



## On some miscellaneous sea cucumbers (Echinodermata: Holothuroidea) in the collections of the South African Museum with three new species

AHMED S. THANDAR

School of Life Sciences, University of KwaZulu-Natal, Westville Campus, Private Bag X54001, Durban 4000

E-mail: [thandara@ukzn.ac.za](mailto:thandara@ukzn.ac.za)

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### Abstract

A miscellaneous collection of mostly small holothuroids, comprising some 140 specimens, received from the Iziko South African Museum (SAM), are here recorded and/or briefly described. Of these, one jar contained a badly mutilated holothuroid which was unidentifiable and hence not included here. The remaining material comprises 18 nominal species and an

indeterminate elasipodid, perhaps representing a species of *Benthodytes*. Of the 18 nominal species, four are new to science, one of which has already been described as *Trachythyone flaccida* Thandar, 2013. Another, although represented by a single mature specimen from deep-water off the Transkei coast (Eastern Cape Province), is so different from its congeners that it is also described as a new species, *Stereoderma mohammedi* n. sp. Two other specimens, although juvenile, are so extraordinary in their composition of ossicles, that they are also taken to represent another new species, *Temparena trouspetita* n. sp. The collection also includes a single specimen of *Synallactes*, which together with a specimen misidentified as *S. viridilimus* by Thandar (2008), is also described as a new species, *S. quatrami* n. sp. The remaining species proved to be either new records for the southern African region or already well-known southern African forms whose distribution ranges have now changed.

**Key words:** Dendrochirotida, Cucumariidae, Colochirinae, Cucumariinae, Thyonidae, Sclerothyonidae, Cucumellidae, Vaneyellidae, Psolidae, Synallactidae

## Introduction

Several years ago the writer received a miscellaneous collection of mostly minute sea cucumbers from Ms Liz Hoenson, formerly of the Iziko South African Museum, for identifications and recording. The collection contained 34 lots of mixed materials representing some 140 specimens. Of these, one jar contained a badly mutilated elasipodid which is unidentifiable and hence not included here. The remaining material, although not very rich in terms of the number of specimens, proved to represent four new species and some already known forms. Of the four new species one has already been described as *Trachythyone flaccida* Thandar, 2013. Another, although represented by a single mature specimen from deep-water off the Transkei coast, is so different from its congeners, that it is also described as a new species, *Stereoderma mohammedi* n. sp. Of the remaining new species, one is represented by two juvenile specimens, collected from off Scottburgh coast in KwaZulu-Natal. However, it has so extraordinary ossicle composition, that I feel obliged to give it a name, *Temparena trouspetita* n. sp., but its true generic disposition can only be ascertained once adult specimens come to light. The remaining new species, represented by a single large specimen is identified as belonging to the genus *Synallactes*, It is here described as *S. quatrami* n. sp., with *S. viridilimus* (Thandar, 2008 *partim, non* Cherbonnier, 1952) as its synonym. Of the remaining species *Pseudostichopus mollis* Théel, 1886, is a new record for the southern African region, while 7 species are already known southern African forms, but show a considerable extension of range eastwards. These include *Ocnus rowei* Thandar, 2008; *Thyone hirta* Cherbonnier, 1970; *Temparena chuni* (Ludwig & Heding, 1935); *Cucumella triplex* Ludwig & Heding, 1935; *Echinocucumis hispida* (Barrett, 1856); *Psolidium acorbulum* Thandar, 2006, and *Psolus imperfectus* Clark, 1923. All species are here systematically treated.

## Systematic account

### Order Dendrochirotida Grube, 1840

### Family Cucumariidae Ludwig, 1894

### Subfamily Colochirinae Panning, 1949

### *Hemiocnus insolens* (Théel, 1886)

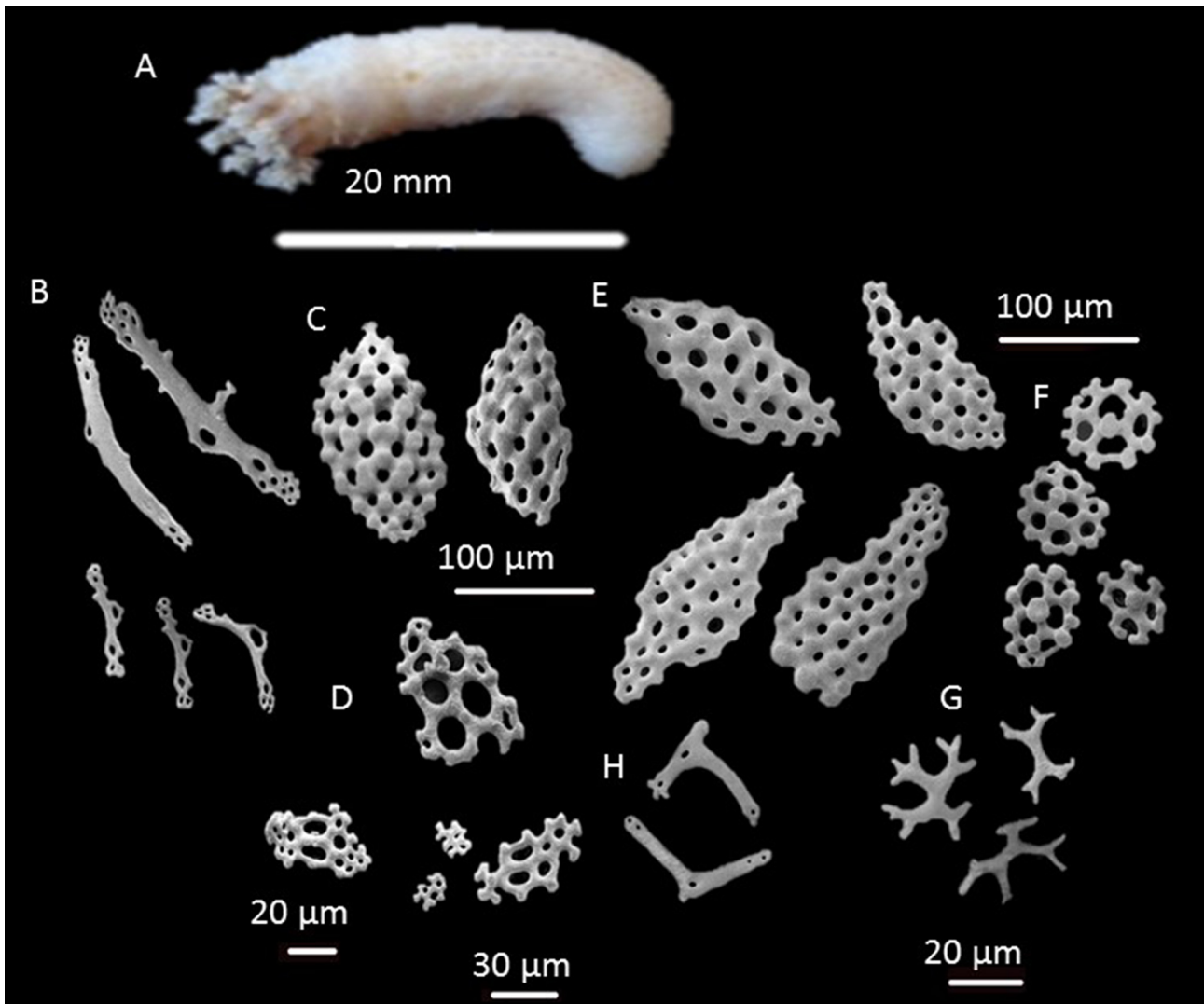
(Figure 1)

*Cucumaria insolens* Théel, 1886: 70, pl. 4, fig. 5; Cherbonnier, 1952: 480, pl. 39, figs. 1–23.

*Pseudocnella insolens* Thandar, 1987:289, figs. 1a, 2, 5a–c; 1991: 129, fig. 1D; 1992 (synonymy before 1992); 2008:22; Thandar & Rambaran 2015:58, fig. 10.

*Hemiocnus insolens* Mjobo & Thandar 2016:157.

**Diagnosis** (see Théel 1886, Cherbonnier 1952).



**FIGURE 1.** *Hemiocnus insolens* (Théel, 1886). AFR-SAMC-A090907. A. Specimen (entire); B. Rods from tentacles; C. Anal surface ossicles; D. Introvert ossicles; E. Plates from body wall; F. Buttons from body wall; G. Baskets from body wall; H. Rods from body wall.

**Material examined.** A23068-0821054, AFR-SAMC-A090907, South Coast Demersal Trawl, 89 m, 12 IV 2004, 34° 04', 23° 51', 60 spec; SAM-A090908, AFR-A24725-0933455, South Coast Demersal Trawl, 100 m, 34° 41.7', 22° 9.17', 28 IV 2005, 12 spec; SAMC-A090909, AFR-7147-063-036, Port Elizabeth, Algoa Bay, 38 m, 18 V 1988, 2 spec; SAMC-A090910, Kalk Bay, VII 1912, K. H. Barnard, 1 spec.

**Distribution** (after Thandar 2008) Luderitz (Namibia) to Port Elizabeth, 0–110 m.

**Remarks.** This well-known southern African south and west coast species was transferred from the genus *Pseudocnella* Thandar, 1987 to *Hemiocnus* by Mjobo & Thandar (2016), erected to accommodate the type species *Pseudocnella syracusanus* (Grube 1840) from the Mediterranean and a new Mediterranean species, *H. rubrobrunneus* from Tunisia. Some pertinent features of *H. insolens* were discussed by Thandar (2008), who commented on several morphs separated by Natasen Moodley (2000) on the basis of anal ossicles. These morphs have yet to be confirmed by gene sequencing as the species appears to be highly polymorphous with several colour morphs which defy separation by morphology alone.

### ***Trachasina crucifera* (Semper, 1869)**

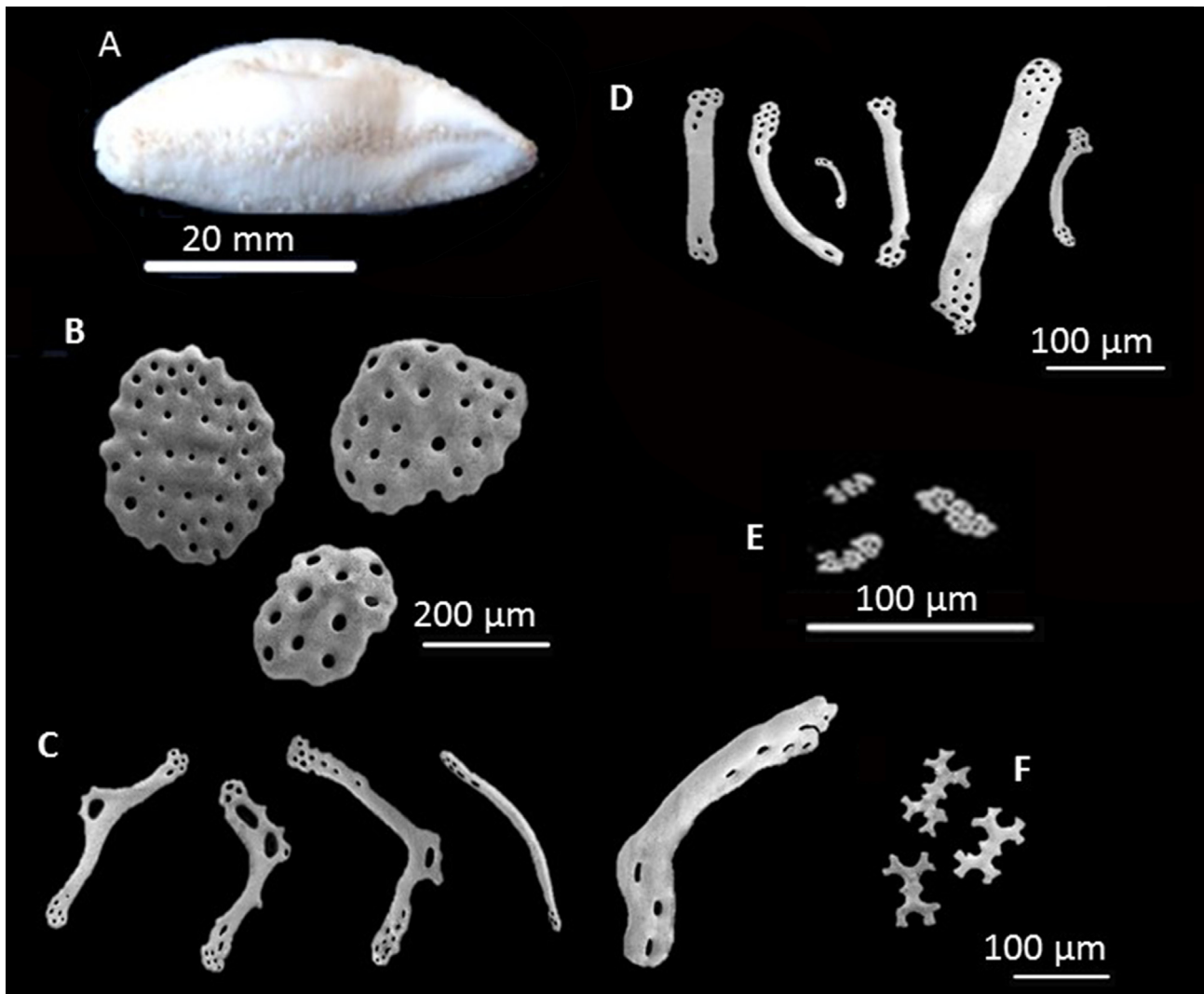
(Figure 2)

*Cucumaria crucifera* Semper, 1869:121, fig. 1.

*Trachythyone crucifera* Panning, 1949:427, fig. 15; Thandar, 1991:131, figs. 10a & 15a (synonymy).

?*Trachythyone crucifera* Panning, 1964:170, fig. 9.

*Trachasina crucifera* Thandar & Natsen Moodley, 2003:284; Thandar, 2006:26, fig. 8!; Deepa & Biju Kumar, 2011:102, figs. 3 & 4.



**FIGURE 2.** *Trachasina crucifera* (Semper, 1869). SAMC-A090911. A. Specimen (entire); B. Body wall plates; C. Rods from tube feet; D. Rods from tentacles; E. Rosettes from tentacles; F. Crosses from tube feet.

**Diagnosis** (see Semper 1868, Panning 1949).

**Material examined.** SAMC-A090911, Saco da Inhaca, 19.II.56, 1 spec.

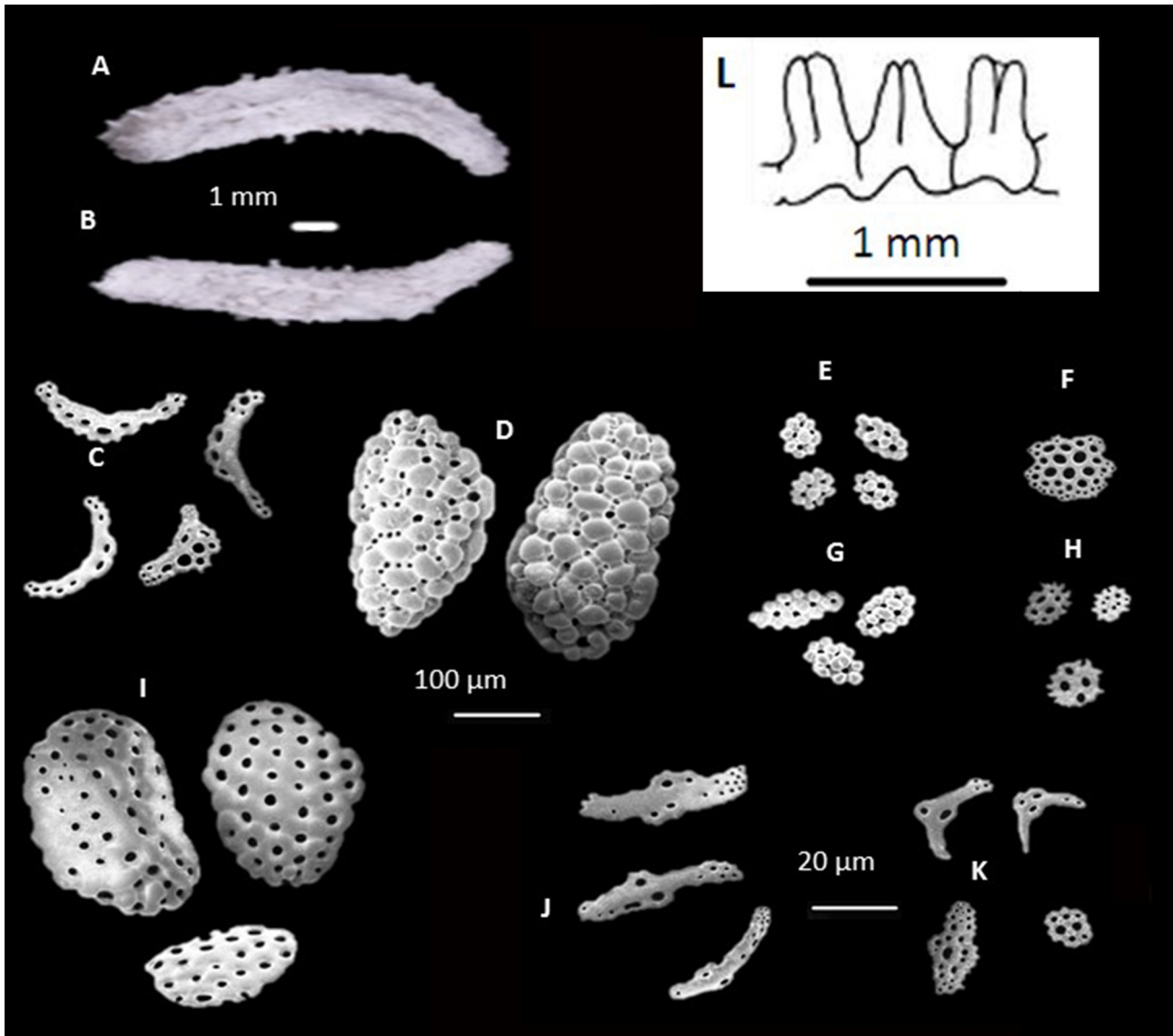
**Distribution.** Typically West Indian Ocean, but also reported from the Bay of Bengal. In southern Africa this species occurs as far south as Scottburgh in KwaZulu-Natal.

**Remarks.** This is a well-known West Indian Ocean species recently re-recorded from India by Deepa & Biju Kumar (2011). Thandar (1991, 2006) reported rosettes from the introvert but the current specimen shows an absence of ossicles in the introvert. It is possible that the rosettes could have come from the tentacles since such ossicles, together with rods, occur abundantly in the tentacles. Deepa & Biju Kumar (2011) do not comment on the introvert ossicles. Crosses were found throughout the body wall, including the tube feet; end-plates are present.

### ***Ocnus rowei* Thandar, 2008**

(Figure 3)

*Ocnus rowei* Thandar, 2008:19–22, fig. 8.



**FIGURE 3.** *Ocnus rowei* Thandar, 2008. SAMC-A090912. A. Specimen (entire) dorsal; B. Specimen (entire) ventral; C. Rods from tube feet; D. Large knobbed plates from body wall; E. Buttons from body wall; F. Tube feet end-plate; G. Small knobbed buttons from body wall; H. Baskets from body wall; I. Large smooth plates from body wall; J–K. Tentacle ossicles. (C–I same scale; J–K same scale).

**Diagnosis** (see Thandar 2008).

**Material examined** SAMC-A090912, SM185, off Port Alfred, 33°39.03' S, 27°11.06' E, heavy dredge, 90 m, 31.V.1978, 1 spec.

**Description.** Specimen small, slightly U-shaped. Mouth and anus directed upwards (Figure 3A & B). Form sub-cylindrical, dorsal surface arched, ventral surface flattened, sole-like. Length about 12 mm along ventral surface; mid-body width about 2.8 mm, much broader anteriorly and narrower posteriorly. Colour off-white in alcohol. Tentacles retracted, eight large and of unequal length; ventral two hardly discernible. Anal teeth and/or special anal papillae absent. Tube feet in ambulacra, in single zig-zag rows situated on longitudinal ridges (indicating position of longitudinal muscles, both dorsally and ventrally), decreasing in size in both directions. Ventral tube feet also in single rows, with most of the anterior ones of the mid-ventral ambulacrum extending from about quarter body length from anterior end to about quarter body length from posterior end. Most tube feet non-retractile but better developed dorsally, all supported by well-developed end-plates; 1 or 2 tube feet also in interambulacra. Large, non-imbricating, knobbed plates clearly visible especially ventrally, situated more or less

equidistant from each other. Calcareous ring as in holotype (Figure 3L; see also Thandar 2008). Polian vesicle single, ventral, saccular. Gonad immature. Body wall ossicles characteristically of three types: minute rugose baskets (Figure 3H); mostly four-holed buttons, some with large, some with small knobs, or a mixture of two (Figure 3E & G); and large multilocular knobbed and smooth plates/scales (Figure 3D & I). Tube feet ossicles include simple, curved, perforated rods with a varying number of holes (Figure 3C) and small end-plates (Figure 3F). Tentacle and introvert ossicles as in holotype, the former comprising knobbed plates/buttons, smooth perforated plates, and small to large perforated rods (Figure 3J & K); the latter (introvert) comprising buttons/plates and rods similar to those of tentacles, but fewer.

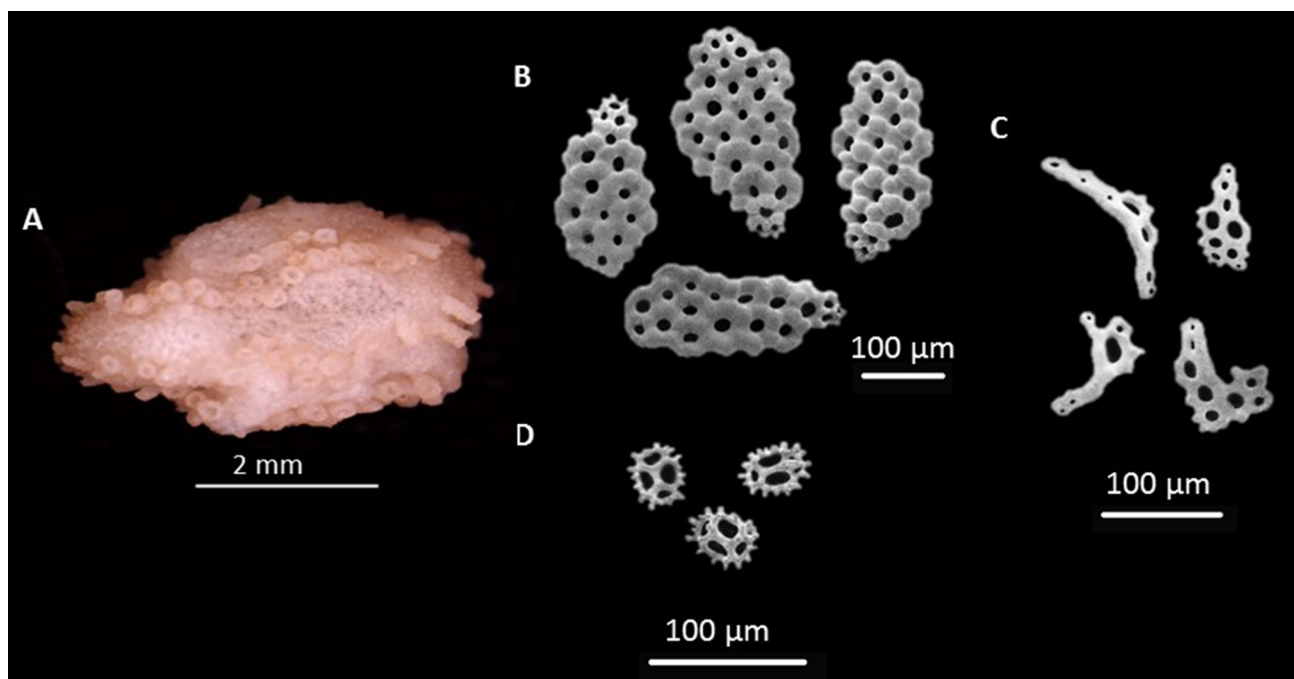
**Distribution.** From False Bay, South Africa, as far east as Port Alfred in Eastern Cape Province, 42–90 m.

**Remarks.** This obviously juvenile specimen corresponds well with the description of the holotype by Thandar (2008), who compared it with the well-known *Pentacta doliolum* (Pallas, 1766) which it strongly resembles but differs in the unequal size of the tentacles (the mid-ventral two being reduced), softer body wall and usually non-retractile tube feet. Its placement in *Ocnus* is questionable as Rowe (in Rowe & Gates, 1995) implied restriction of the genus to include only the Mediterranean and the North-West African forms.

**?*Plesiocolochirus* sp.**

(Figure 4)

**Material examined.** SAMC-A090912, SM185, off Port Alfred, 33°39.03' S, 27°11.06' E, heavy dredge, 90 m, 31 V 1978, 1 spec.



**FIGURE 4.** *Plesiocolochirus* sp. SAMC-A090912. A. Specimen (entire); B. Plates from body wall; C. Rods from tube feet; D. Baskets from body wall.

**Description.** Specimen minute, brittle due to previous drying. Form truncate, anteriorly broad, posteriorly slightly tapered. Length about 5 mm, width in mid-body about 2.5 mm. Colour in alcohol light pinkish to off white. Tube feet in double rows, decreasing anteriorly and posteriorly, suckers well developed, interambulacra naked. Because of brittle nature of the specimen, number and form of tentacles not examined. Skin thin. Calcareous ring not well calcified perhaps because of juvenility of specimen. Body wall ossicles a superficial layer of baskets and large, knobbed, single-layered perforated plates. Baskets deep, cup-like with cross-shaped base perforated by 4–5 holes and neat, spinous rim, spines short, evenly spaced but varying in size, shorter ones more numerous; length of baskets about 30 µm. Plates elongate, single-layered, knobbed with one end slightly



thin and denticulate; holes minute up to 30 or more; length of plates about 300  $\mu\text{m}$ . Tube feet deposits smooth, perforated rods of a variety of form and uneven margins, up to 150  $\mu\text{m}$ .

**Remarks.** The specific identity of this single, obviously juvenile specimen could not be determined with any degree of certainty; even its generic position is uncertain. It may represent a juvenile of *Plesiocolochirus dispar* (Lampert), an east coast form but the lack of any multi-layered plates and buttons in the body wall prevents such a conclusion.

## Subfamily Cucumariinae Ludwig, 1894

### Genus *Echinocucumis* Sars, 1859

#### *Echinocucumis hispida* (Barrett, 1856)

(Figure 5)

*Eupyrgus hispida* Barrett, 1856: 46, pl. 4, figs a–b.

*Echinocucumis typica* Sars, 1861: 102, pl. 10, figs. 11–20, pl. 11, figs. 1–17; Théel, 1886: 9, fig. 3;

*Cucumaria typica* Ludwig, 1901: 149.

*non Echinocucumis typica* Clark, 1923: 418 (= *Ypsilothuria bitentaculata*).

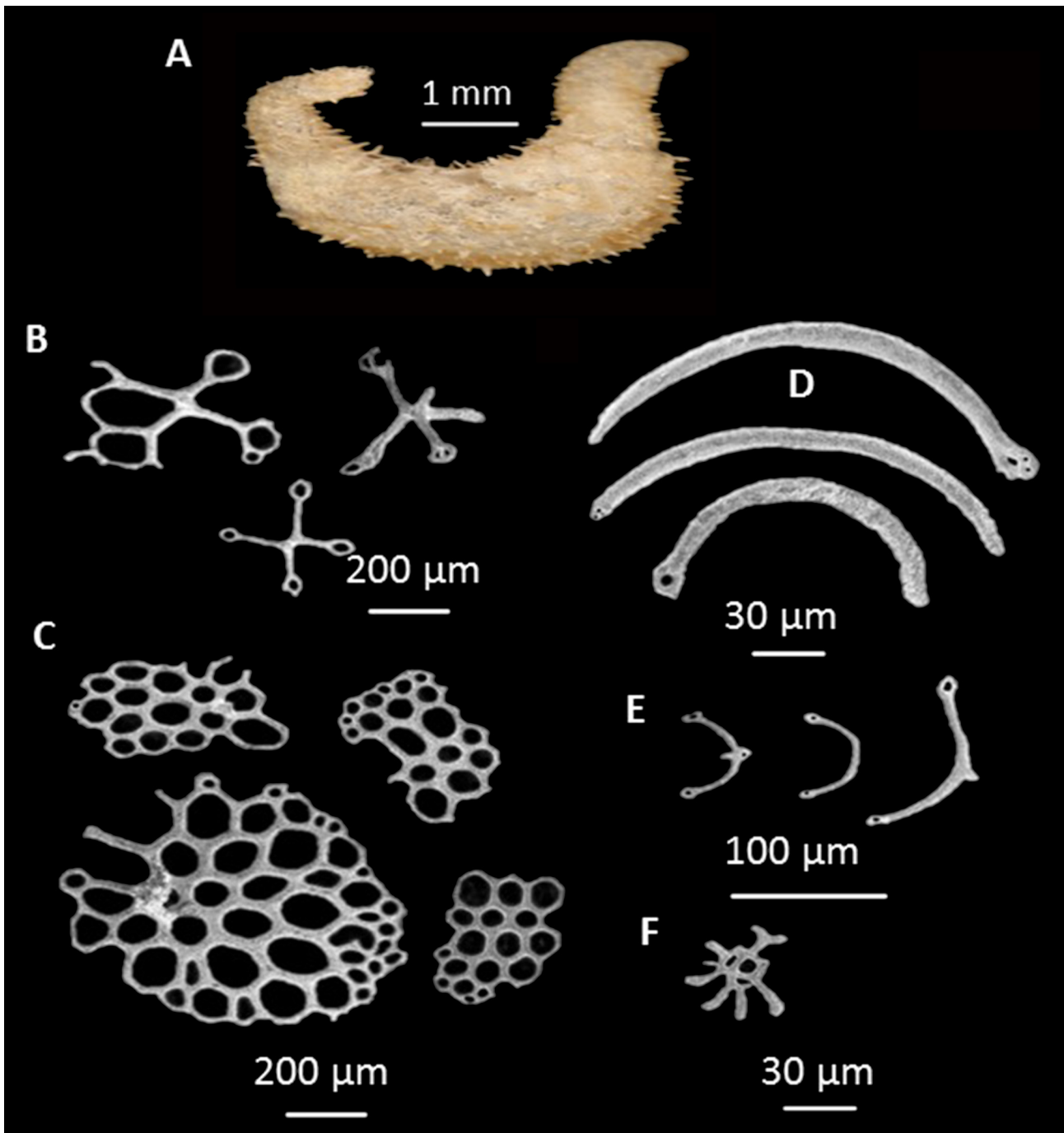
*Echinocucumis hispida* Deichmann, 1930: 150, pl. 18 (fig. 9); Ludwig & Heding, 1935: 167; Panning, 1949: 454; Pawson, 1965: 8, fig. 2; Hansen, 1988: 306, fig. 5; Madsen & Hansen, 1994: 67, fig. 38 (transposed in original paper); Thandar, 1999: 370, figs. 2, 14 A–C.

**Diagnosis** (see Pawson 1965; Thandar, 1999).

**Material examined.** MB-A090925, SM246, off Transkei, south of Port St. Johns, 31° 58.06' S, 29° 35.06' E, biological dredge, 1640–1660 m, 27.VI.1979, 1 spec.

**Description.** Specimen small (juvenile), strongly U-shaped and attenuated at both ends, with oral end lying slightly above level of anal end (Figure 14A). Body wall thin, brittle, now fragmented into two parts. Length along ventral surface about 15 mm, width in mid-body just over 1 mm. Colour greyish-white to off-white. Tube feet in single/double rows (Figure 14A), double rows mid-ventrally and single rows elsewhere; often difficult to distinguish between spires of thecal plates, however, latter are shorter, brittle and stand erect from body wall. Tentacles retracted, anus apparently surrounded by minute papillae. Calcareous ring low as introvert considerably elongated, simple and delicate, composed of separate, asymmetrical, radial and interradial plates, easily separated, number difficult to distinguish because of size and extreme brittleness of specimen. Radial plates bifid anteriorly, slightly concave posteriorly; interradial plates slightly broader and shorter, with a triangular tip. Tentacles dendritic, 8 in number with 6 large, of unequal length and 2 much reduced. Polian vesicle single, elongated, tube like. Madreporite not detected. Oesophagus elongated, main part of alimentary canal confined to mid-body. Cloaca much elongated, more than length of oesophagus. Specimen extremely young, therefore gonad absent. Respiratory trees poorly branched. Thecal plates of body wall large (Figure 14C), smooth, irregular, multilocular, spired, with large holes; spire vertical, eccentric, high. Body wall ossicles also include spatulated crosses with perforated or non-perforated arms and an eccentric spire similar to that of thecal plates (Figure 14B); crosses perhaps represent developmental stages of plates. Tube feet ossicles as curved rods with terminal holes and sometimes also a medial spinous projection (Figure 14E) and developing end-plates (Figure 14F). Tentacle ossicles as smooth curved rods with or without terminal holes (Figure 14D).

**Distribution.** Cosmopolitan, 50–3257 m.



**FIGURE 5.** *Echinocucumis hispida* (Barrett, 1856). MB-A090925. A. Specimen (juvenile); B. Spatulated crosses (with or without apophyses) of body wall; C. Plates of body wall (some spired); D. Tentacle rods; E. Tube feet rods; F. Developing end-plate from tube feet.

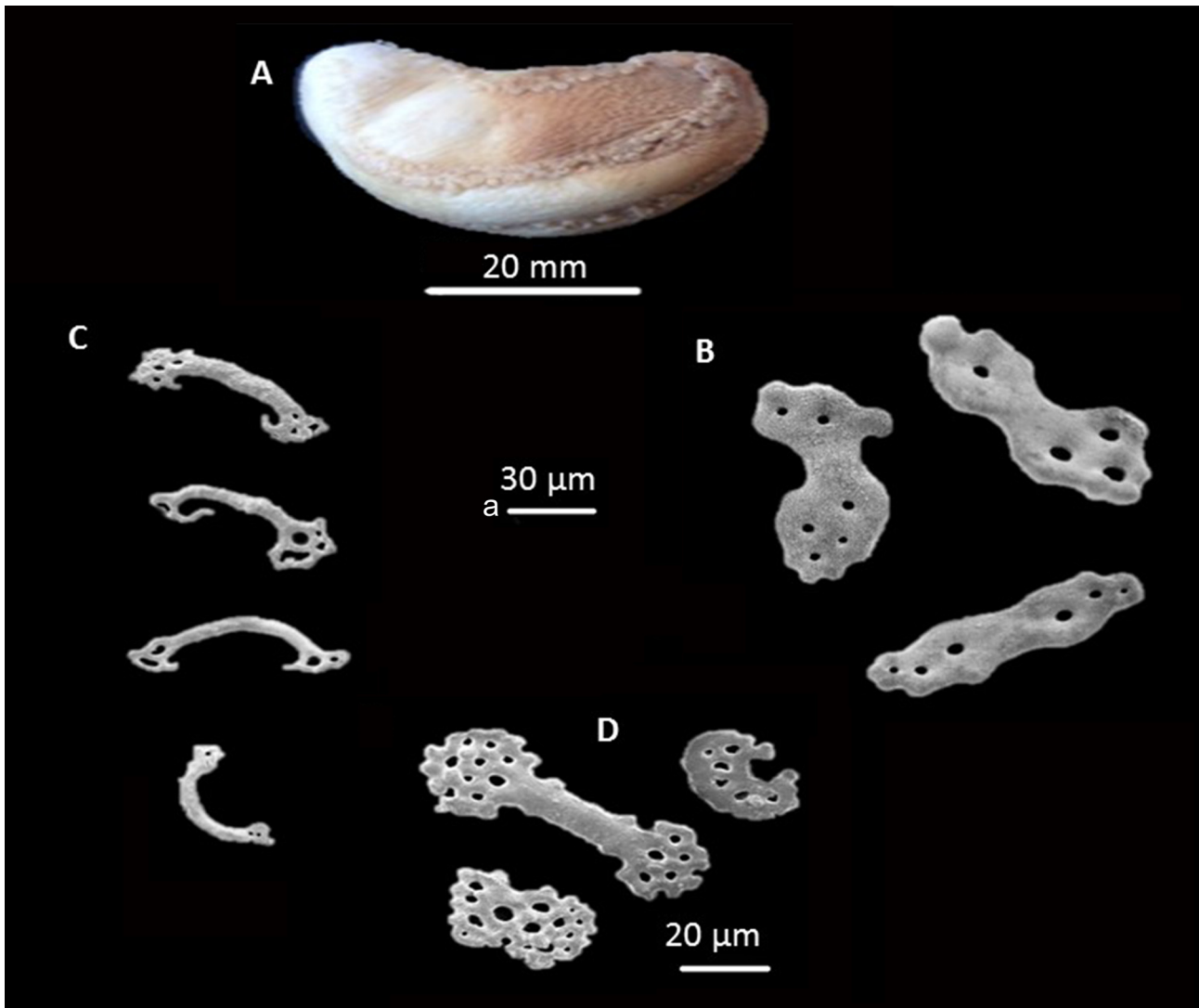
**Remarks.** The specimen at hand is a juvenile of *Echinocucumis hispida*, characterised by simple plates with eccentric spire and spatulated crosses, also with eccentric spire (apophysis). The juvenile of this species are well described by Hansen (1988) and Madsen & Hansen (1994). It was Madsen who stated that *Echinocucumis* is similar to the Cucumariidae genera *Staurocucumis* and *Psolicucumis*, perhaps implying that it should be classified within the Cucumariinae. In fact, Smirnov (2012) recently included *Echinocucumis* in the Cucumariidae and not in its former family Ypsilothuriidae, the latter he restricted to only two genera, *Ypsilothuria* and *Ypsilocucumis*. Regrettably, the legends to the illustrations given by Madsen & Hansen (1994) were inadvertently interchanged. The legend to their Figure 38, which illustrated the ossicles of a 14 mm juvenile, was attached to their Figure 43,



which represented the ossicles of *Psolus squamatus*. There were also other transpositions not pertinent here but require corrections. The ossicles of the current juvenile closely match those illustrated by Hansen (1988) and Madsen & Hansen (1994). Thandar (1999) described this species from the south-western part of the Western Cape Province at 2525–3257 m, based on 15 adults and some fragments. It is here noted that there is considerable transformation of the juvenile ossicles of this species with age/growth.

***Roweia frauenfeldi* (Ludwig, 1882)**

(Figure 6)



**FIGURE 6.** *Roweia frauenfeldi* (Ludwig 1882). SAMC-A090913. A. Specimen (entire); B. Body wall ossicles; C. Rods from tube feet; D. Tentacle ossicles. (B & C scale a).

*Cucumaria frauenfeldi* Ludwig, 1882: 130; Cherbonnier, 1952:477, pl. 37 figs. 1–14; Clark & Rowe, 1971: 192.

*Cucumaria posthuma* Lampert, 1885: 248.

*Cucumaria deichmanni* Cherbonnier, 1952: 478.

*Roweia frauenfeldi frauenfeldi* Thandar, 1985: 110, figs. 1–2; 1991: 137, figs. 2d, e, 15e, f; 1991: 137, figs. 2d, e & 15e, f (synonymy).

**Diagnosis** (See Thandar 1985)

**Material examined.** SAMC-A090913, Port Alfred, J. Hewitt, 18.III.1934, 5 spec.

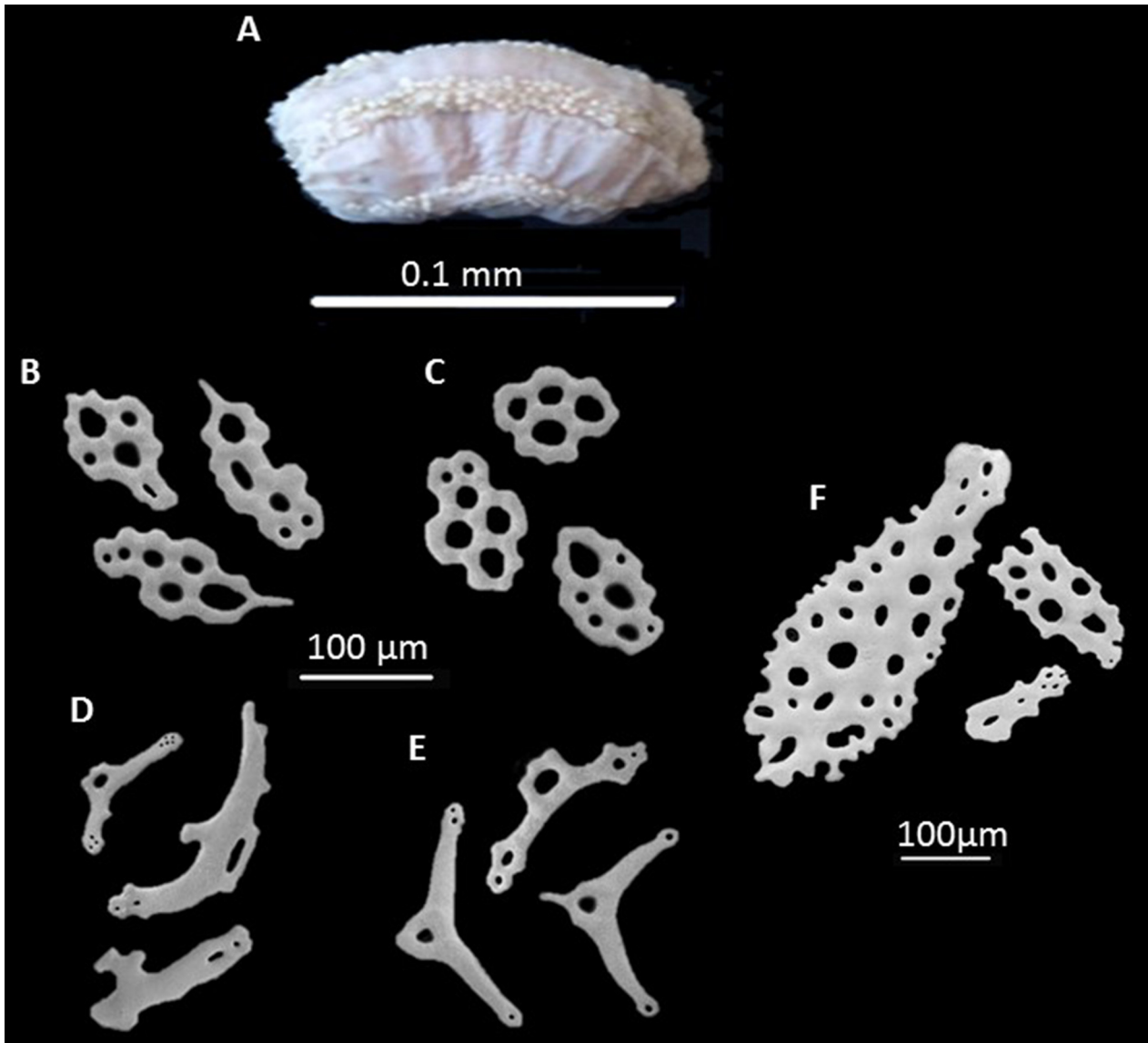
**Distribution.** Southern Angola to East London, intertidal.

**Remarks.** This is another well-known southern African shallow-water species. Thandar (1985) separated the temperate form *R. frauenfeldi frauenfeldi* (Ludwig) from the sub-tropical form *R. frauenfeldi webbi* Thandar. However, due to the absence of slender rods in the body wall and the presence of rosettes in the anal region of *R. frauenfeldi webbi* the writer is now of the opinion that both subspecies should be elevated to full species.

***Pseudocnus thandari* Natasen Moodley, 2008**

(Figure 7)

*Pseudocnus thandari* Natasen Moodley, 2008: 6164, figs. 1–2; Thandar, Zettler & Arumugam, 2010: 18.



**FIGURE 7.** *Pseudocnus thandari* Natasen Moodley, 2008. SAM-A22743-188060-1089. A. Specimen (entire); B. Handled plates from body wall; C. Handle-less plates from body wall; D. Rods from tentacle; E. Rods from tube feet ; F. Introvert plates.

**Diagnosis** (see Natasen Moodley 2008).

**Material examined.** AFR-A22743-188060-1089, SAM-A22743-188060-1089, West Coast Demersal Trawl, 24 m, , 20.I.2004, 3 spec.; SAM-A3901, off Namibian-Angolan border, 129–131 m, 11 spec

**Distribution.** West coast of South Africa to northern Namibia, 18–131 m.

**Remarks.** This species, although relatively recently described, appears to be well established in the cold waters of the west coast of southern Africa, extending from St. Helena Bay, northwards to the Namibian-Angolan border. It is well characterised by the presence in the body wall of plates, often with a smooth, elongated, spine-like process.

***Stereoderma mohammedi* n. sp.**

(Figure 8)

**Material examined.** Holotype: SAMC-A090915, SM232, off coast of Transkei, south of Port St. Johns, 32° 10.9' S, 29°10.4' E, heavy dredge, 560–620 m, 26.VI.1979, 1 spec.

**Diagnosis.** Holotype minute, U-shaped, length along ventrum 15 mm. Tentacles 10, of more or less equal size, not dendritic but with few sparse branches. Anal teeth present. Tube feet short, scattered. Calcareous ring simple. Stone canal short; Polian vesicles two. Respiratory trees elongate, unbranched. Body wall ossicles as simple, smooth or slightly knobbed imbricating, multilocular plates of a variety of shapes, those of ventral surface slightly elongate; nodules, when present, mostly minute, holes 7–16 in number, some plates polygonal. Tube feet rods curved, with characteristic short marginal projections; end-plates present. Tentacles with minute, smooth to slightly nodular, perforated plates.

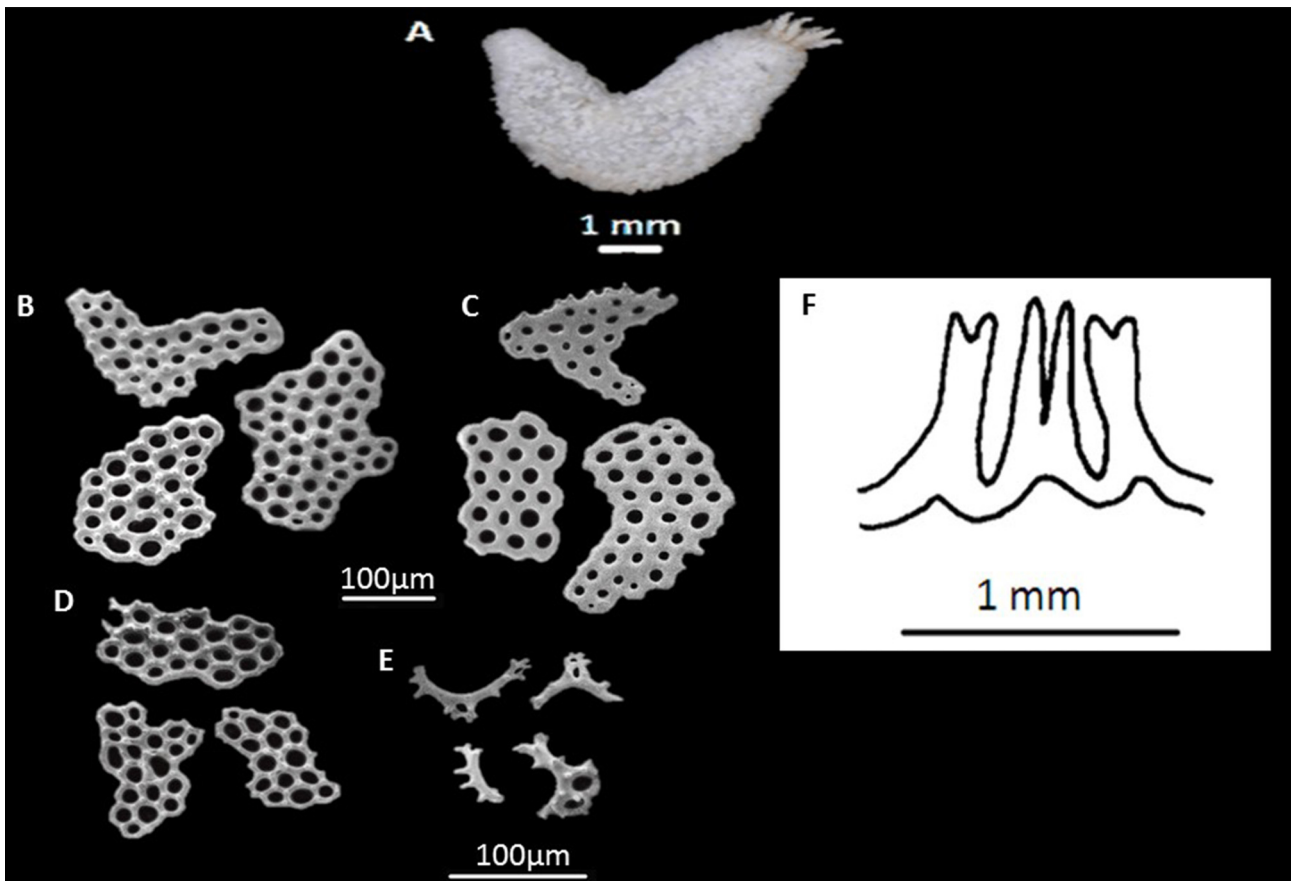
**Etymology.** This species is named after my son, Mohammed, in appreciation of him providing us with a very comfortable retirement home in our twilight years.

**Description.** Holotype minute, U-shaped, oral and anal ends sharply turned up, mouth slightly above level of anus (Figure 7A). Length along ventrum 15 mm, breadth in mid-body about 2 mm. Tentacles 10 of more or less equal size, mid-ventral two only slightly reduced; tentacles not at all tree-like or dendritic, branches few and short (Figure 7A). Anal teeth present, minute. Tube feet short, scattered but more prominent in the ambulacra. Colour in alcohol white, including tube feet and tentacles. Calcareous ring simple, well developed (Figure 7F); radial and interradial plates meeting at base, both of equal length, bifurcating anteriorly, notched posteriorly. Stone canal short, lying just behind the mid-dorsal interradial plate; madreporite well calcified but amorphous. Polian vesicles two, sac-like. Respiratory trees paired, unbranched, appearing as elongated tubes arising independently from cloaca, right one longer than left, both slightly curved distally. Gonad as paired tufts of short unbranched tubules, full of developing eggs, each tuft comprising about half a dozen tubules, younger tubules attached more posteriorly. Longitudinal muscles unpaired, filamentous. Retractor muscles arise from longitudinal bands at about mid-body, more anteriorly in ventral ambulacra. Body wall ossicles comprise simple, smooth or knobbed imbricating, multilocular plates of a variety of form (Figure 7B–D), 140–250 µm, those of ventral surface slightly elongated; nodules, when present, mostly minute, found both around margin and surface of plates (Figure 7B), rarely only on surface, of two different sizes, plates with large nodules rare; holes 7–16. Some plates smooth (Figure 7C), some polygonal (Figure 7D). Tube feet with very characteristic, strongly curved, smooth to minutely knobbed rods with short projections on curved surface, sometimes also with one or two medial holes (Figure 7E). End-plates present, up to 100 µm, with a varying number of holes with no regular arrangement. Tentacles with minute perforated plates, up to 100 µm, either smooth or slightly nodular.

**Distribution.** Known only from type locality.

**Remarks.** The specimen at hand is clearly referable to *Stereoderma*, in his *kirchsbergi* group, as characterised by Panning (1949), because of the presence of thick, knobbed, imbricating plates. Panning included several species in this group as opposed to his *unisemita* group where the plates were said to be non-imbricating. At that time *Stereoderma* represented a hodgepodge collection of largely unrelated forms. Panning (1964) himself suspected this and thought that the genus was perhaps mono-typed by its type species, *Stereoderma unisemita* (Stimpson, 1851) and only a couple more species could be referred to it. Since then many of the species originally contained in *Stereoderma*, were transferred to other genera by various workers. Within the existing species in *Stereoderma* the current specimen appears to be closest to *Stereoderma congoana* (Heding, 1935) and *Stereoderma monodi* (Cherbonnier, 1950) both West African species but with larger knobs to the plates. The ossicles of the current specimen come very close to those of *Cucumaria inflexa* Koehler & Vaney, 1908 from the Bay of Bengal, at 170 m. However, this latter species was transferred to *Mitsukuriella* by Heding and Panning (1954) on the assumption that the calcareous ring, as illustrated by Koehler & Vaney, indicates the presence of 15 and not 10 tentacles as

described. The current specimen, however, has clearly 10 tentacles, scattered tube-feet, a calcareous ring of a different form and is hence different from *C. inflexa*. It is clear that further specimens of *C. inflexa* would do much to clarify issues concerning this species tentacle number and form of the calcareous ring. Koehler & Vaney (1908) illustrated rods from the body wall in *C. inflexa* but these may have come from the tube feet. However, they are of a different form than those which characterise the current material which, in addition, has smooth to knobbed plates in the body wall. The writer is of the opinion that the mature specimen at hand definitely represents a new species because of its scarcely branched tentacles, respiratory trees as simple, unbranched tubes, two Polian vesicles and very characteristic body wall and tube feet ossicles.



**FIGURE 8.** *Stereoderma mohammedi* n.sp. SAMC-A090915. A. Specimen (entire); B. Body wall ossicles with nodules; C. Smooth body wall ossicles; D. Polygonal body wall ossicles with nodules; E. Spinous tube feet rods; F. Part of calcareous ring (dorsal).

### Family Thyonidae Panning, 1949

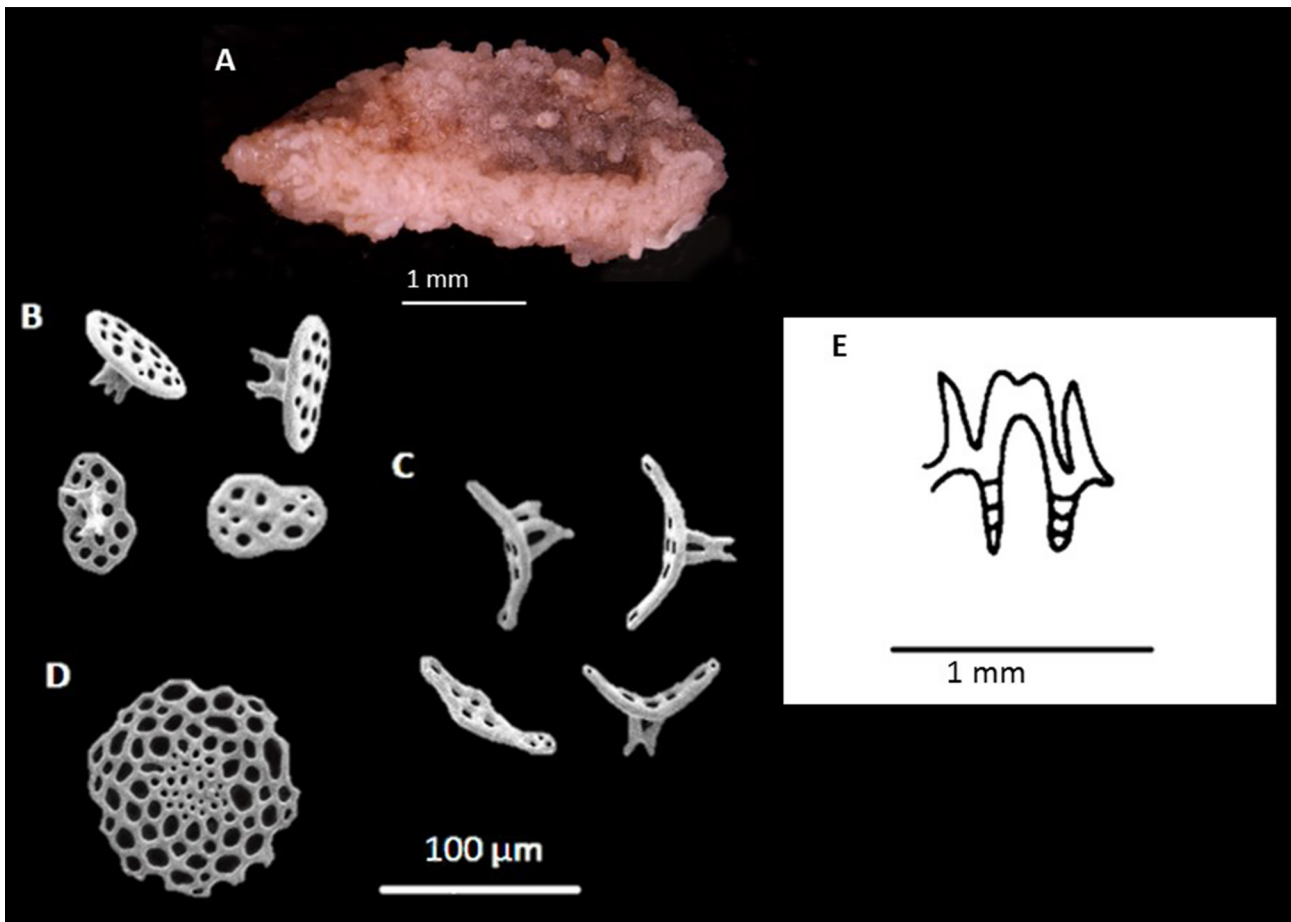
#### *Thyone hirta* Cherbonnier, 1970

(Figure 9)

*Thyone hirta* Cherbonnier, 1970: 288, fig. 4 N–S, fig. 5 A, B; Thandar, 1990:214; 2008: 6, fig. 2 A–F.

*Thyone* sp. indet. 1 Thandar, 2008:12, fig. 6 A–G.

**Material examined.** SAMC-A090916, SM185, off Port Alfred, 33°39.03' S, 27°11.06' E, heavy dredge, 90 m, 31.V.1978, 1 spec.



**FIGURE 9.** *Thyone hirta* Cherbonnier, 1970. SAMC-A090916. A. Specimen (entire) juvenile; B. Tables from body wall; C. Tables from tube feet; D. Tube feet end-plate; E. Part of calcareous ring (dorsal view).

**Diagnosis** (see Cherbonnier 1970; Thandar 1990).

**Description.** Specimen minute, brittle, perhaps due to previous drying-up. Form sub-cylindrical, dorsal surface arched, ventral surface flattened and concave (Figure 8A). Colour pinkish-white to off-white. Length about 5 mm, breadth in mid-body about 2 mm. Tentacles 10, retracted, bushy, in 8+2 arrangement, 8 large ones of various sizes. Anterior end narrower than posterior. Anus terminal, anal teeth non-evident. Tube feet scattered, dorsally mostly retracted with some serial arrangement, more numerous ventrally, suckers reduced, of more or less same diameter as tube feet. Calcareous ring poorly calcified (Figure 8E), radial and interrarial plates loosely united at base, the former deeply incised, processes short, weakly developed. Gonadal tubules immature. Body wall ossicles comprise tables (45–70 µm) with a circular/oblong disc, perforated by numerous small holes (Figure 8B); spire of moderate height (20–30 µm), comprising two pillars with a single low cross-bar and terminating in two diverging processes, with each bearing one or more teeth. Some multilocular discs without spire, also present. Tube feet ossicles comprise tables (55–95 µm) with a curved disc, spire (15–30 µm), also two-pillared, ending in two teeth of which one or both may be subdivided into minor denticulations (Figure 8C). Some tube feet tables with less curved discs and no spire. End-plates well developed, circular, with small medial holes, and large peripheral holes (Figure 8D). Tentacle ossicles include small plates of various forms. Introvert ossicles as tables only, much like those of body wall; some tables with large discs also present, but rare; some appearing as plates with medial knobs which perhaps represent reduced spires of degenerating tables.

**Distribution.** False Bay and Port Alfred, Eastern Cape Province, 48–90 m.

**Remarks.** The current specimen taken from off Port Alfred in the Eastern Cape Province at 90 m corresponds very well with *Thyone* sp. indet.1 described by Thandar (2008) from False Bay in the Western Cape Province at 42 m, judging from its calcareous ring and deposits. However, Thandar (2008) compared his indeterminate form with *T. comata* Cherbonnier, 1970, a tropical sub-tropical species, and not with *T. hirta* which he also described in the

same paper. This error of judgement is regretted since it now appears that his indeterminate form, as well as the current specimen, are both referable to *Thyone hirta* except for the form of the calcareous ring which perhaps influenced Thandar's original determination. Since both Thandar's *Thyone* sp. indet. 1 and the current specimen are juvenile not much emphasis can be placed on the form of the calcareous ring which is reputed to change drastically with growth in most *Thyone* species. However, the body wall, tube-feet, tentacles and introvert ossicles are identical to those of *T. hirta* illustrated both by Cherbonnier (1970) and Thandar (2008).

## Family Sclerothyonidae Thandar, 1989

### Genus *Temparena* Thandar, 1989

**Diagnosis** (from Thandar 1989, amended herein).

Small, barrel to U-shaped species up to 25 mm long. Tentacles 10, ventral two reduced to stubs. Skin thin, rigid with ossicles. Mature specimens with radial and interradial plates of calcareous ring small, compact, with radials carrying long, undivided, paired processes much longer than the height of the ring. Body wall ossicles, tables and plates, tables with oval to irregular disc perforated with few (4–8) holes, spire short, 2-pillared, with or without teeth; plates thick, multilocular, elongated, oblong or circular, holes minute, in one species the medial or marginal holes are often occluded, leaving only minute pores. Tube-feet ossicles as minute plates and rods and/or reduced tables. Introvert and tentacle ossicles as perforated plates with crinkled margins.

**Remarks.** The above diagnosis of Thandar (1989) is modified to include the new species described below. Since mature individuals of the new form is not known this aspect of the original diagnosis is here excluded. *Temparena* was erected in the subfamily Sclerothyoninae, which has recently been elevated to full family rank by Smirnov (2012).

### ?*Temparena trouspetita* sp. nov.

(Figure 10)

**Material examined.** SAMC-A090917, :SM123, South off Scottburgh, 30°33.04' S, 30°48.06' E, heavy dredge, 690 m, 10.V.1977, 2 spec.

**Etymology.** The name of this new species is with reference to the tiny holes in the central part of the body wall plates (Fr. trous = holes; petits = small).

**Diagnosis.** A species of probably *Temparena* presently known from two barrel-shaped juvenile, up to 3 mm long. Tentacles 10, ventral two reduced to insignificant stubs, large tentacles with only short branches. Tube feet mostly in ambulacra, in single rows per ambulacrum (?juvenile); Calcareous ring poorly calcified or underdeveloped. Polian vesicle single. Ossicles of body wall comprise tables and plates. Tables with oblong smooth disc perforated by four or more holes, terminal holes at each extremity; spire usually reduced, of two pillars joined at apex, terminating in two or more teeth. Plates smooth, elongate, irregular or rounded, multilocular, with minute central holes, others often partially occluded. Tube-feet with minute perforated rods and plates; end-plates absent. Tentacles with smooth, multilocular plates with serrated or spinous margins and small holes (Figure 9E).

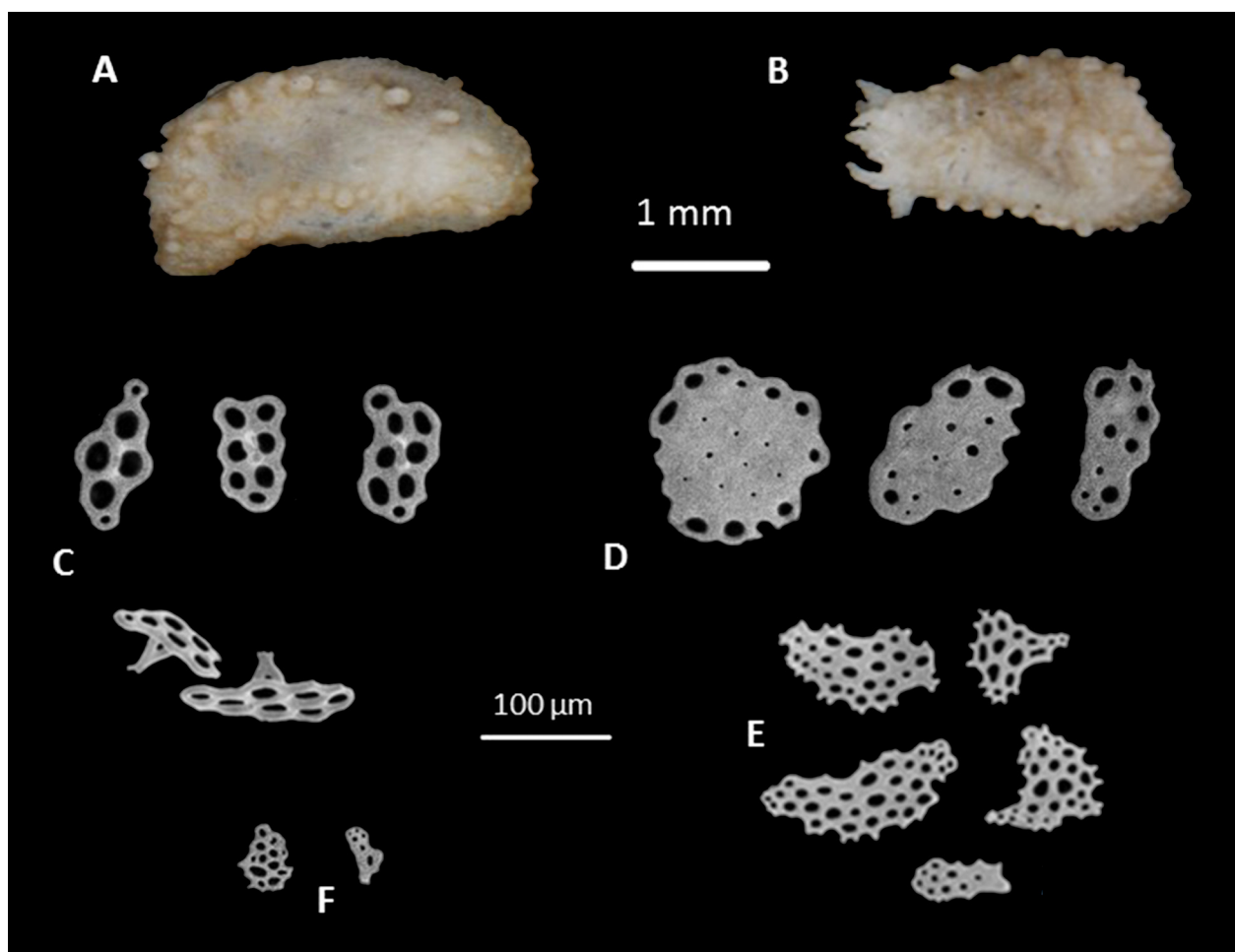
**Description.** Both specimens minute, juvenile, larger (holotype—Figure 9A) only about 3 mm long, height 2 mm, mid-body width about 1 mm. Form barrel-shaped, mouth and anus sub-dorsal, tentacles retracted. Smaller specimen (paratype—Figure 9B) only 2.5 mm long, with retracted posterior end, but with extended tentacles of which 8 well developed and 2 reduced to inconspicuous stubs; large tentacles (of paratype) dendritic but with short branches. Colour in alcohol beige-grey. Tube feet situated in ambulacra, in single rows (?juvenile); holotype with few tube feet also in interambulacra; paratype with naked interambulacra. Anal teeth not observed. Calcareous ring of both specimens poorly calcified, with short radial processes, perhaps still in process of development. Polian vesicle single, stone canal not observed, gonad immature in holotype; absent in paratype. Respiratory trees well developed. Ossicles of body wall comprise tables and plates. Tables of holotype (Figure 9C) with an oblong disc perforated by four or more holes, terminal holes at each extremity usually smaller, disc 90 µm–120 µm, smooth, spire often reduced, up to 40 µm, pillars joined at apex, terminating in two or more teeth. Plates of body wall



smooth, elongated, irregular or rounded, multilocular, with holes often occluded medially or marginally or both (Figure 9D). Tube-feet deposits as minute perforated rods and plates (Figure 9F), end-plates absent. Tentacles with smooth, multilocular plates, up to 100  $\mu\text{m}$ , with serrated or spinous margins and small holes (Figure 9E).

**Distribution.** Only recorded from south of Scottburgh, South Africa, 690 m.

**Remarks.** It is regrettable that this well characterised form is represented only by a pair of juveniles, up to 3 mm in length. Despite this, the writer has no doubt that although their calcareous ring is absent or underdeveloped their combination of two-pillared tables and plates as body wall deposits, betray their generic identity. It is therefore here referred to the genus *Temparena* without much hesitation. However, it is pertinent that mature specimens with well-developed calcareous ring need to be found to definitely confirm the generic identity. Nevertheless, the tube-feet and tentacle deposits are identical to those of the type species of *Temparena*. While in *T. chuni* the table discs are usually quadrilocular, in the current specimens they are usually multilocular and the plates are extraordinary, unlike the elongated plates of the type species. Although both specimens are immature with poorly or undeveloped calcareous ring, its ossicles are so characteristic, unlike any other known dendrochirotid that I feel obliged to name this extraordinary form.



**FIGURE 10.** *?Temparena trouspetita* n.sp. SAMC-A090917. A. Dorsal surface of holotype; B. Ventral surface of paratype; C–F. Ossicles of holotype (C. Body wall tables; D. Body wall plates; E. Tentacle plates; F. Tube feet ossicles). (C–F same scale).

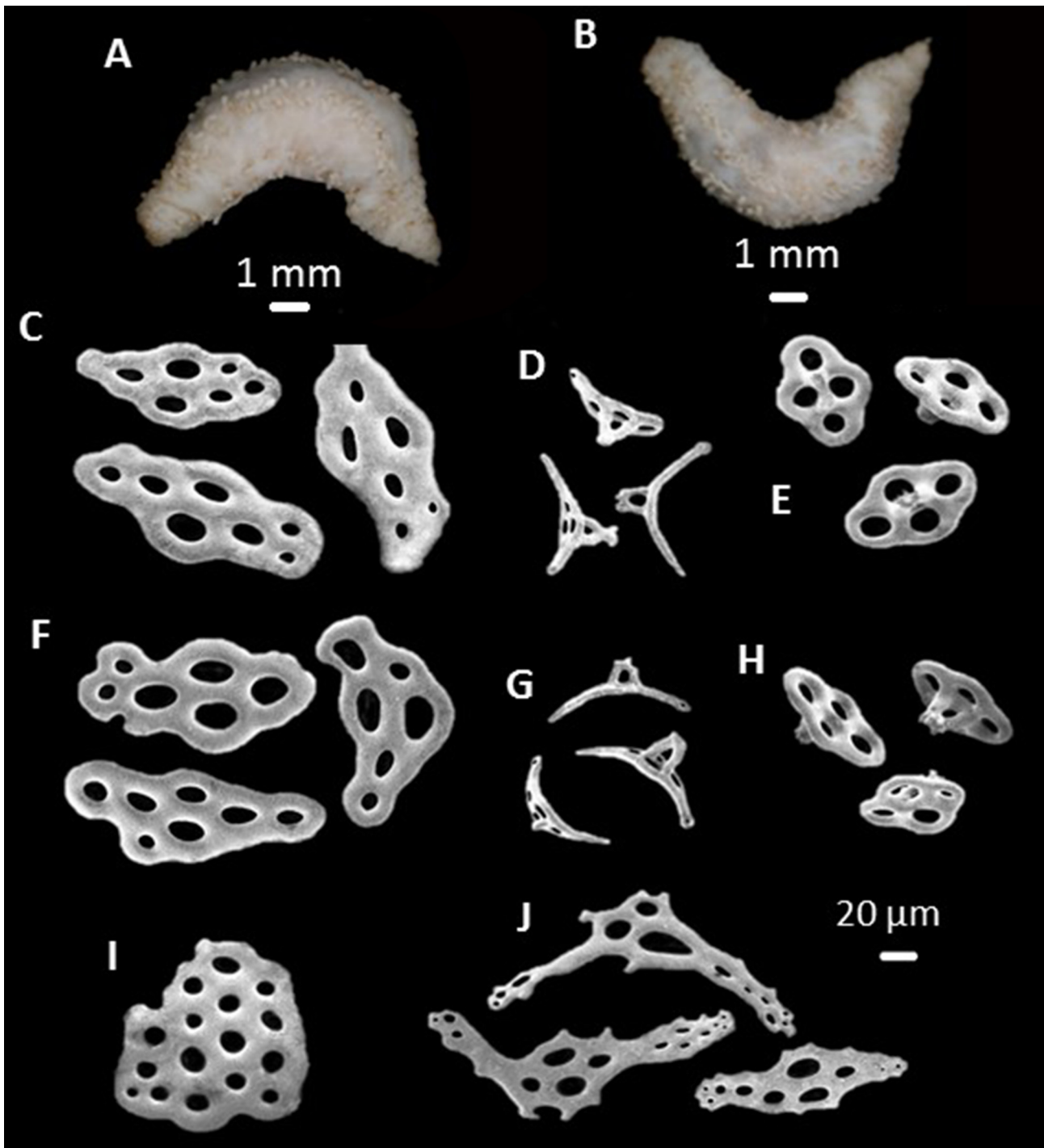
### *Temparena chuni* (Ludwig & Heding, 1935)

(Figure 11)

*Cucumaria? chuni* Ludwig & Heding, 1935:192, figs. 51, 52, pl.2, figs. 1–7.

*Pentamera chuni* Deichmann, 1948:350; Panning, 1949:460.

*Temparena chuni* Thandar, 1989: 296–297 fig. 4.



**FIGURE 11.** *Temparena chuni* (Ludwig & Heding, 1935). SAMC-A090918. A & B. Specimen (entire); C. Plates from dorsal body wall; D. Dorsal tube feet rods; E. Tables from dorsal surface; F. Plates from ventral body wall; G. Ventral tube feet rods; H. Tables from ventral surface; I. Ventral surface tube feet end-plate, J. Tentacle rods.

**Material examined.** SAM: SM179, North off Port Alfred, 33°30' S, 27°22' E, heavy dredge, 80 m, 1 spec.

**Diagnosis** (see Thandar 1989).

**Description.** Specimen small, U-shaped, almost cucumber-like (Figure 10A, B). Colour off-white, anterior end broader than posterior end and slightly below level of anus. Length about 15 mm along ventrum, 3 mm wide in mid-body, height 4 mm. Tentacles retracted; anal teeth present. Tube feet restricted to ambulacra in double rows dorsally, decreasing to a single row in both directions; ventral tube feet also in double rows but better developed and more crowded, also decreasing in size and number in both directions. Gonad (testis) mature, comprising undivided tubules almost filling entire body cavity; mature female tubules not detected, hence hermaphroditism not

confirmed. Other structures, including calcareous ring and ossicles (Figure 10C–J), correspond well with the species description by Ludwig & Heding (1935) and Thandar (1989).

**Distribution.** Off South coast of South Africa between Port Alfred and Cape point, 80–365 m.

**Remarks.** This is the third record of this well characterised, adequately described species. However, the hermaphrodite nature of the gonad, as reported for the species by Ludwig and Heding (1935) and Thandar (1989) could not be ascertained, perhaps because of the lack of full maturity of the specimen at hand.

### Family Cucumellidae Thandar & Arumugam, 2011

**Diagnosis** (from Thandar & Arumugam 2011, amended herein).

Dendrochirotid holothuroids with about 12 tentacles, digitate, unbranched. Calcareous ring simple, without posterior bifurcation of the radial plates; test absent; body wall ossicles non-contiguous, comprising simple tables with mostly trilocular to multilocular smooth disc, with a solid or 3-pillared spire ending in 2–3 (sometimes 4), smooth or toothed processes.

**Remarks.** In the diagnosis of their new family, the authors state that the spire of the table ends in 2–3 smooth, diverging processes. Ludwig & Heding's description of the tables is not clear and no tables could be found in the still extant holotype. However, in the current specimens it appears that *C. triplex*, the type species, has a spire ending in 3-, sometimes 4-toothed processes. The diagnosis is, therefore, here amended to include this feature.

### Genus *Cucumella* Heding (in Ludwig & Heding, 1935)

**Diagnosis.** As for the family.

### *Cucumella triperforata* Thandar & Arumugam, 2011

(Figure 12)

*Cucumella triperforata* Thandar & Arumugam, 2011:42, fig. 1–3.

**Diagnosis** (see Thandar & Arumugam 2011).

**Material examined.** SAMC-A090919 SM232, off Port St. Johns, Eastern Cape Province, 32°10.9' S, 29°10.4' E, 560–620 m, heavy dredge, 25.VI.1979, 3 spec.; SM236, off Transkei coast, Eastern cape Province, 32°14.03' S, 29°11.06' E, heavy dredge, 660–670 m, 25.VI.1979, 1 spec.

**Distribution.** Off Port St. Johns- East London area, Eastern Cape Province, 560–775 m.

**Remarks.** This species was described by Thandar & Arumugam (2011) and was distinguished by the presence of two anal papillae (Figure 11 A) which are conspicuously larger than the rest and the discs of the body wall tables are consistently trilocular (Figure 11B). At 560–620 m this species was collected together with *Psolidothuria yasmeeana* and *Stereoderma mohammedi* and at 660–670 m together only with the latter species and a young heart urchin.

### *Cucumella triplex* Ludwig & Heding, 1935

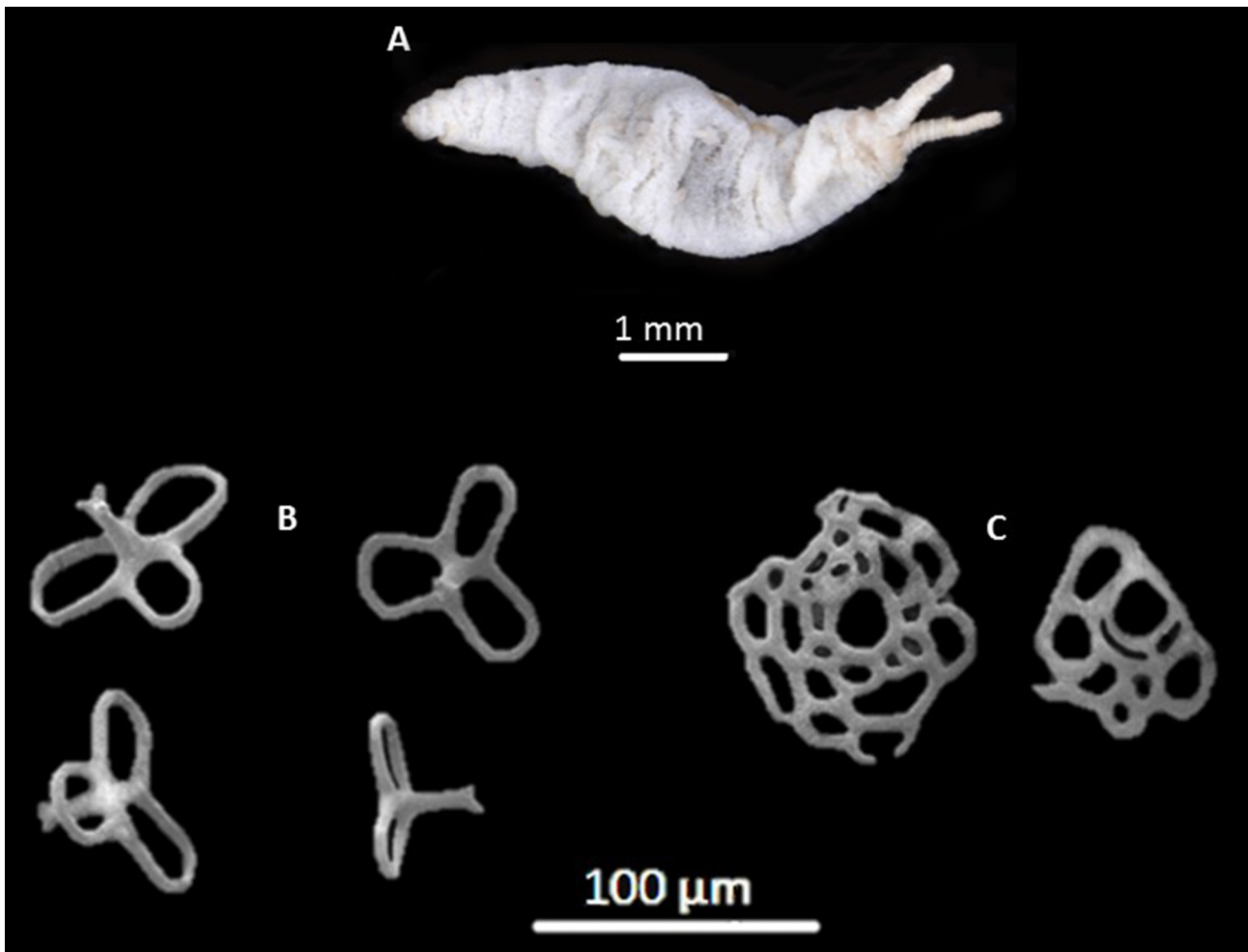
(Figure 13)

*Cucumella triplex* Ludwig & Heding, 1935: 210, pl. 2, figs. 39–49; Heding, 1942: 220, figs. 12 & 13; Deichmann, 1948: 359; Heding & Panning, 1954: 66, fig. 16(a–e), Thandar, 1991: 137; Thandar & Arumugam, 2011:47 (passim).

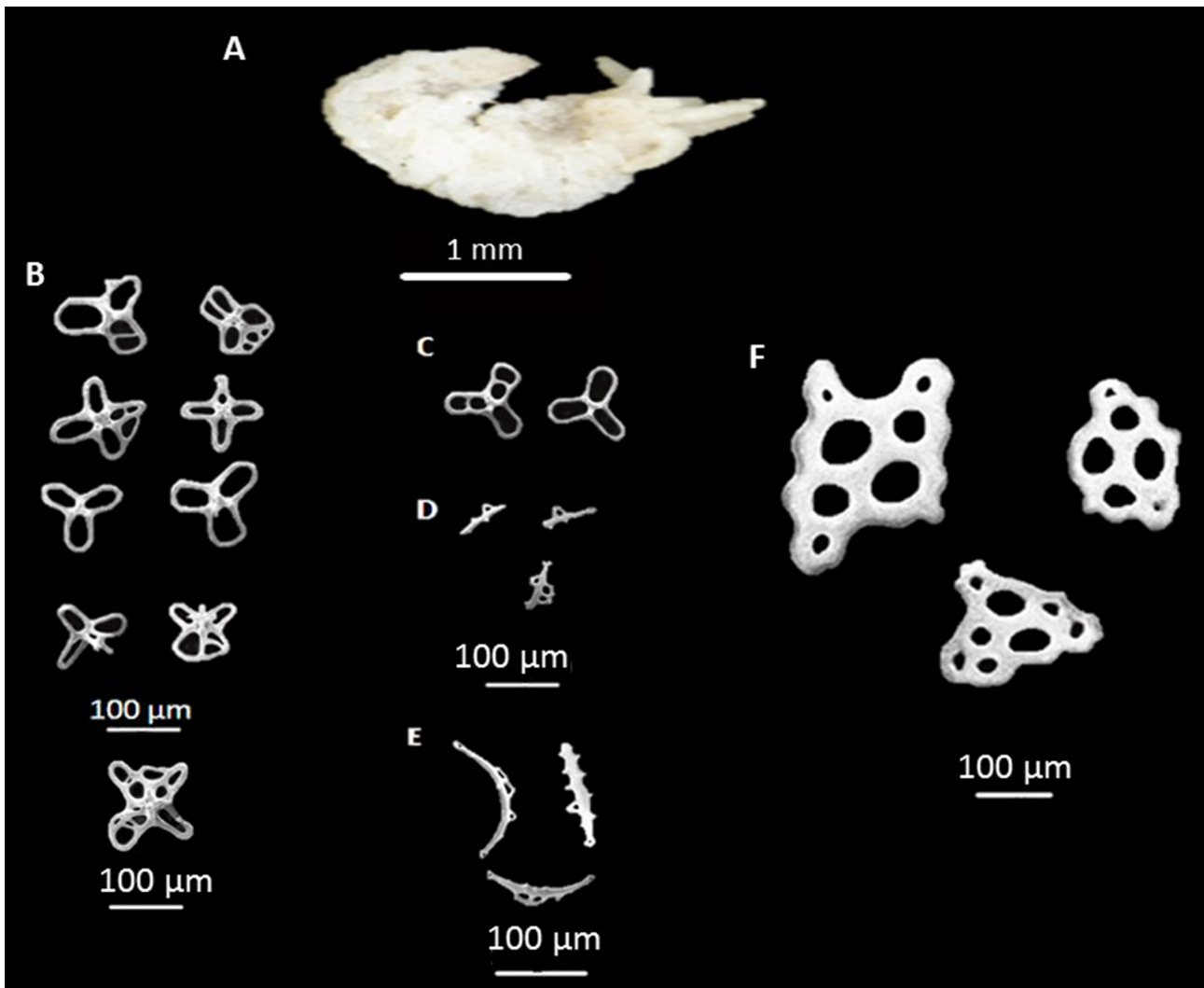
**Material examined.** SAMC-A090920, SM162, off East London, Eastern Cape Province, South Africa, 32°55' S, 28°31' E, heavy dredge, 630 m, 25.V.1978, 3 spec.

**Description.** Specimens well preserved, slightly U-shaped (Figure 12A), colour in alcohol beige-white. Largest about 5 mm long and 2.5 mm wide. Smallest specimen more U-shaped, perhaps due to stronger

contraction. In all specimens anterior end broader than posterior, with some tentacles clearly protruding from mouth. All tentacles finger-shaped or digitate. In largest specimen only 5 large tentacles could be easily counted while other large ones have detached but lie free in the fluid, the 2 ventral ones apparently reduced. Medium-sized specimen also with 5 large tentacles and 2 reduced ventral ones. In the smallest specimen there are definitely 10 tentacles with an 8+2 arrangement. Anal papillae present, of which two are better developed than others (Figure 12A), but these are not as long as in *C. triperforata* and not easily demonstrated in the medium specimen. Tube feet reduced and sparse, absent on the dorsal surface of largest individual, which has about 5–7 tube feet per ambulacrum ventrally; medium-sized specimen with few short tube feet antero-dorsally, fewer postero-dorsally and about 6–8 on the three ventral ambulacra. Smallest specimen with very few, apparently retracted tube feet, difficult to demonstrate. Largest specimen (mature male) with translucent body wall, with some internal organs visible through it. Ossicles of dorsal and ventral body wall identical, comprising only tables, mostly with tri-radiate, sometimes quadri-radiate disc with three or more holes (Figure 12B & C); disc 94–131  $\mu\text{m}$ , spire short, up to 31  $\mu\text{m}$  in height, terminating in a tri-forked or quadri-forked apex armed with minute teeth; basic table discs apparently trilocular with more holes developing by partitioning of these or are added on later. Tube-feet deposits (Figure 12D) as simple rods, up to 81  $\mu\text{m}$ , with few marginal spines and usually one or two marginal holes located medially. Tentacle ossicles as rods and plates, the former straight or curved, up to 100  $\mu\text{m}$  long with few marginal spines and holes (Figure 12E), resembling tube-feet rods but much larger; plates smooth, multilocular (Figure 12F), up to 313  $\mu\text{m}$ .



**FIGURE 12.** *Cucumella triperforata* Thandar & Arumugam, 2011. SAMC-A090919. A. Specimen (entire); B. Body wall ossicles; C. End-plates from tube feet.



**FIGURE 13.** *Cucumella triplex* Ludwig and Heding, 1935. SAMC-A090920. A. Specimen (entire); B. Tables from dorsal body wall; C. Tables from ventral body wall; D. Rods from tube feet; E. Rods from tentacles; F. Plates from tentacles.

**Distribution.** Agulhas Bank to East London, South Africa, 155–630 m.

**Remarks.** The tentacle number of the holotype of *C. triplex* was only arrived at after Heding's (in Ludwig & Heding, 1935 and Heding 1942) several examinations of the type. Of the current material, only the largest specimen was dissected in order to determine its exact tentacle number but this was not ascertained, as some tentacles were very minute. In all other respects the specimens resemble that described by Heding (in Ludwig & Heding, 1935). Tables with trilocular disc resemble those of *C. triperforata* but these are later transformed to those with multilocular disc absent in the latter species; disc circular with undulating margins. Intermediate stages between the two types are common. Furthermore, the spire in *C. triplex* ends in usually three toothed prongs where as those of *C. triperforata* end in two non-toothed prongs.

#### Family Vaneyellidae Pawson & Fell, 1965

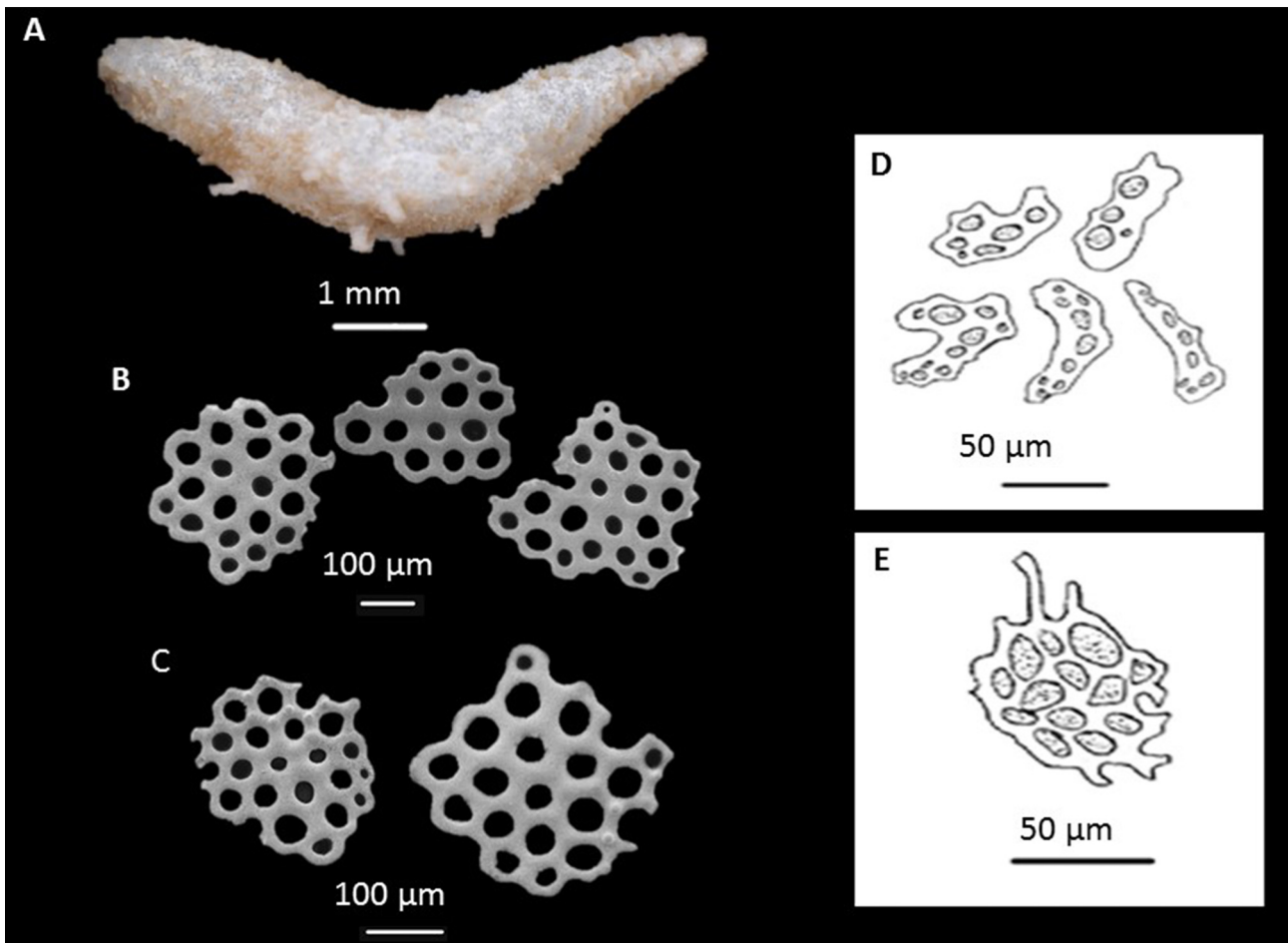
#### *Psolidothuria yasmeena* Thandar, 2006

(Figure 14)

*Psolidothuria yasmeena* Thandar, 2006: 44–46, fig. 15.

**Diagnosis** (see Thandar 2006).





**FIGURE 14.** *Psolidothuria yasmeena* Thandar, 2006. SAMC-A090921. A. Specimen (entire); B. Smooth plates from body wall; C. Plates from body wall with nodules; D. Tube feet deposits; E. Tube feet end-plate; D & E (From Thandar, 2006).

**Material examined.** SAMC-A090921, SM123, off south of Scottburgh, 30°33.04' S, 30°48.06' E, heavy dredge, 690 m, 10.V.1977, 5 spec.; SAMC-A090922, SM129, off Margate, 30°53.04' S, 30°31.07' E, heavy dredge, 850 m, 11.V.1977, 7 spec.; SAMC-A090923, SM232, off south of Port St. Johns, 32°10.9' S, 29°10.4' E, heavy dredge, 620–560 m, 25.VI.1979, 6 spec.; SAMC-A090924, SM236, off Transkei, south of Port St. Johns, 32°14.03' S, 29°11.06' E, heavy dredge, 660–670 m, 25.VI.1979, 1 spec.

**Description.** Specimens slightly to strongly U-shaped, the latter perhaps due to preservation (Figure 13A). Size-range 5–10 mm along ventrum, and up to 1 mm in breadth in mid-body. Mouth and anus terminal, anterior end broader than posterior end with anus lying slightly above level of mouth. Colour in alcohol beige-grey, more pronounced ventrally and sometimes also orally. Tentacles retracted, anal teeth and anal papillae absent. Tube feet sparse (Figure 13A), located in ambulacra, better developed ventrally, non-retractile, most protruding from body surface, decreasing in size in both directions; suckers well developed. Largest specimen with about six large tube feet in all ventral ambulacra. Smaller specimens with only few long ventral tube feet. Dorsal tube feet present, also confined to ambulacra but few and minute. Suckers of the dorsal tube feet much reduced. Body wall rigid due to presence of imbricating scales/plates which are either smooth (Figure 13B) or slightly nodular (Figure 13C). Tentacles 8, digitate or finger-shaped but finely branched, 6 large, of unequal size, 2 much reduced. Internal anatomy, including ossicles, as described for the type by Thandar (2006).

**Distribution.** South-east coast of South Africa, 620–850 m.

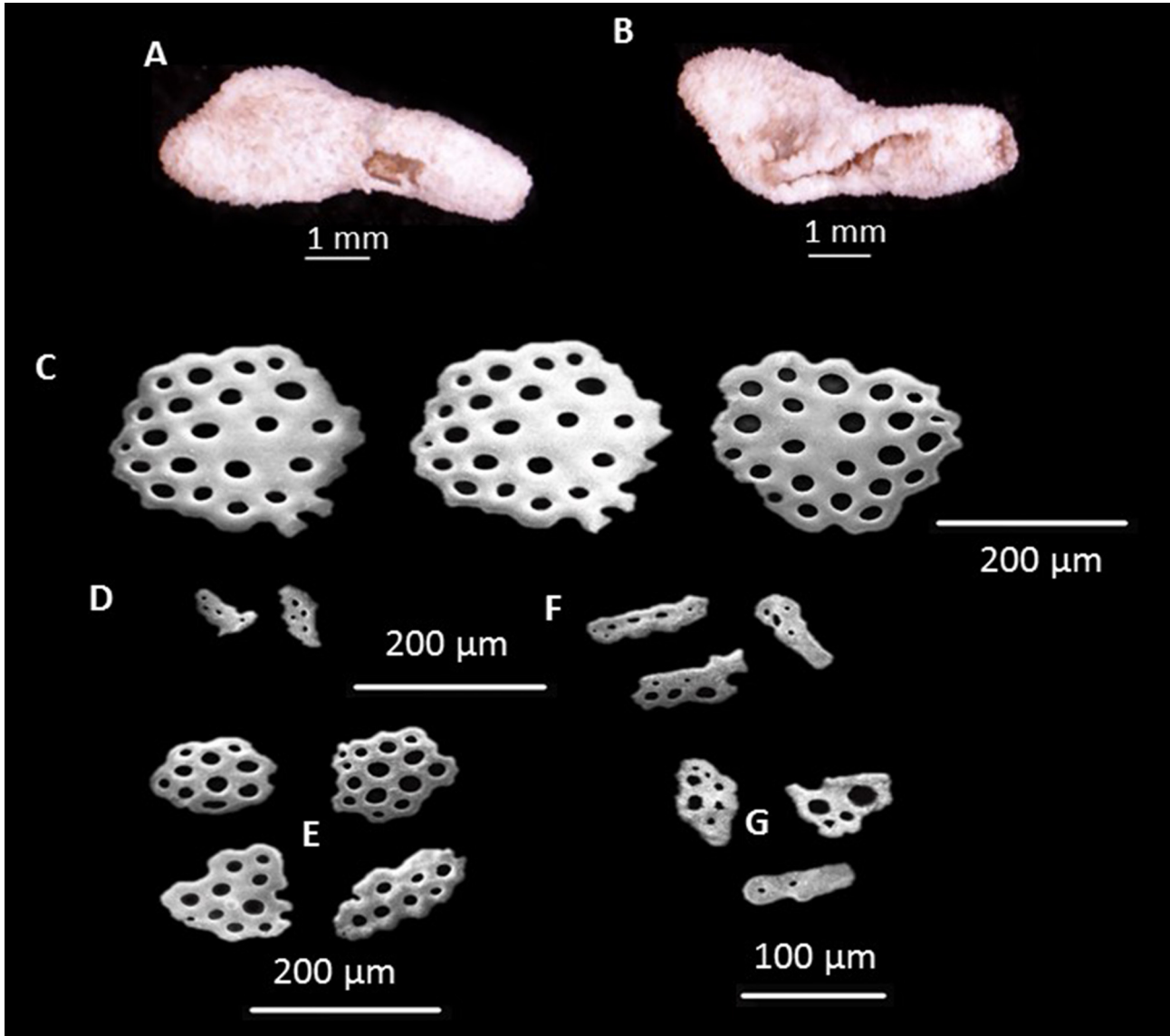
**Remarks.** This species has been adequately described from the holotype and 24 paratypes by Thandar (2006) from material collected off Port St. Johns—East London area by the same cruise on 24.VI.1979 at 710–775 m. Thandar compared his material with *P. octodactyla* Thandar, 1998 and requires no further comments.



Family Psolidae Burmeister, 1837

*Ekkentropelma groovia* Thandar, 2006  
(Figure 15)

*Ekkentropelma groovia* Thandar, 2006: 41–44, fig. 14.



**FIGURE 15.** *Ekkentropelma groovia* Thandar, 2006. SAMC-A090926. A. Specimen dorsal surface; B. Specimen ventral surface; C. Plates from dorsal surface; D. Rods from dorsal podia; E. Plates from ventral surface; F. Rods from ventral podia; G. Rods and plates from tentacles.

**Diagnosis** (see Thandar 2006).

**Material examined.** SAMC-A090926, SM162, off East London, 32°55' S, 28°31' E, heavy dredge, 630 m, 25.V.1978, 1 spec.

**Description.** Specimen minute (Figure 15A, B), cylindrical, narrow anteriorly, truncate posteriorly, slightly swollen just behind the middle. Colour yellowish-white. Length about 5.5 mm, anterior end about 1 mm in diameter, mid-body about 2 mm. Tentacles withdrawn, with some evidence of valves surrounding mouth. Ventral groove (Figure 15B) evident, starting on right side of animal and proceeding to left side, to terminate about 2 mm before anus. Tube feet few, better developed ventrally than dorsally, ventral tube feet about five on each side of groove and few within groove; antero- and postero-ventral tube feet reduced. Dorsal tube feet evident but more

reduced than ventral. Anus slit-like; anal teeth not evident. Body enclosed by large, imbricating, multilocular plates/scales dorsally (Figure 15C), much smaller ventrally (Figure 15E). Tube feet ossicles as small perforated rods (Figure 15D & F). Tentacle ossicles as plates and rods (Figure 15G).

**Distribution.** Off Port St. Johns and East London, 630–775 m

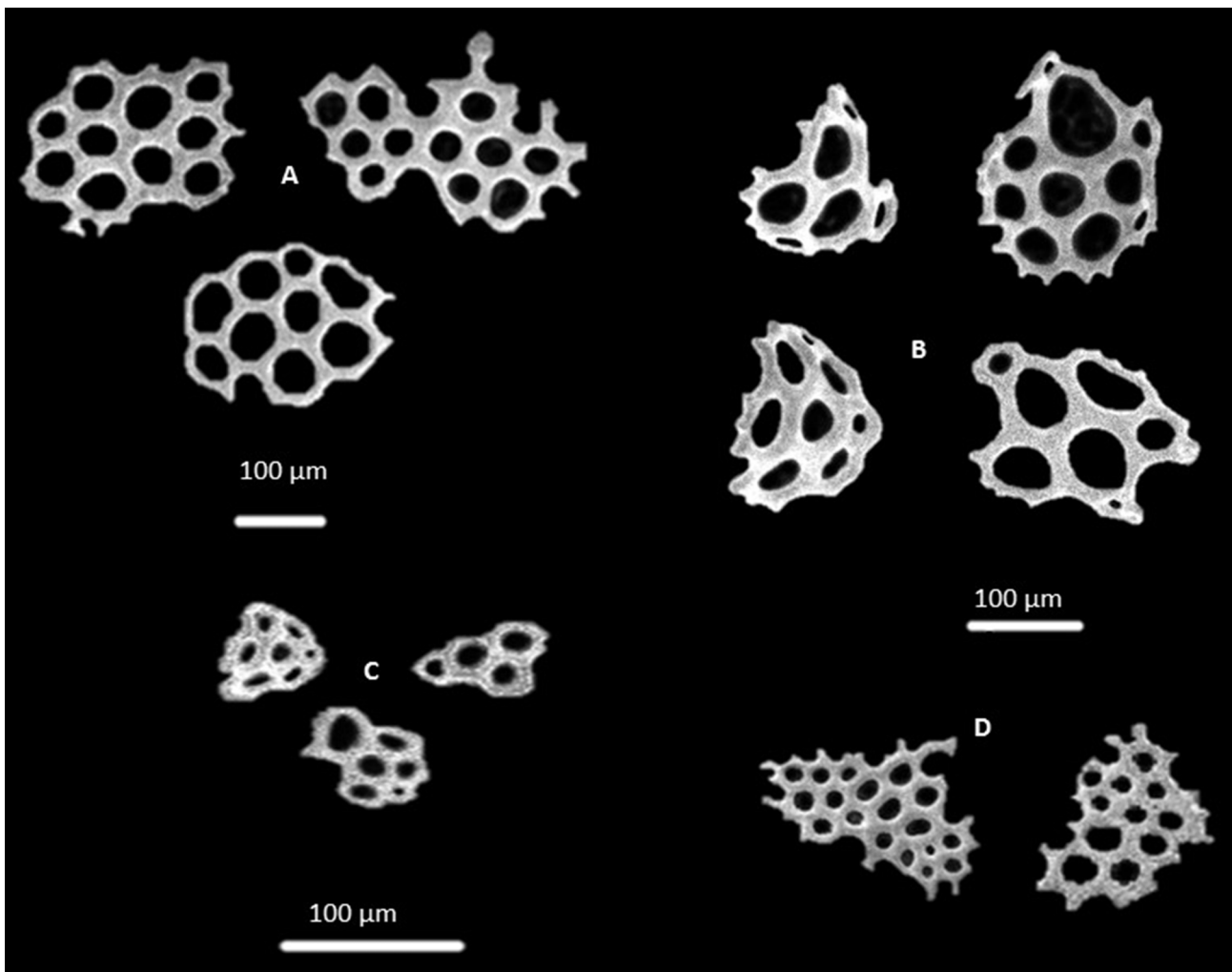
**Remarks.** This species was described and remarked upon by Thandar (2006) and requires no further comments.

***Psolidium acorbulum* Thandar, 2006**

(Figure 16)

*Psolidium acorbulum* Thandar, 2006: 39, fig.13.

Samyn & VandenSpiegel, 2016:487, text-fig. 27.



**FIGURE 16.** *Psolidium acorbulum* Thandar, 2006. SAMC-A090927. A. Dorsal body wall plates; B. Ventral body wall plates; C. Plates from tube feet; D. Fragmented end-plates.

**Diagnosis** (see Thandar 2006)

**Material examined.** SAMC-A090927, SM123, off south of Scottburgh, 30°33.04' S, 30°48.06' E, heavy dredge, 690 m, 10.V.1977, 1 spec.

**Description.** Form typically psolid with an arched dorsal surface and flattened ventral surface forming the sole which is largely covered by ventral flaps of the body wall; sole thin-walled, membranous. Specimen length about 2.5 mm, width in mid-body just over 1 mm. Colour off-white in alcohol. Dorsal scales overlapping, not possible to determine the number of scales between mouth and anus as latter two not apparent. Dorsal tube feet in three

conspicuous rows, but few also in inter-ambulacra. A single row of tube feet present on margin of sole. Tube feet emit from between scales and not through them. Tentacle number undetermined, tentacles simple (digitate) or very finely branched. Internal anatomy typical of species, form and size of ossicles as in type. Dorsal plates (Figure 16A) include large type, up to 335 µm and small type, up to 70 µm, all with about 10 holes. Ventral plates (Figure 16B) much smaller, larger ones up to 240 µm, and smaller ones up to 135 µm, all with up to 10 holes, usually fewer. Tube feet deposits comprise minute perforated plates (Figure 16C), larger ones up to 350 µm, smaller ones up to 90 µm; end-plates present, up to 100 µm, with numerous holes.

**Distribution.** East coast of South Africa, from Scottburgh to East London, 690–775 m, perhaps extending to N. Mozambique.

**Remarks.** This species was originally based on two specimens collected from off Port St. Johns and East London area on the east coast of South Africa. Now, its occurrence north of Port St. Johns is a noteworthy extension of its range. This species was described by Thandar (2006) and therefore only a few pertinent features are recorded above. The knobs on the plates are not as prominent as in the type. It is also difficult to determine the tentacle number and form. Simple tentacles were described for the type where as in the current specimen some tentacles appear minutely branched. Despite this there is no doubt as to the specific identity of the current material. As in the type the form is exactly psolid-like and the mouth and anus not distinguishable as they are both covered by overlapping scales.

### ***Psolus imperfectus* Clark, 1923**

(Figure 17)

*Psolus imperfectus* H.L.Clark, 1923: 418.

*Psolus imperfectus* Deichmann, 1948: 363, fig. 21, 1–10.

**Diagnosis** (see Deichmann 1948).

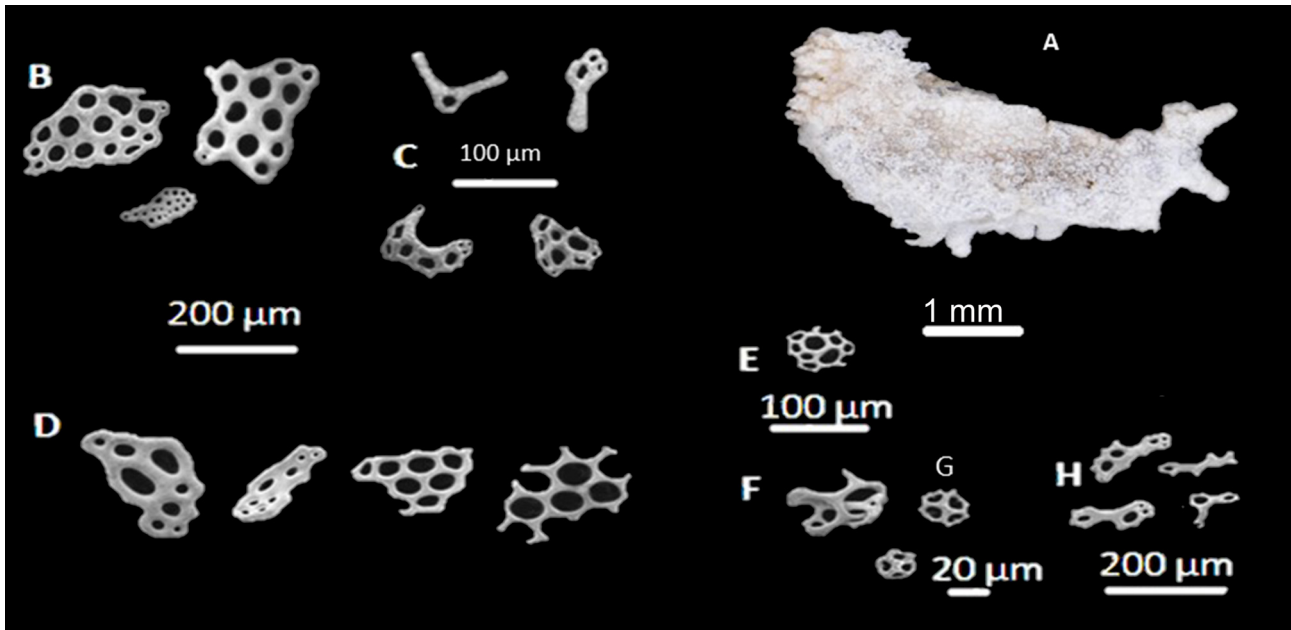
**Material examined.** SAMC-A090928, SM232, south of Port St. Johns, 32°10.9' S, 29°10.4' E, 620–560 m, 25.VI.1979, 1 spec.

**Description.** Specimen minute, perhaps immature (Figure 17A). Length 5 mm (including tentacles), breadth about 2.5 mm in mid-body. Colour off-white. Mouth terminal, slightly dorsally directed; anus not visible. Specimen flat, dorsal surface only slightly arched, ventral surface flat, left margin folded over a rather indistinct sole, hence ventral tube feet displaced. Only eight tube feet on the right side, about 10 on the left side, few mid-ventrally. Because of deformed nature of the body the lateral tube feet do not appear in single series as some are displaced medially; those on left lateral side protrude, including the two most posterior ones. Dorsal surface without tube feet. Tentacles 10, clearly dendritic, two ventral slightly reduced. Oral valves absent. Dorsal and ventral body wall covered by smooth imbricating plates (Figure 17B & D), dorsally up to 80 µm in size, ventrally up to 58 µm. Baskets (Figure 17G) common in body wall, minute, with four holes piercing a rather thick base and about 15–16 spines on the rim, pointed in all directions; dorsal baskets up to 40 µm, ventral baskets up to 35 µm. Ossicles of tube feet include large, thick perforated plates and rods (Figure 17H), up to 175 µm, plus numerous baskets; the latter apparently larger than those of body wall, and often with more than four basal holes. End-plates reduced (Figure 17E), up to 150 µm, not always present. Tentacle ossicles include large thick rods and small smooth plates similar to those of tube feet (Figure 17C).

**Distribution.** South of Port St. Johns to Cape Agulhas, 376–620 m.

**Remarks.** The size and form of the animal, the number and distribution of tube feet and the type of body wall ossicles, confirm that this specimen as a juvenile of *Psolus imperfectus*. It is regrettable that H.L. Clark (1923) neither figured the ossicles nor the animal itself, and perhaps failed to detect any baskets found in association with the plates. His material comprised two juveniles collected off south-east of Cape Agulhas, at 365.76 m (200 fathoms). The holotype which was presumably in the South African Museum could not be located. The paratype from the Museum of Comparative Zoology (Harvard) was studied by Deichmann (1948). Deichmann was therefore the first to find minute baskets, in addition to the plates. Except for the fewer number of holes in the plates of the current material, its baskets are identical to those described by Deichmann (1948). Samyn & Vandenspiegel (2016) show some spired scales which were not observed in the South African material. A point of interest is that Deichmann illustrated both smooth and knobbed plates. Despite this the specimen is identified as a juvenile *Psolus*

*imperfectus*. Deichmann (1948) mentioned the presence of about 20–25 holes in the plates which have a slightly knobbed surface. Clark (1923) also recorded about 20–24 holes, but did not comment on the knobbed plate surface. There is a possibility that the two specimens studied by Clark are perhaps not conspecific with that described by Deichmann and herein. However, the current material with fewer holes in the otherwise smooth plates, appears intermediate in form, perhaps because of its small size. In the absence of the holotype, the specimen must be regarded as a juvenile of *P. imperfectus*. The type was described from south of Cape Agulhas at about 366 m; hence the current specimen indicates a noteworthy extension of its range eastwards into the warmer waters of the Eastern Cape.



**FIGURE 17.** *Psolus imperfectus* Clark, 1923. SAMC-A090928. A. Specimen (entire); B. Plates from dorsal body wall; C. Rods and plates from tentacles; D. Plates from ventral body wall; E. Developing end-plate from tube foot; F. Developing plate from ventral body wall; G. Baskets from ventral body wall; H. Rods from tube feet of ventral body wall. (B & D same scale; E & F same scale).

## Order Aspidochirotida Grube, 1840

### Family Synallactidae Ludwig, 1894

#### *Synallactes quatrami* n. sp.

(Figure 18)

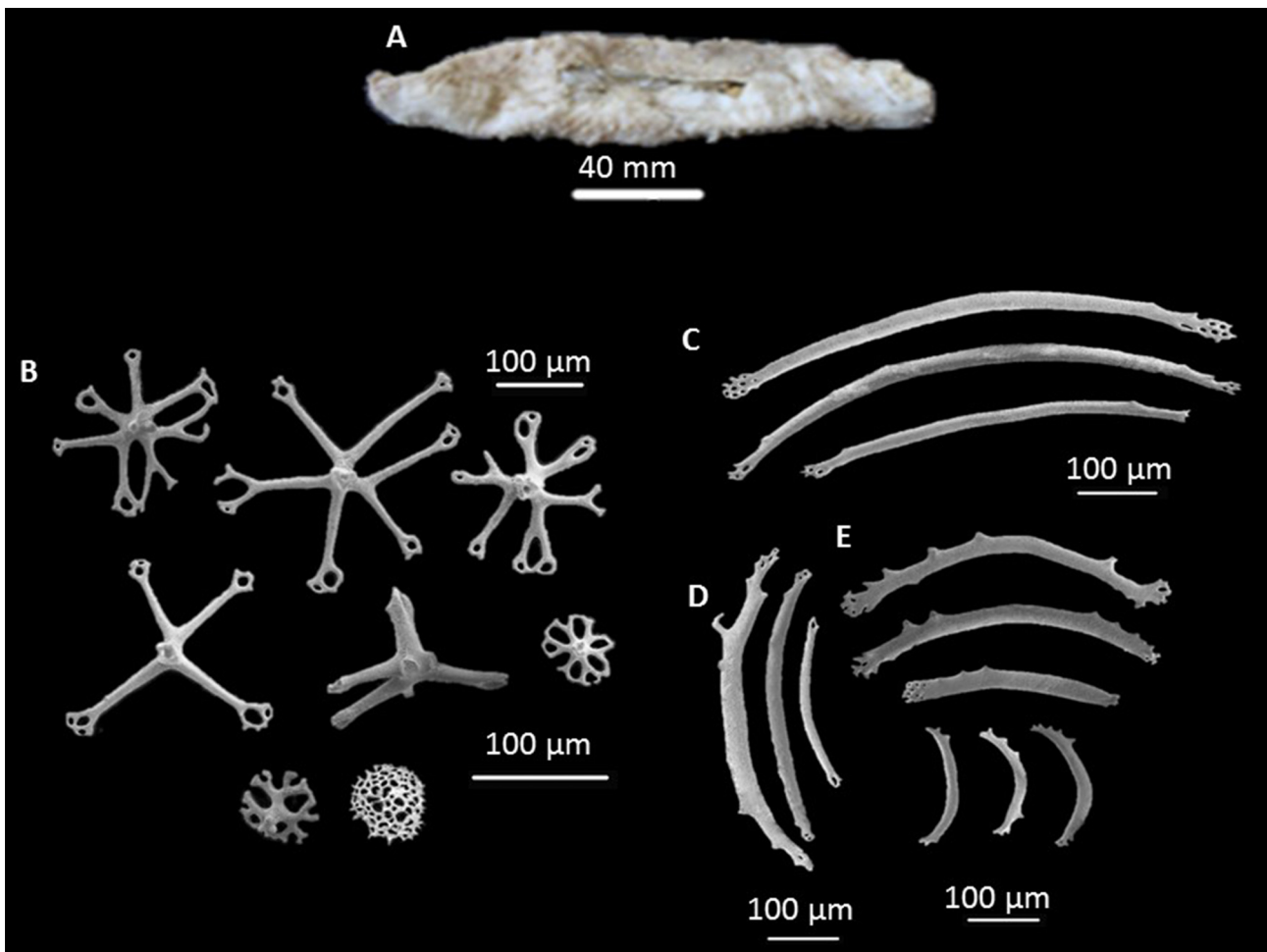
*Synallactes viridilimus* Thandar, 2008: 43, fig. 17 (non *S. viridilimus* Cherbonnier, 1952).

**Etymology.** The species is so named because of its four-branched large tables (I. quattro- four, rami- branches).

**Material examined.** SAMC-A090929, A9153-075-084-5082, off Lamberts Bay, Western Cape Province, 32°05.7' S, 16°19.8' E, 440 m, 16.VIII.1989, 1 spec.

**Diagnosis.** A medium-sized species of *Synallactes*, up to 160 mm in length. Tentacles 18. Dorsal papillae reduced, size and arrangement of papillae not easily distinguishable, about six papillae placed dorsally just behind collar, not arranged in groups but in pairs, perhaps part of dorsal papillae; in addition groups of 3–5 oral papillae surround mouth. Tube feet short, in ventral ambulacra, in about 2–4 rows, reaching level of mouth and anus. Ossicles of body wall as three types of tables: small, with cross-shaped mostly incomplete disc; other small tables with complete lattice-like disc; and large tables mostly with 4-armed disc with arms terminally perforated by one to few holes, but not forming lattice-like festoon of holes. Spire of large tables solid, low, with 3–4 terminal teeth. Crosses with or without spires not observed. Rods of tube feet, papillae and tentacles typically synallactid.

**Description.** Specimen (Figure 18A) 159 mm in length, 45 mm in breadth in mid-body. Specimen poorly preserved, almost macerated. Tentacles 18, yellowish in colour. Dorsal papillae not at all obvious, apparently situated on warts/tubercles in about six longitudinal rows but size and number of papillae not easily distinguishable as they appear minute, about six papillae placed dorsally just behind the collar, not arranged in groups but in pairs, perhaps being part of dorsal papillae; in addition groups of 3–5 oral papillae surround mouth. Tube feet also short, in ventral ambulacra, in about 2–4 rows, decreasing in size in both directions, but reaching level of mouth and anus. Ventral ambulacrum with naked area without tube feet. No special anal papillae, but some ventral podia reach level of anus. Ossicles of body wall comprise three types of tables (Figure 17B): small with cross-shaped mostly incomplete disc; other small tables with complete lattice-like disc (spire height of small tables 60–110  $\mu\text{m}$ , arm length 30–100  $\mu\text{m}$ , total disc size of such tables 70–210  $\mu\text{m}$ ); and large, mostly 4-armed tables with arms terminally perforated by one to few holes but disc not forming lattice-like or racquet-shaped bodies (disc diam. of large tables 30–50  $\mu\text{m}$ , arm length 160–320  $\mu\text{m}$ , total size of large tables 190–370  $\mu\text{m}$ ). Spire of large tables solid, low, with 3–4 terminal projections. Minute crosses with or without spires not observed. Rods of tube feet (Figure 17C) and papillae (Figure 17D) typically synallactid, up to 670  $\mu\text{m}$ ; tentacle rods up to 570  $\mu\text{m}$  (Figure 17E).



**FIGURE 18.** *Synallactes quaterama* n. sp. SAMC-A090929 (cf. *viridilimus* Thandar, 2008). A. Specimen (entire); B. Body wall tables; C. Rods from papilla; D. Rods from tube feet; E. Rods from tentacle.

**Distribution.** West coast of South Africa, between Lambert and Hondeklip Bays, 425–450 m.

**Remarks.** In the form and texture of the specimen, the occurrence of oral papillae and the form of the ossicles it appears that the current specimen is very close to *Synallactes viridilimus* Cherbonnier, 1952 and *S. challengeri* Théel, 1886 and almost identical to *S. viridilimus* described by Thandar (2008) (non Cherbonnier 1952). However, in the occurrence of 4-armed large tables, the complete lattice-like disc of some small tables and the presence of oral papillae in pairs/groups shows that it is identical with Thandar's (2008) (non Cherbonnier's 1952) *S. viridilimus*, confirming its status as a new species. It is unlike any other southern African synallactid described to date.

Genus *Pseudostichopus* Théel, 1886

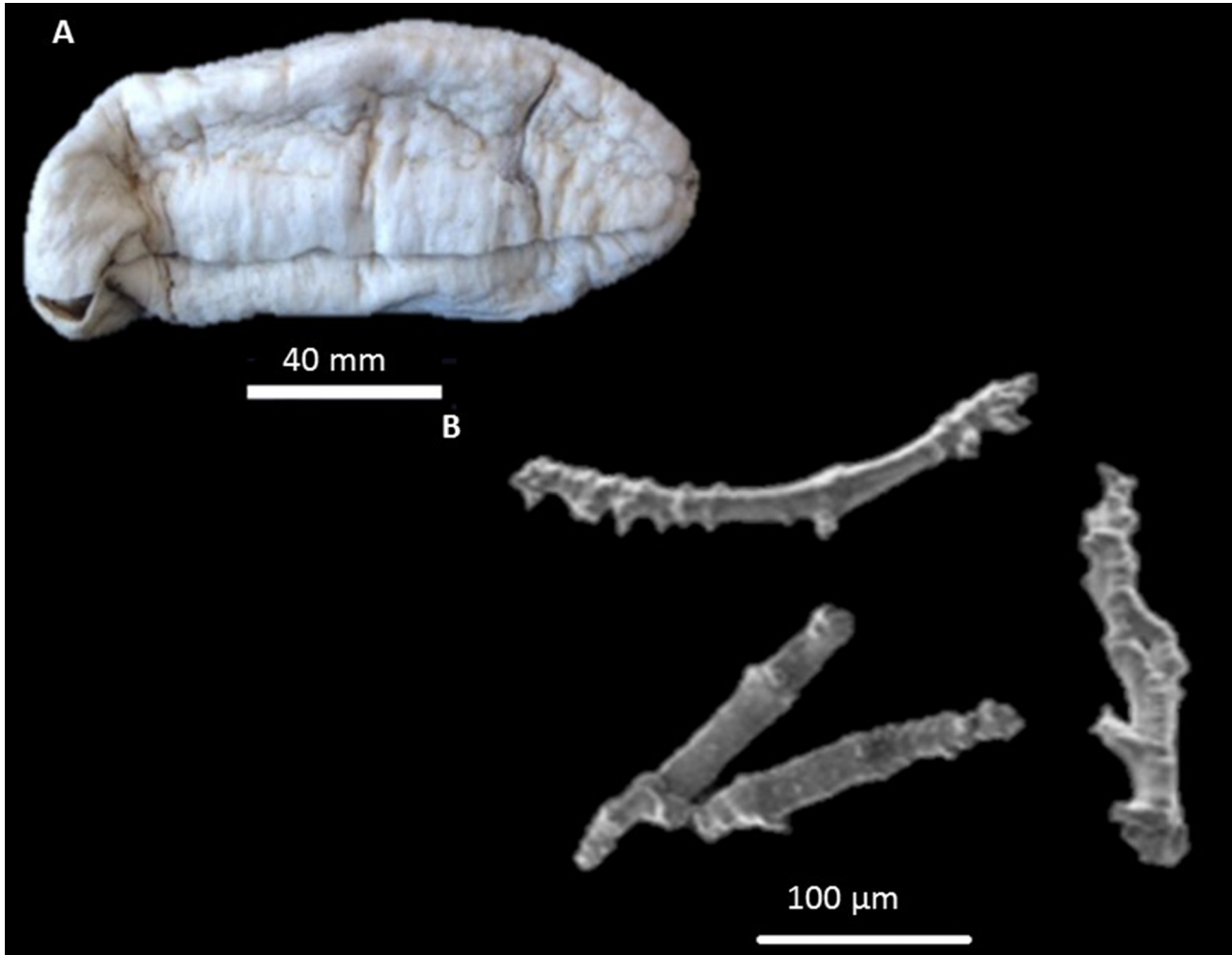
*Pseudostichopus mollis* Théel, 1886

(Figure 19)

*Pseudostichopus mollis* Théel, 1886 :169–170, pl. 10 figs. 5, 6; Branch *et al.* 1993: 55 (in key); O’Loughlin & Ahearn, 2005: 171–173 (synonymy complete).

*Pseudostichopus trachus* Sluiter, 1901: 52–53, pl. 5 fig. 1, pl. 8 fig 8.

?*Pseudostichopus mollis* Samyn & VandenSpiegel 2016:479, fig. 20.



**FIGURE 19.** *Pseudostichopus mollis* Théel, 1886. SAMC-A090930. A. Specimen (entire); B. Rods from tentacles.

**Material examined.** SAMC-A090930, Marion Island, 46°44.5' S–45°44.5' S, 37°40.9' E–37°37.4' E, 909 m, 25.VI.2001, R. Leslie, 1 spec.

**Diagnosis** (see O’Loughlin & Ahearn 2005).

**Description.** Specimen well preserved (Figure 19A). Length about 127 mm, breadth in mid-body about 60 mm. Colour off-white, both dorsally and ventrally. Tentacles retracted, mouth ventral, anus terminal, anal furrow not distinct. Tube feet retracted, minute, easily overlooked in superficial study, scattered, scarcely 1 mm in length; suckers present/absent. Tentacles, including the ones removed in a previous study, about 16, with yellowish tips. Calcareous ring low, radial plates better developed than interradial plates and about twice as high; posterior margin of the ring undulating. Polian vesicle single, sac-like. Stone canal not observed. Gonad tubules (testis) may or may not be dichotomously branched distally. Respiratory trees well branched, right one much longer than left, reaching anterior third of body; left one short, confined to posterior end. Longitudinal muscles unbranched and cylindrical. No ossicles detected in body wall, gonad and respiratory trees. Ossicles of tube feet usually absent but may include minute spinous rods, either situated at base or tip. Tentacle ossicles as straight or curved spinous rods (Figure 19B).



**Distribution.** Sub-Antarctic-Antarctic, North and South Pacific Oceans, southern Indian and East Atlantic Oceans and eastern Australian continental slope, 91–1587 m (O’Loughlin & Ahearn 2005).

**Remarks.** The genus *Pseudostichopus* was revised by O’Loughlin and Ahearn (2005) who provided a formidable list of synonyms for several of their recognized species. Comprehensive testing of these synonyms awaits further testing. According to their key, the current specimen is identified as *P. mollis* Théel, 1886 (= *P. trachus* Sluiter, 1901). Unbranched gonadal tubules characterise this species but in the current material some are distinctly branched at least once dichotomously. However the pygal furrow is indistinct and the tube feet and their distribution also indistinct. Nevertheless, the size of the specimen, its encrustation (*Globigerina*), minute tube feet, absence of ossicles in the gonad and respiratory trees, and their presence in only the tentacles and tube feet, betrays its specific identity.

### ?*Pseudostichopus* sp.

**Material examined.** SAMC-A090931, SM246, off Transkei South of Port St. Johns, 31°58.06’ S, 29°35.06’ E, biological dredge, 1640–1660 m, 27.VI.1979, 1 spec.

**Remarks.** There is another single, minute (6 mm x 2 mm) specimen, in the current material, whose generic identity cannot be determined. It appears to be juvenile and lacks gonads. It has a translucent body wall, is pinkish white in colour and densely covered with sponge spicules and some other encrustations. Its tentacles are minute and could not be counted and the distribution of its minute tube feet could not be determined. The pygal furrow, if at all present, is inconspicuous. The calcareous ring is well developed with broad anteriorly notched radial plates. There are no ossicles in the body wall and other organs. Therefore, whether the specimen represents a *Pseudostichopus* or another genus is debatable. O’Loughlin & Ahearn (2005) list only two species with a dense mat of sponge spicules, viz. *P. hyalegerus* (Sluiter, 1901) and *P. spiculiferus* (O’Loughlin, 2002). However, the first is a West Pacific form with ossicles in the papillae and pygal lobes and the latter is an Antarctic form with ossicles in the gonad. Hence more material is required for both generic and specific determination.

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