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# THE SPHAEROMATID ISOPOD GENUS *SPHAEROMOPSIS* HOLDICH & JONES IN AFRICAN, AUSTRALIAN AND SOUTH AMERICAN WATERS

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## INTRODUCTION

Although occasional reference has been made in the literature to psammobiotic sphaeromatid isopods, only three publications have dealt with them in any detail. Brown (1973) gave details of the ecology and feeding behaviour of the hemibranchiate sphaeromatid, *Exosphaeroma truncatitelson* Barnard, from South Africa; Holdich & Jones (1973) dealt with the systematics and ecology of a new eubranchiate sphaeromatid, *Sphaeromopsis amathitis* Holdich & Jones, from Kenya; and Eleftheriou et al. (1980) examined the systematics and ecology of a new platybranchiate sphaeromatid, *Tholozodium ocellatum* Eleftheriou, Holdich & Harrison, from India. In all three cases the sphaeromatids were found inhabiting intertidal sandy beaches with cirolanid isopods.

Recent studies of the intertidal sandy beaches of Queensland, Australia have revealed the presence of a number of new species and new records of cirolanid isopods (Holdich et al., 1981) and of the eubranchiate sphaeromatid genus, *Dynamenella* Hansen (Harrison & Holdich, 1981). In addition, a new species of *Sphaeromopsis* was found inhabiting similar substrata to some of the cirolanid and *Dynamenella* species. The genus *Sphaeromopsis* was previously known only from Watamu, Kenya, East Africa, but its discovery in Australia prompted an examination of other collections. This revealed two additional species of *Sphaeromopsis*, one from the Red Sea and the other from Brazil.

## MATERIALS AND METHODS

A wide variety of intertidal micro-environments was sampled manually on the north eastern coast of Queensland, Australia, and on a number of offshore islands (Heron Island, Hinchinbrook Island, Magnetic Island and Lizard Island). Samples from these micro-environments were examined soon after collection and the fauna extracted under a binocular dissection microscope. *Sphaeromopsis* was only commonly found in association with intertidal sand; and stones, dead coral and wood lying on sand on the open coasts and estuaries of

the mainland and the continental islands. Using suction samplers, a large number of samples was obtained from sublittoral sediments in the Townsville area during routine sampling by divers from the James Cook University Three Bays Survey, and subsequently sieved through a 1.0 mm mesh. Only one sample revealed a *Sphaeromopsis* specimen. Some other isopods found during this study have already been dealt with by Holdich & Harrison (1980a, b, c, d), Holdich et al. (1981) and Harrison & Holdich (1981).

In addition to the samples mentioned above, collections of isopods have been examined from southern Queensland, from South Australia and West Australia, but these have failed to reveal any *Sphaeromopsis*. Collections made from Mediterranean sandy beaches in Israel, and the Red Sea by Dr. D. M. Dexter (using a 0.025 $m^2$ corer sampling to a depth of 0.2 m, with samples being sieved through a 0.5 mm mesh) were found to contain *Sphaeromopsis* specimens in the Red Sea material. Examination of the literature revealed these to be the same as specimens previously described by Stebbing (1910) as *Exosphaeroma reticulatum* from the Red Sea. Specimens of *Pseudosphaeroma mourei* Loyola e Silva kindly lent by Dr. Loyola e Silva proved, upon re-examination, to be a species of *Sphaeromopsis*.

In order to clarify the situation all species now known to belong to the genus *Sphaeromopsis* are redescribed with a new species from Australia. All material mentioned below but not designated a museum reference number has been placed in a reference collection at Nottingham University.

As so few systematists define developmental stages of isopods when listing collections, the following definitions are given for *Sphaeromopsis*: adult male — appendix masculina free and fully formed; sub-adult male (i.e. stage before adult male) — appendix masculina fused with endopod tissue and only visible in partly formed state through endopodal cuticle, penes terete, shorter than those of adult; immature male (i.e. stage before sub-adult male) — penes obvious but shorter than those of sub-adult male, no indication of appendix masculina, whole animal markedly smaller than adult males; ovigerous female — female with brood pouch (whether brood is present or not); non-ovigerous female — a specimen of adult or sub-adult size, but showing no obvious sexual characters; immature specimen — a specimen smaller than sub-adult male or non-ovigerous female size, showing no obvious sexual characters but having seven free and fully formed pairs of pereopods; juvenile — a specimen with only six free and fully formed pairs of pereopods, the seventh pair being reduced and held horizontally across the sternite of pereonite 7.

## **Sphaeromopsis** Holdich & Jones, 1973

Generic diagnosis. — Eubranchiate Sphaeromatidae with antennular peduncle article 1 not extended anteriorly as a plate. Both sexes with pereon and pleon lacking dorsal processes and ornamentation. Pleon with posterior

margin bearing two short, separate sutures at either side. Both sexes with both uropodal rami lamellar; endopod greater than half length of exopod. Pleotelsonic apex entire, lacking notch, but lateral margins folded ventrally, producing an arch in posterior view. Exopod of pleopod 3 with or without an articulation. Sexual dimorphism not pronounced.

Adult male usually larger than adult female, with relatively longer uropodal exopods. Inferior margins of pereopods with dense pads of fine setae. Penes sub-equal in length to pleopod 1, fused at base, broad in proximal half, tapering in distal half. Appendix masculina with margins sub-parallel or broad proximally and tapering distally; arising from interno-proximal angle of endopod of pleopod 2 and extending to, or just beyond, ramal apex.

Ovigerous female, inferior margins of pereopods lacking dense mats of fine setae. Mouthparts not metamorphosed. Brood pouch lacking plates, formed from two opposing ventral pockets covering the entire ventral pereon and opening in the mid-line between the fourth pereopods.

Type species - *Sphaeromopsis amathitis* Holdich & Jones, 1973.

## **Sphaeromopsis amathitis** Holdich & Jones, 1973

*Sphaeromopsis amathitis* Holdich & Jones, 1973: 385-395.
Type locality. — Watamu Marine Park, Kenya, in intertidal sand.

Material examined. — Paratypes collected by University College of North Wales (Bangor) Marine Biology Expedition, 1969. 8 adult males, 25 sub-adult males, 12 ovigerous females, 127 non-ovigerous females, 293 juveniles.

Diagnosis of adult male paratype, 3.27 mm in length (fig. 1a-h). — *Sphaeromopsis* with apex of pleotelson broadly truncate in dorsal view, with a low, wide, arched apex in posterior view. Uropodal endopod with slight externo-distal crenulation; external margin of exopod crenulate. Penes tapering gradually from mid-points to narrowly rounded apices. External margin of endopod of pleopod 1 straight. Appendix masculina with margins sub-parallel, extending to ramal apex. Exopod of pleopod 3 lacking a transverse articulation.

Diagnosis of sub-adult male paratype (fig. 1i, j). — Inferior margins of pereopods lacking dense mats of fine setae. Penes half length of those of adult male, tapering smoothly from bases to narrowly rounded apices. Appendix masculina not free; forming beneath cuticle of interior margin of endopod by separating from ramal tissue in distal half.

Description of ovigerous female. — Differs from adult male in sexual characters and in manner outlined in generic description. None of the ovigerous females seen contained broods within the brood pouch. This renders this stage inobvious and accounts for the original statement of Holdich & Jones (1973: 391) that no ovigerous females were encountered.

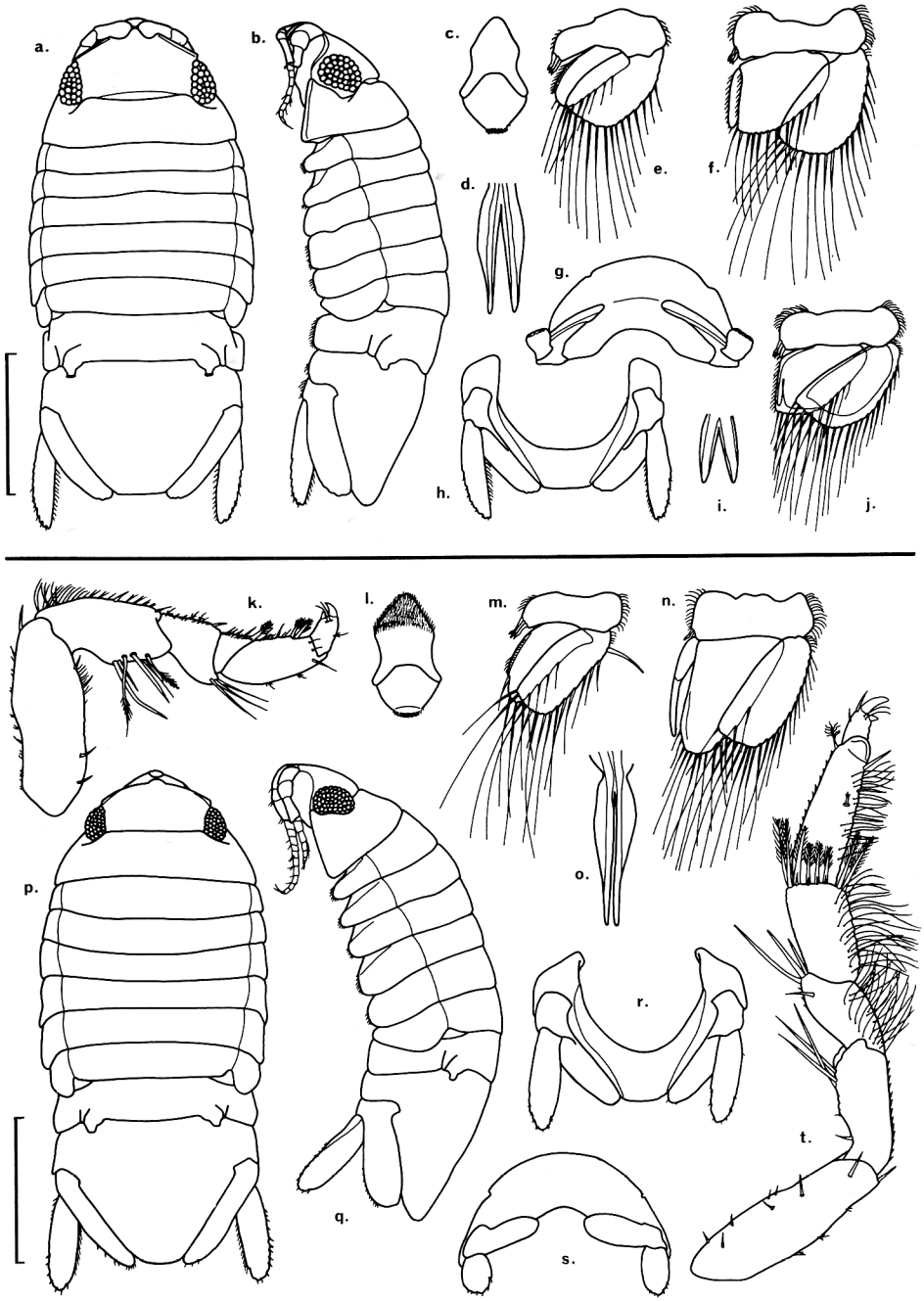


Fig. 1. a-j, *Sphaeromopsis amathitis* Holdich & Jones. a-h, adult male paratype. a, dorsal; b, lateral; c, epistome and labrum; d, penes; e, pleopod 1; f, pleopod 2; g, pleotelson, posterior; h, pleotelson, ventral. i, j, sub-adult male paratype. i, penes; j, pleopod 2. k-t, *Sphaeromopsis mourei* (Loyola e Silva), adult male paratype. k, pereopod 1; l, epistome and labrum; m, pleopod 1; n, pleopod 2; o, penes; p, dorsal; q, lateral; r, pleotelson, ventral; s, pleotelson, posterior; t, pereopod 7. Scale lines represent 1 mm.

Colour of specimens in alcohol. — Pale cream, either lacking chromatophores completely, or with scattered, small, pale chromatophores dorsally, especially on cephalosome, pleon and pleotelson.

Remarks. — Holdich & Jones (1973: fig. 2d) figured pereopod 1, not 2 as stated.

## **Sphaeromopsis serriguberna** sp. nov.

Type locality. — Kurrimine, Queensland, 17°54′S 146°05′E. South side of river estuary. Under stones and coral on intertidal sand.

Material examined. — Holotype adult male, 2.9 mm in length (Queensland Museum reg. no. W7953). Collected by D. M. Holdich, 21 May 1976, from type locality. Paratypes from type locality; collection details as above: 101 adult males (one supplying three microslides, Q. M. reg. no. W7954), 132 sub-adult males (one as Q.M. reg. no. W7955), 21 immature males, 39 ovigerous females (one as Q.M. reg. no. W7955), 30 non-ovigerous females (one as Q.M. reg. no. W7955), 141 immature specimens, 82 juveniles.

Kurrimine: Under stones and wood at river entrance, intertidal; coll. D. M. Holdich, 21 May 1976, 1 adult male, 4 sub-adult males, 2 ovigerous females, 1 non-ovigerous female, 1 juvenile. — In fine sand, midshore; coll. D. M. Holdich, 18 May 1976, 12 adult males, 2 ovigerous females, 3 non-ovigerous females, 2 immature specimens, 1 juvenile. — From piece of coral 5 cm in diameter; coll. D. M. Holdich, 21 May 1976, 8 adult males, 13 sub-adult males, 4 immature males, 5 ovigerous females, 3 non-ovigerous females, 4 juveniles.

Kenny, South of Mission Beach, Queensland: In fine sand and under stones on sand near jetty, midshore; coll. D. M. Holdich, 19 May 1976, 7 adult males, 3 sub-adult males, 7 ovigerous females, 2 juveniles.

Clump Point, Kurrimine: In sand on open region of beach; coll. D. M. Holdich, 19 May 1976, 1 adult male.

Bingal Bay, Clump Point, Kurrimine: Under stones on sand by jetty; coll. D. M. Holdich, 19 May 1976, 2 adult males, 11 sub-adult males, 9 ovigerous females, 4 non-ovigerous females.

South Mission Beach, Kurrimine: In sand, midshore; coll. D. M. Holdich, 19 May 1976, 1 ovigerous female.

Casuarina Beach, Lizard Island, Queensland, 14°40′S 145°30′E: From fine sand; beach rock on sand; beach rock crevices; wood embedded in sand, and from mixed weed (including *Halimeda* sp.) from reef flat; coll. D. M. Holdich, 9-13 June 1976, 15 adult males, 10 sub-adult males, 3 immature males, 41 ovigerous females, 16 non-ovigerous females, 5 immature specimens, 30 juveniles. — Transects taken across beach and nearby reef flat; coll. P. N. Slattery, 29 September 1977, 32 adult males, 1 sub-adult male, 18 ovigerous females, 17 non-ovigerous females, 14 immature specimens, 14 juveniles.

Coconut Beach, Lizard Island: In intertidal sand; coll. D. M. Holdich, 11 June 1976, 5 adult males, 9 sub-adult males, 1 immature male, 8 non-ovigerous females, 43 immature specimens, 10 juveniles.

Lizard Island: Australian Museum (code: LI-10; reg. no. P.28823) 15 adult males, 6 sub-adult males, 1 ovigerous female, 5 non-ovigerous females, 1 immature specimen.

Alma Bay, Magnetic Island, Townsville, Queensland, 19°10′S 146°50′E: In intertidal sand; coll. D. M. Holdich, 23 April 1976 and 9 July 1976, 15 adult males, 6 sub-adult males, 8 ovigerous females, 8 non-ovigerous females, 43 immature specimens, 3 juveniles.

Picnic Bay, Magnetic Island: From semi-permanent logs and pieces of wood at top of dead coral zone; midshore; coll. D. M. Holdich, 9 July 1976, 12 adult males, 5 sub-adult males, 1 immature male, 22 ovigerous females, 3 non-ovigerous females, 2 immature specimens.

Radical Bay, Magnetic Island: In fine but mixed sand at base of rock, midshore; coll. D. M. Holdich, 27 April 1976, 2 adult males, 1 ovigerous females.

Cleveland Bay, Townsville: Particulate substratum at 11 m depth; coll. James Cook University of North Queensland, 10 June 1975 (site code: R34 (c)), 1 ovigerous female.

Pallarenda, Townsville: From sand around base of wooden pier pile, intertidal; coll. D. M. Holdich, 14 May 1976, 1 sub-adult male. — In waterlogged driftwood heavily bored by *Teredo*

sp. on lower shore; coll. D. M. Holdich, 11 July 1976, 1 non-ovigerous female. — In coarse intertidal sand just above break from flatter lower shore to upper shore; coll. R. S. Muffley, 30 April 1977 (code: PAL 30-4-77), 1 adult male.

Ross River, Townsville: In estuarine region 12 km from sea, 0.5 km downstream from Aplin Wier (Riverside Park), on *Teredo*-bored driftwood on gravel/sand bank; coll. D. M. Holdich, 23 June 1976, 1 ovigerous female.

Yorkey's Knob, Cairns, Queensland, 16°51′S 145°43′E: Under stones on intertidal sand by jetty; coll. D. M. Holdich, 26 May 1976, 1 adult male, 1 ovigerous female, 1 non-ovigerous female.

Ramsey Bay, Hinchinbrook Island, Queensland, 18°22′S 146°14′E: In intertidal sand; coll. N. L. Bruce, 22 August 1978, 1 ovigerous female.

Description of adult male (fig. 2a-h, j, l-s). — *Sphaeromopsis* with pleotelson sub-triangular; apex narrowly truncate in dorsal view, with a narrow, deep arch in posterior view.

Appendages: Eight-articled antennular flagellum sub-equal in length to peduncle, extending to level of pereonite 1. Antenna with twelve-articled flagellum extending to level of pereonite 2. Epistome with smoothly rounded, sub-triangular apex and concave lateral margins. Mandibles with four teeth on each incisor edge, three teeth on lacinia mobilis, and palps well formed. Outer lobe of maxillule with four blunt, and a group of shorter, acute, spines; inner lobe with the four pectinate spines sub-equal in length. Both outer lobes of maxilla bearing long, distally curved spines, setae absent; inner lobe with row of pectinate spines, the most proximal being the longest and being straight, several others being curved. Maxillipedal endite bearing three prominent, apical pegs in addition to setae, and palp articles 2 to 4 with setose lobes. All pereopods bi-ungulate, each with accessory unguis simple; superior lobes of ischium and merus with tufts of long setae; inferior margins of merus, carpus and propodus with dense mats of fine setae and scattered longer setae. Pereopod 1 more robust than those following; inferior margin of carpus with three robust spines, the infero-distal being the longest. Pereopods increasing in length from 1 to 7. Infero-distal margin of carpus of pereopod 6 with one long, robust spine. Distal region of carpus of pereopod 7 with a row of stout, plumose spines. Penes with margins sub-parallel proximally but tapering abruptly in mid-region and styliform in distal half. Basis of pleopod 1 extended internally as a lobe, bearing three coupling hooks; endopod with external margin concave. Appendix masculina broad proximally, tapering evenly to narrowly rounded tip just beyond level of endopodal apex. Exopod of pleopod 3 lacking a transverse articulation. Pleopods 4 and 5 similar to those of type species. Uropodal endopod extending just beyond pleotelsonic apex, with interno-distal margin smoothly rounded, externo-distal margin slightly crenulate; exopod extending just beyond endopod, apically and externally dentate with an internal margin of short setae and several external setae.

Description of sub-adult male (fig. 2i, j). — Inferior margins of pereopods lacking dense mats of fine setae. Penes half length of those of adult male, tapering slightly from bases to rounded apices. Appendix masculina inobvious,

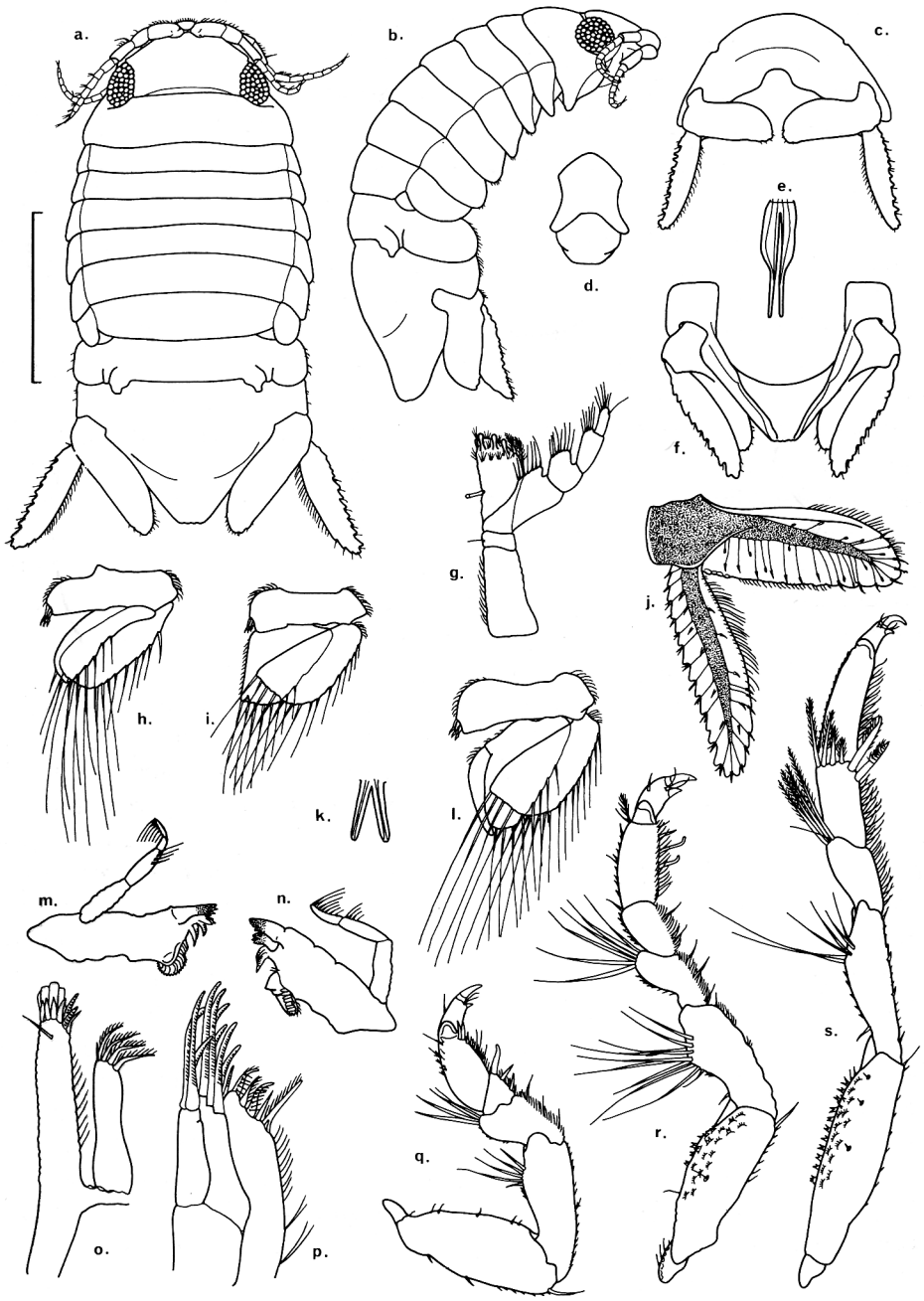


Fig. 2. *Sphaeromopsis serriguberna* sp. nov. a-h, j, l-s, adult male. a, dorsal; b, lateral; c, pleotelson, posterior; d, epistome and labrum; e, penes; f, pleotelson, ventral; g, maxilliped; h, pleopod 1; j, uropod (showing transcuticular connections between surface setae and epidermis); l, pleopod 2; m, right mandible; n, left mandible; o, maxillule; p, maxilla; q, pereopod 1; r, pereopod 4; s, pereopod 7. i, k, sub-adult male paratype. i, pleopod 2; k, penes. Scale represents 1 mm.

separating only slightly from endopodal tissue beneath cuticle at infero-distal margin of ramus.

Description of ovigerous female and non-ovigerous female. — Differs from adult male in sexual characters and in manner outlined in generic description. Non-ovigerous female similar to ovigerous female but lacks brood pouch.

Colour of specimens in alcohol. — Golden brown. Chromatophores almost absent, or: dorsally, covering entire body surface or concentrated in lateral regions; ventrally, scattered over entire ventrum or concentrated on cephalosome, bases of pleopods and pleotelson. Chromatophores never observed on pereopods or uropodal rami.

Etymology. — *Sphaeromopsis* + serratus + gubernum (i.e., toothed rudder, the uropodal exopodite).

Remarks. — The teeth on the external margin of the uropodal exopod of this species can be less pronounced than those shown in fig. 2a, h, and in some females the exopod can be markedly shorter than the uropodal endopod.

### **Sphaeromopsis reticulata** (Stebbing, 1910), comb. nov.

*Exosphaeroma reticulatum* Stebbing, 1910: 220, 221, 230, pl. 22(B); Nierstrasz, 1931: 194.

Material examined: El Hamira Beach, Gulf of Aqaba (Elat), Red Sea, 29°21′N 34°48′E: In sand at high tide level, coll. D. M. Dexter, 11 July 1979, 23 adult males, 18 sub-adult males, 14 ovigerous females, 4 non-ovigerous females, 9 immature specimens, 48 juveniles.

Râs Muhammad, Red Sea, 27°44′N 34°15′E: In sand at high tide level; coll. D. M. Dexter, 24 July 1979, 1 immature male, 1 ovigerous female, 1 juvenile.

Description of adult male (fig. 3a-e, g-k, m-r). — *Sphaeromopsis* with pleotelsonic apex extended and narrowly rounded in dorsal view; forming a narrow arch in posterior view.

Appendages: Eight-articled antennular flagellum sub-equal in length to peduncle, extending to level of pereonite 2. Antenna with eleven-articled flagellum extending to level of pereonite 3. Epistome with smoothly rounded, sub-triangular apex and short concave lateral margins. Mandibles with four teeth on each incisor edge, three teeth on lacinia mobilis, and palps well formed. Maxillule, maxilla and maxilliped as those of *S. serriguberna*, except that the inner lobe of the maxilla has an additional long, externo-distal spine. All pereopods bi-ungulate, each with accessory unguis simple; superior lobe of ischium with one long, stout seta; all meri and all carpi except that of pereopod 1 with long supero-distal setae; inferior margins of ischium, merus, carpus and propodus with mats of fine setae and scattered longer setae. Pereopod 1 more robust than those following; inferior margin of carpus with two stout, infero-distal setae. Pereopods increasing in length from 1 to 7. Supero-distal margin of carpus of pereopod 6 with one long stout, plumose spine and two long, simple spines. Distal region of carpus of pereopod 7 with a row of stout, plumose spines. Penes broad at base, tapering gradually to narrowly rounded apices

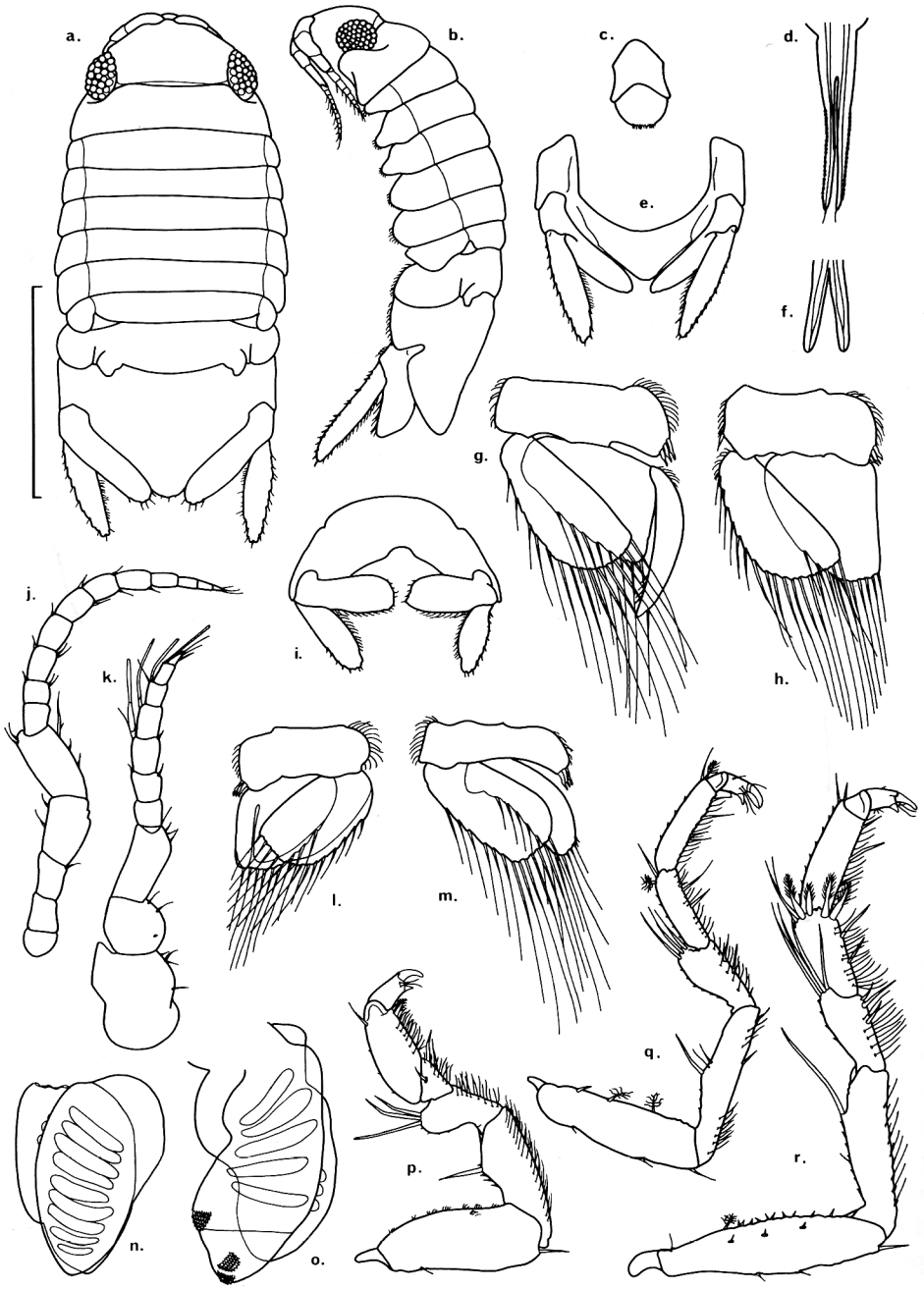


Fig. 3. *Sphaeromopsis reticulata* (Stebbing). a-e, g-k, m-r, adult male. a, dorsal; b, lateral; c, epistome and labrum; d, penes; e, pleotelson, ventral; g, pleopod 2; h, pleopod 3; i, pleotelson, posterior; j, antenna; k, antennule; m, pleopod 1; n, pleopod 4; o, pleopod 5; p, pereopod 1; q, pereopod 2; r, pereopod 7. f, l, sub-adult male. f, penes; l, pleopod 2. Scale line represents 1 mm.

with fine terminal extensions. Basis of pleopod 1 extended internally as a lobe, bearing three coupling hooks; endopod with external margin concave. Appendix masculina broad, sub-crescentic, 1.5 times length of endopod, tapering distally to acute apex. Exopod of pleopod 3 lacking a transverse articulation. Uropodal endopod extending well beyond pleotelsonic apex with externo-distal margin slightly crenulate; exopod extending just beyond endopod, externally crenulate except in proximal region, with an internal margin of short setae and several external setae.

Description of sub-adult male (fig. 3f, l). — Inferior margins of pereopods lacking mats of fine setae. Penes half length of those of adult, tapering slightly from bases to rounded apices and lacking terminal extensions. Appendix masculina not free; forming beneath cuticle of endopod; separate from ramal tissue except in extreme proximal region, and having sub-parallel margins and a broadly rounded apex.

Description of ovigerous female and non-ovigerous female. — Differs from adult male in sexual characters and in manner outlined in generic description. Non-ovigerous female similar to ovigerous female but lacks brood pouch.

Colour of specimens in alcohol. — Pale cream or golden, occasionally dark red-brown. Chromatophores almost absent, or: dorsally, small chromatophores scattered over entire surface, with some specimens having pronounced dark patches on lateral pleon and mid-anterior pereon; ventrally, chromatophores on cephalosome, coxal plates, bases of pleopods and lateral pleotelsonic margins. Chromatophores not observed on pereopods.

### **Sphaeromopsis mourei** (Loyola e Silva, 1960), comb. nov.

*Pseudosphaeroma mourei* Loyola e Silva, 1960: 138-149; Menzies & Glynn, 1968: 66; Holdich & Jones, 1973: 393.

Material examined. — Itapocoroi, Santa Catarina, Brazil: In *Sargassum* sp. 7 adult males, 5 ovigerous females, all paratypes.

Diagnosis of adult male paratype, 3.27 mm (fig. 1k-t). — *Sphaeromopsis* with apex of pleotelson extended, truncate in dorsal view, with a low, wide, arched apex in posterior view. Uropodal endopod not obviously crenulate; exopod sub-equal in length to endopod, slightly crenulate apically and externo-distally Penes narrow at base, widening, then tapering to styliform apices. External margin of endopod of pleopod 1 slightly concave. Appendix masculina dilated proximally; slender in distal half with narrowly rounded apex not reaching endopodal apex. Exopod of pleopod 3 bearing a transverse articulation.

Description of ovigerous female. — Differs from adult male in sexual characters and in manner outlined in generic description.

Colour of specimens in alcohol. — Pale cream or red-brown. Chromatophores almost absent, or: dorsally, small dark chromatophores over entire surface or restricted to lateral regions; ventrally, chromatophores on

cephalosome, coxal plates, bases of pleopods, pleotelson, and occasionally bases of pereopods.

## ECOLOGY

The ecology of *S. amathitis* has previously been described by Holdich & Jones (1973). It was found that these isopods appeared to prefer the more exposed beaches in the Watamu Marine Park (Kenya, 3°0′S 40°0′E) where the sand was moderately coarse, well oxygenated and water saturated. In areas of mud the sphaeromatids were absent. *S. amathitis* was found at all levels from MHWS to approximately MLWS, but maximum densities occurred around MLWN. The maximum number recorded was 18 per 25 $cm^2$ of sand surface. From examination of the gut contents it was suggested that *S. amathitis* is a herbivore, feeding on plant material originating from nearby *Cymodocea* beds. Cirolanid isopods inhabiting the same levels exhibited defined patterns of swimming activity but this was not found in the sphaeromatid isopods, although they were attracted to a surface light during night-time high tides.

The specimens of *S. mourei* collected by Loyola e Silva (1960) were from various beaches in Brazil, between latitudes 28°S and 4°S. In addition, samples were taken from a substratum of sandy mud, at a depth of 1 m, in a lagoon (Lagoa da Conceiçao, Santa Catarina) which receives occasional influxes of sea water. This species has also been taken from washings of *Sargassum* sp. in the intertidal zone.

Stebbing (1910) does not mention the habitat of *S. reticulata* but those found by Dr. Dexter were inhabitants of sandy beaches at El Hamira (Gulf of Aqaba/Elat) and Râs Muhammad on the southern tip of the Sinai Peninsula. They were found only at the high tide level — an unusual observation. The cirolanid isopod, *Eurydice arabica* Jones also occurred at this level on the two beaches mentioned although elsewhere it was also found at mid or low tide level. These are the only confirmed records for the northern hemisphere (27°30′N-29°30′N).

In Queensland, Australia a large number of samples of *S. serriguberna* were collected during 1976 between latitudes 15°S and 19°S. At Pallarenda, Townsville they were found associated with coarse and medium grained sand around the bases of wooden pier piles on the mid to lower shore with *Gnathia cornuta* Holdich & Harrison. They were also found associated with driftwood in a tidal river, where the salinity ranged from 0 to 40‰ and the water temperature from 19 to 35°C during the year. Only one specimen of *S. serriguberna* was recorded sublittorally, off Townsville, at 11 m on a particulate substratum. On the nearby Magnetic Island, *S. serriguberna* was found at a number of intertidal sites, sometimes with *Pseudolana concinna* (Hale). At Picnic Bay semipermanent logs near the upper part of the midshore and just above a zone of dead coral, yielded many different species of crustacean, including *S.*

*serriguberna, Gnathia falcipenis* Holdich & Harrison, *Cirolana cranchii* var. *australiense* Hale, and *Dynamenella* sp.(vide Harrison & Holdich). At Alma Bay many *S. serriguberna* were found associated with the fine sand around the bases of boulders. The isopods appeared to prefer well-washed sand on the mid to lower shore. In 500 $cm^3$ of such sand 600 individuals of a wide range of sizes, including ovigerous females were found. The isopods were present in the sand in both autumn and spring. By stamping on the wet sand at low tide the isopods could by induced to swim out into the surface water. They appeared some 15 to 20 seconds after the increase in pressure in a similar manner to psammobiotic cirolanids. Many of the locations where *S. serriguberna* was found are periodically subjected to low salinities. A number of laboratory experiments were carried out to assess the salinity tolerance of this isopod and it was found that it could survive freshwater for at least 6 hours and 50% seawater for at least 48 hours.

Further north in Queensland, *S. serriguberna* was found commonly in the Kurrimine area of the mainland, mainly in midshore sand on open beaches and at the mouths of estuaries. If stones, wood or lumps of dead coral occurred in the sand these were often covered in hundreds of *S. serriguberna* and smaller numbers of *Dynamenella* sp. (vide Harrison & Holdich) and an as yet unidentified species of *Sphaeroma. S. serriguberna* could also be seen moving in the sand at the edge of the flood tide and pieces of dead coral were readily 'colonised' by these individuals. In some localities they were found associated with stones subjected to a flow of freshwater during the low tide period.

On Lizard Island, *S. serriguberna* was found in intertidal coral sand with *Dynamenella* sp. and cirolanid isopods. They were also found in beach rock crevices at low tide with two new species of *Dynamenella* (vide Harrison & Holdich), in lower shore drift wood, washing from reef flat algae, and in coral sand from below the water of the reef flat. Baited traps were put on the reef flat at night to catch cirolanids and occasionally *S. serriguberna* was caught in these.

It would appear from the observations made that *S. serriguberna* is mainly an inhabitant of clean, well oxygenated sand on the mid to lower shore. Unlike *S. amathitis* it probably becomes active at high tide — hence its occurrence sublittorally, in traps, on reef algae, and its tendency to swim when pressure is applied to the sand. When solid objects are put into its habitat it will readily invade them. It is able to survive immersion in freshwater and this assists it to colonise a wide variety of sandy habitats. *S. mourei* has been recorded from low salinity water but also appears able to inhabitat sandy mud. As with *S. amathitis*, *S. serriguberna* is probably herbivorous, feeding on plant material and micro-organisms in the sand and on the surface of solid objects. *Sphaeromopsis* would appear to undertake the whole of its life-history within the sand habitat and its occurrence in other cryptic habitats is probably accidental, i.e. due to stranding as the tide ebbs.

## DISCUSSION

*Sphaeromopsis mourei* differs from the other known species in this genus in having an articulation on the exopod of pleopod 3. Following Hansen (1905) many authors have considered the presence or absence of this articulation among eubranchiate sphaeromatids to be at least a generic characteristic. A recent study by the present authors, however, has shown that in the eubranchiate genus *Dynamenella* Hansen this character would appear to be of limited importance (Harrison & Holdich, 1981). As in *Sphaeromopsis*, some species of *Dynamenella* possess an articulation while others do not, the species not differing markedly in any other major respects and apparently belonging to the same genus. It would appear that this character can no longer be considered suitable for separating groups of genera, and must be judged, at most, a specific character.

Holdich & Jones (1973: 393) did not place *Pseudosphaeroma mourei* in *Sphaeromopsis* because it had an articulation on the exopod of pleopod 3, and because the rami of pleopods 4 and 5 "lacked definite respiratory folds". In common with some other eubranchiate and hemibranchiate sphaeromatids, when the posterior pleopods of *S. mourei* are mounted as a permanent microslide preparation, the respiratory folds become inobvious. When the pleopods are observed unmounted using reflected light, the folds can clearly be seen on both rami of pleopods 4 and 5. It is to be recommended when examining sphaeromatids that the posterior pleopods be examined before mounting, to ascertain their general structure.

The generic status of three other New World species, currently housed in the hemibranchiate genus *Exosphaeroma*, warrants further investigation. These are *Exosphaeroma diminutum* Menzies & Frankenberg, 1966, *E. alba* Menzies & Glynn, 1968 and *E. productatelson* Menzies & Glynn, 1968. *E. diminutum* was found in intertidal sand on the coast of Georgia, U.S.A. The other two species were found intertidally in a variety of habitats, and just sublittorally in Puerto Rico. From the published descriptions these appear to resemble species of *Sphaeromopsis*. Indeed, Menzies & Glynn (1968) stated that *E. alba* and *E. productatelson* were not species of *Exosphaeroma*, although they did not go as far as to found a new genus.

Although few species of *Sphaeromopsis* are currently known, it is noteworthy that specimens have only been found along east facing coasts in tropical and sub-tropical regions. The genus *Sphaeromopsis* appears to be closely related to the genus *Dynamenella* Hansen. Females of these genera can be difficult to separate, especially if the female *Dynamenella* has a pleotelsonic apex showing only a weak indentation. That these genera show identical brood pouch structures also suggests close relationship. It may be of significance that species of *Dynamenella* have also been found in sandy, intertidal habitats, and in Australia, at least, have been found in the same samples as specimens of *Sphaeromopsis* (vide Harrison & Holdich in press).

Above species level within the Sphaeromatidae, the morphology of males varies considerably and provides most of the generic characters. Females vary less markedly and on occasion it may be virtually impossible to refer females to a particular genus, the females of several genera appearing almost identical (Hansen, 1905: 119). When investigating sphaeromatid systematics, the similarity of females of different genera, especially with respect to the brood pouch, would appear to be a useful indication of generic relationships.

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RÉSUMÉ

Une nouvelle espèce de *Sphaeromopsis* Holdich & Jones (Isopoda, Sphaeromatidae) est décrite du Queensland, Australie. C'est la première fois qu'une espèce de ce genre est signalé de l'Australie. Des données écologiques sont également fournies. D'autres espèces du genre sont décrites du Brésil et de la mer Rouge.

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