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Sublittoral and bathyal sea cucumbers (Echinodermata: Holothuroidea) from the Northern Mozambique Channel with description of six new species

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Abstract

The 2009 expedition with the research vessel Miriky sampled the sublittoral and bathyal waters of the northern Mozambique Channel. This exploration campaign resulted in a small, but very diverse collection of holothuroids comprising 174 specimens representing 31 species, 18 genera, 10 families and 5 orders. Of these species, many were hitherto unknown for Madagascar or even for the Indian Ocean, and six, *Bathyplotes aymeric* **sp. nov.**, *Holothuria (Cystipus) yann* **sp. nov.**, *Holothuria (Stauropora) bo* **sp. nov.**, *Holothuria (Metriatyla) alex* **sp. nov.**, *Holothuria (Theelothuria) cyrielle* **sp.nov.**, *Molpadia thandari* **sp. nov.**, are new to science. *Molpadia lenticulum* (Cherbonnier & Féral, 1981) is a new combination. This contribution provides an illustrated and annotated overview of the poorly known, highly biodiverse, sublittoral and bathyal sea cucumber fauna of the northern Mozambique Channel. Our findings demonstrate how ignorant we are about the poorly explored habitats of our planet and therefore stress the urgent need for more explorations to such regions.

Key words: taxonomy, new records, new species, new combination, Madagascar

Introduction

The holothuroids of the shallow-waters of Madagascar are reasonably well known thanks to the efforts of several workers (Bell, 1984; Cherbonnier, 1970, 1988; Ludwig, 1883; Massin *et al*., 1999, Théel, 1886). Nearby shallow-waters have also been prospected (Clark & Rowe, 1971), some very recently. For instance, Rowe & Richmond (2004) provided an account on the littoral echinoderms of Rodrigues Island, Samyn *et al.* (2005, 2006) documented the sea cucumbers of the Comoros, Conand *et al.* (2010) did the same for the holothuroids of Reunion Island and most recently Conand *et al.* (2013) for the Scattered Islands of the Glorioso Archipelago in the Mozambique Channel.

The sublittoral and bathyal (50–2000 m depth) depths of Madagascar on the other hand have largely remained

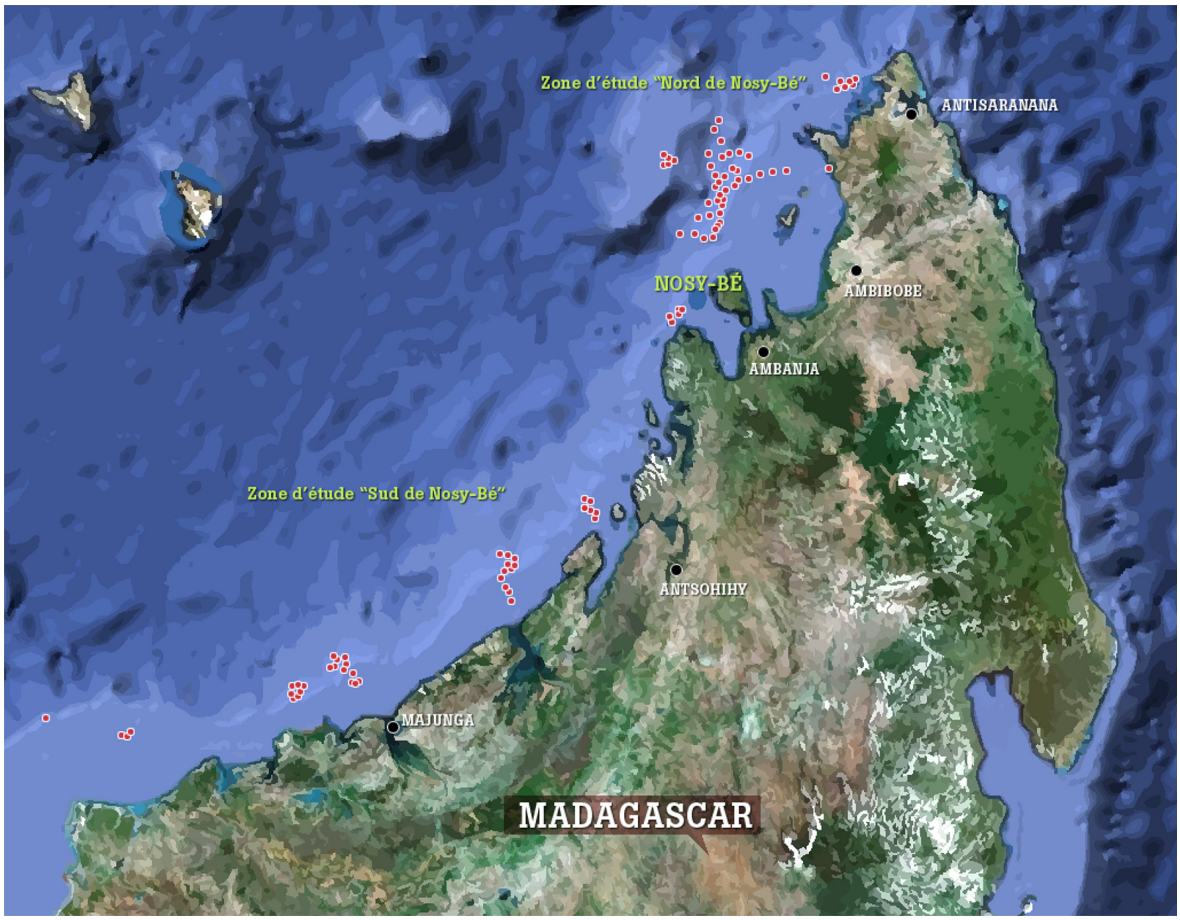
unexplored. Hanssen (1975), in his monumental worldwide review of deep-sea holothuroid taxonomy, mentioned a mere two bathyal species for the region: *Benthogone rosea* Koehler, 1896 and *Laetmogone fimbriata* (Sluiter, 1910). Fortunately, the nearby bathyal fauna of the eastern and southern shores of South Africa are better prospected. H.L. Clark (1923), Ludwig & Heding (1935), Cherbonnier (1952) and more recently A.M. Clark (1977), Solis-Marin (2005) and Thandar (1992; 1999; 2006; 2007; 2007; 2009) provided records.

This paper provides detailed descriptions of the holothuroids we recognize as new to science and gives annotated taxonomic accounts of the other species sampled by the Miriky.

Materials and methods

The specimens here studied were collected by Bouchet, Kantor, Puillandre and Richer from 25 June to 14 July 2009 on board of the vessel Miriky of the 'Société des Pêcheries de Nosi Be'. Depending on the collection site, samples were collected either using a beam trawl (CP for Chalut à Perche) or a dredge (DW for Drague Warren) at depths up to 1020 m. Depth, geographical coordinates, gear and station number are given in table 1; habitat was not provided to the authors.

Map 1 shows the stations where samples were taken.



MAP 1. Collection sites of the Miriky campaign (coordinates of stations where sea cucumbers were sampled available in table 1).

Specimens were directly fixed in 80 % ethanol which was replaced after 15 days, and again after the specimens arrived at the Muséum National d'Histoire naturelle in Paris, France (MNHN)

Material was trusted to us for study by Dr M. Eléaume and N. Améziane, curators of the echinoderm collection of the MNHN.

TABLE 1. Depth, geographical coordinates, gear and station number of the collection sites.

Taxon	Collection date	Collection number	Station code	Latitude	Longitude	Depth (in m)	N° of specimens
ASPIDOCHIROTIDA Grube, 1840							
Holothuriidae Ludwig, 1894							
Bohadschia cousteaui Cherbonnier, 1954	29.VI.2009	**IE-2007-816**	CP3204	12°37,03'S	48°30,3'E	60	1
Holothuria (Cystipus) yann sp. nov	13.VII.2009	**IE-2007-764**	CP3282	14°52'S	46°58'E	261	3
Holothuria (Metriatyla) alex sp .nov.	13.VII.2009	**IE-2007-779**	CP3281	14°58,05'S	46°56,3'E	57	1
Holothuria (Metriatyla) cyrielle sp. nov.	6.VII.2009	**IE-2007-752**	CP3240	14°30'S	47°27'E	257	2
	11.VII.2009	**IE-2007-753**	CP3267	15°32'S	45°43'E	580	1
	27.VI.2009	**IE-2007-810**	CP3188	12°31'S	48°22'E	301	1
Holothuria (Metriatyla) kurti Ludwig, 1891	6.VII.2009	**IE-2007-768**	DW3235	14°32,56'S	47°27,71'E	54	1
	9.VII.2009	**IE-2007-790**	CP3256	15°48,39'S	44°44,37'E	50	4
Holothuria (Stauropora) bo sp.nov	30.VI.2009	**IE-2007-791**	DW3211	12°32'S	47°52'E	300	1
Holothuria (Thymiosycia) impatiens (Forskål, 1775)	3.VII.2009	**IE-2007-812**	DW3230	13°25'S	47°57'E	158	1
Stichopodidae Haeckel, 1896							
Stichopus herrmanni Semper, 1868	9.VII.2009	**IE-2007-755**	CP3257	15°47'S	44°46'E	0	1
Mesothuriidae Smirnov, 2012							
Mesothuria oktaknemus Sluiter, 1901	8.VII.2009	**IE-2007-754 (2)**	CP3251	15°25'S	45°57'E	800	1
	11.VII.2009	**IE-2007-760**	CP3271	51°31'S	45°45'E	800	1
	8.VII.2009	**IE-2007-777**	CP3252	15°22'S	45°58'E	900	1
	8.VII.2009	**IE-2007-778 (4)**	CP3253	15°25'S	45°55'E	950	3
	12.VII.2009	**IE-2007-804**	CP3278	15°24'S	45°56'E	780	3
Mesothuria regularia Heding, 1940	8.VII.2009	**IE-2007-754 (1)**	CP3251	15°25'S	45°57'E	800	1
	11.VII.2009	**IE-2007-794**	CP3268	15°31'S	45°45'E	800	1
	11.VII.2009	**IE-2007-818**	CP3270	15°31'S	45° 42'E	800	2
Mesothuria parva (Théel, 1886)	14.VII.2009	**IE-2007-813**	CP3289	14°29'S	47°26'E	379	3
	14.VII.2009	**IE-2007-775**	CP3289	14°29'S	47°26'E	379	3
Zygothuria marginata (Sluiter, 1901)	8.VII.2009	**IE-2007-783**	CP3250	15°22'S	46°00'E	750	1
	8.VII.2009	**IE-2007-778 (2)**	CP3253	15°25'S	45°55'E	950	2
Synallactidae Ludwig, 1894							
Amphigymnas multipes (Walsh, 1891)	13.VII.2009	**IE-2007-798**	CP3284	14°51'S	46°59'E	297	1
Bathyplotes natans (Sars, 1868)	12.VII.2009	**IE-2007-772**	CP3279	15°22'S	45°57'E	1020	1

……*continued on the next page*

TABLE 1. (Continued)

Taxon	Collection date	Collection number	Station code	Latitude	Longitude	Depth (in m)	N° of specimens
Bathyplotes aymeric sp.nov.	12.VII.2009	**IE-2007-769**	CP3273	15°29,86'S	46°3,37'E	34	2
	13.VII.2009	**IE-2007-785**	CP3281	14°58,05'S	46°56,8'E	57	1
Kareniella gracilis Heding, 1940	27.VI.2009	**IE-2007-803**	CP3194	12°19'S	48°12'E	704	1
Pseudostichopus hyalegerus (Sluiter, 1901)	27.VI.2009	**IE-2007-793**	CP3194	12°19'S	48°12'E	704	4
	25.VI.2009	**IE-2007-796**	CP3178	12°59'S	48°09'E	380	2
	27.VI.2009	**IE-2007-799**	CP3188	12°31'S	48°22'E	301	3
	2.VII.2009	**IE-2007-800**	DW3228	12°55'S	48°11'E	319	1
	26.VI.2009	**IE-2007-802**	CP3182	12°36'S	48°16'E	364	18
	14.VII.2009	**IE-2007-805**	CP3293	14°30'S	47°26'E	408	1
	26.VI.2009	**IE-2007-807**	CP3184	12°40'S	48°12'E	524	4
Pseudostichopus mollis (Théel, 1886	8.VII.2009	**IE-2007-778 (3)**	CP3253	15°25'S	45°55'E	950	6
DACTYLOCHIROTIDA Pawson & Fell, 1965							
Ypsilothuriidae Heding, 1942							
Ypsilothuria cf. *bitentaculata* (Ludwig, 1893)	12.VII.2009	**IE-2007-757**	CP3278	15°24'S	45°56'E	780	1
	11.VII.2009	**IE-2007-758**	CP3270	15°31'S	45°42'E	800	1
	6.VII.2009	**IE-2007-762**	CP3240	14°30'S	47°27'E	257	1
	8.VII.2009	**IE-2007-765**	CP3251	15°25'S	45°57'E	800	2
	10.VII.2009	**IE-2007-784**	CP3261	15°35'S	45°43'E	217	1
	14.VII.2009	**IE-2007-786**	CP3289	14°29'S	47°26'E	379	1
	8.VII.2009	**IE-2007-780**	CP3293	14°30'S	47°26'E	408	5
	9.VII.2009	**IE-2007-789**	CP3252	15°22'S	45°58'E	900	1
	12.VII.2009	**IE-2007-792**	CP3279	15°22'S	45°57'E	1020	2
	11.VII.2009	**IE-2007-795**	CP3269	15°31'S	45°46'E	1000	1
	11.VII.2009	**IE-2007-797**	CP3271	15°31'S	45°45'E	800	2
	7.VII.2009	**IE-2007-811**	CP3249	14°48'S	47°00'E	637	3
	12.VII.2009	**IE-2007-815**	CP3277	15°25'S	46°00'E	237	1
	6.VII.2009	**IE-2007-821**	CP3241	14°30'S	47°27'E	325	2
DENDROCHIROTIDA GRUBE, 1840							
Cucumariidae Ludwig, 1894							
Panningia trispicula Thandar, 2008	11.VII.2009	**IE-2007-773**	CP3266	15°34'S	45°43'E	396	1

……continued on the next page

TABLE 1. (Continued)

Taxon	Collection date	Collection number	Station code	Latitude	Longitude	Depth (in m)	N° of specimens
	8.VII.2009	**IE-2007-761**	CP3252	15°22'S	45° 58'E	900	1
	6.VII.2009	**IE-2007-819**	DW3239	14°30'S	47°26'E	unkown	1
Pentacta doliolum (Pallas, 1766)	14.VII.2009	**IE-2007-809**	CP3288	14°31,9'S	47°26,54'E	54	1
Pentacta tesselara Cherbonnier, 1970	7.VII.2009	**IE-2007-814**	DW3245	14°53'S	46°56'E	257	3
Phyllophoridae Oestergren, 1907							
Ekmanothyone incurva (Cherbonnier, 1988)	9.VII.2009	**IE-2007-774**	DW3255	15°48,21'S	44°42,96'E	39	3
	29.VI.2009	**IE-2007-776**	CP3205	12°37,64'S	48°25,99'E	63	10
	6.VII.2009	**IE-2007-787**	DW3236	14°32,52'S	47°26,06'E	58	7
	12.VII.2009	**IE-2007-788**	CP3273	15°29,86'S	46°3,37'E	34	1
Sclerodactylidae Panning, 1949							
Sclerodactyla multipes (Théel, 1886)	10.VII.2009	**IE-2007-763**	CP3260	15°35'S	45°45'E	193	1
	10.VII.2009	**IE-2007-767**	CP3261	15°35'S	45°43'E	217	1
Psolidae R. Perrier, 1902							
Psolidium acorbulum Thandar, 2006	6.VII.2009	**IE-2007-808**	DW3239	14°30'S	47°26'E	unknown	1
Psolus agulhasicus Ludwig& Heding, 1935	28.VI.2009	**IE-2007-770**	CP3201	12°05'S	48°49'E	930	1
	28.VI.2009	**IE-2007-771**	DW3200	12°06'S	48°54'E	653	22
ELASIPODIDA THEEL, 1881							
Deimatidae Ekman, 1926							
Orphnurgus natalasper Thandar, 1992	27.VI.2009	**IE-2007-820**	CP3194	12°19'S	48°12'E	704	1
	27.VI.2009	**IE-2007-801**	CP3194	12°19'S	48°12'E	704	1
MOLPADIDA Haeckel, 1896							
Molpadiidae Müller, 1850							
Molpadia africana (Ludwig & Heding, 1935)	13.VII.2009	**IE-2007-781**	CP3284	14°51S	46°59'E	297	1
	13.VII.2009	**IE-2007-756**	CP3284	14°51'S	46°59'E	297	2
Molpadia andamanensis (Walsh, 1891)	11.VII.2009	**IE-2007-782**	CP3269	15°31'S	45°46'E	1000	3
	11.VII.2009	**IE-2007-817**	CP3271	15°31S	45°45'E	800	2
Molpadia lenticulum (Féral & Cherbonnier, 1981) new comb.	8.VII.2009	**IE-2007-778 (1)**	CP3253	15°25'S	45°55'E	950	1
Molpadia thandari sp.nov.	14.VII.2009	**IE-2007-806**	CP3289	14°29'S	47° 26'E	379	1
	14.VII.2009	**IE-2007-759**	CP3289	14°29'S	47°26'E	379	1

Ossicles were removed from various tissues in household bleach and were observed with light and scanning electron microscopy (Samyn *et al*. 2006; 2007). For light microscopy, no permanent slides were made. For SEM, samples were dried and mounted on aluminium stubs, coated with gold in a sputter coater, and observed with a JEOL JSM-5400LV .

Studied specimens have been divided between the collections of the MNHN, the Royal Museum for Central Africa (MRAC) and the Royal Belgian Institute of Natural Sciences (RBINS). The scanning electron microscopy stubs with ossicles have been deposited in the collection of the MRAC.

Species new to science are described and illustrated. Other species are provided with a comprehensive synonymy (or reference to such), illustrations, remarks on their taxonomy, and their geographical and bathymetric distribution.

Results

Table 1 lists the collected specimens together with their original collection numbers, collection dates, collection depths and locality information.

Systematic account

Order Aspidochirotida Grube, 1840

Family Holothuriidae Ludwig, 1894

Genus *Bohadschia* Jaeger, 1833

Bohadschia cousteaui Cherbonnier, 1954
(Fig. 1 A–B)

Bohadschia cousteaui Cherbonnier, 1954: 252; Cherbonnier, 1988: 44, fig. 15A–K (records before 1988); Samyn, 2000: 15; Samyn, 2003: 19, figs 7A–F, 551G, pl. 1G; Samyn *et al*., 2005: 15.

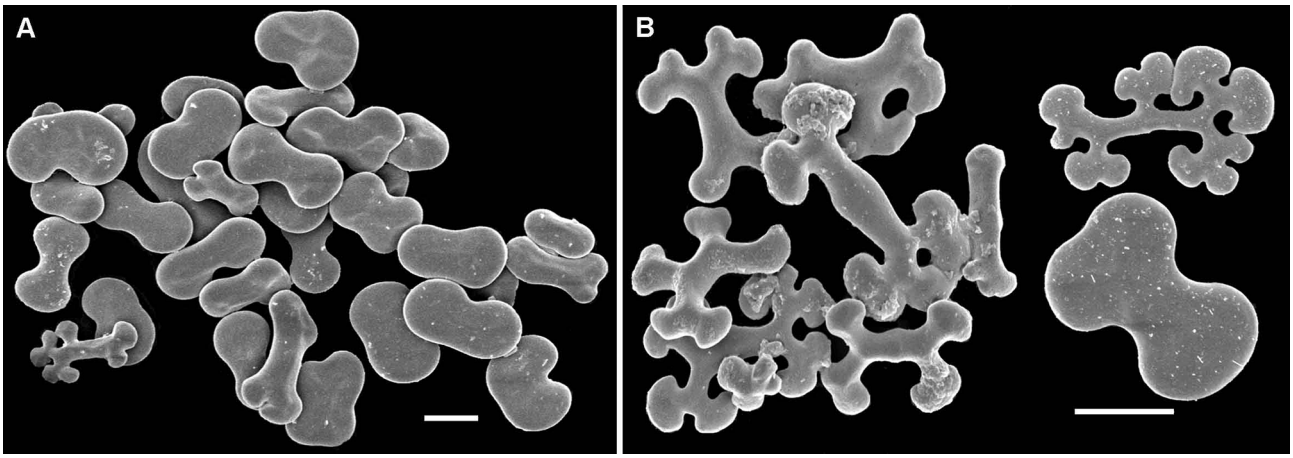


FIGURE 1. *Bohadschia cousteaui* Cherbonnier, 1954. **A–B:** SEM photos of ossicles from ventral (A) and dorsal (B) body wall. Scale bars: 20µm.

Material examined. *Non-type material*: **IE 2007-816** (1 specimen, collected near Cape Saint-Sébastien).

Remarks. *B. cousteaui* was previously known only from very shallow waters 0–9 m (Samyn *et al.* 2006). The present dark brown specimen was sampled at 60 m depth. It had a small *Carapus mourlani* (Petit, 1934) pearlfish entangled in its dirty white to light brown Cuvierian tubules.

Genus *Holothuria* Linnaeus, 1767

Subgenus *Cystipus* Haacke, 1880

***Holothuria (Cystipus) yann* Samyn sp. nov.**
(Fig. 2 A–H)

Material examined. *Type material*: **IE2007-764** (holotype & 2 paratypes, collected in front of Mahajamba Bay)

Comparative type material. EcHh 3550 (holotype of *Holothuria (Cystipus) mammosa* Cherbonnier, 1988; Nossi-Bé, Ambaro Bay, Madagascar, coll. Crosnier, 4.XII.1964, 24 m depth).

Type locality. Madagascar, in front of Mahajamba Bay, Station CP3282 (Decimal coordinates: -14.87; 46.97).

Etymology. This species is named after Yann Samyn, twin-daughter of Reen Tallon and Yves Samyn, in recognition of her patience when her dad is writing up some taxonomic work at home. The species epithet has been put in apposition.

Known geographical distribution. For now only known from the type locality.

Taxonomic description (holotype and paratypes). *External anatomy*—Holotype 110 mm long and 20–50 mm wide, with maximum circumference of 120 mm. First paratype 100 mm long and 15–40 mm wide, with maximun circumference of 115 mm. Second paratype 112 mm long and 20–30 mm wide with maximum circumference of 85 mm (fig. 2A,B). Body tapering towards both ends, but especially posteriorly. Body wall heavily wrinkled, both dorsally and ventrally. Very gritty to the touch. Bivium convex, high. Trivium flat. Bivium separated from trivium by regular row of small lateral papillae. Mouth ventral, surrounded by collar of small papillae which are very reduced ventrally. Number of tentacles in holotype and paratypes could not be counted due to contraction. Anus subdorsal, narrow, not surrounded by papillae. Color in alcohol: bivium beige, marked with parallel irregular brown lines that become thicker mid-dorsally; trivium beige, also marked with irregular brown lines. Ventral tube feet very scarce, only some in ambulacral areas, posteriorly in two uneven rows. Dorsal podia slightly more numerous and spread over complete surface. Podia and lateral papillae white.

Internal anatomy (paratypes, holotype not dissected)—Calcareous ring with interradial pieces nearly as wide and slightly less long than radial ones; radial pieces with anterior notch, interradial ones slightly convex posteriorly. Stone canal not observed, Polian vesicle single, 20–25 mm long. Tentacle ampullae small; 8–10 mm long, 12 counted. Gonad not observed. Gut filled with fine muddy sediment. Right respiratory tree well developed reaching oral end of body; left respiratory tree poorly developed going up to mid body. Longitudinal muscles, bifid and flat, 6 mm wide, edges attached. Cuvierian tubules present, extremely thick and positioned in a contracted ball like structure

Ossicles—Tentacles with spinose rods up to 250 µm long (fig. 2C), ventral and dorsal body wall with similar tables and buttons (fig. 2D,E). Tables numerous, rim of disc undulating to spiny, disc knobbed at edge, up to 100 µm across, perforated by four central and up to 16 small peripheral holes, pillars short (30–45µm high), with 0–1 cross beams, smooth and ending in a spiny crown. Buttons very numerous, nodulous centrally and at rim, 40 to 110 µm long, generally 3 to 4 pairs of holes, but with up to 7 pairs of holes in those from ventral body wall; holes relatively small and often obscured by numerous knobs; few buttons modified into fenestrated ellipsoids (fig 2D,E). Dorsal tube feet, ventral tube feet and lateral papillae with elongated plates up to 180 µm in addition to tables and buttons that are similar to those of body wall (figs 2F–H). Longitudinal and suspensor muscles of cloaca, cloaca, gonad and respiratory trees devoid of ossicles.

Remarks. The ossicle assemblage, with tables with heavily knobbed disc and low spire and with buttons which are irregularly knobbed and which have narrow, sometimes nearly obliterated holes, places this species in the *Holothuria* subgenus *Cystipus* Haacke, 1880. In *Cystipus* twelve species are currently recognized (Laguerda-Figueras & Solis-Marin 2009). *H. (C.) yann* can easily be distinguished from the other species in *Cystipus* by its coloration pattern. Its ossicles resemble those of *H. (C.) mammosa* Cherbonnier, 1988, (Fig. 2) but *H. yann* can easily be differentiated from *H. mammosa* because the cloaca of the latter holds perforated rods (new observation by authors) whereas *H. yann* has no ossicles in the cloaca. Moreover, *H. mammosa* is characterized by having large conical papillae over the complete body wall whereas *H. yann* only has reduced lateral papillae. *H. mammosa*, known only from the holotype, was collected at 24 m depth, whereas the three known specimens of *H. yann* were collected at 261 m depth, making it the deepest *Cystipus* species ever collected.

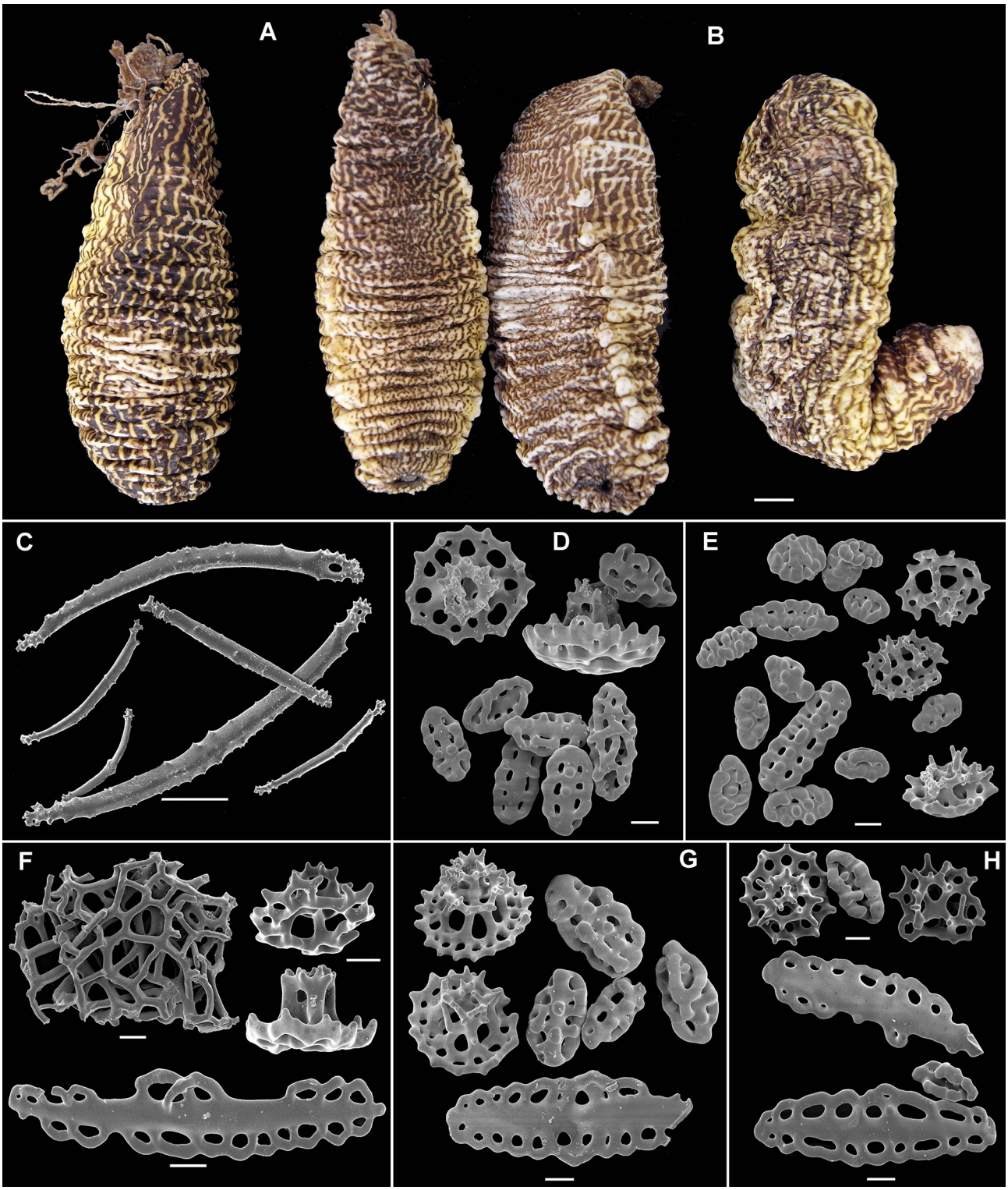


FIGURE 2. *Holothuria (Cystipus) yann* **sp. nov. A–B.** Dorsal view (A) and ventral view (B) of paratypes. **C–G**: SEM photos of ossicles from tentacles (C), dorsal (D) and ventral (E) body wall, dorsal tube feet (F), lateral papillae (G) and ventral tube feet. A,B = 1cm; C = 50µm; D–H = 20µm.

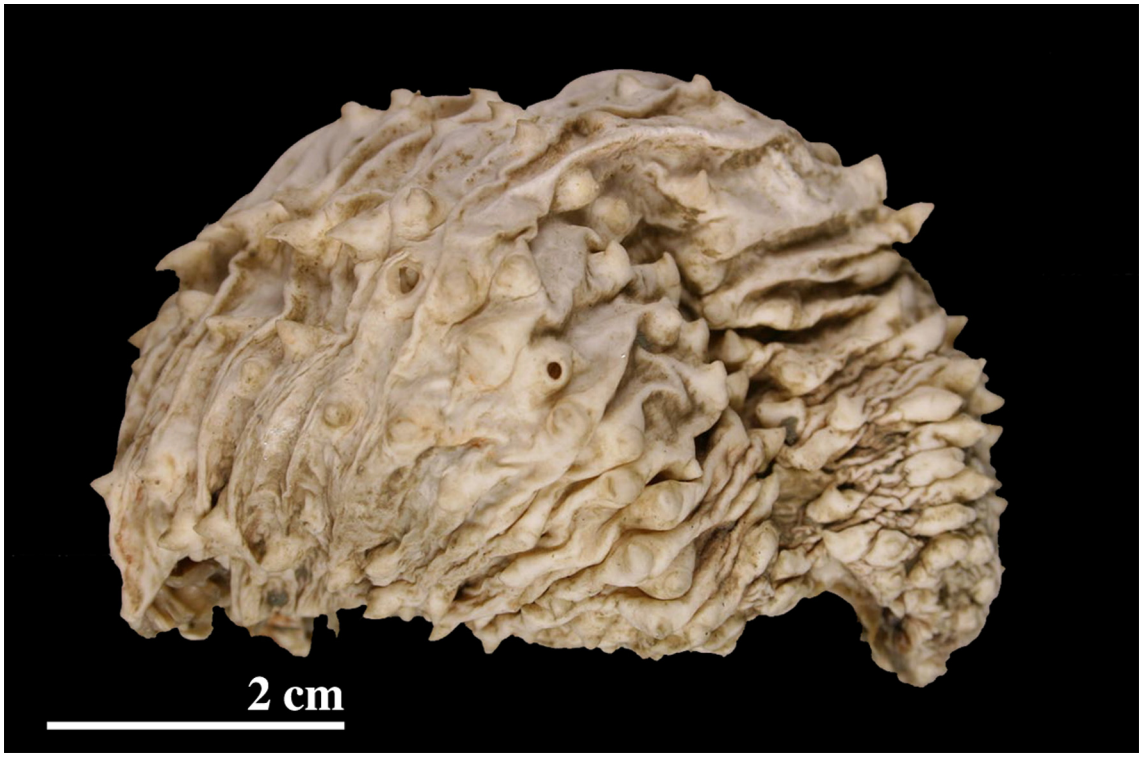


FIGURE 3 *Holothuria (Cystipus) mammosa* Cherbonnier, 1988. Dorsal view of the holotype.

Subgenus *Metriatyla* Rowe, 1969

***Holothuria (Metriatyla) alex* Samyn sp.nov.**
(Fig. 4 A–F)

Material examined. *Type material*: **IE-2007-779** (holotype, sampled in front Mahajamba Bay)

Comparative material examined. ZMB Ech 1681 (holotype of *Holothuria (Metriatyla) martensii;* Semper, 1868 (Fig. 5); Ambon, Indonesia, leg. V. Martens, unknown depth); **MNHN EchHh 3894** (*Holothuria (Metriatyla) horrida* Massin, 1987, erroneously identified as *H. martensii* Semper, 1868, Tuléar, Mahavatsy, Madagascar, coll. Thomassin, 15.IX.1962, unknown depth); **MNHN EchHh 3906** (*Holothuria (Metriatyla) horrida* Massin, 1997, erroneously identified as *H. martensii* Semper, 1868, Tuléar, devant labo, st. 450, Madagascar, coll. Thomassin, 23.IX.1962, unknown depth); **MNHN EchHh 7030** (*Bohadschia vitiensis* (Semper, 1868), erroneously identified as *H. martensii* Semper, 1868, Antsirane, Madagascar, coll. Decary, 1919, unknown depth).

Type locality. Madagascar, Mahajamba Bay, Station CP 3218 (Decimal coordinates: -14.97; 46.94)

Etymology. This very handsome species is named after Alex Samyn, first daughter of Reen Tallon and Yves Samyn, in recognition of her support, when her dad is writing up his taxonomic work at home. The species epithet has been put in apposition.

Known geographical distribution. For now only known from the type locality.

Taxonomic description (holotype). *External anatomy*—55 mm long and 24 mm wide at mid body, tapering acutely posteriorly. Trivium flat, separated from more convex bivium by fringe of well-developed lateral papillae (fig. 4A,B). Mouth ventral, surrounded by collar of reduced papillae, especially ventrally. Number of tentacles could not be determined due to contraction. Anus terminal, unguarded by papillae. Color in alcohol: bivium dark beige with some darker spots forming more or less two transversal lines with beige, evenly spread, papillae; trivium brown, with evenly scattered beige tube feet.

Internal anatomy: specimen partly eviscerated, leaving only part of the gut, the right respiratory tree and the oral structures. Calcareous ring narrow. Single short stone canal, 4 mm long, ending in spherical madreporite. Polian vesicles not observed. Gonad not observed. Gut filled with very fine mud. Longitudinal muscles very flat, bifid, only 3 mm wide. Cuvierian tubules not observed.

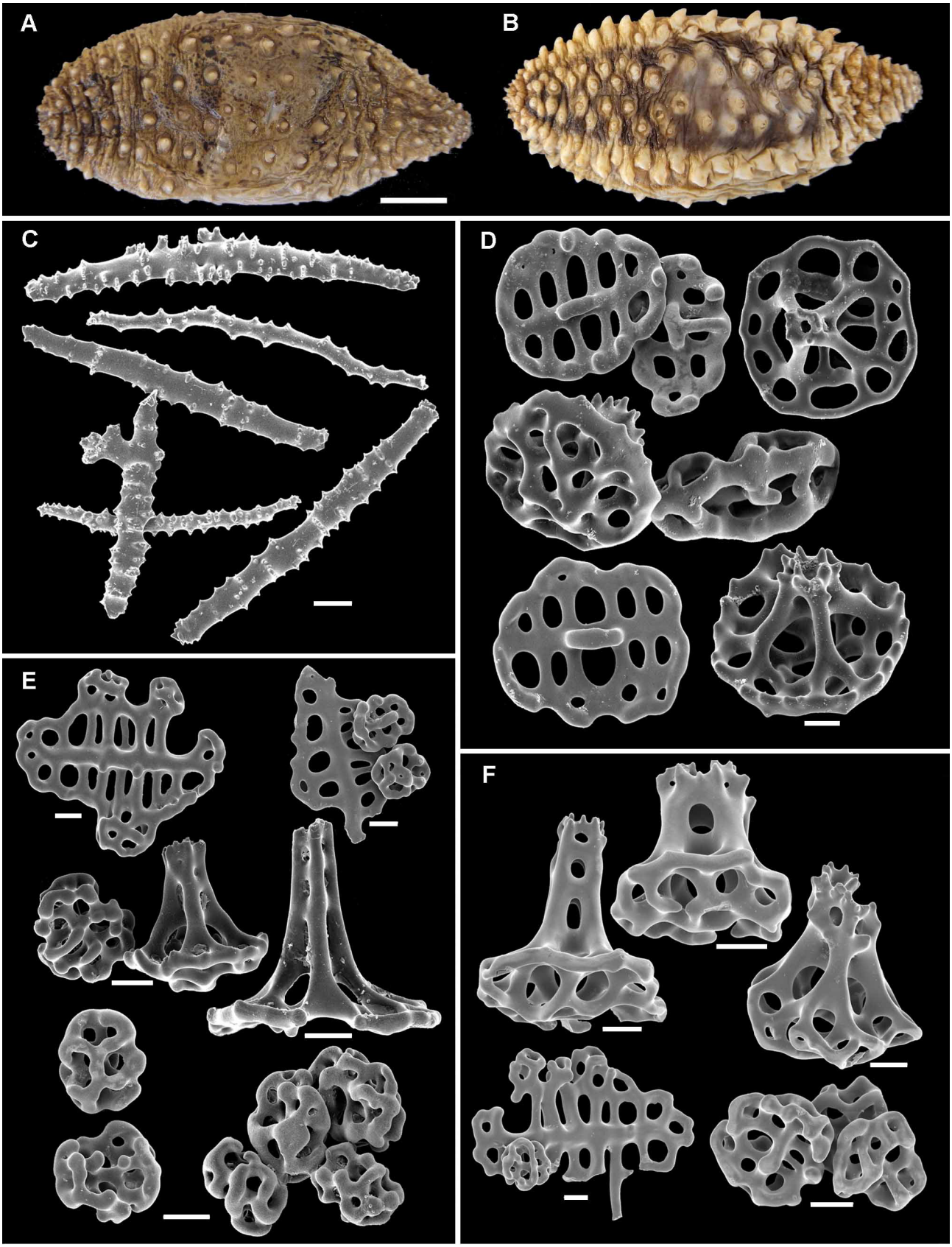


FIGURE 4. *Holothuria (Metriatyla) alex* **sp. nov. A–B**: Dorsal (A) and ventral (B) views of holotype; **C–F**: SEM photos of ossicles from tentacles (C), dorsal body wall (D), lateral papillae (E) and dorsal papillae (F). Scale bars: A,B = 1cm; C,E,F = 20μm; D = 10μm.

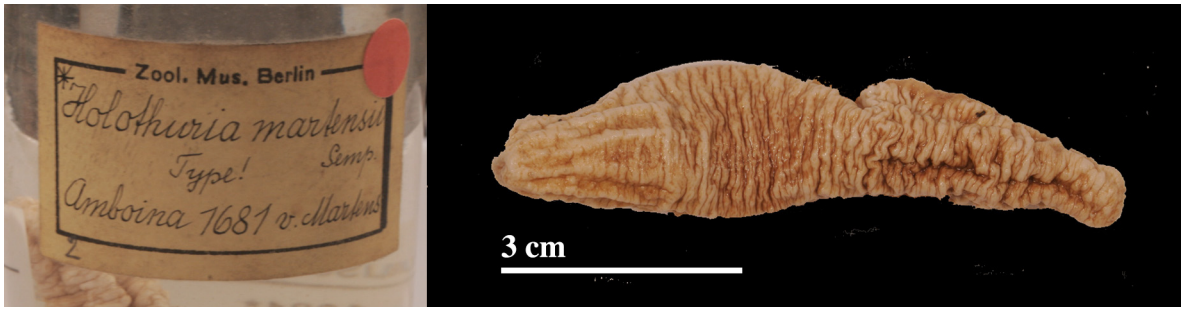


FIGURE 5. *Holothuria (Metriatyla) martensii* Semper, 1868. Label and dorsal view of the holotype.

Ossicles: Tentacles with spiny rods, occasionally with some perforations, 110–480 µm long (fig. 4C). Ventral and dorsal body wall with tables, buttons and few fenestrated ellipsoids. Tables with disc on average 60 µm across, perforated by irregularly distributed central holes and 14 to 16 peripheral holes, rim of the disc undulating, edge smooth to spiny, spire low (1–2 cross beams) with four pillars (30–38µm high) ending in simple spiny crown (fig. 4D). Buttons very wide (31–48 µm wide and µm 50–68 long), smooth to knobbed with a central bridge (fig. 4D). Dorsal papillae with tables, plates and numerous ellipsoids (36–50µm wide, 45–53µm long); plates flat or tri-dimensional (123–185µm long,), tables similar to those of the body wall with a few tables with a higher spire (43–72µm, up to five cross beams, fig. 4F). Lateral papillae with numerous fenestrated ellipsoids in addition to plates and tables similar to those of the dorsal papillae (fig. 4E). Longitudinal muscles and cloaca devoid of ossicles.

Remarks. It is with some doubt that we assigned this species to the subgenus *Metriatyla* as its ossicle assemblage does not completely fit with the diagnosis of the subgenus. *H. alex* **sp. nov.** differs from the other species in *Metriatyla* in having tables with discs that, when the spire is low, are turned upwards and are nodulous. *H. alex* also presents fenestrated ellipsoids, whereas no other species in *Metriatyla* does so.

In terms of external morphology *H. (M.) alex* **sp. nov.** is close to *H. (M.) kurti* Ludwig, 1891 (see below for description). *H. alex* can however easily be separated from that species because it lacks the 'spatulate' tables that characterize *H. kurti* (cf fig. 7C) and because of its very characteristic ellipsoids (fig. 4 E,F) and wide buttons (fig. 4D) which are absent in *H. kurti*..

At a first glance one could also think that *H. alex* **sp. nov.** is just a juvenile form of the species described as *H. ocellata* (Jaeger, 1833) by Teo & Ng (2009). However, the coloration pattern (papillae surrounded by a dark ring in *H. ocellata* (sensu Teo & Ng 2009) which is not the case in *H. alex*), the form of the lateral rim of papillae (fused papillae in *H. ocellata* (*sensu* Teo & Ng 2009), not so in *H. alex*), and especially the ossicle assemblage (tack-like tables present in *H. ocellata* (*sensu* Teo & Ng, 2009), absent in *H. alex*) is significantly different.

H. alex **sp. nov.** also resembles *H. martensii* Semper, 1868 in presenting tables with reduced disc and with tall, smooth spires. We studied the ossicle assemblage of the holotype of *H. martensii* (fig.5) and of three specimens from Madagascar which Cherbonnier (1988) identified as *H. martensii.* We came to the conclusion that *H. alex* is markedly different because it presents fenestrated spheres, tables with an upward turned disc and wide buttons.
Of the three specimens Cherbonnier (1988) identified as *H. martensii*, one turned out to be *Bohadschia vitiensis* (Semper, 1868) and two *Holothuria (Metriatyla) horrida* Massin, 1987.

Holothuria (Metriatyla) cyrielle VandenSpiegel sp. nov.

(Fig. 6 A–G)

Material examined. *Type material*: **IE-2007-752** (holotype and 1 paratype, sampled in front of Nazendry Bay)
Comparative material examined: **ZMB Ech 1681** (holotype of *Holothuria (Metriatyla) martensii* Semper, 1868 (Fig. 5); Ambon, Indonesia; leg. V. Martens; unknown depth).

Non-type material: **IE-2007-753** (1 specimen, dredged between Majunga and Cape Saint-André); **IE-2007-810** (1 specimen, dredged between Nosy-Bé and Banc du Leven).

Type locality. Madagascar, in front of Nazendry Bay, Miriky St. CP3240 (Decimal coordinates: -14.5; 47.45)

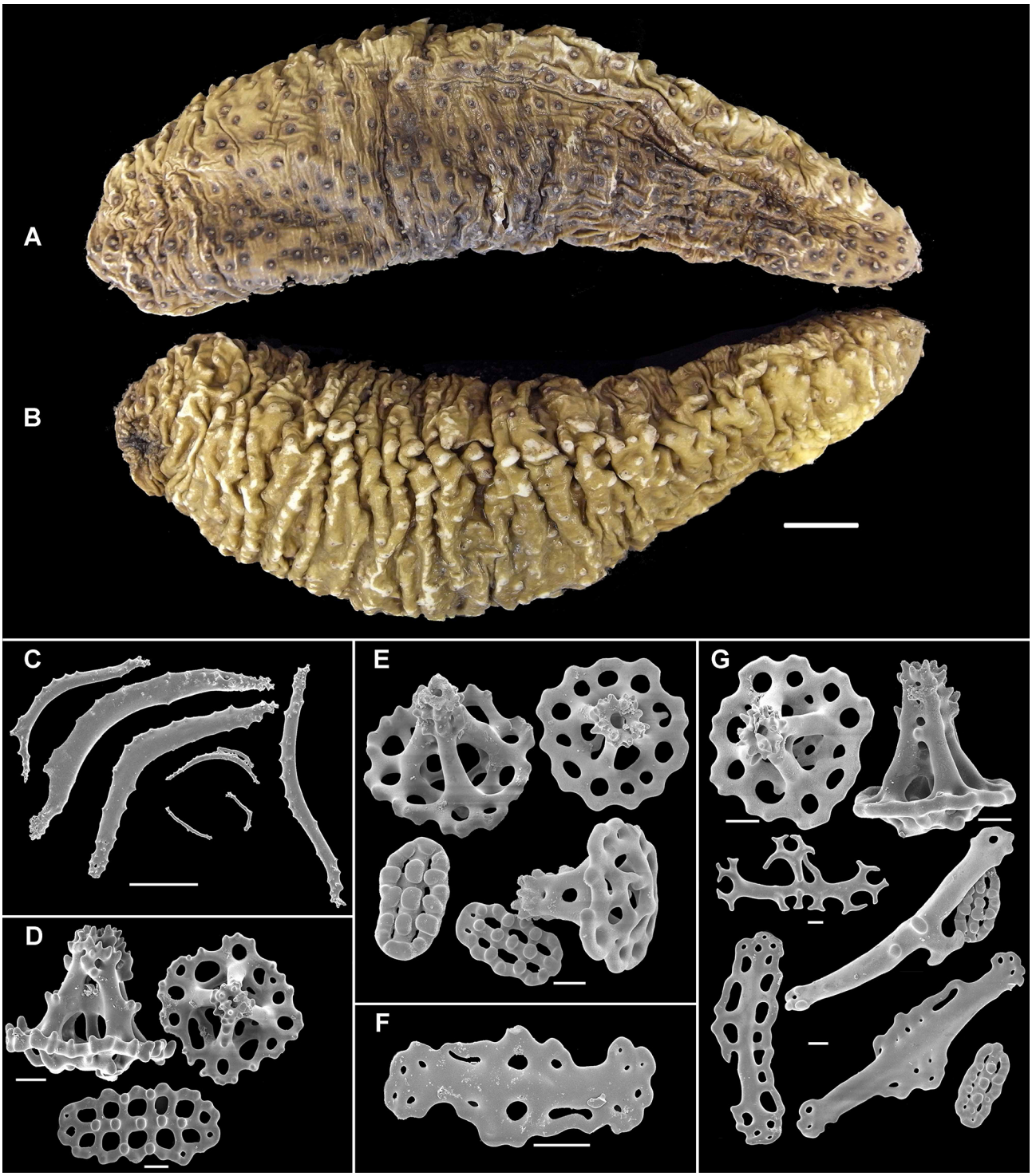


FIGURE 6. *Holothuria (Metriatyla) cyrielle* **sp. nov. A–B**: dorsal (A) and ventral (B) views of holotype; **C–G**: SEM photos of ossicles from tentacles (C), dorsal body wall (D), ventral body wall (E), dorsal tube feet (F) and ventral tube feet (G). Scale bars: A,B = 1cm; C = 100µm; E–G = 20µm.

Etymology. This species is named after Cyrielle VandenSpiegel, daughter of Joelle Dellis and D. VandenSpiegel, in recognition of her patience when her dad is writing up some taxonomic work at home. The species epithet has been put in apposition.

Known geographical distribution. Known from the type locality (Nazendry Bay), between Majunga & Cape Saint-André and between Nosy Be and 'Banc du Leven'

Taxonomic description (holotype and paratype). *External anatomy* - Holotype 190 mm long and 30–60 mm wide, with maximum circumference of 170 mm. Paratype 210 mm long and 30–45 mm wide, with maximum

circumference at mid-body of 120 mm (fig. 6A,B). Body tapering towards both ends. Body wall heavily wrinkled, especially ventrally; very gritty to the touch. Bivium convex. Trivium flat. Bivium separated from trivium by irregular row of enlarged lateral papillae. Mouth ventral, surrounded by 18 small tentacles in paratype (number could not be determined in holotype). Anus terminal, 4 (holotype) to 13 (paratype) mm wide, surrounded by some ten evenly spaced papillae. Color in alcohol: bivium brownish, with scattered, evenly spread, short papillae, each separated by narrow dark brown ring. Trivium lighter brown, covered by small and few, evenly spread, tube feet; no darker ring surrounds ventral tube feet.

Internal anatomy—Calcareous ring with stout radial and interradial pieces; interradials slightly wider and longer than interradial ones; radial pieces with deep anterior and posterior notch; interradial pieces with prominent anterior tooth and convex posterior margin. Stone canal single, straight, 30 mm long in holotype, ending in a well developed madreporite, 12 mm long in paratype. Polian vesicle single, club-shaped, 30 mm long in holotype, 35 mm long in paratype. Radial canal positioned nearly 1 cm below calcareous ring. Tentacle ampullae small, 5–8 mm long. Gonad well developed, in single tuft with long tubules that bifurcate only occasionally. Gut filled with fine muddy sediment. Respiratory trees well developed, with left one reaching mid-body while right one goes up to oral end. Longitudinal muscles bifid, flat and wide (10 mm in paratype, 15 mm in holotype) with edges attached to body wall. Inner side body wall brownish, irregularly marked by by purplish-brown spots. Cloaca 35 mm long in paratype, 45 mm long in holotype. Cuvierian tubules present, very thick.

Ossicles—Tentacles with curved, occasionally branching, slightly rugose rods, 110–480 µm long (fig. 6C). Ventral and dorsal body wall with nodose buttons and tables (fig. 6D,E). Tables disc 50–70 µm across, perforated by central holes and numerous small peripheral holes, positioned in a ring; rim of disc undulating to spiny, spire with four short smooth to spiny pillars (70–74µm high), united by one or more cross beams and ending in a spiny crown. Buttons moderately to very nodulose, 43–90 µm long, perforated by 3 to 7 pairs of holes, holes larger in the dorsal buttons (fig. 6D,E). Ventral tube feet with perforated rods, 110–300 µm long, and plates, 100–208 µm long, in addition to tables and buttons similar to the ones in the body wall (fig. 6G). Dorsal tube feet with massive plates (up to 265µm long and 90µm wide) in addition to buttons and tables similar to the ones from the dorsal body wall (fig. 6F), rods absent. Longitudinal and cloacal suspensor muscles, gonad and cloaca devoid of ossicles.

Remarks. The tables in the body wall of *Holothuria (Metriatyla) cyrielle* **sp. nov.** have a rugose spire and one to several cross-beams. They resemble those in the original description of *Holothuria (Metriatyla) martensii* Semper, 1868 (See Semper 1868: pl 30, fig 16 a&b). We have examined the holotype of *H. martensii* which we located in the Zoological Museum of Berlin and come to the conclusion that they are different species because *H. martensii* also has tables with smooth tall spires in the body wall, as noted by Théel (1886), Panning (1934) and Liao (1997), and buttons which are less nodulous.

Thandar (pers. comm.) found a specimen of the KwaZulu-Natal Coast in South Africa, at depth of approximately 100 m, that is very close, if not identical, to the species we here recognize.

H. cyrielle **sp. nov.** has a bathymetric range from 257–580 m (100–580 m if Thandar's (pers. comm.) record proves indeed the same species), which makes it the deepest species in *Metriatyla* ever recorded. It is also interesting to note that *H. cyrielle* confirms that *Holothuria* species with Cuvierian tubules can reach bathyal depths as reported by O'Loughlin *et al.* (2009) for *H. (Panningothuria) austrinabassa* O'Loughlin, 2007, which is known to occur at 800 m depth.

Holothuria (Metriatyla) kurti Ludwig, 1891

(Fig. 7 A–C)

Holothuria kurti Ludwig, 1891 [1889–92]: 329; Sluiter, 1901: 27, pl. VI, figs 1a–d Pearson, 1903: 200, pl. 3, figs 42–45; Koehler & Vaney, 1908: 9; Cherbonnier, 1963: 6, 8, fig. 2h.

Holothuria (Holothuria) kurti; Panning, 1935: 98, fig. 89a–h.

Holothuria (Theelothuria) kurti; Rowe, 1969: 158; Clark & Rowe, 1971: 178; Mary Bai, 1981: 15; Price, 1982: 11.

Holothuria (Metriatyla) ocellata (Jaeger,1833); Liao, 1979: 118, fig. 5; Liao, 1997: 135, fig. 78, 305 (description in key) (non *H. ocellata*).

Material examined. *Non-type material*: **IE-2007-768** (1 specimen, collected in front of Nazendry Bay); **IE-2007-790** (4 specimens, collected North of Cape Saint André).

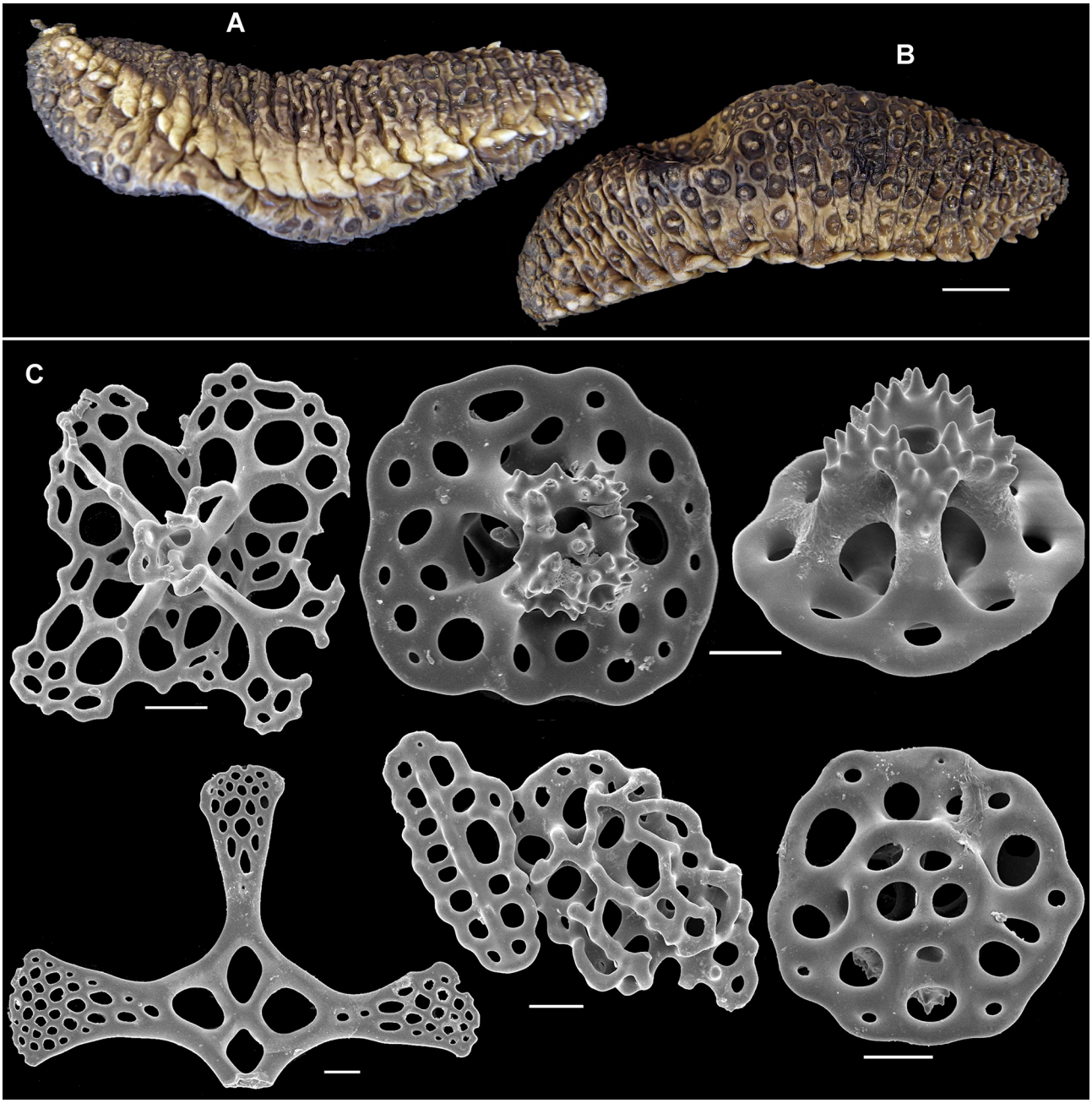


FIGURE 7. *Holothuria (Metriatyla) kurti* Ludwig, 1891. **A–B**: Lateral (A) and dorsal (B) views of specimen IE-2007-768. **C**: SEM photos of ossicles from the lateral papillae. Scale bars: A,B = 1cm; C = 20µm.

Remarks. *H. kurti* is the replacement name that Ludwig (1889–92) proposed for *H. lamperti* Sluiter, 1890, junior homonym of *H. lamperti* Ludwig, 1887.

Liao (1979) suggested that *H. kurti* might be a juvenile form of *H. ocellata* (Jaeger, 1833)[1] (sensu Théel 1886). We do not agree with this point of view because: (i) *H. ocellata* (sensu Théel 1886), as aptly re-described by Teo & Ng (2009), does not present the synallactid-like tables that are characteristic of *H. kurti* (fig. 7C) and (ii) *H. ocellata* (sensu Théel 1886) has few, huge tack-like tables in the papillae (Teo & Ng 2009) whereas *H. kurti* has only tables with a medium high spire ending in a narrow crown, but no true tack-like tables (fig. 7C). Also we can refute the claim that the spatulid tables of *H. kurti* are a juvenile character, because the largest specimen we have under study, 7,3 cm long, possesses gonads and hence is not a juvenile (fig.7 A, B).

1. We have examined the holotype of *Bohadschia ocellata* Jaeger, 1833 and, after discussion with colleagues (Kerr & Paulay, pers. comm), come to the conclusion that this is a valid *Bohadschia* species. Théel's (1886) transition to the genus *Holothuria* was clearly unjustified.

Because *H. kurti* lacks tack-like tables and does not have a calcareous ring with radial plates with posterior extensions, we propose to put *H. kurti* in the subgenus *Metriatyla* and not *Theelothuria* Deichmann, 1958 as suggested by Rowe (1969) and Liao (1979, 1997).

The present specimens, sampled between 50 and 54 m, are new records for Madagascar.

Subgenus *Stauropora* Rowe, 1969

Holothuria (Stauropora) bo Samyn sp. nov.

(Fig. 8 A–F)

Material examined. *Type material*: **IE-2007-791** (holotype, collected between Nosy-Bé and Banc du Leven)

Type locality. Madagascar, between Nosy-Bé and Banc du Leven, Station DW3211 (Decimal coordinates: -12.53; 47.87).

Etymology. This species is named after Bo Samyn, twin-daughter of Reen Tallon and Yves Samyn, in recognition of her patience, when her dad is writing up some taxonomic work at home. The species epithet has been put in apposition.

Known geographical distribution. For now only known from the type locality.

Taxonomic description (holotype). *External anatomy*—117 mm long and 15–30 mm wide, with maximum circumference of 65 mm at mid-body (fig. 8A). Body tapering towards anterior and posterior ends. Body wall smooth, slightly wrinkled and somewhat gritty to the touch. Bivium convex, low. Trivium flat. Mouth ventral, not surrounded by a collar of papillae, Tentacles, 20. Anus terminal, wide, not surrounded by papillae. Color in alcohol: bivium grey, with white patches and some irregular brownish markings; trivium also grey with irregular white central area (artefact of preservation?). Ventral and dorsal tube feet very scarce, their distribution cannot be determined due to contraction.

Internal anatomy - Calcareous ring with interradial pieces as wide and half as long as radial ones. Radial pieces with anterior and posterior notch. Interradial pieces with straight posterior margin. Stone canal not observed, Polian vesicle single, 25 mm long, very narrow. Tentacle ampullae short: ±5 mm long. Gonad not observed. Gut filled with fine muddy sediment. Right respiratory tree well developed reaching anterior end of body; left respiratory tree poorly developed. Longitudinal muscles, bifid and flat, 7 mm wide, edges attached to body wall. Numerous, well developed whitish Cuvierian tubules present.

Ossicles - Tentacles with spiny rods, occasionally with some perforations, 110–480 µm long (fig. 8B). Ventral and dorsal body wall with similar tables and buttons and pseudobuttons. Tables with rim of disc slightly undulating and slightly nodulous, 30 up to 70 µm across, perforated by a single cruciform hole and up to 12 small peripheral holes, three to five pillars, zero to two cross beam terminating in a small crown of four to eight spines; deformed tables with reduced spire or deformed disc are predominant in the ventral body wall (fig. 8B,C). Buttons very irregular in outline, some reduced to a central bar with lateral extensions, perforated by two to six uneven holes, 40 to 50 µm long (fig. 8B,C). Ventral tube feet with plates (68–100 µm long), rods (180–269 µm long) curved and perforated at the extremities and irregular tables similar to those of the body wall (fig. 8D). Dorsal tube feet with plates slightly larger than the ones occurring in the ventral tube feet and a few deformed tables similar to the one occurring in the body wall (fig. 8F). Longitudinal and cloacal suspensor muscles, gonad and cloaca devoid of ossicles.

Remarks. At first we were inclined to classify *Holothuria bo* **sp. nov.** in the subgenus *Lessonothuria* given the shape of the rods of the tube feet (fig. 8C). However, the tables with their central cruciform hole and one or more smaller holes alternating with each arm of the central cross, an upward turned disc and a spire that often is reduced, in combination with the very variable and/or reduced buttons suggest *Stauropora* (Rowe, 1969). This was confirmed by the COI sequence that clearly positioned *H. bo* in the *Stauropora* clade (Michonneau, pers. comm.).

FIGURE 8. *Holothuria (Stauropora) bo* **sp. nov. A**: Ventral and dorsal views of holotype; **B–E**: Ossicles from dorsal body wall (B), ventral body wall (C), ventral tube feet (D) from tentacles (E), and dorsal tube feet (F). Scale bars: A = 1cm, B–D = 10μm, E = 50μm, F=20μm.

Subgenus *Thymiosycia* Pearson, 1914

***Holothuria (Thymiosycia) impatiens* (Forsskål, 1775)**
(Fig. 9 A–B)

Fistularia impatiens Forsskål, 1775: 121, pl.39B; Lamarck, 1816: 76.
Trepang impatiens; Jaeger, 1833: 25.
Sporadipus impatiens; Grube, 1840 : 36; Aranda y Millan, 1908 : 250.
Holothuria (Camerosoma) impatiens; Brandt, 1835: 53.
Holothuria (Holothuria) impatiens; Panning, 1935: 86, fig. 72 (synonymy and records before 1935); Tortonese, 1935: 261; Domantay, 1936: 358, pl. 7, fig. 83, pl. 6, fig. 65; Zavodnik, 1998: 641.
Holothuria (Thymiosycia) impatiens; Rowe & Gates, 1995: 303 (synonymy); Massin, 1999: 57, figs 45 & 111e (records before 1999).

Material examined. *Non-type material*: **IE-2007-812** (1 specimen, sampled West of Nosy-Bé)

Remarks. This single specimen accords with H. L. Clark's (1921: 179, pl. 19, fig. 5) 'typical' colour morph of *Holothuria (Thymiosycia) impatiens*. *H. impatiens* is known to be a complicated species complex (Clark, 1921; Michonneau, 2015), but until formal species are established or synonymised names are re-validated we follow the 'sweeping' synonymy of Panning (1935) and Rowe & Gates (1995). However, we agree with Cherbonnier (1974) to treat *Holothuria truncata* Lampert, 1885 as a valid species, and not as a junior subjective synonym of *H. impatiens* as suggested by Rowe (*in* Rowe & Gates, 1995).

According to Lane *et al.* (2000), *H. impatiens* is found between 0 and 30 m depth. The present record was sampled at 158 m and thus the bathymetric range of the *H. impatiens* complex is much larger than previously thought.

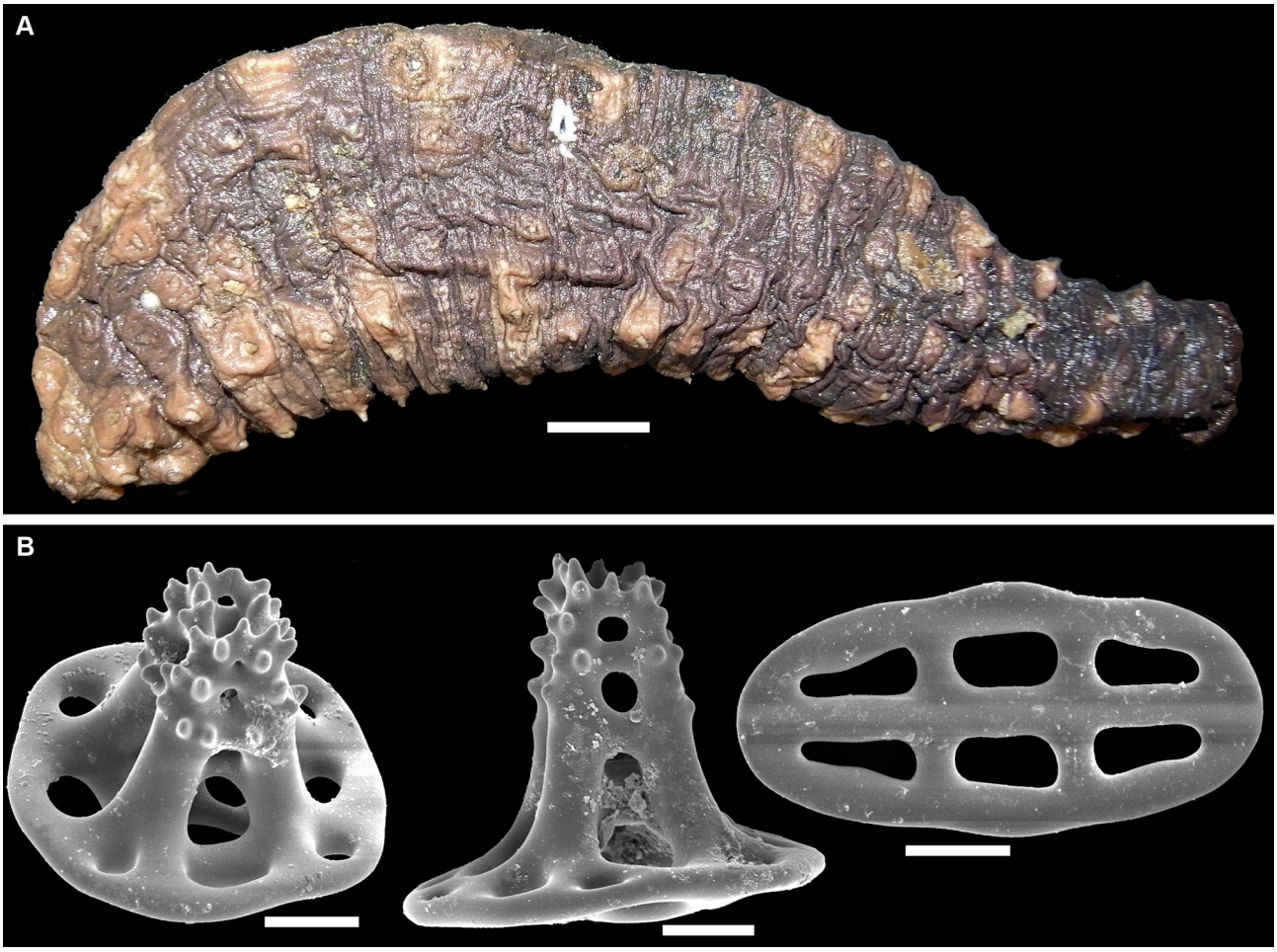


FIGURE 9. *Holothuria (Thymiosycia) impatiens* (Forsskål, 1775). **A**: dorsal view of specimen IE-2007-812; **B**: Sem views of ossicles from the dorsal body wall. Scale bares: A = 1cm; B = 20µm.

Family Stichopodidae Haeckel, 1896

Genus *Stichopus* Brandt, 1835

***Stichopus herrmanni* Semper, 1868**
(Fig. 10 A–C)

Stichopus variegatus Herrmanni Semper, 1868: 73, pls 17, 30, fig. 2.
Stichopus herrmanni; Massin, 1999: 63, 64 fig. 52 (synonymy).

Material examined. *Non-type material*: **IE-2007-755** (1 specimen (skin fragment only), sampled North of Cape Saint-André).

Remarks. *Stichopus herrmanni* Semper, 1868 is a littoral species with as bathymetric distribution 0–20 m (Lane *et al*., 2000). The present sample was taken from an individual sampled in the intertidal.

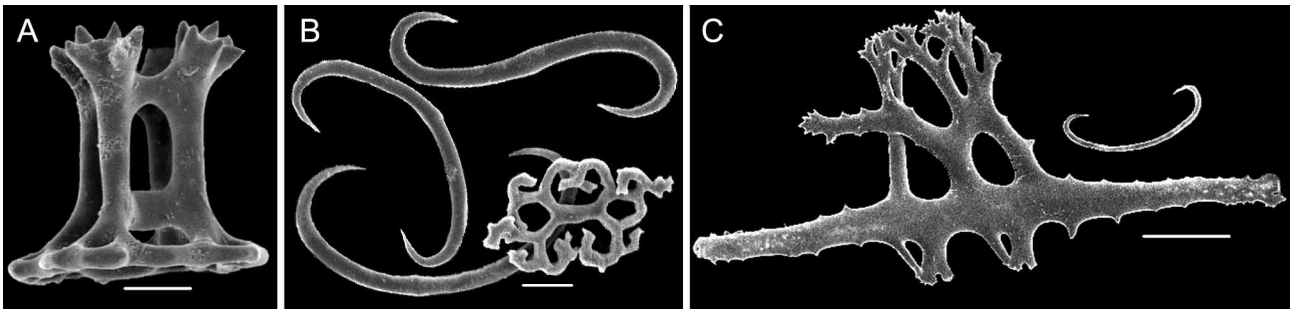


FIGURE 10. *Stichopus herrmanni* Semper, 1868. **A–C**: SEM photos of ossicles from the body wall (A,B) and tube feet (C). Scale bars: A, B = 10µm; C = 50µm.

Family Mesothuriidae Smirnov, 2012

Genus *Mesothuria* Ludwig, 1894

Mesothuria *oktaknemus* Sluiter, 1901
(Fig. 11 A–D)

Mesothuria oktaknemus Sluiter, 1901; Féral & Cherbonnier, 1981: 373,fig. 10A–J.
Mesothuria (Allantis) oktaknemus; Heding, 1940: 333.

Material examined. *Non-type material*: **IE-2007-754(2)** (1 specimen, sampled around Majumga); **IE-2007-760** (1 specimen, collected between Majunga & Cape Saint-André); **IE-2007-777** (1 specimen, around Majumga)**; IE 2007-778(4)** (3 specimens, collected around Majumga); **IE-2007-804** (3 specimens, sampled between Majunga & Cape Saint-André).

Remarks. The present record extends the distribution of this species from the Indo-West Pacific Ocean to the East Indian Ocean.

***Mesothuria regularia* Heding, 1940**
(Fig. 12 A–B)

Mesothuria (Allantis) regularia Heding, 1940: 335–336, textfig. 4.
Mesothuria regularia; Cherbonnier & Féral, 1981: 371, fig.8 A–I; Liao, 1997: 77–78, fig. 42.

Material examined. *Non-type material*: **IE-2007-754(1)** (1 specimen, collected sampled around Majumga); **IE-**

2007-794 (1 specimen, dredged between Majunga & Cape Saint-André); **IE-2007-818** (2 specimens, collected dredged between Majunga & Cape Saint-André)

Remarks. This species was already known from the Pemba Channel (Heding, 1940) and has also has been recorded in the Atlantic (Heding, 1940) and the Pacific (Cherbonnier & Féral 1981; Liao 1997). It is however a new record for Madagascar.

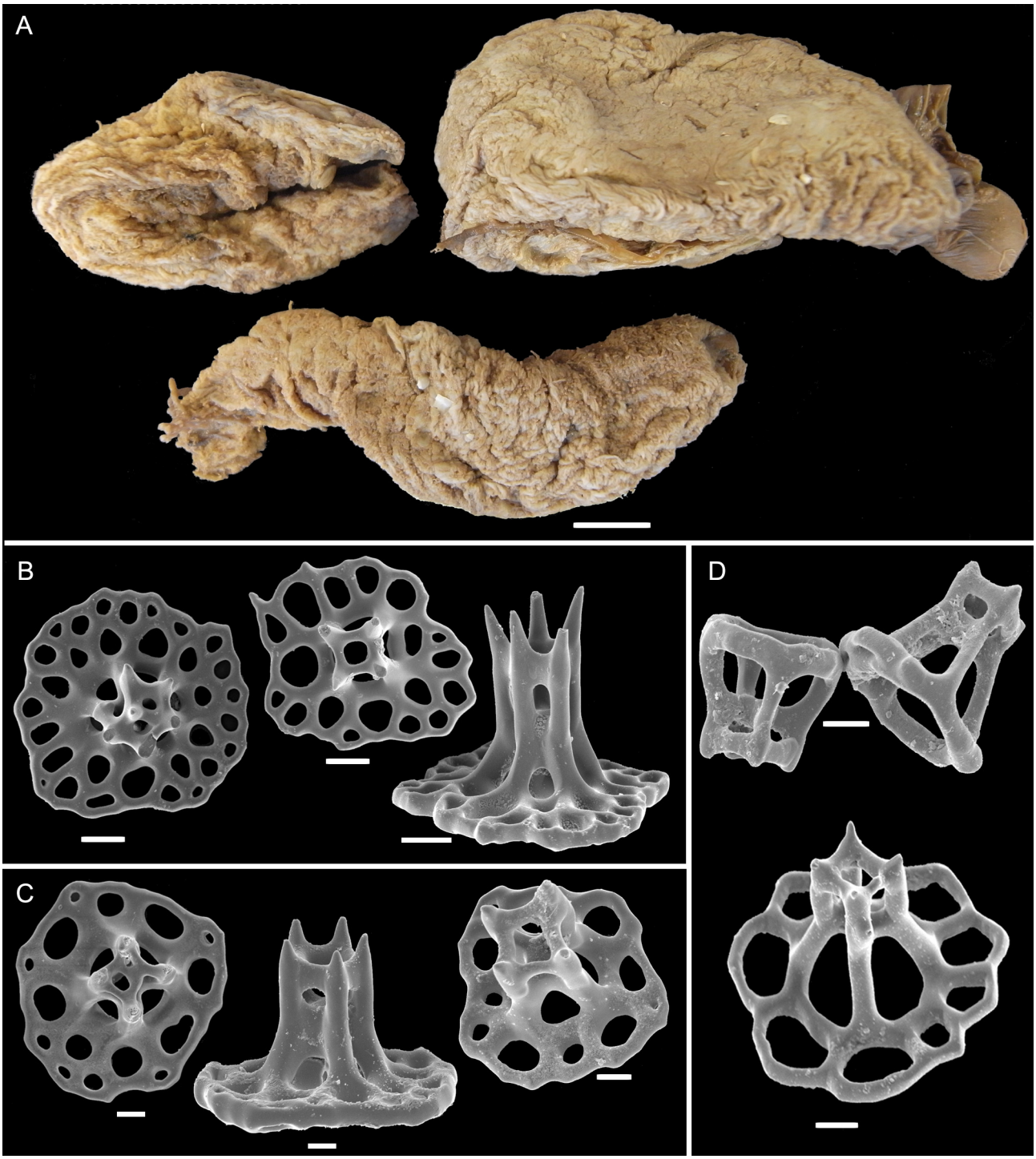


FIGURE 11. *Mesothuria oktaknemus* Sluiter, 1901. **A**: External views of specimens IE-2007-804. **B–D**: SEM photos od ossicles from dorsal body wall (B), ventral body wall (C) and ventral tube feet (D). Scale bars: A = 1cm; B = 20µm; C,D = 10µm.

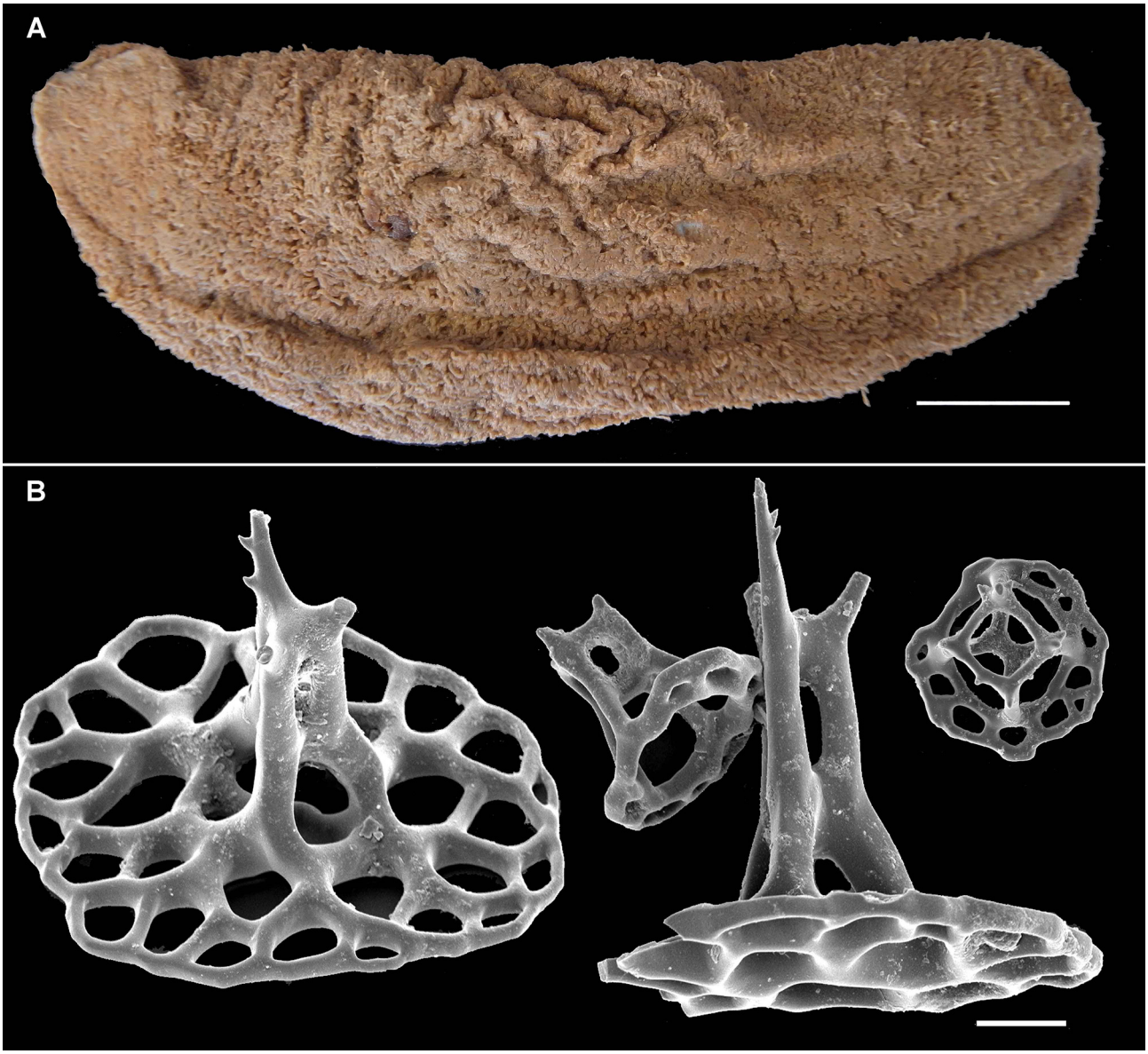


FIGURE 12. *Mesothuria regularia* Heding, 1940. **A**: Dorsal view of specimen IE-2007-794; **B**: SEM photos of ossicles from the body wall. Scale bars: A = 1cm; B = 20µm.

Mesothuria parva **(Théel, 1886)**

(Fig. 13 A–B)

Holothuria murrayi var. *parva* Théel, 1886: 186, pl. 9, fig. 2, pl 16, figs 4 & 5
Mesothuria parva; Cherbonnier & Féral, 1981 (records); Thandar 1992: 161, figs 1 & 6A
Mesothuria deani Mitsikuri, 1912: 40–42, textfig. 9

Material examined. *Non-type material*: **IE-2007-813** (3 specimens, sampled in front of Nazendry Bay); **IE-2007-775** (3 specimens, collected in front of Nazendry Bay)

Remarks. This well-known species is a new record for Madagascar. The closest previous record is from Sodwana Bay in South Africa (Thandar, 1992).

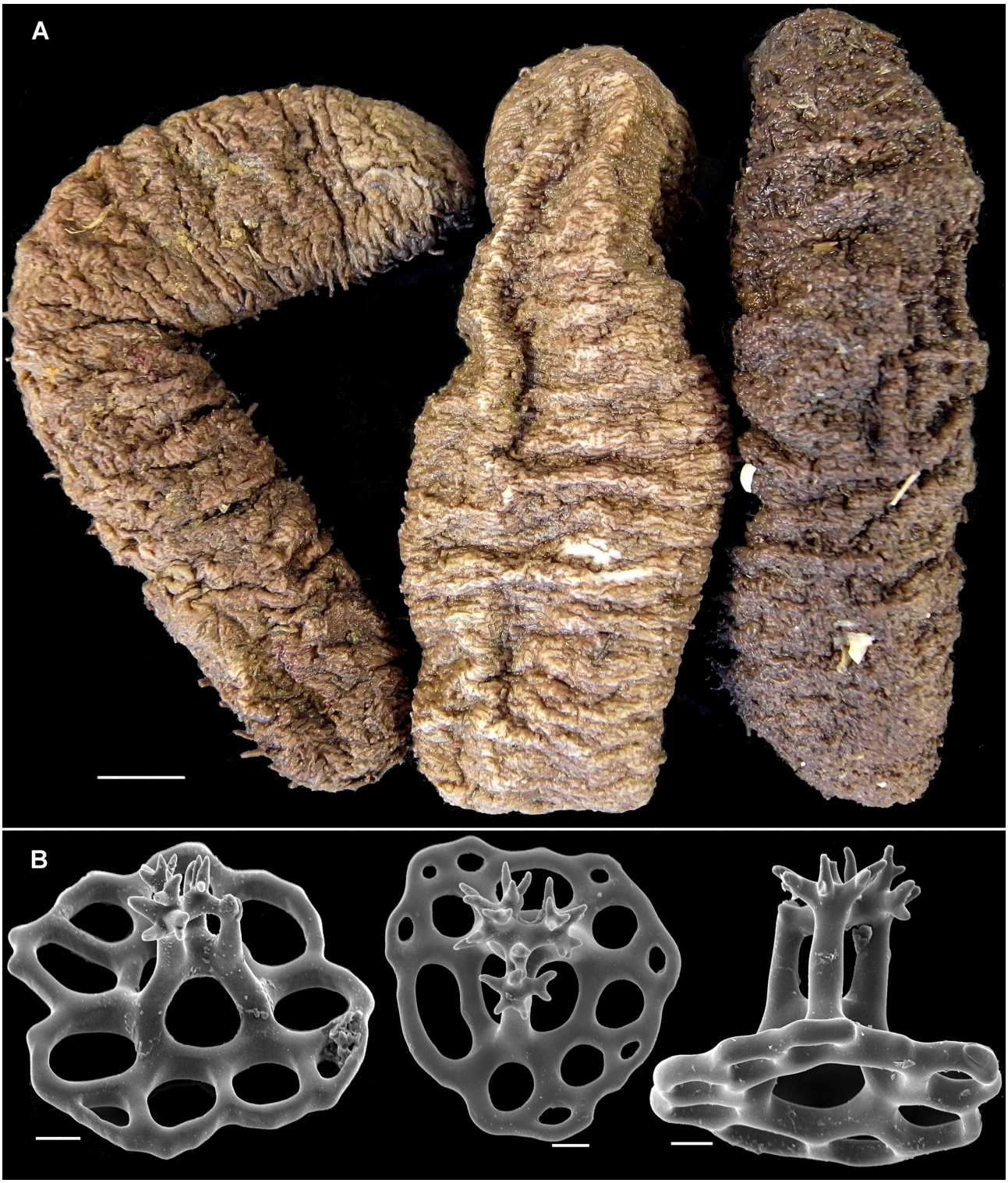


FIGURE 13 *Mesothuria parva* (Théel, 1886). A: Dorsal views of specimens IE-2007-813**; B**: SEM photos of ossicles from the body wall. Scale bars: A = 1cm; B = 10μm.

Genus *Zygothuria* Perrier, 1898

Zygothuria marginata (Sluiter, 1901)

(Fig. 14 A–C)

Mesothuria marginata Sluiter, 1901: 26, pl 8, fig. 4; Liao, 1997: 75, fig. 40.

Mesothuria (Monothuria) marginata; Heding, 1940: 341, textfig. 8.
Zygothuria marginata; Perrier 1902: 331; Gebruk *et al.* 2012: 326, fig. 18.

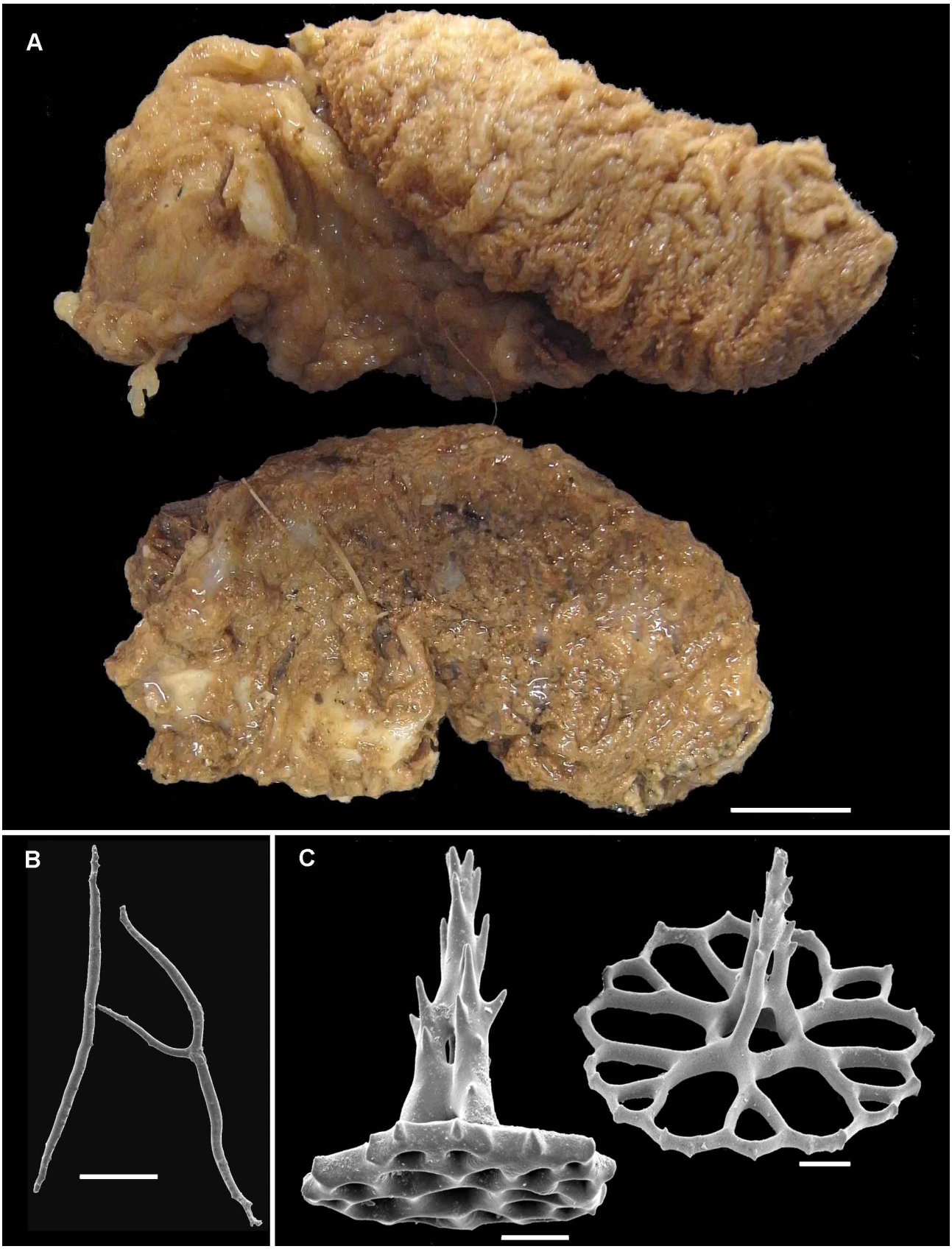


FIGURE 14. *Zygothuria marginata* (Sluiter, 1901)**. A**: External views of specimens IE-2007-778(2); **B–C**: SEM photos of ossicles from tentacles (B) and body wall (C). Scale bars: A = 1cm; B = 100µm; C = 20µm.

Material examined. *Non-type material*: **IE-2007-778(2)** (2 specimens, sampled in front of Majumga); **IE-2007-783** (1 specimen, sampled in front of Majumga).

Remarks. This record is the first for the Indian Ocean.

Family Synallactidae Ludwig, 1894

Genus *Amphigymnas* Walsh, 1891

Amphigymnas woodmasoni (Walsh, 1891)

(Fig. 15 A–B)

Pannychia Wood-Masoni Walsh, 1891: 198–199.
Synallactes Wood-Masoni; Koehler & Vaney, 1905: 14–16, pl 9, figs 26–30.
Amphigymnas multipes Walsh, 1891: 199.
Synallactes reticulatus Sluiter, 1901: 46–48, pl.3, figs 1–2, pl. 8, fig 9.

Material examined. *Non-type material*: **IE-2007-798** (1 specimen, sampled in front of Mahajambe Bay).

Remarks. In the Indian Ocean this species was hitherto known only from the Andaman Sea. This new record for Madagascar thus is a considerable range extension.

Genus *Bathyplotes* Östergren, 1896

Bathyplotes natans (Sars, 1868)

(Fig. 16 A–D)

Holothuria natans Sars, 1868: 20.
Bathyplotes natans; Rowe & Gates, 1995: 328 (synonymy); Pawson *et al*., 2009: 1202.

Material examined. *Non-type material*: **IE-2007-772** (1 specimen, collected between Majunga and Cape Saint André)

Remarks. C-shaped rods have been reported from the body wall of several *Bathyplotes* species. As already noted by Östergren (1896), C-shaped ossicles are absent in the body wall of *B. natans*; they are however present in the cloacal wall and in the longitudinal muscles, the latter being a new observation (fig. 12D).

This record is however the first for the Indian Ocean.

Bathyplotes aymeric VandenSpiegel sp. nov.

(Fig. 17 A–E)

Materiel examined. *Type material:* **IE-2007-785** (holotype, collected in front of Mahajamba Bay); **IE 2007-769** (1 paratype, collected between Majunga and Cape Saint-André).

Type locality. Madagascar, between Majunga and Cape Saint-André, Station CP3273 (Decimal coordinates: -15.5; 46.06); in front of Mahajamba Bay, Station CP3281 (Decimal coordinates: -14.97; 46.95)

Etymology. This species with elegant ossicles is named after Aymeric VandenSpiegel, son of Joelle Dellis and Didier VandenSpiegel, in recognition of his patience when his dad is 'cleaning sea cucumber skeletons at home.

Known geographic description. For now only known from the type locality.

Taxonomic description (holotype and paratype). *External anatomy*—Holotype 12 mm long and 6 mm wide (fig. 17A). Paratype 19 mm long and 9 mm wide. Body with rounded extremities. Bivium somewhat rounded and trivium flattened in holotype, undeterminable in paratype. Body wall gritty to the touch. Bivium with some scattered papillae and laterally with a row of papillae. Trivium seemingly devoid of appendages. Anus terminal. Mouth ventral, tentacles could not be observed. Color in alcohol uniform brown.

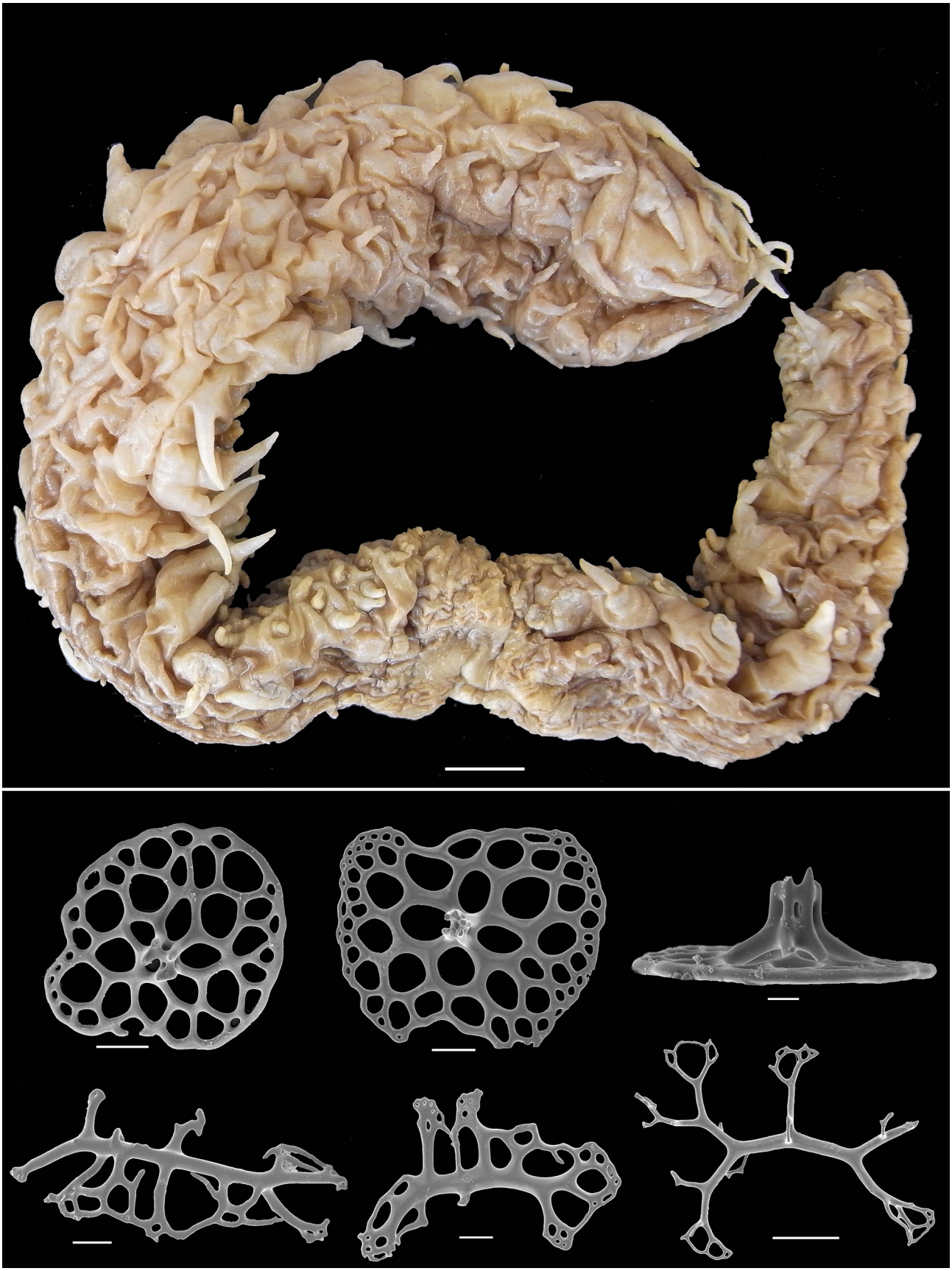


FIGURE 15. *Amphigymnas woodmasoni* (Walsh, 1891). **A**: dorsal view of specimen IE-2007-798, **B**: SEM view of ossicles from the body wall. Scale bars: A = 1cm; B = 50μm.

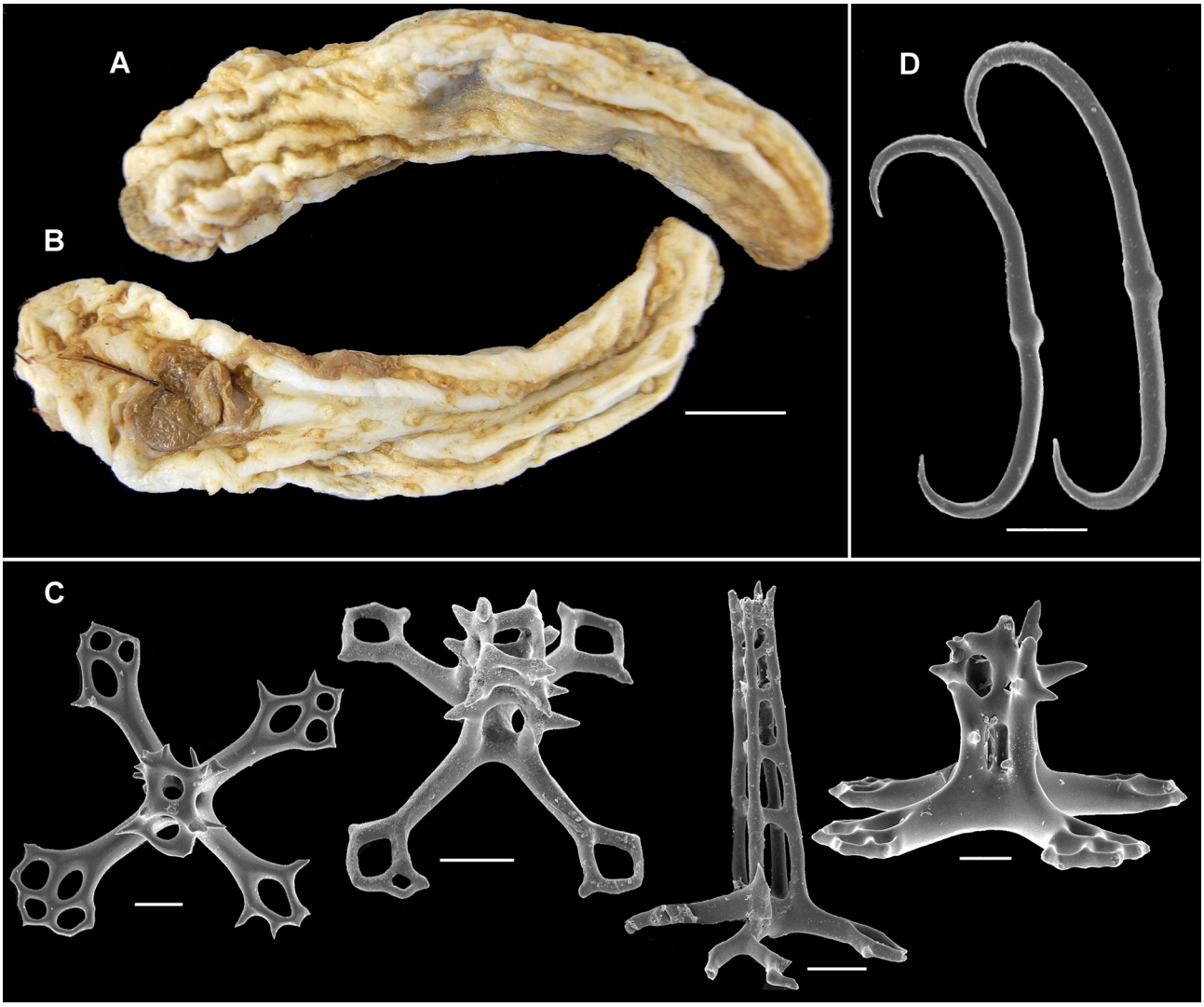


FIGURE 16. *Bathyplotes natans* (Sars, 1868). **A–B**: Dorsal (A) and ventral (B) views of specimen IE-2007-772. **C–D**: SEM photos of ossicles from the body wall (C), the longitudinal muscles and cloaca (D). Scale bars: A,B = 1cm; C = 20µm; D = 10µm.

Internal anatomy—calcareous ring with radial plate twice as long as wide, with anterior and posterior invagination; interradial pieces wider than radial ones, with anteriorly a long and fine tooth and with a straight posterior margin. Stone canal, Polian vesicle and gonad not observed. Respiratory trees very fine, nearly transparent, reaching nearly the anterior end. Longitudinal muscles very narrow, flat, undivided and marginally attached.

Ossicles—Dorsal and ventral body wall with similar numerous tables with a cross-shaped disc surmounted by a long spire (50 to 90 µm long) and a few tables with a more or less circular disc and a reduced spire (fig.17B). Cross-shaped disc 180–204 µm across, 2 to 5 racket-shaped arms perforated at their extremities; four, rarely 5 pillars united by up to 6 cross beam ending in a moderately spiny crown (fig. 17B,C). Dorsal papillae with perforated plates (120 to 180µm long), and tables similar to those of body wall. Lateral papillae with curved rods, plates and tables (fig. 17D); tables generally similar to the ones observed in the body wall but some with a higher spire (140µm high) and seven cross beam. Longitudinal muscles with spiny rods up to 237µm long (fig. 17E).

Remarks. The undivided longitudinal muscles and the predominantly four-pillared tables leave no doubt that this species belongs to the *Bathyplotes.* The long spires with numerous crossbeams resemble those in *B. cinctus* Koehler & Vaney, 1910. However, the latter species always has tables with four arms whereas in *H. aymeric* there can be up to 5 arms. Moreover, *B. cinctus* presents C-shaped ossicles whereas *H. aymeric* does not. Lot IE 2007-769 contained two specimens; one is however not a holothuroid.

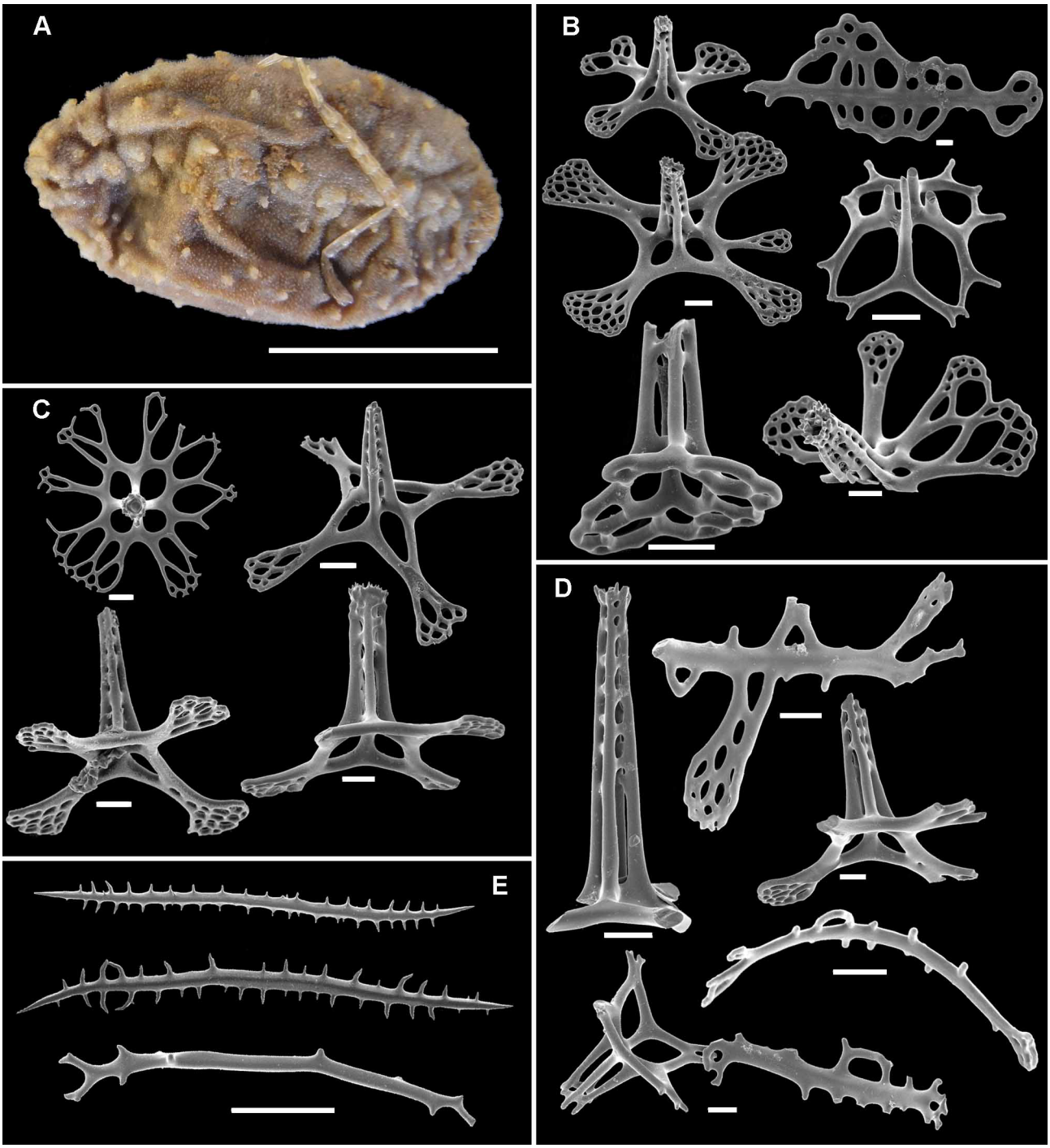


FIGURE 17. *Bathyplotes aymeric* **sp. nov. A**: Dorsal view of holotype; **B–E**: SEM photos of ossicles from ventral body wall (B), dorsal body wall (C), lateral papillae (D) and longitudinal muscles (E). Scale bars: A = 1cm; C–D = 20µm; E = 50µm.

Genus *Kareniella* Heding, 1940

Kareniella gracilis Heding, 1940

(Fig. 18 A–C)

Kareniella gracilis Heding, 1940: 349, textfig. 14; Cherbonnier & Féral, 1981: 381, fig.15 A–J.
Bathyplotes punctatus (Sluiter, 1901): Rowe, 1989: 282.

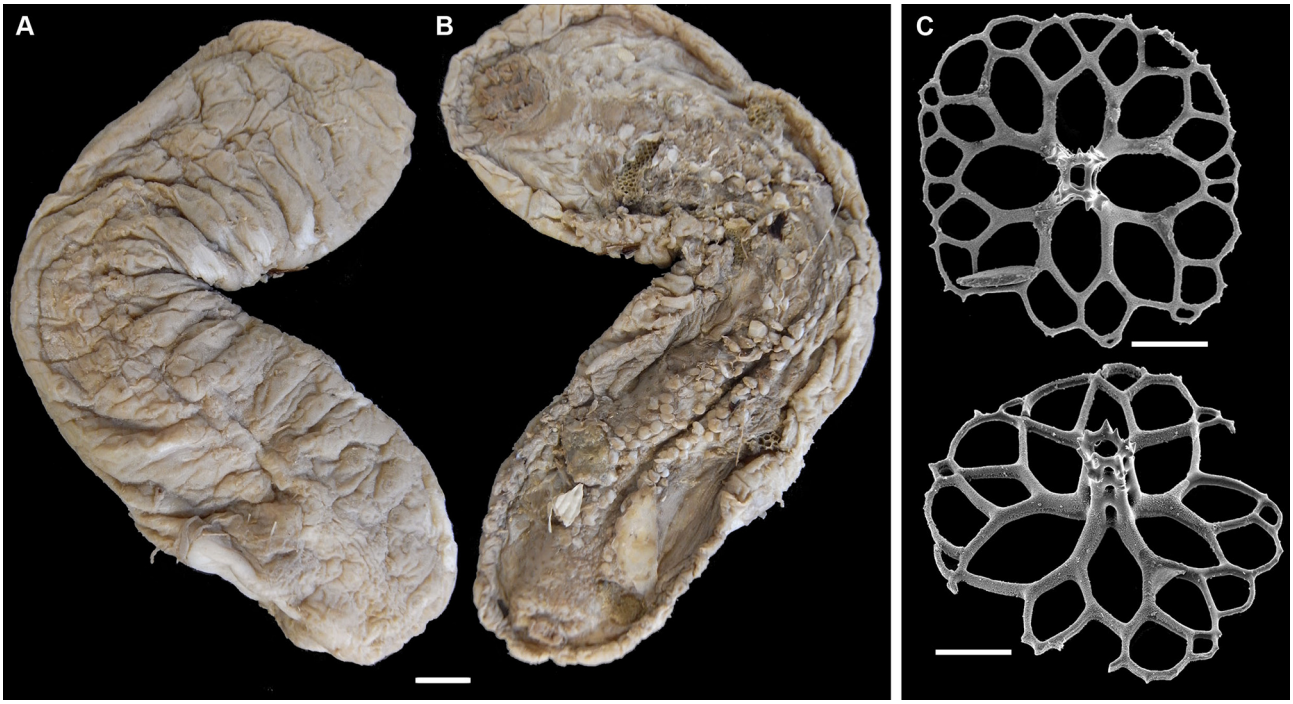


FIGURE 18. *Kareniella gracilis* Heding, 1940. **A–B**: Dorsal (A) and ventral (B) views of specimen IE-2007-803; **C**: SEM photos of ossicles from the body wall. Scale bars: A, B = 1cm; C = 50µm.

Material examined. *Non-type material*: **IE-2007-803** (1 specimen, collected between Nosy Bé and Band du Leven)

Remarks. Heding (1940) erected *Kareniella* for synallactids that are distinctly flattened, have four-pillared tables and have non-retractile tube feet in the median ventral radial area (fig. 14A–C). Rowe (1989: 282) considered *K. gracilis* to be the junior synonym of *Bathyherpystikes punctatus* Sluiter, 1901. We do not agree with this decision as the presence of well-developed medio-ventral tube feet clearly makes *K. gracilis* a distinctive species to be classified in its own genus. Such was also the conclusion of Cherbonnier & Féral (1981) who had examined some of the type material of *K. gracilis*.

We however do agree with Rowe (1989) in classifying *Bathyherpystikes punctatus* in the genus *Bathyplotes.*

The present record is the first for the Indian Ocean.

Genus *Pseudostichopus* Théel, 1886

Pseudostichopus hyalegerus Sluiter, 1901

(Fig. 19)

Meseres hyalegerus Sluiter, 1901: 12.

Pseudostichopus hyalegerus (Sluiter, 1901): O'Loughlin & Ahearn, 2005: 170, 10a, 12n–p (synonymy and records before 2005).

Material examined. *Non-type material*: **IE-2007-793** (4 specimens, dredged between Nosy-Bé and Banc du Leven); **IE-2007-796** (2 specimens, dredged between Nosy-Bé and Banc du Leven); **IE-2007-799** (3 specimens, dredged between Nosy-Bé and Banc du Leven); **IE-2007-800** (1 specimen, dredged between Nosy-Bé and Banc du Leven); **IE-2007-802** (18[2] specimens, dredged between Nosy-Bé and Banc du Leven); **IE-2007-805** (1 specimen, dredged in front of Nazendry Bay); **IE-2007-807** (4 specimens, dredged between Nosy-Bé and Banc du Leven).

Remarks. This species is characterized by having the body wall lacking ossicles, but covered by molluscs, sponge ossicles and foraminiferans (fig. 18).

2. One of the specimens was destructed for SEM imaging.

To date, *Pseudostichopus hyalegerus* was known only from Japan, Eastern Australia and Indonesia (O'Loughlin, 2002; O'Loughlin & Ahearn, 2005), this record extends its range into the Indian Ocean.

FIGURE 19. *Pseudostichopus hyalegerus* Sluiter, 1901. Scale bar = 1cm.

***Pseudostichopus mollis* Théel, 1886**

(Fig. 20A–B)

Pseudostichopus mollis Théel, 1886: 169–170, pl. 10 figs 5, 6; O'Loughlin & Ahearn, 2005: 171, figs 1b, c, 9a, e, 10b, c, 11e, f (synonymy and records before 2005).

Material examined. *Non-type material*: **IE-2007-778 (3)** (6 specimens, sampled in front of Majumga).

FIGURE 20. *Pseudostichopus mollis* Théel, 1886. A: different view of specimens, B: ossicles from tentacles Scale bar: A = 1cm, B = 20µm.

Remarks. The species in the genus *Pseudostichopus* are notoriously difficult to identify because they are characterized by lacking ossicles in the body wall. From the region, three species have been documented: *P. echinatus* Thandar, 1992 characterized by having very irregular knobbed rod ossicles in the tentacles; *Pseudostichopus hyalegerus* (Sluiter, 1901) (see above) and *P. langeae* Thandar, 2006, characterized by having branched rods in the gonad. *P. mollis* had already been reported from the Southern Indian Ocean, off Marion Island (O'loughlin & Ahearn 2005). The six specimens of *P. mollis* observed were eviscerated but pieces of gonads were found in two specimens; no ossicles was observed in the gonads but spiny rods (60–240µm long), occasionally branched and with some perforations, were found in the tentacles (Fig.20B)

Order Dactylochirotida Pawson & Fell, 1865

Family Ypsilothuriidae Heding, 1942

Genus *Ypsilothuria* E. Perrier, 1886

Ypsilothuria cf. *bitentaculata* (Ludwig, 1893)

(Fig. 21 A–C)

Sphaeroturia bitentaculata Ludwig, 1893: 184; 1894: 141, pl. 12, figs 16–17, pl. 14, figs 5–14.
Ypsilothuria bitentaculata attenuata Perrier 1886: Massin, 1996: 44, figs 1 & 2.
Ypsilothuria bitentaculata: Massin & Hendrix, 2011: 422, fig. 7 (synonymy and records before 2011)

Material examined. *Non-type material*: **IE-2007-757** (1 specimen, sampled between Majunga and Cape Saint André); **IE-2007-758** (1 specimen, sampled between Majunga and Cape Saint André); **IE-2007-762** (1 specimen, sampled in front of Nazendry Bay); **IE-2007-765** (2 specimens, sampled in front of Majunga); **IE-2007-784** (1 specimen, sampled between Majunga and Cape Saint André); **IE-2007-786** (1 specimen, sampled in front of Nazendry Bay); **IE-2007-789** (1 specimen, sampled in front of Majumga); **IE-2007-780** (5 specimens, sampled in front of Nazendry Bay); IE-2007-792 (2 specimens, sampled between Majunga and Cape Saint André); **IE-2007-795** (1 specimen, sampled between Majunga and Cape Saint André); **IE-2007-797** (2 specimens, sampled between Majunga and Cape Saint André); **IE-2007-811** (3 specimens, sampled in front of Mahajamba Bay); **IE-2007-815** (1 specimen, sampled between Majunga and Cape Saint André); **IE-2007-821** (2 specimens, sampled in front of Nazendry Bay).

Remarks. *Ypsilothuria* is thought to contain only two species: *Y. talismani* Heding, 1942, which is soft bodied, and *Y. bitentaculata* (Ludwig, 1893) which is 'hard as a little echinoid' according to Heding (1942). The specimens here under study clearly also have the 'hard' aspect of *Y. bitentaculata* (fig. 21A,B). Heding (1942) recognized two subspecies in the latter species: the cosmopolitan *Y. bitentaculata attenuata* R. Perrier, 1886 and the North Atlantic Y. *bitentaculata virginiensis* Heding, 1942. For Y. *bitentaculata attenuata*, Heding (1942) states that it is closely related to the *bitentaculata* from the Indo-Pacific which he described earlier (Ludwig & Heding, 1935; see also Heding, 1942: textfig 27, 2) based on material collected in the Zanzibar Channel. Our specimens fit well with those descriptions because their body wall thecal plates vary in length between 1500–3000 mm (fig. 21C). This is also more or less in agreement with the measurements (scales can exceed 2 mm in length) that Cherbonnier & Féral (1981) provide. On the other hand our specimens differ from other descriptions of *Y. bitentaculata* from the Indo-Pacific in that their thecal plates are more than twice as long (e.g. Pawson, 1965 reports on an average length of 1200 mm; Thandar (1999) gives a range between 900 and 1270 mm) or from the Mediterranean (Massin, 1996; mean length of plates 1000 mm), in that they often carry two spires, and in that these spires are, with a length up to 1100 mm, considerably higher then those reported by Ludwig (1894) (500–580 mm high), Pawson (1965) (500 mm high), Thandar (1999) (500 mm high), Cherbonnier and Féral (1981) (100 mm high) and Massin (1996) (400–500 mm high).

Given these differences we were tempted to erect a new species for our material. We however refrained from doing so until the material collected earlier in the Zanzibar Channel could also be studied.

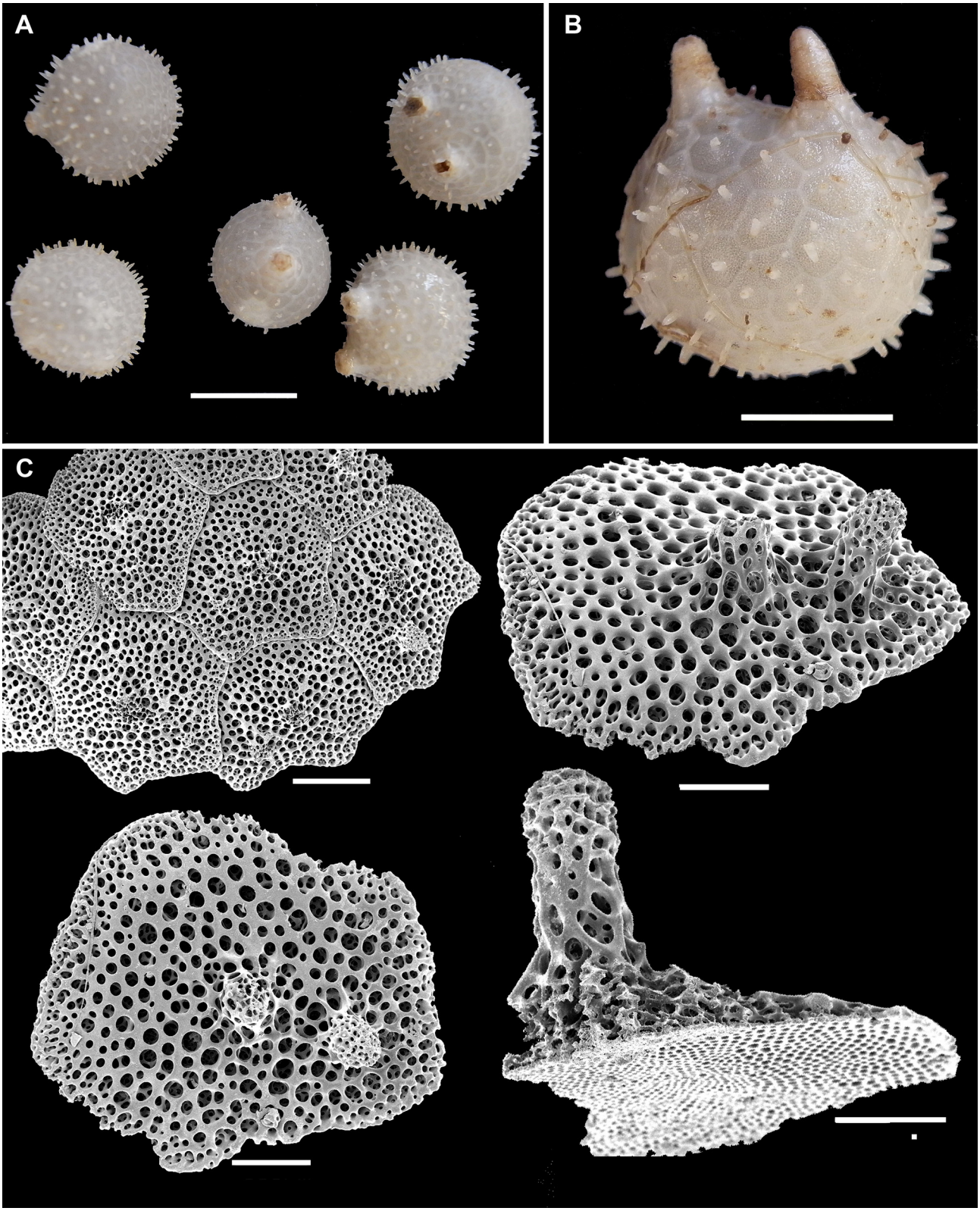


FIGURE 21. *Ypsilothuria* cf. *bitentaculata* (Ludwig, 1893). **A**: different view of specimens IE-2007-780, **B**: lateral view of specimen IE-2007-765, C: SEM view of body wall thecal plates. Scale bares: A&B = 1cm, C = 500µm.

Order Dendrochirotida Grube, 1840

Family Cucumariidae Ludwig, 1894

Genus *Panningia* Cherbonnier, 1958

***Panningia trispicula* Thandar 2008**
(Fig. 22 A–C)

Panningia trispicula Thandar, 2008: 29, fig. 11.

Material examined. *Non-type material*: **IE-2007-773** (1 specimen, sampled between Majunga and Cape Saint André); **IE-2007-761** (1 specimen sampled in front of Majumga); **IE-2007-819** (1 specimen, sampled in front of Nazendry Bay).

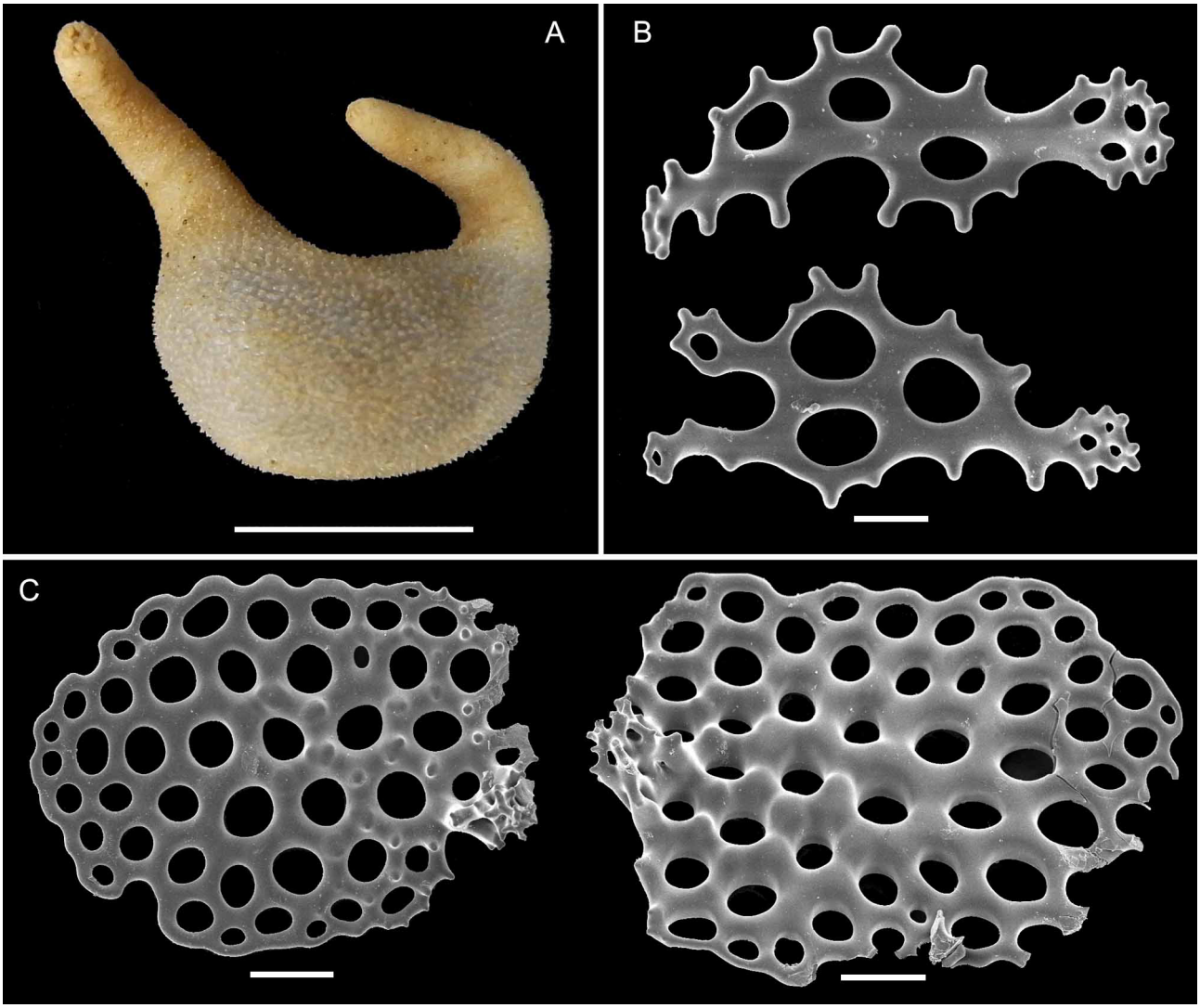


FIGURE 22. *Panningia trispicula* Thandar 2008. **A**: lateral view of specimen IE-2007-761, **B–C**: SEM view of ossicles from tentacles (B) and body wall (C). Scale bares: A = 1cm, B = 20µm; C = 100µm.

Remarks. The three specimens before us, 100 mm long and 12.5 mm wide with maximum circumpherence of 53 mm, 52 mm long and 7.5 mm wide with maximum circumspherence of 36 mm and 12 mm long and 2 mm wide with maximum circumspherence of 3 mm most possibly are *Panningia trispicula* Thandar, 2008 which was hitherto known only from the holotype and the paratype that were sampled off Mossel Bay (34°10' S, 23° 32' E), at

97 m depth. Some differences between our largest specimens and the types are apparent: the largest plates of our largest specimens range from 0.7 to 1.1 mm in length and 0.5 to 0.7 mm in width, whereas those of the types are 0.28 to 0.445 mm long. Also the deposits in the tentacles of the types are less complex than those in our largest specimens.

Genus Pentacta Goldfuss, 1820

Pentacta doliolum (Pallas, 1766)

(Fig. 23 A–C)

Actinia doliolum Pallas, 1766: 152, pl. ii, figs 10–12.
Pentacta doliolum; Cherbonnier, 1952: 490, pl. 43, figs 1–15 (synonymy); Thandar, 1991: 122, figs. 1b, 7, 14c (synonymy and records before 1991)
Pentacta tesselara; Samyn *et al.* 2006: 116 fig. 83 A–H (non *P. tesselara* Cherbonnier, 1970)

Material examined. *Non-type material*: **IE-2007-809** (1 specimen, sampled in front of Nazendry Bay)

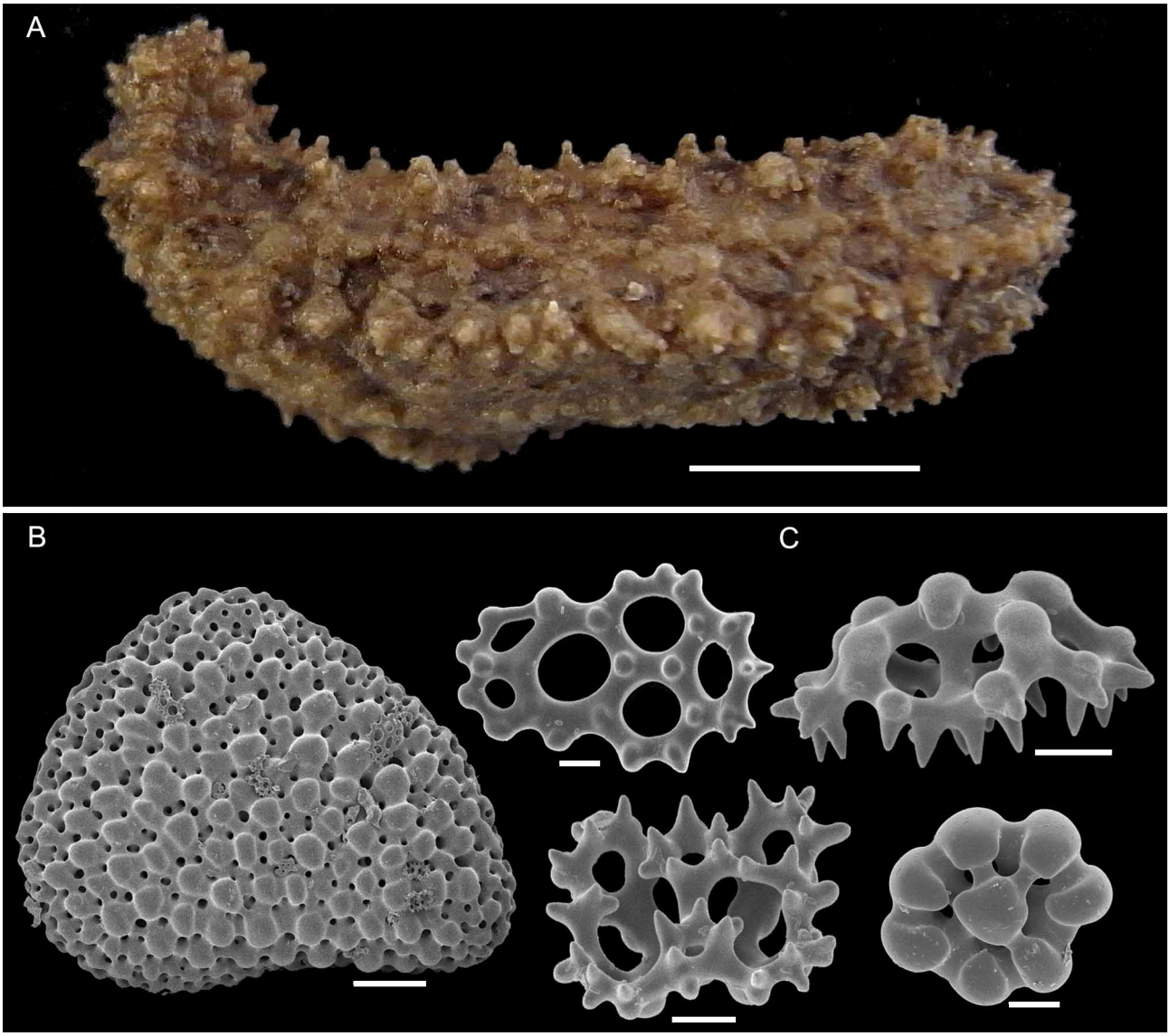


FIGURE 23 *Pentacta doliolum* (Pallas, 1766). **A**: Lateral view of specimen IE-2007-809; **B**: SEM photos of ossicles from the body wall. Scale bars: A = 1cm; B = 100µm; C = 10µm.

Remarks. Thandar (1991; 2006) questioned whether this species is present in East Africa. The present record confirms it is present in the Indian Ocean. Moreover, the specimen studied matches well with material from the nearby Comoros Islands of the same species which, we had previously erroneously identified as *P. tesselara* Cherbonnier, 1970 (Samyn *et al*., 2006)

Pentacta tesselara **Cherbonnier, 1970**
(Fig. 24 A–D)

Pentacta tesselara Cherbonnier, 1970: 282, fig. 2 A–O; Thandar, 1991: 123, fig. 8 A–J; Samyn, 2003: 125 (distribution)
Colochirus minutus; Macnae & Kalk, 1958: 130 (non Ludwig, 1875)
Plesiocolochirus tesselara; Thandar, 2006: 30, fig. 10

Material examined. *Non-type material*: **IE-2007-814** (3 specimens, sampled in Mahajamba Bay)

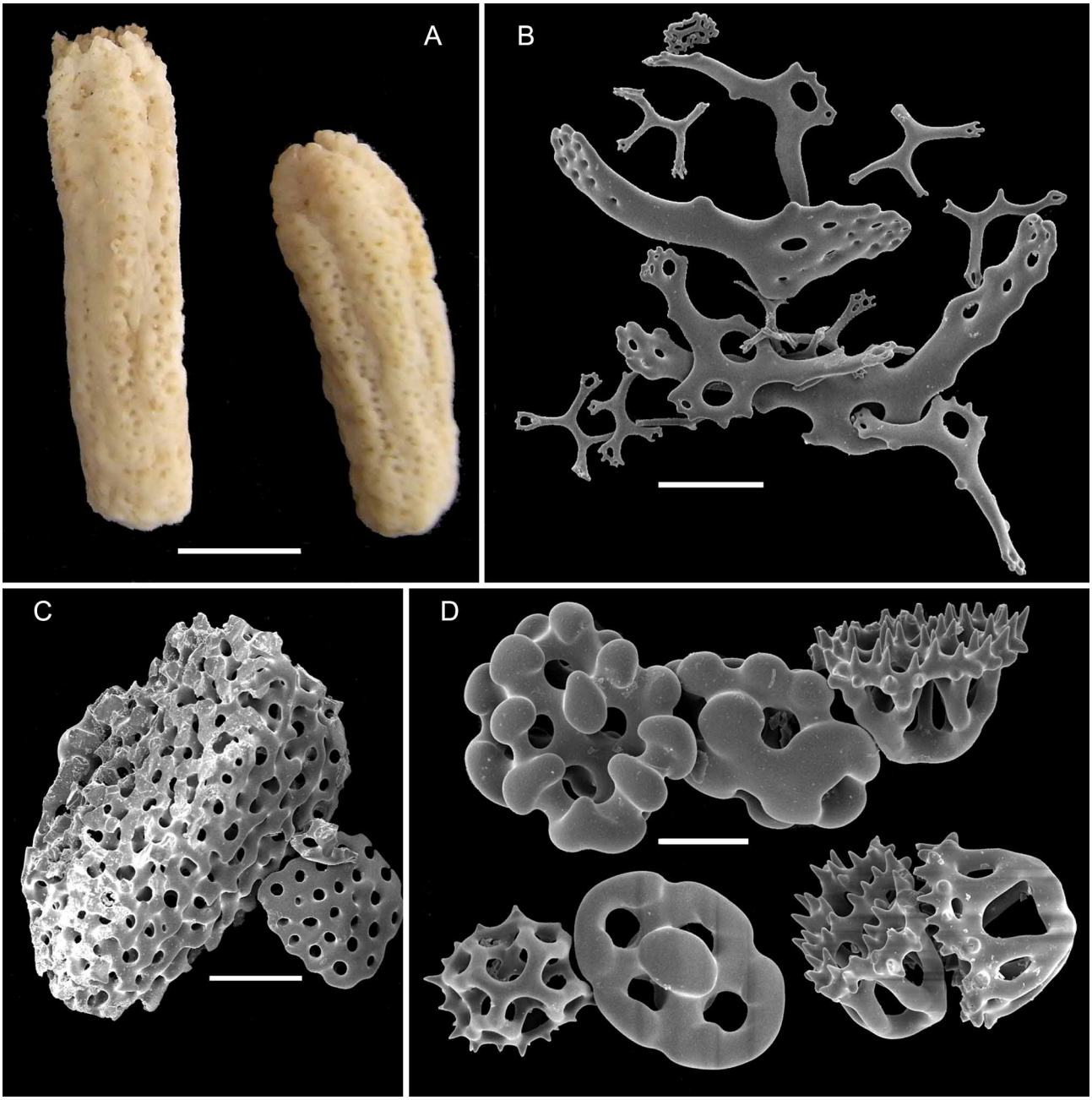


FIGURE 24. *Pentacta tesselara* Cherbonnier, 1970. **A**: External view of specimen IE-2007-814; **B–D**: SEM photos of ossicles from the tentacles (B) and dorsal body wall (C, D). Scale bars: A = 1cm;B = 50µm; C = 100µm; D = 20µm.

Remarks. Hitherto this species was known from only from the shallow-waters of southern Mozambique (Macnae & Kalk, 1958) and the East coast of South Africa (Cherbonnier, 1970, Thandar, 1991, 2006). The present records, sampled at 257 m depth in the Northern Mozambique Channel are thus considerable latitudinal and bathymetric range extensions.

Family Phyllophoridae Östergren, 1907

Genus *Ekmanothyone* Massin, 1993

Ekmanothyone incurva (Cherbonnier, 1988)

(Fig. 25 A–D)

Parathyone incurva Cherbonnier, 1988: 206, fig 89
Parathyone incurvata; Massin, 1993: 257 (*lapsus calami*)
Ekmathyone incurvata; Massin, 1993: 257 (*lapsus calami*)

FIGURE 25. *Ekmanothyone incurva* (Cherbonnier, 1988). **A**: Lateral view of specimens IE-2007-787; **B–C**: SEM photos of ossicles from tentacles (B), dorsal body wall (C) and tube feet (D). Scale bars: A = 1cm; B= 20µm; C, D = 10µm.

Material examined. *Non-type material*: **IE-2007-774** (3 specimens, sampled North of Cape Saint André); **IE-2007-776** (10 specimens, sampled in South of Cape Saint Sébastien); **IE-2007-787** (7 specimens, sampled in front of Nazendry Bay); **IE-2007-788** (1 specimen, sampled between Majunga and Cape Saint André).

Remarks. Massin (1993) noted that *Parathyone* Cherbonnier, 1988, is preoccupied and proposed *Ekmanothyone* Massin, 1993 as replacement name.

The specimens before us match perfectly with Cherbonnier's (1988) description of *P. incurva,* and come from roughly the same area (Banc de Pracel) and depths (65m).

Family Sclerodactylidae Panning, 1949

Genus *Sclerodactyla* Ayers, 1851

Sclerodactyla multipes (Théel, 1886)

(Fig. 26 A–C)

Cucumaria multipes Théel, 1886: 72, pl. 4, fig. 4.
Sclerodactyla multipes; Panning 1949: 459; Liao, 1997: 177 (records before 1997)

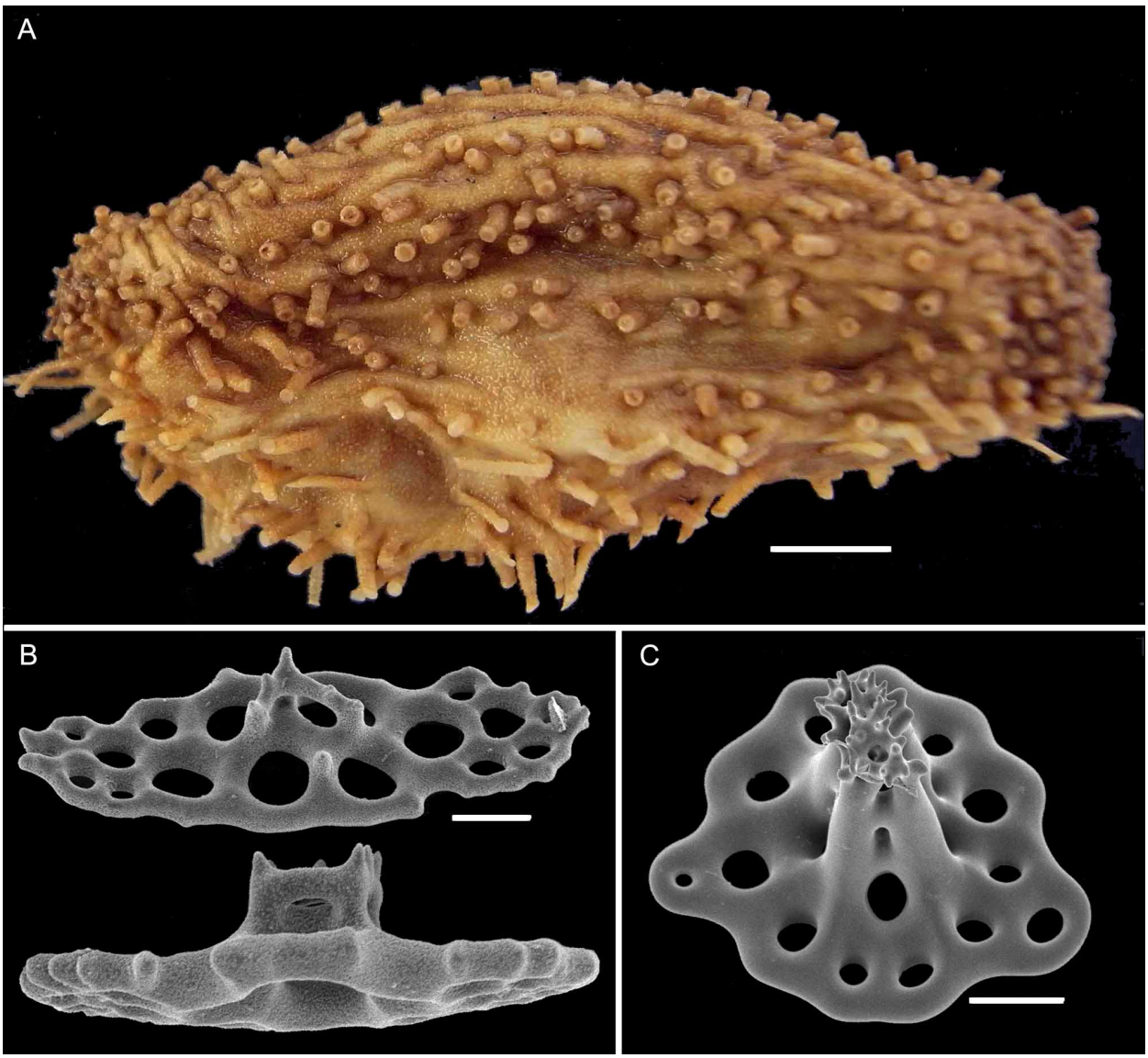


FIGURE 26. *Sclerodactyla multipes* (Théel, 1868). **A**: Lateral view of specimen IE-2007-767; **B–C**: SEM photos of ossicles from introvert (B) and dorsal body wall (C). Scale bars: A = 1cm; B = 20µm; C = 50µm.

Material examined. *Non-type material*: **IE-2007-763** (1 specimen sampled between Majunga and Cape Saint André); **IE-2007-767** (1 specimen sampled between Majunga and Cape Saint André);

Remarks. According to Panning (1949) *Sclerodactyla* holds three species: *S. briareus* (Lesueur, 1824), *S. multipes* (Théel, 1886) and *S. longipeda* (Semper, 1868). It is puzzling that Heding & Paning (1954) transferred *S. longipeda* (Semper, 1868), with its 10 tentacles according to the original description, to *Phyllophourus (Phyllophorella)* Heding & Panning, 1954, which has 20 (15+5) tentacles.

Family Psolidae R. Perrier, 1902

Genus *Psolidium* Ludwig, 1887

***Psolidium acorbulum* Thandar, 2006**
(Fig 27 A–D)

Psolidium acorbulum Thandar, 2006: 38, fig. 13.

Material examined. *Non-type material*: **IE-2007-808** (1 broken specimen; sampled in front of Nazendry Bay)

Remarks. This species was previously known only from the type material that was collected on the South East coast of South Africa between 710–775m. The depth of collection of the studied specimen is unknown (marked as 'croché' or meaning attached in the cruise report and as 0 m on the label). However the coordinates of station DW3239 correspond exactly to those of stationCP3293: 268–408 m. This record thus extends the bathymetric distribution of *P. acorbulum.*

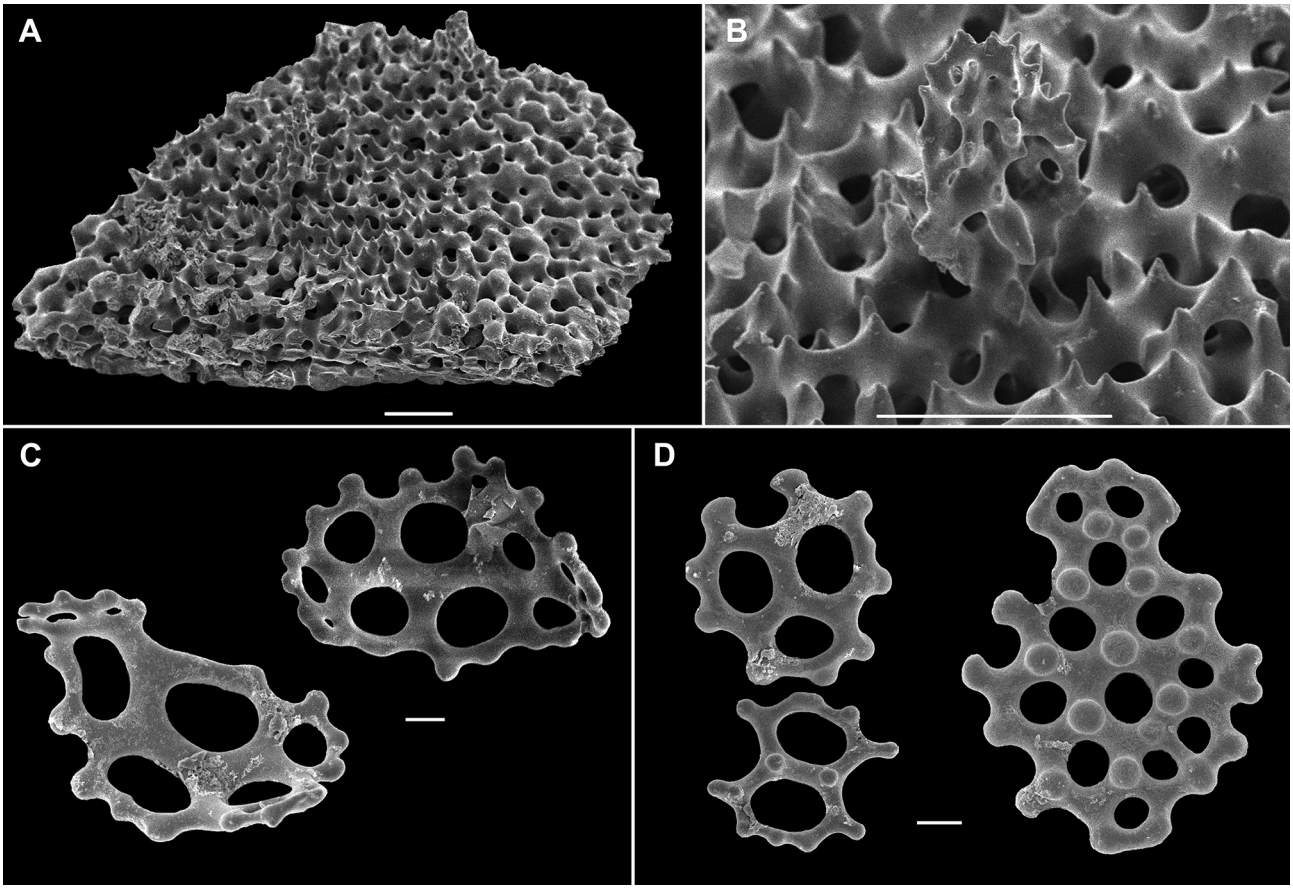


FIGURE 27. *Psolidium acorbulum* Thandar, 2006. **A–D**: SEM photos of ossicles from dorsal body wall (A–C) and ventral body wall (D). Scale bars: A, B = 100µm; C = 10µm; D = 20µm.

Genus *Psolus* Oken, 1815

***Psolus agulhasicus* Ludwig & Heding, 1935**
(Fig. 28 A–C)

Psolus agulhasicus Ludwig & Heding, 1935: 160, textfigs 25 (1&2), 26 (1&2), 27 (1&2); Deichmann, 1948: 362, pl. 21, figs 11 & 12 (synonymy).

Material examined. *Non-type material:* **IE-2007-771** (22 specimens[3], sampled West of Ambre Cape); **IE-2007-770** (1 specimen, sampled West of Cape Ambre).

Remarks. Previously known only from off Aghulhas and off Cape Good Hope, South Africa. The present records extends the distribution of *P. agulhasicus* considerably to the north. Previous records were taken at depths varying from ±140 m to ±1365 m; our samples were taken at depths of 653 m and 930 m.

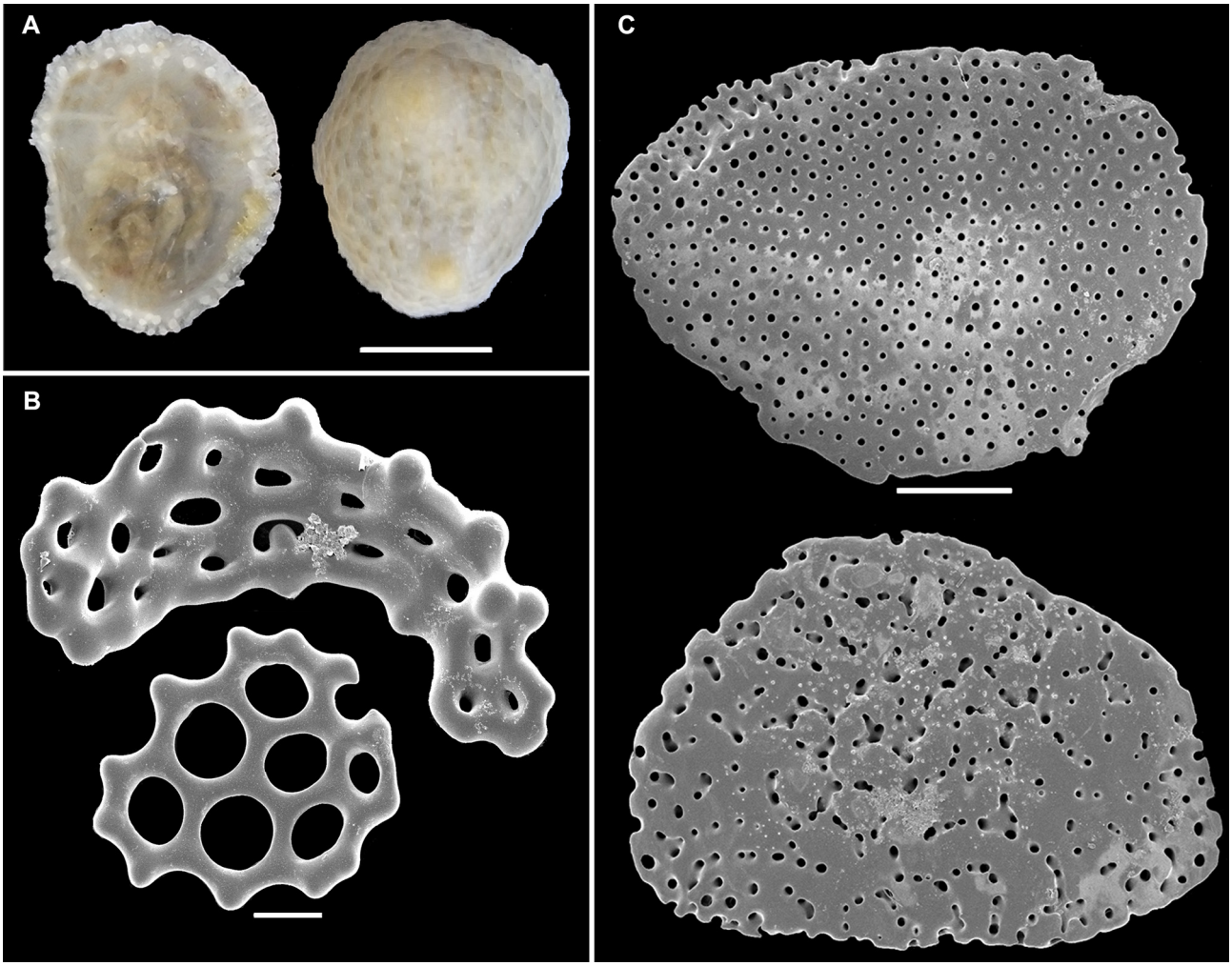


FIGURE 28. *Psolus agulhasicus* Ludwig & Heding, 1935. **A**: Ventral and dorsal views of one specimen from IE-2007-771. **B–C**: SEM photos of ossicles from the body wall. Scale bars: A = 1cm; B = 20µm; C = 200µm.

Order Elasipodida Théel, 1882

Family Deimatidae Ekman, 1926

3. Two were used for SEM.

Genus *Orphnurgus* Théel, 1879

***Orphnurgus natalasper* Thandar 1992**
(Fig. 29 A–E)

Ophnurgus natalasper Thandar, 1992: 176, figs 5, 7B.

Material examined. IE-2007-801 (1 specimen, sampled between Nosy Bé and Banc du Leven); **IE-2007-820** (1 specimen, sampled between Nosy Bé and Banc du Leven).

Remarks. Even though our specimens have only 30 ventrolateral tube feet whereas the original description of *O. natalasper* Thandar, 1992, mentions 40, we feel no hesitation in assigning them to Thandar's (1992) species because the short undivided spinous rods of the body wall are a near perfect match.

These records extends the range of *O. natalasper* northwards roughly 15 degrees. Depth (704 m) is close to the 860 m reported by Thandar (1992).

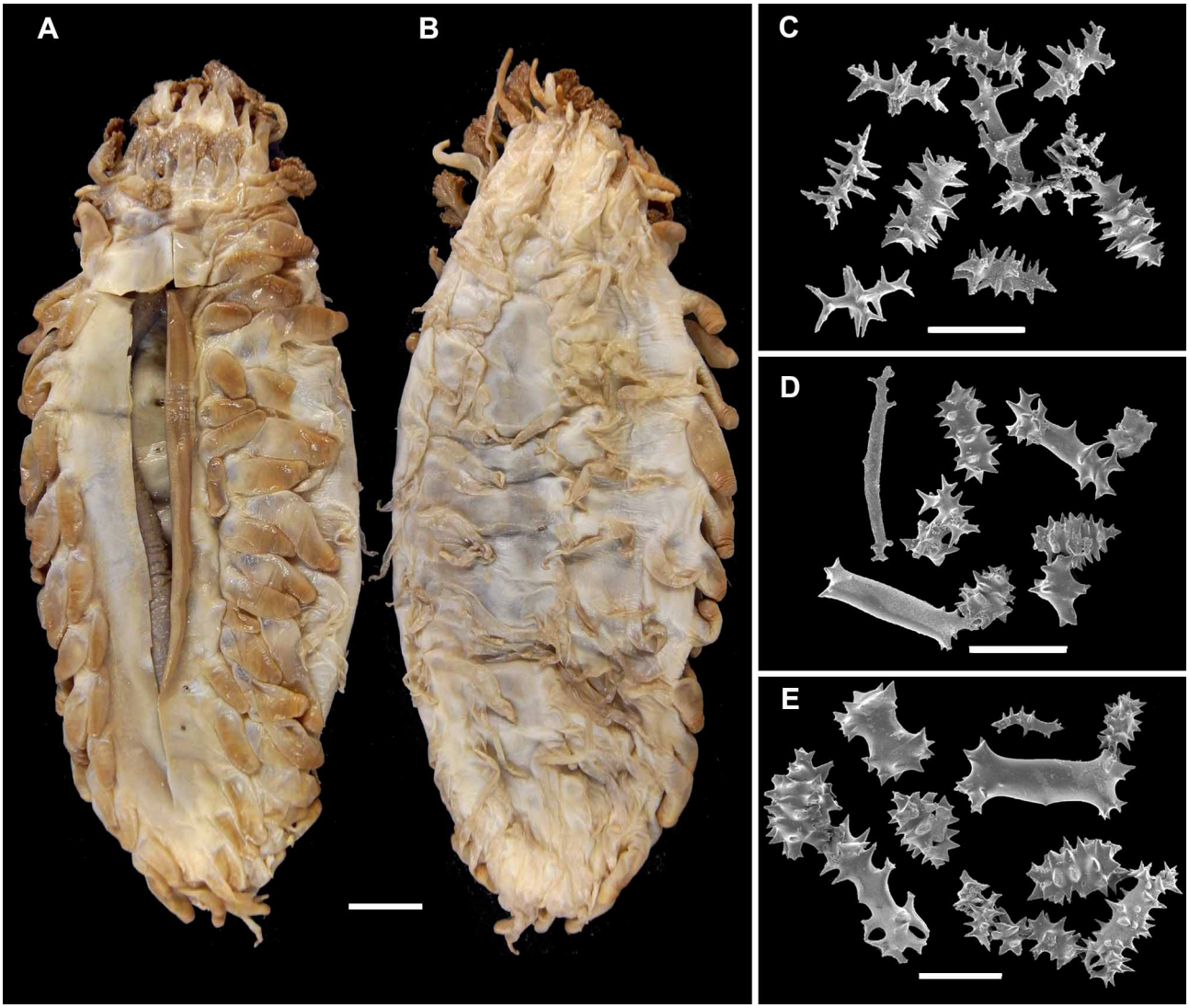


FIGURE 29. *Ophnurgus natalasper* Thandar, 1992. **A–B**: Dorsal view (A) and ventral view (B) of specimen IE-2007-801. **C–E**: SEM photos of ossicles from the anterior part of dorsal body wall (C) anterior (D) and posterior (E) part of ventral body wall. Scale bars: A,B = 1cm; C ,D,E = 100µm.

Order Molpadida Haeckel, 1896

Family Molpadiidae Müller, 1850

***Molpadia africana* (Ludwig & Heding, 1935)**
(Fig. 30 A–C)

Trochostoma africanum Ludwig & Heding, 1935: 142, textfig. 10.

Material examined. IE-2007-756 (2 specimens sampled in Mahajamba Bay); **IE-2007-781** (1 specimen, sampled in front of Mahajamba Bay)

Remarks. This specimen fits remarkably well with the only know previous record of this species approximately 10° to the north in the Zanzibar Channel.

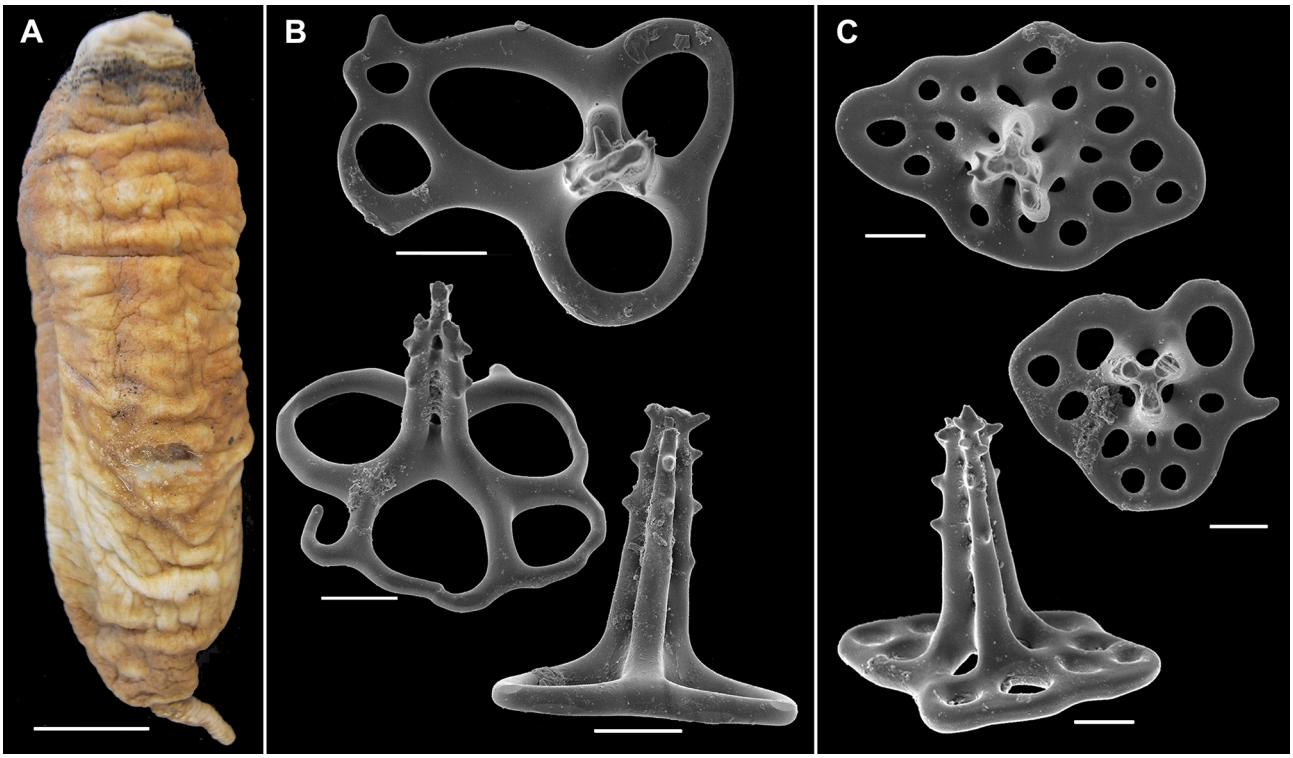


FIGURE 30. *Molpadia africana* Ludwig & Heding, 1935. **A**: Dorsal view of specimen IE-2007-781. **B–C**: SEM photos of ossicles from dorsal body wall (B) and tail (C). Scale bars: A = 1cm; B = 50µm; C = 20µm.

***Molpadia andamanensis* (Walsh, 1891)**
(Fig. 31 A–C)

Trochostoma andamanense Walsh, 1891: 203
Molpadia andamanensis; Clarck, 1908: 162 (synonymy)

Material examined. IE 2007-782 (3 specimens sampled between Majunga and Cape Saint-Andre); **IE-2007-817** (2 specimens sampled between Majunga and Cape Saint-Andre)

***Molpadia lenticulum* (Cherbonnier & Féral, 1981) new comb.**
(Fig. 32 A–B)

Trochostoma lenticulum Cherbonnier & Féral, 1981: 405, fig.29

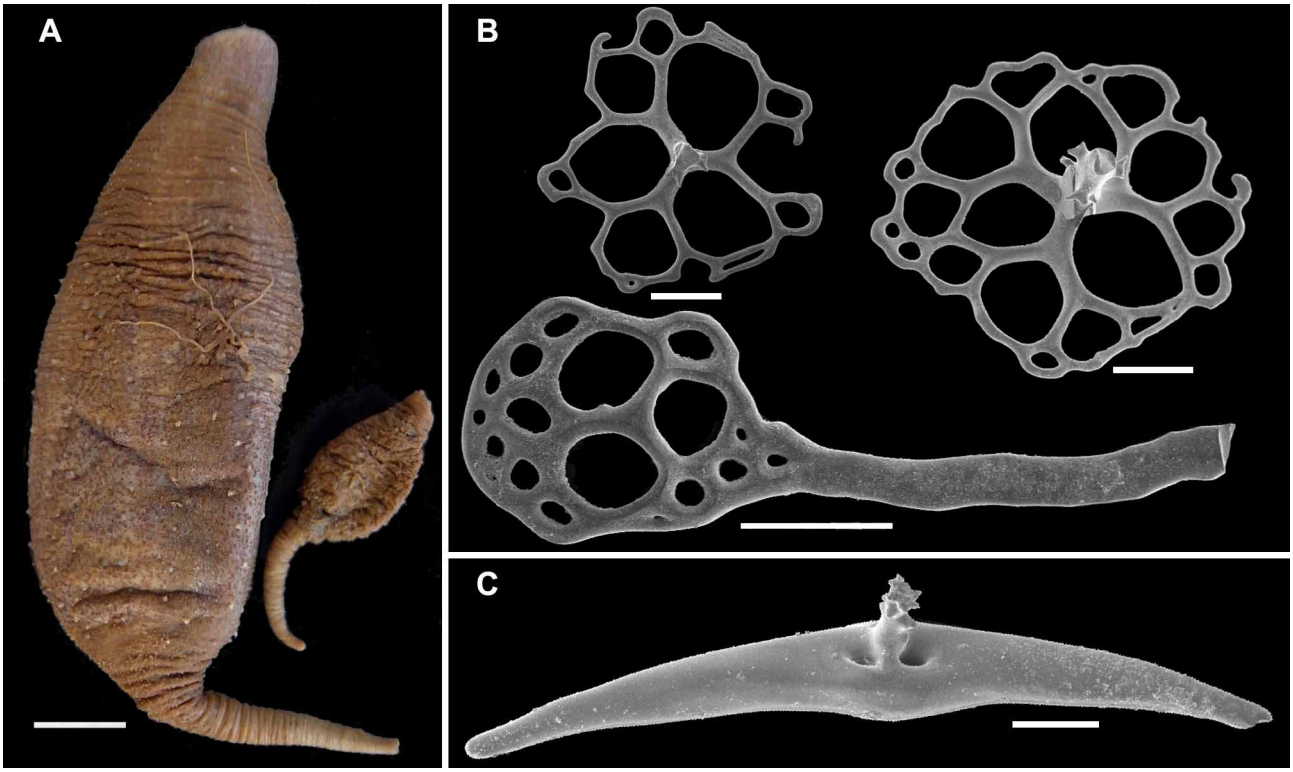


FIGURE 31. *Molpadia andamanensis* Clark, 1907. **A**: lateral view of specimens IE-2007-817. **B–C**: SEM photos of ossicles from body wall (B) and tail (C). Scale bars: A = 1cm; B,C = 100µm.

Material examined. IE-2007-778(1) (1 specimen sampled in front of Majumga)

Remarks. Pawson (1965, 1967, 1977) lumped *Trochostoma* (and eight other genera) with *Molpadia*. As long as no complete revision of the group is carried out, we follow this decision. The holotype and paratype of this species were sampled at 750 m depth in the Philippines. The present record is thus a significant horizontal and vertical (950 m depth) range extension.

Molpadia thandari Samyn & VandenSpiegel sp. nov.

(Fig. 33 A–C)

Molpadia sp. indet.; Thandar, 2007: 52, fig. 24

Material examined. *Type material*: **IE-2007-759** (holotype, sampled in front of Nazendry Bay); **IE-2007-806** (1 paratype, sampled in front of Nazendry Bay)

Type locality. Madagascar, Nazendry Bay, Station CP3289 (Decimal coordinates: -14,4833; 47,4333)

Etymology. This species is named after Prof. Em. Ahmed S. Thandar of the University of KwaZulu-Natal in South Africa, who, in 2007, was the first to recognize this species as a separate taxon.

Known geographic description. Known from off Tongaat Bluff just North of Durban (Decimal coordinates: -29.73; 31.42) to Nazendry Bay near Nozi Lava (Decimal coordinates; -14,4833; 47,4333)

Taxonomic description (holotype and paratype). *Anatomy*—Holotype 70 mm long and 35 mm wide with tail 5 mm long. Paratype 25 mm long and 12 mm wide, with tail 2 mm long (fig. 33A). Body uniform light chocolate brown, with tail somewhat lighter in color. Muscle bands can be seen through the body wall. Tentacles 15, retracted, morphology could not be determined. Anus surrounded by five minute and slender teeth. Calcareous ring with, plates fused, radials with a terminal bifid posterior projection (broken in holotype); interradial with triangular anterior projection of same length of that of radial plate. 15 short tentacle ampullae; Polian vesicule single, elongated; stone canal not detected. Left respiratory tree reaching mid body, right longer. (see also Thandar (2007) for *Molpadia* sp. indet.) Gonad well-developed, branching. Longitudinal muscles divided into two lateral bands that unite before reaching the calcareous ring.

Ossicles—Ossicle assemblage of tentacles could not be determined. Body wall with tables of two different morphologies. The first type has their disc, 123–176 µm wide, perforated with 4 to 6 holes and with four to six arms 132–208 µm long. Disc spire is made of 3 pillars fused over their complete length, 253–300 high (no trace of cross-beams can be seen). The second type of table does not have long disc arms and has their discs perforated by 3–5 large holes, 42–74µm- wide; spire again consistng of three fused pillars, 113–129µm high. Tables from the tail are the typical fusiform *Molpadia* type, 360–412 µm long, with disc slightly swollen centrally and perforated by 2–4 small holes; spire low, 37–51 mm high, ending in four teeth.

Remarks. We agree with Thandar (2007) that the large body wall tables with multi-armed discs and 4–6 holes make this species stand aside from other *Molpadia* species. We feel it justified to regard this character state important enough to warrant it diagnostic for a species new to science.

We decided to picture only the paratype, because the dissected holotype might give a wrong impression of the species.

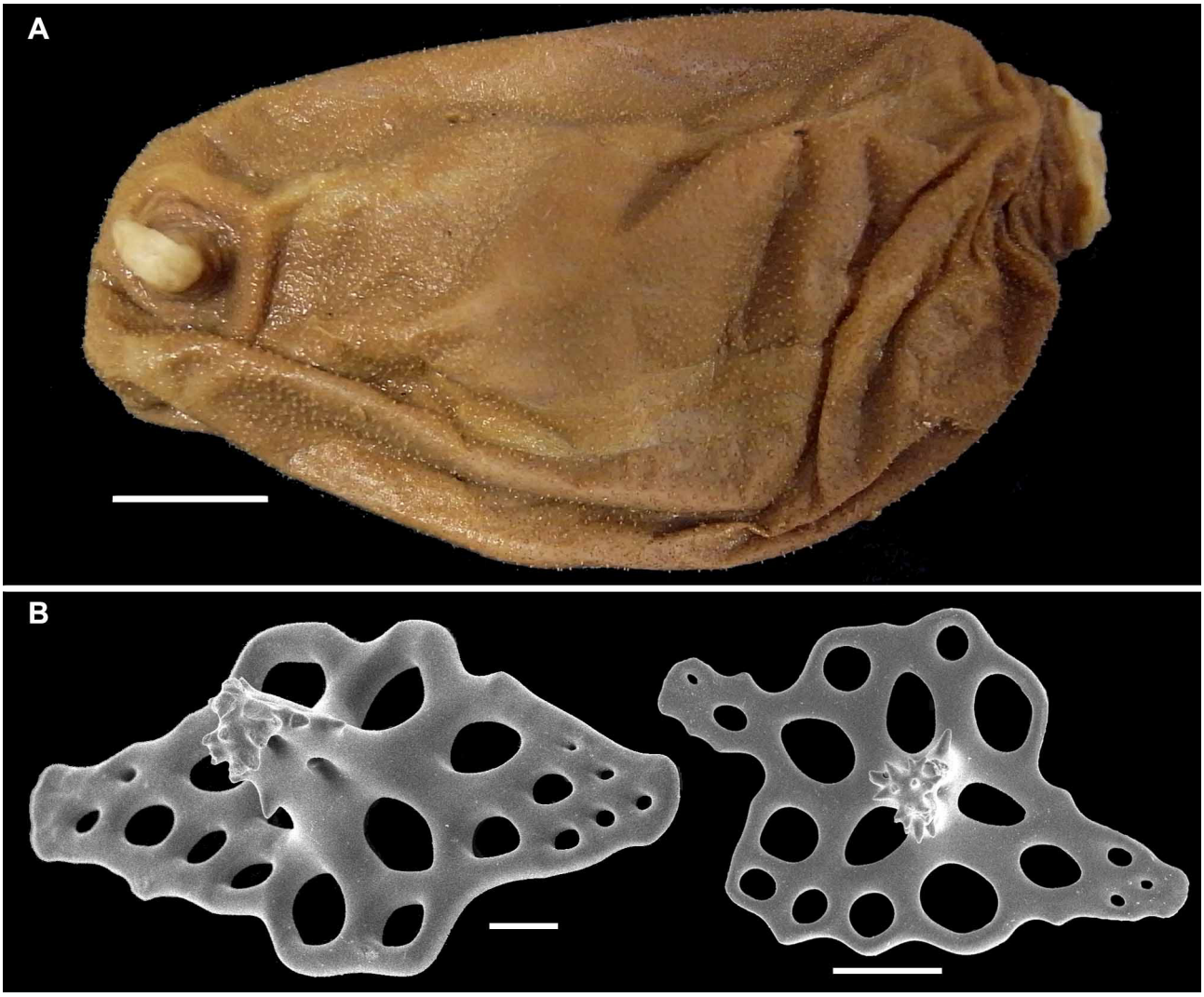


FIGURE 32. *Molpadia lenticulum* (Cherbonnier & Féral, 1981). **A**: Dorsal view of specimen IE-2007-778(1). **B**: SEM photos of ossicles from the tail. Scale bars: A = 1cm; B = 100µm.

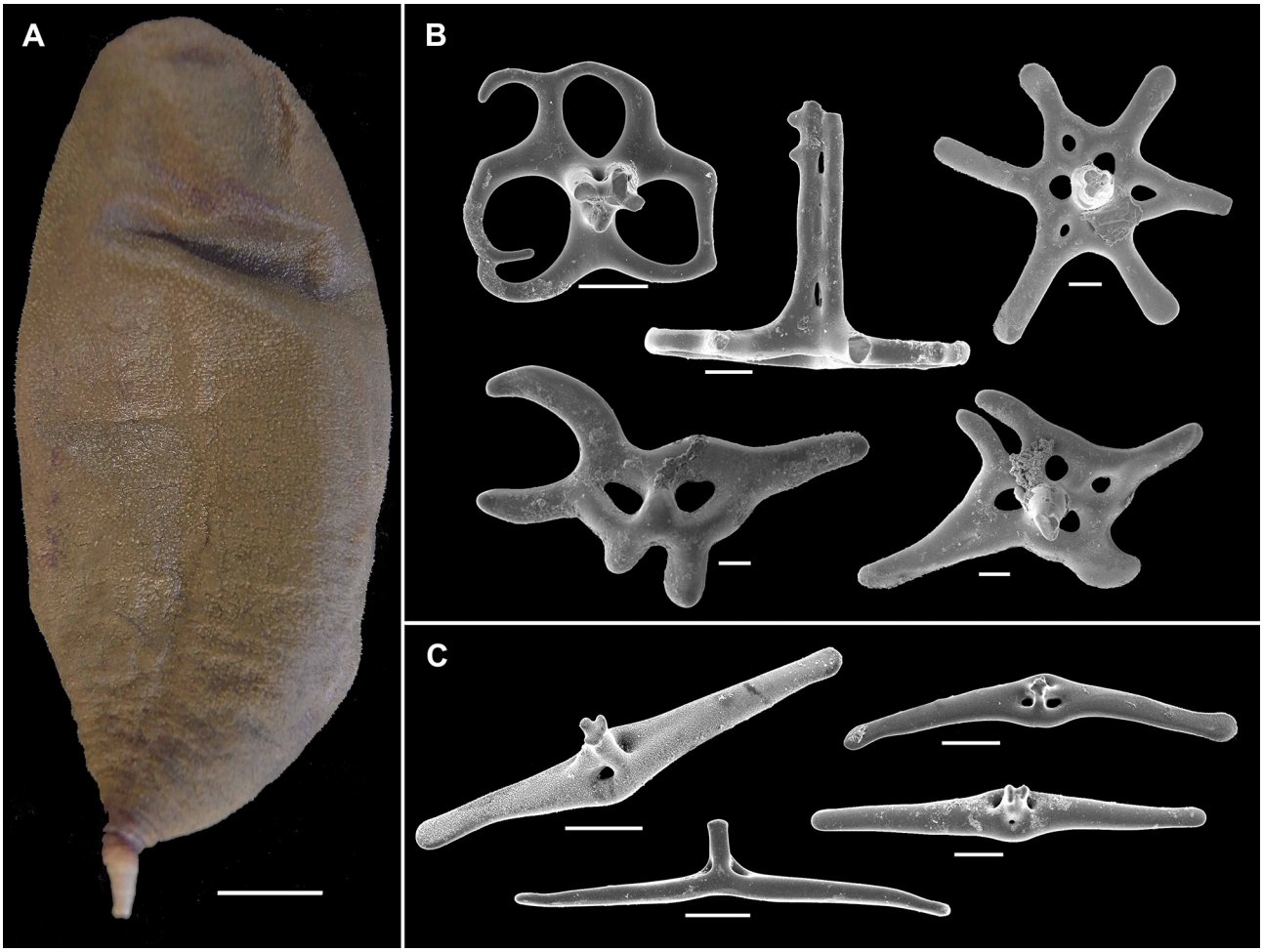


FIGURE 33. *Molpadia thandari* **sp. nov. A**: Dorsal view of the paratype; **B–C**: SEM photos of ossicles from dorsal body wall (B) and tail (C). Scale bars: A = 1cm; B,C = 50µm.

Discussion

As argued by Hanssen (1975) the bathyal zone, from 200/400 to 1800/2600 m depth, has the most varied ecological conditions and hence it is not surprising that in this zone the largest taxonomic richness can be found. Our results indicate that this is indeed the case as we found representatives of five out of the six extant orders. Although, no Apodida were found in this small collection, they probably do occur at the here sampled locations and depths too as all families in this order have deep-see representatives, with the Myyriotrochidae being the most common (Billett, 1991). Their absence in this sample most possibly lays in the fact that sampling was done with a beam trawl and a dredge and not with box-coring or other sampling technique that recovers infaunal organisms such as many deep sea apodids.

The fact that six out of the 31 species present in this small collection are new to science clearly shows that areas and habitats that have received little exploration continue to reveal new taxa. International and collaborative programs like “La Planète Revisitée” that revealed this fauna are to be encouraged.

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Unima). The cruise, PI Dr Philippe Bouchet, was part of a cluster of Mozambique-Madagascar expeditions under the programme "*Our Planet Reviewed*" / "*La Planète Revisitée*" conducted by Muséum national d'Histoire naturelle (MNHN) and Pro-Natura International (PNI) and funded by the Total Foundation, Prince Albert II of Monaco Foundation, and Stavros Niarchos Foundation.

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References

Aranda y Millan, F. (1908) Contribución al conocimiento de los Equinodermos de España y especial de los Holothurioideos. *Memorias de la real Sociedad Española de Historia Natural*, 5, 215–257, 5 pls.

Ayers, W.O. (1851) *Proceedings of the Boston Society of Natural History, taken from the Society's records of 15 January 1851*, 6–7 ("Observations upon the Holothuridae of our coast").

Bell, F.J. (1884) Echinodermata. *In*: Coppinger, R.W. (ed.), *Report on the Zoological Collections made in the Indo_pacific Ocean during the voyage of H.M.S. "Alert", 1881–1882*, London, 117–177 & 509–512, plates 8–17 and 45.

Billett, D.S.M. (1991) Deep-Sea holothurians. *Oceanography and Marine Biology—An Annual Review* 29, 259–317.

Brandt, C. (1835) Echinodermata ordo Holothurina. *In: Prodromus descriptionis animalium ab H. Mertensio in orbis terrarum circumnavigatione observatorum*. St Petersburg, pp. 42–62.

Cherbonnier, G. (1952) Contribution à la connaisance des Holothuries de l'Afrique du Sud. *Transactions of the Royal Society of South Africa* 33, part IV, 469–509, plates 35–50.

Cherbonnier, G. (1954) Note préliminarie sur les holothuries de la Mer Rouge. *Bulletin Muséum National Histoire Naturelle Paris*, 2ième série 26, 252–260.

Cherbonnier G. (1955) Les Holothuries de la mer Rouge. Résltats scientifiques des campagnes de la Calypso. *Annales de l'Institut Océanographique de Monaco N.S*. 30, 129–183 + 28 plates.

Cherbonnier, G. (1958) Holothuries des côtes de Sierra-Leone. *Bulletin Muséum National Histoire Naturelle Paris*, 2ième série 30, 101–108.

Cherbonnier, G. (1963) Les Holothuries de la Mer Rouge de l'Université Hébraïque de Jerusalem. *Bulletin Sea Fishery Research Station Haifa*, 34, 5–10, 2 figs.`

Cherbonnier, G. (1970) Nouvelles holothuries des Cotes d'Afrique du Sud et du Mozambique. *Bulletin Muséum National Histoire Naturelle Paris*, 2ième série, 42, 280–299.

Cherbonnier, G. (1970) *Pseudocolochirus bicolor* n. sp., nouvelle holothurie dendrochirote de Madagascar. *Bulletin du Muséum National d'Histoire naturelle,* 2 ième Série, 42, 424–427.

Cherbonnier, G. (1974) Redescription de l'Holothurie Aspidochirote *Holothuria (Thymiosycia) truncata* Lampert. *Bulletin Muséum National Histoire Naturelle Paris*, *3ième série, Zoologie,* 175, 1439–1443.

Cherbonnier, G. (1988) Echinodermes: Holothurides. *Faune de Madagascar,* 70, 1–292.

Cherbonnier, G. & Féral, J.P. (1984) Les Holothuries de Nouvelle-Calédonie. Deuxième contribution (Première partie: Synallactidae et Holothuriidae). *Bulletin du Muséum national d'Histoire naturelle, Paris Quatrième série, 6, section A (3)*, 659–700.

Clark, A.M. (1977) The South African Museum's *Meiring Naude* Vruises, Part 4, Echinoderms. *Annals of the South African Museum*, 73, 133–147.

Clark, A.M. & Rowe, F.W.E. (1971) Monograph of Shallow-water Indo-West Pacific Echinoderms, i–vii, 1–238, pls. 1–31. *Trustees of the British Museum (Natural History), London*.

Clarck, H.L. (1908) The apodous holothurians. A monograph of the Synaptidae and Molpadidae. *Smithsonian Contributions to Knowledge,* 35, 1–231, 13 plates.

Clark, H.L. (1921) The Echinoderm Fauna of Torres Strait: It's Composition and Its Origin. *Papers of the Department of Marine Biology of the Carnegie Institution of Washigton,* 10, i–viii, 1–233, 38 plates.

Clark, H.L. (1923) The Echinoderm fauna of South Africa. *Annals South African Museum,* 13, 221–435, plates. 8–23.

Conand, C., Michonneau, F., Paulay, G. & Bruggemann, H. (2010) Diversity of the Holothuroid Fauna (Echinodermata) at La Réunion (Western Indian Ocean). *Western Indian Ocean Journal of Marine Science,* 9, 145–151.

Connand, C. Mulochau, Th. & Pascale, C. (2013) Holothuria (Echinodermata) Diversity in the Glorieuses Archipelago (Eparses islands, France, Mozambique Channel). *Western Indian Ocea Journal of Marine Sciences,* 12, 71–78.

Costello, M.J., Emblow, C.S. & White, R. (editors) (2001) European Register of Marine Species. A check-list of the marine species in Europe and a bibliography of guides to their identification. *Patrimoines naturels,* 50, 1–463 pp.

Deichmann, E. (1930) The holothurians of the western part of the Atlantic Ocean. *Bulletin of the Museum of Comparative Zoologyat Harvard,* 71, 41–226

Deichmann, E. (1948) The Holothurian Fauna of South Africa. *Annals of the Natal Museum,* 11, 325–376, plates 17–21.
Deichmann, E. (1958) The Holothuroidea collected by the VELERO III and IV during the years 1932 to 1954. Part II. Apsidochirota. *Allan Hancock Pacific Expeditions,* 11, 239–349, 9 plates.
Domantay, J.S. (1936) The ecological distribution of the echinoderm fauna of the Puerto Galera marine biological station. *Natural and Applied Science Bulletin of the University of the Philippines,* 3, 385–405.
Ekman, S. (1926) Systematisch-phylogenetische Studien über Elasipoden und Aspidochiroten. *Zoologische Jahrbücher, Abteilung für Anatomie und Ontogenie der Tiere* 47, 429–540.
Forsskål, P. (1775) Descriptiones animalium avium, amphibiorum, piscium, insectorum, vermium quae in itinere orientali obseravit Petrus Forskål. Post mortem auctoris edidit Carsten Nieburh. Adjuncta est materia medica kahirina atque tabula maris rubri geographica, Auniae, 140 pp.
Gebruk, A.V, Solis-Marin, F.A., Billett, D.M., Rogacheva, A.V.& Tyler, P.A. (2012) Review of the genus *Zygothuria* Perrier, 1898 and the Atlantic group of species of the genus *Mesothuria* Ludwig, 1894) (Synallactidae: Holothuroidea) with the description of the new species *Mesothuria milleri* sp. nov. *Journal of Natural History,* 46, 265–348.
Goldfuss (1820) Handbuch der klogie. Nurernburg 1, 1–696, 2 plates.
Grube, A.E. (1840) Actinien, Echinodermen und Wurmer des Adriatischen und Mittlemeers. JH. Bon, Königsberg, 92 pp.
Haake, W. (1880) Holothurien. *In*: Möbius K. & Richter, F. (eds.), Beiträge zur Meeresfauna der Insel Mauritius un der Seychellen. Gustav Fischer Berlin, pp. 46–48
Haeckel (1896) Systematische Phylogenie der Echinodermen *In*: Systematische Phylogenie der Wirbellosen Thiere (Invertebrata): Zweiter Teil des Entwurfs einer Systematischen Sttammengeschichte. Reimer, Berlin, 720 pp.
Hanssen, B. (1975) Systematics and biology of the deep-sea holothurians, Part 1. Elasipoda. *Galathea Report Vol 13, Scientific Results of The Danish Deep-Sea Expedition Round the World 1950–1952*, 262 pp, 14 plates.
Heding, S.G. (1940) Die Holothurien der Deutchsen Tiefsee Expedition II. Aspidochirote und Elasipod Formen. *Wissenschaftliche Ergebnisse der Deutschen Tiefsee Expedition auf dem Damfer Valdivia 1898–1899,* 24, 317–375.
Heding, S.G. (1942) Holothuroidea II, Aspidochirotida, Elasipoda, Dendrochirotida. *The Danish Ingolf Expedition,* 4, 1–39.
Hérouard, E. (1902) Holothuries provenant des campagnes de la Princesse-Alice. *Résultats des Campgnes Scientifiques accomplies sur son yacht par Albert Ier Prince souverain de Monaco 21, 1–61, 8 plates.*
Jaeger, G.F. (1833) De Holothuriis. Dissertatio Inauguralis, Turici.laguerda, 40 pps., 3 pls.
Laguerda-Figueras, A. & Solis-Marin, F.A. (2009) *Holothuria (Cystipus) casoae* a new species of sea cucumber (Echinodermata: Holothuroidea) from the central-eastern Pacific Ocean. *Scienta Marina,* 73, 573–578. http://dx.doi.org/10.3989/scimar.2009.73nn3573
Koehler, R. & Vaney, C. (1908) Holothuries recuielles par l'Investigator dans l'Ocean Indien. II. Les Holothuries Littorales. Trustees Indian Museum, Calcutta, 54 pp., 3 plates.
Koehler, R. & Vaney, C. (1910) Description d'holothuries nouvelles appartenant au musée Indien. *Records Indian Museum,* 5, 89–103. http://dx.doi.org/10.5962/bhl.part.10494
de Lamarck, J.B.P.A. (1816) Histoire Naturelles des Animaux sans Vertèbres, presentant les caracteres generaux et particuliers des ces animaux, leur distribution, leurs classes, leurs familles, leurs genres, et la citation des principales espèces qui s'y raportent. 7 Volumes. Verdière, Paris.
Lampert, K. (1885) Die Seewalzen. Eine systematische Monographie. *In*: Semper, C. (ed.), *Reisen im Archipel der Philippinen, Teil 2, Wissenschaftliche Resultate.* Wiesbaden.
Lane, D.J.W., Marsh, L.M., Rowe, F.W.E. & VandenSpiegel, D. (2000). Echinoderm fauna of the South China Sea: an inventory and analysis of distribution patterns. *The Raffles Bulletin of Zoology Supplement,* 8, 459–493.
Liao, Y. (1975) The Echinoiderms of Xisha Islands. I. Holothurioidea, Guangdong Province, China. *Studia Marina Sinica,* 10, 199–230.
Liao, Y. (1979) The Aspidochirote holothurians of China with the erection of a new genus. *In*: Jangoux, M (ed.), Echinoderms: Present and Past, A.A. Balkema, Rotterdam: pp. 115–120.
Liao, Y. (1997). Fauna Sinica, Phylum Echinodermata, Class Holothuroidea. Science Press, Bejing, China, i–ix, 335 pp, 2 plates.
Linnaeus, L. (1767) *Systema Naturae*, seu per regna, tria naturae, secundum classes, ordines, genera, species, cum characteribus, differentiis, synonymis, locis. 12th Edn. Holmiae: Laurentii Salvii, part 2, 533–1327.
Ludwig, H. (1883) Verzeichniss der Holothurien des Kieler Museums; Bericht der Oberhissischen *Gesellschat für Natur-und Heilkunde*, 22, 155–176.
Ludwig, H. (1887) Die von G. Chierchia auf der Fahrt der Kgl. Ital. Corvette „Vettor Pisani" gesammelten Holothurien. *Zeitschrift für Systematik, Geographie und Biologie der Thiere*, 2, 1–36, 2 plates.
Ludwig, H. (1891; 1889–92) Echinodermen: Die Seewalzen. In: H.G. Bronn, ed. Broon's Klassen und Ordnungen des Thierreichs. Bd. 2, Abteilung 3, Buch 1, i–iv, 1–460, 17 plates. CF. Winter'sche, Leipzig.
Ludwig, H. (1893) Vorläufiger Bericht über die auf den Tiefsee Fahrten des "Albatross" (Frühling 1891) im östlichen Stillen Ocean erbeuteten Holothurien. *Zoologische anzeiger,* 16, 179–185.
Ludwig, H. (1894) Reports on an exploration of the west coasts of Mexico, Central and South America, and off the Galapagos Islands in charge of Alexander Agassiz by the US Fish Commission Steamer Albatros. XII. The Holothurioidea. *Memoirs of the Museum of Comparative Zoology at Harvard College Cambridge,* 17, 1–183.
Ludwig, H. & Heding, S.G. (1935) Die Holothurien der deutschen Tiefsee-Expedition. I. Fußlose und dendrochirote Formen. *Wissenschaftliche Ergebnisse der Deutschen Tiefsee-Expedition auf dem Dampfer Valdivia 1898–1899*. 24 (2), 123–214.

MacNae , W. & Kalk, M. (1958) The fauna and flora of sand flats at Inhaca Island, Moçambique. Witwatersrand University Press, Johannesburg, i–iv, 163 pp.
Mary Bai, M. (1981) Monograph on *Holothuria (Metriatyla) scabra*. *Memoirs of the Zoological Survey of India,* 16, 1–75.
Massin, C. (1987) Holothuries nouvelles et peu connues récoltées en Indonésie au cours de la Snellius II Expedition. *Bulletin de l'Institut Royal des Sciences naturelles de Belgique, Biologie,* 57, 97–121.
Massin, C. (1993) On the taxonomic status of the genus *Parathyone* (Echinodermata, Holothurioidea, Dendrochirotida. *Bulletin van het Koninklijk Belgisch Instituut voor Natuurwetenschappen, Biologie,* 63, 257–258.
Massin, C. (1996) Holothuries (Echinodermata) récoltées sur le talus continental Méditerranéen (NW) lors de la campagne DEPRO96. *Mésoglée,* 55, 43–48.
Massin, C. (1999) Reef-dwelling Holothuroidea (Echinodermata) of the Spermonde Archipelago (South-West Sulawesi, Indonesia). *Zoologische Verhandelingen,* 329, 1–144.
Massin C., Rasolofonirina, R., Conand, C. & Samyn, Y. (1999) A new species of *Bohadschia* (Echinodermata: Holothuroidea) from the Western Indian Ocean with a redescription of *Bohadschia subrubra* (Quoy & Gaimard, 1833). *Bulletin de l'Institut Royal des Sciences Naturelles de Belgique (Biologie),* 69, 151–160, 1 plate.
Massin, C. & Hendrickx, M. (2011) Deep-water Holothuroidea (Echinodermata) collected during the TALUDcruises off the Pacific coast of Mexico, with the description of two new species. *Revista Mexicana de Biodiversidad*, 82, 413–443.
Michonneau, F. (2015). Cryptic and not-so-cryptic species in the complex *Holothuria (Thymiosycia) impatiens* (Forsskal, 1775) (Echinodermata: Holothuroidea). bioRxiv.
http://dx.doi.org/10.1101/014225
Mitsikuri, K. (1912) Studies on actinopodous Holothurioidea. *Journal of the College of Science, Imperial University of Tokyo,* 39, 1–284, 8 plates.
Oken, L. (1815) Lehrbüch der Natürgeschichte, Part 3 Zoologie. CH. Reclam, Jena, 850 pp.
O'Louglin, P.M. & Ahearn, C. (2005) A review of pygal-furrowed Synallactidae (Echinodermata: Holothuroidea), with new species from the Antarctic, Atlantic and Pacific oceans. *Memoirs of Museum Victoria,* 62, 147–179.
O'Loughlin, P.M., Paulay, G., VandenSpiegel, D. & Samyn, Y. (2007) New *Holothuria* species from Australia (Echinodermata: Holothuroidea: Holothuriidae), with comments on the origin of deep and cool holothuriids. *Memoirs of Museum Victoria,* 64, 35–52.
O'Loughlin, P.M. (2002) Report on selected species of BANZARE and ANARE Holothuroidea, with reviews of Meseres Ludwig and Heterocucumis Panning (Echinodermata). *Memoirs of Museum Victoria* ,59, 297–325.
Östergren, Hj. (1896) Zur Kenntnis der Subfamile Synallactinae unter den Aspidochiroten. *Festskrift för Lilljeborg. Upsala,* pp. 345–360.
Östergren, Hj. (1907) Zur Phylogenie und Systematic der Seewalzen. *Särtryck ur Zoologiska Studien tillägnade Prof. Tullberg, Uppsala,* pp. 191–215
Panning, A. (1935) Die Gattung *Holothuria* (4. Teil). *Mitteilungen aus dem Zoologischen Staatsintstitut und Zoologischen Museum in Hamburg,* 45, 85–107, 32 textfigs.
Panning, A. (1949) Versuch einer Neuordnung der Familie Cucumariidae. *Zoologische Jahrbücher, Abteilung für Systematik, Ökologie und Geographie der Tiere* 78, 404–470, 62 figs.
Pawson, D.L. (1965) The Bathyal Holothurians of the New Zealand Region. *Zoology Publications from Victoria University of Wellington* 39, 33 pp.
Pawson, D.L. (1976) Some aspects of the biologyof deep-sea echinoderms*Thalassia Jugoslavica,* 12, 287–293.
Pawson, D.L. (1977) Molpadiid Sea cucumbers (Echinodermata: Holothuroidea- of the Southern Atlantic, Pacific and Indian Oceans. *Biology of the Antarctic seas VI, Antarctic Research Series,* 26,97–123.
http://dx.doi.org/10.1029/AR026p0097
Pawson, D.L. & Fell, B.A. (1965) A revised classification of the dendrochirote holothurians. *Brevoria Museum of Comparative Zoology,* 214, 1–7.
Pawson, D.L., Vance, D.J., Messing, C.C, Solis-Marin, F.A. & Mah, C.L. (2009) Echinodermata of the Gulf of Mexico. *In:* Felder, D.L. & Camp, D.K. (eds.) *Gulf of Mexico origin, Water, and Biota, volume 1, Biodiversity*, Texas A&M University Press, pp. 1177–1204.
Pearson, J. (1903) Report on the Holothuroidea collected by Prof. Herdman, at Ceylon, in 1902. *Report to the Government of Ceylon on the Pearl Oyster Fisheries of the Gulf of Manaar* Vol 1, Supplement 5, 181–208, plates 1–3.
Pearson, J. (1914) Proposed re-classification of the genera *Mülleria* and *Holothuria*. *Spolia Zeylanica,* 9, 173–190.
http://dx.doi.org/10.5962/bhl.part.7318
Perrier, R. (1886) *Les explorations sous-marines*. Paris, 352 pp.
Perrier, R. (1898) Sur les Holothuries receueillies par le Travailleur et le Talisman. *Comptes rendus de l'Academie des Sciences,* 126,1664–1666.
Perrier, R. (1902) Expéditions scientifiques du "Travailleur" et du "Talisman" pendant les années 1880, 1881, 1882, 1883. Holothuries. Paris, 273–554, 11 plates.
Price, A.R.G. (1982) Comparison between Echinoderm fauna's of Arabian Gulf, SE Arabia, Red Sea and Gulfs of Aqaba and Sue. *Fauna of Saoudi Arabia,* 4, 3–21.
Rowe, F.W.E. (1969) A review of the family Holothuriidae (Holothuroidea: Aspidochirotida). *Bulletin of the BritishMuseum (Natural History) Zoology,* 18,119–170.
Rowe, F.W.E. (1989) Nine New Deep-water Species of Echinodermata from Norfolk Island and Wanganella Bank, northeastern Tasman Sea, with a Checklist of the Echinoderm Fauna. *Proceedings of the Linnean Society of New South Wales,* 111,

257–291.
Rowe, F.W.E. & Richmond, M.D. (2004) A preliminary account of the shallow-water echinoderms of Rodrigues, Mauritius, western Indian Ocean. *Journal of Natural History,* 38, 3273–3314.
http://dx.doi.org/10.1080/002229301695105
Rowe, F.W.E. & Gates, J. (1995) Echinodermata. *In*: Wells A. (ed.) *Zoological Catalogue of Australia vol. 33.* Melbourne: CSIRO Australia,. i–xiii, 1–510.
Samyn Y. (2003) Shallow-water Holothuroidea (Echinodermata) from Kenya and Pemba Island, Tanzania. *Studies in Afrotropical Zoology,* 292, 1–158.
Samyn Y. & Tallon I. (2005) Zoogeography of the shallow-water holothuroids of the western Indian Ocean. *Journal of Biogeography,* 32, 1523–1538.
http://dx.doi.org/10.1111/j.1365-2699.2005.01295.x
Samyn Y., VandenSpiegel D. & Massin C. (2005) Sea Cucumbers of the Comoros Archipelago. *SPC Beche-de-mer Information Bulletin,* 22, 14–18.
Samyn Y., VandenSpiegel D., Massin C. (2006) Taxonomie des holothuries des Comores. *Abc Taxa* 1, i–iii, 1–130.
Semper C. 1868. Reisen im Archipel der Philippinen. Holothurien.2. Wissenschaftliche Resultate: i–x , 1–288 , plates 1–40. Leipzig.
Sars, M. (1868) Om Echinodermer og Coelenterater funde ved. Lofoten
Semper C. (1868) Reisen im Archipel der Philippinen. Holothurien.2. Wissenschaftliche Resultate, i–x , 1–288, plates 1–40. Leipzig.
Solis-Marin, F.A. (2005) *Synallactes laguardi*, a new species of sea cucumber from South Africa (Echinodermata: Holothuroidea: Synallactidae). *Proceedings of the Biological Society of Washington,* 118, 570–575.
http://dx.doi.org/10.2988/0006-324X(2005)118[570:SLANSO]2.0.CO;2
Sluiter, C.P. (1890) Nachträchliches uber die Echinodermen-fauna des Java-Meeres. *Natuurkundig Tijdschrift Nederlande Indië* 49, 105–110.
Sluiter C.P. (1901) Die Holothurien der Siboga-Expedition. *Siboga–Expeditie. Monograph,* 44, 1–142,11 plates.
Sluiter, CP. (1910) Westindische Holothurien. Ergebnisse Zoologische Forschungereise nach Westindien von W. Kukenthal u. R. Hartmeyer, *Zoologische Jahrbücher, Abteilung Systematik, Ökologie Geographie Tiere*. Supplement 11, Heft 2, 331–341.
Smirnov A.V. (2012) System of the class Holothuroidea. *Paleontological Journal* 46, 793–832.
http://dx.doi.org/10.1134/S0031030112080126
Teo, S. & Ng, C.S.L. (2009) New record of a sea cucumber, *Holothuria ocellata* (Jaeger, 1833) (Holothuroidea: Aspidochirotida: Holothuriidae) in Singapore. *Nature in Singapore,* 2, 411–414.
Thandar, A.S. (1991) The cucumariid holothurians of southern Africa with the erection of a new genus. *South African Journal of Zoology,* 26, 115–139.
http://dx.doi.org/10.1080/02541858.1991.11448240
Thandar, A.S. (1992) The South African Museum's *Meiring Naude* Cruises. Part 18. Holothuroidea. Annals of the South African Museum, 10, 159–180.
Thandar, A.S. (1999) Deep-sea holothuroids taken by the R.V. *Africana II* in 1959, from off the West coast of the Cape Penninsula, South Africa. *Annals of the South African Museum*, 10, 363–409.
Thandar, A.S. (2006) New species and new records of dendrochirotid and dactylochirotid holothuroids (Echinodermata: Holothuroidea) from off the east coast of South Africa. *Zootaxa* 1245, 1–51.
Thandar, A.S. (2007) Additions to the aspidochirotid, molpadid and apodid holothuroids (Echinodermata: Holothuroidea) from the east coast of southern Africa, with the descriptions of new species. *Zootaxa,* 1414, 1–62.
Thandar, A.S. (2008) Additions to the holothuroids fauna of the southern African temperate faunistic provinces, with description of new species. *Zootaxa,* 1697, 1–57.
Thandar, A.S. (2009) New species and a new record of sea cucumbers from deep waters of the South African temperate region (Echinodermata: Holothuroidea). *Zootaxa,* 2013, 30–42.
Théel, H. (1879). Preliminary report on the Holothuroidea of the exploring voyage of H.M.S Challenger, I. *Bihang till Kongliga Svenska Vetenskaps-Akademiens Handlinga,r* 5, 1–20.
Théel, H. (1882) Report on the Holothuroidea dredged by H.M.S. Challenger during the years 1873–1876, Part I *Report on the scientific results of the voyage of H.M.S. Challenger during the years 1873–76*, 1–176.
Théel, H. (1886) Holothuroidea. Part 2. Report of the Scientific Results of the Voyage of the "Challenger" (Zoology), 39, 1–290, 16 plates.
Tortonese, E. (1935) Contributo alla conoscenza degli echinodermi mediterranei. *Annali del museo Civico di Storia Naturale Giacomo Doria,* 57, 219–272.
Walsh, J.H.T. (1891) Natural jistory notes from H.M. Indian Marine Survey steamer "Investigator" No. 24. List of deep-sae holothurians, collected during seasons 1887–91, with description of new species. *Journal of the Asiatic Society of Begal,* 60, 197–204.
Zavodnick, D. (1998) Contributions to the marine fauna of the Rijeka Bay (Adriatic Sea). 8. Echinoderms (Echinodermata). *Natural history researches of the Rijeka region, Natural history library,* 1, 639–646.