

Species Records and Distribution of Shallow-water Coralline Algae in a Western Indian Ocean Coral Reef (Trou d'Eau Douce, Mauritius)

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Seventeen taxa of coralline algae were identified in different reef environments on the eastern coast of Mauritius. Nine of these are reported from this island for the first time: *Amphiroa rigida* Lamouroux var. *antillana* Børgesen, *Amphiroa tribulus* (Ellis et Solander) Lamouroux, *Choreonema thuretii* (Bornet) Schmitz, *Jania capillacea* Harvey, *Jania pumila* Lamouroux, *Jania unguolata* (Yendo) Yendo, *Lithophyllum pallescens* (Foslie) Foslie, *Mesophyllum erubescens* (Foslie) Lemoine and *Sporolithon ptychoides* Heydrich. Data concerning habitat and geographical distribution of the species are presented. Coralline algae are widely distributed in Trou d'Eau Douce reefs, being a group of organisms of major importance in the structure of reef communities. Geniculate coralline algae are common in algal turfs growing on cobbles, dead corals or as epiphytes on larger brown algae. Non-geniculate species are dominant, both in rhodolith beds from shallow lagoon waters in sheltered areas, and in the much exposed reef flat. *Hydrolithon onkodes* (Heydrich) Penrose et Woelkerling, *Lithophyllum tamiense* Heydrich and *Lithophyllum kotschyianum* Unger are the most abundant species on hard substrata while *Mesophyllum erubescens* dominates in rhodolith beds.

Introduction

Coralline algae (Corallinales, Rhodophyta) constitute locally abundant populations from sub-polar to tropical waters (Littler 1976). These algae are very conspicuous in Indo-Pacific reefs, where they play a major role as reef-builders (Marsh 1970, Littler 1973 a, b, Adey et al. 1982, Verheij 1993 a). The algal flora from tropical Western Indian Ocean reefs is relative well known (e. g. Børgesen 1940–1957, Isaac 1967, 1968, 1971, Sartoni 1974, 1978, 1979, 1992, Jaasund 1968–1977, 1976, Papenfuss et al. 1982, Kalugina-Gutnik et al. 1992, Ballesteros 1994). However, in spite of their importance, coralline algae from these reefs have received little attention and only recently Keats and Chamberlain (1993, 1994 a, b), Chamberlain (1993) and Chamberlain and Norris (1994 a, b) have given detailed information on selected species occurring at Natal, South Africa.

Information on the coralline algae from Mauritius has been provided by several authors (Table I). As a rule these works are limited to isolated records of occurrence, although Børgesen (1943) also gives relevant information on the morphology of the geniculate species.

The present study is concerned with the species composition and distribution of coralline algae collected from different reef environments during an extensive survey on the eastern coast of Mauritius.

Materials and Methods

The study area included the surroundings of Trou d'Eau Douce reef (eastern coast of Mauritius), a windward fringing reef situation between Pointe aux Boeufs and the Danish Entrance (20°13' to 20°19' S and 57°46' to 57°49' E). (Fig. 1). Reef morphology is described in Faure (1976, 1977), Salm (1976), Montaggioni and Faure (1980) and Muller et al. (1991). Some different benthic assemblages can be distinguished depending on their position in the reef and to their species composition (Table II). More information is reported in Baissac et al. (1962) and Pichon (1967). The localities sampled were representative of all the communities present in the reef, from the shallow lagoon areas to the fore reef, and were determined by reference to aerial photographs and maps of the region. The number of samples taken of each community is indicated in Table II.

The seaward reef flat and the fore reef were only sampled north to Danish Entrance and south to Ilot des Roches. The rest of the reef was too exposed to study. Sampling was performed in November 1990. Each sampling site was examined by snorkeling or SCUBA-diving down to 10 meters depth and carefully surveyed for 30 minutes. Relative abundances of the different coralline algae, together with other floristic, faunistic and ecological field notes, were written on a PVC slate. Abundance values were estimated *in situ* by an Abundance-Dominance scale

Table I. List of species of coralline algae (Corallinales) previously reported from Mauritius.

Species	References
<i>Amphiroa anceps</i> Kützing	Dickie 1875
<i>Amphiroa beauvoisii</i> Lamouroux	Børgesen 1943
<i>Amphiroa crassa</i> Lamouroux f. <i>minuta</i> Weber-van Bosse	Børgesen 1943
<i>Amphiroa fragilissima</i> (Linnaeus) Lamouroux	Børgesen 1943, 1950
<i>Arthrocardia flabellata</i> (Kützing) Manza	Dickie 1875 (1)
<i>Cheilosporum acutilobum</i> Decaisne	Børgesen 1943
<i>Cheilosporum cultratum</i> (Harvey) Areschoug	Dickie 1875
<i>Corallina pendunculata</i> Lamouroux	Dickie 1875
<i>Haliptilon mauritiana</i> (Børgesen) Garbary et Johansen	Børgesen 1943 (2)
<i>Haliptilon polydactyla</i> (Montagne et Millardet) Garbary et Johansen	Børgesen 1943 (3)
<i>Haliptilon roseum</i> (Lamarck) Garbary et Johansen	Dickie 1875 (4)
<i>Hydrolithon farinosum</i> (Lamouroux) Penrose et Chamberlain	Jadin 1934 (5), Børgesen 1943 (5)
<i>Hydrolithon onkodes</i> (Heydrich) Penrose et Woelkerling	Jadin 1934 (6), Børgesen 1943 (6)
<i>Jania adhaerens</i> Lamouroux	Børgesen 1953
<i>Jania antennina</i> Kützing	Dickie 1875
<i>Jania rubens</i> (Linnaeus) Lamouroux	Børgesen 1943
<i>Jania tenella</i> Kützing	Dickie 1875, Børgesen 1943
<i>Lithophyllum incrassatum</i> Foslie	Printz, 1929, Lemoine in Børgesen 1954, Jadin 1934 (7), Børgesen 1943 (7)
<i>Lithophyllum kotschyianum</i> Unger	Foslie 1907 b (8), Lemoine in Børgesen 1954 (8)
<i>Lithophyllum mauritianum</i> Foslie	Foslie 1907 a
<i>Lithophyllum tamiense</i> Heydrich	Heydrich 1901 (9), Foslie 1901 (10), Printz 1929 (11), Lemoine in Børgesen 1954 (12)
<i>Melobesia mauritiana</i> (Foslie) Lemoine	Jadin 1934, Børgesen 1943, Foslie 1905 (13), Foslie 1908 (14), Foslie 1909 (15)
<i>Mesophyllum crispescens</i> (Foslie) Lemoine	Lemoine in Børgesen 1954
<i>Neogoniolithon frutescens</i> (Foslie) Setchell et Masson	Printz 1929 (16)
<i>Phymatolithon lenormandii</i> (Areschoug) Adey	Jadin 1934 (17), Børgesen 1943 (17)
<i>Sporolithon schmidtii</i> (Foslie) Gordon, Masaki et Akioka	Lemoine in Børgesen 1954 (18)
<i>Titanoderma pustulatum</i> (Lamouroux) Nägeli	Dickie 1875 (19)

Notes:

(1) As *Corallina flabellata* Kützing; (2) as *Corallina mauritiana* Børgesen; (3) as *Corallina polydactyla* Montagne et Millardet; (4) as *Corallina plumifera* Kützing; (5) as *Melobesia farinosa* Lamouroux; (6) as *Porolithon onkodes* (Heydrich) Foslie; (7) as *Lithophyllum incrustans* (Philipi) Foslie; (8) as *Lithophyllum kaiserii* Heydrich; (9) as *Lithophyllum pygmaeum* Heydrich; (10) as *Lithophyllum torquescens* Foslie; (11) as *Lithophyllum moluccense* Foslie f. *pygmaea* Heydrich; (12) as *Lithophyllum moluccense* Foslie f. *torquescens* Foslie; (13) as *Melobesia farinosa* f. *mauritiana* Foslie; (14) as *Melobesia mauritiana* Foslie; (15) as *Heteroderma mauritiana* Foslie; (16) as *Goniolithon frutescens* Foslie; (17) as *Lithothamnium lenormandii* (Areschoug) Foslie; (18) as *Archaeolithothamnium schmidtii* Foslie; (19) as *Melobesia pustulata* Lamouroux and *M. verrucata* Lamouroux.

(Braun-Blanquet 1964) which has been used by Hoek (1969) and Hoek *et al.* (1975) to quantify algal coverage in coral reefs. Voucher material was collected in plastic bags and preserved in 4% formalin in seawater for further study. Some of the geniculate corallines were also mounted on herbarium paper.

For taxonomic studies both mounted herbarium specimens and formalin-preserved plants were used. Scanning electron micrographs were obtained following procedures described in Afonso-Carrillo *et al.* (1985). Selected fragments were fractured with a scalpel and rinsed under distilled water. After air drying, fragments were coated with gold and viewed in a Hitachi S-450 Stereoscan Microscope. Specimens of all taxa listed are deposited in the TFC Herbarium (De-

partamento de Biología Vegetal, Universidad de La Laguna, Canary Islands, Spain).

Results

Species records

Amphiroa anceps (Lamarck) Decaisne

Weber-van Bosse, 1904, p. 93, pl. 16, figs 6–8; Ganesan, 1968, p. 8, figs 1–2, 5–7, 12–20; Jaasund, 1976, p. 79, fig. 158.

Distribution: Reported from West Australia, Malayan Archipelago, Japan, India, Tanzania and South Africa.

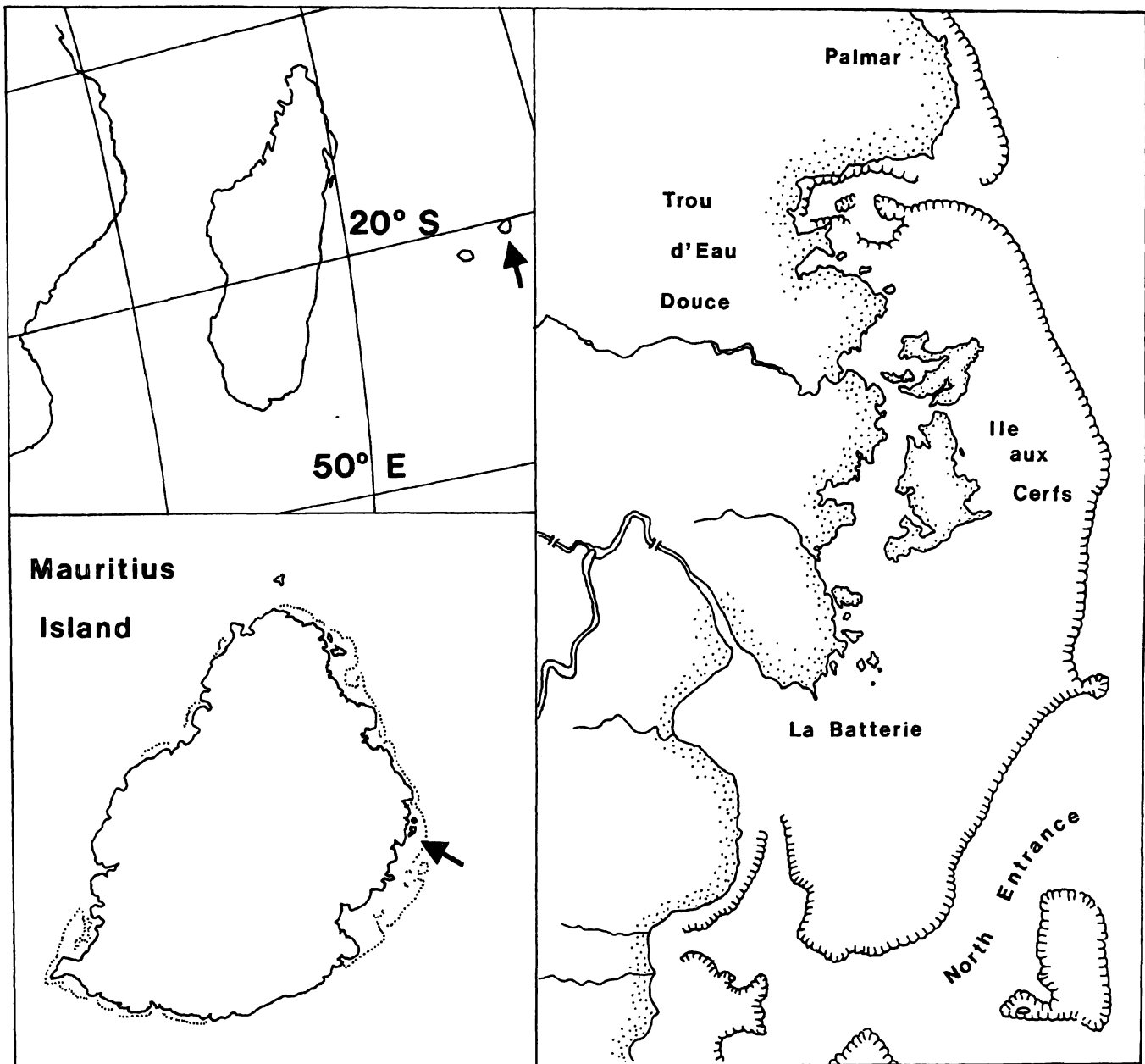


Fig. 1. Location and map of the sampling zone.

Table II. Assemblages distinguished in the Trou d'Eau Douce fringing reef. Dominant organisms are also reported.

Assemblages	Number of samples	Dominance
Inner fringing reefs	34	Corals (<i>Porites</i> , <i>Montipora</i> ; <i>Pavona</i> and <i>Fungia</i> in shallow waters; <i>Seriatopora</i> in deep waters)
Seagrass meadows	11	Seagrasses (<i>Halodule</i> , <i>Halophila</i> in sheltered areas; <i>Thalassodendron</i> in more exposed sites)
Rubble and sand plains	5	Algae (<i>Padina</i> , <i>Turbinaria</i> , <i>Laurencia</i> , <i>Hypnea</i> , <i>Gracilaria</i>)
Rhodolith beds	3	Algae (Non-geniculate corallines)
<i>Acropora</i> fields	15	Corals (<i>Acropora</i>)
Inner (landward) reef flat	8	Algae (<i>Sargassum</i> , Non-geniculate corallines)
Outer (seaward) reef flat	5	Algae (Non-geniculate corallines, <i>Lobophora</i>)
Fore reef	6	Corals (<i>Porites</i> , <i>Montipora</i>)

Specimens examined: Palmar (leg. E. Ballesteros, 14-11-1990; TFC Phyc 8810).

Amphiroa fragilissima (Linnaeus) Lamouroux

Weber-van Bosse, 1904, p. 89, pl. 14, fig. 5; Børgesen, 1915–1920, p. 185; Taylor, 1928, p. 204, pl. 29, fig. 11, pl. 36, fig. 6; Taylor, 1960, p. 403, pl. 47, figs 1–2; Jaasund, 1976, p. 79, fig. 158; Afonso-Carrillo, 1982, p. 214, pl. 55, figs 1–3, pl. 56, figs 1–2.

Distribution: Widespread in tropical and warm temperate seas.

Specimens examined: Pointe Vacoas (leg. E. Ballesteros, 5-11-1990; TFC Phyc 8808), Beau Champ (leg. E. Ballesteros, 11-11-1990; TFC Phyc 8817), North Entrance (leg. E. Ballesteros, 13-11-1990; TFC Phyc 8813, 8821), Trou d'Eau Douce Entrance (leg. E. Ballesteros, 16-11-1990; TFC Phyc 8822).

Amphiroa rigida Lamouroux var. *antillana* Børgesen

Børgesen, 1915–1920, p. 182, figs 171–173; Taylor, 1928, p. 204, pl. 29, fig. 1; Taylor, 1960, p. 404, pl. 47, fig. 3, pl. 48, fig. 1.

Distribution: This species is widespread in tropical and warm temperate seas, although var. *antillana* has been only reported from the Western Atlantic.

Specimens examined: Ile aux Cerfs (leg. E. Ballesteros, 9-11-1990; TFC Phyc 8815).

Remarks: this is a new record for Mauritius.

Amphiroa tribulus (Ellis et Solander) Lamouroux

Taylor, 1928, p. 204, pl. 29, figs 7, 9, pl. 36, fig. 1; Taylor, 1960, p. 406, pl. 47, figs 4–5; Jaasund, 1976, p. 81, fig. 161.

Distribution: Reported from the Caribbean Region and Tanzania.

Specimens examined: North Entrance (leg. E. Ballesteros, 8-11-1990; TFC Phyc 8825), North Entrance (leg. E. Ballesteros, 11-11-1990; TFC Phyc 8811).

Remarks: This is a new record for Mauritius.

Choreonema thuretii (Bornet) Schmitz

Woelkerling, 1987, p. 111, figs 1–25.

Distribution: Widespread in warm temperate and tropical seas.

Specimens examined: Trou d'Eau Douce (leg. E. Ballesteros, 6-11-1990; TFC Phyc 8823).

Remarks: This is a new record for Mauritius. It has been found living semi-endophytically in *Jania capillacea*.

Haliptilon roseum (Lamarck) Garbary et Johansen

Johansen and Womersley, 1986, p. 551, figs 1–6.

Distribution: Australia, South Africa and Mauritius.

Specimens examined: Ile aux Cerfs (leg. E. Ballesteros, 7-11-1990; TFC Phyc 8824).

Jania adhaerens Lamouroux

Børgesen, 1915–1920, p. 195, figs 184–187; Taylor, 1928, p. 205; Taylor, 1960, p. 413, pl. 49, figs 1–2; Jaasund, 1976, p. 77, fig. 154; Afonso-Carrillo, 1982, p. 206, pl. 51, figs 1–2; Lawson and John, 1982, p. 231, pl. 34, fig. 3.

Distribution: Widespread in warm temperate and tropical seas.

Specimens examined: Trou d'Eau Douce (leg. E. Ballesteros, 6-11-1990; TFC Phyc 8819), North Entrance (leg. E. Ballesteros, 12-11-1990; TFC Phyc 8814, 8820).

Jania capillacea Harvey

Børgesen, 1915–1920, p. 198, fig. 188; Taylor, 1928, p. 206, pl. 29, figs 2, 10; Taylor, 1960, p. 412, pl. 49, fig. 4; Lawson and John, 1982, p. 231.

Distribution: According to Lawson and John (1982) this species is widespread in tropical parts of the Atlantic and Pacific Oceans.

Specimens examined: Vacoas (leg. E. Ballesteros, 5-11-1990; TFC Phyc 8809), Ile aux Cerfs (leg. E. Ballesteros, 8-11-1990; TFC Phyc 8816, 8818).

Remarks: *Jania* species with delicate habit are in need of taxonomic reinvestigation. Within *Jania capillacea* we grouped plants with delicate habit, up to 10 mm tall, branching regularly dichotomous with very wide angles, intergenicula less than 100 µm in diameter and 4–6 diameters long. This is a new record for Mauritius.

Jania pumila Lamouroux

Børgesen, 1915–1920, p. 191, figs 181–183; Taylor, 1928, p. 206, pl. 29, fig. 8; Taylor, 1960, p. 414, pl. 49, fig. 5; Jaasund, 1976, p. 77, fig. 156; Villena *et al.*, 1987, p. 19, figs 1–51.

Distribution: Reported from the Caribbean Region, Canary Islands, Japan, Indian Ocean, Red Sea and Tanzania.

Specimens examined: Pointe Vacoas (leg. E. Ballesteros, 6-11-1990; TFC Phyc 8826).

Remarks: This is a new record for Mauritius.

Jania unguolata (Yendo) Yendo f. *brevior* (Yendo) Yendo

Jaasund, 1976, p. 77, fig. 155; Schnetter and Bula-Meyer, 1982, p. 131, pl. 20, fig. D, pl. 21, fig. B. *Corallina unguolata* Yendo f. *brevior* Yendo: Yendo, 1902, p. 27, pl. 3, fig. 9, pl. 7, fig. 9.

Distribution: Reported from Colombia, Galapagos, Japan, Vietnam and Tanzania.

Specimens examined: Ile aux Cerfs (leg. E. Ballesteros, 7-11-1990; TFC Phyc 8827), Ile aux Cerfs (leg. E. Ballesteros, 8-11-1990; TFC Phyc 8828).

Remarks: This is a new record for Mauritius.

Lithophyllum kotschyianum Unger (Fig. 2)

Printz, 1929, p. 35, pl. 65, figs 1–13; Gordon *et al.*, 1976, p. 267, pl. 9, figs 5–6, pl. 10, figs 1–2; Adey *et al.*, 1982, p. 37, figs 23–25; Verheij, 1993 a, p. 40, figs 7–9.

Distribution: reported from Guam, Hawaii, Spermonde Archipelago, Persian Gulf, Red Sea and Mauritius.

Specimens examined: Trou d'Eau Douce (leg. E. Ballesteros, 7-11-1990; TFC Phyc 8802), Trou d'Eau Douce (leg. E. Ballesteros, 15-11-1990; TFC Phyc 8805).

Lithophyllum tamiense Heydrich (Fig. 3)

Verheij, 1993 a, p. 43, figs 19–26. *Lithophyllum moluccense* (Foslie) Foslie: Foslie, 1904, p. 67, pl. 12, figs 2–13; Printz, 1929, p. 36, pl. 55, figs 14–21; Gordon *et al.*, 1976, p. 270, pl. 10, figs 3–7, pl. 11, fig. 1.

Distribution: reported from Malaysia, Western Indian Ocean and Guam.

Specimens examined: Trou d'Eau Douce (leg. E. Ballesteros, 15-11-1990; TFC Phyc 8803).

Lithophyllum pallescens (Foslie) Foslie (Fig. 4)

Lemoine, 1911, p. 156, figs 87–91; Printz, 1929, p. 37, pl. 64, figs 15–17; Adey *et al.*, 1982, p. 40, figs 23, 26–27.

Distribution: reported from Australia, Baja California, Borneo, Hawaii, Indian Ocean, Japan, New Guinea, Panama, Solomon Islands, Red Sea, Philippines and Vietnam.

Specimens examined: Trou d'Eau Douce (leg. E. Ballesteros, 4-11-1990; TFC Phyc 8798).

Remarks: This is a new record for Mauritius.

Mesophyllum crispescens (Foslie) Lemoine (Figs 5–10)

Lithothamnium simulans Foslie f. *crispescens* Foslie: Foslie, 1904, pl. 1, figs 21–23; Printz, 1929, p. 45, pl. 8, figs 16–17.

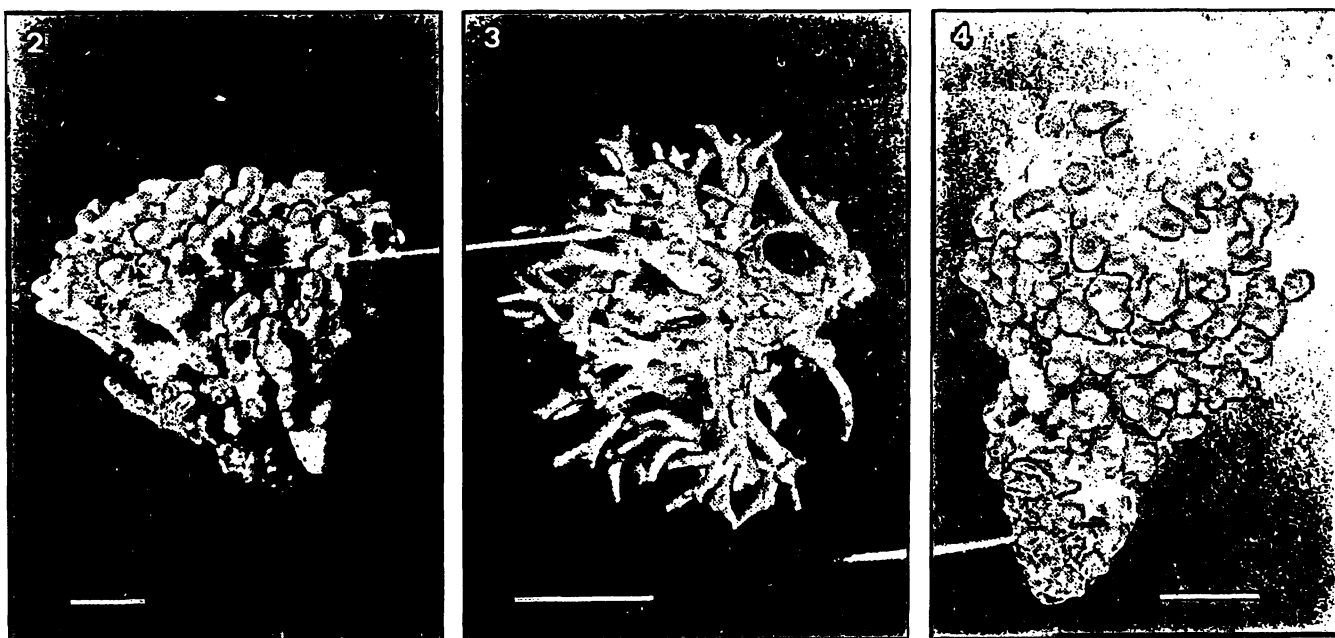
Distribution: Reported from Indonesia and Mauritius.

Specimens examined: Trou d'Eau Douce (leg. E. Ballesteros, 14-11-1990; TFC Phyc 8797), North Entrance (leg. E. Ballesteros, 16-11-1990; TFC Phyc 8812).

Remarks: Although the plants examined are in good agreement with previous descriptions, this species is in need of a modern description, including comparative studies of the type collection. Moreover, according to Woelkerling and Harvey (1992) *Mesophyllum* is delimited from other Melobesoid genera on the basis of the anatomy of spermatangial conceptacles. The absence of spermatangial plants in our collections prevented us from confirming the generic placement of this species in the modern context.

Plants examined are layered to foliose, consisting of lamellate branches, largely free or scarcely adherent to the substratum, orbiculate in outline, and measuring up to 10 mm in their greatest dimensions (Fig. 5). Epithallial concavities are apparent on the dorsal surface (Fig. 6). The concavities appear round because the cells are orientated more or less at right angles to the thallus surface. In contrast, the ventral surface shows a series of small, appressed, overlapping, pointed concavities because the cells are orientated at an acute angle to the thallus surface (Fig. 7).

Some lamellae produce microscopic strut-like branches from the ventral surface. Struts are simple, up to 1.5 mm long and up to 400 μ m broad, and either may hang in a stalactite-like manner or are

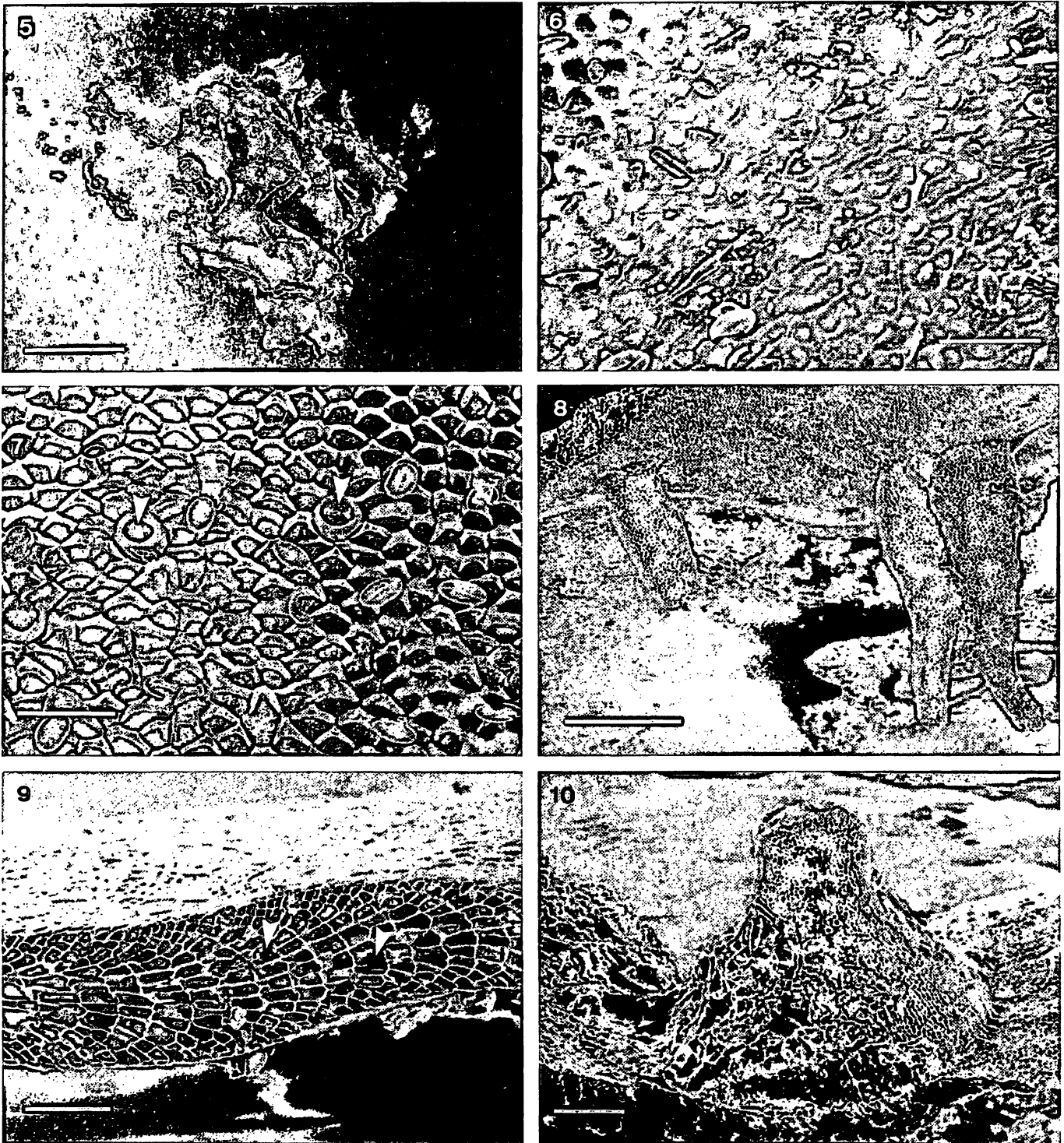


Figs 2–4.

Fig. 2. *Lithophyllum kotschyianum* Unger. Habit. Scale bar = 10 mm. Fig. 3. *Lithophyllum tamiense* Heydrich. Habit. Scale bar = 10 mm. Fig. 4. *Lithophyllum pallescens* Foslie. Habit. Scale bar = 10 mm.

close to the dorsal surface of a subtending lamella or other substrate (Fig. 8). Occurrence of ventral struts have recently been described in the lamellate coralline alga *Synarthrophyton schielianum* Woelkerling *et* Foster (Woelkerling and Foster 1989).

The internal structure is monomerous, with a strongly coaxial medulla comprising arching tiers of cells when viewed in radial vertical sections (Fig. 9). Medullar cells are subcylindrical (20–50 μm long by 7–12 μm in diameter). The cortex is poorly devel-



Figs 5–10. *Mesophyllum crispescens* (Foslie) Lemoine.

Fig. 5. Habit. Note numerous superimposed lamellae. Scale bar = 10 mm. Figs 6–10. SEM. Fig. 6. Dorsal surface view of vegetative thallus showing epithallial concavities. Scale bar = 50 μm . Fig. 7. Ventral surface view of thallus showing more or less angular concavities denoting ends of filaments. Arrowheads indicate position of trichocyte pores. Scale bar = 50 μm . Fig. 8. Side view of a lamellae bearing three simple stalactite-like struts. Scale bar = 500 μm . Fig. 9. Longitudinal fracture of lamellae showing a broad, coaxial medulla of filaments and a poorly developed cortex. Arrowheads indicate examples of cell fusions. Scale bar = 100 μm . Fig. 10. Side view of a conoidal-rostriform gametangial conceptacle. Scale bar = 200 μm .

oped and composed of subcylindrical cells, 9–14 μm long by 5–7 μm in diameter. Epithallial cells are single and domed. Cell fusions are abundant in cortical and medullary filaments (Fig. 9). Only conoidal-rostriform gametangial conceptacles were observed (Fig. 10).

Mesophyllum erubescens (Foslie) Lemoine (Fig. 11)

Lemoine, 1928, p. 252; Gordon *et al.*, 1976, p. 252, pl. 1, figs 5–8; Verheij, 1993 a, p. 61, figs 83–89; Keats and Chamberlain, 1994 b, p. 175, figs 1–34. *Lithothamnion erubescens* Foslie: Foslie, 1904, p. 31, figs 15–17, pl. 3, figs 1–25; Printz, 1929, p. 40, pl. 15, figs 1–25.

Distribution: Reported from Malaysia, Indonesia, South Africa, Brazil and the Cape Verde Islands.

Specimens examined: Tuessrock (leg. E. Ballesteros, 18-11-1990; TFC Phyc 8800).

Remarks: This is a new record for Mauritius.

Hydrolithon onkodes (Heydrich) Penrose *et* Woelkerling (Fig. 12)

Penrose and Woelkerling, 1992, p. 83, figs 4–5; Verheij, 1993 a, p. 47, figs 31–35; Keats and Chamberlain, 1994 a, p. 8, figs 1–19. *Porolithon onkodes* (Heydrich) Foslie: Lemoine, 1911, p. 160; Gordon *et al.*, 1976, p. 266, pl. 9, figs 1–4; Adey *et al.*, 1982, p. 7, fig. 2. *Lithophyllum onkodes* (Heydrich) Heydrich: Foslie, 1904, p. 57, pl. 11, figs 5–10; Printz, 1929, p. 36, pl. 67, figs 1–8. *Spongites onkodes* (Heydrich) Penrose *et* Woelkerling, Penrose and Woelkerling, 1988, p. 161, figs 10–14.

Distribution: According to Keats and Chamberlain (1994 a) this species is widespread in the tropical Indo-Pacific Region.

Specimens examined: Trou d'Eau Douce (leg. E. Ballesteros, 4-11-1990; TFC Phyc 8804), Pointe Vacoas (leg. E. Ballesteros, 5-11-1990; TFC Phyc 8829), Pointe Vacoas (leg. E. Ballesteros, 6-11-1990; TFC Phyc 8806).

Sporolithon ptychoides Heydrich (Fig. 13)

Verheij, 1993 b, p. 190, figs 19–22; Keats and Chamberlain, 1993, p. 542, figs 1–14, 45.

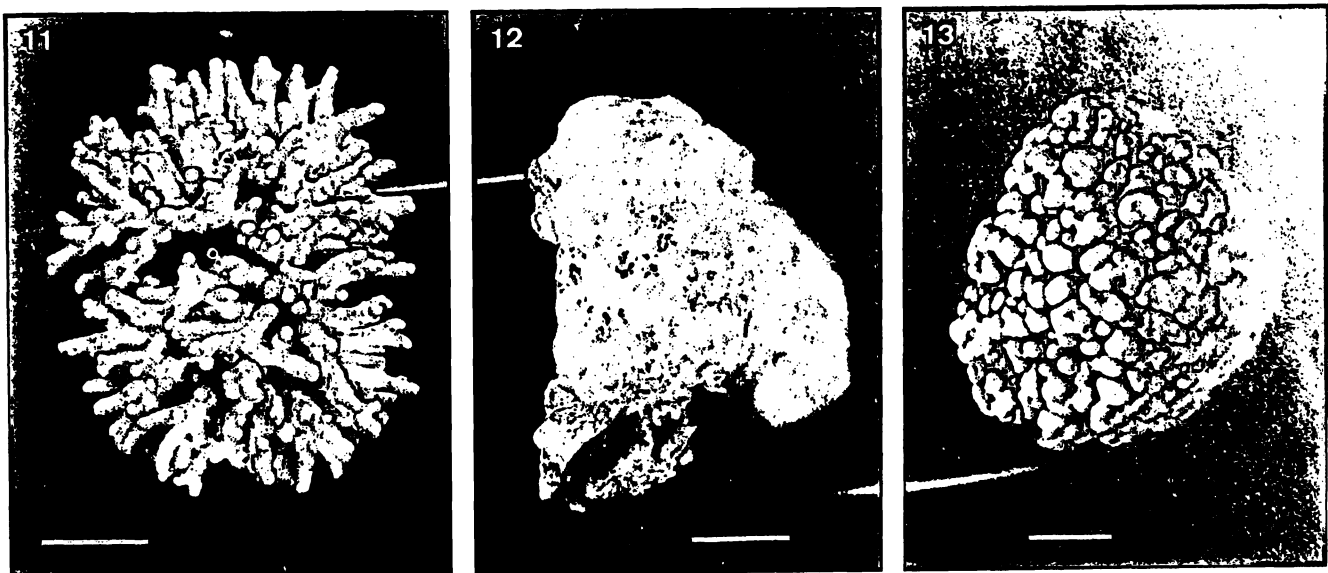
Distribution: According to Verheij (1993 b) this species has been reported from Red Sea, Indian Ocean, Indonesia and Hawaii.

Specimens examined: Tuessrock (leg. E. Ballesteros, 4-11-1990; TFC Phyc 8801).

Remarks: *Sporolithon ptychoides* has been considered an heterotypic synonym of *Sporolithon erythraeum* (Rothpletz) Kylin (Woelkerling and Townsend in Woelkerling 1988). According to Verheij (1993 b) *Sporolithon erythraeum* and *S. ptychoides* are morphologically distinct, but most of the recent material referred to *S. erythraeum* is probably *S. ptychoides*. Lemoine (in Børgesen, 1954) reported *Sporolithon schmidtii* (Foslie) Gordon, Masaki *et* Akioka (as *Archaeolithothamnium schmidtii* Foslie) from Mauritius. After a study of the lectotype collection of *S. schmidtii*, Verheij (1993 b) showed that this species is close to *S. ptychoides* and studies of recently collected material are needed to elucidate the relationships among these species. This is a new record for Mauritius.

Distribution

Distribution of corallines in the different assemblages of the Trou d'Eau Douce reef is summarized in Table III.



Figs 11–13.

Fig. 11. *Mesophyllum erubescens* (Foslie) Lemoine. Habit. Scale bar = 10 mm. Fig. 12. *Hydrolithon onkodes* (Heydrich) Penrose *et* Woelkerling. Habit. Scale bar = 10 mm. Fig. 13. *Sporolithon ptychoides* Heydrich. Habit. Scale bar = 10 mm.

Inner fringing reefs (*sensu* Montaggioni and Faure 1980) cover extensive areas in Trou d'Eau Douce lagoon, mainly near the channels. The upper part of these reefs (above 1.5 meters depth) is made up by corals of the genera *Pavina*, *Porites* and *Fungia*. In deeper areas (1.5 to 4.5 meters depth) there is a higher diversity of living corals (*Porites*, *Montipora*, *Syneraea*, *Millepora*, *Fungia*, *Acropora*, *Platygyra*, *Lobophyllia*, *Leptoria*, *Galaxea*, and others). *Seriatorpora* is the dominant genus below 5 meters depth. Encrusting corallines, mainly *Lithophyllum tamiense* and *L. kotschyianum*, colonize dead corals, together with the green alga *Dictyosphaeria versluysii* Weber-van Bosse, and the brown alga *Lobophora variegata* (Lamouroux) Womersley. *Lithophyllum pallescens* and *Mesophyllum erubescens* grow over rubble, amongst coral colonies. *Hydrolithon onkodes* covers dead, eroded corals in shallow areas. *Jania adhaerens* is a common component of turfs overgrowing dead corals and corallines.

Rhodolith beds are only present in a shallow and sheltered area at the landward side to the north of Ile aux Cerfs. Here cover of corallines attains 100%. *Mesophyllum erubescens* is the most abundant species but *Sporolithon ptychoides* and *Lithophyllum pallescens* are also common.

Seagrass meadows are poor in coralline algae, although some thin non-geniculate species, not examined in this study, are abundant on leaves of *Thalassodendron ciliatum* (Forsskål) Den Hartog. *Haliptilon roseum* grows attached to *Thalassodendron* stems. *Amphiroa fragilissima* and *Amphiroa rigida* v. *antillana* are occasionally found in *Halodule uninervis* (Forsskål) Ascherson meadows, as components of

turf also constituted by *Hypnea nidulans* Setchell and *Chaetomorpha linum* (O. F. Müller) Kützing.

Areas covered by sand and rubble are found everywhere in the lagoon. Sandy plains are almost devoid of vegetation and no corallines are present in this environment. In rubble areas, fleshy algal vegetation can be very diverse, but there are few corallines, mainly *Lithophyllum kotschyianum*, *L. tamiense* and *Hydrolithon onkodes*.

Staghorn and table coral species of *Acropora* are dominant in certain areas of the outer lagoon, usually near the reef flat. Most of these *Acropora* fields show symptoms of degradation, and a large amount of the corals are dead or affected by diseases (Muller *et al.* 1991). The number of species of coralline algae is high (Table III). *Hydrolithon onkodes* is the main species covering dead *Acropora* skeletons, although *Lithophyllum tamiense* and *L. kotschyianum* are also present. *Mesophyllum crispescens* occurs inside the dead and living staghorn coral *Acropora* colonies. Some geniculate corallines (Table III) also occur as components of algal turfs, growing on rubble between coral strips, or as epiphytes of larger algae (*Turbinaria*, *Sargassum*).

Both the inner (landward) and outer (seaward) parts of the reef flat have a very low coral cover. They hold similar coralline algae assemblages, although there are more species in the inner area (Table III). *Hydrolithon onkodes* is the dominant species. *Lithophyllum kotschyianum*, *L. tamiense* and *Mesophyllum crispescens* are also found. *Jania capillacea*, *J. adhaerens* and *Amphiroa fragilissima* are the main components of some algal turfs. *Jania* spp. (Table III) are common epiphytes of *Sargassum* spp. and other large algae.

Table III. Relative abundances of coralline algae in the assemblages distinguished in the Trou d'Eau Douce fringing reef (1: rare; 2: common; 3: abundant; 4: dominant).

Species	Inner fringing reefs	Rhodolith beds	Seagrass meadows	Rubble and sand plains	<i>Acropora</i> fields	Inner reef flat	Outer reef flat	Fore reef
<i>Amphiroa anceps</i>					1			
<i>Amphiroa fragilissima</i>			1		1	1	2	1
<i>Amphiroa rigida</i> v. <i>antillana</i>			1					
<i>Amphiroa tribulus</i>								2
<i>Choreonema thuretii</i>					1			
<i>Haliptilon roseum</i>			1					
<i>Hydrolithon onkodes</i>	2			1	3	3	4	3
<i>Jania adhaerens</i>	2				1	1	2	2
<i>Jania capillacea</i>					2	2	2	
<i>Jania pumila</i>						1		
<i>Jania unguata</i> f. <i>brevior</i>					1	1		
<i>Lithophyllum kotschyianum</i>	3			1	1	1	2	2
<i>Lithophyllum tamiense</i>	3			1	2	1	1	2
<i>Lithophyllum pallescens</i>	1	2						
<i>Mesophyllum crispescens</i>					2	1		
<i>Mesophyllum erubescens</i>	2	4		1				
<i>Sporolithon ptychoides</i>		2						

The fore reef, above 4–5 meters depth, consists of a diverse coral assemblage (*Porites*, *Platygyra*, *Hydnophora*, *Acropora*, *Pleurogyra*, Faviidae) but the percentage of dead corals is high. The coralline species are similar to those reported for the outer reef flat (Table III), with *Amphiroa tribulus* as a distinctive species.

Discussion and Conclusions

Results from this study show that the present knowledge of the coralline algae from Mauritius is still unsatisfactory and further floristic and taxonomic studies are needed. Seventeen taxa have been identified and nine of these were new records for the island. Some species previously cited (see Table I) were not recorded. Amongst the species newly reported for Mauritius, the record of *Amphiroa rigida* var. *antillana* is the most outstanding, since it was only previously known from the Caribbean Region.

Coralline algae are widely distributed in Trou d'Eau Douce reefs, being a group of organisms of major importance in the structure of reef communities. Comparison with other western Indian Ocean areas is not possible, since ecological studies on coral reefs do not identify corallines to the species level (Baissac *et al.* 1962, Price 1971, Harmelin-Vivien *et al.* 1982, Naim 1993), and more detailed phycological studies do not take into account the non-geniculate coralline algae (Payri 1985, Untawale and Jagtap 1989, Kalugina-Gutnik *et al.* 1992). Small geniculate corallines are common epiphytes of larger brown algae and are also important in algal-turfs. Non-geniculate corallines are dominant species, both in rhodolith beds from shallow lagoon waters in sheltered areas, and in exposed reef flats; they are also very important on rubble and overgrowing dead corals, together with other species of non calcareous algae.

Hard substrata have the highest richness of coralline algae (inner fringing reefs, reef flat, *Acropora* fields), with *Hydrolithon onkodes*, *Lithophyllum tamiense* and *L. kotschyianum* being the most abundant species. *Mesophyllum erubescens* dominates in rhodolith beds. *Jania adhaerens*, *Jania capillacea* and *Am-*

phiroa fragilissima are frequent in algal turfs growing on cobbles and dead corals. Finally, *Jania pumila* and *Jania unguolata* f. *brevior* are common epiphytes on *Sargassum* and *Turbinaria* species.

Species composition, abundance, and distribution of non-geniculate corallines in Indo-Pacific coral reefs are only well known from the Central Pacific. According to Littler (1973c) and Adey *et al.* (1982) the main reef-building coralline algae are: *Hydrolithon onkodes*, *Neogoniolithon* spp., *Hydrolithon reinboldii* (Weber-van Bosse *et* Foslie) Foslie, *Hydrolithon gardineri* (Foslie) Verheij *et* Prud'homme van Reine, *Lithophyllum kotschyianum* and *Sporolithon erythraeum*. Results obtained in the present study show that in Trou d'Eau Douce reefs, *Hydrolithon onkodes* and *Lithophyllum kotschyianum* are also abundant species. However, *Hydrolithon reinboldii* and *Hydrolithon gardineri* were not collected, while other species not recorded from the Central Pacific such as *Lithophyllum tamiense* and *Mesophyllum erubescens* were two of the most abundant species in the reefs examined. Both *Lithophyllum tamiense* and *Mesophyllum erubescens* are also important components in the reefs of the Spermonde Archipelago (Indonesia) (Verheij 1993a). These differences in coralline algal composition between Indian Ocean and Central Pacific reefs are in accordance with Littler (1973c) who showed that the non-geniculate coralline flora from Hawaii was close to that of other Central and South Pacific Islands, but it was rather different from that of Indian Ocean Islands. Further studies of the non-geniculate coralline algae in Western Indian Ocean coral reefs are needed to fully evaluate the differences and similarities between Indian and Pacific reefs.

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