, pl. VI.C; 1910: 101.- Richardson, 1910: 17.- Chilton, 1911: 567.- Hale, 1925: 183, fig. 27.- Nierstrasz, 1931:184, figs 75-77.- Monod, 1933: 194.- Barnard, 1936: 368.- Hurley, 1961: 268.- Pillai, 1967: 279, fig. 7e-f, pl. II, 5.- Kensley, 2001: 227.

TYPE MATERIAL: Syntypes (MCZ 3131) held at Museum of Comparative Zoology, Harvard, USA; type locality Calcutta, West Bengal, India.

REMARKS: Recorded from a beached specimen on Raoul Island, Kermadec Islands by Chilton (1911). The record would require confirmation given the recorded tropical distribution of South Africa and East Africa to India, the Philippines and eastern Australia. The identity of many earlier records also need confirmation, particularly as differences have been commented on, and it is now apparent that the genus is diverse (nine species) in the New Zealand region. The original description of *R. orientalis* gives minimal data and figures only the dorsal view and frons, and there is not sufficient detail to identify the species. Several records in the synonymy (e.g. Gerstaecker 1882; Hurley 1961; Kensley 2001) are merely repeat citations and are not based on new material or records. At present it seems likely that the New Zealand record is a misidentification.

*Rocinela orientalis* is regarded as not occurring in New Zealand.

## SPECIES INCLUDED IN THE AEGIDAE

This list is additive to those species treated in principal taxonomic account; entries are alphabetical by genus and species.

### *Aega* Leach, 1815

- Aega acuminata* Hansen, 1897; East Pacific off Galapagos Is. and off Costa Rica; 768–1353 m (Brusca 1983).
- Aega acuticauda* Richardson, 1910; Philippines; 245 m; (possibly the juvenile of *A. antennata*).
- Aega angustata* Whitelegge, 1901; New South Wales, Australia; 99–219 m (see p. 232).
- Aega antennata* Richardson, 1910; Philippines, between Gillolo and Kayoa Islands; 485 m; in need of redescription.
- Aega approximata* Richardson, 1910; Philippines, Palawan Passage; 689 m; in need of redescription.
- Aega bicarinata* Leach, 1818; type locality stated as ‘Localité: inconnue’; northeastern Atlantic, 22 m (Holthuis 1956; Kussakin 1979); Holthuis (1956) placed this name under synonymy with *Aega rosacea* (Risso, 1816), but this synonymy was not accepted by Kussakin (1979); *A. rosacea* is here considered as nomen dubium.
- Aega chelipous* Barnard, 1960; Madagascar, from *Carcharinus*; 160 m; in need of redescription.
- Aega concinna* Hale, 1940; Australia, Tasmania; depths not recorded; in need of redescription. Both pereopods 2 and 3 have large club shaped robust seta opposing the dactylus, and pereopod 1 inferior margin is convex and swollen.
- Aega crenulata* Lütken, 1859; North Atlantic, Greenland, Iceland and Norway; 185–950 m; from the Greenland shark *Somniosus microcephalus* (Bloch and Schneider, 1801) (Richardson 1905a, Kussakin 1979).
- Aega dofleini* Thielemann, 1910; Japan, Sagami Bay; depth not recorded; in need of redescription. Whereabouts of the type material not known; apparently lost or destroyed in World War Two.
- Aega ecarinata* Richardson, 1898. Off Little Bahama Banks and off entrance to San Juan, 165–617 m; Puerto Rico (Kensley & Schotte 1989); in need of redescription.
- Aega falcata* Kensley & Chan, 2001; Taiwan; 500 m.
- Aega hirsuta* Schioedte & Meinert, 1879b; Nice, Mediterranean France (no other data). Identity uncertain; possibly a junior synonym of *A. tridens*.
- Aega lecontii* (Dana, 1854); California, Monterey; a poorly known species of uncertain identity; whereabouts of the type material is not known to me; in need of redescription.
- Aega magnifica* (Dana, 1853); both coasts of southern South America to Straits of Magellan; 10–118 m (Bruce 2004a).
- Aega maxima* Hansen, 1897; near Galapagos Is.; 2350 m (Brusca 1983).
- Aega megalops* Norman & Stebbing, 1904 (in Norman 1904); Portugal; 82 m; also South Africa (Barnard 1914; Stebbing 1922); in need of redescription.
- Aega microphthalma* Dana, 1854; California, Monterey (Richardson 1905a); the whereabouts of the type material is unknown; *species inquirenda* according to Brusca (1983); in need of redescription.
- Aega nanhaiensis* Yu, 2007; South China Sea; 85–115 m.
- Aega platyantennata* Nunomura, 1993; Japan, Sea of Japan, off Himi city, Toyama Prefecture; from *Lophius setigerus* (currently *Lophiomus setigerus* (Vahl, 1797), Lophiidae); depth not recorded; in need of redescription.
- Aega psora* (Linnaeus, 1758); **type species**; widely recorded in the North Atlantic, including Gulf of Mexico, and US coasts, Greenland, Iceland, south to Irish and British waters; 48–1280 m (Kussakin 1979, Richardson 1905a); hosts include both bony and cartilaginous fishes. The record of this species from the Red Sea (Bakhrebah 2006) is a misidentification, the figures unambiguously showing a species of *Aegiochus* of unknown identity.
- Aega punctulata* Miers, 1881; Straits of Magellan, Falkland Islands, South Atlantic; depth range not recorded but presumed shallow (see p. 234).
- Aega rosacea* (Risso, 1816); Mediterranean, France; the brief description was accompanied by a single simple figure of the dorsal view. It is possible that the species is the same as *A. bicarinata*, but on the basis of the existing description and the lack of types, the species can be considered as **nomen dubium**.
- Aega serripes* H. Milne Edwards, 1840; Australia, New South Wales, Victoria and South Australia; 18 m (Hale 1925, Bruce 1983).
- Aega sheni* Yu & Bruce, 2006; China and eastern Australia (Coral Sea); 300–435 m.
- Aega stroemii* Lütken, 1859; Lütken gave the distribution as Norway, Færoe Islands and England, and included *A. monophthalma* and *A. bicarinata* as junior synonyms. The name was used earlier as

a nomen nudum in a footnote, by Krøyer (1843 – an attributed date as actual date of publication is not clear; previously cited as 1837). In need of revision.

- Aega tridens* Leach, 1815; poorly known; northeastern Atlantic, Britain, Færoes, Norway; to 200 m (Sars 1897, Kussakin 1979).
- Aega truncata* Richardson, 1910; off North Mindanao, Philippines; 308–414 m, in siliceous sponges. This species is similar to *Aega urotoma* Barnard, 1914, but Richardson's description provides little information on appendages. The propodus of *A. truncata* appears to lack the large distal robust setae opposite the base of dactylus of pereopods 2 and 3 (it is not mentioned), and has more robust setae on the inferior margin of the merus (her description of the anterior pereopod reverses the carpus and merus). In need of redescription.
- Aega webbii* (Guérin-Méneville, 1836); Portugal; 100–300 m; this species remains poorly known, and subsequent records are all of uncertain identity or incorrect; the species is not recognizable from the original description; the type specimen is held at the Academy of Natural Sciences, Philadelphia. Trilles and Justine's (2004) record from New Caledonia is a misidentification of *Aega urotoma* (see p. 55); the species is in need of redescription.

#### *Aegapheles* gen. nov.

- Aegapheles antillensis* (Schioedte & Meinert, 1879b), comb. nov.; Caribbean and Gulf of Mexico; 70–240 m (Bruce 2004a).
- Aegapheles banda* (Bruce, 2004), comb. nov.; Banda Sea, Indonesia and off northern Western Australia; 290–416 m.
- Aegapheles deshaysiana* (H. Milne Edwards, 1840), comb. nov.; eastern North Atlantic and Mediterranean, from the Azores at approximately 38°N south to about 15°N; 100–146 m, one record at 1105 m (Bruce 2004a).
- Aegapheles excisa* (Richardson, 1910), comb. nov.; Philippines and Japan; 16 and 340 m (Bruce 2004a).
- Aegapheles japonica* (Bruce, 2004), comb. nov.; Japan; 120 m.
- Aegapheles kixalles* (Bruce, 2004), comb. nov.; New Caledonia; 540–545 m.
- Aegapheles kwazulu* (Bruce, 2004), comb. nov.; off Natal, South Africa, western Indian Ocean; 237 m.
- Aegapheles musorstom* (Bruce, 2004), comb. nov.; New Caledonia; 475–615 m.
- Aegapheles trulla* (Bruce, 2004), comb. nov.; Coral Sea off Australia and off Ontong Java, Solomon Islands; 650–752 m.

*Aegapheles warna* (Bruce, 2004), comb. nov.; south-eastern Australia from Tasmania to Victoria; 33–518 m.

#### *Aegiochus* Bovallius, 1885

- Aegiochus arctica* (Lütken, 1859), comb. nov.; North Atlantic, Greenland and Iceland; 720–1500 m; from the Greenland shark *Somniosus microcephalus* (Bloch and Schneider, 1801) (Richardson 1905a, Kussakin 1979); in need of redescription.
- Aegiochus australis* (Whitelegge, 1901), comb. nov.; Australia, New South Wales; 89–102 m (Hale 1925); the shape of the anterior margin of the frontal lamina and the small eyes are characteristic; the antennule peduncle is moderately compressed but not expanded; the species is in need of redescription.
- Aegiochus crozetensis* (Kussakin & Vasina, 1982), comb. nov.; southern Indian Ocean, vicinity of Crozet Is.; 280 m (this account, see p. 237).
- Aegiochus cyclops* (Haswell, 1882), comb. nov.; Australia, off New South Wales; *species inquirenda* (see *Aega cyclops* p. 210).
- Aegiochus dentata* (Schioedte & Meinert, 1879b), comb. nov.; Cuba (no other data); later figures (e.g. Kensley & Schotte 1989) are taken from the original description; in need of redescription.
- Aegiochus dollfusi* (Monod, 1933), comb. nov.; Red Sea, Egyptian Gulf of Suez; depth not recorded.
- Aegiochus francoisae* (Wetzer, 1990), comb. nov.; Galapagos, off Fernandina Is.; taken from cloaca of an ascidian; 316 m.
- Aegiochus gracilipes* (Hansen, 1895), comb. nov.; North Atlantic, off northwestern Scotland and Gulf of Mexico; 1335–2787 m (Richardson 1905a, Kussakin 1979); confirmation that the eastern and western Atlantic population are the same species is needed.
- Aegiochus incisa* (Schioedte & Meinert, 1879b), comb. nov.; Mediterranean (no other data); in need of redescription.
- Aegiochus leptonica* (Bruce, 1988), comb. nov.; western Atlantic, off Dry Tortugas, Florida; 1048 m.
- Aegiochus longicornis* (Hansen, 1897), comb. nov.; East Pacific, off Galapagos Is.; 842 m; (Brusca 1983); in need of redescription.
- Aegiochus perulis* (Menzies & George, 1972), comb. nov.; off Peru (8°13'S); 1927–1997 m; in need of redescription.
- Aegiochus plebeia* (Hansen, 1897), comb. nov.; East Pacific, near the Galapagos Islands (see p.238).
- Aegiochus quadratisinus* (Richardson, 1903), comb. nov.; Hawaii; 1207–1459 m (Bruce 1983); Richardson (1904b) published the description twice.

*Aegiochus sarsae* (Brandt & Andres, 2008), comb. nov.; North Atlantic, from the northern Mid-Atlantic Ridge; 3461 m.

*Aegiochus spongiophila* (Semper, 1867), comb. nov.; Philippines, several localities; at least to 152 m (Miers 1878; Richardson 1910); in need of redescription.

*Aegiochus symmetrica* (Richardson, 1905b), comb. nov.; Alaska; 75–196 m; Kussakin (1979) given the maximum depth as 1050 m. In need of redescription.

*Aegiochus synopthalma* (Richardson, 1909), comb. nov.; Japan; 354.6 m (Bruce, 1983).

*Aegiochus tenuipes* (Schioedte & Meinert, 1879b); Cuba (no other data); see comments for *A. dentata*; in need of redescription.

*Aegiochus tumida* (Nunomura, 1988), comb. nov.; off Philippines; 400 m; from 'Venus flower basket' sponge, *Euplectella* sp. Probable junior synonym of *Aegiochus spongiophila*, a species also known from *Euplectella*.

*Aegiochus uschakovi* (Kussakin, 1967), comb. nov.; Chile, Drake Passage; 95–105 m (this account, p. 241).

*Aegiochus ventrosa* (M. Sars, 1859), comb. nov.; type species. North Atlantic, including Greenland, Norway and Britain; (Norman 1904; Richardson 1905a; Kussakin 1997); 220–570 m.

*Aegiochus weberi* (Nierstrasz, 1931), comb. nov.; Indonesia, Celebes Sea; 450 m; described from three male specimens, one of which has a large pair of distally spatulate cephalic processes on the head, a character unique within the family. The figures suggest the possibility that the material consists of two species.

#### *Alitropus* Milne Edwards, 1840

*Alitropus typus* H. Milne Edwards, 1840; Indo-Malaysian region to eastern Australia; freshwater, attacks fishes (Bruce 1983). There are several other proposed names (see Ingle & Fernando 1964), and also *A. foveolatus* Schioedte & Meinert, 1879b, which are here all regarded as junior synonyms.

#### *Epulaega* gen. nov.

*Epulaega lethrina* (Bruce, 1983), comb. nov.; Queensland, Great Barrier Reef, Coral Sea and Papua New Guinea; shallow to 10 m, likely deeper; occurs in nasal passage of some Serranidae and Lethrinidae, occasionally other fishes; also from sponges.

*Epulaega monilis* (Barnard, 1914), comb. nov.; South Africa, Table Bay to East London, 90–331 m (Kensley

1978) (material examined under *E. fracta*, present study); in need of redescription.

*Epulaega nodosa* (Schioedte & Meinert, 1879b), comb. nov.; southeastern Australia; depths mostly not previously reported, to at least 40 m; (Bruce 1983).

#### *Rocinela* Leach, 1818

*Rocinela affinis* Richardson, 1904a; Japan to Australia (Bruce *et al.* 2002); 306 m; in need of redescription.

*Rocinela americana* Schioedte & Meinert, 1879b; western North Atlantic, Maine, USA; 155–287 m (Kussakin 1979).

*Rocinela angustata* Richardson, 1904a; northern Pacific from Japan and Alaska, along the North American coast southwards to Baja California; 150–466 m (Brusca & France 1992). Nunomura (2006) was apparently unaware of the redescription and designation of a lectotype by Brusca and France (1992), and made comments on numerous differences between his material, the original description and the redescription by Kussakin (1979). The identity of Nunomura's material cannot be readily elucidated from the description and drawings. Feeding and prey preferences in captivity have been reported by Wing and Moles (1995).

*Rocinela australis* Schioedte & Meinert, 1879b; Straits of Magellan; shallow; in need of redescription.

*Rocinela belliceps* (Stimpson, 1864); East Pacific from Alaska to Mexico; 59–284 m (Brusca & France 1992). Implicated in attacks on aquacultured salmon (Novotny & Mahnken 1971).

*Rocinela cornuta* Richardson, 1898; Alaska; 1143 m (Richardson 1905a); 100–1200 m according to Kussakin (1979).

*Rocinela cubensis* Richardson, 1898; Caribbean, Cuba; 262 m (Richardson 1905a); in need of redescription.

*Rocinela danmoniensis* Leach, 1818; England 25–1250 m (Kussakin 1979); in need of redescription.

*Rocinela dumerilii* (Lucas, 1849); Atlantic: South Africa (Kensley 1978), Cuba and Mediterranean (Richardson 1905a); 60–500 m; in need of redescription.

*Rocinela granulosa* Barnard, 1914; Western Indian Ocean, off Natal, South Africa; 80–200 m (Kensley 1978); in need of redescription.

*Rocinela hawaiiensis* Richardson, 1903; eastern Indo-Pacific (Hawai'i) to East Pacific (Baja California, Mexico) (Brusca & France 1992); 766–1200 m; Richardson (1904b) republished the description as new.



- Rocinela insularis* Schioedte & Meinert, 1879b; Caribbean, Mississippi to Florida; 425–499 m (Richardson 1905a).
- Rocinela japonica* Richardson, 1898; Japan; 20–64 m (Kussakin 1979); in need of redescription.
- Rocinela juvenalis* Menzies and George, 1972; East Pacific, off Peru; 4506 m; in need of redescription.
- Rocinela kapala* Bruce, 1988; off Cape Moreton, Queensland to Sydney, New South Wales, Australia; 450–765 m.
- Rocinela laticauda* Hansen, 1897; there are only two positive records for the East Pacific off Acapulco, Mexico and off California; 120–960 m (Brusca & France 1992).
- Rocinela lukini* Vasina, 1993; Sea of Okhotsk; 753–1480 m; recorded prey *Raja binoculata* and *Hippoglossus* sp.
- Rocinela maculata* Schioedte & Meinert, 1879b; Greenland and Vladivostok, Russia; 0–22 m (Kussakin 1979; Richardson 1905a); in need of redescription.
- Rocinela media* Nierstrasz, 1931; Buton Strait, southern Sulawesi, Indonesia; 75–94 m; known from a single male specimen, in need of redescription.
- Rocinela modesta* Hansen, 1897; East Pacific, off Bay of Panama, Panama; 848 m (Brusca & France 1992).
- Rocinela murilloi* Brusca & Iverson, 1992; East Pacific from California to Chile; 786–1866 m (Brusca & France 1992).
- Rocinela niponia* Richardson, 1909; Japan; 108 m; in need of redescription.
- Rocinela oculata* Harger, 1883; off Georgia, USA; 461 m (Richardson 1905a).
- Rocinela orientalis* Schioedte & Meinert, 1879b; widely recorded from the tropical Indo-Pacific (see Hale, 1925, present account, p. 211); 22–500 m; in need of redescription.
- Rocinela patriciae* Brasil-Lima, 1986; off Rio Grande do Sul, Brazil; depth and precise position not stated.
- Rocinela propodialis* Richardson, 1905b; Admiralty Inlet, Port Townsend, Alaska; 27–48 m; in need of redescription.
- Rocinela richardsonae* Nierstrasz, 1931; Banda Sea, Indonesia; 560 m; known from a single female specimen, in need of redescription.
- Rocinela signata* Schioedte & Meinert, 1879b; East Pacific from California to Ecuador; western Atlantic and Caribbean from Florida to Brazil; intertidal to 68 m (Brusca & France 1992).
- Rocinela sila* Hale, 1925; Port Adelaide, South Australia (depths not stated).
- Rocinela tridens* Hatch, 1947; Washington State, USA; in need of redescription.
- Rocinela tropica* Brasil-Lima, 1986; Vitória, Espírito Santo, Brazil, 18°38'S, 39°34'W; depth not stated.
- Rocinela tuberculosa* Richardson, 1898; Gulf of California; 15–33 m (Brusca & France 1992).
- Rocinela wetzeri* Brusca & France, 1992; East Pacific at Galapagos Islands and off Costa Rica; 1157–2000 m.

#### *Systemus* Harger, 1880

- Systemus atlanticus* Kononenko, 1988; western North Atlantic; 730–200 m (Kensley 2004; Brandt & Andres 2008).
- Systemus infelix* Harger, 1880; North Atlantic and Mediterranean; 70–2071 m (Kensley 2004).
- Systemus intermedius* Richardson, 1910; to the south of Hong Kong, South China Sea, 20°37'N, 115°43'E; 380–380 m, and Banda Sea, Indonesia (see p. 241).
- Systemus karu* Bruce, 2005; southwestern Pacific, off Vanuatu, with prominently bulbous and faceted eyes; 480–455 m.
- Systemus peruanus* Menzies & George, 1972; tropical East Pacific, off Peru, at approximately 7°S; the species is known from a single juvenile specimen, with faceted eyes present; atypically deep for the genus at 4526–4609 m.

#### *Xenuraega* Tattersall, 1909

- Xenuraega ptilocera* Tattersall, 1909; north-eastern Atlantic; 310–1250 m (Tattersall 1911, Bruce 1993a).

## ROSS SEA AND ANTARCTIC ISLANDS (BALLENY ISLANDS) SPECIES

*Aegiochus antarctica* (Hodgson, 1910), comb. nov.  
(Fig. 137)

*Aega australis* Richardson, 1906a: 187 (name pre-occupied,  
*Aega australis* Whitelegge, 1901).

*Aega australis* Richardson, 1906b: 850.

*Aega australis* Richardson, 1908: 4, figs 8–11.

*Aega antarctica* Hodgson, 1910: 17, pl. 2.– Richardson, 1913:  
4.

*Aega antarctica*.– Tattersall, 1921: 211.– Monod, 1926: 5.– Hale,  
1937: 19; 1952: 28.– Kussakin, 1967: 224; 1982: 74.– Amar  
& Roman, 1974: 582.– Arnaud, 1974: 647.– Jaramillo,  
1977: 60, fig. 1.– Schultz, 1978: 31, fig. 7.– Wägele,  
1990: 521.– Brandt, 1991: 221, figs 2–4.– Nunomura,  
2005: 68, fig. 4.

*Aega koltuni* Kussakin, 1967: 228, figs 5, 6; 1982: 74.– Kensley,  
2001: 227 (**new synonymy**).

*Aega* (*Rhamphion*) *koltuni*.– Brusca, 1983: 11.

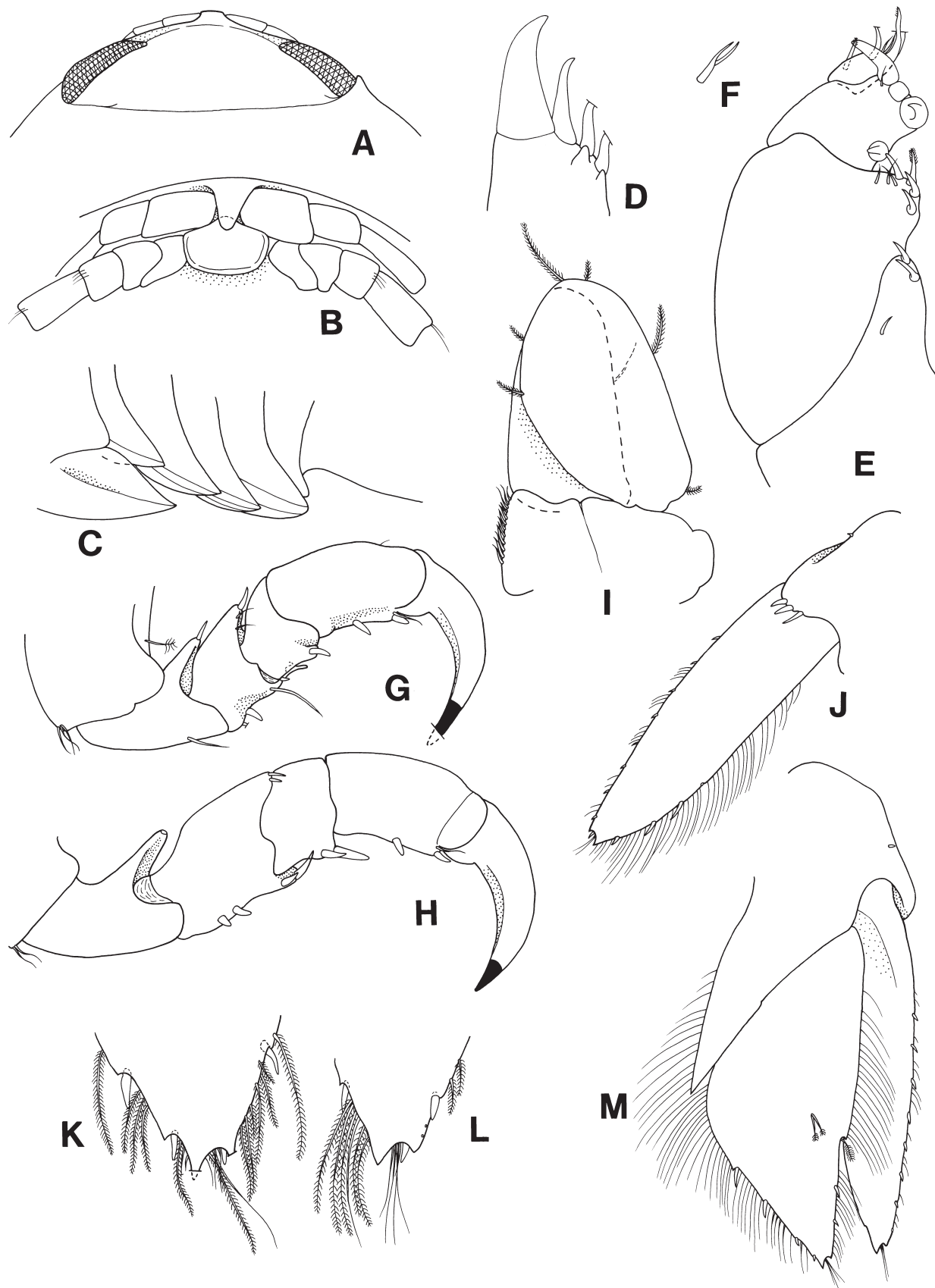
MATERIAL EXAMINED: Paratype of *Aega koltuni* (c. 24 mm, head and pereonite 1 missing), Elephant Island, South Shetlands, 61°15'S, 57°48'E, 10 June 1958, *Ob'* stn 460, 370–400 m, coll. Koltunin (LiN RAN 2 N4614).

**Antarctic Ross Sea and Balleny Islands:** 2♀ (non-ovig. 18.5, 24 mm), 77°05'S, 164°12'E, 24 January 1912, 256 m, *Terra Nova* stn 339 (NMNZ Cr.1093). ♀ (non-ovig. 23 mm), RV *Tangaroa* stn K0803/29 (NIWA 24004). **Cape Adare:** ♀ (non-ovig. or imm. 12.5 mm), 71°43.88'S, 171°45.00'E, 5 February 2004, 451 m, gravel, small stones, shell, coral (NIWA 23660); ♀ (non-ovig. 23 mm), 71°43.67'S, 171°44.12'E, 5 February 2004, 397–389 m, coral, rubble, shell (NIWA 23661); ♀ (non-ovig. 22 mm), 72°08.04'S, 171°26.92'E, 26 February 2004, 466–438 m, coral and rubble (NIWA 23662). 2♀ (non-ovig. 18.0, 12.5 mm), manca (9.5 mm), southern rookery, Cape Bird, 1 February 1971, 83 m, sponge and hydroid bottom, coll. GSK & JKL (AMP43971). **Balleny Islands:** ♀ (non-ovig. or imm. 15.0 mm), 67°25.07'S, 163°54.93'E, 4 March 2004, 230–228 m, rubble (NIWA 23663); 2♀ (non-ovig. or imm. 12.0, ovig., damaged [head missing] ~20 mm), 65°24.76'S, 160°53.22'E, 7 March 2004, 114–151 m (NIWA 23664).

**NIWA 'old' Ross Sea collections** (specimens not measured). 1, Cape Armitage, McMurdo Sound, 20 April 1957, fish trap on seabed under bay ice, 122 m, stn Z15091 (NIWA 23665); 4, stn 298, Cape Evans, 77°38.0'S, 166°20.0'E, 23 February 1958, beam trawl, 124 m, stn Z15049 (NIWA 23666); 1, SU124\*, 27 December 1958, Loc. E, eel trap, stn Z15092 (NIWA 23667); 1 (very poor condition), 3 January 1959, Trap A, on surface (NIWA 23668); 2, A449, 77°05'S, 177°12'E, 11 January 1959, soft gritty mud, 362 m (NIWA 23669; two lots); 2, A457, 77°35'S, 173°18'E, 16 January 1959, (NIWA 23670); ~15 (2 lots, poor condition), A456, Pennell

Bank, 74°30'S, 179°40'E, 15 January 1959, 238–301 m (NIWA 23671); 1, A464, 73°20'S, 173°00'E, 22 January 1959, 369–384 m, sand and pebbles (NIWA 23672); 2, A468, east of Beaufort Is, 76°59'S, 167°36'E, 26 January 1959, 110 m (NIWA 23673); 2, A471, off Cape Evans and Barne Glacier, 77°37'S, 166°20'E, 6 February 1959, 165–169 m (NIWA 23674); 2, A533, Cape Barne, 77°35'S, 166°10'E, 16 February 1960, #27, 97–183 m (NIWA 23675); 1, south of Cape Armitage, McMurdo Sound, 77°51.90'S, 166°43.23'E, 2 November 1961, Dearborn loc. 61D, trap, NIWA stn Z15098 (NIWA 23696). 1, Cape Armitage, 5 February 1957, from seal stomach, 'stn' 379, Transantarctic (N.Z.) Expedition (NIWA 23676); 1, south of Hut Point, McMurdo Sound, 77°51.23'S, 166°39.02'E, 2 May 1959, SU126, Dearborn loc. M, 38 m (D.S.T.), NIWA stn Z15093 (NIWA 23677); 1, SU117, 4 January 1960 (NIWA 23678); 1, SU120, Cape Evans, 22 January 1960, Weddell seal stomach (NIWA 23679); 1, south of Hut Point, McMurdo Sound, 77°51.23'S, 166°39.02'E, 3 September 1959, SU118, Dearborn loc. M, 38 m, NIWA stn Z15094 (NIWA 23680); 1, off Arrival Heights, McMurdo Sound, 77°50.01'S, 166°35.92'E, 26 November 1959, SU127, Dearborn loc. S, 64.5 m, NIWA stn Z15095 (NIWA 23681); 1, off Hut Point, McMurdo Sound, 77°51.05'S, 166°37.50'E, 29 November 1959, SU123, Dearborn loc. P, 57 m, NIWA stn Z15096 (NIWA 23682); 1, off Arrival Heights, McMurdo Sound, 77°49.92'S, 166°34.692'E, 6 December 1959, SU121, Dearborn loc. T, surface (NIWA 23683); 1, 13 June 1961 (NIWA 23684); 1, SN23, 29 June 1961, trap, ½ m net, Dearborn loc. 61D, NIWA stn Z15098 (NIWA 23685); 1, 3 August 1961, trap, Dearborn loc. 61D, NIWA stn Z15098 (NIWA 23686); 1, 28 September 1961, Dearborn loc. 61D, trap, NIWA stn Z15098 (NIWA 23687); 4, 13 October 1961, Dearborn loc. 61D, trap, NIWA stn Z15098 (NIWA 23688); 1, southeast of Cape Armitage, McMurdo Sound, 77°51.99'S, 166°43.23'E, 16 October 1961, 278–290 m, Dearborn loc. 61B, trap, NIWA stn Z15099 (NIWA 23689); 1 (2 lots), 26 October 1961, Dearborn loc. 61D, trap, NIWA stn Z15098 (NIWA

\*The SU prefix indicates the Stanford University Antarctic invertebrate studies carried out in the Ross Sea in the period 1958–61. However, the 'SU' prefix and number as recorded on the specimen labels do not relate to anything in the published station list (Dearborn 1967). Similarly the dated numbers of the format '61D' could not be related with any confidence to stations in the former New Zealand Oceanographic Institute station list (Bullivant 1967). The precise location of the material without coordinates remains unconfirmed.



**Figure 137.** *Aegiochus antarctica* (Hodgson, 1910). All NIWA 23661. A, head, dorsal view; B, frons; C, pleonites, lateral view; D, maxillule apex; E, bifid seta, distal margin of maxilliped palp article 5; F, maxilliped palp articles 4-5; G, pereopod 1; H, pereopod 2; I, pleopod 1; J, uropod exopod, ventral view; K, uropod endopod, apex; L, uropod endopod, apex; M, uropod.

23690); 1, 31 October 1961, Dearborn loc. 61D, trap, NIWA stn Z15098 (NIWA 23691); 2, Pennell Bank, 74°20'S, 179°30'E, 3 February 1960, A520#24, 201–205 m (NIWA 23692); 1, Cape Barne, 77°36.77–36.00'S, 166°08.0–12.0'E, A534#24, 380–366 m (NIWA 23693); 1, probably off Hut Point, McMurdo Sound, 77°50.95'S, 166°37.72'E, 22 December, SU122, Dearborn loc. Hole C, NIWA stn Z15100 (NIWA 23694); 1, off northwestern shore of Cape Armitage, 77°51.42'S, 166°38.73'E, 31 December 1959, SU125, Dearborn loc. W, 53 m, NIWA stn Z15101 (NIWA 23695).

SUPPLEMENTARY DESCRIPTION: *Body* 2.3 times as long as greatest width, with lateral margins subparallel or ovate. Rostral point folded ventrally and posteriorly. *Eyes* small, combined widths less than 50% width of head, separated by about 45% width of head; each eye made up of ~12 transverse rows of ommatidia, each row with ~8 ommatidia; eye colour black. *Pereonite 1 and coxae* 2–3 each with posteroventral angle right-angled. *Coxae* 5–7 with entire oblique carina; posterior margins straight, posterolateral angle acute (less than 45°). *Pleon* with pleonite 1 visible in dorsal view; pleonite 4 with posterolateral margins extending to but not beyond posterior margin of pleonite 5; pleonite 5 with posterolateral angles free, not overlapped by lateral margins of pleonite 4. Dorsal surface with weak longitudinal ridge; pleotelson lateral margins straight, serrate, pleotelson posterior margin with distinct short median point, with 10 robust setae.

*Antennule* peduncle articles 1 and 2 slender, article 2 without distal lobe; flagellum extending to posterior of pereonite 1. *Antenna* flagellum extending to middle of pereonite 3.

*Frontal lamina* posterior margin free, downwardly projecting, blade-like, wider than long, rectangular, anterior margin with median point, forming median angle, posterior margin not abutting clypeus.

*Mandible* molar process present, small distinct flat lobe; palp article 2 with 12 distolateral setae, palp article 3 with 26 setae. *Maxillule* with 4 terminal RS (one large, 3 slender). *Maxilla* mesial lobe with 3 RS; lateral lobe with 3 RS. *Maxilliped* endite with 0 apical setae; palp article 2 with 2 RS (slender); article 3 with 4 recurved RS (and 3 short slender); article 4 with 4 hooked RS; article 5 articulating with article 4, longer than wide, sub-rectangular, with 4 RS (and 1 bifid seta).

*Pereopod 1* ischium inferior margin with 0 RS, superior distal margin with 1 RS; merus inferior margin with 4 RS (and 1 long simple seta), set as two groups (set as 2 and 2), superior distal angle with 1 RS (and 2 short simple setae); 1 RS; propodus 1.9 times as long as proximal width, 2 RS, propodal palm simple, without blade or process, dactylus smoothly curved, 1.2 as long as propodus. *Pereopod 2* ischium inferior margin

with 0 RS, superior distal margin with 1 RS; merus inferior margin with 4 RS, set as two groups (set as 2 and 2), superior distal margin with 2 acute RS; carpus similar in size to that of pereopod 1, inferodistal angle with 2 RS. *Pereopod 3* similar to pereopod 2; propodus without large club-shaped distal robust seta. Inferior margins with 11 palmate setae; margin with 2 RS (in 2 groups), superior distal angle with 4 RS, distal angle with 4 RS.

*Pleopod 1* exopod 1.7 times as long as wide, distally broadly rounded, lateral margin straight, mesial margin strongly convex, with PMS from distal half; endopod 2.0 as long as wide, distally narrowly rounded, lateral margin straight, with PMS from distal half, mesial margin with PMS on distal one-third; peduncle 2.0 as wide as long, mesial margin with 8 coupling hooks. *Pleopod 2 appendix masculina* basally swollen, 1.3 times as long as endopod (Brandt 1991), distally acute (with acute scales mid-length).

*Uropod* peduncle ventrolateral margin with 3 RS, posterior lobe about three-quarters as long as endopod. Uropod rami extending beyond pleotelson, marginal setae in single tier, apices acute. *Endopod* apically sub-bifid, mesial process prominent, lateral margin proximally straight, without prominent excision, proximal lateral margin with 0 RS, distal lateral margin with 2 RS (and 1 in notch), mesial margin straight, with 4 RS. *Exopod* extending to end of endopod, 3.3 times as long as greatest width, apically deeply bifid or sub-bifid, medial process prominent; lateral margin weakly convex, with 8 RS; mesial margin straight, distally convex, with 4 RS.

SIZE: Recently collected material from the Ross Sea, all female, 12–24 mm; Brandt (1991) recorded 10–20 mm for males, 17–30 mm for ovigerous females.

VARIATION: Ross Sea specimens, collected 2004. *Robust setae*: pleotelson ( $n=9$ ) RS 8–13 ranging from 4+4 to 7+6 with 5+5 (33%), 5+6 (22%) and 6+6 (22%) most frequent. Uropod ( $n=16$ ) exopod mesial margin 3–5 with 4 (50%) or 5 (44%) most frequent, lateral margin 8–10 with 8 (44%) and 9 (50%) most frequent; uropod endopod mesial margin varied from 5–10 RS with 5 (31%) and 6 (25%) the most frequent, lateral margin variable, with 0+2, 0+3, 1+2 and 1+3; the most frequent counts were 1+2 (50%) and 1+3 (44%).

REMARKS: *Aegiochus antarctica* is readily identified by the small eyes that are little larger than 'cirolanid size' in conjunction with a short pleotelson that has an ill-defined but distinct median longitudinal ridge. At the northern limits of its distribution the species may be sympatric with other congeners, but multiple characters of eye size, frontal lamina shape, presence of

flattened antennule peduncle articles, and pereopodal and uropodal details will separate those species from *A. antarctica*.

Comparison of the type material of *Aegiochus koltuni* (Kussakin, 1967) reveals no differences from *Aegiochus antarctica*. Kussakin (1967) in describing *A. koltuni* made no reference to *A. antarctica*, comparing only with the rather more different *Aega magnifica*; *A. koltuni* is here placed in synonymy with *Aegiochus antarctica*.

Nunomura (2005) recorded this species from 20°E off Antarctica (western sector of the southern Indian Ocean), and commented on a number of differences from other, unspecified, descriptions. While the identification is probably correct, unfortunately the illustrations in Nunomura's account are of insufficient accuracy and detail to allow for comparison with material at hand from the Ross Sea or with other figured descriptions (e.g. Hodgson 1910 or Brandt 1991).

The original date of publication has been somewhat confused, in part by Richardson's (1913) reluctance to accept that she was not attributed authorship of the new name published by Hodgson (1910), and by the repeated publication of the description as a new species. Irrespectively, the correct name, and authority, is *Aegiochus antarctica* (Hodgson, 1910).

Wägele (1990) documented the growth and reproductive biology of this species in captivity.

**DISTRIBUTION:** A widespread and apparently common species, with numerous records from the Weddell Sea, the Ross Sea and subantarctic islands of the Southern Ocean; the northerly records are at about 60° South; at depths (present material) of 38–1300 m, with all but one record less than 450 metres; Brandt (1991) recorded a maximum depth of 710 m.

*Aegiochus glacialis* (Tattersall, 1921), comb. nov.  
(Fig. 138)

*Aega glacialis* Tattersall, 1921: 211, pl. 4, figs 1–10.– Monod, 1926: 5.– Hale, 1937: 19; 1952: 28.– Kussakin, 1967: 225; 1982: 74.– Brandt, 1991: 216, fig. 1, 4 (tel 2).

*Aega* (*Ramphion*) *glacialis*.– Brusca, 1983: 11.

**MATERIAL EXAMINED:** **All Ross Sea:** ♀ (non-ovig. 36 mm), 71°44.11–88°S, 171°44.00–43.15'E, 5 February 2004, 429–454 m (NIWA 23697); ♀ (non-ovig. 37 mm), Hut Point, McMurdo Sound, 30 January 1960, 300 m (NIWA 23698). 2 ♂ (21 mm, ~18 mm head missing), McMurdo Sound, RS14 (NIWA 23699).

**NIWA 'old' collections** (specimens not measured): SU119\*, 10 January 1960, Dearborn loc. X, 135 m, trap (NIWA 23700); 1, southeast of Cape Armitage,

McMurdo Sound, 77°51.99'S, 166°43.23'E, 8 July 1961, Dearborn loc. 61B, 271–290 m, trap (NIWA 23701); 2, southeast of Cape Armitage, McMurdo Sound, 77°51.99'S, 166°43.23'E, 24 July 1961, Dearborn loc. 61B, 271–290 m, trap (NIWA 23702); 1, southeast of Cape Armitage, McMurdo Sound, 77°51.99'S, 166°43.23'E, 8 August 1961, 271–290 m, Dearborn loc. 61B, trap (NIWA 23703); 1, 25 August 1961, Dearborn loc. 61B, trap (NIWA 23704); 1, 14 September 1961, Dearborn loc. 61D, trap (NIWA 23705); 1, 6 October 1961, Dearborn loc. 61B, trap (NIWA 23706); 2, 16 October 1961, Dearborn loc. 61B, trap (NIWA 23707).

*Also examined:* ♂ (20 mm), Antarctica (Atlantic sector), 75°15'S, 26°14'W, 29 January 1909, 500 m, EPOS3, stn 229, GSN6, Petersen, Tendal & Schiøtte on RV *Polarstern* (ZMUC unreg).

**SUPPLEMENTARY DESCRIPTION:** Rostral point folded ventrally and posteriorly. *Eyes* large, not medially united, separated by about 19% width of head; each eye made up of ~23 transverse rows of ommatidia, each row with ~12–16 ommatidia; eye colour black. *Pleon* with pleonite 4 with posterolateral margins extending clearly beyond posterior margin of pleonite 5; pleonite 5 with posterolateral angles free, not overlapped by lateral margins of pleonite 4. *Pleotelson* 0.9 times as long as anterior width, dorsal surface with weak longitudinal ridge; lateral margins weakly concave, smooth, posterior margin with distinct short median point, with 10–14 RS.

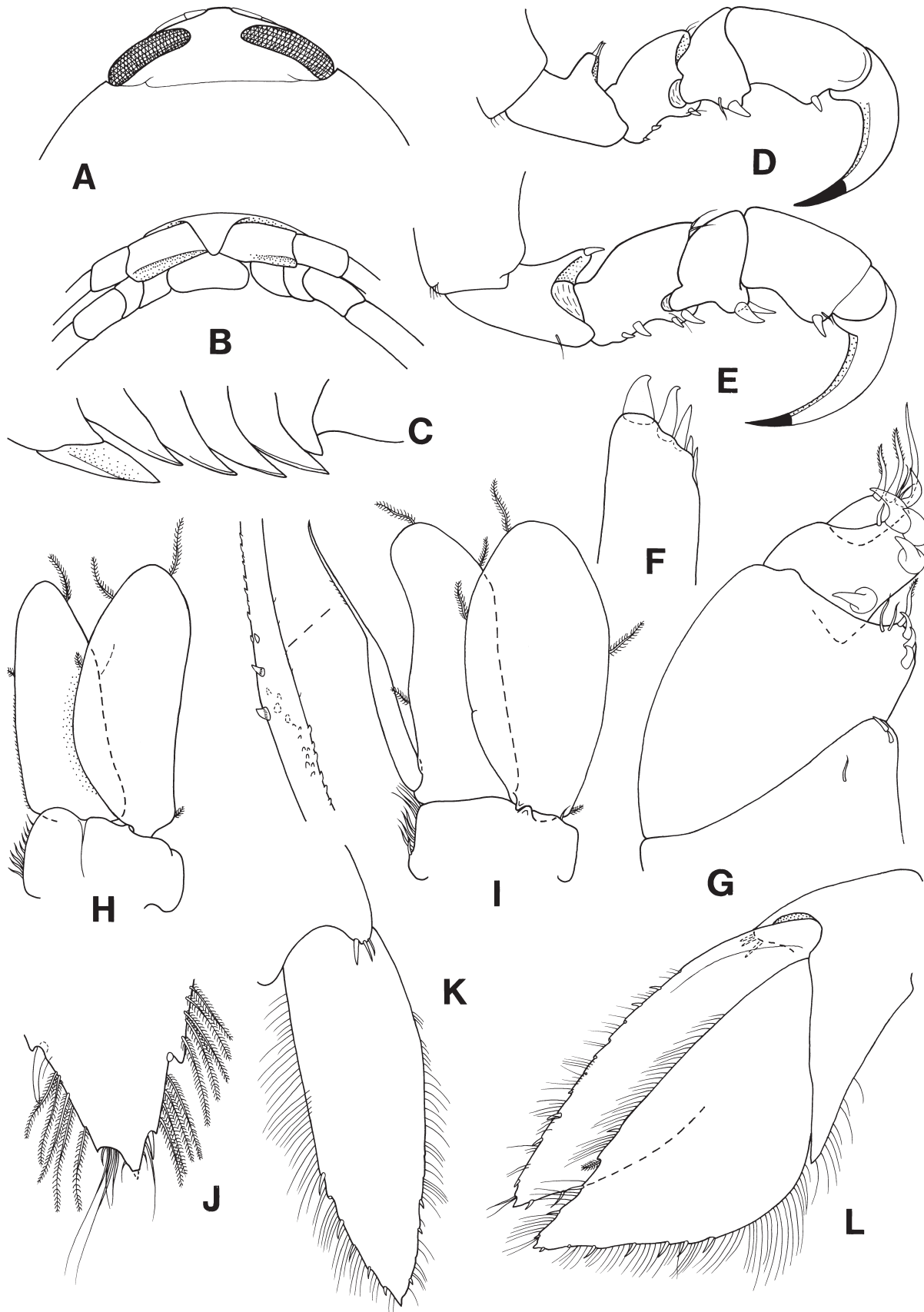
*Antennule* peduncle articles 1 and 2 slender, article 2 without distal lobe; flagellum extending to pereonite 2. *Antenna* flagellum extending to middle of pereonite 3.

*Frontal lamina* posterior margin free, downwardly projecting, blade-like, wider than long, posterior margin concave (weakly), anterior margin rounded, posterior margin not abutting clypeus.

*Maxillule* with 4 or 5 terminal RS (one large, 3 or 4 slender). *Maxilla* lateral lobe with 3 RS. *Maxilliped* palp article 2 with 3 RS (slender); article 3 with 3 recurved RS (and 3 straight); article 4 with 4 hooked RS (and 1 mesial short slender seta); article 5 articulating with article 4, longer than wide, sub-rectangular, with 6 RS (3 long, serrate, 1 curved and 2 short).

*Pereopod 1* ischium inferior margin with 0 RS, superior distal margin with 1 RS; merus inferior margin with 3 RS (and one simple seta), set as two groups (of 2 and 1), superior distal angle with 0 RS; carpus inferior margin with 1 RS (and 1 simple seta); propodus 1.9 times as long as proximal width, 1 RS, propodal palm with small distal lobe, dactylus smoothly curved, 1.2 as long as propodus. *Pereopod 2* ischium inferior margin with 0 RS, superior distal margin with 1 RS; merus inferior margin with 4 RS (distal RS large, proximal small), set as two groups, superior distal margin with

\*See comments concerning station data under 'material examined' for *A. antarctica*, p. 231.



**Figure 138.** *Aegiochus glacialis* (Tattersall, 1921). All NIWA 23697. A, head, dorsal view; B, frons; C, pleonite, lateral view; D, pereopod 1; E, pereopod 2; F, maxillule apex; G, maxilliped palp articles 4-5; H, pleopod 1; I, pleopod 2; J, uropod exopod, apex; K, uropod exopod, ventral view; L, uropod.

0 acute RS (2 simple setae); carpus similar in size to that of pereopod 1, inferodistal angle with 2 RS (set on inferodistal lobe). *Pereopod* 3 similar to pereopod 2; propodus without large club-shaped distal RS.

*Penes* low, mutually adjacent tubercles.

*Pleopod* 1 exopod 2.6 times as long as wide, distally narrowly rounded, mesial margin weakly oblique, lateral margin straight, mesial margin strongly convex, with PMS from distal half; endopod 2.6 times as long as wide, distally narrowly rounded, lateral margin sinuate, with PMS from distal one-third, mesial margin with PMS on distal one-third; peduncle 1.8 times as wide as long, mesial margin with 9 coupling hooks. *Pleopod* 2 *appendix masculina* basally swollen, 1.04 times as long as endopod, distally acute (with acute scales mid-length).

*Uropod* peduncle ventrolateral margin with 3 RS, posterior lobe about one-third as long as endopod. *Uropod* rami not extending beyond pleotelson, marginal setae in single tier, apices acute. *Endopod* apically sub-bifid, mesial process prominent, lateral margin sinuate, without prominent excision, proximal lateral margin with 1 RS, distal lateral margin with 3 RS, mesial margin straight, with 7 RS. *Exopod* extending to end of endopod, 3.2 times as long as greatest width, apically sub-bifid, mesial process prominent; lateral margin weakly convex, with 12 RS; mesial margin convex, with 6 RS.

REMARKS: A full description of *Aegiochus glacialis* has been given by Brandt (1991). The species is readily separated from *A. antarctica*, the only other Antarctic species, by the far larger eyes, the inferior margin of the carpus of pereopods 2 and 3 being lobate and the distal margin of the palm of pereopod 1 being weakly lobed (compared to not lobed in *A. antarctica*); adult *A. glacialis* are also somewhat larger than *A. antarctica* with an adult size exceeding 30 mm (maximum here of 37 mm), while *A. antarctica* has not been recorded at a size greater than 24 mm.

*Aega australis* Richardson, 1906 is not a synonym of *Aegiochus glacialis*, contrary to the synonymy given by Brandt (1991) for *Aegiochus glacialis*, but a junior homonym of *Aega australis* Whitelegge, 1901, a valid species, and a junior subjective synonym of *Aegiochus antarctica* [Brandt (1991) did not give a synonymy for *A. antarctica*].

DISTRIBUTION: Multiple records from the Ross Sea and the Weddell Sea; the most northerly record is at approximately 72° South (Brandt 1991 – though not all station data are provided for Brandt's material); depth range 15–700 m (Brandt 1991).

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## APPENDIX 1. INVALID AEGID NAMES

Included here are species no longer in the family as a consequence of being junior synonyms, relegated to species inquirenda or nomen dubium, or having been transferred to other combinations or placed in other families.

- Aega affinis* H. Milne Edwards, 1840; no locality was given by Milne Edwards (1840) for this species which, with only four lines of description, remains incertae sedis [Milne Edwards also used the 'popular' name of *Aega voisine*]; regarded as a junior synonym of *Aega psora* by Kussakin (1979). This is not *Rocinela affinis* Richardson, 1904a.
- Aega alaskensis* Lockington, 1877; now in *Rocinela*.
- Aega australis* Richardson, 1906b (and Richardson, 1908); junior homonym of *A. australis* Whitelegge, 1901; = *Aega antarctica* Hodgson, 1910.
- Aega basalis* Heller, 1868; *Corallana* (Corallanidae).
- Aega belliceps* Stimpson, 1864; now in *Rocinela*.
- Aega bicavata* Nordenstam, 1930; = *Aega semicarinata* Miers, 1875.
- Aega dubia* Richardson, 1910; = *Aega vigilans* Haswell, 1881.
- Aega edwardsii* Dollfus, 1891; = *Aega punctulata* Miers, 1881 (present study, see Appendix 2, p. 235).
- Aega efferata* Dana, 1853; nomen dubium.
- Aega emarginata* Leach, 1815; = *Aega psora* Linnaeus, 1758.
- Aega entaille* Latreille, 1829; = *Aega psora* Linnaeus, 1758.
- Aega giganteocula* Nunomura, 1988a; = *Aegiochus vigilans* Haswell, 1881 (present study, p. 150).
- Aega harfordi* Lockington, 1877; long placed in *Cirolana* Leach, 1818 (Cirolanidae).
- Aega hirta* White, 1847; nomen nudum; subsequently cited by Hansen (1890) and listed by Nierstrasz (1931); see Clarke and Preswell (2001).
- Aega interrupta* von Martens, 1868; = *Alitropus typus* Milne Edwards, 1840.
- Aega koltuni* Kussakin, 1967; = *Aega antarctica* Hodgson, 1910 (present study, p. 226).
- Aega loveni* Bovallius, 1886; = *Aega ventrosa* Sars, 1859.
- Aega macronema* Bleeker, 1857; now in *Argathona* (Corallanidae).
- Aega magnoculis* Richardson, 1909; = *Aega plebeia* Hansen, 1897.
- Aega maorum* Filhol, 1885; = *Pseudaega punctata* (Thomson, 1884) (Cirolanidae).
- Aega meinerti* Miers, 1884; = *Aega serripes* Milne Edwards, 1840.
- Aega multidigita* Dana, 1853; now in *Alcirona* (Corallanidae).
- Aega novizelandiae* Dana, 1853; nomen dubium (present study, p. 211).
- Aega ommatophylax* Stebbing, 1905; = *Aega vigilans* Haswell, 1881.
- Aega ornata* Richardson, 1911; now in *Tridentella* Richardson, 1905 (Tridentellidae Bruce, 1984).
- Aega schioedteana* Bovallius, 1885; = *Aega deshaysiana* (Milne Edwards, 1840).
- Aega stroemii* Lütken, 1859; = *Aega bicarinata* Rathke, 1837.
- Aega tumida* Nunomura, 1988b; there is little to differentiate this species from the poorly known *Aegiochus spongiophila* (Semper, 1867), the likelihood of *A. tumida* being a junior synonym being further strengthened by the fact that both species are known only from 'glass' sponges (Hexactinellidae).
- Acherusia rotundicauda* Lilljeborg, 1851; = *Rocinela danmoniensis* Leach, 1818.
- Acherusia complanata* Grube, 1864; = *Rocinela dumerilii* (Lucas, 1849)
- Aegiochus nordenskjoeldii* Bovallius, 1885; = *Aega ventrosa* M. Sars, 1859.
- Alitropus dimorphus* Pillai, 1954; = *Alitropus typus* Milne Edwards, 1840.
- Alitropus foveolatus* Schioedte and Meinert, 1879b; = *Alitropus typus* Milne Edwards, 1840.
- Harponyx pranizoides* Sars, 1882; = *Syscenus infelix*, Harger, 1880.
- Rocinela aries* Schioedte and Meinert, 1879b; = *Rocinela signata* Schioedte and Meinert, 1879 (see Brusca & France 1992).
- Rocinela alascensis* (Stimpson, 1864); = *Rocinela belliceps* (Stimpson, 1864).
- Rocinela deshaysiana* Milne Edwards, 1840; long placed in *Aega*; now in *Aegapheles*.
- Rocinela latis* Southwell, 1915: 321, figs 12–15; a species of *Nerocila*, aegathoid stage, from *Lates calcarifer*.
- Rocinela lilljeborgii* Bovallius, 1885; = *Syscenus infelix*, Harger, 1880.
- Rocinela major* Brocchi, 1877; southern Indian Ocean, St. Paul Island; the identity of this species is entirely unknown and there is no information on the whereabouts of any potential type material; here regarded as **nomen dubium**.
- Rocinela mundana* Lanchester, 1902; = *Alitropus typus* Milne Edwards, 1840.
- Rocinela ophthalmica* Milne Edwards, 1840. Type locality Sicily. No further data than that given by Milne Edwards (1840) are available. Milne Edwards stated that *Aega deshaysiana* (then as *Rocinela deshaysiana*) was very similar to this species, and it is possible that it is a species of *Aega*. *Species inquirenda*.
- Rocinela simplex* Chilton, 1926; = *Alitropus typus* Milne Edwards, 1840.

## APPENDIX 2. EXTRA-LIMITAL SPECIES

The species included here are some of those in need of at least partial redescription because of their similarity to New Zealand species in the body of the monograph. Some of these have been placed in synonymy with older names at some point. For most species the descriptive notes are based solely on the type material.

*Aega angustata* Whitelegge, 1901 (Figs 139, 140)

*Aega angustata* Whitelegge, 1901: 232, fig. 21a-21f.- Hale, 1925: 170, fig. 20.- Nierstrasz, 1931: 182.- Bruce, Lew Ton & Poore, 2002: 160.

*Aega (Aega) angustata*.- Brusca, 1983: 10.

Not *Aega angustata*.- Stephenson, 1980: 153, figs 1-5 (misidentification, = *Aega komai* Bruce, 1996).

Not *Aega angustata*.- Trilles & Justine, 2004: 220, figs 6, 7 (misidentification, = undescribed species).

MATERIAL EXAMINED: *Holotype*, ♂ (14.3 mm), 5.5-6.5 km off Wattamolla, NSW, 34°10'S, 151°11'E, 22 March 1898, stn 57, 99-108 m, coll. E.R. Waite on HMCS *Thetis* (AM G2160). ♂ (17.0 mm), Bass Strait, 81-HK-1, stn 148/29, from *Raja* (NMV J8878). ♂ (17.5 mm), BSS stn 157 (NMV J8882).

DESCRIPTION: *Body* 3.7 times as long as greatest width, dorsal surfaces smooth or polished in appearance, widest at pereonite 5 or pereonite 6, lateral margins subparallel. Rostral point projecting anteriorly, not ventrally folded. *Eyes* large, not medially united, separated by about 30% width of head. *Pereonite 1 and coxae* 2-3 each with posteroventral angle rounded. *Coxae* 5-7 with entire oblique carina; posterior margins convex, posterolateral angle rounded. *Pleon* with pleonite 1 largely concealed by pereonite 7; pleonite 4 with posterolateral margins extending clearly beyond posterior margin of pleonite 5; pleonite 5 with posterolateral angles free, not overlapped by lateral margins of pleonite 4. *Pleotelson* 0.9 times as long as anterior width, dorsal surface with longitudinal carina on distal third; lateral margins weakly convex, deeply serrate, posterior margin with distinct short median point, with 0 RS.

*Antennule* peduncle articles 1 and 2 flattened, article 2 anterodistal lobe extending to end of article 3; articles 3 and 4 0.3 times as long as combined lengths of articles 1 and 2, article 3 3.1 times as long as wide; flagellum with 5 articles, extending to mid-point of eye. *Antenna* peduncle article 2 inferior surface without distinct longitudinal suture; article 5 flattened and expanded, 2.1 times as long as article 4 (in situ); flagellum with 8 articles, extending to posterior of pereonite 1.

*Frontal lamina* flat, longer than greatest width, lateral margins converging posteriorly, anterior margin rounded, without small median point, posterior margin not abutting clypeus.

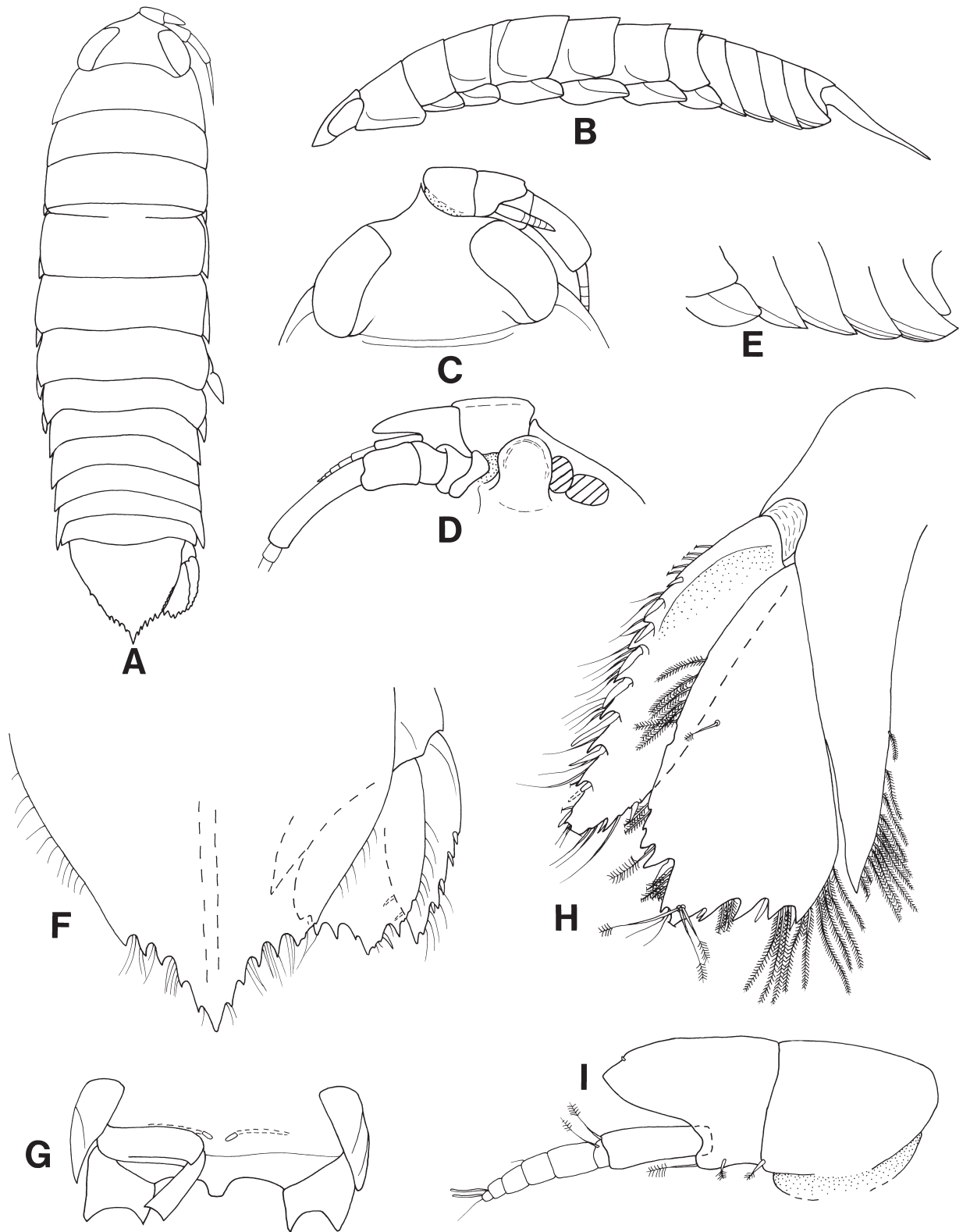
*Pereopod 1* basis 1.9 times as long as greatest width; ischium 0.5 times as long as basis, inferior margin with

0 RS, superior distal margin with 2 RS; merus inferior margin convex and thickened, merus inferior margin with 2 RS (small), set as distal group, superior distal angle with 2 RS; carpus 0.7 as long as merus, inferior margin with 0 RS; propodus 1.3 times as long as proximal width, inferior margin with 1 RS (distal), propodal palm simple, without blade or process, dactylus smoothly curved, 1.3 as long as propodus. *Pereopod 3* ischium inferior margin with 3 RS, superior distal margin with 1 RS; merus inferior margin with 5 RS (set as 3 + 2), set as two groups, superior distal margin with 2 acute RS; carpus longer than that of pereopod 1, with inferodistal lobe, inferodistal angle with 1 RS, propodus with large club-shaped distal RS. *Pereopods 5-7* inferior margins of ischium-carpus with long acute RS. *Pereopod 6* basis 2.9 times as long as greatest width, inferior margins with 6 palmate setae; ischium 0.6 as long as basis, inferior margin with 5 RS (set loosely as 1, 1, 2 and 1), superior distal angle with 5 RS, inferior distal angle with 8 RS; merus 0.7 as long as ischium, 2.0 as long as wide, inferior margin with 6 RS (set loosely as 3 and 3, 4 being submarginal), superior distal angle with 5 RS, inferior distal angle with 5 RS; carpus 0.9 as long as ischium, 3.6 times as long as wide, inferior margin with 4 RS (set as 1 and 3), superior distal angle with 3 RS, inferior distal angle with 6 RS; propodus 1.0 as long as ischium, 6.8 times as long as wide, inferior margin with 3 RS (set as 1 and 2), superior distal angle with 1 slender seta, inferior distal angle with 4 RS.

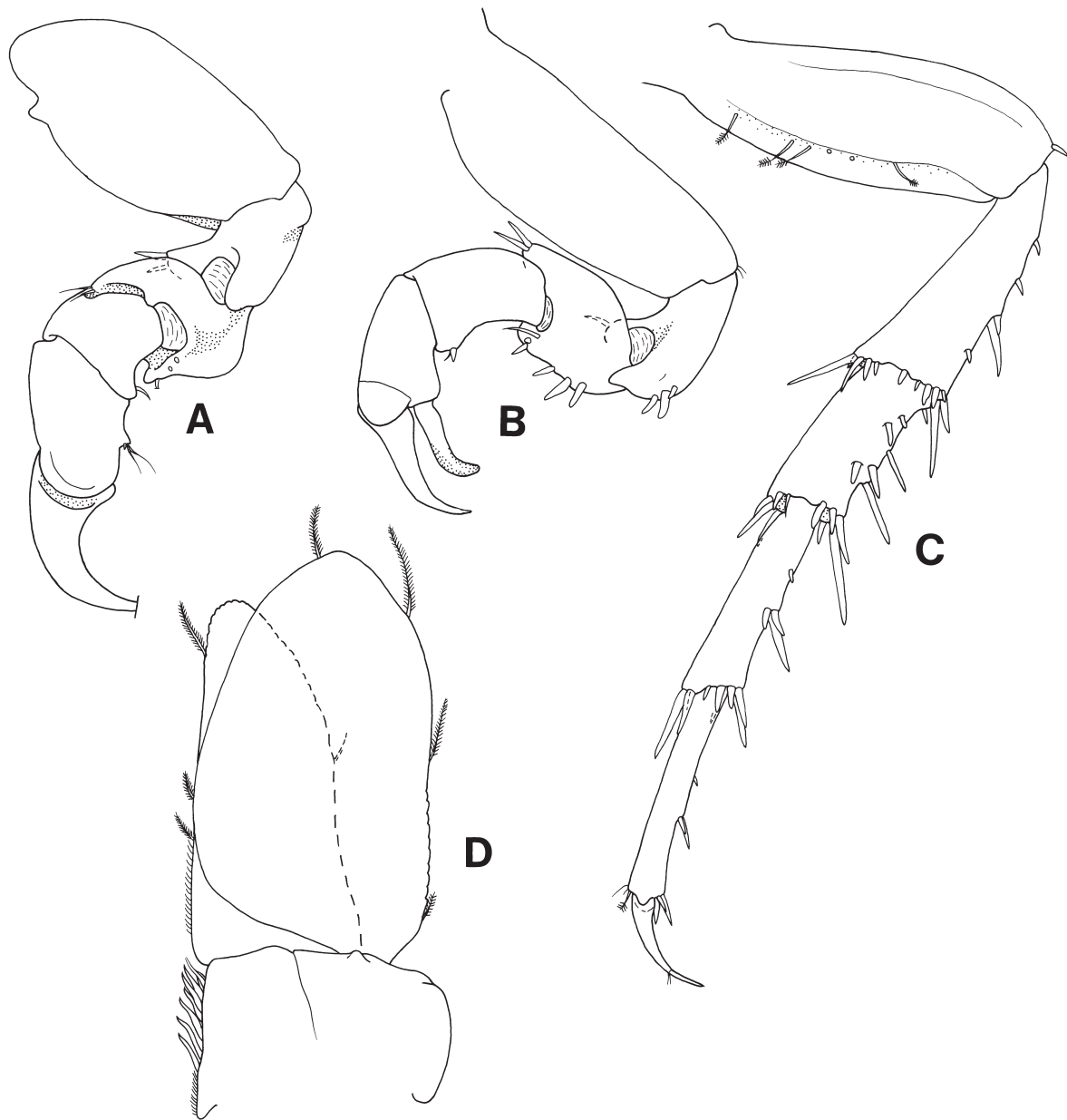
*Penes* short rectangular lobes; penial openings separated by 11% of sternal width, penial process 3.5 times as long as basal width.

*Pleopod 1* exopod 1.8 times as long as wide, distally broadly rounded, lateral margin straight, mesial margin weakly convex, with PMS on distal two-thirds; endopod 1.5 times as long as wide, distally narrowly rounded, lateral margin weakly concave, with PMS on distal half, mesial margin with PMS on distal one-third; peduncle 1.5 times as wide as long, mesial margin with 6 coupling hooks. Exopods of pleopods 1-3 each with distolateral margin not digitate.

*Uropod* peduncle ventrolateral margin with 2 RS, posterior lobe about as long as endopod. Uropod rami with endopod and exopod co-planar, rami not extending beyond pleotelson, marginal setae in single tier, apices acute. *Endopod* apically not bifid, lateral margin proximally convex and distally convex, without prominent excision, proximal lateral margin with 0 RS,



**Figure 139.** *Aega angustata* Whitelegge, 1901. Holotype. A, dorsal view; B, lateral view; C, head; D, frons; E, pleonites, lateral view; F, pleotelson; G, sternite 7; H, uropod; I, antennule.



**Figure 140.** *Aega angustata* Whitelegge, 1901. Holotype. A–C, pereopods 1, 3 and 6, respectively; D, pleopod 1.

distal lateral margin with 1 RS, mesial margin straight (deeply serrate), with 4 RS. *Exopod* not extending to end of endopod, 3.8 times as long as greatest width, apically not bifid; lateral margin weakly sinuate, with 8 RS (prominent); mesial margin sinuate, proximally concave, with 2 RS.

**REMARKS:** An abbreviated description of the holotype is given here to facilitate identification of this species. The specimen was not further dissected, consequently descriptive details were taken from pereopods 3 and 6 rather than the usual 2 and 7. *Aega angustata* is readily

identified by the elongate body, antennule peduncle articles 1 and 2 being strongly compressed and expanded, antenna peduncle article 5 expanded, pereopod 3 with a large robust seta opposing the dactylus, the serrate pleotelson posterior margin, uropods with the rami not extending posterior to the pleotelson apex, the uropodal endopod with a truncate and irregularly serrate posterior margin and the lateral margin of the uropodal exopod with prominent robust setae.

There are several similar species (see remarks for *Aega komai*, p. 37), and *A. angustata* is immediately separated from those species by the lateral margin

of the uropodal exopod lacking serrations and having prominent robust setae. Trilles and Justine (2004) figured a specimen from New Caledonia as having deeply serrate lateral margins to the uropodal endopod and exopod, those margins also lacking robust setae, indicating clearly that their material is not *A. angustata* (there are further differences in pleopod setation but the illustrations are not of a standard that permits confident interpretation).

DISTRIBUTION: Known from southeastern Australia with records from off Sydney to the Bass Strait, Victoria.

*Aega punctulata* Miers, 1881 (Fig. 141)

*Aega edwardsii* White, 1847: 107 (**nomen dubium**; also nomen nudum, see Clark & Preswell 2001).

*Aega punctulata* Miers, 1881: 77, pl. 7, figs 10–12.

*Aega edwardsii* Dollfus, 1891: F58, pl. VIII, fig. 3a–d (**new synonymy**).

*Aega punctulata*.– Nierstrasz, 1931: 184.

*Aega (Aega) punctulata*.– Brusca, 1983: 11.

?*Aega edwardsii*.– Kussakin & Vasina, 1980: 359, fig. 1 [identity uncertain, see 'remarks'].

Not *Aega punctulata*.– Hale, 1937: 17, fig. 5.– Bruce, Lew Ton & Poore, 2003: 161 [misidentification, see 'remarks'].

Not *Aega* cf. *punctulata*.– Barnard, 1960, 95, fig. 2 [identity uncertain, see 'remarks'].

MATERIAL EXAMINED: *Holotype*: ♂ (non-ovig. 29 mm), Wolsely Sound, Straits of Magellan, H.M.S. *Alert* (BMNH 79.18).

*Non-type*: ♀ (non-ovig. 33 mm), Port Stanley, Falkland Is., from mullet's gills, coll. A.G. Bennett (BMNH 1920.7.5.2).

*Aega edwardsii*, ♂ (20 mm), ♀ (non-ovig. 26 mm), *syntypes*; label data: "type (Miss. Sc. du Cap Horn, 8:vi, Zool, Crust, p. 28, '63)" (MNHN Is.2437). [Type locality is 'Baie Orange, Cape Horn' (Dollfus 1891).]

DESCRIPTIVE NOTES: Eyes small, separated by 41% width of head. Body dorsal surfaces coarsely punctate, with abundant stiff setae, these being most dense posteriorly. Frontal lamina anteriorly rounded, posterior margin abutting labrum. Pleotelson posterior margins angled, forming shallow median point, provided with 10–12 (as 5+5 or 6+6) RS. Antenna peduncle article 5 slightly shorter than article 4. Pereopods 1–3 propodal palm with small distal lobe. Pereopod 1 merus inferior margin with 2+3 and 1+3 RS; pereopod 2 merus inferior margin 4+5 RS, arranged as a single proximal row of 4 RS and distal double row; pereopod 3 similar to pereopod 4. Uropod rami extending slightly beyond posterior margin of pleotelson; dorsal surfaces with stiff setae; uropod endopod mesial margin with 7 or 8 RS, lateral with 1+2 RS; uropod exopod mesial with 3 or 4 RS lateral margin with 9 or 10 RS.

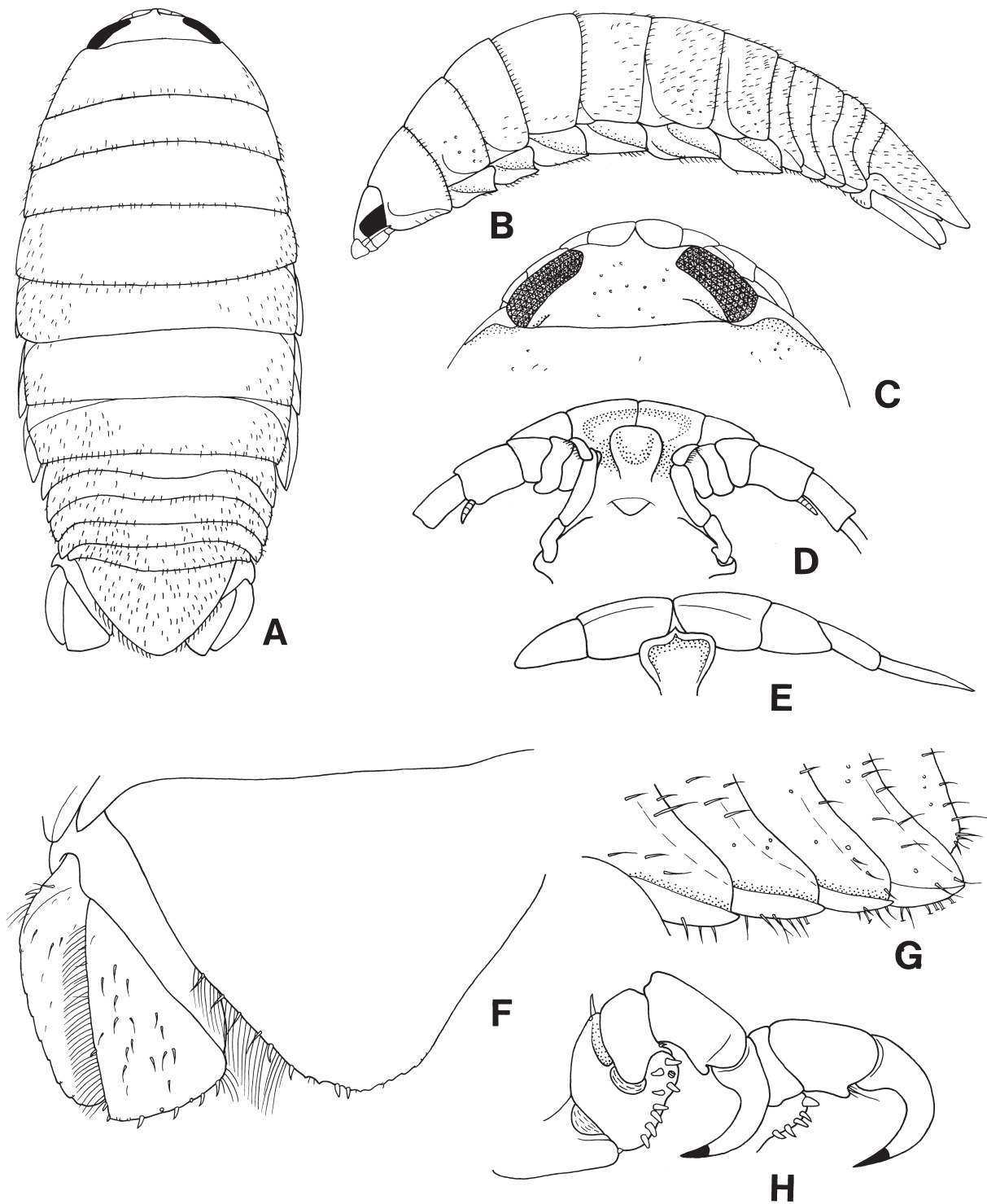
REMARKS: *Aega punctulata* can be immediately identified by the prominent, stiff setae over the dorsal body surfaces, these setae being longest on pereonites 6 and 7, pleon and pleotelson; other distinguishing characters include the relatively small and widely separated eyes (of almost cirrolanid proportions), short antennule (extending only to posterior of head), short antenna (extends to posterior of pereonite 1), pattern of robust setae of the merus of pereopods 1–3, and the shape of the posterior margin of the pleotelson, which is indistinctly angled.

The holotype is in poor condition, having lost the distal articles to all the anterior pereopods. The Port Stanley specimen is largely intact, but the uropods and pleotelson posterior margin are heavily rubbed and the specimen is fragile. The descriptive details provided here were therefore obtained through direct examination.

Menzies (1962) placed *Aega punctulata* into synonymy with *Aega semicarinata* without explanation. Earlier, Hale (1937) had clearly considered the species to be valid. There are substantial differences between *A. punctulata* and *A. semicarinata* and indeed all other species of *Aega*, most particularly the prominently setose dorsal body surfaces, but also the shape of the pleotelson which in *A. semicarinata* is medially excavate, differences in the setation of pereopods 1–3 and in *A. semicarinata* much larger eyes. *Aega urotoma* is similar, but again lacks the setose body surfaces, has a subtruncate posterior margin to the pleotelson, which also lacks robust setae, has more strongly expanded antennule peduncle and antenna peduncle articles 4 and 5, and has short robust setae on the merus of pereopods 1–3 in comparison to *A. punctulata*, these robust setae being arranged in a different pattern.

Examination of the syntypes of *Aega edwardsii* Dollfus, 1891 allows confirmation that the species is a junior synonym of *Aega punctulata*. Although most dorsal setae are missing, enough setae remain and the presence of numerous setal sockets indicate that these specimens bear the unique setosity of *A. punctulata*. The synonymy is further confirmed by the eye size, frontal lamina shape, pleotelson, pereopod and uropod morphology and setation.

Hale's (1937) record of this species from Maria Island, off Tasmania, is a misidentification. Hale specifically mentions that his specimens lack the setose body surfaces described by Miers (1881) as well as having more strongly dilated antennule and antenna, and illustrated his material as having larger eyes, a clearly rounded and crenulated posterior margin to the pleotelson and a more elongate frontal lamina. In *A. punctulata* antenna peduncle article 5 is shorter than article 4 while in Hale's figure it is longer. The identity of a Hale's record remains uncertain at present, although



**Figure 141.** *Aega punctulata* Miers, 1881. Holotype, except E and H (BMNH Port Stanley specimen). A, dorsal view; B, lateral view; C, head; D, frons; E, frontal lamina; F, pleotelson and left uropod; G, pleonites; H, pereopods 1 (right) and 2 (left), in situ.

his figures show a species similar to *Aega semicarinata* and *Aega urotoma*.

The record of *Aega cf. punctulata* from Madagascar by Barnard (1960) is of equally uncertain identity. Bar-

nard was aware that the shape of the frontal lamina appeared to be unique, commenting that it was 'almost sufficient to justify the institution of a separate species', but desisted in the absence of comparative material. At

present this record can only be considered as a generic record of an undescribed species.

Kussakin and Vasina (1980) recorded *Aega edwardsii* from the Kerguelen Islands. The descriptive information provided is of family or generic level only and is inadequate to confirm or reject their identification. Setose body surfaces are not mentioned, and pereopod 1 is figured as lacking robust setae which is in contrast to *Aega punctulata*, which has robust setae on the inferior margin of the merus.

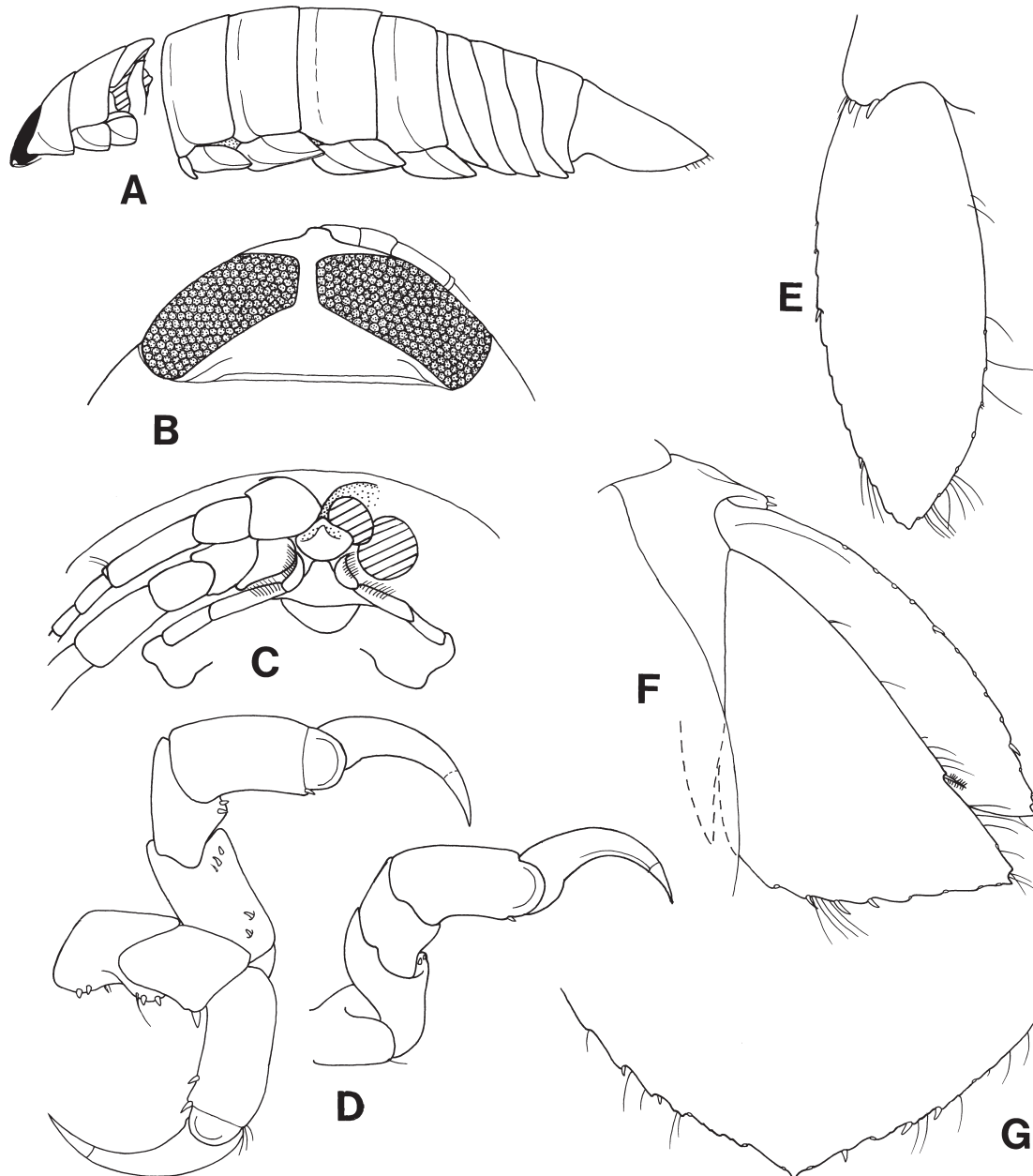
White's (1847) name is included in the synonymy, although the real identity of this nomen nudum can-

not be established. There is nothing to indicate that this is the same species that was described by Dollfus (1891).

DISTRIBUTION: Known from the Straits of Magellan, Falkland Islands and off Cape Horn, South America.

*Aegiochus crozetensis* (Kussakin & Vasina, 1982),  
comb. nov. (Fig. 142)

*Aega crozetensis* Kussakin & Vasina, 1982: 264, figs 5, 6.-  
Kensley, 2001: 226.



**Figure 142.** *Aegiochus crozetensis* (Kussakin & Vasina, 1982). Holotype. A, lateral view; B, head; C, frons; D, pereopods 1-3 (from right to left); E, uropod endopod, ventral view; F, uropod; G, posterior margin of pleotelson.

MATERIAL EXAMINED: *Holotype*, ♂ (18.5 mm), Crozet Island, southern Indian Ocean, 46°36.2'S, 50°40.1'E, 29 November 1970, 280 m, coll. *Skif III*. (ZIASL RAN 1/71626) [Specimen damaged, pereonite 3 crushed; dissected P1, left uropod, pleopods 1 and 2 not with specimen].

DESCRIPTIVE NOTES: Eyes separated by 6% width of head. Penial processes opening flush with ventral surface of sternite 7, separated by ~10% width of sternite. Frontal lamina anterior margin with median point, posterior margin rounded, not ventrally directed, not blade-like. Posterior margin of pleotelson weakly serrate at the points of insertion of RS, with 12 (6+6) RS. Uropod endopod mesial margin weakly serrate, with 8 RS, lateral with 0+1 (or 0+2 RS, missing RS not clearly distinguishable); uropod exopod mesial with 8 RS, lateral margin with ~12 RS. Pereopodal robust setae: pereopod 1 propodus without 1 small, distal RS; carpus with 0 RS; merus with 0+2 or 1+2 RS; pereopod 2 propodus with 1 small distal RS; carpus with 2 distal RS, merus with 2+2 RS; pereopod 3 propodus with 2 distal RS; carpus with 2 distal RS, merus with 2+2 RS.

REMARKS: Permission to dissect was not granted, and the specimen, which had been previously dissected, was not accompanied by the dissected appendages. *Aegiochus crozetensis* can be identified by narrowly separated eyes, shape of the frontal lamina with an anterior median point and wide and rounded posterior margin, pereopods 1–3 with small robust setae on the merus and a weakly curved dactylus, and the shape and setation of the uropodal rami and posterior margin of the pleotelson.

*Aegiochus kanohi* sp. nov. is similar to *A. crozetensis* but that species has united eyes and the frontal lamina has a blade-like posterior margin.

DISTRIBUTION: Known from the vicinity of Crozet Islands, southern Indian Ocean.

*Aegiochus plebeia* (Hansen, 1897), comb. nov.  
(Figs 143, 144)

*Aega plebeia* Hansen, 1897: 105, pl. 2, figs 4a–d.– Richardson, 1904: 29.– Van Name, 1924:183.– Birstein, 1973: 172.

*Aega magnoculis* Richardson, 1909: 80, fig. 7; 1910: 17.– Nierstrasz, 1931: 181.– Gurjanova, 1936: 70, 259.– Kussakin, 1979: 247, fig 118.

*Aega plebeja*– Nierstrasz, 1931: 183.– Gurjanova, 1936: 72. [lapsus].

*Aega (Ramphion) plebeia*– Brusca, 1983: 19, figs 1b, 10, 11.

MATERIAL EXAMINED: *Syntypes*, ♂ (23 mm), ♀ (non-ovig. 30, ovig. 35 mm), off Cocos Island, off Panama, East

Pacific, 05°43'N, 85°50'W, 26 February 1891, *Albatross* stn 3363, 1788 m (USNM 20726 [The non-ovigerous female has had all right-side appendages from P1 to the uropod dissected and the left-side antenna, antennule, mouthparts and uropod; labelling indicates dissection by Brusca.]). ♀ (non-ovig., 17.5 mm), 18°23'S, 71°13'W, off Peru, 1972, 1100 m, coll. E. del Solar (USNM 189292 [previously examined by Brusca 1983]). ♀ (non-ovig 19 mm, damaged, crushed), off Arica, Chile, 18°40.5–32.2'S, 70°36.0–29.8'W, 7 May 1972, 768–968 m, 25' otter trawl (LACM C2916, Acc#BI72-5SIO Benthic Invertebrates, MV72-II-27).

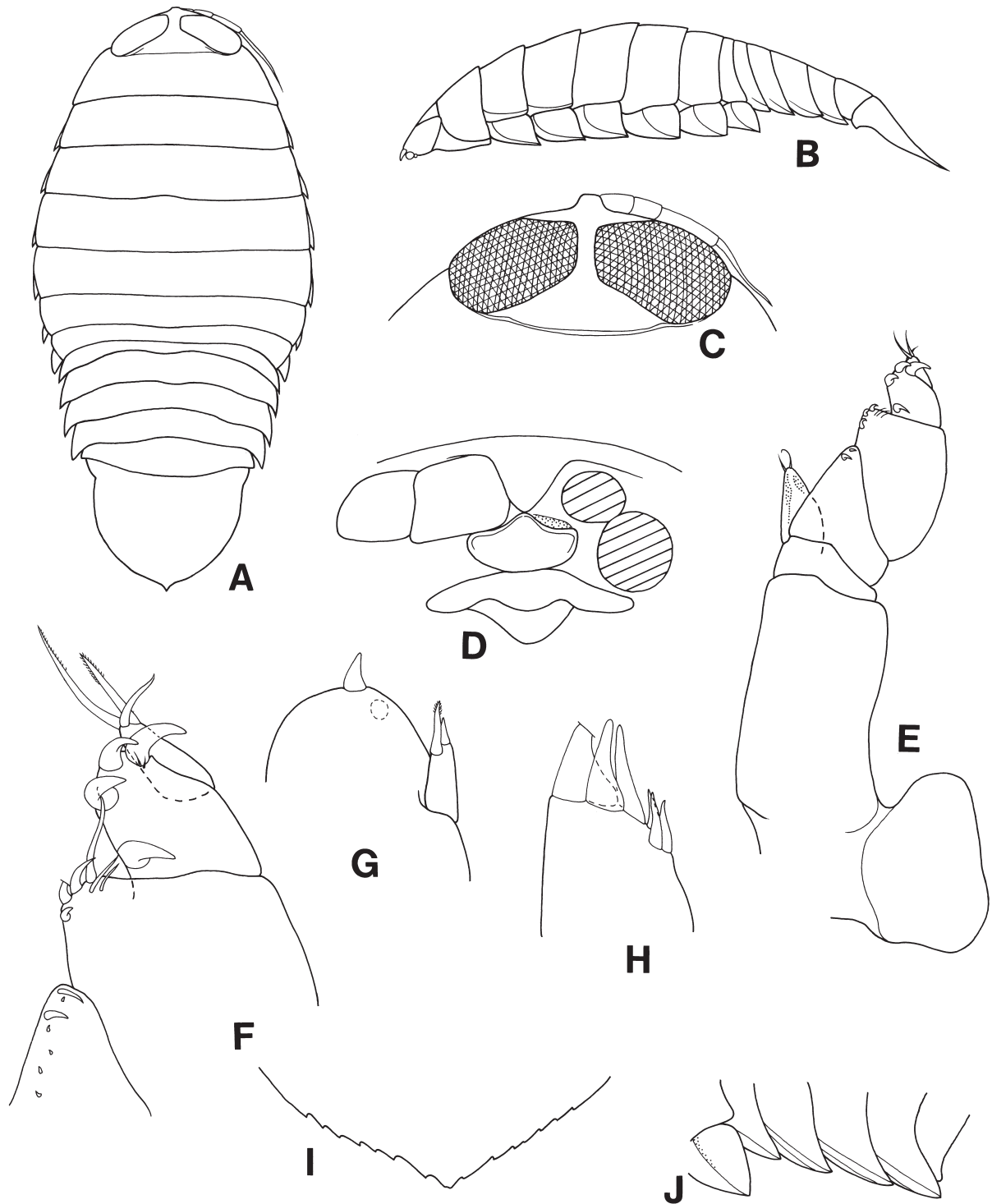
*Additional material: New Caledonia:* Manca (13.0 mm), Norfolk Ridge, 24°19'S, 167°49'E, 2 September 1985, BIOCAL stn. CP62, 1395–1410 (MNHN Is.5863). ♀ (18.0 mm, non-ovig.), Norfolk Ridge, 23°52'S, 167°58'E, 3 September 1985, BIOCAL stn. CP69, 1220–1225 m (MNHN Is.5864).

DESCRIPTIVE NOTES: Eyes separated by 7% width of head. Penes low tubercles; penial openings separated by 3% of sternal width. Coxae not acute and posteriorly produced, posterior margins straight (2–4) or convex (5–7). Frontal lamina anterior margin with weakly produced median point, posterior margin rounded, blade-like, not ventrally directed. Posterior margin of pleotelson weakly serrate at the points of insertion of RS, with 12 (6+6) RS. Uropod endopod mesial margin weakly serrate, with 7 or 8 RS, lateral with 0+3 (or 1+3) RS; uropod exopod mesial with 4 RS, lateral margin with ~12 RS. Pereopodal RS: pereopod 1 propodus with 1 large, distal RS; carpus with 1 small RS; merus with 1 small distal RS; pereopod 2 propodus with 1 large distal RS; carpus with 1 large curved RS, merus with 1+2 small RS.

VARIATION: Robust setae: Pleotelson 11–14 (as 7+7, 5+6 and 6+8). Uropodal exopod lateral margin 12–14, mesial margin 4 (twice) or 5 (four times); uropodal endopod lateral margin 0+3 (twice) or 1+3 (ovigerous female), mesial margin 7 or 8 (three each).

REMARKS: Among those species which have a posteriorly folded rostrum and frontal lamina with a free posterior margin, *Aegiochus plebeia* can be identified by the large and close-set eyes, pereopods 1–3 with a weak propodal lobe which is provided with a prominent, conspicuous robust seta, and the relatively wide uropodal rami. *Aegiochus piihuka* sp. nov. is immediately distinguished by the prominent propodal lobe on pereopods 1–3. *Aegiochus tara* sp. nov. is more similar, but has strongly laterally expressed and posteriorly acute coxae that are conspicuous in dorsal view and all of which have the posterior margin concave, posterior pereopods that are more slender, uropodal rami that



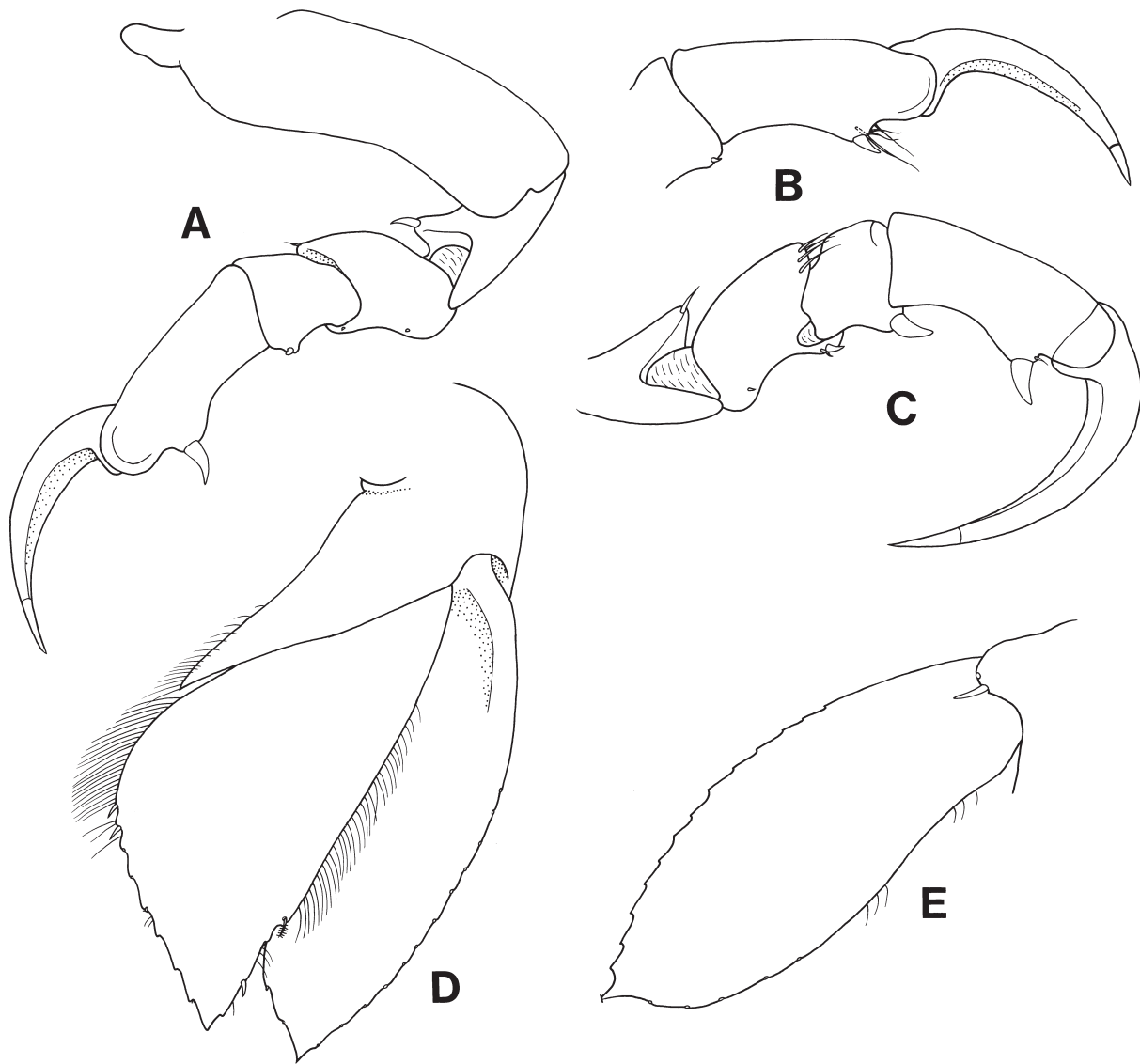


**Figure 143.** *Aegiochus plebeia* (Hansen, 1897). Female syntype, 30 mm. A, dorsal view; B, lateral view; C, head; D, frons; E, maxilliped; F, maxilliped palp, articles 3-5; G, maxilla apex; H, maxillule apex; I, pleotelson posterior margin; J, pleonites, lateral margin.

are more slender and acute, and the pleotelson lateral margins are noticeably sinuate with a more strongly produced and acute apex.

Two specimens from the Norfolk Ridge (New Caledonia) are here identified as *Aegiochus plebeia*,

agreeing in all characters but two. The robust seta at the distal end of the propodal palm of pereopods 1-3 is somewhat smaller than in the type material, and the uropodal endopod lateral margin has a robust seta pattern of 1+3. Such variation occasionally occurs in what



**Figure 144.** *Aegiochus plebeia* (Hansen, 1897). Female syntype, 30 mm. A, right pereopod 1; B, right pereopod 1 propodus; C, pereopod 2, ischium-dactylus; D, uropod; E, uropod exopod, ventral view.

are otherwise consistent characters, and at present I consider these differences to be regional variation. It would require a far larger series of specimens to determine if there are two populations of cryptic species.

*Aegiochus plebeia* was revised by Brusca (1983), who included *Aega magnoculis* as a junior synonym. The distribution of this species, based on existing identifications and records is somewhat disjunct, with several records from the tropical East Pacific, two from the Alaskan region, and four records from the north-western and western Pacific from Indonesia to Japan (Brusca 1983). The depth range is given as 688–2534 metres (Brusca 1983). In the light of the new species described in this publication, the characters given by Brusca (1983) to distinguish *A. plebeia* no longer do so. Given that there are two other similar species in the

Pacific (*A. piihuka* sp. nov. and *A. tara* sp. nov.), that there are two similar species in the East Pacific (see below) and one in the Atlantic, and that the stated depth range is inconsistent with distribution patterns shown by most aegids, I would regard all determinations other than those made here and those from the tropical East Pacific as requiring confirmation.

Three other species are similar in appearance to *Aegiochus plebeia*:

*Aegiochus ventrosa* (M. Sars, 1859) – also has pereopods 1–3 with a weak propodal lobe that is provided with a prominent, conspicuous robust seta (ZMUC specimens), although this has been inconsistently figured for the species (M. Sars 1897; Bovallius 1885, 1886; Kussakin 1979). *A. ventrosa* has a wider frontal lamina, with subtruncate lateral margins and a straight

posterior margin (rather than convex), and more robust pereopods 1–3 than *A. plebeia*. Known distribution: northern Atlantic.

*Aegiochus francoisae* (Wetzer, 1990) – has acute points on all coxae and no lobe on the carpus and propodus, the penes are basally fused and the pleotelson has 4+4 robust setae. It may be that some records of *A. plebeia* are misidentifications of this species. Known distribution: the Galapagos region.

*Aegiochus symmetrica* (Richardson, 1905b) – is very similar to *A. plebeia*, but has no propodal lobe at all on pereopods 1–3 (and is therefore also very similar to *A. francoisae*). The recorded depth for this species is far more shallow than for *A. plebeia*. Known distribution: northeastern Pacific region (southeastern Alaska, Vancouver Island).

DISTRIBUTION: Accepted records from the East Pacific: Panama and Chile; here provisionally recorded from the Norfolk Ridge, south of New Caledonia; at depth of 768–1788 metres. Likely to occur within the New Zealand chart area, the Norfolk ridge records being just on the edge of the distributional limit for this monograph.

*Aegiochus uschakovi* (Kussakin, 1967), comb. nov.  
(Fig. 145)

*Aega uschakovi* Kussakin, 1967: 225, figs 1, 2.  
*Aega (Rhamphion) uschakovi*. – Brusca, 1983: 12.  
Not *Aega* sp. (aff. *uschakovi*). – Nunomura, 2005: 70, fig. 5 [= *Aega* sp.].

MATERIAL EXAMINED: *Holotype*, ♀ (ovig. 18.0 mm), Drake Passage, 55°45'S, 70°11'W, 6 June 1958, *Ob'* stn 451, 95–105 m, (ZIASL RAN No 1/46415).

DESCRIPTIVE NOTES: Eyes separated by 7% width of head. Frontal lamina triangular, posterior margin free, not downwardly directed. Posterior margin of pleotelson serrate at the points of insertion of RS, with 8 (4+4) RS. Uropod rami with margins distinctly serrate, most conspicuously on distal half of uropodal exopod. Uropod endopod mesial margin distinctly serrate, with 7 (both rami) RS, lateral with 2+2 RS (both rami); uropod exopod mesial with 6 RS (both rami), lateral margin with ~12 RS. Pereopodal RS: pereopod 1 propodus without RS; carpus with 0 RS; merus with 0+1 RS; pereopod 2 propodus with 1 small distal RS, none on palm; carpus with 1 small RS, merus with 1+2 RS.

REMARKS: Permission to further dissect the type specimen was not given, and as it was not accompanied by the previously dissected appendages, a redescription of this poorly known species is not possible. Pereopods 1–3 on the left side are all damaged or missing; on

the right side pereopods 1 and 2 were not in position suitable for drawing and pereopod 3 was obscured under pereopods 4 and 5; without dissection it is not possible to provide more precise detail of the setation of the anterior pereopods.

The tentative identification of *A. uschakovi* by Nunomura (2005) is probably not correct. The figures given by Nunomura show that, in his material, the eyes are more widely separated, the pleotelson is more triangular in shape and the uropod endopod far narrower than in the type material.

*Aegiochus uschakovi* can be identified by the relatively narrow eyes, which are clearly separated, the triangular frontal lamina, and the pattern and number of robust setae on the margins of the pleotelson and uropodal rami.

DISTRIBUTION: Known from Drake Passage, Tierra del Fuego.

*Syscenus intermedius* Richardson, 1910 (Fig. 146)

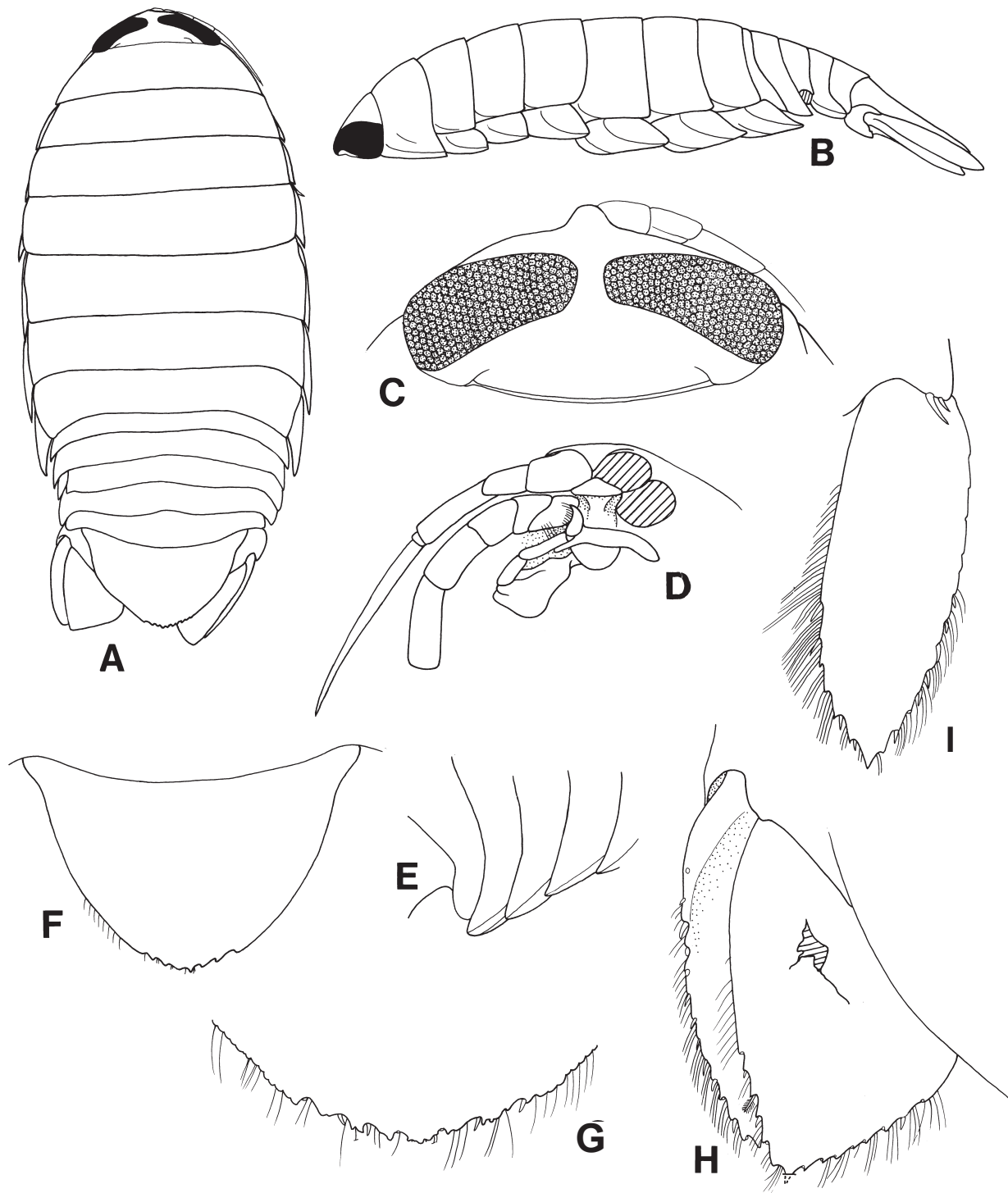
*Syscenus intermedius* Richardson, 1910: 17, fig. 16. – Bruce, 1997: 114.

MATERIAL EXAMINED: *Holotype*, ♂ (26 mm), China Sea, 20°37'N, 115°43'E, 8 August 1908, 380–380 m, US Bureau of Fisheries *Albatross* Philippine Expedition, 1907–9, stn 5301 (USNM 41009).

*Additional material*: ♂ (23 mm), Indonesia, off Tanimbar Islands, 08°42'S, 131°53'E, 2 November 1991, stn. CP69, 356–368 m, coll. *Baruna Jaya 1* (MNHN Is.5884).

DESCRIPTIVE NOTES: Anterior margin of head subtruncate, with obscure median point; dorsum of pereon somewhat vaulted; coxae each posteriorly rounded; pleotelson posteriorly rounded, lateral margins evenly convex, not inflected; frontal lamina wide, diamond-shaped; antennule flagellum extends to middle of pereonite 1; antennal flagellum extends to posterior of pereonite 4. Pereopod 1 lacking RS; anterodistal angle of merus with about 6 simple setae. Pereopods 5–7 notably elongate, inferior margin of merus and carpus of pereopod 7 with 6 and 9 acute RS respectively; uropod exopod and endopod subequal in length.

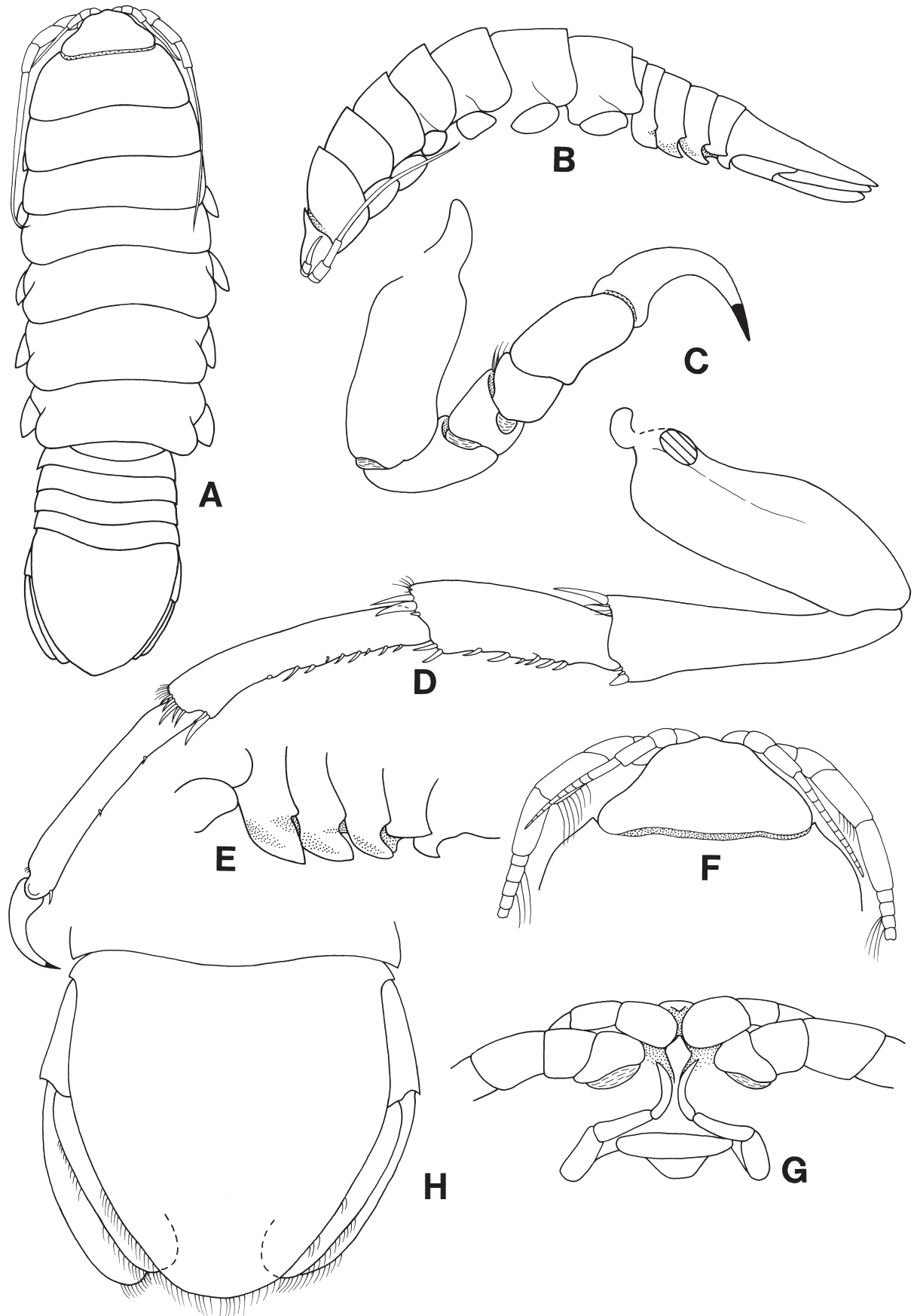
REMARKS: *Syscenus intermedius* can be identified by having a subtruncate anterior margin to the head, rounded coxae, a broadly rounded pleotelson, antennal flagellum extending to posterior of pereonite 4, few setae on the distal margins of the ischium to merus of the pereopods, and pereopods 6 and 7 elongate, with the inferior margins of the merus and carpus provided with 6 and 9 acute robust setae respectively.



**Figure 145.** *Aegiochus uschakovi* (Kussakin, 1967). Holotype. A, dorsal view; B, lateral view; C, head; D, frons; E, pleonite; F, pleotelson; G, pleotelson posterior margin; H, uropod endopod, ventral view; I, uropod exopod, ventral view.

Bruce (1997a) and Kensley (2004) both stated incorrectly that the species was known from the Philippines, whereas station data indicate that it was in reality collected closer to Hong Kong.

**DISTRIBUTION:** Known from the type locality, south of Hong Kong, South China Sea, here recorded from the Banda Sea, Indonesia.



**Figure 146.** *Syscenus intermedius* Richardson, 1910. All figs holotype. A, dorsal view; B, lateral view; C, pereopod 1; D, pereopod 7; E, pleonites, lateral view; F, head, dorsal view; G, frons; H, pleotelson.

### APPENDIX 3. OTHER MATERIAL EXAMINED

This appendix lists identified specimens examined or identified in the course of preparing this monograph but not otherwise reported or cited in the text.

#### 1. SPECIES CODED DIRECTLY INTO AEGA DATA SET

- Aega antennata* Richardson, 1910: ♀ (non-ovig. 41 mm), eastern Indian Ocean, 129 m NW of Port Hedland, Western Australia, 18°10'S, 118°18'E, 10 October 1982, 298–300 m, coll. LMM on RV *Soela* (WAM 2278-86). ♀ (non-ovig. 48 mm), eastern Indian Ocean, 129 m NW of Port Hedland, Western Australia, 18°26'S, 117°34'E, 11 April 1982, 418 m, coll. LMM on RV *Soela* (WAM 2275-86).
- Aega psora* (Linnaeus, 1758): ♂ (21 mm), ♀ (non-ovig. 31.5 mm), Disko, Godhavn, Greenland, December 1908, off *Somniosus microcephalus* (ZMUC unreg).
- Aega serripes* Milne Edwards, 1840: ♀ (34 mm), Australia, 64 km west of Kingston South Australia, 36°50'S, 139°05'E, 16 Aug 1909, FIS *Endeavour* (AMP43984). ♂ (17.5 mm), ♀ (ovig. 39, non-ovig. 30 mm), d'Entrecasteaux Channel, Tasmania, October 1929, abt. 5 fathoms, presented Mel Ward (AM P10682). ♀ (non-ovig. 36 mm), Bottle and Glass, Port Jackson, Sydney, 20 January 1934, Iredale and Whitley (AM P37508). ?♀ (17.0 mm), Shellharbour, NSW, 29 April 1926, coll. Mel Ward (AM P45438). ♀ (non-ovig. 38 mm), east of Wilsons Promontory, Victoria, 24 August 1994, 30 m, stn SS05/94/30 (AM P43965).
- Aegiochus arctica* (Lütken, 1859): ♂ (24 mm), 'Greenland Island and Finmark', no other data; specimen from H.M. Hale's collections (AM P37520).
- Aegiochus maxima* (Hansen, 1897): holotype, ♀ (non-ovig. 54 mm), off Cocos Island, off Panama, 26 February 1891, *Albatross* stn 3362, 2350 m [as 1125 fms] (USNM 20727).
- Aegiochus ventrosa* M. Sars, 1859: 3♀ (non-ovig. 18.5, 20, 33 mm), *Ingolf* stn 95, 75 fvn, RT 1.70 (ZMUC unreg). ♂ (21 mm), 64°21.5'N, 57°01.5'W, Davis Strait, 2 December 1992, 787–772 m, coll. *Shinwa Maru* (ZMUC unreg).
- Epulaega lethrina* (Bruce, 1983): ♂ (7.5 mm), north of Lord Howe Island, 11 May 1979, 23°58.00'S 159°3.99'E, stn I738 (NIWA 34828).
- Epulaega nodosa* Schioedte & Meinert, 1879: ♂ (16.5 mm), Bass Strait, 27 August 1994, sled, 20 m, stn SS05/94/54 (AM P43966).

#### 2. SPECIES EXAMINED OR CONSULTED IN COURSE OF MONOGRAPH PREPARATION

- Alitropus typus* H. Milne Edwards, 1840: ♀ (non-ovig. 13.5 mm), Dawson River, tributary of Fitzroy River, Queensland, June 1959, from giant perch [*Lates calcarifer*], coll. C. Vallis (AM P37516). ♀ (non-ovig. 13.5 mm), Northern Territory, Australia, #36 TMB01-17 (NTM unreg); 2♂ (12.0, 9.5 mm), ♀ (non-ovig. 13.5 mm) 3 juveniles, Northern Territory, Australia, #36 TMB01-18 (NTM unreg).
- Aega australis* Whitelegge, 1901. Syntypes; ♂ (12.5 mm; head detached, previously heavily dissected), ♀ (ovig. 11.1 mm; previously dissected), 8.0–9.5 km off Coogee, NSW, 33°57.0'S, 151°21.5'E, stn 44, 91 m, fine sand, coll. E.R. Waite on HMCS *Thetis* (AM G2281). Non-type: ♀? (non-ovig. 9.5 mm), 11.0–12.5 km off Wollongong, NSW, 34°27'S, 151°04'E, stn 48, 102 m, sand, mud and rock, coll. E.R. Waite on HMCS *Thetis* (AM P9604). (Note: only two [?types] specimens not four as stated on label.)
- Aega concinna* Hale, 1940. Holotype; ♂ (33 mm), entrance to Oyster Bay, Tasmania, 30 July 1909, 42°40'S, 148°03'E (AM E6740).
- Aega* aff. *falcata*: entrance of Otsuchi Bay, Japan, 39°2'N, 142°0'E, 19 April 1995, off *Lophiomus setigerus* (Vahl) (ZMUC unreg).
- Aega* aff. *monophthalma*: ♀ (non-ovig. 50 mm), east of Heron Island, QLD, Australia, 21°18.9'S, 153°31.7'E, 20 Nov 1985, 502 m, coll. CSIRO *Soela* Cruise 0685, stn 18, AJB (NTM unregistered).
- Aega* aff. *semicarinata*: ♂ (21 mm), South Africa, 6 km south of Cape Barracouta 13 December 1929, 4 m s Cap, 68 m, stn 50, coll. Dr. Th. Mortensen's Java–South Africa Expedition (ZMUC unreg).
- Aega* aff. *semicarinata*: ♀ (ovig. 53 mm), southeastern Atlantic, South Africa, 34°21'S, 17°57'E, 18 December 1929, 320 m, mud, coll. Dr. Th. Mortensen's Java–South Africa Expedition (ZMUC unreg). Similar to *A. semicarinata* but lacking the large propodal RS, covered with short blunt glassy 'setae' and wider body shape; the RS on anterior pereopods seem larger. Identity uncertain.
- Aegiochus* aff. *gracilipes* Hansen, 1895: ♀ (ovig. 24 mm), Gulf of Guinea, Victoria–Banana, 02°00'N, 09°14'E, 2 December 1950, 1560 m, *Galathea* stn 241 (ZMUC 2804).

*Aegiochus* aff. *tara*: ♀ (ovig. 27 mm), Western Indian Ocean, off Kenya, 04°00'S, 41°27'E, 15 March 1951, 1551 m, *Galathea* stn 63 (ZMUC 2803).

*Aegiochus* sp. ♀ (ovig. 11.5 mm), Japan, Okinawa, Sagami Sea, 2 July 1914, 400 fv, coll. Th. Mortensen (ZMUC unreg). Not any species that I can recognise; eyes narrowly separate, no pleotelson RS, pleopods not digitate, but otherwise similar to *A. coroo*.

*Aegiochus* sp. ♀ (ovig. 11.5 mm), Canada, British Columbia, 'W of Snake Island, between Snake Island and Gabriola Island, Straits of Georgia', 14 June 1915, c. 63 m, from sponge, coll. Th. Mortensen (ZMUC unreg). Not any species I that I can recognise; eyes small, similar to *A. laevis*, but pleotelson RS, pleopods not digitate.

*Aegiochus* sp. ♂ (11.5 mm), Indonesia, Java, 07°35'N, 114°42'E, 10 April 1929, 200 m, coll. Th. Mortensen (ZMUC unreg). Not any species that I can recognise; 4 pleotelson RS, pleopods not digitate, no RS on propodal palm of P1-P3, otherwise similar to *A. laevis*.

*Aegiochus* sp. (nov.): ♂ (9.5 mm), 3 ♀ (non-ovig 12.0, ovig 9.3, 13.5 mm), Indonesia, Kei Islands, 12 May 1922, stn 59, 385 m, coral (ZMUC unreg). Not any species I can recognise; vaguely similar to *A. coroo* but pleopods not digitate, no pleotelson RS, males and non-ovig. with long RS P1-P3, these being shorter in ovig female.

*Aegiochus vigilans* (Haswell, 1881): 1, Indonesia, Kei Islands, 12 April 1922, stn 16, sand, *Lithothamnion*, Danske Exped. til Kei Islands, 1922 (ZMUC unreg). 1, Indonesia, Kei Islands, 24 April 1922, stn 39, 60 m, sand, *Lithothamnion*, Danske Exped. til Kei Islands, 1922 (ZMUC unreg).

*Barybrotes* species. At present it is accepted that the genus is monotypic, the single species being *B. indus* Schioedte and Meinert, 1879a. No attempt is made here to reassess the identity or validity of other proposed names. ♀ (ovig. 21 mm), Cauda, Nha-Trang, 15 May 1929, Dana stn 3710 (ZMUC unreg); ♀ (ovig. with ova, 21 mm), 5th Thai-Danish Expedition, 1966, stn, 1022, haul 6, 1411-1966 m (ZMUC unreg); ♀ (non-ovig., 16 mm), 5th Thai-Danish Expedition, 1966, stn. 1025, haul 4, 1811-1966 m [7th leg present, no app. M.] (ZMUC unreg); manca (11.5 mm), 5th Thai-Danish Expedition, 1966, stn, 1022, haul 9, 1411-1966 m [no 7th leg] (ZMUC unreg); ?(15 mm, may be male), 4°41'N, 98°13'E, 9 Nov 1929, Dana stn 3900 [pleopods too fragile to examine] (ZMUC unreg); ♀ (non-ovig., 17.5 mm), 4°20'N, 98°47'E, 10 Nov 1929, Dana stn 3901 [7th leg present, no app. M.] (ZMUC unreg); manca (9.0 mm), 4°41'N, 98°13'E, 9 Nov 1929, Dana stn 3900 (ZMUC unreg); manca (7.2 mm), off Mombasa, Kenya, 22 Mar 1951 *Galathea* stn. 259 [telson damaged] (ZMUC unreg).

*Rocinela 'orientalis'*: 1, Indonesia, Kei Islands, 9 May 1922, stn 53, 85 m, sand, coral, Danske Exped. til Kei Islands, 1922 (ZMUC unreg).

# APPENDIX 4. MATRICES

## 1. Matrix *Aega* species

Polymorphic states:  $x = 1/2$ ;  $y = 2/3$ ;  $z = 2/4$ .

'Tridentella'	1111111111	1x1111111111	1111111111	1??1??1111	x1111x1111	1111111111	1111111111	11x11
alazon	1122131213	1211143211	2211232121	1412223211	1222111212	2413312111	2122211131	12313
angustata	1122121133	2311421412	21?22222??	??1??1??22	1211212213	11133??1	2?31213111	11131
antarctica	1x32211211	2212324111	1111142112	2321112111	2111222111?	1313521221	2221313212	21212
antennata	212221223	1223131222	2311222121	1312123211	22212112??	23322??1	2131113111	21122
antillensis	1222131211	2213144211	2111232111	1312213211	1222111212	2433212311	2122211132	22313
arctica	1132222123	1211353111	1111142312	2311112112	2111222112	1312121111	2121213112	21212
banda	1222121x13	1211144211	12?11321?1	1?2222?211	1222111212	2431312111	2122211131	22313
beri	x232222111	2211355111	11111331?2	2311112111	2121221113	1212112111	2121113112	21212
bertrandii	1212231311	2211321111	1111133112	2321112111	2121221113	1211221212	2221113112	21211
birubi	2222121113	1211143211	2121232121	1322233211	1222111212	2432112111	2122211131	22313
copidis	x222132311	2213143211	2?112321??	1??211211	1224111211	2231412111	2122211131	22312
coroo	1112231311	2211321111	1111133112	2321112112	2121211113	1311211212	2221113112	11211
derkoma	1211131122	221112?111	1111132112	2231??11	12212111??	131111??1	2221113112	11111
deshaysiana	1222121213	1213143211	2211232121	1311?21211	1222111212	2433512111	2122211132	22311
excise	1122121113	1211143211	2321222111	1312223211	12211112??	24332??1	2122211131	12312
falcate	2122221121	22211y1222	1121222121	1412113221	22212111??	133111??1	11?111?2112	2??12
falklandica	x222122413	1213123312	2121222211	1522213211	1222211111	2231312211	2131111121	31211
fracta	2111131123	2211122111	1111123112	2321124111	1221211131	1331122111	2231113112	21221
francoisae	1232222111	1211323111	1111143?13	?32?112111	3121?21131	1311211211	?221111?11	11211
glacialis	1232221123	2213324111	111?142312	2321112111	2113221121	2312121221	2221213212	31212
gordoni	12322212x2	2211321111	1111142312	2221112111	2111221112	2313111212	1221313211	21112
hamiota	2222132123	1211145211	2321232121	1312233211	1221111211	2431212111	2132212131	12313
insomnis	x232221z12	2211321111	1111223112	2221112111	2111211121	2312521212	1221113212	21111
japonica	x122131213	x211143211	2111232221	1422223x11	12221112??	24332??1	2122211131	22312
kakai	1232232313	1211323111	1111142312	2321112111	2111221122	2313121221	2221313212	31213
kanohi	1232231212	2211323111	1111142312	2431112112	2111221112	2312121211	2211313112	21111
kixalles	x222131123	1213145211	2111232121	1322233211	12241212??	24333??1	2122211131	22313
koma	1122122131	2311435412	21222222?1	12121?3222	1221222213	111?312111	??3131311? ?2?31	
kwazulu	x222131113	1212143211	23112321?1	1??2??11	1221111212	2412312111	2122211132	22311
laevis	1232211311	1211322111	1111142312	22?1112112	1111221112	1113511222	2221113111	21211
leptonica	x132132311	1213354111	1111133113	22?1112212	21212211??	13131??1	2121113212	21212
lethrina	1211131121	2211121111	2111132112	2111114212	3221?11131	1311111111	2221113211	21111





magnifica	1122112411	2213124211	1311122223	1322223211	1224111112	2331211111	2131133121	22211
mahana	x122131313	1213145211	2311222111	1212213211	1222121212	2433312111	2122211131	22313
maxima	2222122121	2211123211	1311122221	1512123211	12221111??	23335?????	213x11x121	22212
monophthalma	3222132231	1121135412	2321221211	141x123211	1222211111	2332511211	2231132111	22222
musorstom	2222132x23	1211141211	2111232121	1322223211	1224111212	2431212111	212221x121	12313
nodosa	1211131121	1212122111	1111132112	2311114211	122122113?	13111122111	1221313112	22211
nohinohi	1132222122	2211321111	1211142112	2221112111	2111221112	2312121212	2221313212	21112
piihuka	2232222z11	1211324111	1111142313	2321112111	2113221111	2211221111	2221113212	21211
plebeian	1232221121	2211324111	1111142313	2221112112	2113221111	1311221211	2221313112	21212
psora	21221212x1	2212123312	2211231221	1412111211	1221111112	2231211211	1131111121	21212
pushkini	x232222221	2211323111	1111142312	2321112111	2111221111	1312121211	2221313112	21211
rickbruscai	1222132223	1211141211	2311232121	1412223211	1222121212	2431212111	213221x121	12313
riwha	x132221121	2211354111	1111133112	2321112112	2121121111	1112111111	2221313211	31213
semicarinata	2122122121	1232231312	2121222221	1322223211	1222212112	1332212111	2221232112	11213
serripes	3122121131	1222231212	2211222211	1512223111	1221111121	2231212111	2131212112	21212
sheni	1222121??1	1211122211	2321122211	1412213211	1224111112	2231111111	213133x121	21212
stewelwei	2222131211	1211225312	1321121221	152x233211	1222111111	1331212211	2131123212	22221
tara	x2322223x1	2213124111	1111142312	2321112112	21112211??	22122?????	2221313112	31212
trulla	1222131213	2213145211	2121232121	1422123211	12141212??	24314?????	212221x121	22312
umpara	1222131123	2211143211	2111122111	1322223211	1222211212	2432212111	2122211131	12311
urotoma	2122112121	1212231412	2322222221	1412123211	1221212112	13322?????	2231232112	21211
ventrosa	1232222311	2221324111	1111142312	2211112111	2113221122	1313121221	2211313112	2x212
vigilans	1112131121	1211324111	1111131113	2211111211	1221221113	1331111211	1121213112	22211
warna	x222132213	1211144211	2311232121	1312213211	12211112??	24312?????	2122212131	22313
whanui	3222111223	1231324312	1121122221	x?????????	12221111??	22314?????	2131111111	32212



## 2. Matrix Aegidae genera

Polymorphic states:  $x = 1/2$ ;  $y = 1/3$ ;  $z = 2/3$ .

Tridentella	1111111111	111111x111	1111111111	1111111111
Aega	1122311121	1211122111	1221211211	1221211211
Aegapheles	1122311121	1211122111	1221211212	1221211212
Aegiochus	11221111x2	1111132121	1121211111	1121211111
Alitropus	2112321121	1111233122	2--2222322	2--2222322
Epulaega	1111311121	1111132121	1321211111	1321211111
Rocinela	2122211121	212123322x	2--2222322	2--2222322
Syscenus	12111222y1	2122123222	z--2122322	z--2122322
Xenuraega	1211122231	2122--4222	3--2--21-	3--2--21-

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