

**NEW SPECIES AND A NEW RECORD OF SPHAEROMATID ISOPODS (CRUSTACEA)  
FROM THE ANDAMAN SEA, THAILAND**

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**ABSTRACT**

Three new species of Sphaeromatidae are described from the Andaman Sea, Thailand. *Dynamenella yomsii* sp. nov. is recognised by the granular dorsal surface, serrate uropod rami and circular subapical foramen of the pleotelson. *Paradella tomleklek* sp. nov. is distinguished from other species of *Paradella* by the smooth dorsal pereonites, granular pleon and pleotelson and emarginate pleotelson apex. Both species were found intertidally among oysters at Cape Panwa, Phuket. *Sphaeromopsis sei* sp. nov. was collected intertidally from sand beaches at Phuket and is diagnosed by the long slender setae on the upper margins of the ischium, merus and carpus of pereopods 2–7 and posteriorly directed uropod exopods.

*Cilicaeopsis whiteleggei* (Stebbing, 1905) is recorded for the first time in Thailand. *Cilicaeopsis whiteleggei* can be identified by the male pleonal bulge extending posteriorly almost to the pleotelson apex and the slightly downturned pleonal process which extends to the uropod tips with an emarginate distal margin. Specimens were collected subtidally in the Andaman Sea around Phuket.

**INTRODUCTION**

Few species of sphaeromatid isopods are known from the Andaman Sea, Thailand. *Cerceis bicarinata* Barnard, 1936 was first found off Little Andaman Island, *Pistorius sasayamai* Nunomura, 1990 was described from Mai Thon Island, off Phuket and *Sphaeroma triste* Heller, 1861 was recorded from the Nicobar Islands (Heller described *Sphaeroma tristis* in 1861, though many authors incorrectly refer to his 1865 expansion as the original description).

*Sphaeroma felix* Lanchester, 1902, described from the Malay Peninsula, is the only other sphaeromatid species known from the northeastern Indian Ocean (from Sumatra and Singapore to Myanmar), but was later found to be a synonym of *Sphaeroma triste* by Barnard, 1936. That few sphaeromatid species are known from the northeastern Indian Ocean is more likely a reflection of little sampling effort than low diversity.

Useful references for identifying sphaeromatids include Harrison and Ellis (1991 and the

references therein) which presents an illustrated key to all genera and Harrison and Holdich (1982, 1984).

In this paper one new record and three new species are described from collections made near Phuket by the Phuket Marine Biological Center, Thailand (PMBC) and the Zoological Museum, University of Copenhagen, Denmark (ZMUC). Full details for the BIOSHELF stations and sampling sites of the collections from the ZMUC are given in 'The 1996–1998 BIOSHELF cruises' (Bussarawit and Aungtonya, 2001).

**MATERIALS AND METHODS**

Adult male and ovigerous female specimens were dissected and examined using a Wild M5 dissecting microscope and an Olympus BX50 compound microscope and drawn under Nomarski illumination using a camera lucida. Illustrations are of male left limbs unless otherwise noted and are labelled: A1, A2, antennae 1 and 2; Ep, epistome; MD, MDp, mandible and palp; MX1, MX2,

maxillae 1 and 2; MP, maxilliped; P1–P7, pereopods 1–7; PL1–PL5, pleopods 1–5. All **scale bars** are 1 millimetre and refer to habitus drawings only. Material has been deposited at PMBC, ZMUC and Museum Victoria, Melbourne, Australia (NMV).

### TAXONOMY

#### Family Sphaeromatidae

#### *Cilicaeopsis* Hansen, 1905

*Cilicaeopsis*.—Harrison and Holdich, 1984: 332.

#### Type species

*Cilicaea granulata* Whitelegge, 1902.

#### Remarks

The genus *Cilicaeopsis* can be recognised by the prominent posterior process extending from the midline of the pleon in males, and distinguished from the genus *Cilicaea* Leach, 1818 by the lack of a median tooth in the semicircular notch of the pleotelson apex (Harrison and Holdich, 1984; Harrison and Ellis, 1991).

*Cilicaeopsis* comprises eight species described from western and eastern Australia, Indonesia, the Philippines, South Vietnam and Sri Lanka (Harrison and Holdich, 1984; Kensley and Schotte, 1997). The genus has been recorded from the subtidal to 400 metres depth, usually on sand.

#### *Cilicaeopsis whiteleggei* (Stebbing, 1905)

*Cilicaea whiteleggei* Stebbing, 1905: 39–40, pl. 9.  
*Cilicaeopsis whiteleggei*.—Richardson, 1910: 29.—Hale, 1929: 35.—Nierstrasz, 1931: 206–210, figs 97–108.—Harrison and Holdich, 1984: 337–341, figs 24–25.

#### Material examined

PMBC 17531, 2 males, 1 female, 1 juvenile, BIOSHELF St. C1, 09°01'N, 098°03'E, Ockelmann sledge, 39 m, coll. S. Bussarawit and C. Aungtonya, 20.04.1996; PMBC 17532, 7 males, 2 females, BIOSHELF St. C1, 09°02'N, 098°03'E, triangular dredge, 39 m, coll. S. Bussarawit and

C. Aungtonya, 20.04.1996; PMBC 17533, 1 male, 3 juveniles, BIOSHELF St. E 20m, 08°30'N, 098°12'E, Ockelmann sledge, 20 m, coll. S. Bussarawit and C. Aungtonya, 22.04.1996; PMBC 17534, 4 juveniles, BIOSHELF St. C4, 09°00'N, 097°30'E, Box corer, 129 m, coll. S. Bussarawit and C. Aungtonya, 22.04.1996; NMV J39346, 3 males, 2 females, BIOSHELF St. C1, 09°02'N, 098°03'E, triangular dredge, 39 m, coll. S. Bussarawit and C. Aungtonya, 20.04.1996.

#### Distribution

*Cilicaeopsis whiteleggei* has been recorded subtidally from Sri Lanka, the Philippines, Indonesia, north-east Australia and the Coral Sea (Harrison and Holdich, 1984).

#### Remarks

*Cilicaeopsis whiteleggei* can be identified by the male pleonal bulge extending posteriorly almost to the pleotelson apex and the slightly downturned pleonal process which extends to the uropod tips with an emarginate distal margin. The body of the female is smooth, with longitudinal ridges either side of the midline of the pleon and anterior pleotelson (Harrison and Holdich, 1984).

The pleon and uropods appear morphologically quite diverse within the species. Variation between populations from Indonesia has been illustrated by Nierstrasz (1931) and between other populations from Queensland, Australia by Harrison and Holdich (1984).

#### *Dynamenella* Hansen, 1905

*Dynamenella*.—Harrison and Holdich, 1982: 89.

#### Type species

*Dynamene perforata* Moore, 1901.

#### Remarks

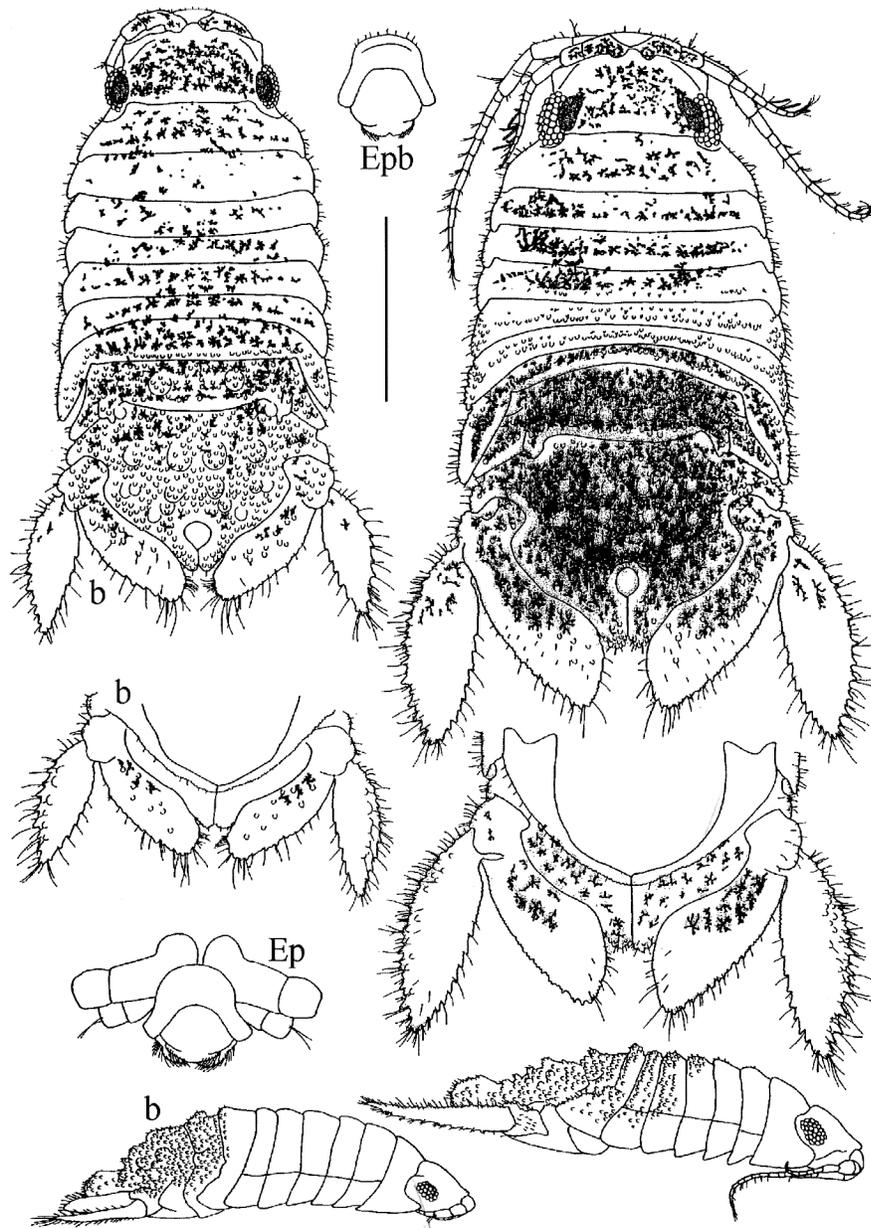
*Dynamenella* is characterised by the dorsally-directed subapical foramen on the pleotelson of males and the lack of dorsal processes on the pereon and pleon. Out-turned ridges on the ventral margins of the pleotelson either meet in the posterior midline or are lacking. The female brood pouch is formed

solely of opposing pockets covering the ventral pereon and has no oostegites (Harrison and Holdich, 1982; Harrison and Ellis, 1991).

Twenty species of *Dynamenella* have been recorded intertidally and subtidally from Chile, Brazil, Puerto Rico, Belize, Cuba, Panama, Oregon (USA), South Africa, Somalia, Mozambique, Egypt, the Arabian Sea, Pakistan, India, Japan and

Queensland (Australia) (Harrison and Holdich, 1982; Javed and Ahmed, 1988; Messana, 1990; Kensley and Schotte, 1997).

*Dynamenella yomsii* sp. nov.  
(Figs 1–4)



**Figure 1** *Dynamenella yomsii* sp. nov. Holotype, male, 3.2 mm, PMBC 17525; b. paratype, female, 3 mm, PMBC 17526. Scale bar is for dorsal views.

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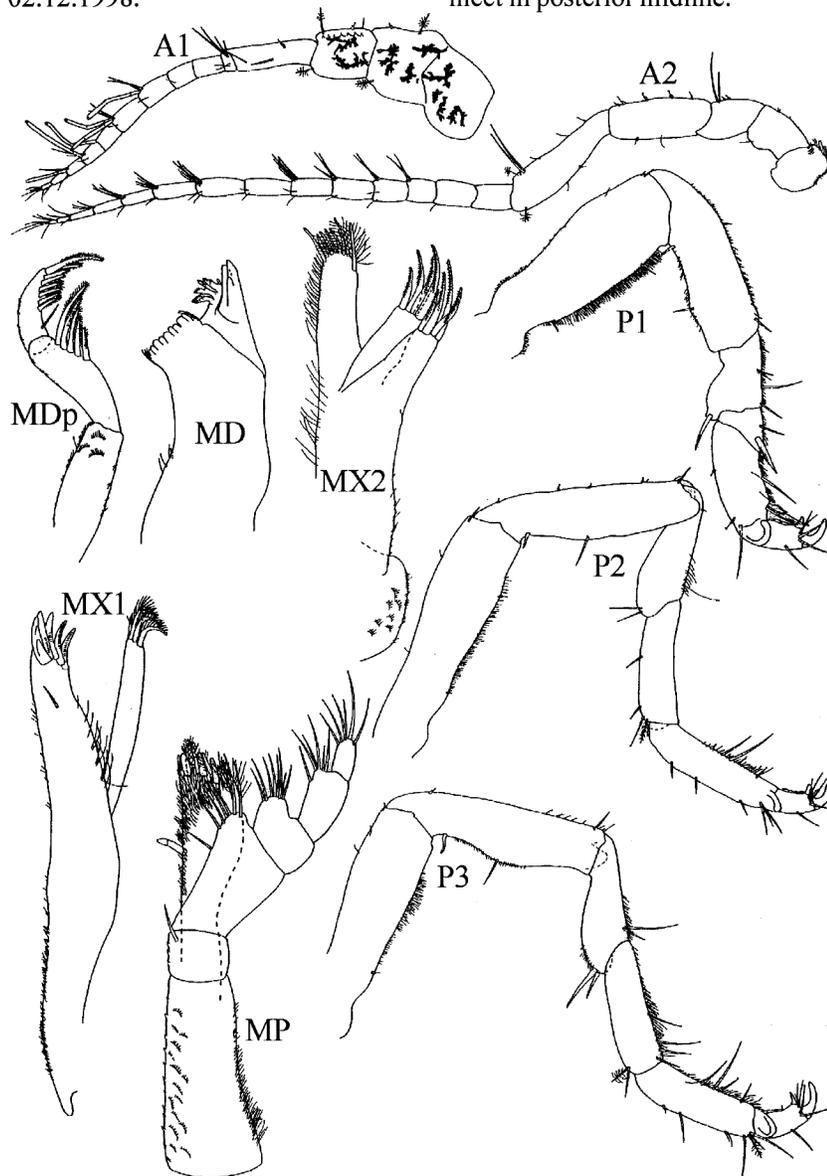
**Material examined**

**Holotype:** PMBC 17525, adult male, 3.2 mm, Cape Panwa, Phuket, 07°47.94'N, 098°24.53'E, among oysters, intertidal, hand collected, coll. N.L. Bruce and M.J. Storey, 04.12.1998.

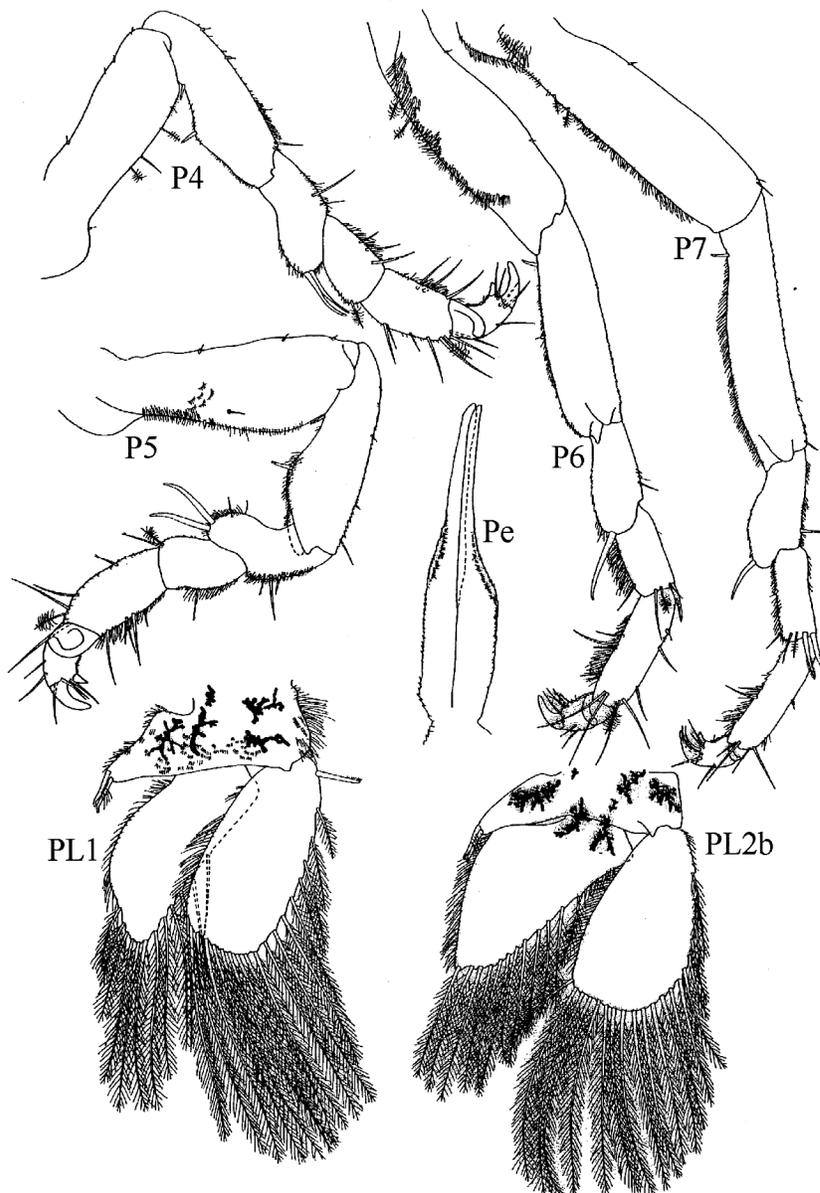
**Paratypes:** PMBC 17526, ovigerous female, 3 mm, and PMBC 17536, 12 males, 23 females, 7 juveniles, all with same data as holotype; PMBC 17527, 1 male, 3 females, 2 juveniles, same locality, 03.12.1998; NMV J39344, 3 males, 3 females, same locality, 04.12.1998; NMV J39345, 3 males, same locality, 02.12.1998.

**Description of holotype**

Entire dorsal surface with chromatophores, pleon and pleotelson most densely pigmented, lateral margins setose. Pleon granular, with pronounced tubercle each side of midline. Pleotelson granular, with 12 tubercles in 4 longitudinal rows, median pair of rows diverging around subapical foramen. Subapical foramen circular, separated from apex by slit closed along entire length. Pleotelson apex granular; ventrally, pleotelson margin with out-turned ridges which meet in posterior midline.



**Figure 2** *Dynamenella yomsii* sp. nov. Holotype, male, 3.2 mm, PMBC 17525.



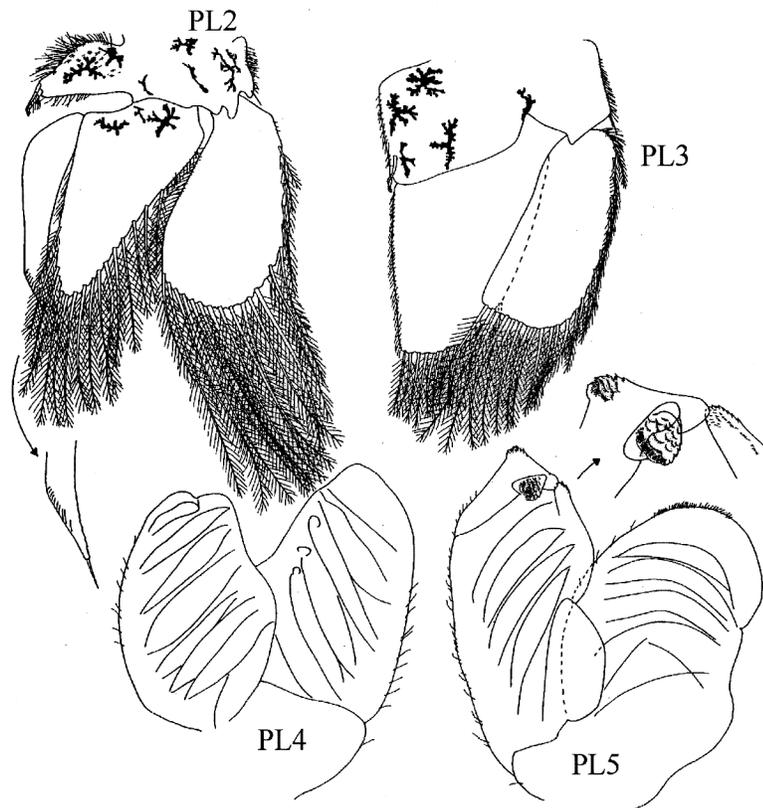
**Figure 3** *Dynamenella yomsii* sp. nov. Holotype, male, 3.2 mm, PMBC 17525; b. paratype, female, 3 mm, PMBC 17526.

Antenna 1 peduncular articles 1 and 2 with chromatophores, article 3 slender, flagellum of 10 articles. Antenna 2 flagellum of 14 articles.

Epistome anteriorly rounded, smooth. Spine row of mandible with about 5–6 spines, mandibular palp basal article with microtrichia, article 2 with 5 plumose setae, article 3 with 8 plumose setae and 1 proximal smooth seta. Maxilla 1 medial lobe with 4 plumose setae and 1 short smooth seta; lateral lobe with stout lateral seta and 4 medial,

pectinate setae. Maxilla 2 lateral and middle lobes with 4 anteriorly pectinate robust setae; medial lobe with about 8 slender setae, some plumose. Maxilliped endite with surface microtrichia, setose from apex to just proximal of coupling hook, distally with 3–4 very stout setae and about 5 slender plumose setae.

Pereopod 1 most stout. Pereopods 2–3 slender. Pereopods 4–5 more stout. Pereopods 4–7 ischium to propodus with rough surface.



**Figure 4** *Dynamenella yomsii* sp. nov. Holotype, male, 3.2 mm, PMBC 17525.

Pereopods 6–7 slender, distal margin of carpus with 1–2 pectinate robust setae and 1 plumose seta.

Penes parallel until half length and tapering distally, proximolateral margins serrate. Peduncle of pleopods 1–3 with chromatophores and 2 medial coupling hooks. Pleopod 1 proximolateral margin of exopod with robust seta. Pleopod 2 appendix masculina flattened, broad proximally, curved, extending beyond distal margin of endopod, apex with 1 seta. Pleopod 5 exopod with 1 scale patch apically, 1 subapically and 1 proximal to suture. Exopod of uropod with smooth dorsal surface and serrate lateral and medial margins, ventral surface with lateral row of tubercles along entire margin. Endopod dorsal surface with small, fine setae and granulations, lateral margin serrate.

#### Ovigerous female (PMBC 17526)

Similar to male. Dorsal surface of pereon only granular at posterior margin of pereonite 7. Pleon and pleotelson much less densely pigmented than male. Dorsal pleon tubercles more pronounced than

in male. Pleotelson with 16 tubercles, more pronounced than in male; 2 on anterior margin and 4 longitudinal rows of single and paired tubercles. Median pair of rows diverging around subapical foramen. Uropod rami smaller than in adult male.

#### Distribution

Intertidal, among oysters. Only known from Cape Panwa, Phuket, Thailand.

#### Etymology

The species name *yomsii* is anglicised Thai for 'pigment' and refers to the pigmented dorsal surface (noun in apposition).

#### Remarks

*Dynamenella yomsii* sp. nov. is distinguished from most species in the genus by its granular dorsal surface and serrate uropod rami, features it shares with *D. granulata* Javed and Ahmed, 1988 from the Karachi coast of Pakistan. Both species also have similar antennae, pereopods and tubercle

patterns on the dorsal surface of the pleotelson. The males of these two species differ most noticeably in the shape of the subapical foramen of the pleotelson, being key-hole shaped in *D. granulata* and circular in *D. yomsii*. *Dynamenella granulata* has a much more pronounced pair of longitudinal granulate rows from the foramen to the pleotelson apex. The appendix masculina also differs substantially in the two species, that of *D. granulata* is armed proximally with robust setae on the medial and lateral margins and surface, which are distally setose and not flattened.

***Paradella*** Harrison and Holdich, 1982

*Paradella*.— Harrison and Holdich, 1982: 99.

**Type species**

*Paradella octaphymata* Harrison and Holdich, 1982.

**Remarks**

The genus *Paradella*, like *Dynamenella*, has a dorsally directed subapical foramen on the pleotelson of males and lacks dorsal processes on the pereon and pleon. *Paradella* is recognised by out-turned ridges on the ventral margins of the pleotelson which do not meet in the posterior midline. The female brood pouch is formed of opposing pockets covering the ventral pereon and a short oostegite on pereopod 4 (Harrison and Holdich, 1982; Harrison and Ellis, 1991).

*Paradella* comprises ten species recorded intertidally and subtidally from Chile, Puerto Rico, Panama, California (USA), Kenya and Queensland (Australia) (Harrison and Holdich, 1982; Müller, 1991, 1995; Kensley and Schotte, 1997).

***Paradella tomleklek*** sp. nov.  
(Figs 5–8)

**Material examined**

**Holotype:** PMBC 17528, adult male, 4.5 mm, Cape Panwa, Phuket, 07°47.94'N, 098°24.53'E, among oysters, intertidal, hand collected, coll. N.L. Bruce and M.J. Storey, 08.12.1998.

**Paratypes:** PMBC 17529, ovigerous female, 4 mm, and PMBC 17530, 1 male, 5 females, 32 juveniles, all with same data as holotype; NMV J39347, 1 male, 7 females, 2 juveniles, same locality, 04.12.1998.

**Description of holotype**

Entire dorsal surface with chromatophores. Pleon granular, with pronounced tubercle either side of midline; lateral to point of articulation with pleotelson, posterior margin with two suture lines converging anterior to the margin. Pleotelson granular, with 8 tubercles in 4 longitudinal rows. Subapical foramen oval, separated from apex by slit. Pleotelson apex emarginate.

Antenna 1 peduncular article 1 subequal in length to article 3, with chromatophores, article 2 shortest, flagellum of 10 articles. Antenna 2 flagellum of 18 articles.

Epistome triangular, anteriorly rounded, smooth. Spine row of mandible with about 4 spines, mandibular palp article 2 with 6 plumose setae, article 3 with 10. Maxilla 1 medial lobe with 4 plumose setae and 1 short smooth seta, lateral lobe with 4–5 stout lateral setae and 4 medial, pectinate setae. Maxilla 2 lateral and middle lobes with 4 anteriorly pectinate robust setae, medial lobe with about 2 slender setae and 3 stout, plumose setae. Maxilliped endite setose from apex to just proximal of coupling hook, distally with 3–4 very stout setae and about 5 longer plumose setae, medial margin with 2 coupling hooks (other specimens of this species have 1).

Pereopod 1 stout. Pereopods 2–7 lower margins of merus, carpus and propodus with many elongate microtrichia.

Penes tapering to acute apex, with lateral microtrichia. Peduncle of pleopods 1–3 with chromatophores and 3 medial coupling hooks. Pleopod 2 appendix masculina smooth, with subparallel margins and rounded apex, extending beyond distal margin of endopod. Pleopod 5 exopod with 1 scale patch apically, 1 subapically and 1 proximal to suture. Exopod of uropod with smooth dorsal surface and serrate lateral margin. Endopod dorsal surface with granulations.

**Ovigerous female (PMBC 17529)**

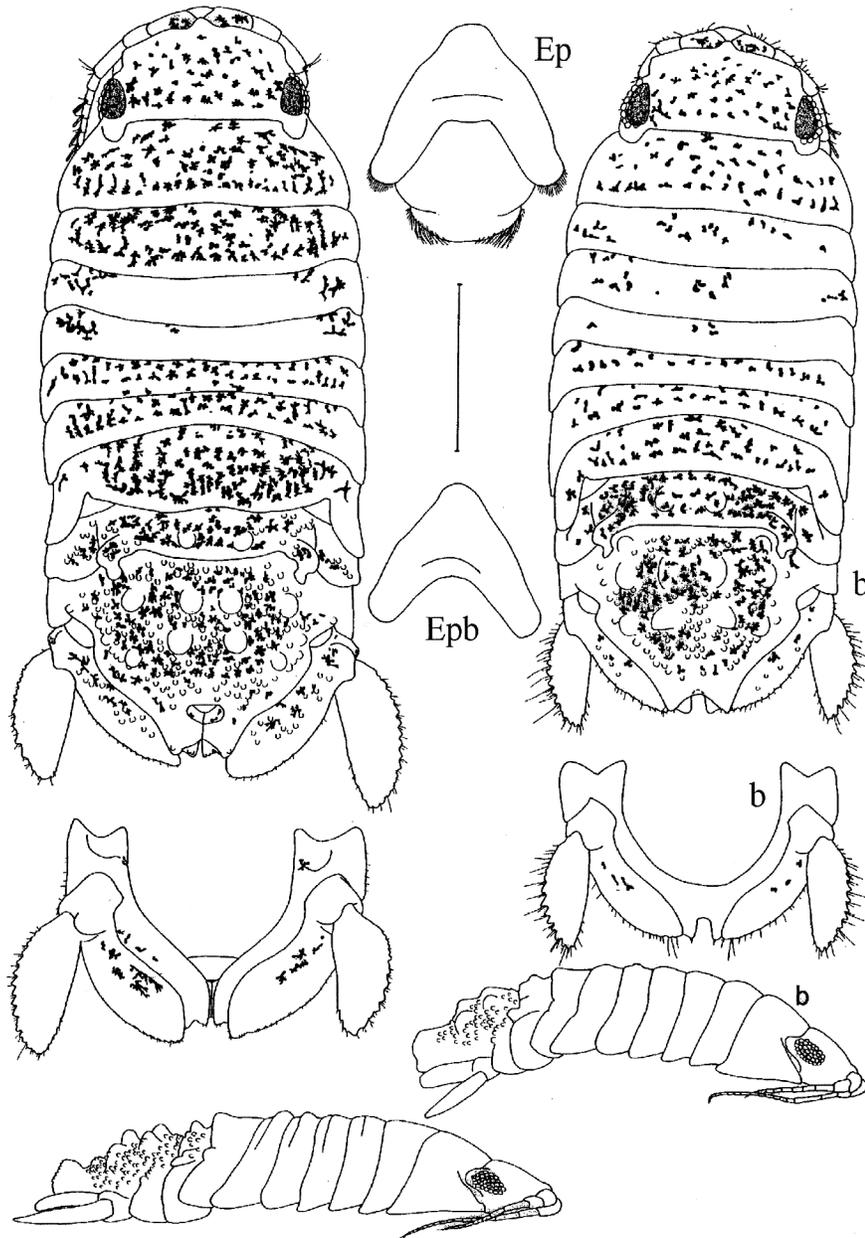
Similar to male. Pleon without granulations. Pleotelson without dorsal subapical foramen, apex emarginate. Lower margins of merus, carpus and propodus of pereopods 2–7 without elongate microtrichia.

**Distribution**

Intertidal, among oysters. Only known from Cape Panwa, Phuket, Thailand.

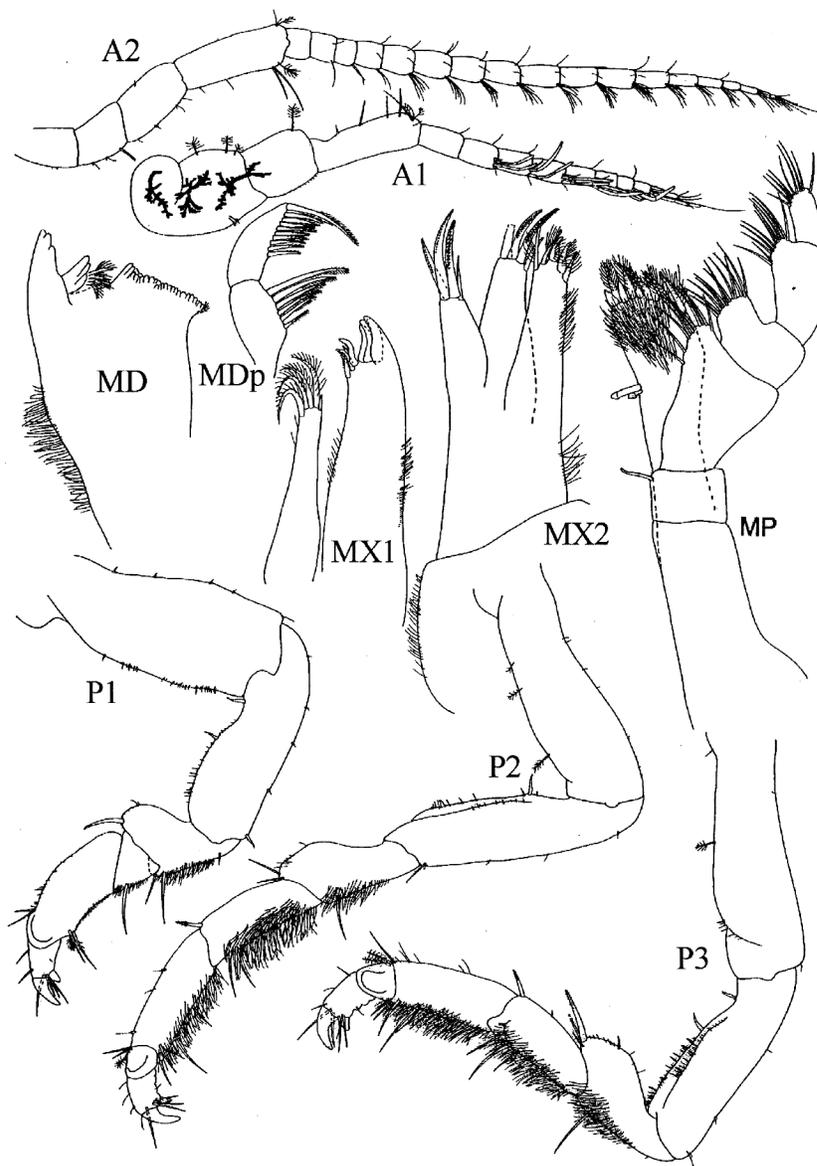
**Etymology**

The species name *tomleklek* is anglicised Thai for 'tubercle', and refers to the prominent tubercles on the pleotelson (noun in apposition).



**Figure 5** *Paradella tomleklek* sp. nov. Holotype, male, 4.5 mm, PMBC 17528; b. paratype, female, 4 mm, PMBC 17529. Scale bar is for dorsal views.

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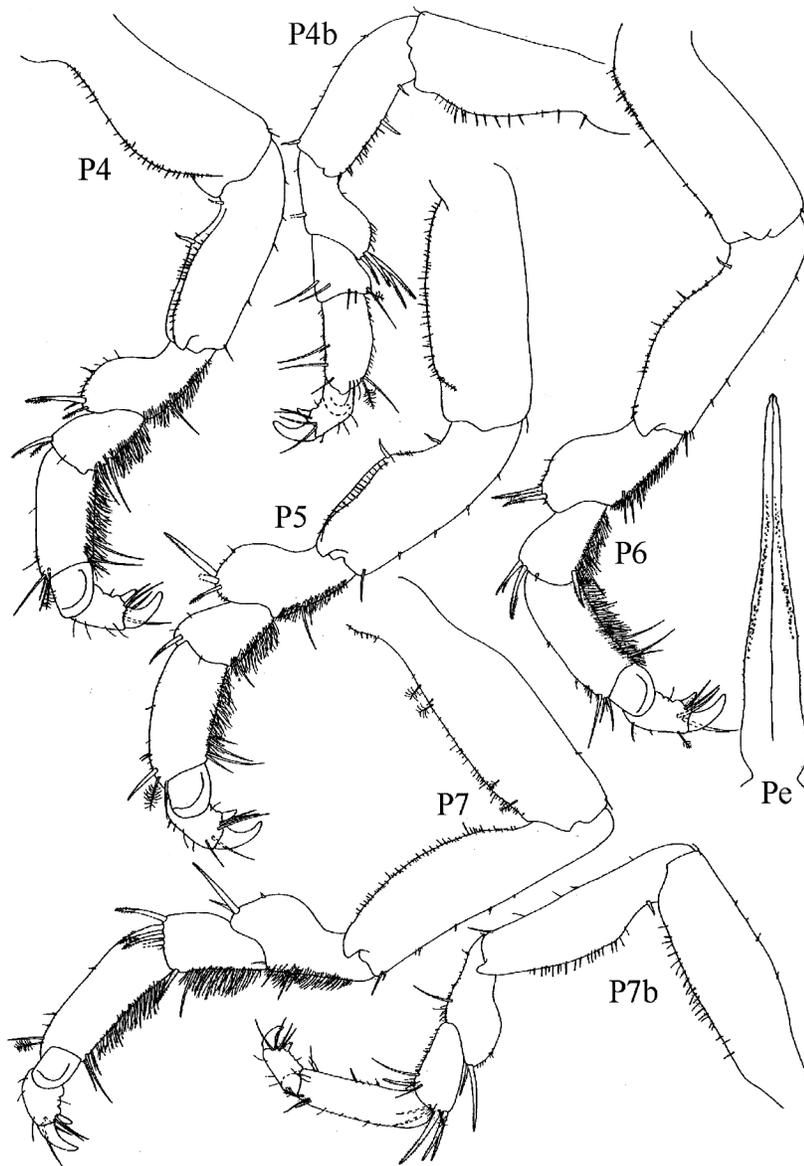
**Figure 6** *Paradella tomleklek* sp. nov. Holotype, male, 4.5 mm, PMBC 17528.

#### Remarks

*Paradella octaphymata* Harrison and Holdich, 1982, *P. harrisoni* Müller, 1995, *P. tuberculata* Müller, 1991 and *P. tomleklek* sp. nov. all have eight dorsal tubercles in four longitudinal rows on the pleotelson of males and females. The uropod of *P. octaphymata* is much more laterally rounded and the appendix masculina extends much further past the endopod apex than in *P. harrisoni*, *P. tuberculata* and *P. tomleklek*. Also, males of *P. octaphymata* lack a distal notch either side of the

midline of the ventral pleotelson. *Paradella tuberculata* has a similar epistome and pereopods to *P. tomleklek* but is granulate over the entire dorsal surface, has much rounder uropod exopods and the two suture lines on the posterior pleonal margin, lateral to the point of articulation with the pleotelson, converge at the margin.

*Paradella harrisoni* is most similar to *P. tomleklek* but is recognisably different in the anteriorly blunt epistome, granules on the posterior margins of pereonites 5–7 and the acute articulation



**Figure 7** *Paradella tomleklek* sp. nov. Holotype, male, 4.5 mm, PMBC 17528; b. paratype, female, 4 mm, PMBC 17529.

with the pleotelson on the posterior pleonal margin. Females of *P. tomleklek* have more prominent pleotelson tubercles, more markedly serrate lateral uropod exopod margins and more distinctly emarginate pleotelson apex than females of *P. harrisoni*.

*Sphaeromopsis* Holdich and Jones, 1973

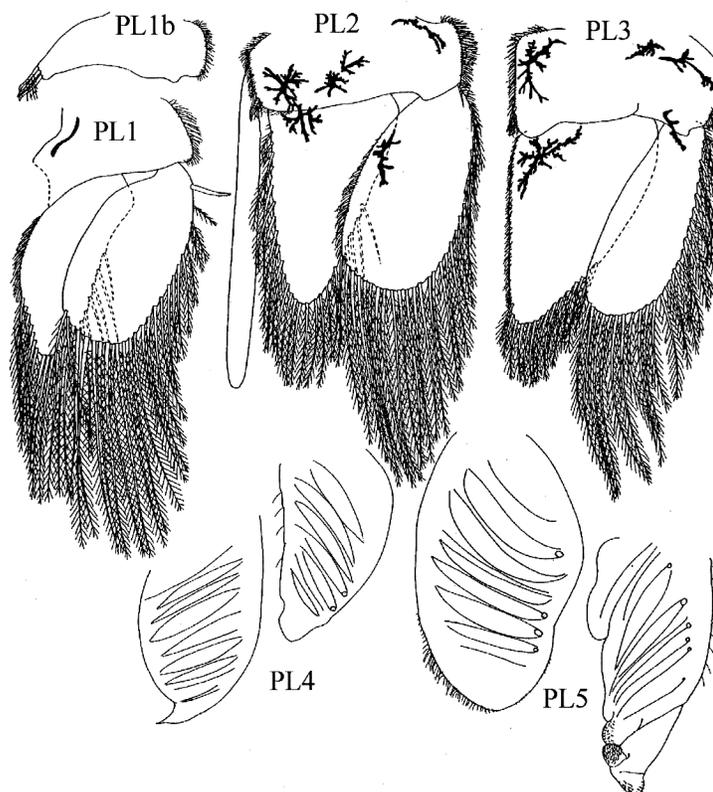
*Sphaeromopsis*.—Holdich and Harrison, 1981: 287.

#### Type species

*Sphaeromopsis amathitis* Holdich and Jones, 1973.

#### Remarks

Useful characters identifying the genus *Sphaeromopsis* are the lack of dorsal processes and ornamentation on the pereon and pleon, the arched shape of the pleotelson in posterior view, the absence of a notch on the pleotelson apex and the exopod of the uropod being subequal to or



**Figure 8** *Paradella tomleklek* sp. nov. Holotype, male, 4.5 mm, PMBC 17528; b. paratype, female, 4 mm, PMBC 17529.

longer than the endopod. The female brood pouch is formed of opposing pockets covering the ventral pereon and has no oostegites (Holdich and Harrison, 1981; Harrison and Ellis, 1991).

Six species of *Sphaeromopsis* have been recorded from sand beaches intertidally and subtidally in Dominica, Brazil, Kenya, the Red Sea, Pakistan and Queensland (Australia) (Holdich and Harrison, 1981; Kensley and Schotte, 1994; Javed and Yousuf, 1995).

*Sphaeromopsis sei* sp. nov.  
(Figs 9–12)

**Material examined**

**Holotype:** ZMUC CRU-3627, adult male, 3 mm, Nai Harn Beach, Phuket, Thailand, sand, upper intertidal at high tide, hand collected, coll. D. Eibye-Jacobsen, 29.11.1995.

**Paratypes:** ZMUC CRU-3246, 2 males, same data as holotype; ZMUC CRU-3628, ovigerous female,

2.7 mm, ZMUC CRU-3247, 1 male, 2 females, 3 juveniles, and PMBC 17537, 1 male, 1 female, SE corner of Racha Noi Island, sand between medium-sized coral heads, 1.5 m, hand collected, coll. D. Eibye-Jacobsen, 30.11.1995; ZMUC CRU-3244, 1 male, north of Kata Beach, Phuket, sand, upper intertidal at high tide, hand collected, coll. D. Eibye-Jacobsen, 29.11.1995; ZMUC CRU-3245, 1 male, Karon Beach, Phuket, cream-coloured sand, upper intertidal at high tide, hand collected, coll. D. Eibye-Jacobsen, 29.11.1995; ZMUC CRU-3257, 2 females, 13 juveniles, small bay along southern coast of Hi Island, 07°44'N, 098°22'E, sand, surf zone, hand collected, coll. D. Eibye-Jacobsen, 20.11.1995.

**Description of holotype**

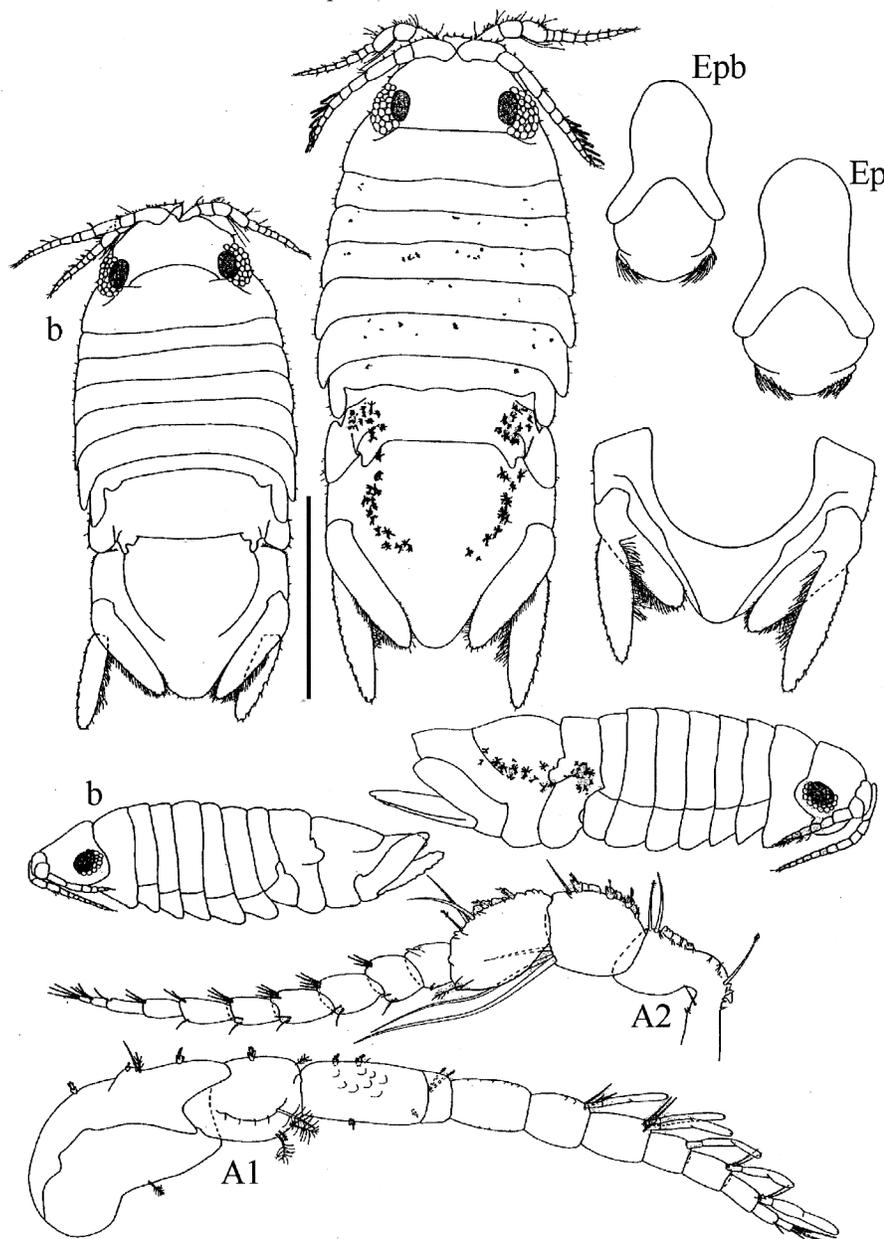
Entire dorsal surface smooth. Lateral pleon and pleotelson with chromatophores. Pleon posterior margin with two suture lines converging at the margin lateral to point of articulation with pleotelson. Pleotelson with smooth dorsal dome,

apex rounded, lateral margins folded ventrally.

Antenna 1 peduncle and flagellum of similar length, with 8 flagellar articles. Antenna 2 shorter than antenna 1, peduncular article 4 with 2 long slender setae, flagellum with 10 articles.

Epistome longer than labrum, with smoothly rounded apex. Basal article of mandibular palp with microtrichia, article 2 with 3 plumose setae, article 3 with 5 setae. Maxilla 1 medial lobe with 4 plumose

setae, lateral lobe with stout lateral setae and smaller, pectinate medial setae. Maxilla 2 lateral and middle lobes with about 4 anteriorly pectinate long robust setae, medial lobe with row of plumose setae, innermost seta longest. Maxilliped endite setose from apex to just proximal of coupling hook, distally with 2-3 very stout setae and slender plumose setae.

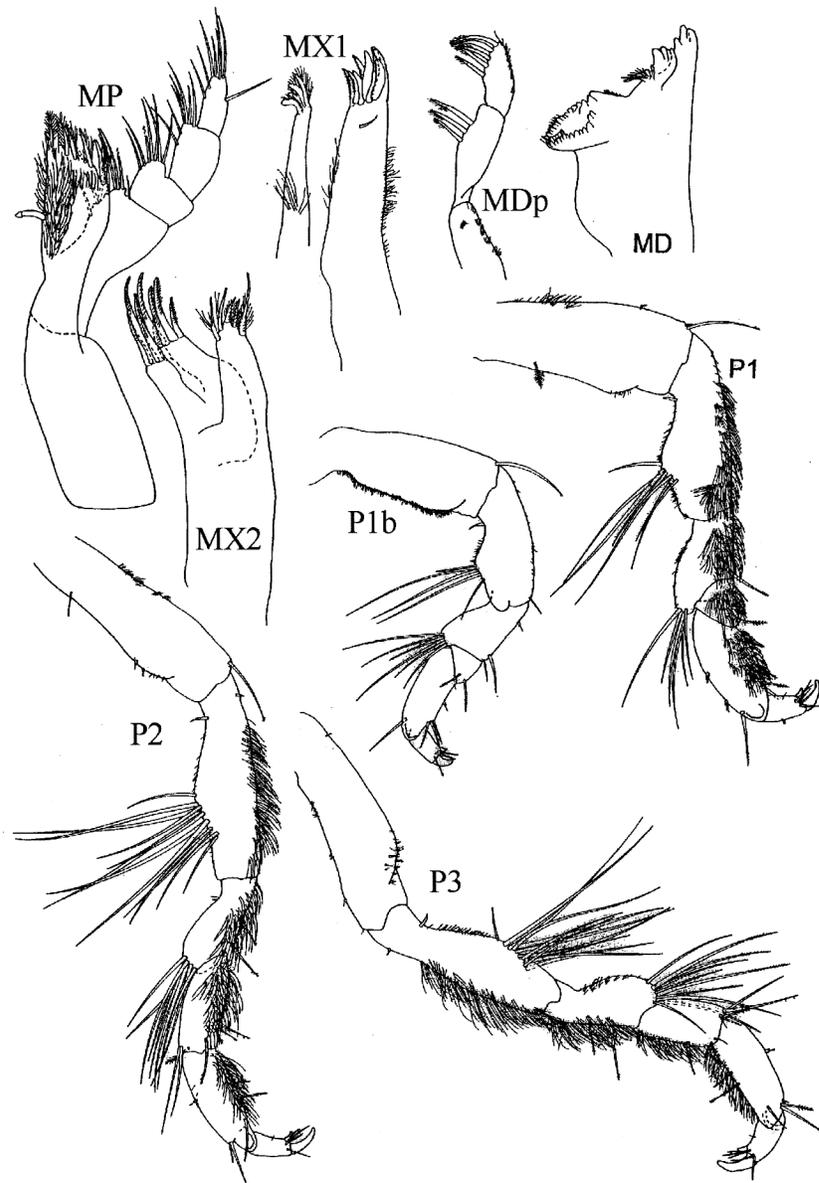


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**Figure 9** *Sphaeromopsis sei* sp. nov. Holotype, male, 3 mm, ZMUC CRU-3627; b. paratype, female, 2.7 mm, ZMUC CRU-3628. Scale bar is for dorsal views.

All pereopods, lower margins of ischium to propodus with dense elongate microtrichia and scattered longer setae. Pereopod 1 most stout; upper lobes of ischium and merus with long slender setae; carpus with robust seta. Pereopods 2–7 upper lobes of ischium, merus and carpus with long slender setae, sometimes with tiny setules distally. Pereopod 7 carpus with plumose robust setae distally.

Penes widening slightly and reaching

maximum width at one-third length, then tapering distally, proximally with lateral microtrichia. Peduncle of pleopods 1–3 with 3 medial coupling hooks. Pleopod 1 peduncle with medial microtrichia, exopod larger than endopod, proximolateral margin of exopod with smooth seta. Pleopod 2 appendix masculina tapering to rounded tip, extending just beyond distal margin of endopod. Pleopod 5 exopod with indistinct transverse suture; with 1 scale patch apically, 1 subapically and 1



**Figure 10** *Sphaeromopsis sei* sp. nov. Holotype, male, 3 mm, ZMUC CRU-3627; b. paratype, female, 2.7 mm, ZMUC CRU-3628.

proximal to suture. Endopod of uropod not extending beyond pleotelson apex, lateral margin setose. Exopod posteriorly directed, extending beyond pleotelson apex, lateral margin serrate, medial margin setose.

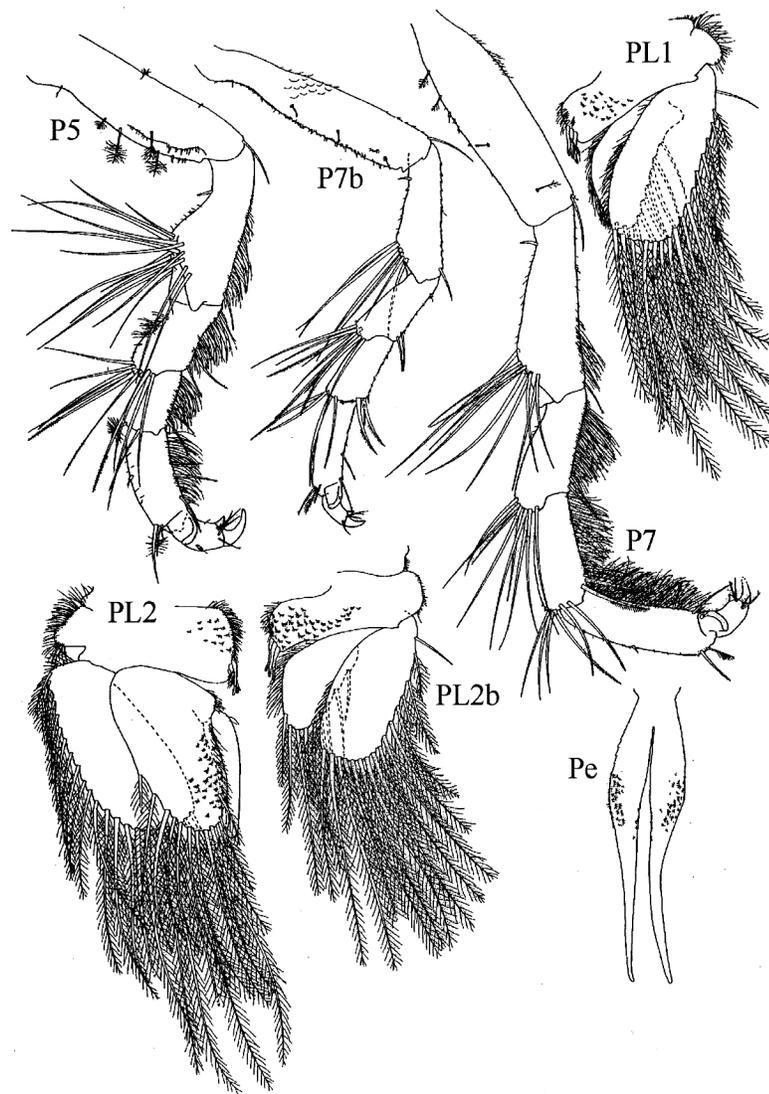
**Ovigerous female** (ZMUC CRU-3628). Similar to male. Lower margin of pereopods without dense elongate microtrichia. Uropod rami smaller than in male.

**Distribution:** Intertidal and subtidal, sand. Only

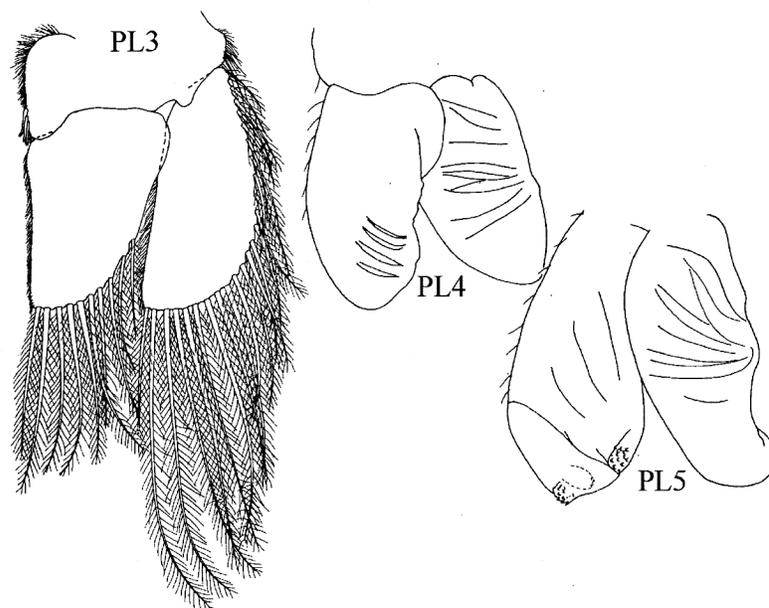
known from Phuket Province, Thailand, where it is present on most sand beaches. Dexter (1996) reported a 'Sphaeromatidae?' from several beaches around Phuket, that species being *Sphaeromopsis sei* sp. nov.

**Etymology:** The species name *sei* is anglicised Thai for 'sand', which refers to the species association with sand (noun in apposition).

**Remarks:** *Sphaeromopsis sei* sp. nov. can be identified by the long slender setae on the upper



**Figure 11** *Sphaeromopsis sei* sp. nov. Holotype, male, 3 mm, ZMUC CRU-3627; b. paratype, female, 2.7 mm, ZMUC CRU-3628.



**Figure 12** *Sphaeromopsis sei* sp. nov. Holotype, male, 3 mm, ZMUC CRU-3627.

margins of the ischium, merus and carpus of pereopods 2–7 and the dense elongate microtrichia on the lower margins of the ischium in male pereopods. This species appears most similar to *S. serriguberna* Holdich and Harrison, 1981 from Queensland, Australia. The uropod endopod of *S. serriguberna* reaches beyond the truncate pleotelson apex and in *S. sei* it is short of the rounded pleotelson apex. The uropod exopod of *S. serriguberna* is directed laterally at the tip and posteriorly in *S. sei*. *Sphaeromopsis serriguberna* has a much less setose maxilliped endite, much fewer or absent elongate microtrichia on the lower margins of the ischium in pereopods 1–7 and fewer or no long slender setae on the upper margins of the carpus of pereopods 2–7.

#### ACKNOWLEDGEMENTS

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**PMBC / DANIDA  
INTERNATIONAL WORKSHOP  
ON THE BIODIVERSITY OF CRUSTACEA  
IN THE ANDAMAN SEA  
AT PHUKET MARINE BIOLOGICAL CENTER  
29 NOV. - 20 DEC. 1998**

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