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Report of Newly Recorded Eight Scleractinian Corals from Middle and South Andaman Archipelago, India

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GJSFR-C Classification : *FOR Code: 279999*

REPORTOFNEWLYRECORDEDEIGHTSCLERACTINIANCORALSFROMMIDDLEANDSOUTHANDAMANARCHIPELAGOINDIA

Strictly as per the compliance and regulations of :

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Tamal Mondal [α], C. Raghunathan [σ] & K. Venkataraman [ρ]

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I. Introduction

The coral reef ecosystem is one of the most productive ecosystems of this planet and stood second in rank after Tropical Rainforests. The complexity of food chain and its resemblance thrive the naming of coral reef ecosystem as Rainforests of Sea [1]. The distributional pattern of corals indicates very minimum coverage i.e.0.2% of world's ocean floor, despite of this narrow affiliation, it support enormous microhabitat with an estimated quantification of 25% of all marine species [2]. The coverage and support ratio has been contiguously demonstrating the widespread significance of coral reef biodiversity for sustaining the marine biodiversity. Andaman and Nicobar Islands with its intrinsic ecological attributes sustain a wide range of marine faunal communities from intertidal region to the greater depth of the sea. The presence of mostly fringing type reefs in the continental shelf region of these islands harbours optimum level of scleractinian corals. The life supporting environmental clues for the scleractinian corals mostly available in tropical waters [3]. Scleractinian corals are baseline animals for the development of balanced marine ecosystem [4]. Andaman and Nicobar Archipelago signify the natural inherent and pristine environment for the recruitment and development of scleractinian corals. The biological, ecological, sociological, economical and etc. roles of scleractinian lives are undreamed off either directly or indirectly. The present paper deals with the addition of eight newly recorded species in Indian waters from Andaman and Nicobar Islands with their global and regional status as well as earlier record on distribution.

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II. Material and Methods

An extensive study was carried out in Middle and South Andaman Archipelago of Andaman and Nicobar Islands during March and November 2014 to document the scleractinian corals. Undersea species investigation was carried out by employment of Self Contained Underwater Breathing Apparatus (SCUBA) diving. Underwater recording of individual species was made by underwater digital camera (Canon Powershot G15). Sampling of small portion of colonies were also made to study the corallite structures for better understanding of the morphological features under stereo zoom microscope (Leica, M 205 A). Species individual photos were identified in conjunction with Veron and Pichon [5-7], Veron *et al.* [8] Veron and Wallace [9], Veron [10] and Wallace [11]. On completion of detailed taxonomical characters, the specimens were registered in National Zoological Collections and deposited at Zoological Survey of India, ANRC, Port Blair.

III. Results

Eight species of scleractinian corals were recognized as new to Indian waters from Andaman and Nicobar Islands on the basis of morphological characterization. The detailed morphometric description is given below with distributional range.

Systematics

Family: ACROPORIDAE Verrill, 1902
Genus: Acropora Oken, 1815

a) ***Acropora azurea*** Veron, and Wallace 1984 (Fig. 1)

Material Examined: Five colonies of the said species were observed at Neil Island (Lat. 11°51.115'N and Long. 93°02.689'E) of South Andaman at the depth of 9 m to 14 m on 27.iv.2014. One small portion of the

colony was sampled for taxonomical studies (Reg. No.: ZSI/ANRC-10593).

Description: Colonies are the combination of irregularly arranged clumps of fine branches and branchlets. Those are arising basically from a solid base. Radial corallites are not regularly arranged. The radial corallites are appressed and ended with small nariform rounded openings. Axial corallites are small and tubular.

IUCN Red List category and criteria: Not Evaluated, 2014.

Occurrence in Andaman and Nicobar Islands: Rare.

Distribution: India- Andaman and Nicobar Islands; *Elsewhere-* Australia, Indonesia, Taiwan, Province of China and Viet Nam.

Family: FAVIIDAE Gregory, 1900

Genus: Favia Oken, 1815

b) ***Favia vietnamensis*** Veron, 2000 (Fig. 2)

Material Examined: Two colonies were observed at Neil Island (Lat. 11°50.556'N and Long. 93°00.508'E) of South Andaman at the depth of 15 m to 17 m on 26.iv.2014.

Description: Colonies are massive in structure but the appearance is usually small. Corallites are irregularly shaped and deeply excavated to form the colony. Septa are well marked and irregular in length. Developed paliform lobes are prominent. Colonies are usually fleshy during *in situ* condition.

IUCN Red List category and criteria: Near Threatened, 2014.

Occurrence in Andaman and Nicobar Islands: Rare.

Distribution: India- Andaman and Nicobar Islands; *Elsewhere-* Australia, Cambodia, Indonesia, Japan, Kenya, Malaysia, Mozambique, Papua New Guinea, Philippines, Singapore, Taiwan, Province of China, Tanzania, United Republic of Thailand and Viet Nam.

Family: DENDROPHYLLIIDAE Gray, 1847

Genus: Turbinaria Oken, 1815

c) ***Turbinaria irregularis*** Bernard, 1896 (Fig. 3)

Material Examined: Two colonies were observed at Neil Island (Lat. 11°51.115'N and Long. 93°02.689'E) of South Andaman at the depth of 10 m on 27.iv.2014.

Description: Colonies are encrusting plates. The outer marginal areas are free and irregular. Corallites are also irregularly arranged in colony and exsert. The openings of the corallites are small. The coenosteum is usually smooth and uniform between adjacent corallites.

IUCN Red List category and criteria: Least Concern, 2014.

Occurrence in Andaman and Nicobar Islands: Rare.

Distribution: India- Andaman and Nicobar Islands; *Elsewhere-* American Samoa, Australia, British Indian Ocean Territory, Cambodia, Comoros, Djibouti, Egypt, Eritrea, Guam, Indonesia, Israel, Japan, Jordan, Madagascar, Malaysia, Maldives, Mauritius, Mayotte, Micronesia, Mozambique, Northern Mariana Islands, Oman, Palau, Papua New Guinea, Philippines, Réunion, Samoa, Saudi Arabia, Seychelles, Singapore, Solomon Islands, Somalia, Sudan, Taiwan, Province of China, Thailand, Viet Nam and Yemen.

Family: SIDERASTREIDAE Vaughan and Wells, 1943

Genus: Psammocora Dana, 1846

d) ***Psammocora vaughani*** Yabe and Sugiyama, 1936 (Fig. 4)

Material Examined: Five colonies were observed at Haddo NSRY Jetty adjoining area (Lat. 11°40.667'N and Long. 92°42.902'E) of South Andaman at the depth of 4 m on 07.iii.2014.

Description: Colonies are sub-massive and can be seen as small colonial patch. Corallites are arranged in groups within shallow depressions. Septo-costae are thick. They are arranged in neat and have granulated margins.

IUCN Red List category and criteria: Near Threatened, 2014.

Occurrence in Andaman and Nicobar Islands: Rare.

Distribution: India- Andaman and Nicobar Islands; *Elsewhere-* Fiji, Guam, Indonesia, Japan, Kiribati, Marshall Islands, Micronesia, Nauru, Northern Mariana Islands, Palau, Papua New Guinea, Philippines, Solomon Islands, Taiwan, Province of China, Tuvalu, Vanuatu, Wallis and Futuna.

Family: SIDERASTREIDAE Vaughan and Wells, 1943

Genus: Coscinaracea Milne Edwards and Haime, 1848

e) ***Coscinaraea wellsi*** Veron and Pichon, 1980 (Fig. 5)

Material Examined: One colony was observed in Ship wreck at North Bay (Lat. 11°43.006'N and Long. 092°45.465'E) of South Andaman at the depth of 9 m on 21.iii.2014.

Description: Colonies are small and thin plate like structure. The plate margins are lobed and irregular in orientation. The laminae are overlapping. Corallites are irregularly distributed. The columellae are with deep, The septo-costae are thick and granulated.

IUCN Red List category and criteria: Least Concern, 2014.

Occurrence in Andaman and Nicobar Islands: Rare.

Distribution: India- Andaman and Nicobar Islands; *Elsewhere-* Australia, British Indian Ocean Territory, Cambodia, Comoros, Djibouti, Egypt, Eritrea, Fiji, French Polynesia, Indonesia, Israel, Japan, Jordan, Kenya, Kiribati, Madagascar, Malaysia, Maldives, Marshall Islands, Mauritius, Mayotte, Micronesia, Mozambique, Myanmar, Nauru, New Caledonia, Norfolk Island, Palau, Papua New Guinea, Philippines, Réunion, Saudi Arabia, Seychelles, Singapore, Solomon Islands,

Somalia, Sri Lanka, Sudan, Taiwan, Province of China, Tanzania, Thailand, Tuvalu, Vanuatu, Viet Nam and Yemen.

Family: FUNGIIDAE Dana, 1846

Genus: Halomitra Dana, 1846

f) ***Halomitra meierae*** Veron and Maragos, 2000 (Fig. 6)

Material Examined: Eleven colonies were observed at off Neil Island (Lat. 11°55.300'N and Long. 93°05.613'E) of South Andaman at the depth of 25 to 32 m on 25.iv.2014. One colony was sampled for taxonomical studies (Reg. No.: ZSI/ANRC-10830).

Description: Colonies are free-living, circular in outline and are flat. Colony is with a central area of parallel septo-costae surrounded by a border of peripheral septo-costae. The septo-costae are perpendicular to the colony margin. Mouths are distinguishing in the central area. The structures of the mouths are small. Septo-costae are arranged in two or three different orders. Septal teeth are prominent and arranged. The teeth are usually granularly dentate and sides of walls are granular. The costae are arranged upto the colony margin. Costal pits are presents. Costal spines are echinose.

IUCN Red List category and criteria: Not Evaluated.

Occurrence in Andaman and Nicobar Islands: Rare.

Distribution: India- Andaman and Nicobar Islands; *Elsewhere-* Indonesia and Irian Jaya.

Family: MUSSIDAE Ortmann, 1890

Genus: Lobophyllia de Blainville, 1830

g) ***Lobophyllia flabelliformis*** Veron, 2000 (Fig. 7)

Material Examined: One colony was observed in Ship wreck at North Bay (Lat. 11°43.006'N and Long. 092°45.465'E) of South Andaman at the depth of 9 m on 21.iii.2014.

Description: Colonies are dome-shaped and flabello-meandroid. The valleys are closely compacted and elongated. Due to presence of fleshy polyps, it can be encountered as *Symphyllia* at *in situ* condition. Valleys are well separated. The septal dentition is well marked and strong.

IUCN Red List category and criteria: Vulnerable, 2014.

Occurrence in Andaman and Nicobar Islands: Rare.

*Distribution: India-*Andaman and Nicobar Islands; *Elsewhere-* Australia, Indonesia, Japan, Malaysia, Papua New Guinea, Philippines, Singapore, Solomon Islands, Taiwan, Province of China, Thailand and Viet Nam.

Genus: Mussismilia Ortmann, 1902

h) ***Mussismilia braziliensis*** (Verrill, 1867), (Fig. 8)

Material Examined: One colony was observed at North Passage Island (Lat. 12°18.288'N and Long. 92°54.830'E) of South Andaman at the depth of 6 m on 28.xi.2014.

Description: The colony is large, massive and dome shaped in organization. Cerioid arrangement of corallites is distinctive characterization of this species. The shapes of the individual corallites are variable for each. The corallites are seen as very compact in their developmental pattern also. Septa are round in shape while the dentations are seems to be bead like.

IUCN Red List category and criteria: Data Deficient, 2014.

Occurrence in Andaman and Nicobar Islands: Rare.

Distribution: India- Andaman and Nicobar Islands; *Elsewhere-* Brazil.

IV. Discussion

Scleractinian corals are living with the formation of a variety of interlinking network of faunal communities and close symbiotic association of zooxanthellae [12] mostly shallow depth region (up to 60 m) and encounter as the main source of primary productivity [13] while the azooxanthellate corals are reported from the greater depth. The pattern of vertical narrow range of distribution and presence of microscopic algae i.e. zooxanthellae continues the life process by photosynthesis and respiration and also manage the entire reef energy cycle either from physical energy of oceanic circulatory process or carbon cycle of associated faunal creatures (www.reef.edu.au). Due to the proximity of mammoth beneficial aspects, the scleractinian corals have been considered under great concern of study from the past to recent date. The wide range of species diversity from 1488 to 1520 [14, 15] and their morphological plasticity depending on the geographical as well as physiological deviation leads to immense emphasis on taxonomical studies [16-18]. The taxonomical works on scleractinian corals in India was initiated during 1847 [19] and carried out very scarcely till 1960s. During the period of around next 30 years, active taxonomical works were made by several workers and a total of 199 species of scleractinian corals were recorded as Indian scleractinian database [20-32] In 2003, Venkataraman *et al.* described a total of 208 species of scleractinian corals from all the major four reef areas of India while Andaman and Nicobar Islands represented 177 species of scleractinian corals among them [33]. Due to extensive taxonomical exploration of Zoological Survey of India, a total of 591 species of scleractinian corals are reported from Indian waters while Andaman and Nicobar Islands represents 563 species with two new species of corals, of which one species of coral under the family Fungiidae [34-37]. The addition of eight species of scleractinian corals as new record to Indian waters from Andaman and Nicobar Islands will strengthen the species database of these islands as well as India. Presently reported eight species are found only from the above mentioned study areas and very rare in occurrence to the Andaman and

Nicobar Islands. *Lobophyllia flabelliformis* Veron, 2000 belong to the family Mussidae, was evaluated as Vulnerable (VU) species according to the IUCN Redlist category and criteria while two species were evaluated as Near Threatened. More extensive studies are required in future in Andaman and Nicobar Islands to explore the distributional range of new scleractinian corals as well as the ecological studies to evaluate the regional occurrence and status to compare with the global ratio. The emerging knowledge on scleractinian corals will be helpful to conservation the marine biodiversity with active management plan and strategies.

V. Acknowledgements

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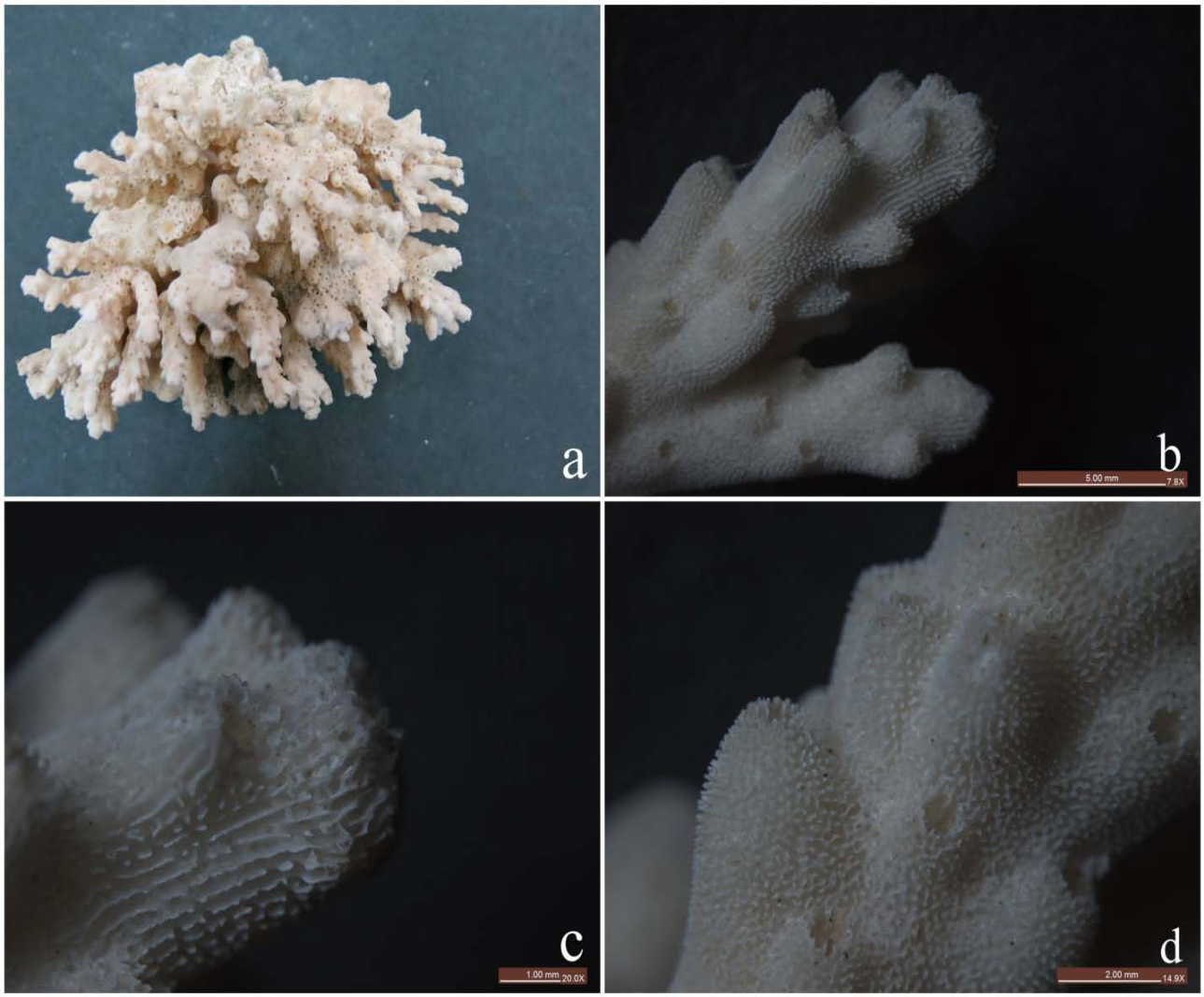

Fig. 1 : *Acropora azurea* Veron, and Wallace 1984
a Small portion of a colony; b- Branches of colony; c- Axial corallites; d- Radial corallites

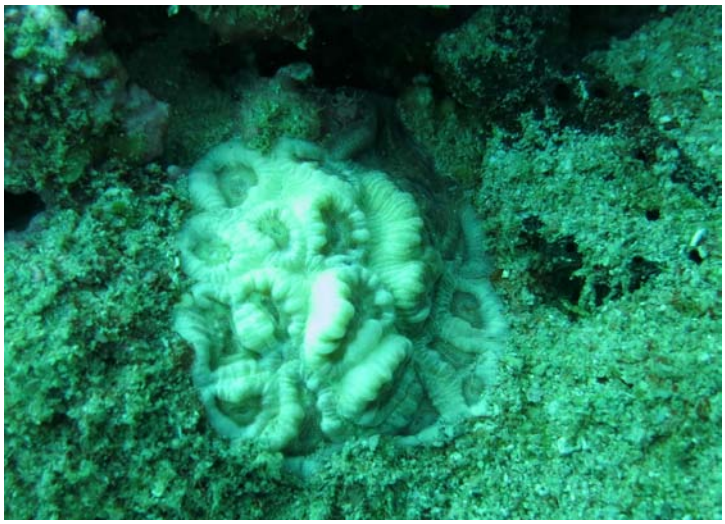

Fig. 2 : *Favia vietnamensis* Veron, 2000

Fig. 3 : *Turbinaria irregularis* Bernard, 1896

Fig. 4 : *Psammocora vaughani* Yabe and Sugiyama, 1936

Fig. 5 : *Coscinaraea wellsi* Veron and Pichon, 1980

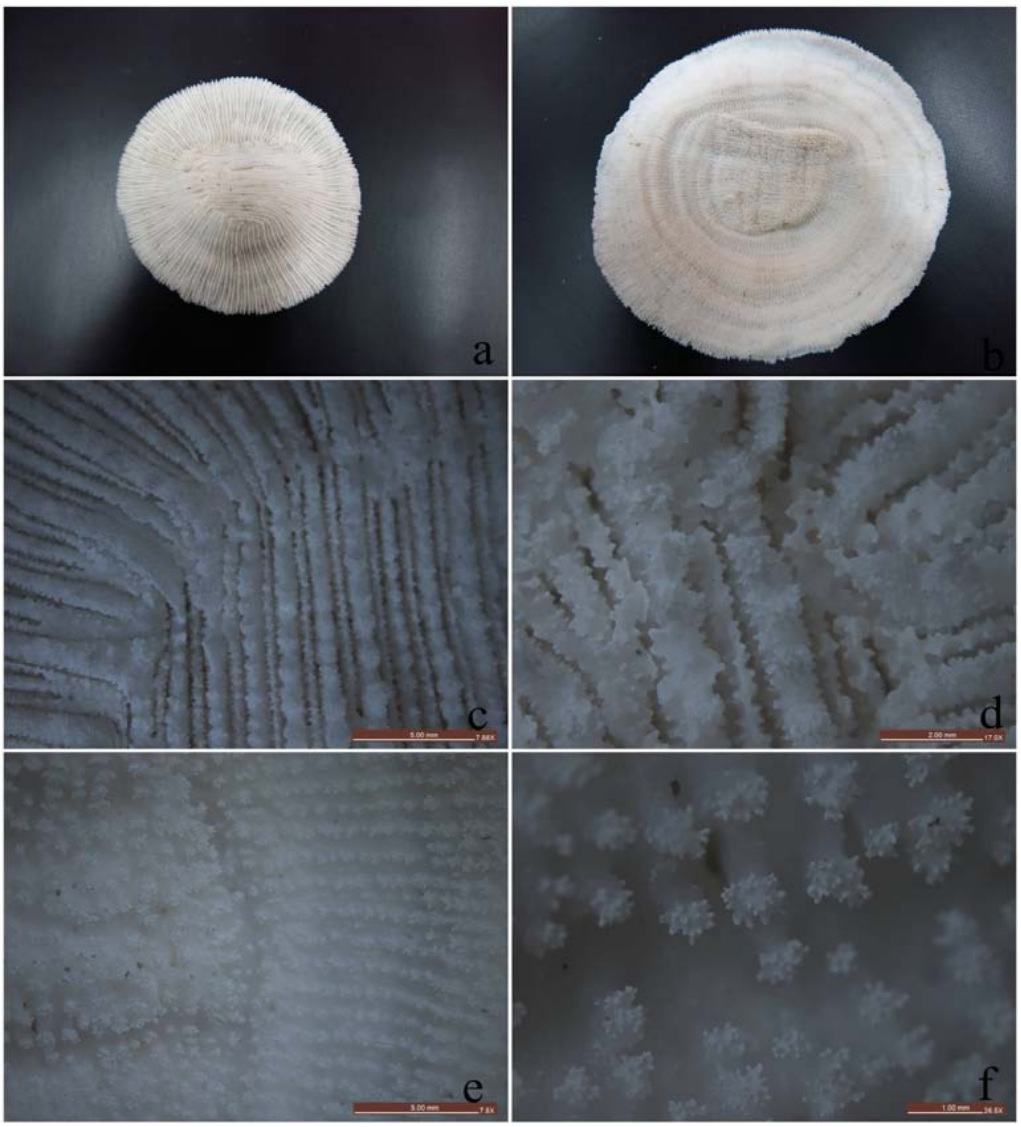

Fig.6 : *Halomitra meierae* Veron and Maragos, 2000

a- Dorsal side of coralla; b- Ventral side of coralla; c- Septal arrangement; d- septal teeth; e-Costal arrangement; f- Costal spines

Fig. 7 : *Lobophyllia flabelliformis* Veron, 2000

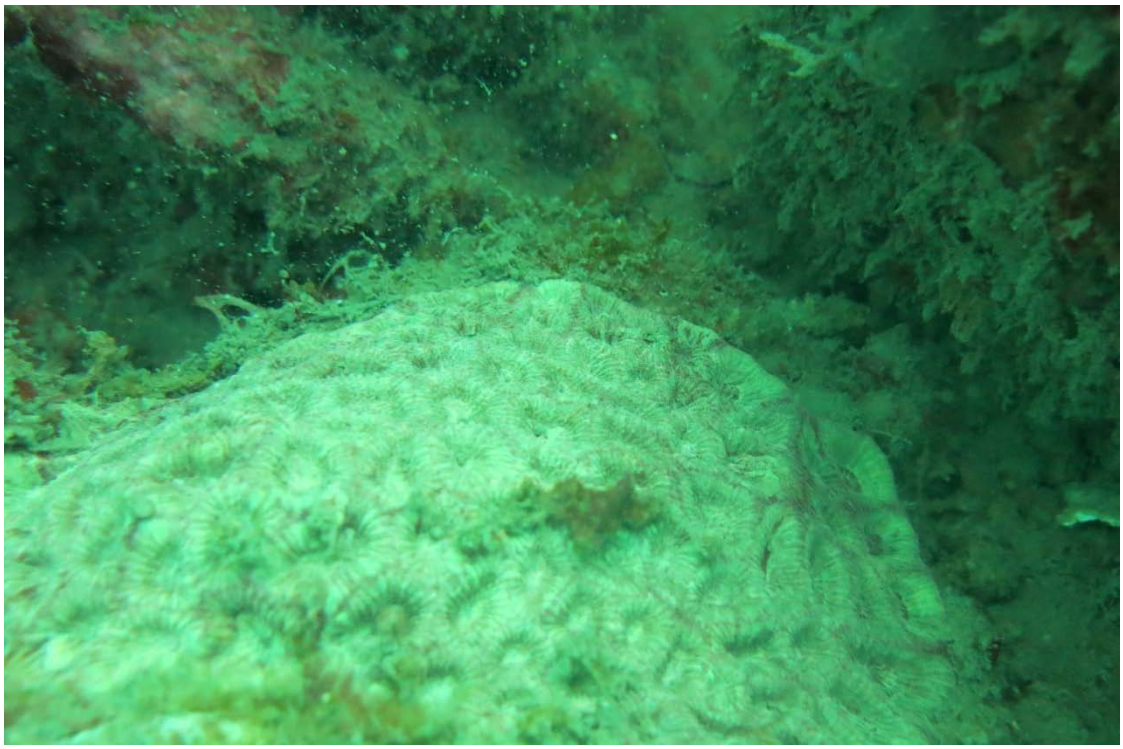

Fig. 8 : *Mussismilia braziliensis* (Verrill, 1867)