



## A new species and a new record of *Sphaeroma* Bosc, 1802 (Sphaeromatidae: Isopoda: Crustacea) from intertidal marine habitats of the Persian Gulf

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### Abstract

Two species of *Sphaeroma* (Sphaeromatidae: Isopoda) from the Iranian coasts of the Persian Gulf were studied and described. *Sphaeroma khalijfarsi* **sp. nov.** is described from the intertidal zone of the Strait of Hormuz. This species is distinguished by the smooth pereonites; pleon without prominent tubercles and bearing some scattered small tubercles; pleotelson with numerous scattered small tubercles and well upturned posterior margins. *Sphaeroma walkeri* Stebbing, 1905 is reported from Kish and Qeshm Islands and from the southern coasts of Iran. Among the non-Indian Ocean species, *Sphaeroma intermedium* Baker, 1926 is transferred to genus *Lekanesphera* Verhoeff, 1943.

**Key words:** taxonomy, Isopoda, Sphaeromatidae, *Sphaeroma*, new species, The Persian Gulf

### Introduction

The genus *Sphaeroma* has a worldwide distribution, and about 25 present of valid species has been reported from Indian Ocean: (*S. annandalei* Stebbing, 1911: India (Pillai 1955), Persian Gulf (Khalaji-Pirbalouty & Wägele 2010); *S. bigranulata* Budde Lund, 1908: Zanzibar; *S. coglobator* Pallas, 1766: Gulf of Suez; *S. serratum* Fabricius, 1787: Gulf of Suez (Monod 1933), South Africa (Kensley 1978); *S. sieboldii* Dollfus, 1889: Madagascar (Roman 1970); *S. terebrans* Bate, 1866: South Africa, India, Thailand, Sri Lanka, Indonesia, Australia (Harrison & Holdich 1984), Madagascar (Roman 1970); *S. triste* Heller, 1865: India, Nicobar Islands (Pillai 1961), Indonesia, Australia (Harrison & Holdich 1984); *S. tuberculata* Purusotham & Rao, 1971: India; and *S. walkeri* Stebbing, 1905: Sri Lanka (type locality), India, Red Sea, South Africa, Australia (Carlton & Iverson 1981), Pakistan (Ghani & Qadeer 2001).

The first species of *Sphaeroma* to be reported from the Persian Gulf was *S. irakiensis* Ahmad (1971), which was subsequently synonymised with *Sphaeroma annandalei* Stebbing, 1911 by Khalaji-Pirbalouty & Wägele (2010). Following Ahmad's (1971) record, no further *Sphaeroma* were reported from the Persian Gulf except in a table summarizing the distribution of *Sphaeroma walkeri* Stebbing, 1905 from Sudia Arabian coast (Carlton & Iverson 1981).

In the present paper we describe a new species of *Sphaeroma* and provide a new record of *S. walkeri*.

### Material and methods

Samples were collected from the Persian Gulf during 2006–2010. Appendages were dissected and mounted in stained antibacterial glycerine–gelatine (Merck). Pencil drawings were made using a standard camera lucida mounted on a compound microscope (Olympus BX 51) and stereomicroscope (Olympus SZX12). Photographs were taken with a Leica Z6 imaging system. For greater depth of view, the software Auto-Montage was used for assembling 10 source images to one final image.

Terminology follows Bruce (2003). The material has been returned to the borrowing national history collections.

## Abbreviations:

BM	Natural History Museum, London.
USNM	Smithsonian Institution Natural Museum of Natural History, USA.
RMNH	National Museum of Natural History, Leiden, the Netherlands.
ZFMK	Zoologisches Forschungsmuseum Alexander Koenig, Bonn, Germany.
ZMH	Zoologisches Museum Hamburg, Hamburg, Germany.

## Systematics

### Family Sphaeromatidae Latreille, 1825

#### Genus *Sphaeroma* Bosc, 1802

**Diagnosis.** Maxilliped robust, particularly the palp; internal border of endite with fringe of robust, circumplumose setae with swollen base; apical margin of endite with smooth setae and often some plumose seta set in amongst fine simple setae; palp articles 2–4 often lacking mesial lobes, inferior margins straight, bearing dense fringes of long, bare or finely plumose setae; palp article 5 longer than 4. Antennule peduncle article 3 elongate, slender and often more than 2 times as long as article 2. Pereopods 1–3 ischium and merus superior margins bearing dense fringes of long stiff finely plumose setae. Pereopods 4–5 are shorter than the other pereopods with the basis bearing inferiorly extended lobes; merus, carpus and propodus are short. Pereopods 6–7 basis, ischium, merus inferior and superior margins bearing dense fringes of long fine setae. Penes flat, separated, with folded margins, often covered with several small fine setae.

**Remarks.** The genus *Sphaeroma* is closely related to *Lekanesphera* Verhoeff, 1943. In addition to some characters mention by Jacobs (1987), *Lekanesphera* is distinct from *Sphaeroma* in having a maxilliped with palp article 5 sub-equal or shorter than palp article 4 (in *Sphaeroma* article 5 longer than article 4); antennule peduncle article 3 less than two time as long as article 2. Moreover, the setation on pereopods 1–3 and 6–7 of *Lekanesphera* is not as dense as in *Sphaeroma*.

The genus *Sphaeroma* Bosc, 1802 includes 41 species, which currently are considered as valid (Appeltans *et al.* 2010). However, based on the published descriptions and drawings, some of them should be assign to other genera.

*Sphaeroma intermedium* Baker, 1926 was first described as *Exosphaeroma intermedia* Baker, 1926 and later transferred to *Sphaeroma* genus by Harrison & Holdich, 1984. Based on description and drawing of Baker, 1926 and also Harrison & Holdich, 1984, this species with having the following characters is transferred to *Lekanesphera*: Maxilliped palp articles with more or less pronounced lobes, endite semicircular distal margin bearing stout circumplumose setae, palp article 5 sub-equal to article 4; pereopods 4–5 not robust and without long setae on ischium and merus superior margins, merus and carpus not short; pereopods 6–7 basis, ischium, merus superior margins without dense fringes of long fine setae.

*Sphaeroma dumerilii* Leach, 1818 and *Sphaeroma savignii* H. Milne Edwards, 1840, synonymised with *Dynamenopsis dumerilii* by Monod 1933 and then accepted as *Dynamenella dumerilii*.

Based on the pleotelson with subapical foramen and uropod without acute teeth, *Sphaeroma globicauda* Dana, 1853 would not appear to be a species of *Sphaeroma* (it is probably belongs to *Dynamenella* or *Paradella*).

*Sphaeroma granti* Walker & Scott, 1903 with well extended pleotelson apex and lateral marked notch of pleotelson does not appear to belong in *Sphaeroma*.

Finally, based on the shape of the maxilliped with the lobate palp articles, a maxillule with four circumplumose robust setae on mesial lobe, pereopod 4 with a long carpus, pereopods 6 and 7 lacking dense, long marginal setae on the ischium, merus and carpus, *Sphaeroma mukaii* Nunomura, 2006 does not belong in *Sphaeroma* (but the correct generic placement is unknown).

***Sphaeroma khalijfarsi* sp. nov.**

(Figs 1–5)

**Material examined. Holotype.** Male (7.1 mm), Qeshm Island, Eastern coast, Northwest of Qeshm city, muddy-sand shore, beneath stones, 3 July 2009, 26°58'138"N, 56°15'391"E, coll. A. Behpouri and V. Khalaji (ZMH-K-42582).

**Paratypes:** 11 adult males (up to 8.5 mm, average size 6.5 mm), 9 females (up to 8 mm, average size 6 mm), same data as holotype (ZMH-K-42583). 4 females (5.5, 6, 7.2, 8.2 mm); 3 juveniles, Baddar-e-Kolahi, muddy-sand shore, 22 April 2008, 27°03' N, 56°51'E, coll. R. Naderloo (ZMH-K-42584). 2 subadult males (5.5, 6 mm), 5 females (5, 5.5, 6, 6.2, 7 mm); Bandarabbas, Khour-e-shilat, muddy-sand shore, 29 Jun 2009, 27°11'55"N, 56°19'03"E, coll. A. Behpouri and V. Khalaji (ZMH-K-42585).

**Diagnosis.** Head dorsally with a pair of small tubercles on either side anteriorly. Pereonites 1–7 smooth, lacking tubercles. Pleon without prominent tubercles, bearing some small scattered tubercles. Pleotelson granulated, lateral and posterior borders upturned, apex broadly rounded. Maxilliped palp articles 2–4 bearing dense fringes of long fine-plumose setae on superior margin. Appendix masculina inserted basally, apically curved, extending well beyond endopod, with a row of cuticular spines on apex mesial margin. Penes rami with lateral and mesial margins bearing several small fine setae.

**Description of male.** Body about 1.8 times as long as greatest width, widest at pereonite 6 (Fig. 1A). *Head* anterior margin with pair of weak sub-median tubercles, rostral process barely visible in dorsal view. Pereonites 1–7 dorsally smooth, posterior margin with fringe of fine setae, pereonites 2–7 with coxal plate sutures clearly visible on lateral sides (Fig. 1B); coxal plate 4 narrower than others, ventrally more rounded in pereonites 5–7.

*Pleon* (Fig. 1A) dorsal surface bearing some small scattered tubercles.

*Pleotelson* (Fig. 1A) wider than long, dorsal surface granulated with small scattered tubercles, posterior part excavated dorsally with upturned margins and broadly rounded, slightly truncated apex.

*Antennule* (Fig. 1C) article 3 slender and about 2.3 times as long as article 2; flagellum 12-articled, articles 7–10 each bearing aesthetascs.

*Antenna* (Fig. 1D) peduncle article 5, about 2 times as long as article 1; inferior margin of articles 1–4 fringed with fine dense setae; flagellum 14-articled, each article with an apical tuft of fine setae, posterior setae being smaller.

*Epistome* (Fig. 1E) with triangular and pointed apex, lateral margins near apex concave.

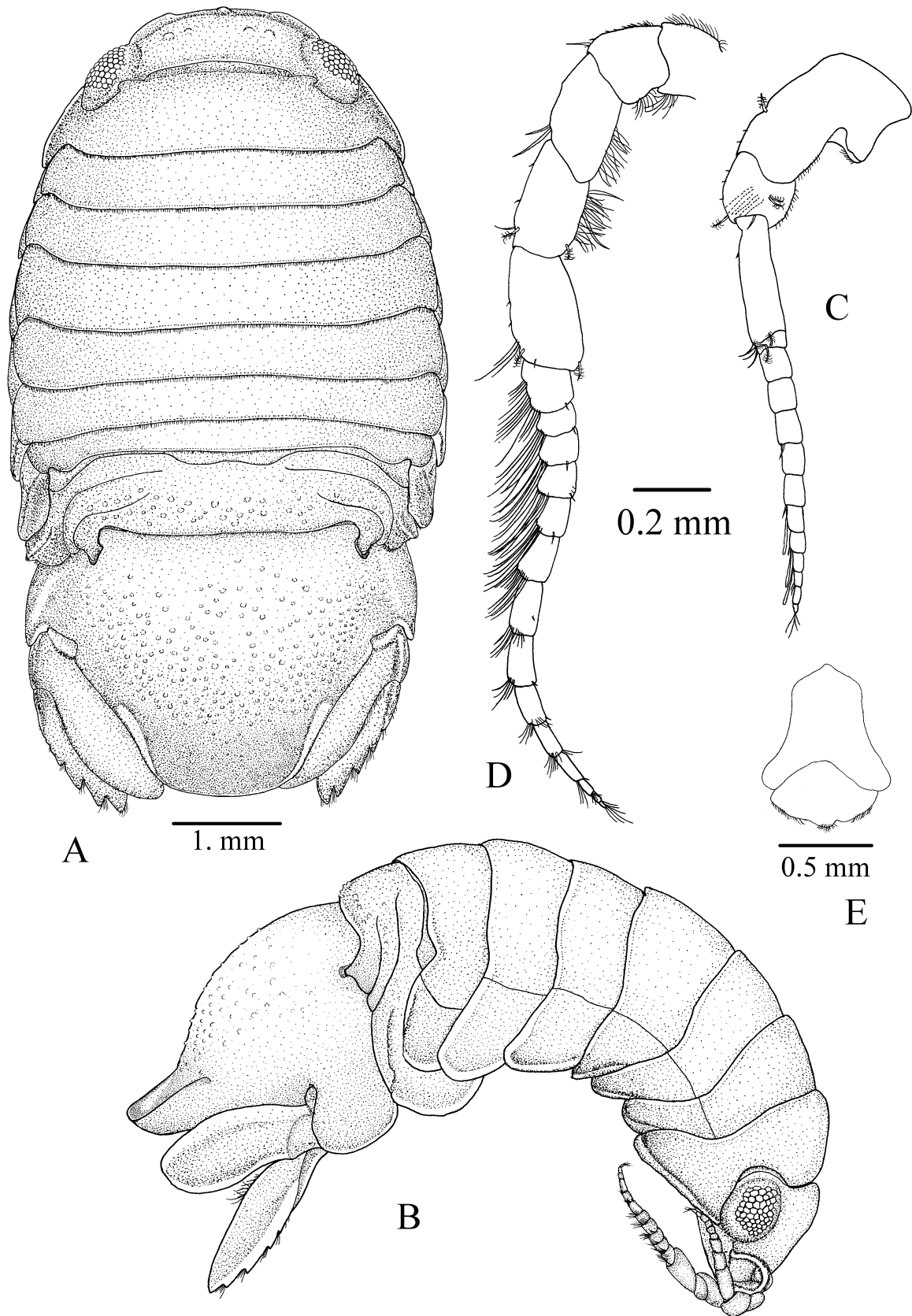
*Left mandible* (Fig. 2C, D) incisor with 4 cusps, lacinia mobilis with 3 cusps; spine row of 6–8 curved, serrate spines; palp article 2 as long as 1, article 2 and 3 distolateral margins with 17 and 22 biserrate setae.

*Maxillule* (Fig. 2A) lateral lobe with simple slender setae on mesial and lateral margins, distal margin with 8 robust, serrate and 2 simple robust setae, dorsal surface with 1 robust, long and apically serrate seta; mesial lobe with simple setae on inner margin, apical margin with 3 circumplumose robust setae (each of them with some small spines, particularly on apical part), and 2 shorter plumose setae.

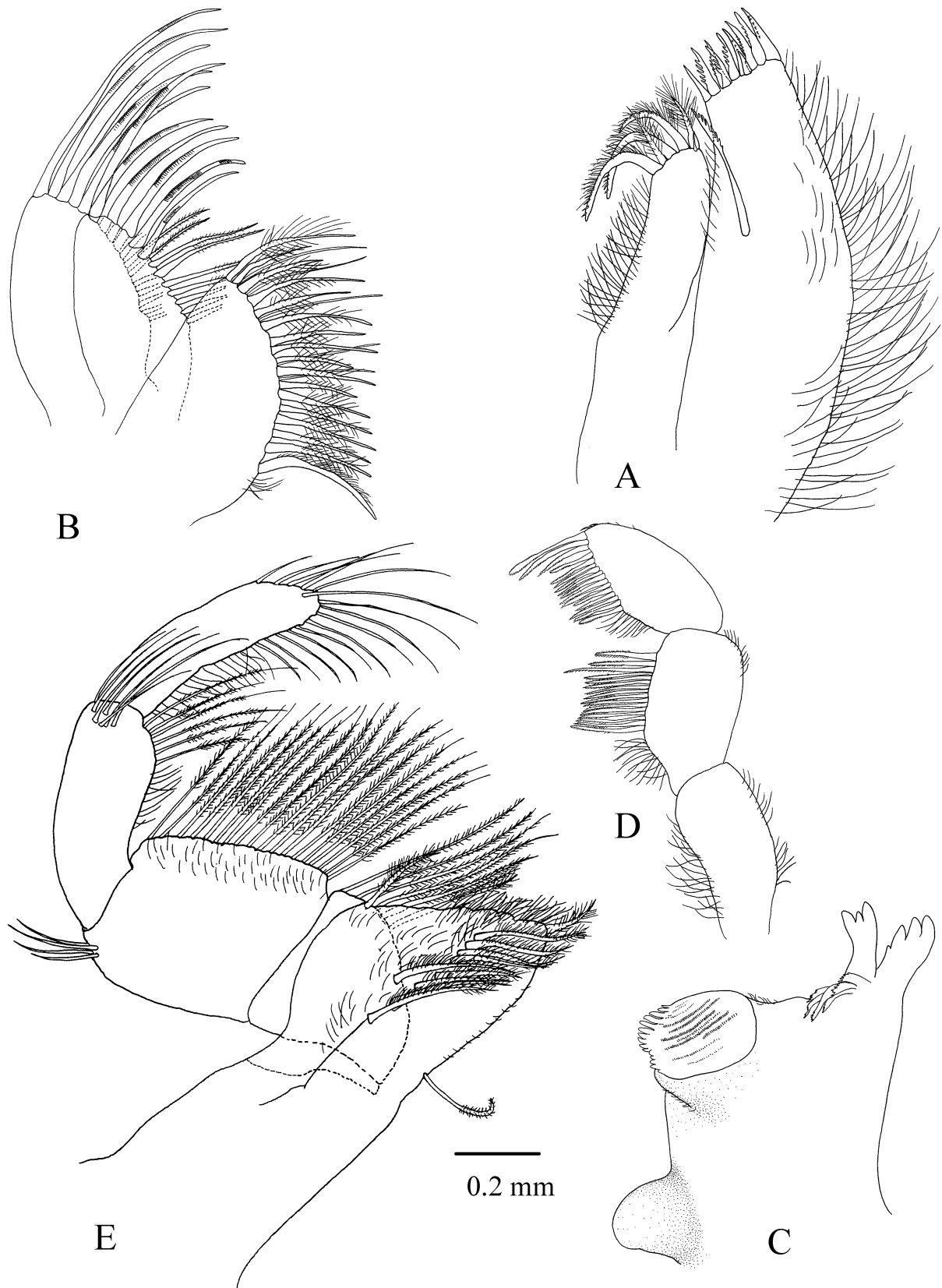
*Maxilla* (Fig. 2B) lateral and middle endites with about 28 finely pectinate robust setae; mesial endite wider, with about 27 plumose setae.

*Maxilliped* (Fig. 2E) endite with some plumose setae, set in amongst fine simple setae in apical margin, mesial margin with single coupling hook, ventral surface with a row of about 10–12 long robust circumplumose setae; palp articles 2–4 bearing dense fringes of long fine-plumose setae on superior margin, articles 3–4 with some slender simple setae on inferodistal angle, article 5 about 1.2 time as long as article 4.

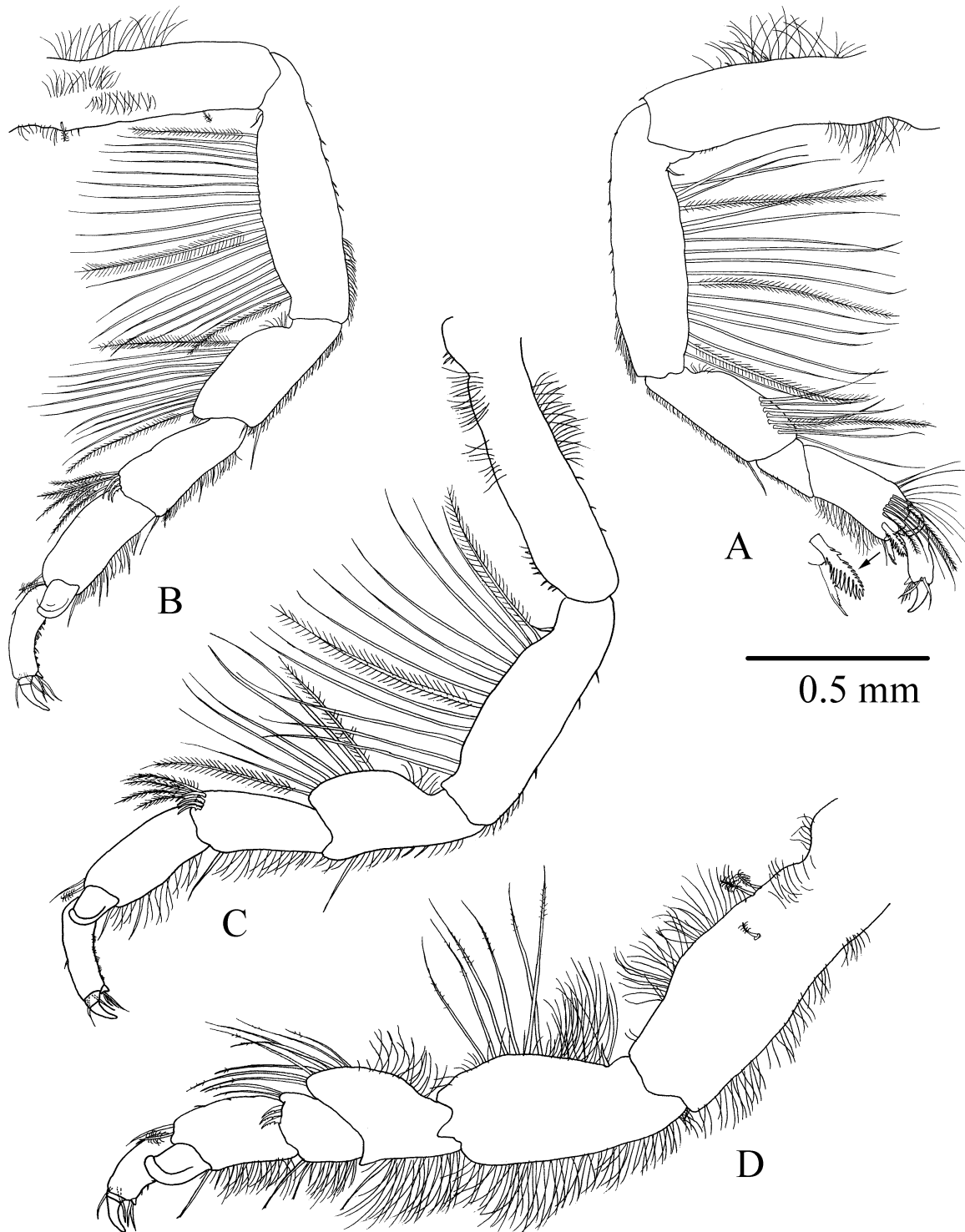
*Pereopod 1* (Fig. 3A) basis about 3.3 times as long as greatest width, proximal superior margin fringed with dense fine setae; ischium 3.7 times as long as greatest width, superior margin fringed with numerous long plumose setae; merus, carpus and propodus inferior margins with dense fringe of short setae; propodus inferodistal angle with 1 biserrate and 1 nodular robust setae; rostral surface with transverse row of several long plumose setae. *Pereopod 2* (Fig. 3B) ischium and merus with dense fringes of long plumose setae on inferior margins, carpus with 3 robust biserrate setae on inferodistal corner; merus, carpus and propodus inferior margins fringed with short setae. *Pereopod 3* (Fig. 3C) similar to pereopod 2. *Pereopods 4* and *5* (Fig. 3D, 4A) are shorter than pereopods 1–3, ischium and merus with several long distally plumose setae in superior margins; *Pereopods 6* and *7* (Fig. 4B, 4C) are similar except in some details such as the number of serrate robust setae on distal margin of carpus. *Pereopod 7* with inferior and superior margins of ischium to carpus bearing dense long simple fine setae; carpus distal margin with 13–15 biserrate setae.



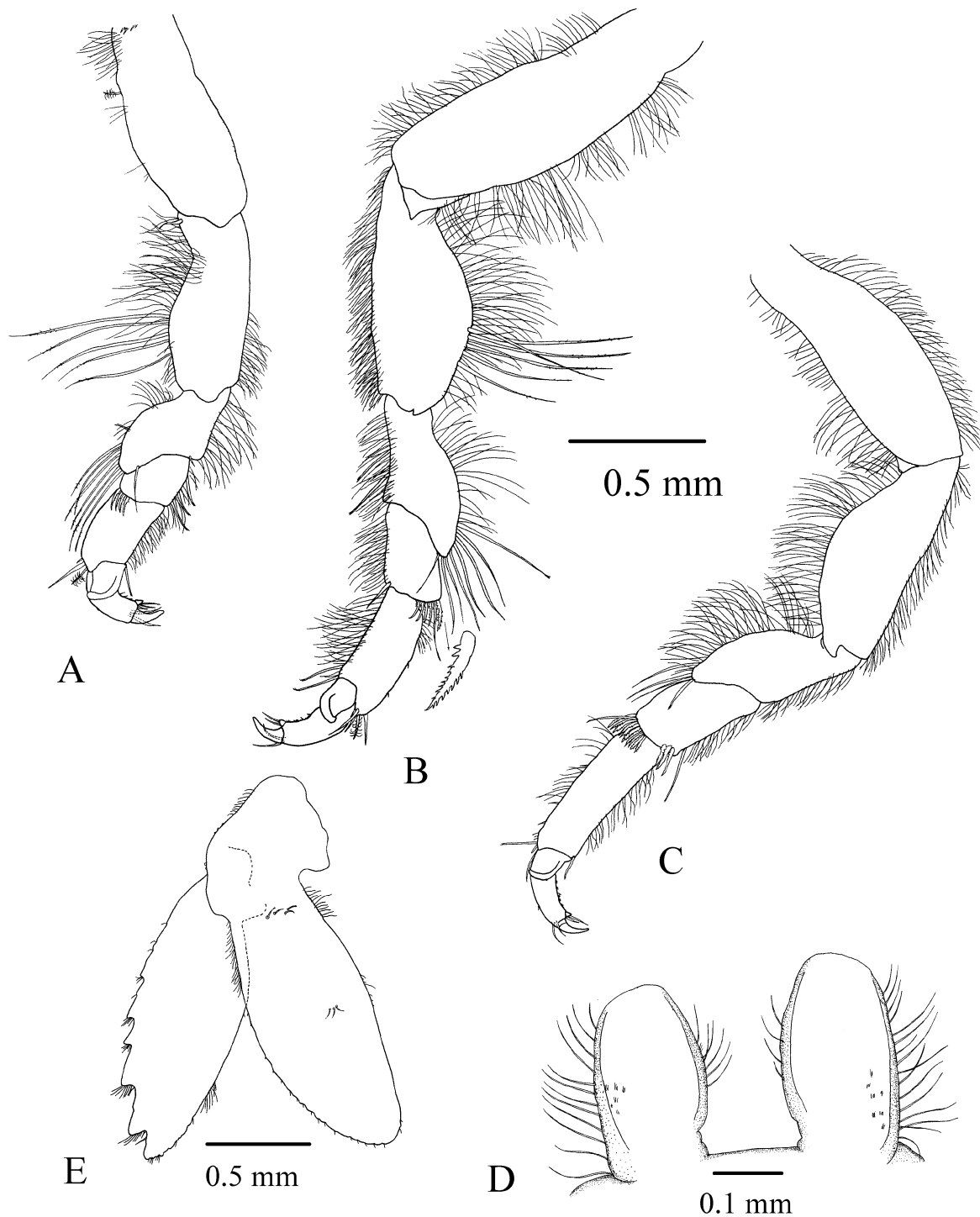
**FIGURE 1.** *Sphaeroma khalijfarsi* sp. nov., male (ZMH-K- 42582). A, dorsal view; B, lateral view; C, antennule; D, antenna; E, epistome.



**FIGURE 2.** *Sphaeroma khalijfarsi* sp. nov., male (ZMH-K-42582). A, maxillule; B, maxilla; C, left mandible; D, palp of left mandible; E, maxilliped.



**FIGURE 3.** *Sphaeroma khalijfarsi* sp. nov., male (ZMH-K-42582). A–D, pereopods 1–4.



**FIGURE 4.** *Sphaeroma khalijfarsi* sp. nov., male (ZMH-K- 42582). A–C, pereopods 5–7; D, penes; E, uropod.

*Pleopod 1* (Fig. 5A) exopod and endopod with approximately 33 and 19 plumose marginal setae; exopod with a single stout seta on proximal lateral corner; sympod mesial margin with 3 coupling hooks. *Pleopod 2* (Fig. 5B) exopod and endopod with approximately 33 and 26 plumose marginal setae; *appendix masculina* arising basally, curving laterally, extending well beyond endopod by about 1.7 as long as endopod, with row of cuticular spines on apex mesial margin; sympod with 3 distomesial coupling hooks. *Pleopod 3* (Fig. 5C) exopod and endopod with approximately 31 and 19 plumose marginal setae; sympod with 3 distomesial coupling hooks, lateral margin with fringe of thin setae and 5 long simple setae on distolateral corner. *Pleopod 4* (Fig. 5D) endopod with a pronounced and curved apical lob with a single stout seta on apex; exopod with about 15 slender setae on lateral margin; sympodite sympod with about 8 long slender setae on distolateral

corner and a single simple seta on mesial margin. *Pleopod 5* (Fig. 5E) exopod with 5 scale patches (3 distally and 2 proximal to transverse suture), lateral margin with approximately 35 slender marginal and sub-marginal setae.

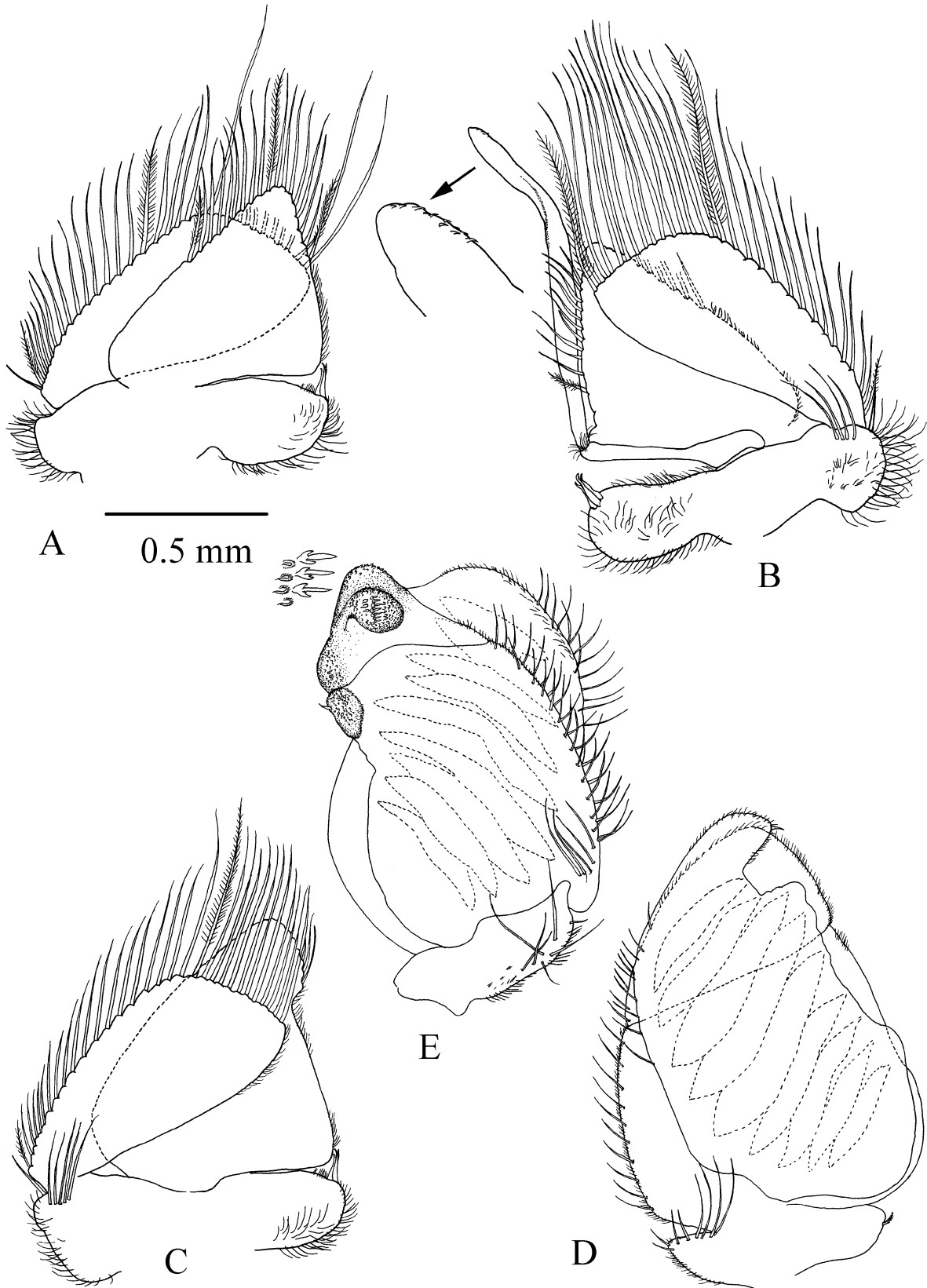


FIGURE 5. *Sphaeroma khalijfarsi* sp. nov., male (ZMH-K-42582). A-E, pleopods 1-5.



*Penial* processes (Fig. 4D) each 1.8 as long as basal width, lateral margins covered with several small fine setae, distally bluntly rounded as illustrated.

*Uropod* (Fig. 4E) exopod lateral margin clearly serrate, with 4–5 teeth; endopod with rounded apex without dense marginal setae.

*Female*. apart from sexual characters similar to male, body size smaller than in male and pleotelson is shorter than male.

Individuals of this species show a variety of colours (polychromatic) from bright, black stripes to entirely black, even within a single population (Fig. 11 A–C).

**Remarks.** *Sphaeroma khalijfarsi* **sp. nov.** can be recognized by the smooth surface of pereonites, presence of some small scattered tubercles on the pleon dorsal surface, lacking of prominent tubercles on the pleon and pleotelson; granulated pleotelson, with well upturned lateral and posterior borders, the posterior margin of which is broadly rounded.

Of the known species of *Sphaeroma*, *S. khalijfarsi* **sp. nov.** is closely related to *S. serratum* Fabricius, 1787. The type locality of *S. serratum* is unknown but the species has been recorded from Morocco and Tunisia (Monod 1932), the Gulf of Suez (Monod 1933), Tunisia (Rezig 1977), South Africa, the Mediterranean Sea and the Black Sea (Kensley 1978), Romania, Greece, Italy, France, and Spain (Jacobs 1987). Based on the drawings and comments provided by Monod (1932), Rezig (1977) and Jacobs (1978), and on examination of material (RMNH 7203 from Spain, USNM 138250 from Egypt, and ZMH K-16425), *S. serratum* clearly differs from *S. khalijfarsi* **sp. nov.** in having a pleotelson with smooth dorsal surface, without upturned borders, not extended and with broadly rounded apex, and by having a straight appendix masculina without an apical cuticular spine. Moreover, the shape and serration of the uropod rami differ between the species (Endopod has broadly rounded apex in *S. khalijfarsi* **sp. nov.** but it has narrow apex in *S. serratum*; exopod has more serration in *S. serratum*).

The new species differs from *S. terebrans* Bate, 1866 (reported from India to Australia), which has a transverse row of four prominent tubercles on pereonites 6 and 7, and a pleotelson with subtriangular apex. In addition, *S. triste* Heller, 1861 is readily distinguishable from *S. khalijfarsi* **sp. nov.** in having prominent tubercles on pleon and pleotelson and pereonites ridges. Examination of syntypes of *S. sieboldii* Dollfus, 1889 (type locality: Japan, from RMNH) shows that this species differs from *S. khalijfarsi* **sp. nov.**, by having a more serrate uropodal exopod, a wider rostrum and a differently shaped pleotelson in ventral view.

**Etymology.** The name of this species comes from “Khalij-e-Fars”, the Persian name of the Persian Gulf (type locality).

### *Sphaeroma walkeri* Stebbing, 1905

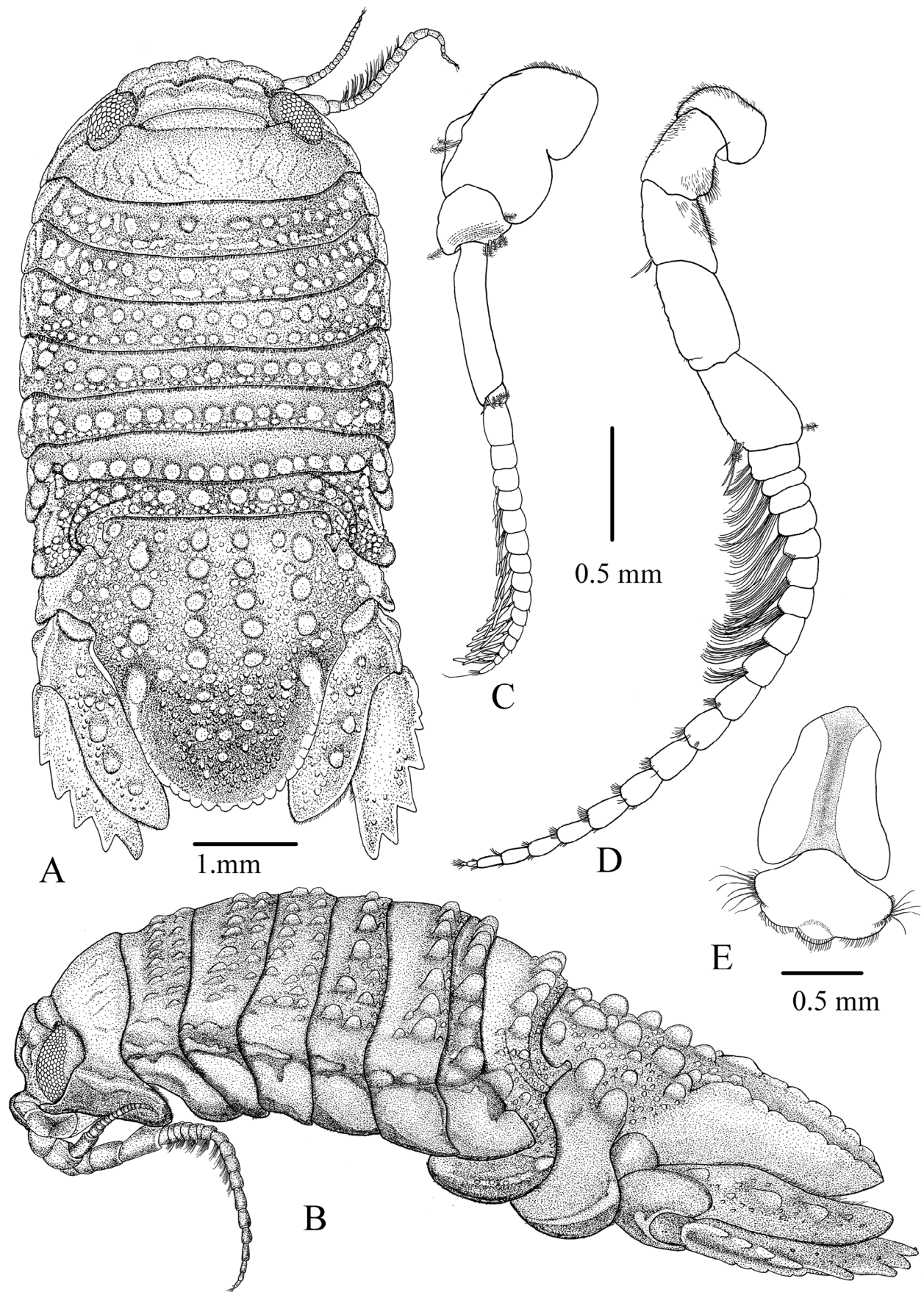
(Figs 6–10)

*Sphaeroma walkeri* Stebbing, 1905: 31–33, 61, pl. VII.; 1910: 220; 1917: 444. — Barnard, 1920: 360; 1936: 178; 1940: 405. — Omer-Cooper, 1927: 240. — Baker, 1928:49. — Nierstrasz, 1931: 192. — Monod, 1931: 36. — Monod, 1933: 198. — Larwood, 1940: 28. — Pillai, 1955: 132, pl. VI. — Loyola e Silva, 1960: 41, figs. 6–7. — Joshi & Ball, 1959: 61–62. — Menzies & Glynn, 1968: 56, fig. 23. — Miller, 1968: 8–11, fig. 3. — Glynn 1972: 286, fig. 5. — Carlton & Iverson, 1981: 31–48. — Estevez & Simon, 1976: 288. — Harrison & Holdich, 1984: 279–282, fig. 1. — Jacobs, 1987: 22–24, fig. 6. — Mak *et al.*, 1985: 75. — Kensley & Schotte, 1989: 235, fig. 101. — Kussakin & Malyutina, 1993: 1170. — Bruce, 1993: 156, fig. 1. — Ghani & Qadeer, 2001: 871–872. — Galil, 2008: 443–444.

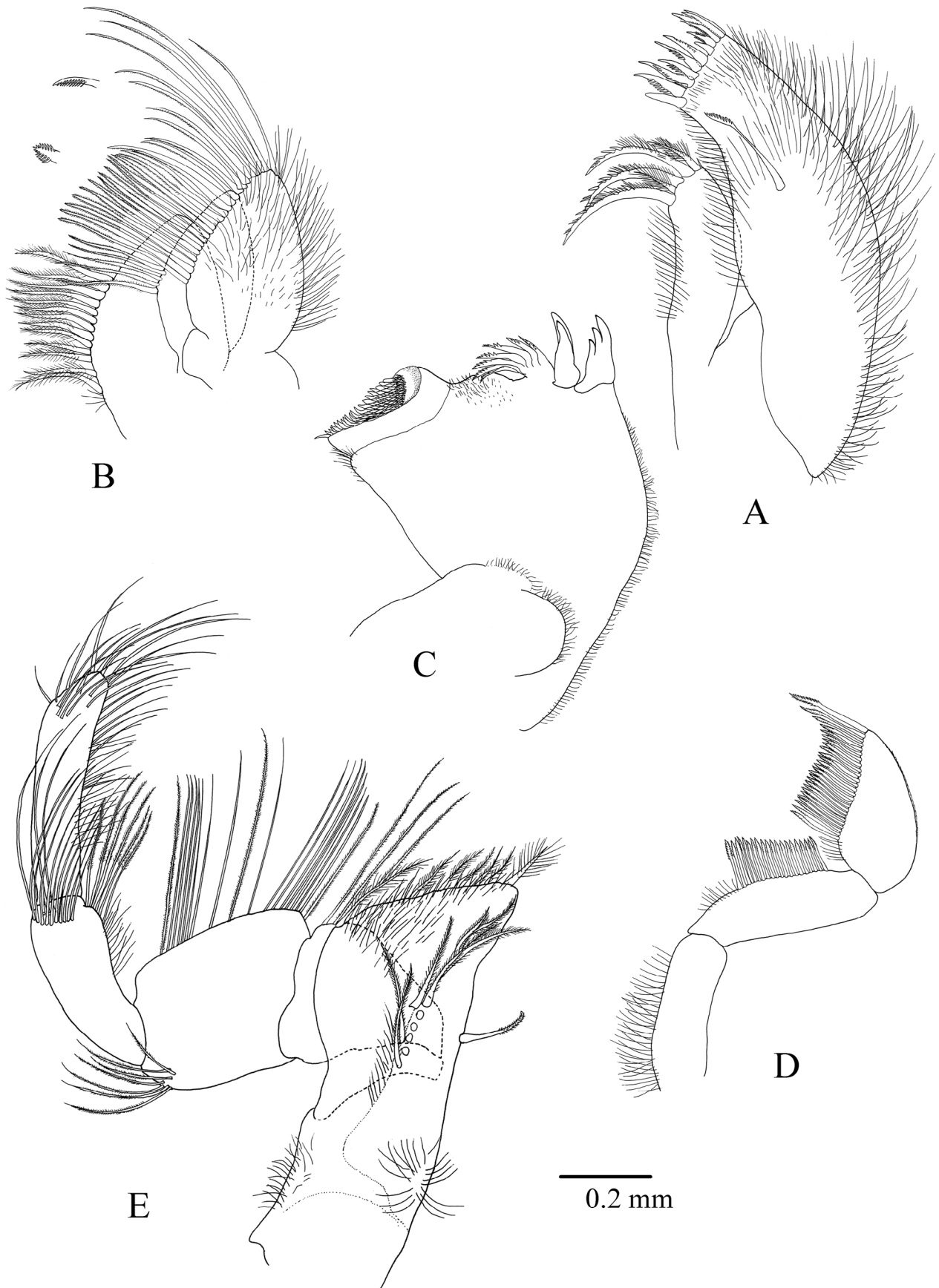
**Type locality.** Jokkenpidi Paar, Sri Lanka (Stebbing 1905).

**Material examined.** Kish Island, Forest Park, beneath stones, 26 Jun 2006, 26°30'470" N, 54°02'677"E, 2 female (7.2 mm), male (8 mm) (ZMH–K– 42586). Bustaneh, 26°30'N, 54°39'E, 2 January 2006, cobble beach under wood (ZMH–K– 42587). Qeshm Island, Zayton Park, in tubes and small borrows in soft rocks, 8 May 2010, 26°55'414" N, 56°15'415" E, 3 male (6, 7.5, and 9 mm), 5 female (5.5, 6.2, 6.5, 7 and 7.5 mm) (ZMH–K– 42588).

**Diagnosis.** A diagnosis to the species can be found in Stebbing (Harrison & Holdich, 1984).



**FIGURE 6.** *Sphaeroma walkeri*, male (ZMH-K- 42586). A, dorsal view; B, lateral view; C, antennule; D, antenna; E, Epistome.



**FIGURE 7.** *Sphaeroma walkeri*, male (ZMH-K-42586). A, maxillule; B, maxilla; C, left mandible; D, palp of left mandible; E, maxilliped.

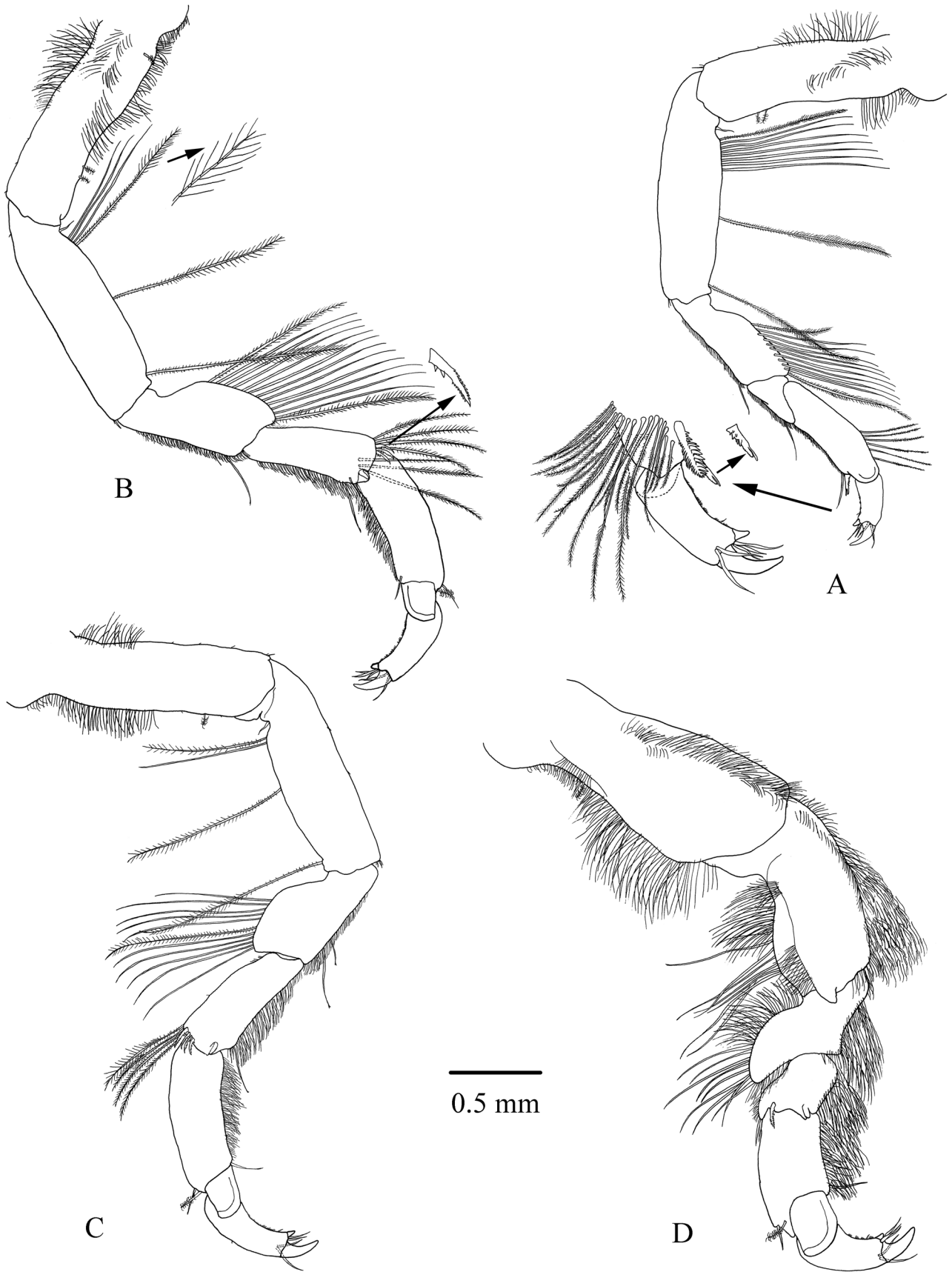
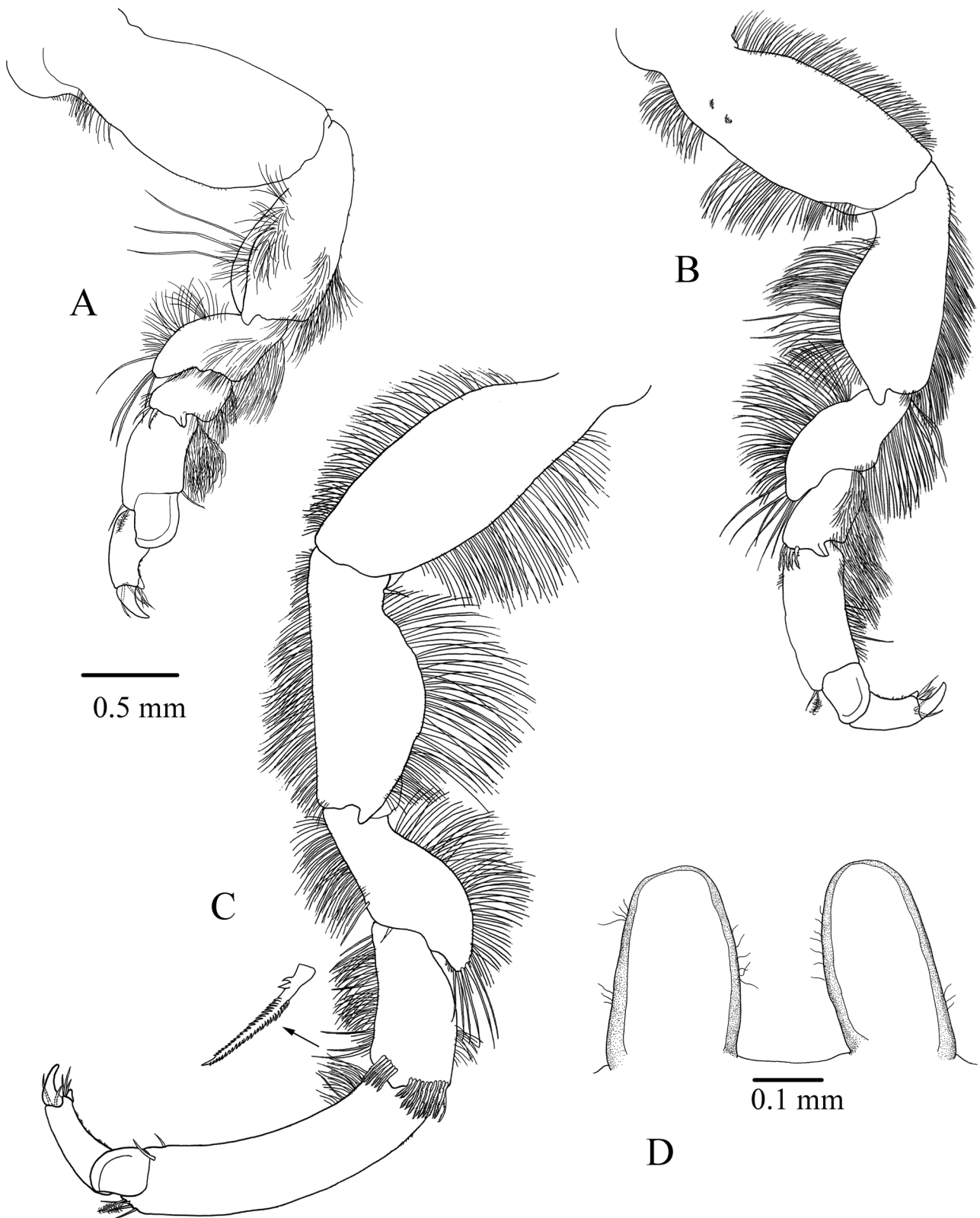


FIGURE 8. *Sphaeroma walkeri*, male (ZMH-K-42586). A-D, pereopods 1-4.



**FIGURE 9.** *Sphaeroma walkeri*, male. A–C, pereopods 5–7; D, penes.

**Additional characters.** Head anterior margin with two sub-marginal projections. Appendix masculina extended well beyond endopod, row of cuticular spines present on mesial margin of the apex. Lateral and mesial margins of penial processes folded with several marginal small fine setae.

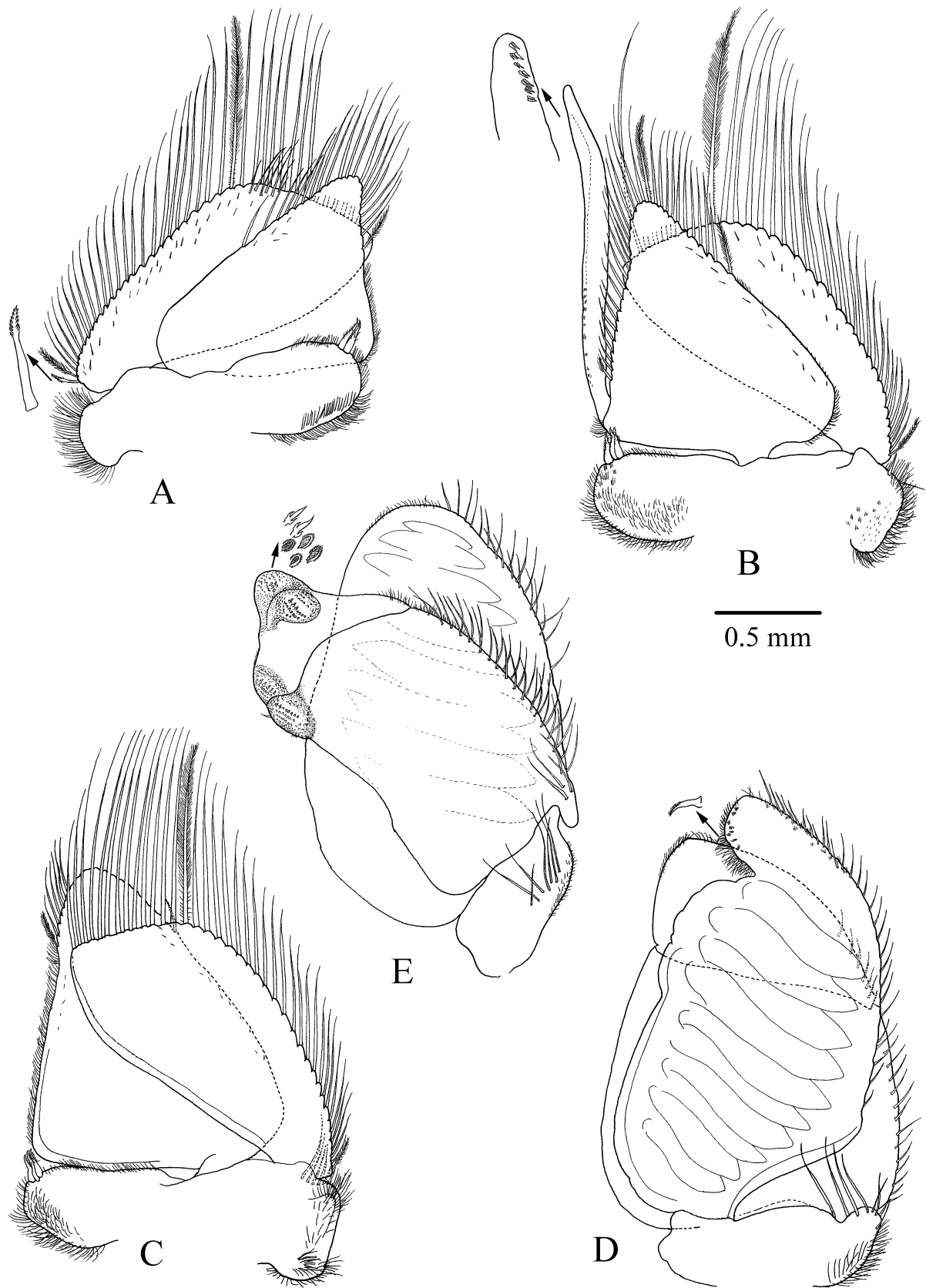
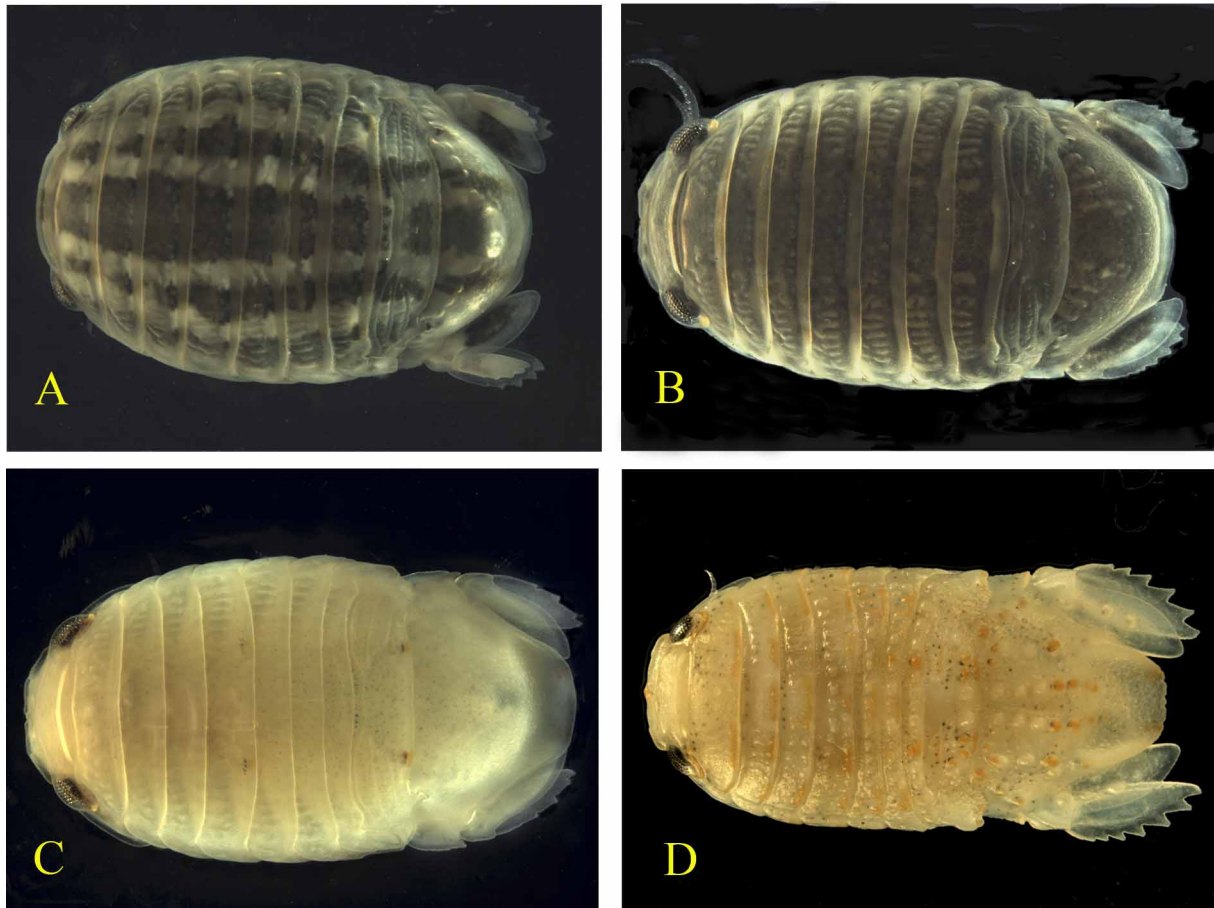


FIGURE 10. *Sphaeroma walkeri*, male (ZMH-K- 42586). A-E, pleopods 1-5.





**FIGURE 11.** A–C, *Sphaeroma khalijfarsi* sp. nov., from Qeshm Island; D, *Sphaeroma walkeri*, from Qeshm Island (the Persian Gulf).

**Description of male** (from Kish Island, the Persian Gulf). Body about 2.0 times as long as greatest width, widest at pereonite 6. *Head* uneven, with 2 projections on frontal surface, rostral process developed, visible in dorsal view (Fig. 6A). Pereonites 2–7 with coxal sutures clearly visible on lateral sides; pereonites 2–4 each bearing two irregular transverse rows of low tubercles which gradually increase posteriorly; pereonites 5–7 and pleon with a transverse row of prominent tubercles.

*Pleon* (Fig. 6A) dorsal surface granulose, with a transverse row of prominent tubercles, posterior margin bearing two separate sutures on either side.

*Pleotelson* (Fig. 6A) wider than long, dorsal surface granulated with scattered tubercles, either side of midline bearing a longitudinal row of 5 prominent tubercles more posteriorly some smaller ones, flanked on either side by a longitudinal row of 3 prominent tubercles, posterior part dorsally concave subapically, with upturned and crenulated borders.

*Antennule* (Fig. 6C) article 3 elongate, slender and about 2.8 times as long as article 2; flagellum 16-articled, articles 3–15 each bearing aesthetascs, extending to posterior margin of pereonite 1.

*Antenna* (Fig. 6D) peduncle articles 4 and 5 subequal in length, articles 1–3 shorter; flagellum 20-articled, flagellum articles 1–9 with an apical tuft of long fine setae.

*Epistome* (Fig. 6E) with triangular apex, lateral margins concave and sublinear.

*Left mandible* (Fig. 7C, D) incisor with 3 cusps, lacinia mobilis with 2 cusps; spine row of 7–8 curved, serrate spines; molar process round, crushing surface ridged; palp article 2 as long as 1, article 2 distolateral margin with 20 biserrate setae; article 3 with 29 biserrate setae, terminal seta being longest.

*Maxillule* (Fig. 7A) lateral lobe with simple setae on mesial and outer margins, apical margin with 10 robust, serrate or biserrate and 2 simple robust setae, gnathal subapical surface with 1 robust, long and apically serrate seta; mesial lobe with simple setae on inner margin, apical margin with 3 circumplumose

robust setae (each of them with some small spines, particularly on apical part), 2 shorter circumplumose, and a single short stout setae.

*Maxilla* (Fig. 7B) lateral and middle endites with about 28 pectinate robust setae; mesial endite with about 30 plumose setae.

*Maxilliped* (Fig. 7E) endite wide distally, with some plumose setae, set in amongst fine simple setae in semicircular distal margin, mesial margin with single coupling hook, ventral surface with a row of about 19–20 long robust plumose setae; palp articles 2–4 bearing dense fringes of long fine-plumose setae on superior margin, articles 3 with some slender fine-plumose setae on inferodistal angle, article 5 about 1.4 as long as article 4.

*Pereopod 1* (Fig. 8A) basis proximal superior margin with dense fine setae; ischium superior margin fringed with numerous long plumose setae, proximal superior corner with single robust seta; merus, carpus and propodus inferior margins with dense fringe of short setae; propodus inferodistal angle with 1 biserrate and 1 nodular robust setae; rostral surface with transverse row of about 16 long plumose setae. *Pereopod 2* and 3 (Fig. 8B, 8C), slender, similar in shape as illustrated; *pereopods* 4 and 5 (Fig. 8D, 9A) are shorter than *pereopods* 1–3, ischium to propodus inferior margins fringed with long fine dense setae; *Pereopods 6* (Fig. 9B) and 7 are similar except in some details such as the number of serrate robust setae on distal margin of carpus. *Pereopods 7* (Fig. 9C) with inferior and superior margins of ischium to carpus bearing dense groups of long simple fine setae; carpus distal margin with 20–21 biserrate setae, propodus relatively long and curved.

*Pleopod 1* (Fig. 10A) exopod and endopod with approximately 42 and 24 plumose marginal setae respectively; exopod with a single biserrate seta on proximal lateral corner and 6–7 long simple setae on superodistal margin lower than marginal setae. *Pleopod 2* (Fig. 10B) exopod and endopod with approximately 43 and 32 plumose marginal setae respectively; *appendix masculina* arising sub-basally, extending well beyond endopod, with a row of double cuticular spines on apex mesial margin; sympod with 3 distomesial coupling hooks. *Pleopod 3* (Fig. 10C) exopod and endopod with approximately 40 and 26 plumose marginal setae respectively; sympod with 3 distomesial coupling hooks, lateral margin with fringe of thin setae and 5 long simple setae on distolateral corner. *Pleopod 4* (Fig. 10D) endopod with a pronounced and curved apical lobe with a single stout plumose seta on apex, lateral margin with about 30 slender setae; exopod with about 22 slender setae on lateral margin; sympodite with about 8 long slender setae on distolateral corner and a single simple seta on mesial margin. *Pleopod 5* (Fig. 10E) exopod with 5 scale patches (3 distally of and 2 under the transverse suture), lateral margin with approximately 39 slender marginal and sub-marginal setae, sympod with about 7 slender setae on medial surface.

*Penial* processes (Fig. 9D) each 1.5 as long as basal width, several small fine marginal setae present.

*Uropodal* (Fig. 6A, 11D) exopod slightly longer than endopod with 5–6 external teeth and an acute apex; endopod margins fringed with dense simple setae, narrowly rounded apex, dorsal surface bearing 2–3 prominent tubercles and an oblique ridge on the basal region.

*Female*. apart from sexual characters similar to male, body size principally smaller than in male, propodus of *pereopod 7* relatively shorter and pleotelson shorter than in male.

**Remarks.** *Sphaeroma walkeri* has a worldwide distribution which probably has been transported by shipping. This species is a wood-borer, but it also burrows in to soft rock and can be found beneath stones or in crevices in rocky coasts (as in the present study).

The species can be recognized by the presence of an uneven pereonite 1, pereonites 2–4 each bearing two irregular transverse rows of weak tubercles, pereonites 5–7 and pleon with one transverse row of prominent, round and blunt tubercles. In addition the middle side of the pleotelson has two longitudinal rows of five prominent tubercles which flanked on either side by a longitudinal row of 3 prominent tubercles. Based on examination of the Persian-Gulf specimens and the other material from Brazil, in contrast to the previous descriptions and illustrations, *S. walkeri* has an irregular transverse row of tubercles on pereonite 2. In addition, the antenna flagellum articles are similar in all the examined material, bearing an apical tuft of long fine setae, but these setae were not shown in the original type description. Moreover, Stebbing's description of *S. walkeri* mentioned 6 or 7 teeth on the outer margin of the uropodal exopod, whereas the respective illustration shows only 5 teeth. Stebbing doubtlessly counted the pointed apex of the exopod as a tooth. Most later authors (e.g., Pillai 1955, Harrison & Holdich 1984) mentioned five marginal teeth and an acute apex.



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