

New genera and species of sphaeromatid isopod crustaceans from Australian marine coastal waters

NIEL L. BRUCE

Marine Biodiversity and Biosecurity, National Institute of Water and Atmospheric Research, Private Bag: 14-901, Kilbirnie, Wellington, New Zealand (n.bruce@niwa.co.nz)

Abstract

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Australia has a great diversity of sphaeromatid isopods, both in terms of species and genera, with 187 recorded species and subspecies in 58 genera. This contribution records and describes a further four genera: *Austrasphaera* gen. nov., *Cassidias* Richardson, 1906, *Koremosphaera* gen. nov. and *Pedinura* gen. nov. and ten new species: *Austrasphaera berentsae* sp. nov., *A. springthorpei* sp. nov., *Cassidias australiensis* sp. nov., *Exosphaeroma agmokara* sp. nov., *Exosphaeroma alveola* sp. nov., *Koremosphaera colonus* sp. nov., *Margueritta sandyi* sp. nov., *Moruloidea perionasus* sp. nov., *Pedinura flindersia* sp. nov. and *Pedinura mokari* sp. nov. Several appear to be common and widely distributed, with both species of *Austrasphaera* and *Pedinura flindersia* ranging from Vic. to WA; *Pedinura mokari* is recorded from Vic. and SA while *Cassidias australiensis* is recorded from the NT to the North-West Shelf, WA. The remaining species are restricted to or near to their type locations. A brief diagnosis is given for *Exosphaeroma* and an annotated list of all accepted species is provided, including incertae sedis species and some recent exclusions from this genus.

Key words

Taxonomy, Isopoda Sphaeromatidae, *Austrasphaera*, *Cassidias*, *Koremosphaera*, *Pedinura*, *Exosphaeroma*, Australia

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Introduction

Over the last two decades of the twentieth century Museum Victoria and the Australian Museum made extensive shallow-water collections from southern Australian coastal regions from New South Wales to southern Western Australia. The collectors used fine-scale collecting techniques such as epibenthic sleds and in shallow coastal waters, SCUBA, which resulted in a wealth of undescribed crustacean material. These collections include new species many of which, though not collected previously, proved to be widely distributed and common. This contribution draws principally from these collections, but is supplemented by material from the South Australian Museum, Adelaide and some collected by myself.

Australia has a rich sphaeromatid fauna (Poore et al., 2002) that displays extraordinary morphological diversity. The documentation of this fauna results from three discrete periods of research – by Baker (1908–1929), Harrison and Holdich (1980–1984 in either combination) and Bruce (1982 to the present). Poore et al. (2002) listed 187 species and subspecies of Sphaeromatidae which, together with the species described herein, are nearly 28% of all sphaeromatid species known world-wide, and approximately 17% (the figures are continually changing) of all isopod species known from Australia. It is

estimated that this may represent less than 50% of the potential total.

Methods follow those outlined in Bruce (1994a, 1995, 1997). Abbreviations are: AM, Australian Museum, Sydney; NTM, Museum and Art Gallery of the Northern Territory, Darwin; NMV, Museum, Victoria, Melbourne; QM, Queensland Museum, Brisbane; SAM, South Australian Museum, Adelaide; WAM, Western Australian Museum, Perth; CP, circumplumose; PMS, plumose marginal setae; RS, robust seta/setae; SEM, scanning electron microscope.

Austrasphaera gen. nov.

Type species. *Austrasphaera berentsae* sp. nov., here designated.

Diagnosis. Anterior margin of head overriding antennule and antennae bases. Pleon with all segments entirely fused, with no visible sutures, entirely fused to pleotelson. Antennule peduncle articles 1 and 2 subequal in length, each about twice as long as article 3; article 3 posteriorly offset. Pereopods basis and ischium subequal in length, short, about two-thirds as long as propodus. Pleopod 1 operculate, rami collinear, endopod with mesial margin indurate. Male appendix masculina massive, 0.8–1.0 as wide as endopod, 1.2–1.5 times as long as endopod, distally widest. Uropods subterminal.

Description of female. Body elongate, 3–4 times as long as greatest width, strongly vaulted; dorsal surface smooth; lateral margins subparallel to weakly ovate; unable to conglobate. Head weakly to strongly anteriorly produced, weakly immersed in pereonite 1, anteriorly overriding antennule and antennal bases; rostral process minute. Eyes small, lateral. Pereon segments without raised posterior margins. Coxal plates distinct, overlapping anterior over posterior. Membrana cingula absent. Pleotelson without foramen or excision, but with shallow ventral exit channel. Pleonal sternite present.

Antennule and antenna in ventral position on head. Antennule peduncles narrowly separated by epistome; peduncle articles 1 and 2 robust, anteriorly flattened, expanded; article 2 inferodistal angle produced forming a lobe, plane of articles 1 and 2 of projecting ventrally; peduncle article 3 short, about 0.17 as long as articles 1 and 2, posteriorly offset at mid-point of article 2; flagellum of 3 articles. Antenna slender, held beneath body, peduncle articles 1–3 short, together about 1.3 times as long as article 4, article 5 longest; flagellum as long as or slightly shorter than peduncle.

Epistome narrow, unornamented, anteromedian portion weakly produced. Labrum unornamented. Mandible incisor unicuspid or with weakly defined cusps; left mandible with or without prominent lacinia mobilis; molar process smooth, without serrations or ridges; palp article 1 longest, 3 shortest. Maxillule with lateral lobe with 13 RS on gnathal surface, mesial lobe with 2 long CP slender setae and 1 short slender seta. Maxilla with all articles well developed; lateral and middle lobes with flat finely serrate RS, mesial lobe with blunt and acute long RS, some of which are basally CP. Maxilliped endite distally with cactus and club setae, laterally with 1 long

curved CP seta; palp articles not mesially produced, mesial margins with numerous setae, lateral margins without setae.

Pereopods all robust, inferior margins flattened; dactylus with prominent recurved trifold secondary unguis; propodus longest, about 1.0–1.6 times as long as basis. Pereopods lacking serrate and trifold RS.

Brood pouch composed of an anterior and posterior pocket.

Pleopods with all rami elongate, pleopods 1–3 with PMS, 4 and 5 without PMS. Pleopod 1 exopod 1.3–1.6 as long as endopod, endopod about half as wide as exopod, apex distally narrowed. Pleopods 3 and 4 without transverse suture. Pleopods 4 and 5 exopod and endopods with transverse thickened ridges; pleopod 5 endopod with 2 scale patches and transverse suture. Uropods endopod and exopod lamellar, exopod smaller than endopod.

Male. Similar to female except for sexual characters. Pleopod 2 appendix masculina basally or subbasally attached. Penes short, adjacent, basally not widely separated. Pereopod 1 lateral margin with 2 proximally positioned submarginal serrate RS.

Composition. *Austrasphaera berentsae* sp. nov.; *A. springthorpei* sp. nov.

Etymology. From Latin *australis* (meaning south, in reference to the 'South Land', i.e., Australia), with the ending *-sphaera* indicating the family affinity (feminine).

Remarks. This distinctive genus is characterised by the following characters: elongate and strongly vaulted body; pleonite and pleotelson entirely fused; posterior margin of the pleotelson entire; antennules ventrally positioned on head, with articles 1 and 2 expanded, plane of articles ventrally directed; antennule peduncle articles 1 and 2 subequal in size, article 2 with an anterior lobe and article 3 posteriorly offset on article 2; pereopods robust with a very short basis and a long propodus; operculate pleopods, pleopod 2 exopod about half as long as endopod, in the male endopod with a massive appendix masculina; pereopods 5–7 without the usual serrate and trifold setae; and uropods with the exopod smaller than the endopod (but not minute).

Pleopods 4 and 5 have thickened ridges on both rami placing this genus within the broad subfamily concept of Dynameninae Bowman, 1981. Bruce (1995) defined the *Ischyromene*-group, an informal grouping of genera within the Dynameninae. *Austrasphaera* shows all the characters of that group of genera: proportions of the antennule peduncle articles, pleopod 1 with the endopod mesial margin being indurate, and pleopod 2 with the exopod distinctly shorter than the endopod. *Austrasphaera* is similar to four southern Australian genera (Juleta Bruce, 1993, *Maricoccus* Poore, 1994 and *Margueritta* Bruce, 1993) which share: anterior margin of the head produced, overriding the antennule and antennal peduncles, antennule peduncle article 3 being posteriorly offset (also present in *Diclidocella* Bruce, 1995, and some species of *Cymodocella* Pfeffer, 1887, see Bruce, 1995), pleopod 1 being operculate, pereopods 5–7 with none (or very few) trifold or serrate setae and the pleotelson largely fused to the pleon. The body shape of the four genera varies from scale-like in *Maricoccus*,

flattened in *Juletta*, vaulted in *Margueritta*, to elongate and semicylindrical in *Austrasphaera*.

Two South African species, incorrectly placed in *Dynamenella*, are similar to *Austrasphaera* and to the *Ischyromene*-group. These are "*D.*" *taurus* Barnard, 1940 and "*D.*" *navicula* Barnard, 1940. "*D.*" *taurus* has a similar antennule with peduncular article 2 being large and anterodistally produced, and the anterior margin of the head produced with ventral antennules and antennae (rather than anterior). "*Dynamenella*" *navicula* has a similar head and body shape to *Austrasphaera*, but those appendages that were figured by Barnard otherwise differ. Both species have a pleon with four segments and collinear antennule peduncle articles; pereopod and pleopod morphology is unknown and further comparison is not possible without the redescription of the South African species.

Austrasphaera berentsae sp. nov.

Figures 1–4

Material examined. Holotype. Female (ovigerous 3.6 mm), Vic., Bay of Islands, 38°35.0'S, 142°49.5'E, 28 Apr 1988, 2.5 m, red algae, R.T. Springthorpe and P.B. Berents (AM P51061).

Paratypes. **Vic.** 10 males (2.4–2.5 dissected, 2.6 mandibles dissected, 2.8 mm), female (ovigerous 3.5 mm, dissected), same data as holotype (AM P41342). 8 females (ovigerous 3.5–3.8 SEM, 3.9 SEM, 3.9 mm), 1 km E of Harmers Haven, 38°34'S, 145°40'E, 6 Mar 1982, 6 m, 300 m offshore, rocky, R.S. Wilson and C. Larsen (NMV J26391). Female (3.7 mm), same data as previous (NMV J26394). Male (2.8 mm), same data as previous, but 11 m (NMV J26229). Male (2.9 mm), female (3.4 mm), 50 m E of Petrel Rock, Venus Bay, 38°39'S, 145°42'E, 5 Mar 1982, 8 m, rocky, M. MacDonald, M. Gomon and G. Barker (NMV J26393). Male (2.8 mm), female (3.5 mm), 75 m SW of Eagles Nest, Venus Bay, 38°40'S, 145°40'E, 5 Mar 1982, 8 m, rocky, R.S. Wilson and G. Barker (NMV J26390). Male (2.5 mm), 50 m offshore, east side of S point, Twin Reefs, 38°41'S, 145°39'E, 11 m, C. Larsen, G. Barber and R.S. Wilson (NMV J26395).

Non-type material. **Vic.** Laurence Rocks, Portland, 38°34.0'S, 141°40.5'E, 23 m, *Herdmania momus* with encrusting sponge and red algae (AM P41379). Whalers Point Lighthouse, Portland, 38°20.5'S, 141°37.5'E, 10 m, brown algae from boulder bottom (AM P41399). **SA.** "The Hotspot" reef, Flinders I., 33°40.8'S, 134°22.5'E, 21 m, large red algae (NMV J39716); 33°40.5'S, 134°22.05'E, 12 m, assorted algae (NMV J39724); 33°40.5'S, 134°22.0'E, 17 m, algae, large forms (NMV J39696). NE end of West I., 35°37.0'S, 138°36.0'E, 12 m, red algae (NMV J39697). Western River Cove, Kangaroo I., 35°43'S, 137°35'E, 6 m, coralline algae (AM P51064). **WA.** Mississippi Bay, E of Esperance, 34°0.0'S, 122°17.0'E, 72 m, algae (AM P41125). Point Peron, S of Perth, 32°16'S, 115°41'E, 4 m, *Posidonia* and algae (AM P51063). Green I., Rottneest I., 32°01'S, 115°30'E, mixed algal turf (AM P41113). Dongara–Port Denison Beach, 29°16.0'S, 114°55.0'E, 5 m, red algae, mainly *Laurencia* (NMV J26152); 3 m, drift red algae on sand (NMV J26168). Seven Mile Beach, Dongara, 29°12.0'S, 114°53.0'E, 1 m, epiphytes on *Amphibolus* (NMV J39700); D. Edgar (NMV J39698). Red Bluff, Kalbarri, 27°42'S, 114°0.9'E, 10 Jan 1984, mixed corallines (AM P51062).

Description of female. Body about 3.5 times as long as greatest width, ovate, widest at pereonites 3 and 4; dorsal surfaces smooth, without scattered setae. Cephalon anterior margin without transverse ridge, ventral rostral process weakly

developed. Head and pereonites 1 subequal in length in dorsal view, pereonite 1 about twice as long as pereonite 2, with 1 or 2 low indistinct sublateral bosses; pereonites 2–7 of approximately equal length; pereonite 7 with low indistinct median boss; coxae with sutures, ventrally directed. Pleon with weak median boss, posterior margin indicated by short lateral sutures. Pleotelson posterior margin smoothly rounded; ventral margin with shallow exit channel not extending to posterior of pleotelson.

Antennule peduncle article 2 2.6 times as long as wide, about 1.3 times as long as article 2; article 2 flattened, inferior margin convex; inferior margins of both articles 1 and 2 with mass of flattened scales and fine tubular setae; article 3 about one-quarter as long as article 2, inserted midpoint of posterior margin; flagellum 3-articled, extending to pereonite 1, about 1.7 times as long as article 3. Antenna peduncle articles 1–3 short, combined lengths about equal to that of article 5; article 4 about 0.8 as long as article 5, both articles 4 and 5 with inferior margins convex; flagellum about equal in length to peduncle, extending to anterior margin of pereonite 2, with 8 articles.

Epistome smooth, narrow, laterally encompassing labrum, anteriorly truncate. Left mandible incisor without distinct cusps, lacinia mobilis without cusps, spine row of 3 serrate curved spines; right mandible with 3 indistinct cusps, spine row of 1 broad-based multidigitate spine and 3 serrate blunt spines; molar process irregular, largely smooth, without serrate margins or ridged surfaces; palp article 1 longest, without setae; article 2 with 4 biserrate setae, article 3 with 6 biserrate setae, terminal seta being largest. Maxillule mesial lobe with 2 long, weakly pectinate setae and 1 shorter simple seta; lateral lobe with 10 terminal and peripheral RS on gnathal surface, eleventh seta set between these; lateral most RS are weakly serrate on distal part of seta. Maxilla lateral lobe and middle lobe each with 3 and 4 curved RS respectively, mesial lobe with 6 RS, variously serrate, mesial-most seta only being acute, remainder terminally rounded. Maxilliped endite extending about half way along palp article 4, distal margin with 1 conical RS, 3 rounded RS, 2 cactus RS and 2 slender CP RS; palp articles 2–5 with about 10, 15, 14 and 11 setae respectively.

Pereopod articles generally with abundant widely-spaced microtrichs. Pereopod 1 basis about 1.7 times as long as greatest width, approximately half as long as propodus; inferodistal angle with 1 simple setae; ischium as long as basis, twice as long as greatest width; merus about 0.4 as long as ischium, 0.8 times as long as greatest width, carpus (inferior margin) 0.6 as long as merus, 0.5 as long as wide; propodus twice as long as ischium, 3 times as long as greatest width; dactylus about half as long as propodus, unguis strongly recurved, inferior margin with prominent serrate cuticular scales, secondary unguis recurved with 2 basal cusps. Pereopods 2 and 3 similar to pereopod 1; pereopod 2 with 1, 1 and 4 setae on inferior margins of merus, carpus and propodus respectively; pereopod 3 with 2, 2 and 3 setae on inferior margins of merus, carpus and propodus respectively. Pereopods 5 and 6 similar, shorter than pereopods 1 and 2. Pereopod 6 propodus inferior margin without setae. Pereopod 7 short, slightly longer than pereopod 6, articles robust and laterally flattened, merus slightly shorter than wide,

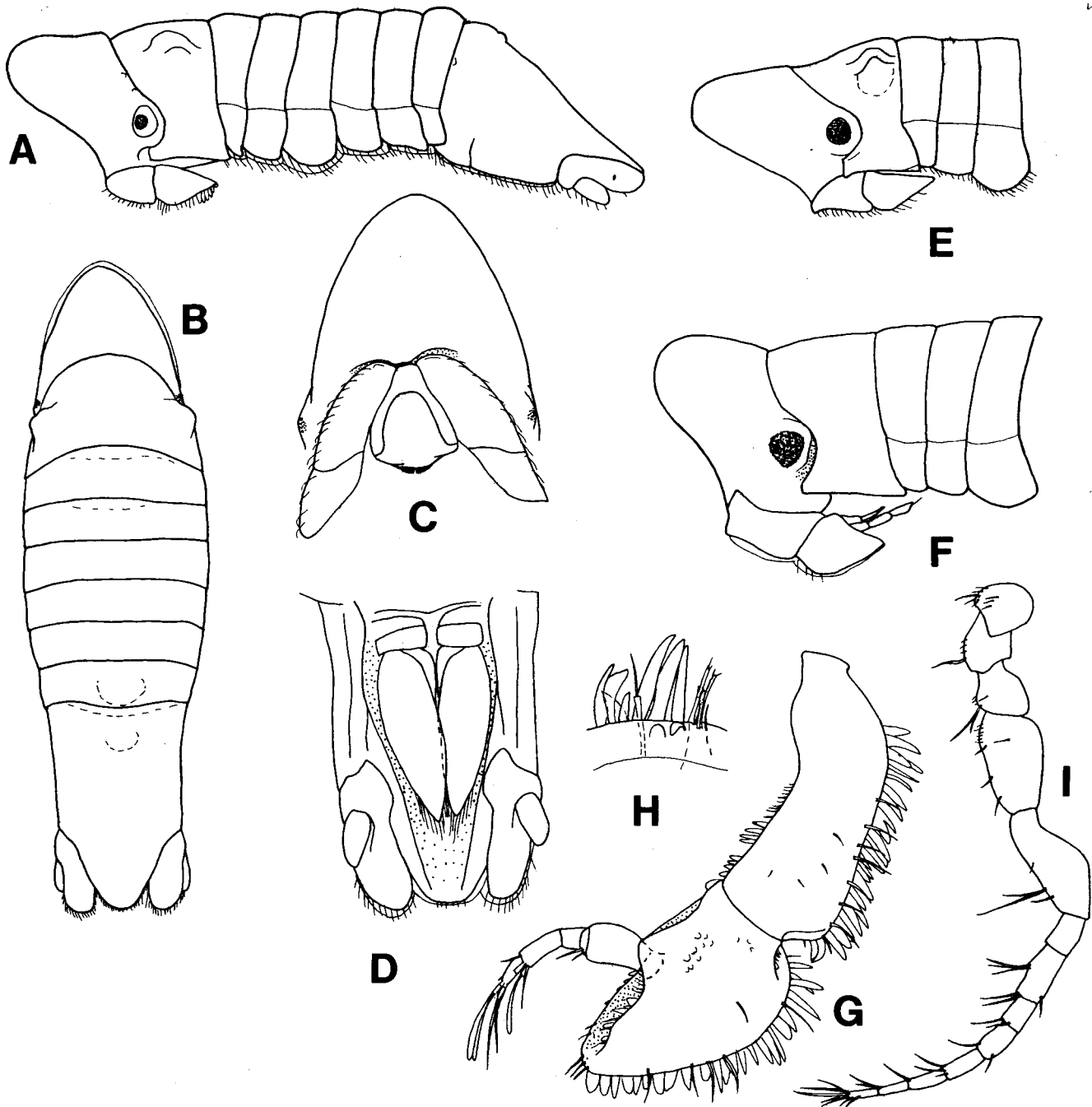


Figure 1. *Austrasphaera berentsae* sp. nov. A, B, D, female holotype, G–I, female paratype, (AM P41342), remainder as indicated. A, lateral view; B, dorsal view; C, frons and anterior of head in ventral view; D, pleon and pleotelson, ventral view; E, head and anterior pereonites, female 3.5 mm Flinders I. (NMV J39716); F, head and anterior pereonites, male 2.8 mm paratype (AM P41342); G, antennule; H, antennule, detail of marginal setae; I, antenna.

appearing rounded in lateral view, inferior margin with setulose fringe and CP setae; propodus 2.8 times as long as proximal width, tapering distally, inferior margin with fringe of CP setae, superior margin with numerous scale-setae; dactylus 0.7 times as long as propodus.

Pleopod 1 exopod and endopod with 13 and 8 PMS respectively; endopod 0.8 times as long as exopod, slender, 4 times as

long as greatest width, proximal lateral margin weakly concave. Pleopod 2 exopod and endopod with 16 and 10 PMS respectively, those of the proximal two-thirds of the exopod lateral margin only feebly plumose; endopod 1.8 times as long as exopod. Pleopod 3 exopod and endopod with c. 17 and 8 PMS respectively. Pleopod 4 both rami with prominent ridges, exopod lateral margin with 4 fine setae. Pleopod 5 both rami with

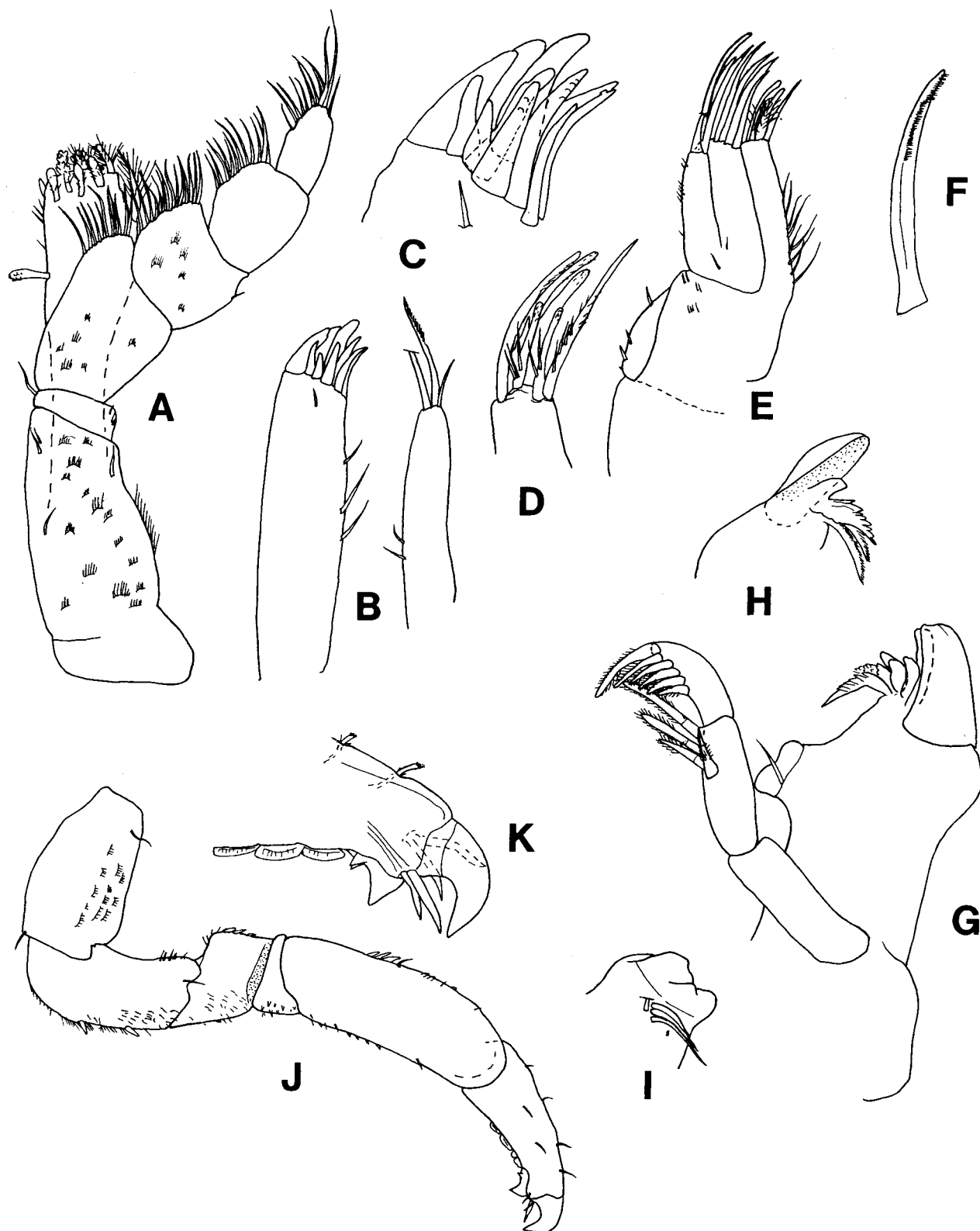


Figure 2. *Austrasphaera berentsae* sp. nov. All figs female paratype (AM P41342). A, maxilliped; B, maxillule, mesial and lateral lobes; C, apex, maxillule lateral lobe; D, maxilla mesial lobe apex; E, maxilla; F, robust setae from maxilla middle lobe; G, right mandible; H, distal left mandible; I, mandible molar; J, pereopod 1; K, pereopod 1, dactylus unguis and secondary unguis.

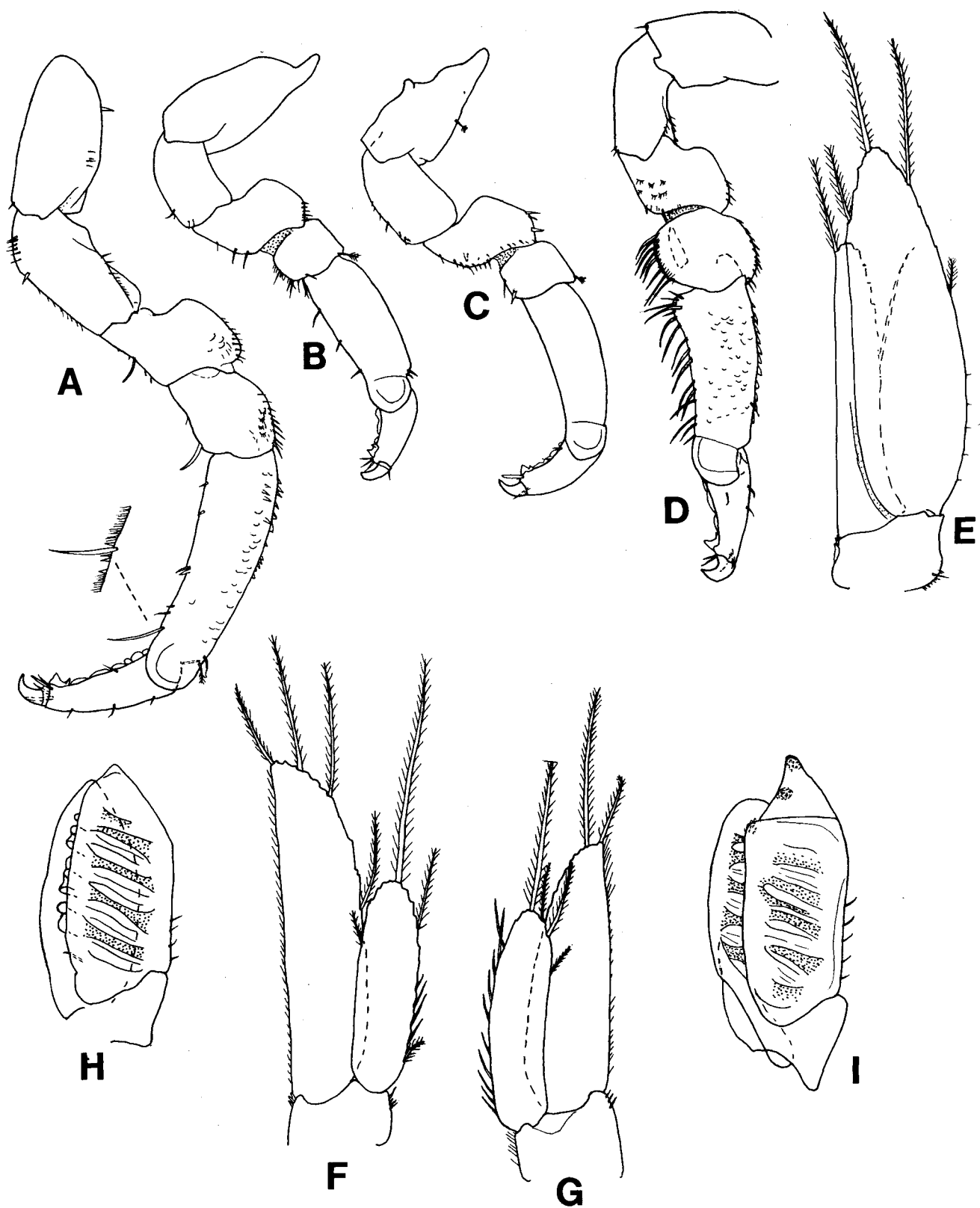


Figure 3. *Austroasphaera berentsae* sp. nov. A–D, pereopods 2, 3, 6 and 7; E–I, pleopods 1–5.

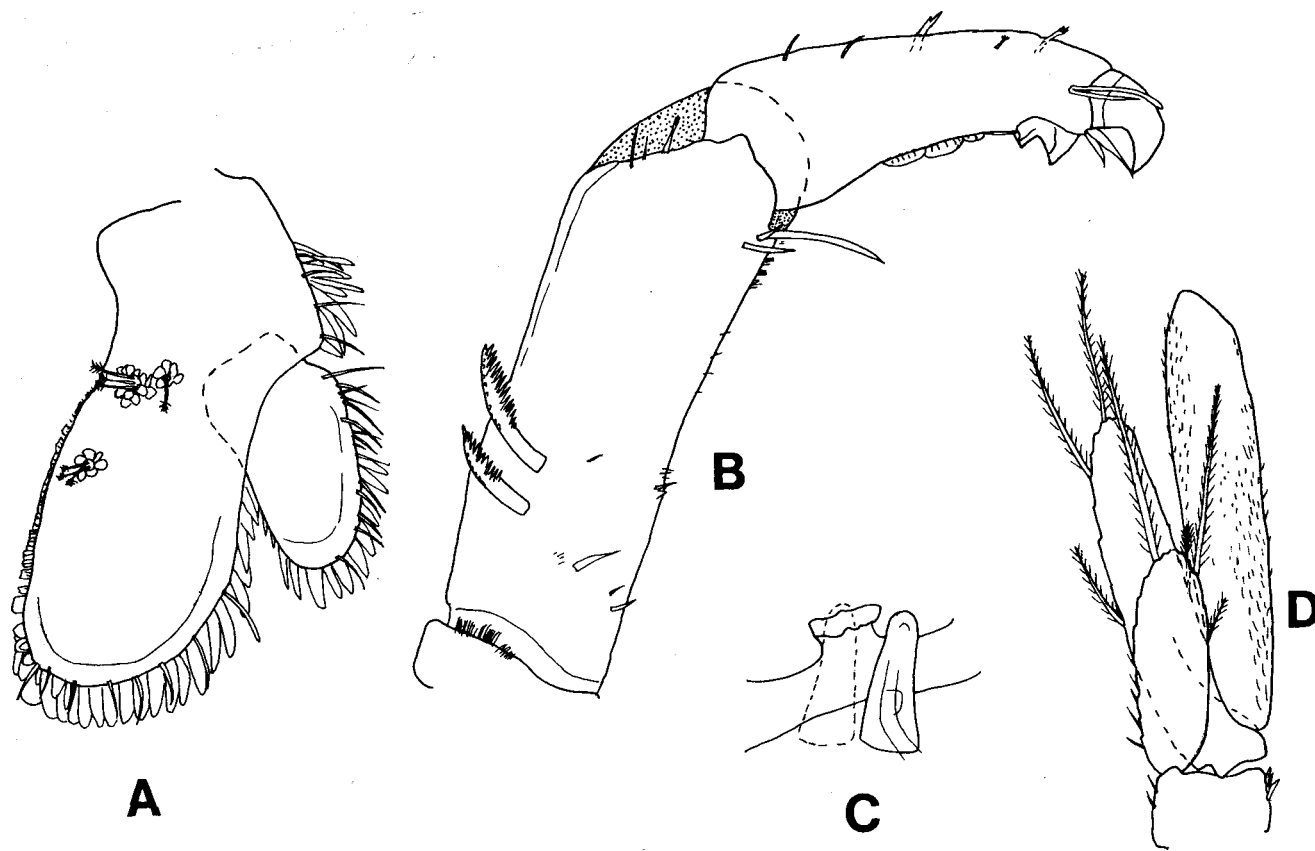


Figure 4. *Austrasphaera berentsae* sp. nov. A, uropod, female paratype (AM P41342). B–D, male NMV J26391). B, male pereopod 1; C, penial process and pleonal sternite; D, pleopod 2.

prominent ridges; exopod with 3 scale patches and transverse suture. Uropod rami flattened, margins provided with continuous flattened scales and fine setae; exopod 0.4 times as long as fused endopod, 1.8 times as long as greatest width, distal margin broadly rounded; endopod broadly rounded, dorsal with 3 clusters of sensory setae.

Male. Anterior margin of head produced slightly dorsally (in contrast to female in which is produced anteriorly). Males lack indistinct nodules on pereonite 1, pleon and pleotelson. Pereopod 1 propodus proximomesial surface with 2 strongly pectinate robust submarginal setae. Penial processes separate, adjacent, about 2.5 times as long as basal width, tapering to rounded apex. Pleopod 2 endopod 1.7 times as long as exopod; appendix masculina lateral margins diverging slightly, surface with abundant microtrichs, about 5.3 times as long as wide, and 1.2 times as long as endopod, apex obliquely truncate; widest at approximately three-quarters of its length.

Size. Males 2.1–2.8 mm, ovigerous females 3.5–3.8 mm, non-ovigerous females 3.2–3.6 mm.

Etymology. For Dr Penny B. Berents (Australian Museum), amphipod taxonomist and collector of much valuable peracarid material.

Distribution. Vic., SA, WA, north to Kalbarri; 2.5–23 m, with red and brown algae, including the red alga *Laurencia* and the seagrass *Posidonia*.

Remarks. *Austrasphaera berentsae* is readily distinguished by the head being strongly produced anteriorly, an ovate body shape, the uropods being posterolateral in position and not meeting posteriorly and by the short uropod exopod. The uropods of the sympatric *A. springthorpei* fold across the posterior margin of the pleotelson, and the penial processes are relatively shorter and the appendix masculina less massive than that of *A. berentsae*.

Austrasphaera springthorpei sp. nov.

Figures 5–7

Material examined. Holotype. Female (ovigerous 3.2 mm), WA, Red Bluff, Kalbarri, 27°42'S, 114°0.9'E, 10 Jan 1984, mixed corallines, R.T. Springthorpe (AM P51057).

Paratypes. 10 males (2.2–2.5 mm), 17 females (with visible ova 2.5–3.5 mm, 3.5, non-ovigerous 2.4–3.3 mm), c. 64 unmeasured male, female, and manca, same data as holotype (AM P41124). Male (2.4 mm), female (ovigerous 3.0 mm), same data as holotype except mixed algae and sediment (AM P41128). 2 males (2.4, 2.5 mm), female (2.5 mm), Point Peron, 48 km S of Perth, 32°16'S, 115°41'E, 27 Jan 1972, 4 m, *Posidonia* and algae, W.F. and J.M. Ponder (AM P51060). 2 females (ovigerous 2.7, 2.9 mm), Mississippi Bay, 48 km E of Esperance, 34°0.0'S, 122°17.0'E, ?1972, 2 m, mixed algae, W.F. and J.M. Ponder (AM P51058).

Non-type material. **Vic.** Henty Reef, Apollo Bay, Mounts Bay, 38°47.0'S, 143°40.5'E, 18 m, red algae on boulder (AM P51059). **SA.** W of 'The Hotspot' reef, Flinders I., 33°40.8'S, 134°22.5'E, 21 m,

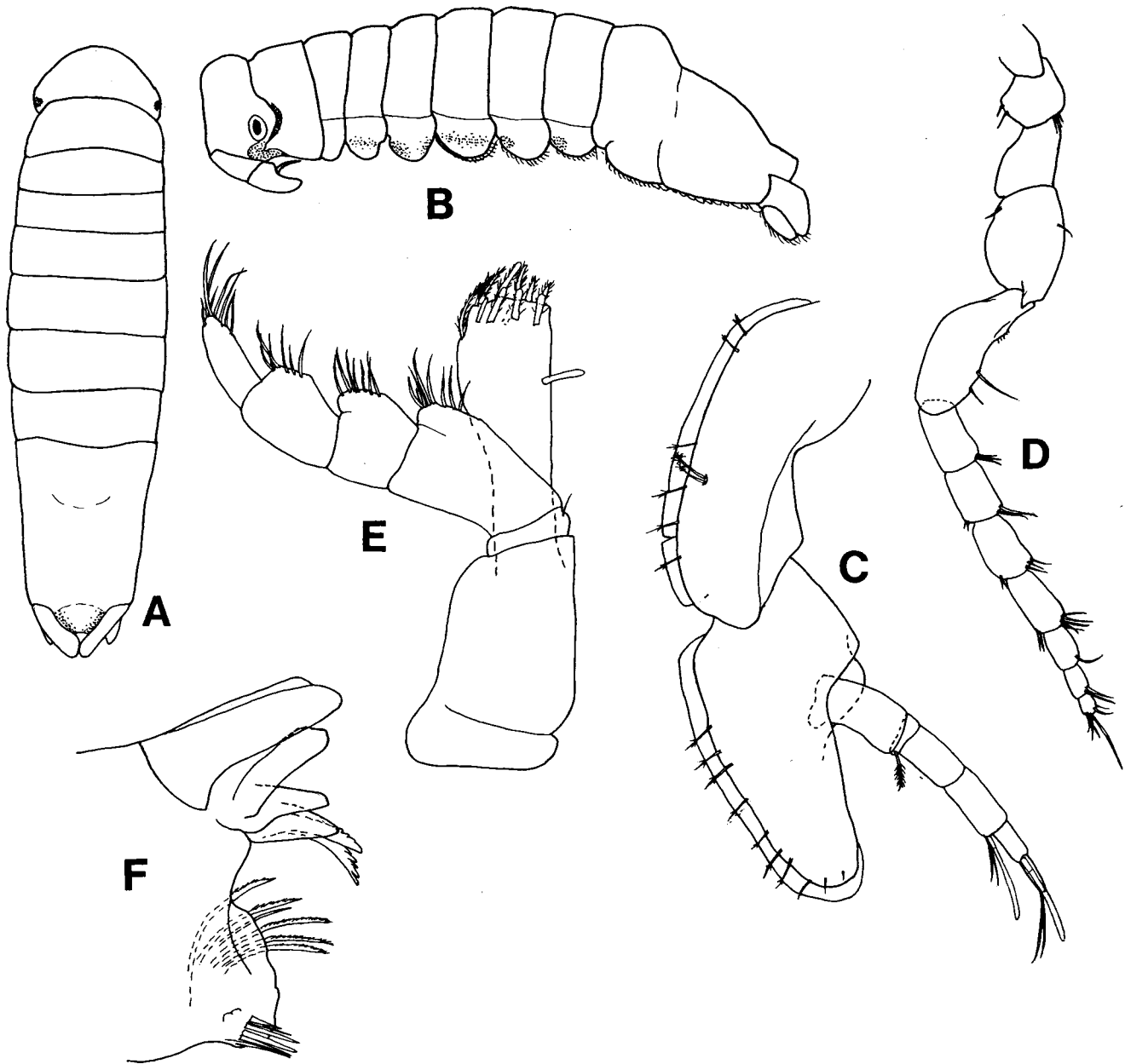


Figure 5. *Austrasphaera springthorpei* sp. nov. A, B, holotype, remainder female paratype (AMP41124). A, dorsal view; B, lateral view; C, antennule; D, antenna; E, maxilliped; F, left mandible.

large red algae (NMV J39699); 17 m, assorted algae (NMV J39726); 21 m, large red algae (NMV J39718). North of Tiparra Light, Tiparra reef, 34°4'S, 137°23'E, 10 m, red algae (NMV J26209). WA. Dongara (NMV J39725).

Description of female. Body about 3.8 times as long as greatest width, ovate, widest at pereonites 5 and 6; dorsal surfaces smooth, without setae or microtrichs. Cephalon anterior margin without transverse ridge, ventral rostral process weakly developed. Head and pereonites 1 subequal in length in dorsal view, pereonite 1 about 1.2 times as long as pereonite 2; pereonites 2–7 of approximately equal length, 5 and 6 slightly

longer than 7 and 4; coxae with sutures, ventrally directed, inferior margins with setulose fringe. Pleon mesial portion indistinctly raised, posterior margin indicated short lateral suture. Pleotelson posterior margin depressed, terminally with minute indentation, forming open exit-channel with uropods; ventral margin with shallow exit channel not extending to posterior of pleotelson.

Antennule peduncle article 2 1.6 times as long as wide, about 0.9 times as long as article 2; article 2 flattened, with large anterodistal lobe; anterior margins of both articles 1 and 2 with gel-like layer and fine tubular setae; article 3 about one-third as long as article 2, inserted at midpoint of posterior

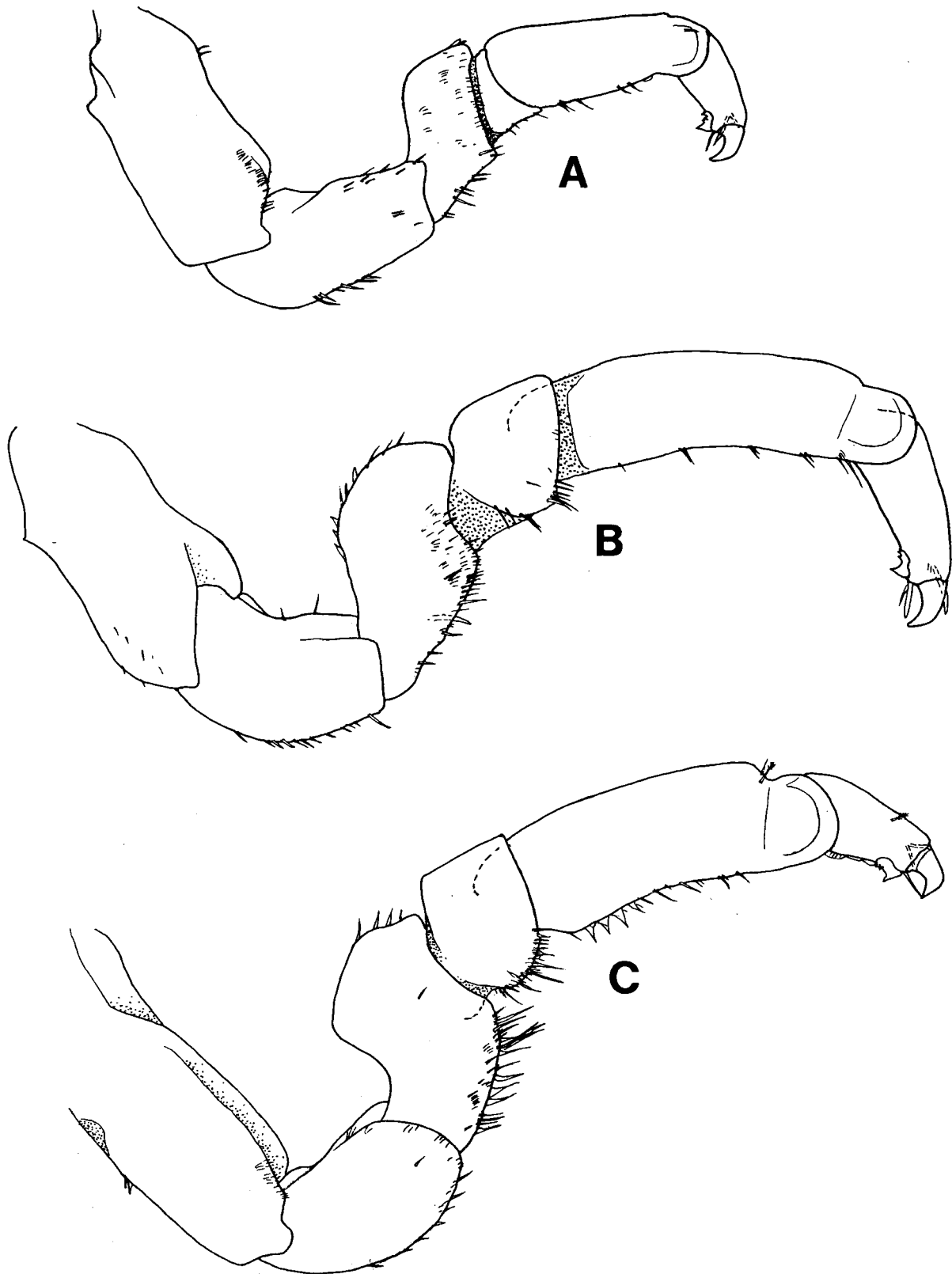


Figure 6. *Austrasphaera springthorpei* sp. nov. Female paratype (AM P41124). A–C, pereopods 1, 2, and 7.

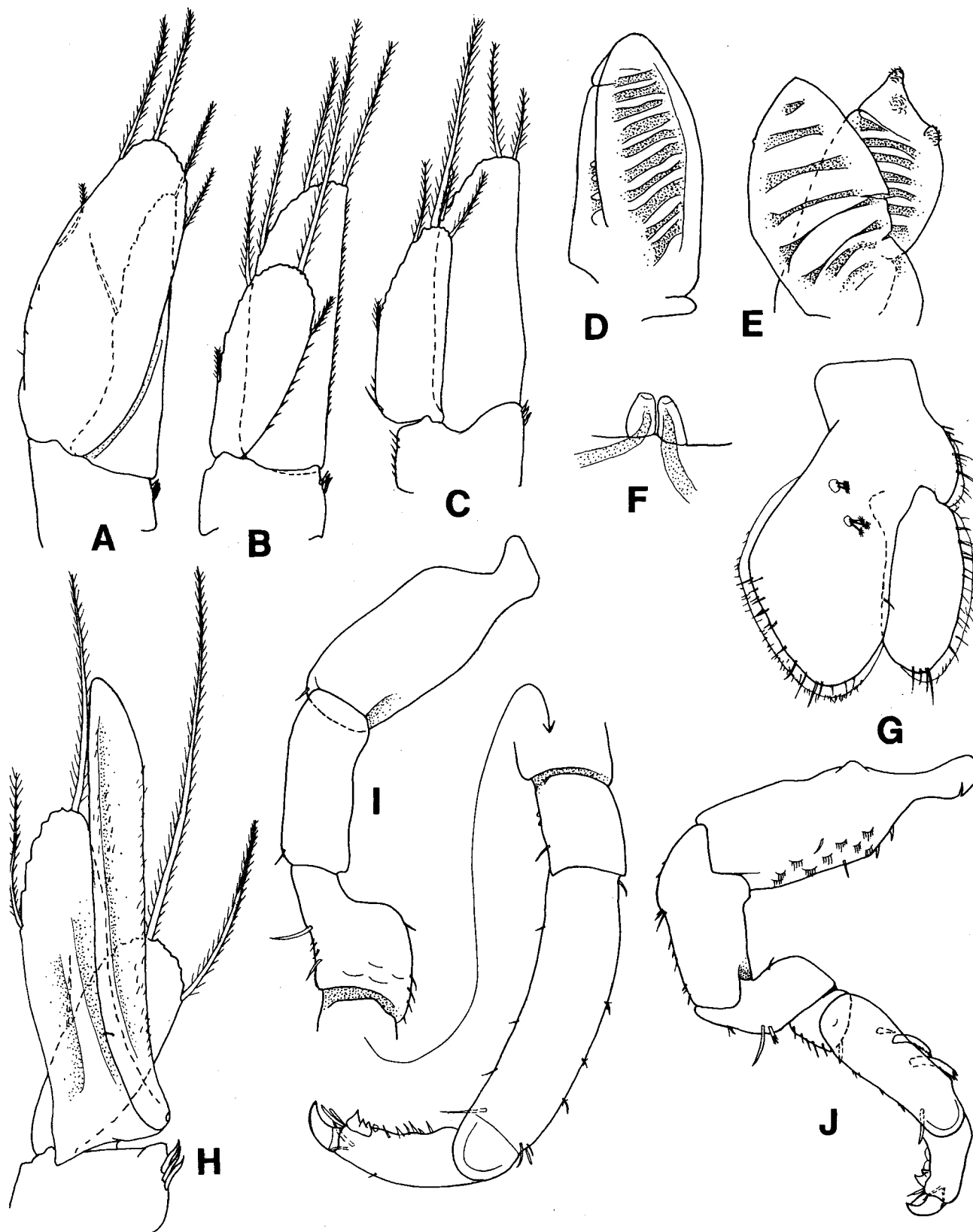


Figure 7. *Austrasphaera springthorpei* sp. nov. A-E, G, female paratype, F, H-J male paratype (AM P41124), A-E, pleopods 1-5; F, penial processes; G, uropod; H, pleopod 2, male; I, pereopod 2, male; J, pereopod 1 male.

margin; flagellum 3-articled, extending to pereonite 1, about 1.7 times as long as article 3. Antenna peduncle articles 1–3 short, combined lengths about equal to that of article 5; articles 4 and 5 subequal in length; flagellum about 0.7 as long as peduncle, extending to anterior margin of pereonite 2, with 7 articles.

Epistome and mouthparts conforming to the generic characters and generally similar to that of *A. berentsae*. Maxilliped palp articles 2–5 mesial margins with 7, 7, 6 and 8 setae respectively.

Pereopods similar to *A. berentsae*.

Pleopod 1 exopod and endopod with 18 and 10 PMS respectively; endopod 0.9 times as long as exopod, slender, 3.3 times as long as greatest width, proximal lateral margin distinctly concave. Pleopod 2 exopod and endopod with 18 and 9 PMS respectively; endopod 1.4 times as long as exopod. Pleopod 3 exopod and endopod with 10 and 8 PMS respectively. Pleopod 4 and 5 with both rami with prominent ridges, both with incomplete transverse suture; pleopod 5 exopod with 3 scale patches. Uropod rami flattened, margins provided with gel-like layer and fine setae; exopod 0.6 times as long as fused endopod ovate, twice as long as greatest width, distal margin broadly rounded; endopod broadly rounded, mesial margin oblique to lateral margin, dorsally with 2 clusters of sensory setae.

Male. Penial processes about 1.3 times as long as basal width, tapering to rounded apex. Pleopod 2 endopod 1.3 times as long as exopod; appendix masculina weakly sinuate, mesial margin curving laterally slightly, surface with scattered microtrichs, about 8.6 times as long as wide, 1.4 times as long and 0.6 times as wide as endopod, apex narrowly rounded.

Size. Males 2.2–2.6 mm, ovigerous females 2.5–3.5 mm, non-ovigerous females 2.4–3.3 mm.

Etymology. For Roger T. Springthorpe (Australian Museum), whose field-collecting has over the years contributed many new discoveries.

Distribution. Western Vic., SA and WA to Kalbarri; 2–18 m, from coralline and red algae and *Posidonia*.

Remarks. See *Remarks* for *A. berentsae* for the differences that separate the two species of *Austrasphaera*. As the appendages of these two species are so similar an abbreviated description is given for this species.

Cassidias Richardson

Cassidias Richardson, 1906: 20.—Barnard, 1920: 374.—Kensley, 1978: 87.—Harrison, 1984a: 373.—Harrison and Ellis, 1991: 934.

Type species. *Cassidias argentinea* Richardson, 1906, by monotypy. Types held at USNM, Smithsonian Institution, Washington, DC, USA.

Diagnosis. Pleotelson with prominent median process; posterior margin with simple median notch and distinct ventral exit channel. Antennule peduncle article 1 more than twice as long as article 2, articles 1 and 2 robust; article 3 slender, all articles collinear. Maxilliped palp articles 2–4 with distomesial angle moderately produced, mesial margins with numerous setae. Pleopods 1–3 with both rami longitudinally oblique. Pleopod 2 with appendix masculina distally attached. Male uropods

attached subdistally on pleon, endopod reduced to short stub, exopod round in section with apical spike, entire ramus extending beyond posterior margin of pleotelson.

Description of male. Body stout, about twice as long as greatest width, strongly vaulted; dorsal surface finely granular, with scattered setae; unable to conglobate. Head weakly immersed in pereonite 1. Eyes large, lateral, facets distinct, prominent posterior lobe. Pereon segments without raised posterior margins. Coxae not distinctly demarcated, overlapping anterior over posterior, ventrally directed. Membrana cingula absent. Pleon of 4 segments, segment 1 largely concealed by pereonite 7, segments 2–4 indicated by 2 distinct suture lines running to lateral margins of pleon. Pleotelson with prominent median process; posterior margin with simple median notch and distinct ventral exit channel. Pleonal sternite present.

Antennule and antenna anteriorly positioned on head. Antennule peduncle articles 1 and 2 robust, article 1 more than twice as long as article 2; article 3 slender, all articles collinear; flagellum shorter than peduncle, extending to anterior of pereonite 1. Antenna peduncle article 1 and 2 short, subequal, shorter than 3–5, which become progressively longer; flagellum about as long as peduncle, extending to posterior of pereonite 1.

Epistome anteriorly acute, with weak mesial constriction; with indistinct ventral tubercle Labrum unornamented. Mandible incisor multicuspid; molar process prominent, crushing, provided with marginal scale teeth; left mandible with prominent lacinia mobilis both mandibles with spine row of 5 or 6 spines; palp article 1 longest, 3 shortest. Maxillule lateral lobe with about 13 RS on gnathal surface, most of which are serrate; mesial lobe with 5 long RS, 3 of which are prominently serrate. Maxilla with all articles well developed; lateral and middle lobes with flat strongly curved and finely serrate RS, mesial lobe with several and acute long RS, some of which are basally CP. Maxilliped endite distal margin numerous long acute CP setae and 3 long CP RS on distomesial margin; palp articles 2–4 each with distomesial angle produced, mesial margins with numerous setae, lateral margins of articles 2 and 3 without setae, article 4 with 1 seta.

Pereopods all ambulatory, pereopods 1–3 subsimilar, more robust than 4–7; inferior margins of merus, carpus and propodus with serrate and CP RS; setulose fringe weakly developed; dactylus with prominent simple secondary unguis and 1 flattened seta arising at lateral margin, 2 flat setae at distolateral margin. Pereopods 6 and 7 inferior and distal margins of merus, carpus and propodus with numerous serrate and biserrate RS.

Penes paired, separated by about basal width of penial process; short, not reaching pleopod peduncles.

Pleopods 1–3 both rami with PMS, longitudinal axis of both rami oblique. Pleopod 1 exopod extending beyond endopod distal margin subtruncate, proximolateral angle with single short acute RS; endopod distinctly triangular in shape. Pleopod 2 with appendix masculina distally attached on mesial margin. Pleopod 3 exopod with complete suture, suture not distinct on pleopod 4 and incomplete on pleopod 5. Pleopods 4 and 5 exopod and endopods with well-developed transverse thickened ridges; pleopod 5 endopod with 3 lobate scale patches and

transverse suture. Uropod exopod 3 times as long as wide, subdistally attached on pleon, endopod reduced to short stub, exopod round in section with apical spike, entire ramus extending beyond posterior margin of pleotelson.

Female. Pleotelsonic process considerably smaller than in the male; uropods with both rami lamellar, positioned midlaterally on pleon, endopod extending only slightly beyond posterior margin of pleotelson; both rami with numerous CP setae. Mouthparts metamorphosed. Brood pouch of the type species made up of 4 pairs of oostegites on pereonites 1–4 (Harrison 1984, but see remarks).

Composition. *Cassidias argentina* Richardson, 1906, *C. australiensis* sp. nov., *C. africana* Barnard, 1920. *Cassidias trituberculata* Thielemann, 1910 has been synonymised with *Holotelson tuberculatus* Richardson, 1909 (Kwon, 1990).

Remarks. Harrison (1984a), on the basis of differences in brood-pouch morphology, excluded *Cassidias africana* Barnard, 1920 from the genus. The type species is known only from females (Richardson, 1906), and until such time as males are known it is impossible to assess the generic characters for this genus. Although brood-pouch morphology is generally consistent within sphaeromatid genera, there is insufficient evidence to consider such differences to be axiomatically of generic merit, and this character is known to vary in *Sphaeroma* (Harrison, 1984a) and now also in *Margueritta* (present study). At present it seems appropriate to retain the genus, diagnosed on the basis of the known males, with recognition that its status is uncertain. A new genus cannot adequately be differentiated from *Cassidias* on the basis of type material.

Males of this genus, as here defined can be readily recognised by subterminal uropods which have the endopod reduced in size, by the presence of a broad, blunt, posteriorly directed process on the pleotelson and by the terminal appendix masculina. In addition, the posterior margin of the pleotelson has a distinct simple median notch. Females have the uropods in a more midlateral position and both rami are flat. The process on the pleotelson is reduced compared with that of the male, but does allow identification of females.

The most similar genus is *Neonaesa* Harrison and Holdich, 1982b which is readily differentiated by the males having the appendix masculina mesially attached, the pleotelson posterior margin with three small notches and the pleotelson dorsal surface with a small median boss flanked by two low submedian bosses. Females of *Neonaesa* are separated by having a cylindrical uropodal exopod and a reduced endopod in contrast to female *Cassidias* which have uropodal rami both present and flat.

Cassidias australiensis sp. nov.

Figures 8–13

Material examined. Holotype. Male (4.0 mm), NW end of McCluer I., NT, 11°02'S, 132°58'E, 16 Oct 1982, hydroids etc. from bommies, G.C.B. Poore (NMV J39703).

Paratypes. **NT.** Males (3.4–4.0 dissected, 4 each 3.5–4.0 [all crushed] mm), females (ovigerous 4.3 mm, dissected, non-ovigerous 2.6–4.2 dissected), immature (2.3–2.7 mm), 54 unmeasured immature, males and females, same data as holotype (NMV J26384, J39709). Female (non-ovigerous 3.2 mm), Table Head, Coburg Peninsula, 11

May 1983, mixed substrata, rocks and sponges, N.L. Bruce (NTM Cr012315). Male, 25 females and immature, McCluer I., S end, 11°06'S, 133°00'E 17 Oct 1982, 8.0 m, hydroids etc., G.C.B. Poore (NMV J26388). 4 males, c. 40 females and immature, McCluer I., NW end, 11°02'S, 132°58'E 16 Oct 1982, 8.0 m, yellow hydroids, J.K. Lowry (NMV J26389). 13 males, c. 100 females and immature, Fannie Bay, Darwin, 11°24'S, 130°48'E, 26 Oct 1982, 8 m, hydroids etc., J.K. Lowry (NMV J26386). **WA.** Females (ovigerous 3.0, non-ovigerous 3.1 mm), North-West Shelf, 19°29.7'S, 118°52.2'E, 24 Oct 1983, 37 m, sled, CSIRO, RV Soela (WAM C28895).

Description of male. Body about twice as long as greatest width, strongly vaulted, ovate, widest at pereonite 5; dorsal surfaces anteriorly smooth, becoming minutely granular towards posterior, scattered setae present on posterior of pereonites and on pleotelsonic process. Cephalon anterior margin with 2 transverse ridges, ventral rostral process weakly developed. Head and pereonite 1 subequal in length in dorsal view, pereonite 1 about 1.4 times as long as pereonite 2, unornamented; pereonites 2>3<4<5>6>7. Pleon about twice as long as pereonite 7, with evident sutures and sublateral 'keys'. Pleotelson process proximal half with convex lateral margins distal portion with lateral margins straight, posteriorly subtruncate with weak median indentation; distal part with 2 distinct ranks of setae merging to one across posterior margin; in lateral view appearing distally narrowly rounded; ventral margin with deep exit channel, ventral margin wide and flattened with sublateral depression mesial to uropods.

Antennule peduncle article 1 1.9 times as long as wide, about 4.7 times as long as article 2, distal one-third of anterior margin with obscurely indented blade; both articles 1 and 2 finely pilose, posterior margin with sensory setae; article 3 about half as long as article 1 4 times as long as wide, twice as long as article 2; flagellum 7-articled, extending to posterior of pereonite 1, about 2.5 times as long as article 3. Antenna peduncle articles 1 and 2 short, article 1 anterior margin with mass of setae, combined lengths about equal to that of article 5; article 3 about 0.8 times as long as article 4; article 4 about 0.7 as long as article 5, articles 3–5 collinear; flagellum about equal in length to peduncle, extending to anterior margin of pereonite 2, with 12 articles.

Epistome anteriorly acute, minutely granular, with weak lateral constriction; with distinct anteromedial nodule. Left mandible incisor with 4 cusps, lacinia mobilis with 3 cusps, spine row of 5 serrate curved spines; right mandible with 3 indistinct cusps, spine row of 2 broad-based multidigitate spines, 5 serrate spines; molar process round; palp articles 1 and 2 subequal in length, article 2 distolateral margin with 3 biserrate setae; article 3 with 11 biserrate setae, terminal seta being largest. Maxillule mesial lobe with 3 long, weakly pectinate RS and 2 shorter simple RS, lateral lobe with 11 peripheral RS on gnathal surface, twelfth seta set between these; most RS are weakly and bluntly serrate on distal part, proximal RS strongly serrate. Maxilla lateral lobe and middle lobe each with 7 and 6 curved finely serrate RS respectively, mesial lobe with 6 serrate and biserrate RS. Maxilliped endite lateral margin strongly convex, distal margin with 1 simple RS at sublateral angle, 4 curved CP RS, 3 sinuate CP RS; distomesial margin with 3 large stout CP RS, increasing in size proximally;

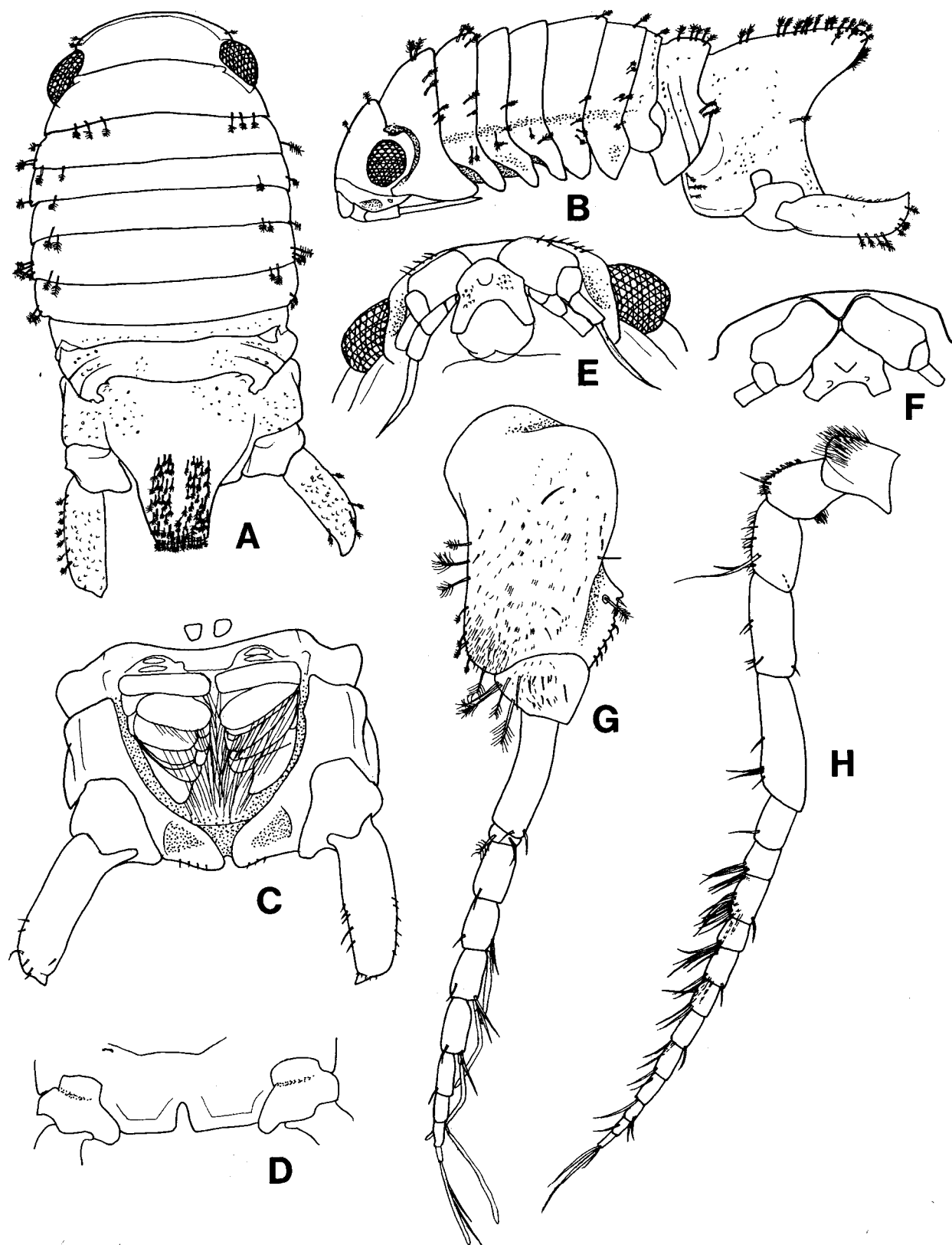


Figure 8. *Cassidias australiensis* sp. nov. A–F, male holotype, G–H, male paratype, remainder as indicated. A, dorsal view; B, lateral view; C, pleon, ventral view; D, pleotelson, posterior margin, posterior view; E, frons and anterior of head in ventral view; F, frons, female; G, antennule; H, antenna.

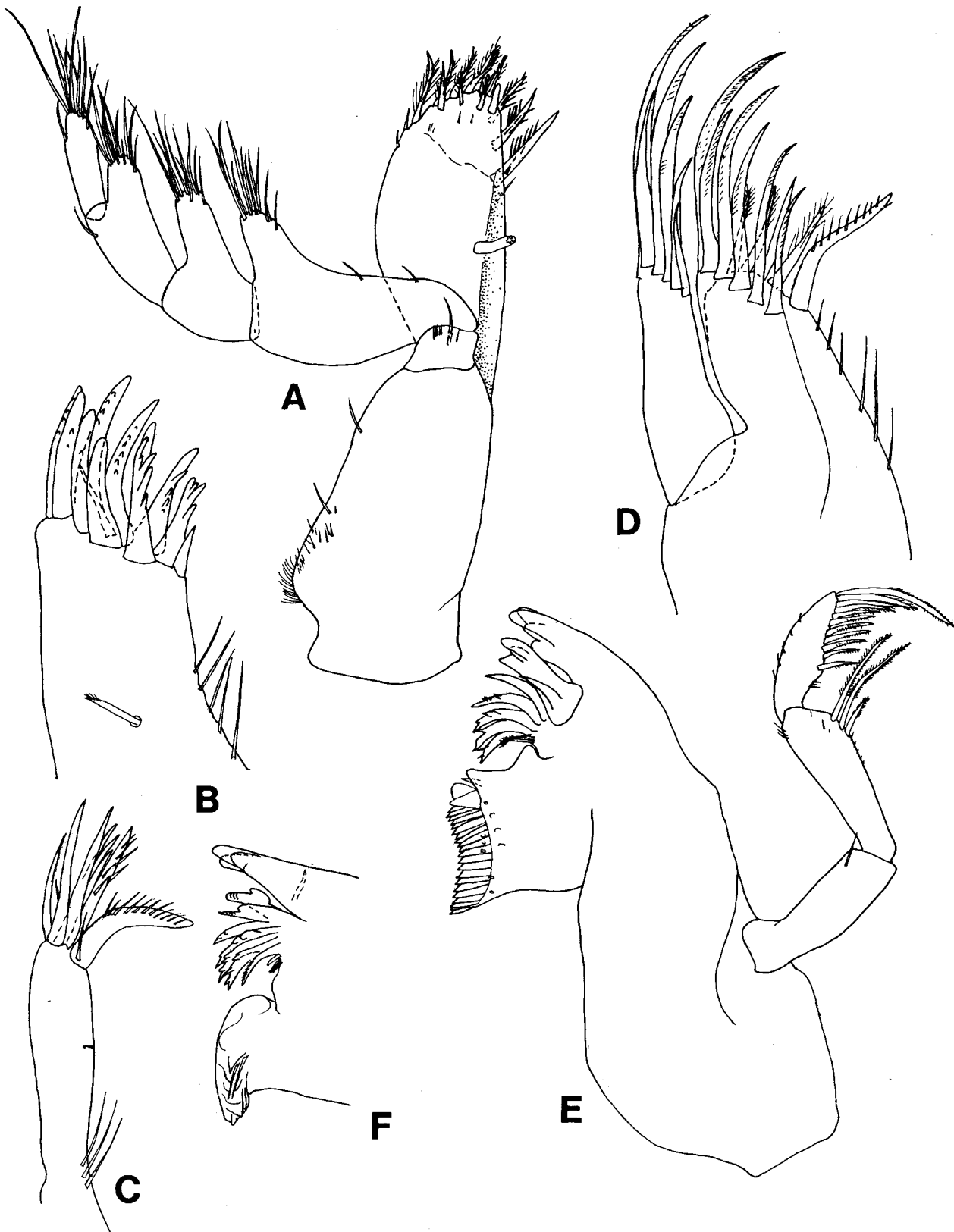


Figure 9. *Cassidias australiensis* sp. nov. All figs male paratype. A, maxilliped; B, maxillule, lateral lobe; C, maxillule mesial lobe; D, maxilla; E, left mandible; F, right mandible, distal part.

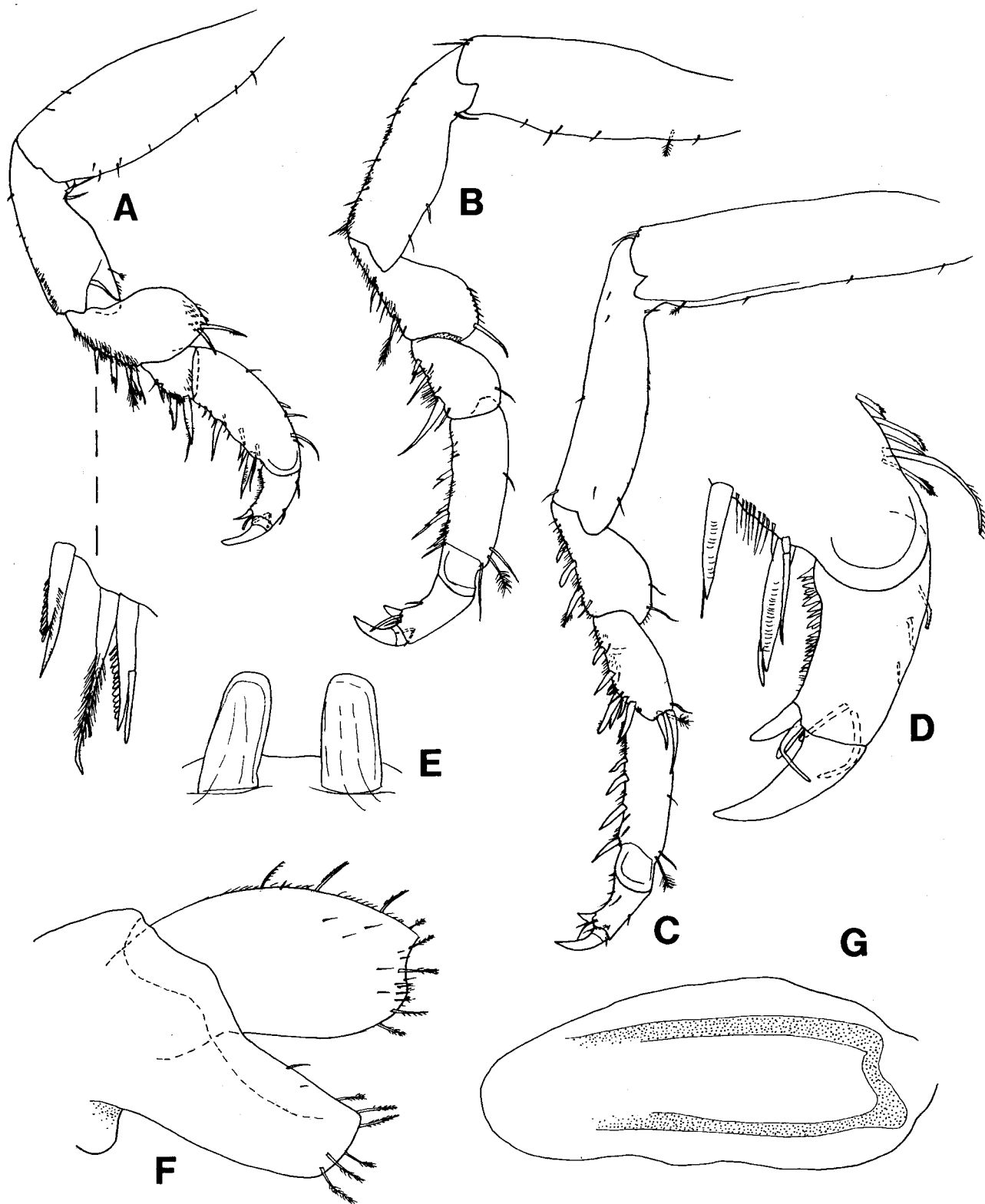


Figure 10. *Cassidias australiensis* sp. nov. A–C, pereopods 1, 2 and 7; D, dactylus, pereopod 1; E, penial processes; F, uropod, immature; G, oostegite 2.

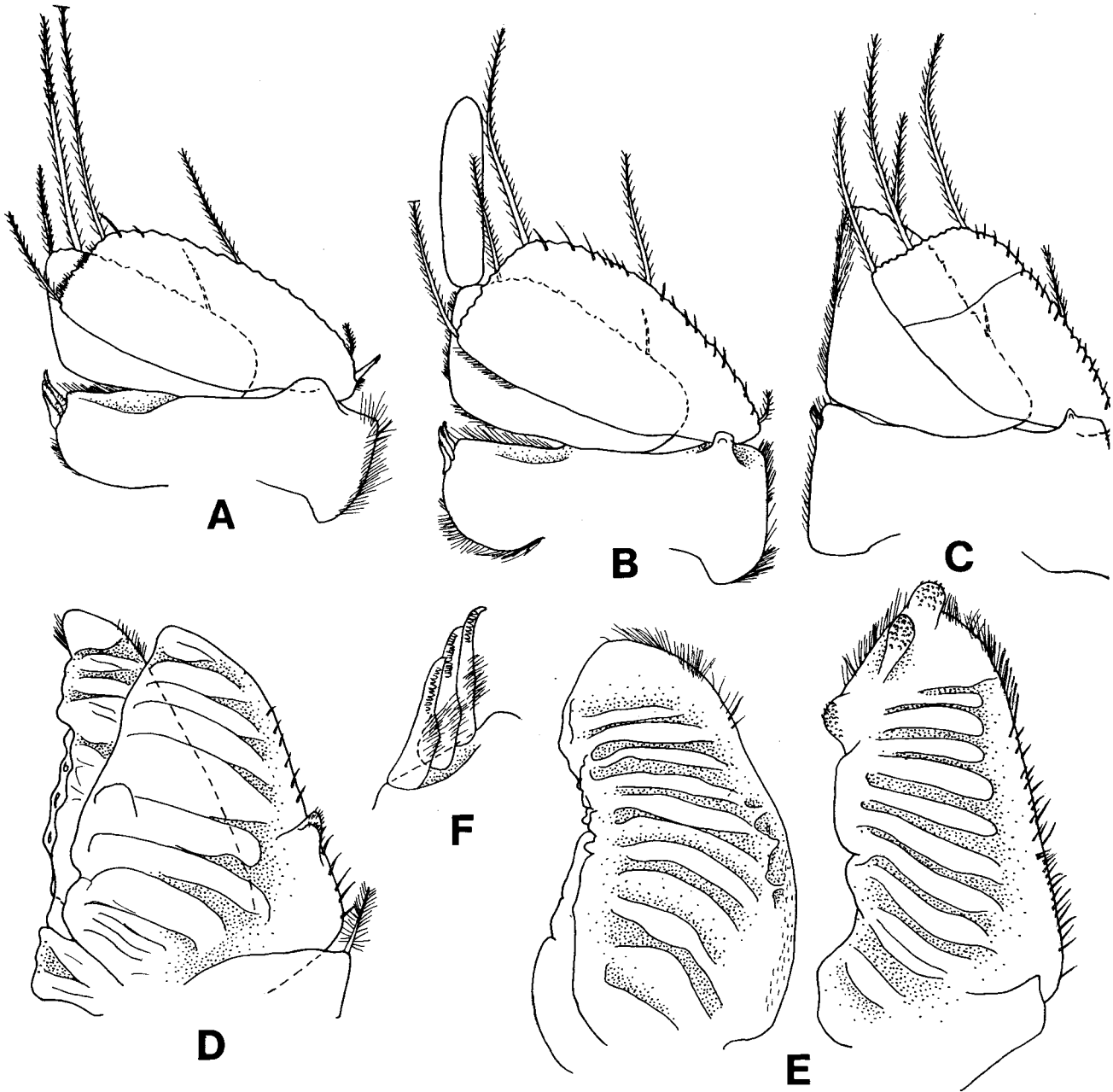


Figure 11. *Cassidias australiensis* sp. nov. A–E, pleopods 1–5; F, coupling hooks, pleopod 1.

palp slender, article 2 4 times as long as basal width; articles 3 and 4 with finger-like distomesial lobes; articles 2–5 with about 12, 13, 14 and 16 setae respectively.

Pereopod 1 basis about 2.9 times as long as greatest width, approximately twice as long as propodus; superior margin with few widely-spaced short simple setae; ischium about as long as propodus, twice as long as greatest width, proximal superior margin with 2 acute short simple RS, inferior margin with short setulose fringe; merus about 0.7 as long as ischium, 1.2 times as long as greatest width, superior distal angle with 2 acute biserrate RS, inferior margin with distally plumose setae set among

setulose fringe; carpus approximately as long as wide, inferior margin 0.6 times as long as merus, with 2 distally plumose setae; propodus 2.5 times as long as greatest width, inferior margin with 3 stout serrate and 2 slender distally plumose setae; dactylus 0.6 times as long as propodus, unguis inferior margin with prominent serrate cuticular scales, secondary unguis recurved simple. Pereopods 2–7 subsimilar. Pereopods 2 and 3 similar to pereopod 1. Pereopod 2 basis 3 times as long as greatest width, inferodistal angle with single simple seta, superior margin with widely spaced small setae; ischium 0.7 times as long as basis, 3 times as long as greatest width,

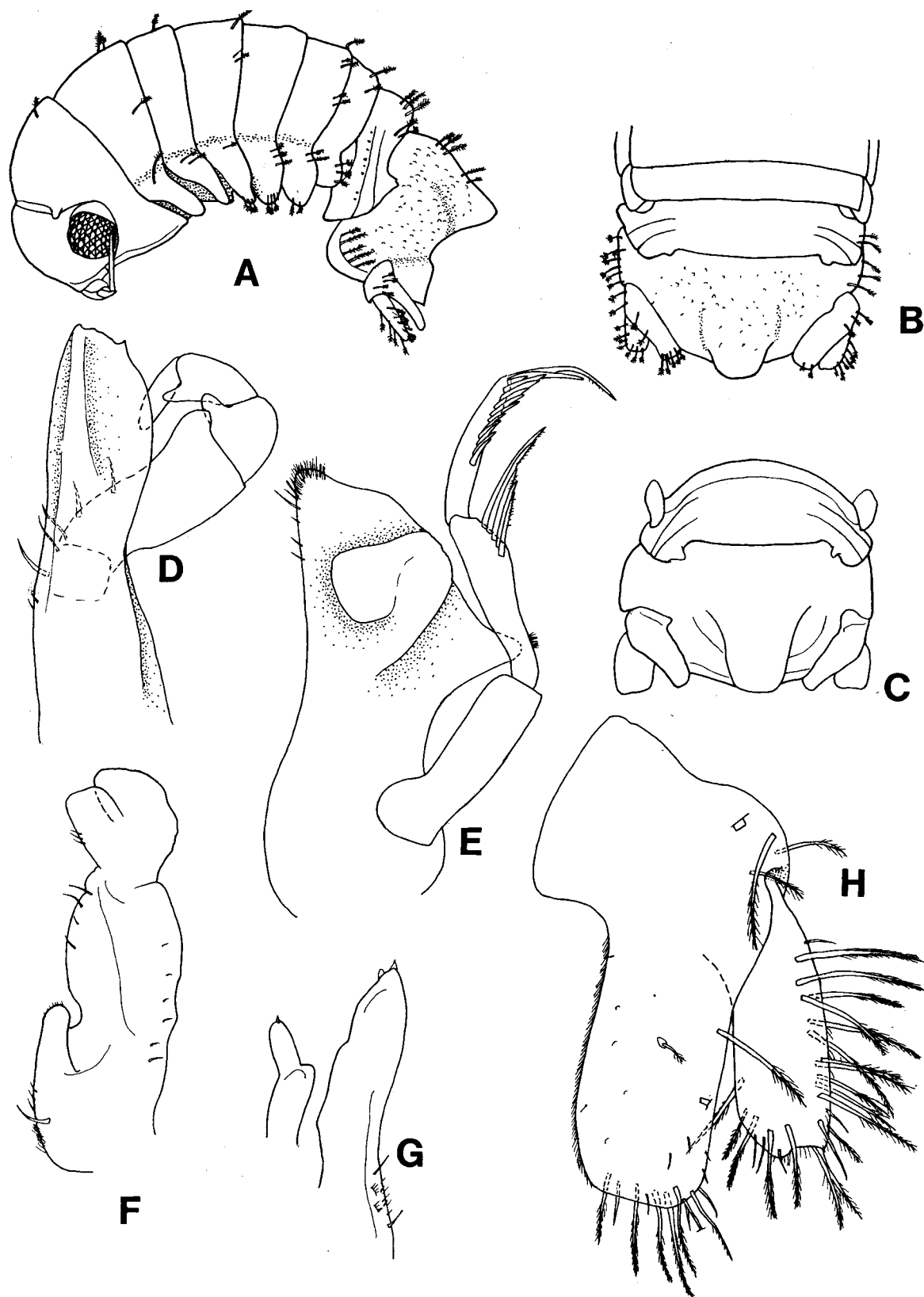


Figure 12. *Cassidias australiensis* sp. nov. All female except C, immature paratype. A, lateral view; B, dorsal view of pleon; C, dorsal view of pleon, immature; D, maxilliped; E, left mandible; F, maxilla; G, maxillule; H, uropod.

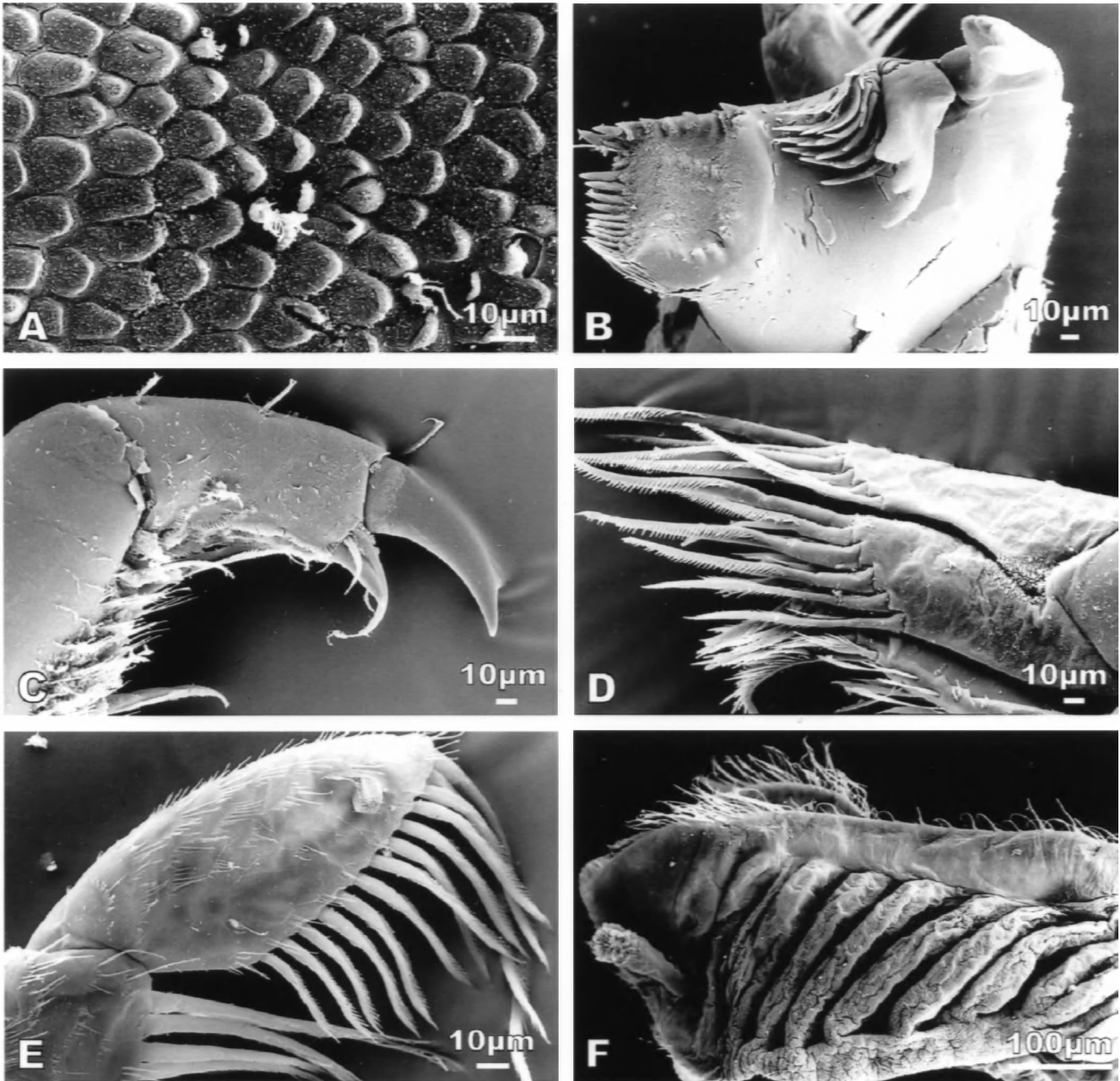


Figure 13. *Cassidias australiensis* sp. nov. SEMs. Male, McLuer Island, NT, NMV J26384. A, cuticle on pleon; B, left mandible; C, pereopod 1, dactylus; D, maxilla; E, mandible palp article 3; F, pleopod 5, exopod dorsal.

superior distal margin with 2 simple setae, inferior margin with short setulose fringe and 4 widely-spaced short simple setae; merus about half as long as ischium, superior distal angle with 1 long simple seta, inferior margin setulose with 2 long distally plumose setae, distal seta being twice as long as proximal seta; carpus anterodistal angle with single small simple seta, inferior margin setulose, with 4 setae, longest of which is simple, remainder distally plumose; propodus about as long as ischium, superior distal angle with 3 setae one of which is pap-pose, inferior margin finely setulose, with 3 RS; dactylus 0.6 as long as propodus. Pereopods 5–7 similar, longer and with more

RS than pereopods 1 and 2. Pereopod 7 basis 4 times as long as greatest width, inferodistal angle with single simple seta, superior margin with 2 widely-spaced small setae, distally with 1 palmate seta; ischium 0.8 times as long as basis, 3.8 times as long as greatest width, proximal superior margin with 1 short acute RS, superior distal margin with 1 simple setae, inferior margin with 2 widely-spaced short simple setae; merus one-third as long as ischium, superior distal margin with 2 simple setae, inferior margin setulose with 3 simple RS; carpus 1.3 times as long as merus, anterodistal angle with 2 acute RS, 1 simple and 1 palmate seta, simple seta, inferior margin setulose, with 1

simple and one serrate RS, inferodistal angle with 4 serrate RS; propodus 1.7 times as long as ischium, superior distal angle with 1 simple and 1 palmate seta, inferior margin finely setulose, with 4 simple RS; dactylus 0.4 as long as propodus.

Penes twice as long as basal width, distally subtruncate; separated by 1.1 times basal width of penial process.

Pleopod 1 exopod and endopod with 26 and 12 PMS respectively; endopod 0.4 as long as exopod, 4 times as long as greatest width, proximal lateral margin weakly concave. Pleopod 2 exopod and endopod with 28 and 10 PMS respectively; appendix masculina 5 times as long as wide, bluntly rounded, mesial margin straight, lateral margin weakly convex. Pleopod 3 exopod and endopod with 28 and 13 PMS respectively. Pleopod 4 both rami with prominent thick ridges, exopod lateral margin with c. 10 fine setae, small proximal submarginal lobe. Pleopod 5 both rami with prominent thick ridges; exopod with 3 scale patches distal to suture, lateral margin with numerous short simple setae, distal margins with longer scale-setae; endopod with scale-setae on distal margin only. Uropod 3 times as long as wide.

Female. Body shape similar to that of male, but pleotelson process prominent, less developed; with fewer setae on dorsal surfaces. Uropod endopod 4 times as long as wide (including peduncular portion), distal margin subtruncate; exopod about 3 times as long as wide, distal margin concave. Brood pouch of 3 pairs of overlapping oostegites arising from pereonites 2–4.

Size. Adult males 3.4–4.0 mm, ovigerous females 3.0–4.3 mm, non-ovigerous females 2.6–4.2 mm.

Etymology. All species of *Cassidias* have been named after the country from which they were collected (coincidentally all starting with the letter 'a'), and I continue with that practice.

Distribution. NT, North-West Shelf, WA; 8–37 m. The species has been recorded from hydroids, while field observations suggest that it is a commensal of gorgonian 'corals'. A colour photograph shows a similar isopod from Indonesia, identified as *Cassidias* sp., on a gorgonian (Bruce, 1999).

Remarks. Neither *Cassidias argentina* nor *Cassidias africana* have been described in detail. The male of *Cassidias argentina* remains unknown, but the female differs from *C. australiensis* in being larger, with distally rounded uropods (in *C. australiensis* the female uropodal endopod is truncate, the exopod distally indented). Males of *Cassidias africana* differ in having the pleotelsonic process subacute rather than truncate and have a far longer uropodal endopod which is distally swollen giving a somewhat club-shaped appearance.

Exosphaeroma Stebbing

Exosphaeroma Stebbing, 1900: 553; 1902: 54 (part).—Stebbing, 1910a: 220.—Stebbing, 1910b: 428.—Hansen, 1905: 103, 118.—Richardson, 1905: 287.—Barnard, 1914: 374.—Monod, 1933: 9–20.—Menzies, 1962: 132.—Menzies and Frankenberg, 1966: 45.—Menzies and Glynn, 1968: 65.—Schultz, 1969: 131.—Hurley and Jansen, 1977: 55.—Kussakin, 1979: 398.—Harrison, 1984a: 381.—Brusca and Iverson, 1985: 26.—Jacobs, 1987: 67.—Kensley and Schotte, 1989: 229.—Harrison and Ellis, 1991: 939 (key).

Type species: *Sphaeroma gigas* Leach 1818, by original designation.

Diagnosis. Pereonite 7 posterior margin even or forming a mesial point, without processes; pleon and pleotelson without process. Pleonite 1 dorsal posterior margin with pair of flat and flush submedian lobes. Pleotelson posterior margin entire, ventrally excavate, without distinct exit channel. Maxilliped palp articles 2–4 mesial margin with distinct lobes. Pereopods 1–3 with inferior margins of merus–propodus densely setulose; ischium superior margin usually with cluster of long simple setae at midpoint. Penial process basally set apart, slender usually between 3–5 times as long as basal width. Pleopod 2 appendix masculina slender, basal in position, extending well beyond distal margin of ramus, apex may be glandular in appearance; pleopods 3–5 exopods with complete transverse suture; pleopods 4 and 5 exopods with or without thickened ridges or folds. Uropods with both rami prominent in dorsal view, lamellar, subequal in length, margins not serrated. Mouthparts not metamorphosed. Brood pouch (Harrison, 1984) formed of four pairs of oostegites that do not overlap at the midline.

Species included and distribution. See Appendix. *Exosphaeroma* appears to be distributed world-wide, though apparently absent from the North Atlantic with those species currently known from the western Atlantic and Caribbean being incorrectly placed. Its presence in the eastern South Atlantic is uncertain as there are insufficient data from the African coast to be sure of its absence. Loyola e Silva (1979) reviewed the distribution of the genus as then composed.

Remarks. Characters which best serve to identify *Exosphaeroma* include the lamellar uropodal rami with the exopod being about as large as the endopod, with both rami lacking serrate margins, the entire posterior margin to the pleotelson which lacks a ventral exit channel, and the superior margin of the ischium of pereopods 1–3 provided with long setae. Pleopod 2 usually has the appendix masculina longer than the endopod, and the distal portion is often folded back on itself. Pleonite 1 has two flat submedian lobes forming part of the pleonite outline, a character shared with at least *Isocladus* Miers, 1976. That genus is readily separated by males having a prominent backwardly-directed process on pereonite 7.

Exosphaeroma is in critical need of revision, the most recent diagnosis being that of Kensley and Schotte (1989). A minimal diagnosis is offered here, based on those species for which the characters mentioned are described. Currently 32 species are included (Appendix), although many more species have been incorporated, and some removed, notably to *Gnorimosphaeroma* Menzies, 1954, *Harrieta* Kensley, 1987, *Ptyosphaera* Holdich and Harrison, 1983, *Thermosphaeroma* Cole and Bane, 1978, *Tholozodium* Eleftheriou, Holdich and Harrison, 1980 and also *Clianella* Boone, 1923, *Cymodoce* Leach, 1814, *Paracerceis* Hansen, 1905, *Pseudosphaeroma* Chilton, 1909, *Sphaeroma* Bosc, 1892 and *Sphaeromopsis* Holdich and Jones, 1973.

The relationship of *Exosphaeroma* to the similar *Isocladus* Miers, 1976 and *Zuzara* Leach, 1818 is unresolved (Bruce and

Holdich, 2002). *Isocladus* and *Zuzara* are not precisely defined and include numerous ill-defined and poorly described species. Many of the 39 species, including those regarded as incertae sedis (see Appendix), have minimal descriptions. All of the Southern Hemisphere species need to be redescribed for there to be sufficient data to assess species differences, relationships or the biogeography of this genus.

***Exosphaeroma agmokara* sp. nov.**

Figures 14–17

Material examined. Holotype. Male (7.7 mm), Broken Head, NSW, c. 28°42'S, 153°37'E, 30 Mar 1980, intertidal, on rocks at sand-rock interface, N.L. Bruce (QM W26727).

Paratypes. 6 males (7.0–7.4, immature 5.4, 5.6 mm), 5 females (ovigerous 5.8, 5.9, non-ovigerous 5.7–6.6 mm), 3 manca (3.9–5.0 mm), same data as holotype (QM W8573).

Description of male. Body 1.8 times as long as greatest width, ovate, widest at pereonite 5; dorsal surfaces smooth, anteriorly with fine ridges. Cephalon anterior margin without transverse ridges, ventral rostral process weakly developed, not visible in dorsal view. Head about one-third as long as pereonite 1, pereonite 1 about 1.5 times as long as pereonite 2; pereonite 2>3=4>5<6<7; pereonite 7 laterally shorter than 6, longer than pereonite 6 at median point. Pleon laterally about twice as long as pereonite 7, with sublateral 'keys'. Pleotelson strongly vaulted, posterior margin produced to acute apex; ventral margin anteriorly excavate.

Antennule peduncle article 1 1.4 times as long as wide, about 2.4 times as long as article 2, anterior and posterior margins convex; article 3 about two-thirds as long as article 1, 2.5 times as long as wide, 1.6 times as long as article 2; flagellum 16-articled, extending to posterior of pereonite 1, about 2.8 times as long as article 3. Antenna relatively robust, peduncle articles 1 and 2 short, article 1 anterior margin with mass of setae, combined lengths about equal to that of article 5; article 3 about 1.2 times as long as article 4; article 4 about 0.6 as long as article 5, articles 3–5 collinear; flagellum about 1.4 times as long as peduncle, extending to middle of margin of pereonite 3, with 17 articles.

Epistome anteriorly truncate, anterior lateral margins straight, diverging to mid point, then narrowing to medial constriction. Left mandible incisor with 3 cusps, lacinia mobilis with 3 cusps, spine row of 7–8 curved serrate spines; right mandible with 3 indistinct cusps, spine row of 2 broad-based multidigitate spines, 11 serrate spines; molar process round, crushing surface strongly ridged; palp articles 1 and 2 subequal in length, article 2 distolateral margin with 16 finely biserrate setae; article 3 with 18 biserrate setae, terminal 2 setae being longest. Maxillule mesial lobe with 4 long, strongly CP RS, lateral lobe with 10 RS on gnathal surface, twelfth seta set between these; 4 lateral-most and mesial-most RS simple, others strongly serrate. Maxilla lateral lobe and middle lobe each with 9 curved finely serrate RS respectively, mesial lobe with about 20 serrate and biserrate RS, many of which are weakly spatulate, proximal seta longest. Maxilliped endite lateral margin strongly convex, distal margin with 1 simple RS at sublateral angle, 5 curved CPRS, 8 mesially bent CPRS; distomesial

margin with 5 large stout CPRS, increasing in size proximally; palp articles 2–5 with about 26, 30, 30 and 24 setae respectively.

Pereopod 1 with inferior margin of distal half of ischium and entire margin of merus to propodus with dense setulose fringe; basis about 2.8 times as long as greatest width, approximately twice as long as propodus; superior margin with 3 close-set short simple setae at midpoint; ischium 0.8 times as long as basis, 2.3 times as long as greatest width, superior margin weakly setulose with 4 prominent acute simple setae; merus short, about 0.3 times as long as ischium, about 0.7 times as long as greatest width, superior distal angle with 5 acute long simple setae, inferior margin with 5 setae distal-most only being long and extending beyond setulose fringe; carpus 0.8 times as long as wide, inferior margin with 1 long seta and distally with 1 RS; propodus 2.0 times as long as greatest width, 0.7 times as long as ischium, inferior margin with 2 setae and distally with 1 RS; dactylus 0.8 times as long as propodus, unguis inferior margin with prominent serrate cuticular scales, secondary unguis recurved simple. Pereopods 2–7 subsimilar, pereopod 7 slightly shorter than pereopod 6. Pereopod 2 basis 2.4 times as long as greatest width, inferior proximal margin and submarginal surface with setulose fringe; inferodistal angle with single simple seta, superior margin with widely spaced small setae; ischium 0.8 times as long as basis, 2.3 times as long as greatest width, superior distal margin with 4 prominent simple setae, inferior margin with setulose fringe at distal angle only; merus about half as long as ischium, superior distal angle with 2 long simple seta, inferior margin with dense setulose fringe with 4 short and 1 long simple seta; carpus slightly (1.1) times longer than merus, 1.6 times as long as greatest width, anterodistal angle with 2 small simple seta, inferior margin with dense setulose fringe, with 5 long simple setae; propodus 0.9 times as long as ischium, superior distal angle with 3 setae one of which is palmate, inferior margin with dense setulose fringe, with 8 simple setae none of which greatly exceed length of setulose fringe; dactylus 0.4 as long as propodus. Pereopods 5–7 similar, longer and with more RS than pereopods 1 and 2, pereopod 7 noticeably more slender than pereopod 6. Pereopod 7 basis 4.2 times as long as greatest width, inferodistal angle with single simple seta, superior margin with 4 widely spaced small setae, distally with group of 4 palmate seta, proximal inferior margin with setulose patch; ischium 0.6 times as long as basis, 2.9 times as long as greatest width, proximal superior margin with 4 prominent long simple setae, inferior distal angle with 1 short simple setae; merus half as long as ischium, superior distal angle truncate, with 5 long simple setae, inferior distal margin with setulose fringe with 2 simple setae; carpus 1.3 times as long as merus, anterodistal margin with 8 acute biserrate and 3 simple RS, inferior margin with setulose fringe with 4 simple setae, inferior distal angle with 2 stout biserrate RS; propodus about as long as ischium, 4.8 times as long as wide, inferior margin setulose but less dense than merus and carpus, distally with 2 short simple RS, superior distal angle with 1 simple and 1 palmate seta; dactylus 0.4 as long as propodus.

Penes slender, 4.5 times as long as basal width; separated by about twice basal width of penial process, angled mesially, weakly curved.

Pleopod 1 exopod and endopod with c. 35 and 27 PMS

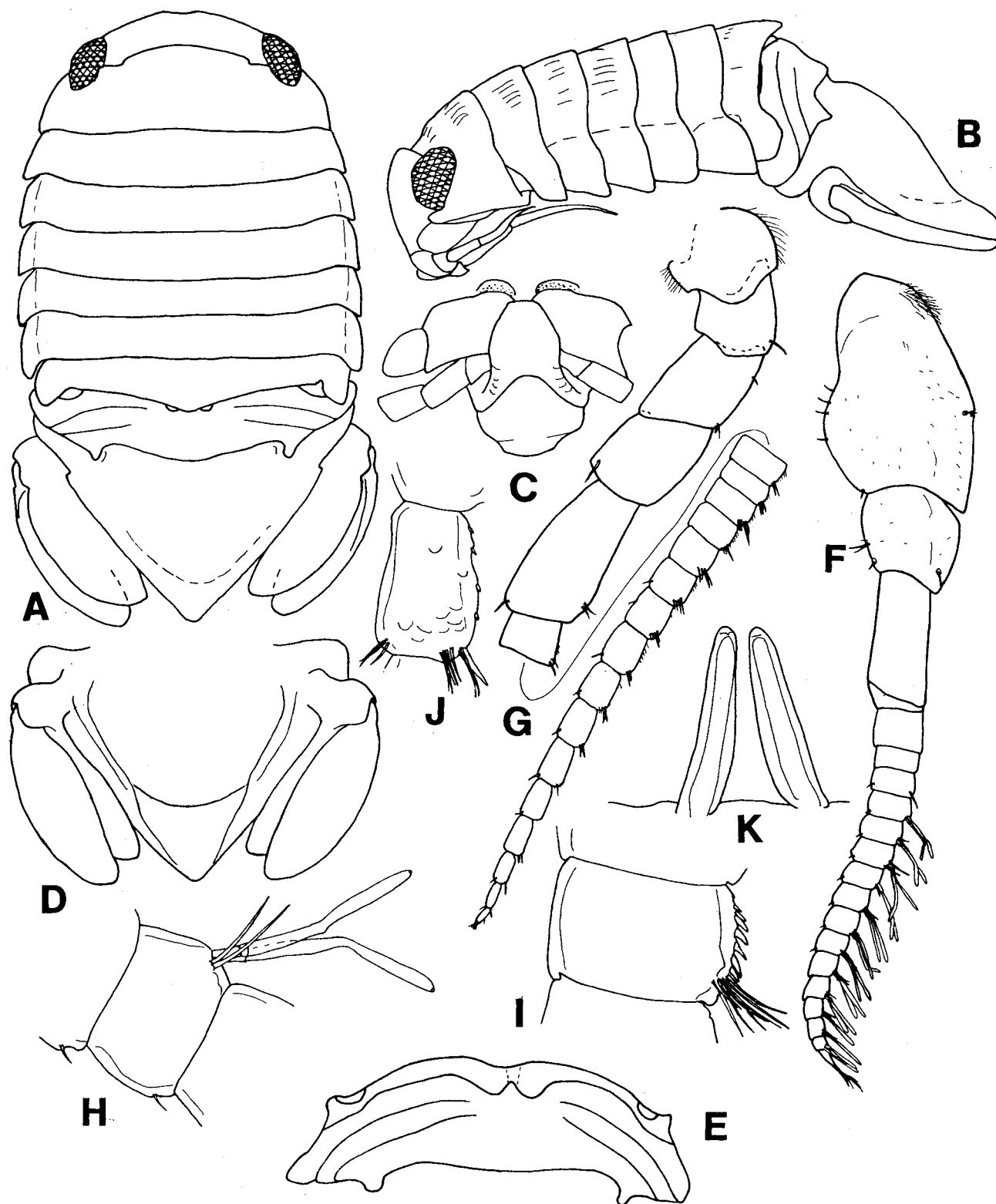


Figure 14. *Exosphaeroma agmokara* sp. nov. A–E, holotype, remainder ♂ paratype. A, dorsal view; B, lateral view; C, frons; D, pleotelson, ventral view; E, pleon; F, antennule; G, antenna; H, antennule flagellum article 6; I, antenna, flagellum article 5; J, antenna, flagellum article 13; K, penes.

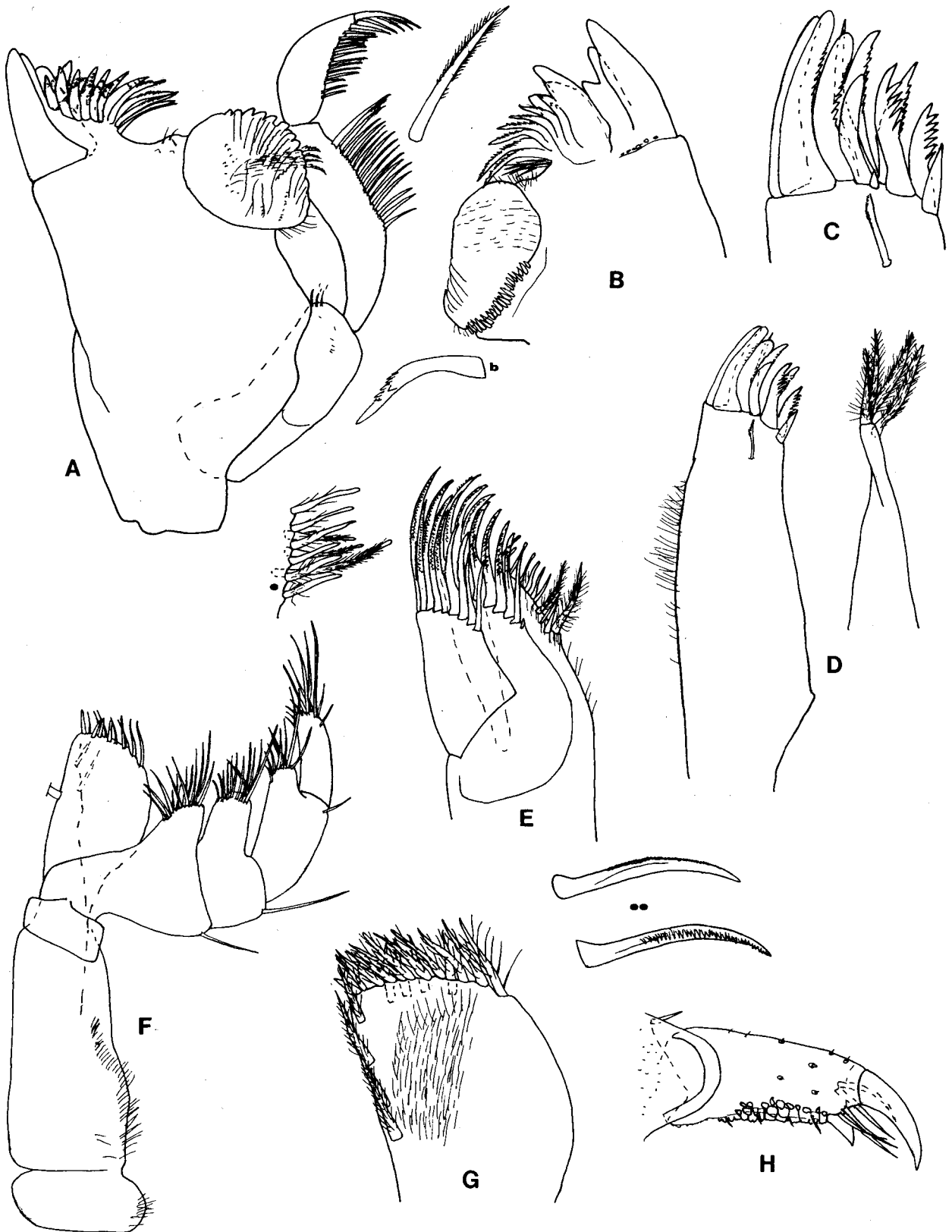


Figure 15. *Exosphaeroma agmokara* sp. nov. A, right mandible; B, left mandible; C maxillule lateral lobe; D, maxillule; E, maxilla. e, RS from mesial lobe; ee, RS from lateral and middle lobes; F, maxilliped; G, maxilliped endite, dorsal surface; H, pereopod 1 dactylus.

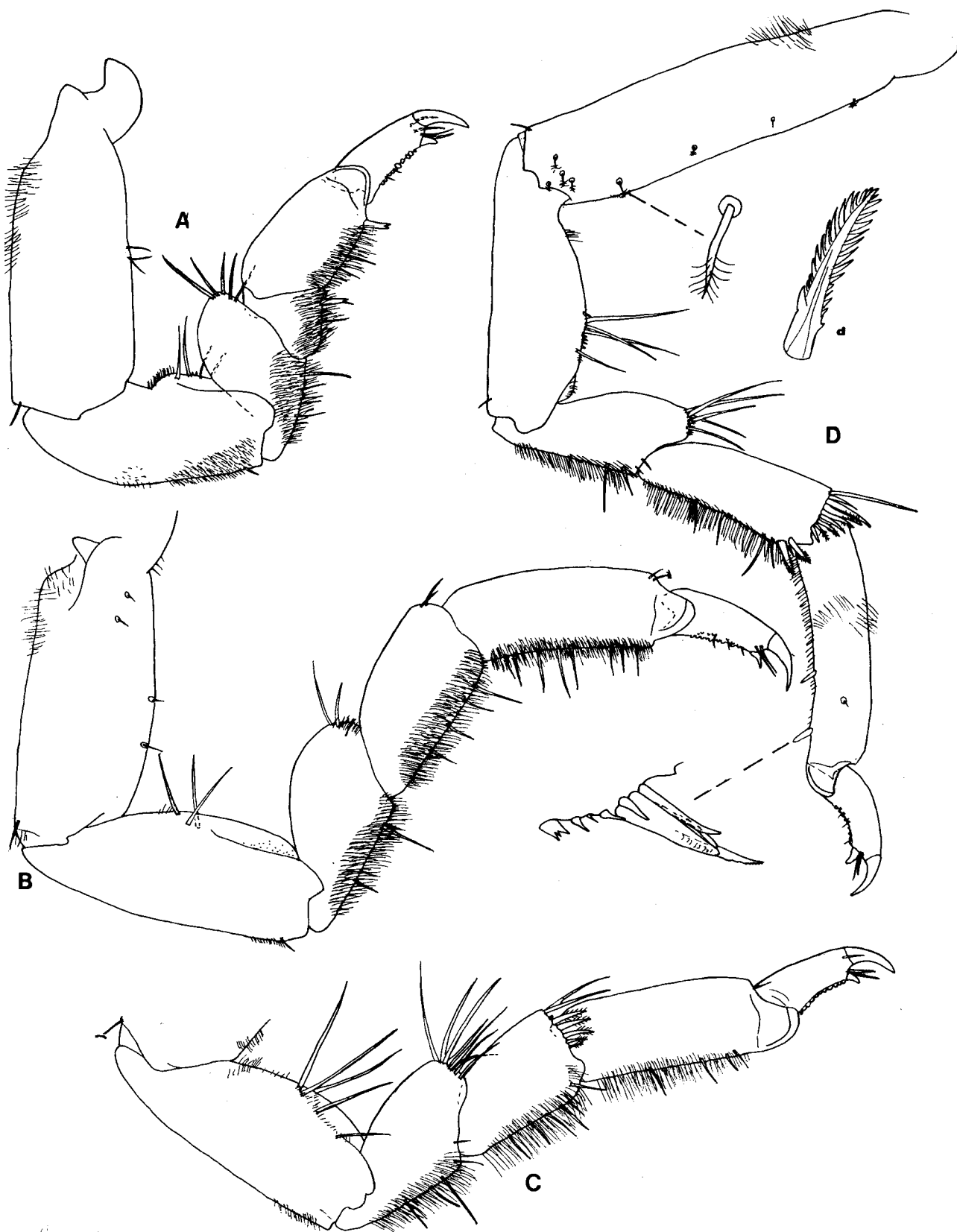


Figure 16. *Exosphaeroma agmokara* sp. nov. A–D, pereopods 1, 2, 6, 7, with detail of pereopod 7 setae; d, robust seta from carpus distal margin.

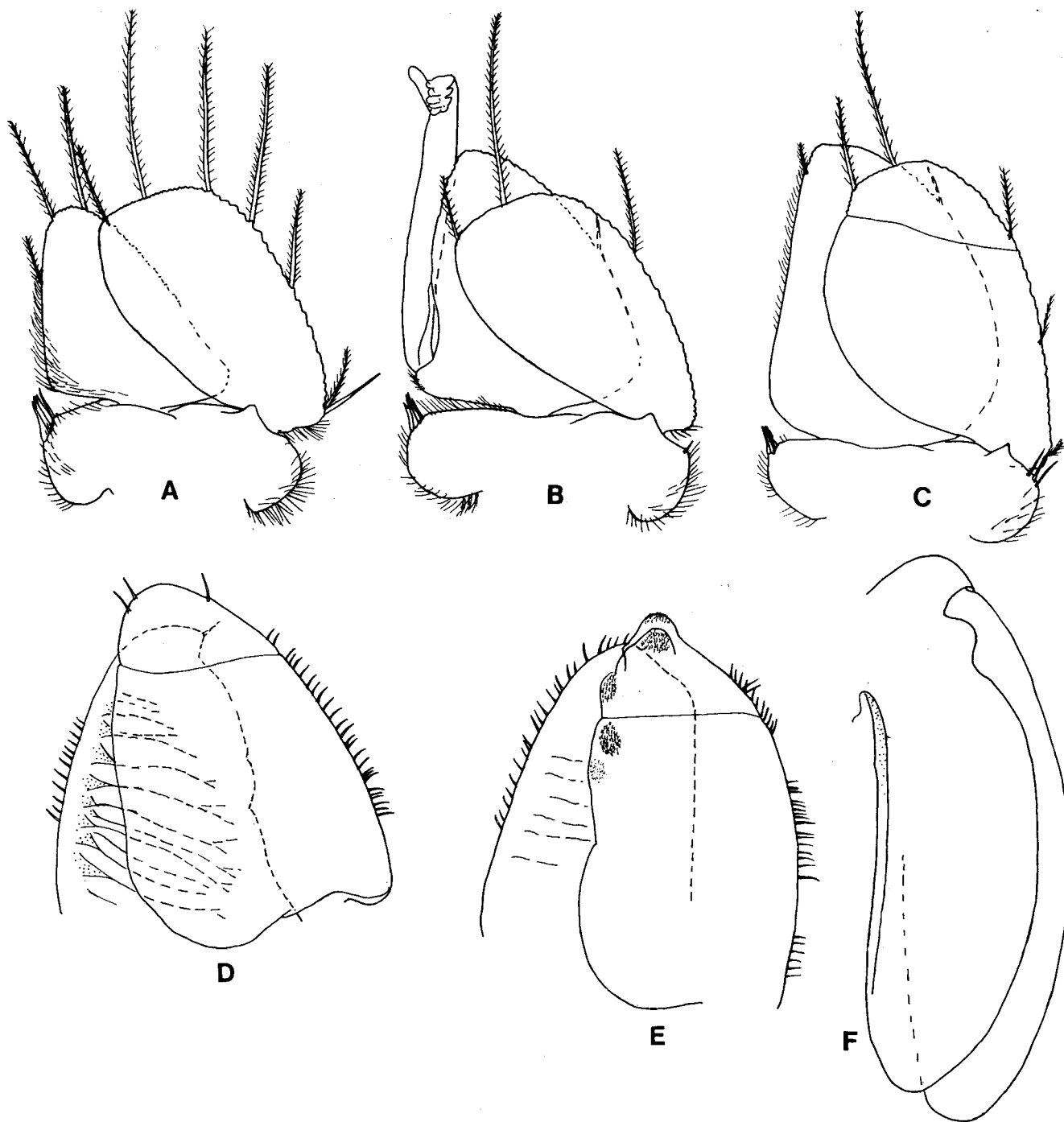


Figure 17. *Exosphaeroma agmokara* sp. nov. A–E, pleopods 1–5; F, uropod.

respectively, exopod proximolateral RS prominent; endopod 0.7 as long as exopod, 1.5 times as long as greatest width. Pleopod 2 exopod and endopod with c. 42 and 30 PMS respectively; appendix masculina 12 times as long as wide, distally highly folded and glandular in appearance, apically rounded, Pleopod 3 exopod and endopod with c. 45 and 19 PMS respectively; exopod transverse suture entire. Pleopod 4 endopod with prominent thick ridges, lateral, exopod transverse suture entire,

distal margin with 3 short simple setae, lateral margin with continuous evenly spaced fine simple setae. Pleopod 5 both endopod with feeble thickenings, without raised ridges, lateral margin with evenly spaced fine simple setae; exopod with 4 scale patches, 3 distal to suture, lateral margin with numerous evenly spaced simple setae, with obscure proximal lobe. Uropod exopod extending slightly beyond endopod, about 3 times as long as wide; endopod about twice as long as wide; both

rami with lateral margins evenly convex distal margin evenly rounded.

Female. Similar to male.

Size. Males 7.0–7.7 mm, ovigerous females 5.8–5.9 mm, non-ovigerous females, 5.7–6.6 mm, manca 3.9–5.0 mm.

Etymology. From Greek *agmo* (break) and *kara* (head), alluding the type locality; noun in apposition.

Distribution. Known only from the type locality, Broken Head, northern NSW.

Remarks. Many species of *Exosphaeroma* (Appendix) are similar. *Exosphaeroma agmokara* sp. nov. is best identified by the posterior margin of pereonite 7 being weakly produced to form a median point which overrides pleonite 1, the evenly rounded uropodal rami which extend to about the end of the pleotelson (i.e. not extending noticeably beyond nor falling short of the pleotelson apex), the apex of the pleotelson being weakly produced and acute, the narrowly truncate anterior margin of the epistome and, in the male, by the distal margin of the appendix masculina being bent with the subdistal part being heavily folded (concertina-like).

No Australian species of *Exosphaeroma* has pereonite 7 produced to form a median point, while *E. serventii* Baker, 1928 has the uropodal exopod distally acute; *E. bicolor* Baker, 1926 has the uropodal exopod longer than the endopod and distally acute, and an anteriorly rounded epistome; *E. laevis* (Baker, 1910) has an anteriorly acute epistome; *E. aliae* Baker, 1926 has a broadly subtruncate pleotelson and anteriorly acute epistome; and *E. varicolor* Barnard, 1914 has proportionally wider uropods, the pleotelson bearing two short anteriorly-positioned submedian ridges.

Similar species are the larger *E. gigas* (Leach, 1818) (Brandt and Wägele, 1989) from the Southern Ocean, *E. obtusum* (Dana, 1853, sensu Hurley and Jansen, 1978) from New Zealand and *E. pallidum* Barnard, 1940 from South Africa. Of these only *E. obtusa* has pereonite 7 forming a median point but can be distinguished by the widely truncate epistome, more bluntly rounded uropodal rami and the subdistal margins of the pleotelson being convex rather than straight. The shape of pereonite 7 is not mentioned in the poorly-known *E. pallidum*, which can be separated from *E. agmokara* by having lanceolate uropodal rami.

Exosphaeroma alveola sp. nov.

Figures 18–22

Material examined. Holotype. Male (6.5 mm), near mouth of Moona Creek, Jervis Bay, NSW, 34°04.5'S, 150°41.0'E, 23 Jan 1982, 4.5 m, on test of ascidian *Herdmania*, P.B. Berents (AM P51055).

Paratypes. NSW. 3 males (6.0 mm), 2 females (non-ovigerous 3.5, 4.2 mm), E of Fairy Bower, Manly, 33°48'S, 151°17'E, 22 Nov 1984, 6 m, sand between rocks, J. Just (AM P41189). 2 females (non-ovigerous 4.3, 4.4 mm), Edwards Beach, Middle Harbour, Sydney, 33°49.4'S, 151°15.1'E, 17 Mar 1985, under rocks at low tide, N.L. Bruce (AM P41389). Male (7.1 mm), same as previous, 23 Mar 1985 (AM P41382). 5 males (4.6–[6.7 dissected] mm), 11 females (non-ovigerous 3.0–4.6 mm), same data as holotype (AM P51056). Male (5 mm, rolled), Murrumbulga Point, Twofold Bay, 37°05'S, 149°54'E, 17 Sep 1985, intertidal rock platform, P.A. Hutchings and S.J. Keable

(AM P41201). 2 males (5.5, 6.6 mm), Quarantine Bay, Murrumbulga Point, Twofold Bay, 37°05'S, 149°54'E, 17 Sep 1985, subtidal breakwater, P.A. Hutchings and S.J. Keable (AM P41202). 2 females (5.5, 3.0 mm), Murrumbulga Point, Twofold Bay, 37°05'S, 149°54'E, 9 Oct 1985, subtidal rock, P.A. Hutchings and S.J. Keable (AM P35955). Tas. 4 females (4.0–5.5 mm), 3 females (?3.8, 4.0, 4.3 mm), Governor L. Bichen, 41°52'S, 148°19'E, 29 May 1984, 30 m, on bryozoan, (NMV J26419).

Description of male. Body heavily calcified, 1.7 times as long as greatest width, dorsum noticeably flattened, lateral margins distinctly thickened, approximately straight in dorsal view, diverging, widest at pereonite 6; dorsal surfaces minutely punctate. Head about 1.3 times as long as pereonite 1, dorsally deeply corrugated; pereonite 1 > 2 > 3 = 4 > 5 < 6 < 7; pereonite 7 laterally narrower than 6, not forming part of body outline, laterally wholly overlapped by coxae of pereonite 7. Pleon laterally about as long as pereonite 7 in lateral view (flexure makes this difficult to measure accurately), with median weakly elevated region, with evident sublateral 'keys'. Pleotelson strongly vaulted, posterior margin produced to bluntly rounded apex; ventral margin anteriorly excavate; dorsal margin mesially raised, with 2 obscure punctate submedian ridges uniting at about midpoint, expanding at posterior margin.

Antennule peduncle article 1 1.4 times as long as wide, about twice as long as article 2, anterior margins convex, distal one-third somewhat produced; article 3 about two-thirds as long as article 1, 3.7 times as long as wide, 1.3 times as long as article 2; flagellum 7-articled, extending to posterior of pereonite 1, about 1.5 times as long as article 3; antennule peduncles prominently visible in dorsal view. Antenna relatively robust, peduncle articles 1 and 2 short, article 1 anterior margin with mass of setae, combined lengths of articles 1 and 2 about equal to that of article 5; article 3 about 0.8 times as long as article 4; article 4 about 0.6 as long as article 5, articles 3–5 collinear; flagellum about 0.8 times as long as peduncle, extending to posterior margin of pereonite 1, with 12 articles.

Epistome prominently visible in dorsal view, anteriorly truncate, anterior lateral margins straight, diverging to midpoint, then narrowing to medial constriction; ventral surface pitted, centrally depressed. Left mandible incisor with 4 cusps, lacinia mobilis with 3 cusps, spine row of 8 curved serrate spines; right mandible with 3 indistinct cusps, spine row of 2 broad-based multidigitate spines, 8 serrate spines; molar process round, crushing surface strongly ridged; palp article 2 longest, article 2 distolateral margin with 9 stout and prominently biserrate setae; article 3 with 12 prominently biserrate setae, 2 terminal setae being longest. Maxillule mesial lobe with 4 long, strongly CP RS and 1 simple slender seta, lateral lobe with 11 RS on gnathal surface, twelfth seta set between these; gnathal RS variously serrate, submesial RS being most strongly serrate. Maxilla lateral lobe and middle lobe each with 9 curved finely serrate RS respectively, mesial lobe with about between 12–18 serrate and biserrate RS (number could not be clearly observed), proximal seta longest. Maxilliped endite lateral margin strongly convex, distal margin with 1 simple RS at sublateral angle, 5 curved CP RS, 2 short straight CP RS; distomesial margin with 3 large stout CP RS, increasing in size

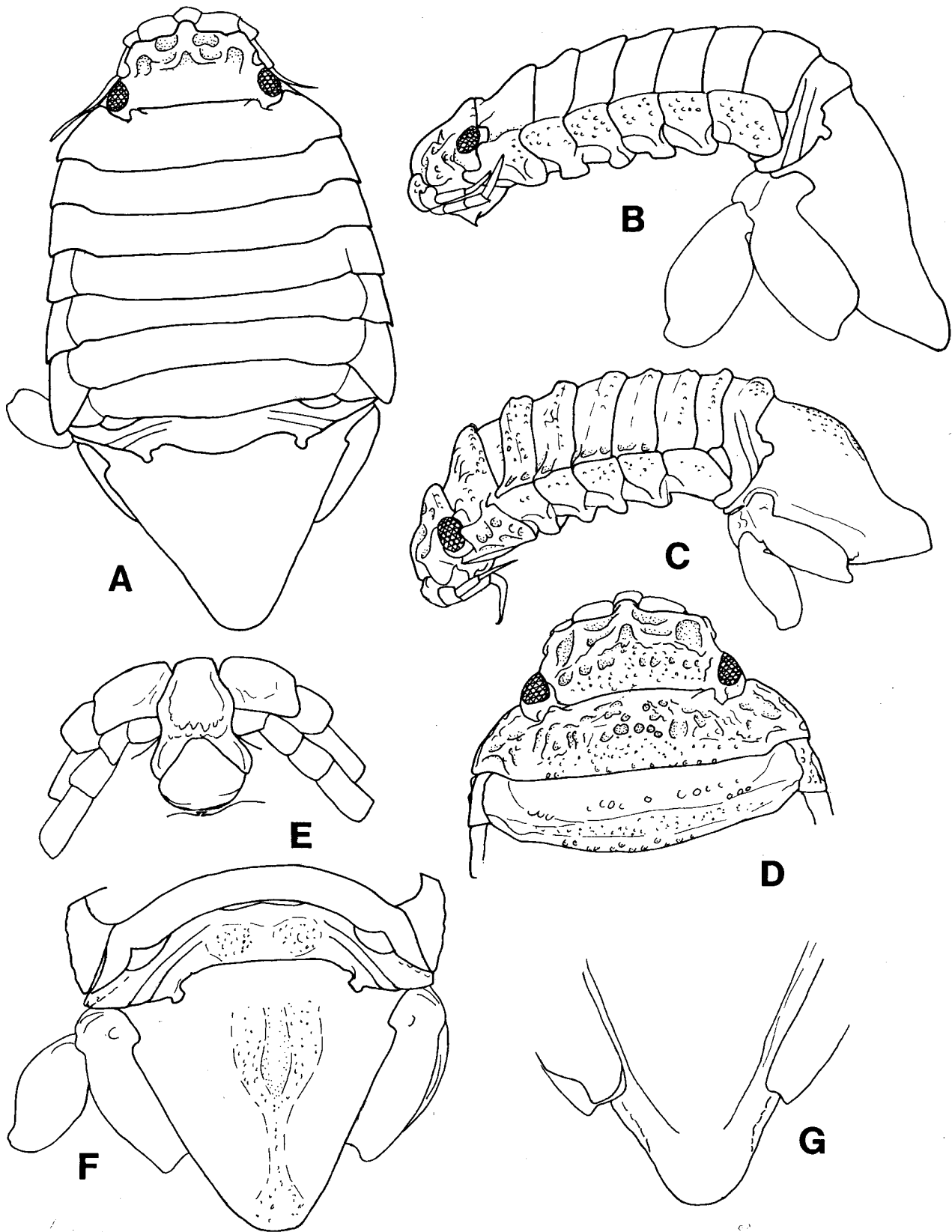


Figure 18. *Exosphaeroma alveola* sp. nov. A, B, E, G, holotype, remainder as indicated. A, dorsal view; B, lateral view; C, lateral view female; D, dorsal view, head and pereonite 1, female; E, frons; F, pleon and pleotelson, female; G, pleon, posterior margin, ventral view.

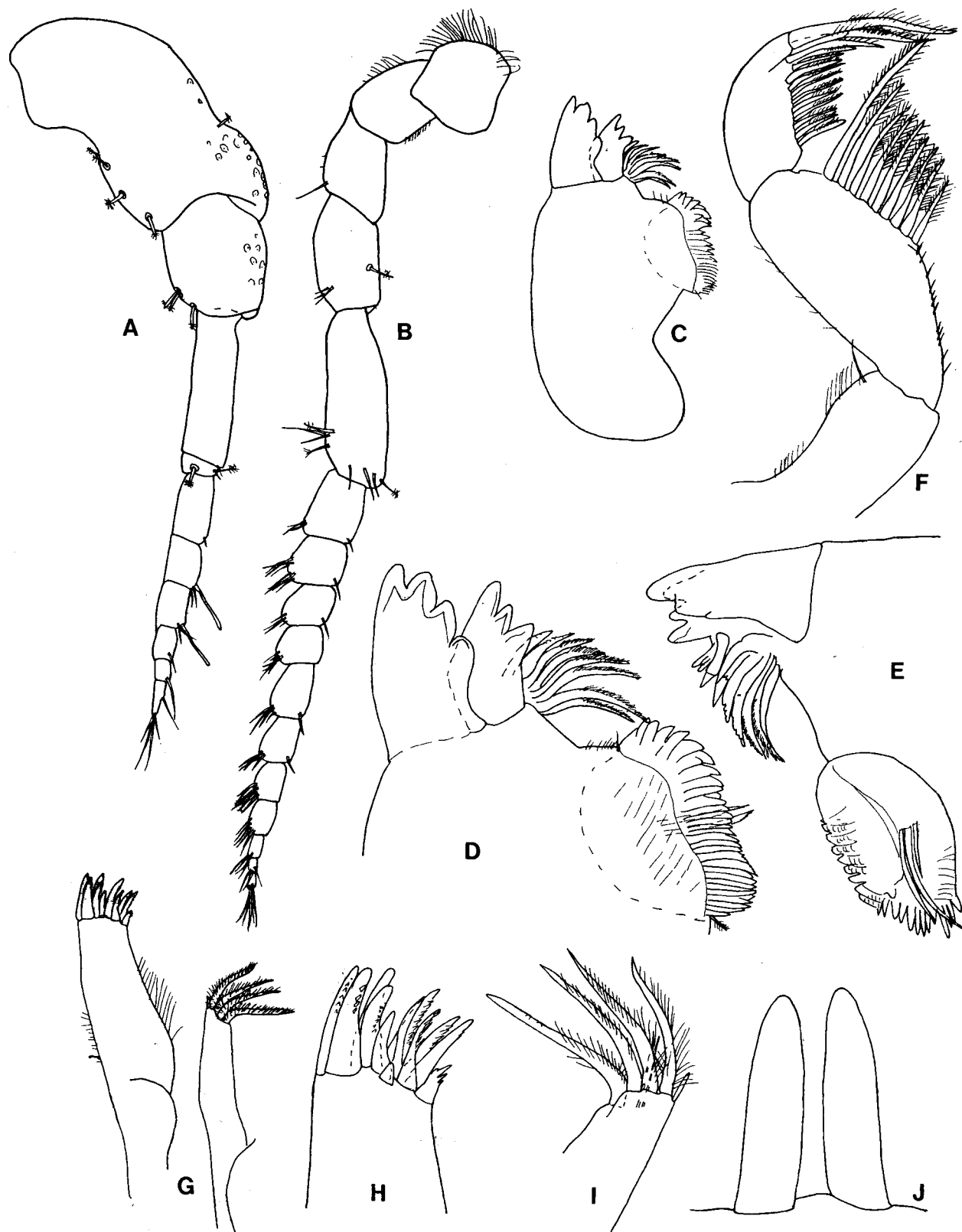


Figure 19. *Exosphaeroma alveola* sp. nov. A, antennule; B, antenna; C, left mandible; D, left mandible, distal part; E, right mandible, distal part; F, mandible palp; G, maxillule; H, maxillule, gnathal end, lateral lobe; I, maxillule, lateral lobe; J, penial processes.

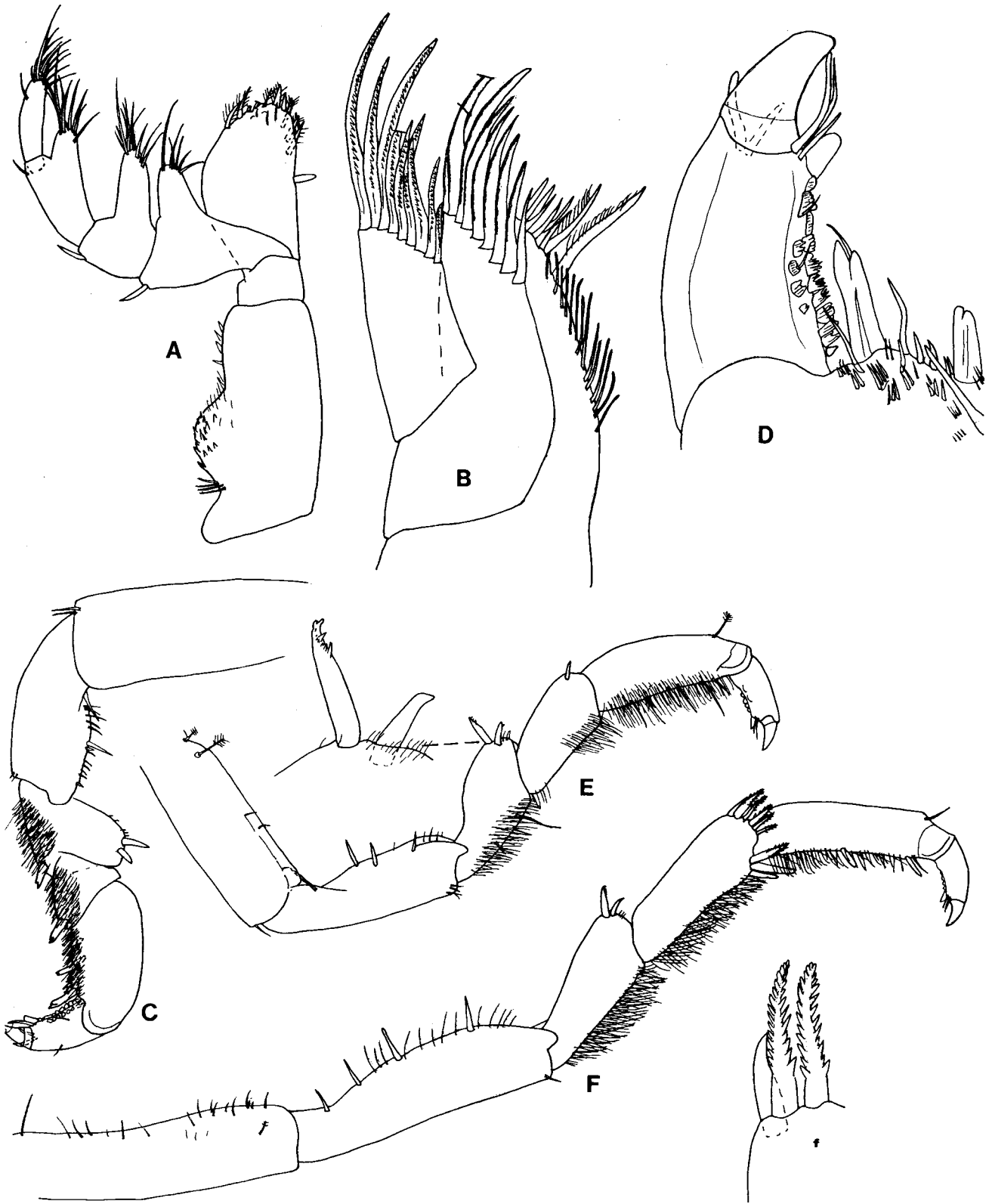


Figure 20. *Exosphaeroma alveola* sp. nov. A, maxilliped; B, maxilla; C, pereopod 1; D, pereopod 1, dactylus; E, pereopod 2; F, pereopod 7, f, RS from carpus superior distal angle.

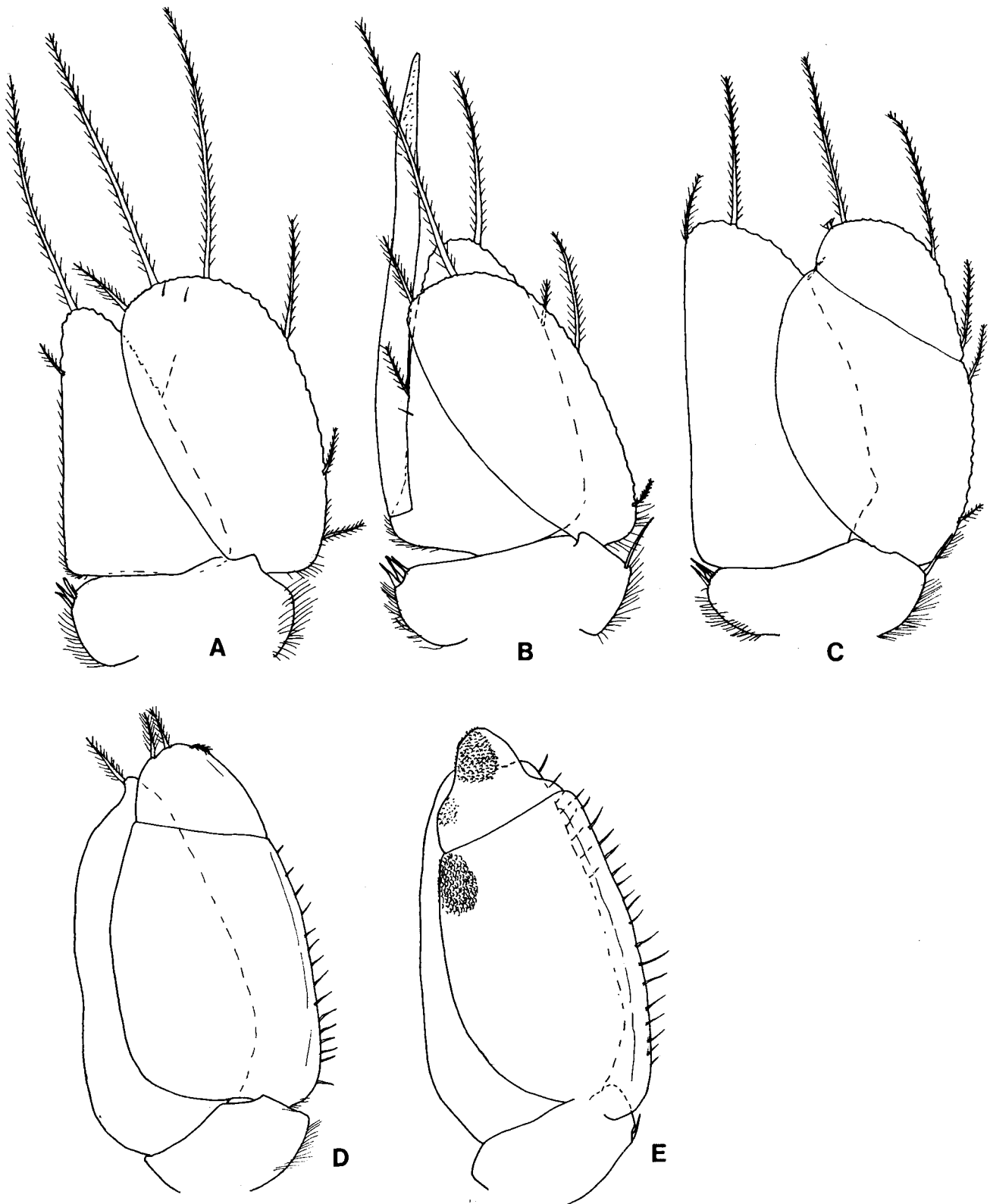


Figure 21. *Exosphaeroma alveola* sp. nov. A–E, pleopods 1–5.

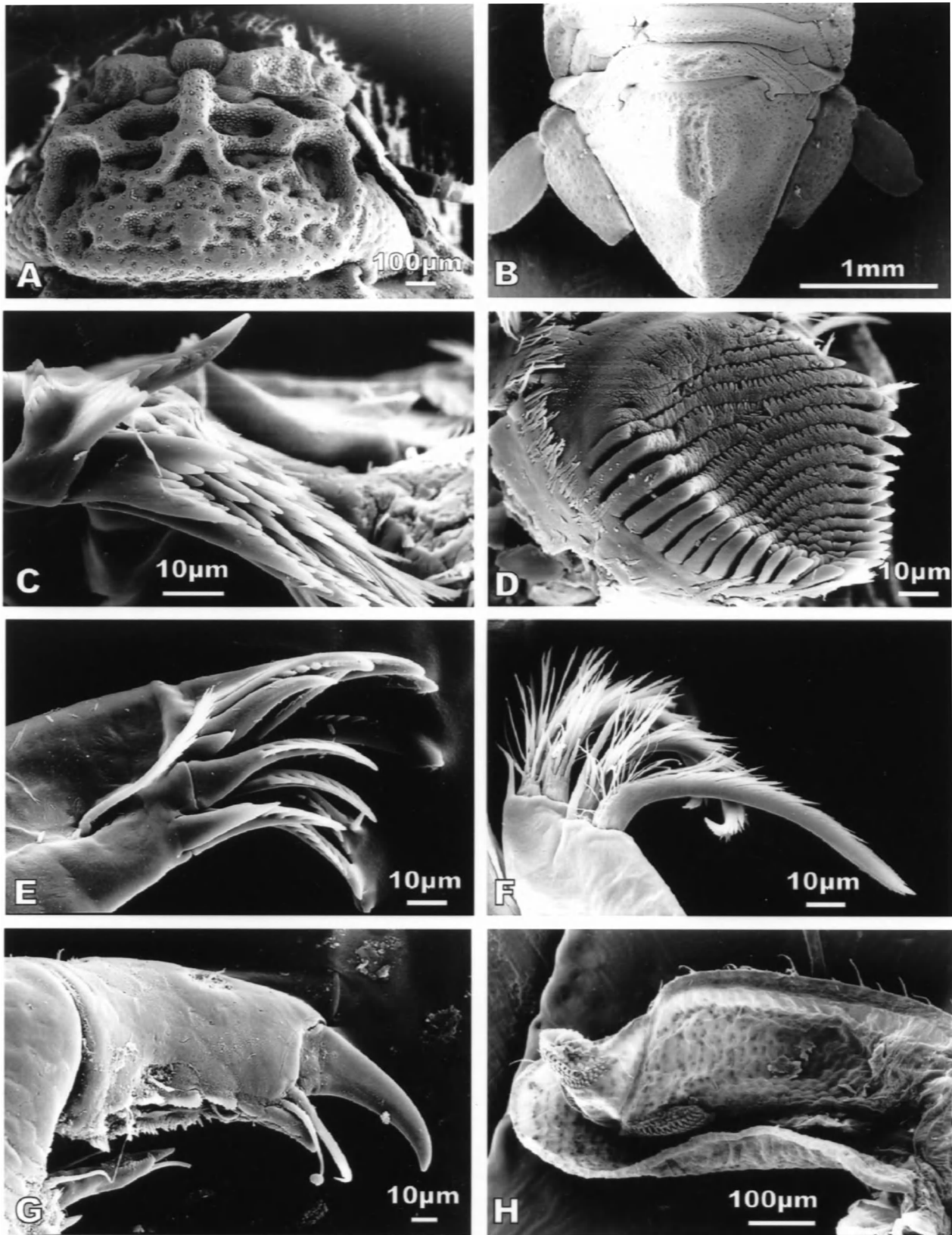


Figure 22. *Exosphaeroma alveola* sp. nov. SEMs. Female, AM P51056. A, head; B, pleon, dorsal view; C, right mandible, spine row; D, right mandible, molar; E, maxillule, lateral lobe; F, maxillule, mesial lobe; G, pereopod 1, dactylus; H, pleopod 5, exopod.

proximally; palp articles 2–5 with about 11, 14, 16 and 14 setae respectively.

Pereopod 1 basis about 2.7 times as long as greatest width, 1.7 times as long as propodus; margins without setae, inferodistal angle with single seta; ischium 0.6 times as long as basis, about as long as propodus, twice as long as greatest width, superior margin with scattered scale-setae, with 2 prominent mesial acute simple setae, one proximal and 1 at midpoint, inferior margin without setae; merus short, about half as long as ischium, about 0.8 times as long as greatest width, superior distal angle with 2 short RS, inferior margin with dense setulose fringe, with 1 apically bifid RS at distal angle; carpus 0.8 as long as wide, inferior margin with dense setulose fringe, distally with 1 apically bifid RS; propodus 2.0 times as long as greatest width, about as long as ischium, inferior margin setulose, with 3 apically bifid setae; dactylus 0.6 times as long as propodus, unguis inferior margin with prominent serrate cuticular scales, secondary unguis recurved, blunt, simple. Pereopods 2–7 subsimilar, slender. Pereopod 2 basis 3.3 times as long as greatest width, inferior margin with 2 minute widely spaced setae; inferodistal angle with single simple seta, superior margin proximally with 2 palmate setae, with widely spaced small setae; ischium 0.9 times as long as basis, 3.3 times as long as greatest width, superior margin with 3 prominent acute RS, one set proximally, 2 set at midpoint, slender seta distally, inferior margin setulose at distal angle only; merus about half as long as ischium, superior distal angle with 2 apically serrate RS, inferior margin with dense setulose fringe with 4 short setae and 1 long simple seta; carpus slightly (1.1) times longer than merus, 1.9 times as long as greatest width, anterodistal angle with 1 short RS, distal half of inferior margin densely setulose; propodus 1.4 times as long as ischium, superior distal angle with 1 palmate seta, inferior margin with dense setulose fringe, with 6 simple setae none of which greatly exceed length of setulose fringe; dactylus about half as long as propodus. Pereopods 5–7 similar, longer and with more RS than pereopods 1 and 2. Pereopod 7 basis 4.8 times as long as greatest width, inferior margin without setae, superior margin with numerous widely spaced small setae, distally with 1 palmate seta; ischium 0.8 times as long as basis, 3.6 times as long as greatest width, proximal superior margin setulose with 4 prominent acute RS, inferior distal angle with 1 short simple setae; merus about half as long as ischium, superior distal angle with 2 short acute distally serrate RS, inferior margin with dense setulose fringe with 1 distally bifid RS; carpus 1.3 times as long as merus, anterodistal margin with 6 acute biserrate and 1 simple RS, inferior margin with dense setulose fringe, inferior distal angle with 1 simple and 2 stout biserrate RS; propodus about as long as ischium, 4 times as long as wide, inferior margin setulose but less dense than merus and carpus, distally with 2 short simple RS, superior distal angle with 1 simple and 1 palmate seta; dactylus 0.4 as long as propodus.

Penes 3.4 times as long as basal width; separated by about half basal width of penial process, straight with subacute apex.

Pleopod 1 exopod and endopod with c. 33 and 17 PMS respectively, exopod proximolateral RS prominent; endopod about as long as exopod, 1.7 times as long as greatest width. Pleopod 2 exopod and endopod with c. 34 and 22 PMS

respectively; appendix masculina 18 times as long as wide, straight, distally glandular in appearance, apically acute, extending beyond endopod by 0.4 of its length. Pleopod 3 exopod and endopod with c. 37 and 14 PMS respectively; exopod transverse suture entire. Pleopod 4 rami without folds, distally with 1 PMS; exopod transverse suture entire, distal margin with 2 short PMS, lateral margin proximal to suture with continuous evenly spaced fine simple setae. Pleopod 5 with both rami lacking folds, endopod lateral margin with evenly spaced fine simple setae; exopod transverse suture entire, with 3 scale patches, 2 distal to suture, lateral margin with numerous evenly spaced simple setae. Uropod rami subequal in length, rami not extending beyond posterior margin of pleon, exopod with lateral margin convex with apex laterally falcate, endopod distally subtruncate with distolateral angle produced.

Female. Slightly smaller than males; body shape generally similar to that of male, dorsal surface markedly more ornamented.

Size. Males 4.6–6.6 mm, females 3.0–4.6 mm.

Etymology. From Greek *alveus* (cavity, pit), alluding the pitted surfaces of this species.

Distribution. Southern NSW, Tas.; from ascidians, bryozoans, under rocks and in sand from intertidal to 6 m in NSW, 30 m in Tas.

Remarks. Although the large uropods and coarsely pitted dorsal surfaces of this species immediately separates it from all other species, *Exosphaeroma alveola* is strikingly similar to the South African *E. planum* Barnard, 1914 in the shape of the pleotelson and uropods, pleotelson ornamentation and the somewhat flattened body shape. In contrast to *E. planum* the posterior margin of the pleotelson extends well beyond the uropods.

Four Southern Hemisphere species of *Exosphaeroma* have similar pleotelson ornamentation, with the anterior dorsal surface with two submedian ridges and the posterior part being somewhat produced, with a median ridge. These species are *E. antikraussi* Barnard, 1940, *E. kraussi* Tattersall, 1913, *E. varicolor* Barnard, 1914 (also recorded from Australia by Hale, 1929) all from South Africa, and *E. montis* (Hurley and Jansen, 1978) comb. nov. (Appendix) from New Zealand.

Most species of *Exosphaeroma* have a group of long, simple setae at the midpoint of the superior margin of the ischium and at the distal margin of the merus of the pereopods. This is shown by the type species (Brandt and Wägele, 1989), *E. agmokara* sp. nov., *E. bruscai* (Espinosa-Peréz and Hendrickx, 2002) and *E. amplicauda* (Stimpson, 1857) (Kussakin, 1979), but has rarely been illustrated for other species. In the present species these setae are absent.

Koremasphaera gen. nov.

Type species. *Koremasphaera colonus* sp. nov., here designated.

Diagnosis. Pleotelson posterior margin entire, without ventral exit channel. Dorsal surfaces of pereonites 2–7, pleon and pleotelson densely setose. Pleon with 4 segments, sutures running to lateral margin. Antennule peduncle article 1 more than twice as long as article 2, articles 1 and 2 robust; article 3 slender, all

articles collinear. Maxilliped palp articles 2–4 each with distomesial angle strongly produced, those of 3–4 finger-like; article 5 elongate and finger-like; mesial margins with numerous long simple setae. Pleopods 4 and 5 without thickened folds or ridges. Uropods attached subdistally on pleon, both rami semicylindrical in section, apically acute, exopod apex with cuticular spike; pleotelson posterior margin entire.

Description of male. Body stout, about twice as long as greatest width, strongly vaulted; dorsal surface granular, with abundant setae. Head weakly immersed in pereonite 1. Eyes small, facets distinct. Pereon segments with raised posterior margins. Coxae distinctly demarcated, overlapping anterior over posterior, ventrally directed. Membrana cingula absent. Pleon of 4 segments, segment 1 largely concealed by pereonite 7, segments 2–4 indicated by 2 distinct suture lines running to lateral margins of pleon. Pleotelson posterior margin entire without distinct ventral exit channel. Pleonal sternite absent.

Antennule and antenna anteriorly positioned on head. Antennule peduncle articles 1 and 2 robust, article 1 more than twice as long as article 2; article 3 slender, all articles collinear; flagellum about as long as peduncle, extending to middle of pereonite 1. Antenna peduncle articles 1–2 short, subequal, shorter than 4–5, which become progressively longer; flagellum shorter than peduncle, extending to posterior of pereonite 1.

Epistome anteriorly narrowly rounded, apex overlapped by rostrum, medial constriction not present. Labrum unornamented. Mandible incisor multicuspid; molar process prominent, crushing, provided with marginal scale teeth; left mandible with prominent lacinia mobilis both mandibles with spine row of 5 or 6 spines; palp article 1 longer than articles 2 and 3. Maxillule lateral lobe with about 13 RS on gnathal surface, most of which are serrate; mesial lobe with 4 long RS, 3 of which are prominently serrate, and 2 short acute simple RS. Maxilla with all articles well developed; lateral and middle lobes with flat strongly curved and finely serrate RS, mesial lobe with several acute long RS, some of which are basally CP. Maxilliped endite distal margin numerous long acute CP setae and 3 long CP RS on distomesial margin; palp articles 2–4 with distomesial angle strongly produced, that of articles 3–4 finger-like, article 5 elongate and finger-like; mesial margins with numerous long setae, lateral margins of articles 2 and 3 without setae, article 4 with 1 distal seta.

Pereopods all ambulatory, robust; pereopods 1–3 subsimilar, more robust than 4–7; inferior margins of merus, carpus and propodus with serrate and CPRS; setulose fringe weakly developed; dactylus with prominent simple secondary unguis and 2 flattened setae arising at lateral margin, 2 flat setae at distolateral margin. Pereopods 6 and 7 inferior and distal margins of merus, carpus and propodus with numerous serrate and biserrate RS.

Penes paired, adjacent; short, about twice as long as basal width; not reaching pleopod peduncles.

Pleopods 1–3 both rami with PMS. Pleopod 1 exopod distal margin subtruncate, proximolateral angle with single short acute RS; endopod distinctly triangular in shape. Pleopod 2 with appendix masculina basally attached on mesial margin. Pleopod 3–5 exopods with complete suture. Pleopods 4 and 5

exopod and endopods without transverse thickened ridges; pleopod 5 endopod with 2 scale patches. Uropod attached in ventromesial position; both rami subcylindrical in section, subequal in length; both rami narrowing evenly to an acute apex, not extending significantly beyond posterior margin of pleotelson, exopod distally with hardened spike.

Female. Similar to male; brood-pouch unknown.

Etymology. From Greek *korema* (brush), coupled with the ending *-sphaera* to indicate family affinity; alluded to the densely setose dorsal surfaces (feminine).

Remarks. *Koremasphaera* is another monotypic genus difficult to characterise and define but its species defies placement in any existing genus. The most similar genera are *Cymodoce* Leach, 1814 and *Oxinasphaera* Bruce, 1997, both large genera. *Oxinasphaera* is unambiguously defined, the principle diagnostic apomorphic characters being the antennule peduncle spikes, epistome and pereon with cuticular spikes, and the short uropod exopod with a deeply bifid apex, all of which are absent in *Koremasphaera*. In addition *Oxinasphaera* usually has an excavate pleotelson posterior margin. Points of similarity include the very long finger-like prolongation of the mesial lobes of the mandible palp articles 3, 4 and 5, the penial morphology and the presence of weakly developed spikes on the pleon and pleotelson. *Cymodoce* is less similar, and differs in the pleotelson having an excavate posterior margin, in having both uropod rami lamellar (European species) or the exopod only lamellar (Indo-Pacific species; Bruce, 1997), slender and elongate penial processes, and in having the posterior of the pleotelson with a prominent dorsal hardened hemispherical medial dome.

The characters which serve to identify *Koremasphaera* are the densely setose dorsal body surfaces; the posterior margin of the pleotelson entire; uropod rami thickened and terminally acute; penial processes short, wide and adjacent; maxilliped palp articles 3–5 strongly produced and provided with long setae; and pleopods 4 and 5 without thickened folds or ridges. Uropod morphology in Sphaeromatidae is consistent within genera, at least when monophyly seems assured (e.g. *Sphaeroma* and *Oxinasphaera*) and the uropods of *Koremasphaera*, with both rami semicylindrical and apically acute and subequal in size, are unique and a putative synapomorphy.

Koremasphaera colonus sp. nov.

Figures 23–27

Material examined. Holotype. Male (7.5 mm), “The Whaleback” bommie, 0.5 km S of Point Hicks, Vic., 37°48.5'S, 149°16.8'E, 8 Apr 1989, sponge/yellow zoanthid community in roof of cave, 13 m, G.C.B. Poore and R.S. Wilson (NMV J39723).

Paratypes. Female (non-ovigerous 11.5 mm), 5 immature (4.5–5.5 mm), 36 manca (2.3–2.6 mm), same data as holotype (NMV J26403).

Description of male. Body twice as long as greatest width, lateral margins subparallel, widest at pereonite 5; dorsal surfaces of pereon, pleon and pleotelson densely setose, pereonites 6 and 7, pleon and pleotelson with small cuticular spikes. Head anterior margin without transverse ridges, rostral process visible in dorsal view, overlapping epistome ventrally; head

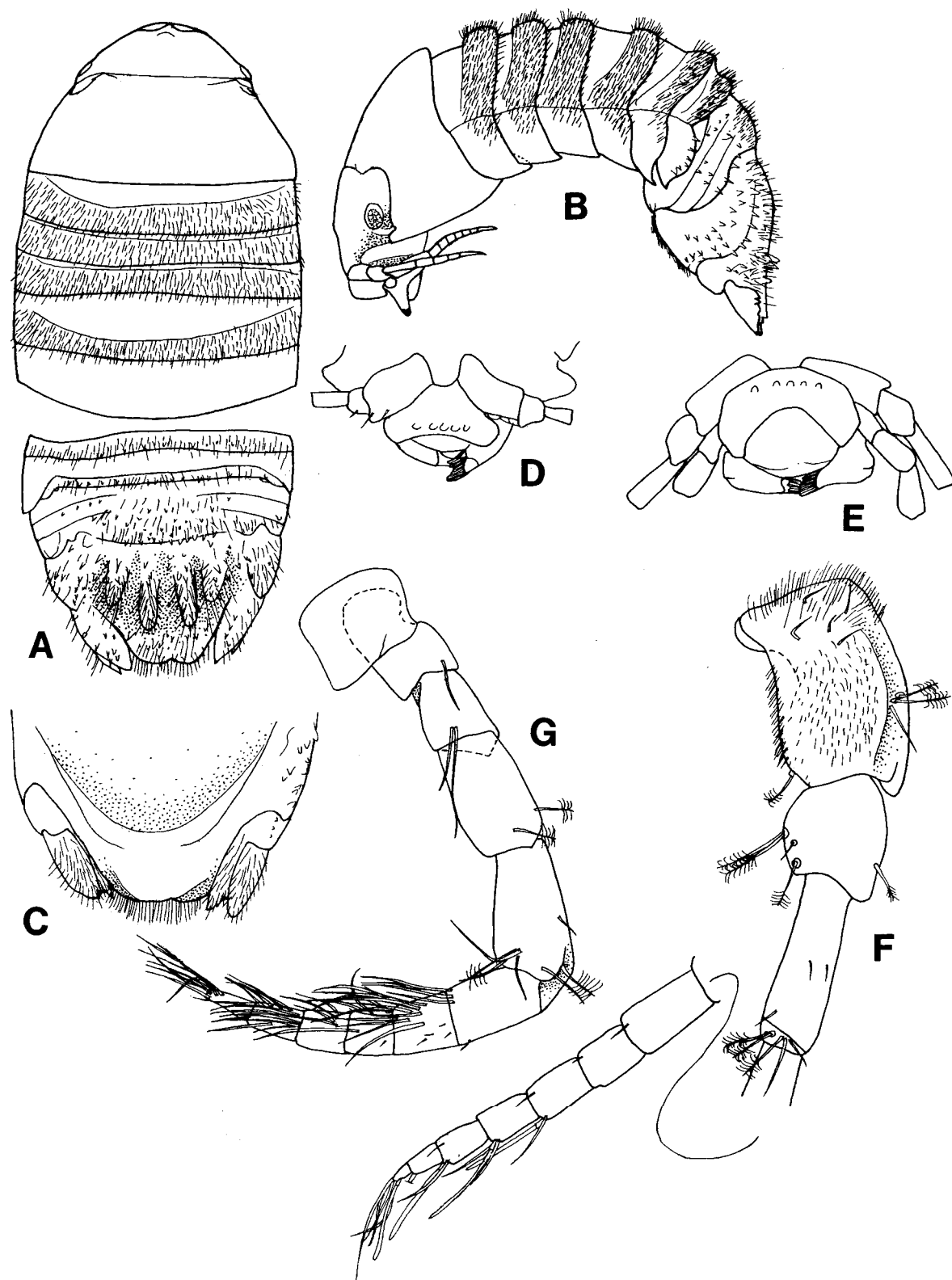


Figure 23. *Koremosphaera colonus* sp. nov. A–D, holotype, remainder as indicated. A, dorsal view; B, lateral view; C, pleon, posterior margin, ventral view; D, epistome, anterior view; E, epistome, ventral view; F, antennule; G, antenna.

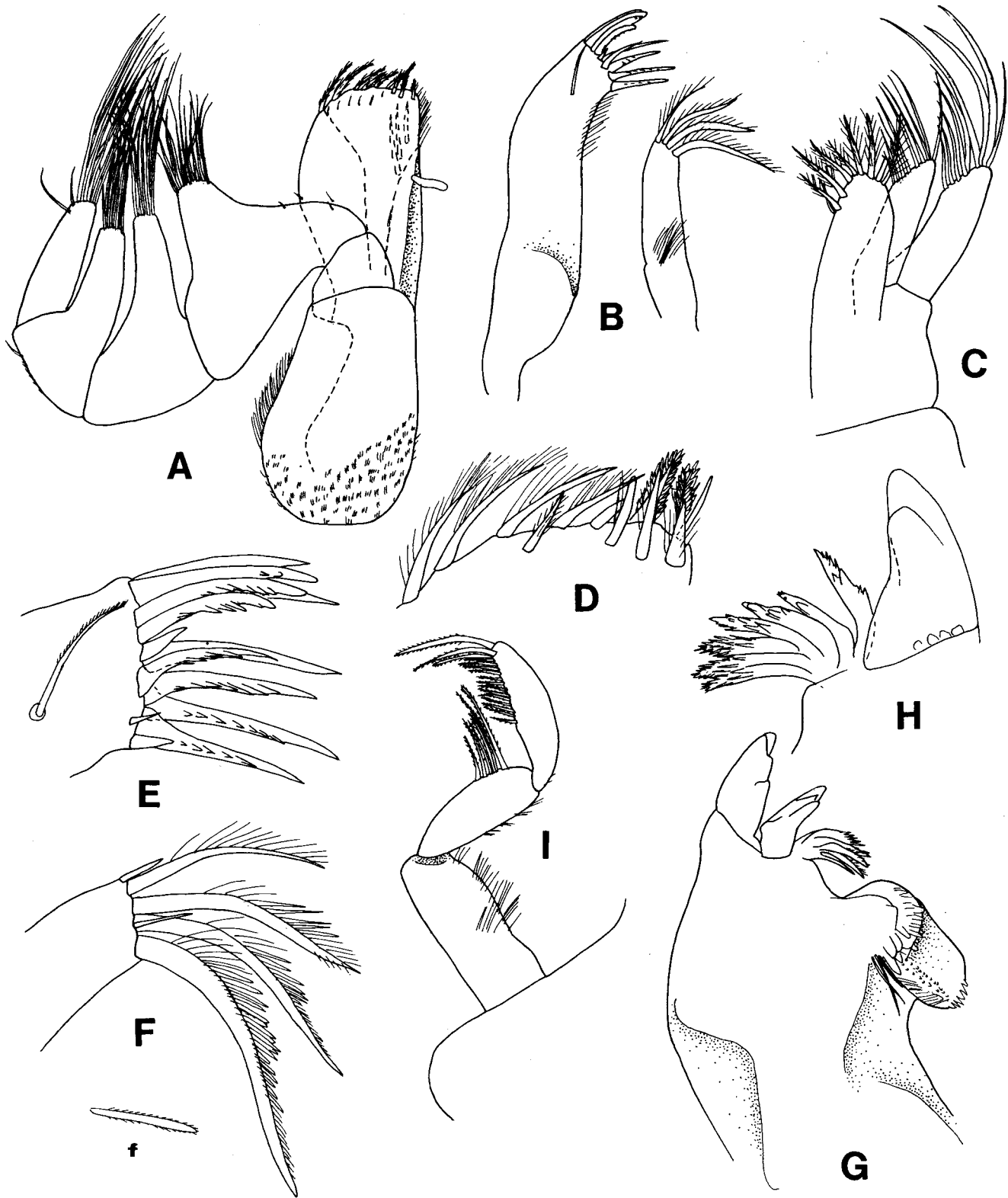


Figure 24. *Koremosphaera colonus* sp. nov. A, maxilliped; B, maxillule; C, maxilla; D, maxilliped endite, distal margin; E, maxillule, lateral lobe, gnathal RS; F, maxillule, mesial lobe; G, left mandible; H, right mandible, incisor and spine row; I, mandible palp.

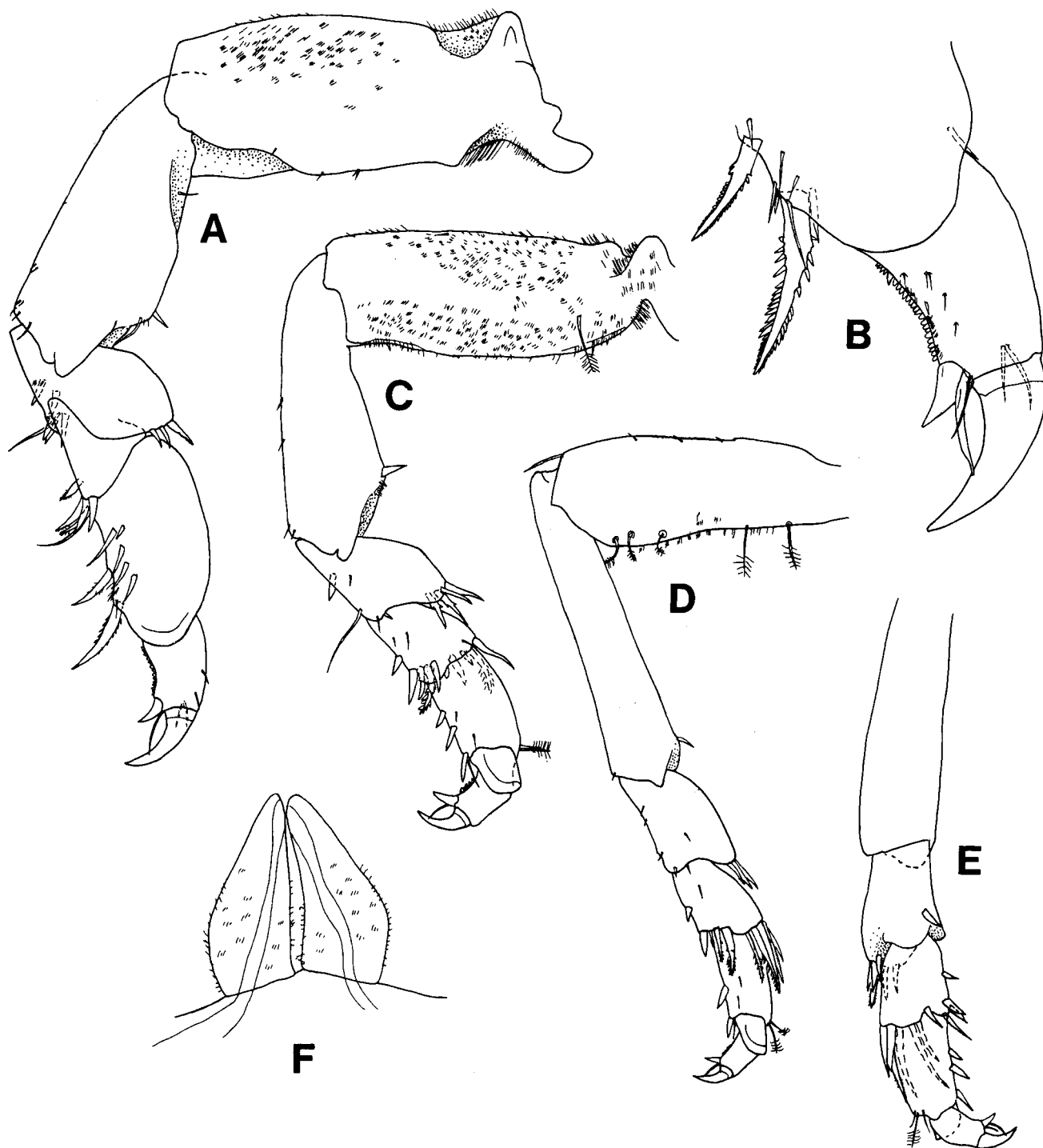


Figure 25. *Koremosphaera colonus* sp. nov. A, pereopods 1; B, pereopod 1, dactylus; C, pereopod 2; D, pereopod 7; E, pereopod 6, ischium–dactylus; F, penial processes.

about half as long as pereonite 1 in dorsal view; pereonite 1 dorsally smooth, pereonites 2–7 posteriorly with raised setose ridge, postero-ventral angles of coxae 5–7 produced to acute point, pereonite 1 about 1.5 times as long as pereonite 2; pereonite 2 > 3 > 4 < 5 > 6 > 7. Pleon laterally about twice as long as pereonite 7, with evident sutures, without pleonal sublateral

'keys'. Pleotelson strongly vaulted, posterior margin weakly produced and flat; dorsal surface with 4 indistinct subparallel longitudinal ridges, lateral ridges being shortest.

Antennule peduncle article 1 1.5 times as long as wide, about 1.9 times as long as article 2, anterior margin convex, with submarginal ridge, posterior straight, angled obliquely

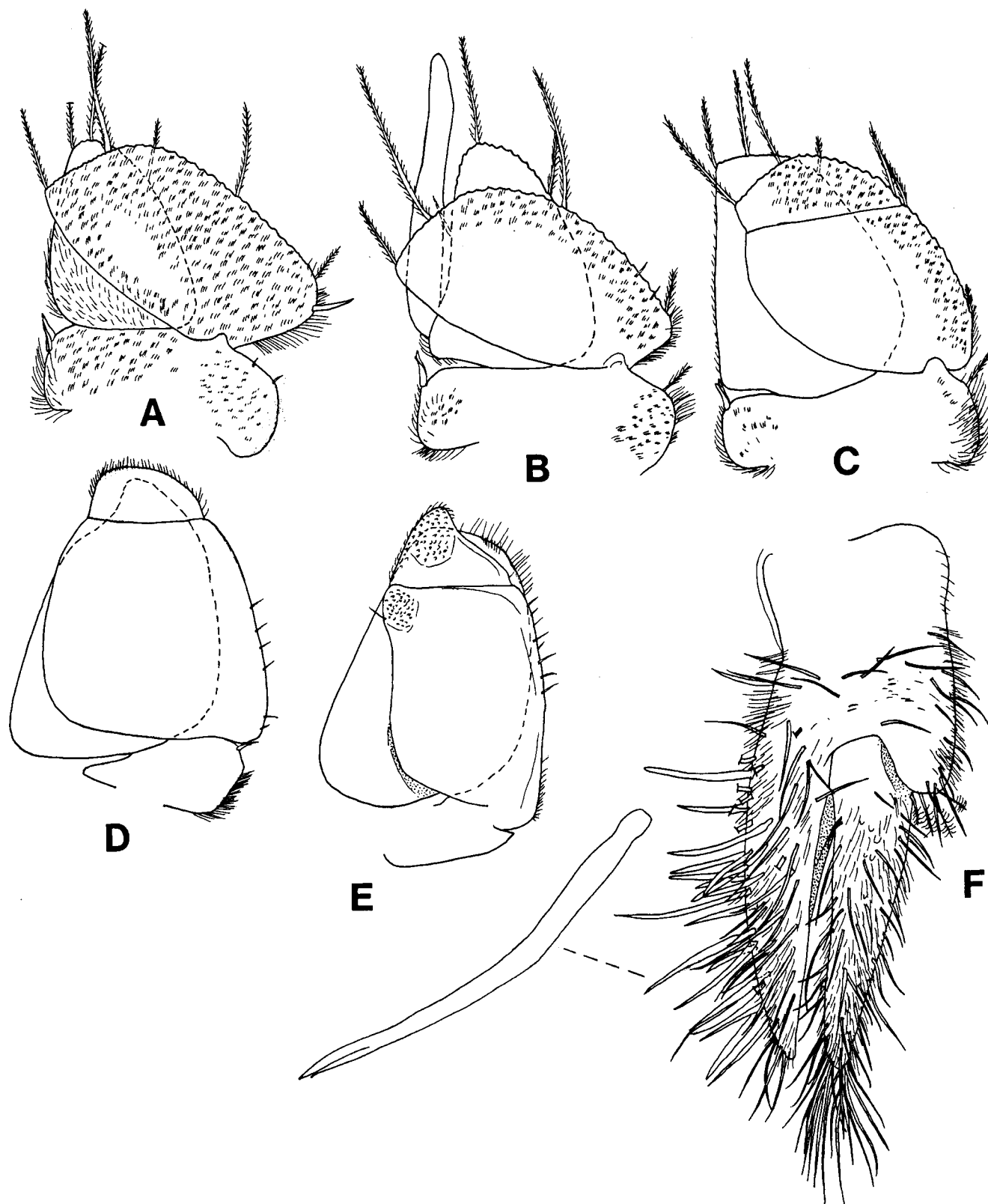


Figure 26. *Koremosphaera colonus* sp. nov. A–E, pleopods 1–5; F, uropod.

distally; article 3 about as long as article 1, about 4.1 times as long as wide, 1.7 times as long as article 2; flagellum 8-articled, extending to posterior of pereonite 1, about twice as long as article 3. Antenna relatively robust, peduncle articles 1 and 2 short, article 1 quadrate, combined lengths of articles 1 and 2 about equal to that of article 5; article 3 about 0.6 times as long as article 4; articles 4 and 5 subequal in length, articles 3–5 collinear; flagellum stout, about 0.7 times as long as peduncle, extending to middle of margin of pereonite 3, with 6 densely setose articles.

Epistome anteriorly narrowly rounded, posterior surface with transverse row of 4 nodules. Left mandible incisor with 4 cusps, lacinia mobilis with 3 cusps, spine row of 5 curved serrate spines; right mandible with 2 indistinct cusps, spine row of 1 broad-based multidigitate spine and 6 distally serrate spines; molar process round, crushing surface strongly ridged; palp article 1 longest, articles 2 and 3 subequal in length, article 2 distolateral margin with 6 finely biserrate setae; article 3 with 17 biserrate setae, terminal 2 setae being longest. Maxillule lateral lobe with 12 terminally acute RS on gnathal surface, twelfth seta set between these. Maxilla lateral and middle lobes with 11 and 9 curved finely serrate RS respectively, mesial lobe with about 8 serrate and biserrate RS. Maxilliped endite lateral margin strongly convex, distal margin with 3 CP RS at sublateral angle, 2 cactus setae, 6 curved CP RS; distomesial margin with 35 large stout CP RS, increasing in size proximally.

Pereopod 1 basis about twice as long as greatest width, approximately twice as long as propodus; superior margin with few widely-spaced short simple setae, inferior lateral surface with numerous scale-setae; ischium 1.6 times as long as propodus, twice as long as greatest width, superior margin with 1 proximal and 1 distal acute short simple RS; merus about 0.3 times as long as ischium, 0.8 times as long as greatest width, superior distal angle with 3 acute simple RS inferior distal margin with 4 acute RS and 1 simple slender seta; carpus 1.2 times as long as wide, inferior margin 1.2 times as long as merus, distally with 1 biserrate, 4 acute RS and 1 slender seta; propodus 1.9 times as long as greatest width, inferior lateral margin with 5 short acute RS, inferior margin with 2 basally biserrate RS; dactylus 0.7 times as long as propodus, inferior margin with prominent serrate cuticular scales, secondary unguis simple, acute. Pereopods 2 and 3 similar to pereopod 1, less robust. Pereopod 2 basis 2.4 times as long as greatest width, lateral surfaces dense with scales, 1 proximolateral palmate seta; ischium 0.9 times as long as basis, 3 times as long as greatest width, superior margin with 1 proximal and 1 distal acute short simple RS, inferior margin with 3 widely spaced short simple setae; merus about one-third as long as ischium, superior distal angle with 4 acute RS, inferior margin with 1 short stout acute RS and 1 long simple seta; carpus about as long as merus, anterodistal angle with 5 RS, 2 of which are biserrate, inferodistal margin with 5 acute RS, one of which is biserrate; propodus about half as long as ischium, 1.8 times as long as carpus, superior distal angle with 1 simple and 1 palmate setae, inferior margin with 3 short stout acute RS, distal-most being longest; dactylus 0.5 times as long as propodus. Pereopods 5–7 similar, ischium notably longer than for

pereopods 1–3, distal margins of carpus with more and longer RS. Pereopod 7 basis 2.6 times as long as greatest width, inferodistal angle with single simple seta, superior margin with 2 proximal and 2 distal palmate setae, numerous widely spaced small scale-setae; ischium 1.1 times as long as basis, 4.5 times as long as greatest width, superior distal angle with 1 acute RS, merus one-third as long as ischium, superior distal margin with 3 acute RS, inferior margin 3 minute setae and 1 minute RS at distal angle; carpus about as long as merus, anterodistal angle with 5 long acute simple and serrate RS, inferior margin with 2 stout short acute RS, distal angle 3 biserrate RS; propodus 1.4 times as long as carpus, 0.4 times as long as ischium, superior distal angle with 2 palmate seta, inferior margin with 3 short stout acute RS, 1 at mid point, 2 at base of dactylus; dactylus 0.4 as long as propodus.

Pleopod 1 exopod and endopod with c. 32 and 11 PMS respectively, both rami densely setulose; endopod triangular, 0.6 times as long as exopod, 1.3 times as long as greatest width; exopod lateral and distal margins quadrate. Pleopod 2 exopod and endopod with c. 33 and 14 PMS respectively; appendix masculina 10 times as long as wide, slightly wider proximally, distally weakly bent laterally, apex bluntly rounded. Pleopod 3 exopod and endopod with c. 32 and 12 PMS respectively. Pleopod 4 exopod lateral margin with 7 fine simple setae, distal margin with continuous fine setae. Pleopod 5 exopod with distal scale patch large, forming mediodistal lobe, lateral margin with numerous simple setae, distal margins with long scale-setae; endopod with scale-setae on distal margin only. Uropod peduncle and rami densely covered with large distally bifid simple setae, palmate setae and scale-setae.

Female. Body shape generally similar to that of male, but dorsal surfaces lacking large setae, with smaller tubercles than in male, but with a densely pilose appearance from the abundant scale-setae.

Etymology. From Latin *colo* (dwell, inhabit), in the sense of a colony.

Distribution. Known only from the type locality, off Point Hicks, Vic.; possibly a commensal of sponges.

Remarks. The setose dorsal body surface in combination with the pleotelson posterior margin being entire and subcylindrical terminally acute uropod rami of about equal length all serve to identify the genus and species.

Margueritta Bruce

Margueritta Bruce, 1993: 164.

Type species. *Margueritta sylviae* Bruce, 1993, by original designation.

Species included and distribution. *Margueritta sylviae* Bruce, 1993; *Margueritta sandyi* sp. nov.; southern WA.

Remarks. The new species differs from the type species in the brood-pouch morphology. The type species was re-examined to ensure that the original diagnosis was correct. Harrison (1984a) considered brood-pouch morphology to show important generic characters, and the differences between the two species could be considered to be of generic merit. However some genera,

such as *Sphaeroma* (Harrison, 1984a) are known to be variable, and the two species *Margueritta* otherwise agree.

***Margueritta sandyi* sp. nov.**

Figures 28–30

Material examined. Holotype. Female (3.2 mm, ovigerous), western side of Carnac I., off Fremantle, WA, 18 Dec 1971, 4–7 m, on algae, W.F. Ponder (AM P50939).

Paratypes. Female (2.9 mm, non-ovigerous), manca (1.5 mm), North Lumps, 2 km off Mullaloo, WA, 31°47.30'S, 115°42.80'E, 2 May 1986, 8 m, red algal turf adjacent to reef, G.C.B. Poore and H.M. Lew Ton (NMV J26053).

Holotype of *Margueritta sylviae* Bruce, 1993 (AM P41021).

Description of female. Body about 1.7 times as long as greatest width, ovate, widest at pereonites 2 and 3; dorsal surfaces smooth, with irregular series of low bosses these provided with scattered setae. Cephalon anterior margin anteriorly projecting over frons, medially indented; without transverse ridge, ventral rostral process weakly developed. Pereonites 1 about 1.6 times as long as head in length in lateral view, about 1.8 as long as pereonite 2, with 2 clusters of low sublateral bosses; pereonites 2–7 of approximately equal length; pereonites 2, 3 and 5 with submarginal irregular transverse row of low bosses; pereonite 4 with one large median boss and single boss at each lateral margin; pereonites 6 and 7 each with two submedian bosses, pereonite 6 with 2 additional low submarginal bosses; coxae with sutures, ventrally directed, each with dorsal boss. Pleonite 1 entire; pleon otherwise without evident sutures, posterior margin indicated short lateral suture. Pleotelson with prominent anteriorly positioned median boss; posterior margin with distinctly produced ventrally open tube extending beyond posterior of uropodal rami.

Antennule peduncle article 1 about 3.3 times as long as distal width, anterior margin with 3 stout simple setae and 1 palmate seta; peduncle article 2 about half as long as article 1, 1.7 times as long as wide, anterodistal margin with 1 long and

1 short simple setae and 3 palmate sensory setae; article 3 about 0.7 as long as article 2, weakly offset on posterior margin of article 2; flagellum 4-articled, extending to pereonite 1, about 2.8 times as long article 3. Antenna peduncle articles 1–3 short, combined lengths 1.5 times as long as article 5; article 4 about 0.8 as long as article 5, both articles 4 and 5 with inferior margins convex; flagellum about equal in length to peduncle, extending to anterior margin of pereonite 2, with 8 articles.

Epistome smooth, narrow, laterally encompassing labrum, not anteriorly produced. Mandible as for the genus. Maxillule mesial lobe with 2 long, weakly pectinate setae and 2 shorter simple seta, lateral lobe with 10 peripheral RS on gnathal surface. Maxilla lateral lobe and middle lobe each with 2 and 3 curved RS respectively, mesial lobe with 6 setae, variously circumplumose, mesial-most seta only being acute, remainder terminally rounded. Maxilliped endite extending to palp article 5, distal margin with 1 conical RS, 3 rounded RS, 2 cactus RS and 3 slender CP RS; palp articles 2–5 with about 6, 12, 10 and 10 setae respectively.

Pereopod 1 basis about 2.4 times as long as greatest width, 1.6 times as long as propodus; inferodistal angle with 1 long simple setae; ischium 0.9 times as long as basis, 2.4 times as long as greatest width, margins with scale-setae more abundant on inferior margin; merus about 0.2 as long as ischium, 1.8 times as long as greatest width, inferior margin with sparse scale-setae and single long simple seta; carpus (inferior margin) 0.6 as long as merus, 0.4 as long as wide, with single simple seta; propodus 0.7 times as long as ischium, twice as long as greatest width inferior margin with single distal simple seta; dactylus about 0.8 times as long as propodus, inferior margin with prominent serrate cuticular scales; unguis strongly recurved, secondary unguis recurved with 2 basal cusps. Pereopods 2 and 3 similar to pereopod 1, but with more and longer setae. Pereopods 5 and 6 similar, shorter than pereopods 1 and 2. Pereopod 7 slightly longer than pereopods 2–6, otherwise generally similar.

Pleopod 1 exopod and endopod with 8 and 9 PMS respec-

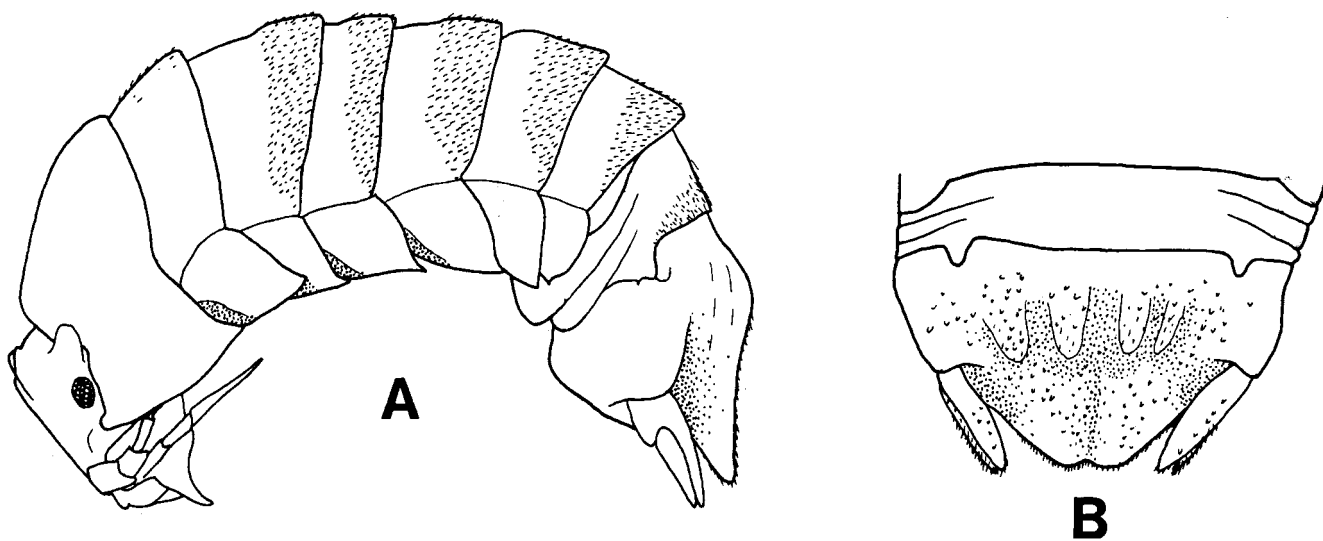


Figure 27. *Koremosphaera colonus* sp. nov. Female. A. lateral view; B. pleon and pleotelson, dorsal view.

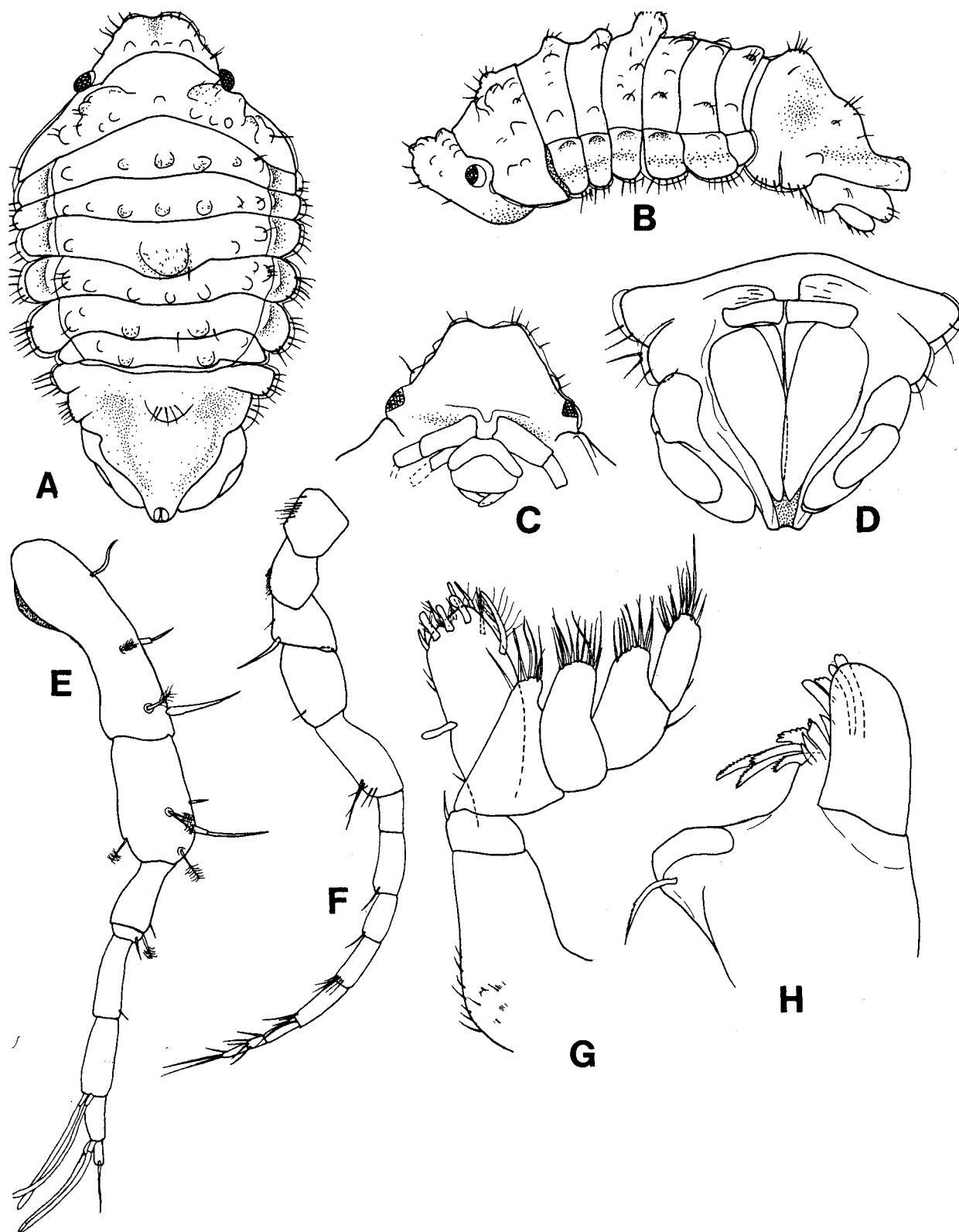


Figure 28. *Margueritta sandyi* sp. nov. A–D, holotype, remainder _ paratype. A, dorsal view; B, lateral view; C, frons, ventral view; D, pleon, posterior margin, ventral view; E, antennule; F, antenna; G, maxilliped; H, right mandible.

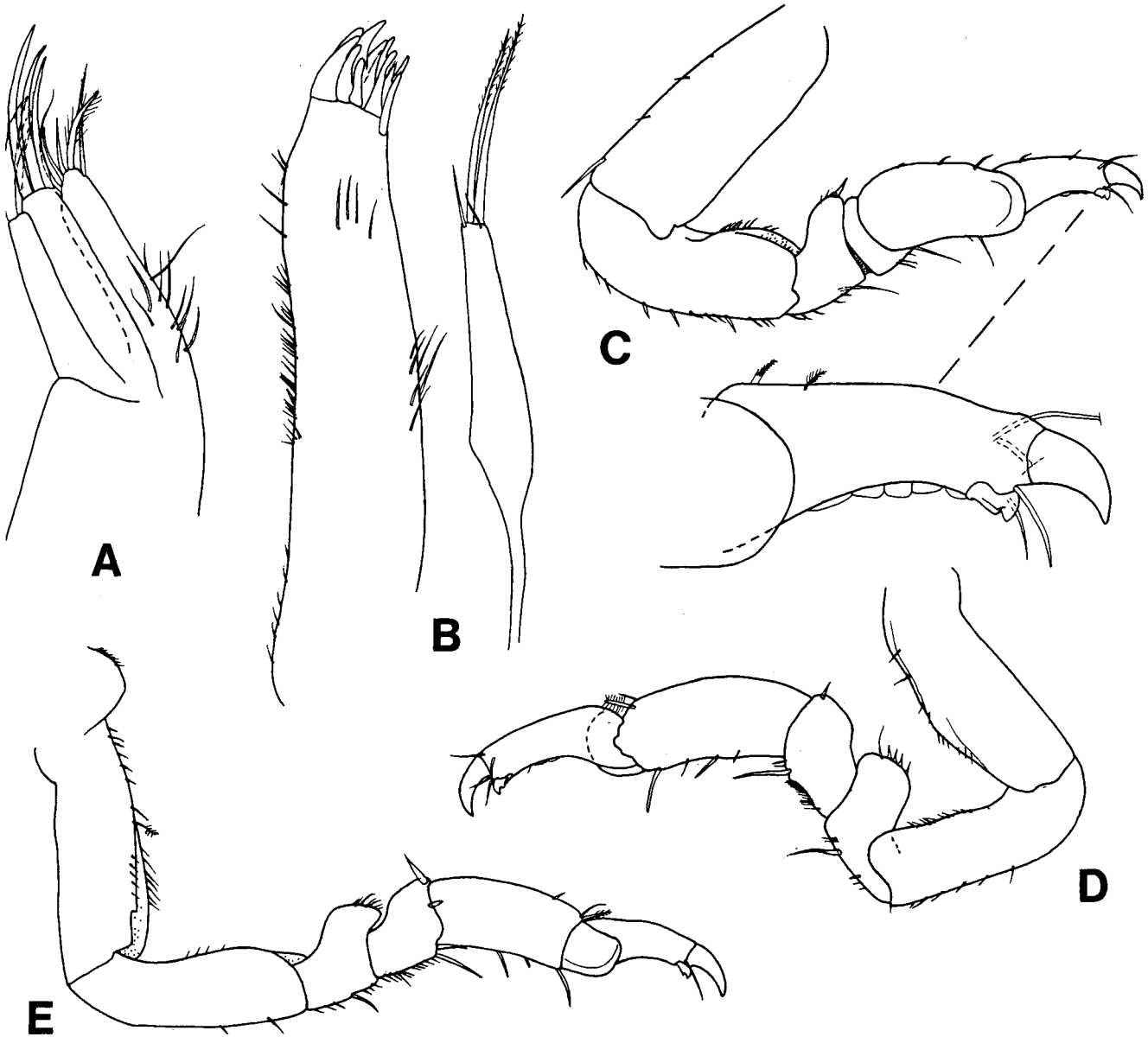


Figure 29. *Margueritta sandyi* sp. nov. Female paratype. A, maxilla; B, maxillule; C, pereopod 1; D, pereopod 2; E, pereopod 7.

tively, both rami distally narrowly rounded; endopod 0.6 as long as exopod, 2.5 times as long as greatest width, proximo-lateral margin weakly concave. Pleopod 2 exopod and endopod with c. 18 and 15 PMS respectively, those of distal margin of endopod submarginal; endopod twice as long as exopod. Pleopod 3 exopod and endopod with c. 17 and 14 PMS respectively. Pleopods 4 and 5 damaged, examined in situ, similar to that of the type species. Uropods not dissected and not examined in detail; rami flat, distally rounded, not extending to distal margin of pleotelson.

Male. Unknown.

Etymology. For Dr A.J. (Sandy) Bruce in recognition of his contribution to knowledge of the Crustacea, and to Caridea of the tropical Indo-Pacific and Australia in particular.

Distribution. Carnac I. and off Mullaloo, southern WA; on algae; 4–8 m.

Remarks. The numerous small dorsal bosses and the prominent median bosses on pereonite 4 and the pleotelson separate this species from its congener, *Margueritta sylviae*. Additional conspicuous points of differences are that in *M. sandyi* the body shape is narrower, the body itself is more strongly vaulted and the pleotelson extends posterior to the uropodal rami.

Moruloidea Baker

Moruloidea Baker, 1908: 150.—Baker, 1926: 276.—Hale, 1929: 292.—Harrison, 1984a: 383.—Harrison, 1984b: 268.

Valentinia Stebbing, 1914a: 351 (name preoccupied).

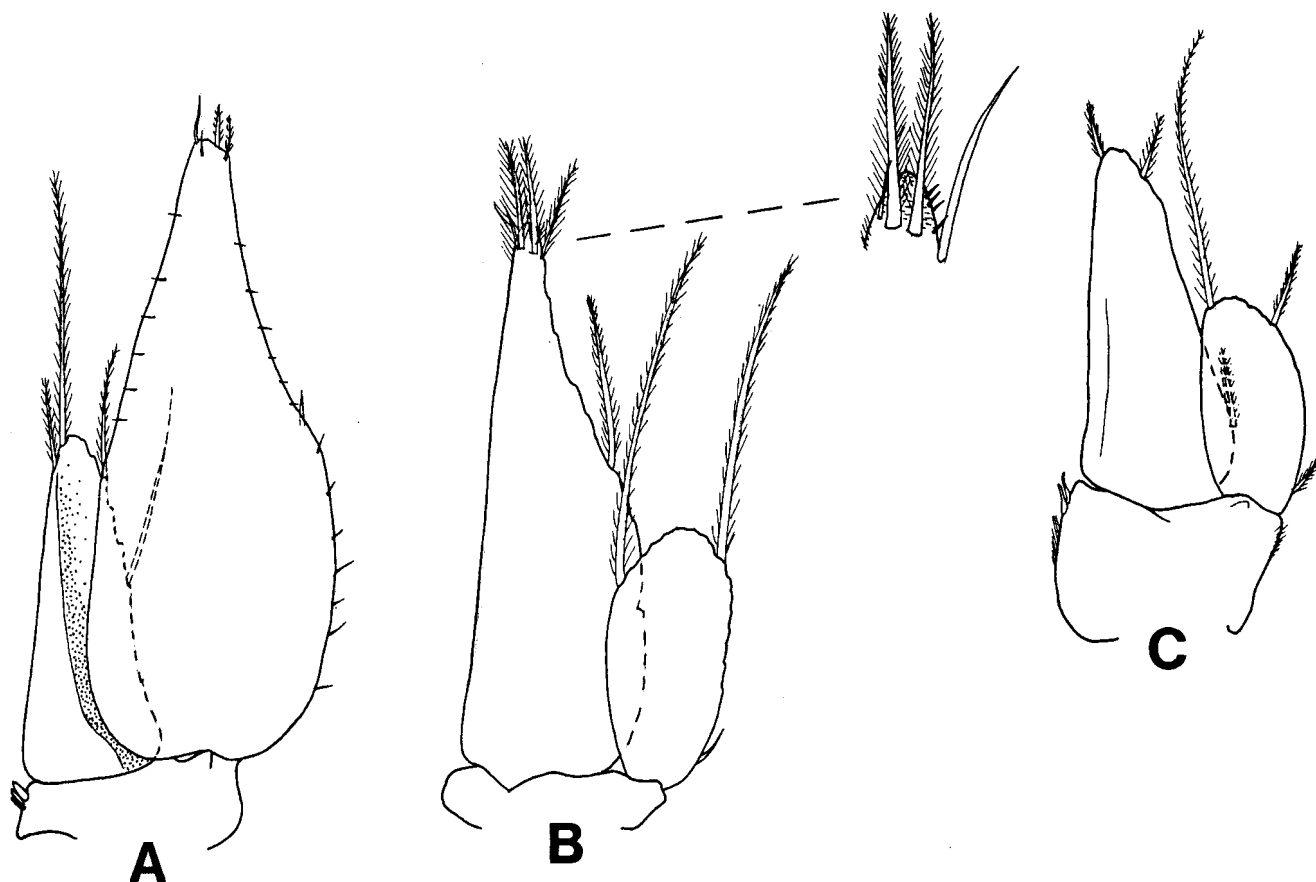


Figure 30. *Margueritta sandyi* sp. nov. Female paratype. A, pleopod 1; B, pleopod 2; C, pleopod 3.

Euvalentinia Stebbing, 1914b: 944 (replacement name).—Barnard, 1920: 374.—Nierstrasz, 1931: 218.—Loyola e Silva, 1974: 3.

Type species. Moruloidea lacertosa Baker, 1908, by monotypy.

Species included and distribution. Moruloidea lacertosa Baker, 1908; *M. darwinii* (Cunningham, 1871); *M. tasmaniae* (Baker, 1926); *M. tumida* (Harrison 1984b); *M. perionasus* sp. nov.; Gondwanan, southern coasts of Australia (WA, SA and Tas.), with one species from Atlantic coast of South America and Falkland Is (Harrison, 1984b).

Diagnosis of male. Body stout, about twice as long as greatest width, strongly vaulted; dorsal surfaces nodular. Pleotelson with or without median process; posterior margin with simple median notch and shallow exit channel. Coxae of pereonite 5 overlapping those of both pereonite 4 and 6. Pleon of 4 segments, segment 1 largely concealed by pereonite 7, segments 2–4 indicated by 2 distinct suture lines running to lateral margins of pleon. Antennule peduncle article 1 more than twice as long as article 2, articles 1 and 2 robust; article 3 slender, all articles collinear. Antenna articles 3 and 5 proportionally large, article 5 strongly reflexed. Mandible incisor unicuspid, or cusps indistinct; molar process prominent, crushing, provided with marginal scale teeth. Maxilliped palp articles 2–4 with distomesial angle moderately produced, mesial margins with numerous setae. Pereopods all ambulatory, pereopod 1

massive, robust, propodus inferior margin with or without lobe-like extension; pereopods 2–7 subsimilar, slender. Penes paired, close set; short, not reaching pleopod peduncles. Pleopods 1–3 both rami with PMS, both rami of subequal length; pleopod 1 with longitudinal axis of both rami weakly oblique, remaining pleopods with longitudinal axis of rami straight. Pleopod 2 with appendix masculina basally attached. Pleopods 3–5 exopods with complete suture. Pleopods 4 and 5 exopod and endopods usually with well-developed transverse thickened ridges; pleopod 5 endopod with 3 lobate scale patches. Uropods attached anterolaterally on pleon, exopod moderate to minute in size; both rami flat not extending beyond posterior margin of pleotelson.

Female. Sexual dimorphism weak; mouthparts not metamorphosed. Brood pouch of the type species of 3 pairs of oostegites on pereonites 2–4; brood housed in 4 pairs of internal pouches (Harrison, 1984). Antenna peduncle and pereopod 1 not as robust as in the male.

Remarks. The genus was revised by Harrison (1984b) who placed *Valentinia* Stebbing, 1914a and *Euvalentinia* Stebbing, 1914b into synonymy.

The coxae of pereonite 5, antenna, antennule, pereopod and pleotelson of *Moruloidea* are similar to those of *Caecocassidias* Kussakin, 1967 (Brandt, 1998), *Cymodopsis* Baker, 1926, *Ceratocephalus* Woodward, 1877 (Bruce, 1994b),

Kranosphaera Bruce, 1992 and *Waiteolana* Baker, 1926 (Harrison 1984b). All have coxal plates 5 overlapping both anteriorly and posteriorly, robust pereopod 1 and the posterior margin with a simple shallow exit channel. Most (*Moruloidea*, *Caecocassidias*, *Ceratocephalus* and *Kranosphaera*) have the antenna with peduncle article 5 strongly reflexed and flat uropodal rami with the exopod varying from moderate to absent *Kranosphaera*. All species of *Cymodopsis* are inadequately described and the genus is poorly understood. Until *Cymodopsis* is revised the relationships of these genera to each other and to others will remain unclear.

The presence of a prominent pleotelson process in *Moruloidea perionasus* sp. nov. and additional data on *M. darwinii* (Brandt, 1998) necessitates modification of the diagnosis of Holdich (1984b). *M. darwinii* was described by Brandt (1998) as having lamellar rami on pleopods 4 and 5.

Moruloidea perionasus sp. nov.

Figures 31–34

Material examined. Holotype. Male (7.0 mm, immature), Thistle Cove, WA, 34°0'S, 122°12'E, 11 Apr 1984, 5.0 m, G.C.B. Poore and H.M. Lew Ton (NMV J39710).

Paratypes. **SA.** 2 males (6.2 immature, 5.5 adult [crushed] mm), north side of West I., Encounter Bay, 35°37'S, 138°36'E, 21 Mar 1985, 5 m, sediment at base of *Heterozostera*, G.C.B. Poore and H.M. Lew Ton (NMV J26202). Male (4.6 mm, immature), West I., Encounter Bay, 28 Jan 1990, under boulder fauna, S.A. Shepherd (SAM C5744).

Description of male. Body 1.8 times as long as greatest width (including anterior and posterior processes), widest at pereonites 1 and 5; dorsal surfaces of pereon, pleon and pleotelson granular. Head anterior margin strongly anteriorly produced to form anteriorly medially indented and bifid process, rostral process and frons distinctly ventral in position; head about 1.4 times as long as pereonite 1 in lateral view; pereonite 1 dorsally with ill-defined transverse band of tubercles, laterally with distinct boss and oblique thick longitudinal ridge; pereonites 2–4 narrower than pereonites 1 and 5, each with transverse row of small low tubercles; pereonite 5 wider than 4 and 6, coxae with prominent boss; pereonites 5–7 without distinct tubercles, pereonite 6 narrower than 7, pereonite 7 narrower than 6. Pleon posteriorly rounded in dorsal view, posterodorsal margin with low tubercles; sublateral pleonal 'keys' present. Pleotelson strongly vaulted, posterior margin with strongly produced dorsally arched process dorsal surface of which is provided with irregularly shaped nodules.

Antennule peduncle article 1 2.4 times as long as wide, about 8 times as long as article 2, anterior margin convex, posterior margin straight, angled obliquely distally; article 3 about as 0.5 times as long as article 1, about 3.6 times as long as wide, 4.0 times as long as article 2; flagellum 13-articled, extending to posterior of pereonite 1, about twice as long as article 3. Antenna peduncle article 1 short, setose; articles 2 and 3 relatively elongate, article 2 2.5 times as long as wide, article 3 0.6 times as long as article 4, 1.7 times as long as wide; article 3, single long simple seta at superior distal angle; articles 2–4 collinear; article 4 0.8 times as long as article 5, 2.5 times as

long as wide, superior margin with scale-setae; article 5 2.6 times as long as wide; flagellum stout, about 0.9 times as long as peduncle, extending to anterior of pereonite 2, with 11 articles.

Epistome anteriorly acute, with median constriction, surface irregular. Mandibles with both incisors unicuspid; left mandible with lacinia mobilis distally narrow, with 3 small cusps, spine row of 4 curved serrate spines; right mandible spine row of 1 broad-based bifid, multidigitate spine and 5 distally serrate spines; molar process round, crushing surface strongly ridged, marginally serrate; with basal group of 3 long plumose setae; palp not observed. Maxillule lateral lobe with 11 terminally acute serrate RS on gnathal surface, twelfth seta set between these. Maxilla lateral and middle lobes each with 6 curved finely serrate RS, mesial lobe with about 12 serrate and biserrate RS. Maxilliped endite lateral margin strongly convex, distal margin with 7 CP RS, 2 cactus setae, distomesial angle with 1 simple RS; distomesial margin with 3 large stout CP RS, increasing in size proximally; mesial margin of palp articles 2–5 with 9, 10, 12 and 8 long simple setae respectively; palp lateral margins without long setae, with 1 short simple seta at distal angle of article 3 and 4.

Pereopod 1 basis about twice as long as greatest width, approximately twice as long as propodus; ischium 1.2 times as long as propodus, 1.9 times as long as greatest width, superior margin with 1 proximal and 1 distal acute short simple RS; merus about 0.4 as long as ischium, 0.6 times as long as greatest width, superior distal angle with 2 acute simple RS inferior distal margin with 2 short bifid and 1 long acute simple; carpus inferior margin 1.2 times as long as merus, distally with 2 short bifid; propodus 1.5 times as long as greatest width, inferior lateral margin with 2 short biserrate RS, inferior margin with 3 stout bifid RS; dactylus 0.7 times as long as propodus, inferior margin with prominent serrate cuticular scales, secondary unguis simple, with distal point. Pereopod 2 basis 3.0 times as long as greatest width, margins with scattered scale-setae, superior margin with weak distal flange; ischium 0.75 times as long as basis, 2.8 times as long as greatest width, superior margin with 1 proximal and 1 distal acute short simple RS, merus about 0.7 times as long as ischium, superior distal angle with 2 short acute RS, inferior margin with 2 short stout acute setae and 1 long simple seta; carpus about as long as merus, superior distal angle with 1 simple seta, inferior margin with 2 acute simple setae, distal angle with 1 RS; propodus about as long as ischium, 1.6 times as long as carpus, superior distal angle with 1 simple and 1 palmate setae, inferior margin with 3 short stout acute RS; dactylus 0.5 times as long as propodus. Pereopods 5–7 similar, basis and ischium relatively longer than for pereopod 2, distal margins of carpus with more and longer RS. Pereopod 7 basis 4.4 times as long as greatest width, inferodistal angle with single simple seta, superior margin with widely-spaced small scale-setae; ischium 0.9 times as long as basis, 5.7 times as long as greatest width, superior margin with 1 proximal short acute RS, merus 0.4 times as long as ischium, superior distal margin with 1 acute RS, inferior distal angle with 1 stout acute seta; carpus about as long as merus, anterodistal angle with 3 long acute finely serrate and 1 simple RS, inferior margin with 2 stout short acute RS, inferior distal angle 3

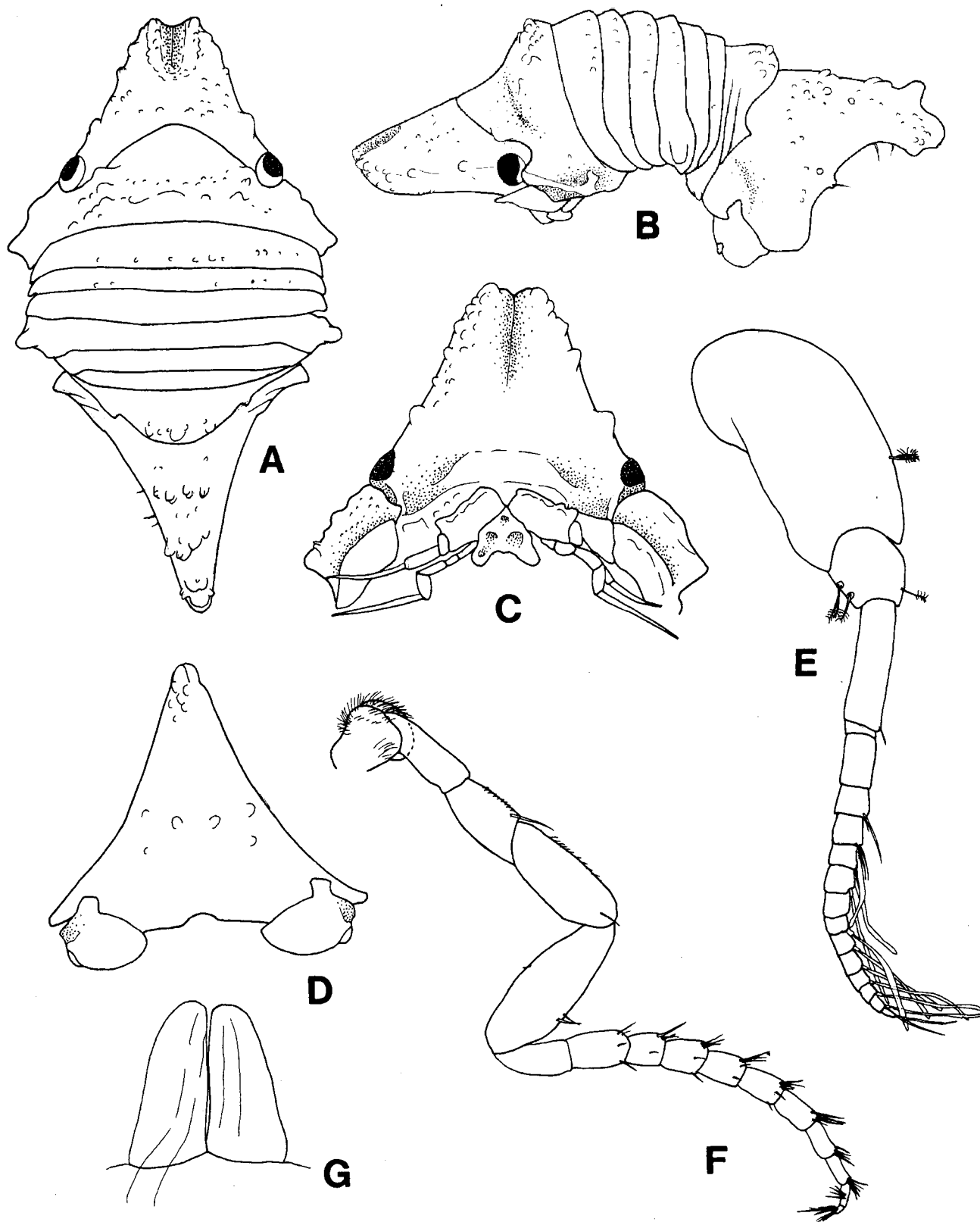


Figure 31. *Moruloidea perionasus* sp. nov. A–D, holotype, remainder male paratype, NMV J26202. A, dorsal view; B, lateral view; C, frons, ventral view; D, pleon, posterior margin, posterior view; E, antennule; F, antenna; G, maxilliped; H, penes.

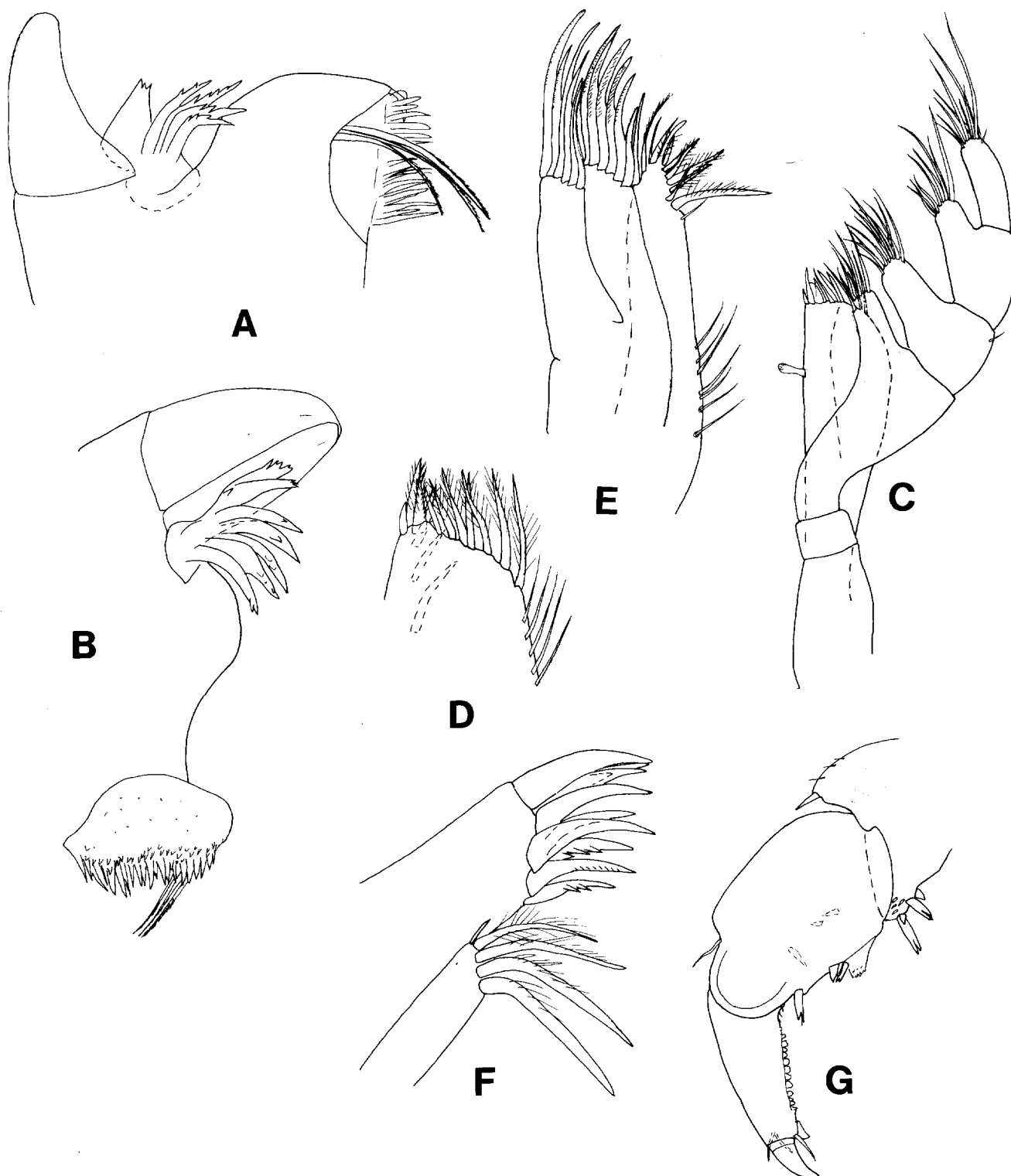


Figure 32. *Moruloidea perionasus* sp. nov. Male paratype, NMV J26202. A, right mandible; B, left mandible; C, maxilliped; D, maxilliped endite, distal margin; E, maxilla; F, maxillule; G, pereopod 1, propodus.

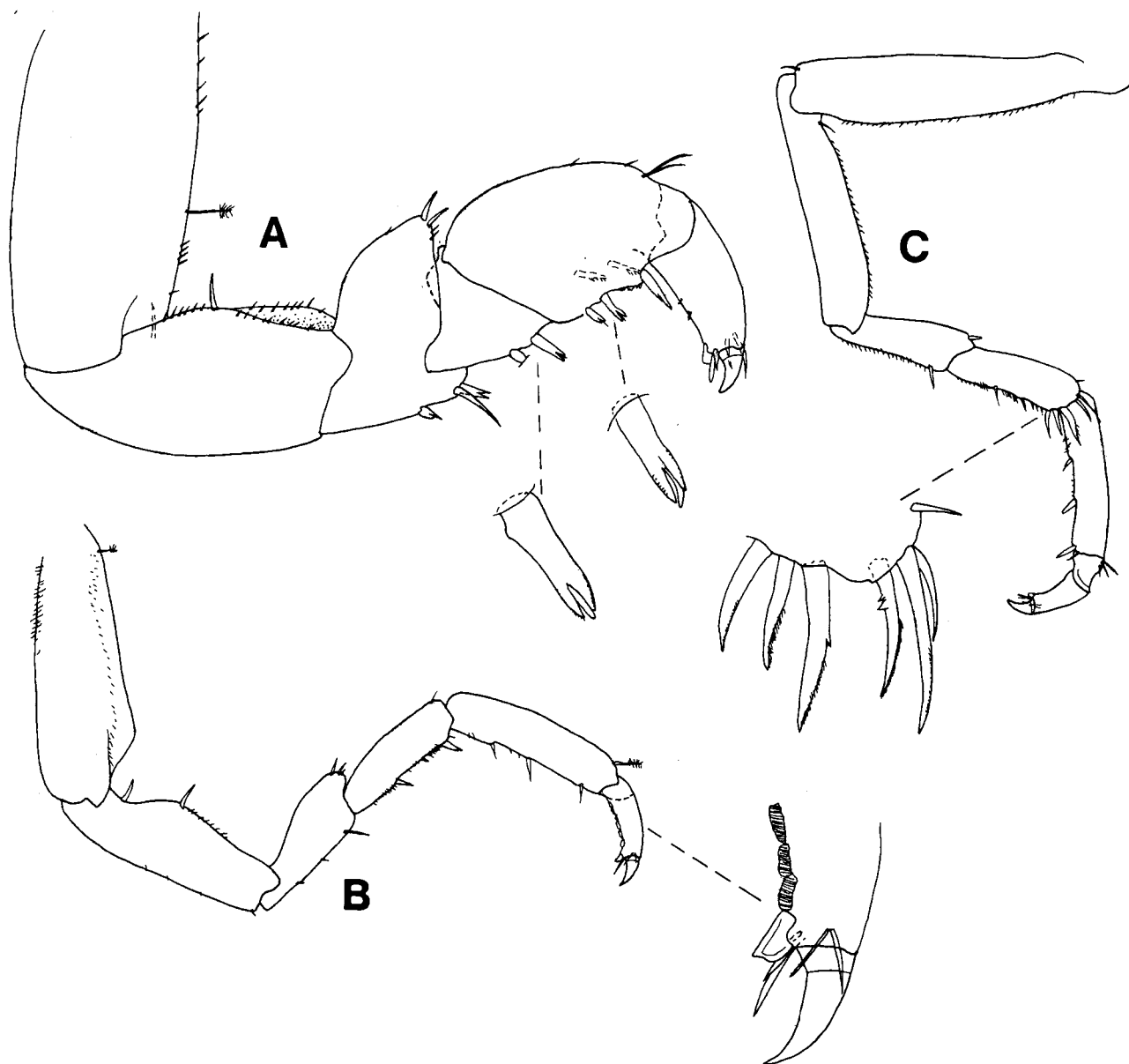


Figure 33. *Moruloidea perionasus* sp. nov. A, pereopod 1 holotype; remainder male paratype, NMV J26202; B, pereopod 2; pereopod 7.

finely biserrate RS; propodus 1.5 times as long as carpus, 0.7 times as long as ischium, superior distal angle with 2 palmate seta, inferior margin with 3 short stout acute RS; dactylus 0.4 times as long as propodus.

Penes mutually adjacent, twice as long as basal width; mesial margin straight, lateral margin angled mesially, apex bluntly rounded.

Pleopod 1 exopod and endopod with c. 17 and 16 PMS respectively, endopod mesial margin setulose; endopod sub-triangular, 0.9 times as long as exopod, 1.5 times as long as greatest width; exopod lateral and mesial margins subparallel, distal margin rounded. Pleopod 2 exopod and endopod with c. 18 and 27 PMS respectively; appendix masculina 11 times as long as wide, slightly wider proximally, weakly sinuate, apex

bluntly rounded. Pleopod 3 exopod and endopod with c. 50 and 18 PMS respectively. Pleopod 4 exopod lateral margin with 3 fine simple setae, distal part triangular, both margins with fine setae; endopod without setae. Pleopod 5 exopod with 2 distal bi-lobed scale patches, lateral margin with scattered minute simple setae; endopod with fine setae on distal margin only. Uropod peduncle dorsal surface densely covered with small nodules and minute hemispherical structures; endopod mesial margin straight, lateral margin with distal half angled mesially, distolateral margin subapically excavate; lateral margin entirely fringed with expanded cuticular scales; exopod small, 0.2 as long as endopod and peduncle, setin to anterolateral angle.

Female. Similar to male; ovigerous females not known.

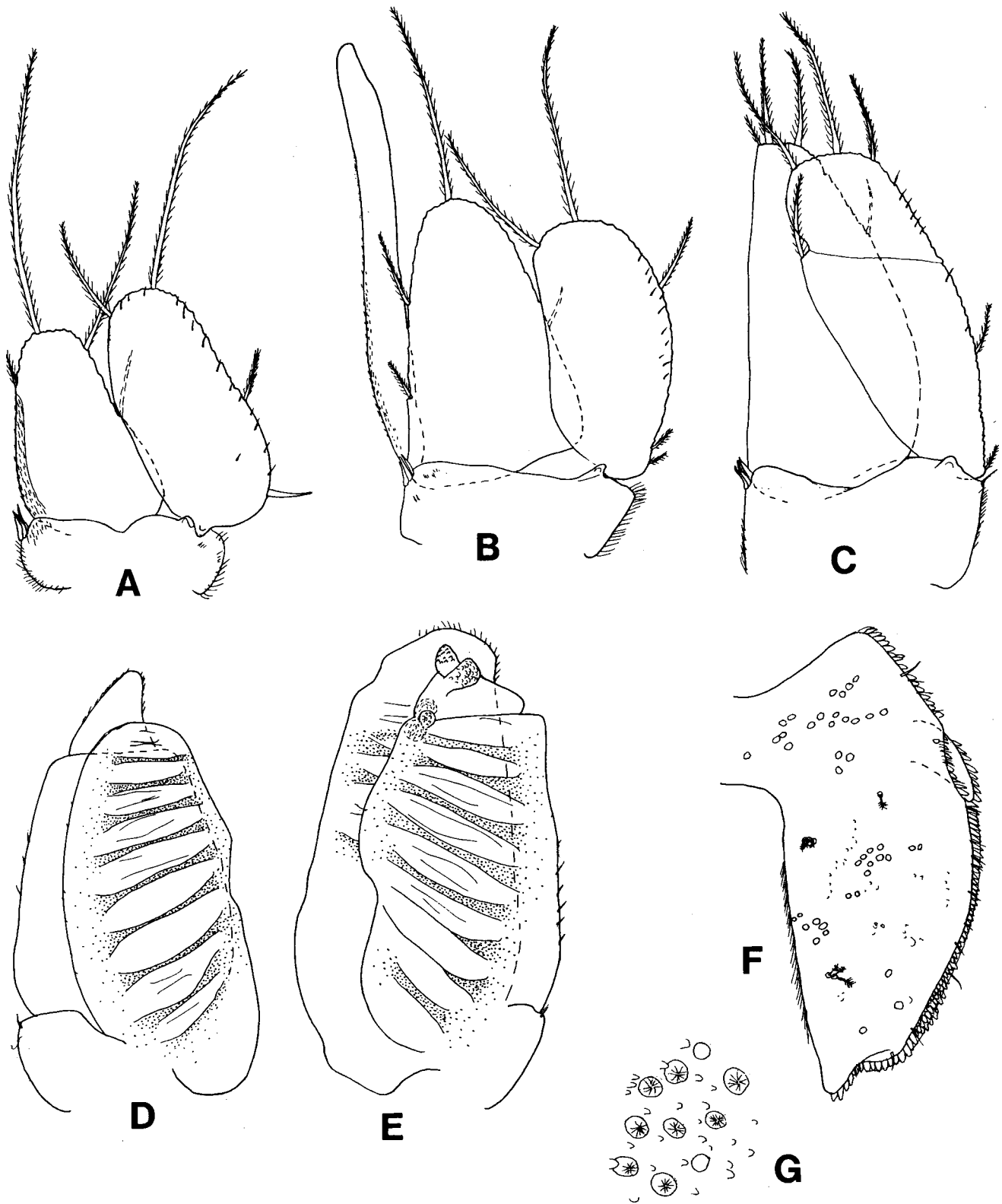


Figure 34. *Moruloidea perionasus* sp. nov. Male paratype, NMV J26202. A–E, pleopods 1–5; F, uropod; G, detail of uropod dorsal surface.

Etymology. From Greek *periosus* (immense) and *nasus* (nose), alluding the hugely projecting anterior margin of the head; noun in apposition.

Distribution. Thistle Cove, Great Australian Bight, WA, to Encounter Bay, SA; intertidal to 5 m.

Remarks. This remarkable spindle-shaped isopod is easily recognized by the prominent anterior cephalic and pleotelson projections. No other species in the genus has such ornamentation, and in addition the uropodal exopod is reduced to an inconspicuous small flat stub. These characters distinguish *Moruloidea perionasus* from all other sphaeromatids except perhaps *Bregmotypta* Bruce, 1994c, the only genus with similar cephalic and pleotelsonic projections. There are many differences at generic level, but in *Bregmotypta* the cephalic process is single and the pleotelson has two prominent bosses, while in *M. perionasus* the anterior process is doubled, and the posterior process is single and elongate.

Character states that support inclusion in *Moruloidea* are: antenna with expanded and reflexed articles 4 and 5; close-set, terminally rounded short, flat penial processes; appendix masculina arising basally, not distally narrowed and longer than ramus; pereopod 1 much more robust than pereopods 2–7, the propodus of which has a proximal extension; coxae 5 overlapping anteriorly and posteriorly; uropodal rami lamellar with exopod smaller than endopod. Other characters such as mouthparts and pleopods present a consistent appearance with other species of the genus.

The immature specimen was selected as holotype as it was the most intact specimen. The propodus of pereopod 1 in this juvenile lacks the prominent ‘heel’ of the adult male although that part of the inferior margin is weakly produced; the dactylus lacks the scales on the inferior margin.

Pedinura gen. nov.

Type species. *Pedinura flindersia* sp. nov., here designated.

Diagnosis. Pleotelson posterior margin entire, posteriorly produced, without exit channel, without ventral depression or groove. Antennule and antenna anteriorly positioned, peduncle articles 1 and 2 flattened and expanded; antennule peduncle articles 2 and 3 short, less than half as long as article 1; article 3 and flagellum collinear. Pereopods 1, 4–7 robust, pereopods 2 and 3 slender, pereopods 2 and 3 dactylus with prominent comb seta set against unguis. Pleopods 1–3 with rami of about equal length; pleopod 1 with axis of rami straight, not oblique. Pleopod 2 appendix masculina medially inserted, extending beyond distal margin of endopod. Pleopods 4 and 5 endopod and exopod with thickened ridges. Uropods ventrolateral in position, not visible in dorsal view; exopod minute, inserted into lateral margin, stub-like.

Description of male. Body elongate, 3 times as long as greatest width, moderately vaulted; dorsal surface smooth; lateral margins subparallel; unable to conglobate. Head weakly immersed in pereonite 1; rostral process minute or absent. Eyes small, lateral. Pereon segments without raised posterior margins. Coxal plates fused, without discernable suture, overlapping anterior

over posterior. Membrana cingula absent. Pleon with 4 segments, pleonite 1 entire, 2 lateral sutures running to posterior margin of pleon. Pleotelson posterior margin produced as plate-like extension posterior to pleopod chamber; without foramen, without ventral exit channel or groove. Pleonal sternite present.

Antennule and antenna anteriorly positioned. Antennule peduncles not separated by epistome; peduncle articles 1 and 2 expanded, anteriorly flattened; plane of articles 1 and 2 of projecting ventrally; peduncle articles 2 and 3 short, article 3 shorter than article 2, together about 0.5–0.8 as long as article 1; flagellum of 4 articles, slightly shorter than combined lengths of articles 1 and 2. Antenna slender, peduncle articles 1 and 2 short, appearing fused, peduncle articles 4 longer than articles 3 and 5; flagellum as long as or slightly longer than peduncle.

Epistome wide, unornamented. Labrum unornamented. Mandible incisor 3- or 4-cuspid; left mandible with lacinia mobilis or without; molar process with or without marginal serrations; palp article 1 longest, 3 shortest. Maxillule with lateral lobe with 11 RS on gnathal surface, mesial lobe with 2 long and 1 short CP slender setae and 2 short simple seta (type species). Maxilla with all articles well developed; lateral and middle lobes with flat RS, mesial lobe with blunt and acute long RS, some of which are basally CP. Maxilliped endite distally with cactus and club setae, laterally with 1 long curved CP seta; palp articles not mesially produced, mesial margins with numerous setae, lateral margins without setae.

Pereopods 1, 5–7 robust, 2 and 3 slender; pereopods 2 and 3 dactylus with prominent pectinate secondary unguis opposing unguis, all other pereopods with prominent recurved trifold secondary unguis.

Penes short, not extending to pleopod peduncles; mutually adjacent or slightly set apart.

Pleopods 1 with axis of both rami straight, not oblique, about equal in length. Pleopod 1 not operculate, not indurate. Pleopod 2 appendix masculina medially attached. Pleopods 3 exopod with transverse suture, pleopods 4 with or without suture, pleopod 5 without. Pleopods 4 and 5 exopod and endopods with transverse thickened ridges; pleopod 5 endopod with 2 or 3 distal scale patches. Uropods endopod lamellar, exopod minute, stub-like, set into anterolateral margin of endopod.

Female. Antennule peduncle of type species articles 1 and 2 greatly expanded anteriorly. Brood pouch of overlapping oostegites arising on pereonites 2, 3 and 4. Mouthparts not metamorphosed.

Composition and distribution. *Pedinura flindersia* sp. nov.; *Pedinura mokari* sp. nov.; subtropical WA to Vic., Australia.

Etymology: A combination of Greek *pedinos* (flat, even), and *oura* (tail), alluding to the flattened pleotelson of the two species (feminine).

Remarks. The characters that best distinguish *Pedinura* are: the plate-like extension to the posterior margin of the pleotelson entirely lacking any exit channel, groove or depression; ventral uropods (not visible in dorsal view) with a minute exopod;

expanded articles to antennule peduncle articles 1 and 2; and the appendix masculina being mesially inserted and extending beyond the distal margin of the exopod.

Pedinura resembles *Amphoroidea* Milne Edwards, 1840, *A. angustata* Baker, 1908 being the most similar. Although *Amphoroidea* and its species have not been fully described, the two genera can immediately be separated by *Amphoroidea* having anterolateral uropods, prominent in dorsal view and extending well beyond the posteriorly narrowed pleotelson. Further points of distinction include the appendix masculina being basal (mesial in *Pedinura*), pleopod 1 endopod distinctly triangular with an indurate mesial margin, and the uropod with both rami large and lamellar.

Cassinopsis Milne Edwards, 1840 is similar (Brandt, 1998) but in that genus the antennule peduncular articles 1 and 2 are not expanded, pereopod 2 lacks the pectinate robust seta opposite the dactylus, and most notably the uropods are lateral (not ventral) and extend well to the posterior of the pleotelson which is not posteriorly produced.

***Pedinura flindersia* sp. nov.**

Figures 35–39

Material examined. Holotype. Male (3.8 mm), “The Hotspot” reef, 5 n. miles W of north end of Flinders I., SA, 33°40.50'S, 134°22'E, 19 Apr 1985, 17 m, assorted red algae, S. Shepherd (NMV J39728).

Paratypes. **Vic.** 3 females (immature 2.0, 2.2, 2.3 mm), 2 manca (1.1, 1.2 mm), Whalers Point Lighthouse, Portland, 38°20.5'S, 141°37.5'E, 1 May 1988, 10 m, brown algae from boulder bottom, R.T. Springthorpe and P.B. Berents (AM P50944). Male (5.0 mm), 38°40'S, 145°35'E, 6 Mar 1982, 0 m, rocky, G.C.B. Poore (NMV J26380). Female (4.2 mm), 2 manca (1.5, 2.5 mm), 500 m offshore, 1 km E of Harmers Haven, 38°34'S, 145°40'E, 6 Mar 1982, 11 m, rocky, C. Larsen and G. Barber (NMV J26377). Male (4.1 mm), female (3.0 mm), 300 m offshore, E of Harmers Haven, 38°34'S, 145°40'E, 6 Mar 1982, 6 m, rocky, R.S. Wilson and C. Larsen (NMV J26381). Male (5.5 mm), female (3.5 mm), 50 m offshore, E side of South Point, Twin Reefs, 38°41'S, 145°39'E, 4 Mar 1982, 11 m, rocky, C. Larsen, G. Barber and R.S. Wilson (NMV J26383). Male (4.2 mm), The Oaks, Bunurong Coast, 38°40'S, 145°38'E, 5 Mar 1982, rock, G.C.B. Poore (NMV J26375). Male (3.1 mm), Eagles Nest, Venus Bay, 38°40'S, 145°40'E, 5 Mar 1982, rock, G.C.B. Poore (NMV J26378). Female (5.2 mm), NW side of Henty Reef, Mounts Bay, 38°47.0'S, 143°40.5'E, 3 May 1988, 18 m, red algae on boulder, R.T. Springthorpe and P.B. Berents (AM P50946). **SA.** 2 males (3.3 dissected, 3.4 mm), 6 females (ovigerous 3.7, 4.4, 5.0 dissected, non ovigerous 2.9, 3.0, 3.1 mm), immature (2.4, 2.6, 2.8, 3.0, 3.8 mm), manca (1.7, 1.7, 1.8 mm), same data as holotype (NMV J39721). 2 males (3.0, 3.2 mm), 2 females (3.4, 3.6 mm), Snapper Point, Beachport, 37°29.3'S, 139°59.6'E, 14 May 1990, 6.0 m, brown algae, on limestone reef, G.C.B. Poore (NMV J26231). **WA.** Female (3.0 mm), Seven Mile Beach, N of Dongara, 29°12'S, 114°53'E, 24 Apr 1986, 1 m, *Amphibolus* epiphytes, G.C.B. Poore and H.M. Lew Ton (NMV J26173). Female (4.1 mm), Cliff Head, S of Dongara, 29°32'S, 114°59'E, 22 Apr 1986, 1 m, red algae on limestone, G.C.B. Poore and H.M. Lew Ton (NMV J26158). Female (3.9 mm), off jetty, Green I., Rottneest I., 32°01'S, 115°30'E, 21 Dec 1983, 1 m, mixed algal turf on rock, R.T. Springthorpe (AM P50943).

Other material, unmeasured. **Vic.** Bay of Islands, 38°35.0'S, 142°49.5'E, 2.5 m, red algae (AM P50945). Portland, 38°24'S, 141°40.5'E, 23m, *Herdmania momus* with encrusting sponge and red algae (AM P50947). **SA.** Topgallant I., Investigator Group, 33°43'S,

133°36.60'E, 20 m, on *Cystophora* and *Plocamium* (NMV J39730). “The Hotspot” reef, N end of Flinders I., 33°40.50'S, 134°22'E, 12 m, assorted algae (NMV J39706); 21 m, red algae (NMV J39722). 7, 2.3 n. miles W of Tiparra Light, Tiparra Reef, Tiparra Bay, 15 Mar 1985, 10 m, red algae (NMV J39727). **WA.** Port Denison Beach, Dongara, 5 m, red algae, mainly *Laurencia* (NMV J39704).

Description of male. Body about 3.2 times as long as greatest width, lateral margins subparallel, pereonites of subequal width, pereonite 4 marginally widest; dorsal surfaces smooth, unornamented. Head anterior margin without transverse ridge, rostral process not visible in dorsal view. Head and pereonites 1 subequal in length in dorsal view, pereonites 1>2=3<4=5>6>7. Pleotelson posterior margin smoothly rounded.

Antennule peduncle article 1 1.4 times as long as proximal width, about 2.6 times as long as article 2; article 2 flattened, about as long as wide, anterior margin with single small seta, posterodistal angle with 2 small setae; article 3 about half as long as article 2; flagellum 4-articled, extending to anterior of pereonite 1, about 0.4 times as long article 3. Antenna peduncle articles 1 and 2 about as long as combined lengths of article 3 and 4; article 4 about as long as article 5, about 1.3 times as long as wide; flagellum about equal in length to peduncle, extending to anterior margin of pereonite 2, with 6 articles.

Epistome smooth, narrow, laterally encompassing labrum, anteriorly forming distinct point. Mandible incisor with 3 cusps; lacinia mobilis absent; spine row of 3 serrate curved spines, on right mandible with additional broad-based multi-digitate spine; molar process appearing largely smooth, without serrate margins or ridged surfaces; palp article 1 longest, without setae; article 2 with 3 biserrate setae, article 3 with 4 biserrate setae, terminal seta being largest. Maxillule mesial lobe with 2 long and 1 shorter weakly CP and 1 short simple seta; lateral lobe with 9 peripheral simple RS on gnathal surface, eleventh seta set between these. Maxilla lateral lobe and middle lobe each with 4 curved flat simple RS respectively, mesial lobe with about (not clearly observed) 6 RS, variously serrate. Maxilliped endite extending about half way along palp article 3, distal margin with 1 conical CP, 3 rounded RS, 1 cactus RS and laterally with 2–3 slender CP RS; palp articles 2–5 with about 4, 9, 8 and 11 setae respectively.

Pereopod 1 basis about 1.6 times as long as greatest width, about 1.1 times long as propodus; ischium 0.6 times as long as basis, 1.8 times as long as greatest width, inferior surfaces with abundant microtrichs; merus about 0.7 times as long as ischium, 0.7 times as long as greatest width; carpus (inferior margin) 0.7 as long as merus, 0.8 times as long as wide; propodus 1.5 times as long as ischium, 1.9 times as long as greatest width, inferior margin with 2 biserrate RS, inferodistal margin with 2 biserrate RS and 2 short simple setae adjacent to base of dactylus; dactylus 0.4 times as long as propodus, unguis strongly recurved, inferior margin with few small cuticular scales, secondary unguis recurved with 2 basal cusps. Pereopod 2 with all articles slender; basis about 3.1 times as long as greatest width, about as long as propodus; ischium 0.8 times as long as basis, 2.5 times as long as greatest width, inferodistal margin with single seta; merus about 0.7 times as long as ischium, 1.7 times as long as greatest width, superior distal

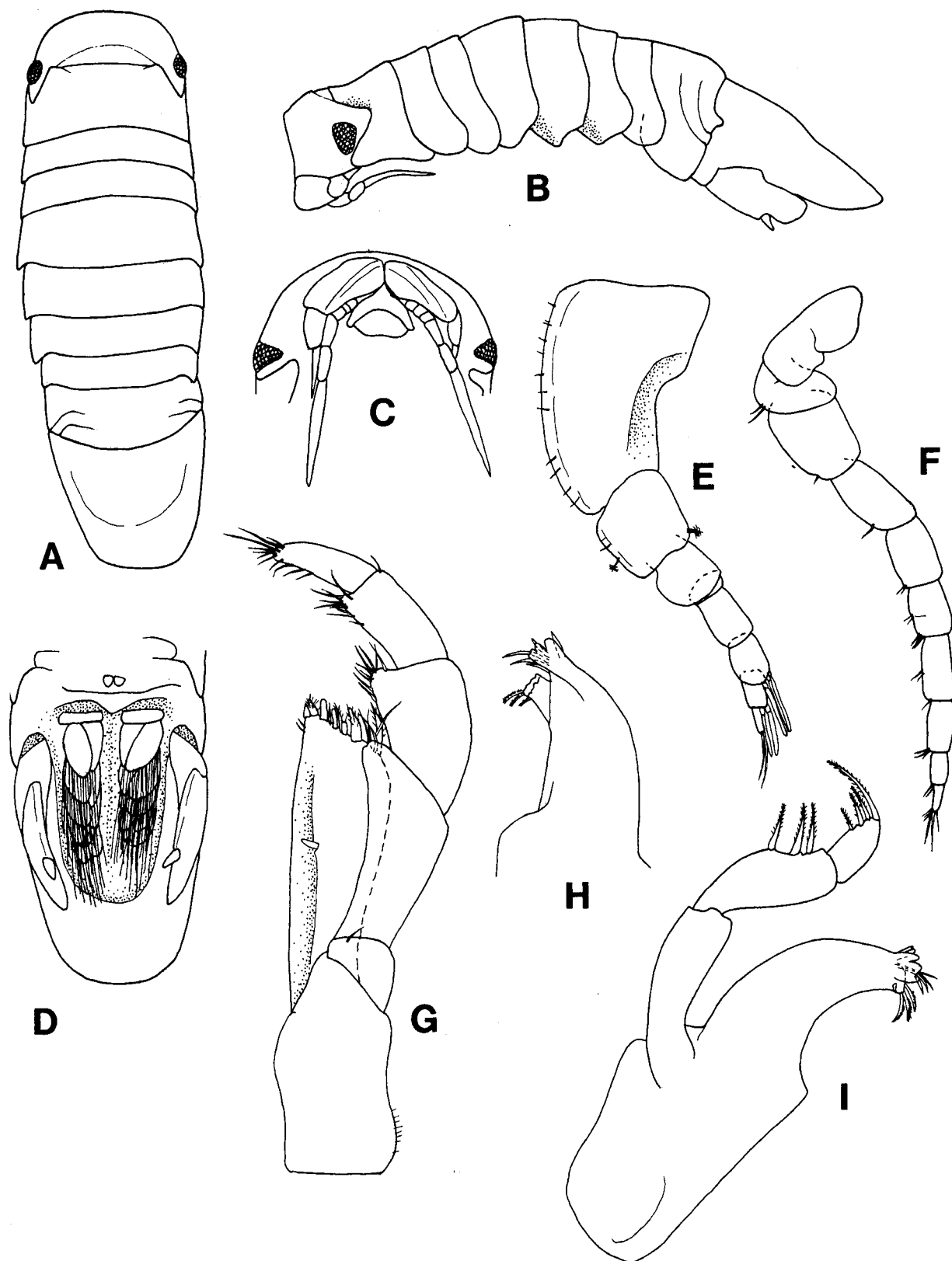


Figure 35. *Pedinura flindersia* sp. nov. A–D, holotype, remainder male paratype NMV J39721. A, dorsal view; B, lateral view; C, frons, ventral view; D, pleon and pleotelson, ventral view; E, antennule; F, antenna; G, maxilliped; H, left mandible; I, right mandible.

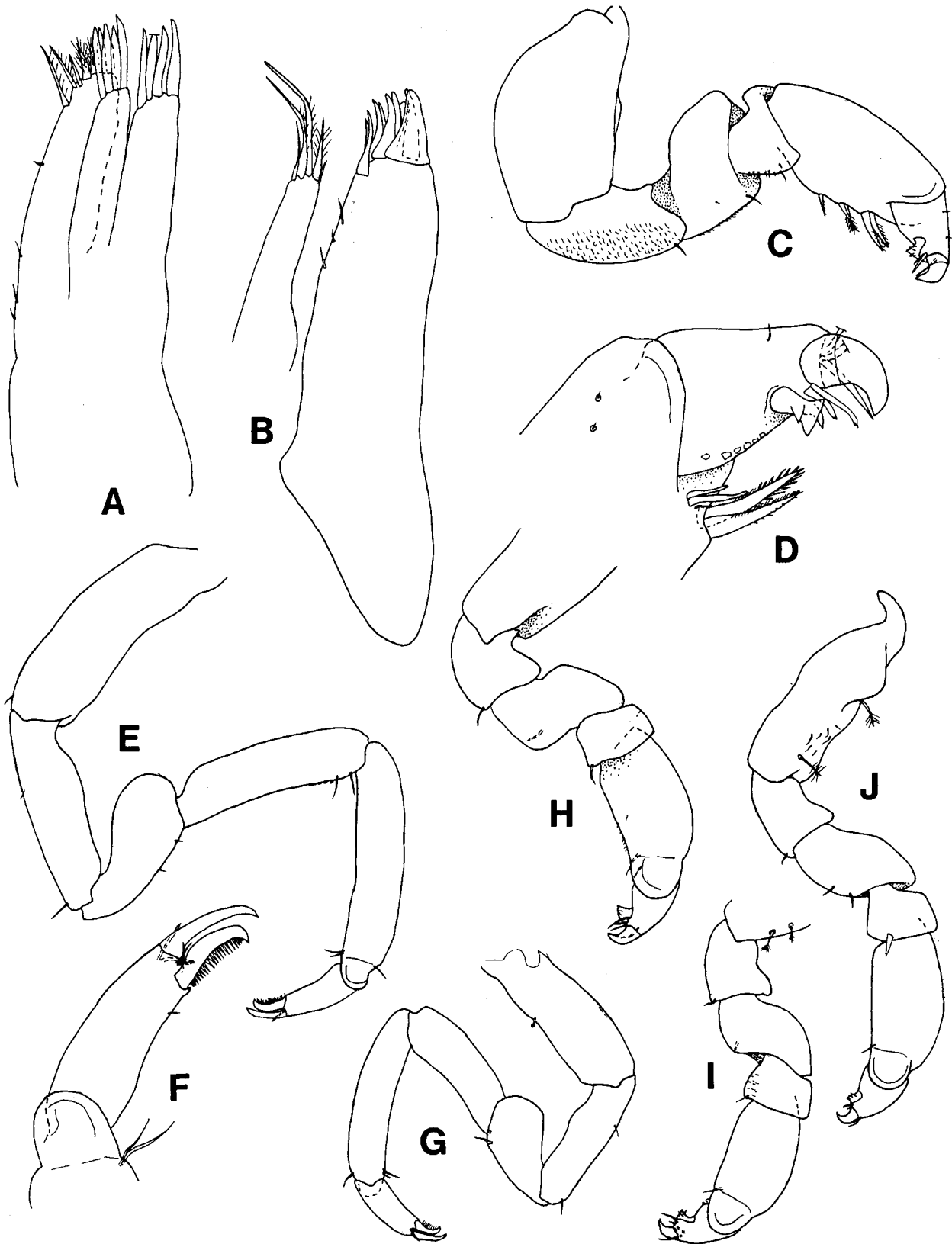


Figure 36. *Pedinura flindersia* sp. nov. All figs male paratype NMV J39721. A, maxilla; B, maxillule; C, pereopod 1; D, pereopod 1, dactylus; E, pereopod 2; F, pereopod 2, dactylus; G, pereopod 3; H, pereopod 6; I, pereopod 4; J, pereopod 7.

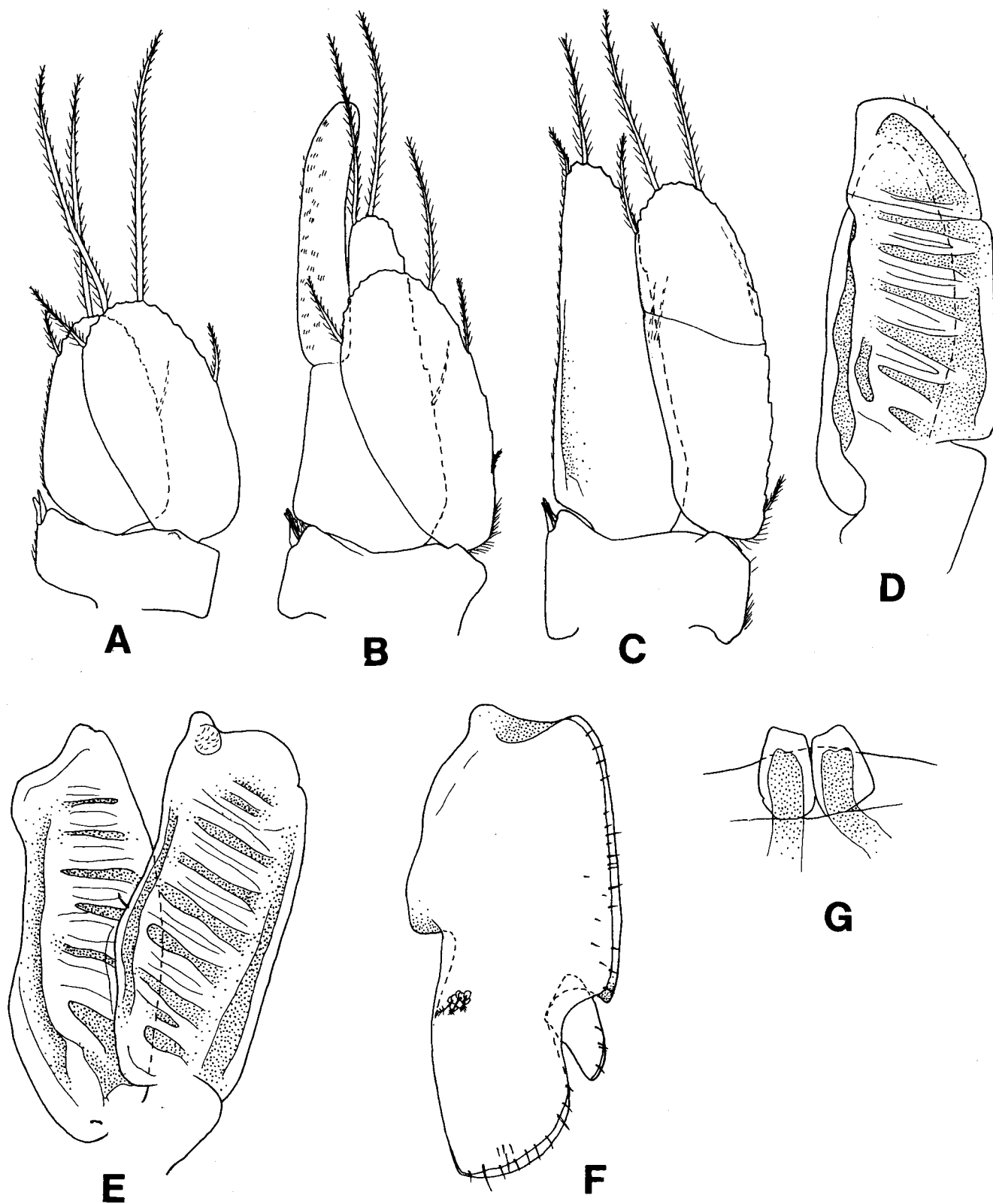


Figure 37. *Pedinura flindersia* sp. nov. All figs male paratype NMV J39721. A–E, pleopods 1–5; F, uropod; G, penes.

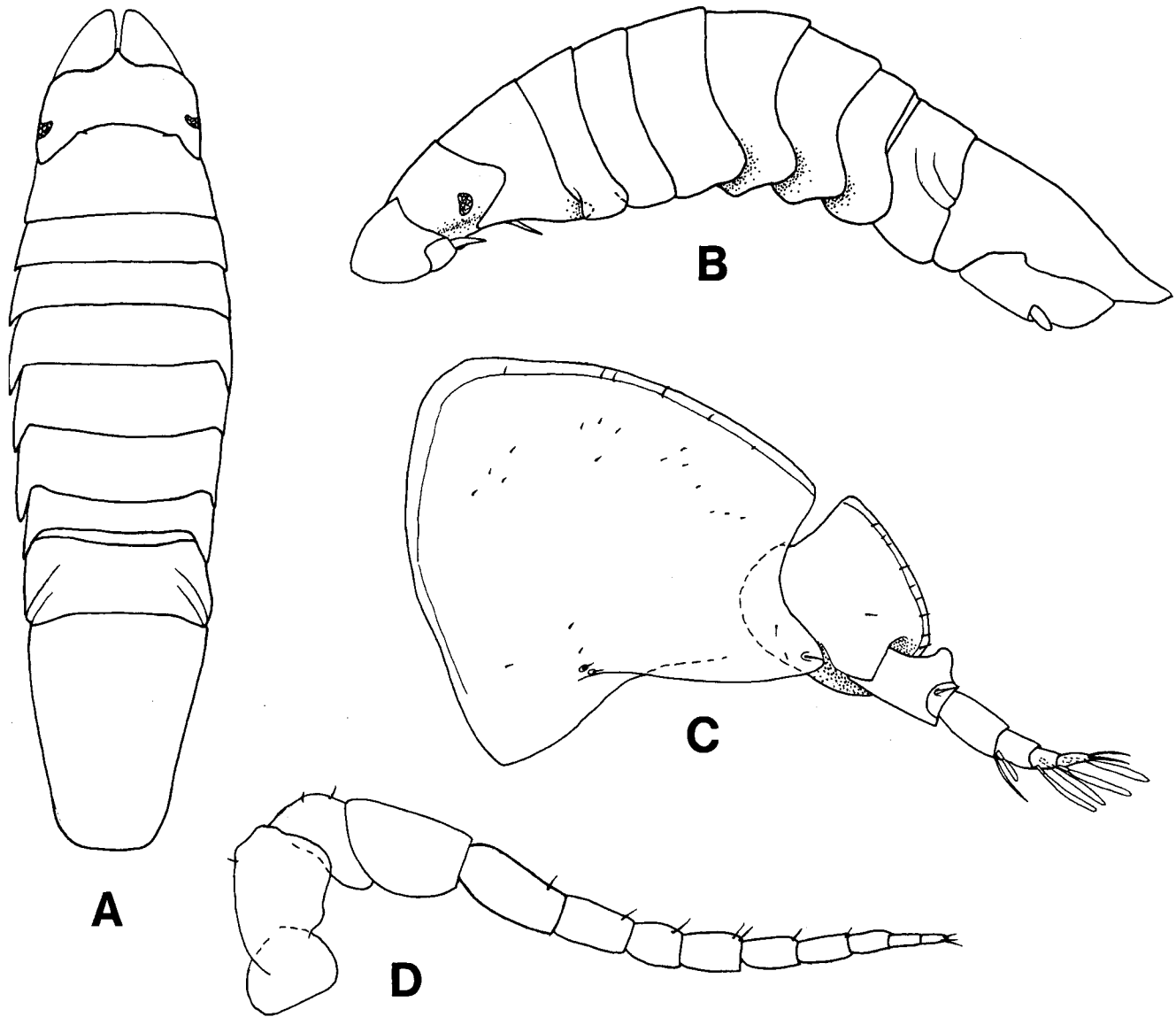


Figure 38. *Pedinura flindersia* sp. nov. All figs female paratype NMV J39721. A, dorsal view; B, lateral view; C, antennule; D, antenna.

margin strongly convex; carpus 1.7 as long as merus, 4 times as long as wide; propodus 1.3 times as long as ischium, 5.3 times as long as greatest width; dactylus 0.4 times as long as propodus, unguis slender apically falcate, secondary unguis flat and strongly pectinate extending alongside unguis. Pereopod 3 similar to 2, but a little more robust. Pereopods 4–7 similar to pereopod 1, but carpus quadrate rather than subtriangular, propodus inferior margin without biserrate RS; all pereopods without trifold and biserrate setae. Pereopod 7 basis with proximal flange; carpus distal margin with single simple acute RS.

Penial processes separate, adjacent, about 1.7 times as long as basal width, quadrate in shape, distal margin weakly oblique, feebly indented.

Pleopod 1 exopod and endopod with c. 14 and 12 PMS respectively; rami of similar size, endopod 0.9 as long as

exopod, 1.8 times as basal width, lateral margin converging slightly to rounded distal margin; exopod 2.0 times as long as greatest width, margins subparallel, distal margin broadly rounded. Pleopod 2 exopod and endopod with c. 18 and 12 PMS respectively, pleopod 2 endopod 1.2 times as long as exopod, 2.3 times as long as greatest width, lateral margin strongly recessed at insertion point of appendix masculina; appendix masculina attached about half way along mesial margin, lateral surface with abundant microtrichs, about 5.3 times as long as wide, 0.8 times as long as endopod, apex bluntly rounded. Pleopod 3 exopod and endopod with c. 24 and 11 PMS respectively; both rami elongate, endopod very slightly (1.06) longer than exopod, slender, 2.9 times as long as greatest width, proximal lateral margin convex. Pleopod 4 both rami with prominent ridges, exopod lateral margin with fine setae, exopod suture incomplete. Pleopod 5 both rami with prominent

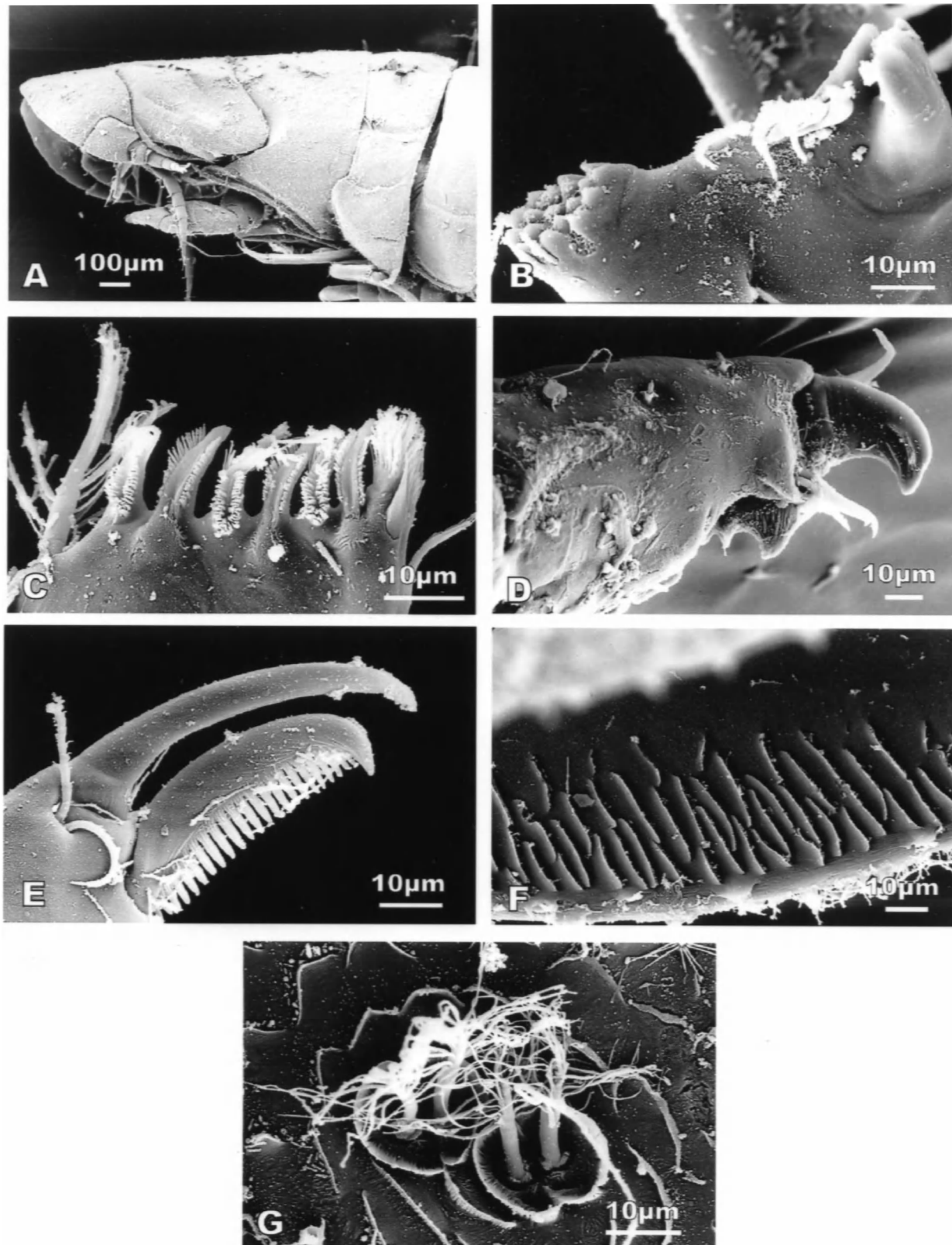


Figure 39. *Pedinura flindersia* sp. nov. SEMs. Female, 'The Hotspot' reef, Flinders I., NMV J39722. A, anterior, lateral view; B, mandible; C, maxilliped, distal margin; D, pereopod 1 dactylus; E, pereopod 2, pectinate robust seta on propodus; F, uropod lateral margin; G, sensory setae, uropods.

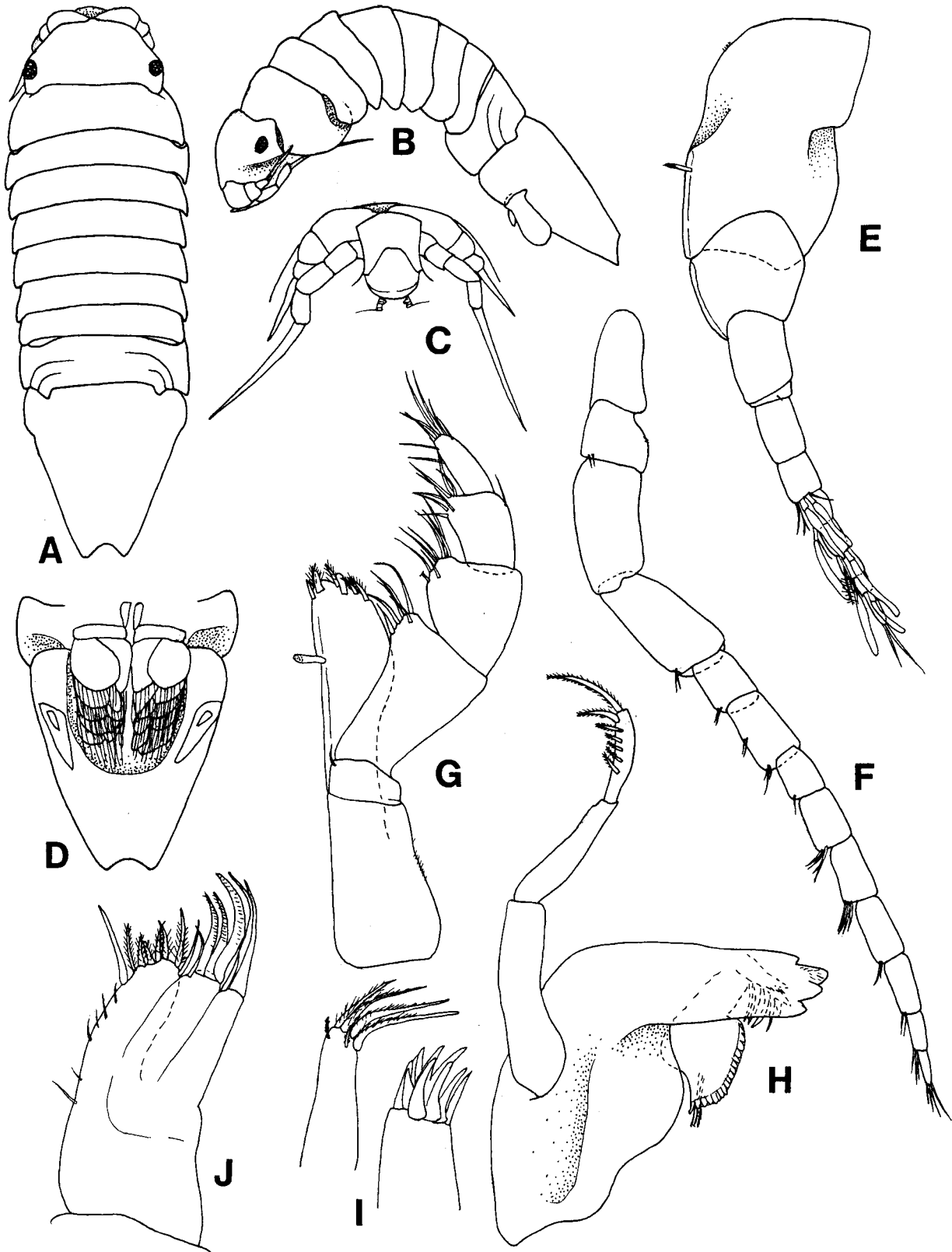


Figure 40. *Pedinura mokari* sp. nov. A–D, holotype, remainder male paratype NMV J39721. A, dorsal view; B, lateral view; C, frons, ventral view; D, pleon and pleotelson, ventral view; E, antennule; F, antenna; G, maxilliped; H, left mandible; I, maxilla; J, maxillule.

ridges; exopod with 2 distal scale patches, and transverse absent. Uropod rami flattened, margins provided with mebrana cingula; exopod inserted into lateral margin at about one-third from posterior margin, 0.2 times as long as fused endopod, anterior margin convex, posterior weakly concave, distal margin narrowly rounded; endopod anterolateral margin straight, posterolateral part subtruncate, mesial margin weakly convex; broadly rounded, proximomesial cluster of 3 sensory setae.

Female. Anterior body outline includes conspicuously expanded antennule peduncular articles 1; rostral point evident in dorsal view; eyes smaller than in males. Antennule peduncle article 1 0.8 times as long as mesial width, about 2.6 times as long as article 2, anteriorly produced, plate-like; article 2 flattened, about as long as wide, anterior margin produced, anteromesial angle at right angles, forming continuous margin with peduncular article 1; article 3 anterior margin with small distinct anterior boss. Antenna as for the male.

Size. Males 3.1–5.5 mm, ovigerous females 3.7–5.0 mm, non-ovigerous females 2.9–5.2 mm; juvenile (sex indeterminate) 2.4–3.8 mm; manca 1.1–2.5 mm.

Etymology. From the type locality; noun in apposition.

Distribution. Vic. (Bunerong), SA, WA (Rottnest I., Seven Mile Beach, Dongara); intertidal to 21 m; mainly on red and brown algae, specifically on *Cystophora*, *Laurencia* and *Plocamium*.

Remarks. This species is distinguished by the posterior margin of the pleotelson being widely subtruncate and without a median indentation. Further distinguishing characters include the strongly expanded antennule peduncle articles 1 and 2, the anteriorly acute epistome not visible in dorsal view, robust pereopods and the uropod exopod being set distally on the endopod.

Pedinura mokari sp. nov.

Figures 40–42

Material examined. Holotype. Male (3.2 mm), Snapper Point, Beachport, SA, 37°29.3'S, 139°59.6'E, 14 May 1990, 6.0 m, brown algae etc., G.C.B. Poore and R.S. Wilson (NMV J39714).

Paratypes. Vic. Male (3.1 mm), wharf at Port Campbell, 38°37.5'S, 142°59.5'E, 8 Apr 1988, 5 m, wood and encrusting algae from wharf pile, R.T. Springthorpe and P.B. Berents (AM P50942). Male (3.2 mm), ?female (2.6 mm), juv. (1.8, 2.0 mm), 50 m offshore, E side of South Point, Twin Reefs, 38°41'S, 145°39'E, 4 Mar 1982, 11 m, rocky, C. Larsen, G. Barber and R.S. Wilson (NMV J26228). ?female (3.0

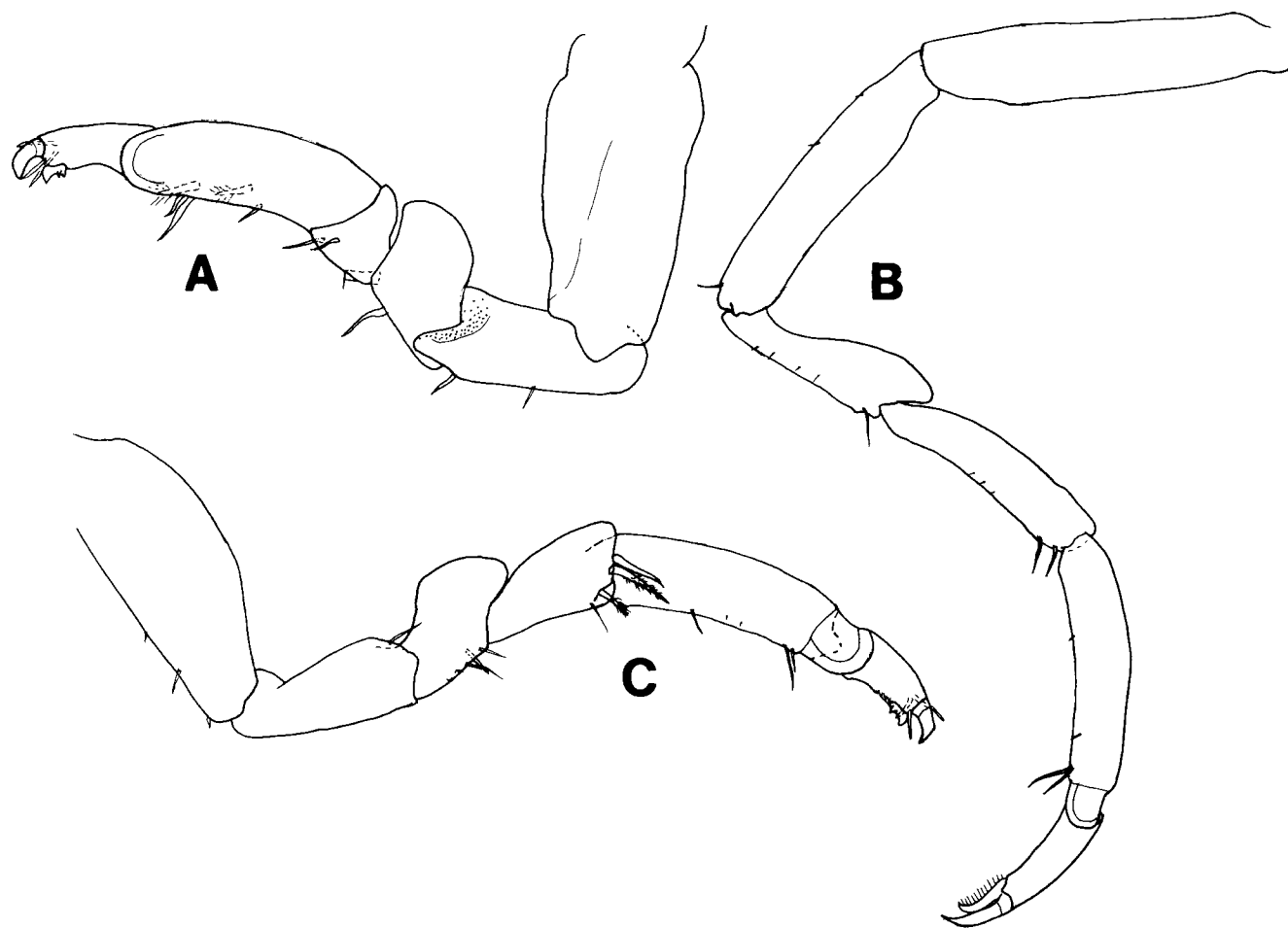


Figure 41. *Pedinura mokari* sp. nov. Male paratype NMV J39721. A–C, pereopods 1, 2 and 7.

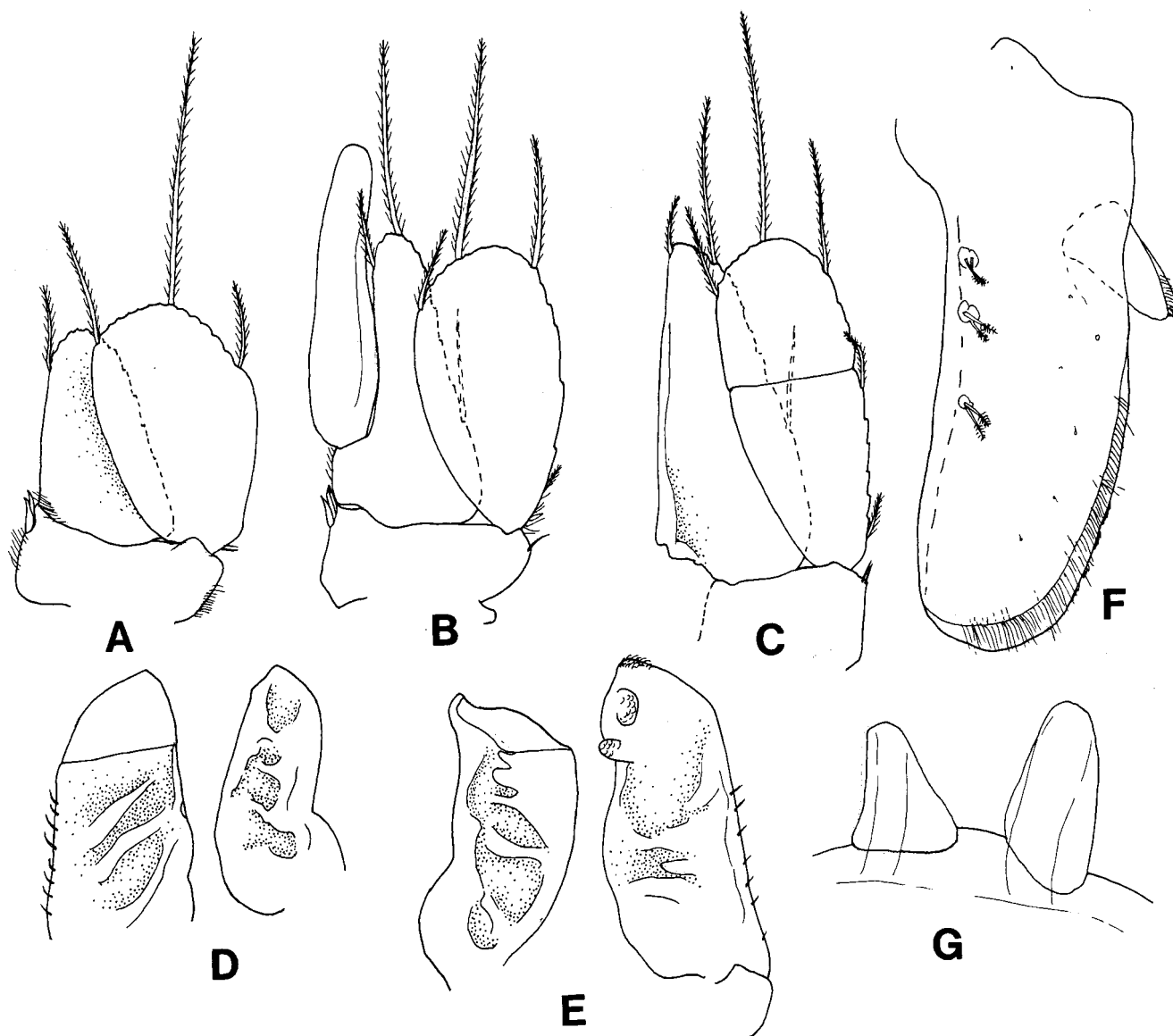


Figure 42. *Pedinura mokari* sp. nov. Male paratype NMV J39721. A–E, pleopods 1–5; F, uropod; G, penes.

mm), SW of Eagles Nest, Venus Bay, 38°40'S, 145°40'E, 5 Mar 1982, 8 m, rocky, R.S. Wilson and G. Barber (NMV J26226). 6 females (ovigerous 3.0–3.5 mm, non-ovigerous 3.1–3.2 mm), E side of Cape Paterson, 38°41'S, 145°36'E, 5 Mar 1982, 6 m, rocky, R.S. Wilson, G. Barber et al. (NMV J26334).

Description of male. Body about 3.0 times as long as greatest width, lateral margins subparallel, pereonites of subequal width; dorsal surfaces smooth, unornamented. Head anterior margin without transverse ridge, rostral process present. Head 1.5 times as long as pereonite 1, pereonites 1>2=3=4=5>6>7. Pleotelson lateral margins straight, converging towards posterior, posterior margin flat with median excavation.

Antennule peduncle article 1 1.3 times as long as proximal width, about 2.0 times as long as article 2; article 2 flattened, 0.9 times as long as wide; article 3 about 0.9 times as long as article 2; flagellum 5-articled, extending to anterior of

pereonite 1, about as length of articles 2 and 3 combined. Antenna similar to type species, flagellum with 9 articles.

Epistome smooth, narrow, laterally encompassing labrum, widest anteriorly with distinct and convex anterior margin, lateral margins shallowly concave. Mandible incisor with 4 cusps; lacinia mobilis present; spine row of 4–5 serrate curved spines; molar process appearing large, with serrate margins or ridged surfaces; palp article 1 longest, without setae; article 2 without setae, article 3 with 7 biserrate setae, distal 2 setae being largest. Maxillule mesial lobe with 4 long and 2 shorter CP; lateral lobe with 10 peripheral simple RS on gnathal surface. Maxilla lateral lobe and middle lobe each with 4 curved, flat, finely serrate RS respectively, mesial lobe with about (not clearly observed) 8 RS, variously serrate. Maxilliped endite extending about half way along palp article 3, distal margin with 1 conical RS, 2 rounded RS, 1 cactus RS and 2–3

slender CPRS; palp articles 2–5 with about 5, 9, 10 and 9 setae respectively.

Pereopod 1 basis about 2.3 times as long as greatest width, about 1.4 times long as propodus, widest proximally; ischium 0.6 times as long as basis, 2.58 times as long as greatest width, inferior margin with 2 acute simple setae, one set at distal angle; merus about 0.4 times as long as ischium, 0.8 times as long as greatest width, inferior margin with 2 acute RS; carpus (inferior margin) 0.7 as long as merus, 0.7 times as long as wide, inferodistal angle with 2 simple setae; propodus 12 times as long as ischium, 32 times as long as greatest width, inferior margin with single proximal seta, inferomesial margin with 2 biserrate RS, inferodistal margin with 2 simple RS adjacent to base of dactylus; dactylus 0.5 times as long as propodus, unguis strongly recurved, inferior margin with few small cuticular scales, secondary unguis recurved with 2 basal cusps. Pereopod 2 with all articles slender; basis about 6.7 times as long as greatest width, about 1.3 times as long as propodus; ischium 0.8 times as long as basis, 4.7 times as long as greatest width, inferodistal angle with single seta; merus about 0.7 times as long as ischium, 3.1 times as long as greatest width, superior distal margin convex, inferodistal angle with single slender seta; carpus 1.1 as long as merus, 4.7 times as long as wide, inferodistal angle with 2 slender setae; propodus about as long as ischium, 5.7 times as long as greatest width; dactylus 0.6 times as long as propodus, unguis slender, apically falcate, secondary unguis flat and strongly pectinate, extending alongside unguis. Pereopod 3 similar to 2, but a little more robust. Pereopods 4–7 similar to pereopod 1, but more slender, carpus quadrate rather than subtriangular, propodus inferior margin without biserrate RS; all pereopods without trifid and biserrate setae. Pereopod 7 basis with proximal flange; carpus distal margin with 3 biserrate acute RS.

Penial processes separate, about 1.3–1.6 times as long as basal width, tapering distally to rounded apex.

Pleopod 1 exopod and endopod with c. 14 and 12 PMS respectively; rami of similar size, endopod 0.9 as long as exopod, 1.6 times as long as basal width, lateral margin converging slightly to rounded distal margin; exopod 1.5 times as long as greatest width, margins convex, distal margin broadly rounded. Pleopod 2 exopod and endopod with c. 20 and 11 PMS respectively, pleopod 2 endopod about as long as exopod, 2.0 times as long as greatest width, lateral margin strongly recessed at insertion point of appendix masculina; appendix masculina attached about one-quarter of way along mesial margin, about 4.4 times as long as wide, 1.1 times as long as endopod, apex bluntly rounded. Pleopod 3 exopod and endopod with c. 22 and 12 PMS respectively; both rami elongate, endopod very slightly (1.04) longer than exopod, 2.3 times as long as greatest width, proximal lateral margin convex. Pleopod 4 both rami with obscure ridges, exopod lateral margin with fine setae, exopod suture complete. Pleopod 5 both rami with indistinct ridges; exopod with 3 distal scale patches, transverse suture absent. Uropod rami flattened, margins provided with mebrana cingula; exopod inserted into lateral margin at about one-quarter from proximal margin, 0.2 times as long as fused endopod, triangular, apex subacute; endopod antero-lateral margin weakly convex, posterolateral part rounded,

mesial margin straight; mesially with 3 cluster of 2 sensory setae.

Female. Sexes similar, the dimorphism of the type species apparently not present in this species

Size. Males 3.1–3.2 mm, ovigerous females 3.0–3.5 mm, non-ovigerous females 3.1–3.2 mm.

Etymology. *Mokari* is an Aboriginal word meaning new; noun in apposition.

Distribution. Vic. and SA, where it is sympatric with the more widely distributed *P. flindersia*; 5–11 m, rocky habitats.

Remarks. *Pedinura mokari* is separated from the only congener, *P. flindersia* by the posteriorly indented pleotelson, the epistome being widest anteriorly and visible in dorsal view and the weakly expanded antennular peduncle articles 1 and 2.

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Appendix. Species currently placed in *Exosphaeroma* Stebbing, 1900

Many species of *Exosphaeroma*, including all those described by Keppel H. Barnard from southern Africa and all those described by W.H. Baker from southern Australia during the first half of the twentieth century (13 of the 32 included here), need redescription, but only those that are particularly inadequately described or are of uncertain generic status are mentioned as such. Australian species are shown in bold.

- Exosphaeroma agmokara* sp. nov. Type locality—Broken Head, Northern NSW Australia; intertidal, under rocks on sand.
- Exosphaeroma aliae* Baker, 1926. Type locality—Victor Harbour, South Australia.
- Exosphaeroma alveola* sp. nov. Type locality—Jervis Bay, New South Wales, Australia; intertidal.
- Exosphaeroma amplicauda* (Stimpson, 1857). Type locality—Monterey Bay, California; in need of redescription [original combination *Sphaeroma*].
- Exosphaeroma antikraussi* Barnard, 1940. Type locality—Barnard cited several locations in South Africa.
- Exosphaeroma bicolor* Baker, 1926. Type locality—Kangaroo Island, South Australia.
- Exosphaeroma brevitelson* Barnard, 1914. Type locality—Sea Point, near Cape Town, South Africa; intertidal.
- Exosphaeroma bruscai* Espinoza-Pérez and Hendrickx, 2001. Type locality—Los Arcos, Jalisco, Pacific Mexico; among inter-tidal algae and rocks to a depth of 3 metres.
- Exosphaeroma diminutum* Menzies and Frankenberg, 1966. Type locality—Sapelo Island, Georgia, USA; Chesapeake Bay to Florida and Venezuela (Kensley and Schotte 1989); this species does entirely conform to the genus.

- Exosphaeroma echinensis* Hurley and Jansen, 1977. Type locality—Kaikoura, New Zealand; intertidal and subtidal.
- Exosphaeroma estuarium* Barnard, 1951. Type locality—Umbagaga Estuary, near Umkomaas, Natal coast, South Africa; among *Zostera* seagrass.
- Exosphaeroma falcatum* Tattersall, 1921. Type locality—Spirits Bay, North Cape, New Zealand; subtidal to 20 m.
- Exosphaeroma gigas* (Leach, 1818). Type species. Type locality—unknown ('*Son pays inconnu*.'); this species has a wide reported distribution in the Southern Hemisphere, including Macquarie Island and Tasmania, but from the time that the genus was established (Stebbing 1900; more recently Poore et al. 2002) there has been at least a subjective doubt that all material under this name is correctly identified [original combination *Sphaeroma*].
- Exosphaeroma hylecoetes* Barnard, 1940. Type locality—Barnard cites several locations in South Africa.
- Exosphaeroma inornata* Dow, 1958. Type locality—Palos Verdes, Los Angeles County, California, under kelp hold-fasts.
- Exosphaeroma kraussi* Tattersall, 1913. Type locality—Saldanha Bay, Cape Town, South Africa; the uropodal exopod is clearly figured as serrate, and the species is in need of redescription.
- Exosphaeroma laevis* (Baker, 1910). Type locality—Gulf of Saint Vincent, South Australia [original combination *Zuzara*].
- Exosphaeroma laevisculum* (Heller, 1868). Type locality—South Africa [original combination *Sphaeroma*].
- Exosphaeroma media* George and Stromberg, 1968. Type locality—San Juan Island, Washington, USA.
- Exosphaeroma montis* (Hurley and Jansen, 1978), *comb. nov.* Type locality—Mount Maunganui, New Zealand; intertidal; conforms well with the diagnosis for *Exosphaeroma* [original combination *Cymodopsis*] and is here transferred to that genus; see 'Remarks' for *Exosphaeroma alveola* sp. nov. for comments.
- Exosphaeroma obtusum* (Dana, 1853). Type locality—Bay of Islands, New Zealand; widely recorded around New Zealand; also Stewart Island, Auckland Island, the Snares Islands, Campbell Island and Chatham Island (Hurley and Jansen 1977); intertidal [original combination *Sphaeroma*].
- Exosphaeroma octoncum* (Richardson, 1899). Type locality—Monterey Bay, California [original combination *Sphaeroma*]; in need of redescription.
- Exosphaeroma pallidum* Barnard, 1940. Type locality—Woodstock Beach, Table Bay, South Africa; also recorded from southern Australia.
- Exosphaeroma parva* Chilton, 1924. Type locality—Chilka Lake, India; in need of redescription.
- Exosphaeroma planum* Barnard, 1914. Type locality—Sea Point, near Cape Town, South Africa; intertidal.
- Exosphaeroma planulum* Hurley and Jansen, 1977. Type locality—Heathcote–Avon Estuary, Christchurch, New Zealand; intertidal, estuarine; a replacement name for homonym *Exosphaeroma planum* Hurley and Jansen, 1970.

Exosphaeroma porrectum Barnard, 1914. Type locality—South Africa; intertidal to 5 metres.

Exosphaeroma rhomburum (Richardson, 1899). Type locality—California [original combination *Sphaeroma*].

Exosphaeroma serventii Baker, 1928. Type locality—Pallinup Estuary, on the Great Australia Bight coast of Western Australia.

Exosphaeroma studeri Vanhöffen, 1914. Type locality—Punta Arenas, Chile.

Exosphaeroma truncatitelson Barnard, 1940. Type locality—Kleinmond, Cape Province, South Africa.

Exosphaeroma varicolor Barnard, 1914. Type locality—Woodstock Beach and Sea Point, near Cape Town, South Africa.

Incertae sedis

Exosphaeroma alba Menzies and Glynn, 1968. Puerto Rico. This species and its named variety *E. alba chromata* Menzies and Glynn, 1968 were provisionally placed in *Exosphaeroma* (as ?*Exosphaeroma*) by Menzies and Glynn (1968). The morphology or the antennule peduncle, penial processes, shape and orientation of pleopod 1 rami, appendix masculina, and pleonal sutures (which run to the posterior margin of the pleon) and the pleotelson with a distal incision (or exit channel) all preclude its inclusion in *Exosphaeroma*, and suggest a closer affinity with *Dynamenella*. Remarkably, Menzies and Glynn (1968) considered the most similar species to be a species of *Dynamenella*, yet placed their new species in *Exosphaeroma*.

Exosphaeroma antillense Richardson, 1912. Type locality—Montego Bay, Jamaica (Kensley and Schotte, 1989); the bidomed pleotelson together with the short uropodal exopod and overlapping oostegites suggest that this is not a species of *Exosphaeroma* (as suggested by Kensley and Schotte 1989).

Exosphaeroma antarctica Richardson, 1908. Type locality—Port Madryn, Patagonia; the description and figures are of insufficient detail to distinguish this species from similar species such as *E. gigas* and *E. obtusum*.

Exosphaeroma aphrodita Boone, 1923. Type locality—La Jolla, California. This species has never been illustrated, and from the description given by Boone it is not possible to assess its status. Boone's description describes the dorsal surfaces of the body as being highly nodular and ornamented.

Exosphaeroma productatelson Menzies and Glynn, 1968. Puerto Rico. This species is very similar to *E. alba*, and the comments given for that species also apply entirely to this species, except the posterior margin of the pleotelson is entire.

Exosphaeroma yucatanum (Richardson, 1901). Included in *Exosphaeroma* by Kensley and Schotte (1989). The trilobate pleotelson and tri-domed pleotelson dorsum would indicate that this is not a species of *Exosphaeroma*.

Exosphaeroma coatsii Tattersall, 1913. Port Stanley, Falkland Islands. This species is based on females and has prominent nodules across the pereonites, pleon and pleotelson. The uropods have smooth margins, and the apex of the pleotelson is acute. I am unaware that this species has been placed into synonymy, but as it is based on females there is the possibility that it is a species of *Isocladus*. Not included in Nierstrasz's (1931) listing of species.

Exclusions

Exosphaeroma crenulatum Richardson, 1902. Synonym of *Dynamenella perforata* (Moore, 1902) (see Glynn, 1974).

Exosphaeroma pulchellum Colosi, 1921. Synonym of *Sphaeroma hookeri* (Leach, 1818) (see Jacobs, 1987).

Exosphaeroma calcareum (Dana, 1853). At times placed in *Exosphaeroma* (e.g. Nierstrasz, 1931), more recently retained in *Isocladus* (e.g. Menzies, 1962).

