

To Prof. Brian Kensley,
with best wishes -

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TWO NEW SPECIES OF *PARACILICAEA* STEBBING, 1910 (CRUSTACEA: ISOPODA: SPHAEROMATIDAE) FROM THE COAST OF SOUTH-EAST ASIA

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Abstract

Two new species of *Paracilicaea* are described: *P. asiatica* sp. nov. which is similar to the majority of *Paracilicaea* species in having a lambdoid epistome with a subacute apex, and *P. fimbriata* sp. nov. which is distinguished by a broadly truncate epistome. Species of *Paracilicaea* are widespread around Australia and along the coasts of East Africa, but they have not been previously recorded from the north-western Indo-Pacific.

Introduction

This paper describes two new species of *Paracilicaea* Stebbing, 1910. Specimens for study were obtained by the joint Soviet-Chinese, Soviet-Indonesian and Soviet-Vietnamese expeditions of 1958-62 from the intertidal zone of southern China, Hainan Island, northern and southern coasts of Java. Additionally, a small collection obtained by Dr Bruggen (1907) from Jakarta (labelled as Batavia), probably from the intertidal zone, was examined. All type specimens are deposited in the Zoological Institute of the USSR Academy of Sciences (ZIN) in Leningrad.

The genus *Paracilicaea* may be considered as a primarily tropical Indo-West-Pacific taxon. Only single species penetrate into and inhabit the subtropical waters of South Australia. However, species of this genus were hitherto confined to the coasts of East Africa, from where seven species are known (Roman 1979; Kensley 1984) and Australia, from where eight species of *Paracilicaea* are recorded (Harrison and Holdich 1984). From the vast areas of the north-western coast of the Indo-West-Pacific, including the coast of south Asia, the Greater Sunda Islands, New Guinea, the Philippines and many other islands, representatives of *Paracilicaea* have not hitherto been recorded. This can be explained by the few

reports on the isopod fauna of this region and is not associated with any biogeographical or ecological reason. The two species of *Paracilicaea* described in this paper shows the genus to have a wide latitudinal range from 21° N to 8° S.

Description of species

Paracilicaea asiatica sp. nov.
(Figs. 1-3)

Material. Pacific Ocean. South China Sea, North Coast, Naochoudao Island (22°55' N, 110°35' E), 19 December 1958, intertidal zone, coll. O. B. Mokievsky, 1 adult ♂, length 5.6 mm (holotype ZIN N 1/82152) and fragments of 3 ♀♀, (paratypes ZIN N 1/82153); 18 December 1958, intertidal zone, coll. O. B. Mokievsky, 2 sub-adult ♂♂, length 4.8 mm, 1 immature ♀, length 3.3 mm (paratypes ZIN N 3/82154). South China Sea, Hainan Island, Sanya, 6 December 1959, intertidal rocks, among seaweeds, coll. E. F. Gurjanova, 1 adult ♂, length 6.1 mm (paratype ZIN N 4/82155); 6 April 1958, infralittoral fringe, among *Sargassum* sp., coll. E. F. Gurjanova, 1 adult ♂, length 5.7 mm; 1 non-ovigerous ♀, length 4.7 mm (paratypes ZIN N 5/82156).

Indian Ocean. Java Island, South Coast, Krakal Bay (east of Jogjakarta), 29 August 1962,

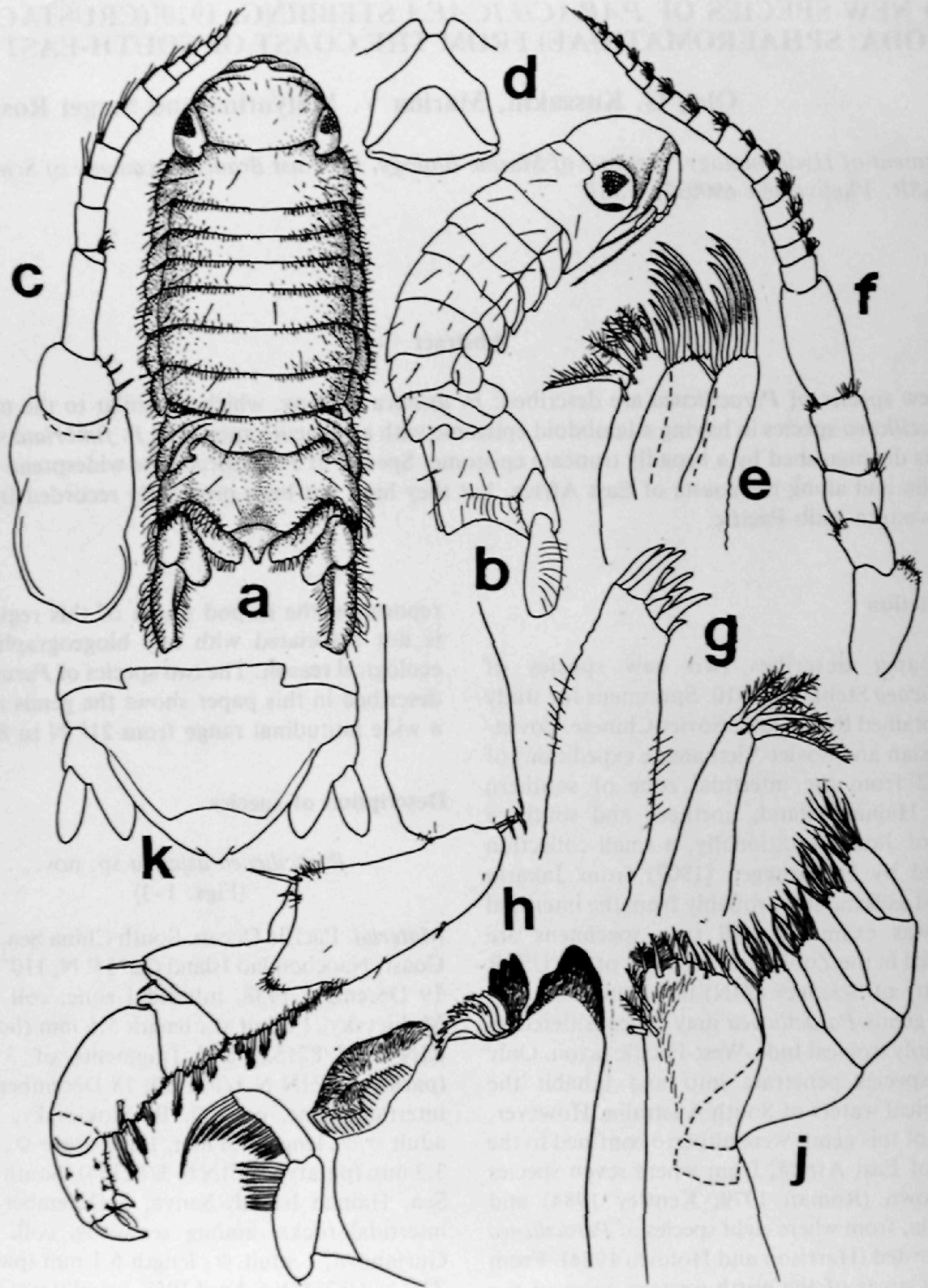


Fig. 1. *Paracilicæa asiatica* sp. nov. Adult male (Holotype ZIN N 1/82152), 5.6 mm: a, dorsal; b, lateral; c, antennal; d, epistome and labrum; e, maxilla 2; f, antenna 2; g, maxilla 1; h, pereopod 1; i, left mandible; j, maxilliped. Non-ovigerous female (paratype): k, pleotelson, dorsal.

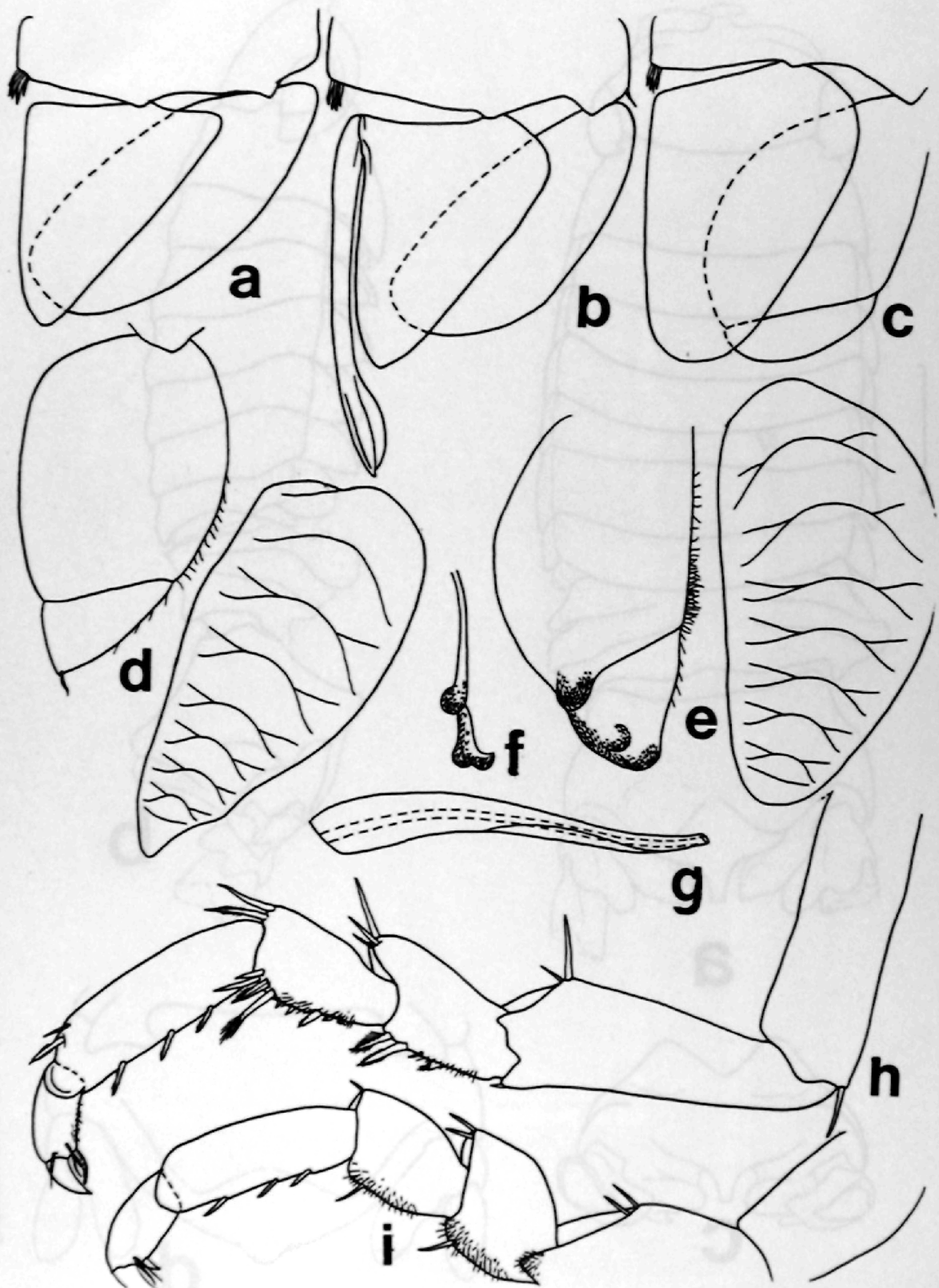


Fig. 2. *Paracilicæa asiatica* sp. nov. Adult male (Holotype): a, pleopod 1; b, pleopod 2; c, pleopod 3; d, pleopod 4; e, pleopod 5; f, distal internal margin of pleopod 5, internal view; g, penis; h, pereopod 2; i, pereopod 7.

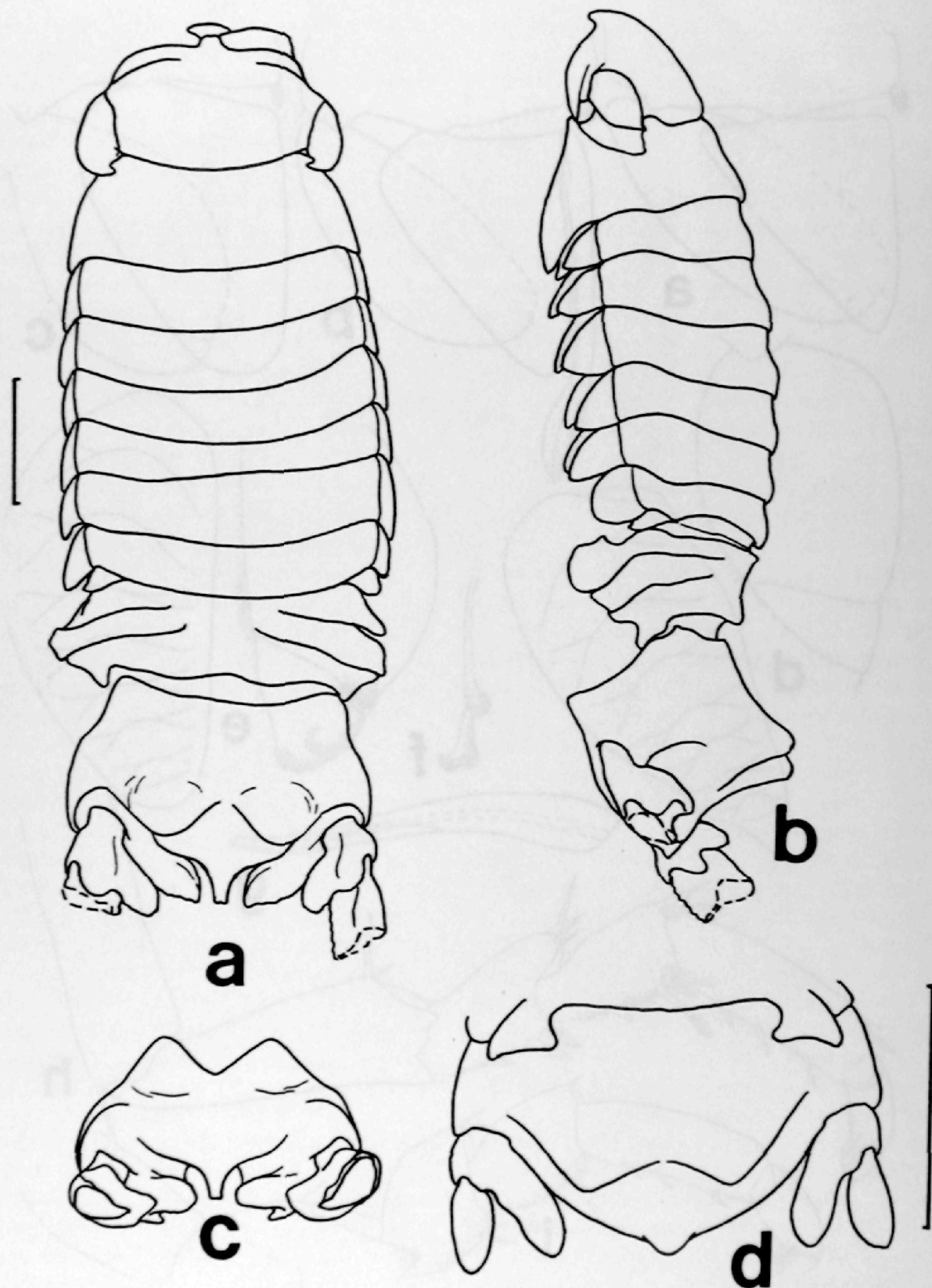


Fig. 3. *Paracilicæa asiatica* sp. nov. Specimens from Indonesia. Adult male, 6.9 mm: a, dorsal; b, lateral; c, posterior. Immature female: d, pleotelson, dorsal. Scale line represents 1 mm in each case.

intertidal zone, coll. O. B. Mokievsky, 1 adult ♂, with damaged uropods, length 6.9 mm; 1 subadult ♂, length 4.7 mm, 5 immature ♀♀, length 2.2–2.6 mm (ZIN N 6/82157). Type locality: Naochoudao Island, South China Sea.

Description. Male holotype. Body strongly convex, comparatively slender, oblong-ovate, slightly wider at pereonites 5–6, almost 2.25 times longer than maximum width at pereonites 5–6. Dorsal surfaces finely granular, covered with setae; setae more strongly developed on pleotelson and along pereon margins, and densely covered by numerous short and very thin hairs.

Cephalon 1.5 times as long as and obviously narrower than pereonite 1; frontal margin with median rostral process, on each side of which is a semicircular incision. Eyes moderate in size, convex, brownish.

Pereonite 1 longest, about as long as combined length of pereonites 2–3, with strong ventrolateral expansion; anterior and posterior ventrolateral angles produced into obtuse pointed triangular lobes of subequal length. Pereonites 2–4 short, subequal in length and width. Pereonites 5–7 subequal in length, nearly twice as long as pereonite 4. Coxae 2–6, with oblique ridges, of pereonites 2–4 produced posteriorly to short beak-like subacute point, of pereonites 5–6 slightly produced down and rounded. Coxal plates of pereonite 7 broadly rounded and not extending considerably as far as tips of coxae 6 and pleonal extensions.

Abdomen nearly 1.5 times as wide as long and 0.29 length of body. Pleonites 1–4 fused medially, pleonite 1 very short and narrow, visible only posterodorsally of coxal plates 7. Lateral margins of pleonite 2 expanded laterally, broadly rounded and each produced anteriorly into a short triangular process. The proximal half of pleonite 4 strongly raised and somewhat produced posteriorly, slightly overhanging anterior part of pleotelson, with a low bulge either side of the midline. Raised anterior two-thirds of pleotelson with wide shallow longitudinal medial groove; broad and moderately high conical bumps either side of depression. Posterior, weakly convex part of pleotelson strongly narrows distally; pleotelson apex obtusely pointed, with weakly defined notch;

incisions either side of medial tooth are deep, flanked by lateral projections provided with triangular apices.

Epistome nearly lambdoid, not broad, with long blunt apex. Antenna 1 somewhat shorter than antenna 2, when curved backwards not reaching posterior margin of pereonite 1; basal article oblong-cylindrical, with slightly concave lateral margins; article 2 as long as wide, 2.5 times width and 0.6 length of article 3, 0.62 width of basal article; article 3 slender, cylindrical, 0.58 width of article 2; 13-articled flagellum is shorter than peduncle. Antenna 2 reaching almost to posterolateral angle of pereonite 1; all peduncle articles slender, basal article comparatively long subequal in length with article 5; articles 2 and 3 short, subequal in length, together nearly as long as basal article; article 4 about 1.5 times as long as article 3 and 0.6 length of article 5; 15-articled flagellum shorter than peduncle. Mandible bearing stout incisor process with blunt strongly sclerotized nearly smooth cutting edge; lacinia mobilis rather long, broad, with 3 blunt cusps; spine row with 5 strong wide pectinate spines; molar process stout and short, very broad, truncate, with rough distal surface, fringed with dense band of short spines; palp with article 2 bearing row of spines distally, article 3 slightly curved, armed with row of 13 stout setae, distal setae more than 2 times as long as preceding one. Maxilla 2 with inner ramus bearing 6–7 plumose spines plus 4 much shorter simple spines; medial and lateral lobes of outer ramus with 8 long, curved, finely serrate spines each. Maxillipedal endite with single comparatively long retinaculum on medial margin; outer margins of palp articles without setae, inner lobes of palp articles 2–4 long, with numerous setae on tips.

Pereopod 1 stout, shorter and thicker than following pereopods; ischium with anterodistal angle bearing 1 long spine plus several small setae, in middle part ischium produced distally into a long triangular lobe; merus with produced superior distal angle bearing 2 spines and posterior border bearing 6 stout plumose spines; carpus short, with three stout plumose spines on posterior margin; primary unguis comparatively short and thick, 2.5 times as long as secondary unguis. Following pereopods 2–4 somewhat narrower

and longer, with carpus and merus about equal in length, together 1.2 times as long as sublinear propodus bearing 3 spines. Pereopod 7 slender, ischium about 3 times as long as wide, as long as basis and about 2 times as long as merus; merus and carpus almost subequal in length; propodus nearly twice as long as carpus; merus with anterodistal angle bearing 3 spines and posterior margin with 2 stout plumose spines near distal angle; carpus with anterodistal angle bearing 2 long spines and posterodistal margin bearing 4 stout setae; short spines present along inferior margin of carpus; propodus bearing 2 spines near superior angle and 3 spines along posterior margin.

Penes slightly curved, tapering to truncate tip, slightly longer than appendix masculina. Pleopod 1 endopod triangular, exopod elongate-oval, 1.2 times as long as exopod. Pleopod 2 endopod subtriangular bearing relatively long and slender appendix masculina, 1.4 as long as endopod: distal part slightly curved outwards, dilated, without serrations; exopod elongate-oval, tapering proximally, slightly longer than endopod. Pleopod 3 endopod relatively broad, oval-trapezoid, with straight medial margin; exopod pyriform in outline with entire suture. Pleopod 4 exopod biarticulate, considerably shorter than plicate endopod; exopod bearing one terminal seta, endopod without setae. Pleopod 5 endopod pleated, with rounded apex, a little longer than exopod; exopod bearing a complete subterminal articulation, distal region of internal margin with three finely-toothed bosses. Uropodal exopod 3 times as long as wide, distinctly incurved, laterally flattened, subelliptical in transverse section, its dorsal part cylindrical and thickened, apex truncated, deflected internally; endopod relatively wide and short, with rounded apex, extending posteriorly beyond pleotelsonic apex.

Non-ovigerous female. Body smooth, covered with fine setae. Posterior margin of pleonite 4 nearly straight in medial part. Proximal two-thirds of pleotelson strongly raised dorsally, produced posteriorly, with broad low-conical bulge either side of midline. Uropodal rami subequal, not extending as far as triangular blunt distal medial tooth of pleotelson; exopod with apex rounded; apex of endopod obliquely truncated.

Variation. Immature males resembling non-ovigerous female in dorsal view, but distal part of pleotelson longer, with a narrow notch either side of short medial tooth. Uropodal endopod shorter and narrower than in female; outer margin of exopod obviously thickened. The Indonesian adult male differs from the holotype and all the Pacific males in having a longer medial tooth on the tip of the pleotelson and deeper notches each side of this tooth and a more strongly thickened outer uropodal exopod margin. As specimens from Indonesia and the Pacific agree in all others respects, it is considered here that they are only geographic variations.

Remarks. Males of *P. asiatica* can be easily distinguished from *P. pubescens* (Milne-Edwards 1840 figured by Harrison and Holdich 1984) by having a pair of dorsal bulges on pleonite 4, lacking a tooth on the lateral margin of the uropodal exopod and a relatively longer medial process on the tip of the pleotelson. *P. stebbingi* Baker 1926 differs from *P. asiatica* by the presence of longitudinal dorsal ridges on the pleonites and pleotelson. *P. asiatica* differs from *P. flexibilis* Baker 1929, *P. hanseni* Stebbing 1910 and *P. aspera* Harrison and Holdich 1984 by lacking dorsal tubercles, from *P. cordylina* Kensley 1984 by its relatively weakly developed bulges on pleonite 4 and a deeper notch on the tip of the pleotelson, which also has a long medial tooth. From *P. gigas* Baker 1929, *P. asiatica* differs by considerably smaller dimensions, by the lack of a tooth on the outer margin of the uropodal exopod, by the presence of paired bulges instead of a medial expansion on the dorsal surface of pleonite 4 and by different outlines of the posterior margin of the pleotelson. From the four East African species — *P. eupyga* (Nobili 1906), *P. mossambicus* Barnard 1914, *P. clavus* Barnard 1955 and *P. teretron* Barnard 1955, forming a distinct group (Harrison and Holdich 1984), *P. asiatica* is clearly distinguished by having considerably broader dorsal bumps on the pleotelson and by another form of uropods. From *P. hamata* (Baker 1908), the species described can be easily distinguished by being sexually dimorphic, as is typical of the genus *Paracilicæa*, by much shorter uropods and many other features.

From *P. septemdentata* (Baker 1910), *P. dakini* (Tattersall 1922) and *P. fimbriata* sp. nov., which belong to an aberrant group within the genus, the present species distinctly differs by a lambdoid epistome, obtusely pointed but not broadly truncated.

Paracilicæa fimbriata sp. nov.
(Figs. 4-5)

Material. Pacific Ocean. Java Sea, Jakarta area, 1907, coll. Dr Bruggen (no other data available), 1 adult ♂, length 10.6 mm (holotype, ZIN N 1/81887); 1 damaged ♀ with embryos at stage 3 (Kjennerud 1952), length 11.6 mm and 1 immature specimen, length 6.5 mm (paratypes ZIN N 2/81888).

Known only from type locality.

Description. Male holotype. Body strongly convex dorsally, nearly parallel-sided, only slightly wider in the middle; somewhat more than 1.8 times longer than maximum width at pereonites 4-5. Dorsal surfaces smooth, without obvious sculpture, marked only with small pitted depressions and bearing a few short setae. Lateral margins of body and uropods fringed by numerous rather long and thin flattened soft filaments, thin simple setae of about the same length are seen between these filaments.

Head short and wide; a little shorter and narrower than pereonite 1; frontal margin with an obvious subquadrate short rostral process, on each side of which is a shallow incision. Eyes large, moderately convex, round-triangular, weakly pigmented.

Pereonites differ strongly in length. Pereonite 1 medially longest, more than 1.5 times as long as pereonite 2; pereonites 2-6 become progressively shorter, pereonite 7 slightly longer than pereonite 6. Pereonite 1 with broad ventrolateral extension, its anterior angles produced forwards and pointed, posterior angles rounded. Coxal plates on pereonite 2 long, nearly rectangular, with a rounded distal margin, those on pereonites 3-4 oblong-triangular and produced somewhat posteriorly, those on pereonites 5-7 lingulate and rounded, and on pereonite 7 shorter than on preceding segment.

Abdomen somewhat more than one third of body length, 1.3 times wider than long. Pleonites 1-4 fused medially, pleonite 1 short and visible only posterodorsally near coxal plates of pereonite 7. Lateral margins of pleonites 2-4 expanded, these expansions on pleonite 2 produced forwards into semicuticular lobes bearing an acute tooth directed forwards on the anterior margin. Posterior margin of pleonite 4 strongly produced backwards into a very broad triangular lobe, medially overhanging the proximal part of the pleotelson. Raised anterior two-thirds of pleotelson bearing a pair of wide round bosses at about midlength. Posterior margin of pleotelson with a short, wide rectangular lobe flanked by small semicircular notches.

Epistome with very wide straight frontal margin and broadly divergent lateral parts. Antenna 1 as long as antenna 2, curved backwards, extending to the level of the posterolateral angle of pereonite 1; basal article large, flattened, obviously narrowed in the middle, 4 times as wide as article 3 and about as long as articles 2 and 3 together; article 2 flattened, relatively short and wide, 0.5 length and 2 times as wide as article 3; article 3 long, slender, cylindrical; flagellum of fourteen articles, about 0.8 length of peduncle. Antenna 2 slender, when curved backwards extends to the level of pereonite 2, basal article very short, article 2 considerably longer than short article 3; article 4 0.77 length of article 5 and nearly 2.6 times as long as article 3; 15-articled flagellum a little longer than peduncle. Mandible bearing strong incisor process with strongly sclerotized, bluntly conical, nearly smooth cutting edge; lacinia mobilis broad, with three blunt cusps; spine row with 9 strong, branched setae; molar process short, stout, truncate, fringed with dense band of thick spines; palp with article 2 bearing a row of 7 stout setae distally, this article 1.5 times as long as article 3, latter bearing a row of 14 short stout setae. Maxilla 2 with inner ramus bearing 8 stout plumose spines plus several shorter simple spines, medial and lateral lobes of outer ramus with 6 long finely serrated spines each. Maxillipedal endite with single long retinaculum on medial margin; outer margins of palp articles without setae; inner distal lobes of palp articles 2 and 4 and article 5 are very long and narrow, each with several long

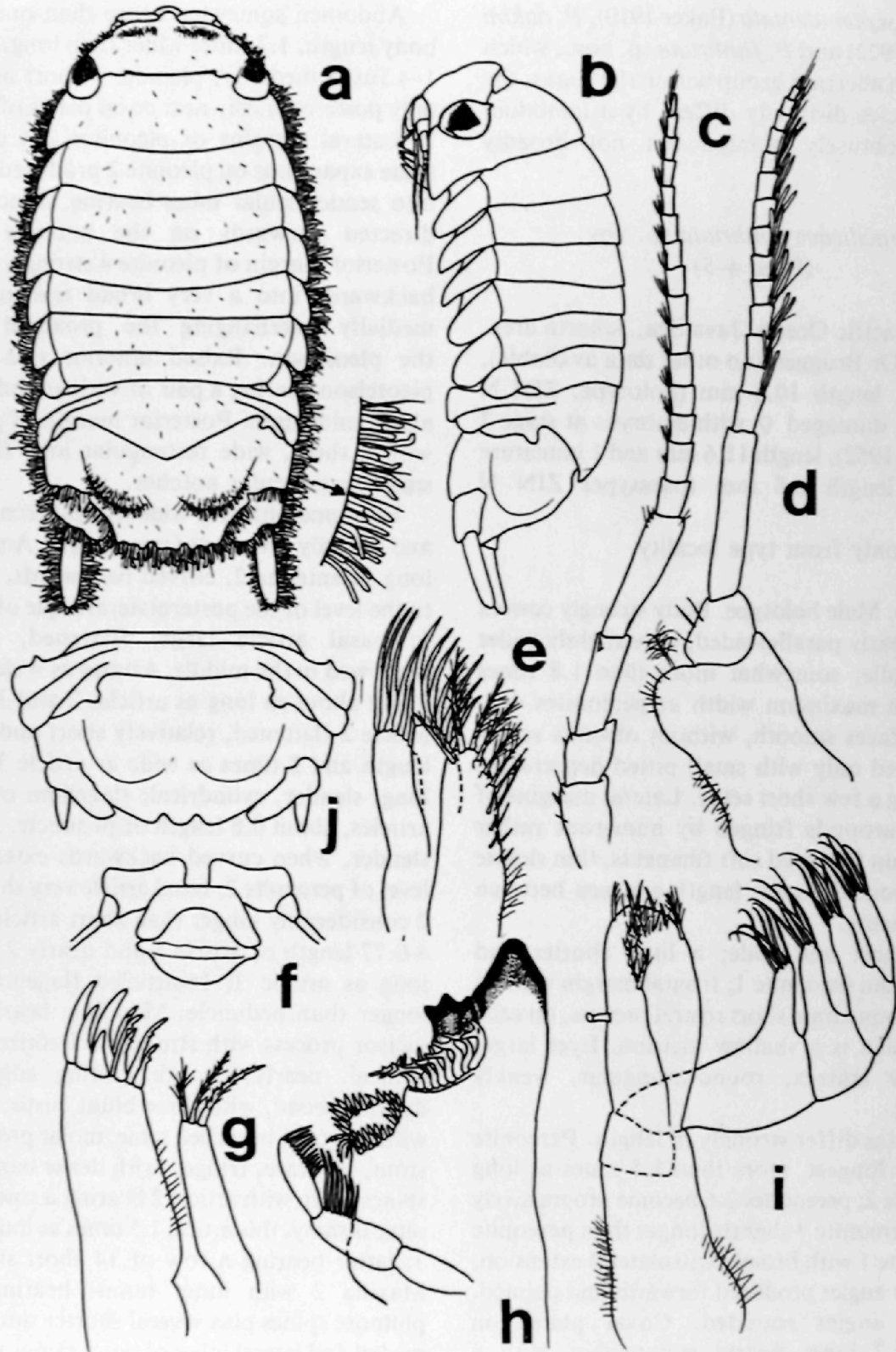


Fig. 4. *Paracilicæa fimbriata* sp. nov. Adult male (Holotype ZIN N 1/81887), 10.6 mm: a, dorsal; b, lateral; c, antenna 2; d, antenna 1; e, maxilla 2; f, epistome and labrum; g, maxilla 1; h, left mandible; i, maxilliped. Damaged female: j, abdomen, dorsal.

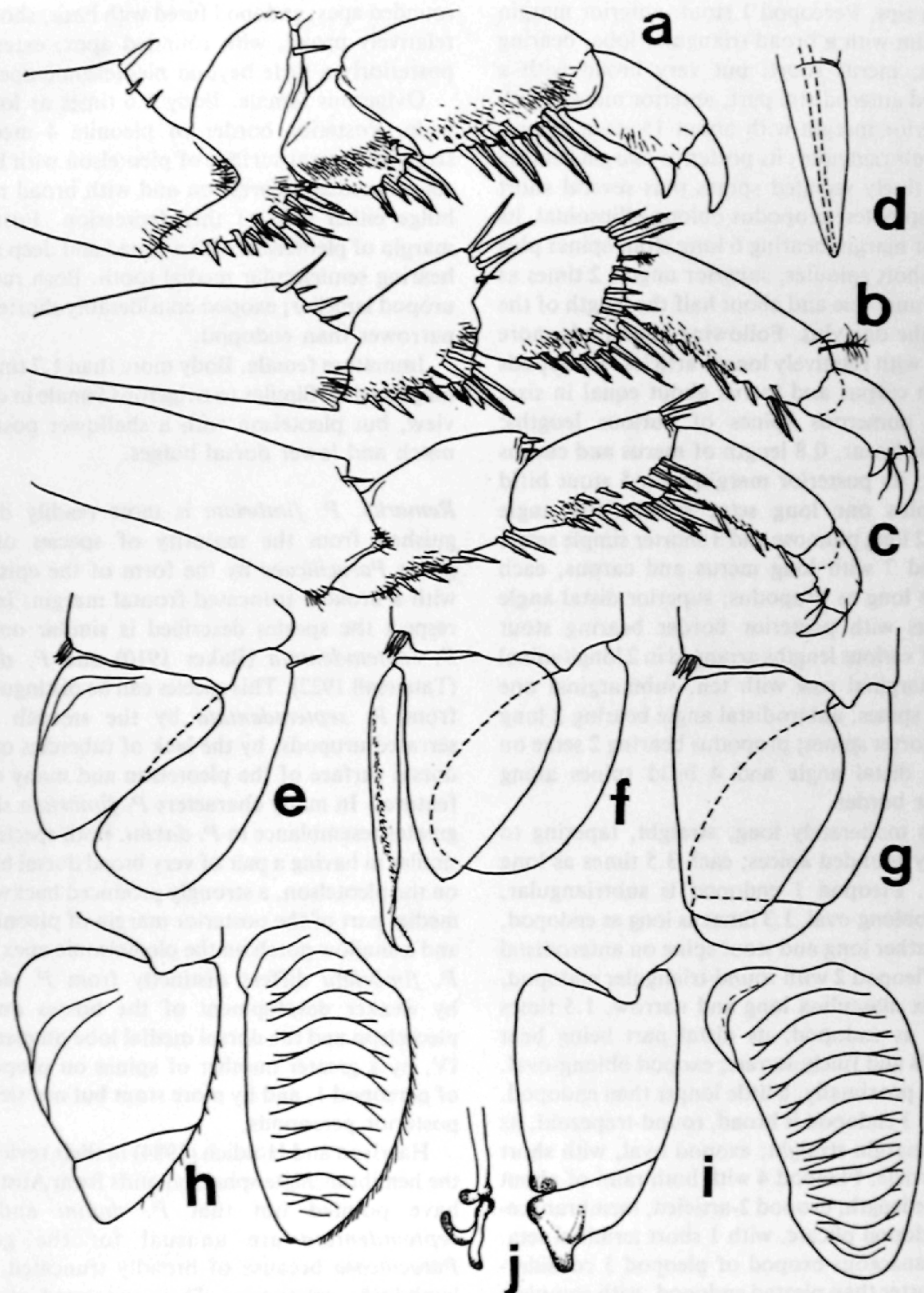


Fig. 5. *Paracilicæa fimbriata* sp. nov. Adult male (Holotype): a, pereopod 1; b, pereopod 2; c, pereopod 7; d, penes; e, pleopod 1; f, pleopod 2; g, pleopod 3; h, pleopod 4; i, pleopod 5; j, distal internal margin of pleopod 5, internal view.

setae on tips. Pereopod 1 stout; anterior margin of ischium with a broad triangular lobe, bearing 3 spines; merus short, but very broad with a produced anterodistal part, anterior margin with 4, posterior margin with about 15 stout spines; carpus subtriangular, its posterior margin bearing 4 stout finely serrated spines plus several short conical spinules; propodus oblong-ellipsoidal, its posterior margin bearing 6 long stout spines plus several short spinules; superior unguis 2 times as long as inner one and about half the length of the rest of the dactylus. Following pereopods more slender, with relatively longer articles. Pereopods 2-4 with carpus and merus about equal in size, bearing numerous spines of various lengths; propodus linear, 0.8 length of merus and carpus together, its posterior margin with 5 stout bifid spines plus one long seta, anterodistal angle bearing 2 long plumose and 3 shorter simple setae. Pereopod 7 with long merus and carpus, each about as long as propodus; superior distal angle of merus with posterior border bearing stout spines of various lengths arranged in 2 longitudinal rows; marginal row with ten, submarginal one with six spines, anterodistal angle bearing 2 long and 2 shorter spines; propodus bearing 2 setae on anterior distal angle and 4 bifid spines along posterior border.

Penes moderately long, straight, tapering to narrowly rounded apices; each 3.5 times as long as wide. Pleopod 1 endopod is subtriangular, exopod oblong-oval, 1.3 times as long as endopod, with 1 rather long and stout spine on anterodistal angle. Pleopod 2 with round-triangular endopod, appendix masculina long and narrow, 1.5 times as long as endopod, its distal part being bent outwards and finely serrate; exopod oblong-oval, tapering proximally, a little longer than endopod. Pleopod 3 endopod is broad, round-trapezoid, its medial margin straight; exopod oval, with short distal article. Pleopod 4 with both rami of about the same length; exopod 2-articled, membranaceous; endopod plicate, with 1 short terminal seta. Membranaceous exopod of pleopod 5 considerably shorter than pleated endopod, with complete subterminal articulation, distal region of internal margin with 3 long, finely toothed bosses. Uropodal exopod 4 times as long as broad, straight, subcylindrical, slightly tapering towards

rounded apex; endopod fused with basis, short but relatively broad, with rounded apex, extending posteriorly a little beyond pleotelsonic apex.

Ovigerous female. Body 1.6 times as long as wide. Posterior border of pleonite 4 medially straight. Dorsal surface of pleotelson with broad round median depression and with broad round bulge either side of this depression. Posterior margin of pleotelson with a broad and deep notch bearing semicircular medial tooth. Both rami of uropod lamellar; exopod considerably shorter and narrower than endopod.

Immature female. Body more than 1.7 times as long as wide. Similar to ovigerous female in dorsal view, but pleotelson with a shallower posterior notch and lower dorsal bulges.

Remarks. *P. fimbriata* is most readily distinguished from the majority of species of the genus *Paracilicæa* by the form of the epistome with a broadly truncated frontal margin. In this respect the species described is similar only to *P. septemdentata* (Baker 1910) and *P. dakini* (Tattersall 1922). This species can be distinguished from *P. septemdentata* by the smooth non-serrated uropods, by the lack of tubercles on the dorsal surface of the pleotelson and many other features. In many characters *P. fimbriata* shows greater resemblance to *P. dakini*. Both species are similar in having a pair of very broad dorsal bosses on the pleotelson, a strongly produced backwards medial part of the posterior margin of pleonite 4, and a shallow notch on the pleotelsonic apex. Yet *P. fimbriata* differs distinctly from *P. dakini* by weaker development of the bosses on the pleotelson and the dorsal medial lobe on pleonite IV, by a greater number of spines on propodus of pereopod 1, and by more stout but not slender posterior pereopods.

Harrison and Holdich (1984) in their review of the hemibranchiate sphaeromatids from Australia have pointed out that *P. dakini* and *P. septemdentata* are unusual for the genus *Paracilicæa* because of broadly truncated, not lambdoid, epistomes. They suggested that a revision of *Paracilicæa* would exclude *P. dakini* and *P. septemdentata* from this genus. The present authors add to this group another species, *P. fimbriata* sp. nov.

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