

## A preliminary annotated checklist of the marine algae and seagrasses of the Wallis Islands (French Overseas Territory of Wallis and Futuna), South Pacific

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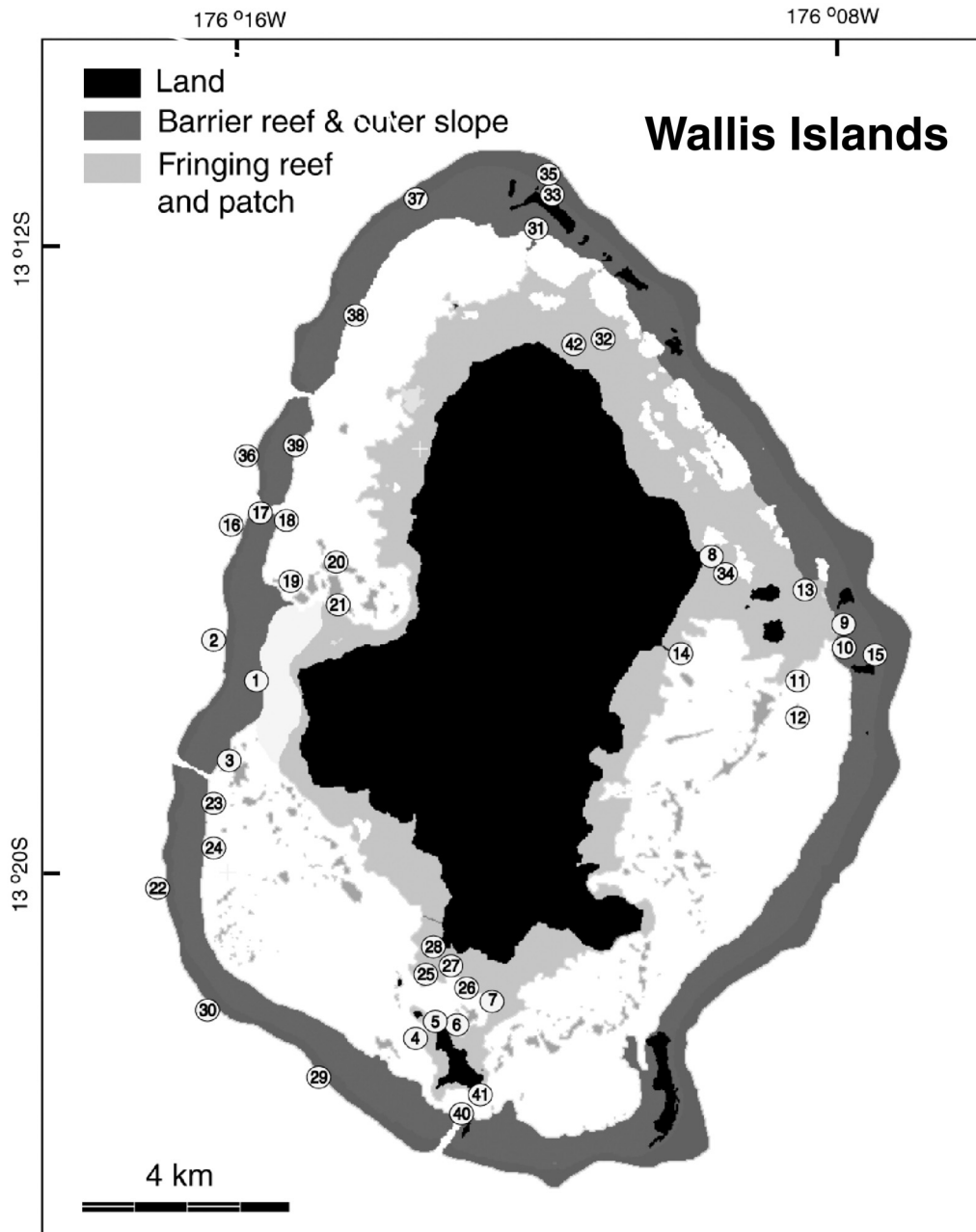
**Abstract.** A total of 194 species of marine algae (14 Cyanobacteria, 41 Chlorophyta, 11 Heterokontophyta and 128 Rhodophyta), as well as three species of seagrasses, represent the first published records for the isolated island of Wallis, South Pacific. The flora has its strongest affinities with Fiji and Rotuma, followed by Samoa and French Polynesia. The lack of diverse habitats and its geographical location are invoked to explain the relatively low species richness compared with localities such as Fiji and Samoa. The flora has a typically tropical component dominated by encrusting coralline red algae, the calcified green algal genera *Halimeda*, and assemblages of Cyanobacteria. Normally ubiquitous species such as *Halimeda discoidea*, and the brown algal genera *Hydroclathrus*, *Colpomenia*, *Rosenvingea*, *Asteronema*, and *Chnoospora* are notably absent from the island, perhaps due to seasonality and the lack of suitable habitats. The minute epiphytic red alga *Acrochaetium kurogii* is reported for the first time outside of its type locality in Japan, while two as yet unidentified species of red algae (*Gracilaria* sp. and *Sebdenia* sp.) could represent new taxa if further useful material is found.

### Introduction

The Wallis Islands (Fig. 1) include Wallis Island, also known as Uvea Island, and 19 small islets that are located in the south-western Pacific between 13°18'S and 176°124'W, two-thirds of the way between Hawaii and New Zealand (Fig. 2). The Wallis Islands form an archipelago that also includes the islands of Futuna and Alofi. Wallis Island is a volcanic high island, of generally elongate shape, which represents the emerged portions of ancient craters. It is 15 km wide in a north–south direction, and 7.8 km long in an east–west direction. Emerged land area comprises 79.12 km<sup>2</sup>, with 129 km of coastline for a total reef-lagoon area of 219.5 km<sup>2</sup>. The highest point is 155 m tall Mt Lulu; the island's geology is composed of volcanic tuffs and basalts. The island was formed in several stages, the last being in the middle Pleistocene. The human population is approximately 10000, distributed in villages mainly on the eastern coast of the island.

There is no previous information in the literature concerning the marine algae or seagrasses of Wallis Island, although there exists a report on the lagoons and reefs of Wallis and Futuna (Salvat 1982) with an excellent treatment of the corals, but which unfortunately only hints at the

existence of two genera of marine algae. A few years later, a study was made of the terrestrial flora of Wallis, including mangroves (Morat and Veillon 1985). At the request of the Environmental Service of the French Overseas Territory of Wallis and Futuna, a survey was undertaken from 24 May to 8 June 2002, so as to establish a preliminary inventory of the coral fauna and benthic macroalgae/seagrass flora, and determine the ecological characteristics of the coral reef and lagoon habitats of Wallis (Payri *et al.* 2002). This paper deals with the marine benthic algae and seagrasses encountered in that study. Scattered algal floras and checklists exist for neighbouring islands such as Rotuma and Fiji (N'Yeurt 1996a, 1996b; N'Yeurt 2002; South and Skelton 2003, 2004), Samoa (Skelton and South 1999, 2002a, 2000b), the Solomon Islands (Womersley and Bailey 1970), Nauru (South and Yen 1992), Phoenix Group, Kiribati (South *et al.* 2001), the Cook Islands (Chapman 1977; N'Yeurt in prep.) and French Polynesia (Payri and N'Yeurt 1997; Payri *et al.* 2000). Recent monographs on the Lord Howe Island flora (e.g. Allender and Kraft 1983, Kraft 2000) and Norfolk Island (Millar 1999) have also proved very useful in identifying species occurring in more northerly islands such as Fiji, Rotuma and Wallis. Other areas of interest such as



**Fig. 1.** Map of the Wallis Islands, showing the 42 collecting stations. See Table 1 for co-ordinates.

Tonga, Tokelau, Vanuatu, and much of Kiribati still remain largely unknown phycologically. The biogeographical implications of algal distribution in the region has been discussed by Millar (1990) and N'Yeurt and South (1997). Recently, Littler and Littler (2003) published a useful illustrated guide to South Pacific algae, adding many new records mainly to the Fijian flora, but also some for American Samoa, the Solomon Islands, the Cook Islands, French Polynesia and Papua New Guinea. Unfortunately, exact localities of collections are not mentioned in that publication.

### Materials and methods

All material was collected using SCUBA, snorkeling or reef-walking. The position of each of the 42 collecting stations (Table 1) was determined with a Garmin 12 portable GPS receiver. Station numbers in the text correspond to the localities mentioned in Table 1. The 42 sites studied have been clustered into five large groups according to geomorphological criteria (fringing reef, barrier reef, lagoon, pinnacle and outer reef slopes; see Table 2 in the Results section). At the base station on land, specimens were sorted out and systematically photographed with a digital camera (Nikon Coolpix E-995, Nikon Corporation, Toyko, Japan) before processing. Microphotographs were taken with an Olympus C-4000Z digital camera (Olympus Optical Co.

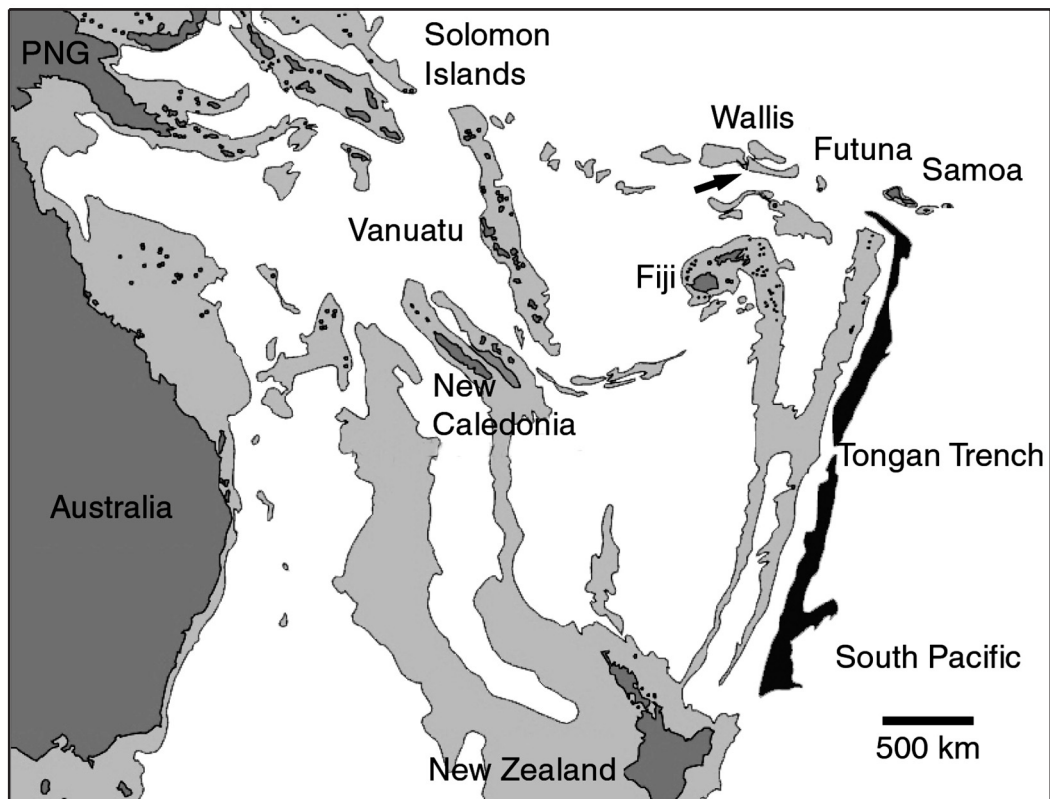


Fig. 2. Map showing the position of the Wallis Islands (arrow) in relation to neighbouring island groups.

(Europa) GMBH, Hamburg, Germany) mounted on an Olympus BH-2 microscope (Olympus Optical Co. Ltd., Tokyo, Japan). Voucher herbarium specimens were pressed by standard techniques, and representative parts of thalli and turf algae were stored in 4% buffered formalin in sealed plastic bags packed in a light-proof container, for shipment and later anatomical examination in the laboratory. Specimens are housed at the Phycological Herbarium of the Université de Polynésie française in Tahiti (UPF), with 'WSS' referring to slide collections.

## Results

### Geomorphology

There is an almost continuous reef system around the main island of Uvea, composed of a barrier reef 63 km long encircling a lagoon 24 km wide in a north–south direction and 15 km long in an east–west direction, and fringing reefs extending up to the barrier reefs in the northern and western parts of the island. The lagoon communicates with the open sea through four passes, one in the South and three on the Western part of the barrier reef. Average depth of the lagoon varies between 10 and 20 m, with maximum depths of 47 m and 52 m in the Eastern and Southern parts, respectively. A total of 19 islets surround the main island, some of volcanic or coralline origin are present on the Eastern barrier reef, and volcanic islets with fringing reefs are present in the Eastern and Southern parts of the lagoon. Maximum tidal

fluctuations are of 2 m, and water exchange in the lagoon occurs through the passes and over the barrier reefs.

### Systematic listing of species

The taxonomy adopted generally follows that of Silva *et al.* (1987, 1996) supplemented by de Reviere (2003), and updated by other sources where necessary. To conserve space, type locality and basionym information are not given as these can be readily found in the sources cited above and in the text. For similar reasons, figures for species are omitted, but many of these can be found in Payri *et al.* (2002), upon request to the authors.

### Cyanobacteria

This section mostly follows the classification of Velasquez (1962) and Silva and Pienaar (2000).

### Chroococcales

#### Dermocarpellaceae

*Sphaenosiphon olivaceus* Reinsch, 1875: 17. (= *Dermocarpa olivacea* (Reinsch) Tilden; Desikachary 1959: 174, pl. 33 figs 13, 14; Nagarkar 1998: 533). Vouchers: WSS 06 St. 5, WSS 53 St. 29, WSS 88 St. 1, 127 St. 8

**Table 1. List of collecting stations around Wallis, as shown in Fig. 1**

Station no.	Latitude	Longitude	Habitat
1	13°17'30.3"S	176°15'35.9"W	Lagoon
2	13°17'8.04"S	176°16'0.84"W	Outer slope
3	13°18'20.2"S	176°15'34"W	Lagoon
4	13°22'11"S	176°13'26.1"W	Fringing reef islet
5	13°22'6"S	176°13'15.5"W	Fringing reef islet
6	13°22'0.84"S	176°13'12.5"W	Fringing reef islet
7	13°21'30"S	176°12'40"W	Fringing reef coastline
8	13°15'52.4"S	176°9'40.36"W	Fringing reef coastline
9	13°16'26.3"S	176°07'29"W	Inner barrier reef
10	13°16'28.2"S	176°07'30"W	Inner barrier reef
11	13°17'28.3"S	176°08'30.3"W	Lagoon
12	13°17'46.9"S	176°08'17.8"W	Lagoon
13	13°16'15.8"S	176°08'18.9"W	Lagoon
14	13°17'4.38"S	176°10'5.52"W	Fringing reef coastline
15	13°17'11.6"S	176°07'29"W	Inner barrier reef
16	13°15'3.3"S	176°15'5.52"W	Outer slope
17	13°15'20.6"S	176°15'22.3"W	Inner barrier reef
18	13°15'22.2"S	176°15'17.6"W	Inner barrier reef
19	13°16'15"S	176°15'14.3"W	Inner barrier reef
20	13°16'2.04"S	176°14'28.7"W	Pinnacle
21	13°16'25.1"S	176°14'33.4"W	Pinnacle
22	13°20'0.9"S	176°16'5.28"W	Outer slope
23	13°19'0.3"S	176°16'14.8"W	Inner barrier reef
24	13°19'34.6"S	176°16'16.4"W	Inner barrier reef
25	13°21'22.4"S	176°13'27.8"W	Pinnacle
26	13°21'28"S	176°12'51.68"W	Fringing reef coastline
27	13°21'9.6"S	176°13'10.9"W	Fringing reef coastline
28	13°21'5.55"S	176°13'07.71"W	Fringing reef coastline
29	13°22'41.4"S	176°14'34.1"W	Outer slope
30	13°21'39.8"S	176°16'6.96"W	Outer slope
31	13°11'17.8"S	176°12'7.62"W	Inner barrier reef
32	13°13'1.38"S	176°11'5.64"W	Fringing reef coastline
33	13°11'6.84"S	176°12'0.54"W	Inner barrier reef
34	13°16'5.4"S	176°09'24.4"W	Fringing reef coastline
35	13°10'5.1"S	176°11'5.1"W	Outer slope
36	13°14'17.4"S	176°15'3.36"W	Outer slope
37	13°11'14.2"S	176°13'6.72"W	Inner barrier reef
38	13°13'0.06"S	176°14'24"W	Inner barrier reef
39	13°14'25.6"S	176°15'6.78"W	Inner barrier reef
40	13°23'10.9"S	176°12'51.8"W	Pass
41	13°22'50"S	176°12'43.4"W	Lagoon
42	13°13'07.4"S	176°11'14.0"W	Fringing reef coastline

*Comments:* this characteristically dumbbell-shaped alga is commonly found as epiphytic colonies on macroalgae such as *Laurencia*, *Hypnea*.

#### Nostocales

##### Nostocaceae

*Nostoc calcicola* Brebisson in Meneghini, 1842: 121. Velasquez 1962: 341, pl. 8 fig. 100. Vouchers: WSS 58 St. 31

##### Rivulariaceae

*Calothrix confervicola* (Dillwyn) C. Agardh, 1824: 70. Velasquez 1962: 353, pl. 10 fig. 125. Vouchers: WSS 123 St. 22

#### Scytonemataceae

*Scytonema polycystum* Bornet et Flahault, 1887: 90. Silva and Pienaar 2000: 26, figs 48, 88–89. Vouchers: WSS 20 St. 26, 60 St. 31, 156 St. 7, 183 St. 40

#### Oscillatoriales

##### Oscillatoriaceae

*Lyngbya majuscula* (Dillwyn) Harvey, 1833: 370. Dawson 1954: 380, fig. 3d; Velasquez 1962: 319, pl. 4 fig. 68; Littler and Littler 1997: 122, fig. 182; N'Yeurt 2001: 692; Albert *et al.* 2002. Vouchers: WSS 88, 230 St. 1, 33 St. 2; UPF 1648, 1679 St. 3; WSS 158 St. 7, 125, 128 St. 8; UPF 1615 St. 16, 1407 St. 20; WSS 224 St. 20; UPF 1511 St. 29, 1450 St. 30; WSS 57, 58 St. 31, 235 St. 35; UPF 1740 St. 36,

**Table 2. Distribution of the species within the five major geomorphological zones**

OS: outer slope (stations 2, 16, 22, 29, 30, 35, 36), BR: barrier reef (9, 10, 15, 17, 18, 19, 23, 24, 31, 33, 37, 38, 39), L: Lagoon (1, 3, 11, 12, 13, 41), P: Pinnacles (20, 21, 25, 40), FR: fringing reef (4, 5, 6, 7, 8, 14, 26, 27, 28, 32, 34, 42)

	OS	BR	L	P	FR
Rhodophyta	67	68	67	13	80
Chlorophyta	13	31	21	7	30
Heterokontophyta	5	4	9	1	10
Cyanobacteria	5	12	8	3	7
Magnoliophyta	0	0	1	0	3
Total	90	115	106	24	130

1517, 1518 St. 41; WSS 226 St. 14.1; UPF 1603 St. 4; WSS 06 St. 5; UPF 1532 St. 10, 1498 St. 11

*Comments:* this species is found at most sites, its colour ranging from greenish to brownish-black.

***Lyngbya polychroa*** (Meneghini) Rabenhorst, 1847: 83. Velasquez 1962: 316, pl. 3 fig. 64 ('*Lynbya sordida*'); Littler and Littler 1997: 183. Vouchers: UPF 1686 St. 3; WSS 206 St. 31

*Comments:* this species (often reported under the synonym *L. sordida* Gomont, see Silva *et al.* 1996) is distinguished from *Lyngbya majuscula* by the smaller average diameter of its filaments, which are between 16 and 30 µm as opposed to 20–60 µm in *L. majuscula* (Velasquez 1962). The sheath is also thinner, and cell contents appears less dense, in *L. polychroa*.

***Oscillatoria bonnemaisonii*** (P. Crouan et H. Crouan) P. Crouan et H. Crouan, 1860: 371. Velasquez 1962: 288, pl. 1 fig. 16. Voucher: WSS 206 St. 31; UPF 1522 St. 41

***Oscillatoria margaritifera*** (Kützing) Gomont, 1892b: 216. Dawson 1954: 380, fig. 3f; Velasquez 1962: 293, pl. 2 fig. 23. Voucher: WSS 206 St. 31

### Phormidiaceae

***Phormidium nigroviride*** (Thwaites) Anagnostidis et Komárek, 1988: 405.

*Comments:* = *Oscillatoria nigroviride* Thwaites; Dawson 1954: 380, fig. 3g; Velasquez 1962: 293, pl. 2 fig. 24. Vouchers: WSS 59 St. 31; UPF 1519 St. 41

***Phormidium papyraceum*** Gomont, 1890: 355. Velasquez 1962: 310, pl. 3 fig. 57. Vouchers: UPF 1553, WSS 85 St. 1; UPF 1707 St. 20; WSS 227 St. 14.1

*Comments:* forms thin sheets on sandy substrata in the lagoon. Filaments interwoven, 3–4 µm in diameter, with prominent transverse walls. When dry, specimens become translucent with a papery texture.

***Spirulina subsalsa*** Oersted, 1842: 566, pl. 7 fig. 4. Velasquez 1962: 284, pl. 1 fig. 13; Nagarkar 1998: 534, fig. 16. Vouchers: WSS 57, 206 St. 31

*Comments:* this characteristically coil-shaped minute Cyanobacteria is often found mixed with other algae in turf populations.

***Symploca atlantica*** Gomont, 1892a: 109, pl. 2 fig. 5. Velasquez 1962: 312; Littler and Littler 1997: 123, fig. 184. Vouchers: UPF 1617 St. 16; WSS 213 St. 23, 216 St. 36, 138 St. 4

*Comments:* forming erect fascicles; filaments 4–5 µm in diameter.

***Symploca hydroides*** (Harvey) Kützing, 1849: 272. Dawson 1954: 380, fig. 3o, p; Velasquez 1962: 312, pl. 3 fig. 59; Islam and Aziz 1982: 650, pl. 2 figs 13–16, pl. 7 figs 34–35; Payri *et al.* 2000: 293; Payri *et al.* 2002: 53, pl. 6 fig. 1; Abed *et al.* 2003: 867, fig. 7a–d. Vouchers: WSS 88 St. 1, 124 St. 8; UPF 1568 St. 16, 1437 St. 25; WSS 62 St. 31; UPF 1527 St. 41, 1287 St. 4, 1479 St. 5, 1541 St. 12

*Comments:* this species forms characteristic erect fascicles with a clay-like texture; filaments 6–7 µm in diameter.

***Symploca laeteviridis*** Gomont, 1892b: 109, pl. 2 figs 6–8. Velasquez 1962: 311, pl. 3 fig. 58; Nagarkar 1998: 539, fig. 25. Voucher: WSS 30 St. 1; UPF 1490 St. 5

*Comments:* this species is distinguished from *S. hydroides* by the smaller diameter of the filaments (3–4 µm, never reaching 5 µm) and the absence of adhesion of filaments into erect fascicles.

### Chlorophyta

#### Ulvales

#### Ulvaceae

***Ulva clathrata*** (Roth) C. Agardh, 1811: 23. (= *Enteromorpha clathrata* (Roth) Greville; Dawson 1954: 384, fig. 6d–e; Egerod 1974: 134, fig. 4; Kraft 2000: 525, fig. 8; N'Yeurt 2001: 693, figs 2, 3a–b; Skelton and South 2002a: 160, fig. 22A–B; 2002b: 8, pl. 5 figs 29–33, pl. 6 fig. 34; Abbott and Huisman 2004: 46, fig. 5A–C). Vouchers: WSS 60 St. 31

*Comments:* based on culture and molecular studies, Shimada *et al.* (2003) suggested that Japanese records of *Enteromorpha* should be transferred to *Ulva*. Most species previously listed under the genus *Enteromorpha* Link (1820) have been transferred to *Ulva* by Hayden *et al.* (2003) based on their own molecular studies. *Ulva clathrata* is readily distinguished by multiserial laterals ending in bulbous expansions.

***Ulva flexuosa*** Wulfen subsp. ***paradoxa*** (Dillwyn) Bliding, 1963: 79. (= *Enteromorpha flexuosa* (Wulfen) J. Agardh subsp. *paradoxa*; Bliding 1963: 79, figs 42a–g, 45a–f;

Egerod 1974: 132, figs 1–3; N'Yeurt 1996: 365, fig. 16; Kraft 2000: 525, fig. 7F; N'Yeurt 2001: 697, fig. 46). Vouchers: WSS 228, 229 St. 3

*Comments:* this subspecies is characterised by its longer uniseriate laterals (up to 2 mm long) and regularly transversely arranged cell rows.

## Cladophorales

### Cladophoraceae

*Chaetomorpha crassa* (C. Agardh) Kützing, 1845: 204. Sartoni 1992: 299, fig. 4E; Littler and Littler 1997: 93, fig. 125; N'Yeurt 2001: 701, fig. 15. Vouchers: UPF 1336, 1337, 1338 St. 8

*Chaetomorpha linum* (O.F. Müller) Kützing, 1845: 204. Egerod 1974: 135, fig. 9; Littler and Littler 1997: 93, fig. 126; 2003: 198. Vouchers: UPF 1583; WSS 112 St. 8

*Cladophora vagabunda* (Linnaeus) van den Hoek, 1963: 144. Sartoni 1992: 304, fig. 6C–E; Littler and Littler 1997: 95, fig. 130; Kraft 2000: 562, fig. 21A–G; Leliaert and Copejans 2003: 70, figs 14A–B, 15; Abbott and Huisman 2004: 79, fig. 24A–D. Vouchers: UPF 1221 St. 1, 1373 St. 8, 1562 St. 9

### Siphonocladaceae

This family was previously listed under the Siphonocladales, but recent morphological and molecular evidence suggests that the latter order and the Cladophorales are monophyletic (Leliaert *et al.* 1998: 178, 2003).

*Boergesenia forbesii* (Harvey) J. Feldmann, 1938: 1503, figs 3–5. Sartoni 1992: 306, fig. 7B; N'Yeurt 1996: 369, fig. 14; Leliaert *et al.* 1998: 184, fig. 13; Payri *et al.* 2002: 44, pl. 1 fig. 10; Littler and Littler 2003: 202. Voucher: UPF 1354 St. 8

*Boodlea composita* (Harvey) Brand, 1904: 187–190. Sartoni 1992: 306, fig. 7C; N'Yeurt 1996: 368, fig. 19 (as *Boodlea coacta* (Dickie) Murray); Leliaert *et al.* 1998: 184, figs 16–19 (non figs 14–15, 20, F. Leliaert pers. com.); Kraft 2000: 569, fig. 24A–C; Payri *et al.* 2000: 70 (as *Boodlea kaeneana* Brand); Littler and Littler 2003: 200; Abbott and Huisman 2004: 85, fig. 26A–B. Vouchers: UPF 1219, 1546 St. 1, 1202 St. 2, 1189 St. 3, 1231 St. 7, 1308 St. 11, 1426, 1731 St. 23

*Comments:* this species forms spongy masses amidst spaces between dead coral. This genus (along with *Phyllocladon* and several others) form a close cluster with *Cladophoropsis* in the family Cladophorophyceae based on recent phylogenetic studies (Kooistra *et al.* 1993; Wysor 2002; Leliaert *et al.* 2003) and a single, highly variable species may need to be recognised (F. Leliaert, pers. comm.).

*Dictyosphaeria cavernosa* (Forsskål) Børgesen, 1932: 2. Sartoni 1992: 319, fig. 13A; N'Yeurt 1996: 371, fig. 12; Littler and Littler 1997: 87, fig. 117; Leliaert *et al.* 1998:

188, figs 30–33; Kraft 2000: 578, fig. 27A–B; Payri *et al.* 2000: 76; Littler and Littler 2003: 202; Abbott and Huisman 2004: 89, fig. 29A. Vouchers: UPF 1554, 1657, WSS 166 St. 1, 1286 St. 4, 1330 St. 9, 1305 St. 12, 1297 St. 13

*Dictyosphaeria versluysii* Weber-van Bosse, 1905: 144. Egerod 1952: 351, figs 1a, 2h–k; Sartoni 1992: 319, figs 13B, 14A; Leliaert *et al.* 1998: 190, figs 37–39; Payri *et al.* 2000: 76; Payri *et al.* 2002: 44, pl. 1 fig. 11; Skelton and South 2002a: 162, fig. 23C, D; Littler and Littler 2003: 204; Abbott and Huisman 2004: 89, fig. 29B. Vouchers: UPF 1289, 1595 St. 4, 1218 St. 7, 1339 St. 8, 1319 St. 10, 1335 St. 9

*Phyllocladon anastomosans* (Harvey) Kraft et Wynne, 1996: 139, figs 16–25. Leliaert *et al.* 1998: 186, figs 23–24; Payri *et al.* 2000: 74; Wynne 2001: 368, fig. 34; Littler and Littler 2003: 200; Abbott and Huisman 2004: 63, fig. 16A, B. Vouchers: UPF 1220, 1551, 1555 St. 1, 1476 St. 5; WSS 62 St. 31

*Comments:* see remarks above for *Boodlea composita*.

*Siphonocladus tropicus* (P. Crouan et H. Crouan) J. Agardh, 1887: 105. Sartoni 1992: 315, fig. 12A; Abbott and Huisman 2004: 90, fig. 30. Voucher: UPF 1633, St. 7

### Valoniaceae

*Valonia aegagropila* C. Agardh, 1823: 429. N'Yeurt 1996: 372, fig. 15a, b; Leliaert *et al.* 1998: 192, figs 40, 41; Payri *et al.* 2000: 78; Littler and Littler 2003: 206; Abbott and Huisman 2004: 92, fig. 31A. Vouchers: UPF 1230 St. 7, 1351 St. 8

*Valonia fastigiata* Harvey ex. J. Agardh, 1887: 101, pl. I fig. 5. Sartoni 1992: 321, fig. 14C; Copejans *et al.* 1995: 98, fig. 39; Leliaert *et al.* 1998: 192, figs 42–44; Payri *et al.* 2000: 78; Payri *et al.* 2002: 44, pl. 1 fig. 7; Skelton and South 2002a: 162, fig. 24A; Littler and Littler 2003: 206. Vouchers: UPF 1217 St. 1, 1187, 1684 St. 3, 1281, 1596 St. 4, 1249, 1250 St. 7, 1340 St. 8, 1332 St. 9, 1309 St. 12

*Comments:* this species is quite common in Wallis, especially on the inner reef slopes where it forms abundant tightly adhering masses nested in the infractuositities of dead coral. It is also found in the seagrass beds, where it assumes an unusual, ball-like unattached form up to 10 cm in diameter.

*Valonia macrophysa* Kützing, 1843: 307. Littler and Littler 1997: 91, fig. 121; Payri *et al.* 2000: 80; Littler and Littler 2003: 206. Vouchers: UPF 1631, 1632 St. 7, 1703 St. 20

*Ventricaria ventricosa* (J. Agardh) Olsen et West, 1988: 104. Sartoni 1992: 323, fig. 14E; N'Yeurt 1996: 372, fig. 23; Littler and Littler 1997: 89, fig. 119; Payri *et al.* 2000: 80; Payri *et al.* 2002: 44, pl. 1 fig. 12; Littler and Littler 2003: 204; Abbott and Huisman 2004: 94, fig. 32B. Vouchers: UPF 1226 St. 3, 1471 St. 5, 1329 St. 9, 1306 St. 12, 1377 St. 16

**Bryopsidales****Bryopsidaceae**

*Bryopsis pennata* Lamouroux var. *secunda* (Harvey) Collins et Hervey, 1917: 62. Mitchell *et al.* 1979: 109, pl. 1 figs 6–8; Littler and Littler 1997: 97, fig. 134; Payri *et al.* 2000: 82; Skelton and South 2002a: 163, fig. 24E; Littler and Littler 2003: 208; Abbott and Huisman 2004: 98, fig. 33C. Vouchers: UPF 1656; WSS 178 St. 1; UPF 1481 St. 2, 1566 St. 16

**Codiaceae**

*Codium bulbopilum* Setchell, 1924: 173, fig. 38; 1926: 84, pl. 11 fig. 1, pl. 12 fig. 2. Jones and Kraft 1984: 26, figs 4, 5B–F; N'Yeurt 1996: 384, figs 42, 45; Kraft 2000: 591, fig. 31F; Skelton and South 2002a: 165, fig. 25F; Littler and Littler 2003: 212. Voucher: UPF 1317, St. 10

*Comments:* the Wallis material agrees with the hummock-like habit of Lord Howe plants in Kraft (2000). The relationship of Pacific records of *C. geppiorum* (e.g. Payri *et al.* 2000: 102) to *C. bulbopilum* remain unclear pending molecular studies (Skelton and South 2002).

*Codium mamillosum* Harvey, 1855: 565. Womersley 1984: 230, figs 77A, 78A; Abbott 1986: 162, fig. 1; N'Yeurt 2001: 720, figs 48, 50, 69; Littler and Littler 2003: 212; Abbott and Huisman 2004: 109, fig. 39A–B. Voucher: UPF 1650, WSS 162 St. 1

*Comments:* a common species at depths below 20 m on the outer reef slope, it can form large dominant covers at depths of up to 100 m in many parts of the South Pacific such as Fiji and McDonald Seamount (ADR N'Yeurt unpubl. obs).

**Caulerpaceae**

*Caulerpa biserrulata* Sonder, 1871: 64, pl. 2 figs 10–12. Coppejans and *al.* 1995a: 74, figs 3, 4; Kraft 2000: 595, fig. 32A, B; Littler and Littler 2003: 214 (= *Caulerpa brachypus* Harvey forma *parvifolia* (Harvey) Cribb *sensu* Cribb 1958: 209, figs 1–7; Coppejans and Meinesz 1988: 184, figs 35–38; Coppejans and Prud'homme van Reine 1992: 673, figs 1A–C, 7A–B; N'Yeurt 2001: 711, fig. 40; Payri *et al.* 2002: 44, pl. 1 fig. 1). Vouchers: UPF 1360 St. 8, 1295 St. 13, 1402 St. 14, 1453 St. 31

*Comments:* the Wallis plants have both simple, smooth and divided, toothed uprights, forming a continuum which circumscribes *Caulerpa brachypus* forma *parvifolia* (Cribb 1958b) and conforms with plants described from Papua New Guinea by Coppejans *et al.* (1995a). *Caulerpa brachypus* forma *parvifolia* was put in synonymy with *C. biserrulata* (Coppejans 1992: 388), and is distinguished from superficially similar *C. brachypus* by its double or triple rows of spines along the assimilator margins. Kraft (2000: 597)

and South and Skelton (2003: 540) reported *C. biserrulata* fronds to be thin and delicate, but Wallis plants were found to be quite coriaceous with thick assimilators, while still possessing conspicuous double rows of marginal teeth (cf. Payri *et al.* 2002, pl. 1 fig. 1). Joly and Semir (1973) described a further variety of *C. brachypus* from Brazil, var. *nordestina*, which has undulate margins and lacks marginal proliferations. The latter authors appropriately noted that it could represent a separate species, and it may be quite distinct from the Pacific material.

*Caulerpa cupressoides* (Vahl) C. Agardh var. *mamillosa* (Montagne) Weber-van Bosse, 1898: 332, pl. 28, fig. 6. Sartoni 1978: 402, fig. 2b; Coppejans and Prud'homme van Reine 1992: 679, figs 3A, 8B; N'Yeurt 1996: 377, figs 25, 35; Kraft 2000: 597, fig. 32C, D; Payri *et al.* 2002: 44, pl. 1 fig. 6; Littler and Littler 2003: 216. Vouchers: UPF 1399, 1400 St. 19, 1456 St. 26, 1242, 1243, 1245 St. 6

*Caulerpa nummularia* Harvey ex J. Agardh, 1873: 38. Littler and Littler 1997: 105, fig. 150; Littler and Littler 2003: 214; South and Skelton 2003: 542, fig. 3; Abbott and Huisman 2004: 121, fig. 44A. Vouchers: UPF 1363 St. 8, 1390 St. 17; WSS 234 St. 35

*Comments:* this species is distinguished from superficially similar *C. peltata* by its crenulated disc-like assimilators which are tiered, as opposed to smooth, single assimilators in the latter species (Kraft 2000; Abbott and Huisman 2004).

*Caulerpa peltata* Lamouroux, 1809b: 332. Weber-van Bosse 1898: 373, pl. 31 fig. 9; Kraft 2000: 601, fig. 33E; N'Yeurt 2001: 714; Skelton and South 2002a: 163, fig. 25B. Vouchers: UPF 1550 St. 1, 1195 St. 3, 1362 St. 8, 1708 St. 17, 1429 St. 23, 1513 St. 31, 1272 St. 5, 1533 St. 12

*Comments:* *Caulerpa peltata* is distinguished from *C. racemosa* var. *peltata* (Lamouroux) Eubank by having thin stolons with simple, never compound, disk-like assimilators which never bear clavate ramuli. The two entities are best kept separate until genetic and molecular studies provide a definitive answer on their status (Kraft 2000).

*Caulerpa racemosa* (Forsskål) J. Agardh, 1873: 35. Sartoni 1978: 406, fig. 4c; Coppejans and Meinesz 1988: 191, figs 22, 23; Coppejans 1992: 397, fig. 4C; Coppejans and Prud'homme van Reine 1992: 698, fig. 18A–B; Coppejans and *al.* 1995a: 78, fig. 7; N'Yeurt 1996: 378, figs 28, 36; Kraft 2000: 602, fig. 34A–D; Payri *et al.* 2000: 94; N'Yeurt 2001: 714, fig. 43; Payri *et al.* 2002: 44, pl. 1 fig. 2; Littler and Littler 2003: 226; Abbott and Huisman 2004: 122, fig. 44B, C. Vouchers: UPF 1251 St. 7, 1298 St. 13, 1403, 1404 St. 19, 1451 St. 31

*Comments:* includes *C. racemosa* vars *peltata* and *uvifera*; see Silva *et al.* (1996).

***Caulerpa serrulata*** (Forsskål) J. Agardh, 1837: 174. Sartoni 1978: 408, fig. 5a; Meñez and Calumpong 1982: 9, pl. 2E; Coppejans and Meinesz 1988: 192, figs 27, 28; Coppejans 1992: 403, fig. 7; Coppejans and *al.* 1992: 701, fig. 20B; 1995a: 78, figs 9, 10; N'Yeurt 1996: 382, figs 30, 40; Payri *et al.* 2000: 94; Leliaert *et al.* 2001: 452, fig. 1; N'Yeurt 2001: 715, fig. 44; Payri *et al.* 2002: 44, pl. 1 fig. 3; Skelton and South 2002a: 164, figs 24B–D; Littler and Littler 2003: 230; Abbott and Huisman 2004: 123, fig. 45A. Vouchers: UPF 1216, 1654 St. 1, 1232, 1233, 1234, 1235, 1236 St. 6, 1320 St. 10, 1296 St. 13, 1405 St. 20

***Caulerpa sertularioides*** (S. G. Gmelin) Howe, 1905: 576. Sartoni 1978: 410, fig. 5b; Coppejans 1992: 404; Coppejans and Prud'homme van Reine 1992: 704, fig. 21A; Coppejans and *al.* 1995a: 80, fig. 8; Littler and Littler 1997: 107, fig. 154; Payri *et al.* 2000: 96; N'Yeurt 2001: 716, fig. 42; Payri *et al.* 2002: pl. 1 fig. 4; Littler and Littler 2003: 232; Abbott and Huisman 2004: 124, fig. 45B, C. Vouchers: UPF 1365 St. 8, 1237, 1238, 1239, 1240, 1241, 1244 St. 6, 1392 St. 19

***Caulerpa taxifolia*** (Vahl) C. Agardh, 1817: 22. Sartoni 1978: 410, fig. 5c; Coppejans 1992: 406, fig. 8A–G; Coppejans and Prud'homme van Reine 1992: 706, figs 6B, 22B; South and N'Yeurt 1993: 122, fig. 17; Coppejans and *al.* 1995: 80, fig. 11; Littler and Littler 1997: 109, fig. 155; Kraft 2000: 604, figs 34E, 35A; Payri *et al.* 2000: 98; Leliaert *et al.* 2001: 452, fig. 2; Payri *et al.* 2002: 44, pl. 1 fig. 5; Littler and Littler 2003: 234; Abbott and Huisman 2004: 124, fig. 46A–B. Vouchers: UPF 1196, 1692 St. 3, 1710 St. 17, 1393, 1394, 1395, 1396, 1397, 1398 St. 19

*Comments:* Coppejans and Prud'homme van Reine (1992: 706) reported an ecad 'mexicana' of *C. taxifolia* from Indonesia, with partly compressed rachis, and basally constricted compressed pinnae. Later, Littler and Littler (2003: 222) reported a plant from Fiji with similar characteristics under *Caulerpa mexicana* Sonder ex Kützing. *Caulerpa taxifolia* and *C. mexicana* are distinct species (Olsen *et al.* 1998). *Caulerpa mexicana* from the Caribbean is characterised by a flattened main axis bearing non-constricted pinnae; the fronds also have a darker green colour with a lustrous sheen not found in *C. taxifolia*. (Meinesz *et al.* 1994; Littler and Littler 2000: 364, fig. on 365, upper). A main difference between the two species would be in the disposition of the rhizoids: sparse on the stolon and very thick and dense in *C. taxifolia*; close together and with few rhizoids per shoot in *C. mexicana*. Taylor (1977) cited *C. mexicana* to be present in the Hawaiian flora, but after re-examination of the herbarium sheets in question by Abbott and Huisman (2004: 124) they were found to be not distinct from *C. taxifolia*. True *C. mexicana* has yet to be confirmed from the South Pacific (A. Meinesz, pers. com.) and present records of this species from Fiji and other regional localities would best be ascribed to *C. taxifolia*. It

would appear however to be present on the Andaman Sea coast, Thailand (Egerod 1975: 5, fig. 23).

***Caulerpa taxifolia*** (Vahl) C. Agardh ecad. ***tristichophylla*** Svedelius 1906: 112, fig. 5. Littler and Littler 2003: 222 ('*Caulerpa mexicana* var. *pluriseriata*') (= *Caulerpa taxifolia* var. *asplenioides* Harvey 1863: pl. 178). Voucher: UPF 1711 St. 17

*Comments:* this ecad is distinguished from the typical form of *C. taxifolia* by its three-dimensional, often radial arrangement of pinnulae on erect assimilators. Quite commonly, both two-dimensionally and three-dimensionally beset assimilators are found on the same plant. Also reported from Fiji (ADR N'Yeurt, unpubl. data), and Mangareva Island, French Polynesia (Weber-van Bosse 1910 (as *C. taxifolia* f. *asplenioides*); ADR N'Yeurt and CE Payri unpubl. data). This appears to be a shallow-water ecotype of *C. taxifolia*, rather than an infraspecific taxon (A Meinesz, pers. comm.). Plants from Fiji reported by Littler and Littler (2003) as *Caulerpa mexicana* var. *pluriseriata* and collections in SUVA-A examined by the first author conform to the Wallis material as *C. taxifolia* ecad. *tristichophylla* as understood here (see comments above on *C. taxifolia*). Weber-van Bosse (1898: 292; 1910: 2) reported this ecad under *C. taxifolia* f. *asplenioides*, based on *C. asplenioides* Greville (1853: figs 1, 2, pl. I) and *C. taxifolia* var. *asplenioides* (Greville) Harvey (1863: pl. 178). The latter forms and varieties were invalidated by Meinesz *et al.* (1984: 108) since the original description of *C. asplenioides* was found to represent *C. mexicana*.

### Halimedaceae

The systematics of the Halimedaceae has recently been revised in molecular studies (Kooistra *et al.* 2002; Verbruggen and Kooistra 2004).

***Halimeda borneensis*** W.R. Taylor 1975: 81, figs 1, 2. (Misapplied name: *Halimeda simulans* Howe: Valet 1968: 48, pl. 9(4) fig. 3; Hillis 1980: 103, fig. 26; N'Yeurt 1996: 390, figs 76, 85; Littler and Littler 1997: 113, fig. 163; N'Yeurt 2001: 274); Hillis 1980: 105, fig. 27; Coppejans *et al.* 2001b: 411; Littler and Littler 2003: 240. Vouchers: UPF 1779 St. 3, 1781 St. 4, 1179, 1784, 1785, 1786 St. 5, 1782, 1783 St. 9, 1790 St. 14

*Comments:* previous Pacific records of *Halimeda simulans* are referable to *H. borneensis* (H. Verbruggen pers. com.) as *H. simulans* is strictly an Atlantic species (Kooistra *et al.* 2002: 134).

***Halimeda distorta*** (Yamada) Hillis 1968: 33, figs 4, 6(2). (Misapplied name: *Halimeda copiosa* Goreau et Graham: Abbott and Huisman 2004: 131, fig. 49A). Hillis 1980: 120, fig. 34; 1985: 11; Verheij and Prud'homme van Reine 1993: 135, pl. 5 fig. 4; Payri *et al.* 2000: 108. Vouchers: UPF 2733



St. 1, 1172 St. 10, 1181, 1819 St. 11, 1823 St. 24, 1822 St. 31, 1818 St. 38

*Comments:* new molecular data suggests that previous Pacific records of *H. copiosa* are referable to *H. distorta*, as the former is exclusively an Atlantic Ocean species (*H. Verbruggen*, pers. comm.). *H. distorta* is characterised by having a single, basal holdfast and heavily calcified, contorted segments, which distinguishes it from superficially similar *H. hederacea* which has multiple rhizoidal holdfasts and keeled, uncontorted segments. The latest molecular evidence points to a merger of *H. distorta* and *H. hederacea*, but it is felt that further research might separate the two species again (*H. Verbruggen*, pers. comm.).

***Halimeda gracilis*** Harvey ex J. Agardh, 1887: 82. Coppejans *et al.* 1995: 86, fig. 24; Leliaert *et al.* 2001: 453, figs 3, 9–10; Littler and Littler 2003: 246; Abbott and Huisman 2004: 133, fig. 49F. Vouchers: UPF 1167, 1820, 1821 St. 30

***Halimeda hederacea*** (Barton) Hillis 1968: 30, figs 3, 6:1, 6:4–8. (Misapplied name: *Halimeda copiosa* Goreau et Graham: Coppejans *et al.* 1995: 84, fig. 21). Payri *et al.* 2002: 46, pl. 2 fig. 1; Littler and Littler 2003: 242. Vouchers: UPF 1823 St. 29, 1822 St. 36 (= *Halimeda opuntia* var. *hederacea* (Barton) Hillis 1959: 360, pl. 2 fig. 7, pl. 5 fig. 4; Taylor 1950: 81, pl. 40 fig. 1; N'Yeurt 1996: 389, figs 70c, 84)

*Comments:* This species is often listed as a variety or synonym of *H. opuntia*, but we prefer to maintain its specietal status in light of new molecular evidence (Kooistra *et al.* 2002; Verbruggen and Kooistra 2004). Additionally, it has a sprawling habit with smooth, shiny segments, as opposed to the clumped habit with dull, rough segments of *H. opuntia*.

***Halimeda incrassata*** (Ellis) Lamouroux 1816: 307; Hillis 1959: 365, pl. 4 figs 1, 2, pl. fig. 21, pl. 6 figs 21–24, pl. 12; Egerod 1974: 147, figs 62–64; Littler and Littler 1997: 111, fig. 159; Payri *et al.* 2000: 110; N'Yeurt 2001: 721, figs 26, 37; Payri *et al.* 2002: 46, pl. 2 fig. 3; Littler and Littler 2003: 246; Abbott and Huisman 2004: 133, fig. 50A. Vouchers: UPF 1779 St. 3, 1185, 1781 St. 6, 1179, 1784, 1785, 1786 St. 7, 1782, 1783 St. 9

***Halimeda macroloba*** Decaisne, 1841: 118. Hillis 1959: 375, pl. 3 fig. 3, pl. 5 figs 19, 20, pl. 6 fig. 17, pl. 12; 1980: 108, fig. 28; Egerod 1974: 148, figs 65–68; 1975: 61, fig. 33; Coppejans *et al.* 1995: 86, fig. 25; Payri *et al.* 2000: 112; N'Yeurt 2001: 722, fig. 38; Payri *et al.* 2002: 46, pl. 2 fig. 4; Littler and Littler 2003: 248; Abbott and Huisman 2004: 135, fig. 50B. Vouchers: UPF 1178, 1802 St. 6, 1803 St. 7, 1176, 1800, 1801 St. 8, 1799 St. 20

*Comments:* this species is the largest *Halimeda* in Wallis, with characteristic bulbous holdfast and segments to 2 cm in diameter.

***Halimeda micronesica*** Yamada, 1941: 121, fig. 15. Hillis 1959: 364, pl. 3 fig. 1, pl. 5 figs 13, 14, pl. 6 fig. 2, pl. 9; Wynne 1993: 22, fig. 10; N'Yeurt 1996: 387, figs 69, 81–82; Payri *et al.* 2000: 112; Payri *et al.* 2002: 46, pl. 2 fig. 5; Littler and Littler 2003: 250. Vouchers: UPF 1832, 1833, 1834 St. 10, 1832 St. 35

*Comments:* the fan-shaped, fused basal segment of this species is distinctive in the field. Common in neighbouring Rotuma Island (N'Yeurt 1996), it was recently also found in Fiji (Littler and Littler 2003).

***Halimeda minima*** (W. R. Taylor) Hillis, 1968: 32. Hillis 1980: 113, fig. 30; Payri *et al.* 2000: 114; N'Yeurt 2001: 723, figs 25, 36; Littler and Littler 2003: 250. Vouchers: UPF 1169 St. 1, 1685 St. 3, 1177, 1792 St. 10, 1793 St. 9, 1794 St. 12, 1389 St. 17, 1797 St. 22, 1795 St. 23, 1173, 1787 St. 24, 1790 St. 25, 1796, 1798 St. 29, 1168 St. 30, 1788 St. 35, 1171 St. 36, 1791 St. 38

***Halimeda opuntia*** (Linnaeus) Lamouroux, 1816: 308. Hillis 1959: 359, pl. 2 figs 7, 8, pl. 5 figs 3, 4, pl. 6 fig. 6, pl. 7 fig. 3, pl. 10; Egerod 1974: 147, figs 59–61; Coppejans *et al.* 1995: 86, fig. 27; N'Yeurt 1996: 388, figs 70a–c, 83; Littler and Littler 1997: 111; Payri *et al.* 2000: 114; N'Yeurt 2001: 723; Payri *et al.* 2002: 46, pl. 2 fig. 2; Skelton and South 2002a: 165, fig. 25C–D; Littler and Littler 2003: 252; Abbott and Huisman 2004: 135, fig. 50C. Vouchers: UPF 1170, 1805, 1827, St. 1, 1804 St. 3, 1807 St. 4, 1809 St. 5, 1811 St. 6, 1180, 1810 St. 7, 1812 St. 6, 1184, 1808, 1829, 1830, 1831 St. 10, 1182 St. 11, 1813 St. 13, 1385 St. 16, 1814 St. 17, 1824 St. 23, 1174, 1815, 1825, 1826 St. 24, 1828 St. 35

***Halimeda taenicola*** W. R. Taylor, 1950: 86, 207, pl. 46 fig. 1. Hillis 1959: 354, pl. 2 fig. 6, pl. 5 fig. 12, pl. 6 fig. 14, pls 11, 14; Hillis 1980: 139, fig. 42; N'Yeurt 1996: 390, figs 72, 74, 86; Payri *et al.* 2000: 116; Payri *et al.* 2002: 46, pl. 2 fig. 6; Littler and Littler 2003: 252. Vouchers: UPF 1817 St. 10, 1175, 1816 St. 9

*Comments:* this normally widely distributed tropical species was in Wallis restricted to the barrier reef on the eastern part of the island.

#### Udoteaceae

***Chlorodesmis fastigiata*** (C. Agardh) Ducker, 1969: 17, fig. 1. Coppejans and Prud'homme van Reine 1989: 127, pl. 3 figs 1–4, 12; Payri *et al.* 2000: 120; Coppejans *et al.* 2001b: 421, figs 22–31; N'Yeurt 2001: 726, fig. 73; Payri *et al.* 2002: 44, pl. 1 fig. 8; Skelton and South 2002a: 165, fig. 26B; Littler and Littler 2003: 238. Vouchers: UPF 1299 St. 11, 1307 St. 12, 1457 St. 31

***Chlorodesmis hildebrandtii*** A et E. S. Gepp, 1911: 16, pl. 8 figs 74–75. Egerod 1974: 143, figs 44–49; Coppejans and Prud'homme van Reine 1989: 129, pl. 3 figs 5–11; N'Yeurt 1996: 393, figs 54, 63; Coppejans *et al.* 2001b: p. 422,

figs 15–21; Littler and Littler 2003: 240. Vouchers: UPF 1267 St. 7; WSS 67 St. 10, 1545 St. 12

*Comments:* crystals were not seen in Wallis plants. *Chlorodesmis hildebrandtii* is distinguished from *C. fastigiata* by its truncated, equally constricted dichotomies; the latter species has unequal constrictions above dichotomies. Abbott and Huisman (2004: 138) follow the opinion of Ducker (1967) in ascribing previous Pacific records of *C. hildebrandtii* to *C. caespitosa* J. Agardh, but other authors (Coppejans *et al.* 2001; Littler and Littler 2003) retain the name for Pacific material.

***Rhipidosiphon javensis*** Montagne, 1842a: 15. Littler and Littler 1990: 35; Verheij and Prud'homme van Reine 1993: 140, pl. 7 fig. 6; Wynne 1993: 23, fig. 14; N'Yeurt 1996: 394, fig. 61; Payri *et al.* 2000: 120; Coppejans *et al.* 2001b: 422, figs 32–34; N'Yeurt 2001: 726, fig. 33; Littler and Littler 2003: 254; Abbott and Huisman 2004: 140, fig. 52C–D (= *Udotea javensis* (Montagne) A. et E. S. Gepp 1904: 363; Dawson 1954: 395, fig. 13b–c; Egerod 1975: 58, figs 28–29; Coppejans and Prud'homme van Reine 1989: 139, pl. 10 figs 3–9). Vouchers: UPF 1280, 1604 St. 4, 1275 St. 5; WSS 120 St. 8, 35 St. 11, 72 St. 12

***Rhipilia tomentosa*** Kützinger, 1858: 12, pl. 28I. Børgesen 1913: 92, fig. 76a–d; Bucher and Norris 1995: 2, figs 1–2; Millar and Kraft 2001: 25, figs 17, 18, 21–29 (= *Rhipilia tenaculosa* A et E. S. Gepp 1911: 56, figs 130–133; N'Yeurt 2001: 729, figs 51a–d, 70; Payri *et al.* 2002: 44, pl. 1 fig. 9). Vouchers: UPF 1200, 1491, WSS 31 St. 2; UPF 1530 St. 10, 1333, 1486 St. 9, 1376 St. 16, 1414, 1628 St. 22, 1442, 1506 St. 29, 1720 St. 30

*Comments:* after examining the relevant type material, Millar and Kraft (2001: 26) put *R. tenaculosa* in synonymy with *R. tomentosa*. This species is also found in nearby Fiji (N'Yeurt 2001). According to Millar and Kraft (2001), Fiji (178–180°E) appears to be the distributional limit eastward for the genus *Rhipilia* in the Pacific, but since Wallis Island (176° W) is slightly to the north-east of Fiji it would seem that the limit has been reset to the latter locality. However that distinction now belongs to the Phoenix Islands, (part of Kiribati), whose eastern limit is 170°30' W. Indeed, South *et al.* (2001: 565) reported three species of *Rhipilia* from the Phoenix Islands (*R. diaphana*, *R. geppii*, and *R. orientalis*), but interestingly *R. tomentosa* is not listed from that locality, nor are any of the Phoenix species found in Wallis. Recent collections from Samoa (Skelton and South 2002) do not include any *Rhipilia* species; however other important nearby localities such as Tonga remain largely unknown phylogenetically.

***Rhipiliopsis howensis*** G. T. Kraft, 1986: 55, figs 22–30; 2000: 620, fig. 38F–G. N'Yeurt 2001: 729, fig. 77a–b. Voucher: WSS 50, St. 29

*Comments:* this is the second report of this species outside of its type locality of Lord Howe Island (Australia); it was also reported from the Suva Lagoon, Fiji (N'Yeurt 2001).

## Ochrophyta (= Heterokontophyta)

The notion of a division of golden-brown algae has been the subject of much controversy since its inception by Luther (1899, 'Heterokontae', or having unequal flagella on gametes), as pointed out in de Reviere (2003: 148). van den Hoek *et al.* (1995) proposed to restrict the term 'Heterokontophyta' for brown algae with tripartite hairs on the longer flagella (Class Phaeophyceae), a definition contested by Cavalier-Smith (1995) who argued for the replacement term 'Ochrophyta' on the grounds that van den Hoek *et al.* (1995) did not apply the rules of the International Code of Botanical Nomenclature in their diagnosis. We use Ochrophyta here as adopted by Wynne (2001) and de Reviere (2003).

### Phaeophyceae

#### Sphacelariales

##### Sphacelariaceae

***Sphacelaria tribuloides*** Meneghini, 1840: 2. Littler and Littler 1997: 71, fig. 89; Draisma *et al.* 1998: 189, fig. 22; Abbott and Huisman 2004: 190, fig. 72D–E. Voucher: WSS 183, St. 40

### Dictyotales

#### Dictyotaceae

***Dictyopteris repens*** (Okamura) Børgesen, 1924: 265, fig. 13. Allender and Kraft 1983: 107, figs 19A–B; Coppejans *et al.* 1995b: 178, figs 3–4; N'Yeurt 1996: 399, figs 91–92; Payri *et al.* 2000: 128; Littler and Littler 2003: 166; Abbott and Huisman 2004: 197, fig. 75E–F. Vouchers: WSS 176 St. 1; UPF 1473 St. 5, 1625 St. 22, 1430, 1431 St. 23, 1526 St. 41

***Dictyota bartayresiana*** Lamouroux, 1809a: 43. Allender and Kraft 1983: 112, figs 21E–F, 22D, 23A ('*D. bartayresii*'); Ajisaka and Enomoto 1985: 38, fig. 1K–L; Coppejans *et al.* 1995b: 180, fig. 8; De Clerck and Coppejans 1997: 416, fig. 9; Payri *et al.* 2000: 132; De Clerck *et al.* 2001; Payri *et al.* 2002: 48, pl. 3 fig. 1; Abbott and Huisman 2004: 202, fig. 77A. Vouchers: UPF 1253, 1254, 1640, 1643 St. 7, 1345 St. 8, 1435 St. 25

*Comments:* this species forms ball-like hemispherical tufts, a distinctive feature of this species (Abbott and Huisman 2004).

***Dictyota divaricata*** Lamouroux, 1809a: 43. Allender and Kraft 1983: 112, figs 21C–D, 22B–C; Ajisaka and Enomoto 1985: 37, fig. 1H–I; Coppejans *et al.* 1995b: 182, fig. 19; Payri *et al.* 2000: 134. Vouchers: UPF 1212 St. 3, 1327, 1578 St. 9, 1614 St. 16

*Dictyota friabilis* Setchell, 1926: 91, pl. 13 figs 4–7. pl. 20 fig. 1; Dawson 1954: 401, fig. 16a–b; Ajisaka and Enomoto 1985: 37, fig. 1J; N'Yeurt 1996: 400, figs 93–94, 100–101; Payri *et al.* 2000: 132; N'Yeurt 2001: 742; Littler and Littler 2003: 168; Abbott and Huisman 2004: 205, fig. 77E. Vouchers: UPF 1548, 1660 St. 1, 1681, 1698 St. 3; WSS 159 St. 7

*Lobophora variegata* (Lamouroux) Womersley ex Oliveira, 1977: 217. Allender and Kraft 1983: 81, figs 4G–H, 5A–B; N'Yeurt 1996: 401, figs 105–106; Littler and Littler 1997: 79, fig. 99a–b; Payri *et al.* 2000: 136; Payri *et al.* 2002: 48, pl. 3 fig. 2; Skelton and South 2002a: 158, fig. 18C–D, G; Littler and Littler 2003: 172; Abbott and Huisman 2004: 209, fig. 80A–C. Vouchers: UPF 1549, 1651 St. 1, 1192, 1688 St. 3, 1597 St. 4, 1318 St. 10, 1318, 1528 St. 10, 1326 St. 9, 1447 St. 30, 1516 St. 41

*Padina boryana* Thivy in W. R. Taylor, 1966: 355, fig. 2. Payri *et al.* 2000: 138; Abbott and Huisman 2004: 213, fig. 81D–F (= *Padina tenuis* Bory 1827: 590; Egerod 1974: 150, fig. 84; Allender and Kraft 1983: 83, figs 5D–E, 6A; N'Yeurt 1996: 402, fig. 108f). Vouchers: UPF 1255, 1256, 1644, WSS 151 St. 7; UPF 1341, 1342, 1343, 1344 St. 8, 1409 St. 37, 1672 St. 43

*Padina melemele* Abbott et Magruder in Abbott, 1996: 143, figs 1–3. Coppejans *et al.* 1995b: 184, fig. 24 ('*Padina* sp. '); Wynne 1998: 287; Coppejans *et al.* 2001: 29; Payri *et al.* 2002: 48, pl. 3 fig. 3; Littler and Littler 2003: 174; Abbott and Huisman 2004: 217, fig. 83A. Voucher: UPF 1384 St. 16

*Comments:* this deepwater species of *Padina* is characterised by a bright yellow to orange superior surface (surface towards which margin is curled; see Wynne 1998: 273) and a bright white calcified inferior surface. Originally described from Hawaii, it is now reported from Papua New Guinea (Coppejans *et al.* 2001), Fiji (N'Yeurt unpubl.; Littler and Littler 2003), New Caledonia (Payri unpubl.), Rapa Island, Austral Group, French Polynesia (ADR N'Yeurt and CE Payri, unpubl. data) and Wallis Island (this study). *Padina melemele* may be quite widespread in the tropical Pacific, but undercollected because of its inconspicuous subtidal habitat.

*Sargassum polycystum* C. Agardh, 1824: 304. Chiang *et al.* 1992: 36, figs 1–12; N'Yeurt 1996: 403, figs 97, 108a–c; N'Yeurt 2001: 745; Payri *et al.* 2002: 48, pl. 3 fig. 4; Skelton and South 2002a: 160, fig. 21; Littler and Littler 2003: 184. Vouchers: UPF 1346, 1347 St. 8, 1460 St. 34

*Comments:* the characteristic knob-like proliferous outgrowths (elevated cryptostomata) on the distinct main axis, and large number of small vesicles on mature plants, are diagnostic for this species (Chiang *et al.* 1992). The only species of *Sargassum* and the largest algae found in Wallis, plants growing in the deep waters of Mata-Utu harbour attained up to 2 m in length. Its abundance at a port of entry

raises questions as to whether this represents an introduced species. From the literature, it is also present (around Wallis) in Fiji, New Caledonia, Samoa and Tonga.

## Fucales

### Sargassaceae

*Turbinaria conoides* (J. Agardh) Kützing, 1860: 24, pl. 66 figs IIe, f. Barton 1891: 217, pl. LIV figs 1, 7–10, pl. LV figs 1–6, 8–10; Coppejans *et al.* 1995b: 192, fig. 36; Payri *et al.* 2002: 48, pl. 3 fig. 5; Littler and Littler 2003: 184. Voucher: UPF 1461, St. 34

*Comments:* this species is mainly distinguished from the usually less rare *T. ornata* by the absence of inward-directed set of teeth on the apical crown of branchlets. Plants are also somewhat less coarse, with thinner crown margins, than *T. ornata*. The Wallis material, however, has a few inward-directed set of teeth on some thalli, but otherwise conforms to the current species concept of *T. conoides*. This was also observed for material of *T. conoides* from New Caledonia (CE Payri, unpubl. data). On-going molecular analyses of the genera in the Fucales should reveal more information on the phylogeny of this group, and whether *T. conoides* is a valid species, or simply an ecomorph of *T. ornata*.

*Turbinaria ornata* (Turner) J. Agardh, 1848: 266. Barton 1891: 219, pl. LIV figs 11–12, pl. LV fig. 7; Dawson 1954: 405, fig. 21; Coppejans *et al.* 1995b: 192, fig. 38; N'Yeurt 1996: 405; Payri *et al.* 2000: 148; N'Yeurt 2001: 745; Wynne 2001: 365, fig. 32; Payri *et al.* 2002: 48, pl. 3 fig. 6; Skelton and South 2002a: 160, fig. 19E; Littler and Littler 2003: 186; Abbott and Huisman 2004: 242, fig. 95. Vouchers: UPF 1222 St. 1, 1252 St. 7, 1316 St. 10

*Comments:* this species was not very common in the stations studied. The apical crown of branches has a distinct row of inward-directed teeth, and the branches are generally thicker than *T. conoides* (see comments above for latter species).

## Rhodophyta

### Porphyridiales

#### Porphyridiaceae

*Chroodactylon ornatum* (C. Agardh) Basson, 1979: 67, pl. IX fig. 52. Abbott 1999: 42, fig. 1A. Voucher: WSS 140 St. 4

*Stylonema alsidii* (Zanardini) K. Drew, 1956: 72. Abbott 1999: 44, fig. 1B–C. Voucher: WSS 08 St. 5

### Erythropeltiales

#### Erythrotrichiaceae

*Erythrotrichia carnea* (Dillwyn) J. Agardh, 1883: 15, pl. I figs 8–10. Abbott 1999: 45, fig. 1E; N'Yeurt 2001: 746, fig. 106. Voucher: WSS 10 St. 5

**Acrochaetiales****Acrochaetiaceae**

*Acrochaetium barbadense* (Vickers) Børgesen, 1915: 45. Abbott 1999: 52, fig. 3B. Voucher: WSS 99 St. 16

*Acrochaetium kurogii* (Lee et Lindstrom) Lee et Lee, 1988: 128. Lee and Yoshida 1997: 186, fig. 10A–E. Voucher: WSS 52 St. 29

*Comments:* this species is epiphytic on the brown alga *Dictyopteris repens*. This minute, elegant plant has opposite branching from every axial cell, with stellate chloroplasts and a central pyrenoid. The visible parts of the thallus grow parallel to the host surface, in a characteristic brittle-star pattern. The Wallis material is in good agreement with the description of the type species, and illustrations in Lee and Yoshida (1997). This appears to be the first report of the species outside of Japan.

**Nemaliales****Galaxauraceae**

*Actinotrichia fragilis* (Forsskål) Børgesen, 1932: 6. Abbott 1999: 64, fig. 7A–C; Payri *et al.* 2000: 160; N'Yeurt 2001: 749, figs 109, 117; Payri *et al.* 2002: 50, pl. 4 fig. 4; Littler and Littler 2003: 62. Vouchers: UPF 1283, 1598 St. 4, 1276 St. 5, 1257, 1634 St. 7, 1302 St. 12, 1379 St. 16, 1620 St. 22, 1433 St. 25

*Galaxaura fasciculata* Kjellman, 1900: 53, pl. figs 1–9; pl. 20 fig. 14. Abbott 1999: 66, fig. 7D–E; Payri *et al.* 2000: 162; N'Yeurt 2001: 749, fig. 116; Payri *et al.* 2002: 50, pl. 4 fig. 10. Vouchers: UPF 1215, 1224 St. 1, 1282, 1285 St. 4, 1303 St. 12, 1378 St. 16, 1408 St. 20, 1432, 1744 St. 25

*Galaxaura filamentosa* Chou in W.R. Taylor, 1945: 139. Abbott 1999: 67, fig. 7F; Payri *et al.* 2000: 164; Littler and Littler 2003: 64. Vouchers: UPF 1717 St. 1, 1600 St. 4; WSS 123 St. 8

*Galaxaura marginata* (Ellis et Solander) Lamouroux, 1816: 264. Abbott 1999: 67, fig. 7G–H; Payri *et al.* 2000: 164; N'Yeurt 2001: 752, figs 118–122; Littler and Littler 2003: 64. Vouchers: UPF 1284, 1592 St. 4

*Galaxaura subverticillata* Kjellman, 1900: 48, pl. 3 figs 12; pl. 20 fig. 17. Abbott 1999: 69, fig. 8F–H. Vouchers: WSS 89 St. 1, UPF 1561 St. 2, 1593 St. 4, 1564 St. 16

*Comments:* we follow the opinion of Abbott (1999) in retaining the species distinct rather than being synonymized with *Galaxaura rugosa*, since the Wallisian plants also have abundant assimilatory filaments throughout the thallus.

**Gelidiales****Gelidiaceae**

*Gelidium pusillum* (Stackhouse) Le Jolis, 1863: 139. Abbott 1999: 194, fig. 50A; Payri *et al.* 2000: 168; N'Yeurt 2001: 760. Vouchers: UPF 1552 St. 1, 1477, WSS 14 St. 5

*Pterocliadiella caerulea* (Kützting) Santelices et Hommersand, 1997: 118. Abbott 1999: 197, fig. 51E; Payri *et al.* 2000: 168. Vouchers: UPF 1645, WSS 155 St. 7

*Pterocliadiella caloglossoides* (Howe) Santelices, 1998: 244. Abbott 1999: 198, fig. 52A–B; Littler and Littler 2003: 64. Voucher: UPF 1664 St. 1; WSS 133 St. 8; UPF 1574, WSS 101 St. 16; UPF 1704 St. 20, 1624 St. 22; WSS 232 St. 36

**Gelidiellaceae**

*Gelidiella acerosa* (Forsskål) Feldmann et Hamel, 1934: 533. Price and Scott 1992: 25, fig. 4A–E; Abbott 1999: 202, fig. 53A–C; Payri *et al.* 2000: 170; N'Yeurt 2001: 760; Littler and Littler 2003: 56. Vouchers: UPF 1225, 1655 St. 1, 1472 St. 5, 1263, 1264, 1635, 1636 St. 7, 1370 St. 8, 1499, WSS 36 St. 11; UPF 1539, 1544 St. 12, 1391 St. 17, 1705 St. 20, 1514 St. 31

**Gracilariales****Gracilariaceae**

*Gracilaria textorii* (Suringar) De Toni, 1895: 27. Yamamoto 1978: 123, pls 12–14; pl. 42 figs 5–7; pl. 43 figs 1–4; N'Yeurt 2001: 772, figs 156, 168; Payri *et al.* 2002: 50, pl. 4 fig. 11. Vouchers: UPF 1357, 1361 St. 8

*Comments:* this species was growing amidst seagrass beds, in a situation similar to that reported for this flattened species on the neighbouring island of Rotuma (N'Yeurt 1996: 415).

*Gracilaria* sp. Vouchers: UPF 1696, St. 23

*Comments:* this unusual, flattened species of *Gracilaria* could represent a new species; its definite identification awaits the discovery of fertile spermatangial plants.

**Bonnemaisoniales****Bonnemaisoniaceae**

*Asparagopsis taxiformis* (Delile) Trevisan, 1845: 45. Abbott 1999: 174, fig. 43A–D; Payri *et al.* 2000: 160; N'Yeurt 2001: 775, figs 141, 142; Skelton and South 2002a: 141, fig. 6G; Littler and Littler 2003: 68. Voucher: UPF 1415 St. 22

*Comments:* the record represents the minute *Falkenbergia* stage in the life cycle of the species; larger thalli of the other stage presumably occur at other seasons in Wallis.

**Cryptonemiales****Halymeniaceae**

*Cryptonemia umbraticola* Dawson, 1959: 43, figs 21F, 22A. Abbott 1999: 136, fig. 32B; Payri *et al.* 2000: 174. Vouchers: UPF 1475, WSS 13 St. 5, UPF 1323, 1325, 1488 St. 9, 1311, 1312, 1313, 1314, 1536, 1537, WSS 74, 75 St. 12; UPF 1387 St. 16, 1463 St. 36

*Comments:* this species forms loose rosettes at the base of coral heads, 12 m depth in the lagoon.

*Cryptonemia yendoi* Weber-van Bosse, 1921: 249, fig. 77. Abbott 1999: 138, fig. 32C–E; Masuda *et al.* 1999: 449, figs 1–7. Vouchers: UPF 1579, WSS 108 St. 9; UPF 1535, 1538, WSS 73, 76 St. 12, 42 St. 23; UPF 1508 St. 29

*Comments:* this species can be distinguished from *C. umbraticola* by its erect habit, with a prominent stipe.

### Kallymeniaceae

*Kallymenia* sp. Voucher: UPF 1207 St. 2

*Comments:* the lack of fertile material and fragmentary nature of the specimen precludes specietal assignment of this plant at this stage.

### Peyssonneliaceae

*Peyssonnelia bornetii* Boudouresque et Denizot, 1973; 1975: 27, figs 24–47. Marcot *et al.* 1976: 237, fig. V; Payri *et al.* 2000: 172; N'Yeurt 2001: 777, figs 138, 146. Vouchers: UPF 1570, WSS 94, 98 St. 16

*Peyssonnelia inamoena* Pilger, 1911: 311, figs 24, 25. Boudouresque et Denizot 1975: 58, figs 107–115; Abbott 1999: 156, fig. 38B; Payri *et al.* 2000: 172; N'Yeurt 2001: 778, figs 139, 140a–e, 143–144; Littler and Littler 2003: 82. Vouchers: UPF 1204, WSS 221 St. 2; UPF 1304 St. 12, 1627, WSS 146 St. 17; UPF 1502 St. 29

*Peyssonnelia* sp. Vouchers: WSS 180; UPF 1701, WSS 200 St. 3; UPF 1334 St. 9, 1669, 1729 St. 23, 1745 St. 25, 1721 St. 30

*Comments:* this species is closest to *Peyssonnelia conchicola* Piccone et Grunow *sensu* Marcot *et al.* 1988: 266; however, in the species from Madagascar the unicellular rhizoids are not laterally inserted, and the thallus is only 3–6 layers thick compared to 7–8 in the Wallis material. Both plants have terminal cystoliths. *Peyssonnelia* sp. also has been reported from the Cook Islands (ADR N'Yeurt unpubl. data).

*Gelidiella maschrisiana* Dawson, 1957a: 17, fig. 4B. Abbott 1999: 204, fig. 53G–H; Payri *et al.* 2000: 170. Vouchers: WSS 127 St. 8; UPF 1605 St. 4, 1741, WSS 218 St. 10

### Corallinales

#### Corallinaceae

*Amphiroa foliacea* Lamouroux in Quoy et Gaimard, 1824: 628, pl. 93 figs 2, 3. Abbott 1999: 178, figs 44C, 45B; Payri *et al.* 2002: 52, pl. 5 fig. 1 (as *Amphiroa crassa*); Skelton and South 2002a: 140, fig. 4D; Littler and Littler 2003: 26. Voucher: UPF 1201 St. 2, 1380 St. 16

*Comments:* Abbott (1999: 178) states that there exists a high degree of variation in intergenicula shape and size in *Amphiroa foliacea*, which may encompass the species circumscription of *A. tribulus*, *A. misakiensis* and other taxa. *Amphiroa tribulus* would be the earlier name, but a critical study of its type is needed before making taxonomic

decisions. In the field however, *A. foliacea* can be readily distinguished by its flat, coarse habit with axes 3–5 mm wide, as opposed to the fragile, thinner branches of *A. tribulus*.

*Amphiroa fragilissima* (Linnaeus) Lamouroux, 1816: 298. Price and Scott 1992: 45, fig. 11A–B; Payri *et al.* 2000: 182; Skelton and South 2002a: 140, fig. 4E; Littler and Littler 2003: 26. Vouchers: UPF 1661 St. 1, 1324, 1608 St. 9, 1445, 1512 St. 29

*Amphiroa tribulus* (Ellis et Solander) Lamouroux, 1816: 302. Payri *et al.* 2000: 182; N'Yeurt 2001: 761, figs 131, 134–135; Payri *et al.* 2002: 52, pl. 5 fig. 2; Littler and Littler 2003: 26. Voucher: UPF 1436 St. 25

*Hydrolithon farinosum* (Lamouroux) Penrose et Chamberlain, 1993: 295–303, figs 1–19. Gordon *et al.* 1976: 255, pl. III figs 1–4 (as *Fosliella farinosa* (Lamouroux) Howe); Penrose in Womersley 1996: 260, fig. 118A–D; Payri *et al.* 2000: 188; Ringeltaube and Harvey 2000: 437, figs 12–13; Littler and Littler 2003: 30. Voucher: WSS 161 St. 1

*Hydrolithon murakoshii* Iryu et Matsuda, 1996: 528. Payri *et al.* 2000: 190; Littler and Littler 2003: 32. Vouchers: WS 65 St. 1, 284 St. 17

*Hydrolithon onkodes* (Heydrich) Penrose et Woelkerling, 1992: 83. Gordon *et al.* 1976: 266, pl. IX figs 1–4; Ballesteros and Afonso-Carrillo 1995: 209, fig. 12; Womersley 1996: 261, fig. 119A–D; Payri *et al.* 2000: 192; Ringeltaube and Harvey 2000: 438, figs 14–16; Payri *et al.* 2002: 52, pl. 5 fig. 7. Vouchers: WS 75 St. 1, 1 St. 3, 120 St. 5, 283 St. 17, 399 St. 29, 403 St. 30

*Hydrolithon reinboldii* (Weber-van Bosse et Foslie in Foslie) Foslie, 1909: 55. Gordon *et al.* 1976: 255, pl. III figs 5–6, pl. IV figs 1–3; Payri *et al.* 2000: 192; Ringeltaube and Harvey 2000: 439, figs 17–20; Payri *et al.* 2002: 52, pl. 5 fig. 10; Littler and Littler 2003: 32. Vouchers: WS 67, 70 St. 1, 161 St. 11, 269 St. 16, 288 St. 17, 297 St. 18

*Hydrolithon rupestris* (Foslie) Penrose, 1996: 265, fig. 121. Penrose in Womersley 1996: 265, fig. 121A–C; Payri *et al.* 2000: 194. Voucher: WS 119 St. 5

*Jania adhaerens* Lamouroux, 1816: 270. Price and Scott 1992: 48, fig. 12A–C; Abbott 1999: 187, fig. 48A; N'Yeurt 2001: 765; Skelton and South 2002a: 141, fig. 6D–F; Littler and Littler 2003: 32. Vouchers: UPF 1547, 1727 St. 1, 1682 St. 3, 1716 St. 15, 1520 St. 41

*Lithophyllum flavescens* Keats, 1997: 357, figs 23–39. Payri *et al.* 2000: 204. Voucher: WS 333 St. 23

*Lithophyllum insipidum* Adey, Townsend et Boykins, 1982: 44, fig. 29A–F. Keats 1997: 352, figs 1–22; Payri *et al.* 2000: 206. Vouchers: WS 3 St. 3, 282 St. 17

*Lithophyllum kotschyuanum* Unger, 1858: 22, pl. V fig. 15. Gordon *et al.* 1976: 267, pl. IX figs 5, 6, pl. X figs 1, 2; Adey

*et al.* 1982: 37, fig. 24A–F; Ballesteros and Afonso-Carrillo 1995: 207, fig. 2; Payri *et al.* 2000: 206; Littler and Littler 2003: 36. Vouchers: WS 124 St. 5, 264 St. 16, 294 St. 18

***Lithophyllum pygmaeum*** (Heydrich) Heydrich, 1897b: 412. Ballesteros and Afonso-Carrillo 1995: 207, fig. 3 (as *Lithophyllum tamiense*); N'Yeurt 1996: 414, fig. 115 (as *Lithophyllum tamiense*); Ringeltaube and Harvey 2000: 436, figs 7–11 (as *Lithophyllum tamiense*); Littler and Littler 2003: 38. Vouchers: WS 118 St. 5, 444 St. 37, 452 St. 38

*Comments:* forming unattached balls on the lagoon floor, or attached to coral boulders in the lagoon. According to Silva *et al.* (1996: 251), *L. pygmaeum* includes *Lithophyllum tamiense* (Heydrich) (Verheij 1994: 103).

***Lithothamnion proliferum*** Foslie in Weber-van Bosse and Foslie 1904: 18, fig. 8, pl. I figs 17–20. Keats *et al.* 1996: 188, figs 1–36 ('*L. proliferum*'); Ringeltaube and Harvey 2000: 445, figs 32, 33 ('*L. proliferum*'); Payri *et al.* 2002: 52, pl. 5 fig. 11; Skelton and South 2002a: 141, fig. 5B; Littler and Littler 2003: 38. Voucher: WS 262 St. 16

***Mastophora pacifica*** (Heydrich) Foslie, 1903: 25. Woelkerling in Womersley 1996: 248, figs 111A–E, 112A–E, 113A–B; Payri *et al.* 2000: 196; Ringeltaube and Harvey 2000: 441, figs 21, 22; Payri *et al.* 2002: 52, pl. 5 fig. 4; Littler and Littler 2003: 40. Voucher: WS 136 St. 4, 361 St. 24, 396 St. 29

***Mesophyllum erubescens*** (Foslie) Lemoine, 1928: 252. Gordon *et al.* 1976: 252, pl. I figs 5–8; Ballesteros and Afonso-Carrillo 1995: 209, fig. 11; Payri *et al.* 2000: 208; Ringeltaube and Harvey 2000: 445, figs 34–37; Payri *et al.* 2002: 52, pl. 5 fig. 8; Littler and Littler 2003: 42. Vouchers: WS 158 St. 11, 397 St. 29

***Mesophyllum mesomorphum*** (Foslie) Adey, 1970: 25. Gordon *et al.* 1976: 252, pl. II figs 1–3. Voucher: WS 295 St. 18

***Neogoniolithon brassica-florida*** (Harvey) Setchell *et al.* Mason, 1943: 91. Penrose in Womersley 1996: 281, fig. 129A–D; Ringeltaube and Harvey 2000: 441, figs 23–27; Payri *et al.* 2002: 52, pl. 5 fig. 5 (as *Neogoniolithon frutescens*). Vouchers: WS 67 St. 1, 4 St. 3, 291, St. 17, 360 St. 24, 376 St. 25, 450 St. 38

***Pneophyllum conicum*** (Dawson) Keats, Chamberlain *et al.* Baba, 1997: 264. Gordon *et al.* 1976: 259, pl. IV figs 6–8, pl. VI fig. 1 (as *Neogoniolithon conicum* (Dawson) Gordon, Masaki *et al.* Akioka); Adey *et al.* 1982: 13, figs 6–7 (as *Paragoniolithon conicum* (Dawson) Adey, Townsend *et al.* Boykins); Payri *et al.* 2000: 202; Payri *et al.* 2002: 52, pl. 5 fig. 6; Littler and Littler 2003: 48. Voucher: WS 6 St. 3

*Comments:* this common Indo-Pacific species with a tortuous taxonomic history is reported to overgrow and kill live corals (Keats *et al.* 1997).

***Sporolithon ptychoides*** Heydrich, 1897: 67–69. Keats and Chamberlain 1993: 542, figs 1–13; Ballesteros and Afonso-Carrillo 1995: 209, fig. 13; Payri *et al.* 2000: 211; Littler and Littler 2003: 52. Vouchers: WS 66 St. 1106 St. 7, 247 St. 8

## Gigartinales

### Caulacanthaceae

***Caulacanthus ustulatus*** (Turner) Kützing, 1843: 395. Wynne 1995: 277, figs 13–15; Abbott 1999: 104, fig. 20D–F; Masuda *et al.* 1999: 451, figs 8–11. Vouchers: UPF 1694, WSS 195 St. 1, 26, 27 St. 4, 67 St. 10; UPF 1715 St. 15

*Comments:* this species is superficially similar to *Hypnea spinella*, *Caulacanthus ustulatus* is distinguished by its more flattened axes, and its polygonal to hexagonal cortical cells in surface view.

### Corynocyttaceae

***Corynocyttis prostrata*** Kraft, in Kraft *et al.* 1999: 26, figs 6, 45–60. N'Yeurt 2001: 797, figs 107, 108, 217; Skelton and South 2002a: 142, fig. 7C; Littler and Littler 2003: 70. Voucher: UPF 1210, 1211, 1606 St. 2, 1322 St. 9, 1382 St. 16, 1623, WSS 144 St. 22; UPF 1446 St. 29

*Comments:* now found throughout the South Pacific (including French Polynesia, pers. obs. and *In Herb.* UPF), this characteristic alga is in most case associated with an ascidian which forms a thick white layer on the inferior surface. The genus, previously listed in the Acrotylaceae, has recently been transferred to a family of its own based on molecular studies (see Saunders *et al.* 2004).

### Dumontiaceae

***Gibsmithia hawaiiensis*** Doty, 1963: 458, figs 1–17. Abbott 1999: 108, fig. 22D–G; Payri *et al.* 2000: 212; Payri *et al.* 2002: 50, pl. 4 fig. 8. Vouchers: UPF 1205 St. 2; WSS 24 St. 4; UPF 1487 St. 9, 1416 St. 22, 1438, 1439 St. 29, 1462 St. 36

### Hypneaceae

***Hypnea cervicornis*** J. Agardh, 1851: 451. Abbott 1999: 113, fig. 24A. Voucher: UPF 1587, St. 8

*Comments:* Haroun and Prud'homme van Reine (1993) reduced *H. cervicornis* in synonymy with *H. spinella* (C. Agardh) Kützing, but we prefer to follow the conservative opinion of Abbott (1999) to distinguish entities that look relatively different in the field.

***Hypnea charoides*** Lamouroux, 1813: 132, pl. 10 figs 1–3. Weber-van Bosse 1928: 449, figs 188, 189; Yamagishi and Masuda 1997: 136, figs 1–9; 2000: 31, figs 10–15; South 2004: 136, fig. 2. Vouchers: UPF 1261, 1262 St. 7, 1366 St. 8

***Hypnea pannosa*** J. Agardh, 1847: 14. Price and Scott 1992: 38, figs 8A–D, 9A; Payri *et al.* 2000: 222; *non* N'Yeurt 2001: 780; Skelton and South 2002a: 143, fig. 7D; Littler and Littler 2003: 76. Vouchers: WSS 182 St. 1; UPF 1676 St. 3, 1279 St. 4, 1268, 1269 St. 5, 1259, 1260 St. 7, 1367, 1586 St. 8, 1424, 1425, 1428, 1671 St. 23, 1434 St. 25

*Comments:* records of *Hypnea pannosa* from the Suva Lagoon, Fiji in N'Yeurt (2001) were relegated to the status of an undescribed species close to the Japanese *Hypnea charoides-valentiae* complex by South (2004: 135). The Wallis material is in good agreement with *H. pannosa* from the Great Barrier Reef (Price and Scott 1992).

***Hypnea saidana*** Holmes, 1896: 256, pl. 11 figs 3a, b. Wynne 1995: 276, fig. 16; Payri *et al.* 2000: 224. Vouchers: UPF 1658 St. 1, 1193, 1194, 1646, 1699 St. 3, 1478, WSS 15, 16 St. 5; UPF 1543 St. 12, 1565 St. 16, 1523 St. 41

***Hypnea spinella*** (C. Agardh) Kützinger, 1847a: 23. Price and Scott 1992: 40, figs 9B, 10A–F; Abbott 1999: 117, fig. 25B–E; Payri *et al.* 2000: 224; Littler and Littler 2003: 76. Vouchers: UPF 1647, WSS 194 St. 3; UPF 1274, 1468, WSS 05, 06 St. 5; UPF 1368, 1588 St. 8, 1573, WSS 99 St. 16; UPF 1732, WSS 39 St. 23; UPF 1484 St. 26; WSS 53 St. 29; UPF 1521 St. 41

*Comments:* this is the most common minute *Hypnea* species in the collections, ubiquitous in most habitats. Based on culture and molecular studies, Yamagishi and Masuda (2000) relegated the entity previously known as *Hypnea cervicornis/spinella* from Japan to the rank of a new species, *H. flexicaulis*. The Wallis material agrees with the concept of *H. spinella* in Price and Scott (1992) and Abbott (1999).

***Hypnea valentiae*** (Turner) Montagne, 1841: 161. Weber-van Bosse 1928: 452, text fig. 190; Børgesen 1934: 17; Littler and Littler 2003: 76. Vouchers: UPF 1637, WSS 149, 152 St. 7; UPF 1673 St. 43

*Comments:* Yamagishi and Masuda (1997: 140; 2000) consider *H. valentiae* from Japan and Vietnam (Dawson 1954: 436, fig. 47) as belonging to the *H. charoides-valentiae* complex. The Wallis material agrees with the descriptions of *H. valentiae* in Weber-van Bosse (1928) and Børgesen (1934), and the two names are retained separate as a conservative measure until future studies on their taxonomic status.

#### Lomentariaceae

***Lomentaria corallicola*** Børgesen, 1939: 113, figs 30–32. Price and Scott 1992: 63, fig. 18A–E; Payri *et al.* 2000: 236; N'Yeurt 2001: 811, figs 223, 224; Littler and Littler 2003: 106. Vouchers: UPF 1663, WSS 171 St. 1

#### Nemastomataceae

***Platoma cyclocolpum*** (Montagne) Schmitz, 1894: 627. Masuda and Guiry 1994: 194–201, figs 1–34; Huisman

1999; N'Yeurt 2001: 781, figs 169–173; Payri *et al.* 2002: 50, pl. 4 fig. 6. Vouchers: UPF 1440, WSS 45, 46, 47 St. 29

*Comments:* the largest and most spectacular fleshy red alga collected from Wallis, the material agrees well with the description of material from the Canary Islands by Masuda and Guiry (1994) and from Australia by Huisman (1999).

***Predaea laciniosa*** Kraft, 1984: 11, figs 25–35. Payri *et al.* 2000: 214; Payri *et al.* 2002: 50, pl. 4 fig. 5; Littler and Littler 2003: 78. Vouchers: WSS 19 St. 5; UPF 1626, WSS 145 St. 22; UPF 1419, 1482 St. 23

***Predaea weldii*** Kraft et Abbott, 1971: 194, figs 1–15. Kraft 1984: 15, figs 36–42; Abbott 1999: 153, fig. 37D–F; N'Yeurt 2001: 783, figs 183, 228; Littler and Littler 2003: 78. Vouchers: UPF 1417, 1418, WSS 198 St. 22

#### Solieriaceae

***Meristotheca procumbens*** Gabrielson et Kraft, 1984: 241, fig. 14A–D. N'Yeurt 1995: 248, figs 3–10; 1996: 416, figs 137, 142–147, 203–205; Payri *et al.* 2000: 220; N'Yeurt 2001: 793, figs 208, 209, 231; Littler and Littler 2003: 92. Vouchers: UPF 1223, 1719, WSS 204 St. 1, 102 St. 2; UPF 1203 St. 3; WSS 136 St. 4; UPF 1575 St. 9, 1613 St. 16

*Comments:* this edible species is relatively infrequent and cryptic in Wallis, presumably the reason why it is not consumed traditionally as in neighbouring islands such as Rotuma (N'Yeurt 1995, 1996) where it is locally abundant in intertidal habitats.

***Sarconema filiforme*** (Sonder) Kylin, 1932: 22. Børgesen 1932: 11, fig. 7; Papenfuss and Edelstein 1974: 32, figs 1–3, 13, 20–25; Payri *et al.* 2000: 220. Vouchers: UPF 1348, 1349, 1350, 1591, WSS 117 St. 8

*Comments:* this species was recorded growing amidst seagrass beds, with other algae. This distinctive species can be recognised by its lubricous, terete thalli with bifurcate tips. This is the fourth report for this predominantly Indian Ocean genus in the South Pacific. Papenfuss and Edelstein (1974: 41) mention having examined herbarium material from New South Wales, Australia, and Upolu, Western Samoa (the latter as *Dicranema setaceum* var. *upolensis* Grunow). It is also found seasonally in Tahiti, French Polynesia (Payri *et al.* 2000).

#### Halymeniales

##### Halymeniaceae

***Halymenia actinophysa*** Howe, 1911: 509, pl. 34. Abbott 1999: 143, fig. 34A. Vouchers: WSS 134 St. 8; UPF 1611 St. 16

*Comments:* the Wallis material is in good agreement with the description of the Type of the species by Howe (1911), especially the macelike subcortical cells with several blunt arms.

*Prionitis* sp. Voucher: UPF 1413, St. 22.

*Comments:* The material being sterile, specific identification is not possible at this stage.

### Sebdeniaceae

*Sebdenia* sp. Vouchers: WSS 177, 179 St. 1 (tetrasporic); UPF 1501, 1670 St. 23

*Comments:* the fragmentary nature of the material precludes the definite identification of this taxon at the present time, but it could represent a new species. It is close to the flattened *Sebdenia* sp. mentioned from Fiji in N'Yeurt (2001: 806).

### Rhodymeniales

#### Champiaceae

*Champia compressa* Harvey, 1838: 402. Millar 1990: 371, figs 30A–D; Masuda *et al.* 2001: 84, figs 14–17; Skelton and South 2002a: 143, fig. 7E, F; Littler and Littler 2003: 102. Vouchers: WSS 84, 181 St. 1, UPF 1691 St. 3; WSS 153 St. 7, 121, 130 St. 8; UPF 1531 St. 10, 1577, WSS 105 St. 9, 222, 239 St. 16; UPF 1723 St. 30

*Champia parvula* (C. Agardh) Harvey, 1853: 76. Millar 1990: 371, figs 29G, H; Price and Scott 1992: 55, fig. 14A–E; Abbott 1999: 218, fig. 60A–C; Payri *et al.* 2000: 238; N'Yeurt 2001: 808, fig. 238; Skelton and South 2002a: 143, fig. 8A–C. Vouchers: WSS 170 St. 1, 156 St. 7

#### Rhodymeniaceae

*Chamaebotrys boergesenii* (Weber-van Bosse) Huisman, 1996: 106, figs 35–38, 40–42. Abbott 1999: 228, fig. 63E–G; Payri *et al.* 2000: 230; Masuda *et al.* 2001: 81, figs 1–6; N'Yeurt 2001: 812, figs 218, 235, 236; Littler and Littler 2003: 110. Voucher: UPF 1695, WSS 196 St. 3; UPF 1465, WSS 04 St. 5; UPF 1702 St. 9, 1496 St. 11, 1737, 1500, WSS 37 St. 23

*Chrysomenia okamurae* Yamada et Segawa, 1953: 110, fig. 3. Abbott 1999: 230, fig. 64C–D. Vouchers: UPF 1572, WSS 96 St. 16

*Coelothrix irregularis* (Harvey) Børgesen, 1920: 389. Price and Scott 1992: 60, fig. 17A–D; Abbott 1999: 233, fig. 65A–D; Payri *et al.* 2000: 230. Vouchers: UPF 1638, 1639, WSS 150 St. 7

*Gelidiopsis intricata* (C. Agardh) Vickers, 1905: 61. Price and Scott 1992: 51, fig. 13A–F; Abbott 1999: 221, fig. 61A; Payri *et al.* 2000: 232; Skelton and South 2002a: 144, fig. 8D–G. Vouchers: UPF 1493 St. 2, 1641, 1642, WSS 154 St. 7, UPF 1328, 1331, 1580 St. 9, 1310 St. 12, 1374, 1375, 1714 St. 15, 1388 St. 16, 1494 St. 40; WSS 34 St. 37

*Gelidiopsis scoparia* (Montagne et Millardet) De Toni, 1900: 410. Abbott 1999: 221, fig. 61B; Littler and Littler 2003: 106. Vouchers: UPF 1206 St. 2, 1690 St. 3, 1470 St. 5, 1497 St. 11, 1563, 1618 St. 16, 1739 St. 36, 1495 St. 40

*Halichrysis coalescens* (Farlow) R.E. Norris et Millar in R. Norris, 1991: 583, 585, 587, figs 7–13. Abbott 1999: 235, fig. 66A–C; N'Yeurt 2001: 812, figs 220, 221, 234; Littler and Littler 2003: 116. Vouchers: UPF 1469, 1480, WSS 18 St. 5; UPF 1738, WSS 211 St. 23

*Leptofaucha anastomosans* (Weber-van Bosse) R. Norris et Aken, 1985: 58, figs 10–12. Dawson 1956: 52, fig. 49 ('*Rhodymenia anastomosans*'). Vouchers: UPF 1571, WSS 95 St. 16; WSH 277, WSS 43, 212 St. 23; UPF 1443, 1509 St. 29

*Comments:* growing intricately associated with articulated coralline algae (*Amphiroa* spp.) to which the blades form numerous secondary attachments, this species also occurs in the Cook islands in similar habitats (ADR N'Yeurt, unpubl. data).

### Ceramiales

#### Ceramiaceae

*Anotrichum tenue* (C. Agardh) Nägeli, 1862: 399. Abbott 1999: 247, fig. 68D; Masuda *et al.* 1999: 453, figs 15–23; Payri *et al.* 2000: 240; Skelton and South 2002a: 145, fig. 9A–F. Voucher: WSS 67 St. 10

*Comments:* Womersley (1998: 344) discusses the range of characteristics in specimens of the *A. tenue* complex, which support the concept of a single species with several varieties sometimes described as separate species.

*Anthamion decipiens* (J. Agardh) Athanasiadis, 1996: 151. Abbott 1999: 250, fig. 69C–D. Voucher: WSS 40, St. 23

*Balliella repens* Huisman et Kraft, 1984: 77, figs 16–26. Price and Scott 1992: 72, figs 20D, 21A–B; Abbott 1999: 257, fig. 71H. Vouchers: WSS 140 St. 4, 69 St. 12, 49 St. 29

*Centroceras minutum* Yamada, 1944: 42. Dawson 1956: 54, fig. 54; Ardré 1987: 285, figs 30–37; Wynne 1993: 12, fig. 7; 1995: 290, fig. 27; Abbott 1999: 262, fig. 73H–I; N'Yeurt 2001: 817, figs 249, 250. Vouchers: WSS 228 St. 3, 68 St. 10

*Comments:* reasons to maintain *Centroceras minutum* as a separate species from *C. clavulatum* are given in Wynne (1993: 12). N'Yeurt (2001: 817) examined slide-mounted type material of *C. minutum* in SAP and found it also to differ from *C. clavulatum*.

*Ceramium codii* (Richards) Mazoyer, 1938: 324. Millar 1990: 393, fig. 41D–F; Abbott 1999: 270, fig. 75D–F; Payri *et al.* 2000: 246; South and Skelton 2000: 56, figs 11–14. Vouchers: WSS 08 St. 5, 126 St. 8, 218 St. 10, 81, 82, St. 12

*Ceramium flaccidum* (Kützting) Ardissonne, 1871: 40. Womersley 1978: 234, figs 4A–D, 14E–H; Price and Scott 1992: 89, fig. 27A–E; Womersley 1998: 410, figs 188E, H, 190A–D; Abbott 1999: 274, fig. 76D–H; Payri *et al.* 2000: 248; South and Skelton 2000: 65, figs 32–39, 41–44;



N'Yeurt 2001: 817, fig. 253. Vouchers: UPF 1683, 1697, WSS 188, 199, 228 St. 3; UPF 1585, 1713, WSS 114, 202 St. 8; UPF 1742, WSS 67, 217 St. 10, 48 St. 29

*Comments:* the broad rows of basipetal cortical cells and forcipate apices are characteristic for this species. This is the largest and most common *Ceramium* species in Wallis, and is locally abundant especially forming reddish, silky tufts on branches of dead coral.

***Ceramium kramerii*** South et Skelton, 2000: 69, figs 45–51. Voucher: WSS 126, St. 8

*Comments:* a minute, distinctive species, epiphytic on larger algae growing on coral debris.

***Ceramium macilentum*** J. Agardh, 1894: 15. Womersley 1978: 232, figs 3E, 14A–D; Price and Scott 1992: 100, fig. 31; South and Skelton 2000: 71, figs 52–62. Vouchers: WSS 194 St. 3, 08 St. 5, 208 St. 23, 48 St. 29

***Ceramium*** sp. aff. *C. marshallense* Dawson, 1957b: 120, figs 27a, b. Price and Scott 1992: 102, fig. 32; Wynne 1993: 14, figs 8–9; 1995: 294, figs 38, 39 South and Skelton 2000: 75, figs 63–71, 73. Vouchers: WSS 25, 139 St. 4

***Ceramium subdichotomum*** Weber-van Bosse, 1923: 333, fig. 125. Wynne 1995: 296, figs 44, 45; 1999: 195, figs 8, 9; Payri *et al.* 2000: 250 ('*subdichotum*'); South and Skelton 2000: 78, figs 74–79. Voucher: WSS 208, St. 23

***Ceramium upolense*** South et Skelton, 2000: 81, figs 80–88. Vouchers: WSS 07, 08 St. 5, 203 St. 9, 99 St. 16, 60, 64 St. 31

***Corallophila apiculata*** (Yamada) R. Norris, 1993: 395. N'Yeurt 1996: 420, figs 148–151, 163 ('*Centroceras apiculatum*'); Abbott 1999: 288, fig. 81A–C; Payri *et al.* 2000: 242. Vouchers: WSS 08 St. 5, 67 St. 10

***Corallophila huysmansii*** (Weber-van Bosse) R. Norris, 1993: 396. Abbott 1999: 290, fig. 81D–E; South and Skelton 2002: 148, fig. 11A. Voucher: WSS 127 St. 8

***Crouania minutissima*** Yamada, 1944: 40. Dawson 1956: 55, fig. 56; Abbott 1999: 294, fig. 82E–G. Vouchers: WSS 33 St. 2, 195 St. 3; UPF 1529, WSS 65 St. 10, 104 St. 9

*Comments:* the Wallis material has straight to slightly upcurved whorl branches with spherical to slightly elongate terminal cells. Cribb (1983) suggested that previous records of *C. minutissima* with three whorl-branchlets actually represent *C. capricornica* Saenger et Wollaston, as discussed in Skelton and South (2002: 149). On the other hand, Abbot (1999: 294) reported having examined authentic *C. minutissima* from Ant atoll in SAP, as well as recent material from that locality, and found three whorl branchlets in both cases. There hence would seem to be an error in Yamada's original diagnosis, and *C. minutissima* is retained here as a conservative measure.

***Diplothamnion jolyi*** van den Hoek 1978: 47; Huisman 1991; Stegenga and Vroman 1987: 411, figs 35, 36; Abbott 1999: 297, fig. 83C. Voucher: WSS 25, St. 4

***Euptilota articulata*** (J. Agardh) Schmitz, 1896: 7. Womersley 1998: 355, pl. 2 fig. 2, figs 141E, 164, 165; N'Yeurt 2001: 820, figs 254–263; Payri *et al.* 2002: 50, pl. 4 fig. 3; Littler and Littler 2003: 122. Vouchers: UPF 1214 St. 3, WSS 139 St. 4, 129 St. 8; UPF 1421, 1422, 1423, 1609, 1621 St. 22, 1449, 1722 St. 30

*Comments:* this elegant, plumose material agrees well with that described by Itono (1977: 139) from Southern Japan.

***Haloplegma duperreyi*** Montagne, 1842b: 258, pl. 7 fig. 1. Price and Scott 1992: 127, fig. 43A–D; Womersley 1998: 282, fig. 133A–E; Abbott 1999: 305, fig. 86E; Littler and Littler 2003: 122. Vouchers: UPF 1492, WSS 32 St. 2; UPF 1213 St. 3, WSS 141 St. 4; UPF 1315 St. 10, 1412 St. 22, 1448, 1724 St. 30

***Ptilothamnion*** sp. Voucher: WSS 128 St. 8.

*Comments:* The material is sterile and specific identification is not possible.

***Spyridia filamentosa*** (Wulfen) Harvey in W. Hooker, 1833: 337. Womersley and Cartledge 1975: 222, figs 1, 3A–B; Price and Scott 1992: 131, fig. 45A–E; Womersley 1998: 372, figs 171, 173A–B; Abbott 1999: 313, fig. 88A–B; Payri *et al.* 2000: 256; Littler and Littler 2003: 124. Vouchers: UPF 1358, 1359, 1584, WSS 113 St. 8

*Comments:* growing as unattached clumps within seagrass beds.

***Wrangelia argus*** (Montagne) Montagne, 1856: 444. Price and Scott 1992: 134, fig. 46A–E; N'Yeurt 1996: 424, figs 167, 169–172. Vouchers: WSS 86 St. 1, 192 St. 3

***Wrangelia dumontii*** (Dawson) Abbott, 1979: 222, figs 21–26, 29–30; 1999: 316, fig. 89A–B. Littler and Littler 2003: 126. Voucher: WSS 139 St. 4

*Comments:* *Wrangelia dumontii* is readily distinguished from *W. argus* by its obtuse branch tips, contrasted to the needle-like tips of the former species.

## Dasyaceae

***Dasya anastomosans*** (Weber-van Bosse) M.J. Wynne, 2002: 539. Millar 1990: 433, fig. 59D–G ('*Dasya pilosa*'); Abbott 1999: 325, fig. 93A–E ('*Dasya pilosa*'); Payri *et al.* 2000: 264 ('*Dasya pilosa*'); Littler and Littler 2003: 128 ('*Dasya pilosa*'). Vouchers: UPF 1665, WSS 173 St. 1

*Comments:* the tortuous taxonomy of this species is discussed in Wynne (2002). The Wallis plants have the typical furry habit with long assimilatory filaments. Weber-van Bosse (1921: 309, pl. 7 fig. 10) only gave a Latin diagnosis for her new species, with a fuller description given in Weber-van Bosse (1923: 376).

*Dasya baillouviana* (S. Gmelin) Montagne, 1841: 165. Littler and Littler 1997: 55, fig. 62; 2000: 170, fig. middle 171; Payri *et al.* 2000: 260. Vouchers: UPF 1534, WSS 71 St. 12

*Eupogodon geppii* (Weber-van Bosse) P. Silva in P. Silva, Meñez et Moe, 1987: 130 (misapplied name: *Exophyllum wentii* Weber-van Bosse (1928: 478, pl. VI figs 5, 6); Hollenberg 1968c: 81, figs 6, 7; Abbott 1999: 363, fig. 105D-H; Payri *et al.* 2000: 278; Skelton and South 2002a: 155, fig. 16C). Vouchers: UPF 1652, WSS 163, 164, 165 St. 1

*Comments:* *Dasyopsis geppii* was first described from the Chagos Archipelago and Seychelles by Weber-van Bosse (1913: 130, pl. 13 figs 18–20; pl. 14 fig. 33), together with *Dasyopsis palmatifida* Weber-van Bosse (1913: 130, pl. 13 fig. 21). Later, Weber-van Bosse (1923: 379) was of the opinion that both species could be conspecific, a view echoed by Dawson (1957b: 124) and confirmed by de Jong *et al.* (1997: 445). Both entities were earlier transferred to the genus *Eupogodon* Kützing (1845: 312) by Silva *et al.* (1987: 130). More recently, Millar (1996: 156) and De Jong *et al.* (1997: 445) alluded to the possibility that *Eupogodon geppi* (Weber-van Bosse) P. C. Silva and *E. palmatifidus* (Weber-van Bosse) P. C. Silva formed a genus of their own. The first author has examined type material of *Dasyopsis palmatifida* (L 938.7–422) and it matches well the Wallis plants, but its affinities to the genus *Eupogodon* is not immediately apparent. Some Pacific records were misidentified in the past as *Exophyllum wentii* Weber-van Bosse; the first author has examined the dried Lectotype (L 0061135) and the liquid-preserved Syntype (L 0109993) and Isotype (L 0109994) of the latter species, and they do not match at all the Wallis, Hawaiian, Fijian or Samoan plants in vegetative or reproductive anatomy. Ongoing molecular analyses (N'Yeurt and PW Gabrielson, unpubl. data) should shed more light on the taxonomy and generic affinities of this unusual plant in the near future.

*Heterosiphonia crispella* (C. Agardh) Wynne var. *laxa* (Børgesen) Wynne, 1985: 87. Price and Scott 1992: 161, fig. 56A–D; Lluch and Garreta 1993: 468, fig. 4; N'Yeurt 1996: 425, figs 175, 181; Payri *et al.* 2000: 266; Littler and Littler 2003: 130; Yamagishi *et al.* 2003: 540, figs 14–23. Vouchers: WSS 176 St. 1, 214 St. 23

#### Delesseriaceae

*Hypoglossum simulans* Wynne, I. Price et Ballantine, 1989: 31, figs 12–26. Wynne 1989: 515, figs 1H, 2A–E; Abbott 1999: 340, fig. 98A–B; Payri *et al.* 2000: 258; N'Yeurt 2001: 832, figs 281, 282, 286; Skelton and South 2002a: 152, fig. 12C–D; Littler and Littler 2003: 134. Voucher: WSS 233 St. 35

*Martensia fragilis* Harvey, 1854: 145. Millar 1990: 418, figs 53C–E; Yoshida and Mikami 1996: 101, figs 1, 4–18; Abbott 1999: 344, fig. 99C–E; Payri *et al.* 2002: 50, pl. 4 fig. 12; Skelton and South 2002a: 153, fig. 14A–D; Littler and Littler 2003: 36. Vouchers: WSS 177 St. 1; UPF 1209 St. 3; WSS 11, 12 St. 4; UPF 1383, 1569, 1607, WSS 93 St. 16; UPF 1725 St. 23, 1441, 1505 St. 29; WSS 63 St. 31; UPF 1525 St. 41

*Comments:* *Martensia fragilis* can be distinguished from superficially similar *M. elegans* by the alternate production of membranous and reticulate portions of the thallus, whereas in *M. elegans* reticulate portions never produce further membranous parts (Millar 1990). This elegant alga is quite common in subtidal habitats surveyed in Wallis.

*Nitophyllum adhaerens* Wynne, 1997: 215, figs 1–14. Abbott 1999: 347, fig. 100E. Vouchers: WSS 177 St. 1, 191 St. 3; UPF 1576, WSS 103 St. 9; UPF 1668 St. 18; WSS 51 St. 29

#### Rhodomelaceae

*Acanthophora pacifica* (Setchell) G.T. Kraft, 1979: 128, figs 1–6, 18–24. Abbott 1999: 353, fig. 102A–C; De Jong *et al.* 1999: 229, fig. 43; Payri *et al.* 2000: 268; Payri *et al.* 2002: 50, pl. 4 fig. 1; N'Yeurt 2001: 33, figs 293–299; Littler and Littler 2003: 142. Vouchers: UPF 1420, 1622 St. 22, 1503 St. 29

*Acanthophora spicifera* (Vahl) Børgesen, 1910: 201, figs 18A–C; 19A–E. Abbott 1999: 355, fig. 102D–E; De Jong *et al.* 1999: 31, figs 3, 33–39, 46; Payri *et al.* 2000: 270; Skelton and South 2002a: 153, figs 16A, 17A; Littler and Littler 2003: 142. Vouchers: UPF 1352, 1353 St. 8

*Comments:* an often overlooked edible species, growing on the reef crest and seagrass beds.

*Bostrychia tenella* (Lamouroux) J. Agardh, 1863 (1851–1863): 869. Falkenberg 1901: 515, pl. 12 figs 10–13; King and Puttock 1989: 34, fig. 15A–D; N'Yeurt 1996: 429, figs 129, 186; Littler and Littler 1997: 59, fig. 68; Payri *et al.* 2002: 50, pl. 4 fig. 2. Voucher: UPF 1410 St. 38

*Comments:* found as spongy, sediment-infiltrated mats at the base of mangrove roots and on beach rock at a marina on the south coast of the island. This species grows together with *Laurencia brachyclados*. It is also found growing on mangrove roots on nearby Rotuma Island (N'Yeurt 1996).

*Chondria arcuata* Hollenberg, 1945: 447, figs 2–4. Gordon-Mills and Womersley 1987: 551, fig. 24D–E, 27; Abbott 1999: 57, fig. 103A; Womersley 2003: 427, fig. 186A–E. Voucher: WSS 236, St. 35

*Chondria armata* (Kützing) Okamura, 1907: 69, pl. XVI figs 9–19. Millar 1990: 459, figs 71A–B; Ballesteros 1994: 538, fig. 1a–c; Payri *et al.* 2002: 50, pl. 4 fig. 7; Littler and

Littler 2003: 144. Vouchers: UPF 1265, 1266, 1301 St. 7, 1542, WSS 79, 80, 81 St. 12

*Comments:* this distinctive species of *Chondria* is also found in neighbouring Fiji (Garbary *et al.* 1991).

***Chondria dangeardii*** Dawson, 1954: 60, fig. 62*f–g*. Price and Scott 1992: 165, fig. 57*A–D*; Ballesteros 1994: 538 fig. 2*a–c*; Abbott 1999: 359, fig. 103*B–C*; Payri *et al.* 2000: 273; Skelton and South 2002*a*: 155, fig. 17*B*. Vouchers: UPF 1718, 1659, WSS 167, 168, 169 St. 1

***Chondria dasyphylla*** (Woodward) C. Agardh, 1817: XVIII. Gordon-Mills and Womersley 1987: 246, figs 30–57; N'Yeurt 1996: 430, figs 134, 188; Payri *et al.* 2000: 74. Vouchers: UPF 1364, 1589 St. 8

***Chondria leptacremom*** (Melvill) De Toni, 1903: 848. Littler and Littler 2000: 202. Vouchers: UPF 1188, 1677, 1693, 1700, WSS 184, 185, 193 St. 3; UPF 1649, WSS 160, 161 St. 7; UPF 1406, WSS 225 St. 19

***Chondria simpliciuscula*** Weber-van Bosse, 1913: 125, pl. 12 figs 9, 10. Price and Scott 1992: 169, fig. 59*A–E*; N'Yeurt 1996: 431, figs 130, 133, 190; Abbott 1999: 361 fig. 104*A–F*; Payri *et al.* 2000: 276. Vouchers: WSS 06, 10 St. 5, 60 St. 31

***Herposiphonia delicatula*** Hollenberg, 1968*b*: 540, figs 1*A,B*, 2*H*, 3. Wynne 1995: 303, fig. 56; Abbott 1999: 371, fig. 107*F–G*. Voucher: WSS 170 St. 1

***Herposiphonia obscura*** Hollenberg, 1968*b*: 549, fig. 25. Abbott 1999: 73, fig. 108*B*. Voucher: WSS 67 St. 10

***Chondrophycus cartilaginea*** (Yamada) Nam, 2004: 267. (= *Laurencia cartilaginea* Yamada 1931: 230, pl. 19 figs *a*, *o*; McDermid 1988: 232, fig. 3; Nam and Saito 1990: 08, figs 1–7; Abbott 1999: 384, fig. 111*D–E*). Vouchers: WSS 174, St. 1; UPF 1675, WSS 186 St. 3; UPF 1355, 1356, 1590, WSS 115, 116 St. 8; UPF 1666, 1736, WSS 210 St. 23

*Comments:* Nam and Saito (1999) and Nam (2004) discuss the *Laurencia* complex and its relationship to *Chondrophycus*.

***Chondrophycus dotyi*** (Saito) Nam, 1999: 463. (= *Laurencia dotyi* Saito 1969: 154, figs 9, 10; McDermid 1988: 233, figs 7, 8; Abbott 1999: 385, fig. 112*A–B*; Payri *et al.* 2000: 284; Payri *et al.* 2002: 50, pl. 4 fig. 9). Vouchers: UPF 1190, 1208 St. 3; WSS 143 St. 4; UPF 1270, 1271, 1466, WSS 02 St. 5, 131, 132 St. 8; UPF 1381, 1610, 1619 St. 16, 1427 St. 23, 1504 St. 29, 1524 St. 41

*Comments:* Garbary and Harper (1998) delineated the characteristics that separate the genus *Chondrophycus* from *Laurencia* and *Osmundea*. Further new combinations were given by Nam (1999: 463).

***Chondrophycus parvipapillata*** (C. K. Tseng) Garbary *et al.* Harper, 1998: 195. (= *Laurencia parvipapillata* Tseng 1943: 204, pl. IV; Abbott 1999: 391, fig. 114*A–B*; N'Yeurt 2001:

842, figs 309–312, 318); Littler and Littler 2003: 148. Vouchers: UPF 1662, WSS 172 St. 1, 135 St. 8; UPF 1612 St. 16

*Comments:* this species can be readily distinguished by its markedly projecting outer cortical cells.

***Chondrophycus succica*** (Cribb) Nam, 1999: 463. (= *Laurencia succica* Cribb 1958*a*: 163, pl. 1 figs 1–3; Price and Scott 1992: 192, fig. 69*A–D*; N'Yeurt 2001: 845, figs 314, 316, 317; Payri *et al.* 2000: 280). Vouchers: WSS 175 St. 1; UPF 1678 St. 3, 1594, WSS 118 St. 4; UPF 1467, WSS 03 St. 5, 119 St. 8; UPF 1386, WSS 239 St. 16; UPF 1667, 1733, 1734, WSS 41 St. 23; UPF 1444, 1507 St. 29

***Laurencia brachyclados*** Pilger, 1920: 6, figs 9, 10. Dawson 1954: 458, fig. 61; McDermid 1988: 232, figs 1, 2; Abbott 1999: 382, fig. 111*A–C*. Vouchers: UPF 1411, WSS 207 St. 38

*Comments:* growing mixed with *Bostrychia tenella* at the base of mangrove roots.

***Laurencia cervicornis*** Harvey, 1853: 73, pl. 18*C*. Littler and Littler 2000: 212. Vouchers: UPF 1735, WSS 209 St. 23

***Laurencia flexilis*** Setchell, 1926: 101, pl. 19. Masuda *et al.* 1999: 455, figs 29–34; Payri *et al.* 2000: 280; Littler and Littler 2003: 52. Vouchers: UPF 1629, 1630, WSS 148 St. 7; UPF 1483 St. 26

*Comments:* originally described from Tahiti (Setchell 1926), this species has since been widely reported in the Pacific and Indian Ocean (Silva *et al.* 1996). It could be confused with *Laurencia venusta* Yamada, but the latter has both longitudinally oriented secondary pit connection between superficial cortical cells and lenticular thickenings in medullary cells, which are not found in *L. flexilis* (Masuda *et al.* 1999).

***Laurencia implicata*** J. Agardh, 1852: 745. Price and Scott 1992: 185, figs 65*A–E*, 66*A–C*. Vouchers: UPF 1712, WSS 201 St. 17; UPF 1458, 1515, WSS 56 St. 31

***Laurencia mariannensis*** Yamada, 1931: 200, pl. 5 fig. *b*, text figs *f*, *g*. Abbott 1999: 388, fig. 113*A–B*. Vouchers: UPF 1485, WSS 23 St. 4

***Laurencia cf. L.*** sp. in Price and Scott, 1992: 194, fig. 70*A–C*. Vouchers: UPF 1567, WSS 91 St. 16

*Comments:* this species is similar to the minute *Laurencia* reported from the Great Barrier Reef by Price and Scott (1992), and could well represent a new species. Further studies are required to elucidate its affinities.

***Polysiphonia apiculata*** Hollenberg, 1968*a*: 61, figs 1*D*, 8, 9. Abbott 1999: 411, fig. 120*C*. Vouchers: WSS 22 St. 2; UPF 1474, WSS 09 St. 5, 127, 128 St. 8, UPF 1581, WSS 109 St. 9

*Comments:* this species is readily distinguished by its abruptly tapering apices with a prominent apical cell.

*Polysiphonia delicatula* Hollenberg, 1968a: 62, fig. 1F. Abbott 1999: 412, fig. 120E. Vouchers: UPF 1687, WSS 190 St. 3, 25 St. 4, 07, 08 St. 5, 60, 64 St. 31

*Polysiphonia homoia* Setchell et Gardner, 1930: 162. Abbott 1999: 417, fig. 122F–G. Voucher: WSS 67 St. 10

*Polysiphonia poko* Hollenberg, 1968a: 70, figs 3A, 15. Price and Scott 1992: 209, fig. 76A–C; Abbott 1999: 421, fig. 123D–G. Voucher: WSS 233, 237 St. 35

*Polysiphonia scopulorum* Harvey, 1855: 540. Stegenga and Vroman 1988: 307, figs 21–26, 29–31; Millar 1990: 445, fig. 65E–G; Price and Scott 1992: 210, fig. 77A–D; Payri *et al.* 2000: 286; N'Yeurt 2001: 37, figs 304, 308; Payri *et al.* 2000: 286; Womersley 2003: 175, fig. 78A–E. Voucher: WSS 205 St. 30

*Polysiphonia sphaerocarpa* Børgesen, 1918: 271, figs 267–271. Stegenga and Vroman 1988: 307, figs 27, 28; Millar 1990: 446, fig. 66A–E; Price and Scott 1992: 212, fig. 78A–D; Schneider and Searles 1997: 204, fig. 19; Abbott 1999: 28, fig. 127A–G. Voucher: WSS 219, 220 St. 10

*Comments:* this species is easily recognised by its small, erect tufted habit and large, adaxially curved globular cystocarps regularly placed on the main axes. Kim and Lee (1999: 280) transferred *P. sphaerocarpa* to their new genus *Neosiphonia* based on reproductive and vegetative differences with *Polysiphonia*, but we concur with Skelton and South (2002: 156) in temporarily maintaining the South Pacific material under *Polysiphonia* pending a better understanding and verification of relevant type material of regional species.

*Tolypiocladia glomerulata* (C. Agardh) Schmitz in Schmitz and Falkenberg, 1897: 441. Falkenberg 1901: 177, pl. 21 figs 27–29; Dawson 1954: 452, fig. 59b–c; Price and Scott 1992: 219, fig. 81A–D; Wynne 1995: 321, fig. 80; Abbott 1999: 442, fig. 132F–H; N'Yeurt 2001: 837, figs 302, 303; Littler and Littler 2003: 158. Vouchers: WSS 157, St. 7; UPF 1730, WSS 208 St. 23

#### Incertae sedis

*Wurdemannia miniata* (Sprengel) Feldmann et Hamel, 1934: 544. Hatta and Prud'homme van Reine 1991: 375, fig. 14a–f; Price and Scott 1992: 31, fig. 6A–E; Abbott 1999: 238. Vouchers: UPF 1556 St. 1, 1599 St. 4; WSS 122 St. 8, UPF 1540, WSS 77 St. 12; UPF 1706 St. 20; WSS 44 St. 23; UPF 1510 St. 29

#### Magnoliophyta (seagrasses)

##### Hydrocharitales

##### Hydrocharitaceae

*Halophila ovalis* (R. Brown) J.D. Hooker, 1858: 45. Dawson 1954: 376, fig. 1d–f; Meñez *et al.* 1983: 30, figs 21A–C, 22;

Lanyon 1986: 27, fig. 8, pl. 1 fig. f, pl. 3 fig. f; Payri *et al.* 2000: 96; Payri *et al.* 2002: 53, pl. 6 fig. 2; Littler and Littler 2003: 186. Vouchers: UPF 1197, 1198, 1199 St. 3, 1227 St. 6, 1246 St. 7, 1369 St. 8, 1459 St. 34

*Comments:* the smallest seagrass in Wallis, with characteristic translucent oval leaves.

#### Potamogetonales

##### Cymodoceaceae

*Halodule pinifolia* (Miki) den Hartog, 1964: 309. Meñez *et al.* 1983: 13, figs 7A–B, 8; Lanyon 1986: 20, pl. 1 fig. d, pl. 3 fig. d; Payri *et al.* 2002: 53, pl. 6 fig. 3; Littler and Littler 2003: 288. Voucher: UPF 1371, WSS 245 St. 8

*Comments:* the Wallis material has irregularly serrate margins and furcate midribs at the apices of leaves, which are diagnostic features of the species. The blades are grass-like, flattened.

*Syringodium isoetifolium* (Ascherson) Dandy in Dandy and Tandy, 1939: 116. Meñez *et al.* 1983: 18, figs 11A–D, 12; Lanyon 1986: 35, fig. 12, pl. 2 fig. c, pl. 4 fig. c; Payri *et al.* 2002: 53, pl. 6 fig. 4; Littler and Littler 2003: 288. Vouchers: UPF 1228, 1229, 1247, 1248 St. 7, 1372 St. 8

*Comments:* the fleshy, terete blades of this species easily distinguishes it in the field from *Halodule pinifolia*.

#### Discussion

##### Taxonomy and algal distribution patterns

This study has yielded a total of 194 species of macrophytes, including 14 Cyanobacteria, 11 Heterokontophyta, 41 Chlorophyta, 128 Rhodophyta and three species of seagrasses. The non-geniculate Corallinaceae are not fully treated, and numerous species remain to be added in future. This study represents the first published records of seagrasses and marine algae for the Wallis islands, increasing our knowledge of the tropical marine flora of the western Pacific. Even though the outer part of the reef has not been sampled in the eastern part of the island, most of the habitats have been examined in the other areas from the surface to a depth of 25 m, both inside and outside of the lagoon.

With respect to the distribution of species among the 42 different stations (Table 2), the highest species richness (130 species) is in the area of the fringing reef, owing to the presence of the large seagrass beds in the sheltered, shallow and soft-bottomed areas which provide microhabitats for various algae. The canopy of the seagrass beds comprises the large *Syringodium isoetifolium*, and the dominant algae are common green species such as *Halimeda macroloba*, *H. incrassata*, *H. opuntia*, *Caulerpa* spp. as well as the diminutive seagrass *Halophila ovalis*. A third species of seagrass *Halodule pinifolia* was less common and found at only one site. The fringing shallow reef flats were dominated by brown algae such as *Padina boryana*, *Dictyota*

**Table 3. Taxa comparison between Wallis and several tropical Pacific areas (excluding Cyanobacteria and coralline algae)**  
Fiji and Rotuma are treated here as a single entity, since all species from Rotuma in common with Wallis also occur in Fiji

Locality	Chlorophyta	Ochrophyta	Rhodophyta	Total
Wallis (this study)	41	11	111	163
Fiji and Rotuma (N'Yeurt <i>et al.</i> 1996b; Littler and Littler 2003; South and Skelton 2003)	136	46	226	408
French Polynesia (Payri and N'Yeurt 1997; Payri <i>et al.</i> 2000; Littler and Littler 2003)	97	42	146	285
Solomon Islands (Womersley and Bailey 1970; Littler and Littler 2003)	76	30	116	222
Rarotonga, Cook Islands (Chapman 1977; ADR N'Yeurt unpubl. data)	44	23	99	166
Samoa (including American Samoa) (Skelton and South 1999, 2002a, 2002b; Littler and Littler 2003)	75	43	155	273

*bartayresiana*, *Turbinaria conoides* and *Sargassum polycystum*. Moreover, 30% of the species sampled in the fringing reefs were only found in this particular area (e.g. *Acanthophora spicifera*, *Coelothrix irregularis*, *Gracilaria textorii*, *Hypnea cervicornis*, *Sarconema filiforme*, *Pterocladia caerulescens*, *Spyridia filamentosa*, *Hypnea charoides*, *Anadyomene tropicus*, *Siphonocladus tropicus*, *Borgesenia forbesii*, *Chaetomorpha linum*, *Valonia aegagropila*, *Sargassum polycystum* and *Turbinaria conoides*). The least species rich of all sites are the pinnacles with only 24 species, none of which is restricted to this zone. Seventy-one per cent of the pinnacle flora also occur on the fringing reef, which is undoubtedly due to the very similar geomorphological features of the reef flats between the two areas, and the influence of the eroding land mass (terrigenous inputs leading to sedimentation, water turbidity). Unlike the barrier reefs, most of the pinnacles are not under direct oceanic water influence.

The flora of the barrier reef and lagoon reef patches is rich and similar in terms of species number (115 v. 106 sp.), and most of the species in these areas have a wide distribution pattern (18 and 14%, respectively, are restricted to these areas). However, barrier reefs and lagoon components cannot be considered as one single area, because the species composition differs from one area to the next, and only five species were found in both areas, (e.g. *Chlorodesmis fastigiata*, *Hydrolithon murakoshii* and *Sebdenia* sp.). The barrier reef is dominated by non-geniculate coralline algae, especially mastophoroids (*Hydrolithon* spp. and *Neogoniolithon* spp.), and Lithophylloids (*Lithophyllum inspidium*, *L. flavescens* and the branching *L. kotschyannum*) which form large crusts on hard substratum and play an important role in consolidating the rubbles and large pieces of corals resulting from destructive dynamite fishing practices. The shallow and soft-bottom areas of the lagoon were locally dominated by patches of green algae such as *Halimeda incrassata* and *Caulerpa* spp. (*C. brachypus*, *C. taxifolia* and *C. sertularioides*), and Cyanobacteria assemblages, which appear to be seasonal based on

examination of satellite imagery data over several years. The flora of the coral reef patches in the lagoon area is dominated by abundant clumps of the common green algae, *Halimeda opuntia* and *H. minima*, as well as turf communities of algae, mostly red (e.g. *Polysiphonia* spp., *Ceramium* spp.). Few species (five) were restricted to this area: *Codium mamillosum* and *Dasya* spp. Finally, the outer reef slopes which are less rich than the adjacent barrier reef (90 species), contain 23% of the species that are not found in other areas; they are mostly Rhodophyta, such as *Acanthophora pacifica*, *Chrysiomenia okamurayae*, *Platoma cyclocolpum*, *Predaea weldii*, *Prionitis* sp., and a few Chlorophyta such as *Rhipiliopsis howensis*, *Halimeda gracilis* and *H. hederacea*. Few species are found in both the outer slope and barrier reef areas; they are mostly *Halimeda* spp. (*H. distorta*, *H. taenicola* and *H. micronesica*) and coralline algae. Overall, the most represented genera are *Laurencia* (10 species), followed by *Halimeda* (nine species), *Ceramium* (seven species) and *Hydrolithon* (five species).

The general pattern observed from the distribution of the Wallis marine flora is characterised by very few species (4%: e.g. *Halimeda opuntia*, *H. minima*, *Hydrolithon onkodes*, *Valonia fastigiata*) shared between the different sites, while most of them are area-restricted. This agrees with what is described in French Polynesia by Payri *et al.* (2000) for the algae, and also by Galzin and Legendre (1988) for fishes as a result of biotic (inter specific competition, and grazing) and abiotic factors (microhabitat, nutrient levels and water movement, Littler and Littler 1994).

#### Biogeographic comparisons

Establishing biogeographic comparisons of an area's flora requires accurate species taxonomy and also a similar sampling effort from both the study site and the other regions selected for the comparison. Thus, in respect of this assumption, the comparison has been restricted to the neighbouring regions and those located at the same latitude range (Table 3). Coralline algae and Cyanobacteria have not

been included as they are generally understudied; forms and varieties of species have been counted as distinct taxa.

The number of taxa (crustose corallines and Cyanobacteria excluded) of Wallis at first sight appear to be generally low compared with neighbouring islands such as Fiji and Samoa. However, this may be a reflection of limited sampling rather than a true biogeographical difference, as this study was based on a single 16-day survey in which some habitats (such as the turbulent eastern region of Wallis) were excluded. Wallis has no endemic or notable records; neighbouring Rotuma, on the other hand, has one endemic taxon (*Avrainvillea rotumensis*; N'Yeurt *et al.* 1996a) but this species has since been reported north of Rotuma, in Tuvalu (J. Orepuller, pers. comm.).

It is interesting that several very common tropical genera, such as *Hydroclathrus*, *Rosenvingea*, *Colpomenia*, *Chnoospora*, *Asteronema*, *Neomeris* and *Cheilosporum*, are absent and to note that (excepted for *Asteronema*, *Chnoospora*, *Neomeris* and *Cheilosporum*) they do not occur either north of Fiji such as in Rotuma (N'Yeurt 1996), the Solomon Islands (Womesley and Bailey 1970), Nauru (South and Yen 1992) or Kiribati (South *et al.* 2001). It could be a seasonal factor, as these species are known to be mainly present during the warm season (Payri 1987) and collecting was done in Wallis at the onset of the cooler season. In the Solomon Islands, Womersley and Bailey (1970: 294) report another seasonal brown alga, *Colpomenia* sp., as rare during the cooler month of August. On the other hand, in isolated oceanic islands close to equatorial regions such as Rotuma, Wallis, Nauru, Kiribati there is no marked variation in air and sea temperatures throughout the year, and these conditions could exclude the presence of seasonal species whose distribution range does not reach these higher latitudes. In the case of habitat-specific species such as the widespread brown algae *Chnoospora minima* and usually associated *Asteronema breviarliculatum*, their absence from Wallis (but presence in Rotuma) could be explained by the lack of exposed, rocky habitats in the former island. However, seasonality cannot explain the puzzling absence of the green alga *Halimeda discoidea*, which is usually ubiquitous in the tropical Pacific throughout the year, or *Cheilosporum* spp. which is usually common in overhangs on the reef crest (both of these species, incidentally, do occur in neighbouring Rotuma). An instance of apparently disjunct north–south biogeographical distribution is the presence of the distinctive Japanese species *Acrochaetium kurogii* in Wallis, and also in the Cook Islands (ADR N'Yeurt, unpubl. data). However, hasty conclusions should not be made as such minute epiphytic species are easily overlooked in floristic surveys, and sampling effort is far from normalised in the region, with many areas remaining unexplored. It is becoming clear that an increasing number of species previously considered endemic or restricted to certain areas are in fact much more widespread or pantropical, as shown in the recent discovery

of the deepwater red algae *Predaea weldii* and *Gibsmithia hawaiiensis* (type localities in the central Pacific) in South Africa (De Clerck *et al.* 2002) and *Amansia rhodantha* (type locality in the Indian Ocean) in the South Pacific (N'Yeurt 2002).

Doty (1954) discussed the mutual exclusiveness of the genera *Rhipilia* and *Sargassum* in equatorial localities, such as Kiribati and Bikini atoll. Wallis island (13°18' S) could be considered close to the equator, and the presence of *Rhipilia tenaculosa* would, following this logic, prevent the occurrence of *Sargassum*. Interestingly, a single species of *Sargassum*, *S. polycystum*, occurs at Wallis, albeit only at one site which is a port of entry. It could be hypothesised that *Sargassum* does not occur in the natural state in Wallis, and its presence is the result of introduction via shipping.

Whatever the case might be, other species are surely to be discovered in Wallis, especially in the turbulent eastern region, which is yet to be explored. The present study provides our first knowledge of the benthic marine macrophytes associated with the ecosystem diversity of Wallis. It is the first, but important, step towards the conservation and management of the habitats of this island's marine environment.

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