

RARELY REPORTED SPECIES OF INDONESIAN SEA CUCUMBERS

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ABSTRACT

More than 300 sea cucumber species have been recorded from Indonesian waters. This paper presents eight species which have been rarely reported. *Actinopyga bannwarthi* Panning, 1944, were found among fished sea cucumbers collected by fishermen in Kupang and Karimunjawa. *Stichopus pseudohorrens* Cherbonnier, 1967, was found in West Timor waters; *Thelenota rubralienata* Massin & Lane, 1991, and *A. caerulea* Samyn, Vandenspiegel & Massin, 2006, were collected from the reef in Halmahera, North Maluku. Four other species i.e. *Bohadschia atra* Massin, Rasolofonirina, Conand, Samyn, 1999; *B. subrubra* Quoy and Gaimard, 1833; *Holothuria (Metriatyla) fuligina* Cherbonnier, 1988, and *H. (Thymiosycia) gracilis* Semper, 1868, were discovered from Lombok waters. The latest mentioned species was also found among fished sea cucumbers in Karimunjawa. All species except *T. rubralienata* may be new records for Indonesia. In the case of *H. (Thymiosycia) gracilis* Semper, 1868, it was new record for Lombok waters, following its discovery from West Seram, Central Maluku.

Keywords: Sea cucumbers, Indonesian waters

INTRODUCTION

Three hundred to 350 sea cucumber species from Indonesian waters have been recorded. More than half of them are collected from the depth of more than 3000 m during Siboga expedition (Sluiter, 1901), and the rest represents shallow water species (Massin, 1996, 1999; Massin & Lane, 1991). Sites where the specimens have been gathered, which then several becomes type localities, are mostly located in Eastern Indonesian waters such as Sulawesi, Maluku and small islands of East Nusa Tenggara.

Several sea cucumber species have been reported to have economic value, and bring benefits to trepang fishers for centuries in many countries (Choo, 2008; Conand, 2008). It was assumed that at least 26 species have ever or still been fished in Indonesian waters (Purwati, 2005). Recently, 18

species which were fished and processed to dried trepang in Karimunjawa, north of Central Java have been recorded (Purwati et al., 2010), from which two species will be presented here.

The utility of resources can be direct, indirect and optional value. It has been decades that sea cucumbers are known to be potential for pharmaceutical and medicines (Lawrence et al., 2009; Takashi et al., 1998; Mourao et al., 1998). As part of biodiversity studies, this report is subjected to drag more attention that trepang fishery which is unregulated in Indonesia, as direct utility, is potential to put more species in depletion or biodiversity loss before they are studied. And considering the vast area of tropical Indonesia, intensive exploration and deeper investigation may lead to a breakthrough on optional values of sea cucumbers for human health.

MATERIALS AND METHOD

Examined specimens are the collection of RC Oceanography, LIPI, Jakarta. Each specimen was identified as E. H. (representing *Echinodermata, Holothuroidea*) and followed by number of registration. All specimens have been preserved in 70% ethanol when examined, therefore, the individuals were measured in fixed condition (in millimeter). Photographs of specimens were taken either in fresh or fixed condition.

Species were determined based on spicules' type and composition. Isolation and preservation of the spicules from dorsal and ventral body

wall referred to what has been done in Wirawati *et al.* (2007). Only when spicules of the body wall were not convincing, those in the tentacles and papillae were examined. Small cut (up to 1 cm²) of the examined organs was rinsed and placed in small bottles separately, and dipped into domestic bleaching for 10–20 min. Subsequently, the supernatant was removed (left the spiculed on the base of the bottle), whereas the spicules were rinsed 2–3 times with aquadest, then were preserved with 70% ethanol for longer storing. To observe the spicules, 1–2 drops of isolated spicules were put on an objective glass and examined under a compound microscope.

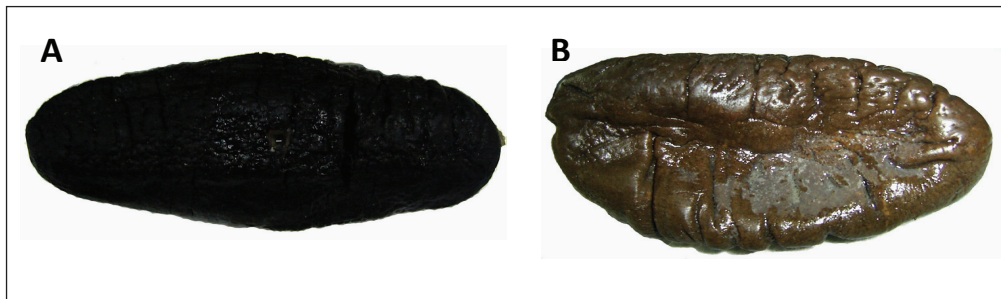


Figure 1. Morphology of *Actinopyga bannwarthi* Panning, 1944, in fixed condition. A: Dorsal view, B: Ventral view.

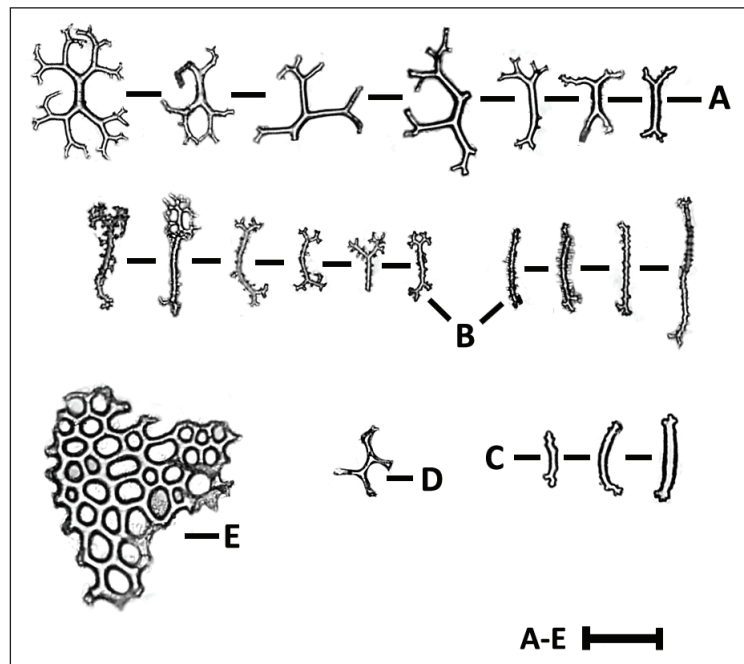


Figure 2. Spicules of *Actinopyga bannwarthi* Panning, 1944. From dorsal integument: branched rods (A), spinose rods (B). From ventral integument: simple rods (C), branched rod (D), terminal plate (E). Bars: 50 μ m.



Figure 3. Distribution map of *Actinopyga bannwarthi* Panning, 1944.

RESULTS

Taxonomic account

Actinopyga bannwarthi Panning, 1944 (Fig. 1,2,3)

Actinopyga serratidens bannwarthi Panning, 1944: 53, fig. 22.

Actinopyga bannwarthi: Cherbonnier, 1988: 15, fig. 1A–K.

Materials – E.H. 389 (1 specimen, in ethanol, 260x90 mm), Aircina-Kupang (West Timor, NTT), coral-sand, depth 12 m; E.H. 461 (1 specimen, in ethanol, 145x40 mm), E.H. 512 (1 specimen, in ethanol, 121x55 mm), Karimunjawa, depth not known.

Diagnosis – body uniformly black with thick body wall, dome-shape in transversal section. Small papillae scattered all over the dorsal surface. Tube feet restricted on ambulacra. Anal teeth present.

Spicules: dorsal integument rod only, large with complex branches and smooth edge rather than small and simpler ones. Rods of ventral integument smaller with simpler branches. Large terminal plates present in ventral integument.

Remarks – The specimens from Karimunjawa were gathered among trepang fished by local

fishermen. This species was easy to be misidentified as *Actinopyga miliaris* due to the body color.

Distribution – Madagascar, Red Sea, Djibouti, Indonesian (Kupang and Karimunjawa).

Actinopyga caerulea Samyn, Vandenspiegel & Massin, 2006 (Fig. 4, 5, 6)

Actinopyga caerulea Samyn, Vandenspiegel & Massin, 2006a: 58–64, fig. 1–5, pl. 1; Samyn *et al.*, 2006b: 50, fig. 50A–K.

Actinopyga crassa; Cherbonnier & Féral, 1984: 664, fig. 3 A–K.

Materials – E.H. 428 (1 specimen, in ethanol, 300 x 95 mm), Akehuda Cape (Northwest Halmahera), coral, depth not known.

Diagnosis – Body pale white. Papillae large, dark-blue and dense in dorsal area. Ventral area had large tube feet scattered unevenly. Anal teeth present.

Spicules: Dorsal body wall had simple rosettes and elongated rod-like spiny rosettes. Ventral spicules were similar to dorsal but with large and less spiny rods.

Remarks – The specimen didn't have perforated terminal plates as in the holotype described by Samyn *et al.* (2006a).

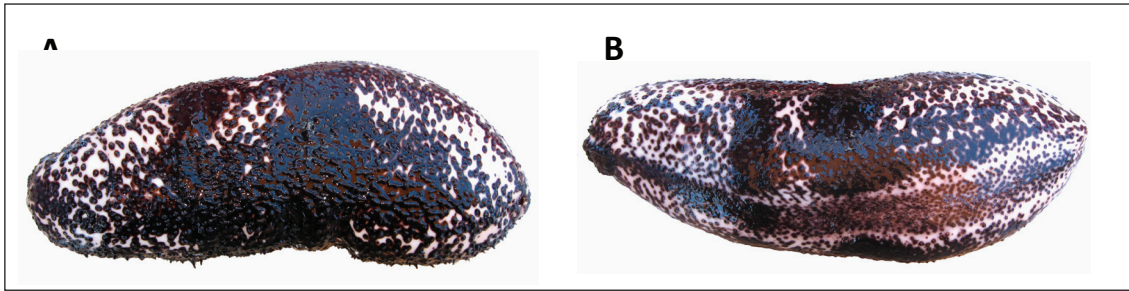


Figure 4. Morphology of *Actinopyga caerulea* Samyn, Vandenspiegel & Massin, 2006 in fresh condition. A: Dorsal view, B: Ventral view

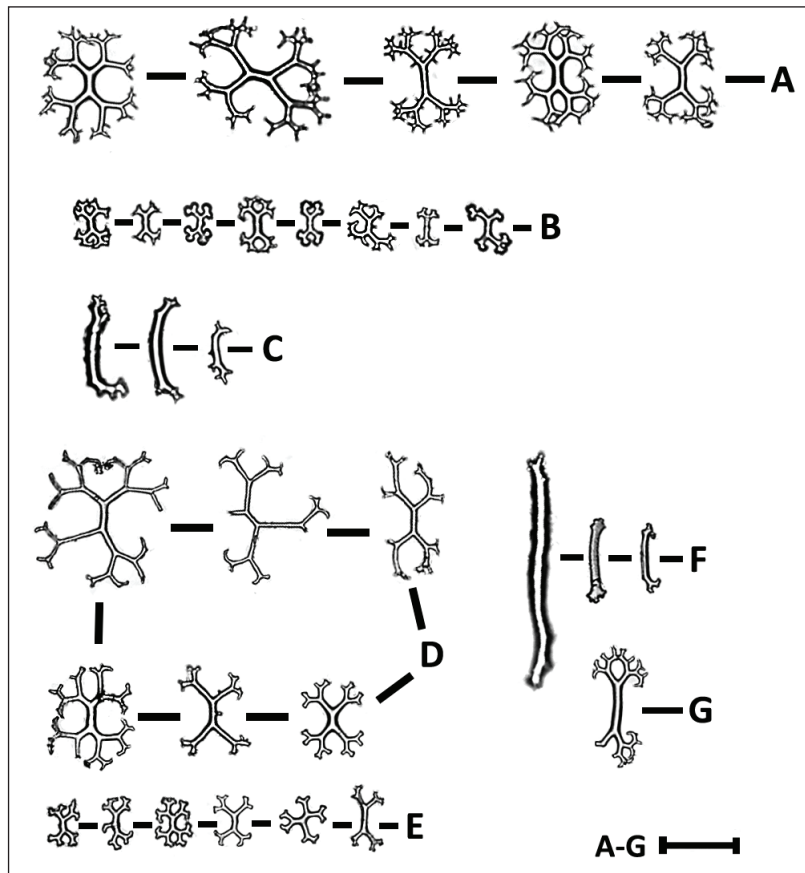


Figure 5. Spicules of *Actinopyga caerulea* Samyn, Vandenspiegel & Massin, 2006. From dorsal integument: rod-like spiny rosettes (A), simple rosettes (B), spiny rods (C). From ventral integument: rod-like spiny rosettes (D & G), simple rosettes (E), less spiny rods (F). Bars: 50 μ m.

Distribution – Thailand, Philippines, Papua New Guinea, Hansa Bay, Madang, New Caledonia and Comoros, Indonesia (Bali, Sulawesi and Halmahera).

***Bohadschia atra* Massin, Rasolofonirina, Conand, Samyn, 1999 (Fig. 7, 8, 9)**

Bohadschia atra Massin, Rasolofonirina, Conand, Samyn, 1999: 151–154, fig. 1–2, pl. 1B, D; Samyn et al., 2006b: 58, fig. 54A–G.



Figure 6. Distribution map of *Actinopyga caerulea* Samyn, Vandenspiegel & Massin, 2006.

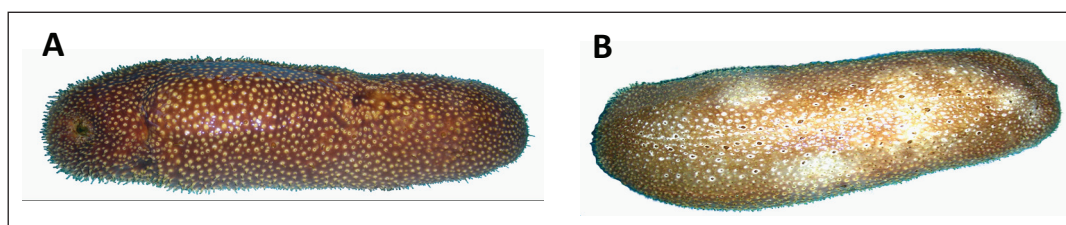


Figure 7. Morphology of *Bohadschia atra* Massin, Rasolofonirina, Conand, Samyn, 1999, in fresh condition. A: Dorsal view, B: Ventral view.

Bohadschia subrubra; Cherbonnier, 1988: 40, fig. 13 (A–K).

Materials – E.H. 444 (1 specimen, in ethanol, 308 x 110 mm), Nare Bay (West Lombok), depth 3 m.

Diagnosis – Body uniformly brown with small papillae scattered all over the dorsal surface. Yellow spots present and scattered on the base of papillae. The ventral surface was light-brown with small tube feet spread without alignment. White spots were present on the base of tube feet. Mouth ventrally and the anus dorsally.

Spicules: Dorsal body wall contains dense branched rosettes and small rods with simple branches. Ventral body wall with perforated grains, simpler branched rosettes than those of dorsal, branched rods and spinose small plates.

Remarks – the specimen from Comores (Massin *et al.* 1999) shows brown-red at the base of each papillae.

Distribution – Madagascar, Comores, Kenya, Tanzania, Indonesia (Lombok).

***Bohadschia subrubra* Quoy & Gaimard, 1833 (Fig. 10, 11, 12)**

Holothuria subrubra Quoy and Gaimard, 1833: 136.

Bohadschia subrubra Cherbonnier, 1952: 36, fig. 14 (A–J); Clark & Rowe, 1971: 176; Massin *et al.* 1999: 155–158, fig. 3–5, pl. 1A, C, D; Samyn *et al.*, 2006b: 64, fig. 57A–F.

Material – E.H. 442 (1 specimen, in ethanol, 330 x 115 mm), Nare Bay (West Lombok), depth 3 m; E.H.523 (1 specimen, in ethanol, 320 x 75 mm), Karimunjawa, depth not recorded.

Diagnosis – Color uniformly brown with irregular white patches scattered on dorsal area. The ventral area light brown with relatively regular elongated white patches along both lateral sides. The dorsal

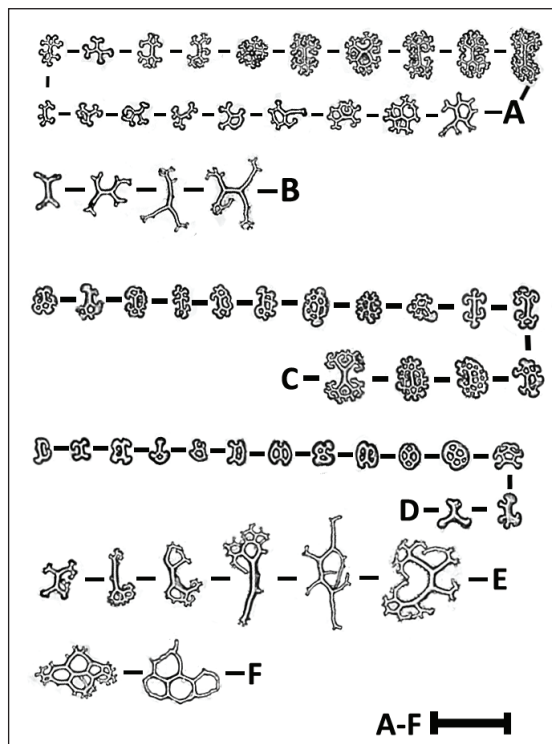


Figure 8. Scicules of *Bohadschia atra* Massin, Rasolofonirina, Conand, Samyn, 1999. From dorsal integument: dense branched rosettes (A), branched rods (B). From ventral integument: simpler branched rosettes (C), perforated grains (D), branched rods (E), small plates (F). Bars 50 μ m.



Figure 9. Distribution of *Bohadschia atra* Massin, Rasolofonirina, Conand, Samyn, 1999.

papillae dark brown, small, dense. Tube feet spread out all over the ventral side.

Spicules: Dorsal body wall had simple small rosettes and large rods with few spines. Ventral spicules had both perforated and un-perforated grains, slender rods with either branched or spinose ends, small rosettes and large perforated terminal plates.

Remarks – Samyn *et al.* (2006b) reported that this species show variety in body color, light brown with black blotches, dark brown with light brown blotches and black.

Distribution – Madagascar, Mauritius, Kenya, Tanzania, Indonesia: Lombok and Karimunjawa.

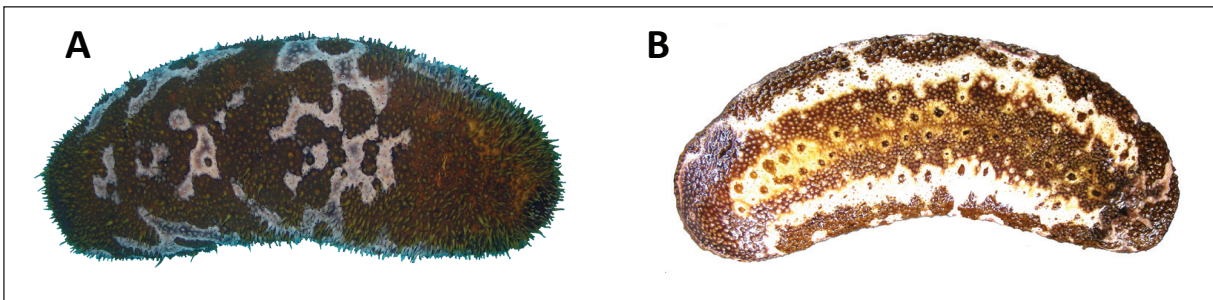


Figure 10. Morphology of *Bohadschia subrubra* Quoy and Gaimard, 1833 in fresh condition. A: Dorsal view, B: Ventral view.

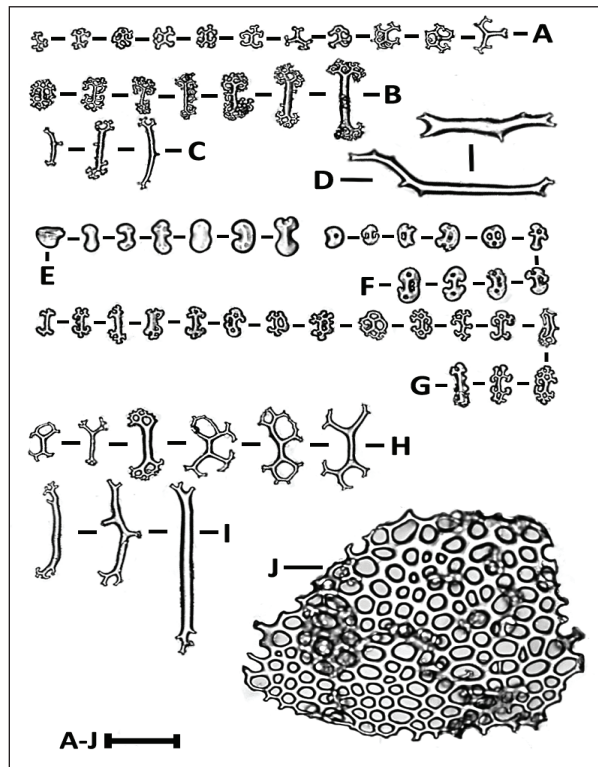


Figure 11. Spicules of *Bohadschia subrubra* Quoy and Gaimard, 1833. From dorsal integument: simple small rosettes (A), rod-like rosettes (B & C), large rods (D). From ventral integument: unperforated grains (E), perforated grains (F), small rosettes (G), rods (H & I), large terminal plate (J). Bars: 50 μ m.



Figure 12. Distribution map of *Bohadschia subrubra* Quoy and Gaimard, 1833.

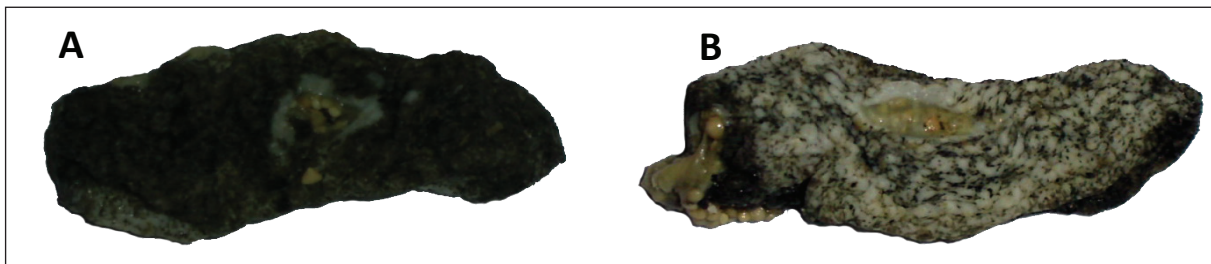


Figure 13. Morphology of *Holothuria (Metriatyla) fuligina* Cherbonnier, 1988, in ethanol. A: Dorsal view, B: Ventral view

***Holothuria (Metriatyla) fuligina* Cherbonnier,
1988
(Fig. 13, 14, 15)**

Holothuria (Metriatyla) fuligina Cherbonnier, 1988: 133, fig. 54A–P.

Material – E.H. 412 (1 specimen, in ethanol, 45 x 14mm,), Ekas Bay (NTB), seagrass, depth 0–1 m; E.H.447 (1 specimen, ethanol, 24 x 14 mm), Kayangan (East Lombok), seagrass, depth 1 m.

Diagnosis – In ethanol, color uniformly black with irregular white patches on the dorsal area. The ventral side white with tube feet spread all over the trivium.

Spicules: Both dorsal and ventral integument had tables and button. Tables were moderate in size, round disc, edge of the disc undulating or smooth, perforation with several small holes in the center and numerous small holes periphery;

spire ended with dense spines and rounded crown; a few tall tables with small crown. Buttons were numerous with 3–8 pairs of holes with nodules and undulating edge.

Remark – This species was found among juveniles of *Holothuria scabra*, and look similar in appearance except irregular white patch on the dorsal area.

Distribution – Madagascar, Indonesia (Ekas Bay, East Lombok).

***Holothuria (Thymiosycia) gracilis* Semper,
1868
(Fig. 16, 17, 18)**

Holothuria gracilis Semper, 1868: 84, 248, pl. 23, pl. 30, fig. 17, pl. 31, fig. 8, pl. 33, fig. 1, pl. 35, fig. 6.

Holothuria (Thymiosycia) gracilis; Rowe, 1969: 147; Clark & Rowe, 1971: 178, pl. 28, fig. 6;

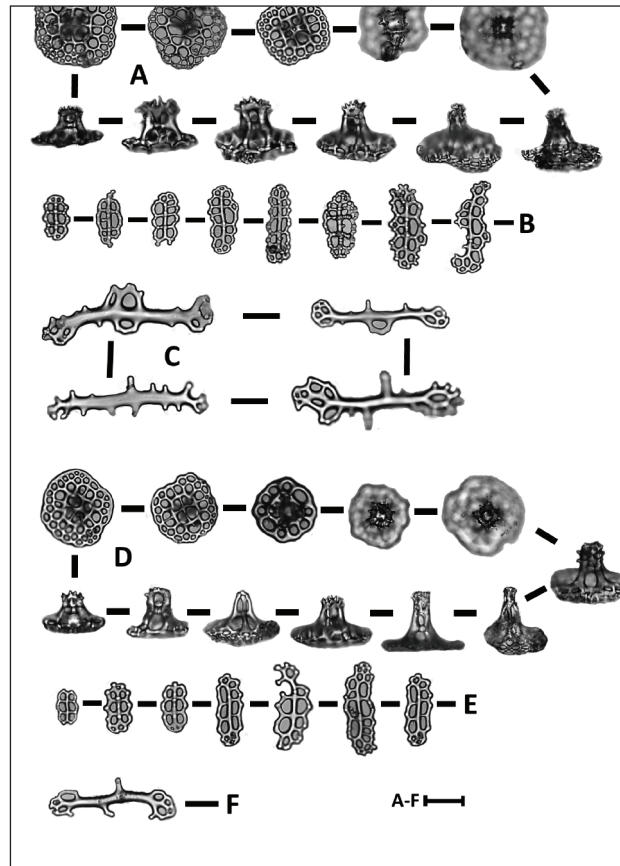


Figure 14. Spicules of *Holothuria (Metriatyla) fuligina* Cherbonnier, 1988. From dorsal integument: tables (A), buttons (B), perforated rods (C). From ventral integument: tables with a few tall & small crown (D), buttons (E), perforated rods (F). Bars: 50 μ m.



Figure 15. Distribution map of *Holothuria (Metriatyla) fuligina* Cherbonnier, 1988.

Cherbonnier, 1988: 91, fig. 36A–K; Setyastuti, 2009: 381–382, fig. 16–17.

Material – E.H. 335, E.H. 339 (5 specimens, in ethanol, from 24 x 10 mm to 78 x 22 mm), West Sekotong (West Lombok), seagrass, depth 0–2 m.

Diagnosis – In ethanol, the color gray-brown with dark spot on the dorsal side. Papillae scattered on the whole dorsal surface. Ventral side pale gray with white spots. Tube feet spread out all over the ventral side.

Spicules: table, button and rod spicules imbedded in both ventral and dorsal integument. Tables with

smooth disc, perforated by four large central holes and 8–10 peripheral holes; spire was moderate ended with spinose and rounded crown. Buttons were numerous, smooth, elongated or sometimes encircled with regular or irregular 5–6 holes. Rods were perforated at the extremities.

Remark – Buttons were similar with *Holothuria arenicola*, except for the rounded buttons. This is the second report of this species in Indonesia, following that from Seram Island, Maluku.

Distribution – Madagascar, Indonesia (Seram and Lombok).

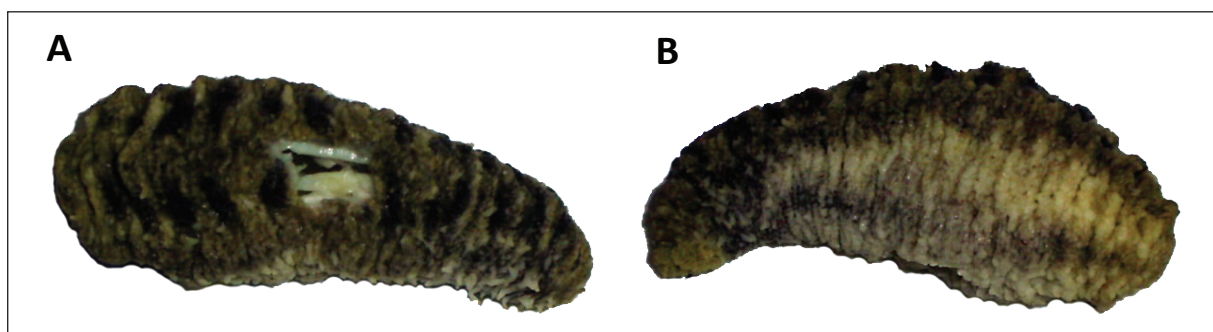


Figure 16. Morphology of *Holothuria (Thymiosycia) gracilis* Semper, 1868, in fixed condition. A: Dorsal view, B: Ventral view.

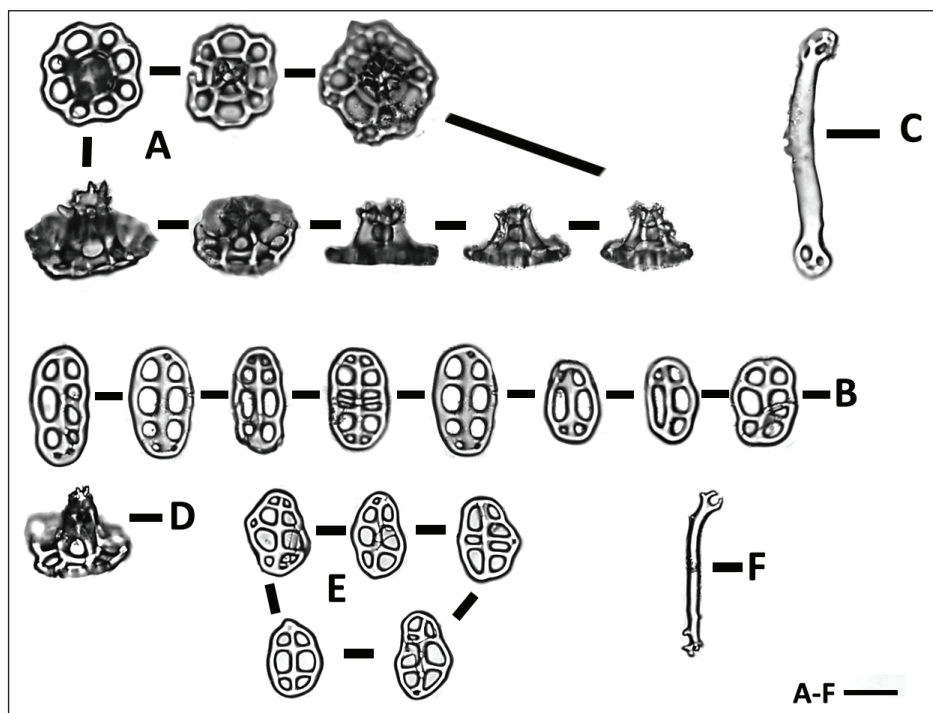


Figure 17. Spicules of *Holothuria (Thymiosycia) gracilis* Semper, 1868. From dorsal integument: tables (A), buttons (B), rod (C). From ventral integument: tables (D), buttons (E), rod (F). Bars: 50 μ m.



Figure 18. Distribution map of *Holothuria (Thymiosycia) gracilis* Semper, 1868.



Figure 19. Morphology of *Stichopus pseudohorrens* Cherbonnier, 1967, on reef habitat. Dorsal view

***Stichopus pseudohorrens* Cherbonnier, 1967
(Fig. 19, 20, 21)**

Stichopus pseudohorrens Cherbonnier, 1967: 63, fig. 4a–s, 5a–e; Samyn, et al., 2006b: 108, fig. 79A–J.

Material – E.H. 400 (1 specimen, in ethanol, 270 x 88 mm), Tablong-Kupang (West Timor, NTT), sand-coral, depth 18 m.

Diagnosis – Body trapezoid in transversal section. In alcohol, pale brown all over. Papillae enlarge, stand individually. Tube feet limited on ambulacra. Spicules: No striking differences between dorsal and ventral integument spicules. Tables were numerous, moderate to tall in dimension; disc rounded with 4 central holes and numerous peripheral holes; edge of the disc undulating or spinose; 4 spires unite into a spinose crown or

sometimes forming semi tack-like ending with spines. Rosettes with curly ends, numerous, smaller in ventral integument.

Remark – Conical and papillae in observed specimen was denser than that reported from Comoros by Samyn et al. (2006). Without spicule examination, this species is easy to be misidentified as *T. ananas*.

Distribution – Israel, Comoros, Indonesia (West Timor).

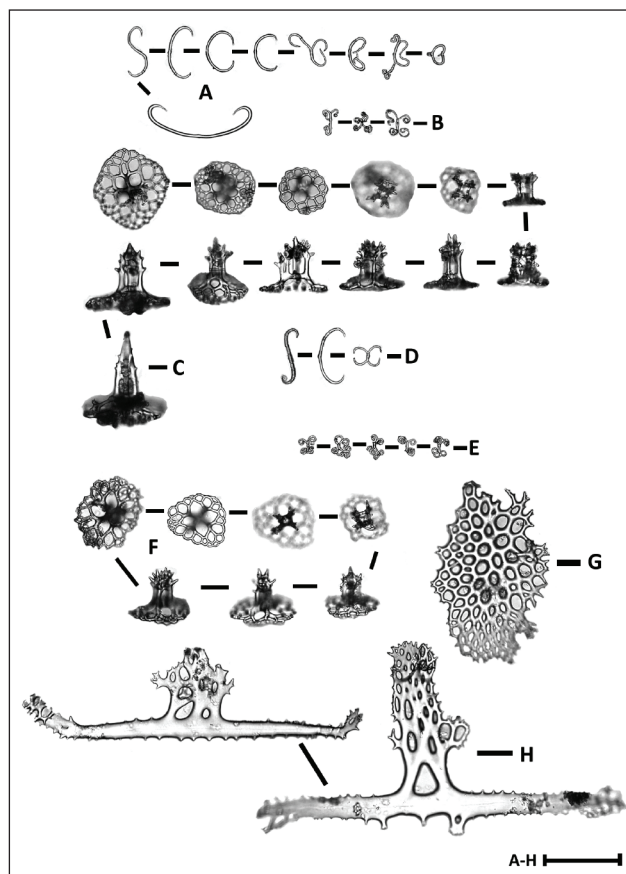


Figure 20. Spicules of *Stichopus pseudohorrens* Cherbonnier, 1967. From dorsal integument: C and S-shaped rods (A), rosettes with curly ends (B), tables (C). From ventral integument: C and S-shaped rods (D), rosettes with curly ends (E), tables (F), large terminal plates (G), large rods (H). Bars: 100 μ m.

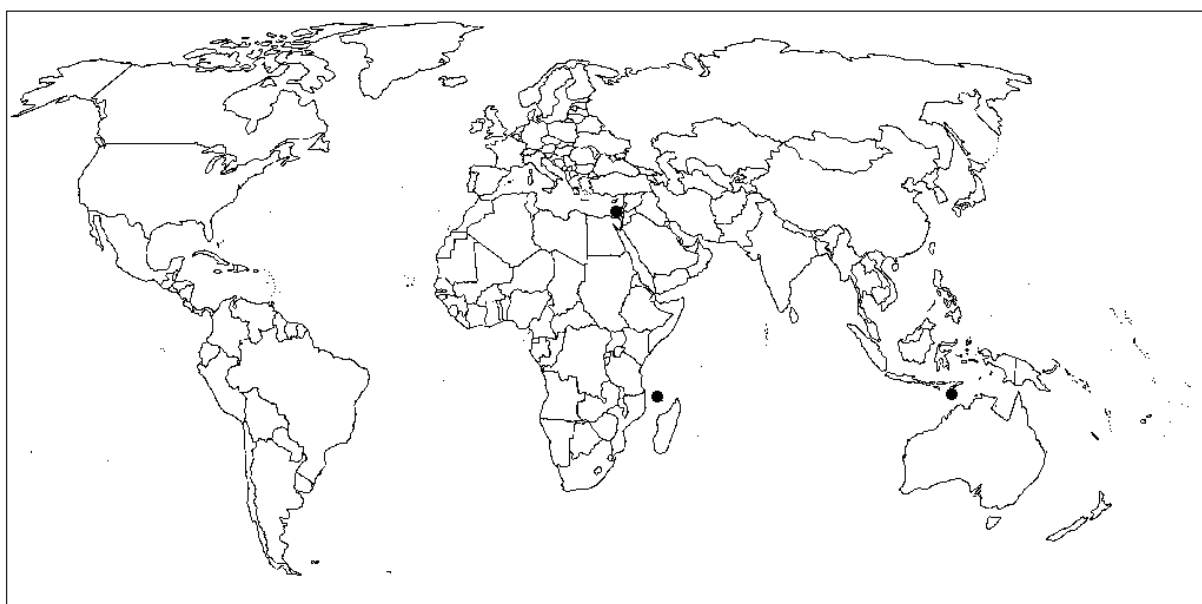


Figure 21. Distribution map of *Stichopus pseudohorrens* Cherbonnier, 1967.

***Thelenota rubralienata* Massin & Lane, 1991**
(Fig. 22, 23, 24)

Thelenota rubralienata Massin & Lane, 1991: 58–62, fig. 1–8.

Material – E.H. 427 (1 specimen, in ethanol, 280 x 72 mm), Tagalaya Island (Northeast Halmahera), depth not known.

Diagnosis – Body trapezoid in transversal section, posterior slightly narrowed. Body color white with

red lines encircling every enlarged papilla. Tube feet along the ambulacra.

Spicules: There are no significant differences between dorsal and ventral spicules, except for the presence of perforated terminal plate in ventral area. Both sides of body wall have slender dichotomously branching rods with spinous ends, elongated and serpent-like military granules with rounded ends, and pseudo-tables with extremely reduced disc and three spires without crown.

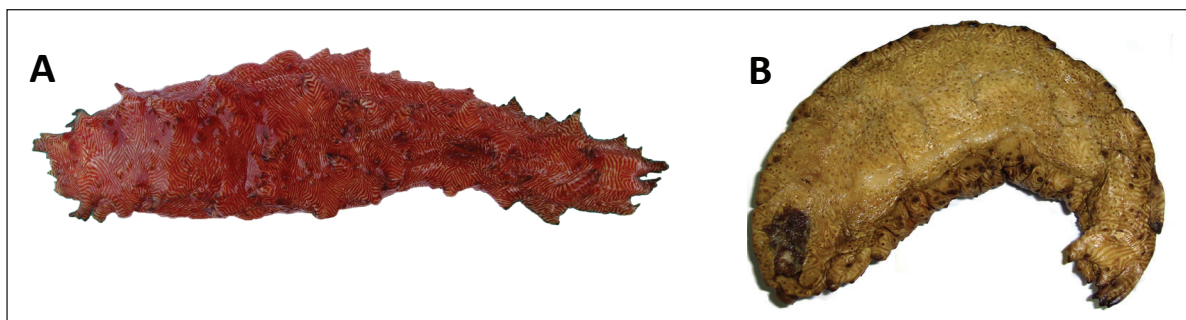


Figure 22. Morphology of *Thelenota rubralienata* Massin & Lane, 1991. A: Dorsal view (fresh specimen), B: Ventral view (in ethanol).

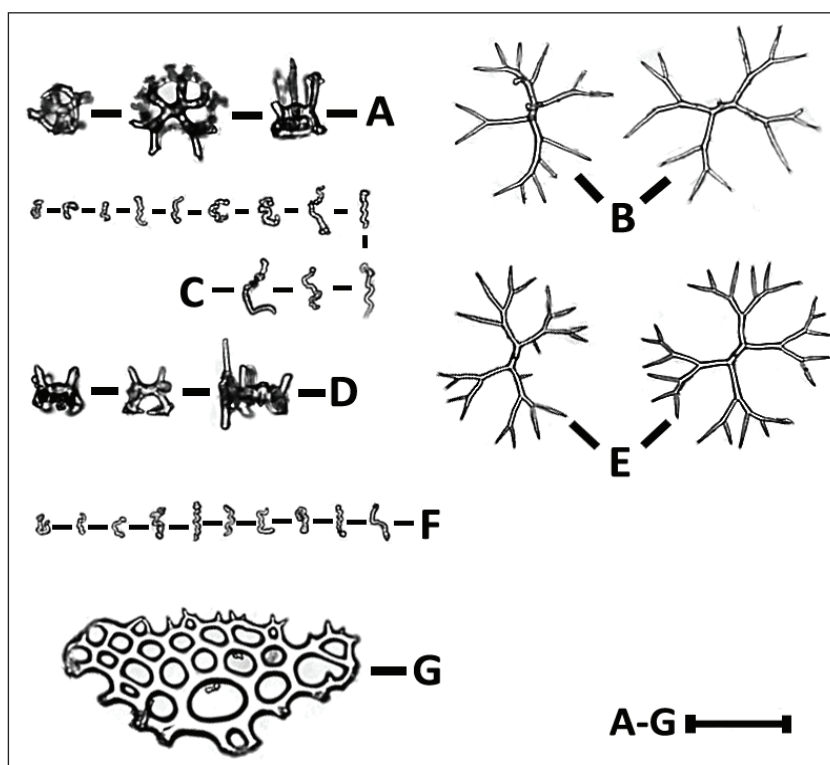


Figure 23. Spicules of *Thelenota rubralienata* Massin & Lane, 1991. From dorsal integument: pseudo-tables (A), dichotomous branched rods (B), serpent-like military granules (C). From ventral integument: pseudo-tables (D), dichotomous branched rods (E), serpent-like military granules (F), terminal plate (G). Bars: 50 μ m.



Figure 24. Distribution map of *Thelenota rubralienata* Massin & Lane, 1991.

Distribution – Guam, New Caledonia, Philippines (Bohol and Mindoro), Papua New Guinea, Solomon Islands, Papua New Guinea (Laing Island), Malaysia (Sabah), Taiping Island, Fiji, Palau and New Britain, Indonesia (Bunaken, Halmahera, Banda Islands, North coast of Flores and Northeast).

DISCUSSION

Six species described in this paper have rarely or never been reported before. Two other species, *H. gracilis* and *T. rubralineata* have been reported to be present in eastern and central Indonesian waters (Setyastuti, 2010; Massin & Lane, 1991). These species were not in the list of fished holothurians of Asia compiled by Chou (2008). Apparently, more species have been entering the fishery, supporting the assumption of Purwati *et al.* (2010). *A. ban-nwarthi* and *A. miliaris* in Karimunjawa (islands north of Java) were called *teripang sepatu* (Purwati *et al.* 2011). The similarity in overall appearance made both species were given the same trepang name. Misleading also occurred in *Stichopus pseudohorrens* that we believed to be potentially misidentified as *Thelenota ananas*, which has been well known for such long time as *teripang nanas*. Both species have large body size with enlarged leaf-like papillae all over the upper side.

Taxonomy is one of many aspects which slowdown the progress of sustainable fishery and conservation programs. Each producing country may have their own composition in the main species targets, and because each population of the targets potentially showed specific population condition and biological charaters, changing in species composition entering the market may be temporary. Otherwise, species and population depletion may not recover. In those perspective, and because the environment changed in many ways and fishing has been more intensified, taxonomic study should be encouraged in Indonesia that is one of the largest trepang producing countries. One of the sea cucumber prospects is uncovering their optional values through bioprospecting for human health.

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