The sclerodactylid holothurians of southern Africa, with the erection of one new subfamily and two new genera (Echinodermata: Holothuroidea)

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The sclerodactylid subfamily Sclerodactylinae is restricted to include only those forms with a short, compact, tubular calcareous ring and a new subfamily Sclerothyoninae is diagnosed to accommodate two new southern African monotypic genera *Sclerothyone* and *Temparena,* with compact but non-tubular calcareous rings. The new genera are erected respectively for Ludwig and Heding's (1935) *Cucumaria? velligera* and *C.? chuni,* formerly classified in *Pentamera.* This brings the total number of sclerodactylid holothurians known from southern Africa to six genera and seven species. All taxa are diagnosed and/or described, a key is provided for all southern African species and their local distributions are mapped.

Die subfamilie Sclerodactylinae van die familie Sclerodactylidae word beperk om slegs vorme met 'n kort kompakte buisvormige kalkring in te sluit, en 'n nuwe subfamilie Sclerothyoninae word gediagnoseer om twee nuwe Suider-Afrikaanse monotipiese genera, *Sclerothyone* en *Temparena,* met kompakte maar nie-buisvormige kalkringe, te omvat. Die nuwe genera word erken om Ludwig en Heding (1935) se *Cucumaria? velligera* en *C.? chuni* onderskeidelik, wat voorheen in *Pentamera* geklassifiseer is, in te sluit. Dit bring die totale aantal bekende Sclerodactylidae vanaf Suider-Afrika op ses genera en sewe spesies te staan. Alle taksa word gediagnoseer en/of beskryf, 'n sleutel word verskaf vir alle Suider-Afrikaanse spesies, en hul plaaslike verspreidingskaarte word voorsien.

Introduction

In their revised classification of the dendrochirotid holothurians, Pawson & Fell (1965) concluded that the then traditional classification of the dendrochirotid holothurians, based on tentacle numbers, concealed some important evolutionary trends and proposed a more natural classification of the dendrochirotids based on the structure of the calcareous ring and spicules, thereby supporting the premise of Fell (1965) who inferred that the calcareous ring of holothurians is probably a homologue of the ambulacral plate system of fossil edrioasteroids. It is speculated that such a system was lost as a result of holothurian evolution but with parts persisting as the calcareous ring. Hence Pawson & Fell supposed that the greater the reduction of the calcareous ring, the more advanced the holothurian. On this basis then they regrouped the various subfamilies of the Cucumariidae, as recognized by Panning (1949), and the Phyllophoridae as recognized by Heding & Panning (1954), so that they became intermixed; assembled the 10-tentacled cucumariid subfamily Sclerodactylinae Panning, 1949 and the polytentaculate phyllophorid subfamily Cladolabinae Heding & Panning, 1954, in the family-group taxon, the Sclerodactylidae; and diagnosed two more dendrochirotid families: the Placothuriidae and Paracucumidae for two small groups of plated forms. Subsequently Pawson (1970) erected the family Heterothyonidae for another small group of plated forms from New Zealand. Thus the order Dendrochirotida currently contains seven families: Placothuriidae, Psolidae, Paracucumidae, Heterothyonidae, Phyllophoridae, Sclerodactylidae and Cucumariidae.

Pawson & Fell's system did gain support from workers such as Panning and Cherbonnier, amongst others, and was used extensively by the writer in the systematic analysis of the southern African holothurian fauna (Thandar 1984).

Although the system was not adopted by Clark & Rowe (1971) in their monograph of the Indo-West Pacific echinoderms, since they preferred to be conservative, Rowe nevertheless comments that 'there are clear parallels in the forms of the calcareous rings and body wall deposits', thus supporting the contention of Pawson & Fell (Clark & Rowe 1971: 194: note 10).

A noticeable trend among the dendrochirotid holothurians is a progressive simplification of the calcareous ring and the replacement of a plated skeleton by non-contiguous calcareous deposits. The Placothuriidae with their plated skeletons and complex calcareous rings in combination do appear to satisfy their claim as the most primitive dendrochirotids. Such plated skeletons are retained in the families Psolidae, Paracucumidae and Heterothyonidae, which, however, have simplified their calcareous rings, but lost in the families Phyllophoridae, Sclerodactylidae and Cucumariidae.

If the Placothuriidae with their plated skeletons and complex calcareous rings are considered to be the most primitive dendrochirotids, each dendrochirotid family below the Cucumariidae can then be visualized as having retained some primitive characters, perhaps in accordance with the the mode of life of its members, while transforming the others. For example, the Heterothyonidae have retained the typical U-shaped bodies, podia and plated skeletons, while showing simplification of the calcareous rings, which, however, do still retain the paired posterior processes to the radial plates. The Psolidae and Paracucumidae, on the other hand, have also retained their plated skeletons but show an extreme reduction of podia, in response to their highly sessile or sedentary existence, and have simplified their calcareous

rings. The Phyllophoridae, Sclerodactylidae and Cucumariidae, which together with the Placothuriidae apparently constitute a single lineage, have transformed their skeletons to non-contiguous microscopic deposits while showing a gradual reduction of the calcareous rings, which reach their ultimate simplicity in the Cucumariidae.

In fact the family Sclerodactylidae comprises several transitional forms apparently bridging the gap between the phyllophorids with complex calcareous rings and the probably derived cucumariids with simple rings. Thus, while most of the dendrochirotid families appear to be rather homogeneous assemblages, the family Sclerodactylidae comprises seemingly unrelated forms with many of its genera being equally at home in the Phyllophoridae. Even Pawson (1966) comments that the boundary between the Phyllophoridae and the Sclerodactylidae is not well defined, suggesting a gradual evolutionary sequence.

However, while Panning (1949) categorically states that only exceptionally are the radial processes of the calcareous ring in the Sclerodactylinae unbroken, Pawson & Fell (1965) use the undivided processes as a key character to separate the Sclerodactylidae from the Phyllophoridae. This is inadmissable since even within a single sclerodactylid or phyllophorid species the processes may be entire or divided. The writer is of the opinion that greater emphasis must be placed on the compact, short, tubular or non-tubular nature of the radial and interradial plates themselves which characterize most sclerodactylid genera (Figure 1b & c), as opposed to the finely divided mosaic-like plates and long tubular arrangement in the phyllophorids (Figure 1a). With this in mind the southern African endemic *Cucumaria? velligera* Ludwig & Heding, 1935, with non-tubular form of the ring with compact plates but entire or divided processes, and *Cucumaria? chuni* Ludwig & Heding, 1935, also with non-tubular compact plates but only entire processes, both classified by Deichmann (1948) in *Pentamera* of the phyllophorid subfamily Thyoninae, are herein assigned to new genera in the Sclerodactylidae – *C.? velligera* to *Sclerothyone* gen. nov. and *C.? chuni* to *Temparena* gen. nov.

The sclerodactylid subfamily Sclerodactylinae should be characterized by reference to its type genus *Sclerodactyla* Ayres, 1851, which has a compact, short, tubular calcareous ring with short prolongations on the radial plates, of the type occurring also in *Havelockia* Pearson, 1903 and other similar genera (Figure 1b). In the two new southern African genera, however, non-tubular calcareous rings exist in which the radial and interradial plates are only united at their bases, but carry long prolongations to the radial plates. This suggests that these genera must be separated from the typical sclerodactylines and classified in their own sub-family, for which the name Sclerothyoninae is here proposed. The new subfamily shows a further reduction of the calcareous ring (Figure 1c) in which the main elements resemble those of the 10-tentacled cucumariids (Figure 1d & e) thus bridging the gap between the Sclerodactylidae and the Cucumariidae.

Apart from *Sclerothyone velligera* and *Temparena chuni,* southern Africa contains five more sclerodactylids: *Havelockia venustella* (Ludwig & Heding, 1935) and *H. versicolor* (Semper, 1868), belonging to the Sclerodactylinae, and *Afrocucumis africana* (Semper, 1868), *Cladolabes bifurcatus* (Deichmann, 1944) and *Ohshimella ehrenbergii* (Selenka, 1867), belonging to the Cladolabinae. This paper provides a key to all southern African sclerodactylid holothurians and additional notes, based on new material, of at least six species in the collections of the Universities of Cape Town (UCT) and Durban-Westville (UDW). The former collection is now housed in the South African Museum.

Family Sclerodactylidae Panning, 1949

Diagnosis (modified from Pawson, 1982:815): Skeleton of microscopic spicules. Tentacles 10–20. Calcareous ring complex, short, tubular or non-tubular, with paired or unpaired processes that are either divided or entire

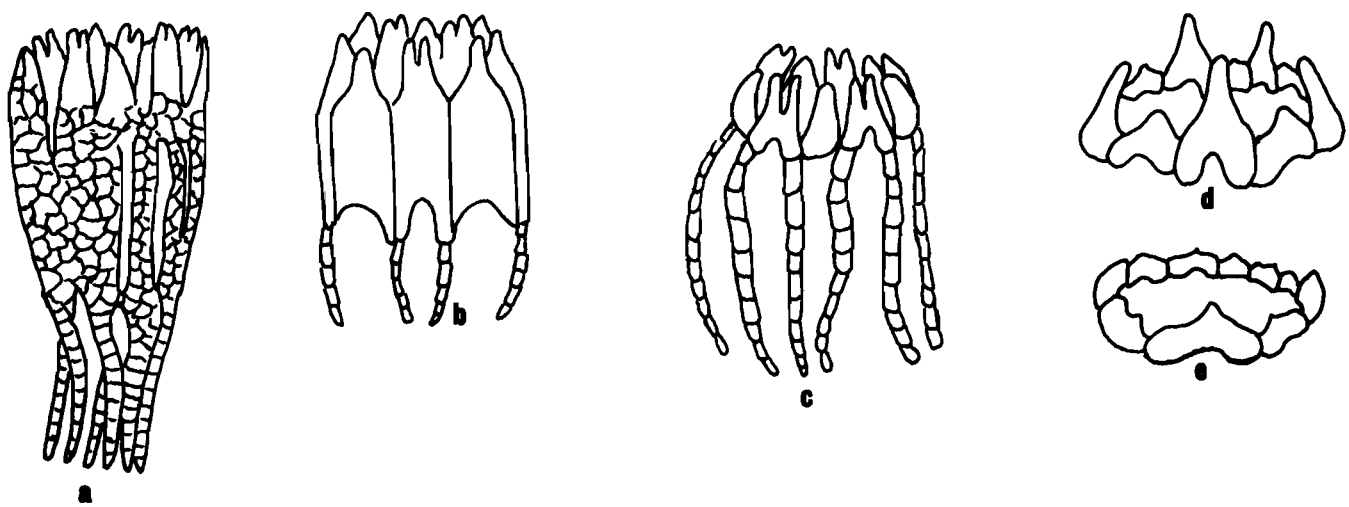

Figure 1 Calcareous rings of some dendrochirotid families and/or subfamilies. (a) Phyllophoridae; (b) Sclerodactylinae; (c) Sclerothyoninae; (d) Colochirinae; (e) Cucumariinae.

but elements of ring compact; calcareous ring not long, tubular and in a mosaic of small pieces as in the Phyllophoridae. Podia usually scattered but sometimes restricted to the ambulacra.

Remarks: With the erection of a new subfamily the Sclerodactylidae now contains three subfamilies of which the 10-tentacled Sclerodactylinae and Sclerothyoninae appear to be largely Atlantic in distribution and the polytentaculate Cladolabinae distinctly Indo-West Pacific. The family contains about 17 genera and approximately 56 species of which six genera and seven species occur in the southern African waters south of the tropic of Capricorn (23,5°S).

Key to the subfamilies and southern African species of the family Sclerodactylidae

1. Tentacles 10 2
   Tentacles 15–20 ..... (Cladolabinae) 5

2. Calcareous ring short, tubular with radial and interradial plates united for most of their length ..... (Sclerodactylinae) 3

   Calcareous ring not tubular, radial and interradial plates joined at base only, though radials possess a pair of posterior processes ..... (Sclerothyoninae) 4

3. Body cylindrical; podia minute, conical papillae absent; table discs oval, lobed; spire low, ending in two clusters of teeth ..... *?Havelockia venustella* (Ludwig & Heding, 1935).

   Body quadrangular in cross section; podia large, conical papillae present; table discs circular to squarish; spire (if present) high, pillars meeting at apex which may or may not be toothed ..... *Havelockia versicolor* (Semper, 1868)

4. Body wall spicules tables with or without a 'handle' on one side and usually an arched spire with or without teeth ..... *Sclerothyone velligera* (Ludwig & Heding, 1935).

   Body wall spicules tables, without 'handles', and smooth multilocular plates ..... *Temparena chuni* (Ludwig & Heding, 1935).

5. Body wall spicules in the form of large, coin-like, lenticular plates with knobs and minute perforations ..... *Afrocucumis africana* (Semper, 1868).

   Body wall spicules mostly in the form of spinous rods 6

6. Spinous rods rarely showing traces of one or two short arms; rosette-shaped miliary granules often present; juveniles with well-developed tables inclusive of spinous rods and granules ..... *Ohshimella ehrenbergii* (Selenka, 1867).

   Spinous rods with a forked base and an apical cluster of spines; no miliary granules ..... *Cladolabes bifurcatus* (Deichmann, 1944).

Subfamily Sclerodactylinae Panning, 1949

Diagnosis (after Panning, 1949: 456, restricted herein): Tentacles 10; calcareous ring compact, short, tubular, with the radial and interradial plates fused for most of their length; posterior paired processes of the radial plates of medium length, usually broken into a few large pieces of calcite, rarely processes unbroken.

Type genus: Sclerodactyla Ayres, 1851 (by indication).

Remarks: The designation of Sclerodactyla as the type genus of this subfamily restricts it to include only those forms with compact, short, tubular calcareous rings of the type found also in *Havelockia* and other related genera. The subfamily currently contains about nine genera some of which may have to be transferred to the new subfamily diagnosed herein.

Genus *Havelockia* Pearson, 1903

Havelockia Pearson, 1903: 197; Panning, 1949: 466; Clark and Rowe, 1971: 203.
Pentathyone H.L. Clark, 1938: 458; Panning, 1949: 459.

Diagnosis (After Pearson 1903: 197; Panning 1949: 466): Calcareous ring short, stout, only anterior projections of radial and interradial plates free; posterior paired processes of radial plates divided into several pieces. Body wall spicules tables with squarish to oval discs usually perforated by four large central and four smaller peripheral holes, the latter sometimes reduced or absent; spire of two pillars joined at apex and terminating in few blunt teeth.

Type species: Havelockia herdmani Pearson, 1903 (by original designation Pearson 1903: 197 = *Thyone versicolor* Semper, 1868, according to James 1976).

Remarks: Havelockia was erected by Pearson (1903) for *H. herdmani* from Ceylon which he designated the type species. H.L. Clark (1938), unaware of Pearson's paper, erected the genus *Pentathyone* with the Indo-West-Pacific *Thyone mirabilis* Ludwig, 1875, as type species. Panning (1949) rightly pointed out that both *Havelockia* and *Pentathyone* are synonymous and this view has been reiterated by Clark & Rowe (1971) and James (1976) amongst other authors. Although Clark & Rowe list *H. herdmani, H. mirabilis* and *H. versicolor* as distinct species, according to James both *herdmani* and *mirabilis* are conspecific with *H. versicolor* (Semper, 1868). *H. versicolor,* being the older, has priority and now replaces *H. herdmani* as the type species of *Havelockia.*

?Havelockia venustella (Ludwig and Heding)

(Figures 2 & 9a)

Thyone venusta W.J. Schmidt, 1926: 125, fig. B (spicules figured for their optical properties) (non *T. venusta* Selenka, 1867).
Thyone venustella Ludwig and Heding, 1935: 203, pl. 2, figs. 15–20; Deichmann, 1948: 356; Day, Field and Penrith, 1970: 83.
Havelockia venustella Panning, 1949: 466.

Diagnosis: A small slender species up to 55 mm in length. Pedicels numerous, minute, scattered. Tables with oval, lobed discs pierced by four large central and often an equal number of alternating smaller marginal holes, or marginal holes incomplete or absent; spire short, of two pillars united at apex by a horizontal bar bearing a cluster of teeth at each end. Anal region with huge, perforated plates.

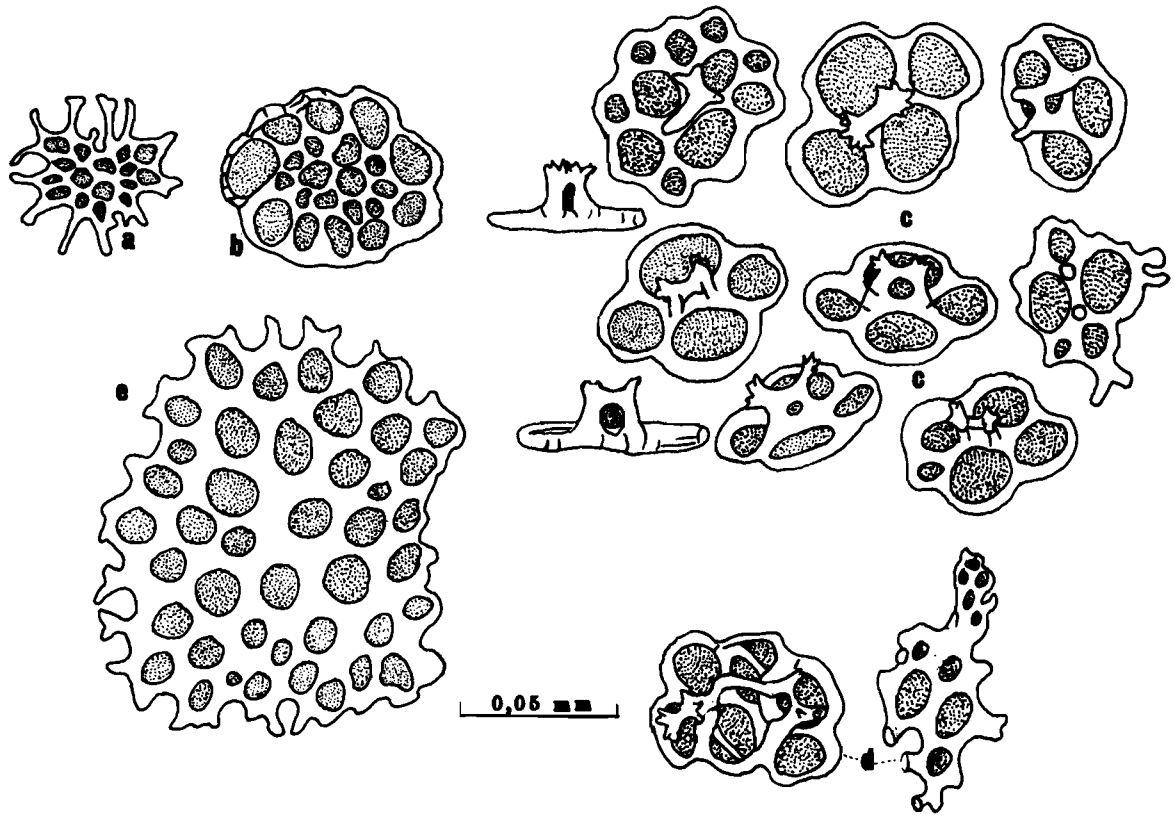

Figure 2 Spicules of ?*Havelockia venustella* (Ludwig & Heding). (a) Reduced end-plate from dorsal pedicel; (b) complete end-plate from ventral pedicel; (c) tables from body wall; (d) abnormal table and plate; (e) periproctal plate. (All drawn to same scale).

Type: ?Bonn (West Germany).
Type locality: Agulhas Bank (35°16'S/22°26'E), 155 m.
Previous record: Type locality only.
Material examined: UCT:St. WCD 216H SW of Cape Point, 400 m, khaki and black sand, 12 Oct 1965, 1 spec; AFR 790A, 33°12'S / 17°39,9'E, 229 m, black speckled green mud, 28 Nov 1947, 1 spec; TRA 73J, Africana II, dredge, Dassen Island, 29 m, shelly sand, 7 Feb 1953, 3 spec.

Description: All specimens eviscerated; largest (AFR 790A) 55 mm in length. Colour off-white speckled with a black substance possibly of foreign origin. Anal teeth, when present, small, flat, in only one specimen each flanked by terminal podia. Calcareous ring, other oral structures and most of viscera lost. Respiratory trees preserved in only largest specimen, each tree with two main trunks – medial trunks longer and more profusely branched. Spicules restricted to posterior end. Table discs (Figures 2c & 9a) 0,05–0,08 mm, spires 0,015–0,030 mm high. Tables rarely incomplete or with distorted spires (Figure 2d). Anal plates (Figure 2e) huge, multilocular. Other minute (0,035–0,165 mm) spicules (? foreign) in the form of Cs or Ss present throughout body wall of all excepting largest specimen. Pedicels without supporting spicules; end plates 0,05–0,08 mm in diameter, usually well developed in only ventral and anal podia (Figure 2a & b).

Distribution: S.W. Cape Province from off Lamberts Bay to Mossel Bay, 155–400 m (Figure 10).
Habitat: Green mud, khaki and black sand, gravel and nodules.

Remarks: This species was established by Ludwig & Heding (1935) upon three poorly preserved specimens, the largest of which measured 40 mm. The specimens were originally identified as *Thyone venusta* Selenka by Schmidt (1926) but Heding (in Ludwig & Heding 1935) believed it hardly likely that the Red Sea species could reach the southernmost tip of Africa. However, Deichmann (1948) observes that both *T. venusta* and *H. venustella* are probably conspecific basing her argument that in many species of *Thyone* the spicules do become reduced with age. However, a single specimen of *Thyone* collected at Isipingo Beach, near Durban, lacks spicules and differs so much from *H. venustella* that it is probable that this specimen and not *H. venustella* is conspecific with Selenka's species.

The calcareous ring of *H. venustella* is poorly described and not illustrated. It is not clear whether Panning (1949), who referred the species to *Havelockia,* examined the holotype. The tables of *H. venustella,* except for their thinner margins, show a remarkable resemblance to those of *Thyone propinqua* Cherbonnier, 1970, also described from south-west Cape Province. The fact that *T. propinqua* was collected from shallow waters and also possesses pedicel spicules suggests that it may represent a juvenile of *H. venustella* since the type measured only 20 mm. It is regrettable that Cherbonnier

(1970) only compared his species with the northern *T. fusus* (O.F. Müller) and not with *H. venustella*. Since the calcareous ring of *H. venustella* is poorly known and since this species was recognized by Dr. Cherbonnier (judging from some UCT material identified by him), there is no justification at this stage to synonymize both species.

***Havelockia versicolor* (Semper)**

Thyone versicolor Semper, 1868: 14.
Thyone mirabilis Ludwig, 1875: 93, pl. 6, fig. 18; Lampert, 1885: 162; Théel 1886: 138; Sluiter, 1901: 93; Kalk, 1958: 216.
Thyone mirabilis? Bell, 1884: 149.
Thyone (?) calcarea Pearson, 1903: 194.
Havelockia herdmani Pearson, 1903: 197; Koehler and Vaney, 1908: 25; Panning, 1949: 466; Clark and Rowe, 1971: 180 (dist.).
Cucumaria areolata Ekman, 1918: 35.
Pentathyone mirabilis H.L. Clark, 1938: 459, pl. 16, fig. 3; 1946: 396; Panning, 1949: 459, text fig. 55.
Pentathyone versicolor Panning, 1949: 460.
Thyone herdmani James, 1969: 60.
Havelockia mirabilis Clark and Rowe, 1971: 180 (dist.).
Havelockia versicolor Clark and Rowe, 1971: 180 (dist.), text fig. 91b, 92h; pl. 29, fig. 13; James, 1976: 55, text fig. 1a–f.

Diagnosis (after James 1976: 55): Length up to 130 mm, quadrangular in cross section. Pedicels scattered, denser in ventral ambulacra; bands of tiny wart-like papillae dorsally; anal papillae present. Posterior paired radial processes of calcareous ring composed of 2–7 pieces. Body wall spicules sparse, tables: discs subcircular to squarish (0,031–0,175 mm), pierced by four large central and often four or more smaller holes; spire elongated (0,04–0,10 mm), of two pillars joined at apex which may or may not be toothed, spire often reduced to knobs on surface of disc or knobs absent. Pedicels with irregular plates and end plates (0,235–0,345 mm). Tentacles with slender rods (0,04–0,06 mm) and rosettes (0,04–0,07 mm); introvert with rosettes (0,02–0,05 mm).

Type: Hamburg University: Zoological Institute: E2873.
Type locality: Phillipines.
Southern African record: Inhaca Island, Mozambique.
Material examined: None.
Local distribution: Known only from Inhaca Island (Figure 10).
General distribution: Indo-West-Pacific.
Habitat: Coral.

Remarks: This Indo-West-Pacific species has been recorded from Inhaca Island (Mozambique) by Kalk (1958) as *Thyone mirabilis* upon identification of some material by Dr. Cherbonnier but has not been taken since. The most recent, complete description of the species is that of James (1976) who is also the author of the synonymy. The species can easily be distinguished from *H. venustella* in size and form of the body and table discs, the height of the spire, the nature of the toothed crown and the large size (0,235–0,345 mm) of the pedicel end plates.

Subfamily Sclerothyoninae subfam. nov.

Diagnosis: Tentacles 10, ventral-most two much reduced. Calcareous ring not tubular, radial and interradial plates united at base only; posterior paired processes of radial plates, long, 3–8 times the height of ring, either entire or broken into several pieces.

Type genus: Sclerothyone gen. nov. (here designated).

Remarks: The subfamily currently contains only the two new monotypic southern African genera *Sclerothyone* erected for *Cucumaria ? velligera* Ludwig & Heding, 1935 and *Temparena* for *C.? chuni* Ludwig & Heding, 1935. It is possible that several other sclerodactylin genera whose calcareous rings are inadequately described would be referred to it on re-examination. Because of the reduced nature of the plates of the calcareous ring this subfamily bridges the gap between the Sclerodactylidae and the Cucumariinae of the family Cucumariidae.

Genus *Sclerothyone* gen. nov.

Diagnosis: Tentacles 10, ventral-most two much reduced. Pedicels in double rows, restricted to ambulacra. No interambulacral papillae. Calcareous ring compact, posterior processes of radial plates long, entire or subdivided into about 10 pieces. Tables of two types: with regular oval four-holed discs with or without a 'handle' on one side, and a short, often arched, two-pillared spire; and with irregular plate-like discs with 6–8 holes and usually an arched spire. Pedicels with end plates, oblong tables and other plates. Introvert and tentacles with perforated plates and rods but no tables.

Type species: Cucumaria? velligera Ludwig and Heding, 1935 (designated herein).

Etymology: The name *Sclerothyone* is derived from a combination of the stem of *Sclerodactyla* as a prefix and *Thyone,* the latter because of the strong resemblance of the type species to *Thyone adinopoda* Pawson & Miller, 1981.

Remarks: The genus *Sclerothyone* is here erected to accommodate only the type species which was referred doubtfully to *Cucumaria* by Ludwig and Heding (1935). Deichmann (1948) transferred the species to *Pentamera* Ayres, 1851 but commented that its tables are so much like those of *Thyone parafusus* and *T. pseudofusus* that, were it not for the ambulacral restriction of the pedicels, the species could well be a *Thyone.* Although there are remarkable similarities in the spicules of these three species, the pedicel tables and calcareous ring of *C. velligera* are different. These features in combination with the body form also prevent the inclusion of the species in *Pentamera* which, as defined by its type species, *P. pulcherrima* Ayres, 1851, is characterized by a short, tubular, partially subdivided, calcareous ring and handle-less tables and plates. Panning (1949), on the other hand, unaware of Deichmann's paper more or less

contemporary with his, referred *C.? velligera,* with some doubt, to *Neothyone.* However, this genus, as diagnosed by Deichmann (1941), has scattered pedicels and knobbed buttons (plates) instead of tables. Since *C.? velligera* is not referable to any of the existing sclerodactylid genera, a new genus is here diagnosed to accommodate it. *Sclerothyone* appears to be distantly related only to *Sclerodactyla* and *Havelockia* amongst the Sclerodactylinae. It differs in the ambulacral restriction of the pedicels, in the form of the calcareous ring and in the presence of two-pillared tables with a 'handle'. The other genera currently included in this subfamily are generally characterized by knobbed buttons or plates.

***Sclerothyone velligera* (Ludwig and Heding) comb. nov.** (Figures 3 & 9b)

Cucumaria? velligera Ludwig and Heding, 1935: 70, text-fig. 49.
Pentamera velligera Deichmann, 1948: 351.
Neothyone ? velligera Panning, 1949: 458.

Diagnosis: As for the genus.

Type: ?Bonn, West Germany.
Type locality: Cape of Good Hope (34°33'S / 18°21'E), 318 m.
Previous record: Type locality only.
Material examined: UCT: St. WCD 219H, S.W. of Cape Point, 360–365 m, rocky bottom, uneven surface, 1 spec.

Description: Specimen vase-shaped (Figure 3j), length 22 mm, breadth of anterior end 6,5 mm. Colour, in alcohol, off-white. Anal papillae present, 'teeth' absent. Pedicels non-retractile, confined to ambulacra in groups of 2–5, more numerous anteriorly.

Calcareous ring (Figure 3f) compact, plates weakly fused at base only; paired posterior prolongations of radials about thrice height of ring, each broken into 9–10 pieces. Madreporite of two kidney-shaped calcareous pieces (Figure 3g). Gonadal tubules unbranched, full of eggs (Figure 3h). Each respiratory tree with two main trunks but only basal parts of trunks, with two sacciform end branches, preserved.

Regular table discs (Figures 3a & 9b) oval, 4-holed

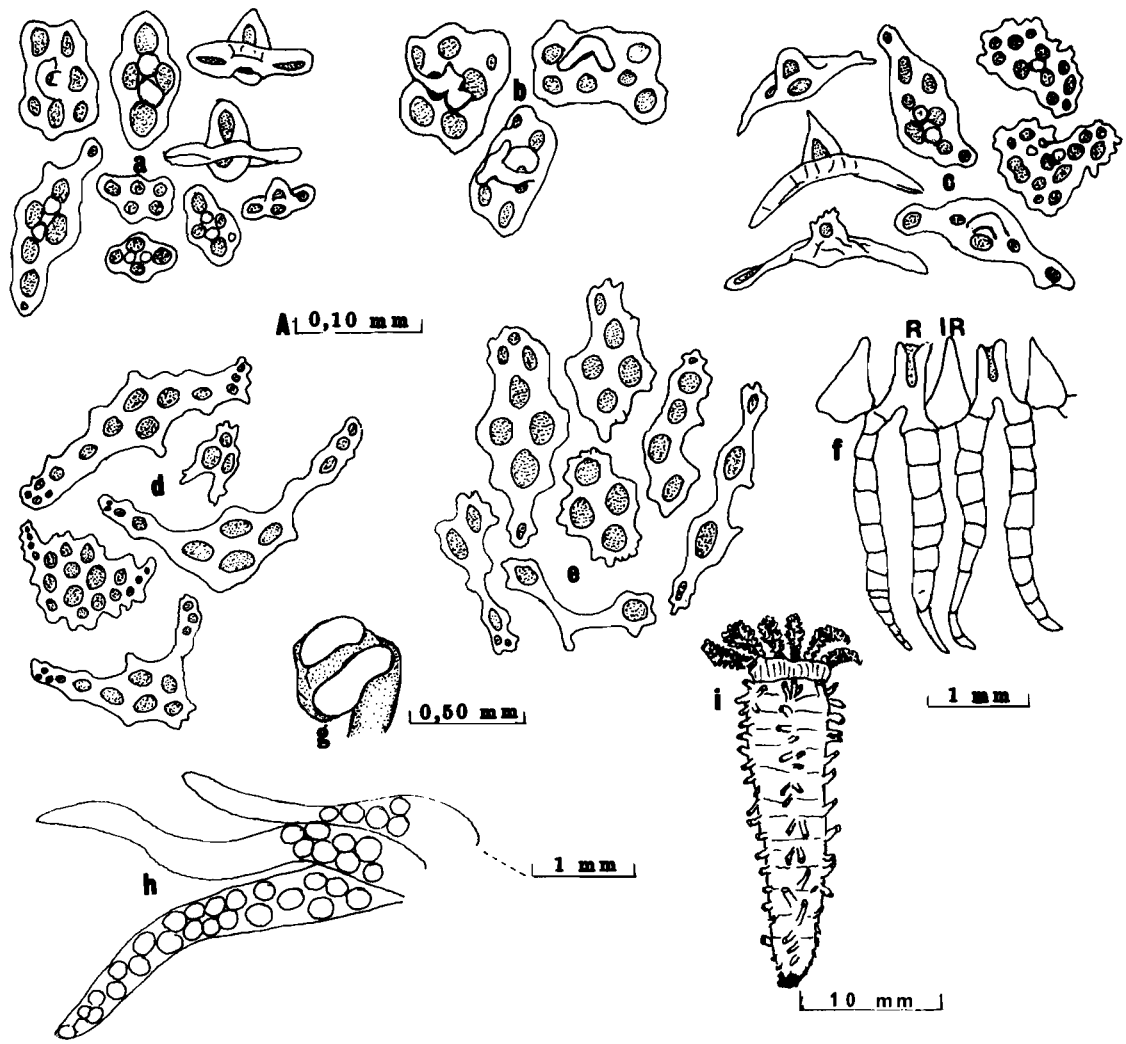

Figure 3 Entire animal, spicules and other internal structures of *Sclerothyone velligera* (Ludwig & Heding). (a) Spicules from dorsal body wall; (b) plate-like table from ventral body wall; (c) pedicel spicules; (d) tentacular spicules; (e) introvert spicules; (f) part of calcareous ring; (g) madreporite; (h) gonadal tubules; (i) entire animal (twice natural size). R – radial plate; IR – interradial plate. (a–e Scale A).

(0,08–0,12 mm); spire (including 'handle') 0,04–0,08 mm, frequently reduced to knobs on surface of disc. Irregular table discs (Figures 3a, b, & 9b) plate-like, rectangular to subrectangular (0,08–0,16 mm), perforated by 5–10 holes; spire arched or terminating in a single tooth. Pedicel plates irregular, multilocular (Figures 3c & 9b); pedicel tables (Figures 3c & 9b) with an elongate (0,12–0,17 mm) curved disc, perforated by usually four large central holes and one hole at each extremity; spire short 0,035–0,070 mm), terminating in one or more teeth. Introvert plates elongate, multilocular or reduced to spectacle-shaped rods (Figure 3e). Tentacular plates and rods curved, irregular (Figure 3d); few rods solid, C-shaped.

Distribution: South-west of Cape Point, South Africa, 318–365 m (Figure 10).
Habitat: Rock.

Remarks: Ludwig & Heding (1935) established this species on the basis of two specimens. As the present specimen differs substantially from the type, it is briefly described above as it may not be conspecific with Ludwig & Heding's species.

Some differences are the distribution of pedicels (in Ludwig & Heding's species stated to be in double rows), the absence of anal 'teeth', the subdivided radial processes, the shape of the madreporite, the origin of retractor muscles, the poor development of teeth on the body wall tables and the presence of rectangular to subrectangular plate-like tables in the integument. Perhaps not all these differences are significant since a superficial study gives the impression that the pedicels are arranged in double rows, the presence of anal teeth is a variable character within a species, and members of the same species may have divided or undivided processes to the radial plates as in *Ohshimella ehrenbergii* (Selenka). The madreporite and the origin of retractors are also variable characters. The irregular tables, if they were present in the type, could have been overlooked.

Features which support the conspecificity of the two forms are their size (Ludwig & Heding's material was 23–24 mm in length), locality and depth at which collected, poor development of respiratory trees and the presence of regular tables of similar form and size.

Since Ludwig & Heding did not comment on the degree of maturity of the gonad, Deichmann (1948) suspected that the ambulacral restriction of the pedicels may be a juvenile character and that the species may possibly belong in *Thyone*. Since the present specimen has mature gonadal tubules it cannot be referred to *Thyone*. In fact its calcareous ring is of a different form than that of species currently included in *Thyone* except *T. adinopoda* recently described by Pawson & Miller (1981). However, although the latter species also has tables with 'handles' similar to those of *S. velligera,* its pedicels are scattered as in other *Thyone* species.

Regrettably the genus *Sclerothyone* is at present monotypic unless more material or a re-examination of the type proves that more than one species is here involved.

Genus *Temparena* gen. nov.

Diagnosis: Small, barrel to U-shaped species up to 25 mm long. Tentacles 10, ventral two reduced to stubs. Skin thin, rigid with spicules. Radial and interradial plates of calcareous ring small, compact, with radials carrying long, undivided, paired processes, up to eight times the height of ring. Gonad hermaphroditic, posterior tubes developed as testis, anterior as ovary, the latter may contain embryos. Body wall spicules tables and plates; tables with usually a four-holed, oval disc and a short, two-pillared spire, with or without teeth; plates thick, smooth, elongate, multilocular. Introvert and tentacles with perforated plates with crinkled margins; no tables.

Type species: Cucumaria? chuni Ludwig and Heding, 1935 (designated herein).
Etymology: The generic name *Temparena* is an anagram of *Pentamera,* the genus in which the type species was formerly classified.

Remarks: The new genus is here erected to accommodate only Ludwig & Heding's *Cucumaria? chuni.* Deichmann (1948) transferred the species to *Pentamera* and it was retained in this genus by Panning (1949). Although the body wall spicules of *C.? chuni* are remarkably similar to those of *Pentamera* the calcareous ring is different. In *P. pulcherrima* (Ayres, 1851), the type species of *Pentamera,* the calcareous ring is short, tubular and, together with the posterior processes of the radial plates, at least partially broken into a mosaic of small pieces of calcite.

Since the calcareous ring and the processes are compact in *C.? chuni* it cannot be classified in Thyoninae. Since no existing genus in the family Sclerodactylidae can accommodate the species, the genus *Temparena* is here erected. Within the family, the genus shows some affinity to *Sclerothyone* and *Sclerodactyla.* It differs from the former in the form of its body and calcareous ring and in the presence of smooth plates and handle-less tables and, from the latter, in its distribution of pedicels, form of the calcareous ring and in the presence of plates in combination with tables.

***Temparena chuni* (Ludwig and Heding) comb. nov.**
(Figures 4 & 9c)

Cucumaria? chuni Ludwig and Heding, 1935: 192, text-figs. 51 and 52, pl. 2, figs. 1–7.
Pentamera chuni Deichmann, 1948: 350; Panning, 1949: 460.

Diagnosis: As for the genus.
Type: ?Bonn (West Germany).
Type locality: Cape of Good Hope (34°33'S / 18°21'E), 318 m.
Previous record: Type locality only.
Material examined: UCT: St. WCD 216A, S.W. of Cape Point, 400 m, dredge, 12 October 1965, 1 spec.

Description: Body form barrel to U-shaped (Figure 4j). Length 18 mm, breadth 6 mm. Colour uniform greyish cream in alcohol. Radial and interradial plates of

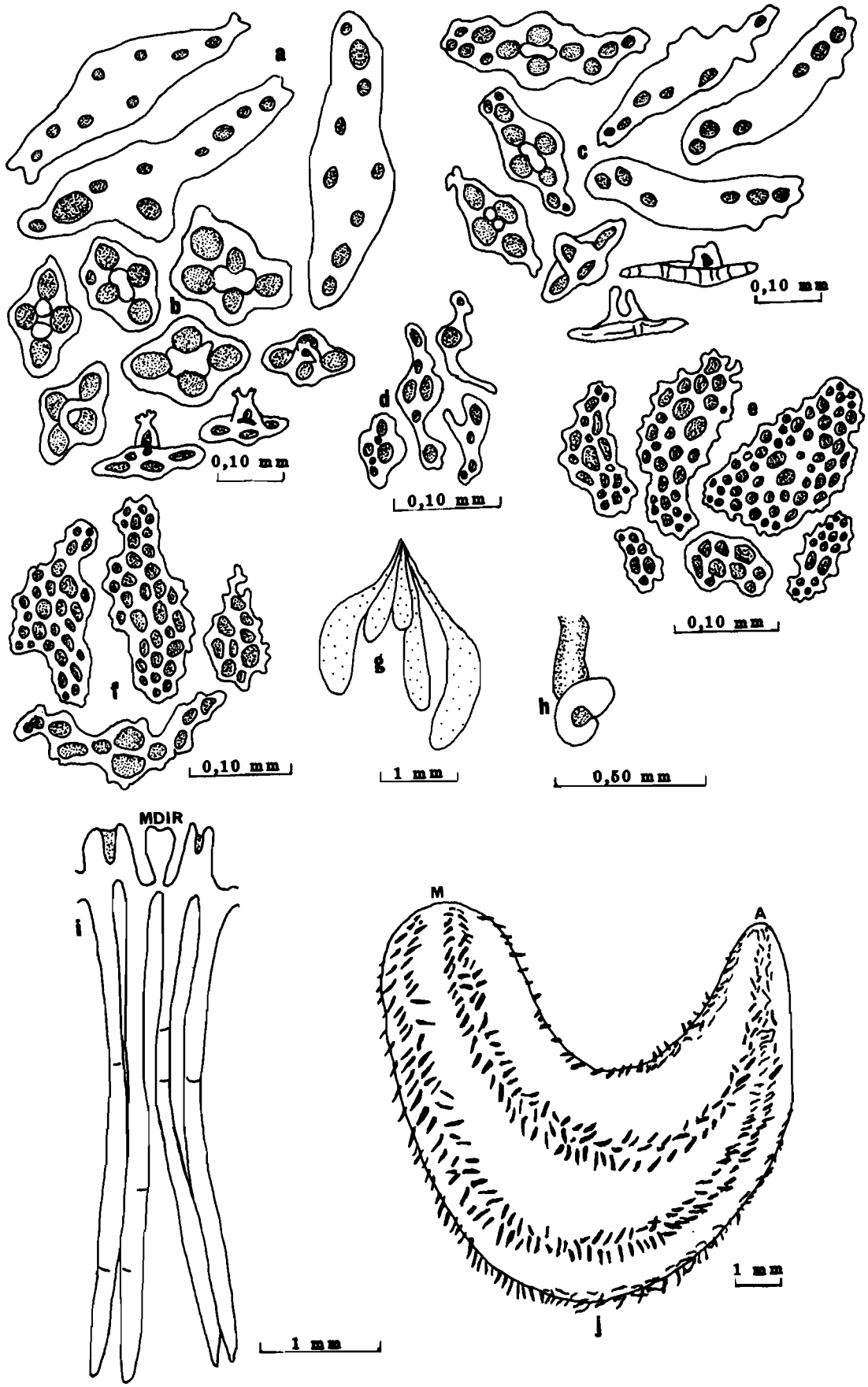

Figure 4 Entire animal, spicules and other internal structures of *Temparena chuni* (Ludwig & Heding). (a) Plates from dorsal body wall; (b) tables from dorsal body wall; (c) tables and plates from ventral body wall; (d) pedicel spicules; (e) introvert spicules; (f) tentacular spicules; (g) gonadal tubules (male); (h) madreporic body; (i) part of calcareous ring; (j) entire animal. A – anus, M – mouth, MDIR – mid-dorsal interradial plate.

calcareous ring (Figure 4i) united by narrow bridges. Posterior prolongations of radial plates about eight times height of ring. Each respiratory tree with two main trunks. Gonad (? testis) (Figure 4g) developed as paired clusters of short, rarely terminally branched, banana-shaped tubules. Ovary not observed but coelom contains several eggs and embryos up to the early post-gastrula stage (0,49 mm) with a pair of coelomic pouches.

Table discs of body wall (Figures 4b & 9c) 0,095–0,160 mm long; spire 0,02–0,06 mm, of two pillars, either terminating in a toothed apex, sometimes arched, or reduced to bow-shaped nodules. Plates (Figures 4a, c & 9c) elongate (0,175–0,350 mm), pierced by 4–13 small holes. Pedicel table discs (Figure 4d) 0,080–0,125 mm, spire height 0,025–0,040 mm; pedicel plates and rods 0,060–0,115 mm. End plates 0,04 mm in diameter. Plates of introvert and tentacles multilocular, of varying size and with crinkly margins (Figure 4e & f).

Distribution: South of Cape Point, South Africa, 318–365 m (Figure 10).
Habitat: Rock.

Remarks: This is the second record of this interesting species, well characterized by its calcareous ring and spicules. In its body form and deposits it approaches *Pentamera calcigera* (Stimpson), from the N.E. Pacific and W. Atlantic waters, illustrated by Pawson (1977). However, a comparison of *T. chuni* with *P. calcigera* received from the USNM, shows that the latter species is much larger and unisexual with a short, tubular calcareous ring and short paired processes to the radial plates. The remarkable similarity in the spicules of both species (the plates of *P. calcigera* being only slightly smaller) raises some doubt as to the justification of the use of the calcareous ring to separate the Sclerodactylidae and the Phyllophoridae (*sensu* Pawson & Fell 1965). The similarity of the spicules of *Sclerothyone* with those of some *Thyone* species also supports this contention.

Since both *T. chuni* and *P. calcigera* are widely distributed their similarities are probably a result of parallel evolution and convergence and perhaps not indicative of any close relationship. Since *T. chuni* is hermaphroditic and either ovoviviparous or practising coelomic incubation, it presumably has a southern origin. However, a similar form has yet to be described from the Antarctic region.

Subfamily Cladolabinae Heding and Panning, 1954

Diagnosis: Dendrochirotid holothurians with 15 or 20 tentacles arranged in two or three circles of (10+5), (10+10) or (10+5+5). Calcareous ring undivided; posterior paired processes of the radials usually entire, if broken into a series of elements then processes exceptionally short and spicules either in the form of spinous rods or large, lenticular, perforated plates.

Type genus: Cladolabes Brandt, 1835 (by indication).

Remarks: This is a polytentaculate subfamily of the Sclerodactylidae represented in southern Africa by three genera and as many species.

Genus *Afrocucumis* Deichmann

Pseudocucumis (partim) Sluiter, 1901: 107; H.L. Clark, 1923: 417.
Afrocucumis Deichmann, 1944: 736; 1948: 358; Heding and Panning, 1954: 108 (synonymy).
Discucumaria H.L. Clark, 1946: 404.

Diagnosis (from Heding and Panning, 1954: 108): Small to medium-sized dendrochirotids with 20 tentacles. Calcareous ring compact, radial plates with short posterior processes subdivided into few pieces; interradial plates without posterior processes. Body wall spicules either plates or rosette-shaped bodies, tables absent.

Type species: Cucumaria africana Semper, 1868 (by monotypy).

Remarks: Heding & Panning (1954) included only two species in this genus, namely *A. africana,* the Indo-West-Pacific species, and *A. ovulum* (Selenka, 1867) from the Panamic region. The latter species, described as a *Stolus* by Selenka, was referred to *Euthyonidium* by Deichmann (1938). However, Heding & Panning transferred the species to *Afrocucumis* and relegated *Euthyonidium* to the synonymy of *Duasmodactyla.* Although the radial plates of the calcareous ring of *A. ovulum* are prolonged posteriorly they are deeply incised and without posterior processes. The spicules are not disc-like plates, as found in *A. africana,* but irregular crosses, plates and rods, the former, according to Deichmann, represent reduced tables. It therefore appears unlikely that *A. ovulum* belongs in *Afrocucumis* which is perhaps monotypic.

Afrocucumis africana (Semper) (Figures 5 & 9d)

Cucumaria africana Semper, 1868: 53, 270, pl. 15, fig. 16; Théel, 1886: 108; Ludwig, 1887: 1236.
Pseudocucumis africana Ludwig, 1888: 815; Lampert, 1896: 61; Sluiter, 1901:107; Mitsukuri, 1912: 257, text-fig. 52, pl. 8, fig. 66; H.L. Clark, 1923: 417.
Phyllophorus transvectus Sluiter, 1914: 19, fig. 7a, b.
Orcula cucumiformis Semper, 1868: 244, 274, pl. 40, figs. 8, 9.
Cucumaria assimilis Bell, 1886: 27; Ludwig, 1899: 561.
Pseudocucumis theeli Ludwig, 1887: 1236, pl. 15, figs. 12–16.
Discucumaria africana H.L. Clark, 1946: 404.
Afrocucumis africana Deichmann, 1944: 736; 1948: 358; Heding and Panning, 1954: 109, text fig. 39; Clark and Rowe, 1971: 182 (dist.), text fig. 95g, pl. 30, fig. 3; Rowe and Doty, 1977: 226, fig. 2a.

Diagnosis (Modified from Deichmann, 1948: 358): A small species reaching a length of 40 mm; colour in life reddish-violet, dull brown in alcohol. Pedicels in double rows in the radii. Tentacles in two (?three) circles. Posterior radial processes of calcareous ring short, broken into three pieces. Spicules in the form of thick, discoidal, lenticular plates with tiny, often occluded holes and pyramidal knobs or low spines on surface.

Type: ?Germany.
Type locality: Mozambique.

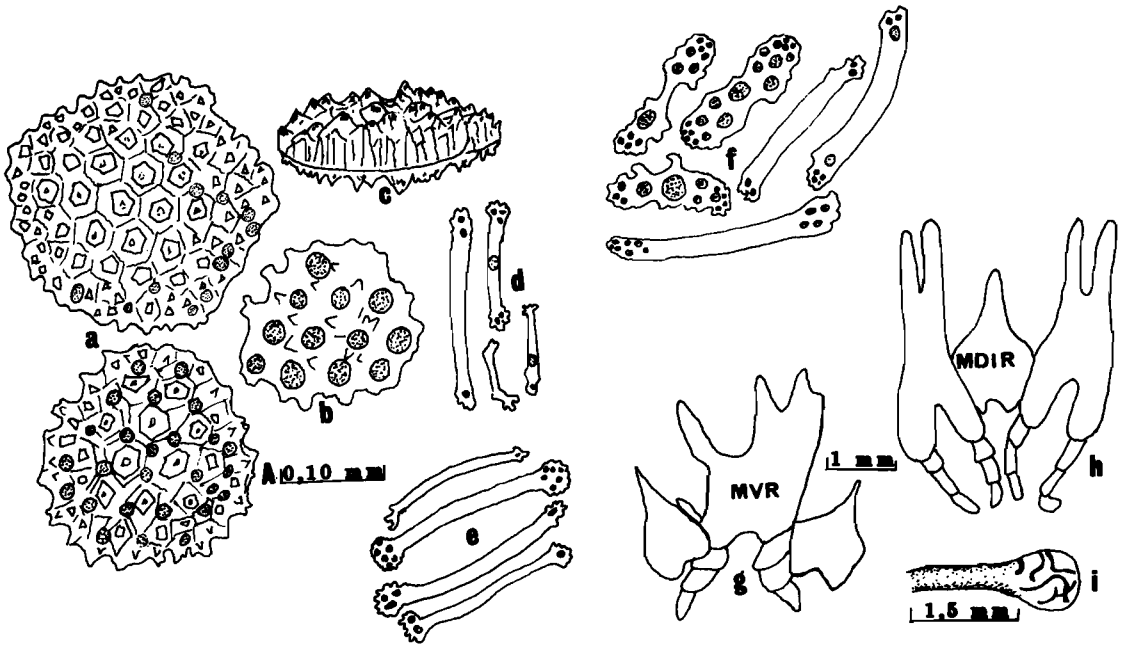

Figure 5 Spicules and other internal structures of *Afrocucumis africana* (Semper). (a) lenticulate plates from dorsal body wall; (b) developing plate; (c) plate from anal region (seen from side); (d) introvert rods; (e) tentacular rods; (f) pedicel plates and rods; (g) & (h) parts of calcareous ring; (i) madreporic body. MDIR – mid-dorsal interradial plate, MVR – mid-ventral radial plate. (a–f Scale A).

Previous southern African record: Mozambique/?Natal.
Material examined: UCT: St. Jan 26N (Jangamo shore collection, Mozambique). 8 July 1968, 4 spec. (1 Adult + 3 juvenile).
Local distribution: Known with certainty only from Mozambique (Figure 10).
General distribution: According to Rowe and Doty (1977) the species is distributed throughout the Indian Ocean, Indonesia and Western Pacific Islands but has yet to be recorded from the Phillipine and Hawaiian Islands.

Remarks: This is a well known and well characterized species. The adult specimen in the present material measures 37 mm. The radial processes of the calcareous ring are broken into three pieces (Figure 5g & h). The ventral radial plate in one juvenile is fragmented transversely into two pieces, probably an artefact or an abnormal development. Smooth, simple, multilocular plates (Figures 5b & 9d), common in the youngest individual (17 mm), are definite precursors of the large lenticular plates (0,220–0,325 mm) of adults. The record of this species from the Natal coast is dubious since H.L. Clark's (1923) material bore both Natal and Mozambique labels.

Genus *Cladolabes* Brandt

Cladolabes Brandt, 1835: 35; Heding and Panning, 1954: 121 (synonymy).
Urodemas Selenka, 1867: 352; H.L. Clark, 1938: 797; 1946: 410.

Diagnosis (from Heding & Panning 1954: 121): Medium-sized to large species with 20 tentacles in two (15+5) or three (10+5+5) circles. Calcareous ring compact but partially soft (?cartilaginous), radial and interradial plates of ring high, posterior paired radial processes distinct or rudimentary. Spicules either tables with rudimentary discs and tall two-pillared spires or rods and clubs derived from tables.

Type species: Cladolabes limaconutus Brandt, 1835 (by subsequent designation Heding and Panning 1954: 121).

Remarks: Heding & Panning (1954) analysed the genus and included in it eight species of which only *C. bifurcatus,* described as *Urodemas bifurcatum* by Deichmann (1944), occurs in southern Africa. The genus *Urodemas,* erected by Selenka (1867) and emended by H.L. Clark (1938), was relegated to the synonymy of *Cladolabes* by Heding & Panning.

***Cladolabes bifurcatus* (Deichmann)** (Figures 6a, 7 & 9e)
Urodemas bifurcatum Deichmann, 1944: 731, fig. 1; 1948: 357, pl. 20, figs. 12, 13.
Cladolabes bifurcatus Heding and Panning, 1954: 132.

Diagnosis (After Deichmann 1944: 731): Medium-sized species up to 85 mm long. Tentacles 20, in three circles (10+5+5). Pedicels restricted to the ambulacra. Calcareous ring soft; radials high, posteriorly incised, with or without rudimentary processes. Polian vesicles and stone canals numerous. Spicules modified tables with a forked base and a rod-like spire ending in a cluster of spines.

Type: UCT, M9F1, 26 Dec 1936; *Syntype:* Mus. Comp. Zool., Harvard (USA).
Type locality: Umtwalumi, Natal (South Coast).

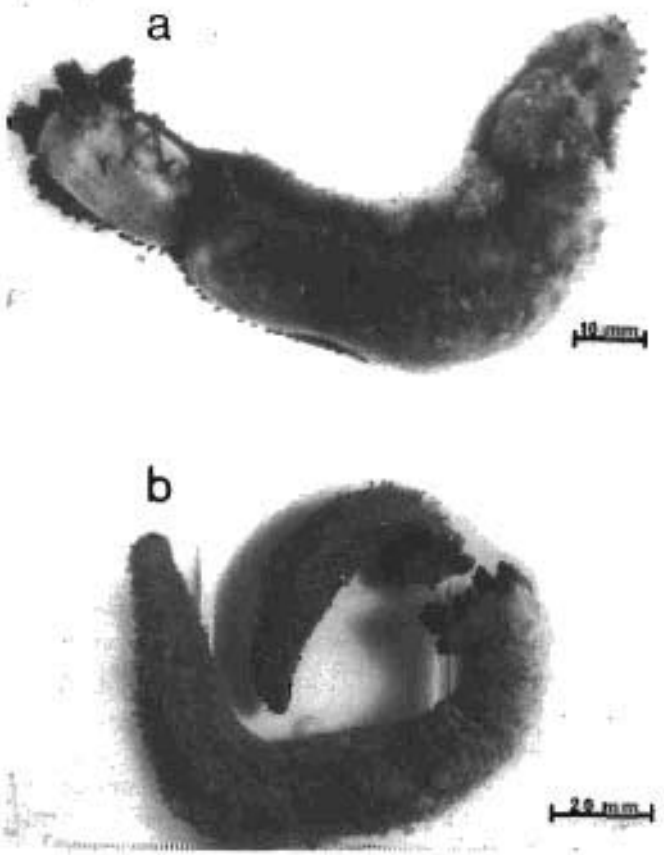

Figure 6 Preserved specimens of (a) *Cladolabes bifurcatus* (Deichmann) and (b) *Ohshimella ehrenbergii* (Selenka).

Previous record: Type locality only.

Material examined: UDW: Treasure Beach, Durban, 7 February 1982, Mrs J. Maxwell, 1 spec.; Vetchy Pier, Durban, 9 April 1982, Mrs J. Maxwell, 2–3 m, in crevice or under stone, 2 spec.; Umdloti Beach, Natal, March 1978, K.S. Ganga and R. Biseswar, rock pool, 1 spec.

Distribution: Southern Natal between Umtwalumi and Umdloti, 0–3 m (Figure 10).

Habitat: In rock crevices and under stones.

Remarks: Deichmann (1944) only diagnosed the species and briefly commented on its anatomy in the remarks. The length of the largest specimen in the present material (Figure 6a) is 85 mm and breadth 27 mm. The life colouration of the present material was light to chestnut brown with rust to dark-coloured suckers and brown to black tentacles. The introvert is remarkably well developed and with three rows of podia per radius ventrally and two dorsally. The radial plates of the calcareous ring carry rudimentary bifurcate processes and the medial borders of the two dorso-radials are notched. There are numerous madreporic bodies and 12 polian vesicles, the latter are arranged in groups of three in the interradii, except the mid-dorsal (Figure 7g).

The spicules (Figures 7a, b, & 9e) as suspected by Deichmann (1944), are modified two-pillared tables with the disc reduced to a forked spiny base, 0,02–0,07 mm wide, and the pillars fused to form a rod, 0,07–0,11 mm long, ending in a cluster of 12 or more spines. The latter may be symmetrically arranged, as observed by Deichmann, or quite asymmetrical (Figure 7c). Incomplete table discs with a pair of holes are occasionally preserved

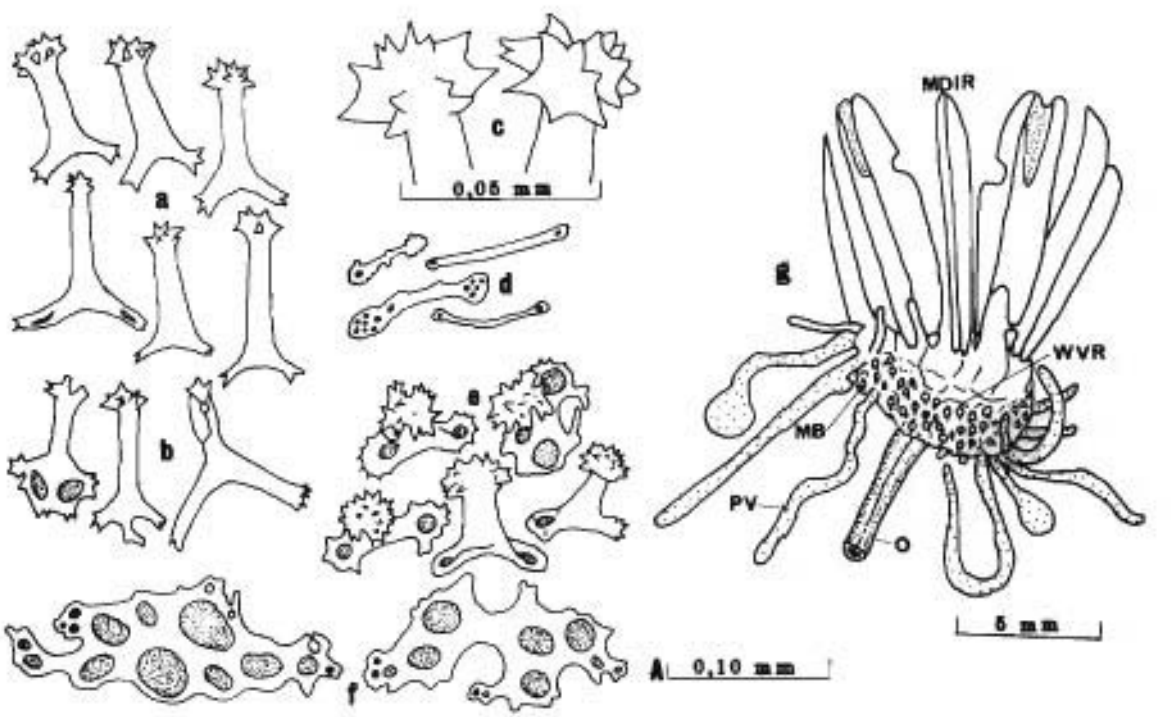

Figure 7 Spicules and aquapharyngeal bulb of *Cladolabes bifurcatus* (Deichmann). (a) Spinous forked rods from dorsal body wall (normal); (b) same from ventral body wall (abnormal); (c) apex of normal rods (enlarged); (d) tentacular rods; (e) introvert tables; (f) pedicel plates; (g) aquapharyngeal bulb. MDIR – mid-dorsal interradial plate of calcareous ring, MB – madreporic body; O – oesophagus; PV – polian vesicle; WVR – water vascular ring (a, b, d–f Scale A).

(Figure 7b). The end plates of the pedicels are 0,6 mm in diameter and these are encircled by other irregular plates, 0,14–0,22 mm long and with 5–30 holes (Figures 7f & 9e). The tentacular deposits include rods with smooth to crinkly margins (Figure 7d) while the introvert deposits are tables with a spinose, 1–4-holed disc, sometimes reduced to a forked base, and a spire ending in a cluster of spines (Figure 7e).

This is the second record of this interesting species. Deichmann (1948: 348) speculates that the species may reach a larger size (the type measured 60 mm) but regards its occurrence around Durban as 'almost certainly fortuitous'. The addition now of more material from shallow waters around Durban indicates that the species is present but may not be common. Further, Deichmann (1944, 1948) is of the opinion that the spicules are abnormal. It is now certain that spinous rods with bifurcate bases are characteristic of this species.

According to Deichmann (1944) the species is most closely related to *C. aciculus* (Semper) from Mauritius and other parts of the Indo-West-Pacific region. However, *C. aciculus* has a different type of calcareous ring with both the radials and the interradials carrying short processes that are often linked, while its spicules are highly modified tables with the spire ending in a single point. On the contrary, the calcareous ring, spicules and pedicel plates of *C. bifurcatus* approximate those of *C. schmeltzii* (Ludwig, 1875) from the East Indies, North Australia and Phillipine Islands, except that in the Natal species the interradials carry no processes. The rods of *C. bifurcatus* can be easily derived from the spiny tables with reduced discs of *C. schmeltzii*. In addition the size, colouration, tentacle arrangement and internal anatomy of both species are similar. However, in *C. schmeltzii* the pedicels are stated to be scattered while in *C. bifurcatus* they are restricted to the ambulacra except in the central mid-body where they also occur in the interambulacra.

C. bifurcatus appears to be endemic to Natal. Its absence from the colder water of the Cape Province in which the southern African endemic fauna dominates, suggests that it is a warm water species.

Genus *Ohshimella* Heding and Panning

Urodemas (partim) Selenka, 1868: 352.
Phyllophorus Ludwig, 1875: 95; H.L. Clark, 1923: 417 (non Grube).
Urodemella Deichmann, 1948: 358.
Ohshimella Heding and Panning, 1954: 133.

Diagnosis (Modified from Heding & Panning, 1954: 133): Medium-sized dendrochirotid holothurians with 20 tentacles in two circles of 15+5. Pedicels scattered more or less evenly in both ambulacra and interambulacra. Calcareous ring compact, radials with short paired processes. Body wall spicules in the form of spinous rods accompanied by rosette-like miliary granules, spinous crosses or plates; tables present in ventral body wall or pedicels of juvenile.

Type species: Urodemas ehrenbergii Selenka, 1868 (by original designation Heding & Panning 1954: 133).

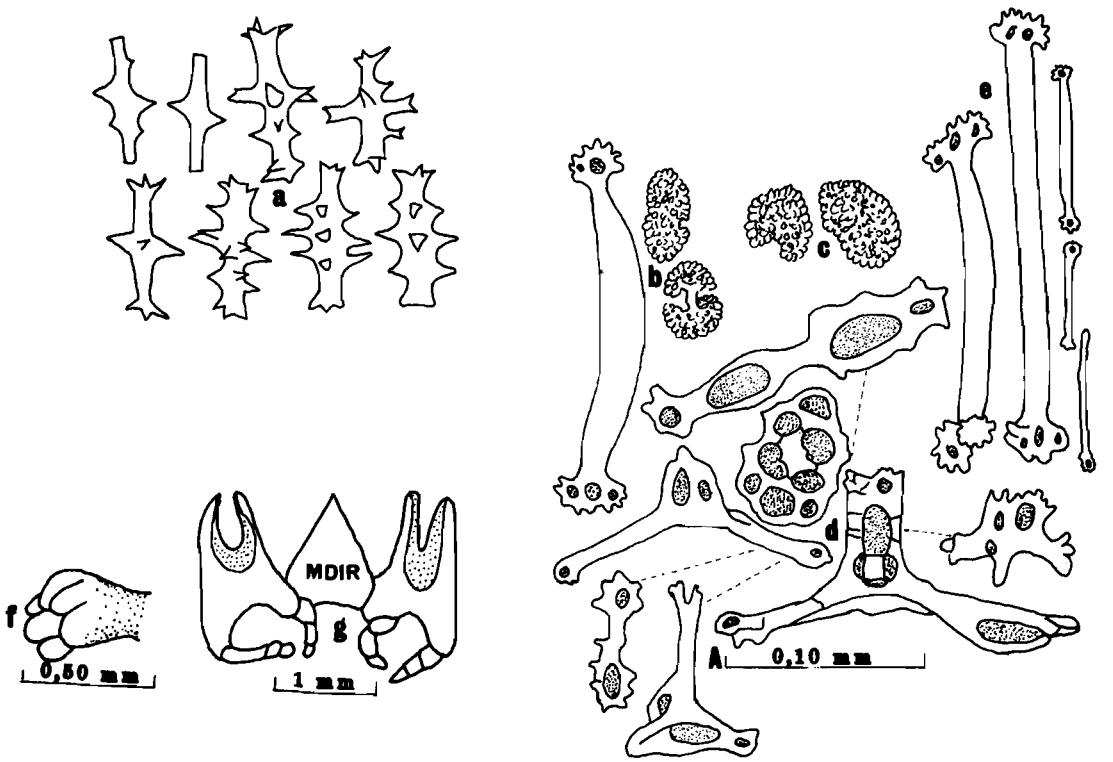

Figure 8 Spicules and other internal structures of *Ohshimella ehrenbergii* (Selenka). (a) Spinous rods from dorsal body wall; (b) rod and rosettes from introvert; (c) rosettes from dorsal body wall; (d) spicules from anal region; (e) tentacular spicules; (f) madreporic body; (g) part of calcareous ring. MDIR – mid-dorsal interradial plate. (a–e Scale A).

Remarks: Ohshimella was erected by Heding & Panning (1954) to accommodate the type species originally described from the Red Sea and *O. mauritiensis* from Mauritius. In southern Africa the genus is represented by its widely distributed type species.

***Ohshimella ehrenbergii* (Selenka)** (Figures 6b, 8 & 9f)

Urodemas ehrenbergii Selenka, 1868: 14, figs. 6–8; Macnae and Kalk, 1958: 130.

Phyllophorus n.sp. Semper, 1868: 245, pl. 30, fig. 21.

Phyllophorus ehrenbergi Lampert, 1885: 181, Théel, 1886: 151.

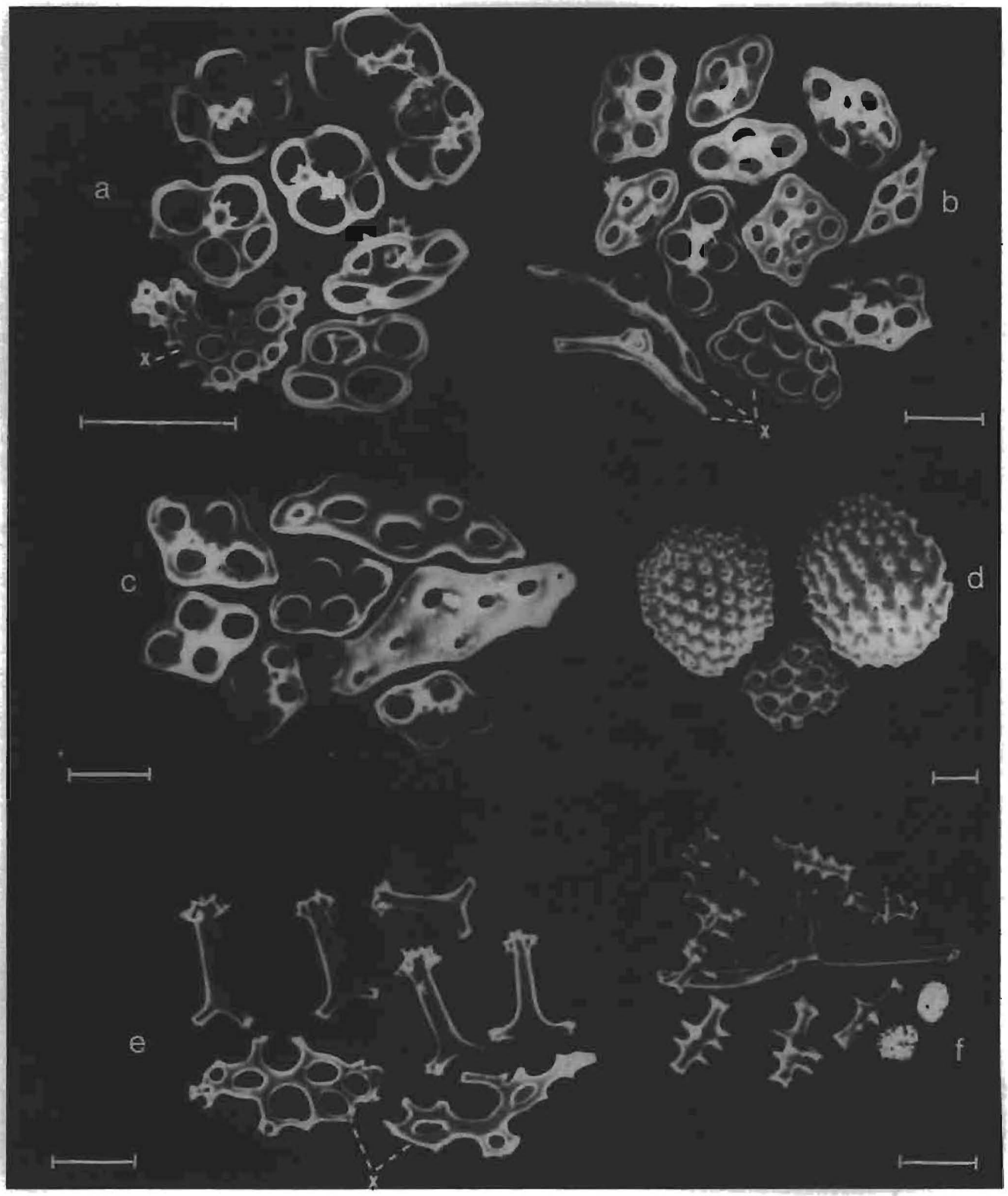

Figure 9 SEM micrographs of representative spicules of (a) *Havelockia venustella* (Ludwig & Heding); (b) *Sclerothyone velligera* (Ludwig & Heding); (c) *Temparena chuni* (Ludwig & Heding); (d) *Afrocucumis africana* (Semper); (e) *Cladolabes bifurcatus* (Deichmann); (f) *Ohshimella ehrenbergii* (Selenka) (juvenile). (x – from podia; others from body wall). Scale: 50 µm.

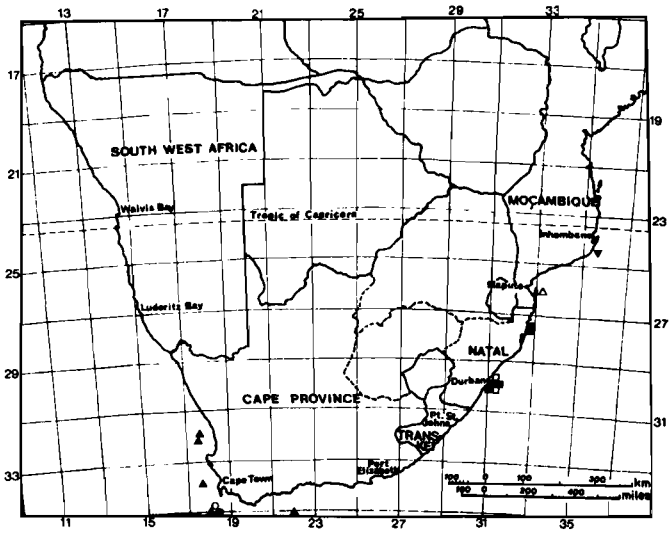

Figure 10 Distribution of southern African sclerodactylid holothurians. ▲ *Havelockia venustella* (Ludwig & Heding); △ *Havelockia versicolor* (Semper); ● *Sclerothyone velligera* (Ludwig & Heding); ○ *Temparena chuni* (Ludwig & Heding); ▼ *Afrocucumis africana* (Semper); □ *Cladolabes bifurcatus* (Deichmann); ■ *Ohshimella ehrenbergii* (Selenka).

Phyllophorus frauenfeldi Ludwig, 1875: 95, fig. 22; Lampert, 1885: 178; Théel, 1886: 151; H.L. Clark, 1923: 417.

Cucumaria turbinata syn. nov. Pearson (non Hutton), 1903: 189, pl. 1, figs. 2–6; 1910: 169, text figs. 13, 14; Heding and Panning, 1954: 137, text fig. 59.

Orcula torrense Helfer, 1913: 433, text figs. 1–7.

Urodemella ehrenbergii Deichmann, 1944: 733; 1948: 358.

Ohshimella ehrenbergii Heding and Panning, 1954: 133, text figs. 57–59; Clark and Rowe, 1971: 182 (dist.), pl. 30, fig. 5.

?Urodemas gracile Selenka, 1868: 114; Heding and Panning, 1954: 137.

Diagnosis (From Selenka 1868: 14, modified herein): Radial prolongations of calcareous ring compact or divided into a few pieces. Body wall spicules short spinous rods, usually accompanied by rosette-shaped miliary granules. Tables present in body wall and/or pedicels of juveniles only.

Type: Berlin Museum.

Type locality: Red Sea.

Previous southern African records: Querimba (Mozambique), Cape Vidal area (Natal).

Material examined: UDW: Park Rynie, Natal, 20 March 1981, K.S. Ganga, under rock, 2 spec. (juvenile); Vetchy Pier, Durban, June, 1982, Mrs J. Maxwell, 2–3 m, 2 spec; Perrier's Rock, Natal, 13 July 1968, A.S. Thandar, wedged in rock crevice, LWS, 3 spec; Cape Vidal, Natal, 26 January 1967, A.S. Thandar, wedged in rock crevice on 'leeward' side of wave washed rock, LWS, 10 spec; Sodwana Bay, Natal, 29 January 1967, A.S. Thandar, under rock, 1 spec.

Local distribution: Mozambique to southern Natal, 0–3 m (Figure 10).

General distribution: From India, Maldives and Ceylon, round Arabia to the Red Sea and east coast of Africa.

Habitat: In rock crevices or under stones at LWS.

Remarks: Urodemas ehrenbergii Selenka, 1868 and *Phyllophorus frauenfeldi* Ludwig, 1875, both originally described from the Red Sea, were synonymized and referred to *Urodemella* by Deichmann (1948) and to *Ohshimella* by Heding and Panning (1954). Thandar (1971, M.Sc. Thesis unpublished) referred some Natal forms to *O. ehrenbergii* but with doubt since, in possessing divided radial processes to the calcareous ring and rosettes in the body wall, they corresponded more with Ludwig's description of *P. frauenfeldi.* Thus the writer erroneously supported the separation of the two species. Because of the sympatry of both species this view cannot be upheld. The breaking up of the radial processes may just be an individual or local variation while the absence of rosettes in Selenka's type may be attributed to their dissolution in the preserving fluid.

However, three of the four more recent specimens in the present material from the Natal coast satisfy Pearson's (1910) description of *Cucumaria turbinata* from Mozambique, also suspected by Heding & Panning (1954) to be conspecific with *O. ehrenbergii.* Since the three specimens are obviously juvenile, judging from their size < 24 mm), ambulacral restriction of most of the pedicels and the immaturity of the gonad, they are nevertheless also referred to *O. ehrenbergii.* Although Pearson (1910) did not comment on the maturity of his single specimen from Mozambique, its size (45 mm) and some ambulacral restriction of pedicels suggest that it undoubtedly was also a juvenile. Hence *C. turbinata* Pearson, 1903, 1910 (non Hutton) is here declared a synonym of *O. ehrenbergii.*

While the adults of *O. ehrenbergii* (Figure 6b) are cylindrical and brownish the juveniles are truncate and greyish-peach with black pedicels. The radial processes of the calcareous ring in juveniles are folded beneath the pharynx and hence not obvious from superficial study. The spinous rods (Figures 8a & 9f) are more or less the same size (0,050–0,085 mm) as those of adults (0,06–0,09 mm) but the rosette-shaped miliary granules (0,010–0,085 mm in adults), are slightly smaller (0,02–0,05 mm) (Figures 8c & 9f). The tables, present in the anal region and pedicels, are clumsy with large 2–8-holed discs (0,14– 0,20 mm) and short 2–4-pillared spires (0,04–0,08 mm). Tables are probably a juvenile feature and lost early in life. Reductional stages of these are frequently evident in the rods and plates found in the anal region and pedicels of some larger specimens.

Since *Urodemas gracile* Selenka, 1868 also came from the Red Sea, Heding & Panning (1954) are perhaps correct in treating it also as a synonym of *O. ehrenbergii.* The presence of *O. ehrenbergii* south of Durban further extends the known range of this species.

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