Mushroom corals (Scleractinia, Fungiidae) of Espiritu Santo (Vanuatu, West Pacific), with the description of a new species

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ABSTRACT
A total of 35 mushroom coral species (Scleractinia, Fungiidae) was recorded at the southeastern coast of Espiritu Santo, northern Vanuatu, during the SANTO 2006 expedition. One species, *Sandalolitha boucheti* n. sp., is described as new to science. It can be distinguished from its congeners by dense and thin septa, fine serrated septal dentations, evenly distributed stomata, and a light brown colour. The present species number is distinctly higher than previous records and suggests that northern Vanuatu, Espiritu Santo in particular, should be included in the so-called Coral Triangle, the Indo-West Pacific centre of maximum marine biodiversity, which would require an extension of this area in southeastward direction.

KEY WORDS
Cnidaria,
Anthozoa,
Hexacorallia,
Scleractinia,
Fungiidae,
Vanuatu,
Espiritu Santo,
Coral Triangle,
new species.

RÉSUMÉ
Coraux champignons (Scleractinia, Fungiidae) d'Espiritu Santo (Vanuatu, Pacific ouest), avec la description d'une novelle espèce.
Un total de 35 espèces de coraux champignons (Scleractinia, Fungiidae) a été rapporté de la côte sud-est d'Espiritu Santo, au nord du Vanuatu, pendant l'expédition SANTO 2006. Une de ces espèces, *Sandalolitha boucheti* n. sp., nouvelle pour la science, est décrite ici. Elle se distingue de ses congénères par des septa nombreux et fins, des indentations septales finement serrulées, des stomates distribués régulièrement et une coloration brun clair. Le nombre d'espèces est bien plus grand que ce qui a été précedemment rapporté, ce qui suggère que le nord du Vanuatu, et plus particulièrement Espiritu Santo, devrait être inclus dans ce que l'on appelle le Triangle du corail – le centre du bassin Indo-Pacifique qui possède une biodiversité marine maximale –, et donc que cette zone doit être agrandie en direction du sud-est.

MOTS CLÉS
Cnidaria,
Anthozoa,
Hexacorallia,
Scleractinia,
Fungiidae,
Vanuatu,
Espiritu Santo,
Triangle du corail,
espèce nouvelle.

Fig. 1. — Map of Vanuatu indicating the position of Espiritu Santo and the sampled area.

INTRODUCTION

Mushroom corals (Scleractinia Bourne, 1900, Fungiidae Dana, 1846) are stony reef corals. Because of their striking appearance, they are well known from coral reefs across the tropical Indo-Pacific (Hoeksema 1989). Most species have a free-living adult stage in their life cycle after becoming detached from a stalk (Hoeksema & Yeemin 2011). A few others have lost this ability and remain attached to a hard substrate (Hoeksema 1989, 2009). They are generally common reef-dwellers and in various reef areas free-living species have been observed to form dense aggregations of mixed or single species, depending on their ability of asexual reproduction through budding or fragmentation (Hoeksema 1991, 2004, 2012; Hoeksema & Koh 2009; Hoeksema & Gittenberger 2010; Hoeksema & Matthews 2011; Hoeksema & Waheed 2011).

Owing to their mobility, free-living mushroom corals inhabit various kinds of substrates. They can be found in a range of reef environments, from shallow reef flats to deep sandy reef bases and from reefs near river mouths to offshore oceanic reefs (e.g., Hoeksema & Moka 1989; Cleary *et al.* 2005; Becking *et al.* 2006; Hoeksema 2012). Because they are relatively common reef-dwellers and easy to spot, mushroom corals constitute a suitable model group as a proxy for assessing species richness in biodiversity surveys. At present 50 Fungiidae are recognised, which form a monophyletic taxon (Gittenberger *et al.* 2011). In biodiversity studies, they have additional value as host corals of many associated species, such as molluscs, crabs, shrimps and fish (Bos 2011; Hoeksema & Fransen 2011; Hoeksema & Gittenberger 2011; Hoeksema *et al.* 2012).

The present study deals with the mushroom coral fauna of Vanuatu, in particular the southeastern part of Espiritu Santo, which was surveyed during the SANTO 2006 expedition (Bouchet *et al.* 2011). Previous knowledge on the mushroom coral fauna of Vanuatu, West Pacific, was based on a few old studies, including a taxonomic revision of the Fungiidae (Hoeksema 1989) and reports on the scleractinian corals of Vanuatu (Veron 1990a, b). This resulted in a preliminary species number of 20 (Table 1) out of a total of 50 (Gittenberger *et al.* 2011). The fieldwork reported in the present study specifically dealt with mushroom corals of Santo in order to obtain a better overview of which fungiid species are present or absent, which resulted in a new total of 35 mushroom coral species. This will allow a comparison with results from areas in the so-called Coral Triangle, the centre of maximum marine species diversity (Hoeksema 2007; Veron *et al.* 2009, 2011) with a total of 46 known species (Hoeksema unpubl.), and from New Caledonia (see Pichon 2006), a neighbouring area that so far has not been considered part of this marine biodiversity centre (Veron *et al.* 2011).

TABLE 1. — Mushroom coral species and their occurrence recorded from 25 sites during the SANTO 2006 expedition. One species (*) was observed at another SANTO 2006 site. Earlier records from Vanuatu are referenced as well as some other West Pacific areas, New Caledonia and Madang (Bismarck Sea, Papua New Guinea): [1], Hoeksema (1989); [2], Veron (1990a, b); [3], Laboute & Richer de Forges (2004); [4], Pichon (2006); [5], Hoeksema (1993a). Notes: (1), As *Fungia* (*Ctenactis*) *simplex* (Gardiner, 1905); (2), as *Cycloseris patelliformis* (Boschma, 1923); (3), maybe partly as *Lithophyllon undulatum* Rehberg, 1892; (4), also as *Fungia* (*Danafungia*) *valida* Verrill, 1864, and *F.* (*D.*) *klunzingeri* Döderlein, 1901; (5), as *Fungia* (*D.*) *danai* Milne Edwards & Haime, 1851; (6), possibly as *Fungia* (*Verillofungia*) sp.; (7), as *Podabacia* sp.; (8), as *Ctenactis echinata*; (9), as *Cycloseris patelliformis* and *Diaseris distorta*; (10), as *Cycloseris cyclolites*; (11), record based on re-examined collection material and photographs.

Species	Number of dive sites, SANTO 2006	Earlier records Vanuatu	New Caledonia Sea	Madang Bismarck
Cantharellus jebbi Hoeksema, 1993	17	–	–	[5]
Cantharellus noumeae Hoeksema & Best, 1984	–	–	[4]	–
Ctenactis albitentaculata Hoeksema, 1989	6	–	[3, 4]	[5]
Ctenactis echinata (Pallas, 1766)	18	[2]	[4]	[5]
Ctenactis crassa (Dana, 1846)	17	[2] [1]	[3 [8], 4]	[5]
Cycloseris costulata (Ortmann, 1889)	16	–	[4]	[5]
Cycloseris curvata (Hoeksema, 1989)	–	–	–	[5] [11]
Cycloseris cyclolites (Lamarck, 1815)	1*	–	[3, 4]	[5]
Cycloseris distorta (Michelin, 1842)	–	–	[4]	[5] [11]
Cycloseris fragilis (Alcock, 1893)	4	[2] [2]	[3 [9], 4]	[5]
Cycloseris hexagonalis (Milne Edwards & Haime, 1848)	1	-	–	[5]
Cycloseris mokai (Hoeksema, 1989)	9	[2] [3]	[4]	[5]
Cycloseris sinensis Milne Edwards & Haime, 1851	7	–	[3, 4]	[5]
Cycloseris somervillei (Gardiner, 1909)	2	–	[3 [10], 4]	[5]
Cycloseris tenuis (Dana, 1846)	1	–	–	[5]
Cycloseris vaughani (Boschma, 1923)	3	–	[4]	[5]
Cycloseris sp.	5	–	–	[5] [11]
Danafungia horrida (Dana, 1846)	15	[1, 2] [4]	[4]	[5]
Danafungia scruposa (Klunzinger, 1879)	13	[2] [5]	[4]	[5]
Fungia fungites (Linnaeus, 1758)	24	[1, 2]	[3, 4]	[5]
Halomitra clavator Hoeksema, 1989	–	–	–	[5]
Halomitra pileus (Linnaeus, 1758)	1	–	[4]	[5]
Heliofungia actiniformis (Quoy & Gaimard, 1833)	5	[1]	[3, 4]	[5]
Heliofungia fralinae (Nemenzo, 1955)	–	–	–	[5] [11]
Herpolitha limax (Esper, 1797)	23	[1, 2]	[3, 4]	[5]
Lithophyllon concinna (Verrill, 1864)	18	[2]	[4]	[5]
Lithophyllon repanda (Dana, 1846)	22	[2]	[4]	[5]
Lithophyllon scabra (Döderlein, 1901)	–	–	[4]	–
Lithophyllon spinifer (Claereboudt & Hoeksema, 1987)	9	– [6]	[4]	[5]
Lithophyllon undulatum Rehberg, 1893	–	[2]	–	[5]
Lobactis scutaria (Lamarck, 1801)	12	[2]	[3, 4]	[5]
Pleuractis granulosa (Klunzinger, 1879)	19	[2]	[4]	[5]
Pleuractis gravis (Nemenzo, 1955)	9	–	[4]	[5]
Pleuractis moluccensis (Van der Horst, 1919)	9	–	[4]	[5]
Pleuractis paumotensis (Stutchbury, 1833)	23	[2]	[4]	[5]
Podabacia crustacea (Pallas, 1766)	3	[2]	[3, 4]	[5]
Podabacia motuporensis Veron, 1990	1	[2] [7]	–	[5]
Polyphyllia novaehiberniae (Lesson, 1831)	16	[1, 2]	[4]	[5]
Polyphyllia talpina (Lamarck, 1801)	15	–	[3, 4]	[5]
Sandalolitha boucheti n. sp.	13	–	–	–
Sandalolitha dentata Quelch, 1884	–	–	–	[5]
Sandalolitha robusta (Quelch, 1886)	22	[2]	[3, 4]	[5]
Zoopilus echinatus Dana, 1846	1	[2]	–	[5]
Total of species	35	20	31	40

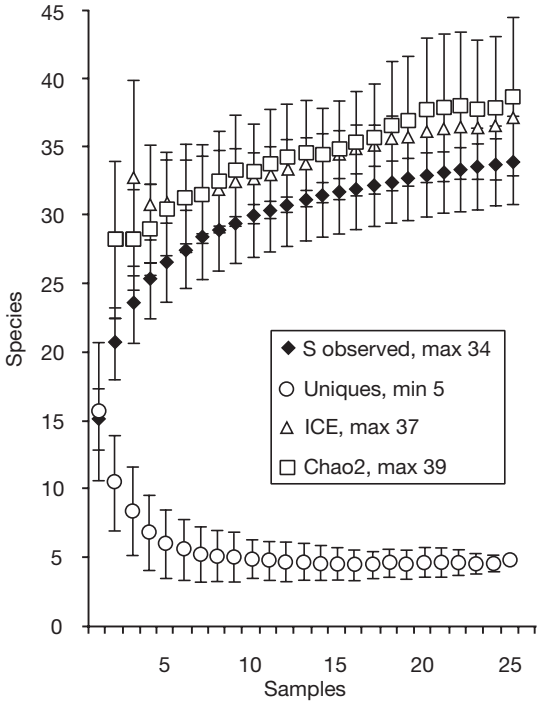

Fig. 2. — Species richness analysis of the mushroom coral fauna of Espiritu Santo with the help of EstimateS 8.2.0. (Colwell 2009): Chao2 is an incidence-based species richness estimator; ICE is an Incidence-based Coverage Estimator; S observed represents the recorded species numbers; and Unique values indicate species only encountered once.

MATERIAL AND METHODS

Mushroom coral species were recorded during the SANTO 2006 expedition in the vicinity of the base camp at Luganville in the southeastern coastal area of Espiritu Santo (Fig. 1; for detailed map, see Bouchet *et al.* 2009). The corals were surveyed during 25 dives (0-35 m deep) in a time span of 15 days (September 2006). Identifications were based on a taxonomic revision of the Fungiidae (Hoeksema 1989) and subsequent descriptions of species mentioned by Hoeksema (1993), all of which are listed with a phylogenetically adapted classification by Gittenberger *et al.* (2011). Two coral species that belong to the Fungiidae according to molecular studies, but which are still classified with the Siderastreidae (Benzoni *et al*. 2007), have not been included in the present study, i.e. *Cycloseris explanulata* (Van der Horst, 1922) and *C. wellsi* (Veron and Pichon, 1980). Formally they did not yet belong to the Fungiidae during the expedition and therefore they were not recorded. Meanwhile their formal status as Fungiidae will be corrected (Benzoni *et al.* in press). Material has been deposited in the coral collection of the Netherlands Centre of Biodiversity Naturalis with catalogue numbers RMNH Coel.

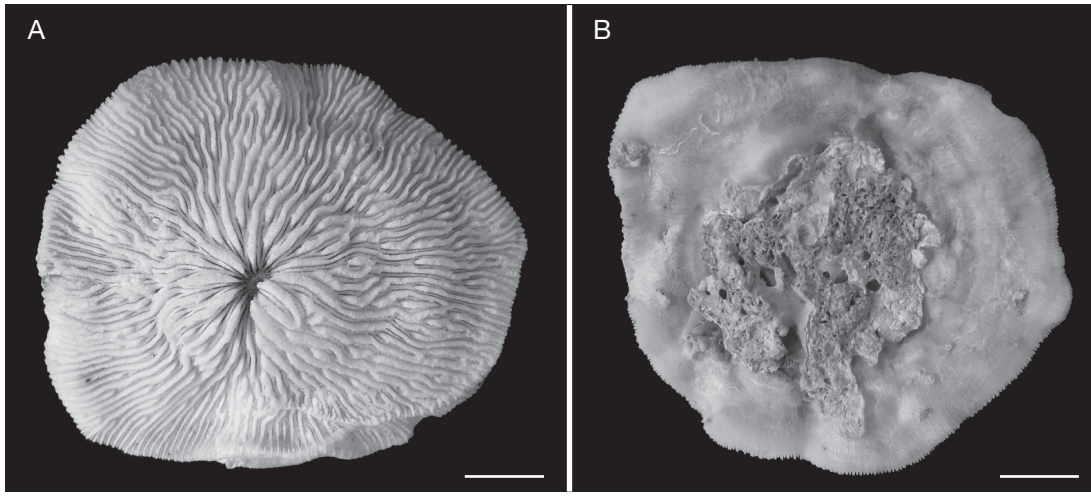

Fig. 3. — *Cantharellus jebbi* Hoeksema, 1993 (RMNH Coel. 40129) from Vanuatu, Espiritu Santo, SE coast, NE Aoré Island, N Aïmbuéi Bay: **A**, upper surface; **B**, lower surface showing attachment area. Scale bars: 1 cm.

The mushroom coral fauna was analysed for species richness with the help of EstimateS 8.2.0 (Colwell 2009). The species richness estimators resulting from the analysis are presented as species accumulation curves in which the sample order has been randomised and the values have been averaged (means and standard deviations are given per sample number). They are extrapolated to indicate total species richness (observed and expected). A reliable measure for species richness is obtained when the curves of the species richness estimators become asymptotic (the mean values flatten out), minimal standard deviations are obtained (approaching or reaching 0), and observed and expected values become equal. The used species richness indicators based on incidence (presence/absence) data are: 1) Chao2 (an incidence-based species

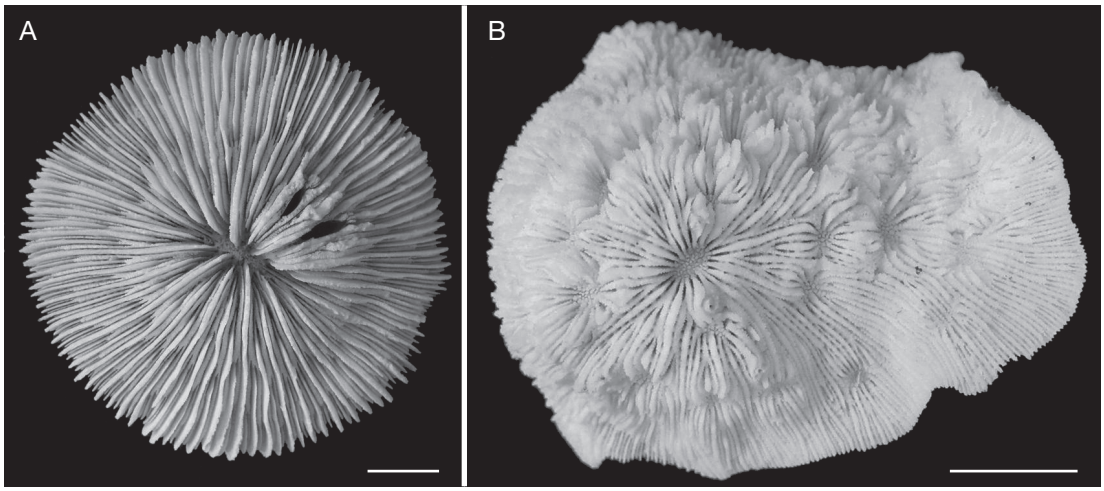

FIG. 4. — Mushroom corals from Vanuatu, Espiritu Santo, SE coast, Coolridge wreck. **A**, *Cycloseris costulata* (Ortmann, 1889) (RMNH Coel. 40134) with coral gall crab pits; **B**, *Cycloseris mokai* (Hoeksema, 1989) (RMNH Coel. 40130). Scale bars: 1 cm.

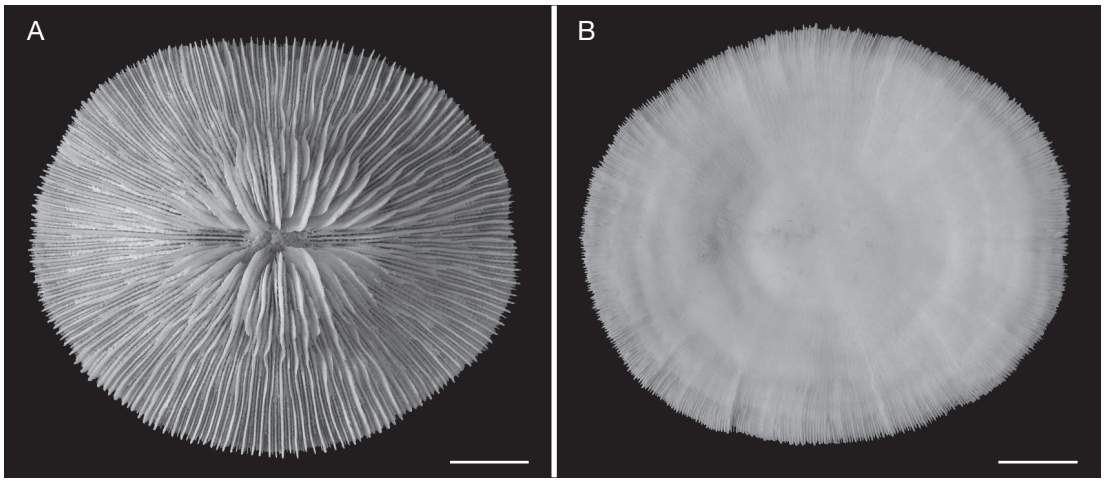

FIG. 5. — *Cycloseris somervillei* (Gardiner, 1909) (RMNH Coel. 40133) from Vanuatu, Espiritu Santo, SE coast, S Aoré Island, Bruat channel, N Perumamasa Island: **A**, upper surface; **B**, lower surface. Scale bars: 1 cm.

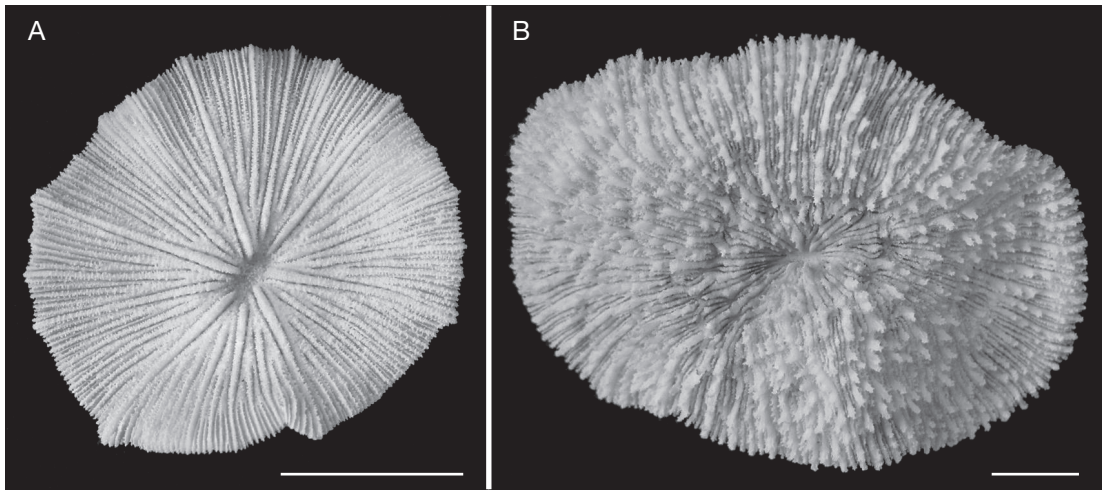

Fig. 6. — Mushroom corals from Vanuatu, Espiritu Santo, SE coast: **A**, *Cycloseris hexagonalis* (Milne Edwards & Haime, 1848) (RMNH Coel. 40132) S Aoré Island, Bruat Channel; **B**, *Zoopilus echinatus* Dana, 1846 (RMNH Coel. 40136) N Tutuba Island. Scale bars: 1 cm.

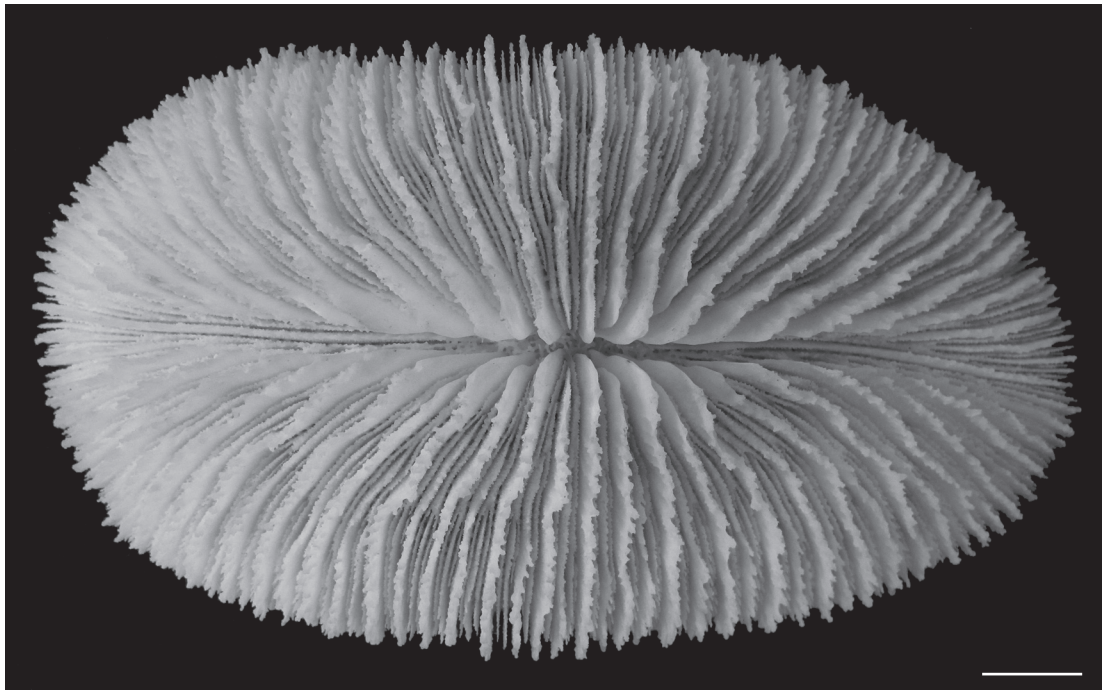

Fig. 7. — *Ctenactis albitentaculata* Hoeksema, 1989 (RMNH Coel. 40128) from Vanuatu, Espiritu Santo, SE coast, E Aoré Island, Alsari Bay, SE Bukora Point. Scale bar: 1 cm.

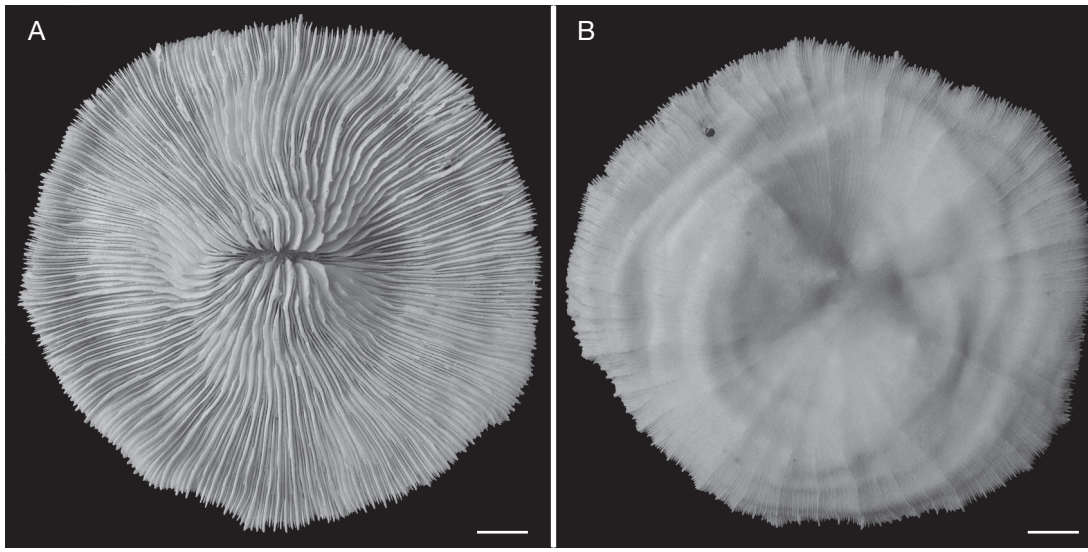

FIG. 8. — *Lithophyllon spinifer* (Claereboudt & Hoeksema, 1987) (RMNH Coel. 40127) from Vanuatu, Espiritu Santo, SE coast, Coolridge wreck: **A**, upper surface; **B**, lower surface. Scale bars: 1 cm.

richness estimator); 2) ICE (an incidence-based coverage estimator); 3) Sobs (the observed species numbers); and 4) Unique values (Colwell 2009).

RESULTS

At the 25 survey sites, 34 mushroom coral species were recorded. A specimen of an additional species, *Cycloseris cyclolites*, was found at another expedition locality (40 m deep) by Eric Folcher (Table 1). The total number of 35 species recorded for Santo appears, however, to be an underestimation according to the species richness analysis with the help of EstimateS 8.2.0 (Fig. 2). The observed number of species (Sobs = 34) and both species richness estimators (Chao2 = 39 and ICE = 37) have not yet reached an asymptote value, while the number of unique species (species represented by a single record) is 5, indicating that it is likely that some other species may have been overlooked.

Sixteen species represent new records for Vanuatu. Some of these are little known, like *Cantarellus jebbi* (Fig. 3). This encrusting species can be confused with *Cycloseris mokai*, also representing a new record, which has finer septa and a higher concentration of stomata (Fig. 4B). For both of these species, and for the newly recorded *C. hexagonalis* (Fig. 6A) and *Sandalolitha boucheti* n. sp. (Figs 11-14), Vanuatu is the southeasternmost known locality to date. Other new records for Vanuatu concern *Cycloseris costulata* (Fig. 4A), *C. cyclolites*, *C. sinensis*, *C. somervillei* (Fig. 5), *C. tenuis*, *C. vaughani*, *Cycloseris* sp., *Ctenactis albitentaculata* (Fig. 7), *Halomitra pileus*, *Lithophyllon spinifer* (Fig. 8), *Pleuractis gravis* (Fig 9) and *P. moluccensis* (Fig. 10). *Zoopilus echinatus*, which also has its southeasternmost distribution limit at Espiritu Santo, was encountered as large free-living corals and as small juveniles with fresh detachment scars (Fig. 6B).

Descriptions of 33 species occurring in Vanuatu are given by Hoeksema (1989, 1993a). Two species are new to science, one of which, *Sandalolitha boucheti* n. sp., is described here. Its characters are decribed in a similar way as those of the two other *Sandalolitha* species, *S. robusta* and *S. dentata*, in order to facilitate comparisons (see Hoeksema 1989). The other one, a relatively widespread, small, and free-living *Cycloseris* species, will be described in a subsequent paper.

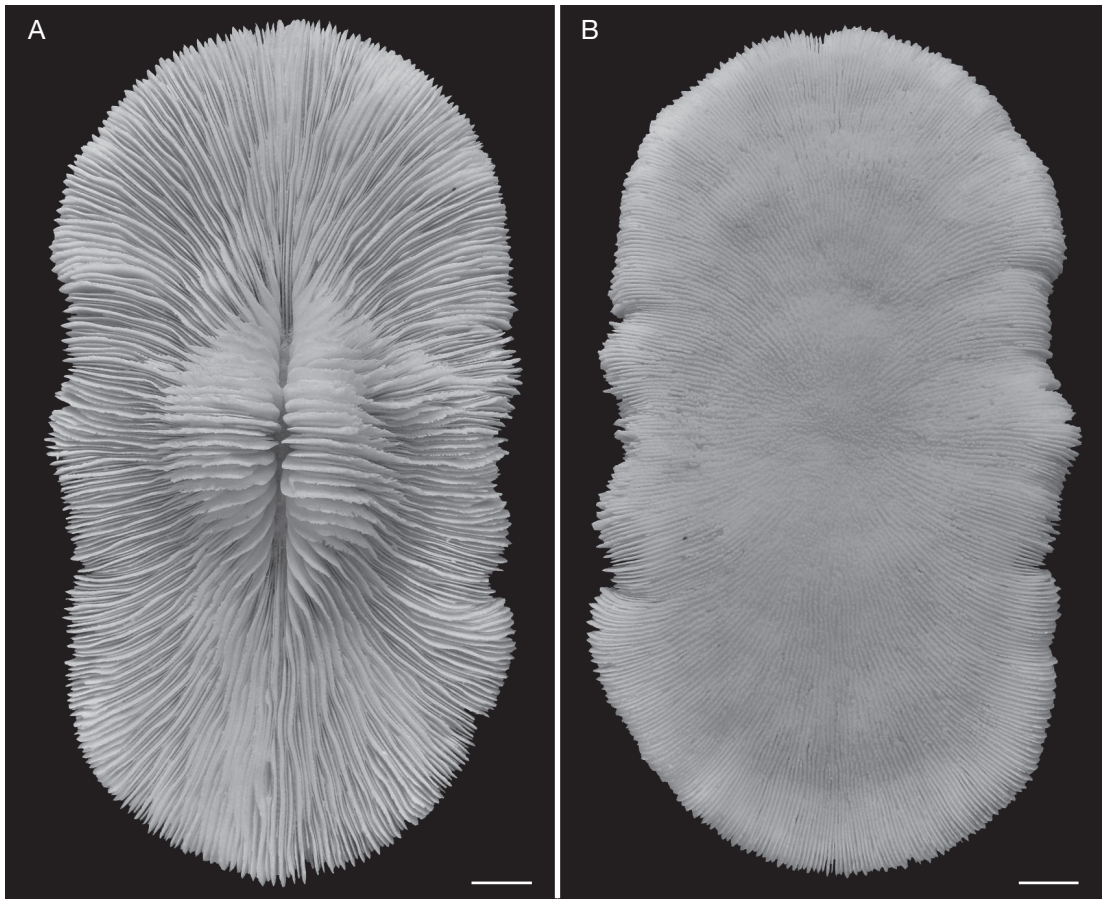

FIG. 9. — *Pleuractis gravis* (Nemenzo, 1955) (RMNH Coel. 40135) from Vanuatu, Espiritu Santo, SE coast, NW Aoré Island, Segon Channel: **A**, upper surface; **B**, lower surface. Scale bars: 1 cm.

SYSTEMATICS

Order SCLERACTINIA Bourne, 1900
Family FUNGIIDAE Dana, 1846
Genus *Sandalolitha* Quelch, 1884

Sandalolitha boucheti n. sp.

TYPE MATERIAL. — Holotype: SANTO 2006, stn FR8, Vanuatu, Espiritu Santo, SE coast, E Aoré Island, S Aïmbuéi Bay, 15°19'50,8"S, 167°07'18,5"E, depth 4 m., 14.IX.2006, B. W. Hoeksema (RMNH Coel. 40125; Fig. 11).
Paratype: SANTO 2006, stn FR20, Vanuatu, Espiritu Santo, SE coast, E Aoré Island, S Aïmbuéi Bay, 15°19'53,4"S, 167°07'26,5"E, depth 8 m, 19.IX.2006, B. W. Hoeksema (RMNH Coel. 40126; Fig. 12).

OTHER MATERIAL. — Malaysia, eastern Sabah, Semporna area, Ligitan Reef 1, South, Yoshi Point, 4°14'05.8"N, 118°33'26.7"E, depth 15 m, 1.XII.2010, B. W. Hoeksema, (RMNH Coel. 39964; Figs 13; 14).

TYPE LOCALITY. — Vanuatu, Espiritu Santo.

GEOGRAPHICAL DISTRIBUTION. — *Sandalolitha boucheti* n. sp. is so far only known from Vanuatu (West Pacific) and northeastern Borneo (Sulawesi Sea).

ETYMOLOGY. — Named after Prof. Philippe Bouchet, leader of the marine component of the SANTO 2006 expedition.

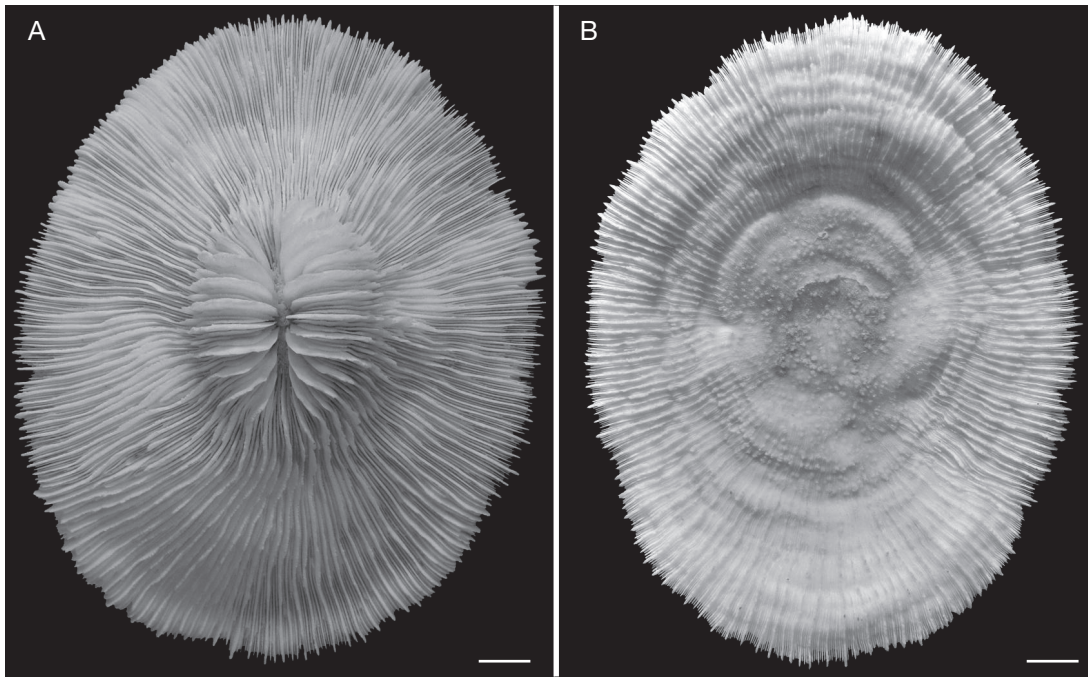

FIG. 10. — *Pleuractis moluccensis* (Van der Horst, 1919) (RMNH Coel. 40131) Vanuatu, Espiritu Santo, SE coast, E Aoré Island, S Aïmbuéi Bay: **A**, upper surface; **B**, lower surface. Scale bars: 1 cm.

DIAGNOSIS. — Corals relatively smaller than congeners with septa that are finer densely packed and nearly of similar height, and with fine dentations (Table 2).

DESCRIPTION

Adult animals free-living. Polyps polystomatous by circumstomadaeal budding over the whole upper coral surface. Outline of corals varying from irregularly circular to oval. Corals varying from highly arched to slightly cup-shaped with a concave upper surface; length range: 8.0-13.5 cm. Septa densely packed and straight, except around stomata, where they bend. Lower order septa thicker and more protruding than those of higher orders. Septa in small corals and higher order septa in larger corals fenestrate. Tentacular lobes absent. Septal margins finely ornamented with irregular serrate dentations, varying from 15 to 30 per cm (Fig. 11B). Septal sides covered by unevenly distributed coarse granulations. Compound synapticulae connecting the septa laterally not easily distinguishable because of the tight septal arrangement. Stomata more or less evenly distributed over the coral surface. Columellae poorly developed, consisting of rudimentary trabeculae. Corallum wall perforated, covered by granulations and without fragmentation clefts. Large detachment scar (diameter 1.0-2.8 cm) distinct (Fig. 13C). Costae unequal in thickness and height, straight and distinct near the corallum margin, but less distinct near the centre; coarsely ornamented with echinous spines, varying from 15 to 30 per cm (Fig. 11C). Living animal light brown (Fig. 14). Small tentacles colourless and translucent.

REMARKS

Morphologically *S. boucheti* n. sp. shares some characters with either one of the other two *Sandalolitha* species, *S. robusta* and *S. dentata* (Table 2). With regard to stomata distribution, it resembles *S. robusta* by showing more or less evenly distributed stomata over the upper surface, while *S. dentata* has most stomata concentrated at the centre. With *S. dentata* it shares serrate septal dentations, while those of *S. robusta* are more lobate.

Fig. 11. — Holotype of *Sandalolitha boucheti* n. sp. (RMNH Coel. 40125) from Vanuatu, Espiritu Santo, SE coast, E Aoré Island, S Aïmbuéi Bay, depth 4 m: **A**, upper surface; **B**, details of septa; **C**, details of costae. Scale bars: A, 1 cm; B, C, 0.5 cm.

Both type specimens show an oval shape, which is also common in *S. dentata*. However, compared to both other *Sandalolitha* species, it has finer septal and costal ornamentations and thinner septa and costae, which appear to be more densely arranged than in the other two species. *S. boucheti* n. sp. also differs from the other two species by being light brown in colour and from *S. dentata* in particular by lacking patches of green (see Hoeksema & Van Ofwegen 2004). *S. dentata* was not recorded at Vanuatu (Table 1).

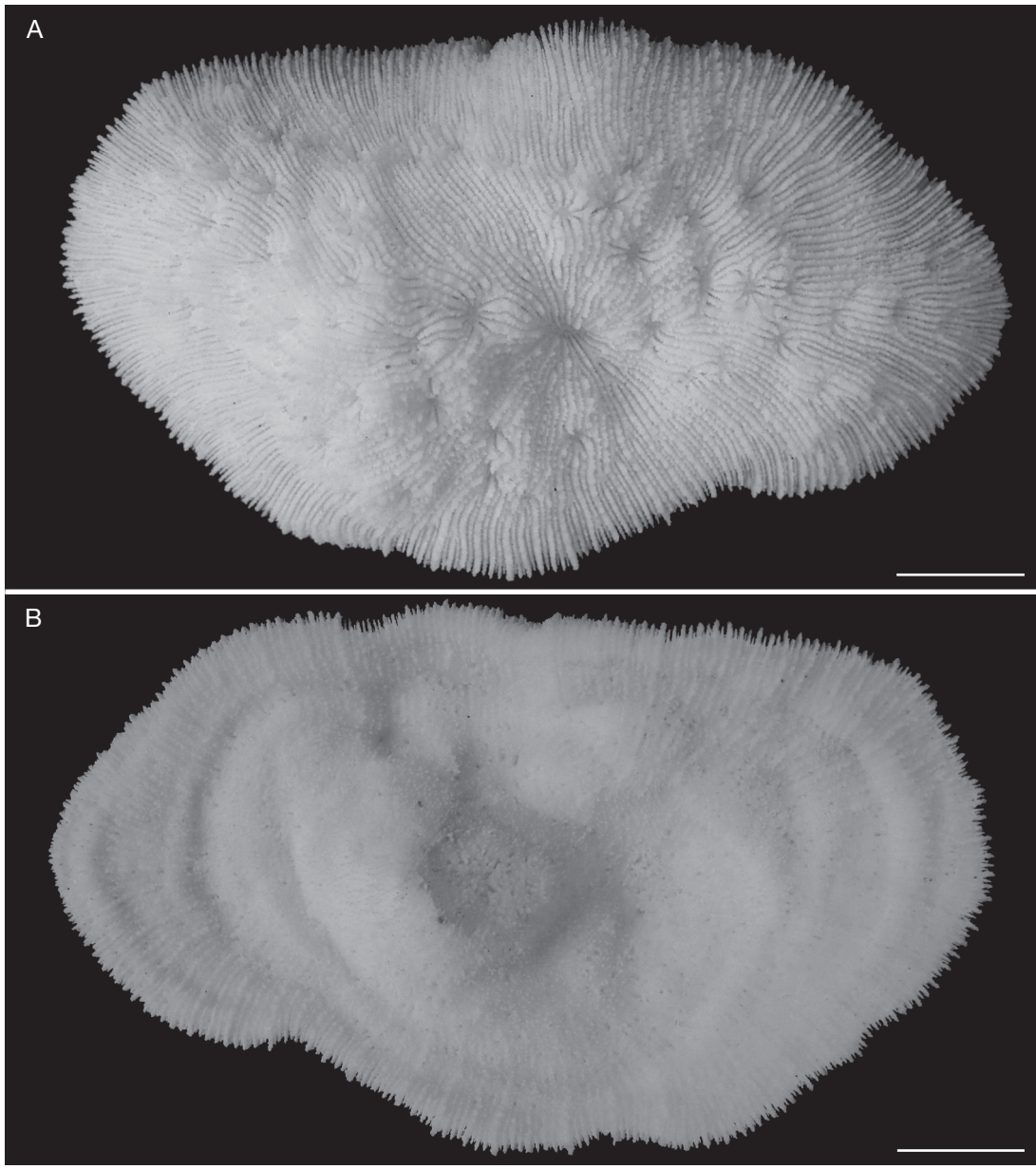

FIG. 12. — Paratype of *Sandalolitha boucheti* n. sp. (RMNH Coel. 40126) from Vanuatu, Espiritu Santo, SE coast, E Aoré Island, S Aïmbuéi Bay: **A**, upper surface; **B**, lower surface showing detachment scar. Scale bars: 1 cm.

DISCUSSION

Although 35 mushroom coral species were recorded during the SANTO 2006 expedition (plus one extra observed by Veron [1990a, b], resulting in a total of 36), it is possible that some other species were overlooked as indicated by the species richness analysis (Fig. 2). In earlier reports (Veron 1990a, b),

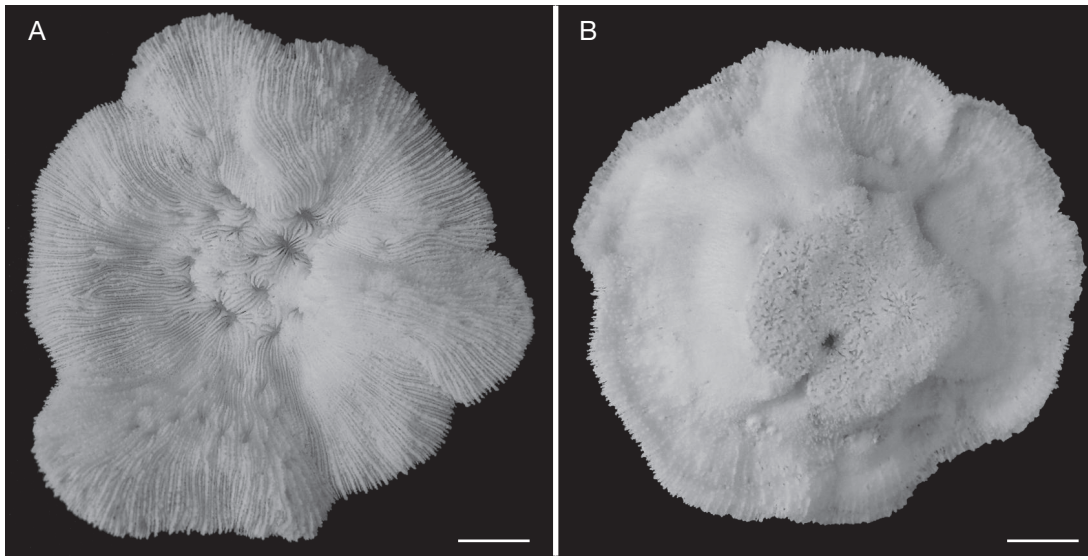

FIG. 13. — Specimen of *Sandalolitha boucheti* n. sp. (RMNH Coel. 39964) from Malaysia, eastern Sabah: **A**, upper surface; **B**, lower surface with large detachment scar. Scale bars: 1 cm.

TABLE 2. — Characters of three *Sandalolitha* species (compare Hoeksema 1989).

Character	*S. dentata* Quelch, 1884	*S. robusta* (Quelch, 1886)	*S. boucheti* n. sp.
Distribution of stomata concentrated at corallum centre or evenly distributed	concentrated	even	even
Septal dentations serrate or lobate	serrate	lobate	serrate
Septa alternating or of nearly similar height	alternating	alternating	similar
Septa and costae loosely packed or dense	loose	loose	dense
Density of septal teeth (per cm^2)	8-25	14-25	15-30

23 species were mentioned from Vanuatu (Table 1), some of which are synonyms according to Hoeksema (1989). Another species, *Heliofungia actiniformis*, was recorded by Hoeksema (1989). *Lithophyllon undulatum* was listed by Veron (1990a, b) but it was not found during the SANTO 2006 expedition. This implies that only 20 fungiid species were observed during previous studies, all of which except one, *L. undulatum*, were also observed during the present survey. At least 14 of the presently listed species represent new records (Table 1). Two species that recently became recognised as Fungiidae, *Cycloseris explanulata* and *C. wellsi* (see Benzoni *et al.* 2007, in press) were not recorded during the present study and also not during earlier surveys of the scleractinian fauna of Vanuatu (Veron 1990a, b).

With regard to reef corals, Vanuatu is not considered part of the Coral Triangle (Veron *et al.* 2009, 2011), which may be based on the species lists presented by Veron (2009a, b). The ahermatypic (azooxanthellate) coral fauna of Vanuatu is also not considered rich enough to be part of the centre of diversity (Cairns 1999, 2007). However, the presently reported increase in the known number of mushroom coral species of Vanuatu, suggests that the number of all reef coral species (n = 296) at Vanuatu (Veron 1990a, b) should also be higher in proportion. The present mushroom coral data

suggest that the centre of mushroom coral diversity (Hoeksema 2007) should have a southeastward extension, including Espiritu Santo and adjacent parts of Vanuatu (Hoeksema & Gittenberger 2011). Compared to the Bismarck Sea with 40 species, Vanuatu is less rich in fungiid species (Hoeksema 1993a; Table 1) but in relation to New Caledonia with 31 species, which is located to the south, its species number is higher (Pichon 2006; Table 1). The number of 36 mushroom coral species in Vanuatu is higher than the 28-30 recorded in some Coral Triangle areas (Hoeksema 2007; Hoeksema & Gittenberger 2011). Therefore Vanuatu's scleractinian fauna is expected to be rich enough to be considered part of centre of mushroom coral diversity and New Caledonia may also fit in with its present record of 31 fungiids. The southeastward extension of this centre may be explained by oceanic currents branching off from the South Equatorial Current (SEC), which have transported larvae of the coral species present here (see Hoeksema 2007).

Coral reef biota in the proximity of large cities may change within several decades of time as a result of human impact (Van der Meij *et al.* 2009, 2010; Hoeksema & Koh 2009; Hoeksema *et al.* 2011). The human population of Vanuatu is not large and therefore it is unlikely that the mushroom coral fauna observed in 2006 has declined since the previous survey by Veron in 1988 (1990a, b). The only threat mentioned for mushroom corals is collecting for the curio trade, which is not mentioned to affect Vanuatu's coral fauna (Amos 2006).

The discovery of a new species during SANTO 2006 was not a unique happening. Since a recent taxonomic revision of the Fungiidae (Hoeksema 1989) various other mushroom coral species were reported as new to science (Veron 1990c, 2000; Hoeksema & Dai 1991; Hoeksema 1993a, b, 2009; Ditlev 2003). *Sandalolitha boucheti* n. sp. is also not the only new marine species recorded as a result of SANTO 2006, since other new species were discovered from coral reefs and from anchialine, brackish, subtidal, and deep waters (Bamber 2009; Lane & Rowe 2009; Mcpherson 2009, 2012; Neusser & Schrödl 2009; Weiner *et al.* 2009; Boxshall & Jaume 2012; McLean 2012; Séret & Last 2012). All these new discoveries together confirm that expeditions to poorly investigated regions, such as Espiritu Santo, are indispensable for a good understanding of the marine realm and its species diversity patterns.

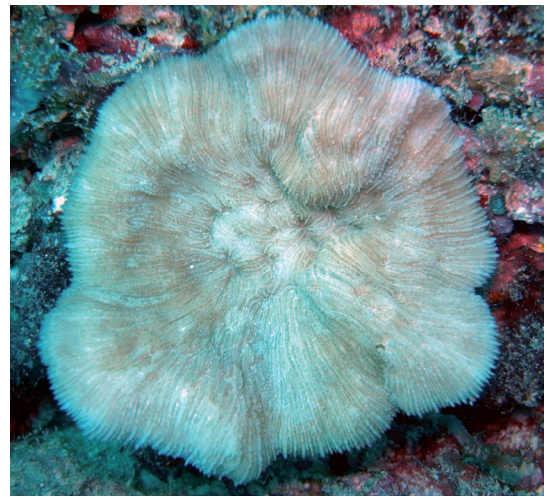

FIG. 14. — Live specimen of *Sandalolitha boucheti* n. sp. (RMNH Coel. 39964) from Malaysia, eastern Sabah, Semporna area, Ligitan Reef 1, South, Yoshi Point, depth 15 m.

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