

The cucumariid holothurians of southern Africa with the erection of a new genus

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The southern African dendrochirotid holothurians of the family Cucumariidae (*sensu* Pawson & Fell, 1965) are revised and a new genus *Pseudoaslia* is erected to accommodate *Cucumaria tetracentriophora* Heding, 1938, which possesses a combination of slender forked rods and four-holed knobbed buttons as body wall deposits. In addition, *Pentacta squamosa* Cherbonnier, 1970 is declared a synonym of *Ocnus capensis* (Théel, 1886); *Cucumaria rigidapeda* Cherbonnier, 1952 and *C. corbula* Cherbonnier, 1953 are referred respectively to the genera *Trachythyone* and *Ocnus*; and *Pseudocolochirus violaceus* Théel, 1886 and a specimen tentatively referred to as *Trachythyone parva* (Ludwig, 1875) are recorded for the first time from southern Africa. These changes result in the total number of cucumariid holothurians now known from southern Africa to 10 genera and 18 species. All species are keyed, briefly described and/or discussed, and their local distributions mapped.

Die Suider-Afrikaanse dendrochirotidiese Holothuria van die familie Cucumariidae (*sensu* Pawson & Fell, 1965) word hersien en 'n nuwe genus *Pseudoaslia* word opgerig om *Cucumaria tetracentriophora* Heding, 1938, te huisves. Hierdie spesie besit liggaamswand-neerslae wat bestaan uit 'n kombinasie van dun gevurkte stafies en knopperrige knopies met vier gate. Hierbenewens word *Pentacta squamosa* Cherbonnier, 1970 as 'n sinoniem van *Ocnus capensis* (Théel, 1886) verklaar; *Cucumaria rigidapeda* Cherbonnier, 1952 en *C. corbula* Cherbonnier, 1953 word onderskeidelik verwys na die genera *Trachythyone* en *Ocnus*; en *Pseudocolochirus violaceus* Théel, 1886 en 'n eksemplaar wat tentatief na *Trachythyone parva* (Ludwig, 1875) verwys word, word vir die eerste keer uit Suider-Afrika aangeteken. Hierdie veranderinge bring die aantal Cucumariidae wat uit Suider-Afrika bekend is op 10 genera en 18 spesies te staan. Sleutels word vir alle spesies verskat en elke spesie word kortliks beskryf en/of bespreek, terwyl hul plaaslike verspreiding in kaart gebring word.

Introduction

The dendrochirotid holothurians currently include seven families: Placothuriidae Pawson & Fell, 1965; Paracucumidae Pawson & Fell, 1965; Heterothyonidae Pawson, 1970; Psolidae Perrier, 1902; Phyllophoridae Oestergren, 1907; Sclerodactylidae Panning, 1949 and Cucumariidae Ludwig, 1894. Of these only the latter four families are represented in the southern African waters, south of the tropic of Capricorn (23½°S latitude). The Psolidae, in need of revision on a world-wide basis, is poorly represented by only four species, all well documented by Deichmann (1948) — there being no subsequent additions to the family. The Sclerodactylidae was recently revised by Thandar (1989), who diagnosed one new subfamily and two new genera. The Phyllophoridae is the subject of another paper (Thandar 1990), in which one new genus is erected.

In the present paper only the Cucumariidae are dealt with, a family which includes most of the southern African dendrochirotid holothurians (18 species). The family was treated in detail by H.L. Clark (1923) and Deichmann (1948). However, there were several subsequent additions to the fauna, mainly as a result of the works of Cherbonnier (1952, 1953, & 1970). It is regrettable that Cherbonnier in his earlier papers (1952 & 1953) did not consider Panning's (1949) revision of the family which is now widely accepted, albeit with amendments.

Thus most of the southern African species of *Cucumaria* (s.e.) and *Thyone* (s.e.) have remained in these genera until recently when the writer referred several species to new genera (Thandar 1985; 1987; 1989; 1990). The remaining cucumariids, however, still require to be re-assigned and are done so here.

All the southern African cucumariids are here briefly treated, a comprehensive key is included to separate them and their local distributions are mapped.

List of southern African Cucumariidae

Colochirinae

- Aslia spyridophora* (H.L. Clark, 1923)
- Ocnus capensis* (Théel, 1886)
- O. corbulus* (Cherbonnier, 1953)
- Pentacta doliolum* (Pallas, 1766)
- P. tesselera* Cherbonnier, 1970
- Pseudoaslia tetracentriophora* (Heding, 1938)
- Pseudocnella insolens* (Théel, 1886)
- P. sinorbis* (Cherbonnier, 1952)
- P. sykion* (Lampert, 1885)
- Trachythyone crucifera* (Semper, 1869)
- T. improvisa* (Ludwig, 1875)
- T. ?parva* (Ludwig, 1875)
- T. rigidapeda* (Cherbonnier, 1952)
- ?*T.* sp.

Cucumariinae

- Pawsonellus africanus* Thandar, 1986
- Pseudocolochirus violaceus* (Théel, 1886)
- Roweia frauenfeldi frauenfeldi* (Ludwig, 1882)
- R. frauenfeldi webbi* (Thandar, 1977)
- R. stephensoni* (John, 1939)

Thyonidiinae

- Cucumella triplex* Ludwig & Heding, 1935

Material and Methods

Material for this investigation was obtained on loan from the University of Cape Town (UCT), the South African Museum (SAM), and through collection trips over several years, undertaken by the writer and the Zoology Department of the University of Durban-Westville (UDW). The specimens were studied by conventional methods outlined by previous writers, notably Fisher (1907), Deichmann (1948) and more recently, Rowe & Doty (1977). Spicules were removed with antiformin (see Mahoney 1966), washed in distilled water and illustrated with the camera lucida. For scanning electron microscopy, the spicules were passed through several changes of absolute alcohol and then transferred, together with a drop of alcohol, onto a specimen stub to which they normally stick once the alcohol evaporates. They were then sputter-coated with gold for 5 min at 30–40 mA and photographed, using the Philips SEM 500.

For the purpose of indicating local distributions and records, Day's (1967) method of using latitude/longitude degree squares, is used. This method was also employed by Clark & Courtman-Stock (1976) in their analyses of the southern African echinoderms, excluding the holothuroids, and it is hoped will become the standard system in expressing the distribution of all the southern African marine groups. The following symbols are used to indicate regions and depth records: C = Cape Province, M = Mozambique, N = Natal, SWA = Namibia, T = Transkei, i = intertidal, s = shallow (0–99 m), d = deep (100–499 m), vd = very deep (500+ m).

Family Cucumariidae Ludwig, 1894

Diagnosis: See Panning, 1949: 411; Pawson, 1982: 815.

Remarks: This family, characterized by 8–20 tentacles, a simple calcareous ring and microscopic spicules, comprises about 30 genera and approximately 170 species. Included here are 10 genera and about 18 species from southern Africa. Pawson & Fell (1965) include the Cucumariinae Ludwig, 1894; Colochirinae Panning, 1949; and Thyonidiinae Heding and Panning, 1954; within the family, the latter being the only polytentaculate family, formerly included in the Phyllophoridae by Heding & Panning 1954. All three sub-families are represented in southern Africa.

By designating *Cucumaria frondosa* Gunnerus, 1767 as the type species of *Cucumaria*, Panning (1949) restricted the genus to include only those cucumariids with 10 tentacles and simple to spinous plates as body wall deposits. On this basis Panning transferred most of the then known southern African species of *Cucumaria* to other genera. It is regrettable that Cherbonnier (1952 and 1953) did not adopt Panning's system in his descriptions of the southern African holothurians. In fact, none of the southern African species assigned to *Cucumaria* by Cherbonnier or the earlier workers, belongs to this genus. Rowe (1970) transferred one southern African species to the genus *Aslia*, while Thandar (1985, 1987, 1989 & 1990) diagnosed the genera *Roweia*, *Pseudocnella*, *Sclerothyone*, *Temparena* and *Thyonina* to accommodate eight more species, the latter genus in the family Phyllophoridae and the preceding two in the family Sclerodactylidae. The remaining species are re-assigned in this revision, which erects the genus *Pseudoaslia*, to

accommodate *Cucumaria tetracentriophora* Heding, 1938, transfers *C. rigidapeda* Cherbonnier, 1952 to the genus *Trachythyone* and *C. corbula* Cherbonnier, 1954 to *Ocnus*. In addition, *Pentacta squamosa* Cherbonnier, 1970 is relegated to the synonymy of *Ocnus capensis* (Théel, 1886) and a specimen tentatively identified as *?Trachythyone parva* is recorded.

Only 15 species of the family are present in the collections here examined. The spicules of some remaining species, not present in the collection but described by Cherbonnier (1953, 1970), are illustrated from paratypes or body wall samples of the types received from the Paris Museum of Natural History (PMNH).

Key to the subfamilies and southern African species of Cucumariidae

1. Tentacles more than 10 Thyonidiinae
..... *Cucumella triplex* Ludwig & Heding, 1935.
Tentacles 8–10 2.
2. Spicules include complete or incomplete baskets, the latter appearing as slender, symmetrical or asymmetrical, dichotomously branched rods, at least in juveniles Colochirinae 3.
Spicules exclude baskets of any form, at least in the southern African species Cucumariinae 16.
3. Spicules of inner layer of body wall mostly quadrilobular knobbed buttons or plates made up of a single layer of calcareous material 4.
Spicules of inner layer of body wall include multilobular plates, either simple (composed of a single layer of calcareous material) or complex (made up of more than one layer of calcareous material); in addition, knobbed buttons present in some species 5.
4. Superficial layer of spicules in the form of complete cup-like baskets; buttons or plates of inner layer quite regular with 10 marginal knobs; pedicels restricted to the ambulacra; interambulacra naked
..... *Aslia spyridophora* (Clark, 1923)
Superficial layer of spicules reduced baskets in the form of thin branched rods; buttons or plates of inner layer quite irregular with a varying number of marginal knobs; interambulacra with papillae (papulae)
..... *Pseudoaslia tetracentriophora* (Heding, 1938)
5. Spicules of inner layer of body wall in the form of simple, smooth, multilobular plates, rarely showing incipient knobs or nodules *Trachythyone* Studer, 1876 6.
Spicules of inner layer of body wall in the form of large, knobbed multilobular plates, often made up of several layers of calcareous material or developed into hollow fenestrated spheres, in addition, knobbed buttons present in some species 10.
6. Body wall spicules include generally incomplete baskets or large spinous crosses with bifurcate arms, in addition to smooth to knobbed plates 7.

- Body wall spicules include mostly complete baskets, though sometimes few in number, and smooth to slightly knobbed plates 8.
7. Superficial spicules in the form of large spinous crosses with bifurcate arms; plates thick, smooth to slightly knobbed, with few (up to 12) holes; no buttons or rosette-shaped granules in body wall
..... *Trachythyone crucifera* (Semper, 1869)
Superficial spicules in the form of mostly incomplete baskets with stout primary cross; other deposits include elongate, multilocular, smooth to knobbed plates, irregular knobbed buttons and minute rosette-shaped granules *Trachythyone* sp.
8. Plates huge (up to 0,8 mm), faintly knobbed at one extremity; anal region with minute, smooth to knobbed buttons or plates
..... *Trachythyone rigidapeda* (Cherbonnier, 1952)
Plates large (up to 0,4 mm), smooth and imbricating, rarely with minute nodules on surface 9.
9. Plates elongate with numerous small holes; margin of plates without nodules
..... *Trachythyone improvisa* (Ludwig, 1875)
Plates irregular with up to 12 (usually fewer) large holes; margin of plates often with incipient nodules
..... *Trachythyone ? parva* (Ludwig, 1875)
10. Body barrel-shaped; superficial spicules incomplete baskets in the form of dichotomously branched rods, absent in adults of one species; multilocular plates complex, made up of more than one layer of calcareous material, oblong or developed into fenestrated spheres; interambulacra with papillae *Pseudocnella* Thandar, 1987 11.
Body somewhat quadrangular in cross section; superficial spicules mostly in the form of complete baskets always ornamented with knobs or spines and sometimes developed into delicate reticulated bodies; multilocular plates either multi-layered or developed into hollow fenestrated spheres; interambulacra usually naked 13.
11. Small species; spicules of body wall include, besides incomplete baskets and complex knobbed plates often with a projecting 'handle', a layer of regular to irregular knobbed buttons
..... *Pseudocnella insolens* (Théel, 1886)
Medium-sized species; spicules of body wall include only incomplete baskets (in one species present in juveniles only) and complex, knobbed plates without 'handles'; buttons absent 12.
12. Incomplete baskets present as a superficial layer throughout life; knobbed plates rarely with one end denticulate; interradial papillae well developed, seldom fully retracted; colour variable, usually light, never black or very dark olive green in life.....
..... *Pseudocnella sinorbis* (Cherbonnier, 1952)
Incomplete baskets present only in juveniles (up to 25 mm long) and sometimes in anal region of slightly larger individuals; knobbed plates often (20%) with one end denticulate; interradial papillae minute, strongly retractile; colour always black or a very dark olive green in life, at least dorsally
..... *Pseudocnella sykion* (Lampert, 1885)
13. Skin thin; baskets simple with 2-4 holes, never developed into reticulated bodies; buttons usually regular with 10 marginal knobs and four holes; multilocular plates never developed into fenestrated spheres; dorsal pedicels well developed, in double rows; interambulacra naked *Ocnus* Forbes and Goodsir, 1839 14.
Skin thick, packed with spicules; baskets spiny, often developed into delicate reticulated bodies; buttons mostly irregular with more than four holes; multilocular plates often developed into hollow fenestrated spheres; dorsal pedicels papilliform, often scattered in interambulacra *Pentacta* Goldfuss, 1820 15.
14. Small species, holotype (mature female) 11 mm in length; baskets heavily nodular, complete; no regular buttons; plates often denticulate at one end
..... *Ocnus corbulus* (Cherbonnier, 1952)
Medium-sized species up to 55 mm in length; baskets often incomplete; buttons numerous, regular; plates never denticulate at one end
..... *Ocnus capensis* (Théel, 1886)
15. Medium-sized species reaching a length of 100 mm; tentacles usually of equal size; baskets often forming delicate reticulated bodies; plates lenticular or developed into hollow fenestrated spheres
..... *Pentacta doliolum* (Pallas, 1766)
Small species, less than 35 mm in length; ventral two tentacles somewhat reduced; baskets deep, cup-like, rarely forming reticulated bodies; plates large, not developed into hollow fenestrated spheres
..... *Pentacta tessellera* Cherbonnier, 1970
16. Anterior margin of calcareous ring scalloped; body wall spicules smooth to slightly knobbed plates or 'buttons', absent in large (>80 mm) specimens.....
..... *Pseudocolochirus violaceus* Théel, 1886
Calcareous ring not scalloped but radial plates with long anterior projections; body wall spicules either thick imbricating plates or spectacle-shaped rods or 'biscuits' 17.
17. Ventralmost two tentacles reduced to stubs; spicules exclusively thick imbricating multilocular plates
..... *Pawsonellus africanus* Thandar, 1986
Tentacles of equal size; spicules spectacle-shaped rods, often accompanied by a superficial layer of minute, slender rods *Roweia* Thandar, 1985 18.
18. Straight, soft, cylindrical species, uniformly black in life; ventral pedicels in 6-12 rows per ambulacrum; numerous interradial papillae (papulae); superficial spicules of body wall slender, curved rods with forked ends
..... *Roweia stephensoni* (John, 1939)

U- or barrel-shaped species, colour variable, never uniformly black; ventral pedicels in 2–5 rows per ambulacrum; no interradial papillae; superficial spicules, if present, slender curved rods with perforated ends *Roweia frauenfeldi* (Ludwig, 1882) 19.

19. Superficial spicules dense, always forming a continuous layer; anal region generally without rosettes; south and west coast form
 *Roweia frauenfeldifrauenfeldi* (Ludwig, 1882)
 Superficial spicules usually absent, if present, rare, never forming a continuous layer; anal region generally with rosettes; east coast form
 *Roweia frauenfeldi webbi* (Thandar, 1977).

Subfamily Colochirinae Panning, 1949

Diagnosis: See Panning, 1949: 411, 425.

Remarks: This subfamily is characterized by the presence of either complete or reduced baskets, at least in the juvenile stage. It is represented in southern Africa by 14 species distributed over six genera, of which *Pseudoaslia* is here erected to accommodate *Cucumaria tetracentriophora* Heding, 1938.

Genus *Aslia* Rowe, 1970

Ludwigia (partim) Panning, 1949: 431 (preoccupied: Pawson 1963: 28).

Aslia Rowe, 1970: 685; Clark & Rowe 1971: 202.

Diagnosis: See Rowe 1970: 685.

Type species: *Cucumaria lefevrei* Barrois, 1882 (by original designation Rowe 1970: 685).

Remarks: *Aslia* was erected by Rowe (1970) to accommodate those species with complete baskets and four-holed buttons, formerly included in the preoccupied genus *Ludwigia* by Panning (1949). The genus at present includes scarcely five species, all referred to it by Rowe. In southern Africa the genus is represented by only *A. spyridophora* (H.L. Clark).

Aslia spyridophora (H.L. Clark, 1923) (Figures 1a, 3, 14a)

Cucumaria spyridophora H.L. Clark, 1923: 410; Deichmann 1948: 347, pl. 19, figs. 6–9.

Ludwigia spyridophora Panning, 1949: 431.

Ocnus spyridophorus Panning, 1971: 30.

Pentacucumis spyridophora Day, 1974: 192; Branch & Branch 1981: 274, 1 text-fig.

Aslia spyridophora Rowe, 1970: 685 (passim).

Diagnosis: See H.L. Clark, 1923: 410; Deichmann 1948: 347.

Previous records: C(33/18/i, 34/22/i to 34/25/i, 32/27/i), N(30/30/i).

Material examined: C(34/20/i,s to 34/27/i,s); T(31/29/i), N(30/30/i, 28/32/i), 70 spec.

Distribution: From Lambert's Bay on the south-west coast

to Perrier's Rock, south of Cape Vidal, on the east coast. Figure 16.

Habitat: Sand, pebbles, broken shells, rock. Usually crypto-faunal or in soft conglomerates of sand, shells and stones.

Remarks: This is a small species (Figure 1a), the size range of the present material being 17–40 mm. Although H.L. Clark (1923) described the species as being red in life, the life colouration is grey, greyish-brown or dark maroon with the suckers often rust-coloured. Alcohol-preserved specimens usually fade to white or off-white. As is characteristic of the genus, the midventral radial and adjacent interradial plates of the calcareous ring are fused (Figure 3j).

The baskets (Figures 3a, e & 14a) (0,03–0,06 mm), are remarkably well developed, especially in the anal region of young individuals, often with four smaller holes alternating with the four primary ones. The buttons (Figures 3b & 14a) (0,045–0,095 mm), are quite regular with 10 marginal knobs, but occasionally a few may be smooth or show some tendency towards the formation of large (0,07–0,17 mm), knobbed plates with up to 16 holes. The pedicel walls are strengthened by perforated rods (up to 0,22 mm), while perforated plates occur in the suckers (Figure 3f). Typical end plates are absent. The tentacles and introvert contain rods, those of the introvert are longer with usually wavy margins and few large central holes and several small ones at the expanded ends (Figure 3g & h).

In the form of its buttons this species comes close to the local *Cucumaria tetracentriophora* Heding, 1938 but differs in its form, absence of interradial papillae (papulae), unequal size of the tentacles and the presence of true baskets. Hence the two species are not congeneric.

The writer could not find any definite record of the species occurring west of Still Bay but Day (1974) records it extending as far as Saldanha Bay on the west coast. Several specimens from the UCT collection are listed as *Pentacucumis spyridophora* but, as far as it could be ascertained, this combination has been published twice only (Day 1974; Branch & Branch 1981). The genus *Pentacucumis* was erected by Deichmann (1957) for *Cucumaria planci* (Brandt) which clearly belongs in *Ocnus*. Hence *Pentacucumis* has long been relegated to the synonymy of *Ocnus*.

Genus *Ocnus* Forbes and Goodsir, in Forbes 1841

Ocnus Forbes, 1841: 229; Panning 1949: 437; (non Semper 1868).

Ludwigia (partim) Panning, 1949: 431 (preoccupied: Pawson 1963: 28).

Pentacucumis Deichmann, 1957: 13.

Diagnosis: See Panning 1949: 437.

Type species: *Cucumaria lactea* Forbes and Goodsir, 1839 (by subsequent designation Rowe 1970).

Remarks: There is some confusion regarding the type species of this genus. Panning (1949) lists *Ocnus brunneus* Forbes, 1841 as type species although Mortensen (1927) indicated that both *lactea* and *brunneus* are synonymous of which *lactea*, being the older, has priority. In the same paper Panning places *lactea* in *Ludwigia*, a name long preoccupied. Rowe (1970) designates *lactea* as the type



Figure 1 Southern African cucumariid holothurians. (a) *Aslia spiridophora* (Clark); (b) *Pentacta doliolum* (Quoy & Gaimard); (c) *Pseudostella tetracentriophora* (Heding); (d) *Pseudocnella insolens* (Théel); (e) *P. sinorbis* (Charbonnier); (f) *P. tyllon* (Lampert).

species of *Ocnus* and, following Mortensen, regards *brunneus* as a junior subjective synonym of *lactea*. However, Panning (1971), unaware of Rowe's paper more or less contemporary with his, now designates *planca* as the type species of *Ocnus* while listing *brunneus* as a synonym of *planca*. If both *lactea* and *brunneus* are indeed synonymous, as Mortensen suspected, then Rowe's designation of the type species must be accepted. The genus *Ocnus* is represented in southern Africa by only *O. capensis* (Théel) and *O. corbularis* (Charbonnier), both from the south-west Cape Province.

Ocnus capensis (Théel, 1886) (Figures 4, 5 & 14b)

Cucumaria capensis Théel, 1886: 62, pl. 5, fig. 2; Ludwig 1888: 20, 1236; H.L. Clark 1923: 412; Ludwig & Heding 1935: 171, text-fig. 38; Deichmann 1948: 348, pl. 19, figs. 10-12; Charbonnier 1952: 488, pl. 42, figs. 1-13.

Ocnus capensis Panning, 1949: 437; Clark & Rowe 1971: 180 (dist.), pl. 20, fig. 6.

Pseudocnus capensis Panning, 1962: 70 (passim).

Pentacta squamata syn. nov. Charbonnier, 1970: 280, fig. 1 (e-m).

Diagnosis: See Théel 1886: 62; Deichmann 1948: 348.

Previous southern African records: CCR/14/L 29/16/d, 33/18/d, 34/18/d, 35/22/d).

Material examined: C(34/18/d), 1 spec. plus fragment of body wall of holotype of *Pentacta squamata* Charbonnier, 1970.

Description: Specimen (WCD 219-G) attenuated at both ends; length along ventral surface 33 mm. Baskers (0.022-0.036 mm) with 1-4 (usually 2) holes, or reduced to nodular crosses (Figures 4a & 14b). Bases (Figures 4b & 14b) (0.06-0.15 mm), usually quadrilobular with 10 marginal knobs. Plates huge (up to 0.60 mm) with 7-37 holes (Figure 4c). Invert with knobbed deposits of varying shape and size (Figure 4d).

Local distribution: In deep waters of S.W. Cape Province from Port Nolloth to Mossel Bay, 155-400 m. *P. squamata*



Figure 3 Southern African cucumariid holothurians (continued). (a) *Trachythone crucifera* (Sämpel); (b) *T. rigidopoda* (Cherbonnier); (c) *Pantomedusa africana* Thunberg; (d) *Rowley frauenfeldi frauenfeldi* (Ludwig); (e) *R. frauenfeldi webbi* (Thunberg); *R. stephensoni* (John).

came from off Cape Peninsula, 110 m. Figure 16.

General distribution: S.W. Atlantic Ocean, E. Indies, Philippine Islands, China and S. Japan.

Habitat: Rock, khaliki and black sand, gravel and nodules.

Remarks: The specimen is so similar in form and spicules to the holotype described by Thiel (1886) that there is little doubt as to its identity. However, its spicules also approach those of *Pantomedusa squamosa* Cherbonnier, 1970 (Figure 5), also from deep water of the west coast, that one is inclined to consider the two forms as being conspecific. It is regrettable that Cherbonnier based his new species on an obvious juvenile measuring 8 mm. His description and drawings of the spicules of *P. squamosa* differ but little from that of *O. capensis* (redescribed by him in 1952), except that the baskets, which he calls plates in *P. squamosa* (Figure 5a), are always complete and the buttons (Figure 5b)

are rare. It is probable that with age the baskets become reduced to crosses and the buttons increase in size and number. Not unlike *O. capensis*, *P. squamosa* is also described as grey with a thin body wall. Although a direct comparison of the body wall spicules of *O. capensis* and *P. squamosa* proved inconclusive, the known spicules are identical in both species (cf. Figures 4d & 5d). Hence, *P. squamosa* is here relegated to the synonymy of *O. capensis*.

Ouria capensis has not yet been taken from shallow waters of the southern African coast. Clark & Rowe (1971), however, record the species as occurring in the warm shallow waters of the West Pacific region. As the southern African denudochiroids are highly endemic, it is unlikely that *O. capensis* originally described from the cold deep Cape waters, is so widely distributed in the warm waters of the West Pacific region. The writer hence agrees with Cherbonnier's (1952) assertion that the West Pacific forms are not identical with Thiel's species. A direct comparison of these forms with the holotype is therefore urgent.

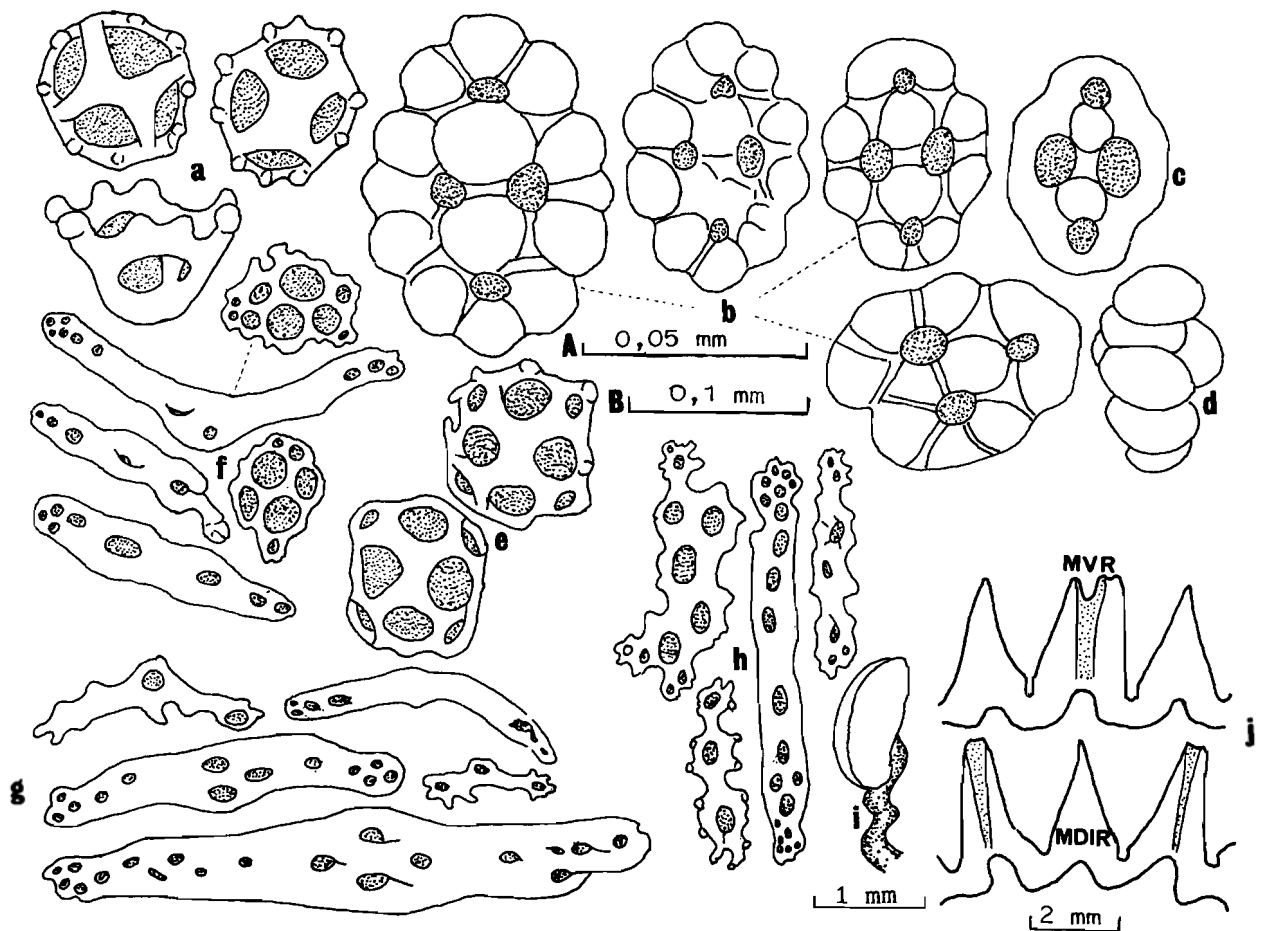


Figure 3 *Aslia spyrizophora* (Clark). Spicules and other internal structures. (a) Baskets from dorsal body wall; (b) buttons from dorsal body wall; (c) smooth button; (d) button from side; (e) baskets of juvenile; (f) pedicel plates and rods; (g) tentacular rods; (h) introvert plate and rods; (i) madreporite; (j) parts of calcareous ring. (MVR — midventral radial plate; MDIR — middorsal interradiar plate) (a–g Scale A; h Scale B).

***Ocnus corbulus* (Cherbonnier, 1953) comb.nov.** (Figure 6)

Cucumaria corbula Cherbonnier, 1953: 594, fig. 1 (1–23); Day, Field & Penrith 1970: 83.

Diagnosis: See Cherbonnier 1953: 594.

Record: C(34/18/?i/s).

Material examined: Dorsal body wall fragment of holotype.

Distribution: Known only from type locality (False Bay), 0–3 m.

Habitat: Rock.

Remarks: This species is based only on the holotype, a mature female, which measured about 11 mm. As the specimen contained ripe eggs it is possible that the species does not reach any appreciable size. Since Cherbonnier does not give the size of the holotype or the dimensions of the spicules these are here deduced from his drawings and the fragment of the type received from the PMNH. The baskets (0,04–0,05 mm) have a strongly nodular rim and smooth to nodular base pierced by 4–8 holes (Figure 6a). The buttons (Figure 6c) (0,10–0,18 mm) are rounded, multilocular and composed of more than one layer of calcareous material. The elongate knobbed plates (Figure 6b) (up to 0,165 mm

long) usually have one end unthickened and denticulate. Such plates are reminiscent of those of *Cucumaria insolens* Théel but the absence, in *O. corbulus*, of interradiar papillae and any regular buttons, and the presence of only complete baskets are noteworthy characters. The species is perhaps not common since it has not been taken again although its type locality has been thoroughly investigated by the UCT surveys.

Genus *Pentacta* Goldfuss, 1820

Actinia Pallas, 1766: 152 (preoccupied).

Pentacta Goldfuss, 1820: 177; H.L. Clark 1923: 416; Deichmann 1930: 179; 1941: 98; 1948: 351; Cherbonnier 1952: 489; Panning 1971: 38; Clark & Rowe 1971: 201.

Colochirus Troschel, 1846: 64; Ludwig 1887: 1229; Sluiter 1901: 97; Panning 1949: 439 (non *Colochirus* Panning 1971).

Cercodemas Selenka, 1867: 343.

Diagnosis: See Deichman 1948: 351; Panning 1971: 38.

Type species: *Actinia doliolum* Pallas, 1766 (designated Goldfuss, 1820: 177, according to Deichmann 1948: 352).

Remarks: Four species, referable to *Pentacta*, have so far

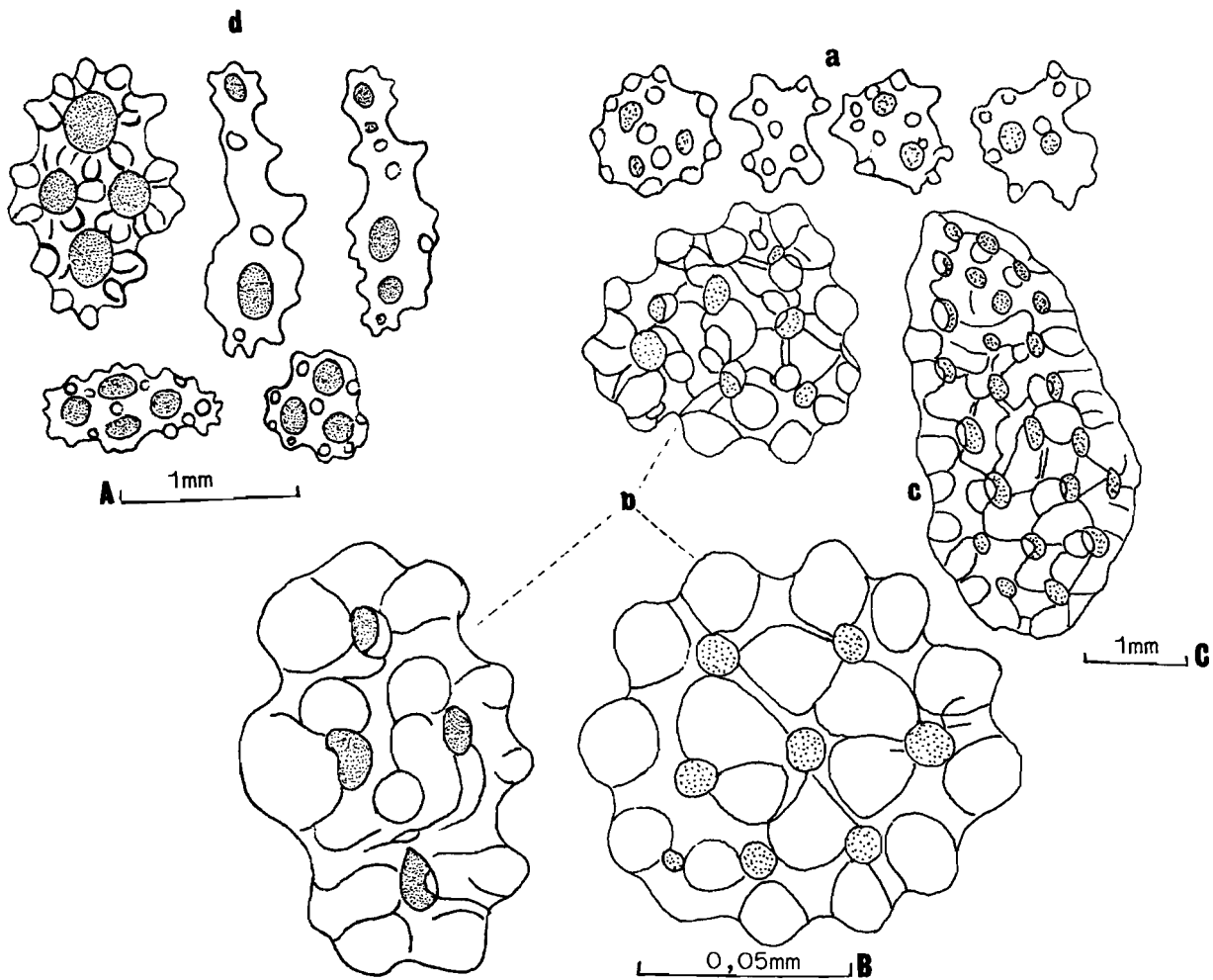


Figure 4 *Ocnus capensis* (Théel). Spicules of adult. (a) Baskets from body wall; (b) knobbed buttons from body wall; (c) large plate from body wall; (d) invert spicules. (d Scale A; b Scale B; c Scale C).

been reported from southern Africa but possibly not all are valid. *Pentacta squamosa* Cherbonnier is here considered a young *Ocnus capensis* (Théel) and the sympatry of *Colochirus minutus* Macnae and Kalk, 1958 (non Ludwig) and *P. tessellera* Cherbonnier, 1970 suggest that they may be conspecific. Since the local *C. minutus* was determined by Dr Cherbonnier, who is also the authority to *P. tessellera*, the latter species is here retained but no further reference is made to *C. minutus* except in Remarks under *P. tessellera*.

***Pentacta doliolum* (Pallas, 1766) (Figures 1b, 7 & 14c)**

Actinia doliolum Pallas, 1766: 152, pl. 2, figs. 10–12.

Pentacta doliolum Goldfuss, 1820: 177; H.L. Clark 1923: 416; Deichmann 1930: 180; 1948: 352, pl. 20, figs. 1–6; Stephenson, Stephenson & du Toit 1937: 359, 363, 381; Cherbonnier 1952: 490, pl. 43, figs. 1–15; Day 1959: 545; 1974: 192; Morgans 1959: 426; 1962: 301, 307, 311; Day, Field & Penrith 1970: 83; Panning 1971: 38, 39 (passim); Branch & Grindley 1979: 169; Branch & Branch 1981: 247, 1 text-fig.

Colochirus doliolum von Marenzeller, 1874: 303; Ludwig 1887: 13; ? Panning 1949: 439, text-figs. 35, 36.

non *Colochirus doliolum* Ludwig, 1888: 818 (= *Pentacta australis* Ludwig.)

non *Colochirus doliolum* delle Chiaje, 1828: 67, 71, 81, pl. 35, figs., Grube 1840: 39; Sars 1857: 120, pl. 1, figs. 18–23 (= *Ocnus planci* Brandt).

Cucumaria discolor Théel, 1886: 64, pl. 4, fig. 8; Vaney 1908: 428; Britten 1910: 239; H.L. Clark 1923: 410; Deichmann 1930: 180; Bright 1937: 63.

Diagnosis: See Deichmann 1948: 352.

Previous southern African records: SWA (26/15/i,s); C(32/18/?i; 34/18/i,s; 34/21/i; 33/25/i); T(31/29/i).

Material examined: SWA(26/15/i), C(28/16/i,s to 29/16/i,s; 32/18/i,s to 34/18/i,s), 118 spec.

Distribution: From Luderitz in South West Africa to Mngazana estuary in the Transkei, 0–52 m. Also reported from East Africa and Ceylon but these records are doubtful. Figure 16.

Habitat: Sand, shell, rock, ?limestone, *Phyllochaetopterus*. Cryptofaunal or in rock crevices, from lower balanoid zone to 52 m.

Description: Largest specimen 75 mm in length (Cherbonnier 1952 records maximum size as 95 mm). Calcareous ring (Figure 7i) with interradial plates slightly shorter than radial plates. Baskets (Figure 7a & j, 14c) rarely incomplete,

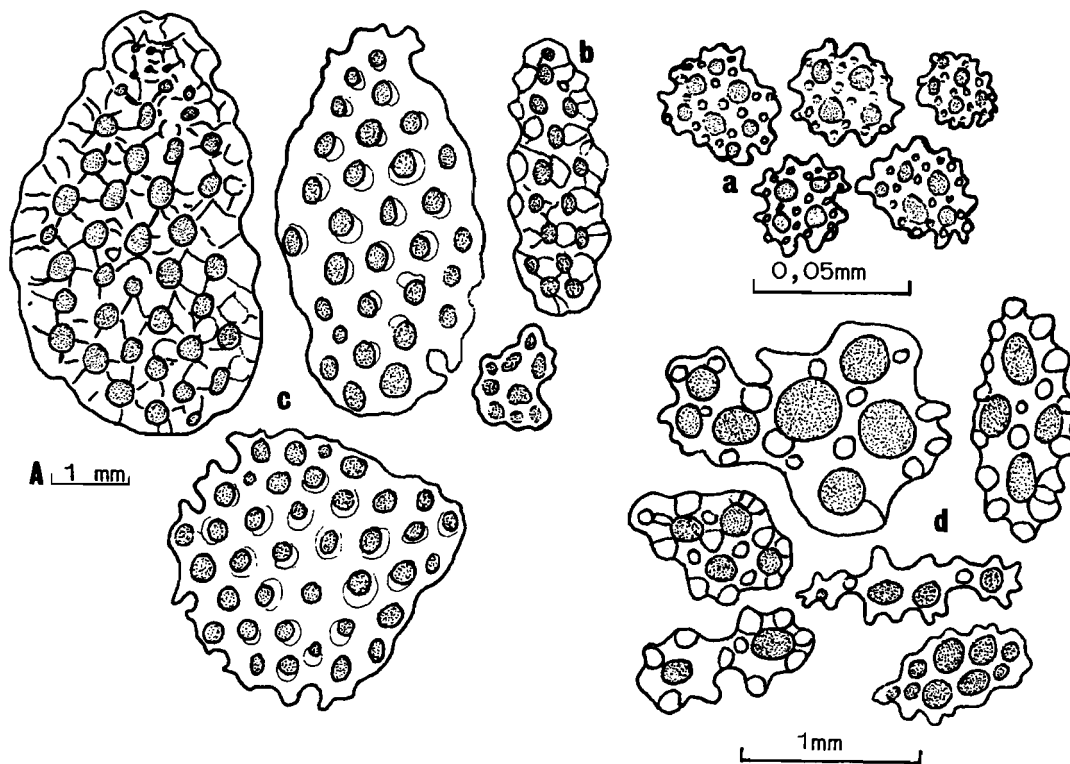


Figure 5 *Ocnus capensis* (Théel). Spicules of juvenile (= holotype of *Pentacta squamosa* Cherbonnier). (a) Baskets from ventral body wall; (b) knobbed button from ventral body wall; (c) plates from ventral body wall; (d) introvert spicules. (b & c Scale A).

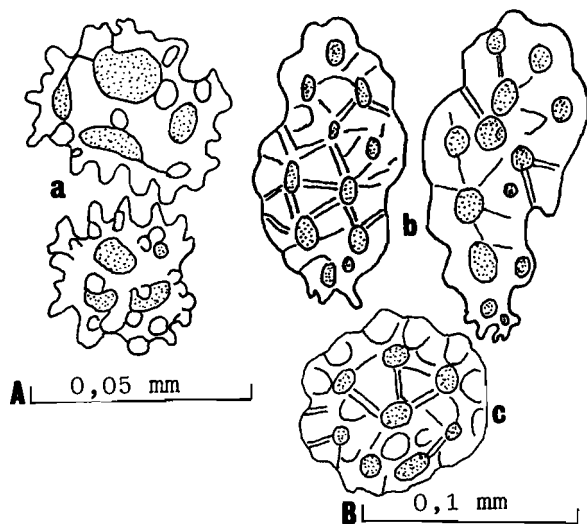


Figure 6 *Ocnus corbulus* (Cherbonnier). Body wall spicules. (a) Baskets; (b) denticulate plates; (c) knobbed button. (a Scale A, b & c Scale B).

always with numerous spiny projections and with 3–7 holes, simple, 0,022–0,042 mm in juveniles, modified to reticulated bodies up to 0,06 mm in adults. Buttons 0,04–0,09 mm, of two types: with small knobs (Figure 7b) and an average length of 0,06 mm or with large knobs (Figure 7c) and average length of 0,09 mm. Plates as large lenticular bodies or heavy fenestrated spheres, 0,50–0,60 mm. Introvert with mostly irregular buttons with tiny knobs and knobbed plates (Figure 7g).

Remarks: In a 10-mm specimen, the smallest in the present

material, a full complement of spicules are present. However, the small knobbed buttons are rare and the plates are few in number. In addition there are numerous scale-like plates in especially the anal region, which, owing to secondary calcium deposition, appear to be the probable precursors of the large lenticular plates of adults.

Although Pallas' (1766) description and figures of the type specimen of *Actinia doliolum* are poor, there is little doubt that his specimen was not the same species here described. A full history of Pallas' species, given by von Marenzeller (1874), was updated and summarized by Deichmann (1948) and therefore it was thought unnecessary to repeat it here.

The closest relatives of *P. doliolum* appear to be *P. robustoides* (Ekman 1918) and *P. australis* (Ludwig 1875) from which it differs in the type of baskets and the presence of huge lenticular plates or fenestrated spheres.

P. doliolum has also been reported from Ceylon by Pearson (1903) and from East Africa by Helfer (1912). However, since it is typically a cold shallow water species, not yet found north of Port St. Johns (C 32°S), it is probably endemic to southern Africa. Its occurrence in tropical East Africa and Ceylon therefore is dubious. Perhaps both Pearson's and Helfer's specimens are misidentified.

***Pentacta tesselera* Cherbonnier, 1970 (Figures 8 & 14d)**

Pentacta tesselera Cherbonnier, 1970: 282, fig. 2 (A–O).

Diagnosis: See Cherbonnier 1970: 282.

Records: M(23/35/i,s; ? 26/33/i), the latter record refers to *Colochirus minutus*.

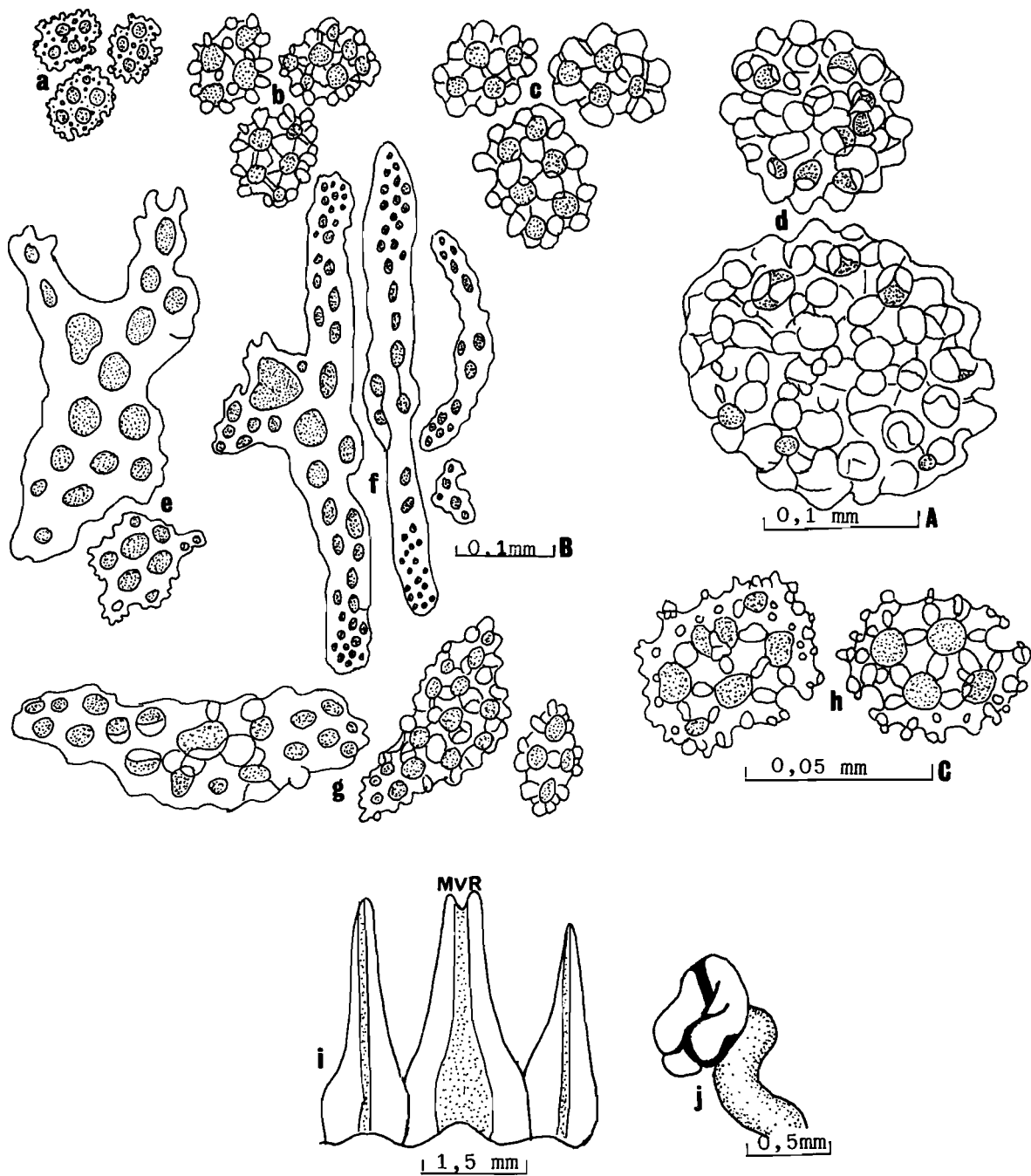


Figure 7 *Pentacta doliolum* (Pallas). Spicules and other internal structures. (a) Baskets from dorsal body wall; (b) small knobbed buttons from dorsal body wall; (c) large knobbed buttons from dorsal body wall; (d) fenestrated spheres from dorsal body wall; (e) dorsal pedicel plates; (f) tentacle rods; (g) introvert spicules; (h) baskets (enlarged); (i) part of calcareous ring; (j) madreporite. (MVR — midventral radial plate). (a–g Scale A; f Scale B; h Scale C).

Material examined: M(23/35/s), 47 spec. plus paratype EcHh 1485.

Distribution: Known with certainty only from type locality, Morrumbene, Mozambique, 3–5 m; *C. minutus* came from Inhaca Island.

Habitat: Sand, shells, leaf detritus.

Remarks: Cherbonnier (1970) based this species on the holotype and 32 paratypes. Since the specimens at hand are part of the same collection and correspond well to the paratype received from the PMNH, there is no doubt as to

their identity. The holotype, probably the largest specimen selected by Cherbonnier, measured only 33 mm. Since female specimens measuring 20–25 mm contain ripe eggs, it does not seem likely that the species reaches any appreciable size. According to Cherbonnier, the dorsal pedicels arise from large conical warts disposed in quincunx but these are not at all obvious in the specimen at hand. Contrary to Cherbonnier's observations, the plates of the calcareous ring, including the ventro-medians, are weakly fused and no accessory polian vesicle was observed in any dissected specimen. The scales of the holotype measured up to 0,9 mm, hence are much longer than those here illustra-

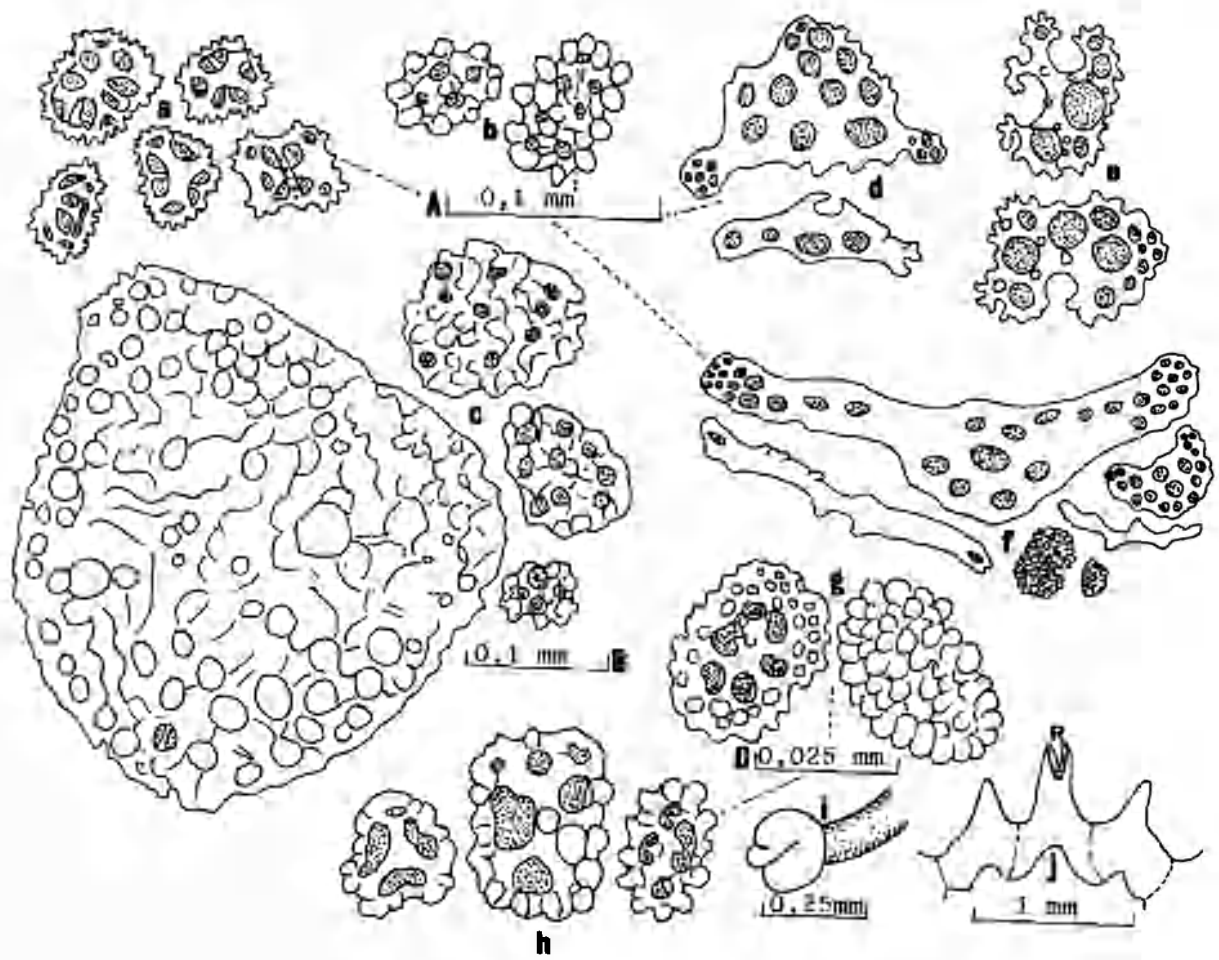


Figure 8 *Pentacta tessellera* Cherbonnier. Spicules and other internal structures. (a) Baskets from dorsal body wall; (b) small knobbed buttons from ventral body wall; (c) plates from dorsal body wall; (d) dorsal pedicel plates; (e) ventral pedicel plates; (f) tentacle spicules; (g) tentacle rosettes (enlarged); (h) introvert spicules; (i) madreporite; (j) part of calcareous ring. (R — radial plate). (a & b, d–f Scale A; c Scale B; g & h Scale C).

ted. With the exception of the above differences, clearly individual variations, the present material corresponds well to the description of the holotype.

The live colouration of the species is said to be olive and purple but alcohol-preserved specimens are greyish to brown with violet blotches interspersed with small greyish specks. The baskets (Figures 8a & 14d) (0,03–0,06 mm) are deep with 4–8 primary holes, rarely some baskets are flat and up to 0,08 mm in diameter. The buttons (Figures 8b & 14d) range in size from 0,03–0,13 mm but the commonest ones are of the same size as the baskets. The scales (Figures 8c & 14d) are of varying shape, multi-layered, measuring 0,10–0,48 mm in length. The tentacle spicules (Figure 8f & g) include rods, plates and rosettes up to 0,035 mm long, while the introvert contains minute buttons (0,02–0,03 mm) with usually an X-shaped base and a knobbed rim (Figure 8h).

Cherbonnier compared his species with several other small Indo-West Pacific species of the genus and concluded that it is not conspecific with any of the well-known forms. However, it appears that *P. tessellera* is closely related to or even conspecific with *P. minuta* (Ludwig) from northern Australia. Although Ludwig's (1875) description of the

spicules of his species is rather brief to provide a definite conclusion, both species appear identical in their size, shape, distribution of podia, and in the form of the baskets and pedicel deposits. Panning (1949) redescribed *P. minuta* (wrongly credited to Fabricius) and provided good illustrations of the deposits. Judging from this as well there appears to be little difference between the two species. Furthermore, *P. minuta* was reported as *Colochirus minutus* from Inhaca Island, Mozambique, by Macnae & Kalk (1958) from material identified by Dr Cherbonnier. It is a pity that Cherbonnier (1970) makes no reference to this in his remarks under *P. tessellera*. However, since Cherbonnier has had the opportunity to examine both species, *P. tessellera* is here retained until a direct comparison between the two is undertaken.

Genus *Pseudoaslia* gen. nov.

Diagnosis: Medium-sized, barrel-shaped forms, up to 110 mm long; tentacles 10, of more or less equal size; pedicels strongly retractile, in 3–5 rows per ventral ambulacrum, 2–3 rows per dorsal ambulacrum; dorsal interambulacra with numerous scattered papillae/papulae. Calcareous ring simple,

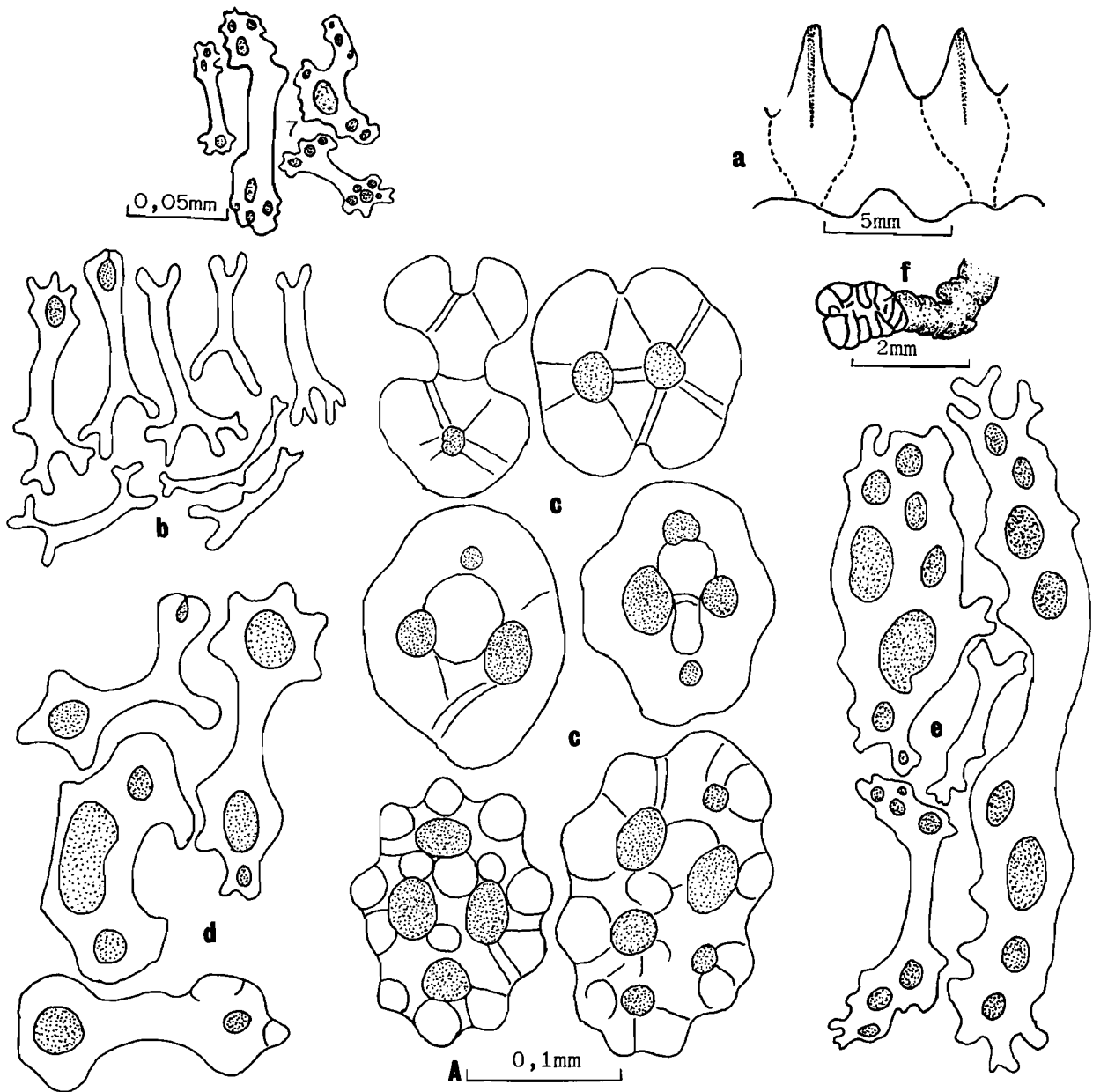


Figure 9 *Pseudoaslia tetracentriophora* (Heding). Spicules and other internal structures. (a) Part of calcareous ring; (b) slender forked rods (? reduced baskets) from dorsal body wall; (d) pedicel spicules; (e) tentacle spicules; (f) madreporite; (g) introvert spicules (b–e Scale A).

without posterior bifurcations to the radial plates; radial and interradial plates solidly fused together. Body wall spicules a superficial layer of minute, slender, slightly curved, forked rods and a deeper dense layer of irregular, usually four-holed knobbed buttons or plates, rarely some spicules developed into simple multilocular plates.

Type species: *Cucumaria tetracentriophora* Heding, 1938 (designated herein).

Etymology: The generic name is derived from the combination of pseudo (Gr. false) and *Aslia*. The gender is feminine.

Remarks: This genus is erected to accommodate only the type species as no similar form has yet been described. *Pseudoaslia* most closely resembles, not *Aslia*, but *Pseudocnella* from which it differs in the form of the superficial layer of rods (? reduced baskets) and the simplicity of the

buttons or plates of the inner layer. Although it resembles *Aslia* in possessing mostly quadrilocal plates there are many significant differences which suggest that both genera are not closely allied.

***Pseudoaslia tetracentriophora* (Heding, 1938)** (Figures 1c, 9, 14e)

Cucumaria tetracentriophora Heding, 1938: 631, text-figs. 1–5; Deichmann 1948: 343, pl. 18, figs. 4–12; Cherbonnier 1952: 487, pl. 41, figs. 18–22, pl. 42, figs. 14–28.

Ludwigia tetracentriophora Panning, 1949: 431.

Pentacucumis tetracentriophora Day, Field & Penrith 1970: 83.

Diagnosis: As for the genus.

Previous records: C(33/25/i, 33/27/i, 33/28/i), T(32/28/i).

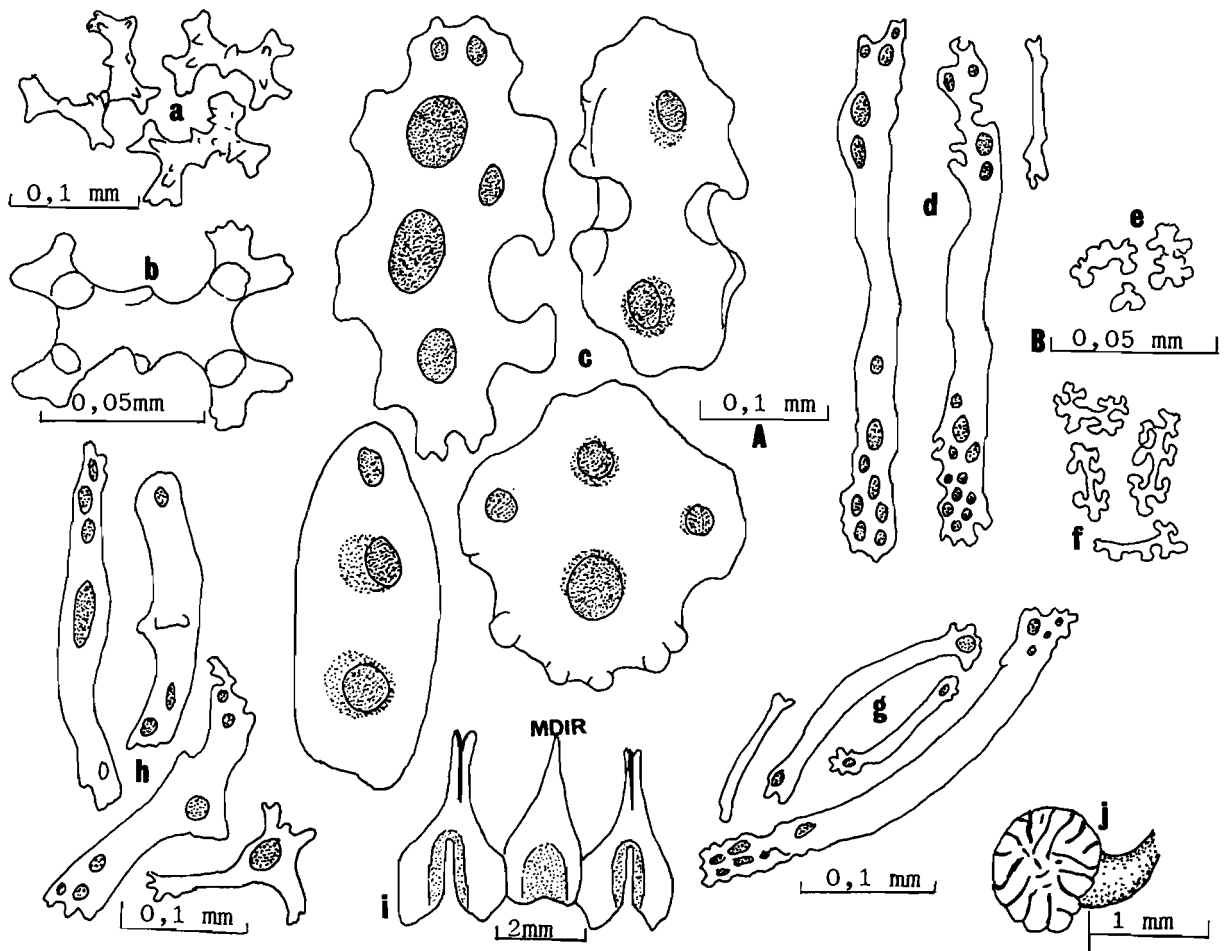


Figure 10 *Trachythyone crucifera* (Semper). Spicules and other internal structures. (a) Crosses from anal region; (b) cross (enlarged); (c) plates from anal region; (d) introvert rods; (e) branched rods (rosettes) from introvert; (f) rosettes from tentacles; (g) tentacle rods; (h) pedicel rods; (i) part of calcareous ring; (j) madreporite. (MDIR — middorsal interradiar plate). (c & d Scale A, e & f Scale B).

Material examined: C(34/18/i, 34/20/i, 34/22/i, 34/24/i, 33/27/i, 33/28/i), 17 spec.

Distribution: False Bay to Qolora, north of East London. Figure 16.

Habitat: Usually found burrowed in sand together with *Roweia frauenfeldi* and *Pseudocnella sinorbis*.

Remarks: The present specimens range in size from 12–110 mm and correspond well to the description of the species given by Heding (1938), Deichmann (1948) and Cherbonnier (1952). Although both Heding and Cherbonnier describe the anal 'teeth' as large, these are, however, difficult to demonstrate or are absent. The calcareous ring (Figure 9a) is well calcified and not 'cartilaginous' as described independently by both Heding and Deichmann, who probably worked on old material.

As in many cucumariids, this species also shows no remarkable change in the form of the spicules with the age of the animal. The calcareous deposits of a 12-mm specimen are more or less identical to those of a 110-mm specimen. However, in juveniles, the formation of knobbed plates from smooth, X-shaped rods is evident. Such rods first develop holes as a result of the fusion of their dichotomous branches to form simple smooth buttons which later become thickened to form knobs, and with further addition of calcareous

material, some of the buttons develop into large multilocular knobbed plates. A single juvenile may show all stages in the development of plates with up to 12 perforations and still contain the full complement of spicules. Hence, in this species at least, the spicules are deployed early in development and once formed are retained throughout life.

The rods ('baskets') (Figures 9b & 14e) are minute (0,024–0,077 mm) with usually forked but occasionally perforated ends. The buttons (Figure 9c & 14e) measure 0,045–0,140 mm and are usually four-holed but often quite irregular with 1–2 holes and with some tendency towards the formation of knobbed plates of the *Pseudocnus* type. The marginal knobs are variable in size and number and never consistently 10. The pedicel rods are spectacle-shaped (Figure 9d), 0,06–0,12 mm, with digitated or swollen ends. The tentacle deposits (Figure 9e) are up to 0,35 mm long while the introvert rods (Figure 9g) are slightly smaller, up to 0,25 mm.

Although most of the plates of *P. tetracentriophora* are four-holed like those of the species of *Aslia*, this is where the resemblance between them ends. The form of the body, the equal size of the tentacles, the presence of interambulacral papillae (papulae) and the type of superficial deposits separate this species sharply from those included in *Aslia* and warrant a higher taxonomic status for it. The species

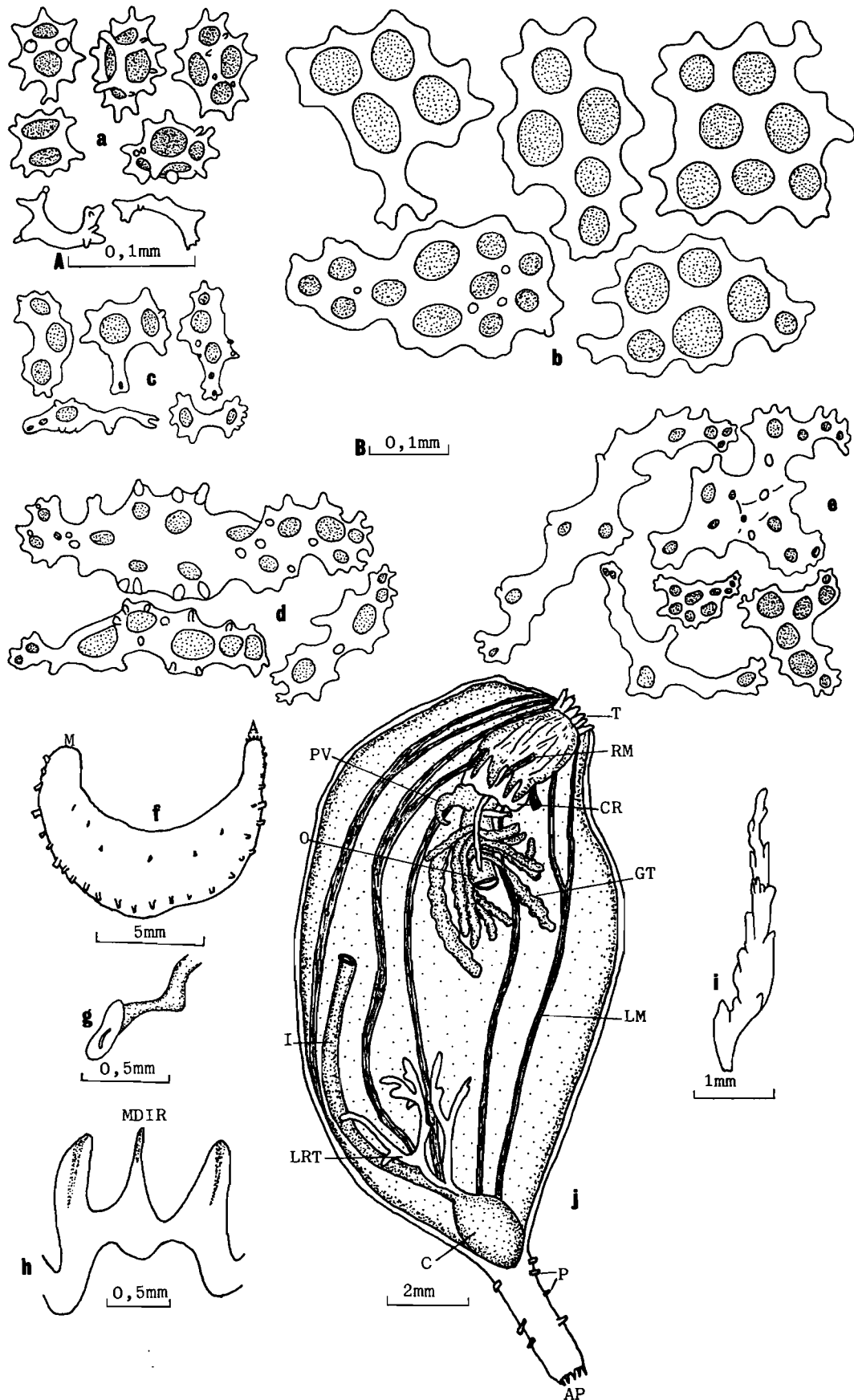


Figure 11 *Trachythyone ? parva* (Ludwig). Spicules and other structures. (a) Complete and incomplete baskets from body wall; (b) smooth to feebly nodulated plates from body wall; (c) pedicel plates and rods; (d) introvert plates; (e) tentacle plates and rods; (f) entire specimen; (g) madreporite; (h) part of calcareous ring; (i) tentacle; (j) dissected specimen. (A — anus; AP — anal papillae; C — cloaca; CR — calcareous ring; GT — gonadal tubule; I — intestine; LM — longitudinal muscle; LRT — left respiratory tree; m — mouth; MDIR — middorsal interradial plate; O — oesophagus; P — pedicels; PV — polian vesicle; RM — retractor muscle; T — tentacle). (a Scale A; b–e Scale B).

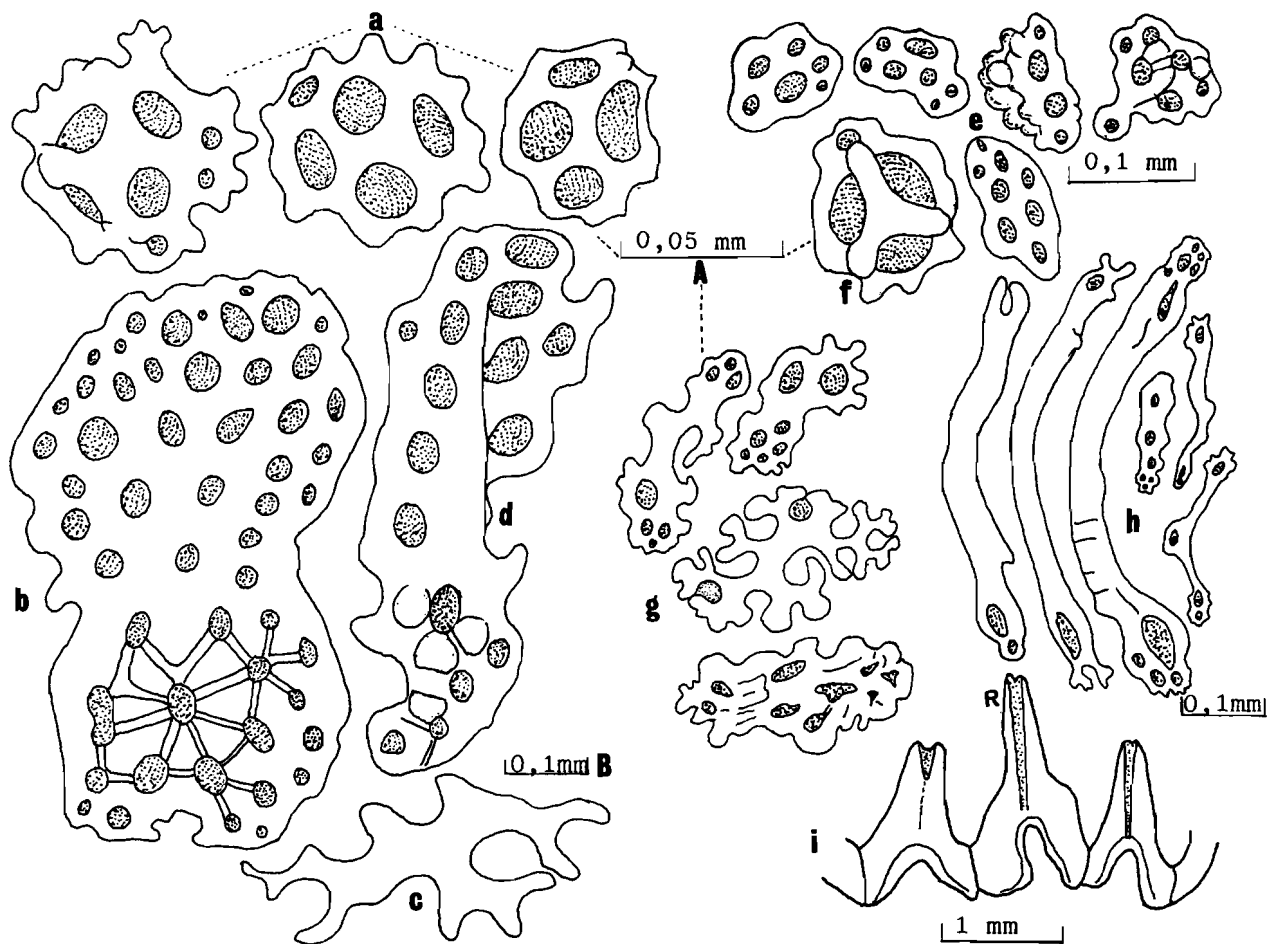


Figure 12 *Trachythyone rigidapeda* (Cherbonnier). Spicules and part of calcareous ring. (a) Baskets from ventral body wall; (b) plate from dorsal body wall; (c) developing plate; (d) plate from ventral body wall; (e) minute anal plates; (f) basket from anal region; (g) introvert spicules; (h) tentacle spicules; (i) part of calcareous ring. (R — radial plate). (a, & e–g Scale A; b–d Scale B).

comes quite close to *Pseudocnella sinorbis* (Cherbonnier) from which it is quite indistinguishable externally. However, its spicules suggest that it is not congeneric with *P. sinorbis*, the similarities are probably consequent upon a similar mode of life. In fact both species occupy the same ecological niche.

Genus *Pseudocnella* Thandar, 1987

Semperia Lampert, 1885: 250 (preoccupied).

Cucumaria (partim) H.L. Clark 1923: 409; Deichmann 1948: 342; Cherbonnier 1952: 477 (non de Blainville 1830).

Pseudocnus (partim) Panning, 1949: 422; 1962: 58.

Stereoderma (partim) Panning, 1949: 422.

Ocnus (partim) Panning, 1949: 437.

Pseudocnella Thandar, 1987: 288.

Diagnosis: See Thandar 1987: 142.

Type species: *Cucumaria sinorbis* Cherbonnier, 1952 (by original designation).

Remarks: This genus was erected by Thandar (1987) to accommodate the type species, *Cucumaria sinorbis*, *C. insolens* Théel, 1886 and *C. sykion* (Lampert, 1885) from southern Africa and *C. syracusana* Grube, 1840 from the Mediterranean. Although classified in the subfamily Colo-

chirinae, because of the presence of incomplete baskets as superficial deposits, the genus appears to be most closely related to *Pseudocnus* of the subfamily Cucumariinae, differing from it in the presence of interradian papillae, incomplete baskets, and knobbed plates made up of more than one layer of calcareous material. The fact that most species of this genus were once classified in *Pseudocnus*, indicates that the separation of the two subfamilies on the basis of the presence or absence of baskets in the superficial layer of the integument, is artificial and cannot be upheld. One is therefore tempted to unite the subfamilies until more satisfactory characters are found to reassemble related genera. It might be preferable to consider the inner layer of deposits since this may be least subject to adaptive change, rather than the more superficial layer. However, the two subfamilies are here tentatively retained for the sake of stability of nomenclature.

Pseudocnella insolens (Théel, 1886) (Figures 1d & 14f)

Cucumaria insolens Théel, 1886: 70, pl. 4, fig. 5. H.L. Clark 1923: 411; Cherbonnier 1952: 480, pl. 39, figs. 1–23.

Semperia insolens Ludwig, 1887: 1231, 1236.

Cucumaria sykion (partim) Deichmann, 1948: 346, pl. 19, fig. 1 & ? 2.

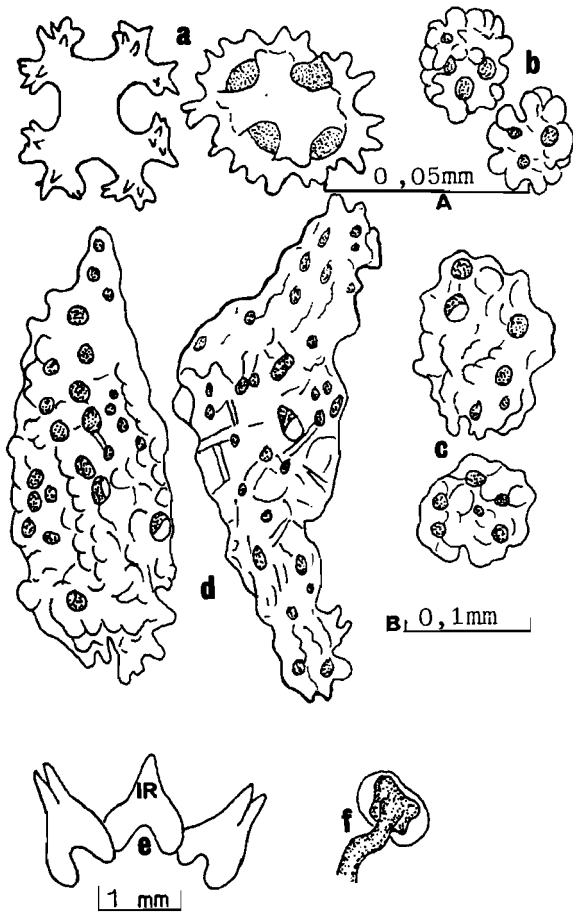


Figure 13 *Trachythyone* sp. Spicules and other structures. (a) Cross and basket from body wall; (b) minute knobbed plates (rosettes) from body wall; (c) large knobbed plates from body wall; (d) elongate plates; (e) part of calcareous ring; (f) madreporite. (IR — interradial plate). (a & b Scale A; c & d Scale B).

?*Pseudocnus dubiosus africanus* Panning, 1962: 64, figs. 7–9.

Pseudocnella insolens Thandar, 1987: 289, figs. 1a, 2, 5a–c (synonymy).

Diagnosis: See Théel, 1886: 70; Cherbonnier 1952: 480

Records: SWA (26/15/i), C(29/16/i to 29/17/i; 33/17/i,s to 34/21/i,s; 33/25/i to 33/26/i).

Distribution: From Luderitz (Namibia) to Port Elizabeth, 0–40 m. Figure 17.

Habitat: Stones, coarse and khaki sand, shells and *Phyllochaetopteris* debris.

Remarks: This species is well described by Théel (1886) and Cherbonnier (1952). Thandar (1987) indicated the dimensions of the spicules and the changes in these with the age of the animal. It is the only brood-protecting species in the genus and easily separated from its congeners.

***Pseudocnella sinorbis* (Cherbonnier, 1952)**
(Figures 1e & 14g)

Cucumaria sykion Deichman, 1948: 346 (partim), pl. 19, figs. 3 & 4.

Cucumaria sinorbis Cherbonnier, 1952: 482, pl. 38, figs. 1–13; pl. 39, figs. 24–31.

Pseudocnella sinorbis Thandar, 1987: 291, fig. 1d, 3, 5e & f) (synonymy).

Diagnosis: See Cherbonnier 1952: 482.

Records: C(33/18/?i to 33/28/i); N(31/30/i, 27/32/i); M(24/35/i).

Distribution: Table Bay to Jangamo, south of Inhambane (Mozambique); intertidal. Figure 17.

Habitat: Cryptofaunic, usually buried in sand; also found in soft conglomerates of stones, sand, shells, etc.

Remarks: This species is also well described by Cherbonnier (1952) and can be readily separated from the almost totally sympatric *P. sykion*, by its light colouration and the presence throughout life of incomplete baskets in the outer layer of the integument. Thandar (1987) commented on the ecological isolation of both species.

***Pseudocnella sykion* (Lampert, 1885) (Figures 1f & 14h)**

Semperia sykion Lampert, 1885: 250.

Cucumaria sykion Théel, 1886: 266; H.L. Clark 1923: 412; Deichman 1948: 346 (partim).

Cucumaria jägeri Lampert, 1885: 249.

Pseudocnus dubiosus jägeri Panning, 1952: 126, figs. 6–9.

Pseudocnus dubiosus jaegeri Panning, 1962: 66, figs. 10 & 11.

Pseudocnella sykion Thandar, 1987: 292, figs. 1b, c, 4 & 5a (synonymy).

Diagnosis: See Thandar, 1987: 292.

Records: C(34/18/i to 33/28/i); T(32/28/i, 31/29/i); N(29/30/i to 31/30/i, 27/32/i); M(26/32,33; 24/35/i);

Distribution: Cape Agulhas to Jangamo, south of Inhambane, Mozambique; intertidal. Figure 17.

Habitat: Common under stones, in pools and in rock crevices.

Remarks: This species has been commented upon in detail by Thandar (1987) who amended its diagnosis and thus requires no further comments.

Genus *Trachythyone* Studer, 1876

Trachythyone Studer, 1876: 453; Panning 1949: 426 (synonymy); 1964: 162.

Leptopentacta (partim) Panning, 1966: 56 (non H.L. Clark 1938: 453, Deichmann 1941: 92).

Diagnosis: See Panning, 1949: 426; 1964: 162.

Type species: *Trachythyone muricata* Studer, 1896 (by subsequent designation Panning 1949).

Remarks: Panning (1964) suspects that the type species is conspecific with *Cucumaria* (= *Trachythyone*) *parva* Ludwig, 1875. If this is so then *C. parva*, which has priority, must replace *T. muricata* as type species of this genus.

Trachythyone, as diagnosed by Panning in 1949, was cosmopolitan, containing about 20 nominal species. Since then several new species have been described. However, in 1966, Panning transferred several species, including one

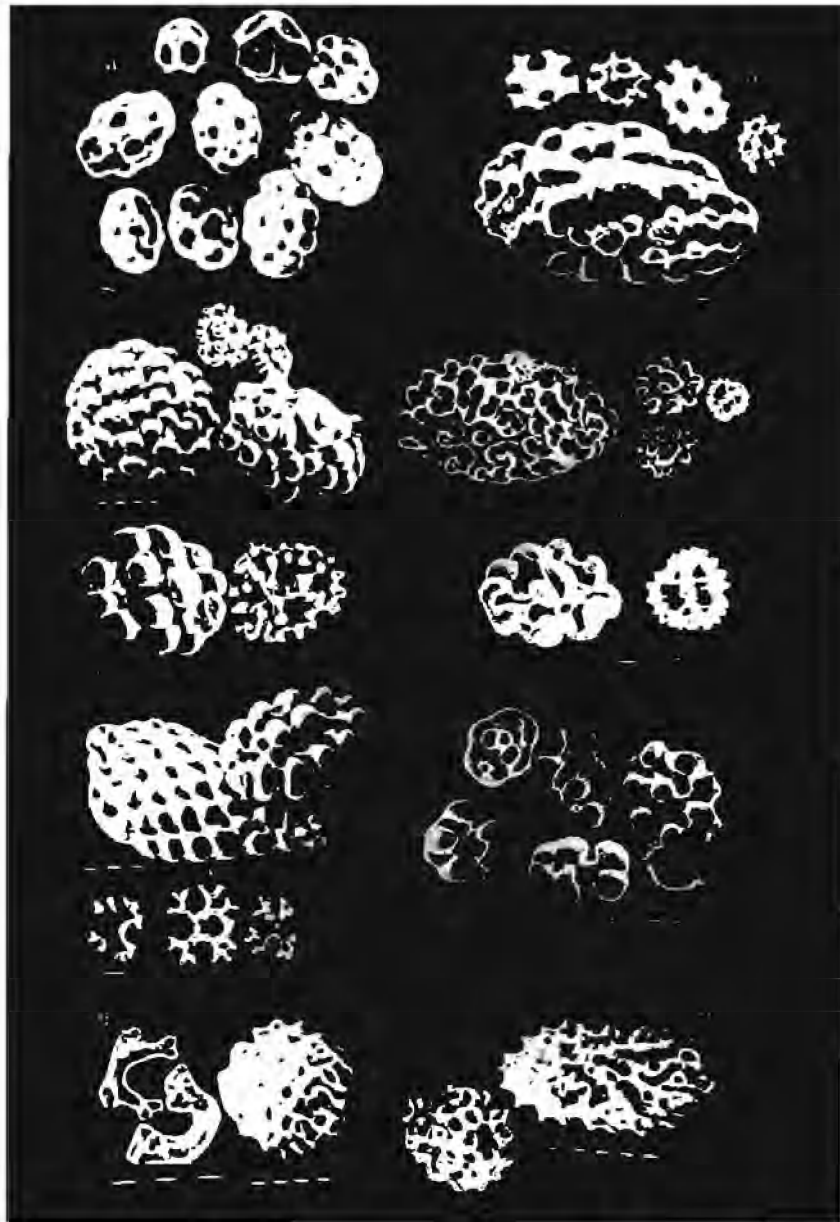


Figure 14 SEM micrographs of body wall spicules of southern African cucumariid holothurians. (a) *Aslia spyridophora* (Clark); (b) *Ocnus capensis* (Théel); (c) *Penacta dotiolum* (Pallas); (d) *P. tessellera* Cherbonnier; (e) *Pseudoastia tetracentriophora* (Heding); (f) *Pseudocnella insolens* (Théel); (g) *P. sinorbis* (Cherbonnier); (h) *P. sykion* (Lampert). (Scale bars = 10 μ m).

southern African form, to *Leptopentacta* H.L. Clark, 1938. However, Rowe (pers. comm.) is of the opinion that *Trachythyone* is probably a cold water genus while *Leptopentacta* is distributed in warmer waters. Since three of the four southern African nominal species, probably referable to *Leptopentacta*, are from cooler temperate waters, they are here classified in *Trachythyone*.

***Trachythyone crucifera* (Semper, 1869)**

(Figs. 2a, 10 & 15a)

Cucumaria crucifera Semper, 1869: 121, pl. 1, fig. 1; Théel 1886: 100; Ludwig 1887: 19, pl. 1, figs. 5–11; Lampert 1896: 60; Deichmann 1948: 343, pl. 18, figs. 1–3; Kalk 1958: 216, 238; Macnae & Kalk 1958: 107, 119; 130.

Trachythyone crucifera Panning, 1949: 427, fig. 15; Cherbonnier 1955: 164, pl. 45, figs. k–v; Clark & Rowe 1971: 182 (dist.); Panning 1971: 37; Day 1974: 192.

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

Trachythyone cruciferae (sic) Branch & Branch 1981: 247, 1 text-fig.

Diagnosis: See Deichmann 1948: 343; Panning 1949: 427, 1964: 170.

Previous southern African records: N(30/30/f); M(26/32,33/f).

Material examined: N(30/30/f, 30/31/s), 3 spec.

Local distribution: Mozambique to Natal as far south as Scottsburgh, 0–3m. Figure 17.

General distribution: Predominantly West Indian Ocean. Also reported from the Bay of Bengal.

Habitat: Rock and sand.

Remarks: This characteristic Indian Ocean species has long been known from the east coast of Africa. Its Natal record is



Figure 15 SEM micrographs of body wall spicules of southern African cucumariid holothurians. (a) *Trachythyone crucifera* (Semper). (b) *T. ? parva* (Ludwig); (c) *T. rigidapeda* (Cherbonnier); (d) *Pawsonellus africanus* Thandar; (e) *Roweia frauenfeldi frauenfeldi* (Ludwig); (f) *R. frauenfeldi webbi* (Thandar); (g) *R. stephensoni* (John). (Scale bars = 10 μ m).

that of Deichmann (1948) based on two specimens collected at Umwalumi (S. of Durban) by the UCT survey. The same specimens were here re-examined together with another more recent specimen (Figure 2a) collected at Durban. The maximum size of the present material is 63 mm and the life colouration of the species beige with darker pedicels. One of the UCT specimens is quite abnormal in that it has only four ambulacra. This abnormality was overlooked by Deichmann. Deichmann briefly diagnosed the species and remarked that the crosses vary in the northern and southern forms. However, a comparison of the crosses with those of the holotype figured by Semper (1869), shows the variations to be insignificant.

The spicules are better developed ventrally. The crosses (Figures 10a,b & 15a) are 0,06–0,11 mm in length and the plates (Figures 10c & 15a) 0,14–0,30 mm. These dimensions correspond well to those given by Panning (1964) for

the lectotype. The plates have 3–12 holes and usually an irregular margin while those from the anal region may be slightly knobbed. The pedicel deposits (Figure 10h) are typical, up to 0,26 mm long. The tentacle and introvert deposits include both elongate (Figure 10d & g) and branched, rosette-like rods (Figure 10e & f) up to 0,02 mm long.

The species was referred to *Trachythyone* by Panning in 1949. However, in 1964 he revised the genus but hesitated to include in it *T. crucifera* which, according to him, occupies an exceptional position within the Cucumariidae. Panning likens the spinous crosses to the spinous deposits of *Ohshimella mauritiana* Heding and Panning. According to him, *T. crucifera* occupies an intermediate position between the Cucumariidae and the currently known Sclerodactylidae and thus separating these families as is done at present demands a degree of evolutionary convergence that is difficult to comprehend. The writer agrees with Panning in as

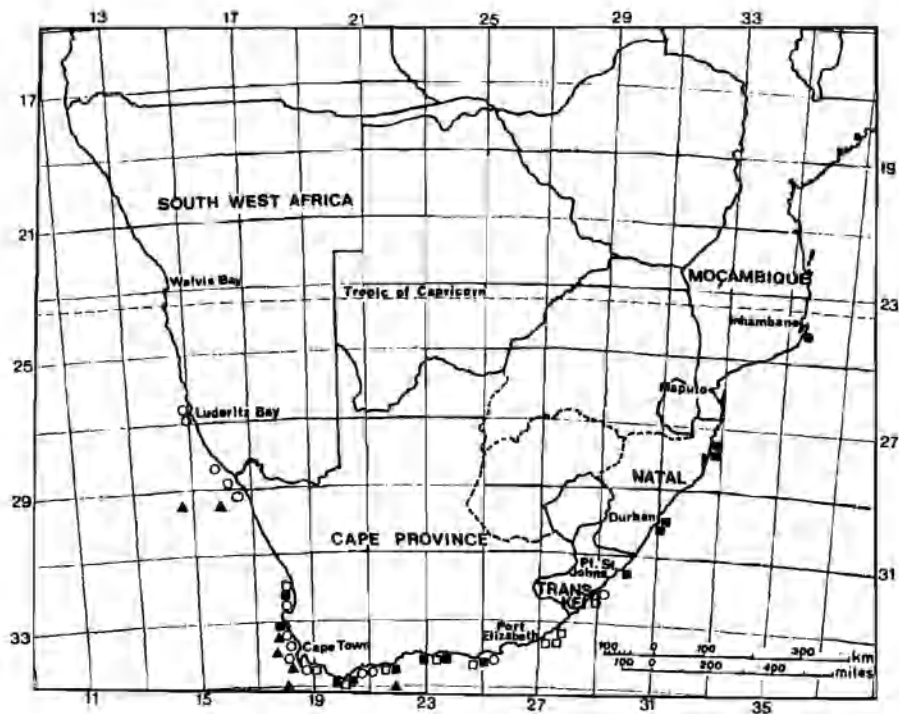


Figure 16 Distribution of common southern African cucumariid holothurians based on actual records. ■ *Aslia spyridophora* (Clark); ▲ *Ocnus capensis* (Théel); ○ *Pentacta doliolum* (Pallas); ● *Pentacta tessellera* Cherbonnier; □ *Pseudoaslia tetracentriophora* (Heding).

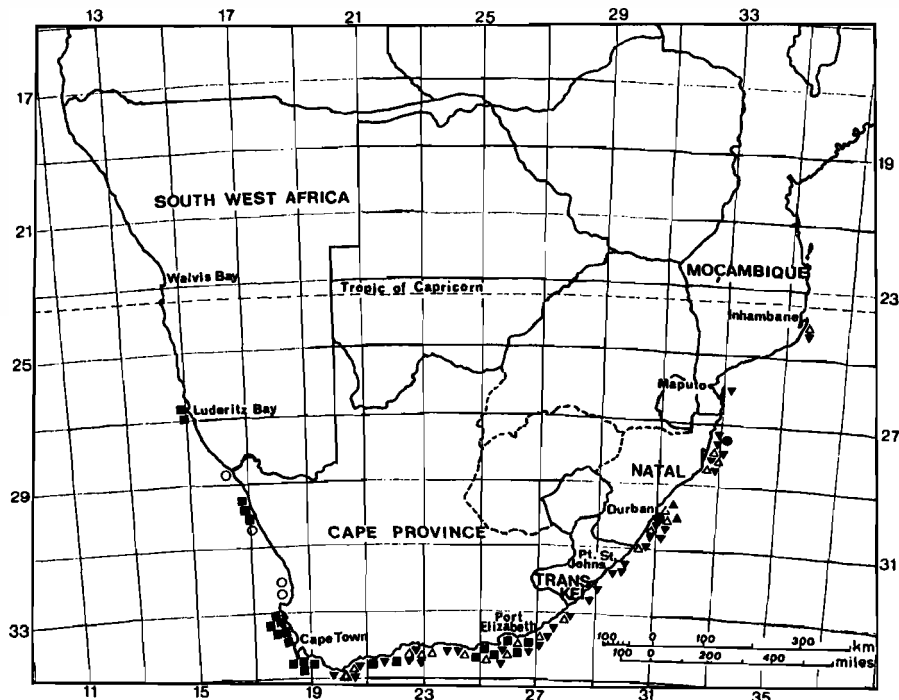


Figure 17 Distribution of common southern African cucumariid holothurians based on actual records (continued). ■ *Pseudocnella insolens* (Théel); △ *P. sinorbis* (Cherbonnier); ▼ *P. sykion* (Lampert); ● *Trachythyone crucifera* (Semper); ○ *T. rigidapeda* (Cherbonnier).

much as the spinous deposits of *T. crucifera* and *O. mauritiana* are similar. Further, both species are typically West Indian Ocean in distribution and in both, the spicules are not as densely packed as they are in typical species of *Trachythyone*. However, there exist several other totally unrelated species with spinous rods and the presence of such deposits in these species cannot be explained in any other

way but by convergent evolution. The two West Indian Ocean forms that come to mind here are *Holothuria parva* Lampert and an as yet undescribed species of *Orphnurgus*. These species must have developed similar deposits quite independently and this may also be true of *T. crucifera* and *O. mauritiana* since they differ not only in tentacle number but also in their calcareous rings. The spinous deposits of *O.*

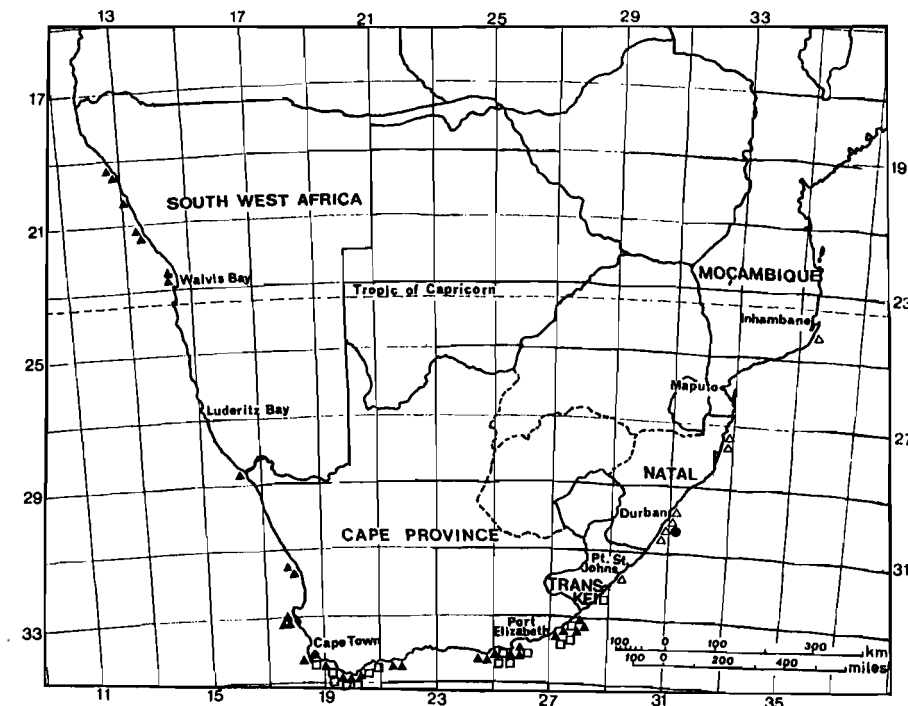


Figure 18 Distribution of common southern African cucumariid holothurians based on actual records (continued). ● *Pawsonellus africanus* Thandar; ▲ *Roweia frauenfeldi frauenfeldi* (Ludwig); △ *R. frauenfeldi webbi* (Thandar); □ *R. stephensoni* (John).

mauritiana may be modified tables, such modifications can be clearly demonstrated in some phylloporids with spinous rods, notably in species of the subgenus *Phyllophorella*. Since the assumption that the spinous crosses of *T. crucifera* are modified baskets has no foundation, Panning is perhaps correct in asserting that *T. crucifera* should be assigned to a monotypic genus. However, more evidence is needed, especially from a study of juveniles, before this is done.

Trachythyone improvisa (Ludwig, 1875)

Cucumaria improvisa Ludwig, 1875: 85, pl. 6, fig. 10; Théel, 1886: 107; H.L. Clark 1923: 414; Deichmann 1948: 349.

Trachythyone improvisa Panning, 1949: 426.

Diagnosis: See Ludwig 1875: 85; Deichmann 1948: 349.

Record: C(38/25).

Material examined: None.

Distribution: Known only from Algoa Bay.

Remarks: This species, based on two specimens presumably from Algoa Bay, has not been found since its description. Both Théel (1886) and Deichmann (1948) speculated that since the species resembles the mediterranean *T. elongata* (Düben and Koren), Ludwig's specimens were mislabelled and probably came from Algier Bay. However, Panning (1966) states that such an error was not possible since Ludwig's description was based on material brought into the Hamburg Museum from Algoa Bay before 1870, while material from the African Mediterranean coast was only received by the Museum after 1900. As no type material exists Panning recommends that the species should be disregarded.

Regrettably no specimen in the present collections is referable to *T. improvisa*. The species that comes closest to it is perhaps *T. rigidapeda* described below. However, the baskets of this latter species are somewhat flat and the plates, although long and multilocular, are often complex, knobbed at one end and constricted in the middle, quite unlike those illustrated for *T. improvisa*.

At what depth *T. improvisa* was taken is not recorded. The study of the southern African deep water shelf fauna has only recently started receiving systematic attention and it is possible that *T. improvisa* would be found again. The species should therefore be left to stand until a thorough knowledge of the shelf fauna is forthcoming.

Trachythyone ?parva (Ludwig, 1875) (Figures 11 & 15b)

Cucumaria parva Ludwig, 1875: 7, fig. 12; 1887: 19; 1898: 25, pl. 1, figs. 14–18; Lampert 1889: 833; Perrier 1905: 29, pl. 2, fig. 1, pl. 3, figs. 16–19; Ekman 1925: 92, fig. 20.

Semperia parva Lampert, 1885: 152.

Trachythyone parva Panning, 1949: 428, fig. 16; 1964: 162, figs. 2–4.

Diagnosis: Ludwig, 1875: 7; Panning 1949: 428.

Previous southern African record: None.

Material examined: C(34/17/vd), 1 spec.

Description: Specimen (Figure 11f) small, U-shaped. Length 18 mm. Colour, in alcohol, white. Tentacles 10, of equal size and feebly branched (Figure 11i). Anal papillae 10, longer than pedicels. Pedicels cylindrical, mostly restricted to ambulacra in double rows, a few also scattered in odd interambulacrum, especially orally.

Calcereous ring (Figure 11h) simple, radial and interradial

plates delicately fused and of equal size; anterior projections of radials blunt. Polian vesicle elongate, slightly to left of dorsal mesentery (Figure 11j). Stone canal short, slightly curved; madreporite ovoid, not lodged in mesentery (Figure 11g). Gonad in two tufts, each consisting of 6–7 unbranched tubules, larger tubules with developing eggs (Figure 11j). Respiratory trees short, each consisting of two main trunks, each trunk with a few short sac-like diverticulations. Baskets few, flat rarely reduced to cross-shaped rods; plates large, imbricating. Baskets (0,05–0,10 mm) with usually a nodular primary cross and rim (Figures 11a & 15b). Plates (0,15–0,40 mm) with 1–12 holes and an uneven, slightly nodular margin (Figures 11b & 15b). Pedicel rods and plates (Figure 11c) three-holed or spectacle-shaped. Tentacles with similar deposits (Figure 11e). Introvert with finely perforated plates of varying shapes and with jagged margins (Figure 11d).

Local distribution: off south-west Cape Province, 3157–3257 m.

General distribution: Antarctic, Subantarctic.

Remarks: The single specimen is tentatively identified with the well known *T. parva* (Ludwig), a species widely distributed throughout the Antarctic–Subantarctic region. Since it is a deep water form which may not be conspecific with *T. parva* it is here briefly described. It differs from the typical *T. parva* in possessing equal, poorly branched tentacles, sparingly distributed interradial podia and in the slender, finely nodular crosses of the baskets. However, Panning (1964) has shown that *T. parva* is very variable in the distribution of pedicels and the type of spicules, while R. Perrier (1905) has described and illustrated baskets with nodular (spinose) primary crosses, similar to those found in the present specimen.

If the specimen is indeed *T. parva* its occurrence off the southern African coast, from which not a single certain Southern Ocean holothurian has yet been recorded, is puzzling. However, the specimen was taken from a considerable depth where the water is as cold as in the shallow Subantarctic region.

In many respects the specimen shares affinities with *T. bouvetensis* (Ludwig and Heding, 1935) from Bouvet Island; *T. macphersonae* Pawson, 1962 and *T. bollonsi* (Mortensen, 1925), both from New Zealand; *T. fallax* Cherbonnier, 1958 from Sierra Leone and *T. crassipeda* Cherbonnier, 1961 from the coast of Brazil.

It differs from *T. bouvetensis* in the equal size of the tentacles, the lack of a deep notch in the radial plates, the occurrence of nodular crosses and the presence of plates with only a few holes. In *T. macphersonae* and *T. bollonsi* the ventral tentacles are reduced, the baskets are of a different type, and the plates small with few holes. Although *T. crassipeda* has 10 equal tentacles the baskets frequently have a five-armed primary cross and the pedicel and tentacular deposits are different. In *T. fallax* the two ventral tentacles are reduced, the calcareous ring and tentacle deposits are different and only smooth plates occur in the body wall. Since *T. parva* is highly variable, some of the above species, separated on minute differences, may possibly be conspecific or consubspecific with it.

Trachythyone rigidapeda (Cherbonnier, 1952) comb.nov. (Figures 2b, 12 & 15c)

Cucumaria rigidapeda Cherbonnier, 1952: 485, pl. 41, figs. 1–17.

Diagnosis: See Cherbonnier, 1952: 485.

Previous record: Type locality only, C(30/16/d).

Material examined: C(28/14/d, 30/16/d, 32/17/d), 13 spec.

Distribution: off Orange River Mouth to Lambert's Bay, 120–185 m. Figure 17.

Habitat: Green mud, clay or sand.

Remarks: Cherbonnier's description, based on a single 98-mm specimen, is complete except that the dimensions of the spicules are not given and the introvert and anal spicules not examined. The largest specimen in the present series measures 105 mm along the ventral surface.

The baskets (Figures 12a, f & 15c) (0,04–0,08 mm) are flat and often develop accessory holes as a result of fusion of tips of two or more nodules of the rim. The plates (Figures 12b–d, 15c) are huge (0,33–0,80 mm), usually thickened and faintly knobbed at one end. They may be either simple with 6–55 large holes, or multi-layered with numerous reduced holes, both types occurring in the same specimen. Minute (*c.* 0,1 mm) button-like plates with 5–8 holes are present in the anal region (Figure 12e). The introvert contains minute (0,05–0,09 mm) crinkly rosette-shaped, often knobbed plates (Figure 12g) and elongate curved rods. The tentacles are without rosettes but with rods and plates of the introvert type (Figure 12h).

This species holds a unique position amongst the southern African dendrochirotidids. The form of its body, the thinness of the body wall, the rigid nature and distribution of the pedicels and type of calcareous deposits are rather distinctive features. Perhaps the species has affinities with the European *T. tergestina* (Sars) with which it shares a similar body form and baskets.

? *Trachythyone* sp. (Figure 13)

Material examined: N(28/32/i), 1 spec.

Description: Length 9 mm. Ventralmost two tentacles reduced. Pedicels in 2–3 rows; interambulacra naked. Calcareous ring (Figure 29e) with unfused plates. Spicules in the form of baskets (Figure 29a) (frequently reduced to spinous crosses), minute rosette-shaped granules (Figure 29b), buttons (Figure 29c), and smooth to knobbed plates (Figure 29d), the latter often with an unthickened, spinose handle.

Habitat: Cryptofaunal, in sand.

Remarks: The single Cape Vidal specimen, obviously a juvenile was described as *Cucumaria* sp. by Thandar (1971) but this was not published. It is here referred to *Trachythyone* because of spinous crosses, some smooth plates and naked interambulacra. The specimen, however, may belong in *Pseudocnella* since the crosses and handled plates are reminiscent of *P. insolens*. However, the presence of rosettes, absent in all stages of development of *P. insolens*, prevents its identification with this species.

Subfamily Cucumariinae Ludwig, 1894

Diagnosis: See Panning 1949: 411, 412.

Remarks: This subfamily includes dendrochirotidids with smooth to knobbed plates as body wall spicules. Rarely are these accompanied by a superficial layer of deposits. In southern Africa the subfamily is represented by three genera and four species.

Genus *Pawsonellus* Thandar, 1986

Diagnosis: A genus of small, somewhat U- or barrel-shaped species with pedicels restricted to ambulacra in double rows, shorter dorsally; inter-ambulacra naked. Tentacles 10, ventral two reduced to stubs. Calcareous ring simple, no posterior bifurcation to radial plates but radial and interradial plates with long anterior projections. Body wall spicules exclusively thick, imbricating, multilocular plates of two types: majority oblong, smooth, with small, often occluded, holes; others irregular to discoidal with larger holes and often one or more tiny nodules. Pedicels with minute, irregular, smooth to slightly nodular plates; end plates absent. Tentacles with rosettes and irregular, smooth, multilocular plates. Introvert with rosettes.

Type species: *Pawsonellus africanus* Thandar, 1986 (by original designation).

Remarks: This genus was erected by the writer to accommodate only the type species represented by small, barrel-shaped specimens collected from the shallow waters of Natal. Although the spicules of the new species do show some resemblance to those of *Pseudocolochirus* and *Panningia*, the calcareous rings and the tentacular crowns of both these genera are different from those of the new genus.

Pawsonellus africanus Thandar, 1986 (Figures 2c & 15d)

Diagnosis: As for the genus.

Records: N(30/31/s).

Distribution: Southern Natal, 6–36 m. Figure 18.

Habitat: Reef sand, sea weeds and bryozoans.

Remarks: In its spicules, tentacular crown and some features of the calcareous ring, *P. africanus* shares some affinities only with *Cucumaria* (= ?*Panningia*) *hyndmani* Thomson from the north-east Atlantic and Mediterranean, notably *forma typica* illustrated by Panning (1949). In the latter species, however, the spicules (0,5 mm long plates) are prolonged and roughened at one end, there are no rosettes in the introvert and the pedicel deposits are of a different kind. Further, the body form is distinctly curved and the radial plates of the calcareous ring are said to bear short, paired, posterior prolongations. Hence it does not seem likely that the two species are closely related.

Genus *Pseudocolochirus* Pearson, 1910

Colochirus (partim) Théel, 1886: 78; Koehler & Vaney 1908.

Pseudocolochirus Pearson, 1910: 172; Deichmann 1930: 181; James 1976: 59.

Diagnosis: See Pearson 1910: 172.

Type species: *Colochirus violaceus* Théel, 1886 (by monotypy).

Remarks: The genus *Pseudocolochirus* was erected by Pearson (1910) to accommodate the type species suspected by both Théel (1886) and Koehler (1895) as not belonging strictly to *Colochirus* (= *Pentacta*). However, Deichmann (1930) thought that the name *Pseudocolochirus* was only proposed by Pearson in a letter to Mortensen and never published. She therefore re-erected and re-diagnosed the genus which, since then, has been erroneously credited to her by Ludwig & Heding (1935) and Clark & Rowe (1971) amongst some workers. James (1976) was the first person to point out this error. Since the genus was initially established for *Colochirus violaceus* Théel, this species must then be designated the type species. The genus at present contains about five species, one west Atlantic and the others all Indo-West Pacific forms.

Pseudocolochirus violaceus (Théel, 1886)

Colochirus violaceus Théel, 1886: 78, pl. 5, fig. 4, pl. 13, figs. 1 and 2.

Cucumaria tricolor Pearson, 1903: 188 (non *Cucumaria tricolor* Sluiter, 1901: 81).

Pseudocolochirus violaceus Pearson, 1910: 170; Clark & Rowe 1971: 180 (dist.); James 1976: 59, fig. 1 (g–j), pl. 1.

Diagnosis: See Théel, 1886: 78; Pearson 1910: 170; James 1976: 59.

Southern African record: M(10/40), depth not recorded.

Material examined: N(27/33/s), 1 spec.

Local distribution: Querimba (N. Mozambique) to Kosi Bay (Natal).

General distribution: E. Africa, Bay of Bengal, E. Indies, N. Australia, Phillipine Islands, China and S. Japan.

Remarks: The species record from Mozambique is based on two specimens briefly described by Pearson (1910), the larger measured 95 mm. The colour is recorded as violet on the interambulacra and white on the ambulacra. There were very few papillae, 9–10 tentacles and 0,063 mm long plates. A single specimen of this species was also taken off the northern Natal coast by the Oceanographic Research Institute in Durban and identified by the writer. In this living specimen which was superbly coloured, the interambulacra were, as stated by Pearson, violet but the ambulacra a bright yellow.

Genus *Roweia* Thandar, 1985

Diagnosis: A genus of medium-sized, cylindrical to U-shaped cucumariids, up to 130 mm long. Tentacles 10, more or less of equal size. Pedicels usually restricted to ambulacra in 2–12 rows ventrally and two rows dorsally; interambulacra naked or with papillae. Calcareous ring without posterior bifurcations to the radial plates but radial plates with long anterior projections. Spicules of body wall a superficial layer of minute, slender, curved rods, forked and/or perforated at extremities (absent or rare in one subspecies), and an inner layer of fairly thick spectacle-shaped rods or 'biscuits' with one or more holes at each end and often with few

knobs, digitations or processes on the margin.

Type species: Cucumaria frauenfeldi Ludwig, 1875 (by original designation).

Remarks: This genus was established by Thandar (1985) for the type species and *R. stephensoni* (John, 1939), both characterized by slender curved rods in combination with spectacle-shaped rods in the body wall.

***Roweia frauenfeldi* (Ludwig, 1882)** (Figures 2d,e & 15e,f)

Cucumaria sp. Semper, 1868: 236, pl. 39, fig. 22.

Cucumaria frauenfeldi Ludwig, 1882: 130; Britten 1910: 239; Vaney 1911: 26, figs. 1–3; H.L. Clark 1923: 413; John 1939: 325, figs. 5 and 6; Deichmann 1948: 345, pl. 18, figs. 13–17; Cherbonnier 1952: 477, pl. 37, figs. 1–14;

'*Cucumaria*' *frauenfeldi* Clark and Rowe, 1971: 192 (part. dist.), pl. 29, fig. 1.

Cucumaria frauenfeldii (sic) Branch and Branch, 1981: 247, figs.

Cucumaria posthuma Lampert, 1885: 248, fig. 52;

Cucumaria deichmanni Cherbonnier, 1952: 478, pl. 37, figs. 16–24, pl. 38, figs. 14–21.

Cucumaria webbi Thandar, 1977: 57, figs. 1 and 2.

Roweia frauenfeldi Thandar, 1985: 110.

Diagnosis: See Thandar 1985: 110.

Southern African records: R. frauenfeldi frauenfeldi: A(15/12); SWA (19/12/i; 20/13/?i,s; 23/14/i; 26/15/i); C(28/16/8; 32/18/i; 33/17/i,s; 34/18/i to 33/28/i).

R. f. webbi: T(32/30/i); N(30/30/i to 29/30/i, 27/32/i); M(24/35/i).

Distribution: Throughout southern Africa from southern Angola to southern Mozambique (Figure 18). Semper's specimen is said to have come from Java but this record has never been verified.

Habitat: South and west coast. — In pool or under rock, embedded in sand; found low down on shore usually uncovered during LWS, sometimes among kelp below LWS; on the south coast usually associated with *Pseudocnella insolens*, *P. sinorbis* and *Pseudoaslia tetracentriophora*.

East coast — In crevices between sandstone slabs containing little sand; never found buried in sand.

Remarks: Thandar (1985) recognizes two subspecies, *R. frauenfeldi frauenfeldi* (Ludwig, 1875) and *R. f. webbi* (Thandar, 1977), the former restricted to the temperate waters of the south and west coasts, differing from the subtropical east coast form (*R. f. webbi*) by the presence of a continuous layer of slender curved rods in the superficial layer of the body wall (Figure 15e) and the general absence of rosettes and strongly digitated rods in the anal region.

***Roweia stephensoni* (John, 1939)** (Figures 2f & 15g)

Cucumaria stephensoni John, 1939: 321, figs. 1–4; Deichmann 1948: 344, pl. 18, figs. 18–25; Cherbonnier 1953: 596, fig. 2 (1–15).

Cucumaria frauenfeldi H.L. Clark, 1923: 413 (partim).

Roweia stephensoni Thandar, 1985: 113.

Diagnosis: See John 1939: 321; Deichmann 1948: 344.

Records: C(34/18/i,s to 34/21/i; 34/24/i to 33/28/i); T(32/28/i).

Distribution: False Bay to Qolora in the Transkei. Figure 18.

Habitat: Wedged in sandy crevices between stones or in rock pools containing little sand, from LWN to below LWS; sometimes washed up on shore after a heavy storm.

Remarks: This species has been described several times and requires no special comments except that it is very distinct from its congener, the type species, in its soft body, the presence of interradial papillae (papulae), a high pedicel number and a different type of calcareous ring.

Subfamily Thyonidiinae Heding and Panning, 1954

Diagnosis: See Heding and Panning, 1954: 32.

Remarks: This subfamily is represented in southern Africa by only *Cucumella triplex* Ludwig and Heding, based on a single individual from the Agulhas Bank. According to Heding & Panning (1954), *Actinocucumis typicus* Ludwig, also belonging to this subfamily, was reported by Pearson from Portuguese East Africa (Mozambique). This is erroneous as Pearson's (1910) paper on the 'Marine fauna of Kerimba Archipelago, Portuguese East Africa' neither lists nor describes *A. typicus*. Apparently Heding & Panning were misled by the subsequent article in the same paper, also by Pearson on the 'Marine fauna of Mergui Archipelago' where *A. typicus* is recorded from Ceylon. According to the distribution table in Clark & Rowe (1971), *A. typicus* is restricted to the West Pacific and East Indian Oceans. No record exists of its occurrence on the East African coast.

Genus *Cucumella* Ludwig and Heding, 1935

Cucumella Ludwig and Heding, 1935: 210; Heding 1942: 220; Deichmann 1948: 358; Heding & Panning 1954: 64.

Diagnosis: See Ludwig & Heding 1935: 210; Deichmann 1948: 358.

Type species: Cucumella triplex Ludwig and Heding, 1935 (by original designation).

Remarks: This genus was erected to accommodate only the type species at the time of its description. In their revision of the Phyllophoridae Heding & Panning (1954) referred two other species to the genus: *C. mutans* (Joshua, 1914) from S.W. Australia and *C. problematica* Heding and Panning, 1954 from Japan. All three species are well keyed by Heding and Panning.

***Cucumella triplex* Ludwig and Heding, 1935**

Cucumella triplex Ludwig and Heding, 1935: 210, pl. 2, figs. 39–49; 1942: 220, figs. 12 and 13; Deichmann 1948: 359; Heding & Panning 1954: 66, fig. 16 (a–e).

Diagnosis (from Ludwig and Heding, 1935): A small species — type (male) 14 mm long. Tentacles 13–15, possibly more. Spicules of body wall exclusively three-pillared tables with an angulated disc and a spire ending in a three-pronged toothed apex; ventral table discs with 3–10 holes; dorsal discs with about 12–21 holes.

Record: C(35/22/d).

Material examined: None.

Distribution: Known only from the Agulhas Bank, 155 m.

Remarks: Since the type is a mature male that measured only 14 mm it does not seem likely that the species grows to any appreciable size. Its tentacle number is not certain and requires verification from new material. The form of its calcareous ring and body wall spicules sharply separates this well characterized species from related West Pacific forms.

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References

- BRANCH, G. & BRANCH, MARGO. 1981. The living shores of Southern Africa. Struik Publishers, Cape Town. 272 pp.
- CHERBONNIER, G. 1952 Contribution a la connaissance des holothuries de l'Afrique du Sud. *Trans. Roy. Soc. S. Afr.* 33: 469–509, 16 pls.
- CHERBONNIER, G. 1953. Complement a l'etude des Holothuries de l'Afrique du Sud (1^{re} Note). *Bull. Mus. natn. Hist. nat. Paris* (2) 25(6): 594–598, 2 text-figs.
- CHERBONNIER, G. 1954. Complement a l'etude des holothuries de l'Afrique du Sud. 2^e note. *Bull. Mus. natn. Hist. nat. Paris* 26(1): 117–123, 3 text-figs.
- CHERBONNIER, G. 1970. Nouvelles espèces d'Holothuries des côtes d'Afrique du Sud et du Mozambique. *Bull. Mus. natn. Hist. nat. Paris* (2) 41(1): 280–299, 9 text-figs.
- CLARK, H.L. 1923. The echinoderm fauna of South Africa. *Ann. S. Afr. Mus.* 13: 221–435, 4 figs., pls. 8–23.
- CLARK, AILSA, M. & COURTMAN-STOCK, JANE. 1976. The echinoderms of southern Africa. *Brit. Mus. (Nat. Hist.) Lond.* 277 pp., 275 text-figs.
- CLARK, AILSA, M. & ROWE, F.W.E. 1971. Monograph of shallow-water Indo-West Pacific echinoderms. *Brit. Mus. (Nat. Hist.) Lond.* 238 pp.
- DAY, J.H. 1967. A monograph of the Polychaeta of southern Africa. Part 1. *Brit. Mus. (Nat. Hist.) Lond.* i–vi + 458 pp.
- DAY, J.H. 1974. Echinodermata: Holothuroidea (sea cucumbers). In: A guide to marine life on South African shores. pp. 189–192, figs. Balkema, Cape Town.
- DEICHMANN, ELIZABETH. 1930. The holothurians of the western part of the Atlantic Ocean. *Bull. Mus. comp. Zool. Harv.* 71: 41–226, 7 text-figs., 24 pls.
- DEICHMANN, ELIZABETH. 1948. The Holothurian fauna of South Africa. *Ann. Natal Mus.* 11: 325–375.
- DEICHMANN, ELIZABETH. 1957. The littoral holothurians of the Bahama Islands. *Am. Mus. Novit.*, No. 1821: 1–20, 71 text-figs.
- FISHER, K.W. 1907. The holothurians of the Hawaiian Islands. *Proc. U.S. natn. Mus.* 32: 637–744. pls. 66–82.
- GOLDFUSS, G.A. 1820. Handbuch der Zoologie. Nuremberg 1: 1–696, 2 pls.
- HEDING, S.G. 1938. *Cucumaria tetracentriophora* sp. n., a new dendrochirote holothurian from South Africa. *Ann. Mag. nat. Hist.* (11)1: 631–634, 5 text-figs.
- HEDING, S.G. & PANNING, A. 1954. Phyllophoridae. Eine Bearbeitung der polytentaculaten dendrochiroten Holothurien des zoologischen Museums in Kopenhagen. *Spolia zool. Mus. haun.* 13: 7–209, 102 text-figs.
- HELFFER, H. 1912. Über einige von Dr Hartmeyer im Golf von Suez gesammelte Holothurien. *Mitt. zool. Mus. Berl.* 6: 327–334, 17 figs.
- JAMES, D.B. 1976. Studies on Indian echinoderms. 6. Redescription of two little known holothurians with a note on an early juvenile of *Holothuria scabra* Jaeger from the Indian seas. *J. mar. biol. Ass. India* 18: 55–61, 1 text-fig., 1 text-pl.
- JOHN, D.D. 1939. Two South African holothurians with similar calcareous deposits. *Ann. Mag. nat. Hist. Ser.* (11)4: 321–329, 6 text-figs.
- KOEHLER, R. 1895. Catalogue raisonné des echinodermes recueillis par M. Korotnev aux îles de la Sonde. *Mém. Soc. zool. Fr.* 8: 374–423, pl. 9.
- LUDWIG, H. 1875. Beiträge zur Kenntniss der Holothurien. *Arb. zool. – zoot. Inst. Würzburg* 2(2): 77–120, pls. 6, 7.
- LUDWIG, H. & HEDING, S.G. 1935. Die Holothurien der Deutschen Tiefsee Expedition. Fusslose und dendrochirote Formen. *Wiss. Ergebn. Deutsch. Tiefsee - Exped. Dampfer 'Valdivia', 1898–1899.* 24: 123–214, 65 text-figs., 2 pls.
- MACNAE, W. & KALK, MARGARET (eds.) 1958. A natural history of Inhaca Island, Mozambique. Witwatersrand Univ. Press. Johannesburg: i–iv, 163 pp.
- MAHONEY, R. 1966. Laboratory techniques in Zoology. Butterworths, London. 404 pp.
- MARENZELLER, E. VON. 1874. Kritik adriatischer Holothurien. *Verh. K.K. Zool.–Bot. Ges. Wien.* 24: 299–320.
- MORTENSEN, TH. 1927. Handbook of the echinoderms of the British Isles. Oxford Univ. Press, Lond. 471 pp.
- PALLAS, P.S. 1766. *Actinia doliolum* Miscellanea Zoologica. Hagoee: 152–156, 3 figs, 1 pl.
- PANNING, A. 1949. Versuch einer Neuordnung der Familie Cucumariidae (Holothurioidea, Dendrochirota). *Zool. Jb.* 78: 404–470, 62 text-figs.
- PANNING, A. 1964. Bemerkungen über die Holothurien-Familie Cucumariidae (Ordnung Dendrochirota). 3. Teil. Die Gattungen *Stereoderma*, *Staurothyone* und *Trachythyone*. *Mitt. Hamb. Zool. Mus. Inst. Kosswig-Festschrift*: 159–174, 10 text-figs.
- PANNING, A. 1966. Bemerkungen über die Holothurien-Familie Cucumariidae (Ordnung Dendrochirota). 5. Teil. Die Gattungen *Heterothyone* Panning 1949 und *Leptopentacta* H.L. Clark, 1938. *Mitt. Hamb. Zool. Mus. Inst.* 63: 51–69, 9 text-figs, pl. 4.
- PANNING, A. 1971. Bemerkungen über die Holothurien-Familie Cucumariidae (Ordnung Dendrochirota). 6. Teil (Schluss). Die Gattungen um *Ocnus* Forbes 1841 und um *Pentacta* Goldfuss 1820. *Mitt. Hamb. Zool. Mus. Inst.* 67: 29–51, 5 text-figs., pl. 3.
- PAWSON, D.L. 1962. A new sea cucumber from Macquarie Island. *Trans. R. Soc. N. Zeal.* 88(4): 47–48, pl. 1.
- PAWSON, D.L. 1963. The holothurian fauna of Cook Strait, New Zealand. *Zool. Pub. Vict. Univ.* No 36: 1–38, 7 text-pls.

- PAWSON, D.L. 1982. Holothuroidea. In: Synopsis and classification of living organisms. pp. 791–818. (Ed.) Sybil P. Parker. McGraw-Hill, New York.
- PAWSON, D.L. & FELL, H.B. 1965. A revised classification of the dendrochirote holothurians. *Breviora* No. 214: 1–7.
- PEARSON, J. 1903. Holothuroidea. In: Report to the Government of Ceylon on the Pearl Osyter Fisheries of the Gulf of Manaar. (Ed.) W.A. Herdman. *London (R. Soc.) Suppl. rep. 5*: 181–208, 3 pls.
- PEARSON, J. 1910. Littoral marine fauna of Kerimba Archipelago, Portuguese East Africa. Holothuroidea. *Proc. zool. Soc. Lond.* 1910: 167–182, 5 text-figs.
- PEARSON, J. 1910b. Marine fauna of the Mergui Archipelago. Holothuroidea. *Proc. zool. Soc. Lond.* 1910: 183–194, figs. 18–21.
- PERRIER, R. 1905. Holothuries antarctiques du Museum d'Histoire Naturelle de Paris. *Ann. Sci. nat. Zoologie* 9: 1–143, 14 text-figs., pls. 1–5, text-figs A–N.
- ROWE, F.W.E. 1970. A note on the British species of cucumarians involving the erection of two new nominal genera. *J. mar. biol. Ass. U.K.* 50: 683–687.
- ROWE, F.W.E. & DOTY, J.E. 1977. The shallow-water holothurians of Guam. *Micronesica* 13: 217–250, 9 text-figs.
- SEMPER, C. 1869. Die Holothurien Ostafrikas. In: Reisen in Ost Afrika. C.C. von der Decken. Leipzig & Heidelberg. 3(1): 117–122, 1 pl.
- THANDAR, A.S. 1971. The intertidal holothurian fauna of the rocky shores of Natal. Unpubl. M.Sc. thesis, Univ. S. Afr.: i–v + 235 pp.
- THANDAR, A.S. 1985. A new southern African genus in the holothurian family Cucumariidae (Echinodermata: Holothuroidea) with the recognition of two subspecies in *Cucumaria frauenfeldi* Ludwig. *S. Afr. J. Zool.* 20(3): 109–114.
- THANDAR, A.S. 1986. A new genus and species of a dendrochirotid holothurian from southern Africa. *J. Zool., Lond.* 210: 483–488.
- THANDAR, A.S. 1987. The status of some southern African nominal species of *Cucumaria* (s.e.) referable to a new genus and their ecological isolation. *S. Afr. J. Zool.* 22(4): 287–296.
- THANDAR, A.S. 1989. The sclerodactylid holothurians of southern Africa with the erection of one new subfamily and two new genera. *S. Afr. J. Zool.* 24: 290–304.
- THANDAR, A.S. 1990. The phyllophorid holothurians of southern Africa with the erection of a new genus. *S. Afr. J. Zool.* 25: 207–223.
- THÉEL, H. 1886. Holothuroidea. Part 2. Rep. scient. Results Voy. 'Challenger' (Zool.) 39: 1–290, 16 pls.

Appendix 1 List of southern African nominal species of Cucumariidae and their present disposition

Nominal species listed by Deichmann (1948) and subsequent authors	Present disposition/ authority
<i>Cucumaria capensis</i> Théel, 1886	Referred to <i>Ocnus</i> /Panning, 1949
<i>C. corbula</i> Cherbonnier, 1953	Referred to <i>Ocnus</i> /this paper
<i>C. crucifera</i> Semper, 1869	Referred to <i>Trachythyone</i> /Panning, 1949
<i>C. deichmanni</i> Cherbonnier, 1952	Synonym of <i>Roweia frauenfeldi</i> (Ludwig, 1882)/Thandar, 1985
<i>C. frauenfeldi</i> Ludwig, 1882	Type species of <i>Roweia</i> /Thandar, 1985
<i>C. improvisa</i> Ludwig, 1875	Referred to <i>Trachythyone</i> /Panning, 1949
<i>C. insolens</i> Théel, 1886	Referred to <i>Pseudocnella</i> /Thandar, 1987
<i>C. jaegeri</i> Lampert, 1885	Synonym of <i>Pseudocnella sykion</i> /Thandar, 1987
<i>C. rigidapeda</i> Cherbonnier, 1952	Referred to <i>Trachythyone</i> /this paper
<i>C. sinorbis</i> Cherbonnier, 1952	Type species of <i>Pseudocnella</i> /Thandar, 1987
<i>C. spyridophora</i> H.L. Clark, 1923	Referred to <i>Aslia</i> /Rowe, 1970
<i>C. stephensoni</i> John, 1939	Referred to <i>Roweia</i> /Thandar, 1985
<i>C. sykion</i> (Lampert, 1885)	Referred to <i>Pseudocnella</i> /Thandar, 1987
<i>C. tetracentriophora</i> Heding, 1938	Type species of n.g. <i>Pseudoastia</i> /this paper
<i>C. webbi</i> Thandar, 1977	Subspecies of <i>Roweia frauenfeldi</i> /Thandar, 1985
<i>Pawsonellus africanus</i> Thandar 1986	No change
<i>Pentacta doliolum</i> (Pallas, 1766)	No change
<i>P. squamosa</i> Cherbonnier, 1970	Synonym of <i>Ocnus capensis</i> /this paper
<i>P. tesselera</i> Cherbonnier, 1970	No change
<i>Cucumella triplex</i> Ludwig & Heding, 1935	No change