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Additions to the aspidochirotid, molpadid and apodid holothuroids (Echinodermata: Holothuroidea) from the east coast of southern Africa, with descriptions of new species

AHMED S. THANDAR

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Abstract

Collections of holothuroid echinoderms received from the Natal and South African Museums, the Universities of Cape Town and Witwatersrand and that present in the former University of Durban-Westville, contain several new species and many others that are new to the fauna of southern Africa, south of the tropic of Capricorn. A paper describing and/or recording several dendrochirotids and a dactylochirotid, from a portion of these materials originating from the east coast of southern Africa, has already been published. The current paper describes and/or reports on several new species and records of aspidochirotid, molpadid and apodid holothuroids, also from the east coast, extending from Inhaca Island, off the coast of Maputo (Mozambique), to the Port St. Johns-East London area (South Africa), the subtropical zoogeographic province. A few other species have been included if they represent juvenile material, or considered extensions of ranges (bathymetric or otherwise) of previously known species, or confirmation of a species previously recorded from a single locality in the region under consideration, or for the provision of taxonomic data that was excluded for some previous published records. Of the 30 species treated, four are new to science and seven are new records for the southern African region. The new species are *Holothuria (Lessonothuria) tuberculata*, *H. (Theelothuria) duoturriforma*, *H.(T.) longicosta* and *H. (T.) pseudonotablis*, whereas the new records include *Stichopus* cf. *monotuberculatus* (Quoy & Gaimard), *Actinopyga bannwarthi* Panning, *A. lecanora* (Jaeger), *Bohadschia marmorata* (Jaeger), *H. (Vaneyothuria) integra* Koehler & Vaney, *Molpadia triforia* (Cherbonnier) and *Protankyra autopista* (Marenzeller).

Key words: Holothuroidea, Aspidochirotida, Molpadida, Apodida, South Africa, new species, new records

Introduction

Currently the writer is in the process of identifying and reporting on numerous lots of holothuroid echinoderms received from the South African and Natal Museums and those as yet undescribed/unrecorded in the collections of the Universities of Cape Town, Witwatersrand and the former Durban-Westville (now University of KwaZulu-Natal: Westville Campus). These come from waters south of the tropic of Capricorn, ranging from the littoral to the deep sea, and contain several hitherto undescribed species and many new records for the southern African region. Most of the materials have been collected as a result of deep-water dredgings on the R.V. 'Meiring Naude' by researchers from the South African and Natal Museums, while others stem from either the Natal Museum's NMDP project, which extended from Kosi Bay on the north-east coast of KwaZulu-Natal to False Bay, east of the Cape Peninsula, as yet unidentified and/or unrecorded from the Universities of Cape Town's and Witwatersrand's ecological surveys (the latter at Inhaca Island, Mozambique), or a result of miscellaneous collections housed in the South African Museum, or made by collectors from the former University of Durban-Westville. A report on the dendrochirotid and dactylochirotid holothuroids contained in these materials from the subtropical east coast of South Africa, has recently been published (see

Thandar 2006). The current paper describes and/or reports on new species and new records of aspidochirotid, molpadid and apodid holothuroids also from the southern African east coast, ranging from Inhaca Island, off the coast of southern Mozambique, to the Port St Johns–East London region in the Eastern Cape Province, an area representing the southern African subtropical faunistic province. A few other species have been added if they are considered extensions of ranges of previously known species or confirmation of a species previously recorded from a single locality in the region under consideration. For the latter as well as the new records, detailed descriptions are avoided if the species is well known or previously well described. Some species dealt with formed part of the writer's PhD thesis (see Thandar 1984) but their descriptions were never published. A few others were recorded by Macnae & Kalk (1969) in their survey of the ecology of Inhaca Island, Mozambique and others by Thandar & Samyn (2004) in their paper on the shallow-water holothuroid biodiversity and biogeography of the South African subtropical east coast. All the latter records were published without the inclusion of any taxonomic data. For the Inhaca specimens data are only provided for those species which were not previously recorded from this region as well as those now also known to occur in South Africa. The 30 species treated include four new species and seven new records for the southern African region.

Acronyms: The following acronyms are used to denote sources of materials and/or location of types and other specimens:

KZN – KwaZulu-Natal, South Africa; MCZ—Museum of Comparative Zoology, Harvard; MNHNP—Museum National d'Histoire Naturelle, Paris; NMDP—Natal Museum Dredging Programme; SAM—South African Museum, Cape Town; UCT—University of Cape Town; UW—University of the Witwatersrand, Johannesburg; ZMH—Zoological Museum, Hamburg.

Systematic Account

Order Aspidochirotida Grube

Family Stichopodidae Haeckel

Genus *Thelenota* H.L.Clark

Thelenota anax H. L. Clark, 1921

Thelenota anax H.L. Clark, 1921: 185, p1.18, fig.3; Thandar, 1987:282; Massin, 1999:78, text-figs.3 & 4 (synonymy before 1999); Samyn 2003:96, fig. 39.

Type

MCZ 1068.

Type locality

Murray Island, Torres Strait, Queensland.

Material examined

Sodwana Reefs, KZN, Oceanographic Research Institute, Durban, 1 spec.

Distribution

Tropical Indo-West Pacific, 5–30 m.

Remarks

The Mozambique record is that of Cherbonnier (1979), based on a single specimen from Glory Islands, Mozambique Channel, at a depth of 25 m. The current South African record is also based on a single specimen taken from the Sodwana reef, northern KZN, by the Oceanographic Research Institute in Durban and maintained alive at the Sea World. It was observed to harbour pearlfish, an association which formed the subject of an excellent review article by Ballard (1990). Thandar & Samyn's (2004) record of *T. ananas* from South Africa is erroneous and should be read as *T. anax*.

Family Synallactidae Ludwig

Genus *Pseudostichopus* Théel

***Pseudostichopus echinatus* Thandar, 1992**

Pseudostichopus (Pseudostichopus) sp. Heding, 1940:360, text-fig. 6.
Pseudostichopus echinatus Thandar, 1992: 164, fig. 2; O'Loughlin & Ahearn, 2005:170.

Type

SAM, A23435.

Type locality

Off KZN coast, South Africa, 28° 21.9' S, 32° 34.6', 775–825 m.

Previous southern African record

Type locality only.

Material examined

SAM-A27917, off Tongaat Bluff, northern KZN, 29° 43.5' S, 31° 27.0' E, NMDP, St. ZV 2, 20 vi 1989, 235 m., 1 spec.

Diagnosis (from Thandar 1992, O'Loughlin & Ahearn 2005, amended herein)

Medium-sized species up to 65 mm long. Body wall encrusted with pointed shells, foraminiferans, sand grains, epizoons, etc. Tentacles about 20. Podia mostly in ambulacra of ventral surface, smaller and scattered dorsally but some dorso-lateral ones often more prominent. Stone canal rudimentary or absent. Spicules restricted to tentacles, in the form of large (up to 300 µm), irregular, closely knobbed or somewhat spinous rods, often perforated and sometimes developed as plates in young individuals; reduced in podia. Body wall, respiratory trees, longitudinal muscles and gonad without spicules.

Description

Specimen partially eviscerated. Length 37 mm, breadth in mid-body 7 mm. Colour in alcohol dull greyish-brown. Form cylindrical, mouth ventral, situated some distance from anterior end. Tentacles 17, retracted, white, peltate. Anus subventral, pygal furrow conspicuous, anal papillae or teeth absent. Body wall remarkably thin with usual encrustations. Podia non-retractile, better developed in the ventro-lateral ambulacra, shorter and scattered dorsally and in mid-ventral ambulacrum; suckers not well defined, occasionally with reduced end-plates.

Calcareous ring damaged, radial and interradial plates similar to those of holotype (see Thandar 1992: fig. 2B). Polian vesicle sac-like; stone canal not detected; longitudinal muscles unpaired. Right respiratory tree longer than left, reaching mid-body but left more conspicuously branched. Gonad (testis) as two tufts of

unbranched tubules.

Spicules confined to tentacles and as reduced (56–90 µm) end-plates in some podia. Tentacle spicules as slightly curved, often perforated rods, 133–274 µm long (mean 189 µm), with minute knobs and/or spines,

Material examined

UW Ecological Survey, Inhaca Island, June 1971, 4 spec.

Description

Specimens small, 38–60 mm long, largest 14 mm wide, vermiform. Colour, in alcohol, uniform pinkish-beige, slightly darker dorsally, speckled with white, indicating accumulation of spicules. Podia small, scattered, better developed ventrally. Mouth anterior, collar absent; anus terminal, surrounded by special anal papillae in five radial clusters. Stone canal short, slightly twisted; madreporite spherical; Polian vesicle single. Cuvierian tubules absent.

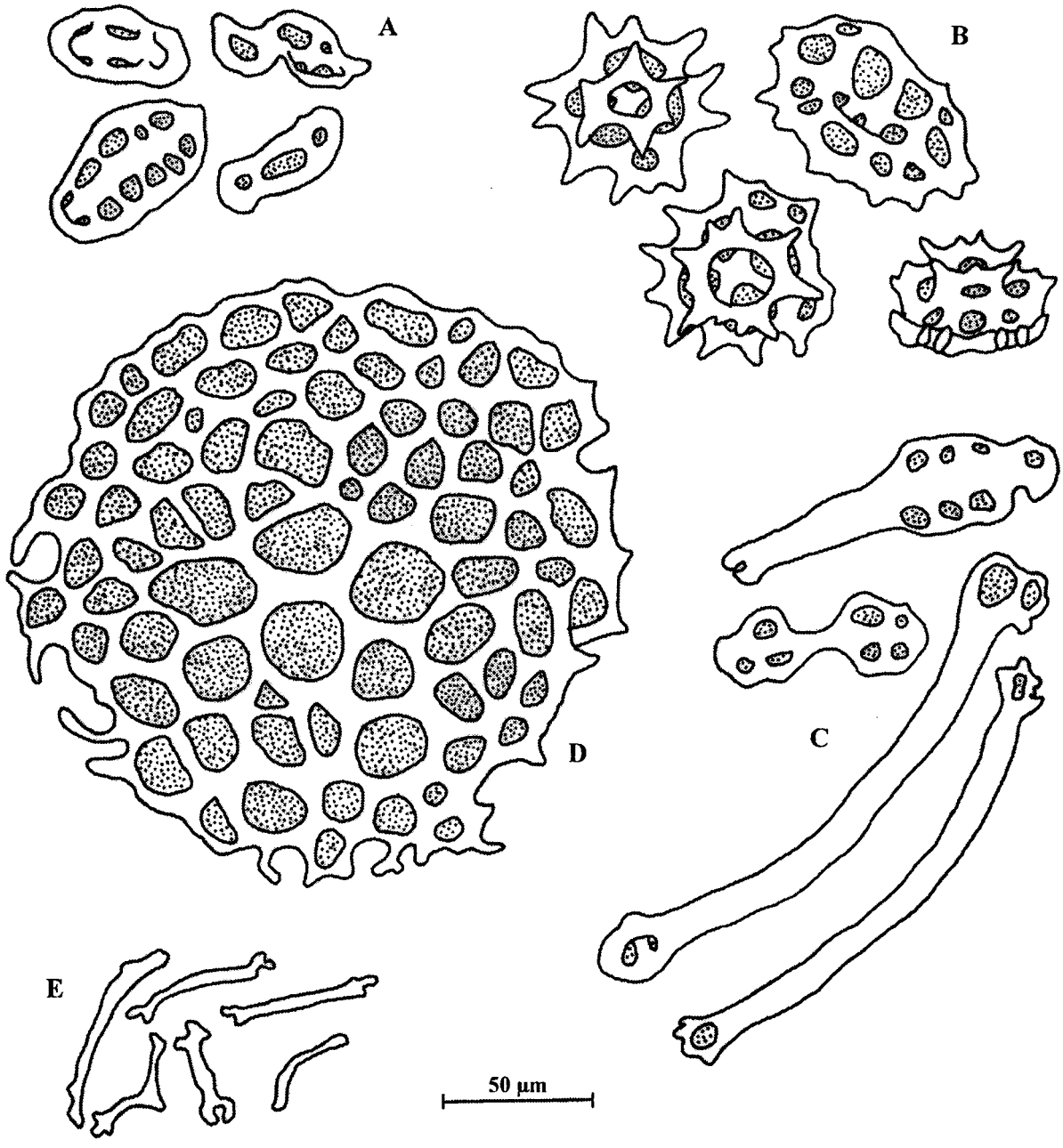

FIGURE 7. *Holothuria (Lessonothuria) pardalis* Selenka, 1867. Inhaca. A. pseudobuttons from body wall; B**.** tables with spinose discs; C**.** podial rods; D**.** end-plate; E**.** tentacle rods. (All drawn to same scale)

Table discs of body wall (Figure 7B) 48–70 µm (mean 56 µm), with distinctly spinose rim with four central and usually a single series of smaller marginal holes, the latter often reduced, then discs incomplete; spire extremely low, 41–48 µm (mean 45 µm), terminating in few teeth. Pseudobuttons (Figure 7A) of diverse size, 43–68 µm (mean 56 µm), and shape, either complete with 3–5 pairs of holes, or incomplete with asymmetrically placed holes, rarely reduced to a single series on one side. Podial deposits include usually elongate, 48–230 µm (mean 139 µm), curved rods (Figure 7C) with one or two perforations at each end, rarely reduced to short rods with more perforations; end-plates (Figure 7D) (ca. 250 µm) present. Tentacles with simple, slightly curved, non-perforate rods, 31–65 µm (mean 43 µm), with uneven margins (Figure 7E).

Distribution

Tropical-subtropical Indo-Pacific, 0–?10 m.

Habitat

Benthic, inshore, shallow, sand, mud, coral debris.

Remarks

This species has a formidable list of synonyms but it is possible that if all extant materials of the various forms are studied, there may be some justification to resurrect some of the names, as was done with *H. (L) lineata* by Rowe (in Rowe & Gates 1995). The writer, for example, has no difficulty in separating *H. (L.) insignis* from *H. (L.) pardalis* despite the fact that it is treated as a synonym of the latter species by many workers, including Rowe (op. cit.). The colouration, texture of the body wall, absence of anal papillae and the presence of multilocular plates with jagged or serrated margins in the ventral podia, are all characteristic of *H. (L.) insignis*. It is for this reason that H.L. Clark's (1923) *H. pardalis*, re-examined by the writer, has been assigned to *H. (L.) insignis* which should be excluded from the synonymy of *H. (L.) pardalis*. The presence or absence of Cuvierian tubules and anal papillae in *H. (L.) pardalis* and its synonyms, should be critically examined in the light of existing type materials, original descriptions, distributions, etc., since such large taxonomic characters cannot be reduced to insignificance.

***Holothuria* (*Lessonothuria*) *tuberculata* sp. nov.**

Figure 8

?Holothuria (Lessonothuria) verrucosa Cherbonnier, 1980:637, fig.12 (A-0), (non *H. verrucosa* Selenka, 1867).

Diagnosis

Medium-sized, cigar-shaped species, holotype 145mm. Podia as conical papillae dorsally and tubefeet ventrally. Tentacles 20, no distinct collar; anal papillae present. Body wall thick, leathery. Polian vesicle single (?two), stone canal single. Table discs spinose to smooth with 8–10 marginal holes; spire of moderate height, terminating in 7–12 teeth. Pseudobuttons mostly irregular, often twisted and/or knobbed or with holes only on one side. Tubefeet with end-plates and other surrounding elongate plates with two series of holes. Table disc diam. 35–85 µm; spire height 20–50 µm; pseudobuttons 20–90 µm; tubefeet plates 130–220 µm.

Type

SAM-A27930, Isipingo, KZN, K. S. Ganga, 24 iv 1978.

Type locality

Isipingo Beach, KZN, rock pool, under stone.

Etymology

The specific name is derived from tuberculum (L.) meaning small hump with reference to the conical, wart-like prominences of the dorsal body wall.

Material examined

Holotype only.

Description

Specimen cylindrical, 145 mm in length, 29 mm in breadth in mid-body, gradually tapering at both ends. Dorsal and ventral surfaces clearly differentiated but not delimited; dorsal surface, in life, a variegated brown with numerous dark specks, ventral surface pale. Podia differentiated into dorsal papillae, situated on tiny warts, and ventral tubefeet, latter not forming a crowded series but with some indication of their arrangement into distinct bands, at least posteriorly, short, thin, with yellow discs; papillae with reduced discs. Other minute warts with aggregated spicules also present. Mouth ventral; collar inconspicuous. Tentacles 20, short, with yellowish crowns. Anus terminal; anal papillae long, tapering. Body wall tough, leathery, rough to the touch and about 3 mm thick.

Calcareous ring (Figure 8 J) small, similar in form to *Holothuria pardalis* but radial plates 2.5 mm high. Tentacle ampullae extremely short. Polian vesicle single, long, tubular, extending to about a third of body length from anterior end. Stone canal single, short, straight free; madreporite elongate, slightly calcified (Figure 8I). Cuvierian organ developed as a spongy mass, probably an aborted or expended structure.

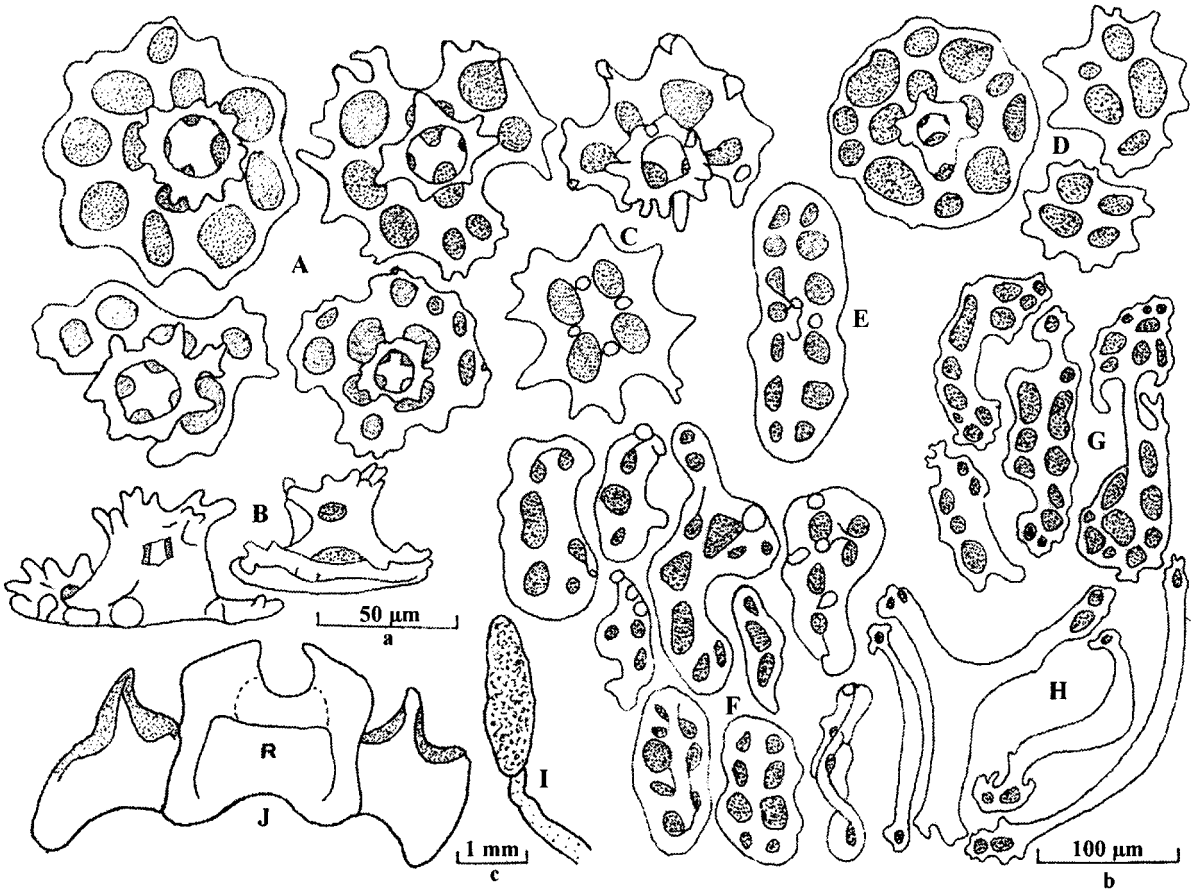

FIGURE 8. *Holothuria (Lessonothuria) tuberculata* sp. nov. Holotype. SAM–A27930. A. Tables from dorsal body wall; B. same from side; C. reduced tables from dorsal body wall; D. tables from ventral body wall; E. button from anal region; F. pseudobuttons from dorsal body wall; G. tubefeet plates; H. rods from anal papillae; I. madreporite; J. part of calcareous ring. (A–F scale a; G–H scale b; I–J scale c)

Spicules of body wall tables and pseudobuttons, larger ventrally. Tables (Figure 8A–D) usually incomplete, complete ones with usually a spinose disc, 35–85 µm, with 8–10 marginal holes; spire moderate, 20–50 µm high, terminating in a perforated ring of 7–12 unequal teeth. Pseudobuttons (Figure 8F) 20–90 µm, mostly irregular, often twisted and/or knobbed or with holes developed only on one side, regular ones with 3–4 pairs of holes. Anal body wall with few elongate, symmetrical pseudobuttons with seven pairs of holes (Figure 8E) and tables with smooth, undulating rims. Tubefeet with large end-plates and other surrounding elongate plates, 130–220 µm, with two series of holes (Figure 8G). Dorsal and anal papillae without end-plates but with curved, elongate rods, expanded and perforated at ends and sometimes with a third arm (Figure 8H). Tentacles with minute rods, smooth or slightly rough at ends.

Distribution

KZN, South Africa and New Caledonia.

Habitat

Rock pool, in sand.

Remarks

Although the holotype comes close to *H. pardalis* in its spicules, judging from its size, form, colouration, distinct warts on the dorsum, the distribution and differentiation of podia, general texture and thickness of the body wall and maximum size of the spicules, referring it to *H. pardalis* is inadmissable. Because of the warts on the dorsum and the form of the spicules the writer was at first inclined to consider it to be referable to *H. verrucosa* Selenka but the latter species is well characterized by its large size (about 23O mm) and numerous tentacles (about 30) and multiple stone canals and Polian vesicles, although many workers do not report the multiplicity of these structures in the species. The specimen thus appears to be intermediate between *H. pardalis* and *H. verrucosa* and not close to any other species within the *Lessonothuria* group. *H. verrucosa*, described by Cherbonnier (1980), from New Caledonia has only 20 tentacles, two Polian vesicles and a single stone canal. Hence it is also not identical to Selenka's species. In fact in its size (l65 mm), colouration, conical papillae, spicules and the presence of some tables with undulating rims, it appears identical to *H. (L.) tuberculata* and hence doubiously referred to its synonymy. Other materials, recorded as *H. verrucosa*, need to be critically examined.

Subgenus *Mertensiothuria* Deichmann

***Holothuria (Mertensiothuria) albofusca* Cherbonnier, 1988**
Figure 9

Holothuria (Mertensiothuria) albofusca Cherbonnier, 1988:114, text-fig. 46; Samyn & Massin, 2003:2489, text-figs.1 & 11A.

Type

MNHNP, EcHh 2753.

Type locality

Nosy Bay, Madagascar.

Previous southern African record

Bhanga Nek, KZN.

Material examined

UW Ecological Survey, Inhaca Island, Mozambique, NB96, 1 spec.

Distribution

South-west Indian Ocean, not yet reported from north of Mozambique.

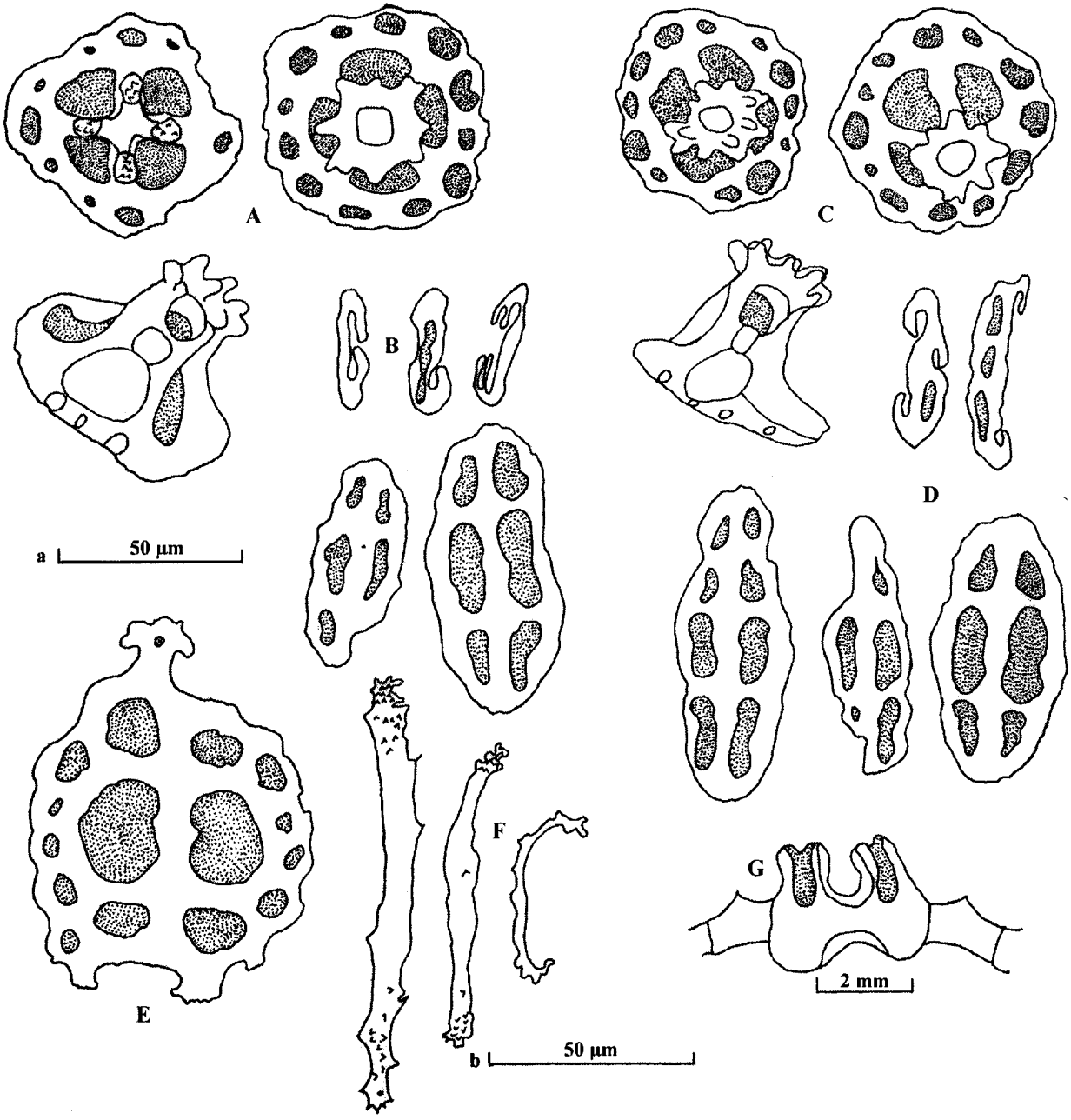

FIGURE 9. *Holothuria (Mertensiothuria) albofusca* Cherbonnier, 1988. Inhaca, UW Ecological Survey, NB 93. A. Tables from dorsal body wall; B. buttons from dorsal body wall; C. tables from ventral body wall; D. buttons from ventral body wall; E. plate from tube foot; F. tentacle rods; G. part of calcareous ring. (A–E scale a; F. scale b)

Remarks

The single specimen, 88 x 20 mm, is yellowish in alcohol, cigar-shaped, with 20 whitish tentacles. The holotype, however, was described as chocolate-brown dorsally (Cherbonnier 1988) with 18 greyish tentacles. Samyn & Massin (2003), who studied a single specimen from KZN, record both the dorsal and tentacle colour

as brown. These differences are perhaps intraspecific as other characters correspond well. The podia are well differentiated into papillae dorsally and thick tubefeet ventrally. The stone canal is short, the madreporite spherical and, as reported by Samyn & Massin (2003), there are two Polian vesicles, the dorsal one elongate and the ventral terminally sacciform. Cuvierian tubules are present. The dorsal buttons (Figure 9B) measure 31–77 µm, the dorsal table discs (Figure 9A) 43–54 µm; corresponding measurements of the ventral spicules (Figure 9C, D) are 55–69 µm and 43–50 µm. The papillae rods are 44–80 µm long whereas those of the tube-feet 86–105 µm, the latter have, in addition, some solitary plates in the tubefeet (Figure 9E). The tentacle rods, 33–114 µm, are terminally spinulate.

***Holothuria (Mertensiothuria) hilla* Lesson, 1830**
Figure 10

Holothuria hilla Lesson, 1830: 226, pl. 79.
Holothuria (Thymiosycia) hilla Massin, 1999: 55 (synonymy & records before 1999).
Holothuria (Mertensiothuria) hilla Samyn & Massin, 2003: 2500, fig. 5 A–E, 11C, 12F (records after 1999).

Type
MNHNP, EcHh 542.

Type locality
Borabora Island (Society Island).

Previous southern African record
Mozambique and east coast of South Africa.

Material examined
SAM-A27931, Sodwana Reef, Rotenone, St. RW 76–15, scuba-gear, 25.vii.1976, 17 m, 1 spec., SAM-A27932, Isipingo Beach, KwaZulu-Natal, 26 iv 1979, rock pool, K.S. Ganga & G.C. Naidu, 1 spec. (juvenile).

Description
Sodwana specimen (SAM-A27931) 45x16 mm, strongly contracted, eviscerated and somewhat mutilated due to previous dissection. Colour, in alcohol, greyish with pale areas around podia. Mouth sub-ventral, collar absent; anus terminal, no special anal papillae. Podia scattered, better developed ventrally with some indication here of their arrangement in rows, few and reduced dorsally. Tentacle ampullae short (<0.5 mm). Polian vesicle single, elongate; stone canal straight, madreporite spherical. Cuvierian tubules present. Body wall table discs 46–65 µm (mean 54 µm) (Figure 10A), smooth, squarish to roundish, with a single series (or only four) marginal holes; spire 33–42 µm high (mean 36 µm), with single cross-bar, terminating in ring of few short spines. Buttons (Figure 10B) smooth, 50–75 µm (mean 61 µm), regular, with 3–5 pairs of large holes. Ventral podial deposits reduced tables, buttons 57–109 µm (mean 74 µm), large multilocular perforated plates (Figure 10C), 98–154 µm x 32–109 µm, and end-plates; buttons often asymmetrical and/or reduced to a single series of holes. Table disc of dorsal podia 54–67 µm (mean 58 µm), spire 37–44 µm (mean 41 µm); buttons 61–100 µm (mean 83 µm) and button-like plates and rods (Figure 10D) 33–135 µm (mean 91 µm), the latter usually perforate at ends. Tentacle rods slender, 28–144 µm (mean 63 µm), spinulated at ends (Figure 10E). Longitudinal muscles with deposits resembling letters of alphabet in both script and print form.

Table discs of Isipingo specimen (SAM-A27932) 42–70 µm, with 8–10 marginal and sometimes a second series of much smaller holes outside these; buttons 50–105 µm.

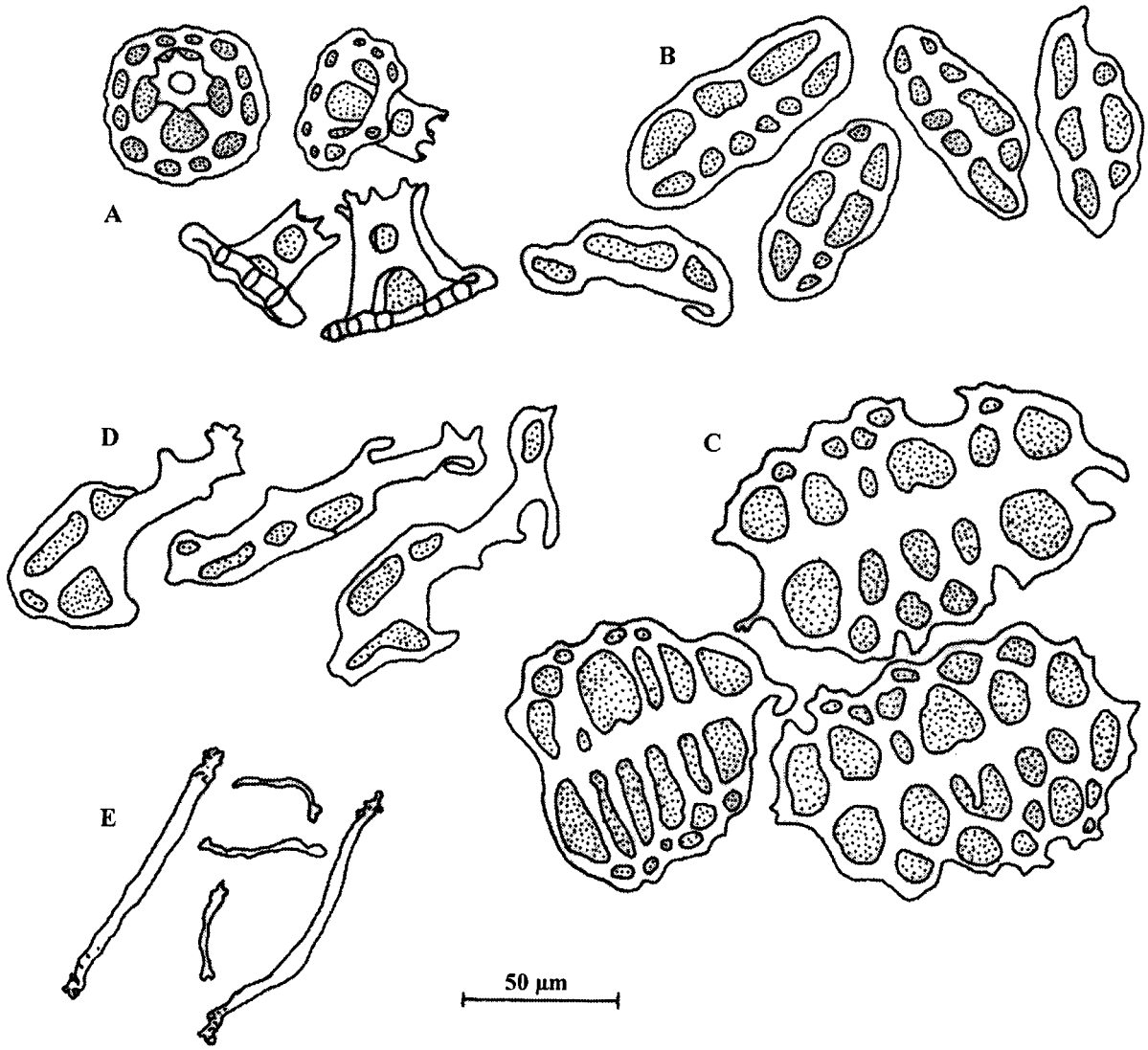

FIGURE 10. *Holothuria (Mertensiothuria) hilla* Lesson, 1833. SAM–A27931. A. tables from ventral body wall; B**.** buttons from ventral body wall; C. plates from ventral podia; D**.** rods from dorsal podia; E**.** rods from tentacles. (All drawn to same scale)

Distribution

Tropical-subtropical Indo-West Pacific Ocean, 0–30 m.

Habitat

Benthic, shallow, inshore.

Remarks

Despite the absence of a distinct ring around the anus, the Sodwana specimen is still referred to the widely distributed *H. (M) hilla*. It is, however, briefly described above as there are some significant differences. The Isipingo specimens, definitely referable to *H. hilla,* have smaller spicules than those given for the species by Rowe (1969), but their dimensions match those of Pearson's (1910) Mozambique specimen and of Samyn & Massin's (2003) Kenya material. The latter workers recently removed the species from *Thymiosycia* and transferred it to *Mertensiothuria.*

Subgenus *Microthele* Brandt

***Holothuria (Microthele) nobilis* (Selenka, 1867)**
Figure 11

Holothuria (Microthele) maculata Brandt, 1835:54 (junior homonym).
Holothuria (Microthele) nobilis Massin, 1999 (synonymy & records before 1999), text-figs. 24–27, fig.110g & h; Samyn, 2003:58 (synonymy after 1999), pls.23–25.

Type

Lost. Selenka's (1867) *M. nobilis* (MCZ 819) designated as lectotype by Rowe (in Rowe & Gates 1995).

Type locality

Guam, N.W. Pacific Ocean.

Lectotype locality

Zanzibar.

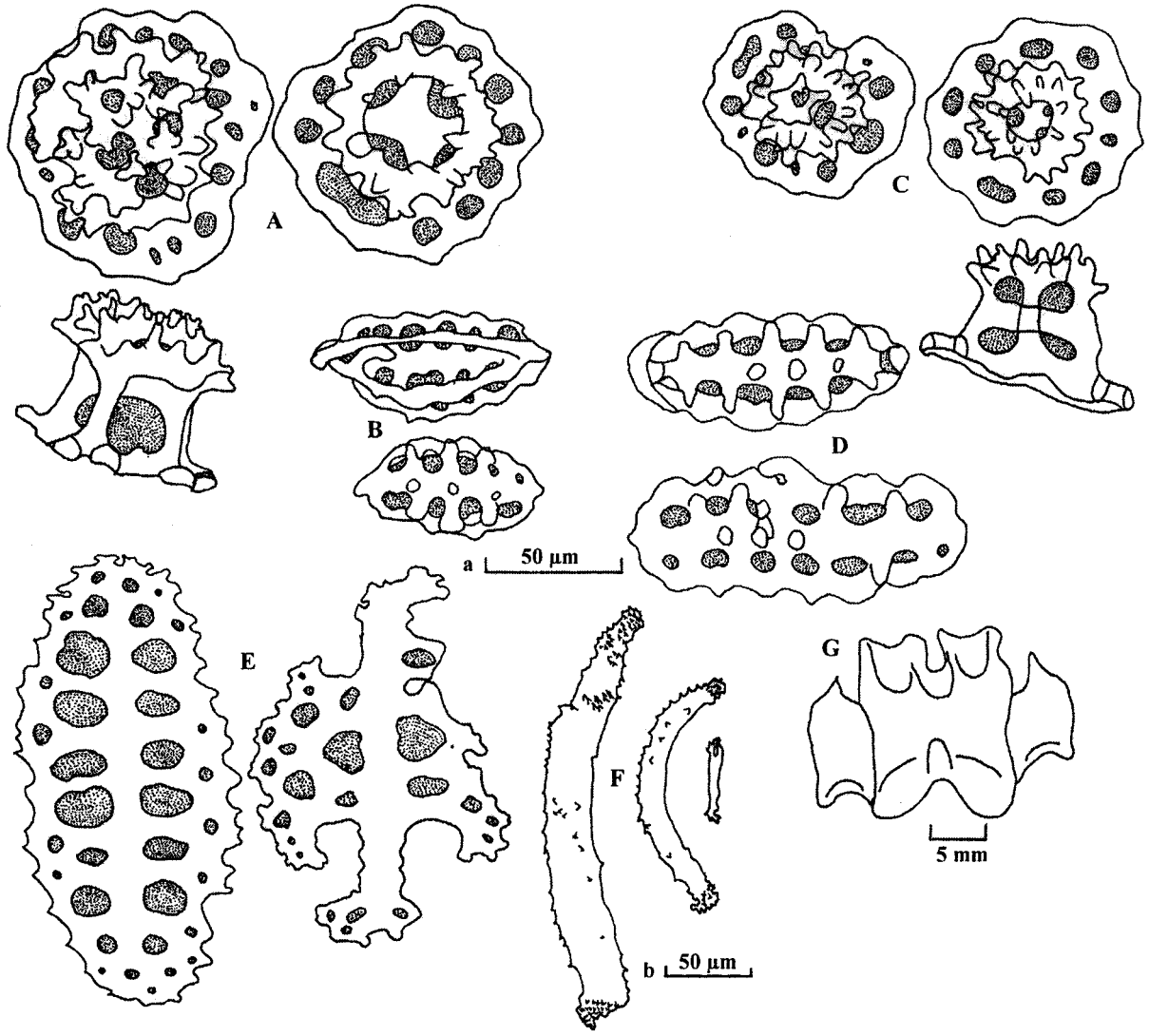

FIGURE 11. *Holothuria (Microthele) nobilis* (Selenka, 1867). SAM–A27933. Kosi Bay, KZN. A. Tables from dorsal body wall; B. buttons from dorsal body wall; C. tables from ventral body wall; D. buttons from ventral body wall; E. plates from ventral podia; F. tentacle rods; G. part of calcareous ring. (A–E scale a; F scale b)

Previous southern African record

Natal.

Material examined

SAM-A27933, Kosi Bay, northern KZN, donated by the Oceanographic Research Institute, Durban, 1 spec.

General distribution

Indo-West Pacific but not yet reported from the Middle East and the Indian subcontinent.

Remarks

This species grows to a very large size (up to 600 mm) and is said to be white or black speckled with white (Rowe and Doty, 1977). The single eviscerated specimen is 245 x 145 mm, black with greyish-white patches dorsally and grey ventrally. The dorsal (Figure 11A) and ventral table discs (Figure 11C) are respectively 75–109 µm and 57–86 µm, while the respective buttons are 66–95 µm (Figure 11B) and 65–127 µm (Figure 11D). The papillae rods measure 136–306 µm, the tubefeet rods and/or plates (Figure 11E) 238–386 µm and the tentacle rods (Figure 11F) 30–224 µm. Thandar (1984) doubted James and Pearse's (1969) record of this species from KZN but, according to collectors from the Durban Oceanographic Institute, it is well established in northern KZN, especially on the Sodwana reefs. It has long been known from Zanzibar but has yet to be reported from Mozambique.

Subgenus *Platyperona* Rowe

***Holothuria (Platyperona) difficilis* Semper, 1868**
Figure 12

Holothuria difficilis Semper, 1868:92, p1.30, fig.1.
Holothuria (Platyperona) difficilis Massin, 1999:38 (synonymy & records before 1999), figs. 28 & 29; Samyn, 2003:65 (synonymy & records after 1999), fig. 26, 54A.

Previous southern African record

Mozambique and east coast of South Africa.

Material examined

SAM-A27934, KZN, North Pier, Durban, G.C. Naidu, 8 x 1977, 1 spec. (juvenile); SAM-A27935, Vetch's Pier, Durban, J. Maxwell, 27 iv 1982, 1–2 m, under rock, 2 spec.

Description

Specimens small, largest 60 mm long. Colour in life olive green to brown with black papillae arising from yellowish green warts, one specimen with bright yellow patch on ventral surface near anus. Cuvierian tubules present. Table discs 30–80 µm and with eight marginal holes (Figure 12A); spire height 48–85 µm. Dorsal buttons (Figure 12B) with 3–4 pairs of holes; ventral buttons (Figure 12C) larger, with 6–7 pairs of holes, and occasionally an incomplete third series outside main series, buttons 80–140 µm. Rods and fenestrated plates of papillae (Figure 12D) with uneven margins. Tubefeet with rods and plates (Figure 12E), the latter with somewhat serrate margins and numerous small holes in 2–4 series. All podial spicules also with characteristic median optical discontinuity.

Local distribution

Known only from around Durban, KZN and Mozambique, 0–6 m.

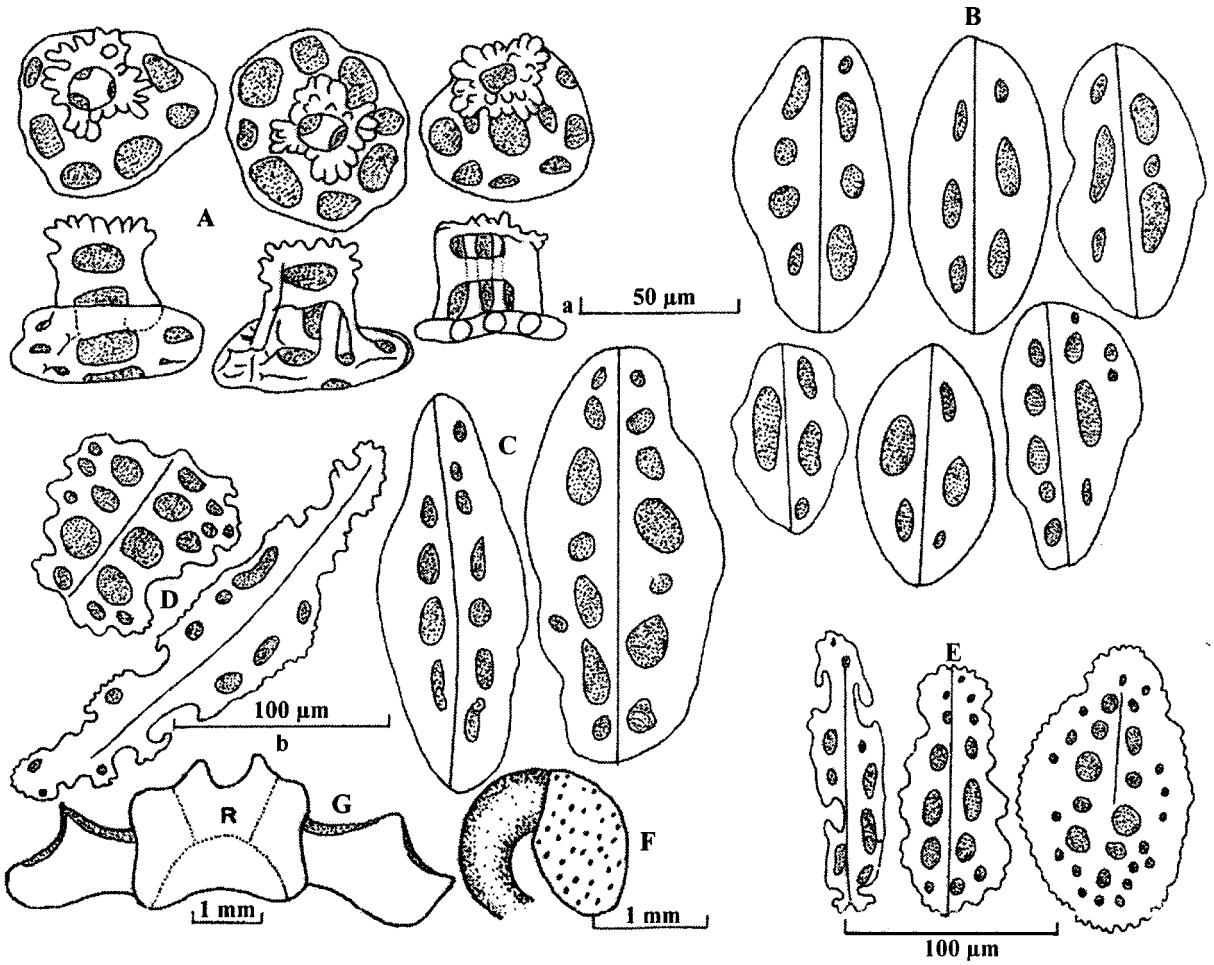

FIGURE 12. *Holothuria (Platyperona) difficilis* Semper. SAM–A27934. Durban. A. Tables from dorsal body wall; B. buttons from dorsal body wall; C. buttons from ventral body wall; D. papillae rod and plate; E. tubefeet plates; F. madreporite; G. part of calcareous ring. (A.–C. scale a; D. scale b)

General distribution

Throughout tropical Indo-Pacific but not reported from the Arabian and Indian Peninsulas.

Habitat

Under stones, in sand.

Remarks

The three species (*H. sanctori* Delle Chiaje, 1828; *H. parvula* Selenka, 1867; *H. difficilis* Semper, 1868) originally included in *Platyperona* by Rowe (1969), are well keyed by Deichmann (1958) who also provides information regarding the colouration, presence or absence of Cuvierian tubules and the synonyms of *H. difficilis*. However, she does not mention the occurrence of any green forms of *H. difficilis* but this colouration is recorded for the consubgeneric *H. parvula* from the West Atlantic region. Since then *H. (P.) rowei* Pawson & Gust, 1981; *H. (P.) crossnieri* Cherbonnier, 1988 and *H. (?P.) insolita* Cherbonnier, 1988 have been described and *H. samoana* Ludwig, 1875 referred to this subgenus by Rowe (in Rowe & Gates 1995). Perhaps not all species are valid and must await a critical re-examination. Since *H. difficilis* is so widely distributed, several variations, probably at subspecific level, must be expected between such geographically isolated populations as those of the East Pacific, West Pacific and West Indian Oceans. This is perhaps the chief reason for the

application of so many names to a species which is otherwise well characterised. Deichmann (1958) relegated many names to the synonymy of *H. difficilis* and this is partially supported by Rowe (in Rowe & Gates, 1995). However, some of the names may have to be reinstated, as our knowledge of the intraspecific variations within *H. difficilis* increases. Colouration, presence or absence of warts and Cuvierian tubules, the maximum size at maturity, the relative dimensions of spicules and the type of podial deposits may offer satisfactory characters. H.L. Clark's (1923), Kalk's (1959) and Thandar & Samyn's (2004) are the only published records of this species from southern Africa but the latter two include no taxonomic data while that of H.L. Clark (a record overlooked by Clark & Rowe, 1971) was based on specimens from Mozambique.

Subgenus *Selenkothuria* Deichmann

***Holothuria (Selenkothuria) erinacea* Semper, 1868**
Figure 13

Holothuria erinaceus Semper, 1868:91k, 250, 279, pl.30: fig.24, p1.34: fig.9, p1.35: fig.14, p1.36: fig.11, p1.38: figs. 1 & 2.
Holothuria (Selenkothuria) erinaceus Cherbonnier, 1988:60 (synonymy before 1988), fig. 22.
Holothuria (Selenkothuria) erinacea Samyn 2003:68 (records after 1988), figs. 27 A–E, 54B.

Syntypes
ZMH E2551.

Type locality
Fiji.

Previous southern African record
Northern Mozambique and KZN, South Africa.

Material examined
Isipingo Beach, KZN, A.S.Thandar, 13 x 1969, 1 spec., (deposited in the Australian Museum under AM J20196).

Local distribution
Known only from southern KZN and northern Mozambique.

General distribution
Indo-West Pacific but not yet recorded from Hawaii, W. India, Pakistan, China and Japan.

Habitat
KZN specimen found in rock pool beneath several specimens of *H. cinerascens*.

Description
Size 90 x 31 mm; radial plates of calcareous ring (Figure 13E) elongate, broad anteriorly, narrower and convex posteriorly. Madreporite (Figure 13D) well calcified, oval. Body wall spicules comprise rods and plates, variously developed (Figure 13A), the former with spiny margins and none to few holes, the latter usually with one or more series of holes on each side of shaft. Papillae rods curved, elongate, with or without perforations (Figure 13B). Tentacle rods (Figure 13C) with expanded and perforated ends.

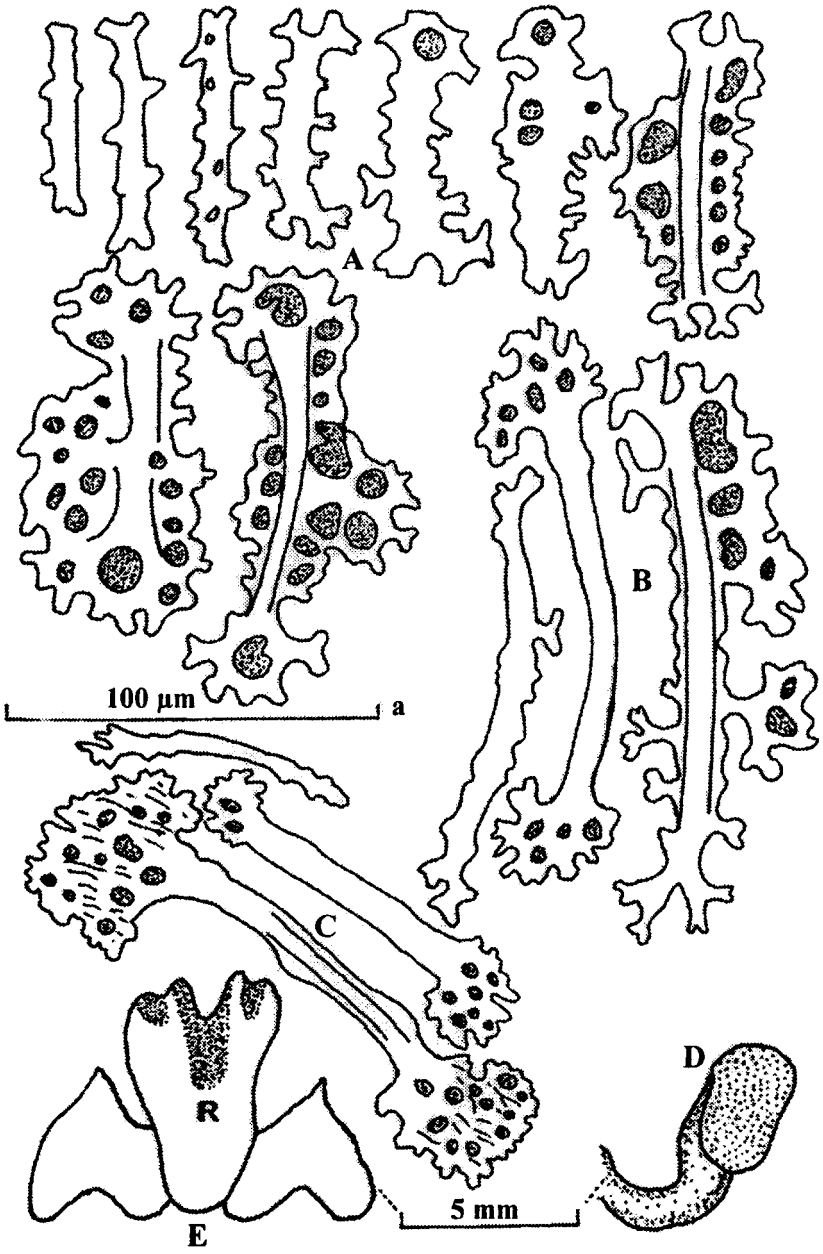

FIGURE 13. *Holothuria (Selenkothuria) erinacea* Semper. Aust. Mus. AM J20196. Isipingo. A. Rods and plates from dorsal body wall (various stages); B. papillae rods; C. tentacle rods; D. madreporite; E. part of calcareous ring. (A. & C scale a)

Remarks

The first record of this species from southern Africa is that of Kalk (1959), based upon material from Mozambique Island. The single KZN specimen was initially thought to be *H. portovallartensis* (see Thandar 1971: M.Sc. thesis, unpublished) and sent to Dr. Cherbonnier for confirmation. Dr Cherbonnier merely queried the identification but did not name the species despite the fact that the Mozambique Island material was identified by him. However, Dr. Rowe (pers.com.) is of the opinion that its spicules are quite typical of *H. (S.) erinacea.* I respect Dr. Rowe's judgment and now also realize that the spicules correspond well with those illustrated by Cherbonnier (1988: fig.22) for the Madagascar material. Notwithstanding this, it must be pointed out that the spicules of both the KZN and Madagascar specimens strongly resemble those of *H.(S.) portovallartensis* illustrated by Caso (1954) and Deichmann (1958), even in their dimension (50–140 µm in

the KZN specimen; 62–155 µm in *H. portovallartensis*). Hence, it is probable that, since both *H. parva* and the typical *H. erinacea* have parallel forms in the East Pacific, respectively in *H. lubrica* and *H. theeli*, the KZN form of *H. erinacea* may be the parallel of East Pacific *H. portovallartensis*, differing in its smaller size and different colouration. Just as the latter species was confused with *H. theeli* on several occasions until it was separated by Caso (1954), so it is likely that what is considered as *H. erinacea* in the Indo-West Pacific region may represent two species. Clark and Rowe (1971) expressed doubt as to the occurrence of *H. erinacea* on the east African coast. This second record indicates that the species is present but perhaps not common.

Subgenus *Stauropora* Rowe

***Holothuria (Stauropora) pervicax* Selenka, 1867**
Figure 14

Holothuria pervicax Selenka, 1867: 327, pl. 18, fig. 54.
Holothuria (Mertensiothuria) pervicax Cherbonnier, 1988: 107 (synonymy before 1988), fig. 43, A–K.
Holothuria (Stauropora) pervicax Samyn, 2003: 74, fig. 30 A–D, fig. 54 E, pl. 3 F (synonymy and records after 1988).

Lectotype
ZMH E2538.

Lectotype locality
Tahiti.

Previous southern African record
Mozambique and southern KZN, South Africa.

Material examined
SAM-A27936, off Beira, 20°25' S, 35°50' E, R.V. 'Algoa', Mozambique SCAD Survey, St. C 00835-014-032-2109, 18.vi.1994, 60 m., 1 spec.; SAM-A27937, Isipingo Beach, KZN, rock pool, K.S. Ganga & G.C.Naidu, 14.iv.1979, 1 spec., SAM-A27938, 26.iv.1979, 1 spec., SAM-A27939, 22.viii.1979, 1 spec., K.S. Ganga, 31.viii.1981, 1 spec., 27.iv.1982, 1 spec.

Description
Mozambique specimen (SAM-A27936): eviscerated, 100 x 33 mm. Colour, in alcohol, beige dorsally, greyish-white ventrally; podia purplish-brown, encircled by white rings. Collar distinct; no special anal papillae. Podia scattered, larger and more numerous ventrally, especially in ambulacra. Cuvierian tubules present.

Discs of body wall tables (Figure 14A) 20–38 µm (mean 25 µm), mostly reduced, margins uneven; spire height 9–33 µm (mean 14 µm). Buttons (Figure 14B) 15–26 µm (mean 21 µm), with 6–13 minute, often occluded holes, rarely without holes, then resembling rosette-shaped granules. Ventral podia with similar tables and buttons as well as plates (Figure 14C, D) (34–53 µm, mean 45 µm) and rods (Figure 14E) (61–119 µm, mean 103 µm), the former with paired series of about 10–45 holes; end-plates large (ca. 570 µm). Dorsal podia also with tables, buttons, rods (Figure 14F) (56–238 µm, mean 116 µm) and plates, the latter less well developed than those of ventral podia (23–60 µm, mean 35 µm), and with 5–14 complete holes; end-plates reduced (ca 115 µm). Tentacles with curved rods (47–347 µm, mean 184 µm) with spinulated ends and slightly spinose margins (Figure 14G).

KZN specimens (SAM-A27837-27839): typical but spicules larger than those of the Mozambique form: table disc diam. 24–68 µm, spire height 20–70 µm, dorsal buttons 15–42 µm, ventral buttons 37–90 µm.

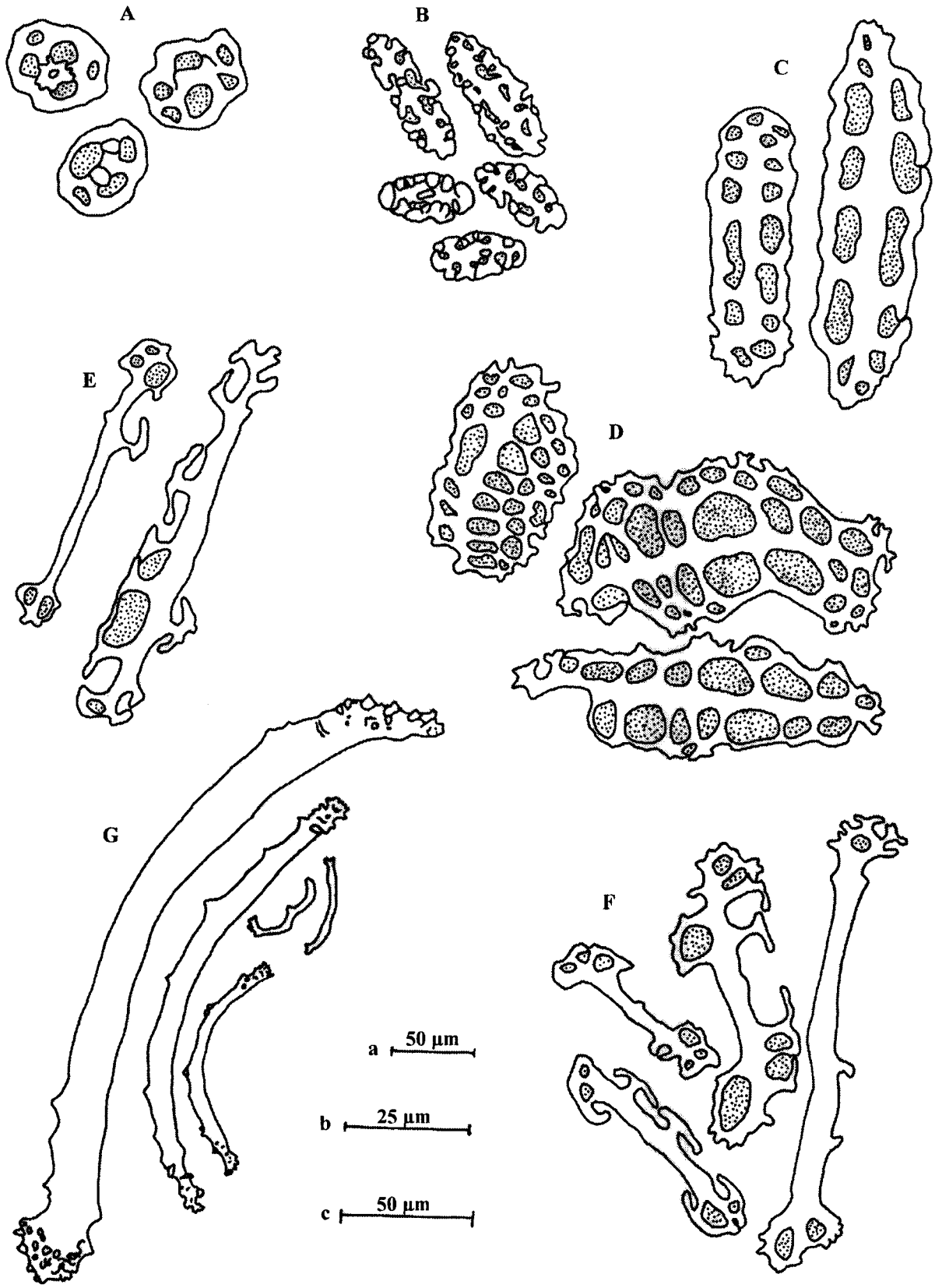

FIGURE 14. *Holothuria (Stauropora) pervicax* Selenka, 1867. SAM–A27936. A. tables from dorso-lateral body wall; B. buttons from dorsal-lateral body wall; C. button-like plates from ventral podia; D. perforated plates from ventral podia; E. rods from ventral podia; F. rods from dorsal podia; G. rods from tentacles. G scale a; (A–C scale b; D–F scale c)

Distribution

Indo-West-Central Pacific Ocean, 0–60 m.

Habitat

Benthic, inshore.

Remarks

The single Mozambique specimen represents the deepest record of the species yet known as Rowe and Gates (1995) record the depth as 0–20 m. There is no reason to doubt its identity as the body form, colouration and spicules are characteristic of the species. This species, previously classified in the subgenus *Mertensiothuria* by Rowe (1969) was transferred to the subgenus *Stauropora*, also by Rowe (in Rowe & Gates 1995).

Subgenus *Theelothuria* Deichmann

***Holothuria* (*Theelothuria*) *longicosta* sp. nov.**

Figure 15

Diagnosis

A moderate-sized cylindrical species, holotype 110 mm long. Dorsal surface yellowish brown mottled with black and with a paired series of dark blotches. Podia as scattered tubefeet. Radial plates of calcareous ring prolonged far beyond posterior border of interradial plates, ventral radial plates with rudimentary posterior bifurcations. Tables few, disc squarish to circular, 35–90 µm in diameter, with spinose rim, rarely knobbed or tables modified to fenestrated spheres; spire low, terminating in a ring of few blunt teeth. Buttons numerous, 40–75 µm in length, usually faintly knobbed and with 2–6 pairs of holes, shaft distinct and often characteristically prolonged at both ends, buttons rarely modified to fenestrated ellipsoids.

Etymology

The specific name refers to the central shaft of the buttons that is often prolonged at both ends.

Type

SAM- A27940.

Type locality

UCT Ecological Survey, MOR 228, Linga Linga, Morrumbene, Mozambique, 12 vii 1968.

Material examined

Holotype only.

Description

Specimen badly contracted and partially eviscerated; length 110 mm, breadth in mid-body 42 mm. Dorsal surface conspicuously arched, ventral less so. Colour, in alcohol, dorsally yellowish-brown speckled with black, especially in mid-body, and with a paired series of dark blotches, decreasing in size and intensity both anteriad and posteriad, bases of dorsal podia ringed with white. Ventral surface pale greenish-yellow with a slight tinge of black or dark brown. Mouth and anus terminal, collar and anal papillae absent. Tentacles lost. Podia in the form of tiny, highly retractile scattered tubefeet, more numerous ventrally but not forming a "sole", papilliform dorsally; suckers minute, rust-coloured. Body wall thick (ca. 4.5 mm), leathery, slightly rough to the touch and packed with spicules.

Calcareous ring (Figure 15E) about 6 mm high, radial plates about twice as long as interradial plates, deeply notched anteriorly and prolonged posteriorly beyond posterior border of interradial plates, only ventral radial plates with rudimentary posterior bifurcations; interradial plates triangular and with a slightly concave posterior margin. Tentacle ampullae short (av. 14 mm). Polian vesicle ventral, elongated (25 mm), slightly coiled. Stone canal short, free, coiled; madreporic body pyriform, well calcified (Figure 15D). Right respiratory tree longer. Cuvierian organ as tufts of short, thick unbranched tubules attached to base of right respiratory tree, some emitted tubules, possibly from base of left tree, visible in anus as long threads. Gonad as single tuft of long unbranched tubules attached on left, new tubules added anteriorly. Cloaca short, wide. Longitudinal muscles paired, thicker ventrally, possibly due to stronger contraction.

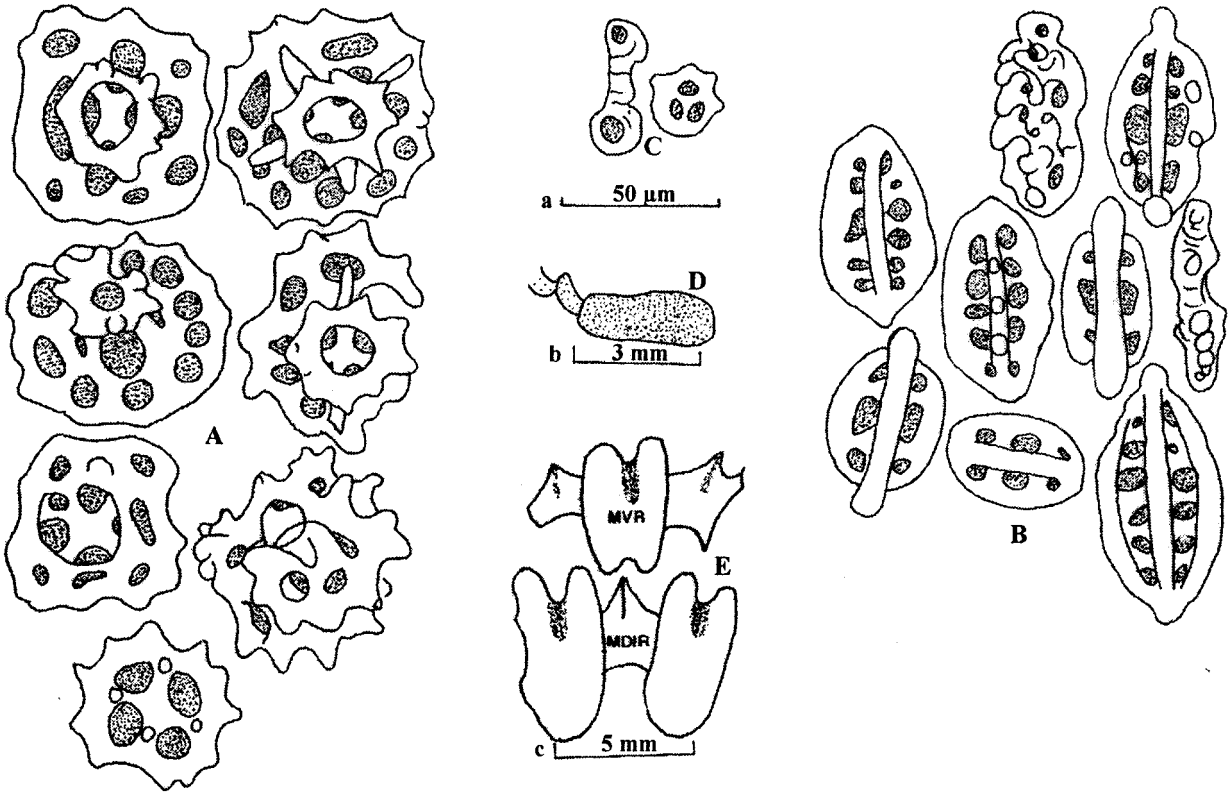

FIGURE 15. *Holothuria (Theelothuria) longicosta* sp. nov. Holotype. SAM–A27940. A. Tables from dorsal body wall; buttons from dorsal body wall; C. tubefeet deposits; D. madreporite; parts of calcareous ring. (A–C scale a; D scale b; E. scale c)

Spicules of body wall comprise tables and buttons. Tables few, disc squarish to circular, 35–90 µm (mean 58 µm) (Figure 15A), pierced by four large central holes and up to 10 smaller marginal holes; rims usually spinose, rarely turned up to give "cup and saucer" effect to table in lateral view; spire low, 25–53 µm, terminating in a ring of few blunt teeth, occasionally disc knobbed or connected to distorted spire to form a fenestrated sphere, rarely table reduced to disc with only four central holes. Buttons (Figure 15B) 40–75 µm (mean 55 µm), numerous, with well defined central shaft that is frequently prolonged at both ends beyond margin of button to give to button a characteristic appearance, holes 2–6 (usually 3) pairs, larger in the middle and decreasing in size at ends; buttons smooth to knobbed with knobs, when present, always few and either developed on central shaft only, or both on shaft and margins, rarely buttons modified into fenestrated ellipsoids. Podial deposits scarce, small, 30–50 µm tables with a reduced spire, smooth to slightly-knobbed buttons, similar to those of body wall, and small (up to 30 µm) spectacle-shaped rods and minute, up to 20 µm) plates with 2–4 holes (Figure 15C), end-plates absent.

Distribution

Type locality only.

Habitat

Sandbank or shipwreck nearby (ex collector's note).

Remarks

The new species is here referred to the subgenus *Theelothuria* because its calcareous ring is reminiscent of this subgenus despite the fact that there is only a single type of tables in the body wall and that some tables are developed into fenestrated spheres, and some buttons into fenestrated ellipsoids - all characters of *Cystipus*, to which subgenus the species was initially referred but the description not published (see Thandar 1984). However, both Massin & Samyn (pers. comm.), who examined the holotype agree that the species fits better into *Theelothuria* than *Cystipus*. However, the body wall spicules of the new species strongly resemble those of *H.* (*Cystipus*) *turrisimperfecta* described by Cherbonnier (1965b) from the coast of Guinea, to be virtually indistinguishable, differing in its colouration, calcareous ring, tables with frequently knobbed discs, different kind of podial deposits and the absence of end-plates. The new species also comes close to several other species, notably *H. notabilis*, but the new species differs in having spired tables, a different kind of central shaft to the buttons and some fenestrated tables; *H. klunzingeri*, differing in the prolonged central shaft of the buttons; *H. maculosa*, differing in the form of the calcareous ring, tables and buttons; *H. hamata*, differing in the absence of distinct papillae; *H. inhabilis*, differing in the spires of tables and the form of buttons and *H. sucosa*, differing in having tables with spinose discs and prolonged button shafts.

***Holothuria (Theelothuria) maculosa* Pearson, 1913**

Figure 16

Holothuria maculosa Pearson, 1913:53, pl.6, fig.3.

Holothuria (Theelothuria) maculosa Rowe, 1969:158 (passim); Clark and Rowe, 1971:178 (dist.); Cherbonnier & Féral, 1984:619, fig. 14; Cherbonnier, 1988:139, fig.57.

Type

Perhaps in the Colombo Museum, Sri Lanka.

Type locality

Aldabra, Seychelles.

Previous southern African record

Inhaca Island, Mozambique (see Cherbonnier 1988).

Material examined

UW Ecological Survey, Inhaca Island, west shore, in *Cymodocea rotundata* on mudflats near P. Rasa (other information not legible), July 1958, 1 spec. (identified as *H. impatiens*); SAM-A27941, UCT Ecological Survey, MOR 228, Linga Linga, Morrumbene, Mozambique, 12 vii 1968, 1 spec.

Description

Length 80mm. Colour, in alcohol, a mottled dull greyish to yellowish brown with eight pairs of dark blotches on dorsum and six series of black specks throughout body length; whitish areas around bases of podia. Tentacles and anal papillae minute; collar not evident. Podia papilliform, scattered. Body wall thin (1–

1.25 mm). Calcareous ring (Figure 16I) high, radial plates broader posteriorly with rudimentary posterior bifurcations. Cuvierian tubules present. Gonadal tubules (?testis) remarkably flat.

Tables of body wall numerous, of four types: commonest type (Figure 16A, B) with round, distinctly spinose disc (50–70 µm) with a single series of 8–10 marginal holes and a low spire terminating in a ring of about 6–8 teeth, frequently spire or disc reduced (Figure 16B); second type less common, with a low spire and a slightly upturned disc up to 60 µm (Figure 16C); third type with spinose or slightly knobbed disc (70 µm) with 10–25 tiny holes in one or more series (Figure 16E); fourth type like those of *Mesothuria*, with lobed disc (70 µm) with eight large peripheral holes and a spire terminating in a compact cluster of teeth (Figure 16D). Buttons (45–55 µm) numerous, oval, heavily knobbed, with 3–4 pairs of holes, rarely forming fenestrated ellipsoids (Figure 16F). Podia with reduced end plates, tables, buttons and button-like knobbed plates (50–100 µm) (Figure 16G). Tentacles without deposits. Cloacal and longitudinal muscles without deposits.

Distribution

Perhaps tropical Indo-West Pacific but reported only from Seychelles, Madagascar, Mozambique and New Caledonia.

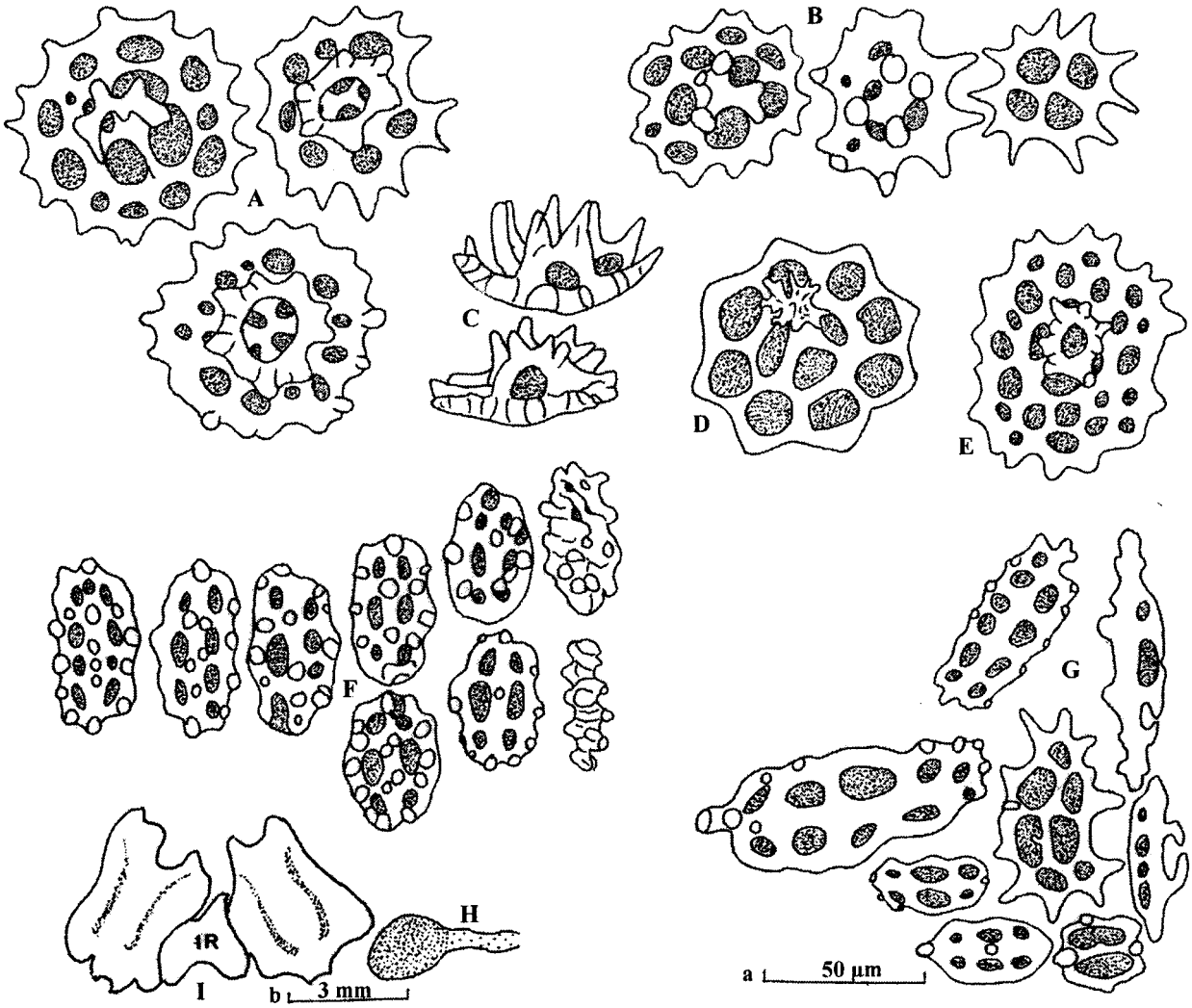

FIGURE 16. *Holothuria (Theelothuria) maculosa* Pearson. SAM–A27941. A. Normal tables from dorsal body wall; B. same (reduced); C. tables with short spiny spire; D.table with large holes (*Mesothuria* type); E. table with multilocular disc; F. buttons from dorsal body wall; G. podial deposits; H. madreporite; I. part of calcareous ring. (A & G scale a; H & I scale b)

Habitat

Sandbank or wreck nearby (collector's note).

Remarks

The UCT specimen (SAM-A27941) was described by Thandar (1984), in his thesis, as *H. (T.) notabilis* Ludwig, 1875 but, regrettably, due to inaccurate cutting and pasting, its description was transposed with that of *H. (T.) pseudonotabilis* sp. nov. (see below), initially described in the thesis as *H. (T.) maculosa*. Dr Rowe, who examined the original description and slides, was quick to realize that the specimen represented *H. (T.) maculosa* and this was independently verified by Drs. Massin and Samyn (pers. comm.), who had the opportunity to examine the complete specimen. The present material resembles the holotype of *H. maculosa* in its colouration, scattered papilliform podia, presence of Cuvierian tubules and in the typical spicules. It, however, differs in the form of its calcareous ring and the presence of four kinds of tables. The radial plates of the calcareous ring of the holotype are illustrated as being prolonged posteriorly beyond the level of the interradial plates to form rudimentary posterior bifurcations. In the present specimen, however, although rudimentary bifurcations are present, no conspicuous posterior prolongations of the radial plates are evident. Cherbonnier's figure (1988:57I), on the other hand, shows no bifurcation of the radial plates. Further, only one form of table is described for the holotype but since the other forms are not common they could have been overlooked. Cherbonnier (1988) also studied a specimen (identified as *H. maculosa* by Dr Heding) from Inhaca Island (Mozambique), received from the Copenhagen Museum, and comments that it is identical to his Madagascar material. The current Inhaca specimen, wrongly identified as *H. impatiens*, is robust, 220 x 75 mm with a similar composition of spicules.

***Holothuria (Theelothuria) duoturriforma* sp. nov.**

Figure 17

Diagnosis

Perhaps a small species, type 40 mm. Colour, in alcohol, white with scattered dark blotches. Podia minute, papilliform, scattered. Papillose collar evident. Anus encircled by five clusters of papillae. Tentacles ?20, whitish. Cuvierian tubules absent. Spicules of body wall tables and buttons. Tables of two sizes: either with a large disc (42–81 µm) of the *Mesothuria* type and a tall spire (42–68 µm) with 2–3 cross-bars or a small disc (39–65 µm) and a short spire (26–39 µm) with usually a single cross-bar, smaller type usually at bases of podia. Buttons restricted to bases of podia and anal region, elongated or oval (45–77 µm, mean 65 µm), with 3–4 pairs of holes and few knobs.

Etymology

The specific name refers to the two types of tables found in the body wall.

Type

SAM-A27942.

Type locality

Off Lala Nek, KZN, South Africa, 72 m.

Material examined

Holotype only, NMDP, St. ZD 6, off Lala Nek (27° 13.0 ' S, 32° 49.7 ' E), 72 m, 7 vi 1990.

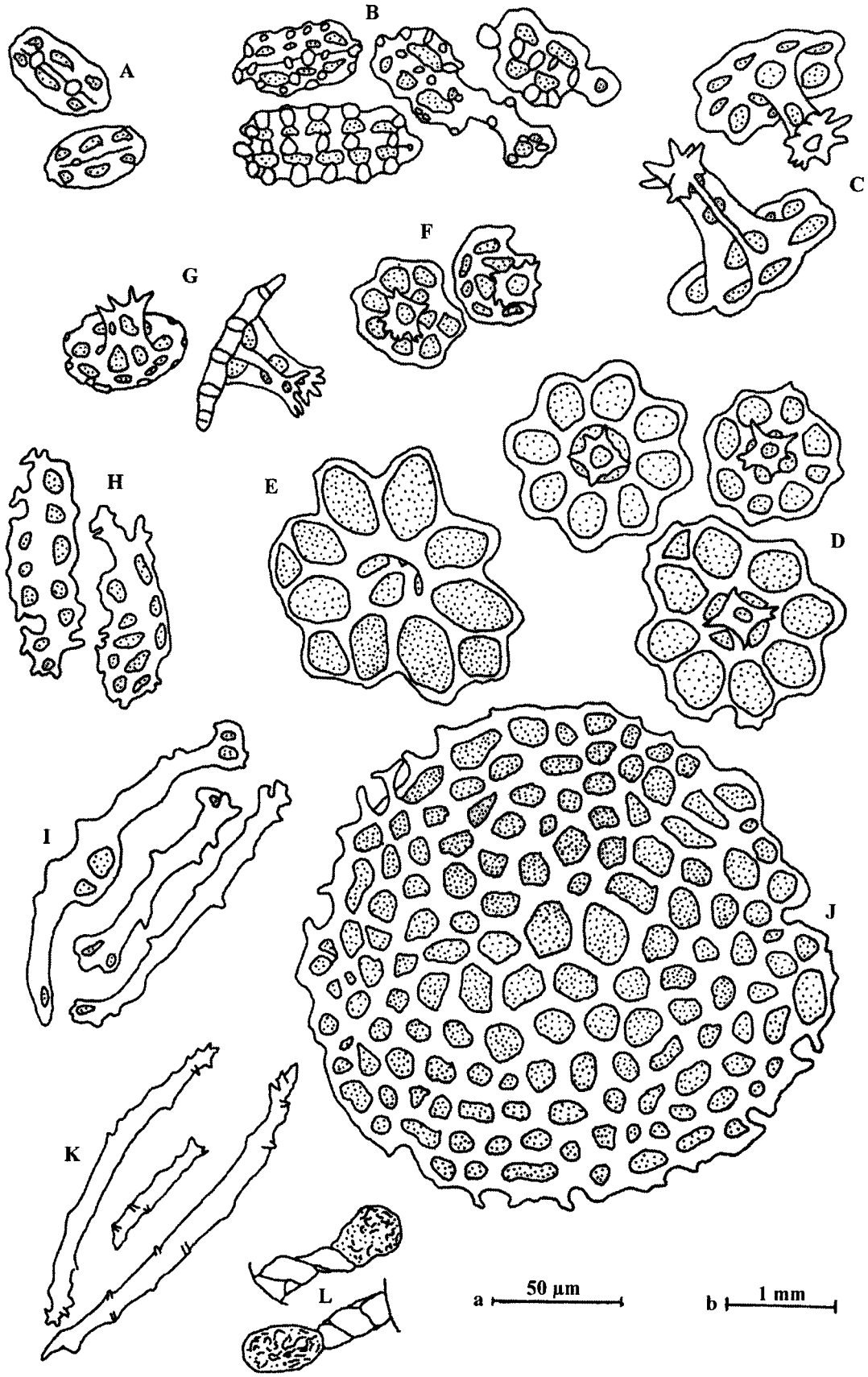

FIGURE 17. *Holothuria (Theelothuria) duoturriforma* sp. nov. Holotype. SAM–A27942. A. buttons from base of podium; B. knobbed podial buttons; C. large body wall tables from side; D. large body wall tables; E. large body wall table from beneath; F. small tables; G. small tables from side; H. podial plates; I. podial rods; J. ventral end-plate; K. tentacles rods; L. madreporite (different views). (A–K scale a; L scale b)

Description

Specimen small, poorly preserved, eviscerated, most of gut and associated structures lost. Body form subcylindrical, dorsal surface arched, ventral flattened but not much so. Anterior end slightly broader than posterior end. Length 40 mm, width in mid-body 9 mm. Colour, in alcohol, white with dark scattered blotches. Mouth anterior, sub-ventral; anus terminal. Podia minute, papilliform, slightly longer ventrally, scattered but with some indication of arrangement in bands. Papillose collar evident. Anus encircled by five clusters of 3–4 papillae per cluster. Tentacles ?18, small, white to slightly beige in colour. Body wall 1 mm thick, gelatinous, smooth.

Calcareous ring damaged; radial plates squarish, as long as wide, with an anterior notch and some evidence of posterior bifurcations; interradial plates small, triangular, projecting slightly beyond anterior border of radial plates. Tentacle ampullae short; Polian vesicle single, sac-like; stone canal short, free, slightly twisted, terminating in an oval, globular, well-calcified madreporite (Figure 17L). Gonad and alimentary canal lost. Right respiratory tree shorter, reaching only half body length, both trees well branched, united at base. Cuvierian tubules absent.

Spicules of body wall comprise tables and buttons. Tables of two sizes: either with a large disc (42–81 µm, mean 59 µm) and a tall spire (42–68 µm, mean 53 µm) (Figure 17C–E), or a small disc (39–65 µm, mean 54 µm) and a short spire (26–39 µm, mean 32 µm) (Figure 17 F), smaller type common at bases of podia. Larger tables of *Mesothuria* type, disc with mostly undulating or occasionally spinose rim, pierced by usually eight large, oval holes, and sometimes with one or more smaller holes outside the larger ones, spire with 2–3 cross-bars, terminating in a ring of several teeth. Smaller table discs somewhat circular, also with about eight marginal holes but a short spire with usually a single cross-bar, margin of disc sometimes turned up giving a cup and saucer appearance to table in lateral view; occasionally tables reduced to button-like discs. Buttons (Figure 17A) rare, restricted to bases of podia and anal region, elongate or oval (45–77 µm, mean 65 µm), usually with 3–5 pairs of holes and several knobs, the latter either restricted to the central shaft or to margins or both; buttons sometimes reduced to just two pairs of central holes. Podial deposits comprise small tables, buttons, perforated rods often developed as smooth plates, and end-plates. Podial tables (Figure 17G) similar to the smaller type from body wall; podial buttons (45–78 µm mean 65 µm), usually heavily knobbed (Figure 17B), with 2–5 pairs of holes; rods (71–113 µm, mean 91 µm), straight or slightly curved (Figure 17I), with 1–2 holes at ends and/or in the middle; plates with usually irregular margins and 5–10 pairs of holes (Figure 17H); end-plates of two sizes, small ones about 148 µm, large ones (Figure 17J) about 187 µm, both with large central holes and smaller peripheral ones but some peripheral holes often as large as central holes. Tentacle with slightly curved, non-perforated rods (39–142 µm, mean 71 µm), usually with slightly spinose margins (Figure 17K). Cloacal and longitudinal muscles without spicules.

Distribution

Known only from type locality.

Habitat

Slightly muddy sand, pennatulids.

Remarks

Of the 14 nominal and one indeterminate species currently classified in the subgenus *Theelothuria*, the present specimen comes close to *H. (T.) squamifera* Semper, 1868 from the Philippines and the Red Sea and *H. (T.) asperita* Cherbonnier & Féral, 1984 from New Caledonia. However, it is not identical to either of the two species. It differs from the former in the height of the table spires, fewer cross-bars to the spires, larger size of the holes on the discs and more nodular buttons, of especially the podia. It differs from *H. (T.) asperita* in the absence of smooth buttons, the larger size of the holes of the discs of the larger tables and the nature of

the table crowns. There is also some resemblance of the new species to *H. (Platyperona) insolita* Cherbonnier, 1988 from Madagascar, especially in the type of tables, their two sizes, and the rarity of buttons. However, Cherbonnier illustrates only smooth buttons with a median optical discontinuity from the anal region of his specimen as well as some minute plates and pseudobuttons. Some reduced tables of the new species resemble those of *H. (T.) klunzingeri* Lampert, 1885 and *H. (T.) notabilis* Ludwig, 1875 but there are gross differences, most notably in the absence of tall-pillared tables in both *H. (T.) klunzingeri* and *H. (T.) notabilis*, suspected by Panning (1935) to be conspecific. It is noteworthy that there are no tack-like tables in the body wall and podia of the new species and although the larger tables are of the synallactid-type, they resemble those of the genus *Mesothuria* rather than those of *Synallactes*.

***Holothuria (Theelothuria) pseudonotabilis* sp. nov.**
Figure 18

Diagnosis

Perhaps a small species, holotype 59 mm long. Colour, in alcohol, an admixture of browns, dorsum with eight pairs of dark blotches, whitish areas around bases of scattered tubefeet. Cuvierian tubules present. Body wall tables few, of three types: commonest type with circular to subcircular, slightly spinose to smooth disc (40–75 µm), low spire (20–50 µm) terminating in ring of about six blunt teeth, rarely rim knobbed or tables modified to fenestrated spheres; second type commoner than third and of *Mesothuria* type with smooth disc (ca. 60 µm) with 6–7 large marginal holes and spire terminating in compact, often tripartite cluster of teeth; third type rare, disc oblong, up to 100 µm, with 2–3 series of holes, smaller marginally. Buttons numerous, slightly knobbed, 30–60 µm, holes often occluded.

Etymology

The new species is so named as it was initially thought to represent *H. notabilis* Ludwig.

Type

SAM-A27943; Inhaca Island, Mozambique, vi. 1971, B. Kensley.

Type locality

Inhaca Island, Mozambique.

Material examined

Holotype only.

Description

Specimen small, badly contracted, 59 x 30 mm; cylindrical, tapering slightly at both ends. Colour, in alcohol, an admixture of browns, paler ventrally; dorsum with eight pairs of dark blotches, whitish areas around bases of podia. Mouth terminal, tentacles 18, short, with light brown disc, 2 mm in diameter. Collar not evident. Anal papillae unequal, in five groups. Podia as scattered tubefeet, shorter dorsally, papilliform posteriorly. Calcareous ring (Figure 18N) high, radial plates longer than wide, with deep anterior ampullary notch and posterior slightly prolonged beyond level of interradial plates to form rudimentary bifurcations; interradial plates half the length of radial plates but just as broad with anterior, median tooth-like projection and deeply concave posterior margin. Polian vesicle single, short, midventral. Stone canal short, free, situated slightly to left of mesentery; madreporite well calcified, pyriform (Figure 18M). Right respiratory tree longer but left more profusely branched, both uniting before opening into cloaca. Gonad as single tuft of branched

tubules on left of mesentery. Cuvierian tubules 15, short, thick, curved, attached to base of left respiratory tree.

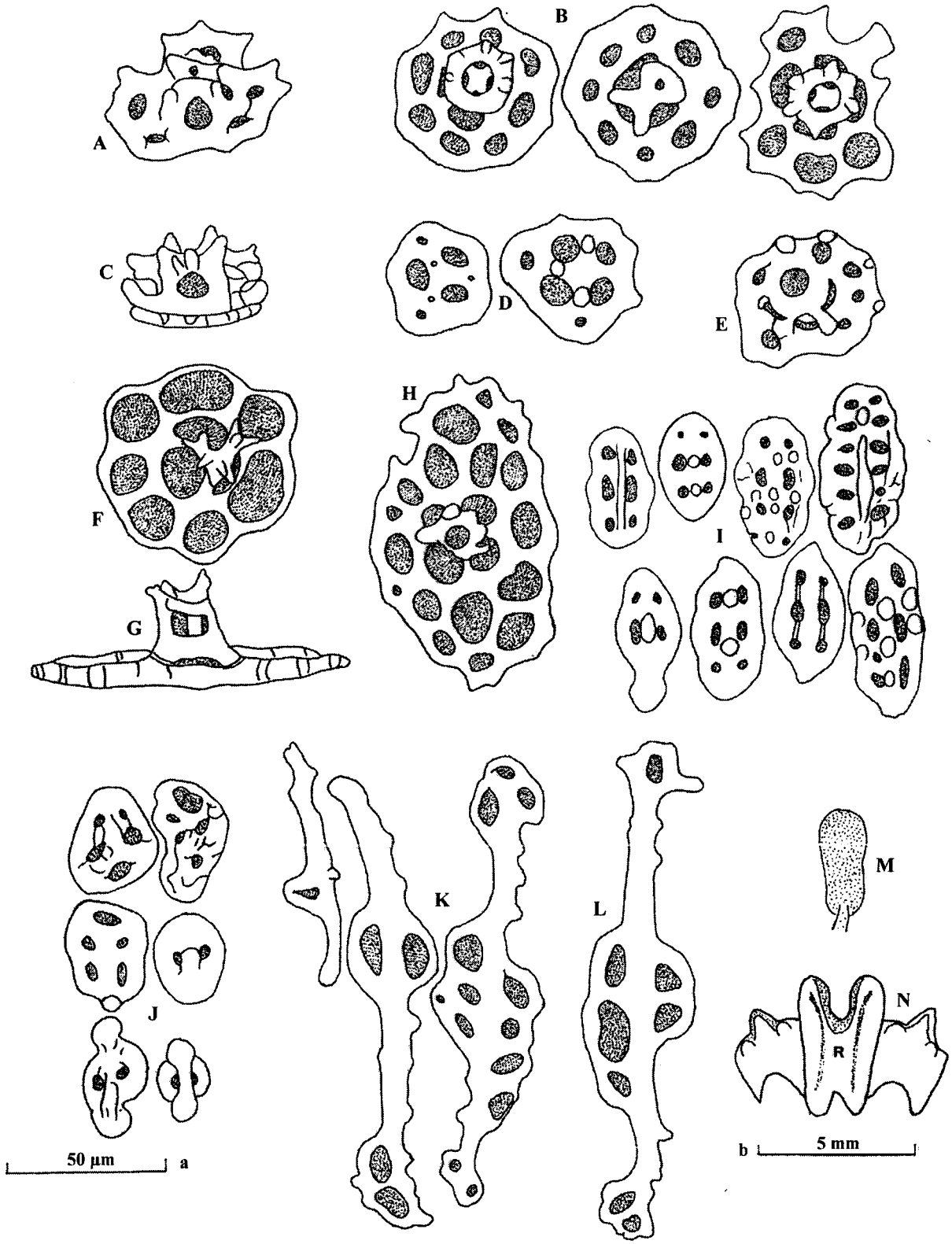

FIGURE 18. *Holothuria (Theelothuria) pseudonotabilis* sp. nov. Holotype. SAM–A27943. A. Table from dorsal body wall (from side); B. tables from dorsal body wall; C. table from ventral body wall (from side); D. reduced ventral tables; E. fenestrated sphere from ventral body wall; table from ventral body wall (*Mesothuria* type); G. same (from side); H. table with multilocular disc; I. buttons from dorsal body wall; J. buttons from ventral body wall; K. rods from.dorsal podia; L. rod from ventral podium; M. madreporite; N. part of calcareous ring. (A & G scale a; H & I scale b)

Spicules of body wall tables and buttons. Tables few, of three types: commonest type (Figure 18A–C) with circular to subcircular, slightly spinose to smooth disc (40–75µm , mean 50 µm) with about eight marginal holes and a low spire (20–50 µm), terminating in a ring of about six blunt teeth, disc and spire frequently reduced (Figure 18D) but rarely rim knobbed or tables modified into fenestrated spheres (Figure 18E); second type like that of *Mesothuria* (Figure 18 F,G) with a smooth, slightly lobed disc (ca. 60 µm), perforated by 3–4 central holes and 6–7 large marginal holes; spire low, terminating in a compact, often tripartite, cluster of teeth; third type of tables (Figure 18H) rare, found only ventrally, disc large, oblong, up to 100 µm, with uneven margins and perforated by four small central holes, a series of slightly larger holes outside these and usually another incomplete series on outside. Buttons (Figure 18 I, J) numerous, slightly knobbed, 30–60 µm, oval with usually a distinct shaft and smooth, slightly undulating, knobbed margins, holes 3(-7) pairs, often occluded, especially ventrally, where only a pair of holes may be present; rarely buttons smooth or modified into fenestrated ellipsoids. Podia with end-plates and elongate rods (up to 150 µm) with central and/or terminal perforations (Figure 18L, K). Tentacles, longitudinal and cloacal muscles without deposits.

Distribution

Known only from type locality.

Remarks

This specimen was initially identified and described by the writer (see Thandar 1984) as *H. (T.) notabilis* Ludwig but due to inaccurate cutting and pasting it appears in the thesis as *H. (T.) maculosa* Pearson (see Remarks under *H. maculosa* above). Dr Rowe (pers. comm.), who examined the original description and slides, thought that the specimen perhaps represents a new species, close to *H. (T.) maculosa*, and this was recently verified by both Massin & Samyn (pers. comm.), who examined my holotype. Since then, I have had the opportunity to examine *H. (T.) notabilis* in the Natural History Museum (London) and conclude that the current specimen differs from it in possessing a different type of calcareous ring, three types of body wall tables, less spinose table discs and in the occasional presence of fenestrated spheres. In *H. (T.) notabilis* the radial plates of the calcareous ring are prolonged far beyond the posterior margin of the interradial plates and the anterior projections of the radial plates are rounded. Further, the tables of Ludwig's species are mostly reduced, the discs very spinose, and fenestrated spheres absent. The new species can also be referred to the subgenus *Cystipus* but, due to its similarities with both *H. maculosa* and *H. notabilis*, it is here classified in *Theelothuria*. In any case both *Theelothuria* and *Cystipus* are closely related (see Rowe 1969:125).

***Holothuria (?Theelothuria)* sp. indet.**

Figure 19

Material examined

SAM A-27944, Park Rynie, southern KwaZulu-Natal, K.S. Ganga, July 1982, 1 spec.

Description

Specimen 20 x 8.5 mm, apparently preserved long after death, eviscerated and badly distorted, hence what appears to be the dorsal surface is actually ventral and vice versa,. Colour uniformly yellowish-white. Skin damaged, parchment-like and translucent. Mouth ventral, encircled by 17 pale yellowish-white tentacles, darker distally, collar absent. Anus terminal, no special anal papillae. Dorsal podia small, few, scattered; ventral podia better developed, confined to ambulacra in 2–3 rows ventro-laterally, two rows in odd ambulacrum, few also scattered in interambulacra.

Body cavity filled with coarse sand, small stones, broken shells and coral debris. Calcareous ring (Figure

19G) damaged but showing broad quadrangular radials, each with a posterior concavity, anterior notch and bifurcate anterior projections; interradial plates small, enclosed by radials, each with median anterior projection.

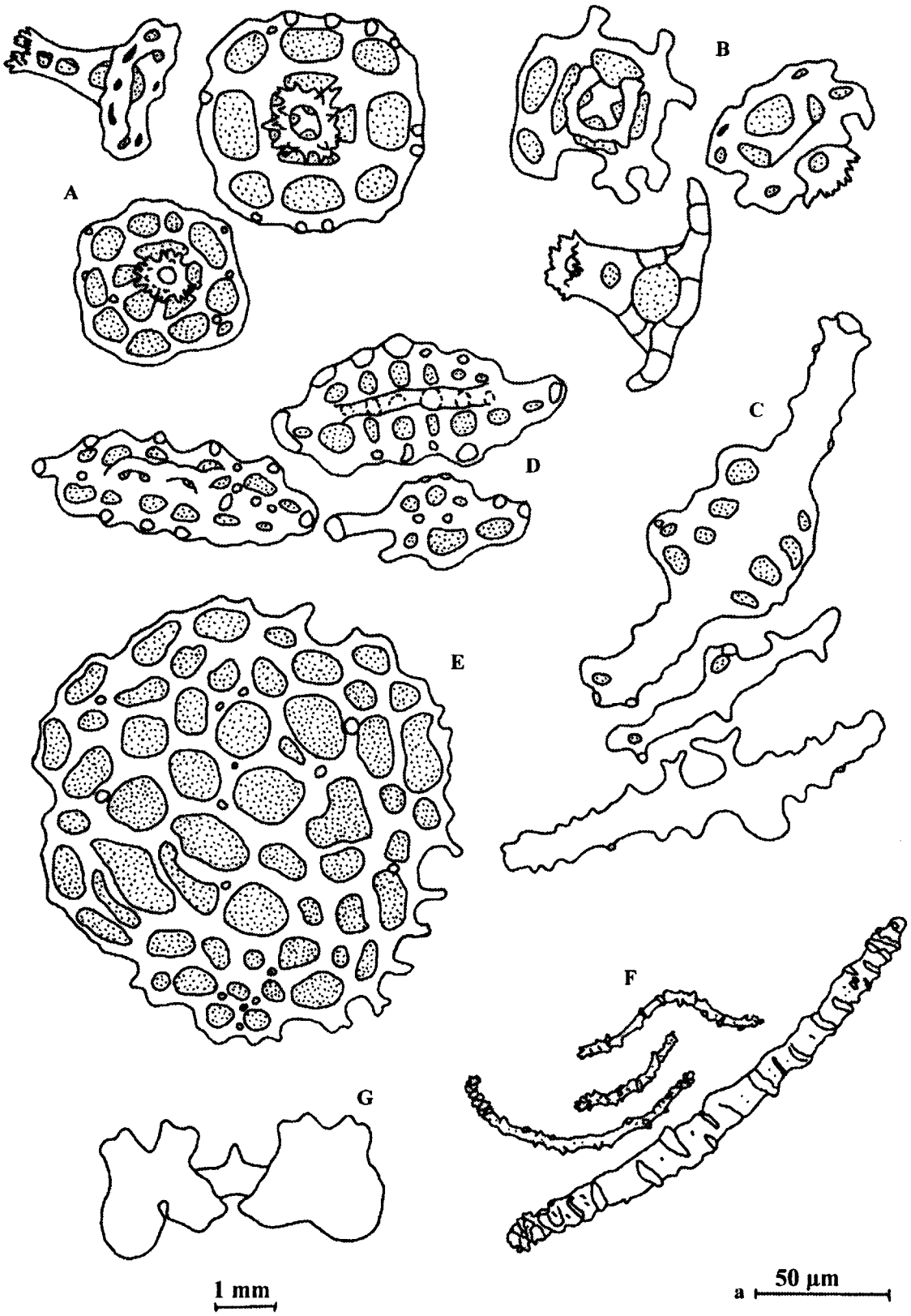

FIGURE 19. *Holothuria (?Theelothuria)* sp. indet. SAM–A27944. A. tall-spired tables from dorsal body wall; B. short-spired tables from dorsal body wall; C. rods of the dorsal podia; D. buttons from dorsal body wall; E. end-plate from dorsal podium; F. tentacle rods; G. calcareous ring. (A–F scale a)

Spicules of dorsal and ventral body wall similar, comprising mostly tables and buttons, the latter usually restricted to bases of podia. Tables of two sizes: larger ones (Figure 19A) with somewhat squarish, slightly upturned, spinose disc (dorsally 56–85 µm, mean 73 µm; ventrally 54–88 µm, mean 74 µm), perforated by four large central holes and nearly always a single series of large peripheral ones, spire low to moderate (dorsally 48–77 µm, mean 55 µm; ventrally 42–54 µm, mean 47 µm), with 1–2 cross-bars, ending in a perforate crown bearing numerous teeth; smaller tables (Figure 19B) with somewhat distorted and/or reduced smooth disc (dorsally 52–69 µm, mean 63 µm; ventrally 60–83 µm, mean 67 µm), with often upturned rims, spire low (dorsally 35–48 µm, mean 43 µm; ventrally 29–40 µm, mean 36 µm) with usually a single cross-bar, crown similar to that of larger tables. Buttons (Figure 19D) few, elongate (dorsally 117–131 µm; ventrally 79–119 µm), usually with more than four pairs of holes, slightly knobbed marginally and medially, with knobs often uniting to convert buttons to simple fenestrated ellipsoids. Podial deposits smooth, elongate rods (79–120 µm, mean 103 µm) with corrugated margins (Figure 19C), often expanded and perforated in the middle and/or at ends, rarely lacking perforations, those of ventral podia sometimes button-like with paired series of holes. End-plates present, dorsally 144–173 µm (Figure 19E); ventrally up to 387 µm. Tentacle deposits (Figure 19F) as curved, spinulated rods of various sizes (48–326 µm).

Remarks

Because of the poor state of preservation of the specimen and the fact that its calcareous ring is damaged, the subgeneric rank of this specimen is dubious. It is tentatively referred to *Theelothuria* because of its spiny-rimmed tables and the occurrence of some buttons in the form of fenestrated ellipsoids. In this respect it comes quite close to *H. (?Theelothuria) turricelsa* Cherbonnier, 1980 but differs in the absence of conical papillae on the dorsum, the more regular form of the table crowns, the height of the table spires, fewer holes on the table discs, the presence of two types of tables and the general simplicity of buttons. The specimen can also be referred to the subgenus *Cystipus* as was remarked for *H. turricelsa* by Cherbonnier (1980). The specimen also comes close to *H. squamifera* Semper, 1868 from the west Pacific Ocean but differs in the two forms of tables. It may also be argued that it might be a juvenile of *H.(M.) nobilis* but its colouration, simplicity of tables, presence of some tall-spired tables and absence of large plate-like spicules in the podia preclude its identification with this species.

***Holothuria* (*Thymiosycia*) cf. *arenicola* Semper, 1868**

Figure 20

Holothuria arenicola Semper, 1868:81, 277, p1.20, pl.30: fig.13, p1.35: fig.4.
Holothuria (Thymiosycia) arenicola Cherbonnier, 1988:82, fig. 32 (synonymy before 1988), Samyn, 2003:81 (synonymy & records to 2003).

Previous southern African record

Mozambique.

Material examined

Mission Rocks, KZN, 12 vii 1968, A.S. Thandar, 1 spec.; Isipingo Beach, KZN, 20 vii 1970, A.S. Thandar, 1 spec. (juvenile); Treasure Beach, Durban, KZN, 2 vii 1974, F.L. Farquharson, 1 spec.; Park Rynie, KZN, 20 iii 1981, K.S. Ganga, 1 spec. (All above materials currently in the Royal Belgium Institute of Natural Sciences, Brussels); Treasure Beach (KZN), 1 spec., (as *H. (T.) conusalba*, deposited in the Australian Museum under AM J20197).

Description

Specimens cylindrical, vermiform or cigar-shaped, largest 100 mm. Dorsum in life, mottled greyish white to beige to a mottled greyish brown, always with 8–9 pairs of dark greyish-brown or rust-coloured blotches, decreasing in intensity posteriad, ventrum greyish white to brown, skin around anus sometimes rust-coloured. Podia either in the form of only tubefeet, then papillae restricted to anus, or podia papilliform dorsally and as tubefeet ventrally. Water ring usually situated far behind level of calcareous ring. Cuvierian tubules present. Tables of body wall with smooth, circular to quadrangular disc, 50–70 µm, with four central and four or more smaller marginal holes, a stout spire with single cross-bar, terminating in a squarish crown of 12–15 teeth, some larger table discs with five central and up to 14 smaller marginal holes. Buttons thick, 50–80 µm, nearly always regular with smooth to gently undulating margins and 3–4 (sometimes 6) pairs of holes, and occasionally with two poorly defined central knobs, often difficult to demonstrate. Because of the thickness of buttons and the funnel-like shape of the holes, the latter may appear small or large depending on the focal point of the objective.

Local distribution

KZN, South Africa, as far south as Park Rynie.

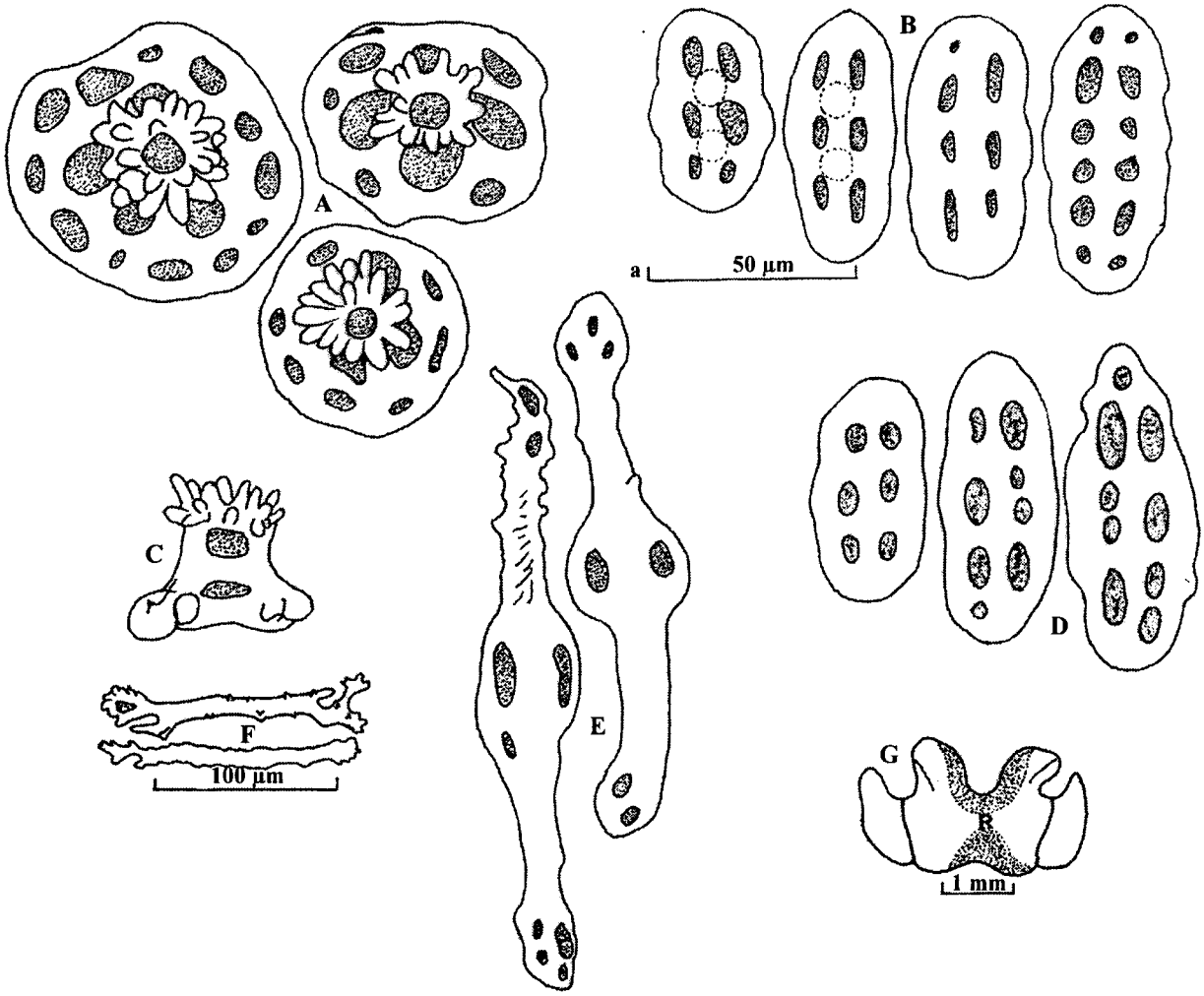

FIGURE 20. *Holothuria (Thymiosycia)* cf. *arenicola* Semper. Treasure Beach. A. Tables from dorsal body wall; B. buttons from dorsal body wall; C. table from ventral body wall (side view); D. buttons from ventral body wall; E. tubefeet rods; F. rods from tentacle stalk; G. part of calcareous ring. (A & E scale a)

General distribution

H.(T.) arenicola (se) almost circumtropical.

Habitat

In sand, under rock ledge or between sandstone slabs.

Remarks

The colour of this species is variable, probably depending to some extent on the immediate habitat. Apart from the normal coloured individuals, rust-coloured specimens were also described by Fisher (1907), Deichmann (1958) and Pawson (1976) and black individuals by Pawson (1976). It is because of this and the form of the spicules the specimens are here tentatively referred to *H. arenicola*. Although cuvierian tubules are said to be present in *H. arenicola*, Pearson (1913) reports their absence in his specimen from Sri Lanka. The dimensions of the spicules here given correspond well with those given for the species by Fisher (1907), Pawson (1978) and to some extent Rowe (1969). Amongst the tropical Indo-West Pacific species of *Thymiosycia*, only *H. macroperona* and *H. strigosa* have buttons greater than 65 mm (see Rowe 1969) but in these species the table discs are 65–80 µm with eight marginal holes and the holes of the buttons large. *H. (T.) arenicola* was first discovered in South Africa by the writer but these records were not published (see Thandar 1971, 1984). Dr Cherbonnier, to whom a specimen was initially sent for confirmation of identification, thought that it represented *H. hilla*. The writer has since examined *H. hilla* from both Mauritius and South Africa and is forced to disagree with Dr Cherbonnier. This opinion is supported by Dr Rowe (pers. comm.). The current specimens are so typical of *H. (T) arenicola* as described by other writers, notably Pearson (1913), Panning (1934), Deichmann (1930, 1958) and Pawson (1976, 1978), that they cannot be referred to another species. Dr Rowe (pers. comm.) is of the opinion that the specimens may represent *H. (T.) conus-alba* Cherbonnier from New Caledonia. I hate to disagree with Dr. Rowe and in this I am supported by Dr Samyn (pers. comm.). In fact, both Dr Samyn and I are of the opinion that these specimens and a few others also collected from the KZN coast by Dr Samyn himself but as yet undescribed, may represent either *H.(T.) milloti* Cherbonnier, 1988 or a new species. The current material differs from *H. milloti* in the absence of anal valves, pseudobuttons amongst the body wall spicules and plate-like spicules in the dorsal podia. Recently Drs Samyn and Massin have begun a revision of *H. (T.) arenicola* complex of species on a world-wide basis and the correct identity of the South African material, now in Belgium, must await the outcome of this or some other revision.

***Holothuria (Vaneyothuria) integra* Koehler & Vaney, 1908**

Figures 21 & 22

Holothuria (Vaneyothuria) integra Koehler & Vaney, 1908: 19, pl. 1, fig 7–10; Rowe, 1969: 152; Cherbonnier and Féral, 1981: 389, fig. 20 A–J; Rowe & Gates, 1995: 304.

Holothuria neozelanica Mortensen, 1925: 330, fig. 23; Rowe, 1969:152 (synonymy).

Type

Calcutta Museum, India.

Type locality

Indian Ocean.

Previous southern African record

None.

Material examined

SAM-A27945, near Inhambane, Mozambique, 23°08' S, 35° 42' E, R.V. 'Algoa', Mozambique SCAD Survey, St. C 00815-014-012-2144, 12.vi.1994, 180 m., 1 spec; SAM-A27946, south of Inhambane, 24° 52' S, 35° 20' E, R.V. 'Algoa', Mozambique SCAD Survey St. C, 00809-014-007-2164, 11.vi.1994, 164 m., 1 spec.

Description

Specimens eviscerated, gut and gonad of larger specimen (SAM-A27945) preserved separately; smaller specimen (SAM-A27946) preserved with pearlfish. Both specimens elongate, sub-cylindrical, narrowing slightly at both ends. Larger specimen 230 mm along dorsal surface, 65 mm in breadth in mid-body; smaller specimen 165 x 30 mm. Colour of larger specimen an admixture of grey, dark and light browns, darker patches antero-dorsally and along ventral surface up to mid-body; smaller specimen dark yellowish-brown dorsally, paler ventrally; dark rings around dorsal podia and with rare whitish wart-like prominences. Mouth ventrally directed, no papillose collar; anus terminal, encircled by five radial clusters of podia similar to those of body wall. Tentacles 18 in larger specimen, 20 in smaller specimen, greyish-green to greyish-brown in colour. Podia minute, mostly retracted, scattered, papilliform dorsally. Body wall leathery, slightly rough to the touch, 2 mm thick.

Calcareous ring (Figure 21K) sculptured in the larger specimen but small in relation to body size; radial plates quadrangular with anterior median notch and paired depressions and a slightly concave posterior border; interradial plates with triangular anterior projection and also slightly concave posterior border. Tentacle ampullae up to 30 mm long. Water ring unusual, situated far behind calcareous ring—12 mm behind in larger specimen, 25 mm in smaller specimen (Figure 21 I). Polian vesicles numerous – larger specimen with three three elongate, up to 8 mm long, rest tiny, situated in circle around water ring; smaller specimen with 10, mostly sacciform vesicles situated all round ring. Stone canals in clusters—larger specimen with seven, short, slightly twisted stone canals, each ending in an elongated madreporic body (longest stone canal, including madreporic body, 3.5 mm); smaller specimen with 17 stone canals: six on left (Figure 21I) and 11 on right (Figure 21J), with at least three madreporic bodies on right arising directly from water ring and another terminating in two madreporic bodies, also a single madreporic body on right served by three stone canals. Respiratory trees well branched, left longer than right. Gonadal tubules mostly unbranched, except for a few branching dichotomously distally. Cuvierian tubules absent.

Body wall tables of larger specimen with spinose disc (Figure 22B), 55–74 µm (mean 65 µm), commonly with four central holes and a single series of peripheral ones, but disc often incomplete, lacking few peripheral holes; spire short to moderate, 36–48 µm, with single cross-bar, terminating in ring of about 12 unequal teeth, often arranged as a Maltese cross when viewed from above; smaller specimen with mostly smooth disc and more pronounced Maltese cross (Figure 21C, D). Buttons (45–71 µm, mean 58 µm) usually smooth, rarely with ill-defined knobs (Figures 21A, B & 22A), often quite regular but 3–7 pairs of holes. Podial deposits comprise rods (148–152 µm, mean 150 µm), usually considerably variable, expanded and perforated in the middle (Figures 21E & 22D) and at ends, less so at the extremities of the larger specimen (Figure 22D), and narrow, elongate plates (68–161 µm, mean 112 µm) with irregular margins and 2–3 series of holes (Figures 21F,G & 22C). Tentacles with curved, spinulated rods (19–526 µm, mean 192 µm), sometimes perforated at one end (Figures 21H; 22E). Longitudinal muscles without deposits.

Distribution

East Indo-West Pacific Ocean, South-West Indian Ocean and New Zealand, 60–306 m (Rowe & Gates 1995).

Habitat

Continental shelf and slope.

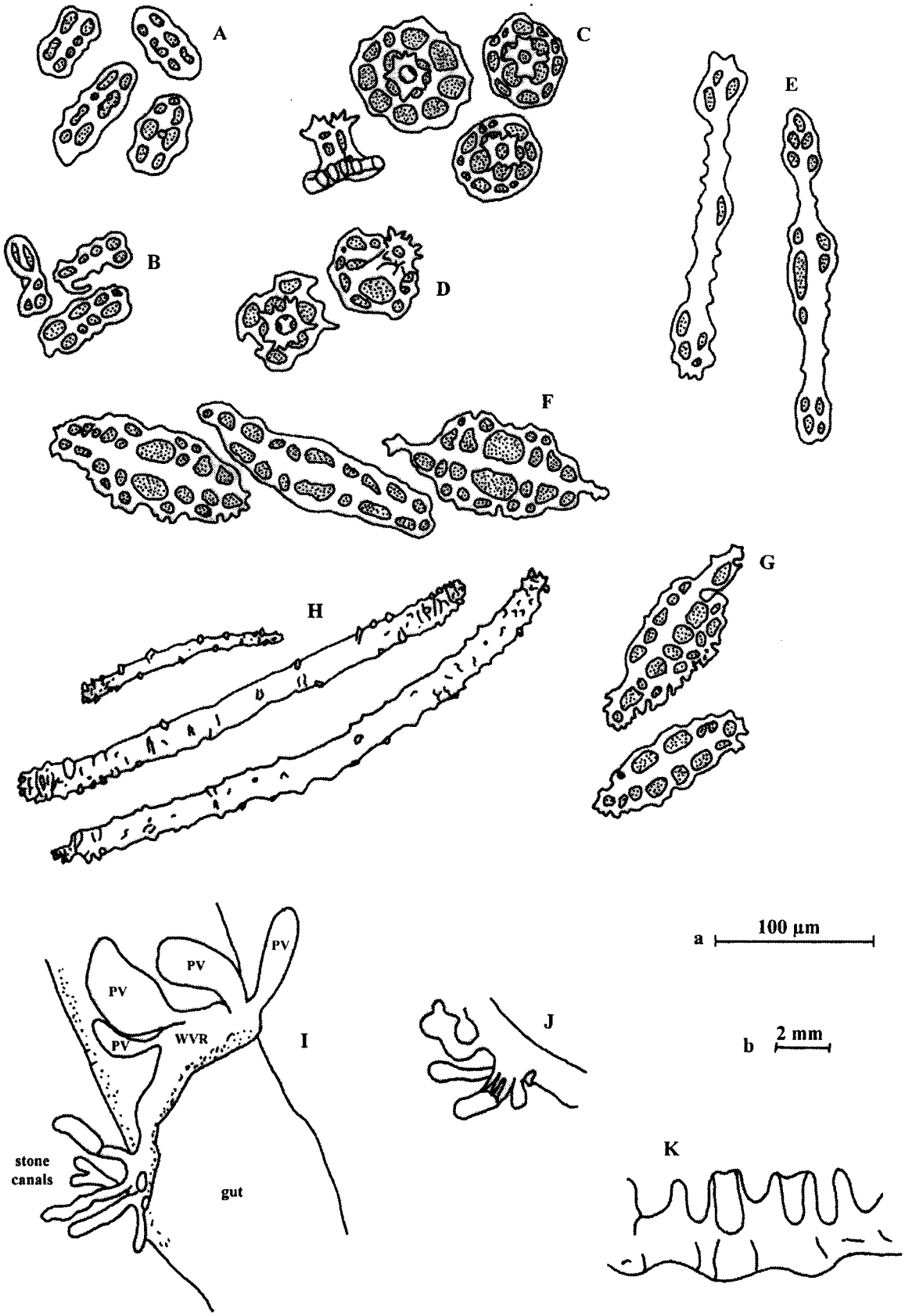

FIGURE 21. *Holothuria (Vaneyothuria) integra* Koehler & Vaney, 1908. SAM–A27945. A. buttons from lateral body wall; B. buttons from ventral body wall; C. tables from lateral body wall; D. tables from ventral body wall; E. rods from lateral podia; F. plates from ventral podia; G. plates from lateral podia; H. rods from tentacles; I. Polian vesicles (PV), water vascular ring (WVR) and stone canals from left cluster; J. stone canals from right cluster; K. part of calcareous ring. (A–H. scale a; I–K scale b)

Remarks

This species is well described by Koehler & Vaney (1908) and more recently by Cherbonnier & Féral (1981) and its synonym *H. neozelanica* by Mortensen (1925). All these descriptions record the presence of Cuvierian tubules, a single Polian vesicle and multiple stone canals. The southern African specimens, which hardly differ from the others in both external and internal features and spicules, have in contrast, not only multiple stone canals but also multiple Polian vesicles and no Cuvierian tubules. These features may warrant a new species or at least a sub-specific distinction for the distantly removed southern African population. Hence, the material is here described in some detail. Koehler & Vaney's material came from an unrecorded locality in the Indian Ocean (perhaps close to India) at about 186 m, that of Mortensen from New Zealand at about 100 m, and that of Cherbonnier & Féral from the Philippines at 217–230 m. Distinctive features of this species, at least in southern Africa, are the numerous stone canals and Polian vesicles and the fact that the water ring is situated far behind the level of the calcareous ring.

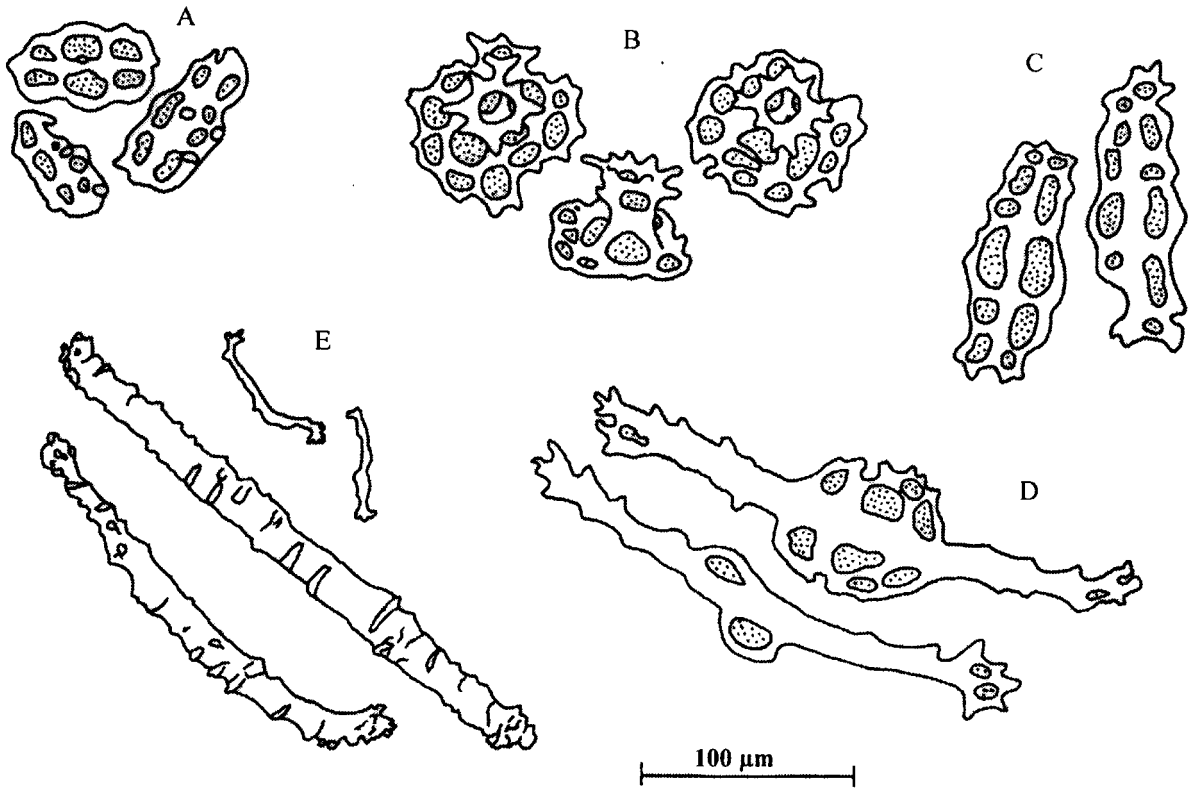

FIGURE 22. *Holothuria (Vaneyothuria) integra* Koehler & Vaney, 1908. SAM–A27946. A. buttons from ventral body wall; B. spinose-margined tables from ventral body wall; C. buttons/plates from ventral body wall; D. rods from ventral tube feet; E. rods from tentacles. (All drawn to same scale)

Order Molpadida Haeckel

Family Molpadiidae Müller

Genus *Molpadia* Risso

***Molpadia triforia* (Cherbonnier, 1965a)**
Figure 23

Trochostoma triforia Cherbonnier, 1965a: 20, pl. 10; Cherbonnier, 1965b: 672, fig. 13 a–u.

Type

MNHNP.

Type locality

South Atlantic, 44 miles WNW of Banana, 145 m.

Previous southern African record

None.

Material examined

SAM-A27947, N.E of Umhlanga Rocks, KZN, 29° 46.1' S, 31° 16.6' E, NMDP, St. ZW 2, 90 m, 21 vi 1989, 1 spec; SAM-A27948, N.E of Umhlanga Rocks, KZN, 29° 46.1' S, 31° 16.6' E, Meiring Naude, St. ZW 3, R. Kilburn, 21 vi 1989, 90 m., 1 spec.

Description

Form barrel-shaped with tail-like appendage. Spec.from St. ZW 2 (SAM-A27947), 40 mm long, 18 mm wide, tail 5 mm. Spec. from St. ZW 3 (SAM-A27948), 34 mm long (excluding tail), 19 mm wide, tail 3 mm. Colour dull greyish brown, speckled with red due to phosphatic bodies, uniformly distributed. Tail whitish, sparingly speckled with red, especially in SAM–A27948. Tentacles 15, short (up to 0.5 mm), white, each with a single pair of digits and an ill-pronounced terminal digit. Anus encircled by five large papillae external to five pairs of smaller papillae, easily demonstrated in SAM–A27948. Skin rough, thin, translucent.

Calcareous ring (spec. SAM–A27948 — Figure 23F) of five radial and 10 interradial plates, the former thicker with deep anterior concavity and bifid posterior prolongation; interradial plates with anterior median projection and a ridge on the outer surface. Polian vesicle single, spherical. Stone canal straight, attached, madreporite spherical, coral-like, connected to body wall (Figure 23E). Tentacle ampullae transparent, most extending beyond posterior border of calcareous ring. Gut filled with mud, shell fragments, sand and other debris. Gonadal tubules paired, immature, branched. Right respiratory longer, reaching anterior end, left one half as long, both arising independently. Longitudinal muscles paired. Ciliary urns not detected.

Body wall tables (Figure 23A, B) with trilobed disc in various stages of development, 190–240 µm (mean 215 µm), perforated by 3–(5) oval, heart-shaped or polygonal holes, spire 130–210 µm (mean 156 µm), of three fused pillars revealing 4–8 cross-bars, tips of spire rarely intact (Figure 23C). Tail tables with fusiform disc (Figure 23D), 140–275 µm (mean 188 µm), perforated by 2–4 central holes, spire two-pillared, 50–65 µm (mean 56 µm), terminating bluntly. Phosphatic granules numerous. No tentacle spicules.

Distribution

South-east Atlantic and south-west Indian Oceans, 90–145 m.

Habitat

Muddy sand, shell debris.

Remarks

It is surprising that this species, originally described from off the NW coast of Angola at 145 m (Cherbonnier 1965a), and then from the coasts of Cameroon at 65–70 m and Dahomey at 150–200 m (Cherbonnier 1965b) should now turn up on the east coast of South Africa at 90 m. Perhaps the current material is not identical to that from the West African coast but there is little evidence at this stage to justify its separation. The only differences appear to be the degree of abundance of phosphatic bodies in the southern African material and the usual absence of teeth on the spires of both the body wall and tail tables. These differences are too

small to describe a new species in a genus where enough specimens are necessary for comparison. It is well known that the amount of phosphatic bodies does vary with age as they become transformed to other deposits. The paucity of toothed spires may possibly be due to abrasion as they project well out from the surface of the body wall.

Trochostoma was reduced to the synonymy of *Molpadia* by H.L. Clark (1907). Heding (1931) and Deichmann (1936 & 1940) attempted a re-classification of the molpadids but without much success. Although Pawson (1977) supported H.L. Clark's synonymy, Cherbonnier and Féral (1981) state that there is enough evidence to resurrect *Trochostoma* based on features of the calcareous ring and body wall deposits, notably the absence of rosettes and racquet-shaped bodies. Despite this, the species is here transferred to *Molpadia* until a critical revision of the molpadiids is forthcoming.

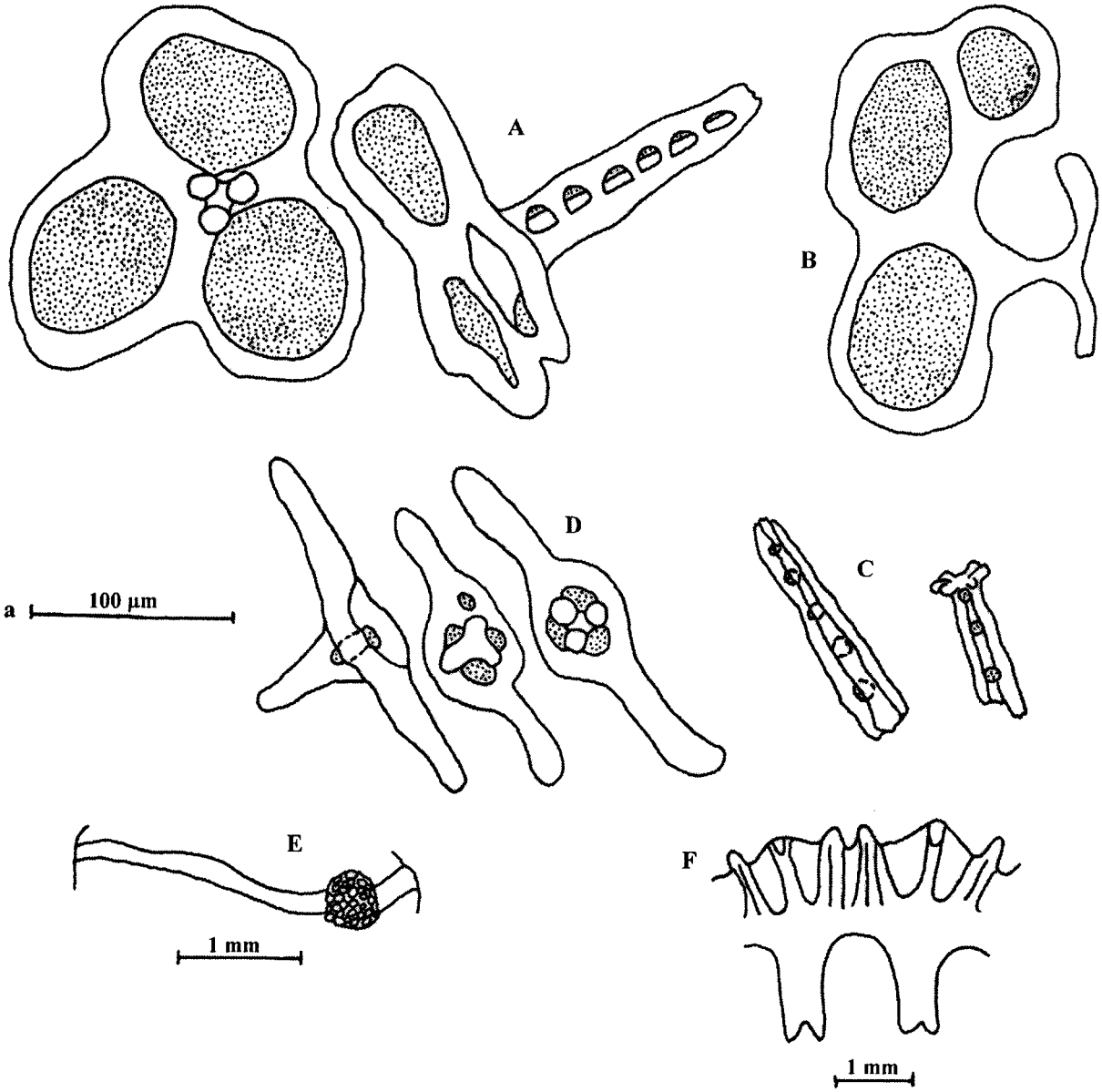

FIGURE 23. *Molpadia triforia* Cherbonnier, 1965. SAM–A27948. A**.** tables from body wall; B. incomplete table disc from body wall; C**.** spires of body wall tables; D**.** tables from tail; E. madreporite; F**.** part of calcareous ring; (A–D scale a)

***Molpadia* sp. indet.**
Figure 24

Material examined

SAM-A27949, off Tongaat Bluff, KZN, 29° 44.4' S, 31° 25.4' E, NMDP, St. ZV 7, 20.vi.1989, 240 m, 1 spec.

Description

Specimen of medium size, length (including tail) 25 mm, breadth 15 mm, tail partially retracted. Colour, in alcohol, greyish-brown, darker ventrally, with rust-coloured tinges indicating phosphatic deposits, common at both ends, tail whitish. Tentacles 15, small (ca.1 mm), whitish, each with a pair of digits and a single unpaired terminal digit. Anus encircled by minute teeth (only observed during spicule preparation), each a delicate sterome (Figure 24H) with large hole close to proximal end. Skin thin, rough, translucent.

Calcareous ring (Figure 24G) sculptured, plates fused, radials with a terminally bifid posterior projection and an anterior notch; interradials with triangular anterior projection of same length as that of radial plate. Tentacle ampullae short, (ca. 2 mm); Polian vesicle single, elongated; stone canal not detected. Respiratory trees delicate, arising independently; right longer, with sac-like branches, better developed proximally; left tree restricted to posterior half of body. Gonad immature, as two tufts of anteriorly attached dichotomously branched tubules.Longitudinal muscles paired, members of each pair uniting before insertion. Ciliary urns not detected.

Spicules of body wall comprising tables of two sizes, with well-developed spires, projecting well out from surface. Large tables (Figure 24A, D) with 238–529 µm disc (mean 425 µm), perforated by about 4–7 holes and with 4–6 long, blunt, undivided arms; spire high (Figure 24A, B), 114–267 µm (mean 222 µm), of three fused pillars terminating bluntly or in 2–3 teeth, with some evidence of former cross-bridges; smaller tables (Figure 24C) with usually trilobed, tri-perforate disc, 171–238 µm (mean 200 µm), if disc multi-lobed then with one or more marginal projections and up to six holes; trilobed tables are of the *T. triforia* type (see above) with tall (124–171 µm) spires and some evidence of several cross-bridges. Tail tables of typical *Molpadia* type (Figure 24E), with fusiform disc, 88–196 µm (mean 152 µm), perforated by up to four small central holes; spire low, 13–27 µm (mean 23 µm), of usually fused pillars, occasionally a single cross-bar, and terminating in about four teeth. Some distorted or developing tables also commonly present in tail (Figure 24F) with disc 46–81 µm (mean 65 µm), spire 13–23 µm. Tentacle deposits absent.

Remarks

The specimen at hand is so similar in external appearance to *Molpadia triforia* that I was at first inclined to consider it conspecific with this species. However, only the smaller tables with a tri-lobed disc are reminiscent of *T. triforia*, the large ones with multi-armed discs and more holes are so different that it is possible that the present specimen represents a new species. I have refrained from describing it as such as species within the genus are notorious in transforming their spicules with age so much so that many workers have cautioned against erecting or naming species on scant material until a complete series is available. The specimen also comes close to *T. parvulum* Cherbonnier & Féral, 1981 from the Philippines at 510 m, but its radial plate projections are only terminally bifid and the large tables quite distinctive with straight and not inwardly curved arms.

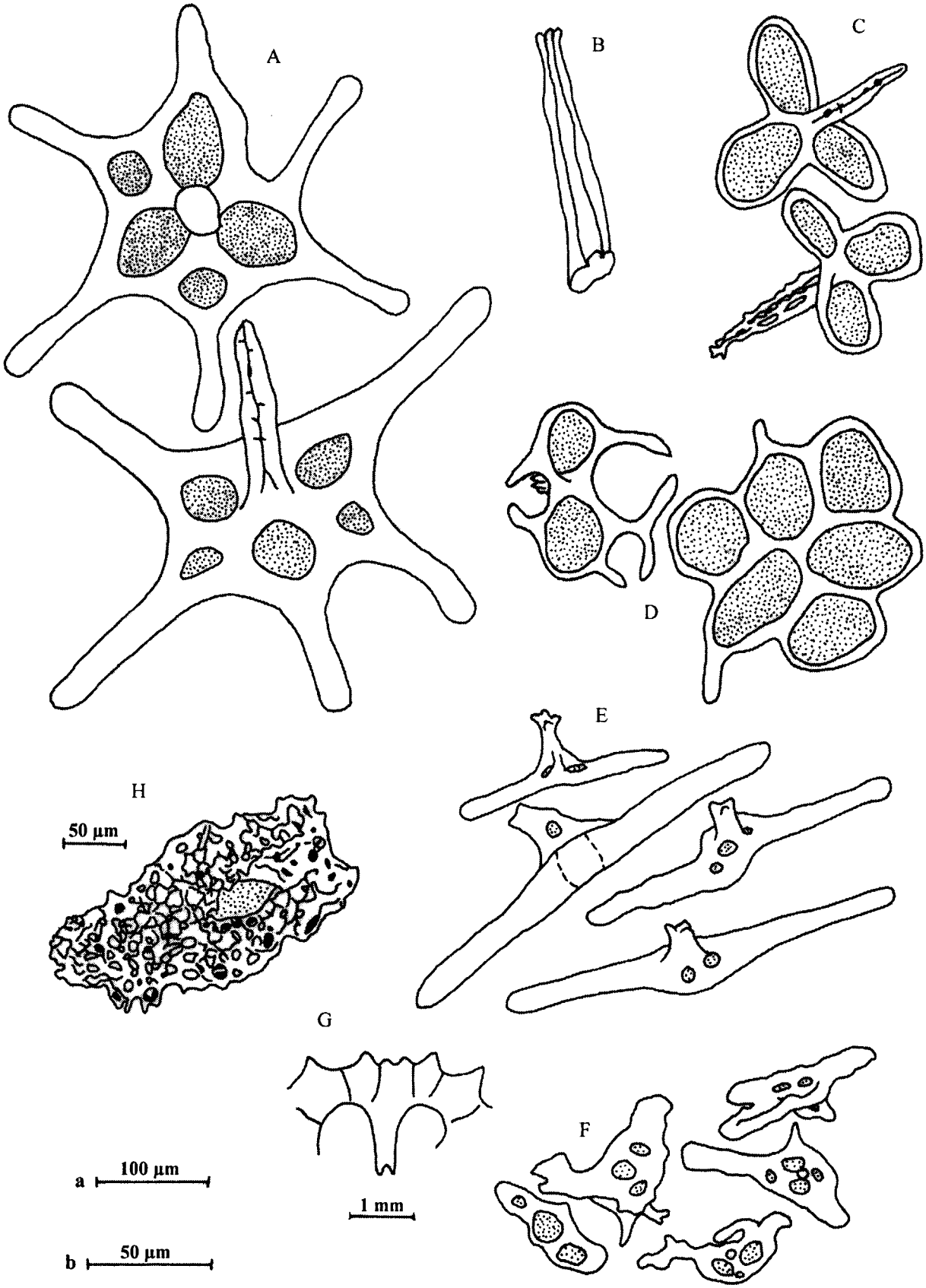

FIGURE 24. *Molpadia* sp. indet. SAM–A27949. A. large tables from body wall; B. spire from a large body wall table; C. small tables from body wall; D. developing body wall tables; E. tables from tail; F. distorted tables from tail; G. calcareous ring; H. anal tooth. (A–D scale a; E & F scale b)

Order Apodida Brandt

Family Synaptidae Oestergren

Genus *Protankyra* Oestergren

***Protankyra autopista* (Marenzeller, 1882)**
Figure 25 (A–F)

Synapta autopista Marenzeller, 1882:123, pl. IV, fig. 3.
Protankyra autopista H.L. Clark, 1907:103, pl. V, fig. 31; Ohshima, 1913:505, fig. 6; 1914:505, fig. 6; Heding, 1928:264, fig. 49, 1–6; Cherbonnier, 1968:3, fig. a–w.

Type
Not determined.

Type locality
Bay of Miya, Japan.

Previous southern African record
None

Material examined
SAM-A27950, S.E. of Sodwana Bay, KZN, 27° 35.6' S, 32° 41.6' E, NMDP, St. ZH 27, 2 vi 1990, 62 m., anterior fragment only.

Description
Fragment 32 x 4 mm, uniformly whitish, papillae absent. Tentacles 12, whitish, longest 1 mm, each with four terminal digits of unequal size. Polian vesicle single; stone canal not detected. Body wall spicules as short robust anchors, irregular to quadrangular anchor plates and small basket-like buttons/plates; radial muscles with minute spherical to oval miliary granules. Anchors (Figure 25A) 100–116 µm long (mean 108 µm), distance between arms 88–103 µm (mean 97 µm), each arm with 0–2 terminal teeth, vertex slightly concave, shaft thick, stock finely branched. Anchor plates (Figure 25B) 91–103 µm (mean 98 µm) long, 59–84 µm (mean 76 µm) wide, with 36–52 smooth holes, with central holes always the larger. Buttons (Figure 25D) 25–44 µm (mean 32 µm) with 4–7 holes, a thick rim and a 4–6 armed base with minute knobs distally, or knobs absent. Miliary granules 9–22 µm (mean 17 µm) (Figure 25C). Tentacles with similar granules or rods, 16–22 µm (mean 19 µm) in stalk (Figure 25F), 22–56 µm (mean 35 µm) at tips (Figure 25E), but more elongate and of diverse shapes.

Distribution
Japan, Red Sea, east coast of South Africa.

Habitat
Shell rubble.

Remarks
Apart from its type locality this species has been reported from Japan by at least three other workers (Britten 1907; Ohshima 1913, 1914 & Heding 1928). The only record outside Japan is that of Cherbonnier (1968), based on several fragments from the Red Sea. There are slight differences between the southern African material and that coming from Japan and the Red Sea. Japanese material is described as reddish while that of the Red Sea as pinkish. In both the teeth of the anchor arms are absent or poorly developed and the knobs on the

baskets faint or absent. These differences may be just geographic variations in distantly separated populations and thus of little significance in trying to separate the southern form.

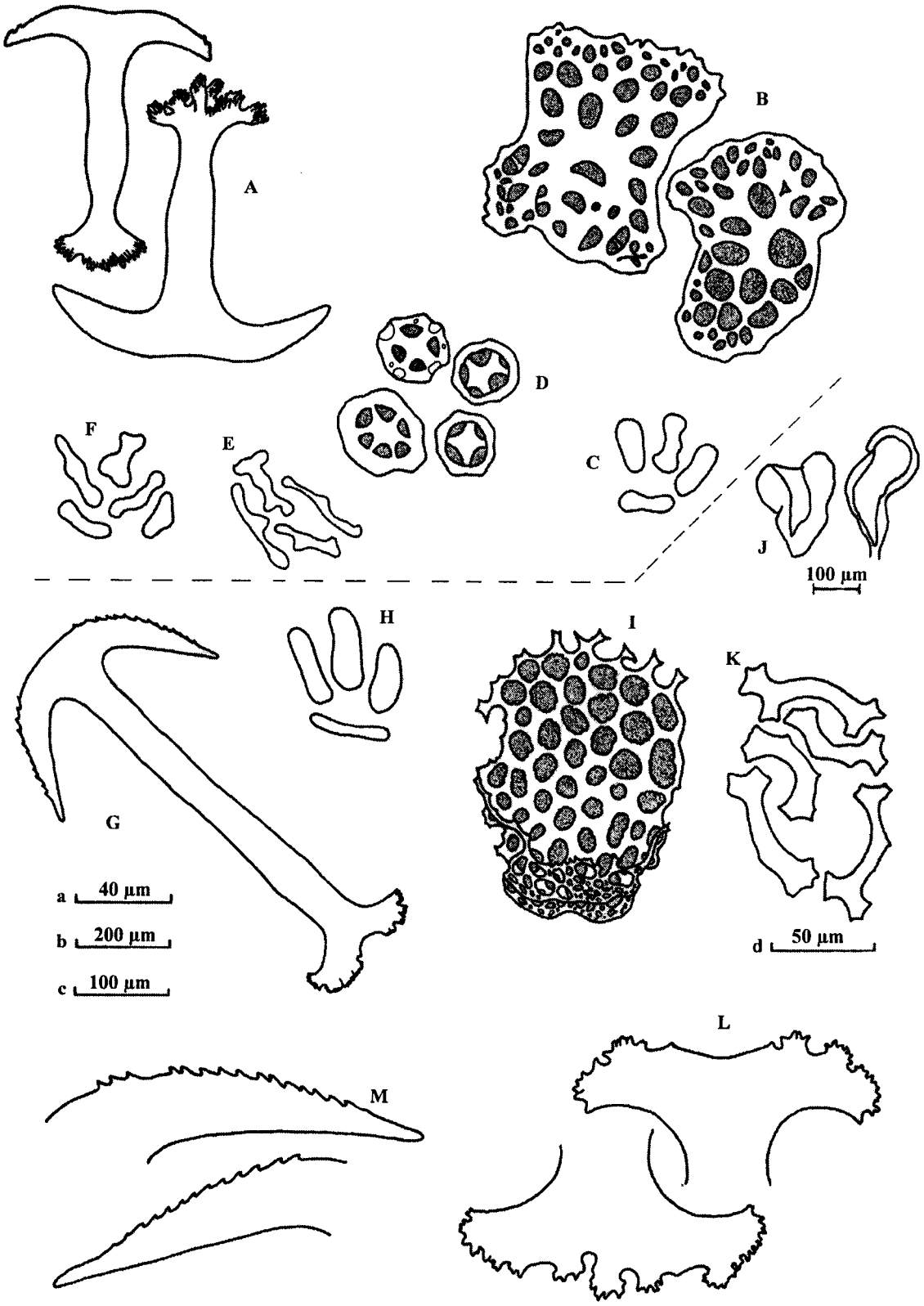

FIGURE 25. (A–F) *Protankyra autopista* (Marenzeller, 1881). SAM–A27950. A. anchors from body wall; B. anchor plates from body wall; C. miliary granules from longitudinal muscle; D. buttons from body wall; E. rods from tentacle tip; F. rods and granules from tentacle stalk. **(G–M)** *Protankyra* sp. SAM-A27951. G. anchor from anterior body wall; H. military granules from longitudinal muscle; I. anchor plate; J. ciliary urns; K. rods from anterior body wall; L. enlargement of anchor stocks; M. enlargement of anchor arms. (A–F & H scale a; G & I scale b; L & M scale c; K scale d)

I am in agreement with Heding (1928) that this species is easily distinguished from its congenors. However, Marenzeller (1882) is of the opinion that it bears a strong resemblance to *P. molesta* Semper, 1868 from the Philippines, a species thought by H.L. Clark (1907), to be a synonymous *with P. bidentata* Woodward & Barrett, 1858 and by Heding (1928) with *P. pseudodigitata* Semper, 1868. The distinguishing features of this species are its robust anchors, irregular anchor plates and smooth to finely knobbed basket-like buttons. It is remarkable that this Japanese species has such a wide distribution but more and complete material is necessary to draw any distinction between the Japanese population and that coming from the West Indian Ocean, including the Red Sea.

***Protankyra* sp. indet.**
Figure 25 (G–M)

Material examined

SAM-A27951, off Matigulu Bluff, KZN, north coast, 29° 22.8' S, 31° 58.7' E, NMDP, St. ZR 13, 16 vi 1989, 520 m, posterior fragment only.

Description

Specimen 162 x 10.5 mm, cylindrical, lacking anterior end. Colour dull yellowish-white with dark specks due to adhering debris. Body wall translucent; intestine looped, posterior filled with globigerina. Ciliary urns solitary (Figure 25J).

Body wall spicules as anchors, anchor plates and bifurcate rods; radial muscles with miliary granules. Anchors (Figure 25G) slender, arms with 7–18 serrations each, not reaching tip of arm (Figure 25M), vertex smooth, convex, stock bilobed, each lobe finely branched, denticles absent (Figure 25L); anterior anchors 760–900 µm (mean 840 µm), distance between arms 460–550 µm (mean 490 µm); posterior anchors longer, 930–945 µm (mean 935 µm). Anchor plates oval (Figure 25I), narrower anteriorly, margins irregular, number of holes in front of bridge usually less than 60, increasing in size anteriorly, larger holes dentate, teeth 1–6, bridge well formed, reticulate, with reticulum obscuring the smaller posterior holes; anterior plates 515–630 µm (mean 575 µm) long, 400–480 µm (mean 443 µm) wide; posterior plates larger 600–730 µm (mean 653 µm) long, 395–515 µm (mean 477 µm) wide. Accessory deposits as anteriorly located curved, bifurcate rods, 58–75 µm (mean 65 µm), with 1–2 short projections (Figure 25K). Miliary granules of radial muscles (Figure 25H) as smooth, 20–40 µm (mean 30 µm) lenticular bodies..

Distribution

Northern KZN, South Africa, 520 m.

Habitat

Mud and clay lumps.

Remarks

The specimen, although incomplete, possesses several characters in combination, making it distinct from any other nominal species of the genus. Once complete specimens become available a new species may need to be erected. Of the approximately 45 nominal species of the genus known to date, the present material comes closest to *P. errata* Koehler & Vaney, 1905, *P. buitendijki* Rowe, 1983, *P. dubia* Cherbonnier, 1965a and *P. similis* (Semper, 1868). It differs from *P. errata* in the absence of spines on the vertex and the complexity of the bridge; from *P. buitendijki* in the absence of denticles on the stock, the shape of the anchor plates and the presence of many more dentate holes; from *P. dubia* in the shape of the arm serrations, absence of denti-

cles on the stock and the presence of bifurcating rods as accessory deposits; and from the brackish water *P. similis* by its habitat, the bilobed and branched nature of the stock, absence of denticles on the stock, presence of toothed holes in the anchor plates and miliary granules in the radial muscles. Table 1 summarises the differences in distribution, depth, size and spicules of the five species here considered.

TABLE 1. Distribution, depth records, size and spicule characteristics of five related species of *Protankyra.*

	P. errata	*P. buitendijki*	*P. dubia*	*P. similis*	*Protankyra* sp.
Distribution	Bay of Bengal	Java	SE Atlantic, NNW of Banana	Philippines	E. coast of S. Africa
Depth (m)	234–864	?shallow	210	shallow, brackish.	520
Size (mm)	4–32	up to 125	? > 50	60–100	>162
Anchors	length ?,	length 700 µm,	length 200– 850 µm,	length up to 430µm,	length 760– 945 µm,
	arms with many serrations,	arms with 10–16 serrations,	arms with many squarish serrations,	arms with many serrations,	arms with 7–18 serrations,
	vertex with a pair of teeth,	vertex smooth, flat,	vertex smooth,	vertex smooth	vertex smooth, flat,
	stock finely branched.	stock branched and denticulate.	stock sub-divided, branched and denticulate	stock not bilobed, finely branched, denticulate	stock bilobed, finely branched and not denticulate.
Anchor plates	length ?, oval, elongate, with irregular margin,	length up to 620 µm, arrow-shaped with squarish posterior; margins irregular,	length 200– 600 µm, oval, with irregular margins,	length 267– 357 µm, oval, with irregular margins,	length 515– 730 µm, irregular with irregular margins;
	holes few, enlarging peripherally, most holes toothed, but only few teeth per hole,	holes mostly smooth, sometimes with 1 or 2 teeth in central holes,	holes few to numerous, mostly with 4–5 teeth,	holes few to many, smooth,	holes few to many, most of the larger ones dentate but few teeth per hole,
	bridge simple	bridge well developed, small oval plates as accessory spicules	bridge ?simple or reticulate	bridge ?reticulate	bridge reticulate
Accessory deposits	curved rods with bifurcate ends	rods with swollen and/ or bifurcate ends	not reported	rods with bifurcate ends	curved rods with bifurcate ends
Miliary granules in radial muscles	not reported	oval to spherical lenticular bodies	oval to spherical lenticular bodies	not reported	oval to spherical lenticular bodies

Family Chiridotidae Oestergren

Genus *Chiridota* Eschscholtz

***Chiridota durbanensis* Thandar, 1996**

Chiridota durbanensis Thandar, 1996: 208, fig. 1 & 2.

Type

SAM-A27712.

Type locality

Cave Rock, off Durban Bluff, KZN, South Africa, 20 m.

Previous southern African record

Type locality only.

Material examined

SAM-A27952, south of South Pier, Durban Bay, UCT Ecological Survey, sieving-grid of dredge, 12.1.1951, 3 fragments.

Description

All fragments badly contracted, lacking anterior and extreme posterior ends, longest fragment 125 mm, width 8 mm, other fragments 20 mm and 60 mm. Colour greyish-brown, darker dorsally. Body wall covered with dense papillae, wheel papillae absent. Spicules of body wall as curved, terminally bifurcate rods, 26–94 µm (mean 62 µm), without central thickening; no deposits in radial muscles.

Distribution

Southern KZN, South Africa, shallow.

Habitat

Sand.

Remarks

The material at hand was left unidentified by Dr Cherbonnier when he reported on the southern African collections. Although anterior and posterior ends are missing there is no doubt that the material represents *Chiridota durbanensis* because of its size, colouration, dense papillose skin, absence of wheel papillae and radial muscle deposits and the presence, in the body wall, of only curved rods without a central thickening. This is a second record of the species described as ?100 mm long. If the three fragments here recorded belonged together, the species length will far exceed its recorded size. The rods are slightly larger than those recorded for the type, perhaps due to the larger size of the present material. Thandar (1996) remarked on two other congenerics, which either lack wheel papillae (*Toxodora pacifica* Ohshima, 1915 from Japan) or have poorly developed wheel papillae (*T. ferruginea* Verrill, 1882 from the eastern coast of USA) and supported the relegation of *Toxodora* to the synonymy of *Chiridota*.

***Chiridota rigida* Semper, 1868**

Chiriridota rigida Thandar and Rowe, 1989: 153 (synonymy & records before 1989); Rowe & Gates, 1995:266.

Type
Hamburg, Germany.

Type locality
Bohol, Philippines.

Previous southern African record
Southern Mozambique and southern KZN, South Africa.

Material examined
SAM-A27953, Park Rynie, KZN, K.S. Ganga, 2.iv.1992, 15 fragments.

Distribution
Tropical Indo-West Pacific Ocean, 0–5 m.

Habitat
Benthic, inshore, sand, rock.

Remarks
The material is poorly preserved and in 15 fragments which, judging from the anterior ends, probably represent six specimens. This is the second record of this characteristic tropical Indo-West Pacific species from South Africa, demonstrating that it is perhaps well established in the shallow, southern African subtropical waters. The colour of the current material is also orange with white papillae, corresponding well with that described for their Park Rynie (KZN) specimen by Thandar & Rowe (1989).

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