

The Cassidininae Hansen, 1905 (Crustacea: Isopoda: Sphaeromatidae) of Australia

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The Cassidininae of Australia are revised. The status of the subfamily is assessed and it is concluded that, as presently constituted, the Cassidininae is an artificial taxon. It is maintained here as a taxon of convenience (*sensu lato*) until the other sphaeromatid subfamilies can be reassessed, but a new diagnosis (*sensu stricto*) is given. The genus *Cassidina* is redescribed. Three new genera are established: *Agostodina* gen. nov. (type species: *A. munta* sp. nov.), *Apemosphaera* gen. nov. (type species: *A. naranagi* sp. nov.) and *Discidina* gen. nov. (type species: *D. banawarra* sp. nov.). New diagnoses are provided for the genera *Cassidina* Milne Edwards, *Chitonopsis* Whitelegge, *Cassidinidea* Hansen, *Paracassidina* Baker, *Syncassidina* Baker and *Platysphaera* Holdich and Harrison. The genus *Dies* is placed in synonymy with *Cassidinidea* and an annotated list is given of all species of the genus. The following new species (excluding the new type species) are described: *Chitonopsis booyoolie*, *Agostodina munta*, *Paracassidina anasilla*, *P. bakeri*, *P. bamarook*, *P. bilbie*, *P. cervina*, *P. dama*, *P. fuscina*, *P. incompta*, *P. kutyo*, *P. munna*, *P. petala*, *P. prolata*, *P. wurrook* and *Cassidinidea korpie*. Keys to the Australian genera and species are given.

KEYWORDS: Cassidininae, Isopoda, Australia, taxonomic revision.

Introduction

The subfamily Cassidininae Hansen, 1905, is the smallest of the three sphaeromatid subfamilies, with 24 genera (Harrison and Ellis, 1991). The subfamily has a world-wide distribution, possibly with the greatest diversity being reached in the southern hemisphere. The sole unifying character is the presence of membranous rami on pleopods 4 and 5 and, as currently composed, the subfamily presents an otherwise diverse range of genera.

In Australia the subfamily has most recently been documented by Holdich and Harrison (1981, 1983) who recorded nine species in seven genera. One of these (*Waiteolana* Baker) was later transferred to the Sphaeromatinae (Harrison, 1984a).

This contribution records 22 species in seven genera from Australian waters, but removes several genera (including one new genus and species) to the status of *incertae sedis* while retaining them within the Cassidininae.

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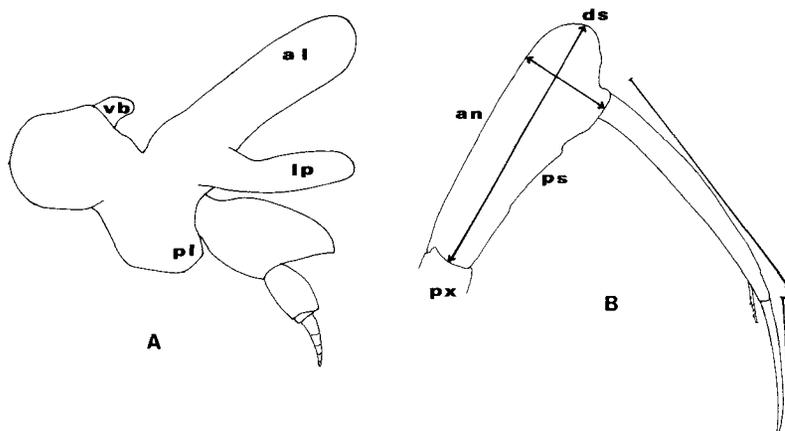


FIG. 1. **A**, antennule: al, anterior lobe; lp, lateral process; pl, proximolateral lobe; and vb, ventromesial boss. **B**, propodus and dactylus—axes and measurements used in determining relative proportions of length to width, dactylus to propodus and unguis to dactylus; an, anterior; ps, posterior; ds, distal; and px, proximal.

Materials and methods

All the material examined was obtained from museum collections, notably the Australian Museum and the Museum of Victoria, with the exception of the CSIRO collected material from Western Australia. The types and additional specimens of all South African Cassidininae were examined.

Descriptions and measurements

Species descriptions are all based on the holotype supplemented by appendages from a matched paratype, usually topotypic from the single sample. In all cases appendages have been dissected from the right hand side of the specimen unless otherwise indicated.

A full description is given for one species of each genus, the remaining species descriptions are restricted to diagnostic and differential characters. In the case of *Paracassidina*, there was no new material available of the type species, and fully detailed description is given for *P. fuscina* sp. nov. and *P. incompta* sp. nov.

Measurements of total body length were taken from the pleotelson posterior margin to the anterior extremity of the antennule or epistome, whichever was longest; for length to width ratios however the length was measured from the pleotelson posterior margin to the anterior of the rostral point. For pereopodal measurements see Fig. 1. Length of the appendix masculina is expressed against the median length of the endopod. When expressing the length of the dactylar unguis in relation to the dactylus, the dactylus length is then excluded from the total length.

Terminology

Particular terms have been coined to describe the morphology of the antennule, particularly that of *Paracassidina*. The terms, illustrated in Fig. 1, are: anterior lobe (al); lateral process (lp); ventromesial boss (vb); proximolateral lobe (pl).

Orientations used in describing appendages are distal and proximal, lateral and mesial, anterior and posterior; the last pair of terms are particularly used in describing pereopods, with the margin against which the dactylus folds being referred to as

posterior, the opposite margin as anterior (see Fig. 1B). The orientation of pereopods 4–7 is reversed from that of pereopods 1–3, but the terminology remains the same to maintain consistency.

Several genera of sphaeromatid have a membrane that appears gelatinous around the body margins through which the setae run. Buss and Iverson (1981) named this the *membrana cingula*.

Several genera described here have a cuticular plate extending across the sternum anterior to the pleopods. This is the pleonal tergite, and is present in the *Cerceis* group of genera (Harrison and Ellis, 1991, couplet 13) and also the *Ischyromene* group of genera (Harrison and Holdich, 1982), both Dynameninae. The median portion of this tergite which projects posteriorly towards the pleopod peduncles is termed the sternal process.

Setae and spines. Watling (1989) provided a new classification of the setae and spines to be found in the Crustacea and differentiated setae (non-cuticular, articulating) from spines (cuticular structures, not articulating). In the Flabellifera in particular, cuticular spines are rare or non-existent. Setae (in Watling's sense) occur in two forms which, it is widely recognized, intergrade. These are setae (thin, flexible, with or without secondary plumosity) and spines (stout, robust, inflexible, either blunt or acute, variously ornamented). Where necessary cuticular spines, nodules and bosses will be referred to as such.

The Sphaeromatidae commonly have abundant scales and scale setae. These are cuticular in origin, being derived from cuticular scales, and are here referred to as setules. In some species the pereopods carry a dense mass of setules on the posterior margin of the pereopod articles, which is referred to as a setulose fringe.

Descriptive terminology for the different forms of the marsupium to be found in ovigerous females is given by Harrison (1984b). The marsupium is here used following Harrison's definition (1984b, p. 366).

Scanning electron microscope preparation

Specimens for SEM were prepared loosely following Felgenhauer's protocol (1987), in particular omitting OsO₄ postfixation. Specimens were cleaned by brush, treated in the surfactant Tween-80, then taken through a graded series of alcohols, into acetone and then critical point-dried. Larger specimens were dissected prior to drying, small specimens dissected after drying. Dried specimens were sputter coated with gold, then examined using a Hitachi S530 SEM.

Abbreviations

AM, Australian Museum, Sydney; ANSP, Academy of Natural Sciences, Philadelphia; BMNH, The Natural History Museum, London; NMV, Museum of Victoria, Melbourne; NSW, New South Wales; NZOI, New Zealand Oceanographic Institute, Wellington; Qld, Queensland; QM, Queensland Museum, Brisbane; SA, South Australia; SAM, South Australian Museum, Adelaide; TM, Tasmanian Museum and Art Gallery, Hobart; Tas, Tasmania; USNM, United States National Museum, Natural History, Smithsonian Institution, Washington, DC; Vic, Victoria; WA, Western Australia; WAM, Western Australian Museum; and ZMUC, Zoologisk Museum, University of Copenhagen.

PMS, plumose marginal setae; and SMS, simple marginal setae.

TaxonomyFamily **SPHAEROMATIDAE** Latreille, 1825Subfamily **CASSIDININAE** Hansen, 1905

Cassidinini Hansen, 1905: 110; Glynn, 1968: 598; Hurley and Jansen, 1977: 71.

Campecopeini Hansen, 1905: 109.

Monolistrini Hansen, 1905: 110.

Cassidininae Iverson, 1982: 251; Kensley and Schotte, 1989: 207.

'Platybranchiatae' Hansen, 1905, *et auct.*

Diagnosis. Body generally dorsoventrally flattened, coxae laterally expressed; eyes dorsal. At least pereopods 2-7 ambulatory, often slender. Pleopods 1 and 2 with rami colinear, endopod not distinctly triangular in shape; pleopods 4 and 5 with both rami lamellar, occasionally obscurely thickened, never with distinct ridges or folds; lateral margin of pleopod 4 and 5 exopods not thickened, devoid of simple marginal setae. Uropod endopod lamellar, about as long as pleotelson, exopod reduced in size, set into lateral margin of exopod. Pleotelson weakly vaulted, posterior margin entire.

Genera included. Cassidininae, *sensu stricto*: *Agostodina* gen. nov.; *Cassidina* Milne Edwards, 1840; *Cassidinidea* Hansen, 1905; *Chitonopsis* Whitelegge, 1902; *Chitonosphaera* Kussakin and Malyutina, 1993; *Discidina* gen. nov.; *Leptosphaeroma* Hilgendorf, 1885; *Paracassidina*, Baker, 1911; *Paraleptosphaeroma* Buss and Iverson, 1981; *Platysphaera* Holdich and Harrison, 1981; *Syncassidina* Baker, 1929.

Cassidininae, *incertae sedis*: *Apemosphaera* gen. nov.; *Anoplocopea* Racovitza, 1907; *Botryias* Richardson, 1910; *Caecosphaeroma* Dollfus, 1896; *Campecopea* Leach, 1814; *Cymodetta* Bowman and Kühn, 1974; *Dynameniscus* Richardson, 1905; *Exosphaeroides* Holdich and Harrison, 1983; *Gnorimosphaeroma* Menzies, 1954; *Monolistra* Gerstaecker, 1856; *Parasphaeroma* Stebbing, 1902; *Stathmos* Barnard, 1940; *Striella* Glynn, 1968; *Tholozodium* Eleftheriou, Holdich and Harrison, 1980.

Remarks and relationships. Hansen (1905), in his revision of sphaeromatid classification, distinguished a subdivision of the family which he termed the Sphaerominae platybranchiatae (Hansen's concept of the Sphaeromatidae included the Limnoriidae and Plakarthritis). Within the platybranchiatae, Hansen recognized four sections (= tribes): Campecopeini, Monolistrini, Cassidinini and Ancinini. These 'section' names were only occasionally later used (e.g. Monolistrini by Racovitza, 1910 and Sket, 1986; Cassidinini by Hurley and Jansen, 1977), but for the most part the term platybranchiatae or platybranchiatae was used in the broadest sense to include all those sphaeromatids which had lamellar rami on pleopods 4 and 5 (e.g. Kussakin, 1979; Holdich and Harrison, 1981). Iverson's formal definition of the Cassidininae (1982) as a subfamily, as indicated by his generic list, subsumed Hansen's remaining platybranch tribes, although these names were not formally placed in synonymy.

The subfamily, as it is currently composed, is distinguished by one character state, that being the laminar pleopods 4 and 5, which lack the thickened folds and ridges present in the Dynameninae and Sphaeromatinae. Two other characters appear to apply to most genera: the pleotelson posterior margin is always entire, lacking an excavate indentation, sinus or foramen and the uropod endopod is lamellar, about as long as the pleotelson with the exopod reduced or absent. In a loose sense the cassidines have often been regarded as flat bodied sphaeromatids with flattened antennular peduncle articles 1 and 2.

In order to develop a rigorous more narrowly defined concept of the Cassidininae it is necessary to base a diagnosis, at least initially, on the type genus *Cassidina*. The

other genera can then be compared to *Cassidina* and the defining characters assessed. Comparison of the cassidine genera to genera of the Dynameninae and Sphaeromatinae reveal a lack of unique distinguishing characters, other than the lack of pleopodal ridges. In particular the dynamenine genera *Amphoroidea* Milne Edwards, 1840 and *Amphoroidella* Baker (see Harrison, 1984a) share the flattened body shape, flattened antennule peduncle articles 1 and 2 and in *Amphoroidella* the uropod exopod is reduced and set laterally into the endopod.

The lack of pleopod ridges is in itself not a useful character for several reasons. Comparison with other flabelliferan families suggest that it should be considered a plesiomorphic character being common to most flabelliferan families, and was furthermore not considered a defining apomorphy for the Flabellifera by Brusca and Wilson (1991), and secondarily a homoplasious character, being found in nearly all estuarine and low salinity sphaeromatids. Furthermore it is often variably expressed, some genera and species (such as *Cassidinidea mosaica* Kensley and Schotte, and *Apemosphaera naranagi* n. sp.) having weak fleshy ridges. Other genera which have weakly developed pleopod ridges (*Waiteolana* Baker and *Artopoles* Barnard for example) have been transferred out of the Cassidininae, while others (*Pseudosphaeroma*), due to unclear pleopod ridges, have been moved between the Sphaeromatinae and Dynameninae. My own examination of species of *Exosphaeroma* reveal that pleopods 4 and 5 range from lamellar, to weakly ridged and with thick ridges. Other characters therefore need to be found to justify and define the Cassidininae.

While pleopodal ridges may be an unreliable and uninformative character, there are other pleopod characteristics which may be of more use. In the genus *Cassidina* both rami of pleopod 1 are approximately colinear and distally rounded; pleopods 4 and 5 exopods are completely devoid of lateral marginal simple setae and also lack a thickened lateral ridge. These pleopod details differ markedly from all Dynameninae and Sphaeromatinae which usually have pleopod 1 endopod approximately triangular, and the exopod angled across laterally, while pleopods 4 and 5 have their lateral margin with a weak but distinct thickened ridge (often not illustrated) and a row of simple marginal setae (as in *Sphaeroma* Bosc, 1802, *Exosphaeroma* Stebbing, 1900, *Cymodoce* Leach, 1814, *Dynamenella* Hansen, 1905). Of the genera currently placed in the Cassidininae *sensu stricto* are those with the *Cassidina*-type of pleopod morphology which also have a simple pleotelson that is weakly vaulted and have lamellar unreduced uropod endopods with a reduced exopod set into the lateral margin of the endopod.

The genera here placed in the redefined Cassidininae *sensu stricto* can be placed into three discrete groups.

Cassidina group

Dorsoventrally flattened, epistome visible in dorsal view separating antennule peduncle bases. Cephalon lateral margins expanded, not set into pereonite 1; pereonite 1 with coxal extensions present; pleonal sternite and sternal process present. Pleon with 3 segments, suture extending to lateral margin, laterally unfused. Antennule peduncle article 1 and 2 flattened anteriorly expanded. Mandible molar with smooth mesial surface. Maxilliped palp article 2 mesial margin expanded, articles 3 and 4 with finger like mesial extensions, article 5 elongate. Pereopod 1 modified with 1 or more elongate articles and elongate dactylus; accessory unguis slender, often serrate. Penes

short, unfused. Pleopod 1 rami subequal in width, distally rounded. Pleopod 3 with transverse suture. Pleopods 4 and 5 without PMS or SMS.

Female with marsupium formed from oostegites, arising from coxae of pereopods 1–4 or 2–4, and overlapping at midline; with or without short posterior pocket.

Four genera form this group: *Cassidina* Milne Edwards, *Chitonopsis* Whitelegge, *Paracassidina* Baker and *Agostodina* gen. nov.

The presence of a pleonal sternite is not unique, this feature also occurring in the *Cerceis* group of genera, the *Ischyromene* group of genera (both Dynameninae), and *Parasphaeroma*. The presence of ventral coxal extensions on pereonite 1 is unique to this group of genera as far as is known, this character not having been noted in other sphaeromatid genera.

This group of closely related genera appears restricted to the Australia–New Zealand region, with one species also recorded from Indonesia. It is absent from South Africa. *Paracassidina* is found in the tropical regions of northern Australia and its range may extend further north.

Leptosphaeroma group

Strongly dorsoventrally flattened. Cephalon set into pereonite 1, not laterally expanded; rostral point acute or narrow. Epistome not visible in dorsal view. Pereonite 1 without coxal extensions, pleon without sternite or sternal process. Antennule peduncle articles 1 and 2 flattened, forming contiguous outline. Mandible molar with rugose or ridged surface. Maxilliped palp articles with weak mesial lobes. Pereopods all ambulatory. Penes short, unfused. Pleopod 1 exopod either narrow, reduced, or absent. Pleopod 2 with appendix masculina sub-basal in position; pleopods 4 and 5 without PMS or SMS, each with transverse suture. Uropod exopod reduced, exopod set laterally into endopod, not articulating.

Marsupium varied; oostegites arising from coxae of pereopods 2 and 3 or 2–4, short, not overlapping at midline, or absent; anterior and posterior pocket (*Paraleptosphaeroma*, *Leptosphaeroma*) may be present.

Five genera can be placed into this group: *Leptosphaeroma* Hilgendorf, *Paraleptosphaeroma* Buss and Iverson, *Platysphaera* Holdich and Harrison, *Chitonosphaera* Kussakin and Malyutina and *Discidina* gen. nov. The first three listed all possess a *membrana cingula* and a greatly reduced pleopod 1 exopod. *Discidina* and *Chitonosphaera* have a similar antennule, epistome and uropod morphology, but the pleopod 1 exopod is not reduced in size.

Cassidinidea group

Cephalon not set into pereonite 1, lateral margins expanded; epistome visible in dorsal view. Pereonite 1 without coxal extensions; pleon without sternite or sternal process. Pleon consisting of 1 segment. Antennule peduncle with articles 1 and 2 weakly or strongly flattened. Mandible molar process weakly ridged. Maxilliped palp articles with weakly developed lobes. Pereopods ambulatory. Penes partly or entirely fused. Pleopod 1 rami elongate, endopod narrow; pleopod 2 appendix masculina elongate, set on posteriorly directed lobe; pleopods 4 and 5 without PMS or SMS.

Female brood pouch formed from anterior and posterior pockets.

Two genera, *Cassidinidea* and *Syncassidina* can be placed in this group.

Of the genera placed into the *incertae sedis* category four genera are too inadequately described to allow for comment to be made on their affinities: *Anoplocopea*, *Campecopea*, *Botryias* and *Dynameniscus*.

Stathmos, *Apemosphaera*, *Gnorimosphaeroma* and *Exosphaeroides* all have pleopods that correspond closely to those of *Exosphaeroma*, as does *Cymodetta*. In contrast *Striella* has a pleopod, pleotelson and uropod morphology that suggests a common origin with *Dynamenella*.

Tholozodium shows nothing in common with any other genus or group of genera.

The resolution of the status of the Cassininae must wait until further data are available on the Sphaeromatinae and Dynameninae. It is however clear that the subfamily, as it is currently defined and constituted, is an artificial taxon defined principally by a single plesiomorphic and probably secondarily convergent character. Furthermore, the distribution of many characters within the general of the Dynameninae and Sphaeromatinae is very poorly understood, particularly details of the mouthparts, fine details of the pereopods, and such characters as the pleonal tergite. Rather than establish premature new classificatory arrangements, the subfamily is here regarded as a 'taxon of convenience' until a more reliable, phylogenetically based, classification can be achieved.

Comments on morphology

Attention is here drawn to certain features of the morphology of the Sphaeromatidae. This is not intended to be comprehensive, but to draw attention to certain characters that have previously been little illustrated and discussed, and which would appear to be potentially useful in the taxonomy of the Sphaeromatidae and perhaps in characterizing the family. All of these characters need to be documented for other sphaeromatid genera before they can be incorporated into phylogenetic schema, or used in the support of generalized statements.

Pereopods

As in many Flabellifera, pereopod 1 is distinct to pereopods 2 and 3. Unlike the cirolanid lineage of families in which pereopods 1–3 differ from 4–7, sphaeromatid pereopods 2–7 are often subsimilar, notwithstanding unusual modifications found in such genera as *Kranosphaera* Bruce, 1992 or *Ceratocephalus* Woodward, 1877 (see Bruce, in press). The form of the pereopod 1 propodus and dactylus may show significant generic differences, and the shape and ornamentation of the dactylus and accessory unguis should be observed.

The articulating junction between the propodus and dactylus of pereopods 2–7 shows a structure apparently unique to the Sphaeromatidae, in which the distal portion of the propodus is demarcated by a distinct suture and has a recessed extension into which a dactylar flange articulates. This feature (Figs 3H, 8B, 22E, F) would provide axial rigidity, and is always absent from pereopod 1. Harrison and Ellis (1991) termed this the 'posterior distal plate', but on pereopods 2 and 3 it is laterally positioned, and on pereopods 4–7 it is mesially positioned, so it can simply be referred to as the *distal plate*.

Mandible

The sphaeromatid mandible accords well with generalized peracaridan mandible as demonstrated by Dahl and Hessler (1982). Variations and exceptions are briefly discussed here.

Lacinia mobilis. This structure is usually present on the left mandible. It is not always clear if the distalmost spine of the spine row is a reduced lacinia mobilis or not when a distinct lacinia mobilis is not present (e.g. Figs 12A, 19H, 46H, 49B).

Spine row. In all sphaeromatids observed, with the exception of *Discidina* gen. nov., there is not a row of discrete spines (as in the cirolanid lineage) but rather a series of basally united spiniform processes which are in turn united with the lacinia mobilis (e.g. Figs 8E, F, 38D and most mandible drawings). This feature was clearly illustrated by Racovitza (1910) and is also shown by *Sphaeroma* (see Bruce, 1993, fig. 1A).

Molar process. Usually a prominent mesially directed process with flat or concave mesial face which is variously ornamented with nodules and ridges, and is peripherally armed with cuticular teeth and setules. In the *Cassidina* group of genera the mesial face is flat, the distal margin often truncate and provided with prominent cuticular teeth (Figs 8G, 14C, D, 38B, C). In contrast *Syncassidina* has a rounded molar process with a smooth and distinctly concave face. *Platysphaera* has a lobate molar with prominent transverse ridges (Fig. 50C, D) not dissimilar to that of *Sphaeroma* (See Bruce, 1993, fig. 1B). Full documentation of molar morphology for the Sphaeromatidae is yet to be achieved, but it is already clear that this structure varies widely within the family, and could be useful in elucidating generic relationships.

Cuticle

The family Sphaeromatidae is noted for its cuticular ornamentation which can be smooth, granular, punctate and variously formed into nodules, bosses, pits and processes. The cuticle of species of *Paracassidina* can be smooth (e.g. *P. dama*; Fig. 38H), granular (e.g. *P. fuscina*; Fig. 22G), minutely punctate (e.g. *P. wurrook*; Fig. 30) or pilose (e.g. *P. anasilla*; Fig. 26A). Ornamentation varies from smooth to nodular with cephalic processes.

Agostodina munta n. sp. has an apparently smooth cuticle which under SEM is shown to be made up of small, approximately pentagonal plates. *Chitonopsis* species are covered by a dense pile of soft setules (Fig. 8D), while *Discidina* has the cuticle covered by a mass of spines and bulbous cuticular setules (Fig. 54A, B).

While not suggesting that these cuticular characters are of generic merit, they may indicate subgeneric groupings (e.g. the *Paracassiana pectinata* group of species all have a smooth cuticle).

Sternites

Several genera of Sphaeromatidae have a pleonal sternite anterior to the pleopod peduncles, and often with a posteriorly directed median process. The *Cerceis*-group of genera and the *Ischyromene*-group of genera both have pleonal sternites. The *Cassidina* group of genera all have a pleonal sternite (Figs 2E, F, 22C, 39D), and additionally have narrow coxal extensions which meet at the midline of pereonite 1 (Figs 2G, 22B, 39C) and surround the buccal appendages. This character has not been reported in any other sphaeromatid genera. Although the pleonal sternite has been sometimes illustrated (e.g. Harrison and Holdich, 1982, fig. 1A; Bruce, 1993) it has rarely been mentioned, although Harrison and Ellis (1991) use it as a key character to the '*Cerceis*-like genera'.

I consider these two characters to be of generic and probably higher taxonomic significance. Their presence or absence should always be noted.

Coxal keys

Coxal 'lock and key' processes are commonly found in dorsoventrally flattened isopods such as the Serolidae. Coxal keys occur in most Cassidininae (*sensu stricto*)

(e.g. Fig. 22D) and appear to give anterior–posterior rigidity to the pereon (a similar ‘lock and key’ is usually seen at the pleon–pleotelson dorsal interface).

Distribution

Australia currently has seven genera of Cassidininae (*sensu stricto*). Of these only *Cassidinidea* is a widespread genus, now known to occur in the western Atlantic (Brazil to New Jersey, USA), probably the eastern Atlantic, southwestern Indian Ocean (South Africa and Mozambique), India and now tropical northern Australia and southern New Guinea. It has not been recorded from Pacific localities. *Platysphaera* also has a wide distribution being recorded here from the Indian Ocean (Indonesia and Western Australia), Papua New Guinea and the Pacific Ocean (New Caledonia and Coral Sea).

The *Cassidina*-group of genera is restricted to the Australian and New Zealand region, with one species of *Chitonopsis* recorded from Indonesia. *Paracassidina*, the largest cassidine genus, appears to occur in all coastal Australian waters, most geographic regions having a least two species; the North West Shelf region has 5 species within the area sampled (Ward and Rainer, 1988). Given the occurrence of *Paracassidina* in tropical shelf areas of Australia near Papua New Guinea it seems likely that its range could extend northwards into other regions. *Syncassidina* occurs commonly in estuarine habitats from southwestern Queensland, New South Wales to Victoria. The original locality was in Western Australia, and the genus will probably occur in suitable habitats, which are likely to be rare, along the arid coasts of the Great Australian Bight and Western Australia. It appears that the estuarine niche may be occupied by *Cassidinidea* in tropical locations.

Australia is flanked by two regions in which the sphaeromatid fauna is well known New Zealand (Hurley and Jansen, 1977) and South Africa (Kensley, 1978). *Cassidina* is the sole representative of the subfamily in New Zealand waters, and this indicates an affinity with the Australian fauna. The South African cassidines are represented by *Parasphaeroma*, *Stathmos* and the widespread *Cassidinidea*. The genera *Parasphaeroma* and *Stathmos* are regarded as *incertae sedis*, and do not share any characters in common with Australian genera.

Key to the Australian cassidinine genera

- 1 Uropod endopod reaching to about distal margin of pleotelson; exopod reduced or absent, set laterally into exopod, not freely articulating 2
 - Uropod endopod shorter than pleotelson; exopod large, inserted ventrolaterally into endopod, freely articulating *Aemosphaera*, gen. nov. 1126
- 2 Epistome prominent in dorsal view; cephalon lateral margins expanded 4
 - Epistome not visible in dorsal view; cephalon laterally encompassed by pereonite 1 3
- 3 Uropod exopod set at anterolateral angle of uropod, not inset; body dorsal surfaces without scale spikes; lateral margins with *membrana cingula*; pleopod 1 endopod reduced in size, half as big as exopod *Platysphaera* 1155
 - Uropod exopod set mediolaterally into endopod; dorsal body surfaces entirely covered with scale spikes, *membrana cingula* absent; male pleopod 1 endopod distal margin forming tube *Discidina* gen. nov. 1159
- 4 Rostral point short, anteriorly narrow, or absent; pleon without lateral sutures; pleopod 1 endopod narrow, about half as wide as exopod, elongate; appendix masculina on backwardly directed lobe. Male penes at least basally fused 5
 - Rostral point anteriorly truncate or excavate; pleon with suture running to lateral margin; pleopod 1 with both rami rounded; appendix masculina set basally. Male with unfused penes 6

- 5 Epistome anteriorly wide; uropod exopod large; penes fused along entire length; antennule peduncle articles, 1 and 2 not flattened or expanded *Cassidinidea* 1149
 – Epistome narrow in dorsal view; uropod exopod minute; penes fused basally; antennule peduncle articles 1 and 2 flattened, expanded *Syncassidina* 1146
- 6 Epistome as long or longer than cephalon in dorsal view; antennule mesial margin abutting epistome; pereopod 1 with biserrate spines on posterior margin of ischium-propodus; dactylus short *Chitonopsis* 1087
 – Epistome as long or shorter than cephalon in dorsal view, but antennule mesial margin free; pereopod 1 without biserrate spines on posterior margin; dactylus elongate 7
- 7 Pereopod 1 merus anterior margin forming greatly elongated lobe, otherwise short; propodus club-shaped, dactylus set subdistally on posterior margin *Paracassidina* 1107
 – Pereopod 1 merus elongate, without lobe, as long as dactylus; propodus curved, not club-shaped, dactylus set distally *Agostodina* gen. nov. 1099

Genus *Cassidina* Milne Edwards

Cassidina Milne Edwards, 1840: 223; Dana, 1853: 748; Gerstaecker, 1882: 222; Thompson, 1889: 263; Stebbing, 1893: 365; 1900: 558; Hansen, 1905: 129; Nierstrasz, 1931: 219; Hurley and Jansen, 1977: 71; Harrison, 1984b: 375; Harrison and Ellis, 1991: 934.

Type species. *Cassidina typa* Milne Edwards, 1840, by monotypy.

Diagnosis of male. Body moderately vaulted; lateral margins without *membrana cingula*. Cephalon lateral margins flattened extending to edge of pereonite 1; anterior margin with 2 sublateral incisions; rostral process present; eyes dorsal, distinctly faceted, weakly reniform. Pereonite 1 shorter than 2; pereonites 2–7 subequal in length, pereonite 7 extending to lateral body margins; coxae laterally expressed with coxal keys; coxal sutures not distinct. Pleon with 3 segments; lateral margin of segments 2 and 3 not fused. Pleotelson anterolateral margin not extending to lateral body margin; posterior margin entire, without ventral groove or channel. Coxae of pereonite 1 and part of 2 extended across sternum, meeting at midline; pleonal sternite anterior to pleopods, with medial sternal process.

Antennule peduncle articles 1 and 2 flattened, anterior margin weakly produced, mesial margin abutting epistome; article 3 subequal in length to article 2; flagellum as long as combined length of peduncle articles 2 and 3. Antenna peduncle articles 1 and 2 subequal in length, short (less than half as long as article 3); article 3 longest, 4 shorter than 5; flagellum slightly shorter than peduncle. Epistome medially constricted separating antennule peduncles, extending beyond antennule article 1.

Mandible molar broad, prominent, mesial surface smooth, margins serrate; lacinia mobilis present on left mandible; spine row present. Maxillule lateral lobe with 13 stout spines, some of which finely serrate, medial lobe with 4 pectinate spines. Maxilla with all lobes setose. Maxilliped palp articles 2–4 produced, those of articles 3 and 4 forming lobes; endite distal margin subtruncate, with stout simple and plumose spines; distomesial margin with 3 plumose spines.

Pereopod 1 ischium shorter than merus; merus and propodus subequal in length; dactylus elongate (about 0.8 length of propodus), with blade-like serrate secondary unguis; anterodistal margin of merus and carpus with very long finely serrate setae. Pereopod 2 merus, carpus and propodus subequal in length; posterodistal margin of carpus lobate; stout blunt spine present at base of short dactylus; secondary unguis prominent, simple, acute; pereopod 3 similar to 2. Pereopods 4–7 subsimilar, pereopod 7 more spinose than preceding pereopods; pereopod 7 with serrate spines at anterodistal angle of merus and across distolateral margin of propodus.

Paired penes present on posterior of sternite 7, not extending to pleopod peduncles.

Pleopod 1 exopod proximolateral margin with 9 spines; both rami distally rounded. Pleopods 2 and 3, both rami with PMS; pleopod 2 appendix masculina basal in position; pleopod 3 with distinct complete transverse suture; pleopods 4 and 5 both rami without setae, exopods without transverse suture; pleopod 5 exopod with 3 scale patches, these not forming lobes. Uropod with exopod reduced but prominent, set laterally at about anterior 0.33 of length of endopod.

Female. Pereopods 2 and 3 without lobe on propodus (i.e. pereopods 2–7 subsimilar). Oostegites present on sternites 2–4; with posterior pocket. Ova held in marsupium.

Remarks. *Cassidina* is the type genus for the subfamily Cassinininae, and is ultimately the defining taxon for the subfamily. The type species of the type genus has only been figured once with any degree of detail, by Milne Edwards (1840). A full description is therefore given here in order to allow assessment of this genus in relation to the subfamily and also to other related genera such as *Chitonopsis*, *Paracassidina*, *Syncassidina* and *Agostodina* gen. nov.

Distribution. The genus is known only from New Zealand (Hurley and Jansen, 1977).

Cassidina typa Milne Edwards

(Figs 2–5)

Cassidina typa Milne Edwards, 1840: 224, pl. 32, figs 10–16; Stebbing, 1900: 559 (discussion); Hansen, 1905: 129–31, pl. 7, fig. 6a; Tattersall, 1921: 226; Thomson and Anderson, 1921: 114; Hurley, 1957: 13; 1961: 271; Hurley and Jansen, 1977: 72, fig. 75.

Cassidina typus. Nierstrasz, 1917: 109, fig. 41; 1931: 219 *lapsus*.

Cassidina neo-zealanica Thomson, 1889: 264, pl. 14, figs 1–4; 1913: 247; Hutton, 1904: 263.

Material examined

All **New Zealand**: 4♂ (12.9, 11.6, 11.5, 9.9 mm), juv. (6.7 mm). Warrington-Koritane (Otago), 45°38'S, 170°40'E, 30 November 1957, 18–22 m, MMO (shore collection) (QM W18490). ♂ (11.8 mm), ♀ (ovig. 8.3 mm), Blueskin Bay, Otago, 45°43'S, 170°37'E, 1 October 1952, 18 m, coll. D. E. Hurley (NZOI colln, dissected prior to current examination. 2♂ (12.1, 11.4 mm), juv. (6.7 mm), Otago Heads, 3 December 1918, 27 m, coll. C. Hedley (AM P5626).

Remarks. Full figures are given here to allow ready identification of this species as well as to demonstrate the generic characters. None of the specimens were in good condition, the material from which the drawings were prepared having at some stage been dried out.

This species is currently known only from New Zealand, at depths from 18 to 1000 m, although Hurley and Jansen (1977) consider the deeper records (> 110 m) to be anomalous.

Genus *Chitonopsis* Whitelegge

Chitonopsis Whitelegge, 1902: 278; Hale, 1929: 205; Nierstrasz, 1931: 219; Holdich and Harrison, 1981: 628; Harrison, 1984b: 376; Harrison and Ellis, 1991: 935.

Chitonopsis. Hansen, 1905: 131 (*lapsus*).

Type species. *Chitonopsis spatulifrons* Whitelegge, 1902, by monotypy.

Diagnosis of male. Body strongly flattened; dorsal cuticle covered by fine, short pilosity; lateral margins without *membrana cingula*. Cephalon with median rostral

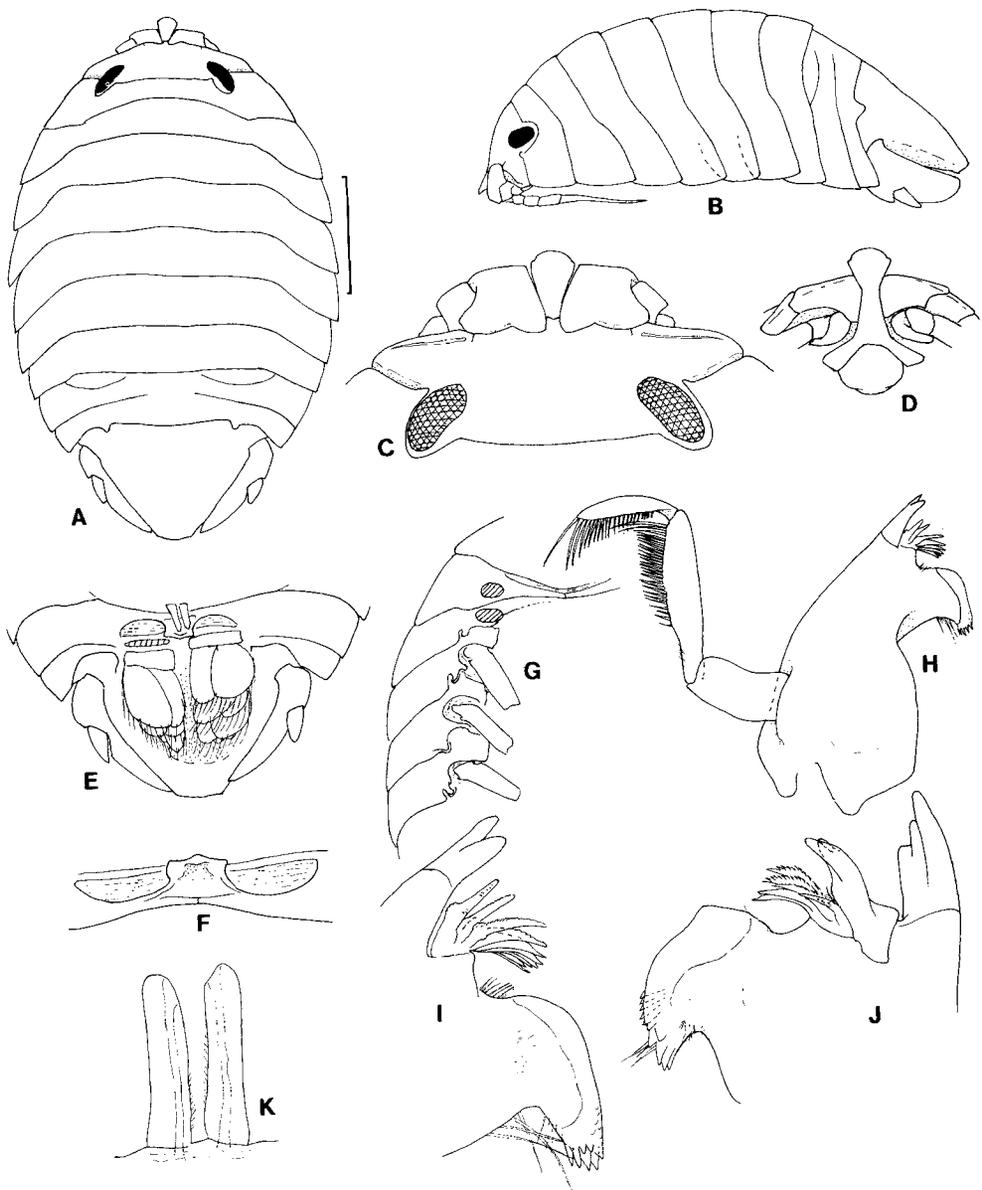


FIG. 2. *Cassidina tya*. All Figs ♂ 12.9 mm. A, dorsal view; B, lateral view; C, cephalon, dorsal view; D, frons; E, pleon in ventral view; F, sternal process; G, coxae 1-5, ventral view; H, right mandible; I, right mandible detail; J, left mandible, detail; and K, penes. Scale line 3.0 mm.

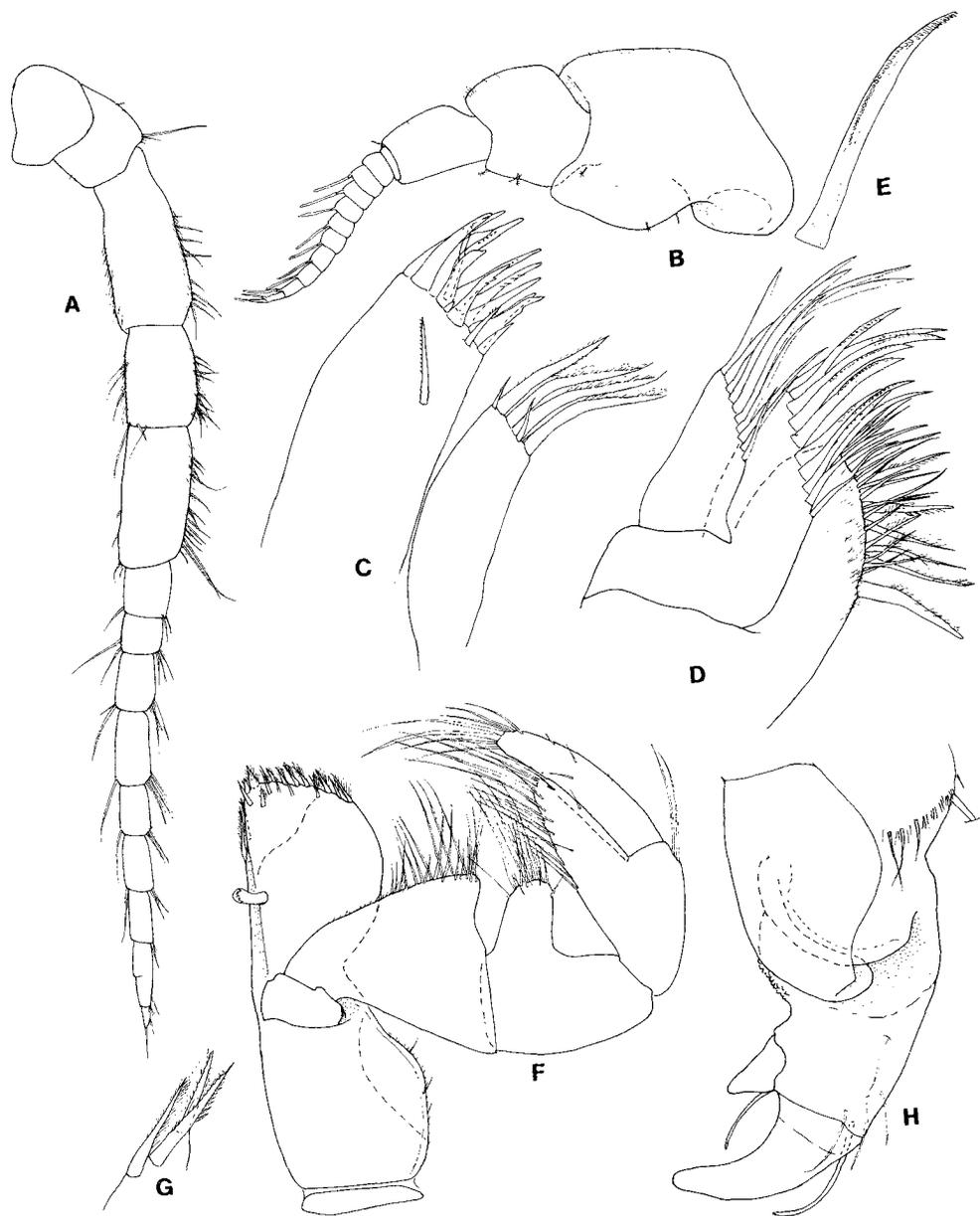


FIG. 3. *Cassidina tya*. All Figs ♂ 11.8 mm, Blueskin Bay. **A**, antenna; **B**, antennule; **C**, maxillule; **D**, maxilla; **E**, seta, maxilla middle lobe; **F**, maxilliped; **G**, spines, maxilliped endite, dorsal distolateral angle; and **H**, pereopod 7 dactylus, showing interlocking flanges.

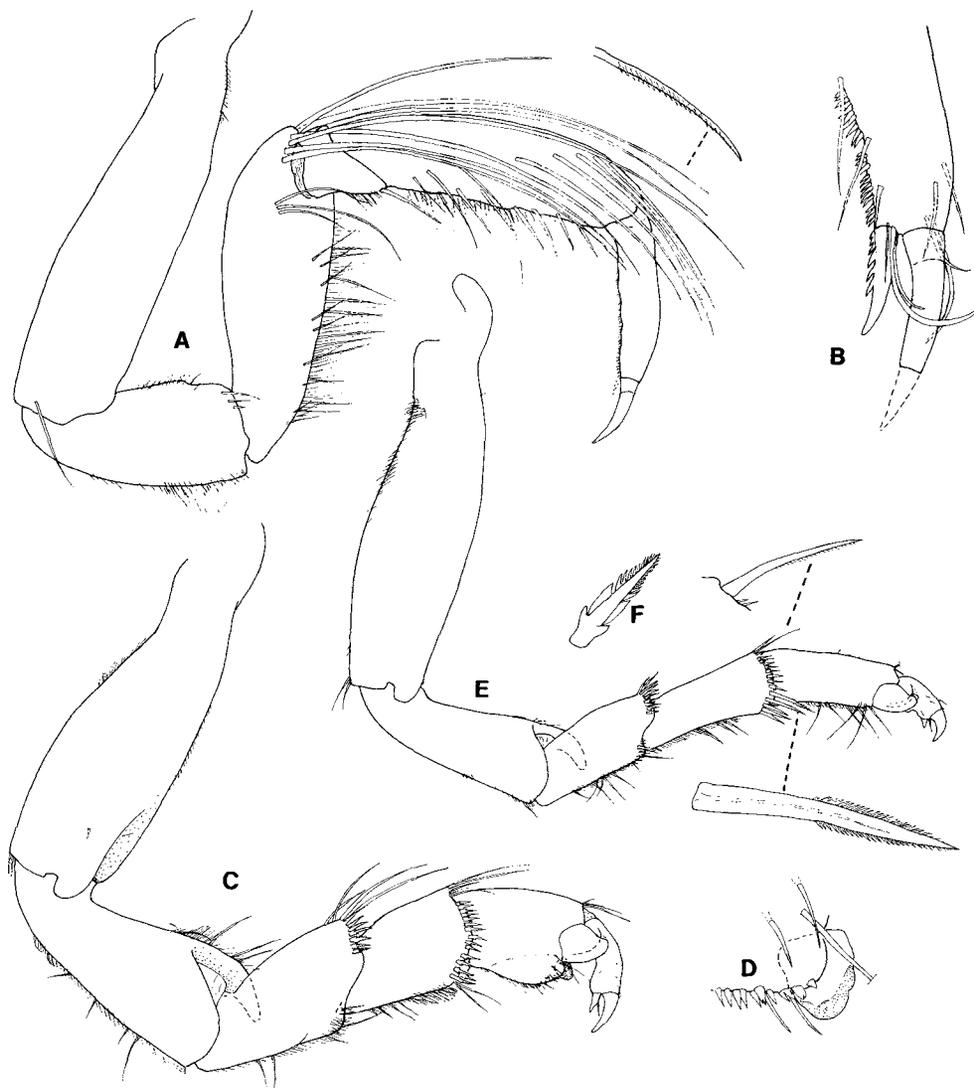


FIG. 4. *Cassidina tya*. All Figs ♂ 12.9 mm, except A. A, pereopod 1, ♂ Blueskin Bay; B, pereopod 1 dactylus, showing unguis and secondary unguis; C, pereopod 2; D, postero-distal spine, pereopod 2 propodus; E, pereopod 7; and F, spine from carpus distal margin.

process; lateral margins flattened, extending laterally to edge of pereonite 1; anterior margin with 2 submedian incisions; eyes dorsal; distinctly faceted, reniform. Pereonite 1 shorter than pereonite 2; pereonites 2–7 subequal in length; pereonite 7 extending laterally to body margin; coxae all laterally expressed, with coxal keys, sutures distinct. Pleon with 3 segments, lateral margins of segments 2 and 3 not fused. Pleotelson anterolateral margin not extending to lateral body margin; posterior margin entire, without exit groove or channel. Coxae of pereonite 1 extending across sternum and meeting at midline; pleonal sternite anterior to pleopods, with medial sternal process.

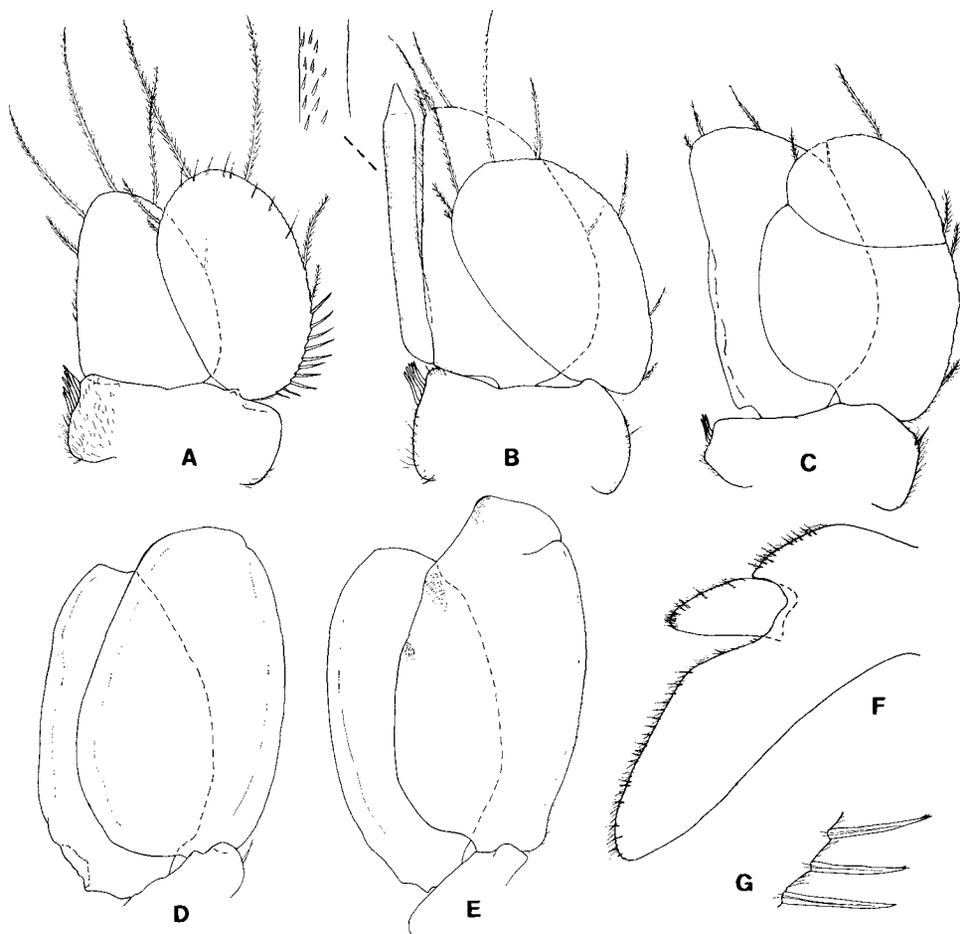


FIG. 5. *Cassidina typa*. All Figs ♂ 12.9 mm except F. A-E, pleopods 1-5, respectively; F, uropod, Blueskin Bay; and G, spines, pleopod 1 exopod proximalateral margin.

Antennule peduncle articles 1 and 2 strongly flattened, anterior margins strongly produced; mesial margin of article 1 abutting epistome; article 3 about half as long as 2; flagellum short, subequal in length to peduncular article 3. Antenna peduncle articles flattened; articles 1 and 2 subequal in length, short (about 0.5 of article 3); article 3 longest, 4 and 5 subequal in length; flagellum slightly shorter than peduncle. Epistome with weak medial dilation, extending anteriorly to about anterior margin of antennule peduncle article 1.

Mandible incisor 3-dentate; molar broad, prominent, mesial face smooth, distal margins serrate; prominent 3-dentate lacinia mobilis present on left mandible; spine row present. Maxillule lateral lobe as for *Cassidina*. Maxilla as for *Cassidina*. Maxilliped palp articles 2-4 produced, article 4 being weakly (*C. spatulifrons*) to strongly (*C. booyoolie*, *C. hanseni*) produced; endite distal margin subtruncate with stout circumplumose spines and elongate serrate spines; distomedial margin with 3-6 plumose spines.

Pereopod 1 ischium shorter than merus; propodus longest article; dactylus short (about 0.4 length of propodus), with blade-like serrate secondary unguis; posterior margin of merus, carpus and propodus with prominent serrate spines; propodus without long setae. Pereopod 2 with merus, carpus and propodus subequal in length, without lobes to articles; distal margin of carpus with row of serrate setae; propodus without stout robust tubercular spine opposing base of dactylus; secondary unguis prominent, simple. Pereopod 3 similar to 2. Pereopods 4–7 subsimilar. Pereopod 7 carpus distal margin with row of serrate spines, posterior 3 of which are nearly as long as propodus.

Paired penes present on sternite 7, not extending to pleopods.

Pleopod 1 exopod with 1 or 2 spines at proximolateral margin; both rami rounded. Pleopods 2 and 3 both rami with PMS; pleopod 2 appendix masculina basal in position; pleopod 3 exopod with faint transverse suture. Pleopods 4 and 5 both rami without PMS, without transverse suture on exopod; pleopod 5 exopod with 3 scaled patches, these not forming lobes. Uropod exopod reduced, but prominent, set laterally at about anterior 0.33 of endopod.

Female. Appendages similar to those of the male. Brood pouch formed from oostegites arising from coxae 1–4; ova retained within marsupium.

Composition. *Chitonopsis hanseni* Nierstrasz, 1931. Off Roti, Timor and Labuanbadjo, Celebes, Indonesia; *Chitonopsis booyoolie* sp. nov. Eastern Australia.

Remarks. This genus is very similar to *Cassidina*, differing in having the antennular peduncle articles 1 and 2 more strongly produced, a short antennular peduncle article 3, a short antennular flagellum, the epistome medially weakly dilated (versus constricted in *Cassidina*); pereopod 1 with a short dactylus, propodus without long setae (with), posterior margin of merus, carpus and propodus with prominent serrate spines (without); the carpus and propodus of pereopods 2 and 3 are not lobed and also lack a prominent tubercular spine opposing the base of the dactylus. *Chitonopsis* is the only genus in the *Cassidina* group of genera to have the marsupium formed from 4 rather than 3 pairs of oostegites.

Most cassidine genera contain few species but, critical to evaluating characters of generic value, *Paracassidina* has several. In *Paracassidina*, and also *Cassidinidea* and other smaller genera, antennal, mouthpart and pereopod morphology remain very uniform. Similarly, though epistome morphology seems to vary widely in *Paracassidina*, all species have a medially constricted epistome, as well as having divergent antennulars. The epistome, pereopodal, antennule and marsupium character states suggest that *Chitonopsis* should be maintained as distinct from *Cassidina* at least until intermediates between these two genera are shown to exist.

Key to males of the genus *Chitonopsis*

- 1 Epistome anteriorly wide, subtruncate; antennule peduncle article 1 with anterior margin truncate; pereopod 1 without long setae at anterodistal angle of merus *C. spatulifrons*
- Epistome anteriorly narrowed or rounded; antennule peduncle article 1 anterior margin oblique, or forming distinct point (viewed *in situ*); pereopod 1 with long setae on anterodistal angle of merus 2
- 2 Epistome broadly rounded, slightly shorter (0.8) than cephalon; antennule peduncle article, about as long as cephalon, anterior margin oblique *C. booyoolie* sp. nov.
- Epistome distally narrow, longer (1.8) than cephalon; antennule peduncle article 1 longer than cephalon, anterior margin forming point *C. hanseni*

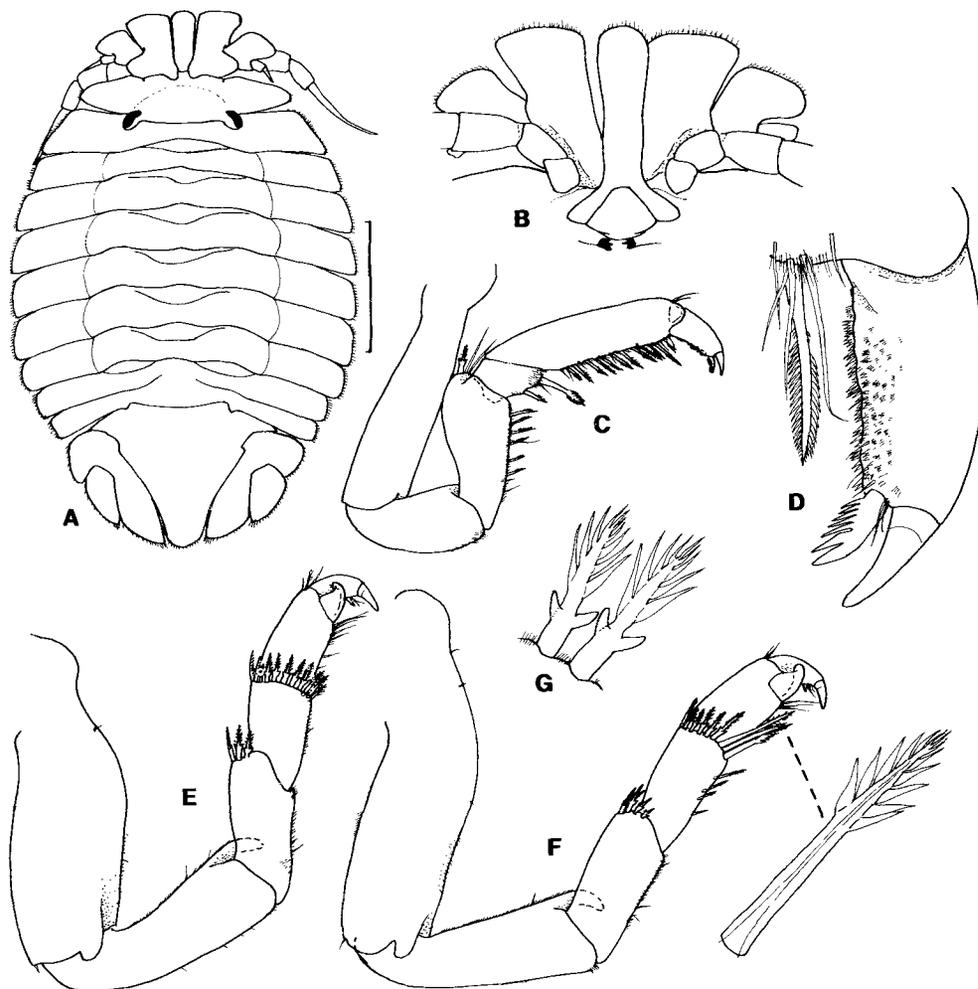


FIG. 6. *Chitonopsis spatulifrons*. All Figs ♂ 16.8 mm except A and B, ♂ 16.5 mm (SAM C5033). A, dorsal view; B, frons; C, pereopod 1; D, pereopod 1, dactylus; E, pereopod 2; F, pereopod 7; and G, trifid biserrate spines, pereopod 2 carpus. Scale line 4.0 mm.

Chitonopsis spatulifrons Whitelegge

(Figs 6–8)

Chitonopsis spatulifrons Whitelegge, 1902: 279, figs 38a–g; Hansen, 1905: 83, 112, 131; Hale, 1929: 305; Nierstrasz, 1931: 221; Holdich and Harrison, 1981: 628, fig. 5.

Material examined

SYNTYPES ♂ (10.9 mm), 5 km east of Port Jackson, NSW, 33°52.5'E, 151°20.0'E, 7 March 1898, 68 m, sand and mud, sta. 34, coll. E. R. Waite on HMCS *Thetis* (AM G2151). ♀ (ovig. 18.6 mm, previously dissected), 9 km east of Coogee, NSW, 33°57.0'S, 151°21.5'E, 15 March 1898, 89 m, fine sand, sta. 44, coll. E. R. Waite on HMCS *Thetis* (AM G2152).

Non type material: 6♂ (13.6, 15.3, 15.4, 15.5 SEM, 16.5 drawn, 16.8 mm dissected), ♀ (non-ovig. 19.5 mm), Marum Is., Sir Joseph Banks Group, S.A., 9 January 1984, on black sponge, 6.1 m, coll. W. Zeidler (SAM C5433). ♂ (15.4 mm), 3♀ (ovig. 15.1, 15.4, 15.5 mm), as above except, 10 January 1984, on sponge

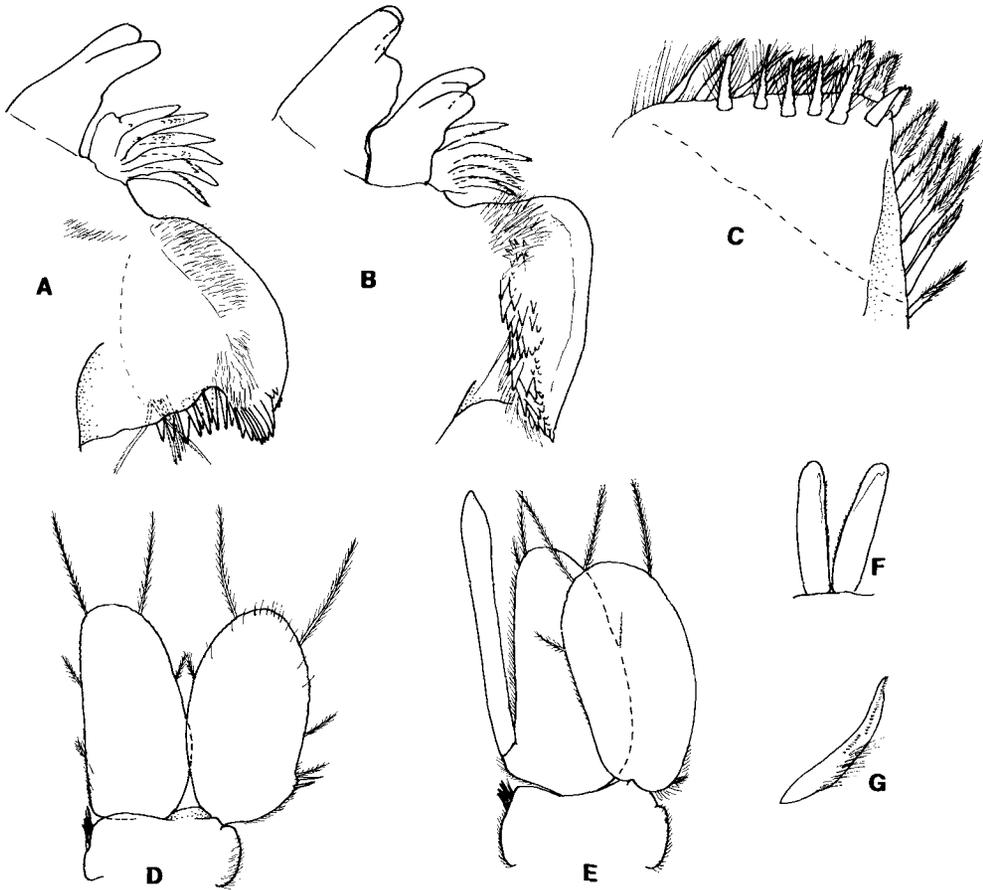


FIG. 7. *Chitonopsis spatulifrons*. All Figs ♂ 16.8 mm (SAM C5433). A, right mandible; B, left mandible; C, maxilliped endite, distal margin; D, pleopod 1; E, pleopod 2; F, penes; and G, coupling hook, pleopod 1.

(AMP41855). ♀ (ovig. 18.9 mm), between Lusby Is. and Partney Is., Sir Joseph Banks Group, S.A., 1 February 1985, on undersurface of *Geodia* sponge, 6.1–7.6 m, coll. K. L. Gowlett (SAM C5428). 3 ♂ (14.0, 16.8, 17.1 mm), 4 ♀ (ovig. 16.0, 16.1, 18.8, 20.0 mm), 3 broken specimens, 'dredged by Dr Verco' (SAM C5425).

Additional material: **South Australia:** Sir Joseph Banks Group: Manca, Reevesby Is., 1.5–3.0 m depth (SAM C5431); ♀, Marum Is., 3.0–7.6 m depth (SAM C5435); ♂, 5 ♀, Partney Is., 4.6–10.7 m (SAM C5429); ♀, Blythe Is., 1.5–6.1 m (SAM C5427); ♂ Marum Is., 6.1 m depth (SAM C5432); ♂, Moreton Bay, Reevesby Is., 2.5–4.6 m (SAM C5430); ♀, Marum Is., 4.6–10.7 m (SAM C5434); 5 specimens, Kangaroo Reef, Boston Is., 3.0–9.6 m (SAM C5423, C5424). 4 specimens labelled 'Gulf of St. Vincent', 7.3–32.9 m, (SAM C1057, C577, C5426, C1557). 1 specimen Whaler's Bay, Thistle Is., 3 March 1941, dredged, 7 m, coll. K. Sheard (SAM C5422). **Victoria:** Broken specimen, 30 km SSW of Warrnambool, 38°38.2'S, 142°35.0'E, 20 November 1981, 59 m, coll. R. Wilson (NMV J34873). ♂, 15 km south of Port Fairy, 38°32.0'S, 142°28.6'E, 20 November 1981, 52 m, medium sand, coll. R. Wilson (NMV J34873).

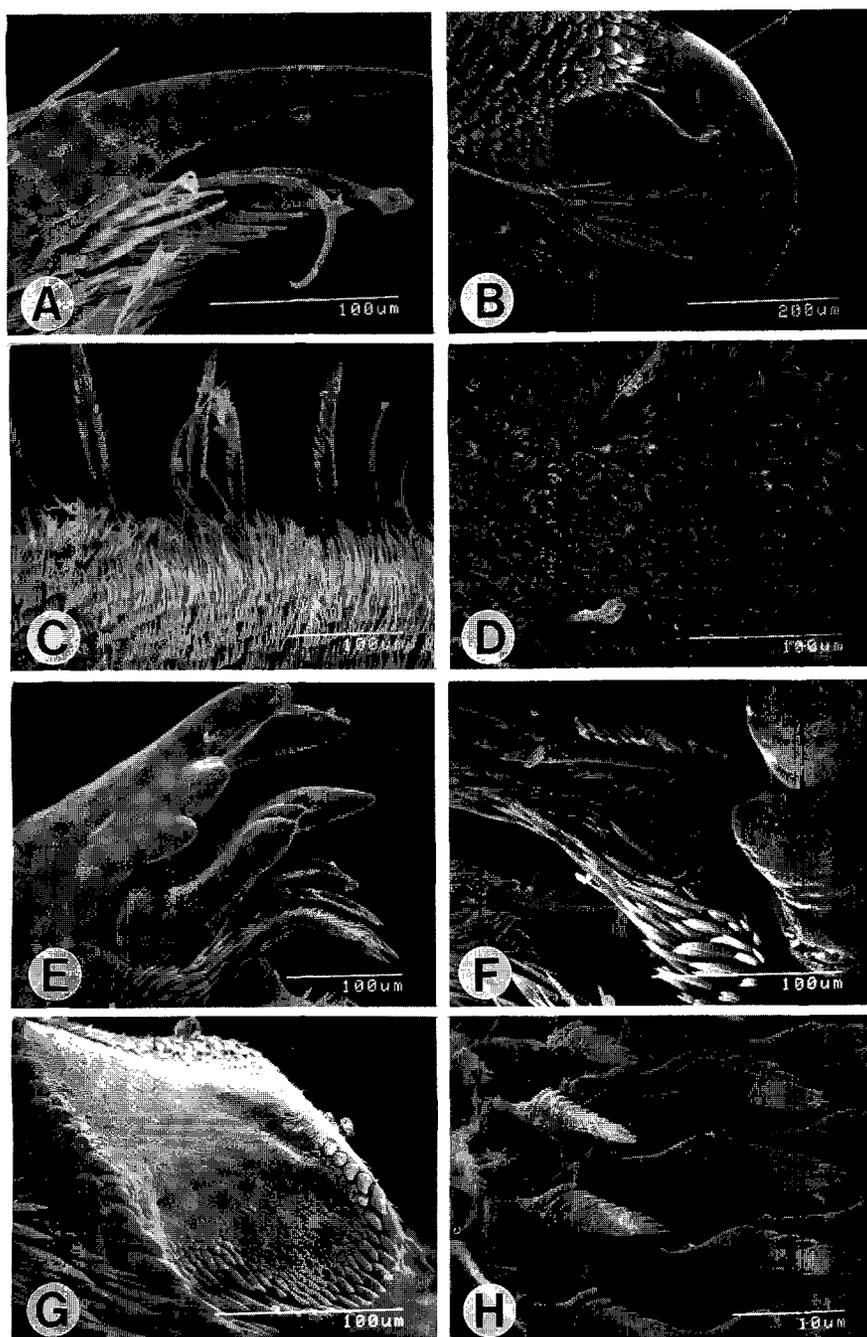


FIG. 8. *Chitonopsis spatulifrons*. (SAM C5433). A, pereopod 1 dactylus, showing scales and accessory unguis; B, pereopod 7, showing propodus/dactylus articulation; C, pereopod 1, merus posterior margin; D, uropod, cuticular setules; E, left mandible; F, right mandible, spine row; G, molar; and H, pleopod 5 scale patch.

Remarks. Supplementary figures to those of Holdich and Harrison (1981) are given here, particularly of details of generic significance.

This species was first recorded from off the Sydney coast of New South Wales from a depth of 66–71 m (Whitelegge, 1902). The Australian Museum and Museum of Victoria both hold extensive collections of isopods from the continental shelf of southeastern Australia. Examination of these collections has failed to reveal further specimens of *Chitonopsis spatulifrons* from that area, and the possibility must be considered that the original record is either in error or that the species no longer occurs in that region.

The collections of the South Australian Museum reveal that the species is common and readily collected from shallow coastal waters of South Australia.

Distribution. Original records from the vicinity of Sydney, NSW, 68–89 m on sand and sand and mud. Current material from the South Australia coast at depths between 1.5 and 10.7 m; three samples were collected from the surface of sponges, and two specimens from Victoria, at a depth of 52 m.

Chitonopsis booyoolie sp. nov.

(Figs 9, 10)

Chitonopsis hanseni Holdich and Harrison, 1981: 632 (footnote).

Material examined

All material from Queensland.

HOLOTYPE ♂ (9.0 mm), lower reaches of Calliope River, Gladstone, Gladstone Survey, 1974–1983, coll. P. Saenger, Qld Electricity Commission (QM W18491).

PARATYPES ♂ (7.5 mm dissected), 6 ♀ (non-ovig. 4.6, 4.7, 5.6, 5.7, 6.0, 6.1 mm), imm. (4.0 mm), 12 manca (2.6–3.5 mm), same data as holotype (QM W18492). ♀ (ovig. 7.1 mm), Moreton Bay, 27°31.4'S, 153°22.2'E, 10 July 1979, trawled, 6 m depth, coll. N. L. Bruce and N. Svennevig (QM W8047).

Description of male. Body ovate, about twice as long as wide; widest at pereonite 4. Cephalon 2.8 times as long as pereonite 1; pereonite 1 shortest, about half as long as pereonite 2; pereonites 2–7 subequal in length.

Antennule peduncle article 1 about as long as wide, anterior margin rounded; shorter in length (0.78) than cephalon; article 2 flattened, not expanded; articles 2 and 3 subequal in length; flagellum about 1.5 times as long as peduncle article 3, with 6 articles. Antenna peduncle and flagellum with abundant setules; flagellum extending to anterior of pereonite 4. Epistome anteriorly rounded, in dorsal view obviously shorter (0.78) than length of cephalon, extending just beyond anterior margin of antennule.

Pereopod 1 ischium shorter (0.7) than merus; merus slightly shorter (0.9) than propodus, anterodistal margin weakly produced, provided with 7 long setae which extend beyond distal margin of propodus; dactylus 0.6 length of propodus, posterior margin with scales; secondary unguis prominently pectinate. Pereopod 2 with ischium about twice as long as merus and carpus, both of which are shorter (0.6) than propodus; anterodistal angle of merus with 1 simple and 2 biserrate setae; distal margin of carpus with 2 long setae and 5 biserrate setae. Pereopod 7 similar to 2 but longer, anterodistal angles of merus and carpus without long setae and posterodistal margin of carpus with long serrate spines, the longest of which is 0.85 length of propodus.

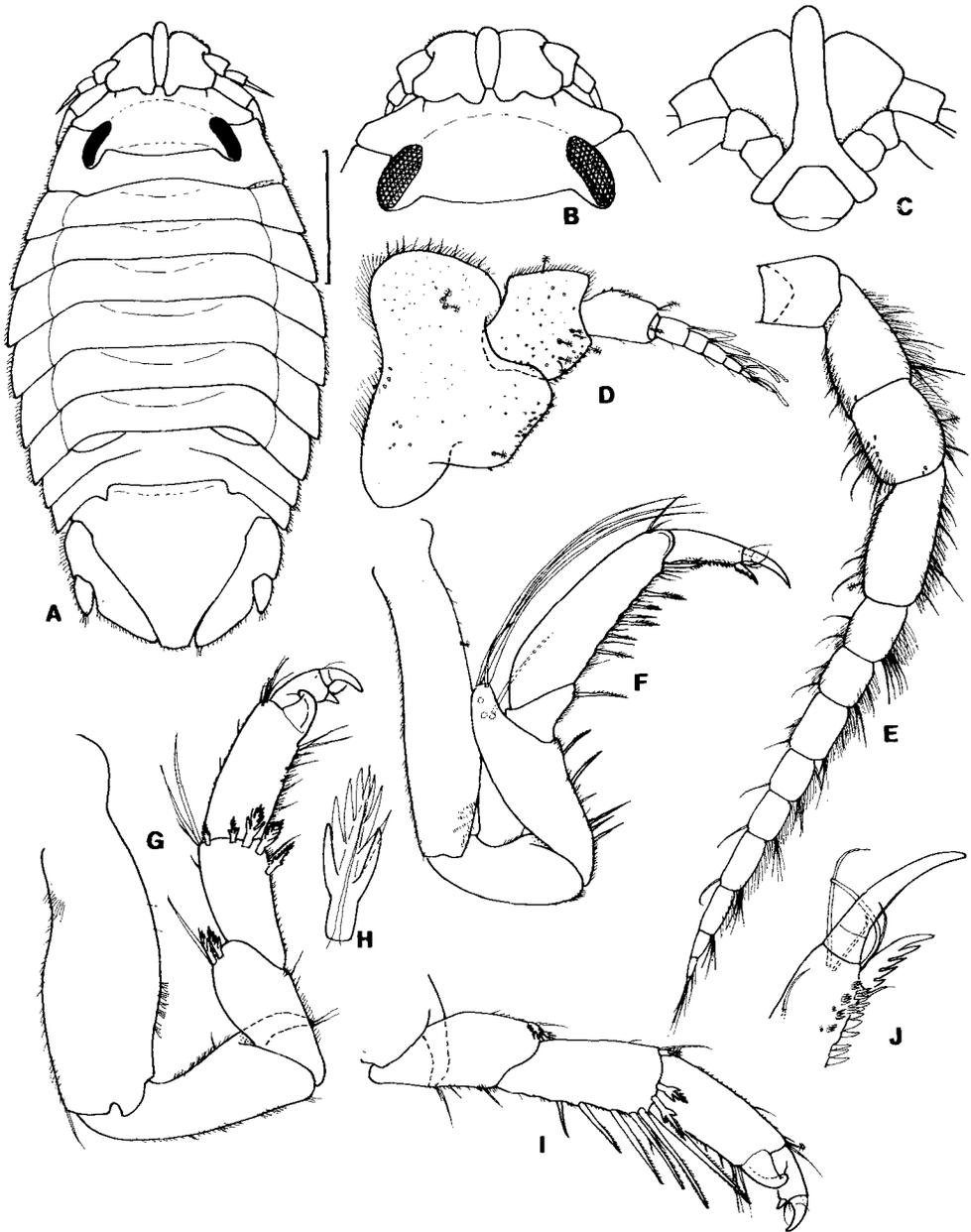


FIG. 9. *Chitonopsis booyoolie* sp. nov. A, C, holotype; B, ♂ 5.99 mm, remainder ♂ 7.5 mm. A, dorsal view; B, cephalon, dorsal view; C, frons; D, antennule; E, antenna; F, pereopod 1; G, pereopod 2; H, spine from pereopod 2 merus; I, pereopod 7, merus-dactylus; and J, pereopod 1, dactylus unguis. Scale line 2.0 mm.

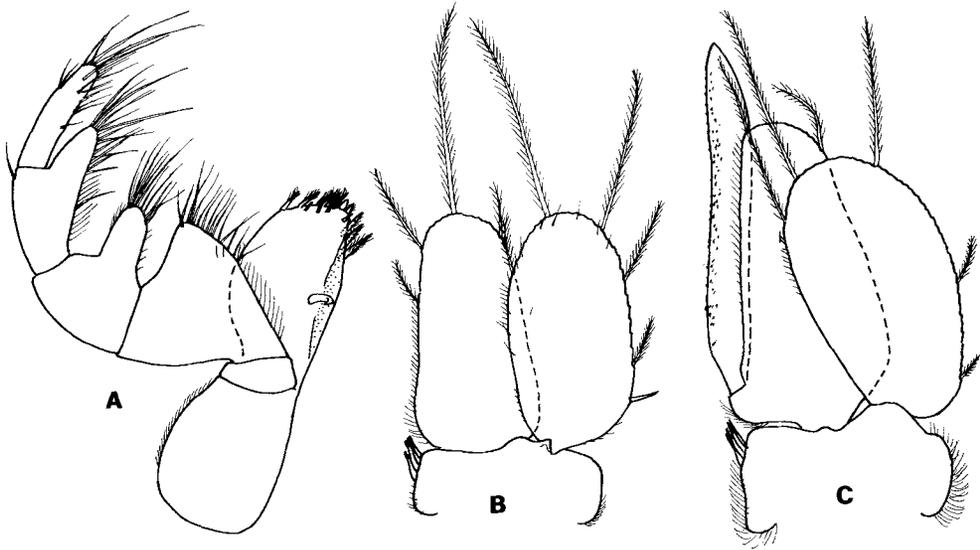


FIG. 10. *Chitonopsis booyoolie* sp. nov., ♂ 7.5 mm. A, maxilliped; B, pleopod 1; and C, pleopod 2.

Pleopod 1 exopod with single spine at posterolateral angle; exopod with 26 PMS, endopod with 19 PMS. Pleopod 2 appendix masculina extending beyond endopod by 0.25 of its length, apex narrowly rounded.

Female. Similar to male.

Colour. Pale brown in alcohol; dorsum with scattered brown chromatophores.

Size. Largest male 9.0 mm, non-ovigerous females 4.6–6.1 mm.

Remarks. This species closely resembles *Chitonopsis hanseni*, the females in particular being similar. Nonetheless, there are a number of differences that clearly separate the two species, and a new species is established for the Australian specimens.

The differences in male *C. booyoolie* are—the epistome is broadly rounded and in dorsal view is about 0.8 the length of cephalon (versus narrowly rounded, and about 1.8 times longer than the cephalon in *C. hanseni*), antennular peduncle article 1 is anteriorly wide and is as long as the cephalon (versus distally narrowed, longer than the cephalon), body lateral margins convex (versus straight), and the cephalon posterior margin is curved (versus straight). Females may be distinguished by the antennular peduncle article 1 being anteriorly more truncate than that of *C. hanseni*, but are otherwise similar.

The precise locality for the Calliope specimens is not known. The specimens were only identified by a species code number and lacked any station data. Moverly (unpublished report to Queensland Electricity Commission, 1986) in a figure caption for the species stated 'lower reaches' from which can be inferred the single sample came from the mouth of the Calliope River.

Distribution. Eastern Australia from the Calliope River (Gladstone harbour) and Moreton Bay, both semi sheltered bays with a strong river influence.

Etymology. The epithet is the former Aboriginal name for the Gladstone locality.

Agostodina gen. nov.

Type species. *Agostodina munta* sp. nov., by present designation.

Diagnosis of male. Body dorsoventrally flattened, lateral margins without *membrana cingula*. Cephalon lateral margins flattened, anterolaterally extended to edge of pereonite 1. Anterior margin with wide truncate rostrum, and 2 sublateral incisions; between rostrum and incisions, anterior margin forms distinct triangular point; eyes dorsal, reniform, distinctly faceted. Pereonite 1 shorter than 2; pereonites 2–5 progressively increasing in length, pereonites 5–7 subequal in length; with coxal keys. Pleon with 3 segments; suture 1 not medially terminating under pereonite 7; lateral margins of segments 2 and 3 not fused. Pleotelson anterolateral margin not extending to lateral body margin; posterior margin entire, without exit channel or groove. Coxae of pereonite 1 extend across sternum, meeting at midline; pleonal sternite anterior to pleopods, with medial sternal process.

Antennule peduncle articles flattened, anterior margin strongly produced, that of article 1 with concave mesial margin, diverging laterally away from epistome, that of article 2 forming lobe; article 3 short, less than half as long as article 2; flagellum short, about 3 times as long as peduncle article 3, with about 6 articles. Antenna peduncle not markedly flattened, article 2 longest, 1 shortest; articles 4 and 5 subequal in length and slightly longer than article 3; flagellum slightly longer than peduncle. Epistome abutting antennule peduncle only basally, strongly constricted medially.

Mandible incisor 3- or 4-cuspid; tridentate lacinia mobilis present on left mandible; spine row of 3 serrate spines on left mandible, 4 serrate and 1 large spine on right; molar process prominent, mesial surface smooth, peripherally with prominent serrations. Maxillule lateral lobe with 10 spines 2 or 3 of which are weakly serrate; medial lobe with 4 fringed spines, 5th short one set proximally to others. Maxilla with all lobes fully setose. Maxilliped palp articles 2–4 with medial margin produced, that of article 3 forming narrowed lobe, that of article 4 forming anteriorly directed lobe which does not extend to distal end of article 5; endite with strongly convex lateral margins, distal margin subtruncate provided with serrate spines, distomedial angle with simple short spines and triangular multiserrulate spine; distolateral margin with 3 plumose spines.

Pereopod 1 with merus and carpus subequal in length, ischium short, less than half (0.4) as long as ischium or propodus; anterodistal margin of merus and propodus with rows of long finely serrate setae; posterior margins of merus, carpus and propodus without prominently serrate spines; dactylus long about 0.8–0.9 as long as propodus, posterior margin with prominent scale teeth; secondary unguis flattened, prominently serrate. Pereopod 2 with ischium about 4 times as long as merus; merus and carpus subequal in length, propodus about twice as long as carpus; dactylus short about half length of propodus, secondary margin short, blunt; distal margin of carpus only with serrate spines. Pereopod 7 with similar proportions of pereopod 2 but slightly longer; carpus distal margin with serrate spines, 3 at posterodistal angle being elongate.

Paired penes present at posterior of sternite 7, not reaching pleopods.

Pleopod 1 exopod proximolateral margin with about 7 spines, rami subequal in size, distally rounded. Pleopods 2 and 3, both rami with PMS; pleopod 2 appendix masculina basal in position; pleopod 3 exopod with distinct entire transverse suture. Pleopods 4 and 5 without setae or transverse sutures; exopod of pleopod 5 with 3 scale patches. Uropod with exopod reduced and set laterally into endopod at about one third of length of endopod.

Female. Similar to male, but antennule article 1 not as strongly produced.

Brood pouch formed from overlapping oostegites on sternite 2–4; embryos held in marsupium.

Remarks. The suite of characters that identify this genus are pereopod 1 with an elongate merus and propodus, merus and propodus being provided with long setae, antennular peduncle article 1 diverging away from the epistome, antennal peduncle proportions (article 2 longest), and the proportion of pereopods 2–7 (merus and carpus shorter than propodus), with the secondary unguis reduced to a small stout blunt tubercle.

The pereopodal morphology of *Agostodina* is similar to that of *Paracassidina* which differs primarily in having the merus of pereopod 1 produced to form a long lobe. *Cassidina* has pereopod 2 and 3 distinct from pereopods 4–7, the latter having a prominent acute secondary unguis to the dactylus and the merus and carpus similar in length (or slightly shorter) to the propodus. *Chitonopsis* has pereopods 2–7 subsimilar, all with an acute prominent secondary unguis to the dactylus, but the merus is longer than the propodus in *C. spatulifrons*; in *C. booyoolie* the propodus is the longest article of pereopod 2, the longest article of pereopod 7 being the carpus; in all species the merus and carpus are elongate in comparison to the species of *Agostodina*.

Distribution. The genus is known only from the North West Shelf region of Western Australia.

Etymology. The name is derived from the Greek word *Agostos* (bent arm) in combination with *-dina* to indicate subfamily affinity; it alludes to the characteristic folded position of pereopod 1.

Key to males of the genus *Agostodina*

- 1 Epistome anterior margin smoothly concave (♂ and ♀); antennule peduncle article 1 with mesial margin of anterior lobe concave, with ventromesial boss *A. munta* sp. nov.
 – Epistome anterior margin with distinct medial point (♂ and ♀); antennule peduncle article 1 with mesial margin of anterior lobe convex, without ventromesial boss *A. shara* sp. nov.

Agostodina munta sp. nov.

(Figs 11–14)

Material examined

All material from off Port Hedland, Western Australia, coll. T. Ward—CSIRO.

HOLOTYPE ♂ (7.6 mm), 19°05.0'S, 118°50.5'E, 30 October 1983, 81 m (QM W18493).

PARATYPES 4♂ (7.4, 7.6 dissected, 7.7, 8.0 mm), 4♀ (ovig. 7.7, 8.0, non-ovig. 6.2, 6.3 mm), 13 imm. (4.4–5.2 mm), same data as holotype (QM W18494). ♂ (8.7 mm), ♀ (non-ovig. 6.7 mm), 19°04.3'S, 119°00.7'E, 23 October 1983, 82 m (AM P41850). ♂ (8.4 mm, imm.), 19°47.6'S, 117°51.8'E, 2 September 1983, 52 m (QM W18495). 2♂ (6.7 imm., 5.7 mm), 2♀ (ovig. 7.0, non-ovig. 5.2 mm), 19°04.1'S, 118°47.1'E, 28 August 1983, 84 m (QM W18496). 5♂ (6.4, 6.7, 8.0, 8.4, 8.7 mm), 5♀ (ovig. 7.2, 7.4, 8.4, non-ovig. 6.2, 6.6 mm), 16 imm. (4.0–5.0 mm), manca (2.7–3.1 mm), 19°04.4'S, 118°47.5'E, 30 October 1983, 82 m (ZMUC).

Additional non-paratypic material. Fourteen unmeasured and unsexed specimens from further six stations, all about 18–19°S, 118–119°E, depth 37–84 m (QM, NMV, WAM).

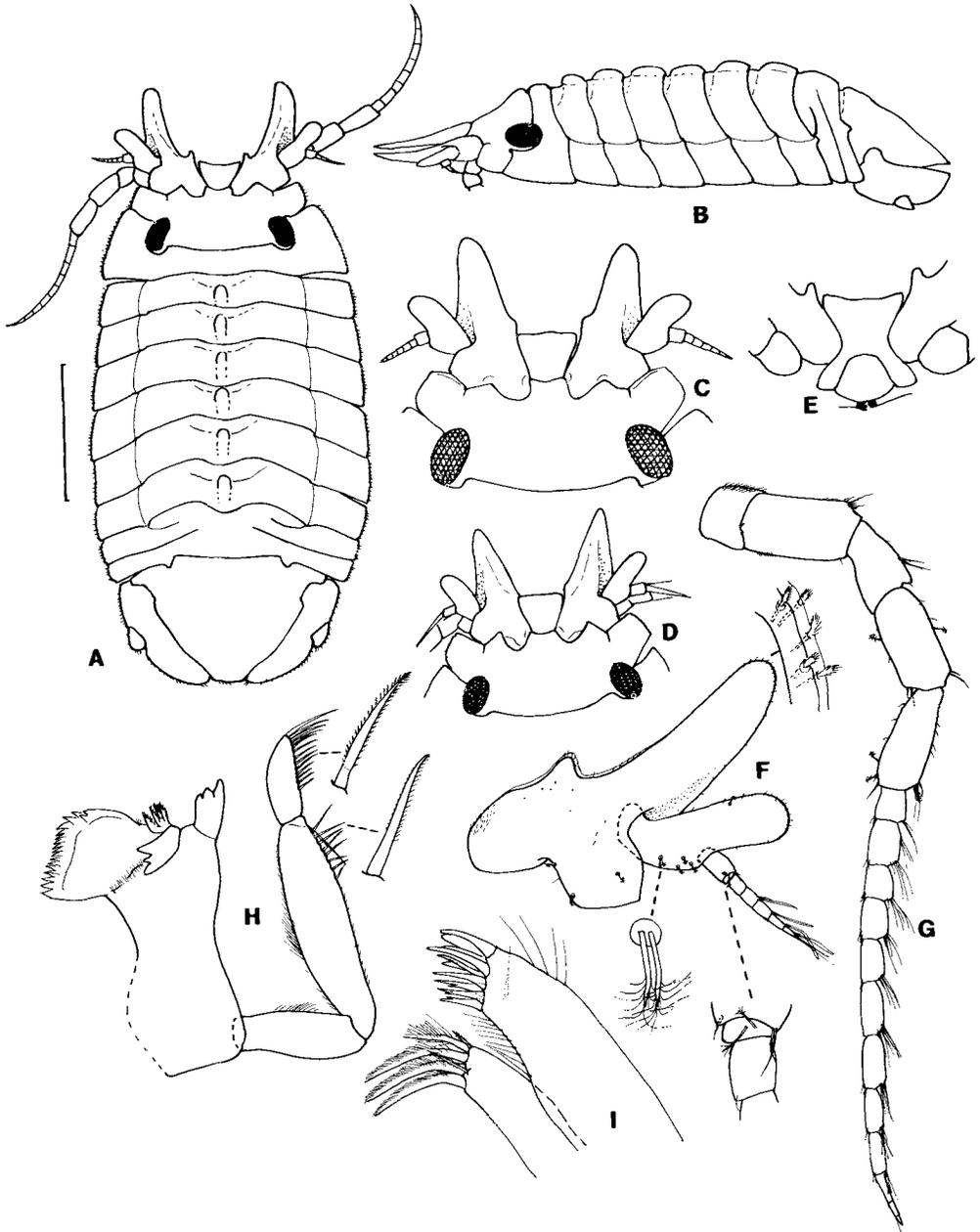


FIG. 11. *Agosiodina munta* sp. nov. A, B, E, holotype, remainder ♂ 7.6 mm, (QM W18494) except where indicated. A, dorsal view; B, lateral view; C, cephalon, immature ♂ 5.7 mm; D, cephalon, ♀ 7.7 mm, (QM W18494); E, frons; F, antennule; G, antenna; H, mandible; and I, maxillule. Scale line 2.0 mm.



FIG. 12. *Agostodina munta* sp. nov., ♂ 7.6 mm (QM W18494). A, right mandible; B, left mandible; C, maxilla; D, seta from maxilla middle lobe; E, maxilliped; F, spine, endite dorsal distal margin; G, penes; H, pereopod 1; and I, pereopod 1 dactylus.

Description of male. Body about 1.8 times as long as wide; greatest width at pereonite 5; cuticle surface finely granulated; cephalon, pereonite, pleon and anterior pleotelson all with single median longitudinal ridge.

Antennule article 1 about twice as long as cephalon, with anterior boss adjacent to anterolateral angle of epistome; article 2 arising from dorsal surface of article 1, with anterolateral margin forming prominent flattened rounded lobe; flagellum with 6 articles. Antenna flagellum extending to pereonite 4, with 17 articles.

Epistome flat, widest at anterior margin which is shallowly concave. Mandible palp article 2 about twice as long as 1, distolateral margin with 9 serrate setae; article 3 less than half as long as 2, lateral margin with 13 serrate setae. Maxilla lateral lobe with 10 setae, lateral most of which is simple, middle lobe with 10 setae; medial lobe with robust abundant serrate and fringed spines and circumplumose setae. Maxilliped

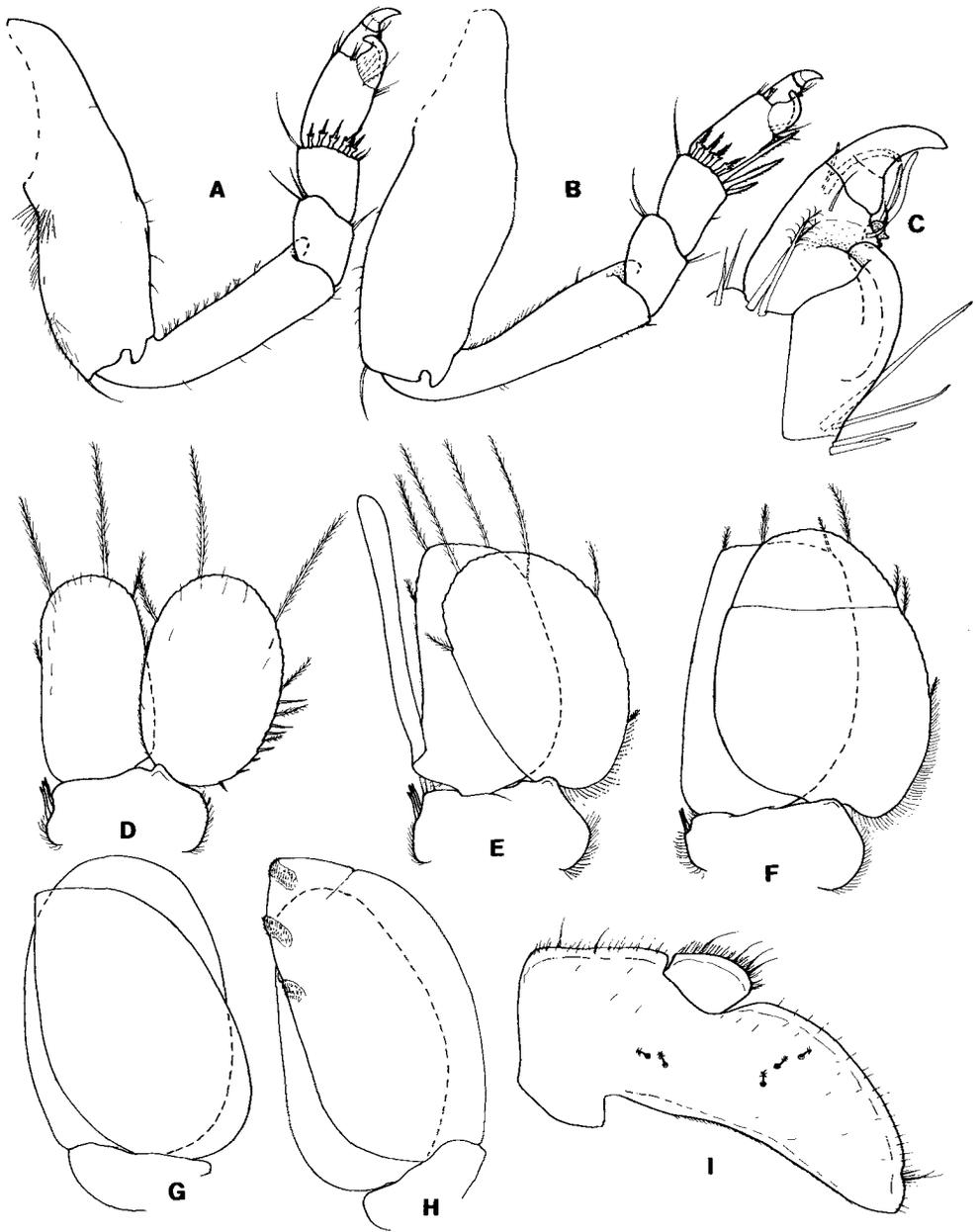


FIG. 13. *Agostodina munta* sp. nov., ♂ 7.6 mm (QM W18494). **A**, pereopod 2; **B**, pereopod 7; **C**, pereopod 7, dactylus; **D–G**, pleopods 1–5, respectively; and **I**, uropod.

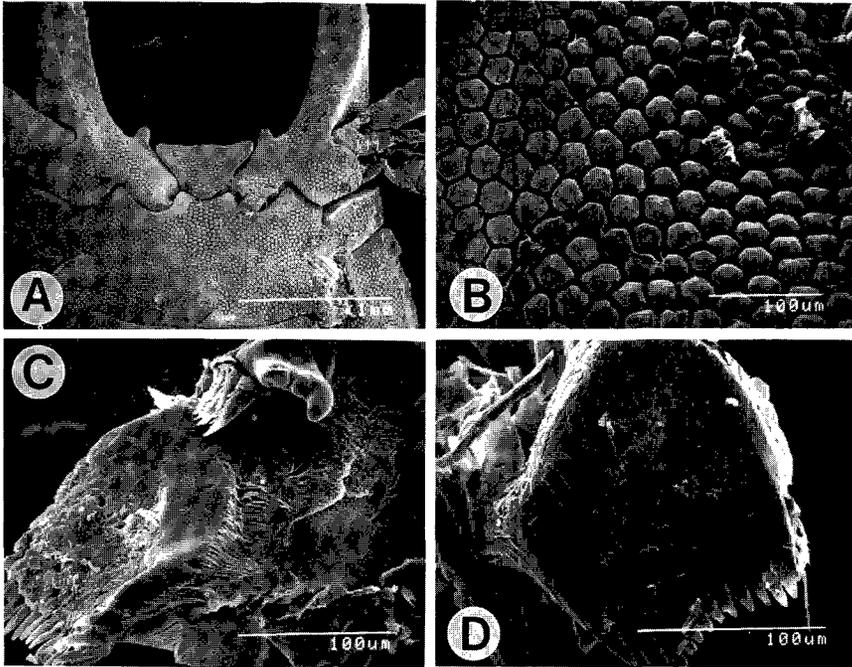


FIG. 14. *Agostodina munta*, (QM W18762). A, cephalon; B, cuticle detail; C, molar, spine row and lacinia mobilis; and D, molar.

palp article 2 with 12–13 setae on medial margin, article 3 with 14, article 4 with about 20 and article 5 with about 13.

Pereopod 1 posterior margins of merus, ischium and carpus with few setules, and single simple setae; ischium and propodus subequal in length; dactylus 0.85 length of propodus; anterodistal margin of merus and propodus each with 8 long setae. Pereopod 2 with 5 serrate spines on carpus distal margin; merus and carpus each < 0.25 length of ischium; propodus greater (2.3) than length of carpus; dactylus about half length of propodus. Pereopod 7 with merus and carpus proportionately slightly longer than in pereopod 2, about 0.33 length of ischium, about 0.6 length of propodus; carpus with 4 serrate spines and 3 elongate biserrate spines.

Penes about 5 times as long as basal width.

Pleopod 1 exopod with 29 PMS, proximolateral margin with 7 spines; endopod with 23 PMS. Pleopod 2 appendix masculina distally rounded, extending beyond endopod by about 0.2 of its length. Uropod endopod extending slightly beyond end of pleotelson, lateral margin curving smoothly; exopod about 0.13 length and 0.55 width of endopod.

Female. Similar to male except antennule article 1 is distally acute with straight margins; article 2 not as broadly lobed.

Colour. White or very pale cream in alcohol; chromatophores not apparent.

Size. Males 5.4–8.7 mm, females 6.2–8.4 mm; juveniles of indeterminate gender 4.0–5.2 mm, manca measured from 2.7–3.1 mm.

Remarks. This species is identified principally by the shape of the epistome (evenly concave) and the antennular peduncle. Antennular peduncle article 1 has an

anteromesial boss and an evenly concave anteromesial margin; article 2 has the anterolateral margin produced to form a broadly rounded flat lobe. Additionally the pereopod 1 dactylus is nearly as long as the propodus.

Distribution. Known only from off Port Hedland, Western Australia at depths from 37 to 84 m. All of the stations from which this species was taken consisted of particulate substrata made up of almost pure sand (Ward and Rainer, 1988). Apparently commoner at depths greater than 50 m (7 of 10 stations).

Etymology. The epithet is an Aboriginal word meaning sand.

Agostodina shara sp. nov.

(Fig. 15)

Material examined

All material from off Port Hedland, W.A., coll. T. Ward—CSIRO.

HOLOTYPE ♂ (6.6 mm) 19°56.6'S, 117°53.8'E, 25 June 1983, 44 m, sled (QM W18500).

PARATYPES ♀ (ovig. 7.0 mm), same data as holotype (QM W18501). ♂ (8.7 mm, dissected), ♀ (ovig. 7.4 mm), 10 imm. (3.3–4.6 mm) 19°29.5'S, 118°52.4'E, 15 February 1983, 36 m, sled (QM W18502). 2♀ (ovig. 7.2, 7.4 mm), 19°30.8'S, 118°49.5'E, 25 October 1983, 39 m (QM W18503). 2♀ (non-ovig. 5.0, 5.4 mm), 19°30.4'S, 118°50.6'E, 11 February 1983, 38 m (QM W18504). ♀ (non-ovig. 6.0 mm), 19°58.3'S, 177°49.1'E, 26 June 1983, 41.5 m (QM W18505). ♀ (ovig. 8.0 mm, damaged) 19°59.1'S, 117°51.3'E, 27 August 1983, 42 m (QM W18506). ♂ (6.7 mm), and broken specimen, 19°30.6'S, 118°49.3'E, 28 January 1983, 37.5 m (AM P41851).

Description of male. The description details those characters which differ from the type species.

Body about twice (1.9) as long as wide; pereonite with weak median ridge. Epistome with distinct anteromedian point.

Antennule peduncle article 1 with mesial margins weakly convex, apex acute; anteromesial boss entirely absent; article 2 curved, distally rounded. Maxilliped palp article 2 mesial margin weakly sinuate, article 3 mesial lobe distally rounded.

Pereopod 1 dactylus shorter (0.79) length of propodus; merus longer (1.1) than propodus.

Female. Similar to the male with the exception of antennule peduncle article 1 shorter than in the male and the epistome with a less prominent median point.

Colour. Pale cream to white in alcohol. Chromatophores not apparent.

Size. Males 6.6–8.7 mm, ovigerous females 7.0–8.0 mm.

Remarks. This species is in most respects very similar to *A. munta*. The two species have overlapping depth ranges, and specimens were taken together from single samples. Nonetheless, *A. shara* has a shallower depth range, as extensive sampling failed to collect it from depths > 44 m. In contrast *A. munta* was common at depths to 84 m. In spite of the similarities the differences are clear cut, and both sexes can be identified. As in the genus *Paracassidina* the discriminating characters are to be found in the antennule and epistome, and to a lesser extent in the first pereopod and maxilliped. The penes, appendix masculina, pleopod 1 and other appendages show no significant differences.

Distribution. From off Port Hedland, W.A., recorded at depths between 36 and 44 m. Bottom sediments in this region are almost pure sand (Ward and Rainer, 1988).

Etymology. The epithet is an Aboriginal word meaning salt water.

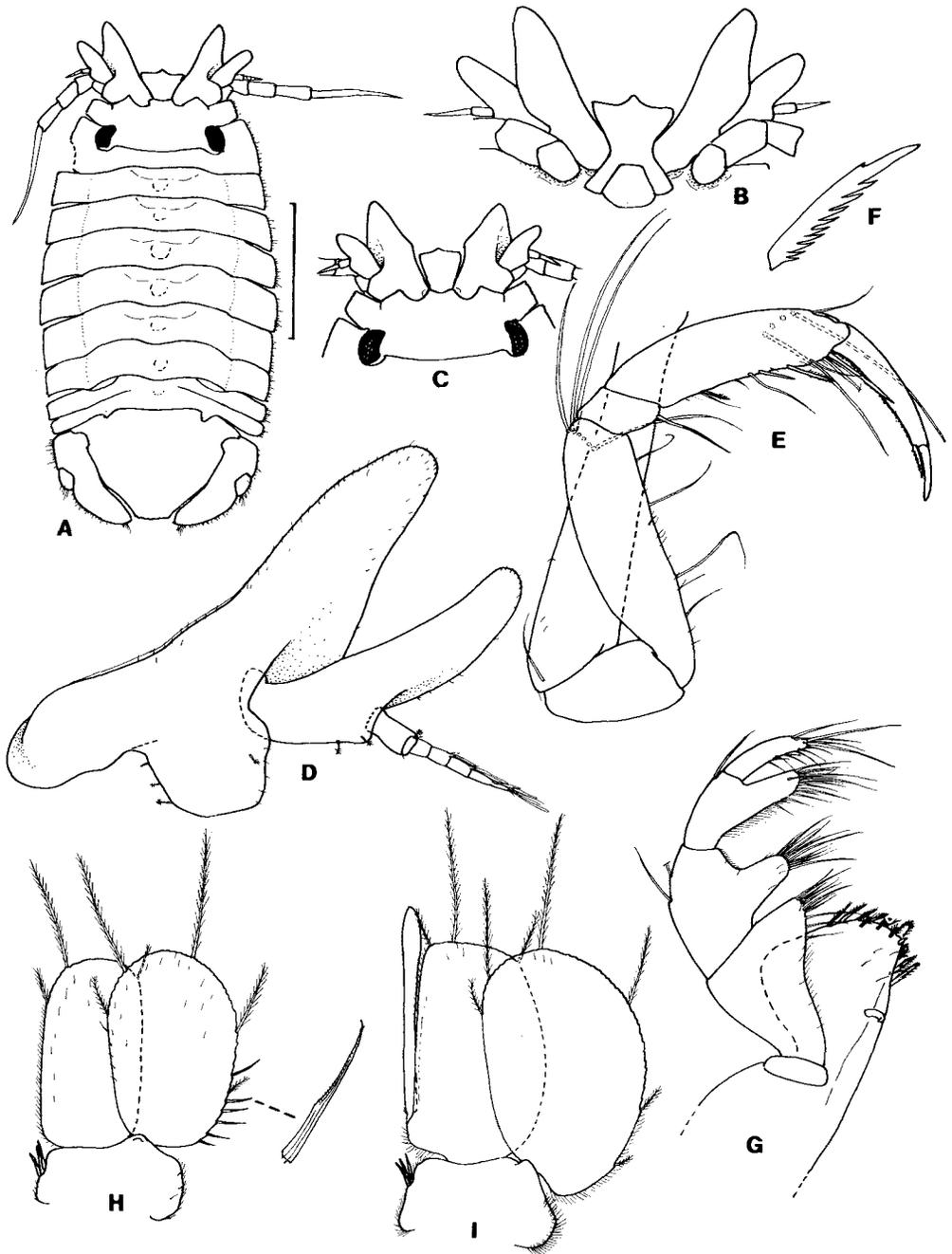


FIG. 15. *Agostodina shara* sp. nov.; Figs A, B, holotype; C, ♀ 7.0 mm, paratype (QM W18501) remainder ♂ 8.7 mm (QM W18502). A, dorsal view; B, frons; C, cephalon, dorsal view; D, antennule; E, pereopod 1; F, dactylus, accessory spine; G, maxilliped; H, pleopod 1; and I, pleopod 2. Scale line 2.0 mm.

Genus *Paracassidina* Baker

Paracassidina Baker, 1911: 90; Nierstrasz, 1931: 219; Holdich and Harrison, 1981: 620; Harrison, 1984b: 385; Harrison and Ellis, 1991: 942.

Type species. *Paracassidina pectinata* Baker, 1911, by monotypy.

Diagnosis of male. Body moderately flattened, about 1.5–2.0 as long as greatest width, body surfaces smooth or granular, with or without tubercles, with or without dorsal setae; lateral margins with setal fringe, *membrana cingula* absent. Cephalon lateral margin flattened, extending to edge of pereonite 1; anterior margin with 2 sublateral incisions; distinct and truncate rostral process present; eyes dorsal, round to weakly reniform, facets distinct. Pereonite 1 shorter than 2; pereonites 2–7 subequal in length; pereonite 7 extending to lateral body margin; coxal keys present, coxal sutures faint or absent. Pleon with 3 segments, lateral margin of segments 2 and 3 not fused. Pleotelson anterolateral margin not extending to body margin; posterior margin entire, without ventral exit channel or groove; posterior margin truncate, weakly bisinuate. Coxae of pereonite 1 extending across sternum, meeting at midline; pleonal sternite anterior to pereopods, with medial sternal process.

Antennule peduncle article 1 flattened, anteriorly weakly to strongly produced, with or without lateral branch; article 2 flattened, usually forming laterally directed lobe; article 3 short; flagellum very short (less than length of peduncle article 3) composed of 3–6 articles; antennule peduncle article 1 abutting epistome only basally. Antenna slender, articles 1 and 2 shorter than 3, 3–5 progressively increasing in length; flagellum shorter than peduncle. Epistome laterally constricted, visible in dorsal view, short or long, separating antennule bases.

Mandible incisor tricuspid; tricuspid lacinia mobilis on left mandible; spine row of 3 or 4 spines; molar large, mesial surface flat and smooth, margins with triangular teeth. Maxillule lateral lobe with about 12 acute spines most of which are pectinate and 2–3 short serrate spines; mesial lobe with 4 fringed spines, and 2 short spines. Maxilla lateral and middle lobes with slender feebly fringed setae; mesial lobe with 4 robust fringed spines, simple and circumplumose spines. Maxilliped palp articles 2 and 4 lobate, that of article 4 with lobe running alongside article 5, as long or longer than article 5; endite with strongly convex lateral margin, distal margin subtruncate provided with acute plumose spines.

Pereopod 1 slender, basis elongate (8–9 times as long as wide), ischium, merus and carpus short; merus with anterior margin produced into long slender lobe reaching to distal extremity of propodus; propodus elongate (about 6 times as long as proximal width), anterodistal margin overriding dactylus; dactylus slender (about 10 times long as proximal width), with slender or pectinate secondary unguis; anterodistal margins of merus lobe and propodus each with row of long feebly fringed setae. Pereopod 2 robust, posterior margin of ischium to propodus variously ornamented with setulose fringe; ischium about as long as combined length of merus, carpus and propodus; distal margin of carpus with 3 trifid serrate spines; dactylus short (< 0.5 propodus) robust, with stout conical secondary unguis. Pereopods 2–7 subsimilar, but pereopod 7 posterodistal angle of carpus with 2 additional long serrate spines.

Paired separate penes present on sternite 7, about 4 times as long as wide.

Pleopods 1–3 with both rami with PMS. Pleopod 1 with both rami distally rounded. Pleopod 2 appendix masculina sub-basal in position, distally slightly wider than at base. Pleopod 3 exopod with complete suture; pleopods 4 and 5 without PMS or transverse suture. Pleopod 5 exopod with 3 scaled patches. Uropod endopod lamellate,

exopod small, about 0.2 length of exopod; exopod distally acute, extending to posterior of telson.

Female. Appendages similar to male; females generally with reduced sculpting; antennule ornamentation reduced, peduncle article 1 never as strongly produced, never with lateral process. In some species, the antennule morphology is similar between sexes. Mouthparts not metamorphosed. Marsupium formed by 3 pairs of oostegites on sternites 2–4, overlapping of midline; ova contained in marsupium.

Composition. The type species and 13 Australian new species described here.

Remarks. The genus *Paracassidina* was established for two specimens (♂ and ♀) from southern Western Australia. The genus was later reviewed by Holdich and Harrison (1981) who gave a revised diagnosis for the genus, based mainly on specimens from Moreton Bay (southeastern Queensland), off Townsville (northeastern Queensland) and also Tasmania. Holdich and Harrison considered all material that they had at hand to be one species, but commented on the variation within the species, regarding most variation as being developmental, geographical or sexual.

The large amount of material at hand now, particularly the material from northern Western Australia has shown that intraspecific variation is not more pronounced than in other sphaeromatids, and much of the variation observed by Holdich and Harrison was due to the presence of several sympatric species. In some cases, while the differences may appear slight, they are clearly discontinuous and in most cases apply to both sexes and also juveniles. Characters by which many sphaeromatid species are discriminated frequently include cephalic, pereonal, pleonal and pleotelson ornamentation and also uropod morphology. In *Paracassidina* pleotelson and uropod morphology is nearly identical between species, as is the morphology of the mouthparts, pereopods 2–7, penes and the pleopods. The appendix masculina occurs in two shapes, straight for most species, longer and sinuate for *P. prolata*, *P. wurrook* and *P. bamarook*.

Characters which distinguish species include obvious dorsal cuticular ornamentation (nodules, smooth, granular, setose, ridges), obvious differences in the epistome (elongate, short, acute, concave) and antennules (presence or absence of lateral process, ventromesial boss, acute, not produced, peduncle article 2 lobed, falcate). Other characters, to be found in pereopod 1, are the relative lengths of the propodus, dactylus and unguis, ornamentation of the secondary unguis and distribution of setules on the posterior margin. Minor difference can be seen in the shape and size of the appendix masculina between some species which have a similar appendix masculina.

Females retain a less well-developed dorsal ornamentation, but one which is still recognizable; additionally the antennular characters are usually lost in those species that have ornamented antennules in the males. The pereopod details do not change between sexes.

Distribution. The fourteen species of the genus are all restricted to marine waters of the Australian continental shelf and slope, all but one being recorded from the intertidal to a depth a little > 200 m; *P. anasilla* has been recorded to depths > 400 m. The thorough studies on the Sphaeromatidae of New Zealand (Hurley and Jansen, 1977) and South Africa (Kensley, 1978) show the genus to be absent from other adjacent southern ocean localities.

Key to males of the genus *Paracassidina*

- 1 Dorsal cuticle smooth or finely pitted (may be pilose); epistome short (< 0.8 length of cephalon in dorsal view); pereopod 1 accessory spine ridged or serrate, never simple 4
- Cuticle granular or smooth; cephalon and pereonites ornamented with tubercles or bosses; epistome lanceolate, usually long (0.7 – 2.5 length of cephalon in dorsal view); pereopod 1 accessory spine ridged or simple, never serrate 2
- 2 Cuticle granular; antennule without lateral process; pereopod 1 accessory spine simple 3
- Cuticle smooth; antennule with lateral process; pereopod 1 accessory spine ridged
P. bilbie sp. nov. 1110
- 3 Antennule article 1 produced, distally acute; epistome > 2.0 length of cephalon; cephalon with 2 submedian anteriorly directed nodules, pereonites each with 3 low rounded bosses *P. fuscina* sp. nov. 1113
- Antennule article 1 weakly produced, not acute; epistome shorter than cephalon; cephalon and pereonites unornamented *P. kutyo* sp. nov. 1117
- 4 Dorsal cuticle smooth but with dense pilosity, each pereonite with 2 transverse ridges *P. anasilla* sp. nov. 1119
- Dorsal surfaces without pilosity or transverse ridges. 5
- 5 Pleopod 2 appendix masculina sinuate, elongate (> 1.5 length of endopod) 6
- Pleopod 2 appendix masculina straight, relatively short (1.0 – 1.2 length of endopod) 8
- 6 Antennule article 1 with anterior lobe and lateral process 7
- Antennule article 1 without anterior lobe and lateral process *P. prolata* sp. nov. 1122
- 7 Dorsal cuticle smooth; antenna flagellum reaching pereonite 4; pereopod 1 dactylus and propodus about equal in length; accessory spine slender, ridged
P. bamarook sp. nov. 1124
- Dorsal cuticle punctate; antenna flagellum reaching pereonite 2; pereopod 1 dactylus about 0.7 length of propodus, accessory spine short, serrate *P. wurrook* sp. nov. 1126
- 8 Antennule article 1 anteriorly acute, without anterior lobe, distally acute; epistome anteriorly excavate *P. incompta* sp. nov. 1130
- Antennule article 1 with anterior lobe, distally rounded; epistome with median ridge and antero-median point 9
- 9 Antennule article 1 without lateral process; pereopod 1 unguis equal in length to dactylus *P. munna* sp. nov. 1132
- Antennule article 1 with lateral process; pereopod 1 unguis shorter (0.3 – 0.6) than dactylus 10
- 10 Antennule article 1 lateral process arising from dorsal surface of anterior lobe 12
- Antennule article 1 lateral process arising from lateral margin of anterior lobe 11
- 11 Antennule article 2 falcate; pereopod 1 unguis 0.6 length of dactylus
P. cervina sp. nov. 1132
- Antennule article 2 forming expanded flat rounded lobe; pereopod 1 unguis 0.4 length of dactylus *P. dama* sp. nov. 1136
- 12 Epistome anteriorly rounded; antennule with weak ventromesial boss not visible dorsal view *P. pectinata* Baker 1138
- Epistome not anteriorly rounded; antennule with prominent ventromesial boss visible in dorsal view 13
- 13 Body vaulted; epistome appearing truncate; antennule article 1 anterior lobe with subparallel margins, lateral process distally narrow *P. petala* sp. nov. 1141
- Body not vaulted; epistome with distinct mesial point, antennule article 1 anterior lobe lateral margin sinuate, lateral process with oblique distal margin
P. bakeri sp. nov. 1143

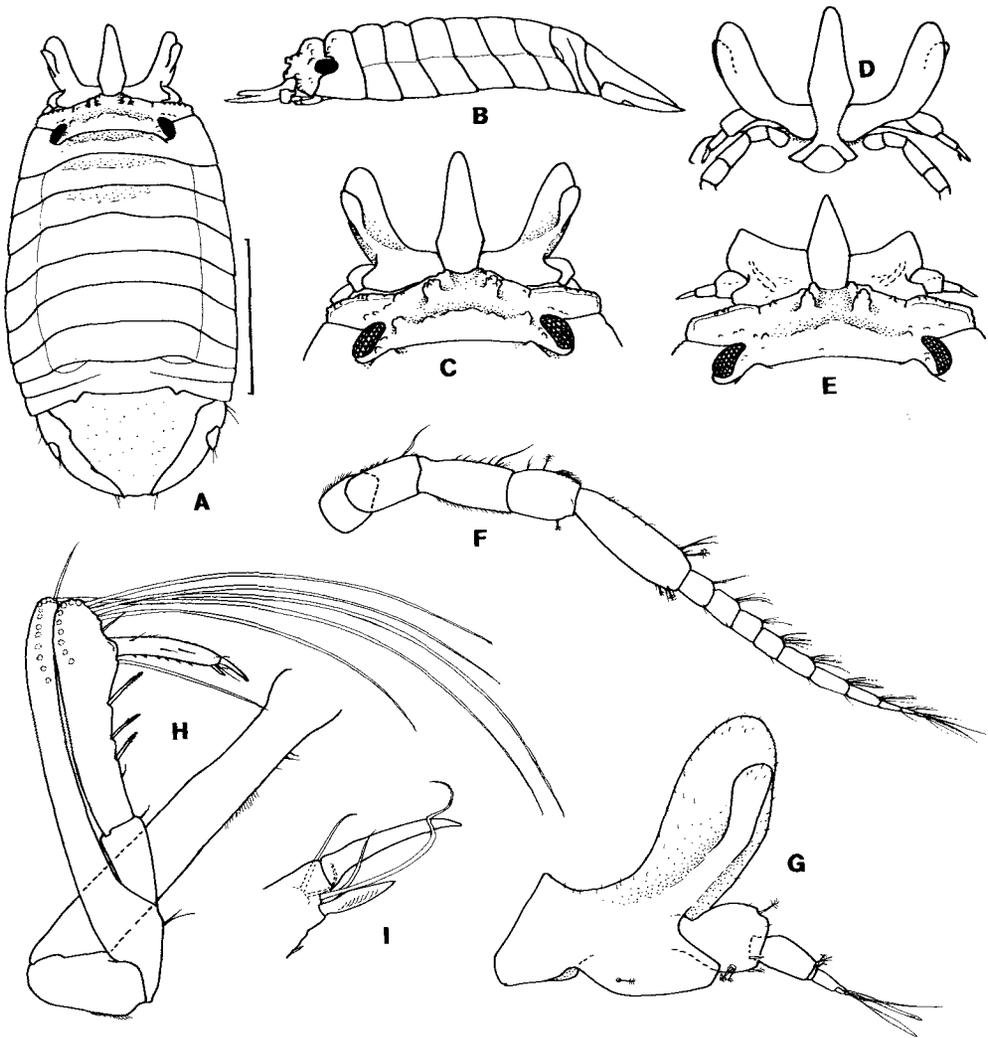


FIG. 16. *Paracassidina bilbie*, sp. nov. A–D, H, holotype; E, ♀ 6.6 mm (AM P41863); G–I, ♂ (SAM C5443). A, dorsal view; B, lateral view; C, head; D, frons; E, head; F, antenna; G, antennule; H, pereopod 1; and I, secondary unguis and unguis, pereopod 1. Scale line 2.0 mm.

Paracassidina bilbie sp. nov.

(Figs 16, 17)

Material examined

All material upper Spencer Gulf, S.A., coll. E. Oks.

HOLOTYPE ♂ (5.8 mm), East of Monument Hill-East, 32°50.0'S, 137°50.52'E, 4 September 1987, 11 m, grab, FRV *Nyerin* (SAM C5438).

PARATYPES ♀ (non-ovig. 4.4 mm), imm. (3.8 mm), 3 manca (2.4, 2.5, 2.7 mm), same data as holotype (SAM C5439). ♂ (5.8 mm, dissected), 2 ♀ (non-ovig. 4.4, 4.8 mm), Monument Hill-West, 32°50'S, 137°49'E, 2 August 1986, 17 m, (SAM C5443). 3 ♀ (non-ovig. 5.0, 5.2, 6.4 mm), 1 crushed, Monument Hill-West, 32°50.0'S, 137°49.0'E, 2 August 1986, 17 m (SAM C5442). ♀ (ovig. 5.5 mm), 2 crushed,

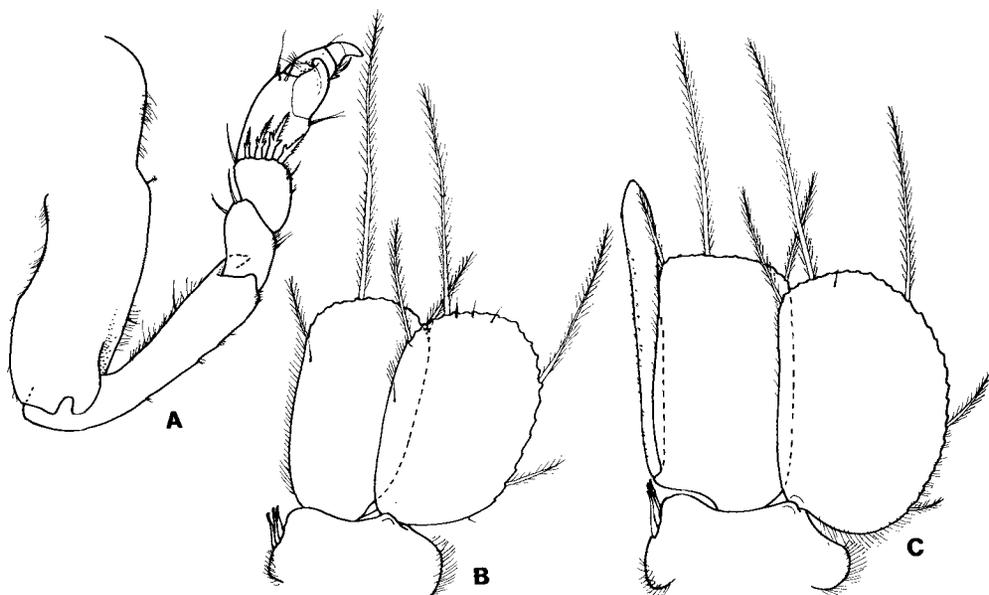


FIG. 17. *Paracassinina bilbie*, sp. nov. ♂ (SAM C5443). A, pereopod 2; B, pleopod 1; and C, pleopod 2.

Mangrove Point, 32°42.3'S, 137°47.3'E, 3 May 1987, FRV *Nyerin* (SAM C5441). 2 ♀ (non-ovig. 5.8, 6.0 mm), Lowly Point-East, 33°0.0'S, 137°49.9'E, August 1986, 18 m, FRV *Nyerin* (SAM C5440). 2 ♀ (ovig. 5.8, 6.6 mm), 2 manca (2.3, 3.2 mm), Ward Spit, Lowly Point, 33°01'S, 137°47.6'E, September 1987, 22 m (AM P41863).

Description of male. Body about 1.7 times as long as wide, smooth; cephalon with scattered tubercles on dorsal surface and lateral margins; 2 short nodulose processes lie posterior to rostrum; posterior of cephalon with obscure low ridge. Pereonites 1–3 with low, wide indistinct ridge; pereonites 4–7, pleon and pleotelson unornamented.

Epistome long, in dorsal view about 1.6 times as long as cephalon, extending just beyond distal margin of antennule, dorsal surface flat, lateral margin diverging for about posterior 0.3 of their length, then converging to narrowly rounded apex.

Antennule peduncle article 1 about 1.7 times as long as cephalon, without ventromesial boss, anterior lobe mesial margin very weakly concave, lateral margin convex; lateral process arising dorsally, spatulate, forming very narrow angle with axis of anterior lobe, extending only slightly beyond lateral margin of anterior lobe; posterolateral lobe truncate; peduncle article 2 anterior margin convex, not produced, flagellum of 3 articles. Antennal flagellum extending to posterior of pereonite 2.

Pereopod 1 merus and propodus with 11 and 12 long setae respectively on distal margin; propodus 3.5 times as long as wide; dactylus 0.6 times as long as propodus, unguis 0.3 length of dactylus; secondary unguis simple, ridged. Pereopod 2 carpus with 4 trifold biserrate spines.

Pleopod 1 exopod with single spine at proximolateral angle. Pleopod 2 appendix masculina about 1.2 times as long as endopod, exceeding endopod by about 0.25 of its length.

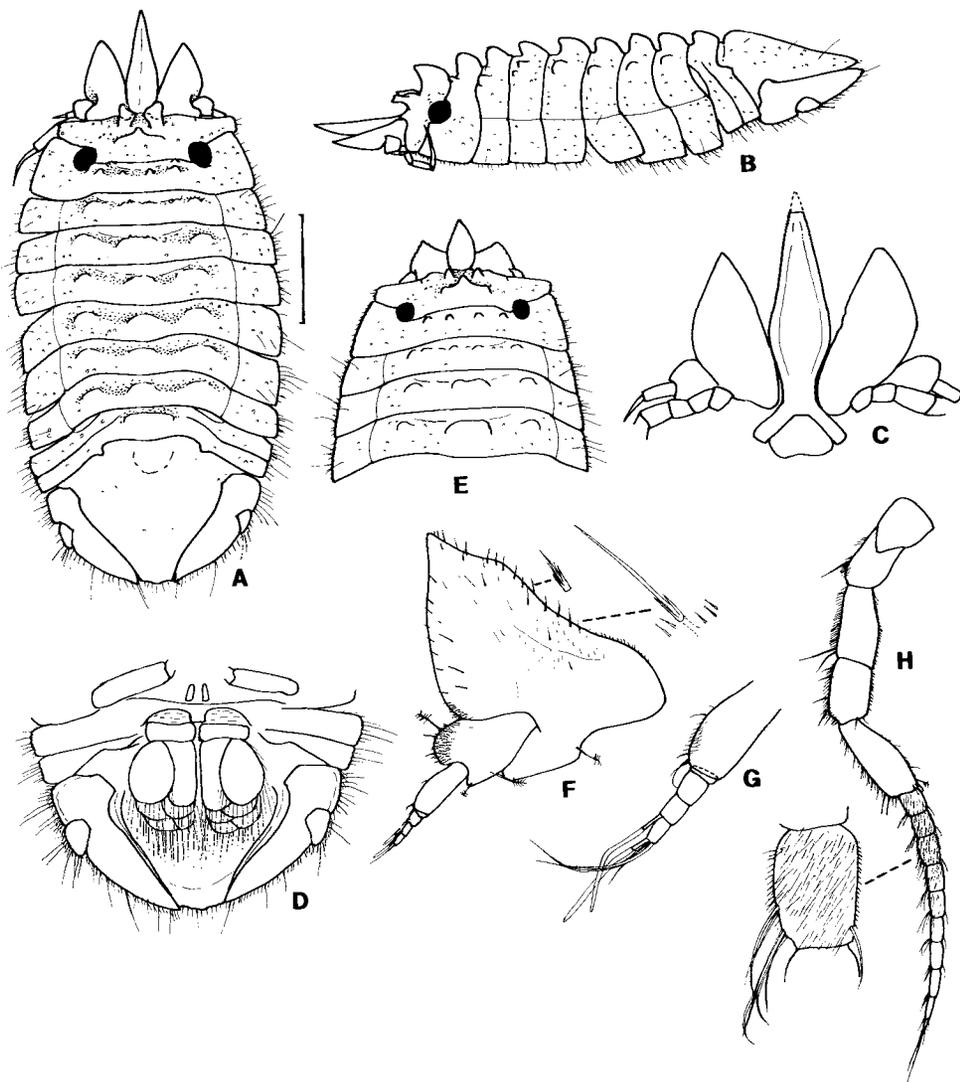


FIG. 18. *Paracassidina fuscina*, sp. nov. A–D, holotype, E, ♀ 5.4 mm, ovig., remainder ♂ 5.3 mm (QM W18510). A, dorsal view; B, lateral view; C, frons; D, pleon and pleotelson, ventral view; E, female, anterior; F, antennule; G, antennule flagellum; and H, antenna. Scale line 1.0 mm.

Female. Epistome lanceolate, with longitudinal median ridge, about 1.3 times as long as cephalon. Antennule peduncle article 1 about as long as cephalon, distally forming abrupt angle, distal apex set wide, dorsally with indistinct nodulose ridge.

Cephalon with similar but less prominent ornamentation to male.

Colour. Specimens were white or clear in alcohol.

Size. Males measured 5.8 mm (2 specimens only), ovigerous females 5.5–6.6 mm, non-ovigerous females 4.4–6.0 mm, manca 2.4–2.7 mm.

Remarks. The large epistome, widely flared antennules of the male and the cephalic ornamentation readily identify this distinctive species.



FIG. 19. *Paracassidina fuscina*, sp. nov. ♂ 5.3 mm (QM W18510). A, maxilliped; B, maxilliped endite, dorsal surface, showing setule distribution; C, maxillule; D, maxillule lateral lobe; E, maxilla; F, setae from lateral (i) and middle (ii) lobes, maxilla; G, right mandible; H, right mandible, detail; and I, left mandible detail.

Distribution. Several locations in the upper (northern) Spencer Gulf, S.A., at depths between 11 and 22 m.

Etymology. Named after the endangered marsupial *Macrotis lagotis* ('Bilbie') which has a conspicuously long nose and long ears.

Paracassidina fuscina sp. nov.

(Figs 18–22)

Material examined

All material from North West Shelf, Western Australia, coll. T. Ward—CSIRO.

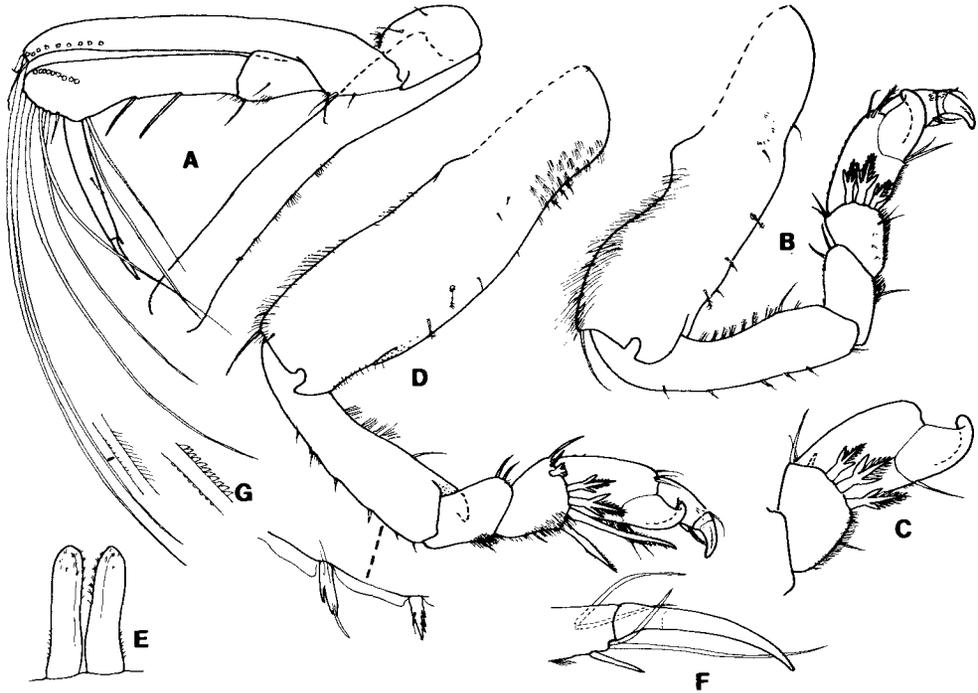


FIG. 20. *Paracassidina fuscina*, sp. nov. ♂ 5.3 mm (QM W15810). A, pereopod 1; B, pereopod 2; C, pereopod 6, carpus; D, pereopod 7, E, penes; F, dactyl unguis and secondary unguis, pereopod 1; and G, seta proximal to pereopod 1 dactylus, detail.

HOLOTYPE ♂ (5.7 mm), 19°30.9'S, 118°49.6'E, 30 August 1983, depth 38 m (QM W18509).

PARATYPES 18♂♂ (4.4–5.8 mm, ♂ 5.3 mm dissected), 19 ovig. ♀♀ (4.7–5.8 mm), 5 non-ovig. ♀ (4.3–4.6 mm), 3 manca (3.0–3.8 mm), same data as holotype (QM W18510).

Additional non-paratypic material. 286 specimens from 15 repeat stations (Ward and Rainer, 1988) (AM, NMV, QM, WAM, ZMUC).

Description of male. Body about 1.8 times as long as wide; dorsal surface finely granular with scattered larger granules and sparse setae. Cephalon with 2 submedian anteriorly directed blunt lobes, widest at distal extremity and broad median low boss with anteriorly directed nodule. Pereonites 2–7 with 1 median and 2 submedian bosses. Pleon with single median boss. Pleotelson with single obscure median boss on anterior margin.

Epistome prominent in dorsal view, lanceolate in shape, about twice as long as cephalon, 3 times as long as wide. Antennule peduncle article 1 produced to acute point, about 1.4 times as long as cephalon; article 2 not strongly produced, article 3 about 0.6 length of article 2; flagellum 0.75 length of peduncle article 3, composed of 3 articles. Antenna with abundant setules on peduncle and on flagellum to flagellum article 6; flagellum with about 11 articles, extending to pereonite 2.

Maxilliped endite distal margin with 5 acute plumose spines, a further 2 submarginal spines; distomesial angle with 2 wide, flat serrate spines and 1 simple spine; dorsal distomesial margin with 3 long circumplumose spines. Maxilliped palp

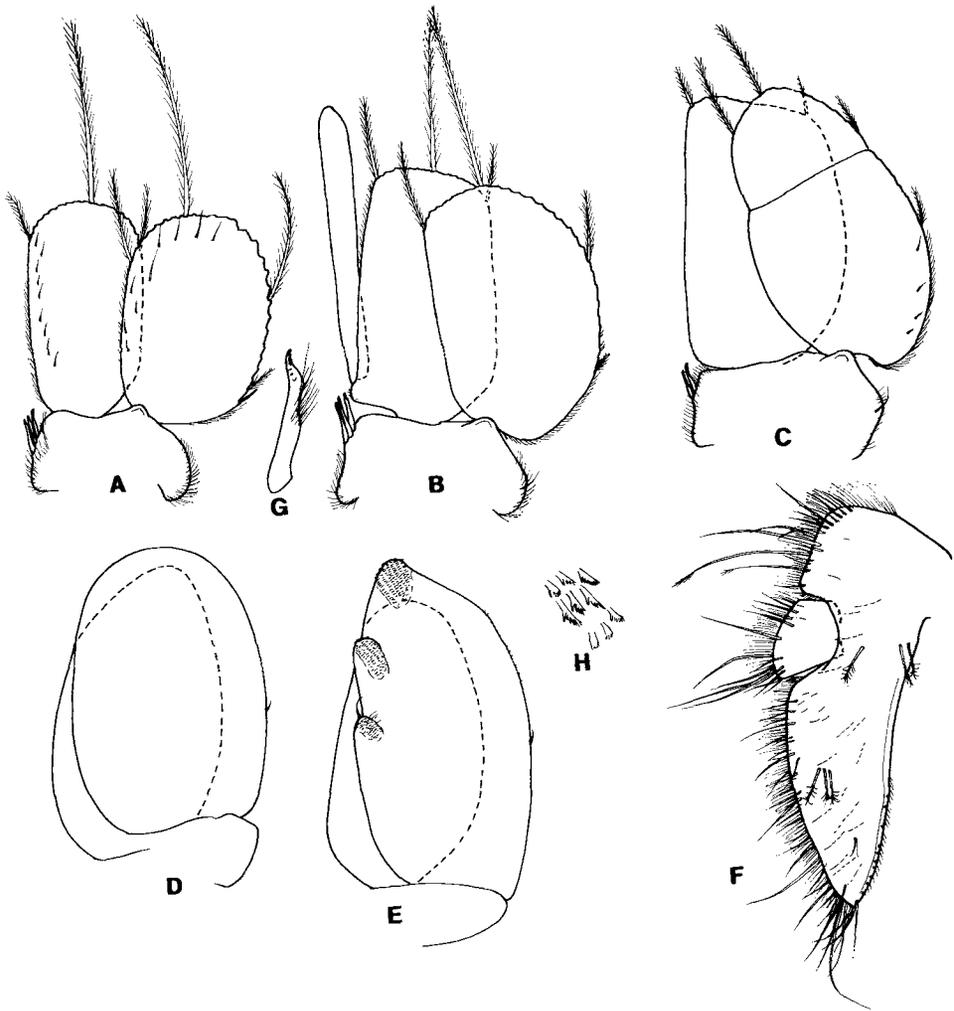


FIG. 21. *Paracassidina fuscina*, sp. nov. ♂ 5.3 mm (QM W15810). A-E, pleopods 1-5, respectively; F, uropod; G, coupling hook, pleopod 1; and H, scales, pleopod 5 distal lobe.

lateral margins without setae; mesial margins of articles 2-5 with 17, 16, 20 and 11 setae, respectively, those of articles 4 and 5 distributed along lateral as well as distal margin.

Pereopod 1 merus with row of 9 long setae, propodus distal margin with 12 long setae; propodus about 3.7 times as long as wide, posterior margin with 2 short biserrate setae and 2 long weakly serrate setae; dactylus about 0.8 length of propodus, unguis about 0.4 length of propodus; secondary unguis short, simple. Pereopod 2 ischium twice combined length of merus and carpus; propodus twice as long as carpus; dactylus about half length of propodus; setulose fringe present on posterior margin of carpus, propodus and distal one third of merus; anterior margin of basis with long setules; distal margin of carpus with 3 bifid biserrate spines. Pereopod 6 and 7 similar to 2, but setule fringe weak; pereopod 7 carpus with 2 long 3 short biserrate spines.

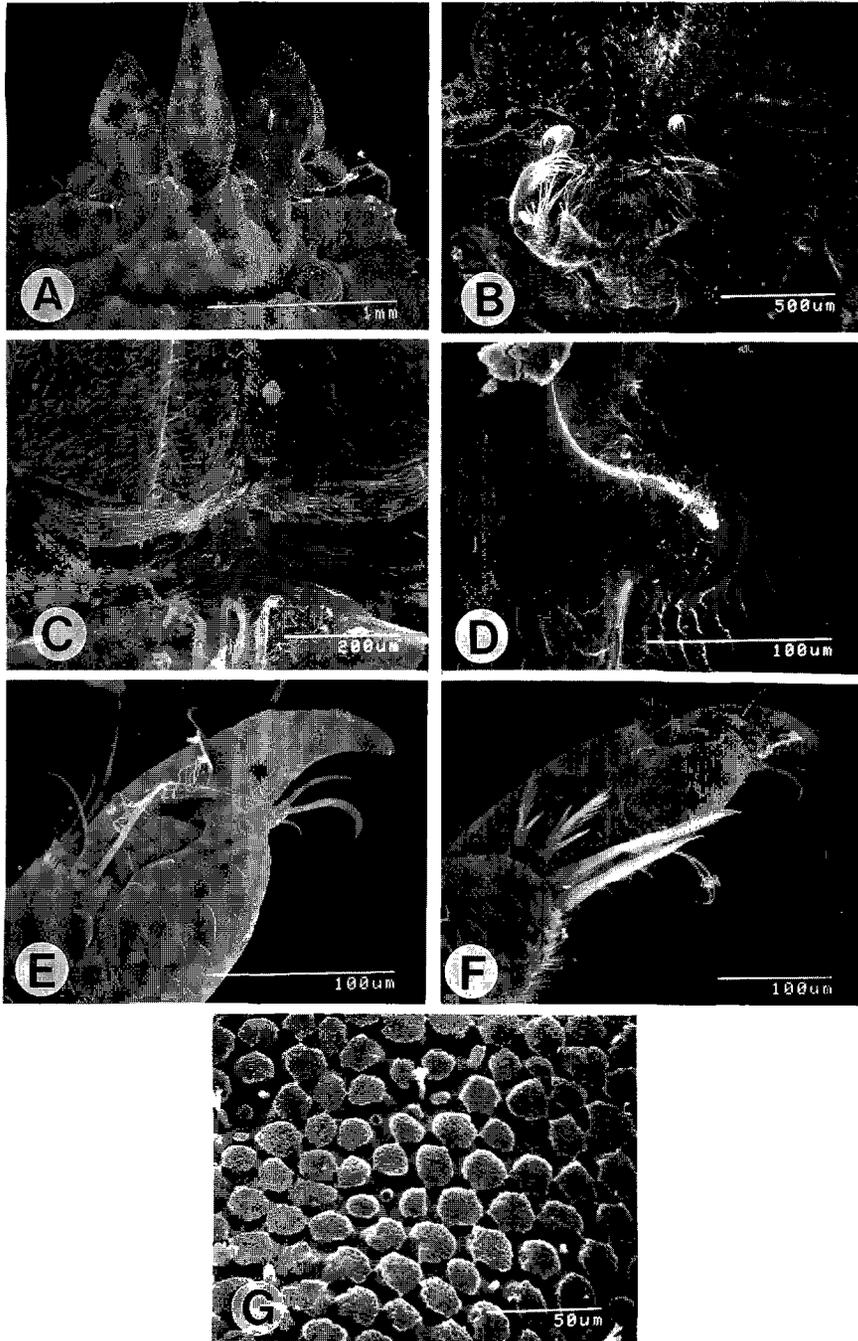


FIG. 22. *Paracassidina fuscina*, sp. nov. (QM W18763, W18766). **A**, cephalon; **B**, frons, showing sternite 1 posterior to buccal appendages; **C**, pleonal sternite anterior to pleopod peduncles; **D**, coxal key, pereonites 2 and 3; **E**, pereopod 2, propodus/dactylus articulation; **F**, pereopod 7, distal articles; and **G**, pleotelson cuticle.

Penes about 3.5 times as long as basal width, apices rounded.

Pleopod 1 exopod with 28 PMS, single spine at proximolateral angle; endopod with 17 PMS. Pleopod 2 appendix masculina about 9 times as long as maximum width, widest near apex; slightly longer than endopod, extending beyond endopod by about 0.2 of its length, exopod about 36 PMS, endopod with 5.

Female. Epistome and antennule peduncle article 1 not as produced as in male, cephalic lobes, and dorsal bosses present, less strongly developed. Appendages similar to those of male.

Colour. Pale cream to white in alcohol, some specimens with dark brown chromatophores ventrally; eye black, occasionally red.

Size. Males 4.4–5.8 mm, ovigerous females 4.7–5.8 mm, manca 3.0–3.8 mm.

Remarks. The epistome and antennules give the anterior end of males of this species a marked tri-pronged appearance. This, and the dorsal ornamentation, easily and immediately identifies this species.

Distribution. Currently recorded only from off Port Hedland, W.A., where it is apparently the commonest species of *Paracassidina*, at depths from 36 to 54 m. Bottom sediments are almost pure sand (Ward and Rainer, 1988).

Etymology. The epithet is a Latin word for trident, alluding to the three-pronged anterior of the animal.

Paracassidina kutyo sp. nov.

(Fig. 23)

Material examined

All material North West Shelf, off Port Hedland, W.A., Coll. T. Ward—CSIRO.

HOLOTYPE ♂ (3.0 mm), 19°56.7'S, 117°51.7'E, 26 August 1983, 42–43 m depth (QM W18507).

PARATYPES 4♂ (3.0, 3.0, 3.0 dissected, 3.1 mm), ♀ (non-ovig. 3.1 mm) same data as holotype (QM W18508). 2♂ (3.2, 3.1), 19°59.0'S, 117°51.4'E, 18 February 1983, 42 m (AM P41868).

Description of male. Body about twice (1.9) as long as greatest width, dorsal surfaces finely granular. Cephalon with rostral process poorly defined; 2 submedian low bosses posterior to anterior margin, further large low median boss near posterior margin; pereonites 1–7 with wide obscure transverse ridge.

Antennule peduncle article 1 short, simple, without lateral process or ventromesial boss, about 0.6 length of cephalon, anterior lobe not produced; article 2 with anterior margin convex, anterolateral margin not lobed; flagellum with 4 very short articles, each with 3–6 aesthetascs, forming a conspicuous cluster. Antennal flagellum extending to posterior of pereonite 2.

Epistome lanceolate, with median longitudinal ridge; in dorsal view about 0.7 length of cephalon, anteriorly extending just beyond antennule. Pereopod 1 merus and propodus with 10 long setae each on distal margin; propodus about 3.2 times as long as wide; dactylus about 0.5 length of propodus, unguis about 0.6 length of dactylus; secondary unguis short slender, acute, unornamented. Pereopod 2 carpus distal margin with 3 trifold biserrate spines.

Pleopod 1 exopod with out proximolateral spine. Pleopod 2 appendix masculina about 1.2 times as long as endopod, exceeding endopod by about 0.3 of its length, lateral margin subparallel, apex blunt, subtruncate.

Female. Similar to male, but antennule flagellum aesthetascs not conspicuous; anterior margin of antennule peduncle 1 rounded; not with a distinct apical point.

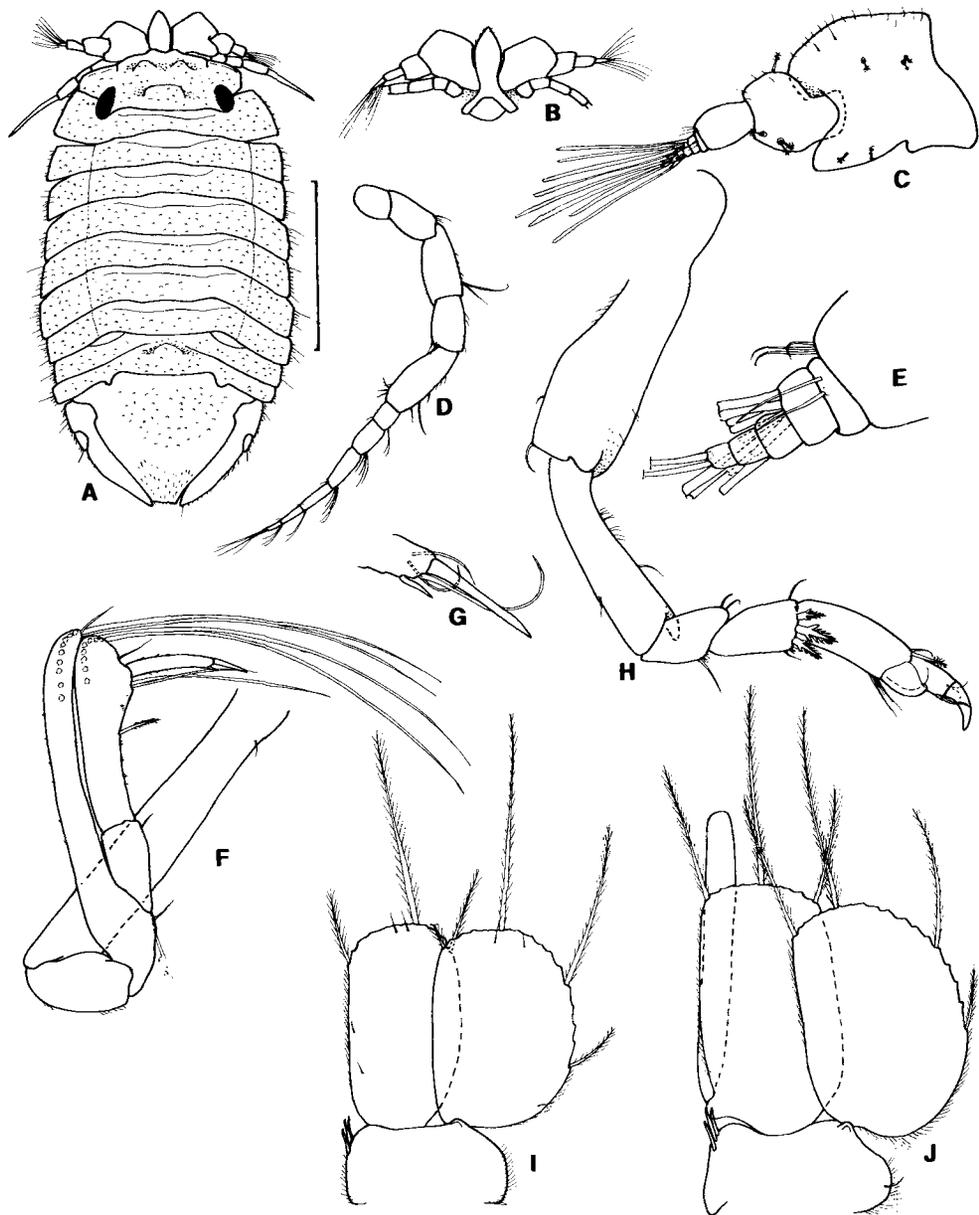


FIG. 23. *Paracassidina kutylo*, sp. nov. A, B, holotype, remainder ♂ 3.1 mm (QM W18508). A, dorsal view; B, frons; C, antennule; D, antenna; E, antennule flagellum; F, pereopod 1; G, pereopod 1, dactylus unguis; H, pereopod 2; I, pleopod 1; and J, pleopod 2. Scale 1.0 mm.

Colour. Specimens with dark brown bands on pereonites, pleotelson and uropods with longitudinal bands.

Size. All specimens measured between 3.0 and 3.2 mm.

Remarks. This distinctive small species is readily identified by its granular appearance and unornamented antennular articles. The only similar species is *Paracassidina fuscina*, also from the North West Shelf, and that species can always be separated by the cephalic ornamentation and strongly produced antennules and epistome, characters which are present in both sexes and juveniles.

The development of a 'tuft' of aesthetascs on the antennule of mature males is unique within the genus.

Distribution. Taken at two adjacent stations off Port Hedland, W.A., at 42 and 43 m depth.

Etymology. The epithet is an Aboriginal word meaning small.

Paracassidina anasilla sp. nov.

(Figs 24–26)

Paracassidina pectinata Holdich and Harrison, 1981: 620 (part, misidentification, material off Twofold Bay, NSW).

Material examined

HOLOTYPE ♂ (5.7 mm), East of Long Reef Point, NSW, 33°43'S, 151°46'E, 20 December 1985, 174 m, coll. J. K. Lowry and R. T. Springthorpe, FRV *Kapala* (AM P41860).

PARATYPES 4♂ (4.6, 4.7, 6.4, 6.4 mm), 14♀ (3 ovig. 5.7, 5.9, 6.0 mm, 11 non-ovig. 3.9–4.6 mm), 14 manca (2.4–2.9 mm), same data as holotype (AM P41026). 4♂ (5.8, imm. 4.7, 4.8, 4.8 mm), 4♀ (ovig. 5.7, 5.8, 6.0, 6.2 mm), 4 imm. (2.9–4.5 mm), same data as holotype (AM P41861). ♂ (imm. 4.6 mm), 6♀ (ovig. 5.4, 5 non-ovig. 4.4–5.0 mm), East of Malabar, NSW, 33°57'S, 151°19'E, 1973, 32 m, coll. AMSBS (AM P22225).

Additional non-paratypic material. **New South Wales:** ♂, 2♀, 8 imm. off Newcastle, 32°53'S, 152°35'E, 15 August 1985, 175 m, coll. FRV *Kapala* (AM P41862); ♂, northeast of Long Reef, 33°43'S, 151°40'E, 5 December 1978, 142 m, coll. FRV *Kapala* (AM P41322); ♂, 4♀, east of Sydney, 33°46'S, 151°43'E, 5 December 1977, 176 m, coll. FRV *Kapala* (AM P41311); 2♂, ♀, same data as previous (ZMUC); 7♀, imm., same data as previous (AM P41282); 2♂, 4♀, off Port Hacking, 5 October 1982, 198 m, coll. W. Ponder and R. T. Springthorpe on RV *Tangaroa* (AM P41305); 3♂, 2♀, off Stanwell Park, 34°13.8'S, 151°29.1'E, 466–498 m, coll. W. Ponder and R. T. Springthorpe on RV *Tangaroa* (AM P41306); 5♂, 24♀, 3 manca, off Nowra, NSW, 34°59.52'S, 151°05.94'E, 14 July 1986, 204 m, coarse shell, coll. G. C. B. Poore *et al.* (NMV J19155). 2♂, 2♀, off Eden, 36°57.40'S, 150°18.8'E, 20 July 1986, 220 m, muddy shell, coll. G. C. B. Poore *et al.* (NMV J19156); 2♀ off Eden, 37°00.2'S, 150°20.01'E, 11 December 1986, 250–300 m, shelly bryozoan sand, coll. P. Hutchings *et al.*, on RV *Franklin* (AM P41286, P41295). ♀, off Twofold Bay, NSW, 37°05'S, 150°05'E, 30 September 1914, 30–50 m, coll. Th. Mortensen on *Endeavour* (ZMUC). **Bass Strait:** ♂, 38°27.6'S, 147°30.7'E, 23 November 1973, 35 m, sand/shell, coll. B. J. Smith *et al.* (NMV J26042). ♂, ♀, 39°08.3'S, 144°43.9'E, 23 November 1981, 66 m, coarse sand, coll. R. Wilson (NMV J31534).

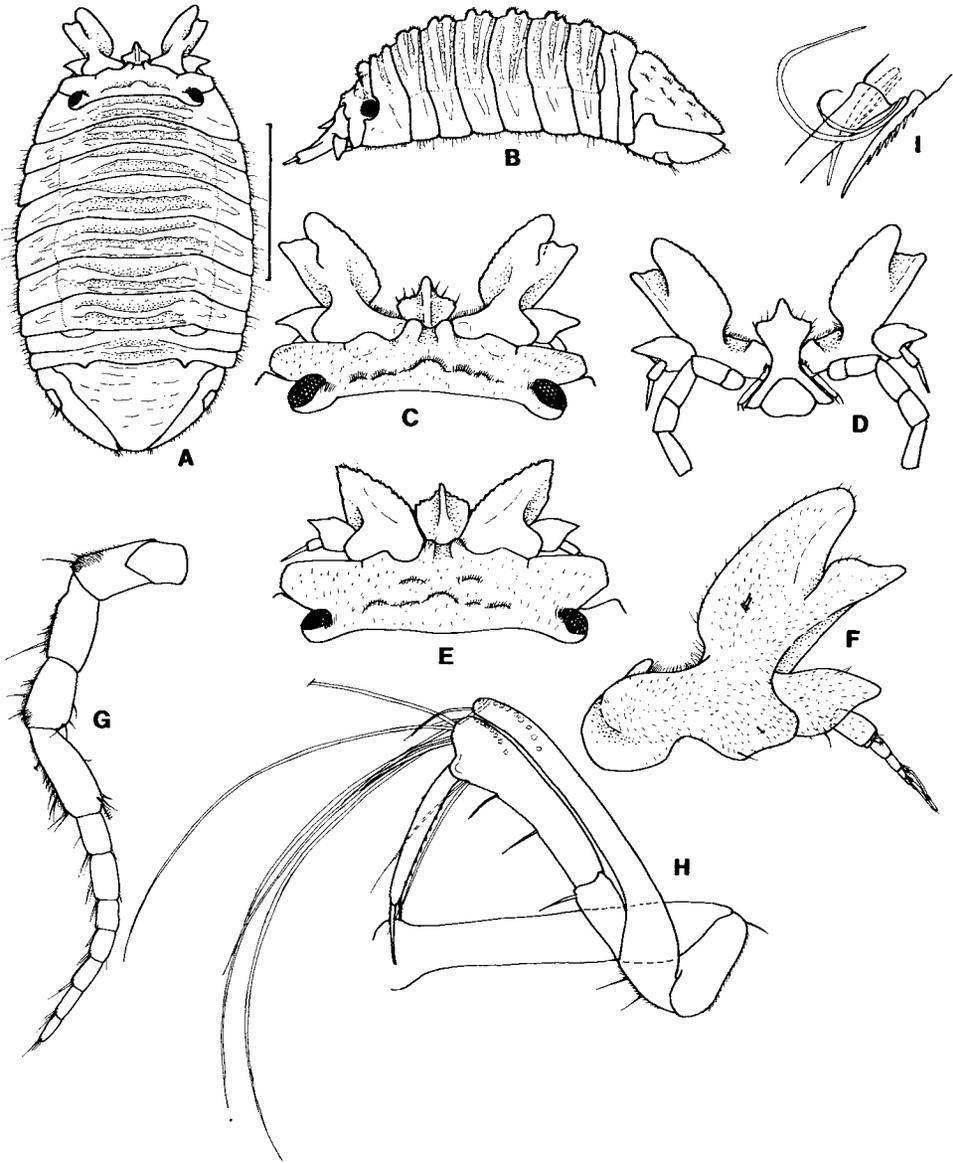


FIG. 24. *Paracassidina anasilla*, sp. nov. A–D, holotype; E, ♂ 6.0 mm, remainder ♀ 5.4 mm (AM P41026). A, dorsal view; B, lateral view; C, head; D, frons; E, head; F, antennule; G, antenna; H, pereopod 1; and I, join of dactylus and unguis, pereopod 1. Scale line 1.0 mm.

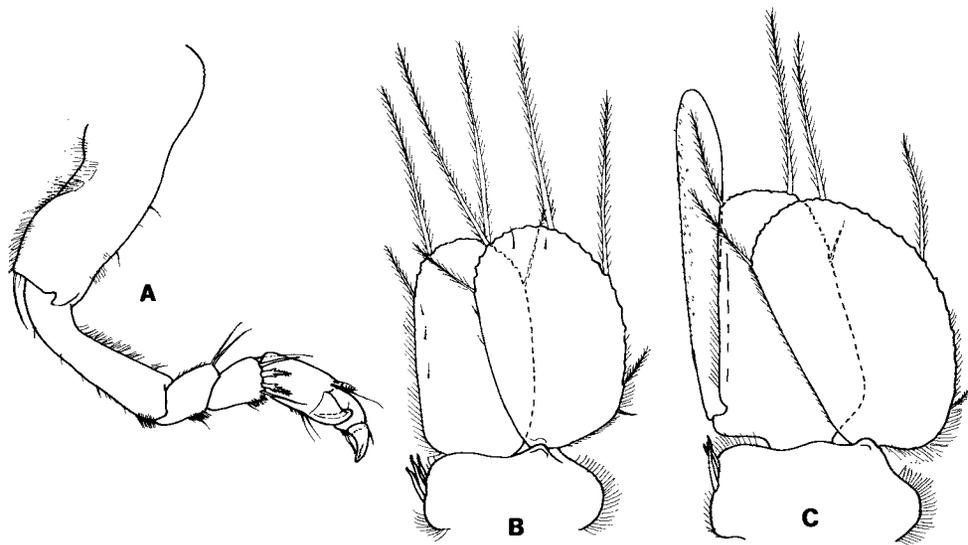


FIG. 25. *Paracassidina anasilla*, sp. nov. All Figs ♂ 5.4 mm (AM P41026). A, pereopod 2; B, pleopod 1; and C, pleopod 2.

Description of male. Body about 1.6 times as long as greatest width, dorsal surfaces entirely covered by short, dense setae. Cephalon rostral point with anterolateral angles each forming nodule; indistinct transverse ridge along posterior of cephalon with median boss; pereonites 1–7 each with 2 obscure transverse ridges; dorsal surface of pleon and pereon with indistinct irregularities.

Epistome short, about 0.8 length of cephalon, with distinct longitudinal median ridge; anterior margin with prominent median point and crenulate anterolateral margins. Antennule article 1 about 1.8 times as long as cephalon, ventromesial boss present; anterior lobe mesial margin proximally indented, then weakly convex and weakly serrate; lateral process arising dorsolaterally, with short mesial margin and blunt irregular distal margin; peduncle article 2 falcate.

Pereopod 1 merus and propodus with 10 and 14 long setae, respectively, on distal margin; dactylus and propodus subequal (0.97) in length; propodus 3.2 times as long as wide; unguis about 0.4 length of dactylus; secondary unguis slender, proximal 0.66 pectinate. Pereopod 2 carpus with 2 trifold biserrate and 2 simple spines.

Pleopod 1 exopod with single spine at proximolateral angle. Pleopod 2 appendix masculina about 1.3 times as long as endopod, exceeding endopod by about 0.3 its length, at widest about 1.5 times as wide as basal width.

Female. Antennule article 1 about 1.3 times as long as cephalon, mesial margin serrate, apex acute; article 2 acute falcate. Epistome similar to male, but apical point less prominent.

Colour. White to cream in alcohol.

Size. Males 4.6–6.0 mm, imm. males (antennule lateral process not fully developed) 4.6–4.8 mm, ovigerous females 5.4–6.2 mm, manca 2.4–2.9 mm.

Remarks. While *Paracassidina anasilla* has an epistome and antennule structure similar to most others of the genus, it is unique in having the dorsum entirely covered by a dense pile of short brush-tipped setae. This dense pilosity traps silt, and presumably camouflages the animal in some way. The antennule morphology is

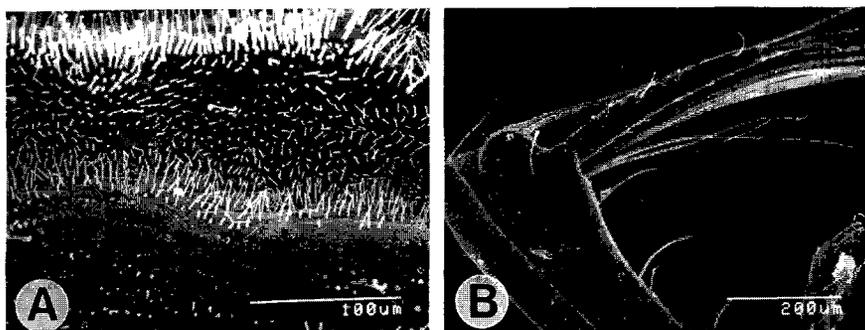


FIG. 26. *Paracassidina anasilla*, sp. nov. (AM P41026). A, pereonite 1; and B, pereopod 1.

distinctive in the shape of the anterior lobe and also the lateral process which is only just separated along its mesial margin.

Distribution. Recorded from off Newcastle, Sydney, Eden and Nowra, NSW, and Bass Strait at depths from 32 to 466 m; substratum records are coarse shell, coarse sand, sand/shell and muddy shell bottoms.

Etymology. The epithet is derived from the Greek *anasillos* meaning bristly hair.

Paracassidina prolata sp. nov.

(Fig. 27)

Material examined

HOLOTYPE ♂ (5.7 mm), off Sydney, NSW, 33°49'S, 151°18'E, 24 May 1972, 42.7 m, coll. AMSBS (AM P41869).

PARATYPES 3♂ (4.3, 4.9, 5.1 mm dissected), 9♀ (ovig. 6.0, 6.4, 6.7, 6.7, 7.2, 7.3, non-ovig. 5.3, 5.4, 5.5 mm), 24 imm. (2.2–4.0 mm), same data as holotype (AM P24297, ♂, ♀ NMV J31536).

Description of male. Body about 1.7 times as long as wide, smooth but not polished, unornamented.

Epistome short, in dorsal view about 0.4 length of cephalon, anterior margins straight, converging to median point, with posteriorly indistinct longitudinal mesial ridge. Antennule peduncle article 1 anterior lobe not strongly produced about 1.3 times as long as cephalon, distally widely rounded, lateral process absent, ventromesial boss absent; article 2 anterior margin convex, anterodistal angle not produced, distal margin subtruncate. Antennal flagellum extending to anterior of pereonite 3.

Pereopod 1 merus and ischium with 10 and 9 long setae respectively on distal margin; dactylus and propodus subequal in length; propodus about 3.4 times as long as wide; unguis about 0.5 length of dactylus; secondary unguis finely serrate. Pereopod 2 with near continuous setulose fringe on posterior margin of ischium to propodus.

Pleopod 1 exopod proximolateral margin with single short spine. Pleopod 2 appendix masculina on posteriorly directed endopod lobe, sinuate, about 1.8 times as long as endopod, exceeding endopod by about 0.4 of its length.

Female. Similar to male except for more rounded anterior margin to epistome and slightly shorter antennule peduncle article 1.

Colour. Cream to pale tan, few brown chromatophores on pleon and pleotelson.

Size. Males 4.3–5.7 mm, ovigerous females 6.0–7.3 mm.

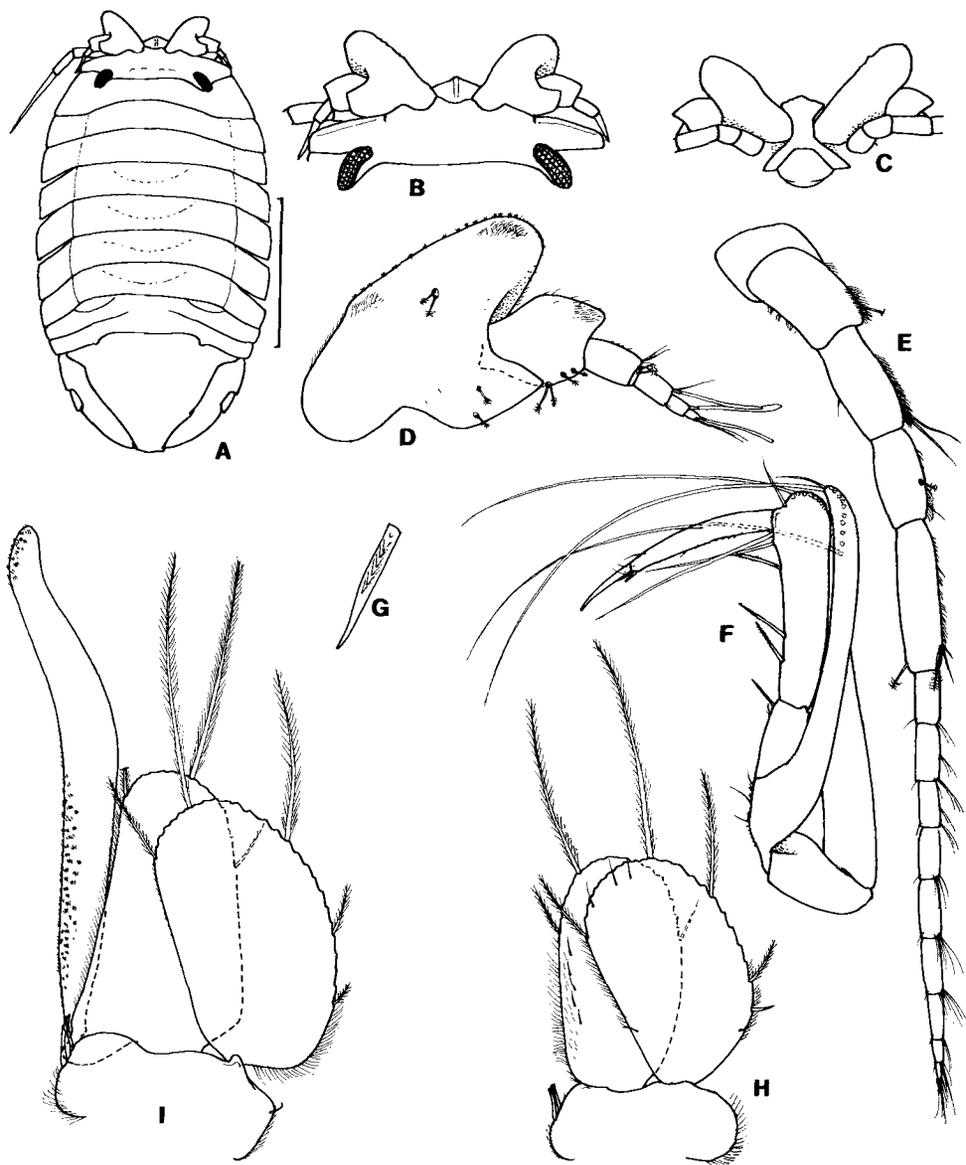


FIG. 27. *Paracassidina prolata*, sp. nov. A–C, holotype, remainder ♀ 5.1 mm (AM P24297). A, dorsal view; B, head; C, frons; D, antennule; E, antenna; F, pereopod 1; G, secondary unguis, pereopod 1; H, pleopod 1; and I, pleopod 2. Scale line 2.0 mm.

Remarks. This species is separated from all others in the genus, with the exception of *P. bamarook* and *P. wurrook*, by the presence of a long sinuate appendix masculina. *Paracassidina prolata* is distinguished from those two species by the males and females having a similar antennular morphology, the males lacking the lateral process and not having a rounded anterior lobe which is not produced. Additionally in *P. wurrook* the pereopod 1 dactylus is shorter (0.7) than the propodus rather than subequal.

It could be considered that all males in this sample of specimens are an immature form of *P. bamarook*. That these males are mature is indicated by the penes and appendix masculina being fully developed, the size of the males close to that of mature (i.e. ovigerous) females, and furthermore, antennular development can be observed in immature males of those species which are ornamented. In species which have an ornamented antennule, the antennular development corresponds with penial and appendix masculina development. Immature males can be seen with partly developed antennules. In none of these species, for some of which there is extensive material, can be seen males with fully developed penial process and appendix masculina, but without the typical antennular morphology.

Distribution. Known only from the type locality.

Etymology. The epithet is adapted from the Latin *prolatus* meaning elongated, and alludes to the long appendix masculina.

***Paracassidina bamarook* sp. nov.**

(Figs 28, 29)

Material examined

HOLOTYPE ♂ (7.0 mm), off Lakes Entrance, Vic, 38°05.0'S, 148°08.5'E, 28 February 1971, 55 m, coll. B. J. Smith and R. J. Plant (NMV J31537).

PARATYPES 4♂ (5.2, 6.3 dissected, 6.6, 6.7 mm), ♀ (ovig. 7.0 mm), 6 imm. (4.6–4.8 mm), 2 manca (3.7, 4.0 mm), same data as holotype (NMV J26050).

Additional non-paratypic material. 2♀ (non ovig.), 13 manca, 40 km SSW of Lakes Entrance, 38°18.0'S, 147°37.0'E, 31 July 1983, 55 m, muddy fine shell, coll. M. F. Gomon and R. Wilson (NMV J26047).

Description of male. Body about 1.6 times as long as greatest width, dorsally smooth, unornamented.

Epistome short, about 0.6 length of cephalon with prominent anteromesial point and lateral points, with distinct longitudinal median ridge.

Antennule peduncle article 1 about 2.3 times as long as cephalon, anterior lobe widely rounded, lateral margin convex; lateral process dorsal, distally clubbed (or thickened); ventromesial boss not visible in dorsal view; proximolateral lobe forming acute point; article 2 short, anterodistal angle not produced; flagellum of 5 articles, subequal in length to peduncle article 3. Antenna flagellum extends to posterior of pereonite 4.

Pereopod 1 merus and propodus with 16 and 10 long setae, respectively, on distal margin; propodus about 3.4 times as long as wide; dactylus and propodus subequal in length, unguis about 0.4 length of dactylus; secondary unguis elongate, finely ridged. Pereopod 2 with setulose fringe on distal half of merus, distal two thirds of carpus, and irregularly on ischium.

Pleopod 1 with one small spine at proximolateral angle. Pleopod 2 appendix masculina sinuate, about 1.6 times as long as endopod, exceeding endopod by about 0.4 of its length, about 2.2 as wide as basal width, widest about half way along its length.

Female. Antennule peduncle article 1 about 1.5 times, as long as cephalon, apex subacute; proximolateral lobe with distinct anterodistal angle. Epistome with weak longitudinal ridge, anterior margin crenulate.

Colour. Pale brown in alcohol.

Size. Males 5.2–7.0 mm, single mature female 7.0 mm.

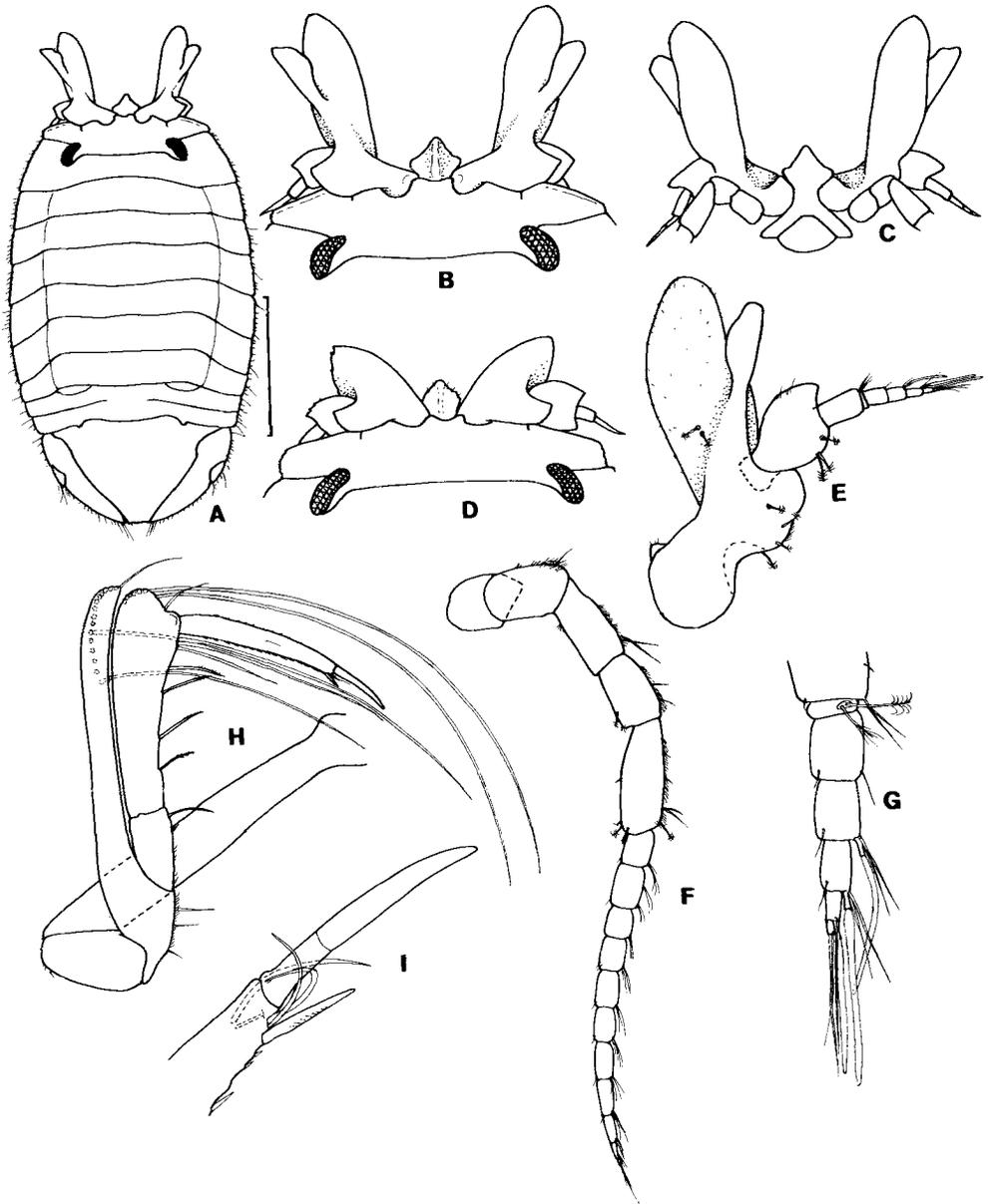


FIG. 28. *Paracassidina bamarook*, sp. nov. A-C, holotype, remainder ♀ 6.3 mm (NMV J26050), except where indicated. A, dorsal view; B, head; C, frons; D, ♀ 7.0 mm (NMV J26050), head; E, antennule; F, antenna; G, antennule, peduncle article 4 and flagellum; H, pereopod 1; and I, unguis and secondary unguis, pereopod 1 dactylus. Scale 2.0 mm.

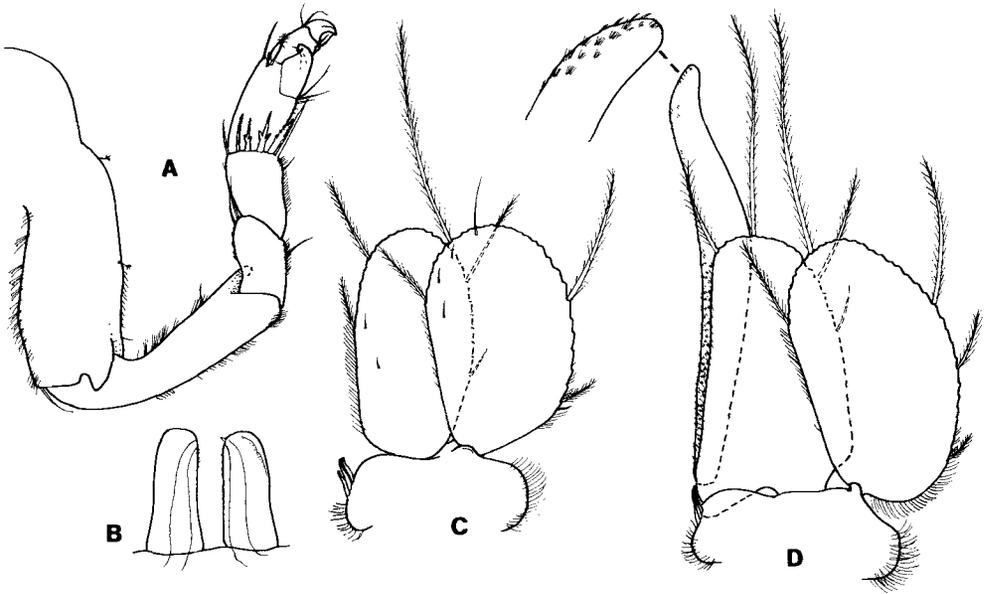


FIG. 29. *Paracassidina bamarook*, sp. nov. ♀ 6.3 mm (NMV J26050). A, pereopod 2; B, penes; C, pleopod 1; and D, pleopod 2.

Remarks. *Paracassidina bamarook* and *P. wurrook* are very similar in appearance, but a number of differences distinguish the two species. In *P. bamarook* the dorsal surface is smooth (compared with coarsely punctate in *P. wurrook*), the antennular frontal lobe is narrower, and the lateral process slightly longer, the antennular proximolateral lobe is acute (versus truncate), the antennal flagellum extends to pereonite 4 (versus pereonite 2–3) and the dactylus is longer (about 1.0 versus 0.7 length of propodus).

The only other similar species is *P. prolata*, but males of that species lack antennule ornamentation.

Distribution. Taken at two localities off Lakes Entrance, Victoria, at a depth of 55 m.

Etymology. The epithet is an Aboriginal word meaning oval shield.

Paracassidina wurrook sp. nov.

(Figs 30, 31)

Material examined

HOLOTYPE ♂ (7.5 mm), East of Malabar, NSW, 33°57'S, 151°19'E, 2 January 1973, 32 m, coll. AMSBS (AM P22226).

PARATYPES Queensland: ♂ (5.0 mm), off Noosa, 26°33'S, 153°31'E, 5 November 1951, 86 m, coll. *Galathea* (ZMUC). **New South Wales:** ♀ (ovig. 6.6 mm), north of Honeysuckle Point, Twofold Bay, 37°05'S, 149°56'E, 21 February 1985, 31.1 m, coll. S. Keable and R. L. Albertson (AM P36179). 3 ♂ (5.0, 5.2, 6.0 mm), 4 ♀ ovig. 5.9, 6.0; non-ovig. 5.2, 5.4 mm), imm. (4.2, 4.2 mm), off Broken Bay, 33°37'S, 151°29'E, 10 February 1986, 75 m, coll. FRV *Kapala* (AM P41870, ♂, ♀, NMV J31538).

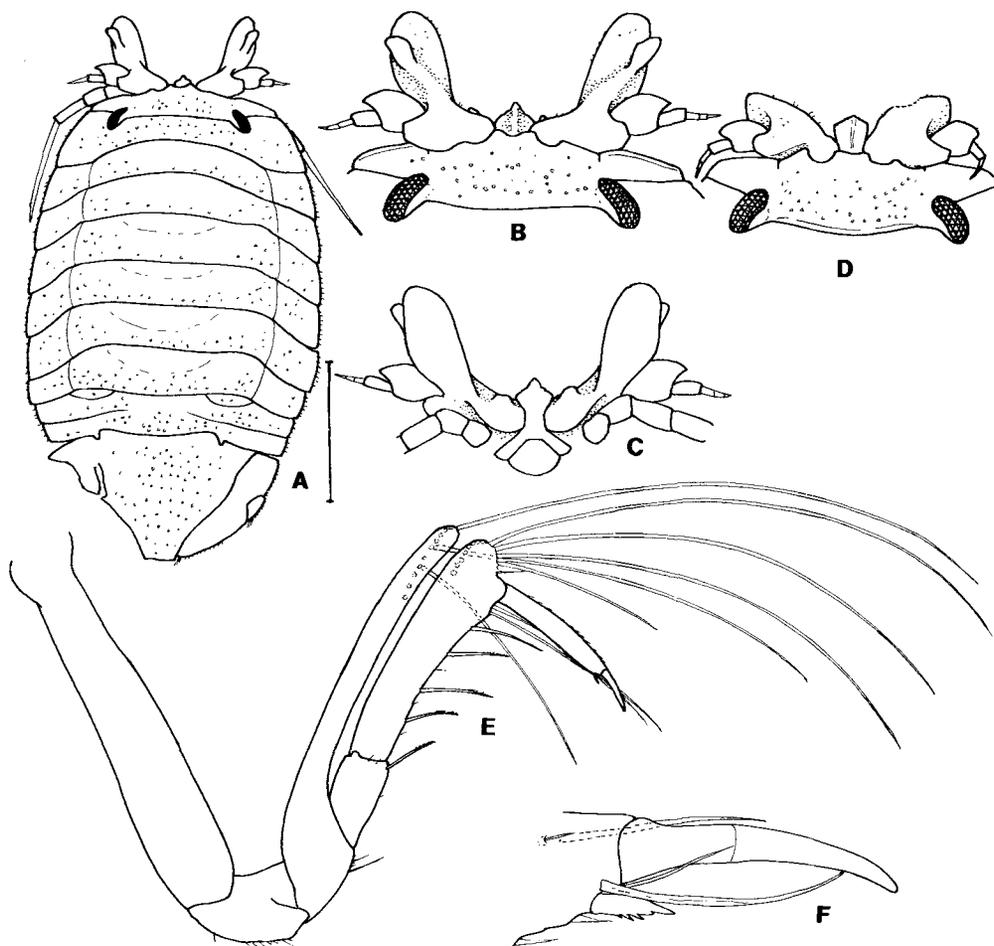


FIG. 30. *Paracassidina wurrook*, sp. nov. **D**, ♀ (AM P36179), remainder holotype. **A**, dorsal view; **B**, head; **C**, frons; **D**, head; **E**, pereopod 1; and **F**, unguis, pereopod 1 dactylus. Scale 2.0 mm.

Description of male. Body about 1.6 times as long as wide, unornamented; dorsal surface coarsely punctate.

Epistome short, about 0.4 length of cephalon; anterior margin with distinct point, anterolateral margins weakly crenulate; distinct longitudinal ridge present. Antennule peduncle article 1 anterior lobe about 1.9 times as long as cephalon, mesial margin curving smoothly to wide broadly rounded distal margin, lateral margin strongly convex; ventromesial boss present; lateral process dorsal, centrally placed, short, about 0.25 length of article 1; proximolateral lobe truncate; article 2 anterior margin convex, anterodistal margin produced, acute, falcate, distal margin concave. Antenna flagellum extending to middle of pereonite 3.

Pereopod 1 merus and propodus with 11 and 14 long setae respectively on distal margins; propodus about 3.7 times as long as wide, posterior margin with 4 stiff and 2 long setae; dactylus about 0.7 length of propodus, unguis about 0.3 length of dactylus, secondary unguis relatively short and robust, with about 3 serrations.

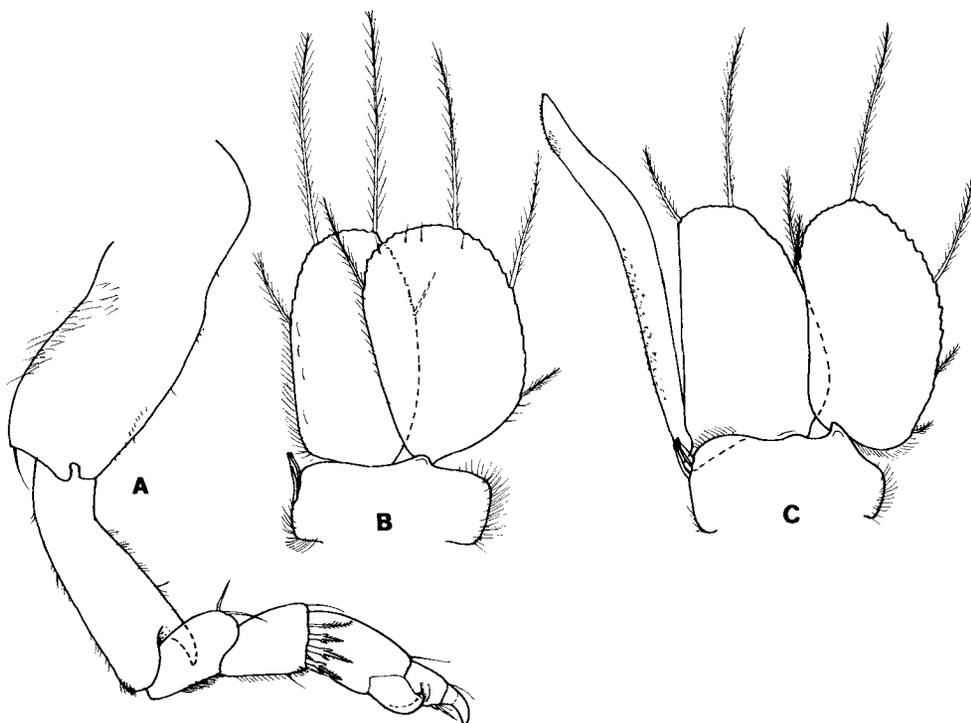


FIG. 31. *Paracassidina wurrook*, sp. nov. A, C, holotype, B, ♀ (AM P36179). A, pereopod 2; B, pleopod 1; and C, pleopod 2.

Pleopod 2 appendix masculina arising on posteriorly directed endopod lobe, about 1.7 times as long as endopod, exceeding endopod by about 0.4 of its length.

Female. Antennule article 1 about 0.9 length of cephalon, article 2 with strongly convex anterior margin. Epistome about 0.5 length of cephalon in dorsal view, anteromesial point not as prominent as male; longitudinal mesial ridge present.

Colour. Pale tan in alcohol.

Size. Males 5.0–7.5 mm, ovigerous female 5.9–6.6 mm.

Remarks. *Paracassidina wurrook* is immediately distinguished from most other species of the genus by the elongate appendix masculina. Of the two other species with similar pleopod 2 morphology, *P. prolata* is distinguished by the male lacking antennular ornamentation. *P. bamarook* is more similar, but *P. wurrook* can be distinguished by having a coarsely punctate cuticle, and antennular peduncle article 1 with a wider anterior lobe, small mesioventral boss, shorter lateral process, and truncate posterolateral lobe. Additionally details of the relative proportions of the pereopod 1 dactylus, which in *P. wurrook* is shorter than *P. bamarook* and also has a serrate rather than simple secondary unguis, serve to distinguish the two species.

Distribution. From central NSW coast, off Sydney, Twofold Bay and Broken Bay, at depths from about 32 to 75 m, to off Noosa, southern Queensland, 86 m.

Etymology. The epithet is an Aboriginal word meaning flat.

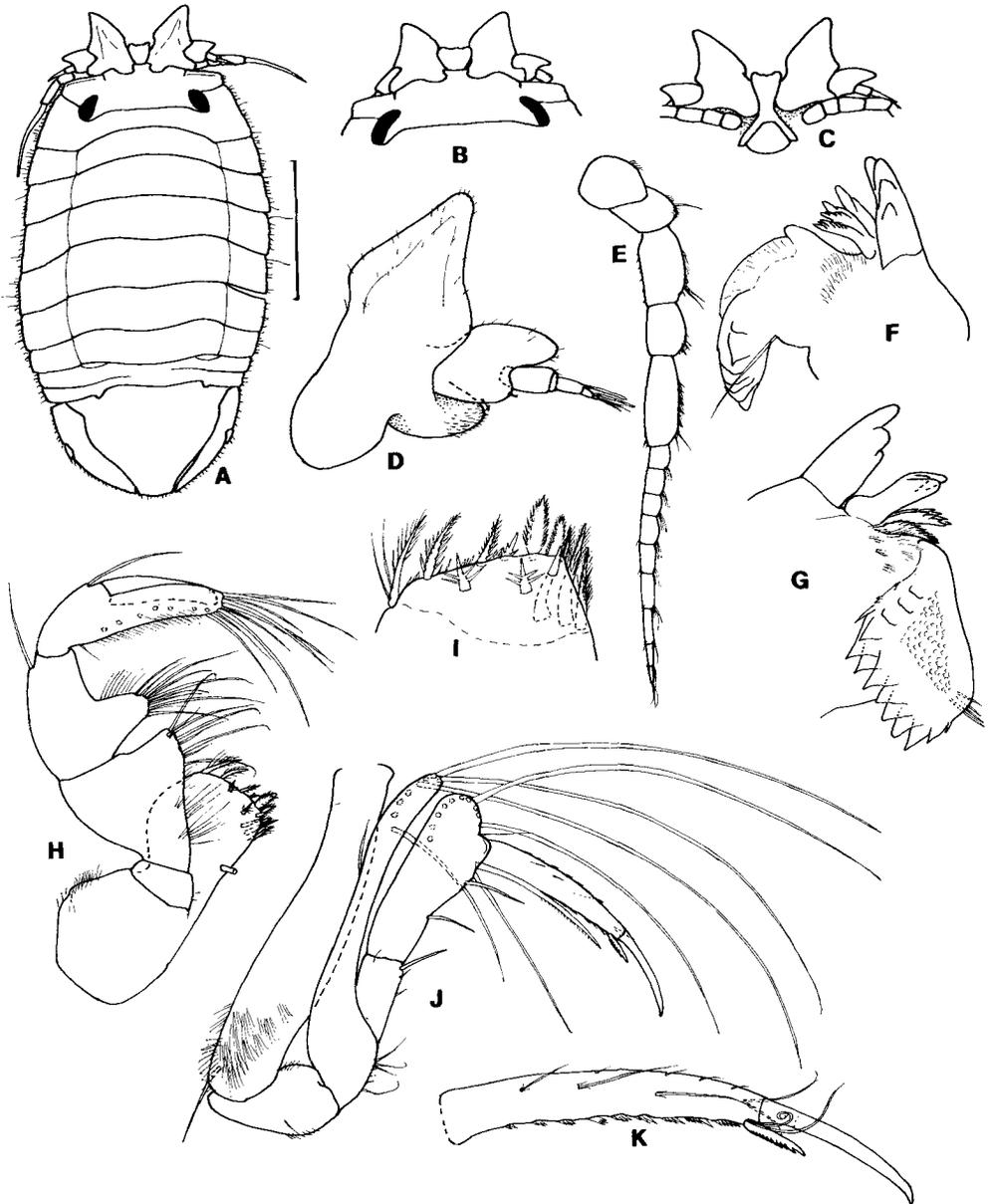


FIG. 32. *Paracassinina incompta*, sp. nov. A, C, holotype, B, ♀ 3.6 mm, remainder ♂ 3.8 mm (both QM W18482). A, dorsal view, B, head; C, frons; D, antennule; E, antenna; F, right mandible, detail; G, left mandible, detail; H, maxilliped; I, maxilliped endite distal margin (dashed line indicates limit of dorsal setules); J, pereopod 1; and K, pereopod 1 dactylus. Scale line 1 mm.

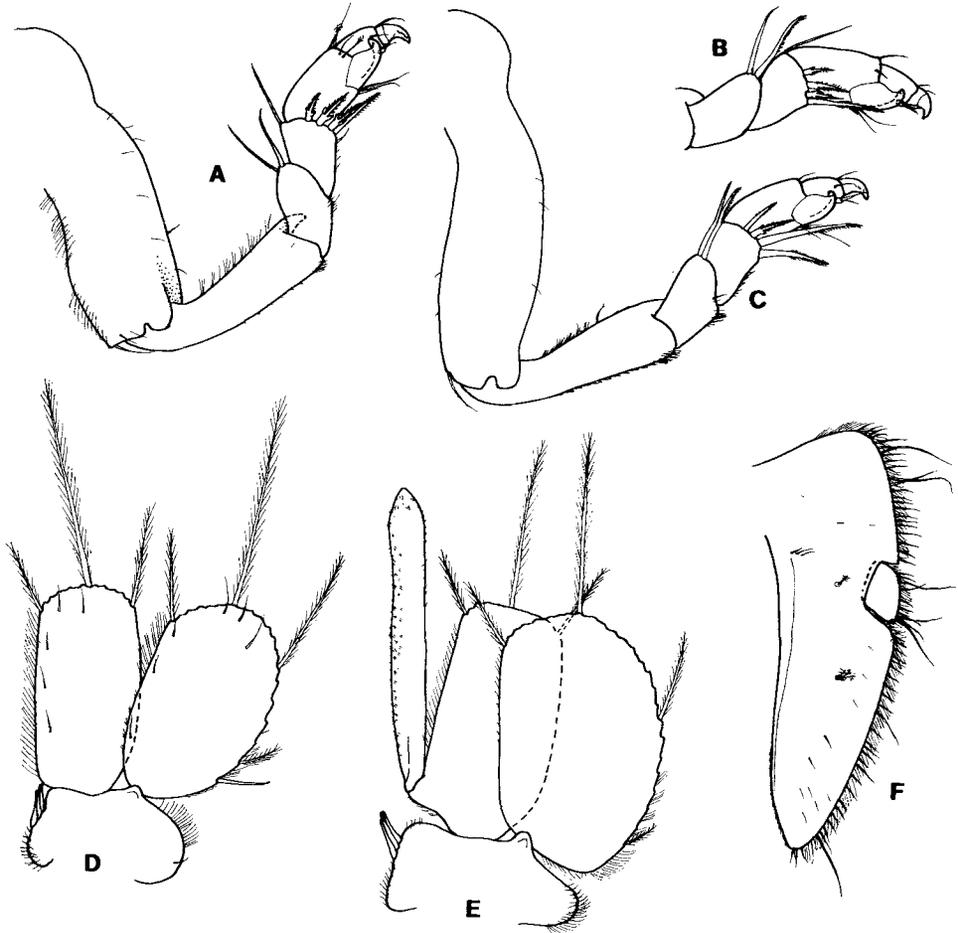


FIG. 33. *Paracassidina incompta*, sp. nov. ♂ 3.8 mm (QM W18482). A, pereopod 2; B, pereopod 6, distal articles; C, pereopod 7; D, pleopod 1; E, pleopod 2; and F, uropod.

Paracassidina incompta sp. nov.

(Figs 32, 33)

Material examined

All material from off Port Hedland, W.A., Coll. T. Ward—CSIRO.

HOLOTYPE ♂ (3.5 mm), 19°29.7'S, 118°52.0'E, 25 October 1983, 39 m (QM W18481).

PARATYPES ♂ (3.8 mm, dissected), 2 ♀ (non-ovig. 3.6, 3.0 mm), same data as holotype (QM W18482). ♂ (3.8 mm), ♀ (non-ovig. 3.9 mm), 19°29.3'S, 118°52.6'E, 15 February 1983, 36 m, (QM W18483). ♂ (3.8 mm), 5 ♀ (ovig. 3.9, 4.0, 4.0, 4.2, non-ovig. 3.4 mm), 19°30.8'S, 118°49.4'E, 30 August 1983, 38 m (QM W18480). 2 ♂ (3.6, 3.8 mm), 2 ♀ (ovig. 3.8, 3.9 mm), imm. (3.1 mm), 19°29.6'S, 118°52.2'E, 30 August 1983, 38 m (AM P41867). ♀ (ovig. 4.4 mm), 19°04.5'S, 118°49.4'E, 28 August 1983, 84 m (QM W18486). 4 ♂ (3.5, 3.7, 3.7, 3.7 mm), 2 ♀ (ovig. 4.2, non-ovig. 3.6 mm), 19°30.5'S, 118°49.5'E, 25 October 1983, 39 m (QM W18484). 2 ♂ (3.4, 3.7 mm), imm. (2.8 mm), 19°28.4'S, 118°55.1'E, 25 October 1983, 37–38 m (QM W18485).

Additional voucher samples to WAM, ZMUC.

Description of male. Body about 1.7 times as long as wide, dorsal surface smooth, without tubercles or other ornamentation.

Epistome short, in dorsal view less than half as long as cephalon, widest anteriorly with anterior margin concave; without longitudinal ridge. Antennule peduncle article 1 simple, without anterior lobe, lateral process or ventromesial boss; anteriorly acute, flexed laterally, about 1.3 times as long as cephalon; mesial margin nearly straight, angled away from body axis, lateral margin distinctly concave; peduncle article 2 anterodistal margin falcate, weakly produced; article 3 short, about 0.6 maximum length of article 2; flagellum with 3 articles, slightly shorter than peduncle article 3. Antennal flagellum extending to posterior of pereonite 2.

Maxilliped palp articles 2–5 mesial margins with about 12, 12, 17 and 10 setae respectively; palp articles 3 and 4 with single prominent seta at distolateral angle; endite distal margin with 4 circumplumose spines and 2 flat biserrate spines, plus 2 submarginal serrate and one simple spine; mediolateral dorsal surface with 3 large circumplumose spines.

Pereopod 1 merus and propodus distal margins with 8 and 10 long setae respectively; propodus about 2.7 times as long as wide, posterior margin with 2 short biserrate spines and 2 long weakly fringed setae; dactylus about 1.4 times as long as propodus; unguis about 0.6 length of dactylus; secondary unguis pectinate. Pereopod 2 ischium about 1.7 as long as combined lengths of merus and carpus; propodus twice as long as carpus; posterior margin of ischium to propodus without setulose fringe, setule patch at posterodistal angle of ischium and merus; distal margin of carpus with 3 trifold biserrate spine and 1 longer biserrate spine. Pereopod 7 ischium about 1.5 times as long as combined length of merus and carpus; propodus about 1.75 times as long as carpus; posterodistal angles of ischium and merus with setulose fringe, remaining posterior margin of ischium, merus and carpus with scale fringe; anterodistal angle of merus with 2 long spines; distal margin of carpus with 2 trifold serrate spines, and 2 long biserrate spines.

Penes about 4 times as long as basal width, apices rounded.

Pleopod 1 exopod with 18 PMS and 1 spine at proximolateral angle; endopod with 11 PMS. Pleopod 2 exopod with 26 PMS, endopod with 11 PMS, appendix masculina about 9 times as long as wide, basally attached; exceeding endopod by about 0.3 of its length.

Female. Sexes essentially similar, but antennular peduncle article 1 slightly shorter (1.2 as long as cephalon), and the epistome is also slightly shorter than in the male.

Colour. Pale tan in alcohol.

Size. Males 3.4–3.8 mm, ovigerous female 3.8–4.2 mm.

Remarks. *Paracassidina incompta* can be identified by the simple antennules which angle away from the short epistome which lacks a longitudinal ridge and also has a concave anterior margin; the antennular peduncle article 2 is falcate. Pereopodal characters to note are the long dactylus on pereopod 1 and lack of an obvious setulose fringe on the pereopods 2–7.

Distribution. Off Port Hedland, W.A., all in the vicinity of approximately 19°30'S, 118°50'E at depths from 36 to 81 m.

Etymology. The epithet is derived from the Latin *incomptus* meaning unadorned.

Paracassidina munna sp. nov.

(Fig. 34)

Material examined

HOLOTYPE ♂ (4.0 mm), Arafura Sea, 10°26.9'S, 137°42.0'E, 13 December 1990, 41 m, gritty mud, coll. S. Cook—CSIRO (QM W18487).

PARATYPES ♀ (3.0 mm, damaged), Gulf of Carpentaria, 13°29.08'S, 137°41.91'E, 12 December 1990, 48 m, sandy mud, coll. S. Cook—CSIRO (QM W18488). ♀ (3.4 mm), Arafura Sea, 9°58.99'S, 137°11.71'E, 13 December 1990, 43 m, slightly gritty sand, coll. S. Cook—CSIRO (QM W18489).

Description of male. Body about twice (1.9) as long as greatest width, smooth, unornamented.

Epistome short, in dorsal view about 0.5 length of cephalon, with triangular anterior margin and distinct median longitudinal ridge. Antennule peduncle article 1 about 1.4 times as long as cephalon, anterior lobe broad, spatulate, with convex mesial margin, wide distal margin and concave lateral margin; lateral process absent, mesioventral boss prominent; article 2 anterior margin strongly convex, anterodistal margin weakly produced, distal margin concave. Antennal flagellum extends to posterior of pereonite 3.

Pereopod 1 merus and propodus with 9 and 10 long setae respectively on distal margins; propodus about 2.6 times as long as wide; dactylus about 1.8 times as long as propodus; unguis and dactylus subequal in length; secondary unguis slender, finely toothed.

Pleopod 1 exopod without spine at proximolateral angle; endopod distal margin with short intersetal projection. Pleopod 2 appendix masculina subequal (1.1 as long) in length to endopod, exceeding endopod by about 0.3 of its length; distal margin of both rami with short intersetal projections.

Female. Antennule peduncle article 1 about 0.75 length of cephalon, anterior margin broadly rounded; article 2 with strongly convex anterior margin, appearing falcate. Epistome anterior margin angled to mesial point, with distinct longitudinal ridge.

Colour. The holotype has a distinctive pattern of dark bands, extending to the coxae on pereonite 1, 4 and 5. Specimens were otherwise clear.

Size. Male holotype 4.0 mm, females 3.0, 3.4 mm.

Remarks. This species is the only member of the genus to have a prominent antennular anterior rounded lobe which lacks the lateral process. Both sexes can be distinguished by the broadly rounded antennular peduncle article 1 and the very long dactylus on pereopod 1, which is nearly twice as long as the propodus, and also has a very long and slender unguis which is about equal in length to the dactylus.

The holotype is a hermaphroditic specimen in that it has oostegites. Nonetheless it shows fully the developed male characters in the form of the antennule, penes and pleopod 2.

Distribution. Western Gulf of Carpentaria, northwards to just south of Papua New Guinea.

Etymology. Munna is an Aboriginal word meaning flat.

Paracassidina cervina sp. nov.

(Fig. 35)

Paracassidina pectinata Holdich and Harrison, 1981: 620 (part), figs 3e, f, h, i, o (not *P. pectinata* Baker, 1911).

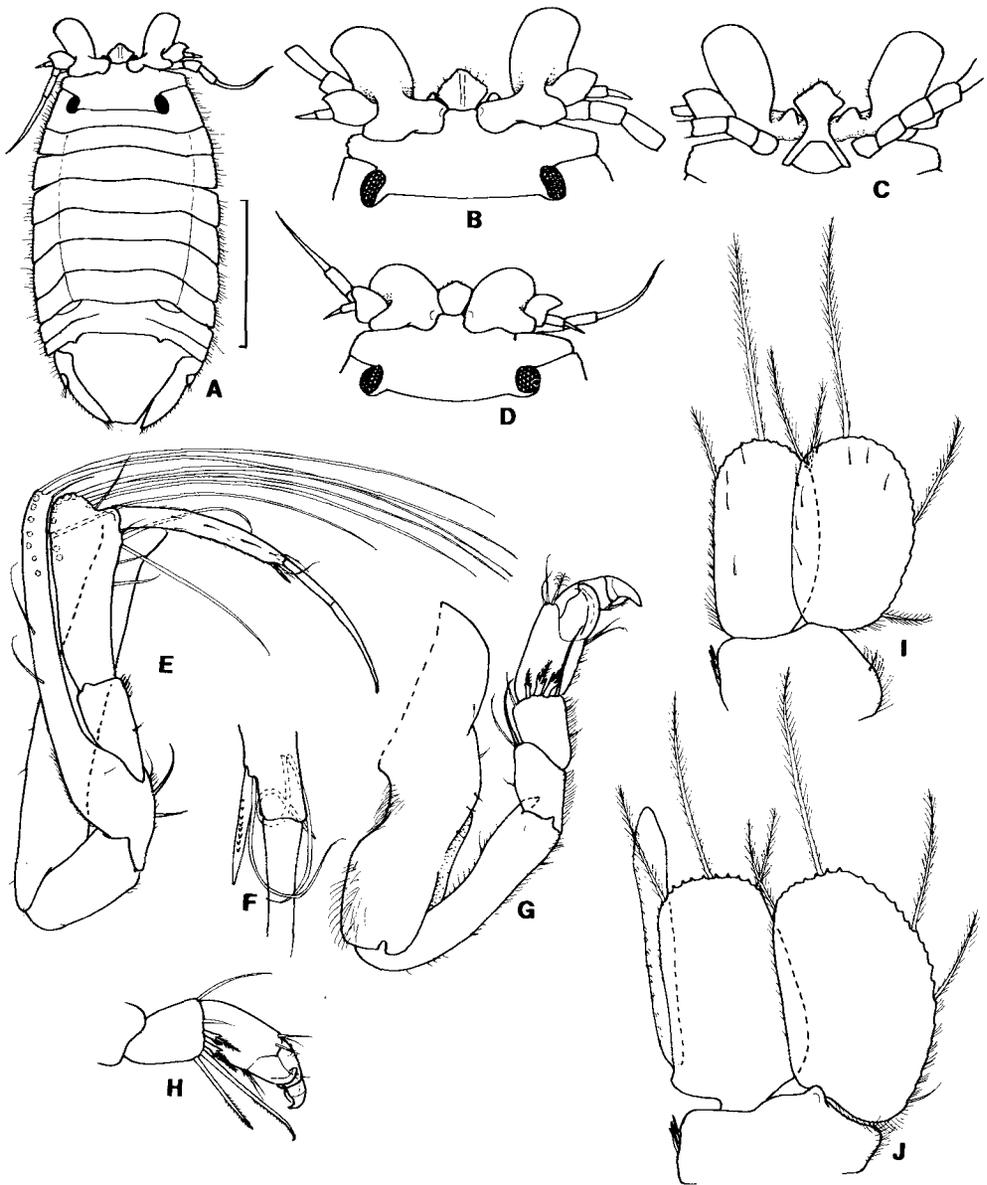


FIG. 34. *Paracassidina mumma*, sp. nov. D, ♀ 3.4 mm, Arafura Sea (QM W18489), remainder holotype. A, dorsal view; B, head; C, frons; D, head; E, pereopod 1; F, secondary unguis, pereopod 1 dactylus; G, pereopod 2; H, pereopod 7, distal articles; I, pleopod 1; and J, pleopod 2. Scale line 1.0 mm.

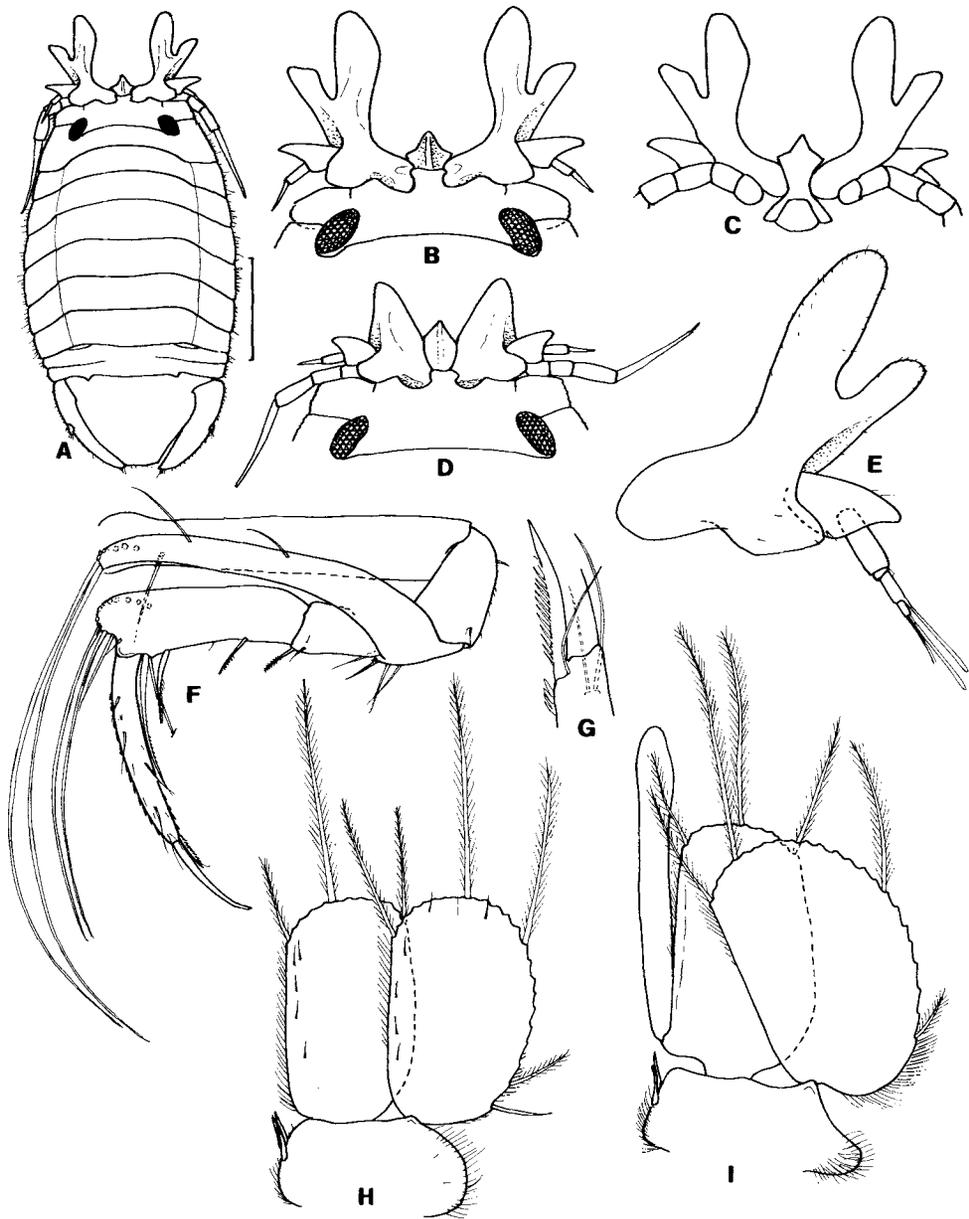


FIG. 35. *Paracassidina cervina*, sp. nov. Figs A–C, holotype, D, ♀ 4.4 mm, E–H ♂ 3.7 mm (QM W18523). A, dorsal view; B, cephalon; C, frons; D, cephalon, ♀; E, antennule; F, pereopod 1; G, secondary unguis; H, pleopod 1; and I, pleopod 1. Scale line 1.0 mm.

Material examined

All material Middle Banks, northern Moreton Bay, southeastern Qld.

HOLOTYPE ♂ (4.7 mm), November 1983–November 1984, depth, coordinates and substratum not recorded, coll. P. Saenger and S. Cook (QM W18522). [Chart indicates depth of 4–20 m, and approximate position of 27°12'S, 153°19'E].

PARATYPES 8♂ (3.4–3.7 mm, mean = 3.5 mm), imm. ♂ (3.0 mm), 10♀ (8 ovig. 3.9–4.4 mm, mean = 4.1 mm, 2 non-ovig. 3.0, 3.7 mm), imm. (2.6 mm), same data as holotype (QM W18523, ♂, ♀ AM P41864).

Additional non-paratypic material. 6♂, 14♀, same locality, collected between March and December 1973, all in poor condition (QM W6273–W6280).

Description of male. Body smooth, unornamented, body about 1.7 times as long as greatest width.

Epistome short, in dorsal view about half as long as cephalon, anterior margin forming distinct acute point, lateral margins each also forming acute point, dorsal surface with distinct longitudinal ridge. Antennule peduncle article 1 nearly 3 times (2.7) as long as cephalon, with strongly produced anterior lobe; anterior lobe with proximal half of lateral margin smoothly concave, anterior half angled laterally, lateral margin almost straight; lateral process coplanar with anterior lobe, lateral margin straight, distal margin wide, obliquely truncate; peduncle article 2 anterodistal margin produced, falcate; flagellum of 3 articles, shorter than peduncle article 3. Antennal flagellum extending to pereonite 3.

Pereopod 1 merus and propodus distal margin each with 10 long setae; meral process with 2 widely spaced simple setae on anterior margin; propodus 2.7 times as long as wide; dactylus about 1.5 times as long as propodus, unguis about 0.6 length of dactylus, secondary unguis long, distinctly pectinate.

Pleopod 1 exopod with single spine at proximolateral angle. Pleopod 2 appendix masculina 1.2 times as long as endopod, exceeding endopod by 0.3 of its length, distally broadly rounded.

Female. Similar to males, but lacking the developed anterior lobe and lateral process on antennule peduncle article 1. Antennule peduncle article 1 distally subacute, about 1.4 times as long as cephalon, peduncle article 2 falcate. Epistome about 0.7 length of cephalon, ovate, anteriorly acute, longitudinal ridge indistinct.

Colour. Pale cream to tan in alcohol, some specimens with brown chromatophores in ventral view.

Size. Males from 3.4–4.7 mm, ovigerous females from 3.4–3.7 mm.

Remarks. *Paracassidina cervina* is distinguished from all others in the genus except *P. dama* by having the antennular lateral process coplanar with the anterior lobe. All other species either lack the lateral process altogether, or the lateral process arises on the dorsal surface of the anterior lobe. *Paracassidina cervina* is readily separated from *P. dama* by the stellate shape of the epistome, shape of the antennular peduncle article 1 anterior lobe, the lateral process being distally obliquely truncate, and by antennular peduncle article 2 being distinctly falcate. Female *P. cervina* can be identified by having the antennular peduncle article 1 more acute and longer than in *P. dama* and also in having antennular peduncle article 2 falcate.

Distribution. Known only from Moreton Bay.

Etymology. The epithet is taken for the subfamily name for 'true deers', Cervinae, and alludes to the antler-like antennules.

Paracassidina dama sp. nov.

(Figs 36–38)

Paracassidina pectinata Holdich and Harrison, 1981: 620 (part), figs 2, 3q, 3m, 3n, 10 (not *P. pectinata* Baker, 1911).

Material examined

HOLOTYPE ♂ (5.1 mm), Middle Banks, northern Moreton Bay, southeastern Qld, November 1983–November 1984, depth, substratum and co-ordinates not recorded, coll. P. Saenger and S. Cook (QM W18524) [Chart details indicate an approximate position of 27°12'S, 153°19'E, and a depth of 4–20 m].

PARATYPES 10♂ (3.9–4.9 mm, mean = 4.3 mm), 13♀ (8 ovig. 4.2–4.8 mm, mean = 4.6 mm, 5 non-ovig. 3.0–3.6 mm), 3 imm. (2.8, 2.9, 3.1 mm), same data as holotype (QM W12577; ♂, ♀, AM P41865).

Additional non-paratypic material. **Queensland:** 6♂, 6♀, all Middle Banks, Moreton Bay (QM W6281–W6287, W8724). James Cook University, Townsville 3—Bays Survey, coll. P. Arnold; all Bowling Green Bay: 3♀, 19°08.5'S, 146°55'E, 16 April 1975, 11 m, mud (QM W18527, W18528); ♂, 19°21.5'S, 147°14.5'E, 16 April 1975, 1.9 m, sand (QM W18526); ♀, 19°21.5'S, 147°06.5'E, 28 May 1975, 2.9 m (QM W18525). **Western Australia:** From off Port Hedland, coll. T. Ward—CSIRO: 2♂ (4.6, 4.2 mm), 3♀ (ovig. 4.4, 5.0, 5.4 mm), 19°30.5'S, 118°49.5'E, 25 October 1983, 39 m (QM W18529); 22♂, 20♀, 7 stations off Port Hedland, 36–83 m (AM, QM, WAM, ZMUC).

Description of male. Body smooth, unornamented, about twice as long as greatest width.

Epistome short in dorsal view, about 0.5 length of cephalon, anterior margin forming narrowly rounded point; with distinct longitudinal ridge. Antennule peduncle article 1 about 2.0 length of cephalon, with strongly produced anterior lobe; anterior lobe mesial margin with excavate basal portion, distal portion strongly convex, lateral margin sinuate; lateral process coplanar with anterior lobe, distally rounded, straight sided; peduncle article 2 flattened, anterodistal margin strongly produced forming rounded flat lobe; flagellum of 3 articles, shorter than peduncle article 3. Antennal flagellum extends to anterior of pereonite 4.

Pereopod 1 merus and propodus distal margin with 8 and 10 long setae respectively; meral process with 2 widely spaced simple setae on anterior margin; propodus 2.9 times as long as wide; dactylus about 1.5 times as long as propodus, unguis about 0.4 times as long as dactylus, secondary unguis long, distinctly pectinate. Pereopod 2 with long setae on anterodistal angles of merus and carpus; setules at distal angles of ischium merus and carpus.

Pleopod 1 exopod with 3 spines at proximolateral angle. Pleopod 2 appendix masculina 1.2 times as long as endopod; exceeding endopod by 0.3 of its length, distally narrowly rounded.

Female. Appendages similar to the male except for antennule peduncle article 1 not as strongly produced, and lacking lateral process; article 2 not as strongly produced, but still broadly rounded; epistome lacking median ridge and anterior margins even (irregular in the male).

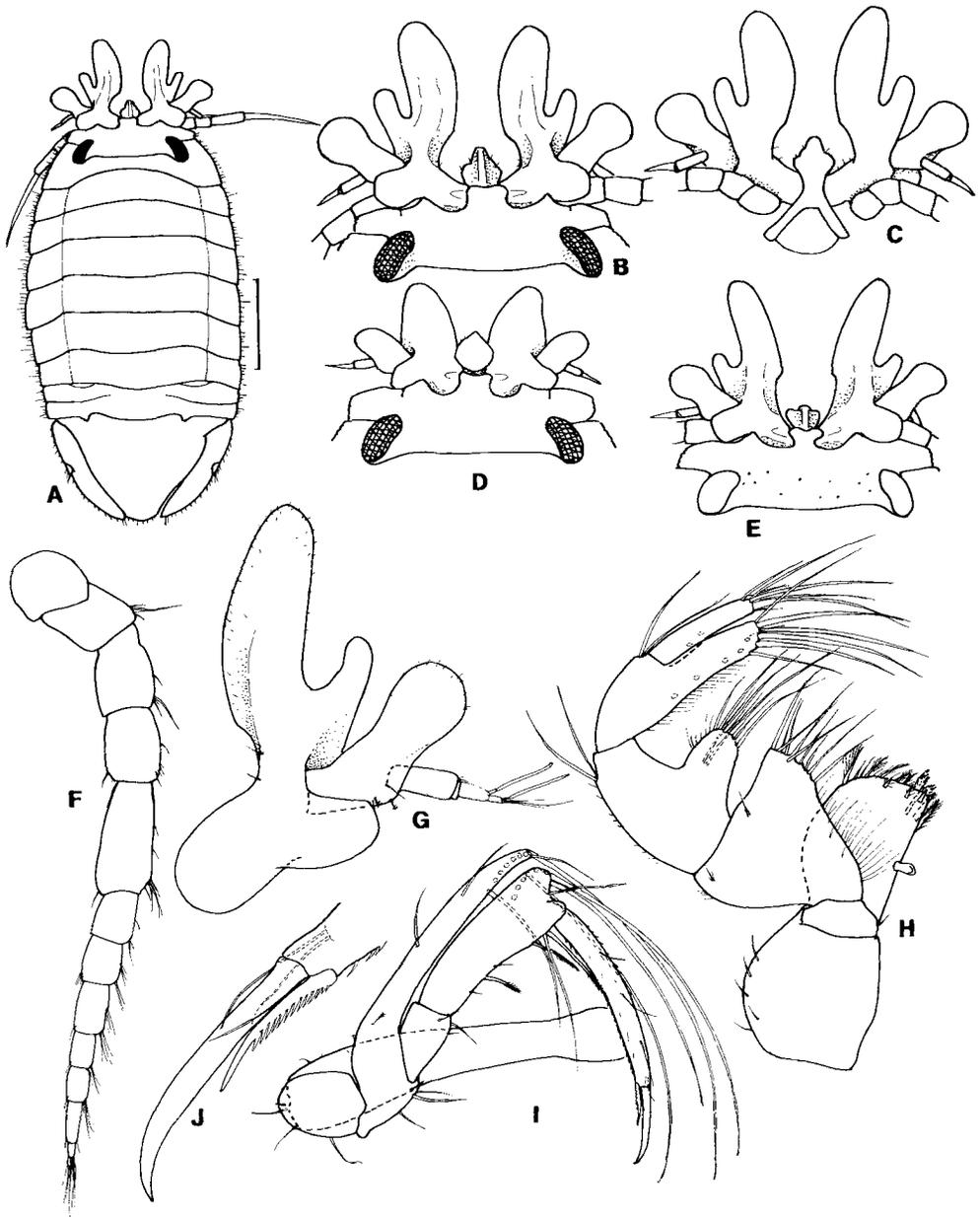


FIG. 36. *Paracassidina dama*, sp. nov. A–C, holotype, F–J, ♂ 4.9 mm, (QM W12577), remainder as indicated. A, dorsal view; B, head; C, frons; D, ♀ 4.4 mm (QM W12577); E, ♂ 4.6 mm, North West Shelf (QM W18529); F, antenna; G, antennule; H, maxilliped; I, pereopod 1; and J, unguis, accessory spine, pereopod 1. Scale line 1.0 mm.

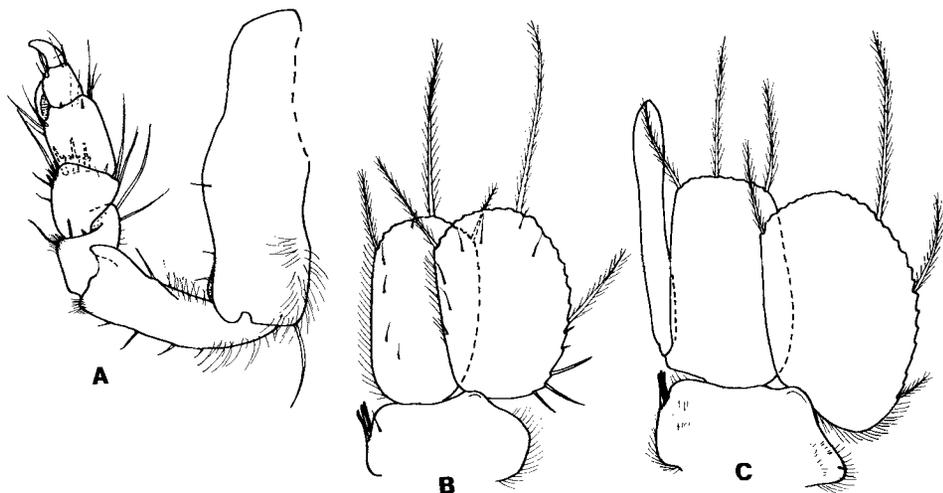


FIG. 37. *Paracassidina dama*, sp. nov. ♂ 4.9 mm (QM W12577). A, pereopod 2, mesial view; B, pleopod 1; and C, pleopod 2.

Colour. Cream to pale tan in alcohol; some specimens with brown chromatophores, particularly evident ventrally.

Size. Males measures 3.9–5.1 mm, ovigerous females measured 3.0–5.4 mm.

Variation. Specimens from Townsville were in poor condition, but the antennular morphology agreed well with the type specimens. Specimens from Western Australia differed from Moreton Bay specimens in the antennular peduncle article 1 anterior lobe mesial margin being less convex and, lateral process being shorter; the anterior lobes being much closer set and the epistome being slightly shorter.

Remarks. This is the only species in the genus with a prominent rounded lobe on antennular peduncle article 2, a feature which, while less developed, is also present in the female. The male is further distinguished by the antennular peduncle article 1 shape, the lateral process being coplanar with the anterior lobe and being straight sided and distally rounded.

Distribution. Here recorded from Moreton Bay southeastern Queensland, Bowling Green Bay, northeastern Queensland, and off Port Hedland, Western Australia. Depths recorded are 1.9–11 m (Cape Bowling Green), 36–83 m (North West Shelf); substrata recorded vary from sand to mud.

Etymology. The epithet is taken from the genus name for fallow deer, and alludes to the palmate antlers.

Paracassidina pectinata

(Fig. 39)

Paracassidina pectinata Baker, 1911: 90, pl. 13; Nierstrasz, 1931: 219; Holdich and Harrison, 1981: 620 (part), figs 3a, b.

Material examined

SYNTYPES ♂ (6.7 mm), ♀ (6.7 mm), from Geographe Bay, W.A., dredged by Verco and Storr (SAM C381).

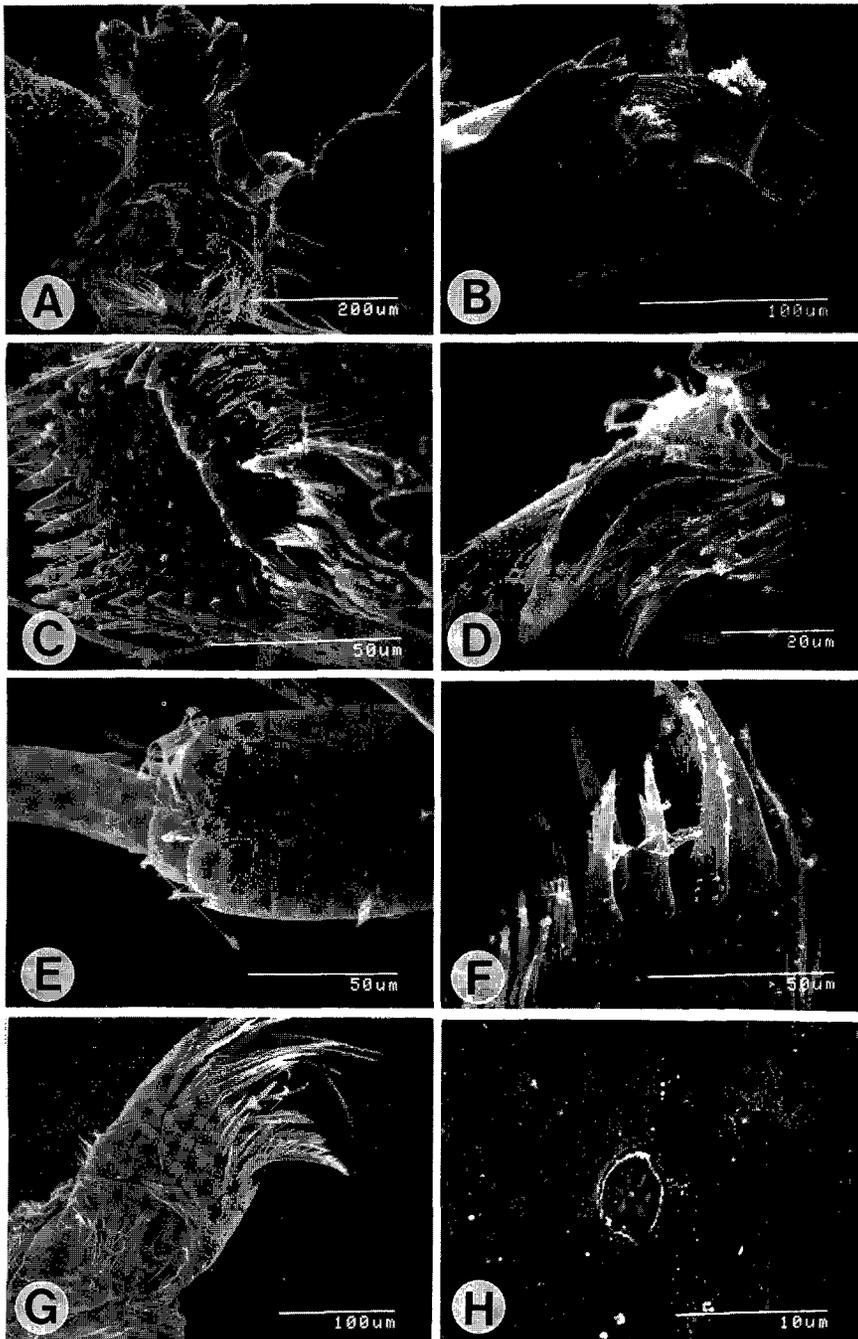


FIG. 38. *Paracassidina dama* sp. nov. (QM W18529). A, frons; B, mandible; C, molar; D, spine row; E, antennule peduncle, articles 3 and 4; F, maxillule, lateral lobe; G, maxilla; and H, pleotelson cuticle.

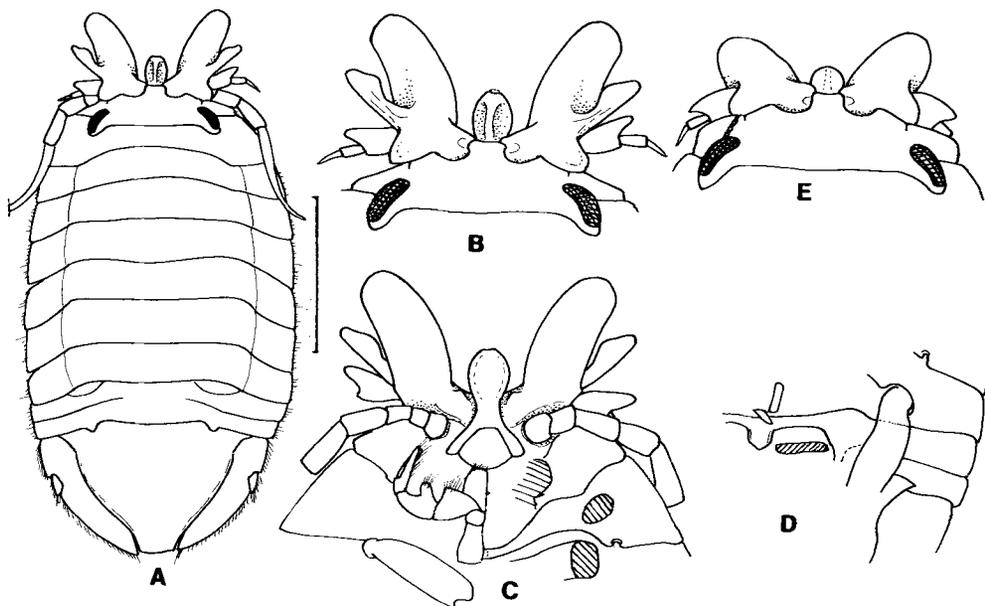


FIG. 39. *Paracassidina pectinata* Baker. A–D, ♂ syntype, E, ♀ syntype. A, dorsal view; B, head; C, frons and sternite 1; D, pleon, showing pleonal stergite and sternal process; and E, head. Scale line 2.0 mm.

Type locality. Geographe Bay, Western Australia. No data, other than that above, is given on the specimen label. Baker (1911) gave the depth as 16–20 fms (= 29.3–36.6 m).

Diagnosis of male. Body smooth, unornamented, about 1.7 times as long as greatest width.

Epistome short, in dorsal view about 0.8 length of cephalon, lateral margins curving smoothly to widely rounded anterior margin; with distinct longitudinal median ridge. Antennule peduncle article 1 about twice length of cephalon, mesial margin curving smoothly away from base, distal margin widely rounded, lateral margin weakly concave; lateral process arising dorsally, distally thickened, lobate with oblique indented margin; weak ventromesial boss visible in ventral view; article 2 anterodistal margin produced, subacute visible in ventral view. Antennal flagellum extends to anterior of pereonite 4.

Female. Epistome shorter than male, anteriorly distinctly rounded. Antennule peduncle article 1 about as long as cephalon, anterior margin widely rounded, article 2 anterodistal margin acute, distal margin concave.

Remarks. Type species for the genus, *Paracassidina pectinata* has effectively not been redescribed since it was named by Baker (1911). The type specimens were figured by Harrison and Holdich (1981), and are again figured here, but with more attention to the antennule morphology. Unfortunately no fresh material of this species is available, and given the similarity of appendage morphology (other than the male antennule and pereopod 1) within the genus, it was decided not to dissect the specimens. Direct observation of the pereopods show them to be consistent with others of the genus.

Paracassidina pectinata can easily be identified as the only species with a distinctly rounded epistome, which is of moderate length (0.8 length of cephalon). The shape of the antennular peduncle article 1 anterior lobe and lateral process further separate *P. pectinata* from related species.

Material identified as *Paracassidina pectinata* by Holdich and Harrison (1981) has all been reidentified and is here assigned to five new species (*Paracassidina anasilla*, *Paracassidina bakeri*, *Paracassidina cervina*, *Paracassidina dama* and *Paracassidina petala*).

Distribution. Known only from the type locality.

***Paracassidina petala* n. sp.**

(Figs 40, 41)

Paracassidina pectinata Holdich and Harrison, 1987, figs 3d, e (not *P. pectinata* Baker, 1911).

Material examined

All type material from Tasmania.

HOLOTYPE ♂ (6.7 mm), off entrance to Little Swanport, 8 June 1977, 10 m, sandy bottom, coll. A. J. Dartnall (TM G3523).

PARATYPES 2♂ (imm. 5.2, 4.6 mm), 4♀ (ovig. 4.7, 5.1, 5.4, 4.2 mm), 8 indet. (2.0–3.4 mm), same data as holotype (TM G2610). ♂ (6.0 mm, dissected), 2 imm. (3.4, 3.5 mm), Frederick Henry Bay, 16 August 1971, coll. J. R. Penprase (TM G1797). ♂ (imm. 4.4 mm), ♀ (non-ovig. 4.2 mm), manca (2.5 mm), Wineglass Bay, Freycinet Peninsula, 8 June 1977, 20 m, coarse sand, coll. A. J. Dartnall, FRV *Penghana* (TM G2613). ♂ (imm. 5.0 mm), ♀ (non-ovig. 4.3 mm), manca (2.0 mm), Bull Bay, Bruny Is., 19 September 1978, 5–30 m depth, coll. A. J. Dartnall (TM G2614). ♀ (imm. 6.0 mm), 4 mancas (2.2, 2.4, 2.4, 3.0 mm), off Hellfire Bluff, near Cape Bernier, 7 June 1977, 12 m, sandy bottom, coll. A. J. Dartnall (TM G2609).

Additional non-paratypic material. **Bass Strait:** ♂ (imm. 4.5 mm), 10 km West of Cape Otway, Vic., 39°49.0'S, 143°24.0'E, 20 November 1981, 56 m, fine sand, coll. R. Wilson (NMV J26043). ♂ (5.7 mm), 50 km S.W. of Lakes Entrance, Vic., 38°15.0'S, 147°22.5'E, 31 July 1983, 16 m, sand with limestone reef outcrops, coll. M. F. Gomon and R. Wilson (NMV J31353).

Description of male. Body about 1.4 times as long as greatest width, vaulted, smooth, unornamented; lateral body margins with conspicuous setal fringe.

Epistome largely concealed in dorsal view, appearing about 0.25 length of cephalon; with indistinct longitudinal median ridge. Antennule peduncle article 1 about 3.5 times as long as cephalon, with elongate anterior lobe and lateral process; anterior lobe mesial margin nearly straight, distal margin rounded, lateral margin weakly concave; ventromesial boss prominent; lateral process arising on dorsal surface, forming narrow angle to anterior process; peduncle article 2 anterodistal margin produced laterally, apically rounded; flagellum with 4 articles. Antennal flagellum extends to posterior of pereonite 3.

Pereopod 1 merus and propodus with 15 and 9 long setae respectively on distal margins; merus anterior surface with 3 widely separate setae; propodus about 2.6 times as long as wide; dactylus about 1.3 length of propodus, unguis about 0.3 length of propodus. Pereopod 2 basis with abundant setules; anterodistal angles of merus and carpus with long setae; posterodistal angles of ischium and merus and posterior margin of merus with setulose fringe.

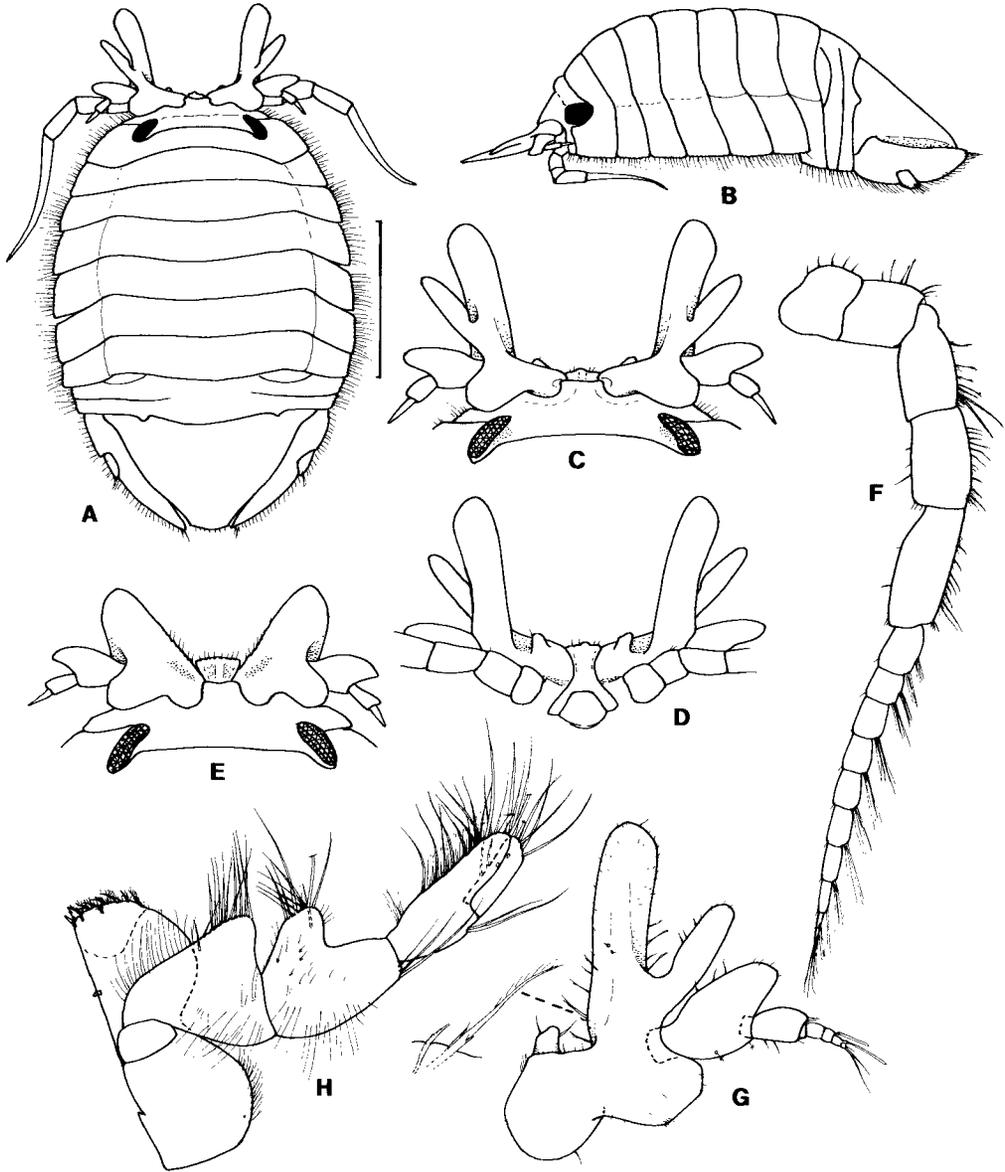


FIG. 40. *Paracassidina petala*, sp. nov. A–D, holotype, F–H, ♂ 6.0 mm (TM G1797). A, dorsal view; B, lateral view; C, head; D, frons; E, ♀ 5.4 mm (TM G2601); F, antenna; G, antennule; and H, maxilliped. Scale line 2.0 mm.

Pleopod 1 with 3 spines on exopod proximolateral angle. Pleopod 2 appendix masculina about 1.4 length of endopod, extending beyond endopod by about 0.45 of its length.

Female. Epistome in dorsal view less than half (0.4) as long as cephalon, anterior margin subtruncate, crenulate. Antennule peduncle article 1 about twice as long as cephalon, axes diverging, anteriorly bluntly rounded; proximolateral margin weakly crenulate; article 2 anterior margin convex, anterodistal produced, distal margin concave.

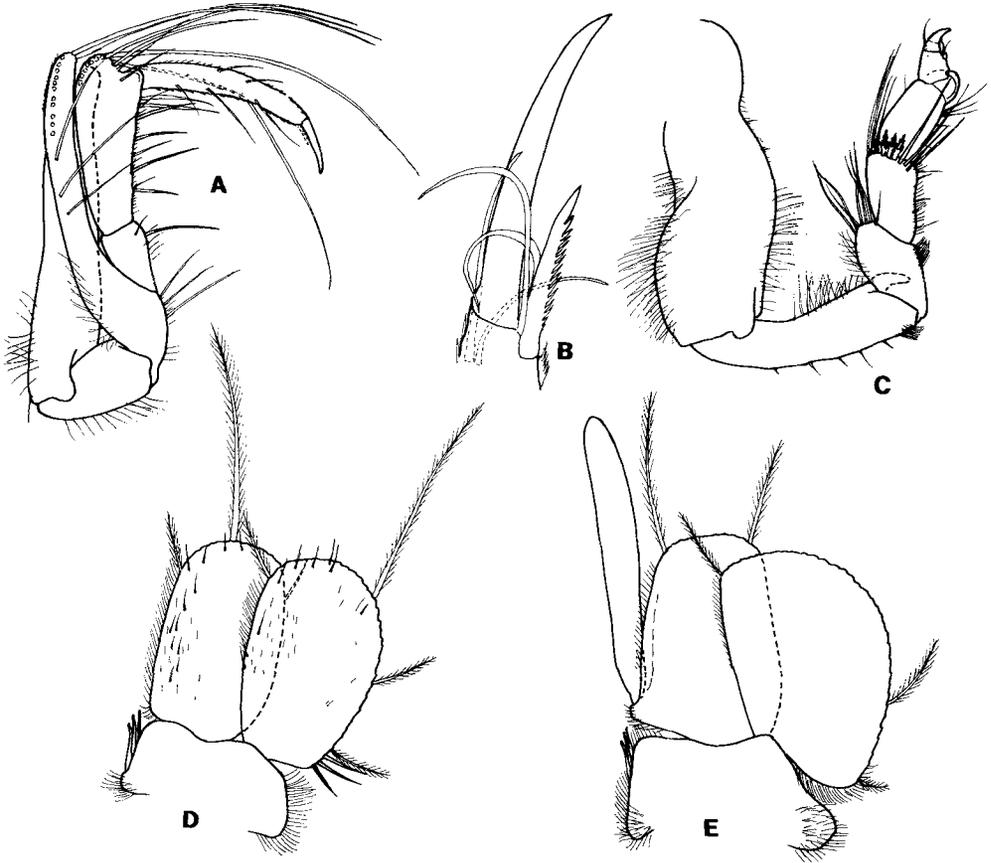


FIG. 41. *Paracassidina petala*, sp. nov. All Figs ♂ 6.0 mm (TM G1797) except **B**, imm. ♂ 5.2 mm (TM G2607). **A**, pereopod 1; **B**, unguis and secondary unguis, pereopod 1; **C**, pereopod 2; **D**, pleopod 1; and **E**, pleopod 2.

Colour. All specimens dark brown with some lighter brown mottling, edges of segments clear.

Size. Males 6.0–6.7 mm, ovigerous females 4.2–4.7 mm, immature males 4.4–5.2 mm, manca 2.2–3.0 mm.

Remarks. Several characters immediately distinguish *Paracassidina petala* from its congeners. The body shape is far more ovate and more strongly vaulted than other species. The strong anteromesial boss, the very long and straight sided anterior lobe on antennular peduncle article 1, and the narrow angled blade-like lateral process together with the short almost truncate epistome all serve to identify the species.

Distribution. Bass Strait and southeastern Tasmania, taken at depths from the intertidal to 56 m, bottom substrata recorded are of fine to coarse sand.

Etymology. The epithet is derived from the Latin *petalos* meaning broad, or outspread.

***Paracassidina bakeri* sp. nov.**

(Fig. 42)

Paracassidina pectinata Holdich and Harrison, 1981: 620 (part, material from off Townsville).

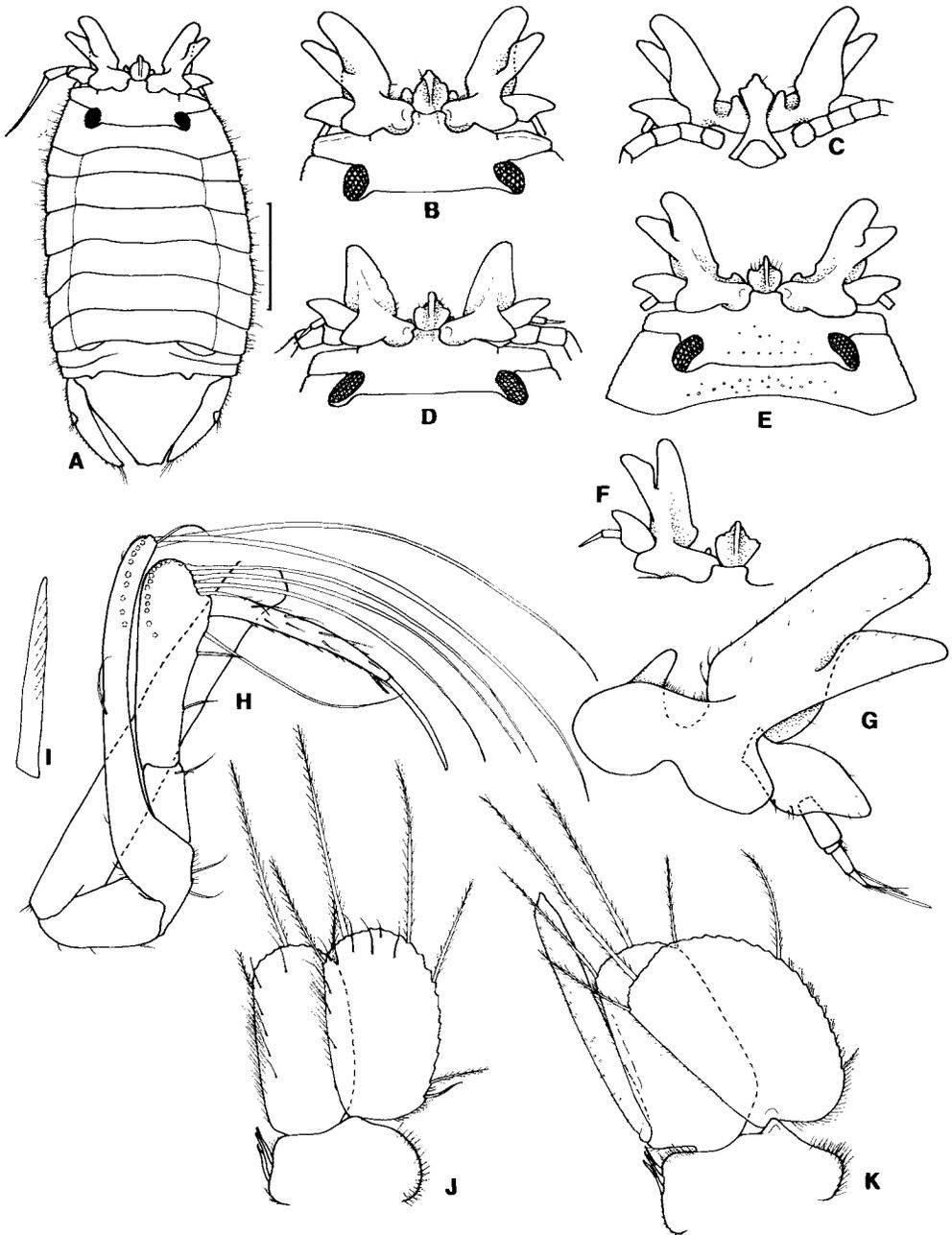


FIG. 42. *Paracassidina bakeri*, sp. nov. A–C, holotype; G–K, ♂ 4.1 mm (QM W18538), remainder as indicated. A, dorsal view; B, cephalon; C, frons; D, cephalon, ♀ 5.4 mm (QM W18536); E, head, pereonite 1, Queensland, ♂ 4.1 mm Sphinx Is. (AM P30378); F, antennule and epistome, Queensland, ♂ 3.6 mm, Cleveland Bay (QM W18540); G, antennule; H, pereopod 1; I, accessory unguis; J, pleopod 1; and K, pleopod 2. Scale line 1.0 mm.

Material examined

All type material from North West Shelf, W.A., coll. T. Ward—CSIRO.

HOLOTYPE ♂ (4.2 mm) 19°04.6'S, 118°51.2'E, 29 August 1983, 82.5 m depth, coll. T. Ward—CSIRO (QM W18535).

PARATYPES ♂ (5.4 mm), 19°30.8'S, 118°49.1'E, 29 August 1983, 38 m (QM W18536). ♂ (3.4 mm), 19°04.3'S, 119°00.6'E, 1 September 1983, 82.5 m (QM W18537). ♂ (4.1 mm, dissected), imm. (2.7 mm), manca (1.9 mm), 19°04.8'S, 118°50.7'E, 30 August 1983, 81 m (QM W18538). ♂ (3.7 mm), 19°04.1'S, 118°47.8'E, 30 August 1983, 82 m (WAM 49-93).

Additional non-paratypic material. **Queensland:** 3 ♀ (ovig. 3.7, 3.9 mm, non-ovig. 3.2 mm), East of Broad Sound, 22°06'S, 150°49'E, 13 December 1977, 53 m, coarse shell, coll. W. Ponder, P. Terrill and I. Loch, HMAS *Kimbla* (AM P30379). 2 ♂ (3.7, 4.1 mm), ♀ (ovig. 3.6 mm), off Sphinx Is., Northumberland Group, 21°28'S, 150°08'E, 19 November 1977, 40 m, grey sandy mud, coll. F. Rowe and P. Coleman, HMAS *Kimbla* (AM P30378). 6 ♂, 7 ♀, Bowling Green Bay and Cleveland Bay, Townsville, 1975, 5.6–11 m, soft mud to coarse sand, coll. P. Arnold, James Cook University (QM W18539–W18544). ♂ (imm. 3.5 mm), ♀ (ovig. 4.0 mm), Cleveland Bay, Townsville, 21 September 1990 (MTQ W13596).

Description of male. Body about 1.7 times as long as greatest width, dorsal cuticle finely granular, without ornamentation.

Epistome short, in dorsal view about 0.6 length of cephalon, anterior margin with narrowly rounded point and sublateral lobes, dorsally with distinct longitudinal ridge. Antennule peduncle article 1 about 1.5 times as long as cephalon, anterior lobe mesial margin proximally concave with abrupt mesial angle, then curving laterally; lateral margin distinctly sinuate; ventromesial boss prominent, conspicuous in dorsal view; lateral process arising dorsally near middle of anterior lobe, lateral margin of process strongly concave, with indented distal margin, posterolateral margin straight, peduncle article 2 anterior margin convex, anterodistal margin produced, acute, distal margin concave; flagellum of 2 articles. Antennal flagellum extending to pereonite 3.

Pereopod 1 merus and propodus distal margins with 11 and 17 long setae respectively; merus process with single seta on anterior margin; propodus 2.8 times as long as wide, posterior margin with 2 short and 1 long setae; dactylus about 1.4 times as long as propodus; unguis about 0.5 length of dactylus; secondary unguis slender, weakly ridged, not pectinate.

Pleopod 1 exopod with single spine at proximolateral angle. Pleopod 2 appendix masculina 1.2 times as long as endopod, exceeding endopod by 0.3 of its length, distal extremity with narrowly rounded tip.

Female. Antennule peduncle article 1 with ventromesial boss; article 1 about 1.5 times as long as cephalon, mesial margin convex, lateral margin concave; article 2 falcate. Epistome similar to male.

Colour. Pale cream to tan in alcohol.

Size. Males 3.4–4.2 mm, ovigerous female 3.6–5.4 mm.

Variation. The shallow inshore material from Townsville differs slightly in that the male antennular peduncle article 1 lobe is less angled away from the body axis and apically narrower than males from Western Australia and offshore Queensland, and the lateral process arises closer to edge of the anterior lobe. The ventromesial boss is equally prominent but set slightly farther apart in Queensland specimens. The dorsal

cuticle of all specimens is finely granular, but some Queensland specimens also have distinct punctae, the sample from Sphinx Island (AM P30378) for example has one male with a punctate cuticle, the female and other male not being punctate. While there appear to be no further differences, there was only one mature male in the Townsville series all others being immature or damaged. Given the range of these specimens, the minor differences can be attributed to geographic variation.

Remarks. This species belongs within the group of species all of which have the lateral process of antennular article 1 arising dorsally, a ventromesial boss, the epistome with a distinct median longitudinal dorsal ridge, and a relatively short appendix masculina. The other species are *P. pectinata* and *P. petala*; *Paracassidina pectinata* has the epistome distinctly rounded while *P. petala* is easily separated by its far more ovate body shape, and longer narrow antennule anterior lobe. Two species from southeastern Australia *P. wurrook* and *P. bamarook* have a similar antennule morphology, but both these species have the appendix masculina about twice as long as the endopod and sinuate rather than about 1.3 times as long as the endopod and straight.

Distribution. Queensland coast, within the Great Barrier Reef at depths of 40.5 m, off Townsville at depths of 5.6–11 m; off Port Hedland, W.A. at depths of 38–82.5 m; substrate recorded as soft mud; coarse to almost pure sand off Port Hedland.

Etymology. Named in honour of W. H. Baker, historically Australia's major contributor in documenting sphaeromatid isopods.

Genus *Syncassidina* Baker

Syncassidina Baker, 1929: 60; Nierstrasz, 1931: 222; Holdich and Harrison, 1981: 625; Harrison, 1984b: 391; Harrison and Ellis, 1991: 946.

Type species. *Syncassidina aestuaria* Baker, 1929, by monotypy.

Diagnosis of male. Body dorsoventrally compressed, lateral margins with setose fringe, without *membrana cingula*. Cephalon lateral margins flattened, extending to edge of pereonite 1; anterior margin with narrowly rounded rostral point; eyes dorsal, distinctly faceted. Pereonites of about equal length, 6th longest; pereonite 7 extending to full body width; without coxal keys, coxal sutures faint or absent. Pleon consisting of 1 segment. Pleotelson anterolateral margin not extending to full width of pleon; posterior margin entire, without ventral groove or exit channel. Coxae of pereonite 1 not extending across sternum; pleonal sternite absent.

Antennule peduncle articles 1 and 2 flattened, anteriorly expanded, without lobes, article 2 short; anterior margins of peduncle articles 1 and 2 contiguous, medial margin of article 1 abutting epistome; flagellum short, slightly longer than peduncle article 3. Antenna peduncle article 1 shortest, article 3 longest, articles 4 and 5 subequal in length, slightly shorter than 3, longer than 2. Epistome medially constricted, anteriorly produced, separating antennule peduncles in dorsal view, scarcely extending beyond anterior of antennules.

Mandible incisor narrow, 3-dentate (left) or 2-dentate (right); molar process prominent broad, mesial face concave, proximally with serrate margins; 3-dentate lacinia mobilis present on left mandible, right mandible with bifurcate lacinoid spine; both mandibles with spine row of 1 short and 2 long fringed spines. Maxillule mesial lobe with 4 fringed spines; lateral lobe with about 10 spines, most of which are pectinate. Maxilla with all lobes with spines, those of lateral and middle pectinate,

mesial lobes with stout fringed and circumplumose spines. Maxilliped palp articles 3 and 4 with weak mesiodistal lobes, lateral margins without setae; endite distal margin obliquely truncate, with 4 long circumplumose spines, 1 short distolateral conical spine, simple spine on ventral distomesial margin.

Pereopod 1 ischium longer than remaining articles, articles without elongate setae; dactylus short, less than half as long as propodus, secondary unguis prominent, acute; propodus mesial surface with large pectinate spines. Pereopods 2–7 subsimilar, propodus without pectinate spines; distal margin of carpus with trifold biserrate spines. All pereopods with setulose fringe on posterior margins of ischium to propodus.

Paired elongate penes present on sternite 7, fused basally, extending to pleopod peduncles.

Pleopods 1 and 2 only with PMS. Pleopod 1 exopod wide, distally rounded, endopod narrow about half as wide as exopod, lateral and mesial margins subparallel. Pleopod 2 exopod narrow, curving medially; appendix masculina positioned on posteriorly directed lobe, elongate (about twice as long as endopod), with narrowly rounded apex. Pleopods 3 and 4 exopods without transverse suture, pleopod 5 exopod with transverse suture. Pleopod 5 exopod with 3 large ill-defined scale patches. Uropod lamellar, extending slightly beyond pleotelson, distally acute; endopod minute, set in lateral margin.

Female. Mouthparts not metamorphosed. Similar in appearance to male. Marsupium composed of anterior and posterior pocket overlapping at pereonite 4. Short oostegites present on sternites 3 and 4.

Remarks. This apparently common monotypic genus can easily be recognized by a number of characters. The projecting epistome in combination with ambulatory first pereopods separates it from most genera. The estuarine genus *Cassinideia* can be distinguished by the larger uropod exopod, wide epistome and the antennular peduncle articles not being expanded. *Syncassinina* is further distinguished by pleopod 3 lacking PMS and lacking a transverse suture.

The morphology of the penes (basally fused) and pleopods 1 and 2 suggests that the most closely related genus is *Cassinideia*: both have an elongate appendix masculina set on a posteriorly directed lobe, in *Cassinideia* the penes are wholly fused (including the vas deferens) while in *Syncassinina* the penes are only basally fused; the first pleopod of both genera have a narrow endopod and wide exopod.

Syncassinina aestuarina Baker

(Figs 43, 44)

Syncassinina aestuarina Baker, 1929: 60, pl. 5; Nierstrasz, 1931: 222; Harrison and Holdich, 1981: 625, fig. 4; Jones, 1986: 20.

Material examined

Queensland: 2 (poor condition), Caboolture River (QM W5611); ♂ (previously dissected), southern Moreton Bay, in mangroves (QM W6305); 2 (poor condition), mouth of Serpentine Creek, Moreton Bay (QM W7105). **New South Wales:** 4, Emerald Beach, near Woolgoolga (NMV J26220); 3, Salamander Bay, Port Stephens, mangroves (AM P41180); 1, Apple Tree Creek, Cowan Waters, 33°39.2'S, 151°09.3'E (AM P41023); 1, Towra Point, Botany Bay, *Zostera* (AM P41197); 1, Wallaga Lake, Snake Is., 36°22'S, 150°04'S, weed beds, coll. AM: Eurobedella Estuarine Survey (AM P41388). **Victoria:** About 200 specimens, Gippsland Lakes, Banksia Peninsula

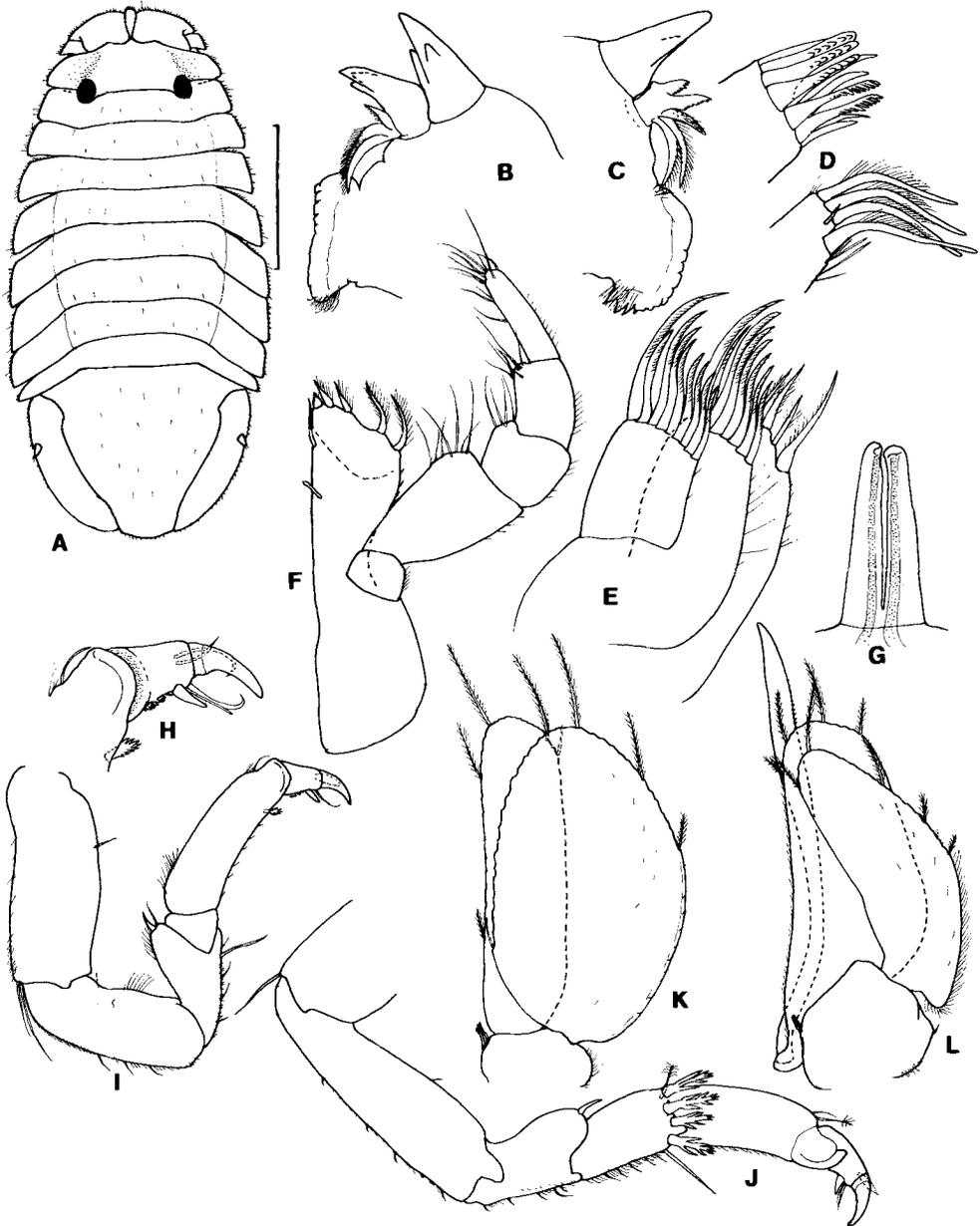


FIG. 43. *Syncassidina aestuaria*. ♂ 3.7 mm, Gippsland lakes, Vic. (NMV J26341). A, dorsal view; B, left mandible apex; C, right mandible apex; D, maxillule apex; E, maxilla; F, maxilliped; G, penes; H, dactylus, pereopod 1; I, pereopod 1; J, pereopod 7; K, pleopod 1; and L, pleopod 2. Scale 1.0 mm.

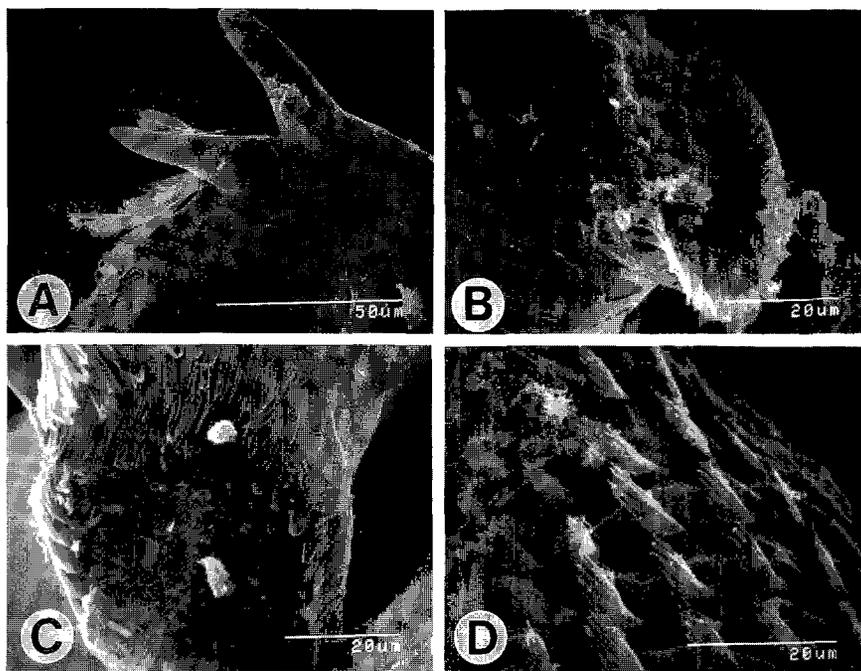


FIG. 44. *Syncassidina aestuaria*. (NMV J26341). A, left mandible; B, molar, oblique aspect; C, molar, *en face*; and D, scale patch, pleopod 5.

c. 38°0'S, 147°36'E, *Zostera* community (NMV J26340–J26342, J26401); about 20 specimens, Mallacoota Inlet, c. 37°30'S, 149°44'E (NMV J26369, J26399, J26400).

Type locality. Rocky bay, Swan River, W.A.

Remarks. Several specimens were subsampled from the NMV Banksia Peninsula series to provide figures to aid identification and supplement those given by Holdich and Harrison (1981).

Distribution. Recorded from southeastern Queensland, localities southwards and westwards along the New South Wales and Victoria coasts. All records are from very shallow estuarine waters, among *Zostera* and mangrove communities. Only one record exists to the west of Victoria, and that is of the type locality.

Genus *Cassidinidea* Hansen

Cassidinidea Hansen, 1905: 113, 131; Menzies and Frankenberg, 1966: 44; Schultz, 1969: 115; Kussakin, 1979: 336; Harrison, 1984b: 374; Kensley and Schotte, 1989: 207; Harrison and Ellis, 1991: 935.

?*Cassidisca* Richardson, 1905: 272 [Type species not designated].

Dies Barnard, 1951: 701; Loyola e Silva, 1960: 52; Carvacho, 1977: 13 [Type species: *Dies monodi* Barnard, 1951 by monotypy].

Type species. *Naesa ovalis* Say, 1818, designated by Hansen (1905). Richardson (1905, p. 274) in stating 'the type and only known specimen' was clearly unaware that other specimens had been donated to the BMNH by Say, and that these specimens had been used by Hansen in formulating his generic diagnosis. Of the three specimens at the BMNH, two have since been lost (J. Ellis, *in litt.*). The remaining specimen should be considered a syntype. The specimen held at the ANSP (Reg. 2830) dried and

mounted on a pin, unfortunately disintegrated on removal from the vial in which it was contained; only two fragments of this specimen now remain. Nonetheless, examination and comparison prior to disintegration confirmed that the two syntypes are the same species.

Diagnosis of male. Body about twice as long as greatest width, widest at pereonite 5; without *membrana cingula*; surface smooth or finely granular, dorsum often with nodules; margins with fringe of setae. Cephalon lacking rostral point, lateral margins expanded; eyes dorsal, rounded; pereonite 1 0.75 length of cephalon, longer (1.4) than pereonite 2; pereonites 2–4 progressively increasing in length, 4–7 subequal in length; coxal keys present. Coxae pereonite 1 not extending across sternum; pleonal tergite absent. Pleonite 1 indicated by 2 anterolateral sutures, otherwise without visible sutures. Pleotelson anterolateral margins not reaching lateral margin of pleon or uropod peduncle; posterior margin without groove or exit channel.

Antennule peduncle dorsoventrally compressed, articles 1 and 2 not markedly flattened or expanded; article 3 longer than article 2; flagellum slightly more than twice as long as peduncle article 3. Antenna peduncle article 1 short, about 0.5 as long as article 2 articles 3–5 progressively increasing in length; flagellum shorter than peduncle, with few (4–7) articles. Epistome prominent in dorsal view, about one third width (0.3–0.4) of cephalon, widely separating antennule bases; flat in ventral view with mesial constriction.

Mandibles with 3- or 4-dentate incisor, spine row of 4 or 5 serrate spines; lacinia mobilis present on left mandible; molar process with serrate teeth, some indistinct ridges. Maxillule with large weakly serrate spines, plus 1 serrate and 1 short spine on lateral lobe; mesial lobe with 4 serrate spines. Maxilla lateral and middle lobes prominent flat nodular spines, medial lobe narrow, with serrate and plumose spine. Maxilliped palp articles 2–4 with weak distally directed lobe; endite subtruncate with simple and plumose spines along distal margin.

Pereopod 1 not elongate or modified; dactylus short with prominent conical secondary unguis; posterior margin without setules or prominent spines. Pereopods 2–7 subsimilar; pereopod 7 merus distal margin with trifold spines, posterior margin of merus to propodus with scale setules.

Penes fused to form single process, *vasa deferentia* fused along entire length of process.

Pleopod 1 with rami subequal in length, both with PMS; endopod narrow (4 times as long as wide) slightly shorter than exopod which is distally concave. Pleopod 2 both rami with PMS; appendix masculina slender, elongate (about 16 times as long as wide), apically acute, borne on prominent posteriorly directed proximomedial lobe on endopod. Pleopod 3 both rami with PMS, exopod with weak suture. Pleopods 4 and 5 rami without setae, exopod of pleopod 5 with 2 scaled patches.

Female. Mouthparts not metamorphosed. Marsupium formed by anterior and posterior pockets which overlap at sternite 4; embryos with the marsupium so formed.

Remarks. The status of *Dies* in relation to *Cassidinidea* has been questioned, being upheld by Carvacho (1977), but not by Kensley and Schotte (1989). Given that the type species has never been fully described, and that some species placed in *Cassidinidea* were incompatible with the genus, the question remained unresolved. Examination of type and fresh material of *C. ovalis* (Say) and *Dies monodi* revealed that the type species of *Cassidinidea* and *Dies* are unquestionably congeneric, and that *Dies* should be regarded as a junior synonym of *Cassidinidea*.

The status of *Cassidisca* Richardson is equally unresolved as it involves the designation of a type species and identity of *C. lunifrons*, considered by some to be a synonym of *C. ovalis*. Species of *Cassidinidea*, including the type species, lack posterior pleonal sutures, but figures of *C. lunifrons* and *C. ovalis* clearly show the species with such sutures (e.g. Menzies and Frankenberg, 1966; Kensley and Schotte, 1989), while all other figures for *Cassidinidea* (including *Dies*) show that pleonal sutures are absent. Additionally, Menzies and Frankenberg (1966) show their specimen to have short, unfused penial processes. Should *C. lunifrons* be shown to be generically distinct to *C. ovalis*, the designation of *C. lunifrons* as the type species of *Cassidisca* would validate that genus. This cannot be done until such time as the two species are fully redescribed from fresh material which has been compared directly to the types.

A number of characters readily identify *Cassidinidea*, including the wide epistome, lack of a rostral point, pleon without sutures, entirely fused penial process and the distinctive morphology of pleopods 1 and 2, pleopod 1 having a slender endopod and distally indented exopod, pleopod 2 with a very long acute appendix masculina arising on a proximally directed endopod lobe. Typically the species of the genus have dorsal nodules and radiating pleotelsonic ridges, strongly developed, for example, in *C. quadricarinatus* or weakly as in *C. monodi*, and altogether absent in *C. ovalis*.

Composition. Kensley and Schotte (1989) expressed doubts, with which I agree, about the validity of several Atlantic species, mainly on the basis of the existing descriptions being indistinguishable from each other or from the type species.

Cassidinidea ovalis (Say, 1818). North eastern United States, 'extremely common in sea water, usually creeping on fuci and other marine plants' (Say, 1818) (Fig. 45). Type species of the genus; one syntype at BMNH (rehydrated).

Cassidinidea lunifrons (Richardson, 1905). Synonymy with *C. ovalis* accepted by most workers, but illustrated differences suggest that the species may need to be reassessed. Western Atlantic.

Cassidinidea tuberculata Richardson, 1912. Mexico. Inadequately described.

Cassidinidea bondi (Van Name, 1936), **comb. nov.** Brackish water, Haiti. It is not possible to distinguish this species from the other Western Atlantic species.

Cassidinidea fluminensis (Mañé-Garzón, 1944), **comb. nov.** Brazil. Redescribed and placed in *Dies* by Loyola e Silva (1960).

Cassidinidea monodi (Barnard, 1951) **comb. nov.** South Africa, type species of *Dies*.

Cassidinidea quadricarinata Pillai, 1954. Trivandrum, India, from a variable salinity lake. Placed in *Dies* by Pillai (1965).

Cassidinidea monodi (Carvacho, 1977), **comb. nov.** From mangroves, Guadeloupe. The cephalon apparently lacks lateral extensions, but the illustrated specimen may not be mature.

Cassidinidea arndti (Ortiz and Lalana, 1980), **comb. nov.** From mangroves, Cuba. This species is very poorly described and cannot be discriminated from other species in the genus.

Cassidinidea korpie sp. nov. Described here.

?*Cassidinidea* sp. Brian and Dartevelle (1949) recorded a small specimen from the Congo estuary as *Sphaeroma terebrans* Bate. This specimen (figs 130 and 132) appears to be a species of *Cassidinidea*. Confirmation of this record would establish the occurrence of the genus in the tropical eastern Atlantic.

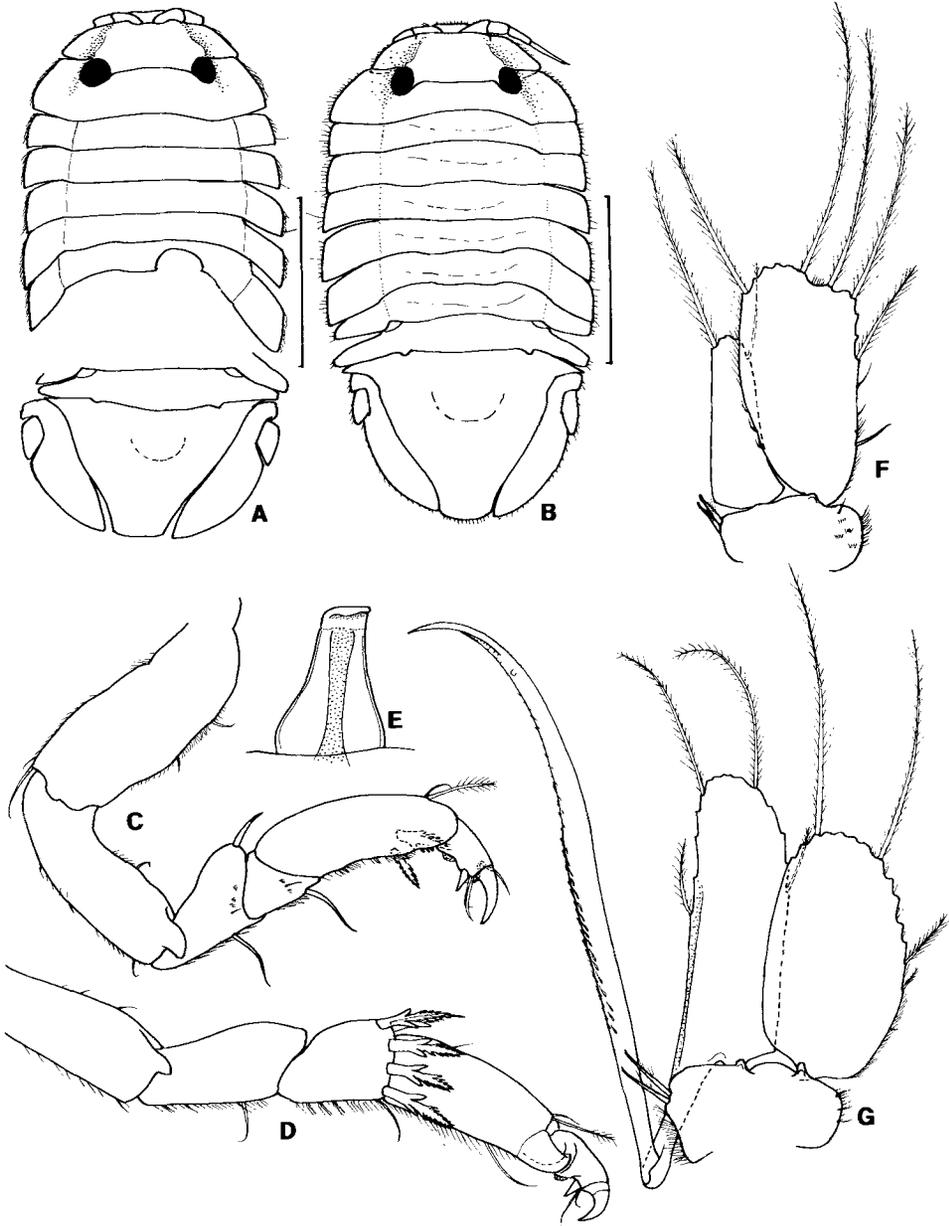


FIG. 45. *Cassidinidea ovalis* (Say). **A**, syntype, BMNH (intact, but telson twisted, drawn as if separated). **B–G**, ♂ 3.0 mm. Florida (QM W18549); **B**, dorsal view; **C**, pereopod 1; **D**, pereopod 7, distal articles; **E**, penial process; **F**, pleopod 1; and **G**, pleopod 2. Scale line 1.0 mm.

Currently placed in the genus, but here regarded as *incertae sedis* are:

Cassinidea pulchra (Chilton, 1924). This species is reportedly very much larger (20 mm) than is usual for the genus (3–5 mm). The description and illustrations, of females, do not allow for a confident assignment to be made. Although many characters agree well with *Cassinidea* the penes and male pleopod 2 have not been described, and the uropod exopod is not compatible with that of *Cassinidea*.

Cassinidea mosaica Kensley and Schotte, 1987. This well described species differs in numerous characters of generic significance: the head is not laterally expanded, the epistome (not illustrated in ventral view) appears narrow, pereopod 7 has long biserrate spines on the carpus, pleopod 1 has the endopod reduced, the appendix masculina is short, basally swollen (versus slender, elongate) and is not set on a posteriorly directed lobe, pleopod 3 exopod lacks a suture, and the penes are clearly unfused. A new genus is needed for this species.

Cassinidea korpie sp. nov.

(Figs 46–48)

Material examined

All the type material from the Northern Territory.

HOLOTYPE ♂ (4.3 mm), Point Farewell, mouth of East Alligator River, 12°05'S, 132°33'E, 9 June 1981, shallow pool, under wood on soft mud, tidal *Rhizophora*, salinity 38–44%, coll. P. J. F. Davie (QM W18545).

PARATYPES ♂ (4.4 mm, dissected), 2 ♀ (non-ovig. 3.0, 3.0 mm), same data as holotype (QM W18547, W18548). ♀ (non-ovig. 3.7 mm) same location as holotype except 16 June 1982 (QM W18546).

Also examined. 2♂, *Cassinidea ovalis*, Florida (QM W18549); syntypes of *Cassinidea ovalis* (Say) (BMNH 1979: 422: 1; ANSP 2830). ♀ (ovig.) *Cassinidea* sp. (undescribed), Fly River, Papua New Guinea (NMV J26041).

Description of male. Body about twice as long (1.9) as greatest width; pereonites 1–7 each with 2 obscure submedian nodules. Pleon with single median nodule. Pleotelson with 4 ill-defined weakly radiating longitudinal ridges, submedian pair being twice as long as lateral pair. Epistome with convex anterior margin, greater than half (0.67) length of cephalon in dorsal view. Antennule flagellum extending to pereonite 1, antenna flagellum extending to anterior of pereonite 2.

Mandible palp article 1 longest, articles 2 and 3 with 6 and 7 serrate spines respectively. Maxilla lateral lobe with 3 spines, middle with 4, medial with 7 plumose spines. Maxilliped palp articles 2–5 with about 8, 12, 9 and 8 setae, respectively.

Pereopod 1 merus about half as long as ischium, carpus triangular, short about 0.3 length of propodus; propodus and ischium subequal in length; dactylus about 0.6 length of propodus, posterior margin with prominent scales, unguis about equal in length to dactylus; propodus with 2 prominent serrate spines at distal margin. Pereopod 2 longer than 1, carpus proportionally longer than in pereopod 1; propodus without serrate spines; posterior margin of merus, carpus and propodus each with single long seta and few setules. Pereopod 7 merus proportionally longer than in pereopod 2; posterior margins of ischium to propodus and anterior margin of ischium to carpus with setulose fringe; carpus distal margin with 3 trifold spines.

Penial process about 3.3 times as long as basal width.

Pleopod 1 endopod with 8 PMS on distal margin, exopod with 20 PMS. Pleopod 2 endopod with 19 PMS, exopod with 25; appendix masculina twice as long as

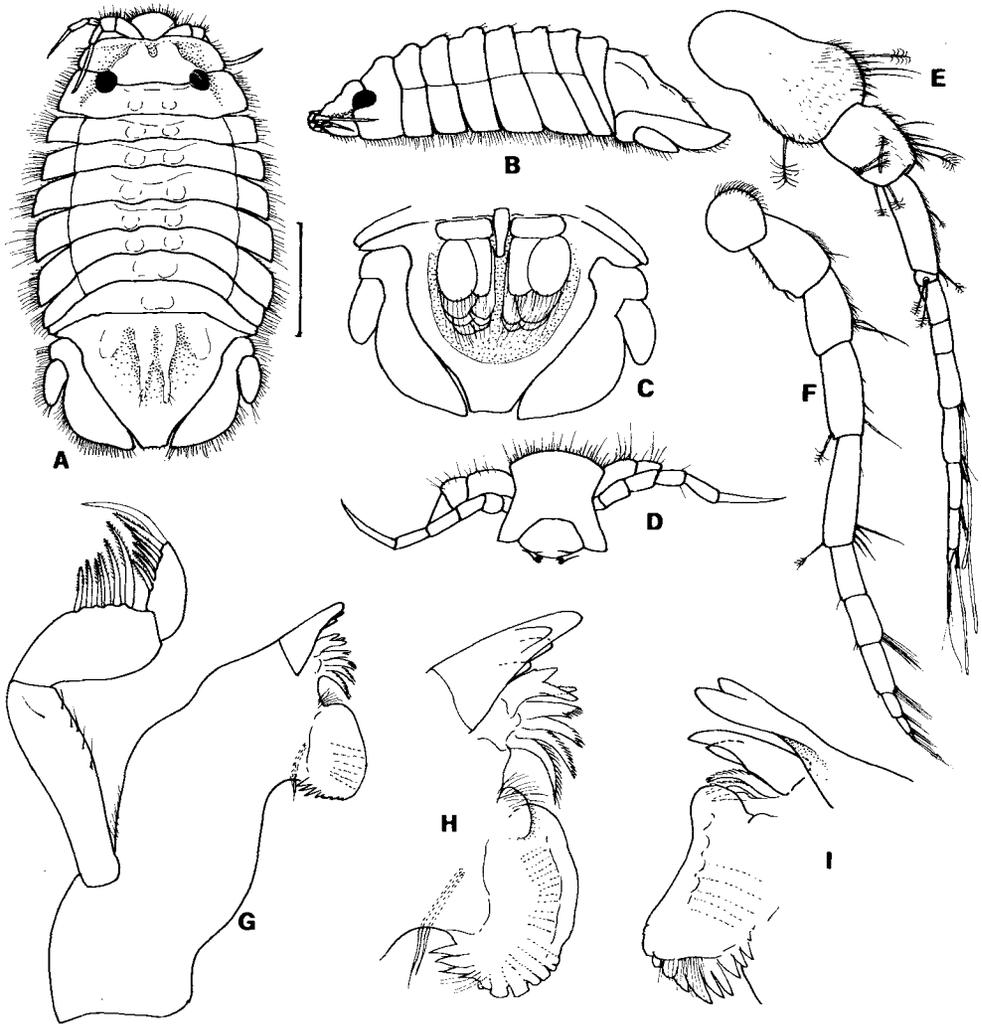


FIG. 46. *Cassidinidea korpje*, sp. nov. A–D, holotype, remainder ♂ 4.4 mm. A, dorsal view; B, lateral view; C, pleotelson, ventral view; D, frons; E, antennule; F, antenna; G, right mandible; H, apex, right mandible; and I, apex, left mandible. Scale line 1.0 mm.

distance from peduncle to endopod distal margin. Pleopod 3 endopod with 8 PMS on distal margin, exopod with 32 PMS.

Female. No mature ovigerous specimens examined; specimens lacking male sexual characters were here identified as non-ovigerous females, and agree closely to male.

Colour. Specimens appeared dark brown due to heavy encrustation on the dorsum. Pale brown where not encrusted.

Size. 3.0–4.4 mm.

Remarks. This species can be separated from others of the genus by the prominently convex epistome anterior margin, presence of paired tubercles on all pereonites, and the form of the pleotelson ridges, with two large irregular submedian ridges and two short low sublateral ridges, and the length of the penial process. A specimen of an ovigerous female of an undescribed species of *Cassidinidea* from the Fly River was

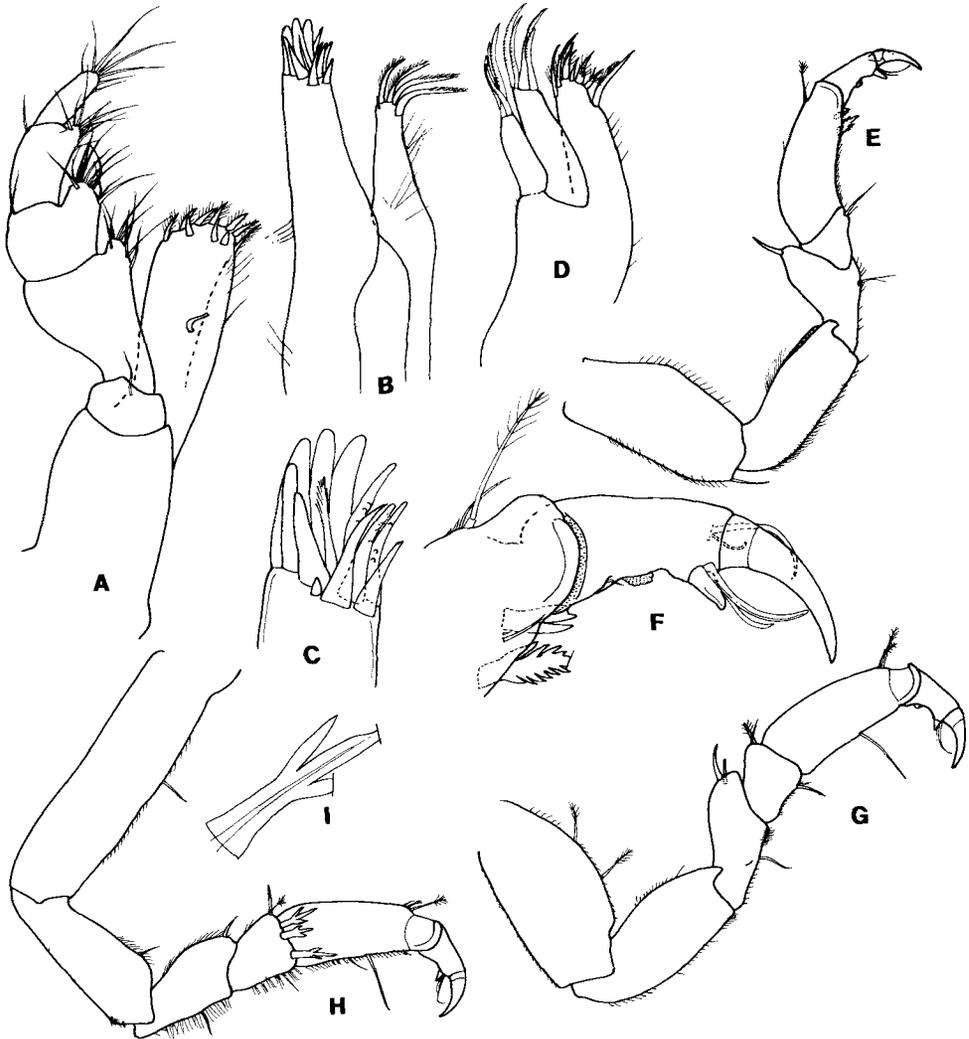


FIG. 47. *Cassinidea korpie*, sp. nov. ♂ 4.4 mm. A, maxilliped; B, maxillule; C, maxillule, lateral lobe apex; D, maxilla; E, pereopod 1; F, pereopod 1, dactylus; G, pereopod 2; H, pereopod 7; and I, spine from pereopod 7 merus.

also examined, that species being easily distinguished by the very prominent and acute pleotelson ridges, and less convex epistome.

Distribution. Northern Territory, Kakadu region, from hypersaline creeks at recorded salinities of 38–44 ppt, in the vicinity of and among mangroves. (Salinity recordings may be biased due to high water temperatures.)

Etymology. The epithet is an Aboriginal word for mangrove.

Genus *Platysphaera* Holdich and Harrison

Platysphaera Holdich and Harrison, 1981: 637; Harrison, 1984b: 388; Harrison and Ellis, 1991: 944.

Type species. *Platysphaera membranata* Holdich and Harrison, 1981, by designation.

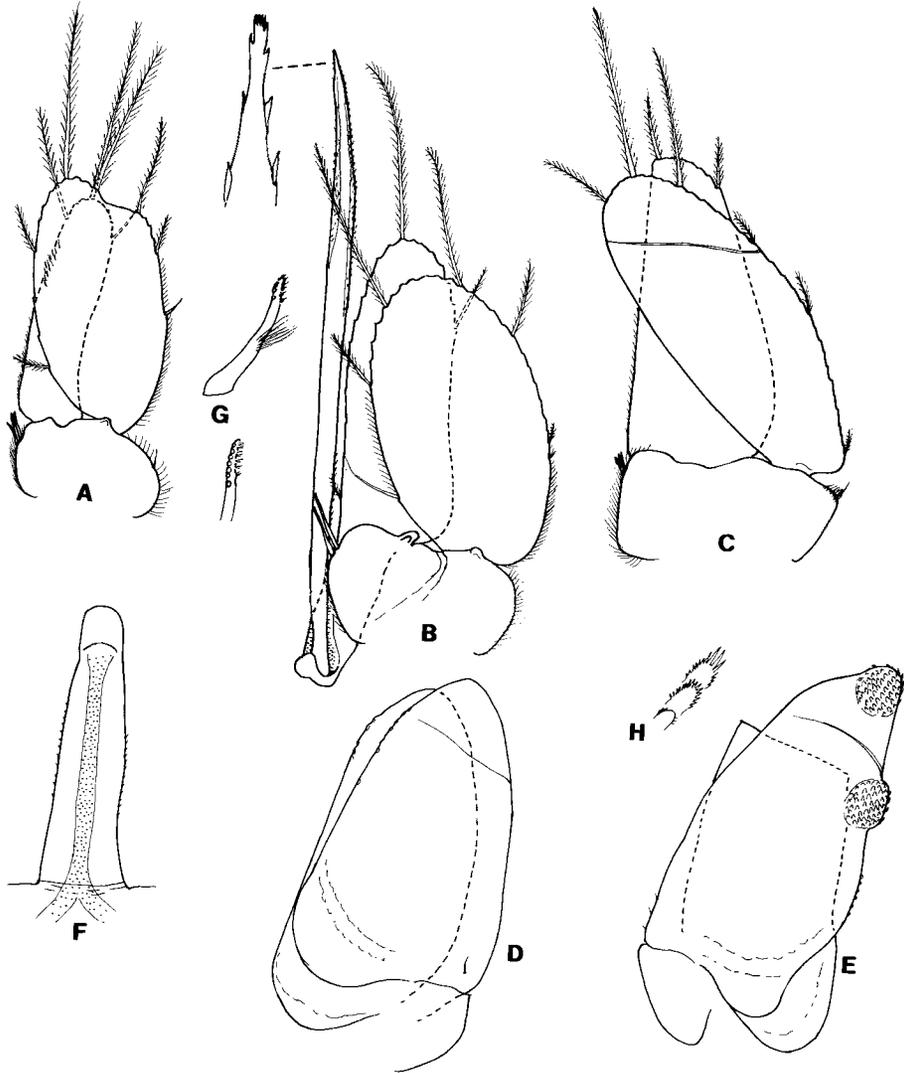


FIG. 48. *Cassidinidea korie*, sp. nov. **A**, **B**, holotype, remainder ♂ 4.4 mm. **A–E**, pleopods 1–4 (right), 5 (left) respectively; **F**, penial process; **G**, coupling hooks, pleopods 1 (entire) and 2 (apex only); and **H**, scales, pleopod 5.

Diagnosis of male. Body strongly flattened, lateral margins with *membrana cingula*. Cephalon lateral margins not expanded, laterally encompassed by pereonite 1; eyes round, dorsal; anterior margin with short acute rostral point. Pereonites 1–7 medially about equal in length, coxal keys present, coxal suture present on pereonites 2–7. Pleon without sutures. Pleotelson anterolateral margins not extending to body outline, posterior margin entire, without exit groove or channel, extending just beyond uropod apices. Coxae of pereonite 1 not extended across sternite, pleonal sternite absent.

Antennule peduncle articles 1 and 2 expanded, flattened, with contiguous anterior margins, not lobed, article 3 slender, set at posterodistal angle; mesial margins of antennule article 1 adjacent, not separated by epistome; flagellum shorter than pedun-

cular article 3. Antennule slender, peduncle articles 1–3 subequal in length, shorter than articles 4 and 5; article 3 anterior margin with scaled lobe.

Epistome short, posterolateral margins not encompassing labrum, anterior margin without apical point, not produced. Mandible incisor narrow 4-dentate; spine row of 3–4 spines present, lacinia mobilis absent; molar process with marginal teeth, surface ridged. Maxillule with 7 spines, lateral 3 broad based, simple, mesial 4 pectinate; mesial lobe with 4 fringed spines. Maxilla with all lobes present, setose. Maxilliped palp articles 2–4 without distinct lobes; endite flat, distal margin subtruncate, sparsely spined.

Pereopods all ambulatory, relatively slender; pereopod 1 robust, 2 and 3 elongate and slender, longer than pereopods 4–7.

Paired short penes present on posterior of sternite 7, not extending to pleopods.

Pleopod 1 with both rami distally rounded, endopod reduced, less than half (0.35) length of exopod. Pleopods 1–3 both rami with PMS, pleopod, 4 and 5 both rami without PMS. Pleopod 2 appendix masculina sub-basally attached, about twice as long as endopod; pleopod 3 exopod without suture, 4 with distinct suture, 5 with faint suture; endopods reduced in size; pleopod 5 exopod with 2 weakly developed scale patches. Uropods not extending posterior to pleotelson, not meeting at midline; exopod reduced, attached laterally, anterior to endopod.

Female. Mouthparts not metamorphosed. Embryos brooded within body cavity; short oostegites present on sternites 2–4, not meeting or overlapping at midline.

Remarks. This small isopod was described from Mellish Reef and Long Island, Chesterfield Reefs in the Coral Sea. To date it has not been recorded from the Great Barrier Reef, although it is one of the more common sphaeromatid isopods on the reefs around Madang, Papua New Guinea (personal observation). A single specimen from Bundegi Reef, extends the Australian range of the genus to Western Australia, while further specimens extend the western limit to Banda Is., Kei Is., Indonesia and the eastern limit of distribution to New Caledonia.

The genus can be immediately recognized by the distinctive and unique uropod morphology, which has the exopod set anterior to the endopod. The pereopods are unusual in having pereopods 2 and 3 more slender than the remaining posterior pleopods, and also in pereopod 4 having a reduced carpus.

Platysphaera membranata Holdich and Harrison

(Figs 49, 50)

Platysphaera membranata Holdich and Harrison, 1981: 637, figs 8, 9.

Material examined

♂ (2.2 mm), 2 ♀ (2.8, 3.4 mm), Madang, Papua New Guinea, 5°08.4'S, 145°50.9'E, 26 April 1989, Barrier Reef south of Wongat Is., 9 m, on back reef, coral rubble, coll. N. L. Bruce and J. Mizeu (QM W18550). Manca (2.1 mm), Bundegi Reef, Exmouth Gulf, W.A., 21°49'S, 113°11'E, 4 January 1981, 9 m, on dead encrusted coral, coll. R. T. Springthorpe (AM P41352). ♀ (non-ovig, 3.4 mm), manca (1.3 mm), Mbere Reef, New Caledonia 22°1.89'S, 166°13.21'E, 7 January 1993, outer slope, rubble (depth not noted), coll. P. Bouchet (NMV J29974). ♀ (ovig, 2.8 mm), Banda Is., Kei Is., Indonesia, 15 June 1914, ~ 15 m, sand, coll. Th. Mortensen (ZMUC). ♂ (2.5 mm), 2 ♀ (ovig, 2.7, 3.0 mm), 3 sex indet. (1.3, 2.0, 2.1 mm), same data, except 11 June 1914, 25 m (ZMUC).

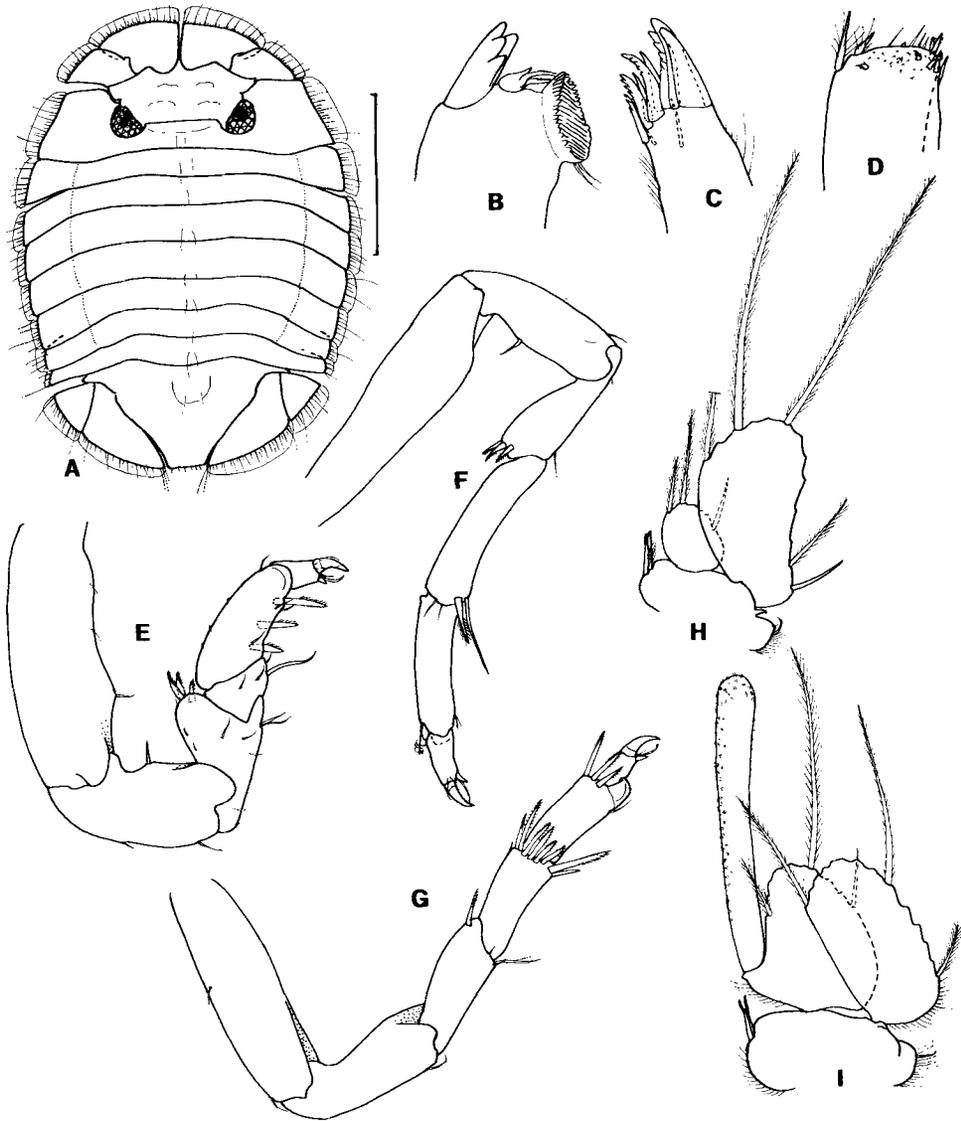


FIG. 49. *Platysphaera membranata*. Madang, PNG, ♂ 2.2 mm, except A. A, ♀ 2.8 mm, dorsal view; B, right mandible apex; C, maxillule, lateral lobe apex; D, maxilliped endite, distal margin; E-G, pereopods 1, 2, 7, respectively; H, pleopod 1; and I, pleopod 2. Scale line 1.0 mm.

Remarks. Figures are given to aid identification and supplement those of Holdich and Harrison (1981). The species is very common at Madang, and was present in nearly all samples from 2 to about 30 m, both within the lagoon as well as on the outer reefs.

The specimen from Western Australia, although of nearly full adult size, is a manca. It does not differ in any way from specimens from the Coral Sea or Papua New Guinea. It would be prudent to regard the identification as provisional until adult males have been examined.

Colour. Observed live colour is always red.

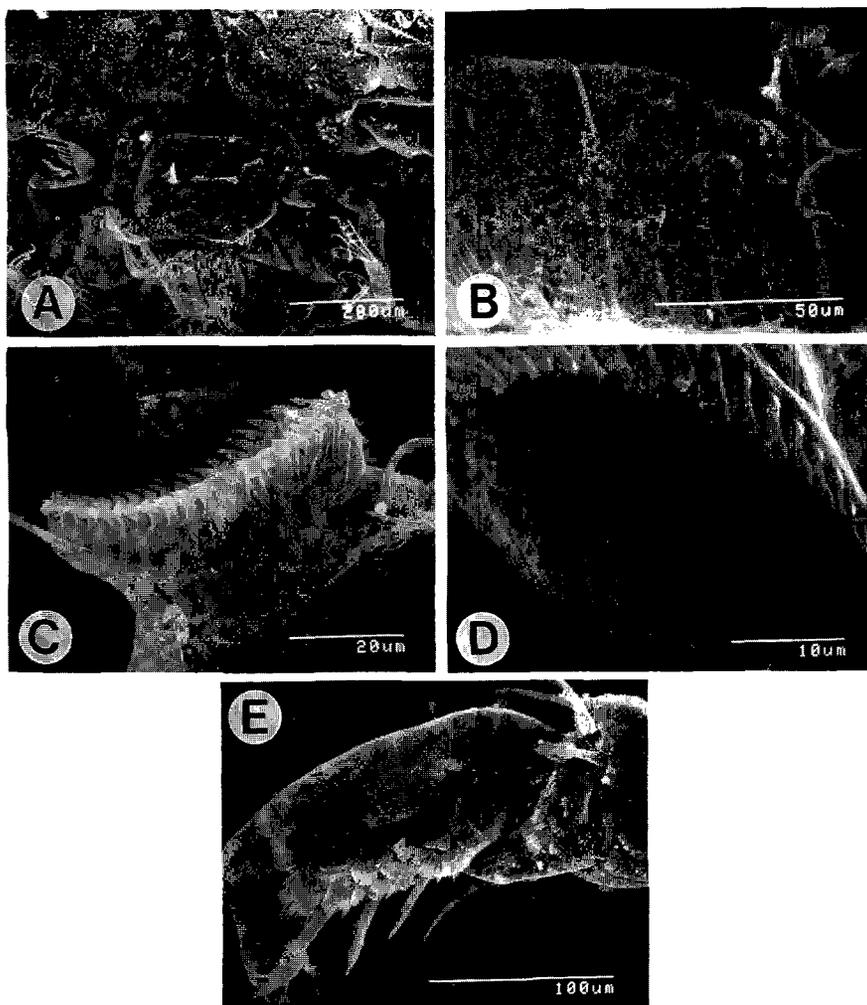


FIG. 50. *Platysphaera membranata*. (QM W18550). **A**, frons; **B**, cingula membranata, pereonite 5; **C**, molar, lateral aspect **D**, molar, *en face*; and **E**, pereopod 1, mesial margin of distal articles.

Distribution. Coral Sea Reefs, off Queensland (but absent from the Great Barrier Reef and continental shelf of Queensland), North West Cape, Western Australia; also Kei Is., Indonesia, Madang, Papua New Guinea and New Caledonia.

***Discidina* gen. nov.**

Type species. *Discidina banawarra* sp. nov., by present designation.

Diagnosis of male. Body strongly depressed, oval in outline, less than (1.4) twice as long as wide; without *membrana cingula*. Cephalon set into pereonite 1, with median rostral point; lateral margins not expanded to body outline; eyes dorsolateral in position. Pereonite 1 half as long as cephalon, shorter than pereonite 2, pereonites 2–7 subequal in length, coxal keys present, coxal sutures weak. Pleon with 4 segments,

segment 1 entire, 2 sutures demarking segments 2–4 not uniting, reaching posterior margin. Coxae of pereonite 1 not extending across sternum; pleonal tergite absent. Pleotelson anterolateral margin extending to body outline, without ventral exit channel or groove. Entire body surface covered short scale spines, plumose setae and inflated scales; lateral margins with sheathed plumed setae.

Antennule peduncle article 1 and 2 strongly compressed, article 2 articulating distally (not dorsally); article 3 slender, short; flagellum short, less than half length of peduncle. Antenna small, slender, articles 1–3 subequal in length, shorter than articles 4 and 5; flagellum shorter than peduncle. Epistome not separating antennule peduncle, not produced beyond cephalon anterior margin, lateral margins converging evenly to medial point.

Mandible incisor narrow, 4-dentate; spine row with about 9 long apically bifid or trifold spines; lacinia mobilis present on left mandible; molar process distally excavate, not a crushing plate, with few marginal scale teeth present. Maxillule lateral lobe with 10 long recurved spines and 2 short simple spines; mesial row with 4 short fringed spines. Maxilla with spines of middle and lateral lobes faintly serrate; mesial lobe narrow with 3 prominent serrate spines and 2 simple spines. Maxilliped palp articles 2–4 with short mesial lobes; endite distally subtruncate, with 6 serrate spines and 1 simple broad based spine.

Pereopods 1–3 shorter than 4–7, all with slender secondary unguis to dactylus. Pereopod 1 not elongate or otherwise modified; merus, carpus and propodus with serrate spines on posterior margin. Pereopod 2 with serrate spines and anterodistal angles of merus, carpus and propodus. Pereopod 7 with serrate spines on anterodistal angle of merus, distal margin of carpus and medial surface of distal half of propodus.

Penes elongate, not fused; at rest positioned under mesial fold of pleopod 1 endopod.

Pleopod 1 rami subequal in length, exopod distally rounded, with PMS, endopod with reduced PMS, distal margin narrowed forming dorsal tube; mesial margin with groove which receives appendix masculina; peduncle mesial margin with ventral groove. Pleopod 2 rami subequal in length, both with PMS; appendix masculina arising basally, on mesially directed lobe of endopod. Pleopod 3–4 exopods each with complete transverse suture, pleopod 5 suture incomplete; pleopod 3 with both rami with PMS, pleopod 4 exopod with PMS on distal margin, pleopod 5 both rami without PMS; exopod of pleopod 5 with 3 weakly developed scaled patches. Uropod not extending beyond pleotelson, exopod reduced set into lateral margin of endopod.

Female. Similar to male in body shape and appendages except for pleopods 1 and 2 which are unmodified (Fig. 54I, J). Mouthparts not metamorphosed. Ova held within body cavity; oostegites present on sternites 2 and 3, not meeting at midline.

Remarks. The genus is unusual within the Cassidininae in having the dorsal surfaces and body margins heavily ornamented with scale spines and setae. The male first pleopods are unique within the Sphaeromatidae (and Flabellifera!) in that the distal end of the endopod has the lateral and mesial margins folded over forming a tube. Furthermore, *Discidina* appears to be unique within the Cassidininae (if not also the Sphaeromatidae) in having sheathed marginal setae. Other unusual characters include pleopod 4 with PMS on the exopod, and the unique morphology of the mandible spine row and molar process.

No other Australian cassidine approaches *Discidina* in appearance. All other Australian genera, except *Platysphaera*, are immediately distinguished by the different

antennule and epistome morphology. *Platysphaera* has a *cingula membranata*, an essentially smooth dorsal surface, and uropods in which the exopod is not set into the lateral endopod margin but is at the anterolateral angle; in addition *Platysphaera* is very small (not exceeding 4 mm), and is associated with coral reef habitats.

Discidina banawarra sp. nov.

(Figs 51–54)

Material examined

HOLOTYPE ♂ (7.4 mm), Whaler's Bay, Thisle Is., lower Spencer Gulf, S.A., c. 35°00'S, 136°11'E, March 1941, dredged 12.6 m, coll. K. Sheard (SAM C5436).

PARATYPES 2♂ (imm. 6.8 dissected, 6.0 mm), 4♀ (ovig. 8.7 mm dissected, 8.4, 8.0, non-ovig. 7.2 mm), same data as holotype (SAM C5437). ♂ (7.5 mm), 4♀ (ovig. 7.4, 7.6, 7.8, non-ovig. 6.5 mm), manca (2.0 mm), Michaelmas Is., King George Sound, W.A., 35°03'S, 118°00'E, 17 December 1983, southeast corner of island, 9 m, on purple sponge and red algae, coll. R. T. Springthorpe (AM P41358).

Description of male. Body about 1.4 times as long as greatest width; pereonite 1 about 0.5 length of cephalon, about 0.7 length of pereonite 2; pereonite 2–7 subequal in length, coxal sutures indistinct.

Antennule peduncle article 1 approximately rectangular in shape, article 2 distal margin strongly falcate; anterior margins of peduncle articles 1 and 2 colinear.

Mandible palp article 2 with 6 serrate spines, article 3 with about 10 serrate spines, distalmost 2 being longest. Maxilliped endite with 9–11 setae each on medial margin of article, 2, 3 and 4 respectively, and on distal margin of article 5.

Pereopod 1 robust, merus triangular, short, less than half as long as propodus; propodus 1.1 as long as ischium; posterior margin of merus with carpus with 2 and propodus with 4 serrate spines; dactylus about 0.5 length of propodus. Pereopod 2 ischium longer (1.1) than propodus; merus and carpus both less than half (0.40 and 0.35, respectively) length of propodus; anterodistal angle of merus with 2 serrate spines, carpus with 1 and 2 serrate spines on distal margin and propodus with 3 serrate spines; posterior margins of ischium to propodus without serrate spines. Pereopod 7 ischium about 2.0 length of merus, carpus about 0.4 length of propodus; merus with 3 serrate spines at anterodistal angle; carpus distolateral margin with 8 serrate spines; propodus with 11 serrate spines at distolateral surface; posterior margins of merus to propodus with 1, 1 and 3 simple spines respectively.

Penes basally swollen, about 6 times as long as basal width.

Pleopod 1 exopod without proximolateral spines, about 34 PMS; endopod with medial row of 10 small PMS; peduncle with 3 coupling hooks. Pleopod 2 exopod with 36 PMS, endopod with 16 PMS; appendix masculina with apex folded in forming groove, terminally club shaped. Pleopod 3 endopod with 13 PMS on distal margin only, exopod with 27 PM on distal and lateral margin; peduncle with 2 coupling hooks. Pleopod 4 exopod with 9 PMS on distal margin.

Female. Pleopod 1 exopod with about 40 PMS, endopod with 17 PMS. Pleopod 2 exopod with 33 PMS, endopod with 15 PMS.

Colour. White and mottled pale brown in alcohol. Colour initially obscured by heavy coating of detritus.

Size. Adult males 7.5–8.0 mm; ovigerous females 7.4–8.7 mm.

Development. The unusual character of the male first pleopod and appendix masculina is only shown by mature adult males. The two males in the material examined with penes present but shorter than those of the holotype both had

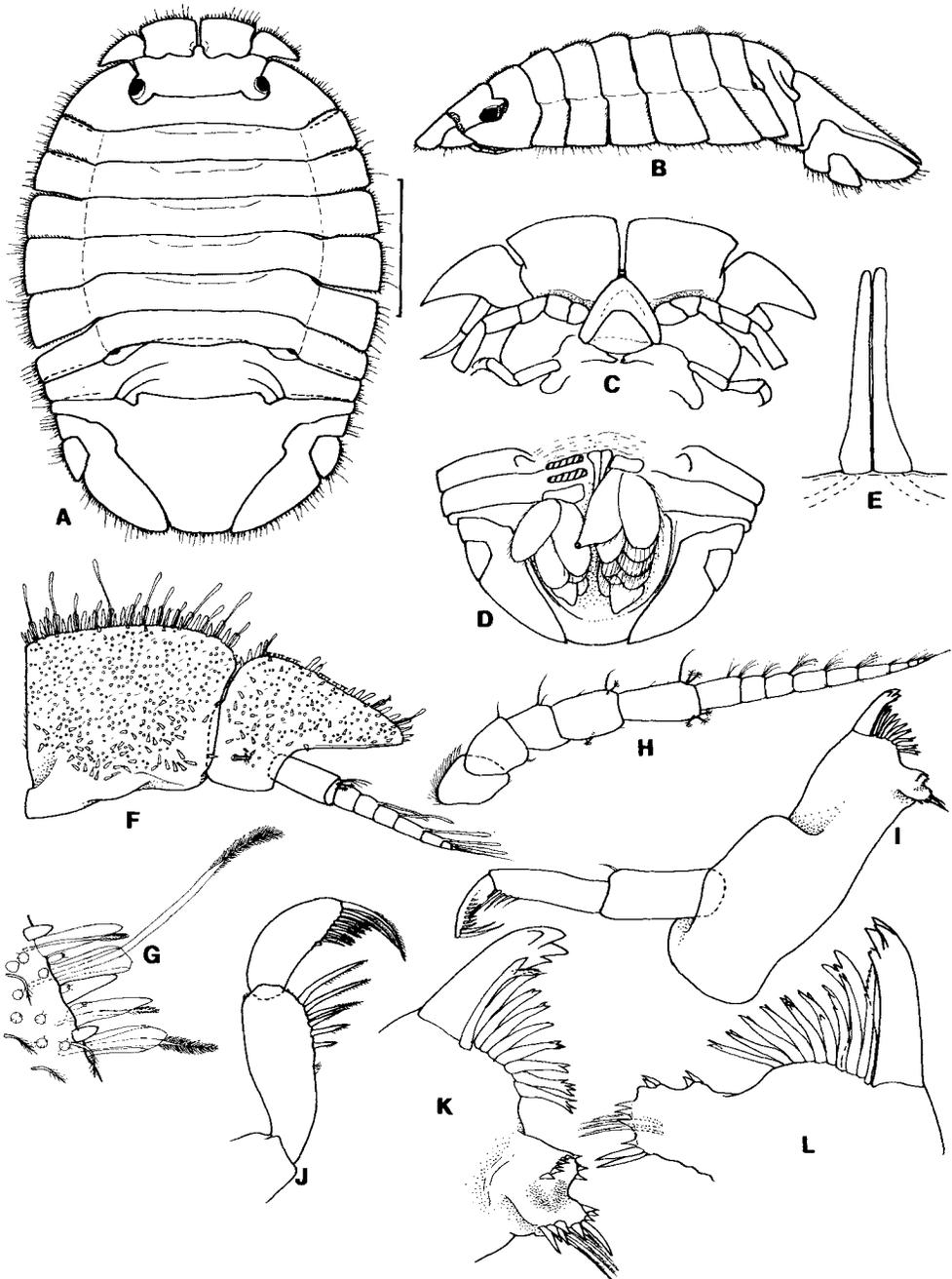


FIG. 51. *Discidina banawarra*, sp. nov. A-E holotype, remainder ♂ 6-8 mm (SAM C5437). A, dorsal view; B, lateral view; C, frons; D, pleon, ventral view; E, penes, *in situ*; F, antennule; G, antennule, details of marginal setation; H, antenna; I, right mandible; J, mandible palp; K, right mandible apex; and L, left mandible apex. Scale line 2.0 mm.



FIG. 52. *Discidina banawarra*, sp. nov. All Figs ♂ 6.8 mm (SAM C5437). A, maxilliped; B, maxilliped endite, distal margin; C, maxillule; D, maxilla; E, seta, maxilla external lobe; F, maxillule apices; G, pereopod 1; H, pereopod 1 dactylus; I, pereopod 2; J, pereopod 7; K, accessory spine, pereopod 7 dactylus; and L, pereopod 7 propodal spine.

pleopod 1 without the apical tube and also lacked an appendix masculina on pleopod 2.

Remarks. This species can be identified by the generic characters.

Distribution. Recorded from Thisle Is., Spender Gulf, S.A., and Michaelmas Is., King George Sound, W.A.

Etymology. The epithet is an Aboriginal word meaning limpet, and alludes to the limpet-like shape of the animal.

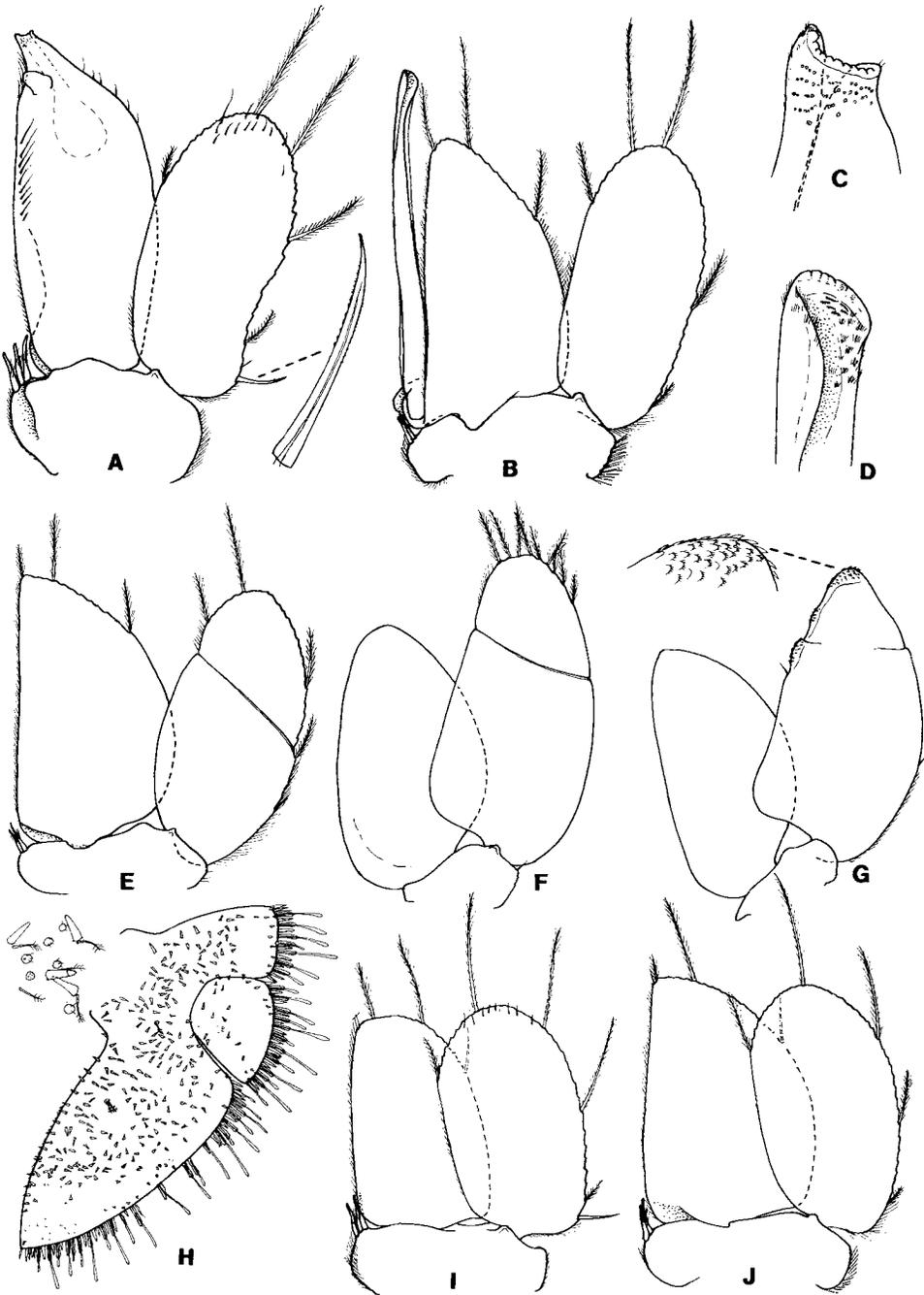


FIG. 53. *Discidina banawarra*, sp. nov. A-D, holotype; E-H ♂ 6.8 mm (SAM C5437); I, J, ♀ 8.7 mm (SAM C5437). A, pleopod 1; B, pleopod 2; C, distal margin, pleopod 1; D, distal extremity, appendix masculina; E-G, pleopods 3-5; H, uropod and detail of surface; I, pleopod 1; and J, pleopod 2.

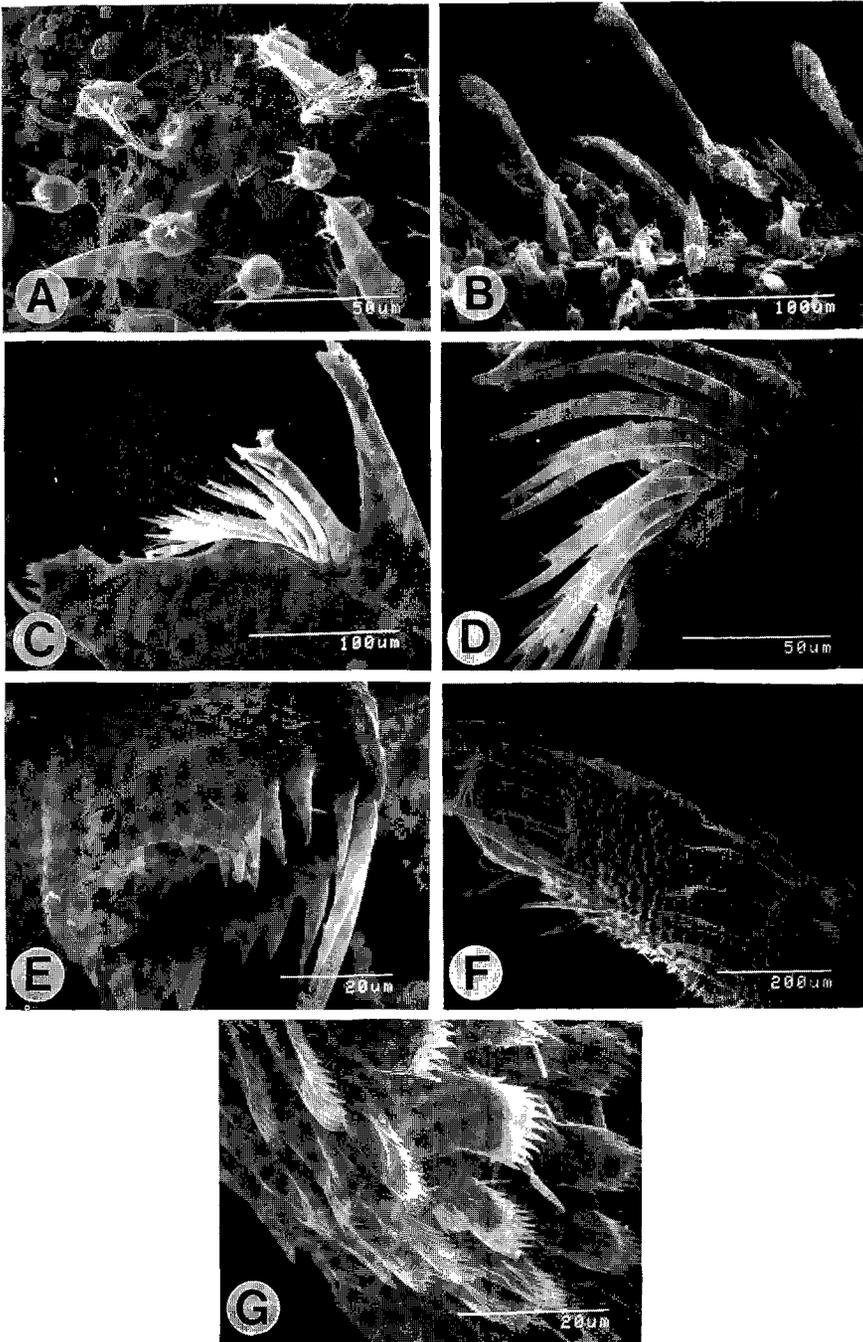


FIG. 54. *Discidina banawarra*, sp. nov. (SAM C5437). A, antennule peduncle, cuticular spines; B, antennule, sheath setae; C, mandible; D, spine row; E, molar; F, pereopod 7; and G, pleopod 5 scale patch.

Apemosphaera gen. nov.

Type species. *Apemosphaera naranagi*, sp. nov., by present designation.

Diagnosis of male. Body dorsoventrally compressed, about 1.5 times as long as greatest width; widest at pereonite 5; without *membrana cingula*. Cephalon about two-thirds as long as pereonite 1, anterolateral margins not laterally produced, with small rostral point; eyes large, rounded, facets distinct. pereonite 1 about 1.5 times as long as 2; pereonites 2–5 progressively decreasing in length, pereonite 6 longer than 5 or 7; weak coxal keys present, coxal sutures absent. Pleon with 4 segments, pleonite 1 present, largely concealed by pereonite 7, two short separate sutures run to posterior of pleon. Pleotelson with anterolateral margin not reaching lateral body margin, without ventral exit channel or groove.

Epistome visible in dorsal view, separating antennule bases, medially constricted. Antennule with peduncle articles not flattened or expanded; article 3 longer (1.3) than article 2; flagellum shorter (0.8) than peduncle. Antenna peduncle article 1 short, 2 and 3 subequal in length, larger than 1, article 4 and 5 longer than 2 and 3; flagellum shorter than peduncle.

Mandible with left incisor 3-cuspid, right 2-cuspid and rounded; both mandibles with prominently ridged molar process; spine row with 4–6 serrate spines; left mandible with prominent bicuspid lacinia mobilis; right with reduced lacinia mobilis. Maxillule lateral lobe with 8 spines in 2 groups, some of which are weakly serrate; mesial lobe with 4 fringed spines. Maxilla lateral and middle lobes with nodular flat spines; medial lobe with large proximal circumplumose spine and about 10 shorter plumose and simple spines. Maxilliped palp articles 2–4 moderately lobed; endite distal margin subtruncate, with acute plumose spines.

Pereopod 1 stout, ambulatory, posterior margin of ischium, propodus with setulose fringe, spines absent; dactylus robust with blunt secondary unguis, about half length of propodus. Pereopod 2 similar to 1, but proportionately longer, posterior margin of dactylus with flattened scales. Pereopod 7 with ischium to propodus elongate, merus to propodus with setulose fringe; distal margin of carpus with serrate trifid spines.

Penes short, separate adjacent on sternite 7, not reaching pleopod peduncle.

Pleopod 1–3 with both rami with PMS. Pleopod 1 exopod distally narrowed, endopod distally subtruncate; rami subequal in length. Pleopod 2 exopod distally truncate, endopod triangular; appendix masculina slender, arising basally. Pleopod 3 with complete transverse suture. Pleopod 4 exopod with transverse suture, endopod with weakly thickened ridges. Pleopod 5 exopod with complete suture and 2 scale patches, endopod with about 5 weakly thickened ridges. uropods large, lamellate, exopod set ventrally in endopod lateral margin.

Female. Not known.

Remarks. *Apemosphaera* is described here, but with the caveat of *incerta sedis*. While appearing similar to *Cassidinidea* in body shape (and therefore included in the generic key), the large ventrally inserted uropodal exopod, unflattened antennular peduncle articles, long antennular flagellum, nodular setae on the maxilla, corrugate mandibular molar and heavily setulose pereopods suggest a closer affinity to genera of the Sphaeromatinae rather than the *Cassidina*, *Cassidinidea* or *Platysphaera* groups of general. The pleopod morphology, which has pleopods 4 and 5 with endopods each with 3–4 weakly developed fleshy ridges and simple setae on the exopod lateral margin, differs little from those of *Exosphaeroma* and several other sphaeromatine genera.

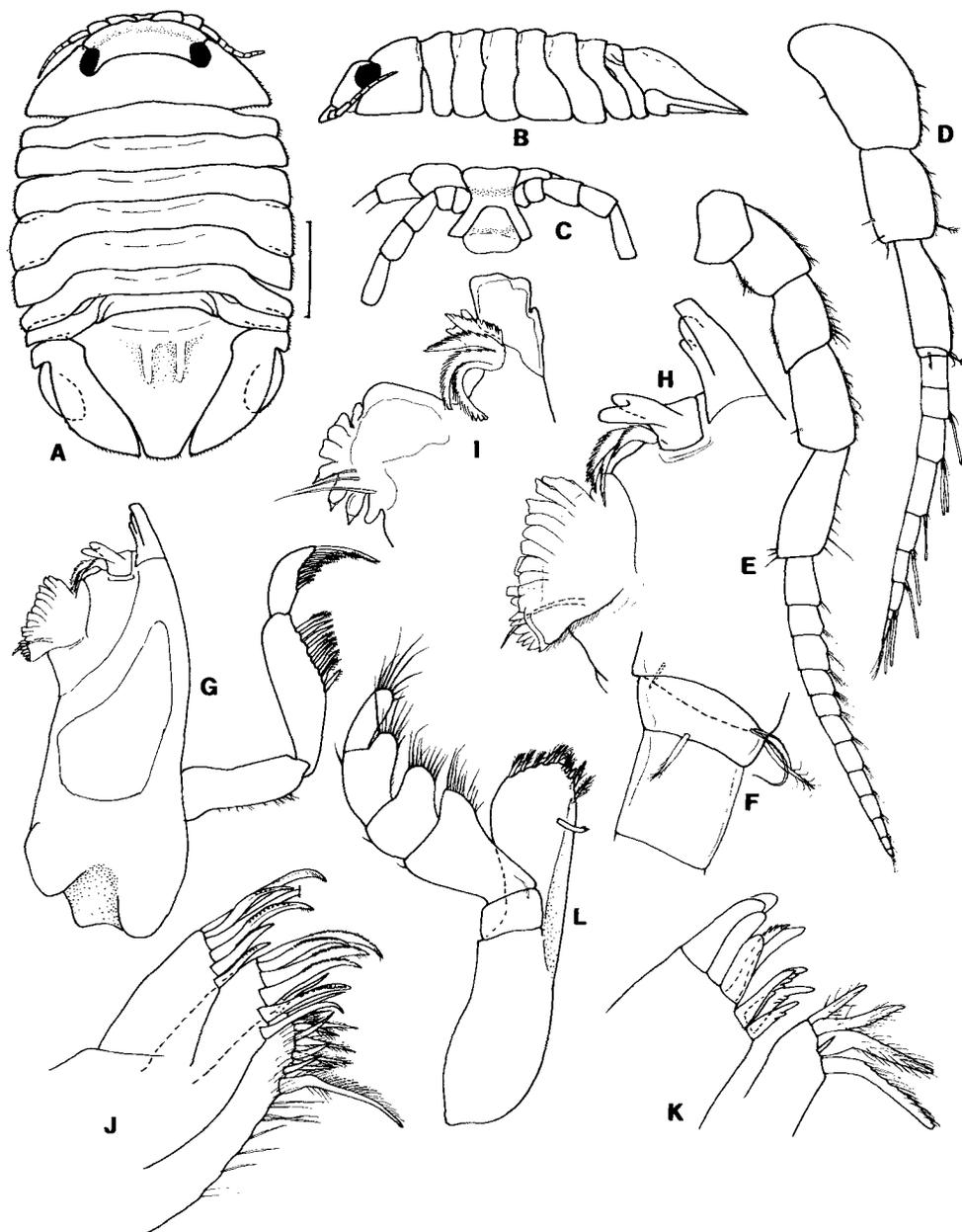


FIG. 55. *Apemosphaera naranagi*, sp. nov. A–C, holotype, remainder, ♂ paratype (QM W18551). A, dorsal view; B, lateral view; C, frons; D, antennule; E, antenna; F, antennule peduncle, distal extremity; G, left mandible; H, left mandible, detail; I, right mandible, detail; J, maxilla; K, maxillule; and L, maxilliped. Scale represents 1.0 mm.

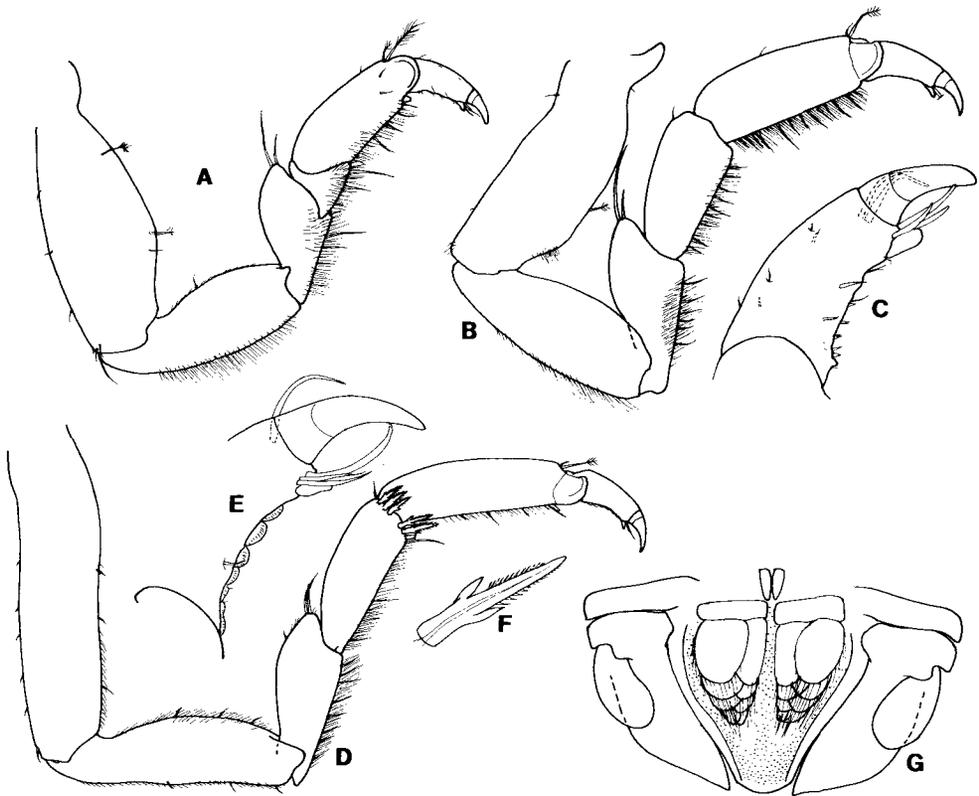


FIG. 56. *Apemosphaera naranagi*, sp. nov. All Figs of ♂ paratype except G (QM W18551). A, pereopod 1; B, pereopod 2; C, pereopod 1, dactylus; D, pereopod 7; E, pereopod 7 dactylus showing scales on posterior margin; F, spine, distal margin pereopod 7 dactylus; and G, pleon in ventral view showing penes, holotype.

Apemosphaera is most closely allied to those genera that, while having both rami of pleopods 4 and 5 without ridges and therefore belonging to the Cassidininae *sensu lato*, have an appendage morphology that corresponds with that of the Sphaeromatinae. Such genera include *Stathmos*, *Exosphaeroides*, *Gnorimosphaeroma* and *Cymodetta* (to a lesser degree as the appendix masculina is highly modified).

Apemosphaera is easily recognized by its flattened body shape, inconspicuous rostral point, epistome visible dorsally in combination with a relatively large uropod exopod which is ventrolaterally inserted.

Etymology. The name is derived from the Greek *apemon* (= harmless) and the ending *-sphaera*. Gender is feminine.

***Apemosphaera naranagi* sp. nov.**

(Figs 55–57)

Material examined

HOLOTYPE ♂ (4.5 mm), mouth of Ludmilla Creek, Darwin, N.T., 12°27'S, 130°50'E, 29 June 1982, on sandy/shell substratum, coll. P. J. F. Davie (QM W18551).

PARATYPE ♂ (4.5 mm), same data as holotype (QM W14392).

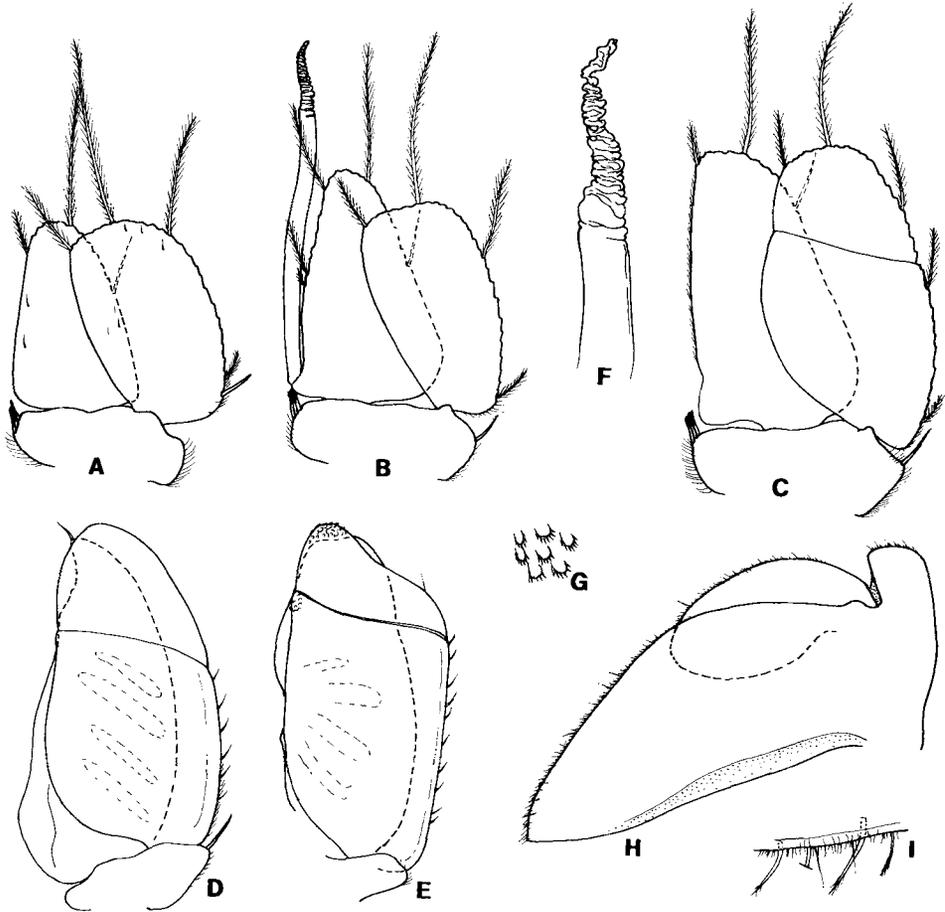


FIG. 57. *Apemosphaera naranagi*, sp. nov. All Figs, ♂ paratype (QM W18551). A–E, pleopods 1–5, respectively; F, appendix masculina apex; G, pleopod 5, distal scales; H, uropod; and I, lateral margin, uropod exopod.

Description of male. Body unornamented. Pleotelson with 2 ill-defined short submesial ridges on anterior surface.

Epistome anterior margin shallowly concave. Antennule extending to posterior of pereonite 1, with 9 articles. Antennal flagellum extending to pereonite 2, with 12 articles.

Mandible palp articles 1 and 2 subequal in length, article 2 with 9 serrate spines on distolateral margin; article 3 about half length of article 2, with 9 spines on distolateral margin, distal most of which is longest. Maxilla with 6 spines each on lateral and middle lobe. Maxilliped palp with about 10 setae on mesial lobes of articles 2–4, 8 setae on distal margin of article 5.

Pereopod 1 propodus and ischium subequal in length, merus about half as long as ischium; carpus short, triangular, about one third length of propodus. Pereopod 2 merus and carpus subequal in length, about 0.6 length of ischium; propodus slightly shorter (0.8) than ischium. Pereopod 7 similar to 2, slightly more slender, ischium proportionately longer nearly twice (1.7–1.9) as long as merus or carpus.

Pleopod 1 exopod with 12 PMS, endopod with 25 PMS, pleopod 2 exopod with 28 PMS, endopod with 16 PMS, pleopod 3 exopod with 29 PMS, endopod with 12 PMS. Uropod endopod apex acute, not extending beyond pleotelson apex, lateral margin angled at mid point; exopod about 0.45 length of endopod.

Female. Not known.

Colour. Pale tan in alcohol.

Remarks. The species can be identified on the basis of generic characters.

Etymology. Naranag is an Aboriginal word (N.T.) meaning small creek.

Acknowledgements

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