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## Marine algal flora of French Polynesia III. Rhodophyta, with additions to the Phaeophyceae and Chlorophyta

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**Abstract** — This third paper in a monographic series on the marine macroalgae of French Polynesia gives a detailed coverage of the species of Rhodophyta occurring in these islands. A total of 197 taxa are presented (195 Rhodophyceae, 1 Phaeophyceae and 1 Chlorophyta; of these, 84 (or 43%) represent new records for the flora, while 7 (or 3.6%) are new species. The new combination *Jania subulata* (J. Ellis et Solander) N'Yeurt et Payri is made for *Haliptilon subulatum* (J. Ellis et Solander) W. H. Johansen. *Padina stipitata* Tanaka et Nozawa (Phaeophyceae) and *Codium saccatum* Okamura (Chlorophyceae) are notable additions to the flora from deepwater habitats in the southern Australs; 56 taxa (or 28.7%) occur only in the Austral archipelago. The flora has most affinities with that of the Hawaiian Islands (Sørensen Index = 0.30), followed by the Cook Islands and Samoa (SI = 0.26 each) and the Solomon Islands (SI = 0.25). There are some disjunct distribution patterns for several subtropical to temperate species, possibly suggesting special oceanic current routes between the southern Australs, Hawaii and the Southern Australian region.

**algae / biogeography / distribution / floristics / French Polynesia / Rhodophyceae / new records / taxonomy**

**Résumé** — Ce troisième volet d'une étude sur la flore marine de la Polynésie française donne une distribution détaillée des espèces de Rhodophycées qui sont présentes dans ces îles. Un total de 197 taxons sont présentés (195 Rhodophycées, 1 Phaeophycée et 1 Chlorophycée), dont 84 (soit 43 %) sont nouveaux pour la flore, et 7 (soit 3,6 %) représentent des nouvelles espèces. La nouvelle combinaison *Jania subulata* (J. Ellis et Solander) N'Yeurt et Payri est faite pour *Haliptilon subulatum* (J. Ellis et Solander) W.H. Johansen. *Padina stipitata* Tanaka et Nozawa (Phaeophyceae) et *Codium saccatum* Okamura (Chlorophyta) sont nouveaux pour la flore, provenant d'habitats profonds dans les îles les plus sud des Australes; 56 taxons (ou 28,7 %) ont été trouvés seulement dans l'archipel des Australes. La flore a le plus d'affinités avec l'archipel Hawaïen (Index de Sørensen de 0,30), suivi par les îles Cook et Samoa (SI = 0,26 chaque) puis par les îles Salomon (SI = 0,25). Une répartition disjointe pour un nombre d'espèces sous-tropicales à tempérées suggèrerai un lien particulier par les courants océaniques entre l'archipel des Australes du sud, l'archipel Hawaïen et la région sud-australienne.

**algae / biogéographie / distribution / floristique / Polynésie Française / Rhodophyceae / nouveaux reports / taxonomie**

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## INTRODUCTION

This study gives a detailed overview of the marine species of Rhodophyta (along with two new records of Phaeophyceae and Chlorophyta) occurring in French Polynesia, and supplements and revises the taxa previously reported by Setchell, (1926), Payri & Meinesz (1985a, b), Payri & N'Yeurt (1997), Payri *et al.* (2000) and Conte & Payri (2002, 2006). The Phaeophyceae and Chlorophyta of French Polynesia, as well as the history of early phycological collecting in these islands, were treated in Payri & N'Yeurt (1997) and N'Yeurt & Payri (2006, 2007).

## MATERIALS AND METHODS

All material was collected using SCUBA, dredging, snorkelling or reef-walking. Herbarium specimens were pressed using standard techniques, and representative parts of thalli and turf algae stored in 4% buffered formalin in sealed plastic bags packed in a light-proof container for shipment and later anatomical examination in the laboratory. Herbarium specimens were photographed using a bench-mounted digital camera (NIKON Coolpix 995). Photomicrographs were obtained using OLYMPUS C-4040Z or C-5050Z digital cameras fitted on an OLYMPUS BH2 microscope. Voucher specimens are housed at the Phycological Herbarium of the Université de la Polynésie française in Tahiti (UPF), with 'S' referring to slide collections, and can also be viewed online at the following Internet address: <http://biodiv.upf.pf/base> (link at times subject to outages). 'IFR' refers to holdings in the herbarium of the French Institute of Research on Coral Reef Environment (IFRECOR) in Bora Bora, French Polynesia (curated by Mr. Denis Schneider). Where necessary, available French Polynesian herbarium records in UPF have been re-verified in the light of new taxonomic information, and some by William Setchell and H. E. Parks as well as other early collections in BM (British Museum, London), PC (Museum National d'Histoire Naturelle, Paris), SAP (Hokkaido University, Sapporo) and UC (University of California, Berkeley) examined either on site or on loan by the first author. Unfortunately, some voucher specimens of species from Moorea listed in Payri (1987), which contain some taxa not held at UPF, could not be located and are presumed lost. Consequently, only those records which could be confirmed on the basis of existing collections, either in UPF or elsewhere, have been included in this study. Recent new records from a deepwater survey by the authors of the island of Moorea in the context of a genetic barcoding program by the University of California Gump Research Station, have been included in this publication. The taxonomy generally follows that of Silva *et al.*, (1987; 1996), Reviers (2003), and is updated with other sources where necessary as stated in the text. For each taxon, basionym and type locality information is provided, followed by relevant synonyms and bibliographic references (mostly restricted to those that are regional, tropical or contain pertinent diagnostic figures). Asterisks (\*) indicate new records for French Polynesia.



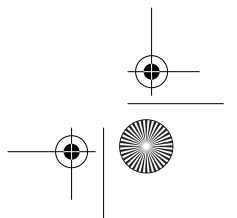
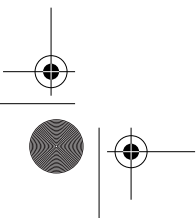
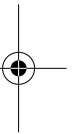
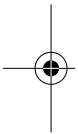
**RESULTS AND OBSERVATIONS**

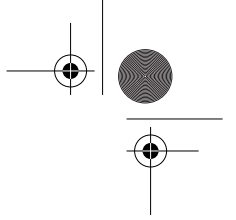
**Key to the genera of French Polynesian Rhodophyta**

- 1a. Thallus internally calcified, even lightly so (bubbles when tested with weak acid) .....2
- 1b. Thallus totally uncalcified .....19
  - 2a. Thallus segmented .....3
  - 2b. Thallus unsegmented .....8
- 3a. Thallus calcified at segment joints ..... *Tricleocarpa*
- 3b. Thallus uncalcified at segment joints .....4
  - 4a. Axes compressed to flattened; segments with upward-curving lobes ....5
  - 4b. Axes terete or compressed; segments not curving upward.....7
- 5a. Thallus dichotomously branched, axes flattened, 1-6 mm wide .. *Jania* (in part)
- 5b. Thallus pinnately branched, axes compressed, 0.3-1 mm wide .....6
  - 6a. Intergenicula 0.3-0.5 mm wide, main axes percurrent, less than 9 tiered medullary cells per intergenicula ..... *Jania* (in part)
  - 6b. Intergenicula 0.5-1 mm wide, main axes not percurrent, more than 10 tiered medullary cells per intergenicula. .... *Corallina*
- 7a. Axes usually terete, less than 150 µm in diameter; conceptacles located at nodes just below dichotomies ..... *Jania* (in part)
- 7b. Axes compressed to terete, more than 500 µm in diameter; conceptacles scattered on internode surface ..... *Amphiroa*
- 8a. Thallus flabellate, with skin-like texture ..... *Titanophora*
- 8b. Thallus not as above. ....9
- 9a. Thallus with rings of verticillate hairs around branches. .... *Actinotrichia*
- 9b. Thallus without verticillate rings of hairs around branches. ....10
  - 10a. Tips of ultimate branches uncalcified. ....13
  - 10b. Thallus calcified throughout, including tips .....11
- 11a. Thallus stone-like or crustose ..... Corallinales (in part)
- 11b. Thallus not stone-like or crustose .....12
  - 12a. Axes rigid, sometimes villous, to 3 mm wide .....18
  - 12b. Axes soft and gelatinous, glabrous, to 10 mm wide ..... *Renouxia*
- 13a. Cortical cells distinctly inflated or club-shaped; carpogonial branch straight, 3-celled, calcification annulate ..... *Yamadaella*
- 13b. Cortical cells not distinctly inflated or clavate; carpogonial branch curved, 3-6-celled, calcification smooth or powdery, not annulate. ....14
  - 14a. Calcification clearly restricted to axial core, surrounded by mucus; spermatangia in whorls on subapical cells, never terminal; sterile filaments issued from base of carpogonial branch making dense, non-involucral clusters below cystocarp ..... *Trichogloea*
  - 14b. Calcification diffuse, not restricted to axial core or covered by mucus; spermatangia usually terminal, not in subapical whorls; sterile filaments



- from carpogonium either absent or making long involucre around cystocarp. . . . . 15
- 15a. Medullary filaments less than 30 µm in diameter, carpogonial branches lateral on subterminal cortical cells; cystocarps with long involucre of sterile filaments issued from carpogonial branch; spermatangia single, in clusters or in non-dendroid pairs . . . . . 16
- 15b. Medullary filaments more than 40 µm in diameter; carpogonial branches on filaments at base of cortical fascicles; cystocarps lacking long involucre of sterile filaments; spermatangia in dense elongate-ovoid heads. . . . *Ganonema*
- 21a. Axes lacking short lateral branchlets; outer cortical filaments unbranched; gonimoblast obconical; spermatangia in dense clusters. . . . . *Titanophycus*
- 21b. Axes with or without short lateral branchlets; outer cortical filaments profusely branched; gonimoblast spherical; spermatangia on outermost cortical filaments. . . . . *Liagora*
- 17a. Thallus crustose, with more or less pronounced hypobasal calcification . . . . . *Peyssonnelia*
- 17b. Thallus not crustose and lacking any hypobasal calcification . . . . . 18
- 21a. Tetrasporangia terminal on elongate filaments; pericarp absent. . . *Galaxaura*
- 21b. Tetrasporangia lateral or terminal on stalk cells; pericarp persistent . . . . . *Dichotomaria*
- 19a. Thallus consisting of a single row of cells . . . . . 20
- 19b. Thallus consisting of more than one row of cells. . . . . 23
- 22a. Thallus less than 5 mm high, of subquadrate cells . . . . . 22
- 22b. Thallus more than 5 mm high, cells not subquadrate. . . . . 21
- 21a. Cells subcylindrical . . . . . *Anotrichum*
- 21b. Cells oval . . . . . *Griffithsia*
- 22a. Thallus less than 500 µm high, entirely uniseriate, unbranched . . . . . *Erythrotrichia*
- 22b. Thallus 1-5 mm high, multiseriate in older parts, irregularly branched . . . . . *Stylonema*
- 23a. Inner structure filamentous or semi-filamentous . . . . . 25
- 23b. Inner structure cellular, or cellular with sparse hyphae . . . . . 24
- 24a. Thallus hollow, vesicle-like or septate with regular diaphragms. . . . . 36
- 24b. Thallus solid throughout . . . . . 41
- 25a. Axes less than 2 mm in diameter, growing in estuaries and river mouths . . 26
- 25b. Axes over 4 mm in diameter, not growing in estuaries and river mouths . . 27
- 26a. Filaments confined to center of axis; branching regularly dichotomous with unstricted branch base; tetrasporangia zonately divided. . . . *Sarconema*
- 26b. Filaments not confined to center of axis; branching irregular with constrictions at base of branches; tetrasporangia cruciately divided . . . . . *Grateloupia*
- 27a. Thallus forming clumps of crisp, rounded rosettes 10-15 mm wide. . . . . *Cryptonemia*
- 27b. Thallus not in clumps or forming rosettes . . . . . 28

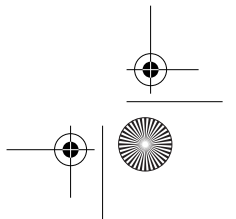
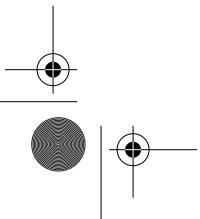
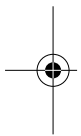




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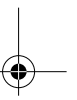
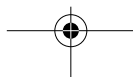
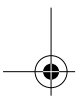
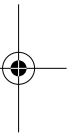
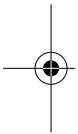
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- 28a. Thallus procumbent, with multiple attachment points . . . . . *Meristotheca*
- 28b. Thallus erect, with a single basal holdfast . . . . . 29
- 29a. Thallus terete . . . . . 35
- 29b. Thallus strap-shaped, blade-like or globose . . . . . 30
  - 30a. Thallus blade-like . . . . . 31
  - 30b. Thallus strap-shaped or globose, not forming blades . . . . . 32
- 31a. At least some anticlinal (cortex to cortex) filaments present . . . . . *Halymenia*
- 31b. Anticlinal filaments absent; thallus usually perforate . . . . . *Kallymenia*
- 32a. Axes strap-shaped, complanate, 3-4 mm wide, with rounded apices . . . . .  
. . . . . *Corynocystis*
- 32b. Thallus globose, not complanate . . . . . 33
- 33a. Holdfast discoid or cartilaginous; tetrasporangia cruciate, lateral on terminal  
cells of cortical filaments . . . . . *Gibsmithia*
- 33a. Holdfast never cartilaginous . . . . . 34
- 34a. Cortical cells rectilinear; spherical nutritive cells present below cystocarp .  
. . . . . *Predaea*
- 34b. Cortical cells ovoid; nutritive cells absent below cystocarps. . . . . *Platoma*
- 35a. Main axis percurrent; higher-order branches spindle-shaped; cells of  
carpogonial branch subrectangular, without a thick mucilaginous coating;  
carposporangial mass fully encircling auxiliary-cell filament . . . *Peleophycus*
- 35b. Main axis not percurrent; higher-order branches not spindle-shaped; cells of  
carpogonial branch sub-moniliform with a thick mucilaginous coating;  
carposporangial mass incompletely encircling auxiliary-cell filament . . . . .  
. . . . . *Dudresnaya*
- 36a. Thallus regularly segmented; diaphragms present; cells barrel-shaped,  
irregularly branched and free . . . . . *Champia*
- 36b. Thallus not regularly segmented; diaphragms absent; cells vesicle-like;  
simple saccate or dichotomously branched and laterally fused . . . . . 37
- 37a. Thallus differentiated into a creeping stolon, stipe and ovoid vesicles . . . . .  
. . . . . *Botryocladia*
- 37b. Thallus not differentiated into a creeping stolon, stipe and vesicles . . . . . 38
- 38a. Thallus ovoid, consisting of free or fused vesicles . . . . . 40
- 38b. Thallus terete, consisting of wiry or arcuate axes . . . . . 39
- 39a. Thallus less than 5 mm high, creeping; branches arcuate and pinkish . . . . .  
. . . . . *Lomentaria*
- 39b. Thallus to 40 mm high, erect; branches straight and iridescent blue . . . *Coelothrix*
- 40a. Thallus dichotomously branched; vesicles ovoid, fused laterally . . . . .  
. . . . . *Chamaebotrys*
- 40b. Thallus saccate, simple to furcate, spindle-shaped, not fused laterally . . . . .  
. . . . . *Gloiosaccion*
- 41a. Ultimate branches flattened or leaf-like . . . . . 42
- 41b. Ultimate branches not flattened or leaf-like . . . . . 53
- 42a. Thallus forming rosettes, differentiated into a rigid naked stem and leaf-  
like ultimate branchlets with a midrib and inrolled tips . . . . . *Amansia*





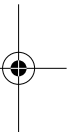
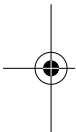
- 42b. Thallus not forming rosettes or differentiated into a rigid stem and leaf-like ultimate branchlets with inrolled tips . . . . . 43
- 43a. Thallus consisting of felt-like lobes and a network of filaments . . *Haloplegma*
- 43b. Thallus not felt-like or composed of a network of filaments . . . . . 44
  - 44a. Thallus strap-shaped or compressed. . . . . 48
  - 44b. Thallus foliose or blade-like . . . . . 45
- 45a. Thallus procumbent and dorsiventral, with a central keel-like region . . . . .  
 . . . . . *Dasya palmatifida*
- 45b. Thallus not as above . . . . . 46
  - 46a. Thallus iridescent, flabelliform and anastomosing, with a central stipe. . 47
  - 46b. Thallus not iridescent, flabelliform or anastomosing; stipe basal or marginal . . . . . 49
- 47a. Thallus foliose; tetrasporangia terminal, carpogonial branch 3-celled . . . . .  
 . . . . . *Halichrysis*
- 47b. Thallus peltate; tetrasporangia intercalary; carpogonial branch 4-celled. . . . .  
 . . . . . *Asteromenia* (in part)
- 48a. Thallus strap-like; axes 1-2 mm wide; medullary cells 60-150 µm wide . . . . .  
 . . . . . *Asteromenia* (in part)
- 48b. Thallus compressed; axes to 150 µm wide; medullary cells 10-18 µm wide . . . . .  
 . . . . . *Caulacanthus*
- 49a. Thallus delicate and thin, membranous (at least in part) . . . . . 50
- 49b. Thallus thick and blade-like and/or subdichotomously branched, cells rounded. . . . . *Rhodymenia*
  - 50a. Midrib present; pluristromatic and branched at the midrib. . *Hypoglossum*
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- 51a. Thallus monostromatic throughout; of unbranched lobes . . . . . *Nitophyllum*
- 51b. Thallus pluristromatic . . . . . 52
  - 52a. Branching irregularly alternate from margins; tetrasporangia in sori . . . . .  
 . . . . . *Myriogramme*
  - 52a. Branching pinnate to subdichotomous; tetrasporangia in whorls on side branchlets. . . . . *Acanthophora pacifica*
- 53a. Thallus plumose, with a pinkish naked creeping stolon and erect axes . . . . .  
 . . . . . *Asparagopsis*
- 53b. Thallus not plumose . . . . . 54
  - 54a. Thallus terete (including turf-like minute forms) . . . . . 56
  - 54b. Thallus compressed to flattened, not turf-like . . . . . 55
- 55a. Thallus erect and lubricous, alternately branched; tetrasporangia zonate, in elongate stichidia; no particularly pungent odour when fresh. . . . *Plocamium*
- 55b. Thallus prostrate, not lubricous; bilaterally branched; tetrasporangia cruciate to zonate, in nemathecia; pungent odour when fresh . . . . . *Portieria*
  - 56a. Thallus 2-20 cm high, erect and non-epiphytic . . . . . 57
  - 56b. Thallus less than 2 cm high, often creeping or epiphytic . . . . . 74





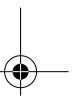
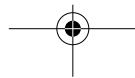
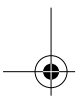
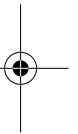
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- 57a. Thallus unbranched in lower portions but irregularly branched above; side branchlets short and truncate, alternately to radially arranged .....58
- 57b. Thallus not as above .....61
- 58a. In cross-section, axial cell surrounded clearly by 5 large pericentral cells ..  
..... *Chondria*
- 58b. In cross-section, axial cell not clearly surrounded by 5 pericentral cells. 59
- 59a. Axial cell with only 2 pericentral cells; axes broad and flattened .....  
..... *Chondrophycus*
- 59b. Axial cell with 4 pericentral cells; axes terete to compressed ..... 60
- 60a. Apical cell sunken in apical pit; central axis unclear except at apex .....  
..... *Palisada*
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- 61a. Thallus composed of wiry axes, more or less rigid .....62
- 61b. Thallus not wiry or particularly rigid .....64
- 62a. Thallus greenish-yellow, tough and wiry with oppositely-branched axes,  
forming decumbent clumps on the reef crest ..... *Gelidiella* (in part)
- 62b. Thallus not decumbent or as above .....63
- 63a. Axes 400-500 µm in diameter; mostly branched at apices, which turn yellow..  
..... *Ahnfeltiopsis*
- 63b. Axes 150-300 µm in diameter; unbranched at apices, not turning yellow .....  
..... *Wurdemannia*
- 64a. Thallus flexible; axes terete or compressed and distally palmate;  
tetrasporangia in terminal bulb-like swellings ..... *Gelidiopsis*
- 64b. Thallus not as above.....65
- 65a. Thallus reddish-brown; ultimate branches strap-shaped or terete; internal  
rhizines present; apical cell conspicuous and exserted.....66
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- 66a. Branching alternate to opposite; branch apex truncate or blunt .....  
..... *Pterocladia*
- 66b. Branching pinnate; branch apex tapered and filiform, pointed ... *Gelidium*
- 67a. Thallus of sparsely and alternately branched axes issued from a creeping  
base; growing as a dense tuft on coral debris.....68
- 67b. Thallus not as above .....69
- 68a. Axial and periaxial cells in clear transverse rows; sporangia in sparse,  
regularly arranged rows..... *Parviphycus*
- 68b. Axial and periaxial cells irregularly disposed; sporangia not arranged in  
regular rows..... *Gelidiella* (in part)
- 69a. Thallus terete and brittle, uniformly covered with short knobby spine-like  
branchlets..... *Acanthophora* (in part)
- 69b. Thallus not as above .....70
- 70a. Thallus furry, with axes covered with fine filamentous side branchlets. .71
- 70b. Thallus not furry .....72
- 71a. Filamentous side branchlets regularly corticated at the nodes only; tetrasporangia  
non-involucrate and protruding on sides of branchlets ..... *Spyridia*





- 71b. Filamentous side branchlets uncorticated; tetrasporangia involucrate and occurring in specialized fusiform stichidia . . . . . *Dasya* (in part)
- 72a. Thallus regularly dichotomously branched, tree-like, with a basal stipe . . . . . *Dermonema*
- 72b. Thallus not as above . . . . . 73
- 73a. Branches terete or flattened, arcuate or straight; proliferous side branchlets absent; tetrasporangia cruciate and scattered in outer cortex . . . . . *Gracilaria*
- 73b. Branches terete or flattened; always arcuate; proliferous side branchlets sometimes present; tetrasporangia zonate and occurring in saddle-shaped sori on the underside of branchlets. . . . . *Hypnea*
- 74a. Thallus soft and rubbery, composed of compressed, elongate lobes with short, irregularly distichous side branchlets and strap-like rhizoids issued from ventral surface of blades. . . . . *Gloiocladia*
- 74b. Thallus not as above . . . . . 75
- 75a. Main axis lacking pericentral cells around axial cell . . . . . 76
- 75b. Main axis with four or more pericentral cells around axial cell. . . . . 77
- 76a. Erect axes sparsely branched, covered with three whorls of upwardly-curved side branchlets per axial cell . . . . . *Crouania*
- 76b. Erect axes alternately to radially branched; whorls of side branchlets absent . . . . . *Seirospora*
- 77a. Main axes partially or fully covered with small cortical cells 8-10 µm in diameter; terminal and lateral trichoblasts never present . . . . . 78
- 77b. Main axes never covered with small cortical cells; terminal and lateral trichoblasts often present . . . . . 82
- 78a. Axes fully corticated . . . . . 79
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- 79a. Thallus minute, less than 2 mm high, epiphytic only on *Lobophora*. . . . . *Phaeocolax*
- 79b Thallus more than 3 mm high, not epiphytic only on *Lobophora*. . . . . 80
- 80a. Tip of axes pointed; nodal spines absent . . . . . *Corallophila*
- 80b. Tip of axes claw-like or forcipate; nodal whorls of spines present . . . . . *Centroceras*
- 81a. Basipetal cells distinctly elongate . . . . . *Gayliella*
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- 82a. Axes with terminal and / or lateral trichoblasts. . . . . 84
- 82b. Axes without terminal or lateral trichoblasts . . . . . 83
- 83a. Thallus erect and irregularly dichotomously branched, with dichotomously branched side branchlets issued from every other segment. . . *Heterosiphonia*
- 83b. Thallus creeping, with erect unbranched axes. . . . . *Ditria*
- 84a. Thallus composed of a creeping, often incurved main axis from which are issued several erect simple branchlets . . . . . *Herposiphonia*
- 84b. Thallus mostly erect and irregularly branched, never with an incurved main axis. . . . . 85







- 85a. Rhizoids separated by a cross-wall from the supporting pericentral cells; tetrasporangia in spiraled series; spermatangial branches with a sterile lateral ..... *Neosiphonia*
- 85b. Rhizoids in open connection with the pericentral cells; tetrasporangia in straight series; spermatangial branches lacking a sterile lateral . *Polysiphonia*

**RHODOPHYTA** R. Wettstein

**Stylonematales** K.M. Drew

**Stylonemataceae** K.M. Drew

***Stylonema*** Reinsch

The taxonomy of this and other related red algal genera was recently revised by Saunders & Hommersand (2004), taking into account recent molecular data.

\****Stylonema alsidii*** (Zanardini) K.M. Drew, 1956: 72. Indian Ocean: Silva *et al.*, 1996: 87; Hawaiian Islands: Abbott, 1999a: 44, fig. 1B-C; Oman: Wynne, 1999: 189; Samoa: Skelton & South, 2002a: 137, fig. 3A-B; 2007: 12, figs 9-10; Pacific Islands: Zucarello *et al.*, 2008: 390. **(Figs 1-2)**

**Basionym:** *Bangia alsidii* Zanardini, 1840: 136 (type locality: Trieste, Italy).

**Homotypic synonym:** *Goniotrichum alsidii* (Zanardini) M. Howe 1914: 75. Tristan da Cunha: Baardseth, 1942: 33, fig. 13A-B; Venezuela: Díaz-Piferrer, 1970: 170, fig. 22.

**Material examined:** Rapa, Australs, 10 Oct. 2000, *leg. V. Clouard*, UPF 3253 RPS57.

Thallus to 5 mm high and 12-15 µm in diameter, filamentous and basally uniseriate, with some older parts multiseriate. Branching simple or irregular.

**Remarks:** Epiphytic on *Fernandosiphonia* sp.; to date in French Polynesia only reported from a single collection from the island of Rapa, southern Australs. Recent phylogenetic studies by Zucarello *et al.* (2008) have shown *S. alsidii* to be a truly ubiquitous species.

**Erythropeltiales** Garbary *et al.*

**Erythrotrichiaceae** G.M. Smith

***Erythrotrichia*** Areschoug

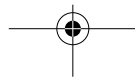
\****Erythrotrichia carnea*** (Dillwyn) J. Agardh, 1883: 15. Indian Ocean: Silva *et al.*, 1996: 88; Rotuma Island: N'Yeurt, 1996: 406, figs 109, 118; Hawaiian Islands: Abbott, 1999a: 45, fig. 1E; Fiji: N'Yeurt, 2001: 746, fig. 106; Samoa: Skelton & South, 2007: 11, fig. 8. **(Figs 3-4)**

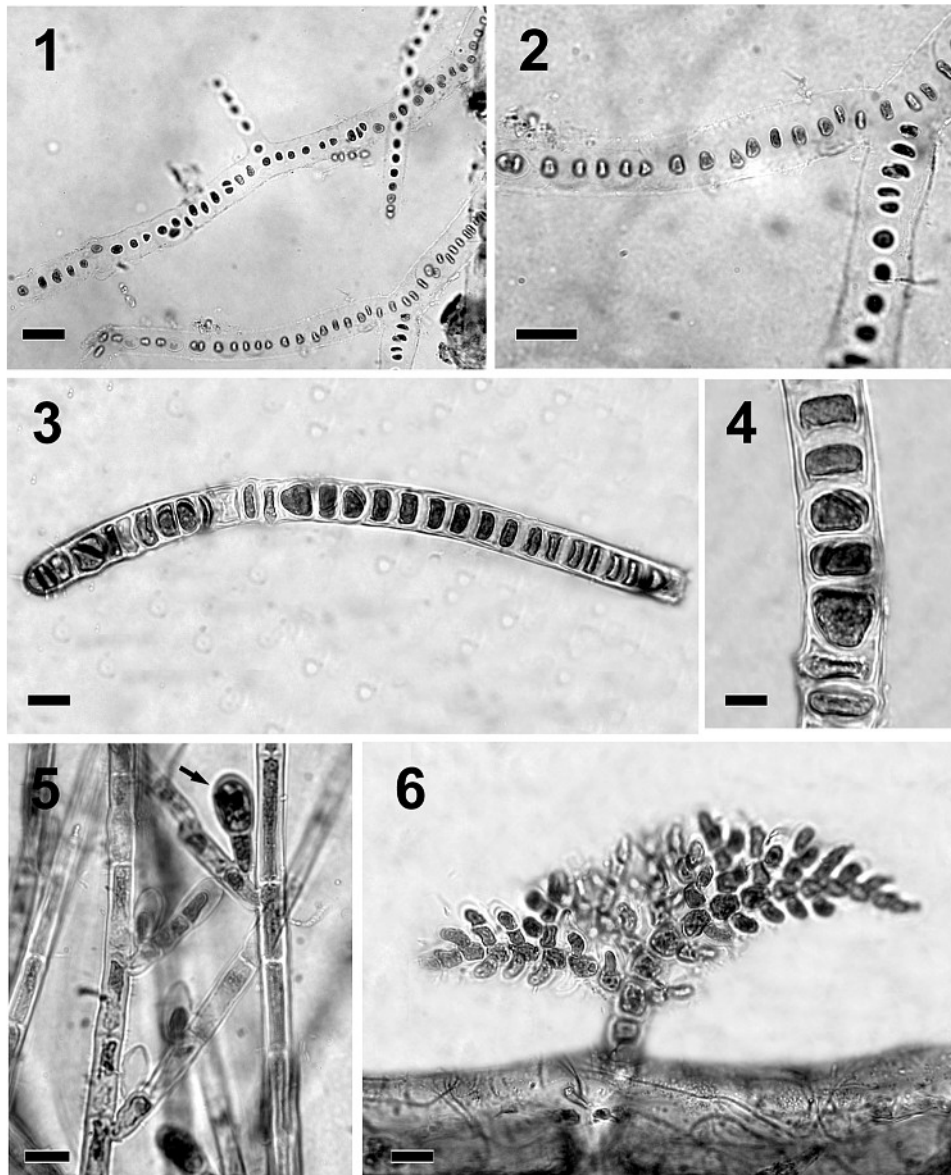
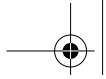
**Basionym:** *Conferva carnea* Dillwyn, 1807: pl. 84 (type locality: Glamorgan, Wales).

**Material examined:** Taapuna, Tahiti, 15 Sep. 1995, *leg. A. D. R. N'Yeurt*, UPF 438 S52; Rapa, Australs, 4 Nov. 2002, *leg. C. E. Payri*, UPF 3421 RPS203.

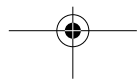
Thallus entirely uniseriate, to 500 µm long and 10-25 µm in diameter, composed of cells isodiametric to cylindrical at the base, gradually becoming longer and broader upwards. Attached to the substratum by a characteristic lobed extension of the basal cell.

**Remarks:** Epiphytic on *Padina* (lagoon, Tahiti) or on *Sargassum* (rocky shelves, Rapa). This species can be differentiated from *Stylonema alsidii* by its entirely uniseriate thallus attached via a lobed extension of the basal cell.





Figs 1-6. **1.** *Stylonema alsidii*: habit of irregularly branched thallus (UPF 3253). Scale = 15  $\mu$ m. **2.** *Stylonema alsidii*: detail of cells of filament (UPF 3253). Scale = 15  $\mu$ m. **3.** *Erythrotrichia carnea*: habit (UPF 3421). Scale = 20  $\mu$ m. **4.** *Erythrotrichia carnea*: detail of rectangular cells of upper thallus (UPF 3421). Scale = 15  $\mu$ m. **5.** *Acrochaetium barbadense*: habit, showing adaxial monosporangia (arrow) (UPF 3425). Scale = 70  $\mu$ m. **6.** *Acrochaetium microscopicum*: habit on *Polysiphonia* host (UPF 3424). Scale = 25  $\mu$ m.



**Acrochaetiales** Feldmann**Acrochaetiaceae** Fritsch *ex* W.R. Taylor**Acrochaetium** Nägeli *in* Nägeli *et* Cramer**Key to the French Polynesian species of *Acrochaetium***

- 1a. Thallus microscopic (less than 100 µm high), fan-like, branched in a single plane, basal portion endophytic . . . . . *A. microscopicum*
- 1b. Thallus macroscopic (more than 3 mm high), tufted in several planes, basal portion a single globular persistent spore partly buried or emergent on host . . . . . *A. barbadense*

\****Acrochaetium barbadense*** (Vickers) Børgesen, 1915: 45. Indian Ocean: Silva *et al.*, 1996: 95; Hawaiian Islands: Abbott, 1999a: 52, fig. 3B. **(Fig. 5)**

**Basionym:** *Chantrasia barbadensis* Vickers, 1905: 60 (type locality: Barbados).

**Material examined:** Mac Donald Bank, 4 Nov. 2002, *leg. IRD*, UPF 3432 RPS 210, UPF 3616; Rapa, Australs, 4 Nov. 2002, *leg. C. E. Payri*, UPF 3425 RPS 203; Rukuaga Point, Rapa, 30 Nov. 2002, *leg. J. L. Menou*, UPF 3199 RPS 3, 3278 RPS 75.

Thallus 5-6 mm high and 60-65 µm in diameter, epiphytic and attached to host via a single persistent globular spore 10-12 µm in diameter. Erect filaments subdichotomously and irregularly branched, becoming more dense in distal portions of thallus. Monosporangia unilateral, adaxial.

**Remarks:** Epiphytic on *Lobophora* or *Polysiphonia*, 10 to 80 m deep. So far in French Polynesia, only reported from the southern Australs.

\****Acrochaetium microscopicum*** (Nägeli *ex* Kützing) Nägeli, 1858: 532, footnote. Indian Ocean: Silva *et al.*, 1996: 99; Hawaiian Islands: Abbott, 1999a: 55, fig. 3G. **(Fig. 6)**

**Basionym:** *Callithamnion microscopicum* Nägeli *ex* Kützing, 1849: 640 (type locality: Gulf of Naples, Italy).

**Material examined:** Rapa, Australs, 4 Nov. 2002, *leg. C. E. Payri*, UPF 3424 RPS 203.

Thallus microscopic and partly endophytic, about 25-40 µm high and 50-70 µm wide, branched to three or four orders in a fan-like fashion in a single plane. Monosporangia sessile or terminal on branchlets.

**Remarks:** Epiphytic on *Polysiphonia*, in *Sargassum* beds on rocky ledges in the upper littoral. So far in French Polynesia, only known from the southern Australs island of Rapa.

**Nemaliales** F. Schmitz**Galaxauraceae** P. G. Parkinson***Actinotrichia*** Decaisne

***Actinotrichia fragilis*** (Forsskål) Børgesen, 1932: 6-7. French Polynesia: Payri *et al.*, 2000: 160; Viêt Nam: Dawson, 1954: 416, fig. 28b; Indonesia: Verheij & Prud'homme van Reine, 1993: 167, pl. 14 fig. 1; Indian Ocean: Silva *et al.*, 1996: 104; Rotuma Island: N'Yeurt, 1996: 407, fig. 113; Hawaiian Islands: Abbott, 1999a: 64, fig. 7A-C; Fiji: N'Yeurt, 2001: 749, figs 109, 117a-b; Littler & Littler, 2003: 62; Samoa: Skelton & South, 2002a: 138; fig. 3C-E; 2007: 16, figs 14-15, 780; Australia: Huisman, 2006: 13, figs 3A, 4A, pl. 4. **(Fig. 7)**

**Basionym:** *Fucus fragilis* Forsskål, 1775: 190 (type locality: Mokha, Yemen).

**Material examined:** Tiahura, Moorea, c. 1982, *leg. C. E. Payri*, UPF 3085; Afaahiti, Tahiti, 10 Jun. 1997, *leg. A. D. R. N'Yeurt*, UPF 223; Nuku Hiva, Marquesas, 1997, *leg. J. Orempuller*, UPF 579; Taone, Tahiti, 2 Mar. 1998, *leg. J. Orempuller*, UPF 3112; Punaauia, Tahiti, 19 Mar. 1998, *leg. C. E. Payri*, UPF 580; Punaauia, Tahiti, 2 Dec. 2000, *leg. A. D. R. N'Yeurt*, UPF 782; Tiahura, Moorea, 28 Sep. 2004, *leg. A. D. R. N'Yeurt & A. Pham*,



UPF 3027; PK 13 Punaauia, Tahiti, 10 Oct. 2004, *leg. A. D. R. N'Yeurt & H. Pouira*, UPF 3109; PK 18 Punaauia, Tahiti, 5 Mar. 2005, *leg. A. D. R. N'Yeurt & A. Pham*, UPF 3071, 3072; Papenoo, Tahiti, 27 Nov. 2005, *leg. A. D. R. N'Yeurt & A. Pham*, UPF 3138.

Thallus bushy, to 6 cm high, reddish orange in colour, relatively stiff and lightly calcified. Axes terete, 380-440 µm in diameter, dichotomously branched, with blunt axes and characteristic whorled annular rings of pigmented, simple assimilatory filaments 13-14 µm wide and 170-171 µm long. Cortex 2-3 layers thick, composed of short, dichotomously branched, terminally inflated assimilatory filaments 12-13 µm in diameter. Non-hairy portions of thallus with cuboid outermost cortical cells 13-14 µm in diameter, and 2-3 layers of ovoid to subspherical inner cortical cells 13-14 µm wide and 27-28 µm long. Medullary filaments densely interwoven, 4-6 µm in diameter.

**Remarks:** The species grows attached to rocks or coral rubble on the reef flat. The annulate patterns of branches due to the presence of verticillate filaments distinguishes this species from similar-looking species of *Jania* or *Amphiroa*. To date the species has not been recorded from the Tuamotu, Gambier or Austral archipelagos.

***Dichotomaria* Lamarck**

The genus *Dichotomaria* was resurrected by Huisman *et al.* (2004) based on molecular studies, which revealed the genus *Galaxaura* to be para/polyphyletic unless some species were removed and transferred to another genus. Wang *et al.* (2005: 688) further emended the genus description with new observations. *Dichotomaria* was initially distinguished from *Galaxaura* by having a tetrasporophytic stage with stalked epidermal cells, and by the lateral or terminal production of tetrasporangia on these stalk cells. In addition, both gametophytic and tetrasporophytic generations are isomorphic in *Dichotomaria* and dimorphic in *Galaxaura*, and a persistent pericarp is present in *Dichotomaria*, but absent in *Galaxaura* (Wang *et al.*, 2005).

**Key to the French Polynesian species of *Dichotomaria***

- 1a. Thallus flattened ..... *D. marginata*
- 1b. Thallus terete ..... *D. obtusata*

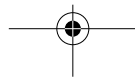
***Dichotomaria marginata*** (J. Ellis *et Solander*) Lamarck, 1816: 146. Huisman *et al.*, 2004: 230; Taiwan: Wang *et al.*, 2005: 691, fig. 7f-g. **(Figs 8-9)**

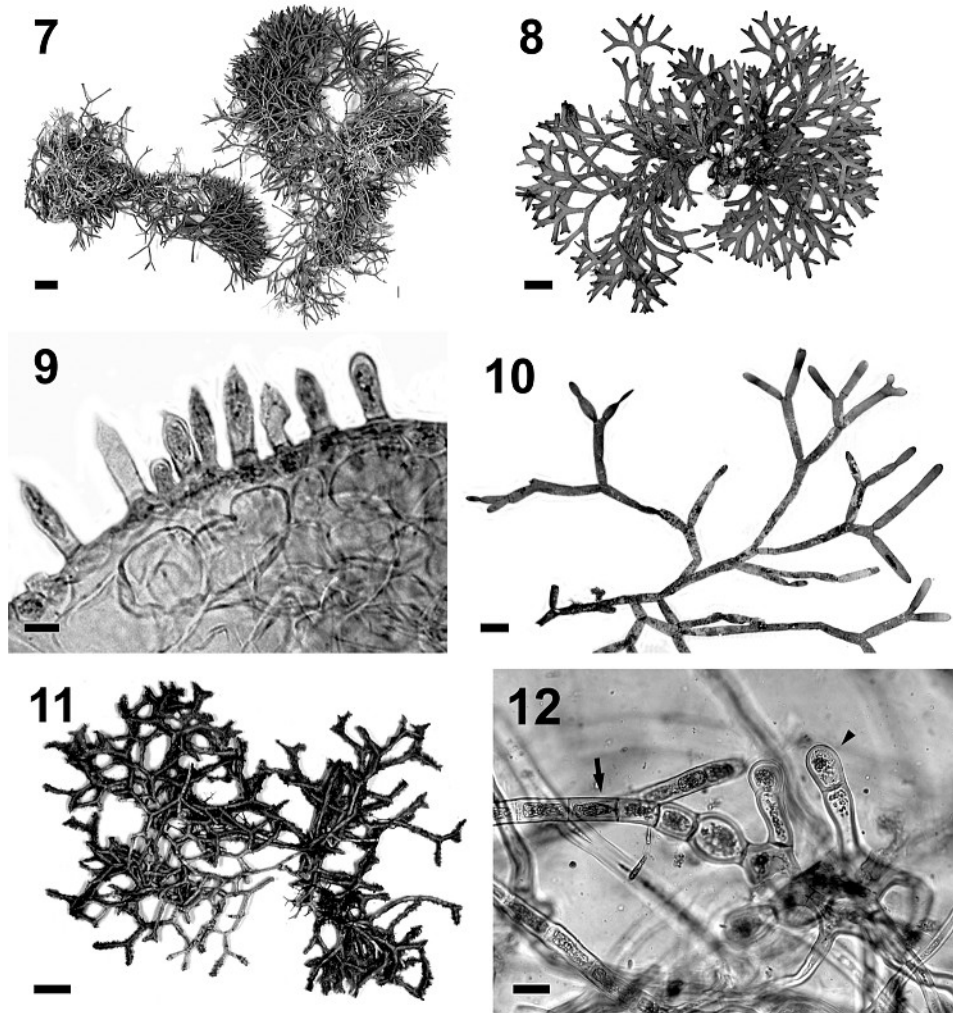
**Basionym:** *Corallina marginata* J. Ellis *et Solander*, 1786: 115, pl. 22 fig. 6 (type locality: Bahamas).

**Homotypic synonym:** *Galaxaura marginata* (J. Ellis *et Solander*) J.V. Lamouroux, 1816: 264. French Polynesia: Payri *et al.*, 2000: 164; Indian Ocean: Papenfuss *et al.* 1982: 411, figs 7-9, 24, 36, 37; Fiji: Itono 1985a: 46, fig. 4 (as *G. stupocaula*); 1985a: 48, fig. 5 (as *G. ventricosa*); N'Yeurt, 2001: 752, figs 118-122; Littler & Littler, 2003: 64; Australia: Huisman & Borowitzka 1990: 157, figs 14-27; Millar, 1990: 304, figs 6A-G; Huisman & Womersley, 1994: 113, figs 32A-F, 33B-D; Huisman & Kurihara, 2006: 17, figs 5A-B, 6A; Hawaiian Islands: Abbott, 1999a: 67, fig. 7G-H.

**Misapplied name:** *Dichotomaria australis* (Sonder) Huisman, Harper *et Saunders*, 2004: 230. New Caledonia: Millar & Payri, 2006: 158, fig. 7; Samoa: Skelton & South, 2007: 17, fig. 18.

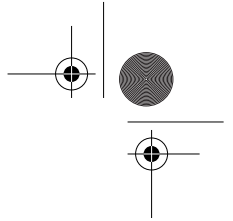
**Material examined:** Tiahura, Moorea, 1982, *leg. C. E. Payri*, UPF 3084; Punaauia, Tahiti, 25 Sep. 1995, *leg. A. D. R. N'Yeurt*, UPF 272, 10 Nov. 1999, *leg. S. Andrefouët*, UPF 2611 / BM 773661; Tiahura, Moorea, 30 Sep. 2004, *leg. A. D. R. N'Yeurt & A. Pham*, UPF 2945.



Marine algal flora of French Polynesia III. Rhodophyta,  
with additions to the Phaeophyceae and Chlorophyta

Figs 7-12. **7.** *Actinotrichia fragilis*: habit (UPF 223). Scale = 5 mm. **8.** *Dichotomaria marginata*: habit (UPF 2945). Scale = 10 mm. **9.** *Dichotomaria marginata*: detail of fusiform spinulose cells on paired, subspherical cortical cells of gametophyte (UPF 272). Scale = 10  $\mu$ m. **10.** *Dichotomaria obtusata*: habit (UPF 273). Scale = 5 mm. **11.** *Galaxaura divaricata*: habit (UPF 267). Scale = 10 mm. **12.** *Galaxaura divaricata*: Detail of cortical region showing both long (arrow) and short (arrowhead) assimilators (UPF 267). Scale = 20  $\mu$ m.

Thallus lightly calcified, to 80 mm high, light pink, greyish-red to greenish-yellow in colour. Axes 1-2 mm wide, regularly dichotomously branched, flattened and glabrous, with bifurcate apices that are distally darkly pigmented, and thickened lateral margins becoming inrolled when dry. Holdfast discoid, about 5 mm in diameter and 8 mm high. Gametophyte cortex pseudoparenchymatous, 2-3 cells thick, composed of an outermost layer of elongate cells 18-20  $\mu$ m in diameter and 7-8  $\mu$ m high, and lower layers of isodiametric to ovoid, paired cells 21-42  $\mu$ m in diameter. Innermost cortical cells strongly compressed and longer



than broad, 36-43  $\mu\text{m}$  long and 11-17  $\mu\text{m}$  high. Fusiform spinulose cells 32-35  $\mu\text{m}$  long and 8-10  $\mu\text{m}$  in diameter restricted to the thickened marginal regions of the thallus, present on every cortical cell. Medulla consisting of coarse filaments 6-7  $\mu\text{m}$  in diameter. Cystocarps spherical and ostiolate, 200-240  $\mu\text{m}$  in diameter, embedded in the filamentous medulla of the marginal regions. Mature carpogonia uninucleate and ovoid, 21-29  $\mu\text{m}$  in diameter.

**Remarks:** This species is distinct as the only flattened Nemaliales in French Polynesia, and grows attached by a single holdfast to hard substrata, down to depths of 15 to 30 m (Moorea, Tahiti). Huisman *et al.* (2004) considered Caribbean *D. marginata* a separate species from Australian populations, which they transferred to *D. australis* (Sonder) Huisman, Harper *et* Saunders; South Pacific material was not included in their study. However, Wang *et al.* (2005) suggested that *D. marginata* is pan-tropical, and in their molecular study Caribbean *D. marginata* from Guadeloupe grouped in a clade with *D. marginata* from Papua New Guinea, South Pacific and the Philippines (Wang *et al.*, 2005: 700, fig. 9), thus confirming the presence of *G. marginata* in the Indo-Pacific. Moreover, in New Caledonia both *D. australis* and *D. marginata* seem to be present, with morphological differences amongst them (Payri, unpubl. observation). Recently, Kurihara & Huisman (2006) have shown, based on *rbcL* sequence analyses, that up to four flattened species of *Dichotomaria* occur in Australia, including *D. marginata*, which is restricted to northern tropical regions, and is characterized amongst other features by the presence of a raised margin, spinulose outer cortical cells and paired subspherical inner cortical cells, features which agree with French Polynesian plants and those from other Pacific localities such as Fiji, the Solomon Islands, Vanuatu (Payri & N'Yeurt, unpubl. obs.) and Samoa (Skelton & South, 2007: 17, fig. 18, as *D. australis*). Clearly, more research on a wide range of specimens is needed to clarify species boundaries in the *D. marginata* complex, for which the latter name is the earliest available.

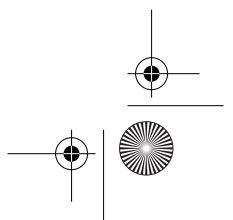
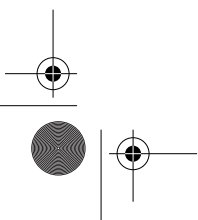
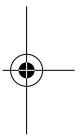
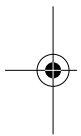
***Dichotomaria obtusata*** (J. Ellis *et* Solander) Lamarck, 1816: 145. Australia: Huisman *et al.*, 2004: 230; Huisman & Kurihara, 2006: 19, figs 2C, 5D-G, pl. 7; Taiwan: Wang *et al.*, 2005: 688, figs 1a-g, 2a-f, 3a-c, 5a-h, 6a-b); Samoa: Skelton & South, 2007: 19, fig. 19. **(Fig. 10)**

**Basionym:** *Corallina obtusata* J. Ellis *et* Solander, 1786: 113, pl. 22 fig. 2 (type locality: Bahamas).

**Homotypic synonym:** *Galaxaura obtusata* (J. Ellis *et* Solander) J.V. Lamouroux, 1816: 262. French Polynesia: Payri *et al.*, 2000: 166; Australia: Huisman & Borowitzka, 1990: 161, figs 28-38; Huisman & Womersley, 1994: 112, figs 30G-J, 33A; Indian Ocean: Silva *et al.*, 1996: 108; Hawaiian Islands: Abbott, 1999a: 68, fig. 7I-J; Papua New Guinea: Littler & Littler, 2003: 64.

**Material examined:** Taapuna, Tahiti, 16 May 1997, leg. C. E. Payri, UPF 273, 274, 275.

Thallus to 15 cm high, moderately calcified, pinkish in colour. Axes terete and hollow, laxly dichotomously branched, 2-3 mm in diameter, composed of ovoid-elongate, turgid segments 5 to 30 mm long which are rounded at either end. Medulla filamentous. Sporophyte cortex 3-layered, composed of one lower layer of large, laterally-adherent clear cells 40-50  $\mu\text{m}$  in diameter and an inner pigmented layer of stalk-like cells 10-12  $\mu\text{m}$  in diameter, each supporting one or two flat-topped outer cortical cells 20-25  $\mu\text{m}$  in diameter. Gametophyte cortex consisting of two layers of clear cells and an outer layer of pigmented lens-shaped cells. Tetrasporangia cruciately divided, lateral on stalk cells of epidermal cells or terminal on epidermal cells.





**Remarks:** The lax habit and large, clearly segmented, turgid axes characterizes this species, which is found growing on coral heads or other hard surfaces in the lagoons of high islands of the Society Group such as Tahiti.

*Galaxaura* J.V. Lamouroux

**Key to the French Polynesian species of *Galaxaura***

- 1a. Upper thallus glabrous; apices truncate, faintly annulate . . . . . *G. rugosa*  
(gametophyte)
- 1b. Entire thallus covered with hair-like filaments; apices obtuse; annulations  
absent. . . . . 2
  - 2a. Branches densely covered with long filaments of uniform length; medulla  
compact, making a continuous transition to loosely arranged assimilatory  
filaments . . . . . *G. filamentosa*
  - 2b. Branches sparsely covered with filaments which are both long and short;  
medulla and assimilatory filaments separated by globose cortical cells and a  
distinct ring of calcification; medulla loosely arranged. . . . . 3
- 3a. Calcification heavy; branching subdichotomous to divaricate; pseudocortex  
present; long assimilatory filaments to 3.5 mm. . . . . *G. divaricata*
- 3b. Calcification light; branching irregularly alternate; pseudocortex absent; long  
assimilatory filaments to 1.6 mm . . . . . *G. rugosa* (tetrasporophyte)

\**Galaxaura divaricata* (Linnaeus) Huisman *et* Townsend, 1993: 100, fig. 2. Papua New Guinea: Millar *et al.*, 1999: 551; Australia: Huisman, 2006: 22, figs 5H, 8A; Samoa: Skelton & South, 2007: 20, fig. 16. **(Figs 11-12)**

**Basionym:** *Eschara divaricata* Linnaeus 1758: 805 (type locality (according to Huisman & Townsend, 1993): 'Oceano Asiatico').

**Heterotypic synonyms:** (given by Huisman & Borowitzka, 1990; Huisman & Townsend, 1993):

*Galaxaura cohaerens* Kjellman 1900: 54, pl. 5 figs 10-18, pl. 20 fig. 10. Papua New Guinea: Littler & Littler, 2003: 62. *Galaxaura fasciculata* Kjellman, 1900: 53-54, pl. 5 figs 1-9, pl. 20 fig. 14 (type locality: Celebes, Indonesia). French Polynesia: Payri *et al.*, 2000: 162; Viêt Nam: Dawson, 1954: 419, fig 29b; Marshall Islands: Dawson, 1956: 45, fig. 35; Caroline Islands: Trono, 1969: 46, pl. 6 fig. 2; Indian Ocean: Papenfuss *et al.*, 1982: 406-407, figs 3, 31-32, 43; Hawaiian Islands: Abbott, 1999a: 66, fig. 7D-E; Fiji: N'Yeurt, 2001: 749, fig. 116a-d; Wallis Islands: N'Yeurt & Payri, 2004: 378.

**Material examined:** Tiahura, Moorea, *leg. C. E. Payri*, UPF 266; Maate'a, Moorea, 12 Jun. 1984, *leg. C. E. Payri*, UPF 2881; Taapuna, Tahiti, 15 Sep. 1995, *leg. A. D. R. N'Yeurt*, UPF 441; Taapuna, Tahiti, 16 May 1997, *leg. C. E. Payri*, UPF 265, 16 May 1997, *leg. C. E. Payri*, UPF 267; Mt. Mokoto, Mangareva, 27 Sep. 1997, *leg. J. Starmer*, UPF 626; Aquarium, Bora Bora, 15 Aug. 2002, *leg. A. D. R. N'Yeurt & D. Schneider*, UPF 2502; Frangeant Povai, Bora Bora, 16 Aug. 2002, *leg. A. D. R. N'Yeurt & D. Schneider*, UPF 2541; Tiahura, Moorea, *leg. A. D. R. N'Yeurt & A. Pham*, 29 Sep. 2004, UPF 2960, 3 Oct. 2004, UPF 2944; PK 18 Punaauia, Tahiti, 5 Mar. 2005, *leg. A. D. R. N'Yeurt & A. Pham*, UPF 3066, 3068.

Thallus moderately calcified, to 8 cm high, forming stiff, compact dark reddish-brown clumps. Main axes to 2 mm wide, terete and subdichotomously to divaricately branched. Branches 0.8-1.5 mm in diameter, not articulated, sparsely to densely covered (especially in upper parts) with matted, reddish-brown assimilatory filaments 16-18 µm in diameter, which are both short (1-3 cells long, to 700 µm, with a globose terminal cell to 28 µm in diameter) and long (to 3.5 mm,



subtended by a globose basal cell 20-24  $\mu\text{m}$  in diameter). Medullary filaments colourless, 8-12  $\mu\text{m}$  in diameter. In cross section of branches, a distinct annular ring of calcification separates the clear, uncalcified medulla towards the centre from the darkly pigmented assimilatory filaments towards the periphery.

**Remarks:** Commonly found growing on coral heads in lagoons of high islands of the Society Group. This species has often been confused with *G. subverticillata* Kjellman, now considered a dimorphic tetrasporophytic phase in the life cycle of *G. rugosa* (J. Ellis *et Solander*) J.V. Lamouroux. The less calcified thallus, alternate branching, absence of pseudoparenchymatous cortical layers, shorter assimilatory filaments (to 1.6 mm long) and presence of terminal tetrasporangia distinguishes the tetrasporophytic phase of *G. rugosa* from *G. divaricata*. *Galaxaura divaricata* has unusual features for a species of *Galaxaura*, and could be closer to *Actinotrichia* according to Huisman *et al.* (2004).

***Galaxaura filamentosa*** R.C.Y. Chou in W.R. Taylor, 1945: 139 (type locality: Sulphur Bay, Clarion Island, Revilla Gigedo, Mexico). French Polynesia: Payri *et al.*, 2000: 162; Taiwan: Chou, 1945: 39, pl. 1 figs 1-6; pl. 6 fig. 1; Hawaiian Islands: Svedelius, 1953: 33, figs 29-32; Abbott, 1999a: 67, fig. 7F; Viêt Nam: Dawson, 1954: 419, fig. 30a; Indian Ocean: Silva *et al.*, 1996: 106; Rotuma Island: N'Yeurt, 1996: 408; Fiji: N'Yeurt, 2001: 750; Papua New Guinea: Littler & Littler, 2003: 64; Samoa: Skelton & South, 2007: 21, fig. 17. **(Fig 13)**

**Material examined:** Tiahura, Moorea, c. 1982, *leg. C. E. Payri*, UPF 271, 442; Moruroa, 18 Dec. 1993, *leg. V. Stiger*, UPF 3083, 3092; Ilot aux Oiseaux, Tikehau, 4 Nov. 1995, *leg. A. D. R. N'Yeurt*, UPF 268; Marokau, c. 1996, *leg. J. Orempuller*, UPF 269; Hikueru, Nov. 1996, *leg. J. Orempuller*, UPF 270; Motu Totegegic, Gambier, 22 Nov. 2000, *leg. A. D. R. N'Yeurt*, UPF 792; Hoa Perete, Rangiroa, 12 Mar. 2003, *leg. C. E. Payri*, UPF 3173; Tiahura, Moorea, *leg. A. D. R. N'Yeurt & A. Pham*, 29 Sep. 2004, UPF 2959, 1 Oct. 2004, UPF 2953.

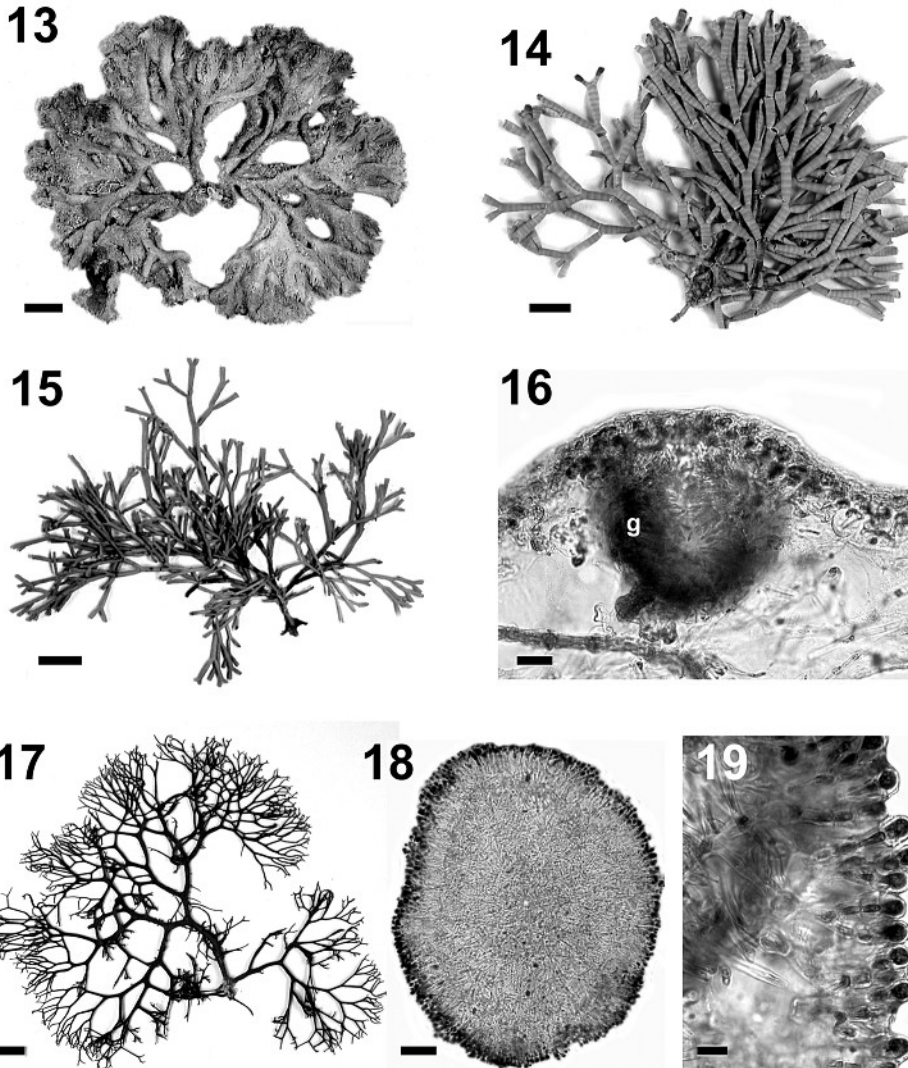
Thallus lightly calcified, to 3 cm high, reddish brown to pinkish white, attached to the substratum via a small discoidal holdfast. Habit hirsute or fur-like, with terete dichotomous branches 2-4 mm in diameter densely covered with fine, dark-red, extended assimilatory filaments of uniform length, 18-25  $\mu\text{m}$  in diameter and 1-4 mm long, arising as a continuation of colourless, compactly arranged medullary filaments. Medullary and assimilatory filaments structurally homogenous, with absence of tumid basal cells and undifferentiated supporting cells, and lack of a distinct ring of calcification.

**Remarks:** Growing on coral rubble in lagoon habitats. The very furry appearance of this species makes it distinctive in the field. It can be distinguished from superficially similar-looking *G. fasciculata* and *G. rugosa* (tetrasporophytic stage) by the characteristic continuous transition from compact, colourless medullary filaments into more loosely arranged pigmented assimilatory filaments.

***Galaxaura rugosa*** (J. Ellis *et Solander*) J.V. Lamouroux, 1816: 263. French Polynesia: Payri *et al.*, 2000: 166. Taiwan: Chou, 1947: 13, pl. IV figs 12-13; pl. X fig. 2; Wang *et al.*, 2005: 693, figs 3d-g, 4a-i, 6c-f, 7a-e; Hawaiian Islands: Svedelius, 1953: 18, figs 14-17; Abbott, 1999a: 68, fig. 8A-E; Indian Ocean: Papenfuss *et al.*, 1982: 421, figs 17-19, 29, 40-41, 45; Fiji: N'Yeurt, 2001: 755, figs 110, 115a-b, 123; Australia: Huisman & Borowitzka, 1990: 153-157, figs 1-13; Huisman, 2006: 22, fig. 7, pl. 6; Indonesia: Verheij & Prud'homme van Reine, 1993: 168, pl. 14 fig. 3; Belize: Littler & Littler, 1997: 23, fig. 6; South Africa: De Clerck *et al.*, 2002: 426, fig. 54; Papua New Guinea: Littler & Littler, 2003: 67; Taiwan: Wang *et al.*, 2005: 693, figs. 3d-g, 4a-i, 6c-f, 7a-e. **(Fig. 14)**

**Basionym:** *Corallina rugosa* J. Ellis *et Solander*, 1786: 115, pl. 22 fig. 3 (type locality: Jamaica).



Marine algal flora of French Polynesia III. Rhodophyta,  
with additions to the Phaeophyceae and Chlorophyta

Figs 13-19. **13.** *Galaxaura filamentosa*: habit (UPF 270). Scale = 5 mm. **14.** *Galaxaura rugosa*: habit (UPF 3015). Scale = 5 mm. **15.** *Tricleocarpa cylindrica*: habit (UPF 2450). Scale = 10 mm. **16.** *Tricleocarpa cylindrica*: transverse section of mature cystocarp, showing inwardly-directed gonimoblasts (g) (UPF 3239) Scale = 40  $\mu$ m. **17.** *Dermonema virens*: habit (UPF 3943). Scale = 5 mm. **18.** *Dermonema virens*: transverse section showing extensive filamentous medulla (UPF 3943). Scale = 100  $\mu$ m. **19.** *Dermonema virens*: detail of pigmented cortical cells (UPF 3943). Scale = 10  $\mu$ m.

**Heterotypic synonyms:** (given by Huisman & Borowitzka, 1990; Huisman *et al.*, 2004; Wang *et al.*, 2005): *Galaxaura glabriuscula* Kjellman. Hawaiian Islands: Tanaka, 1936: 151, figs 12-13, pl. 37 fig. 1; Svedelius, 1953: 10, figs 4-13; Fiji: Itono, 1985: 45, fig. 2. *Galaxaura lapidescens* (J. Ellis *et Solander*) J.V. Lamouroux. Cook Islands: Dickie, 1877: 32; Mauritius: Børgeesen, 1942: 46, fig. 22a-e; Brazil: Joly *et*

*al.*, 1967: 175, pl. I fig. 2, pl. II fig. 5; Indian Ocean: Papenfuss *et al.*, 1982: 407, figs 4-5, 22-23, 34, 44. *Galaxaura pacifica* Tak. Tanaka, 1935: 55, figs 5-6, pl. 18 fig. 2 (type locality: Japan); Tanaka, 1936: 151, fig. 11. *Galaxaura subfruticulosa* R. C. Y. Chou. Pacific Mexico: Dawson, 1953: 52, pl. 20 fig. 1; Hawaiian Islands: Svedelius, 1953: 51, figs 43-47. *Galaxaura subverticillata* Kjellman. Japan: Tanaka, 1936: 146, figs 3-4, pl. 34 fig. 2; Hawaiian Islands: Svedelius, 1953: 38, figs 33-42; Abbott, 1999a: 69, fig. 8F-H; Indian Ocean: Papenfuss *et al.*, 1982: 424, figs 20-21, 29, 42, 46; Belize: Littler & Littler, 1997: 24, fig. 7; Wallis Islands: N'Yeurt & Payri, 2004: 378.

**Material examined:** Maraa, Tahiti, 28 Sep. 1928, *leg. C. Crossland*, BM 841124; Tahara'a, Tahiti, 18 May 1996, *leg. C. E. Payri*, UPF 691; Tahara'a, Tahiti, 6 Jun. 1997, *leg. J. Orempuller*, UPF 378; Afaahiti, Tahiti, 7 Jun. 1997, *leg. A. D. R. N'Yeurt*, UPF 276, 278; Punaauia, Tahiti, 6 Jul. 1997, *leg. C. E. Payri*, UPF 277; Mt. Mokoto, Mangareva, Gambier, 27 Sep. 1997, *leg. J. Starmer*, UPF 621; Motu Martin, Mahina, 15 Oct. 2003, *leg. A. D. R. N'Yeurt*, UPF 3113; Tiahura, Moorea, 29 Sep. 2004, *leg. A. D. R. N'Yeurt & A. Pham*, UPF 2986; Trou du Souffleur, Papenoo, Tahiti, 27 Nov. 2005, *leg. A. D. R. N'Yeurt & A. Pham*, UPF 3015.

Gametophytic thallus heavily calcified, to 5 cm high, purple-pink, terete below and terete to compressed distally, with hollow, densely subdichotomously branched axes 0.7-1 mm in diameter, with truncate branch tips. Characteristic rings or annulations caused by breaks in calcification are present on upper parts of the branches, near the tips. Short and long assimilatory filaments to 1 mm long sparsely to moderately covering lower third of thallus, usually absent above. Medullary filaments 3-5  $\mu\text{m}$  in diameter. Cortex three- to four-layered; inner cortical cells large, 31-55  $\mu\text{m}$  wide and 14-18  $\mu\text{m}$  high, outer cortex composed of pigmented ovoid to pyriform cells 14-16  $\mu\text{m}$  wide and 14-15  $\mu\text{m}$  high. Mature cystocarps spherical, 200-215  $\mu\text{m}$  in diameter, with a distinct pericarp formed of gonimoblast filaments. Carposporangia ovoid, 12-18  $\mu\text{m}$  in diameter, borne singly or in pairs atop short gonimoblast filaments 15-24  $\mu\text{m}$  long and 3-4  $\mu\text{m}$  wide; distributed on all sides of the pericarp, especially on the outward surface. Tetrasporophytic thallus lightly calcified, 5-10 cm high, composed of short, entirely terete, intertwined, irregularly alternately branched axes 1-3 mm in diameter, evenly covered with reddish brown filaments. Assimilatory filaments stiff, both short (2-3 cells long, to 500  $\mu\text{m}$ , with ovoid to spherical terminal cells to 35  $\mu\text{m}$  in diameter) and long (to 1.6 mm, subtended by globose basal cells). Pseudoparenchymatous cortical layers absent. Medullary filaments colourless and loose, separated by a ring of calcification from the more compact, pigmented assimilatory filaments. Tetrasporangia cruciately divided, terminal on long assimilatory filaments.

**Remarks:** Growing on hard surfaces on fringing reefs of high islands in the Society Group. This species has a complicated taxonomic history, as the gametophytic and tetrasporophytic stages are dimorphic and were often interpreted as different species (Huisman *et al.*, 2004). Recent molecular studies (Wang *et al.*, 2005) indicate that the supposedly pan-tropical *G. rugosa* group is polyphyletic, and in need of taxonomic revision.

#### *Tricleocarpa* Huisman *et* Borowitzka

\**Tricleocarpa cylindrica* (J. Ellis *et* Solander) Huisman *et* Borowitzka, 1990: 164-168 figs 40-45, 50-52; Australia: Millar 1990: 306, fig. 5A-C; Huisman & Womersley, 1994: 116-118, fig. 32G; Huisman, 2006: 25, figs 2D, 9A-E, pl. 8; Indian Ocean: Silva *et al.*, 1996: 116; Huisman, 2000: 41; Hawaiian Islands: Abbott, 1999a: 73, fig. 10A; Fiji: N'Yeurt, 2001: 756, fig. 125; Samoa: Skelton & South, 2002a: 138;



Papua New Guinea: Littler & Littler, 2003: 66; Samoa: Skelton & South, 2007: 22, fig. 20. **(Figs 15-16)**

**Basionym:** *Corallina cylindrica* J. Ellis *et* Solander, 1786: 114, pl. 22, fig. 4 (type locality: West Indies).

**Homotypic synonym:** *Galaxaura cylindrica* (J. Ellis *et* Solander) J.V. Lamouroux, 1821: 22, pl. 22, fig. 4; Sri Lanka: Svedelius, 1945: 37; Taiwan: Chou, 1947: 5, pl. I, figs 1-12; pl. VIII, fig. 1.

**Material examined:** Akananue Bay, Rapa, Australs, 02 Nov. 2002, *leg. C. E. Payri*, UPF 1881, 3239 RPS43, 3527; Akatamiro Bay, Rapa, 02 Nov. 2002, *leg. C. E. Payri*, UPF 2450.

Thallus moderately calcified, forming greenish yellow clumps 60-90 mm across, composed of dichotomously branched, glabrous, cylindrical jointed axes 0.5-1.0 mm in diameter, with internodal distance 7-9 mm; branch apices hollow. Brittle and not adhering to paper when dry. Cortex 3-4 layered; inner cortical cells subspherical to oval, 18-35  $\mu\text{m}$  in diameter, longer than broad, not fused laterally. Outermost cortical cells ovate to pyriform, 10-20  $\mu\text{m}$  in diameter. Cystocarp to 200  $\mu\text{m}$  in diameter, with inward-directed gonimoblast filaments and fuzzy boundary owing to sterile paraphyses intermixed with pericarp tissue.

**Remarks:** Growing at depths of 0-3 m, in the upper littoral. This is the first record of the genus in French Polynesia, which differs from *Galaxaura* mainly by its glabrous axes and outer cortical cells which are not coherent following decalcification.

#### Liagoraceae Kützing

*Dermonema* Harvey *ex* Heydrich

***Dermonema virens*** (J. Agardh) Pedroche *et* Ávila Ortíz, 1996:77. French Polynesia: Payri *et al.*, 2000: 158; California: Desikachary, 1961: 135, figs 31-56, pl. 7 figs 1-6; Indian Ocean: Silva *et al.*, 1996: 119. **(Figs 17-19)**

**Basionym:** *Nemalion virens* J. Agardh, 1847: 8 (type locality: Mexico)

**Heterotypic synonym:** *Dermonema frappieri* (Montagne *et* Millardet) Børgesen, 1942: 42, fig. 21. Viêt Nam: Dawson, 1954: 414, fig. 25m; Seychelles: Wynne, 1995: 264, fig. 2.

**Material examined:** Taharaa, Tahiti, 14 Apr. 1997, *leg. A. D. R. N'Yeurt & C. E. Payri*, UPF 249, 250; 3 Mar. 2005, *leg. A. D. R. N'Yeurt & A. Pham*, UPF 3943.

Thallus up to 5 cm high, brown-red at the basal part and greenish at the top; firm and lubricous in texture, forming clumps fixed on the substratum by a small discoidal holdfast. Axes 0.5-1.0 mm wide, terete and dichotomously branched, distally tapered. Basal portions of the thallus broader and elongate, with upper portions gradually thinner and having progressively more frequent dichotomies. Internal structure consisting of an extensive clear filamentous medulla, giving rise to 4-5 times furcate cylindrical assimilatory filaments and a peripheral layer of pigmented, clavate assimilatory cells 10-12  $\mu\text{m}$  in diameter and 18-20  $\mu\text{m}$  long. Spermatangia pedicellate, on subterminal cells of cortical filaments.

**Remarks:** Growing on wave-exposed reefs or rocks. Forming dense clumps during the warm season (December to February). Abbott (1999: 58) reports *Dermonema pulvinatum* (Grunow *ex* Holmes) Fan from the Hawaiian Islands. This species differs from *D. virens* by its short, irregularly dichotomous branches and lacks the elongate basal portions found in the Tahitian plants. There is some controversy concerning the familial placement of this species, with some authors (e.g. Abbott, 1976, 1999; Dixon, 1982) recognizing the Dermonemataceae I. A. Abbott as distinct, and others (e.g. Kraft, 1989; Huisman *et al.*, 2004) considering a single family, Liagoraceae, based on cladistic and molecular data.





**Ganonema** K.C. Fan *et* Y.C. Wang

The complex history and taxonomy of this genus is discussed in Huisman *et al.* (2004).

\***Ganonema papenfussii** (I.A. Abbott) Huisman, I.A. Abbott *et* A.R. Sherwood, 2004: 299, figs 13-22. **(Figs 20-25)**

**Basionym:** *Liagora papenfussii* I.A. Abbott, 1945: 166, fig. 16a-c (type locality: O'ahu, Hawaiian Islands). Hawaiian Islands: Abbott, 1999a: 87, fig. 15A-E.

**Material examined:** Hoa Perete, Rangiroa, 12 Mar. 2003, *leg. C. E. Payri*, UPF 3178, 3179, 3180, 3181, 3182.

Thallus to 20 cm tall, coarse and heavily calcified, rugose in texture, becoming creamy-brown in colour when dried, attached via a conspicuous single basal holdfast. Main axes wide and prominent, 2-3 mm in diameter, alternately to pinnately branched with abrupt transition to thinner, densely branched secondary and higher order axes 0.2-0.8 mm in diameter. Ultimate branchlets 0.1-0.5 mm wide, attenuate, often divaricate. Medullary filaments cylindrical, 40-100 µm in diameter; cortical filaments with cylindrical cells at base, becoming subcylindrical to moniliform/ovoid above, 8-10 µm in diameter; outermost cells irregularly arranged. Plants monoecious; spermatangia in small terminal cap-like groups. Cystocarps globular, lacking involucre, but with small tufts of sterile filaments at base.

**Remarks:** Growing on the reef flat spillway, outer lagoon. This species can readily be distinguished by its large size, coarse habit and percurrent, wide main axes, 2-3 mm in diameter that abruptly transit to thinner, radially branched secondary and higher order axes.

**Liagora** J.V. Lamouroux

**Key to the French Polynesian species of *Liagora***

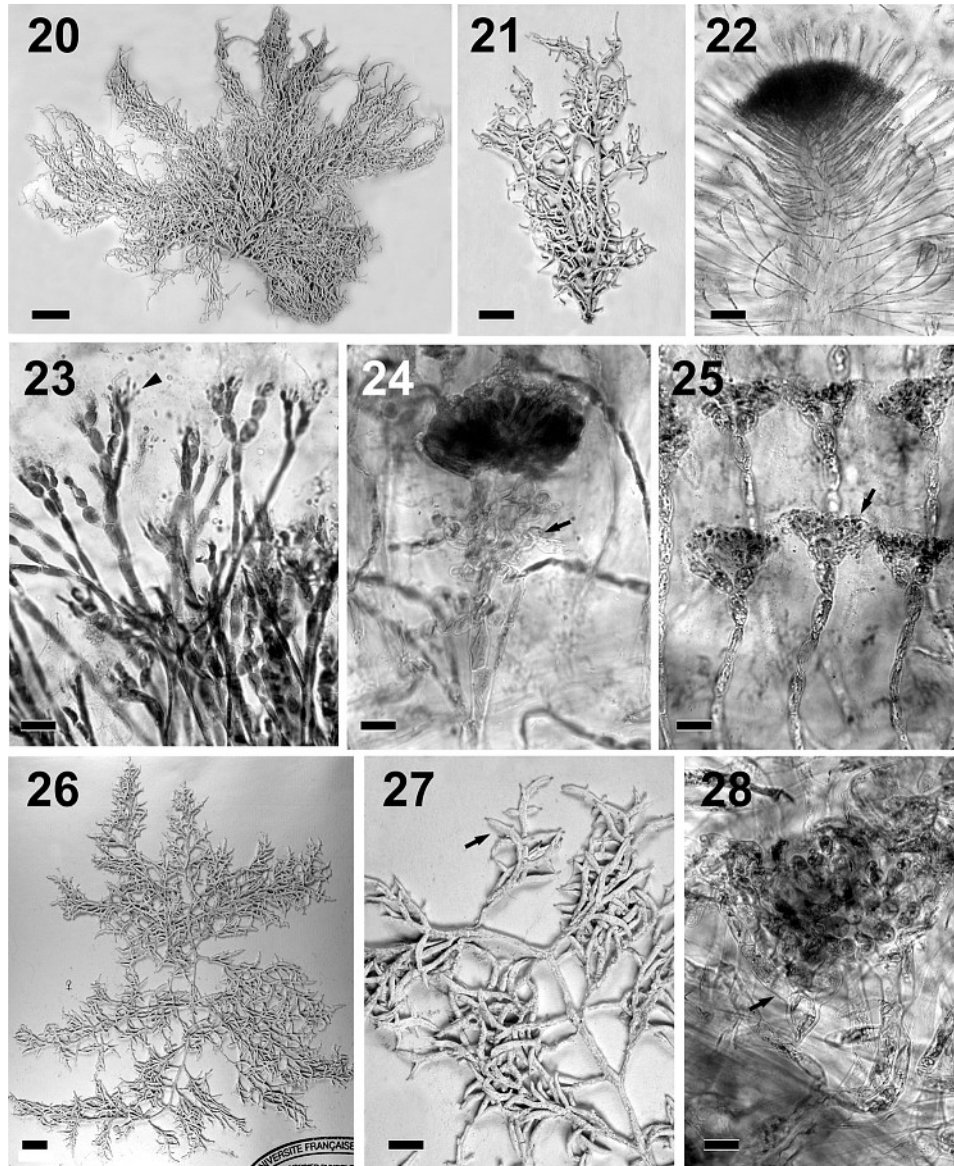
- 1a. Thallus pinnately, radially or irregularly branched; branches fusiform .....  
..... *L. albicans*
- 1b. Thallus more or less regularly dichotomously branched; branches straight .. 2
  - 2a. Axes 0.5-1.0 mm in diameter; regularly dichotomous; apices divaricate ....  
..... *L. divaricata*
  - 2b. Axes 1-2 mm in diameter; pinnate to dichotomous, apices not divaricate .3
- 3a. Branching pinnate to dichotomous; internodes short, 5-10 mm in mid-thallus;  
calcification moderately heavy throughout..... *L. ceranoides*
- 3b. Branching exclusively dichotomous; internodes long, 12-15 mm in mid-thallus;  
calcification light around medullary core ..... *L. sp. inedit*

\***Liagora albicans** J.V. Lamouroux, 1816: 240, pl. 7 fig. 7 (type locality: "Indes Orientales"). Hawaiian Islands: Abbott, 1990: 119, figs 16-21; 1999: 81, fig. 13A-D; Indian Ocean: Silva *et al.*, 1996: 122. **(Figs 26-28)**

**Material examined:** Tuamotu, c. 1995, *leg. J. Orempuller*, UPF 341; Haraiki, *leg. J. Orempuller*, 14 Nov. 1996, UPF 344, 15 Nov. 1996, UPF 340.

Thallus 12-20 cm high, with pinnate to radially branched or subdichotomous, slender percurrent axes 0.8-1.5 mm in diameter, attached via a single basal holdfast. Calcification heavy, rugose in texture and brittle when dry. Ultimate branchlets simple, usually spindle-shaped and basally constricted. Medullary filaments 6-8 µm in diameter, cortical filaments subcylindrical, 8-10 µm in diameter. Plants dioecious or monoecious. Cystocarps compact, with groups of



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Figs 20-28. **20.** *Ganonema papenfussii*: habit of cystocarpic plant (UPF 3179). Scale = 20 mm. **21.** *Ganonema papenfussii*: habit of spermatangial plant (UPF 3182). Scale = 12 mm. **22.** *Ganonema papenfussii*: detail of apical region of branch (UPF 3178). Scale = 50  $\mu$ m. **23.** *Ganonema papenfussii*: groups of spermatangia (arrowhead) terminal on cortical cells (UPF 3179). Scale = 20  $\mu$ m. **24.** *Ganonema papenfussii*: Mature cystocarp with basal tuft of sterile filaments (arrow) (UPF 3178). Scale = 20  $\mu$ m. **25.** *Ganonema papenfussii*: detail of cortical fascicles with terminal groups of spermatangia (arrow) (UPF 3179). Scale = 20  $\mu$ m. **26.** *Liagora albicans*: habit (UPF 344). Scale = 10 mm. **27.** *Liagora albicans*: detail of thallus showing spindle-shaped ultimate branchlets (arrow). Scale = 3 mm. **28.** *Liagora albicans*: cystocarp with sterile filaments (UPF 344). Scale = 20  $\mu$ m.



tightly adhering cortical and sterile filament cells at the base. Spermatangia occurring singly or in pairs at filament apices.

**Remarks:** Growing in the lagoon of atolls of the Tuamotu archipelago. This species is morphologically variable, ranging from laxly, pinnately branched to subdichotomously branched thalli. The brittle, mealy surface when dry, the lax slender habit and the often fusiform, basally constricted secondary branchlets distinguishes this species from the other species of the genus in French Polynesia.

*Liagora ceranoides* J.V. Lamouroux, 1816: 239 (type locality: Virgin Islands). French Polynesia: Payri *et al.*, 2000: 158; India: Børgesen 1931: 3; Japan: Yamada, 1938: 20, pl. 6; Viêt Nam: Dawson, 1954: 416, fig. 28a; Taiwan: Chiang & Chen, 1982: 185, figs 6-10; Canary Islands: Kvaternik & Afonso-Carillo, 1995: 465, figs 77-86; Florida: Brodie & Norris, 1996: 124 fig. 1; Belize: Littler & Littler, 1997: 21, fig. 1; Hawaiian Islands: Abbott, 1990: 116, figs 12-15; 1999: 84, fig. 131-M; Indian Ocean: Silva *et al.*, 1996: 123; Fiji: N'Yeurt, 2001: 758 (f. *leprosa*); Littler & Littler, 2003: 58; Samoa: Skelton & South, 2002a: 139, fig. 3G; 2007: 24, figs 22-23. **(Figs 29-30)**

**Material examined:** Nihiru, 1 Oct. 1995, *leg. J. Orempuller*, UPF 338; Marokau, 22 Sep. 1996, *leg. J. Orempuller*, UPF 342; Hiti, 11 Nov. 1996, *leg. J. Orempuller*, UPF 339; Hikueru, 16 Nov. 1996, *leg. J. Orempuller*, UPF 343.

Thallus 5-12 cm high, whitish pink and moderately calcified, soft and gooey in texture, forming hemispheric clumps. Axes terete, 1-2 mm in diameter, moderately calcified, mealy in texture when dry. Branching pinnate to dichotomous, with short internodes of 5-10 mm between successive forks; ultimate branchlets blunt and dichotomously branched, of same diameter throughout and unstricted at the base. Cortical filaments slender, di- or trichotomously branched, with terminal cells 2-3  $\mu\text{m}$  in diameter. Plants dioecious. Spermatangia pedicellate, terminal on cortical filaments; cystocarps small, with slender involucre filaments.

**Remarks:** Relatively common on coralline crest, down to 20 m in the lagoons and outer slope of the Tuamotu archipelago. The relatively wide, frequently dichotomously branched pink soft axes of this species are characteristic in the field.

\**Liagora divaricata* C. K. Tseng, 1941: 268, figs 2-4 (type locality: Hainan Island, China). Viêt Nam: Dawson, 1954: 415, fig. 27a; Hawaiian Islands: Abbott, 1945: 155, fig. 7a-b; 1999: 85, fig. 14A-B; Abbott & Huisman, 2003: 602, figs 26-33; Indian Ocean: Silva *et al.*, 1996: 125. **(Figs 31-32)**

**Material examined:** Rapa, Australs, 4 Nov. 2002, *leg. C. E. Payri*, UPF 2257.

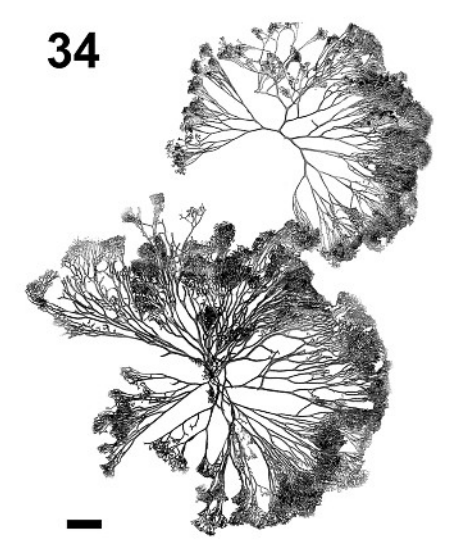
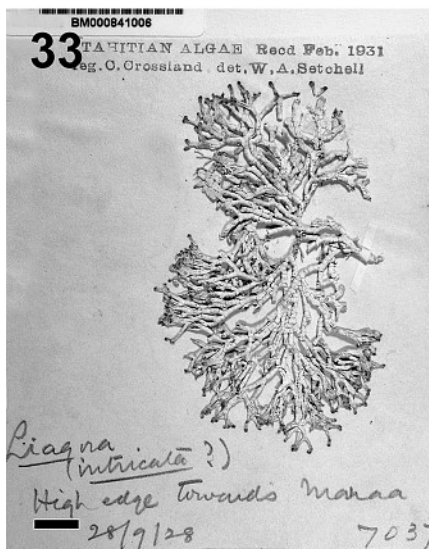
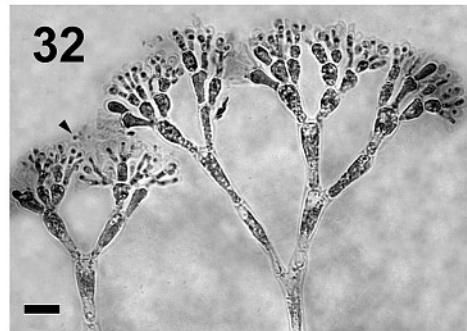
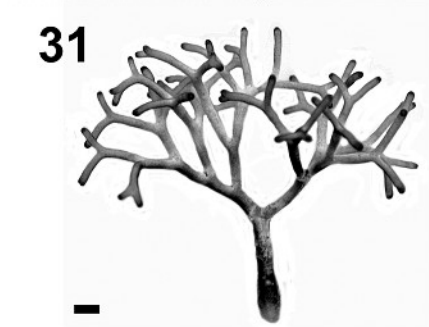
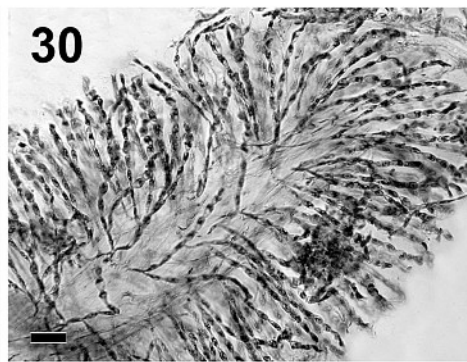
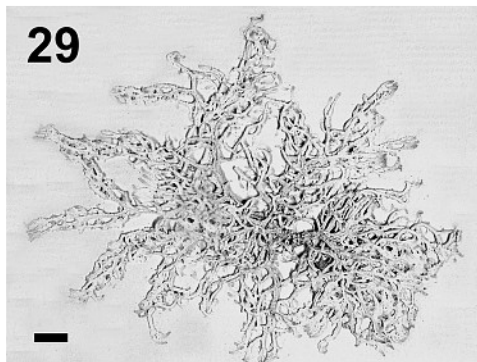
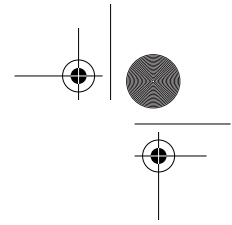
Thallus to 8 cm high, moderately calcified and erect from a single holdfast, white with reddish branch tips, surface of axes smooth when dry. Branching regularly dichotomous. Axes compressed basally and terete above, 0.5-1.0 mm in diameter, with attenuate and divaricate apices. Medulla consisting of cylindrical filaments to 25  $\mu\text{m}$  in diameter. Cortical filaments straight and little branched basally, repeatedly divided and crowded distally, with small ovoid terminal cells. Plants dioecious; spermatangia in digitate clusters on outer cortical cells.

**Remarks:** A single spermatangial specimen found growing on rocky ledges at the base of cliffs, in *Sargassum* beds, 1-3 m deep. The regularly dichotomous branching and attenuate, divaricate branch apices are characteristic of this species.

\**Liagora sp. inedit.*

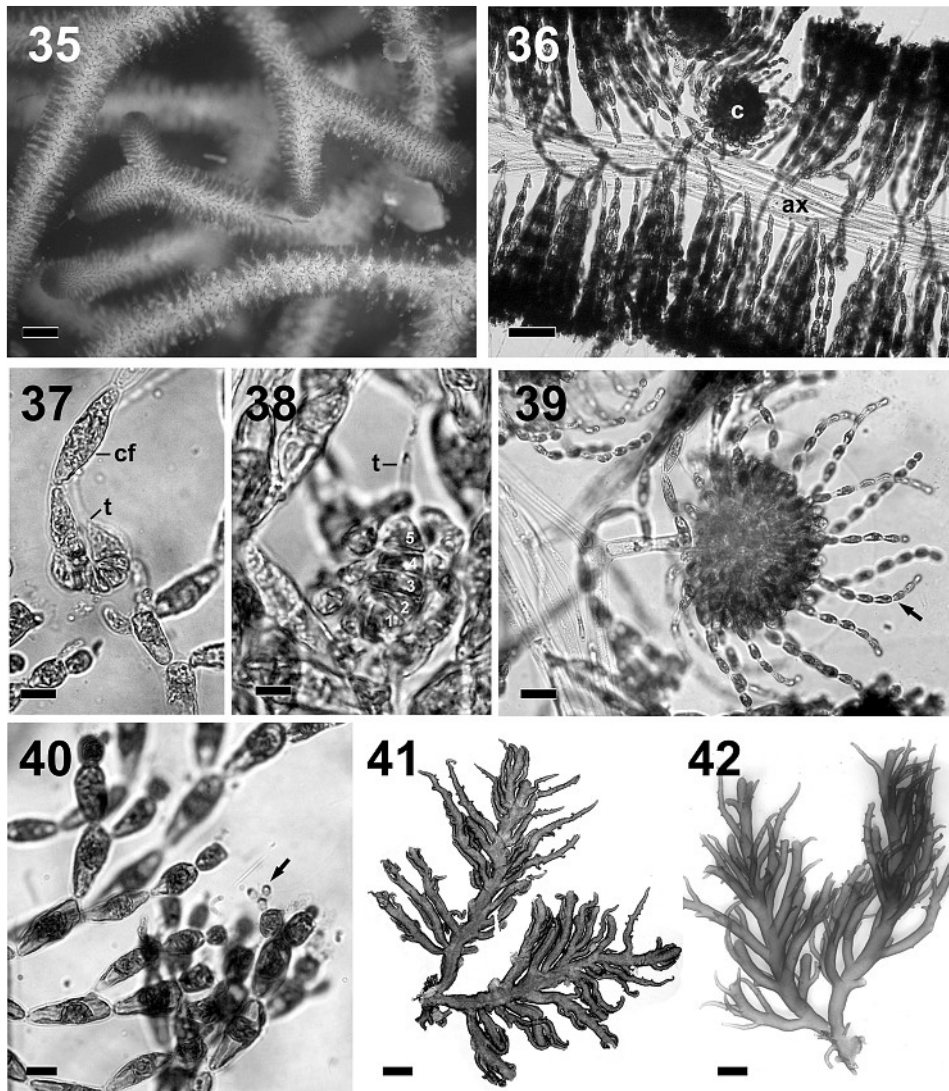
**(Figs 34-40)**

**Material examined:** Rarapai Islet, Rapa, Australs, 04 Nov. 2002, *leg. J. L. Menou*, UPF 2258, 2260, 2261, 2262, 3341 RPS128, 3342 RPS129, 3343 RPS130, 3344 RPS131, 3345 RPS132, 3346 RPS133, 3482 RPS260, 3511 RPS289; north-east oceanic plateau (tuna hole), Rapa, 20 Nov. 2002, *leg. J. L. Menou*, UPF 2259, 3230 RPS34, 3347 RPS134, 3348 RPS135; exit of Ha'urei Bay, Rapa, 29 Nov. 2002, *leg. J. L. Menou*, UPF 3331 RPS118, 3332 RPS119.



Figs 29-34. **29.** *Liagora ceranoides*: habit (UPF 338) Scale = 6 mm. **30.** *Liagora ceranoides*: detail of decalcified branch near apex, showing cortical fascicles (UPF 338). Scale = 5 µm. **31.** *Liagora divaricata*: habit of freshly-collected plant (UPF 2257). Scale = 2 mm. **32.** *Liagora divaricata*: digitate clusters of spermatangia (arrowhead) on cortical cells (UPF 2257). Scale = 12 µm. **33.** *Titanophycus validus*: habit of plant collected by Cyril Crossland in Tahiti (BM 841006). Scale = 10 mm. **34.** *Liagora* sp. inedit: habit (UPF 2258 ). Scale = 20 mm.





Figs 35-42. **35.** *Liagora* sp. inedit: habit of freshly-collected plant (UPF 2258). Scale = 1 mm. **36.** *Liagora* sp. inedit: optical section of branch, showing central axial bundle (ax) and mature cystocarp (c) (UPF 2258). Scale = 50  $\mu$ m. **37.** *Liagora* sp. inedit: carpogonial branch in lateral position on cortical fascicles (cf), showing trichogyne (t) (UPF 2258). Scale = 10  $\mu$ m. **38.** *Liagora* sp. inedit: 5-celled curved carpogonial branch (1-5), with trichogyne (t) (UPF 2258). Scale = 5  $\mu$ m. **39.** *Liagora* sp. inedit: detail of mature cystocarp, with long sterile involucres (arrow) (UPF 3331). Scale = 5  $\mu$ m. **40.** *Liagora* sp. inedit: detail of paired spermatia (arrow) terminal on cortical cells (UPF 3482). Scale = 8  $\mu$ m. **41.** *Trichogloea requienii*: habit of pressed plant (UPF 2247). Scale = 15 mm. **42.** *Trichogloea requienii*: habit of living plant (UPF 2247). Scale = 15 mm.





Thallus pinkish red, 7-8 (12) cm high, composed of lubricous, blunt-ended terete axes 1-1.5 mm in diameter which are repeatedly dichotomously branched. Calcification light and flocculent around medullary core; plants adhering well to paper with a rough texture when dry. Internodes 12-15 mm long in mid-thallus, becoming 3-10 mm long in distal parts. Ultimate branchlets densely crowded, 400-500  $\mu\text{m}$  in diameter. Structure multiaxial, with a central axial bundle 30-40  $\mu\text{m}$  wide composed of parallel filaments 4-6  $\mu\text{m}$  in diameter, producing perpendicularly placed, subdichotomously branched cortical fascicles, 300-350  $\mu\text{m}$  long and  $\bullet\bullet$   $\mu\text{m}$  in diameter. Cells of cortical fascicles 5-10  $\mu\text{m}$  in diameter, ovoid, becoming rounded and 5-8  $\mu\text{m}$  terminally. Plants dioecious; spermatia 2.0-2.5  $\mu\text{m}$  in diameter, pedicellate and occurring usually in pairs, terminal on cortical cells. Carpogonial branches lateral on subterminal cells of cortical fascicles, 56 celled, 30-40  $\mu\text{m}$  long and 10-15  $\mu\text{m}$  wide, with a moderately long trichogyne, slightly to heavily curved upwards. Cystocarps (80)90-140(150)  $\mu\text{m}$  in diameter, embedded in cortical fascicles, with several long involucrel filaments issued from the base of the carpogonial branch. Carposporangia 4-5  $\mu\text{m}$  in diameter.

**Remarks:** Growing at depths of 32 to 55 m, on the oceanic slope. This deepwater species is morphologically similar to *L. ceranoides*, but differs in its strictly dichotomous branching, lighter calcification, and longer internodes.

*Titanophycus* Huisman, G.W. Saunders *et* A.R. Sherwood

\**Titanophycus validus* (Harvey) Huisman, G.W. Saunders *et* A.R. Sherwood 2006: 119, 81, fig. 34A-G. **(Fig. 33)**

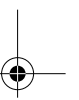
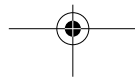
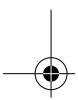
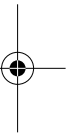
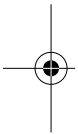
**Basionym:** *Liagora valida* Harvey, 1853: 138, pl. 31A (type locality: Sand Key, Florida, U.S.A). Indian Ocean: Silva *et al.*, 1996: 127; Rotuma: N'Yeurt, 1996: 410, figs 114, 121; Hawaiian Islands: Abbott, 1999a: 93, fig. 17I-J.

**Heterotypic synonym** (according to Huisman *et al.*, 2006): *Liagora setchellii* Yamada, 1938: 13, pl. 3 figs 2, 7-8 (syntype localities: Bonin Island and Ryukyu Islands, Japan; Kashoto, Taiwan). Taiwan: Chiang & Chen, 1982: 190, figs 26-33; Hawaiian Islands: Abbott, 1945: 153, figs 4a-c, 5; 1999: 91, fig. 17F-H; Fiji: N'Yeurt, 2001: 759, fig. 112.

**Material examined:** Maraa, Tahiti, 28 Sep. 1928, *leg.* C. Crossland (det. I. A. Abbott, v. 1975 as *L. setchellii*), BM 841006.

Thallus 6-7 cm high, calcification very heavy, becoming brittle and chalky, giving annulate appearance to some branches. Main axes 1.5-2 mm in diameter, branching dense and irregular, with divaricate, blunt ultimate apices about 1 mm in diameter. Medulla consisting of cylindrical cells 20-28  $\mu\text{m}$  in diameter; cortical filaments usually dichotomously branched four times, the first proximal division well spaced from the other three distal ones which are closely packed together. Cortical cells cylindrical to oval, becoming spherical in distal portions. Plants monoecious or dioecious; spermatangia shortly pedicellate, singly or in pairs on subapical lateral branchlets. Cystocarps large, with dense network of sterile filaments below gonimoblast.

**Remarks:** Found by Crossland to be growing on the 'high edge' (*sic*) of the reef towards Maraa. The very heavy, broken-up calcification and irregular branching of this species is distinctive. This species has not been recollected since Crossland's visit; the Maraa district of Tahiti being phycologically poorly known. The habit of the Tahitian plant in BM is virtually identical to one reported from Fiji (N'Yeurt, 2001: fig. 112, as *Liagora setchellii*). According to Abbott (1999a: 91), *L. setchellii* differs from *L. valida* by its larger size, smaller lateral branchlets bearing spermatangia, thicker branches and higher level of calcification, and differing





sterile filaments and number of carposporangia. Huisman *et al.* (2006: 116-119), presenting new molecular data, segregated *L. valida* under their new genus *Titanophycus*, which differs from *Liagora* by the absence of short lateral branchlets, the production of unbranched terminal filaments two to many cells long, obconical cystocarps, a hardly discernible gonimoblast, and spermatangial branches arising on subperipheral cells which eventually modify into cortical filaments with crowded terminal spermatangia. Huisman *et al.* (2006: 82) listed *L. setchellii* as a synonym of *Titanophycus validus*.

### *Trichogloea* Kützing

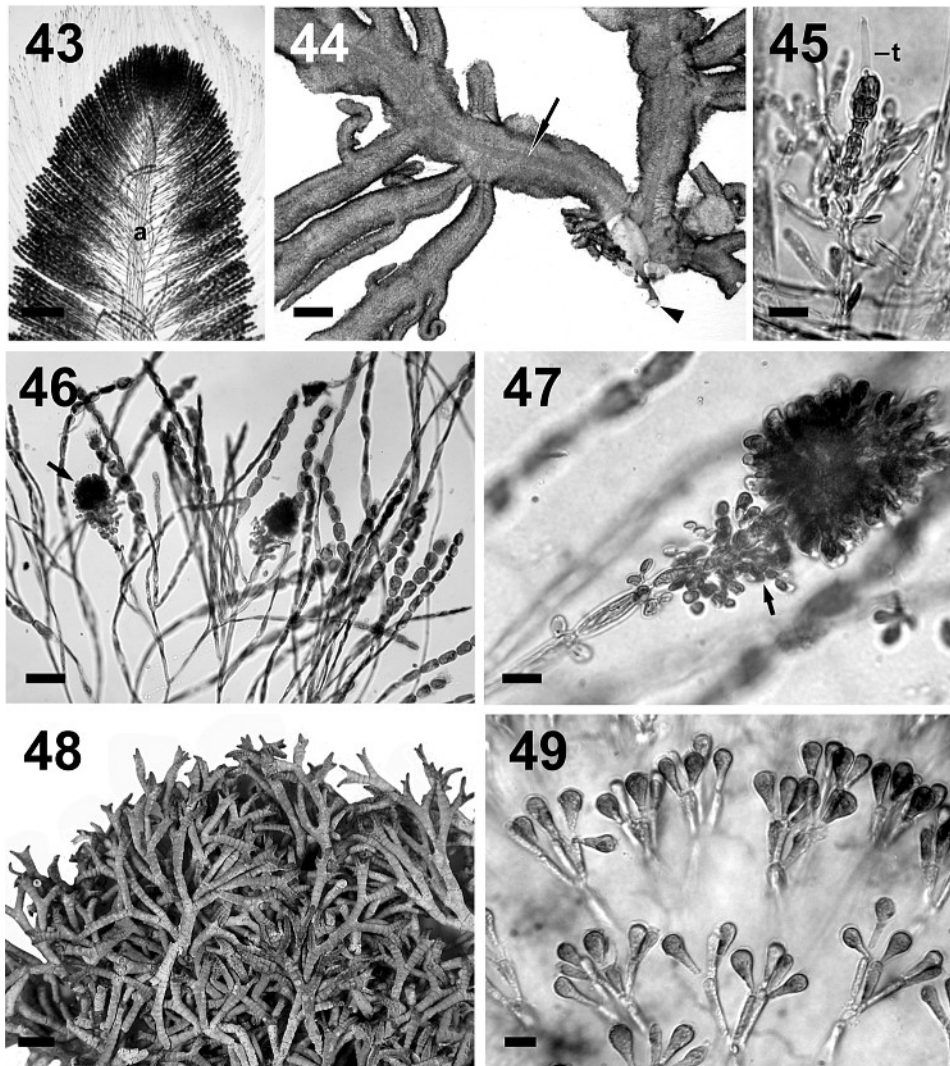
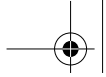
\**Trichogloea requienii* (Montagne) Kützing, 1847: 54. Mauritius: Børgesen, 1942: 17, fig. 7; 1951: 15, fig. 5a-b; 1952: 16, figs 8, 9a-b, pl. I; Cuba: Díaz-Piferrer, 1964: 361, fig. 4; Venezuela: Díaz-Piferrer, 1970: 171, fig. 27; Indian Ocean: Silva *et al.*, 1996: 130; Hawaiian Islands: Abbott, 1999a: 96, fig. 18D-F; Abbott & Huisman, 2005: 151, figs 1-15; Australia: Huisman, 2000: 35; 2006: 85, figs 1G, 35B, 36A-C, pl. 20; Papua New Guinea: Millar *et al.*, 1999: 553, fig. 1D. **(Figs 41-47)**

**Basionym:** *Batrachospermum requienii* Montagne, 1843: 355-356 (type locality: Red Sea).

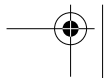
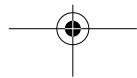
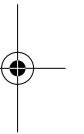
**Material examined:** Akananue Bay, Rapa, Australs, 02 Nov. 2002, *leg. C. E. Payri*, UPF 2248, 2249, 2250, 3322 RPS109, 3324 RPS111, 3325 RPS112, 3352 RPS138, 3356 RPS142; Rarapai Islet, Rapa, 04 Nov. 2002, *leg. J. L. Menou*, UPF 2251, 3323 RPS110; between Patagaroa and Mei Points, Rapa, 18 Nov. 2002, *leg. C. E. Payri*, UPF 2252, 2256, 3227 RPS31, 3319 RPS106; Tauna Islet, Rapa, 27 Nov. 2002, *leg. C. E. Payri*, UPF 2247, 3299 RPS88, 3412 RPS196; right of Rarapai Islet, Rapa, 30 Nov. 2002, *leg. J. L. Menou*, UPF 2253, 2254, 2255, 3301 RPS90, 3304 RPS91, 3305 RPS92.

Thallus reddish brown in colour, lubricous, 16-20 cm high, radially branched with an irregularly pyramidal outline, erect from a discoid basal holdfast. Branches terete to compressed, with a percurrent main axis 5-8 mm in diameter, from which are issued secondary axes up to 3 orders, 2-5 mm in diameter, with tapered, broadly acute tips. Plants are lightly calcified around the medulla, giving the appearance of a lighter coloured central stripe about 0.8-1.5 mm wide in all axes. Adheres well to paper when dry, with a moderately abrasive feel. Medulla of 6-8 central filaments, from which are issued assimilatory filaments 300-400  $\mu\text{m}$  long and 8-10  $\mu\text{m}$  in diameter in mid portions, with elongate, rounded to nearly spherical cells 10-30  $\mu\text{m}$  long. Plants dioecious; carpogonial branches 6-8 cells long, lateral on assimilatory filaments or replacing one part of dichotomies. Mature cystocarps 70-110  $\mu\text{m}$  in diameter, plumose-shaped, with carposporangia 5-8  $\mu\text{m}$  in diameter and a prominent post-fertilization fusion cell. Elongate, moderately dense clusters of sterile cells occur on the first 4 cells immediately below the mature gonimoblast. Spermatia 1-2  $\mu\text{m}$  in diameter, occur in whorls on 2-3 subterminal cells of assimilatory filaments, but usually not on the terminal cell itself.

**Remarks:** Growing relatively commonly at depths of (4-) 27-49 (-67) m, on the inner and outer reef slopes of the southern Australs island of Rapa. The French Polynesian plants are in good agreement with reproductive and morphological characters defined for the species in Abbott & Huisman (2005), but the medulla seems to be much less calcified than reported elsewhere. The morphologically similar *T. lubrica* J. Agardh (type locality Tonga), differs from *T. requienii* in having none to few sterile filaments at the base of cystocarps, and in having both terminal and intercalary spermatangia.



Figs 43-49. **43.** *Trichogloea requienii*: optical section of a decalcified terminal axis, showing medullary axial bundle (a) (UPF 2247). Scale = 1 mm. **44.** *Trichogloea requienii*: detail of base of pressed plant, showing lighter-coloured medullary stripe (arrow) and inconspicuous discoid holdfast (arrowhead) (UPF 2247). Scale = 5 mm. **45.** *Trichogloea requienii*: carpogonial branch, showing trichogyne (t) (UPF 2248). Scale = 10  $\mu$ m. **46.** *Trichogloea requienii*: region of cortex with several mature, plumose cystocarps (arrow) (UPF 2247). Scale = 80  $\mu$ m. **47.** *Trichogloea requienii*: detail of mature cystocarp, showing basal clusters of sterile cells (arrow) (UPF 2249). Scale = 20  $\mu$ m. **48.** *Yamaedella caenomyce*: habit of Tahitian plant, showing characteristic striations on axes (UPF 3011). Scale = 3 mm. **49.** *Yamaedella caenomyce*: clavate cortical cells (UPF 3011). Scale = 20  $\mu$ m.



***Yamadaella*** I.A. Abbott

***Yamadaella caenomyce*** (Decaisne) I.A. Abbott, 1970: 117, figs 1, 3-9. French Polynesia: Abbott, 1970: 117 (J. Tilden specimen in MIN; type of *Liagora intricata* Butters, 1911). Indian Ocean: Silva *et al.*, 1996: 130; Dominican Republic: Wynne & Huisman, 1998: 281, figs 1-7; Hawaiian Islands: Abbott, 1999a: 62, fig. 6A-D; Philippines: Kraft, *et al.*, 1999: 8, fig. 5; Australia: Huisman, 2006: 86, figs 36D-G, pl. 21. **(Figs 48-52)**

**Basionym:** *Liagora caenomyce* Decaisne, 1842: 119 (type locality: Manila, Philippines). Weber-van Bosse, 1921: 202, figs 60, 63-64.

**Material examined:** Rapa Island, Australs, 4 Nov. 2002, *leg. C. E. Payri*, UPF 2263, 3427 (RPS 205), 3484 (RPS 262), 3492 (RPS 270), 3497 (RPS 275), 3515 (RPS 293), 3614; Taharaa, Tahiti, 27 Nov. 2005, *leg. A. D. R. N'Yeurt & A. Pham*, UPF 3011, 3012, 3013, 3014.

Thallus to 15 cm across, intricately branched and mat-like, reddish-brown to cream-coloured, forming discrete, closely adhering clumps. Branching dichotomous to irregular, with axes 0.5-1.5 mm wide. Calcification moderate to relatively heavy, with tips of branchlets uncalcified. The calcification is usually transversely rugose, creating characteristic striation patterns on branches (in Tahitian plants, see remarks below). Medullary filaments closely intertwined, cortical cells distinctly inflated, clavate, 15-20 µm in diameter. Spermatangia pedicellate on sub-terminal cortical cells, in bunches of 1-2. Carpogonial branch straight, 3-celled, lateral on lower portion of cortical fascicles. Cystocarp loosely filamentous, bearing terminal carposporangia or cruciately divided carpotetrasporangia.

**Remarks:** Growing as intricate masses closely adhering the substratum (exposed pavement or fringing reef front). Since Tilden's sampling at the turn of the last century, this species was not recollected in Tahiti until 2005, despite over twenty years of surveying. Perhaps ecological or seasonal factors are responsible for this sudden reappearance. The Tahitian material conforms well to the description of the type of the species, however the Rapa plants do not show the clear, characteristic annulate patterns of calcification on the branches. This difference might be environmentally induced, with heavier calcification masking the usual transversely rugose pattern. Abbott (1999: 63), after re-examination of relevant material exhibiting a large range of habit and size, recognized only a single species of *Yamadaella* worldwide.

**Bonnemaisoniales** Feldmann *et* G. Feldmann**Bonnemaisoniaceae** F. Schmitz***Asparagopsis*** Montagne *in* Barker-Webb *et* Berthelot

***Asparagopsis taxiformis*** (Delile) Trevisan, 1845: 45. French Polynesia: Payri *et al.*, 2000: 160; Marshall Islands: Dawson, 1957: 112, fig. 20; South Africa: Norris, 1992c: 2, figs 1-6; Indian Ocean: Silva *et al.*, 1996: 182; South Australia: Womersley, 1996: 331, pl. 2 fig. 4; fig. 148; Ní Chualáin *et al.*, 2004: 1119, figs 1a, 6b-h; Hawaiian Islands: Abbott, 1999a: 174, fig. 43A-D; Fiji: N'Yeurt, 2001: 775, figs 141-142; Littler & Littler, 2003: 68; Samoa: Skelton & South, 2002a: 141, figs 6G, 7A-B; 2007: 50, figs 79-85; Mediterranean: Andreakis *et al.*, 2004: 278. **(Fig. 53)**

**Basionym:** *Fucus taxiformis* Delile, 1813-1826: 295-296, pl. 57 fig. 2 (type locality: Alexandria, Egypt).

**Material examined:** Punaauia, Tahiti, 11 Oct. 1995, UPF 440; Taapuna, Tahiti, 5 Jun. 1997, *leg. J. Orempuller*, UPF 230; Entre deux Baies, Moorea, 30 Jun. 1997, *leg. A. D. R. N'Yeurt*, UPF 229; Punaauia, Tahiti, 3 Jan. 1998, *leg. S. Andrefouët*, UPF 608; Rurutu, 18 Aug. 2000, *leg. C. E. Payri*, UPF 731; Mekiro, Gambier, 17 Nov. 2000, *leg. A. D. R. N'Yeurt*, UPF 910; Atituiti, Mangareva, *leg. A. D. R. N'Yeurt*, 18 Nov. 2000, UPF 887, 19 Nov. 2000, UPF 912;



Motu Martin, Mahina, Tahiti, 15 Oct. 2003, *leg. A. D. R. N'Yeurt*, UPF 3111; Tiahura, Moorea, 30 Sep. 2004, *leg. A. D. R. N'Yeurt & A. Pham*, UPF 2957.

Gametangial thallus to 10 cm high, light pink and bushy. Main axes erect and abundantly branched, 1.5-2 mm in diameter, with numerous branchlets present at the top. Basal part creeping, attached on hard substrata. Tetrasporic thallus filamentous, 20-25 µm in diameter, consisting of an axial cell surrounded by 3 pericentral cells; ultimate branchlets tapered, with a prominent apical cell. Tetrasporangia cruciately divided and occurring one per segment in series, in short side branchlets.

**Remarks:** A relatively rare (but sometimes locally abundant) alga, present throughout the year in exposed areas such as the bottom of passes and the back reef of the Society and Gambier Archipelagos. The filamentous tetrasporophyte of this species was previously classified as a separate genus and species, *Falkenbergia hildenbrandii* (Bornet) Falkenberg. The relationship between the filamentous and erect stages in the life-history of *Asparagopsis* was demonstrated by Chihara (1961).

#### Gelidiales Kylin

#### Gelidiaceae Kützing *emend.* Perrone, Felicini *et* Bottalico

This family was recently revised by Perrone *et al.* (2006).

#### *Gelidium* J.V. Lamouroux

#### Key to the French Polynesian species of *Gelidium*

- 1a. Thallus with simple to sparsely pinnate, stipitate flattened blades. . . *G. isabelae*
- 1b. Thallus with unbranched perennial lower part, abundantly branched above . . .  
..... *G. samoense*

\**Gelidium isabelae* W.R. Taylor, 1945: 154, pl. 5 figs 8-12 (type locality: Pta. Albermarle, Isla Isabela, Archipiélago de Colón, Ecuador). Australia; New Caledonia: Millar & Freshwater, 2005: 243, figs 46, 75-80. **(Figs 54-55)**

**Misapplied names:** *Gelidium pusillum* (Stackhouse) Le Jolis. French Polynesia: Payri *et al.*, 2000: 168; Rotuma Island: N'Yeurt, 1996: 410, figs 111, 112, 196; Hawaiian Islands: Abbott, 1999a: 194, fig. 50A; Fiji: N'Yeurt, 2001: 760.

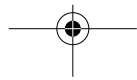
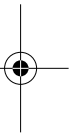
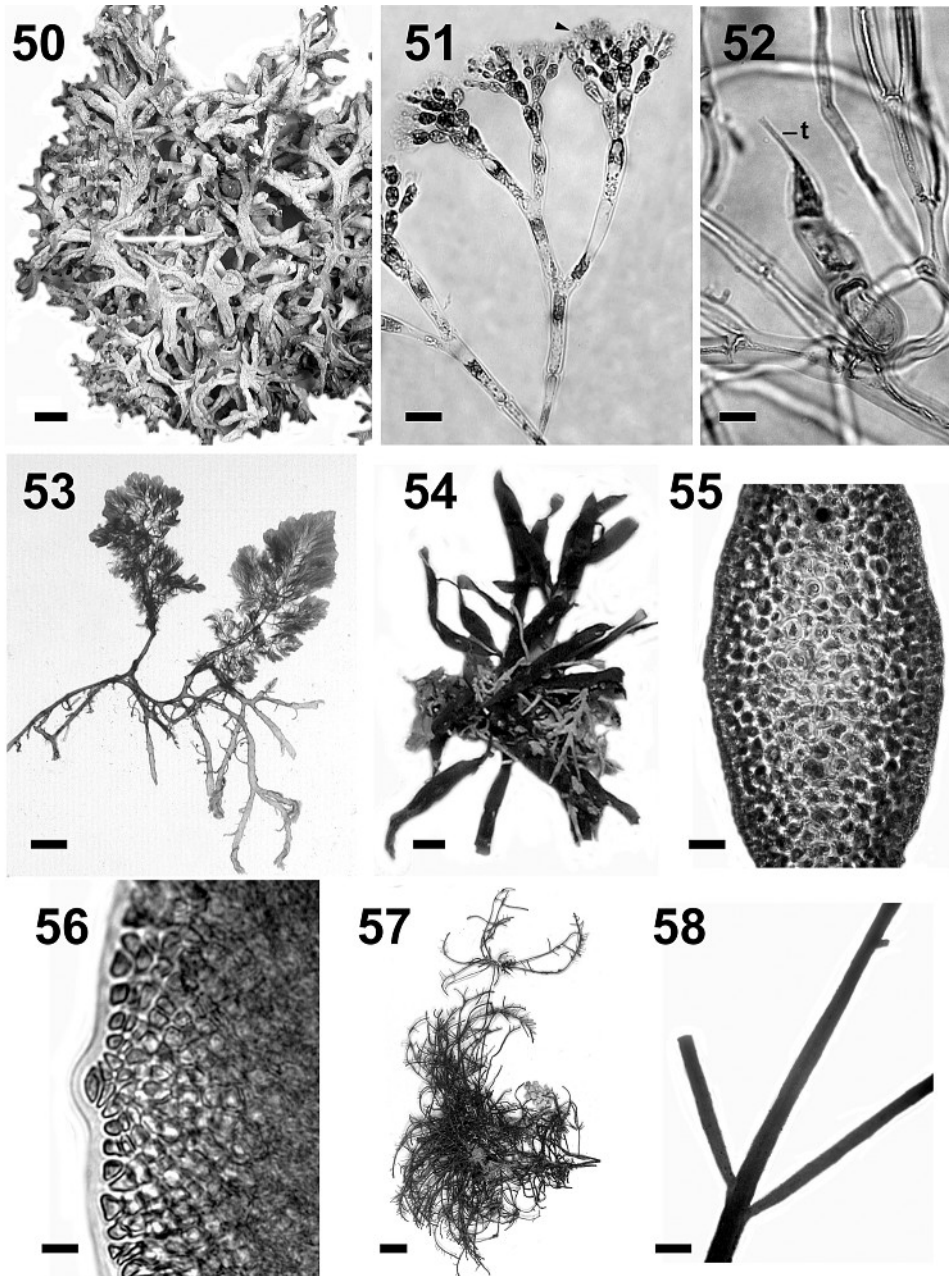
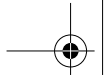
*Gelidium reptans* (Suhr) Kylin. Fiji: Littler & Littler, 2003: 54.

**Material examined:** Taharaa, Tahiti, 14 Apr. 1997, *leg. A. D. R. N'Yeurt*, UPF 288; Afaahiti, Tahiti, 10 Jun. 1997, *leg. A. D. R. N'Yeurt*, UPF 289, 542, 558.

Thallus to 20 mm high, reddish-brown to purple, composed of strap-shaped (ligulate) to clavate flattened blades 0.3-1.9 mm wide, entangled with and arising from a creeping stoloniferous terete base which adheres tightly to the substratum. Upright lower branches terete to compressed, stipitate, 200-300 µm thick; distally flattened and sparsely pinnately branched, 80-100 µm thick, often with tapered filiform tips that can produce hapteroid holdfasts, and a distinct apical cell. In cross section, axes consist of a medulla of elongated, thick-walled cells 15-20 µm in diameter, interspersed with abundant rhizines, surrounded by a cortex of irregularly globose, pigmented cortical cells 2.5-5.0 µm in diameter that is 3-5 cells thick in terete portions, and 1-3 cells thick in flattened portions. The cortex in distal portions of flattened blades is often of uneven thickness, creating visible decussate lines. Tetrasporangial sori in mid-upper parts of secondary branchlets, with irregularly disposed tetrasporangia 25-28 µm in diameter.

**Remarks:** Commonly found in the Society Group, growing on rocks and coralline surfaces from the shoreline to about 10 m depth. Pacific populations of this entity were often reported in the past as *G. pusillum* (type locality Devonshire, England),





but tropical records of this putatively worldwide species were put in doubt by Freshwater & Rueness (1994), as the species appeared to be polyphyletic. More recently, Millar & Freshwater (2005) have examined Australian records of *G. pusillum* and concluded that they were referable to *G. isabelae*. The French Polynesian plants have mostly simple, flattened, basally stipitate axes, and agree well with the description of *G. isabelae* in Taylor (1945) and Millar & Freshwater (2005). Tropical Pacific records of *G. pusillum* should be reinvestigated in the light of this new information, as descriptions of this species in Abbott (1999) and N'Yeurt (1996, 2001) also agree with the species concept of *G. isabelae*. Littler & Littler (2003) report *G. reptans* (type locality: Cape of Good Hope), also a flattened turf-forming species, from Fiji, and their description would agree more with *G. isabelae* than the South African species. *Gelidium samoense*, another turf-forming species found in Samoa, Fiji and Tahiti (Santelices *et al.*, 2004), mainly differs from *G. isabelae* by its long unbranched basal portion, and abundantly branched upper thallus. Also, terminal branches of different ages are dimorphic in *G. samoense*.

***Gelidium samoense*** Reinbold 1907: 204 (Type locality: Apia, Samoa). French Polynesia: Setchell, 1926: 99, pl. 17, figs 1-6 (incl. f. *lineare* Setchell); Fiji: Santelices *et al.*, 2004: 120, figs 1-20; Samoa: Skelton & South, 2007: 27, figs 24-25.

**Misapplied name:** *Gelidium pusillum* (Stackhouse) Le Jolis. Samoa: Skelton & South, 2002b.

**Representative material** (according to Santelices *et al.*, 2004: 127): On reefs between Papenoo and Huau, Tahiti, 05 Jun. 1922, *leg. W. A. Setchell & H. E. Parks*, UC 261322.

Thallus to 20 mm high, forming reddish-brown turfs, consisting of both prostrate and erect axes. Stoloniferous axes terete, 90-110  $\mu\text{m}$  in diameter, attached to the substratum by ventral peg-like haptera. Erect axes 100-400  $\mu\text{m}$  in diameter, basally cylindrical, unbranched and often truncate, distally expanded and compressed, sparsely to abundantly branched up to 4 orders. Terminal axes dimorphic according to age and fertility; young pinnules cylindrical with an emergent apical cell, older axes obtuse and flat, with an apical cell flush with the surface. Fertile branchlets compressed to distally lobed. Medulla of stoloniferous axes composed of 2-3 rows of cuboid to rectangular thick-walled cells to 10  $\mu\text{m}$  in diameter, surrounded by 3-4 rows of rounded to ovate, pigmented cortical cells 6-8  $\mu\text{m}$  in diameter. Rhizines are common amongst medullary cells. Flattened axes with 1-3 layers of medullary cells, surrounded by 1-3 layers of progressively smaller cortical cells. Tetrasporangia cruciately divided, 20-25  $\mu\text{m}$  in diameter, irregularly arranged in branches and branchlets in upper parts of the thallus (Santelices *et al.*, 2004).

**Remarks:** This species has not been recollected in Tahiti since Setchell's record. It is distinguishable from the more common *G. isabelae* by its long, unbranched

- ◀ Figs 50-58. **50.** *Yamaedella caenomyce*: habit of plant from Rapa (UPF 2263). Scale = 3 mm. **51.** *Yamaedella caenomyce*: cortical fascicles, with terminal pairs of spermatangia (arrowhead) (UPF 2263). Scale = 40  $\mu\text{m}$ . **52.** *Yamaedella caenomyce*: 3-celled carpogonial branch lateral on cortical fascicle, showing trichogyne (t) (UPF 3484). Scale = 20  $\mu\text{m}$ . **53.** *Asparagopsis taxiformis*: habit of pressed material (UPF 230). Scale = 3 mm. **54.** *Gelidium isabelae*: habit (UPF 289). Scale = 2 mm. **55.** *Gelidium isabelae*: cross section showing medulla of elongated, thick-walled cells interspersed with abundant rhizines (UPF 289). Scale = 40  $\mu\text{m}$ . **56.** *Pterocladia caerulescens*: optical section of apex, showing apical cell (UPF 3402). Scale = 20  $\mu\text{m}$ . **57.** *Gelidiella acerosa*: habit (UPF 2913). Scale = 10 mm. **58.** *Gelidiella machrisiana*: habit, showing alternate branching (UPF 545). Scale = 400  $\mu\text{m}$ .



perennial lower portion of the thallus, and its abundantly branched, tree-like upper thallus. Setchell's original collection from Tahiti were examined and compared with Fijian collections of *G. samoense* by Santelices *et al.* (2004), and confirmed as such. These authors also report that Setchell's report of *G. samoense* from Tutuila, American Samoa (Setchell, 1924) does not in fact represent this species. In their recent molecular treatment of the Gelidiales, Millar & Freshwater (2005) unfortunately did not include any tropical Pacific material, and such a type of study is in need to clarify the taxonomic position of *Gelidium* species in the region.

**Pterocladaceae** Felicini *et* Perrone

***Pterocladia*** Santelices *et* Hommersand

**Key to the French Polynesian species of *Pterocladia***

- 1a. Thallus less than 15 mm high, mostly creeping, with tufts of rhizoids opposite simple erect axes. . . . . *P. caloglossoides*  
 1b. Thallus erect, 30-70 mm high, branching mostly irregular . . . . . *P. caerulescens*

***Pterocladia caerulescens*** (Kützing) Santelices *et* Hommersand, 1997: 118. French Polynesia: Payri *et al.*, 2000: 168; Hawaiian Islands: Abbott, 1999a: 197, fig. 51E; Japan: Shimada & Masuda, 2000: 97, figs 5-18; 2002: 168, figs 1-6; Wallis Islands: N'Yeurt & Payri, 2004: 378; Australia: Millar & Freshwater 2005: 251, figs 97-99; Bermuda: Schneider & Lane, 2005: 75, figs 6-10; Samoa: Skelton & South, 2007: 28. **(Fig. 56)**

**Basionym:** *Gelidium caerulescens* Kützing, 1868: 19, pl. 56c-d (type locality: Wagap, New Caledonia).

**Homotypic synonym:** *Pterocladia caerulescens* (Kützing) Santelices, 1976: 173. Indonesia: Hatta & Prud'homme van Reine, 1991: 372, fig. 12a-d; Great Barrier Reef, Australia: Price & Scott, 1992: 21, fig. 3A-F.

**Material examined:** Tikehau, 7 Nov. 1995, *leg. A. D. R. N'Yeurt*, UPF 365, 553; Arue, Tahiti, 7 May 1997, *leg. C. E. Payri*, UPF 366; Afaahiti, Tahiti, 10 Jun. 1997, *leg. A. D. R. N'Yeurt*, UPF 367, 543, 559; Entre deux Baies, Moorea, 30 Jun. 1997, *leg. A. D. R. N'Yeurt & J. Orempuller*, UPF 569; Tarakoi, Rapa, 5 Nov. 2002, *leg. C. E. Payri*, UPF 3402, 3594.

Thallus 30-70 mm high, reddish-brown to greyish-green, consisting of distichously branched, flattened erect axes 0.5-1.5 mm in diameter issued from a short creeping, terete axis. Branching of the erect axes alternate to opposite, with the branchlets constricted at the base. Branch tips truncate or blunt, rarely sharp, with a distinct apical cell. Medulla composed of elongate, thick-walled cells surrounded by rhizines; cortex 3-4 layered, composed of pigmented ovoid cells.

**Remarks:** Growing on rocks and coralline algae, in shallow-water habitats.

\****Pterocladia caloglossoides*** (M. Howe) Santelices, 1998: 244. Hawaiian Islands: Abbott, 1999a: 198, fig. 52A-B; China: Bangmei & Yongqian, 1999: 81, figs 1-8; Japan: Shimada & Masuda, 2000: 98, figs 19-24; 2002: 170, figs 7-10; American Samoa: Littler & Littler, 2003: 54; Wallis Islands: N'Yeurt & Payri, 2004: 378; Australia: Millar & Freshwater, 2005: 252, figs 100, 101.

**Basionym:** *Gelidium caloglossoides* M. Howe, 1914: 96, pl. 34 fig. 7, pl. 35 figs 1-12 (type locality: San Lorenzo Island, Peru).

**Homotypic synonym:** *Pterocladia caloglossoides* (M. Howe) E.Y. Dawson, 1953: 76, pl. 6 fig. 1. Indonesia: Hatta & Prud'homme van Reine, 1991: 373, fig. 13a-e.

**Material examined:** Tarakoi Islet, Rapa, Australis, 5 Nov. 2002, *leg. C. E. Payri*, UPF 3579.

Thallus mostly creeping, epilithic, up to 15 mm long, composed of flattened axes 60-700 µm wide and 60-120 µm thick. Prostrate axes in arched segments, with





regularly spaced rhizoidal haptera at points of development of simple, arched erect axes which sometimes become secondarily attached to the substratum. Medulla composed of 1-2 layers of thick-walled cells surrounded by rhizines and a 3-4 layered cortex. Tetrasporangia in apical sori. Cystocarps unilocular.

**Remarks:** Growing at depths of 15-20 m, on coralline algae; so far only known in French Polynesia from the southern Australs (Rapa). The arched, creeping flattened habit of this species is characteristic.

**Gelidiellaceae** Fan *emend.* Perrone, Felicini *et* Bottalico  
**Gelidiella** Feldmann *et* Hamel

**Key to the French Polynesian species of *Gelidiella***

- 1a. Thallus over 3-5 cm high; wiry, decumbent, axes terete to slightly compressed, branching densely opposite throughout ..... *G. acerosa*
- 1b. Thallus up to 2 cm high, soft and pliable, in erect tufts; axes mostly compressed, branching sparse, regularly alternate, in upper portions of the thallus. .... *G. machrisiana*

***Gelidiella acerosa*** (Forsskål) Feldmann *et* Hamel, 1934: 533. French Polynesia: Payri *et al.*, 2000: 170; Viêt Nam: Dawson, 1954: 422, fig 33g; South Africa: Norris, 1992b: 35, fig. 20; Great Barrier Reef, Australia: Price & Scott, 1992: 25, fig. 4A-E; Indian Ocean: Silva *et al.*, 1996: 147; Rotuma Island: N'Yeurt, 1996: 408, figs 110, 120a; Hawaiian Islands: Abbott, 1999a: 202, fig. 53A-C; Fiji: N'Yeurt, 2001: 760; Littler & Littler, 2003: 56; Australia: Millar & Freshwater, 2005: 222, figs 5-6, 8-9; Samoa: Skelton & South, 2007: 29, figs 29-30. **(Fig. 57)**

**Basionym:** *Fucus acerosus* Forsskål, 1775: 190 (type locality: Mokha, Yemen).

**Material examined:** Bora Bora, c. 1840, *leg. Lenormand*, BM 840973; Maraa Point, Tahiti, 24 Sep. 1928, *leg. C. Crossland*, BM 840956; Tahara'a, Tahiti: 18 May 1996, *leg. C. E. Payri*, UPF 686; 6 Jun 1997, *leg. J. Orempuller*, UPF 280; 27 Nov. 2005, *leg. A. D. R. N'Yeurt & A. Pham*, UPF 3169; Afaahiti, Tahiti: 10 Jun. 1997, *leg. A. D. R. N'Yeurt*, UPF 555; 16 Nov. 2004, *leg. A. D. R. N'Yeurt & A. Pham*, UPF 2913; Taone, Tahiti, 2 Mar. 1998, *leg. J. Orempuller*, UPF 3103; Passe Miri Miri, Raiatea, 8 Mar. 2003, *leg. C. E. Payri*, UPF 3948; Punaauia PK 13, 10 Oct. 2004, *leg. A. D. R. N'Yeurt & H. Pouira*, UPF 3117.

Thallus tough and wiry, up to 5 cm high and 10 cm broad, greenish-yellow to purple, consisting of a decumbent basal portion anchored by clusters of rhizoidal haptera and bearing elongate, erect or arcuate-recurved secondary branchlets. Branchlets 458-500 µm in diameter, terete to slightly compressed, up to 45 mm long and 1 mm in diameter, bearing terete filiform determinate branchlets 2-8 mm long, mostly secundly (sometimes radially) or bilaterally arranged. Apical cell 11-12 µm in diameter, prominent. Outer cortical cells anticlinally elongate; internal cortical cells rounded, grading into a medulla of elliptical cells about 12-25 µm in diameter. Tetrasporic branches with 26-30 oblong-cruciate sporangia up to 33 × 65 µm, progressively developed from the swollen apex.

**Remarks:** A common species found in high-energy habitats such as the reef crest, where it can be a dominant component of the algal ridge vegetation in the Society archipelago. It also offers a protective micro-habitat for a range of smaller algal species.

***Gelidiella machrisiana*** E. Y. Dawson, 1957b: 17, fig. 4B (type locality: Pacific Costa Rica). French Polynesia: Payri *et al.*, 2000: 170; Hawaiian Islands: Abbott, 1999a: 204, fig. 53G-H. **(Fig. 58)**





**Material examined:** Hikueru, 27 Sep. 1996, *leg. J. Orempuller*, UPF 282, 545 S159; Tauna Islet, Rapa, Australs, 27 Nov. 2002, *leg. C. E. Payri*, UPF 3339 RPS126.

Thallus to 20 mm high, in tufts, cartilaginous and flexible, composed of a subcylindrical creeping base giving rise to several erect, compressed axes 200-400  $\mu\text{m}$  thick, simple to regularly alternately branched in upper portions, slightly constricted at the base.

**Remarks:** A rare but locally abundant plant, growing as dense tufts on coralline surfaces to 20 m depth in lagoons of atolls (Hikueru) and in the southern Australs (Rapa). The regular alternate branching in upper portions of the thallus, when present, is characteristic.

### *Parviphycus* Santelices

The genus *Parviphycus* was erected by Santelices (2004) to accommodate species previously placed in *Gelidiella*, but which are distinguished from the latter by distichous patterns of apical division, axial and periaxial cells in clear transverse rows, and stichidia with sparse, regularly arranged rows of sporangia.

\**Parviphycus antipae* (Celán) Santelices 2004: 324, figs 3, 9, 15, 20, 25 ('*antipai*'). Lord Howe Island, Australia: Millar & Freshwater, 2005: 224, figs 10-14.

(Figs 59-61)

**Basionym:** *Gelidiella antipae* Celán, 1938: 3 (type locality: Cape Kaliakra, Black Sea, Bulgaria). France: Boudouresque, 1972: 2, figs 1-10; Canary Islands: Afonso-Carrillo *et al.*, 1992: 286, figs 9-14; South Africa: R. E. Norris, 1992b: 35, fig. 21A-E; Hawaiian Islands: Abbott, 1999a: 202, fig. 53D-F; Southern Australia: Womersley & Guiry, 1994: 123, fig. 34K-N.

**Heterotypic synonym** (according to Santelices, 2004): *Gelidiella stichidiospora* E. Y. Dawson, 1953.

**Material examined:** Tauna Islet, Rapa, Australs, 4 Nov. 2002, *leg. C. E. Payri*, UPF 3388 RPS 173.

Thallus 2-3 mm high, with terete creeping and erect axes 70-80  $\mu\text{m}$  in diameter, anchored by abundant unicellular rhizoids forming a continuous mat about 80-90  $\mu\text{m}$  thick on the underside of prostrate portion. Erect axes simple to once-dichotomously branched, apically tapered and lanceolate. Tetrasporangia in terminal stichidia in swollen apical branches, 4 per segment.

**Remarks:** Growing at 19 m depth on the outer reef slope, together with *Heterosiphonia crispella*. So far only known in French Polynesia from the southern Austral island of Rapa. *Parviphycus antipae* is often confused with *Parviphycus adnatus* (Dawson) Santelices (previously known as *Gelidiella adnata* E. Y. Dawson, type locality Viêt Nam); Santelices (2002: 163) provides clear criteria to distinguish the two species using both vegetative and reproductive characters. The French Polynesian material has tetrasporangia in rows of four in stichidia terminal on long erect axes, and thus conforms well with the description of *P. antipae*.

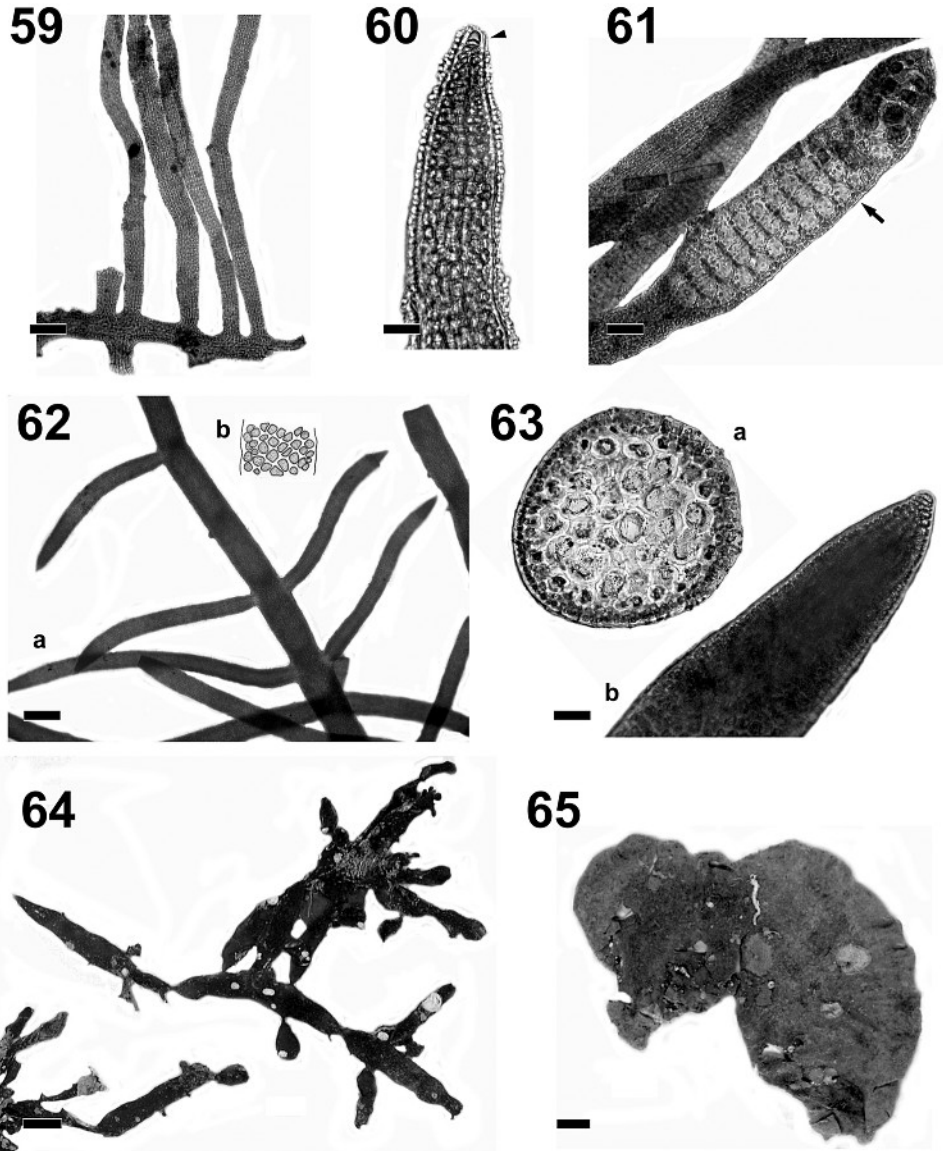
### Gigartinales F. Schmitz

#### Caulacanthaceae Kützing

#### *Caulacanthus* Kützing

\**Caulacanthus ustulatus* (Turner) Kützing, 1843: 395. Mauritius: Børgesen, 1950: 19, figs 5, 6a-d; Morocco: Gayral, 1958: 376, pl. XCVIII; Somalia: Sartoni, 1986: 369, fig. 8A-B; France: Rio & Cabioch, 1988: 231, figs 1-3; Philippines: West & Calumpang, 1990: 182; Seychelles: Wynne, 1995: 277, figs 13-15; Indian Ocean: Silva *et al.*, 1996: 282; Hawaiian Islands: Abbott, 1999a: 104, fig. 20D-F; Micronesia:



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with additions to the Phaeophyceae and Chlorophyta

Figs 59-65. **59.** *Parviphycus antipae*: habit (UPF 3388). Scale = 160  $\mu$ m. **60.** *Parviphycus antipae*: detail of apical region, showing apical cell (arrowhead) (UPF 3388). Scale = 20  $\mu$ m. **61.** *Parviphycus antipae*: tetrasporangial stichidia (arrow) terminal on fertile axis (UPF 3388). Scale = 50  $\mu$ m. **62.** *Caulacanthus ustulatus*: habit (a) and detail of cortical cells (b) (UPF 523). Scale: a = 150  $\mu$ m, b = 100  $\mu$ m. **63.** *Caulacanthus ustulatus*: cross section of mature axis (a) and detail of apical region (b) (UPF 3372). Scale: a = 20  $\mu$ m, b = 18  $\mu$ m. **64.** *Corynocystis prostrata*: habit (UPF 264). Scale = 6  $\mu$ m. **65.** *Peyssonnelia bornetii*: habit (UPF 578). Scale = 6 mm.



Lobban & Tsuda, 2003: 68; Samoa: Skelton & South, 2007: 54, figs 91-95.

(Figs 62-63)

**Basionym:** *Fucus acicularis* var. *β ustulatus* Mertens ex Turner, 1808: 143 (lectotype locality: Cádiz, Spain).

**Heterotypic synonyms** (according to West & Calumpong, 1990 & Zuccarello *et al.*, 2002): *Caulacanthus indicus* Weber-van Bosse, 1921: 222, fig. 67 (type locality: Celebes, Indonesia).

*Caulacanthus okamurae* Yamada, 1933: 277, pls 10-13 (type locality: Mikawa, Japan).

**Material examined:** Motu Nono, Afaahiti, Tahiti, 06 Jun. 1997, *leg. A. D. R. N'Yeurt*, UPF 523 S137, 524 S138; Tarakoi Islet, Rapa, 05 Nov. 2002, *leg. C. E. Payri*, UPF 3372 RPS157, 3373 RPS158; Tauna Islet, Rapa, 27 Nov. 2002, *leg. C. E. Payri*, UPF 3350 RPS136.

Thallus to 3 cm high, forming reddish-brown irregularly clinging mats, with compressed to terete spine-like axes 120-150 µm in diameter, pseudo-dichotomously branched at right angles, with pointed apices. Attachment to the substratum is via multicellular rhizoidal outgrowths from the cortical cells. Secondary anastomoses are frequent among axes of prostrate mats; base of branches are not constricted. Apical cell prominent, obliquely divided. Cortical cells to 25 µm in diameter, irregularly angular in surface view. Structure uniaxial, with axial cells 60-70 µm long and up to 10 µm in diameter. Medullary cells rounded, 10-18 µm in diameter, in 2-3 layers, loosely organized around axial filament. Tetrasporangia 20-25 µm in diameter, zonately divided, embedded in unmodified distal portions of axes. Gametophytes not seen.

**Remarks:** Growing at depths of 0.5-20 m, creeping on coral debris. The flattened, arcuate and pointed axes branched at right angles are characteristic for this species. Cross-breeding and morphological studies by West & Calumpong (1990) established the conspecificity of Australian, Philippine, Indonesian and Japanese species of *Caulacanthus*. This conclusion was further reinforced by molecular phylogenetic studies by Zuccarello *et al.* (2002), who recognized only a single cosmopolitan species of *Caulacanthus*.

### Corynocytaeae Kraft

#### *Corynocytae* Kraft

*Corynocytae prostrata* Kraft in Kraft *et al.*, 1999: 26, figs 6, 45-60 (type locality: Bulusan, Sorsogon Province, Philippines). French Polynesia: Kraft *et al.*, 1999: 28; Fiji: N'Yeurt, 2001: 797, figs 107, 108, 217; Samoa: Skelton & South, 2002a: 142, fig. 7C; 2007: 52, figs 86-87; Papua New Guinea: Littler & Littler, 2003: 70; Wallis Islands: N'Yeurt & Payri, 2004: 380.

(Fig. 64)

**Material examined:** Opunohu Bay, Moorea, 30 Jun. 1997, *leg. A. D. R. N'Yeurt*, MELU KA00058; UPF 264, UPF L3195; Punaauia, Tahiti, 19 Mar. 1998, *leg. C. E. Payri*, UPF 581.

Thallus to 10 cm broad, forming prostrate and irregularly complanately branched clumps with axes 12-15 mm long, 240-500 µm thick and 3-4 mm wide. Branches are strongly basally constricted. Apices rounded and thick, with marginal proliferations sometimes present, giving rise to further axes. Medulla densely filamentous, composed of thick-walled filaments 18-19 µm in diameter. Cortex 3- to 4-layered, consisting of progressively smaller subspherical to ovoid cells 3-12 µm in diameter, with elongate and darkly pigmented outermost cells. Reproductive structures terminal on terete, lateral proliferations. Cystocarps ostiolate, 225-230 µm in diameter, embedded in outer medulla, lacking a fusion cell; gonimoblast filaments growing from cystocarp wall. Carposporangia irregularly angular, 3-6 µm in diameter.



**Remarks:** Growing at depths of 15-20 m, on the outer reef slope, forming intricate clumps, in most cases associated with an ascidian, which forms a thick white layer on the inferior surface. Previously listed in the Acrotylaceae, *Corynocystis* has recently been transferred to a family of its own based on molecular studies (Saunders *et al.*, 2004).

**Peyssonneliaceae** Denizot  
*Peyssonnelia* Decaisne

**Key to the French Polynesian species of *Peyssonnelia***

- 1a. Thallus rigid, hypobasal calcification heavy; rhizoids multicellular. . . *P. bornetii*  
1b. Thallus flexible, hypobasal calcification light; rhizoids unicellular. . . *P. inamoena*

*Peyssonnelia bornetii* Boudouresque *et* Denizot, 1973 (type locality: Cap-Morgiou, France). French Polynesia: Payri *et al.*, 2000: 172; France: Denizot, 1968: 97, figs 83, 84 (as *Peyssonnelia inamoena* from Villefranche-sur-Mer); 1975: 27, figs 24-47; Turkey: Marcot *et al.*, 1976: 237, fig. V; Fiji: N'Yeurt, 2001: 777, figs 138, 146; Samoa: Skelton & South, 2007: 60, figs 104-107. **(Fig. 65)**

**Material examined:** Nuku Hiva, Marquesas, c. 1997, *leg. J. Orempuller*, UPF 578.

Thallus consisting of brittle dark brownish red crusts, 5-8 cm wide and up to 600 µm thick (including hypobasal calcification) with distinct concentric lines on upper surface; lower surface whitish and heavily calcified, up to 380 µm thick; edges not curling upwards when dry. In cross section thallus 120-200 µm thick, consisting of 6-7 layers of uncalcified, regularly arranged rectangular to elongate cells; cystoliths absent. Hypothallial cells clog-shaped, 22-28 × 6-10 µm, in regular files and giving rise to a single coxal cell of similar shape forming in turn 2 or 3 files of inclined to erect elongate to subrectangular perithallial cells 19-31 × 4-6 µm. Rhizoids multicellular, 8-10 µm in diameter, lightly septate, abundant. The perithallus-hypothallus angle (Boudouresque & Denizot 1975: 11) about 55° in the lower half of the thallus. Tetrasporangia elongate, 32-34 µm long and 12-14 µm wide, cruciately divided, terminal on perithallial filaments.

**Remarks:** Growing on coral debris at depths of 10-20 m, so far in French Polynesia only reported from Nuku Hiva island in the Marquesas Group.

*Peyssonnelia inamoena* Pilger, 1911: 311, figs 24-25 (type locality: Gross-Batanga, Cameroon, West Africa). French Polynesia: Payri *et al.*, 2000: 172; Denizot 1968: 97, figs 78-82; Mediterranean Sea: Boudouresque & Denizot, 1975: 58, figs 107-115; South Australia: Womersley, 1994: 164, figs 471-O; Hawaiian Islands: Abbott, 1999a: 156, fig. 38B; Fiji: N'Yeurt, 2001: 778, figs 139, 140a-e, 143-144; Littler & Littler, 2003: 82; Wallis Islands: N'Yeurt & Payri, 2004: 379; Samoa: Skelton & South, 2007: 62, figs 108-110. **(Figs 66-68)**

**Material examined:** Tahara'a, Tahiti, 6 Jun. 1997, *leg. A. D. R. N'Yeurt*, UPF 354; Iles aux Chèvres, Rapa, 4 Nov. 2002, *leg. C. E. Payri*, UPF 1918; Rapa, 8 Nov. 2002, *leg. I. R. D.*, UPF 3437, 3619; Mei Point, Rapa, 26 Nov. 2002, *leg. C. E. Payri*, UPF 2381; Tauna Islet, Rapa, 27 Nov. 2002, *leg. C. E. Payri*, UPF 2343, 2393, 3293, 3295, 3561, 3562; Rapa, 28 Nov. 2002, *leg. J. L. Menou*, UPF 2407, 2408; Rarapai Islet, Rapa, 30 Nov. 2002, *leg. J. L. Menou*, UPF 2435.

Thallus prostrate, 25-45 mm in diameter, deep red-pink in colour, papery thin and pliable; glabrous with faint concentric lines; uncalcified except on lower surface; weakly attached to substratum, edges tending to curl in upwards when dried. Diameter of thallus 85-90 µm in middle portion, tapering to 45 µm at thallus margin. Hypothallial cells rectangular to irregularly quadrilateral, 12-14 × 31-37 µm, giving rise to a single coxal cell of similar shape measuring 10-14 ×



33-34  $\mu\text{m}$ , forming in turn two files of upwardly inclined to erect square to subrectangular perithallial cells 12-13  $\times$  18-19  $\mu\text{m}$ . Cystoliths absent. Unicellular pigmented rhizoids 70-118  $\mu\text{m}$  long are cut off proximally and singly from nearly every hypothallial cell. Hypobasal calcification 7-8  $\mu\text{m}$  thick. Perithallus-hypothallus angle about 70° in mid-thallus.

**Remarks:** Found growing on hard surfaces from shallow water to depths of 40 to 100 m (Society, Australs).

**Phylloporaceae** Nägeli

*Ahnfeltiopsis* P. C. Silva *et DeCew*

\**Ahnfeltiopsis pygmaea* (J. Agardh) P. C. Silva *et DeCew*, 1992: 578. Hawaiian Islands: Abbott, 1999a: 162, fig. 39H; Indian Ocean: Silva *et al.*, 1996: 318.

(Figs 69-71)

**Basionym:** *Gymnogongrus pygmaeus* J. Agardh, 1851: 317 (type locality: India).

**Material examined:** Tekokota, Tuamotu, 26 Sep. 1996, *leg. J. Orempuller*, UPF 384.

Thallus 3-5 cm tall, bushy, cartilaginous and not adhering to paper when dry. Axes subterete to compressed, 0.5-0.7 mm in diameter, irregularly dichotomously branched. Internal structure very compact, consisting of large medullary cells 20-40  $\mu\text{m}$  in diameter, progressively decreasing in size to elongate, thin, densely packed cortical cells about 10  $\mu\text{m}$  long and 5  $\mu\text{m}$  in diameter. Reproduction not seen.

**Remarks:** Growing on the reef flat, at 1 m depth, so far in French Polynesia only known from Tekokota Atoll in the Tuamotu archipelago. The narrow axes, less than 1 mm wide, small thallus size and irregular branching set this species apart from others in the genus, including superficially similar *A. flabelliformis* (Harvey) Masuda.

**Halymeniales** G.W. Saunders *et Kraft*

**Halymeniaceae** Kützing

*Cryptonemia* J. Agardh

**Key to the French Polynesian species of *Cryptonemia***

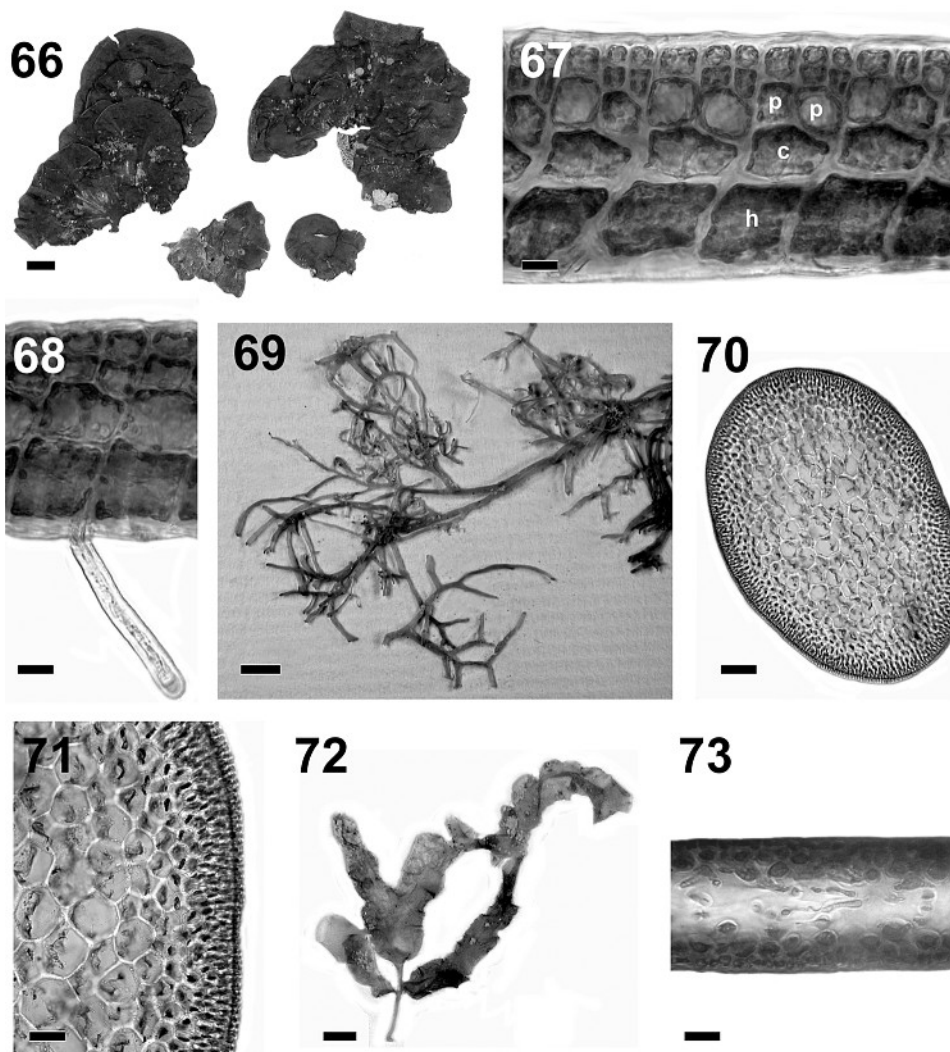
- 1a. Thallus with a distinct rigid stalk; blades elongate with a midrib . . . *C. lomation*
- 1b. Thallus lacking a rigid stalk, blades rounded, lobed, midrib absent . . . . .  
 . . . . . *C. umbraticola*

***Cryptonemia lomation*** (A. Bertoloni) J. Agardh, 1851: 227. French Polynesia: Payri *et al.*, 2000: 174; India: Børgesen, 1934: 8; Canary Islands: Børgesen, 1938: 228, fig. 2; Mediterranean, India, Malaysia: Chiang, 1970: 52, fig. 24, pl. 6a; Mediterranean: Codomier, 1971: 9, figs 4B, 5A, 6A-C; Indian Ocean: Silva *et al.*, 1996: 191. (Figs 71-73)

**Basionym:** *Fucus lomation* A. Bertolini, 1818: 289, pl. X fig. 3 (type locality: Gulf of La Spezia, Italy).

**Material examined:** Ponton I.R.D., Arue, Tahiti, 19 Dec. 1995, *leg. A. D. R. N'Yeurt*, UPF 256, 563; Moorea, Mar. 1997, *leg. D. W. Keats & C. E. Payri*, UPF 254, 255, 257, 537.

Thallus to 20 cm high, attached to the substratum by a small discoid holdfast giving rise to a rigid, naked filiform stalk. Blades yellowish-red, crispy; irregularly linear-oblong, broad and leaf-like, to 3 cm wide and (60)70-90(100)  $\mu\text{m}$  thick, with a conspicuous midrib which becomes distally attenuated or absent. Blade apices blunt, with occasional marginal or midrib proliferations. Internal structure composed of a lax filamentous medulla 20  $\mu\text{m}$  wide, consisting of



Figs 66-73. **66.** *Peyssonnelia inamoena*: habit (UPF 1918). Scale = 6 mm. **67.** *Peyssonnelia inamoena*: cross section of thallus, showing hypothallial cell (h), coxal cell (c) and chains of perithallial cells (p) (UPF 3293). Scale = 12  $\mu$ m. **68.** *Peyssonnelia inamoena*: detail of unicellular pigmented rhizoid (UPF 3293). Scale = 12  $\mu$ m. **69.** *Ahnfeltiopsis pygmaea*: habit (UPF 384). Scale = 3 mm. **70.** *Ahnfeltiopsis pygmaea*: cross section of thallus, showing compact medulla (UPF 384). Scale = 50  $\mu$ m. **71.** *Ahnfeltiopsis pygmaea*: section of thallus, showing progressive transition from the large-celled medulla to small, elongate cortical cells (UPF 384). Scale = 20  $\mu$ m. **72.** *Cryptonemia lomation*: habit (UPF 255). Scale = 6 mm. **73.** *Cryptonemia lomation*: cross section of thallus, showing lax filamentous medulla (UPF 254). Scale = 25  $\mu$ m.

irregularly disposed to periclinal filaments 5-8  $\mu$ m in diameter, enclosed by a dense 2-layered cortex of rounded cells 8-10  $\mu$ m in diameter.

**Remarks:** A relatively rare plant, collected in both shallow and deep water habitats in the Society Islands.



***Cryptonemia umbraticola*** E.Y. Dawson, 1959: 43, figs 21F, 22A (type locality: Indonesia). French Polynesia: Payri *et al.*, 2000: 17; Hawaiian Islands: Abbott, 1999a: 136, fig. 32B; Wallis Islands: N'Yeurt & Payri, 2004: 378. **(Figs 74-75)**

**Material examined:** Bora Bora, Apr. 1990, *leg. C. E. Payri*, UPF 260, 519; Tepoto Sud, 25 Sep. 1995, *leg. J. Orempuller*, UPF 560; Punaauia, Tahiti, 20 Oct. 1995, *leg. S. Andréfouët & A. D. R. N'Yeurt*, UPF 518; Entre deux Baies, Moorea, 12 Dec. 1995, *leg. A. D. R. N'Yeurt*, UPF 258; Takapoto, 8 Jun. 1997, *leg. L. Addressi*, UPF 262; Moorea, Mar. 1997, *leg. D. W. Keats & C. E. Payri*, UPF 261, 263; Opunohu, Moorea, 30 Jun. 1997, *leg. A. D. R. N'Yeurt*, UPF 259; Rarapai Islet, Rapa, 12 Nov. 2002, *leg. J. L. Menou*, UPF 2156; Rapa, 18 Nov. 2002, *leg. M. Adjeroud*, UPF 3245, 3534; Tauna Islet, Rapa, 27 Nov. 2002, *leg. C. E. Payri*, UPF 3334, 3574.

Thallus to 25 mm high and 100-125 µm thick, forming dense clumps of deep-red, crisp, smooth and rounded rosettes. Individual flattened blades subpeltate and irregularly lobed, to 15 mm in diameter, attached to the substratum via a small basal disk giving rise to a minute stipe. Medulla filamentous and relatively dense, consisting of irregular to periclinal filaments 2-3 µm in diameter. Cortex 2-3 layered, consisting of cells about 15 µm in diameter.

**Remarks:** A relatively rare but locally abundant plant, forming dense clumps on vertical surfaces at depths of 15 to 40 m on the outer reef slope and passes.

***Grateloupia*** C. Agardh *nom. cons.*

**Key to the French Polynesian species of *Grateloupia***

- 1a. Thallus flattened to compressed, less than 10 cm high, tips bifurcate . . . . .  
 . . . . . *G. phuquocensis*
- 1b. Thallus terete, to 16 cm high, tips simple, non-bifurcate . . . . . *G. filicina*

***Grateloupia filicina*** (J.V. Lamouroux) C. Agardh, 1822: 223. French Polynesia: Payri *et al.*, 2000: 176; India: Børgesen, 1935: 53, pls 7-9; Viêt Nam: Dawson, 1954: 432, fig. 42a; Hawaiian Islands: Abbott, 1999a: 140, fig. 33A-B; Indian Ocean: Silva *et al.*, 1996: 193; Philippines: Kraft *et al.*, 1999: 15, figs 24-25; Malaysia: Masuda *et al.*, 2000: 183, figs 10-18; Northern Pacific & Mediterranean: Kawaguchi *et al.*, 2001: 437, figs 3, 4a-l; Mediterranean: De Clerck *et al.*, 2005: 391. **(Figs 76-77)**

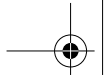
**Basionym:** *Delesseria filicina* J.V. Lamouroux, 1813: 125 (type locality: Trieste, Italy).

**Material examined:** Society Group, n.d., *leg. E. Deslandes*, UPF 300, 305, 551; Opunohu Bay, Moorea, *leg. A. D. R. N'Yeurt*: 25 Nov. 1995, UPF 301; 30 Sep. 2004, UPF 2949; Botanical Gardens, Papeari, Tahiti, *leg. A. D. R. N'Yeurt*: 1 Oct. 1995, UPF 304; 22 Oct. 1995, UPF 552; 27 Apr. 1997, UPF 302; Hotel Beachcomber, Faa'a, Tahiti, 13 Apr. 1997, *leg. A. D. R. N'Yeurt*, UPF 303; Pirae, Tahiti, 17 Jul. 1997, *leg. A. D. R. N'Yeurt*, UPF 824; Rikitea, Mangareva, Gambier, 19 Nov. 2000, *leg. A. D. R. N'Yeurt*, UPF 814, 844.

Thallus to 16 cm high, bushy and erect from a small discoid holdfast, purplish-red to bluish-grey, with a firm and lubricous texture. Main axes terete or flattened, to 0.6-2.0 mm in diameter, irregularly distichously to radially branched up to two orders with the branches constricted at the base and attenuated to filiform, often curved, above. Medulla composed of periclinal filaments; outer medullary cells stellate; cortical cells in 4-8 layers, organized into dichotomously branched rows. Cystocarps small and scattered over thallus surface; spermatangia in cortical patches; tetrasporangia scattered within cortex.

**Remarks:** Growing solitarily on rocks, pebbles and other hard surfaces such as concrete piers, buoys and boat hulls in the calm waters of estuaries, bays and stream outlets in the Society and Gambier group. Molecular phylogenetical analyses have shown that 'true' *G. filicina* is restricted to the Mediterranean

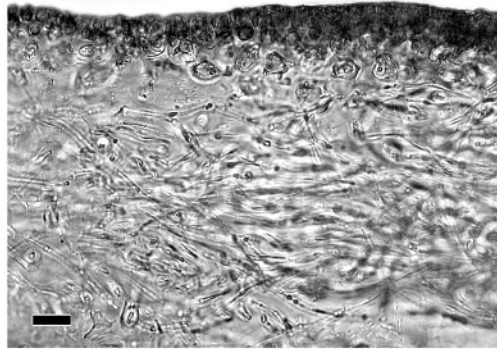




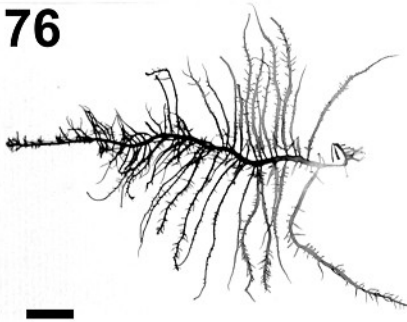
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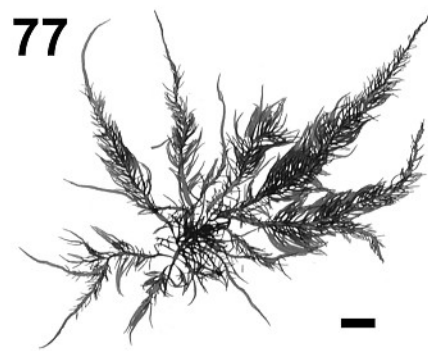
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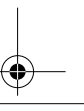
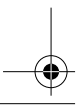
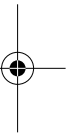
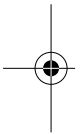
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Figs 74-79. **74.** *Cryptonemia umbraticola*: habit (UPF 258). Scale = 8 mm. **75.** *Cryptonemia umbraticola*: cross section showing fairly dense filamentous medulla (UPF 3334). Scale = 30  $\mu$ m. **76.** *Grateloupia filicina*: habit of lax plant from sheltered bay habitat (UPF 301). Scale = 10 mm. **77.** *Grateloupia filicina*: habit of bushy plant from stream outlet habitat (UPF 824). Scale = 10 mm. **78.** *Grateloupia phuquocensis*: habit of freshly-collected plants (UPF 306). Scale = 3 mm. **79.** *Grateloupia phuquocensis*: cross section of thallus showing filamentous medulla (UPF 3417). Scale = 6  $\mu$ m.





region, and *filicina*-like entities from tropical localities (including French Polynesia) represent cryptic species that have yet to be fully elucidated (De Clerck *et al.* 2005). One such entity from Japan and northern China has been described as *Grateloupia asiatica* Kawaguchi *et* H. W. Wang (Kawaguchi *et al.*, 2001) based on molecular data comparing Asian and Italian populations. The French Polynesian plants are very similar to Malaysian plants reported as *G. filicina* described in Masuda *et al.* (2000); Malaysian samples grouped broadly with American and Italian populations in the analyses of Kawaguchi *et al.* (2001: 440, fig. 6). In the analysis of De Clerck *et al.* (2005: 396, fig. 2) French Polynesian samples of '*G. filicina*' from Opunohu, Moorea grouped broadly with American and Brazilian populations, but were relatively distant from Papua New Guinean and Italian populations. According to De Clerck *et al.* (2005), tropical members of the species complex form a single monophyletic clade, indicating they have evolved from a common ancestor. Additionally, a high dispersal rate and artificial introductions, notably via shipping, might contribute to apparently disjunct genetic patterns.

***Grateloupia phuquocensis*** T. Tanaka *et* P.H. Hô, 1962: 28, figs. 5-6 (type locality: Phu Quoc Island, Viêt Nam). French Polynesia: Payri *et al.*, 2000: 176 ("*phuquoensis*"); Hawaiian Islands: Abbott, 1991: 143, fig. 8; 1999a: 142, fig. 33F-H. (Figs 78-79)

**Material examined:** Society Group, n.d., *leg. E. Deslandes*, UPF 308, 310; Tahara'a, Tahiti, 18 May 1996, *leg. C. E. Payri*, UPF 309; Pointe des Pêcheurs, Punaauia, Tahiti, 27 Apr. 1997, *leg. C. E. Payri*, UPF 306, 307, 529, 557; Afaahiti, Tahiti, 10 Jun. 1997, *leg. A. D. R. N'Yeurt*, UPF 311; Tahara'a, Tahiti, 30 Mar. 1998, *leg. A. D. R. N'Yeurt & V. Stiger*, UPF 596; Rapa Island, Australs, 4 Nov. 2002, *leg. C. E. Payri*, UPF 3609, 3417.

Thallus to 50 mm high and up to 175 µm thick, greenish red to yellowish-green, soft and lubricous texture and composed of a tuft of up to 25 erect, flattened to compressed axes 0.5-1.5 mm wide arising from a diffuse basal holdfast. Axes unbranched below and dichotomously branched above, with sharp, bifurcate tips. Medulla consisting of periclinal filaments; inner cortex composed of triangular to clavate cells; outer cortical cells very small, 2-3 µm in diameter, organized into 5-6 times divided filaments. Tetrasporangia and spermatangia scattered exclusively in sori close to the tips of fertile branches.

**Remarks:** Growing in clumps on rocks, in exposed areas of the shoreline in the Society and Austral islands.

***Halymenia*** C. Agardh, *nom. cons.*

The taxonomy of this genus was revised by Parkinson (1980) and more recently by Abbott, (1999b), De Smedt *et al.* (2001) and Kawaguchi (2004). The presence of at least some anticlinal (cortex to cortex) medullary filaments characterizes the genus in the family.

#### Key to the French Polynesian species of *Halymenia*

- 1a. Blades rounded; inner cortical cells large and mace-like. . . . . *H. actinophysa*  
1b. Blades spatulate; inner cortical cells small, stellate . . . . . *H. nukuhivensis*

\****Halymenia actinophysa*** M. Howe, 1911: 509, pl. 34 (type locality: La Paz, Gulf of California). Hawaiian Islands: Abbott, 1999a: 143, fig. 34A; Wallis Islands: N'Yeurt & Payri, 2004: 381. (Figs 80-81)

**Material examined:** Rarapai Islet, Rapa, Australs, *leg. J. L. Menou*: 4 Nov. 2002, UPF 1917, 3502 RPS280; 30 Nov. 2002, UPF 2720, 3481 RPS259; east oceanic plateau, Rapa, 5 Nov. 2002, *leg. J. L. Menou*, UPF 1966, 3510 RPS288; Mei Point, Rapa, 18 Nov. 2002, *leg. J. L. Menou*, UPF 2225, 3512 RPS290.



Thallus 4-6 cm high, red-pink in colour, consisting of clusters of rounded to lobed blades, slightly undulate with smooth margins, shortly stipitate, arising from a discoid holdfast. Texture gelatinous, soft; thallus 145-155  $\mu\text{m}$  in diameter, with a medulla of predominantly periclinal, with few anticlinal, filaments. Cortex 1-3 layered; inner cortical cells characteristically mace-like, cylindrical, 50-80  $\mu\text{m}$  in diameter, with 2-8 blunt arms subtending medullary filaments. Outer cortical cells 8-25  $\mu\text{m}$  in diameter, irregularly and densely arranged. Tetrasporangia 15-18  $\mu\text{m}$  in diameter, distributed in outer cortex.

**Remarks:** Growing at depths of 22-57 m, on coral debris or shell fragments. So far in French Polynesia, only known from the southern Australs island of Rapa. The unique mace-like subcortical cells with several blunt outgrowths clearly distinguish this species from others in the genus. The French Polynesian material agrees well with the original description of the species in Howe (1911).

\**Halymenia nukuhivensis* N'Yeurt *et* Payri, 2009: 13, figs 2-6 (type locality: Nuku Hiva, Marquesas). **(Figs 82-85)**

**Material examined:** Nuku Hiva, Marquesas, c. 1997, *leg. J. Orempuller*, UPF 574 (holotype), 575.

Thallus 5-6 cm high, composed of clusters of papery-thin spatulate blades 5-15 mm broad and 120-130  $\mu\text{m}$  thick, attached via an inconspicuous cuneate basal holdfast. Medulla composed of an equal proportion of anti-clinal, periclinal and oblique filaments and ganglionic cells; innermost cortical cells 10-20  $\mu\text{m}$  in diameter, stellate, with 3-6 slender arms, 45-50  $\mu\text{m}$  long, subtending medullary filaments 5-7  $\mu\text{m}$  in diameter. Cortex 2-3 layered; outer cortical cells elongate, 2.5-3.0  $\mu\text{m}$  in diameter and 2-3  $\mu\text{m}$  long, arranged in a relatively regular palisade layer, borne in pairs on rounded inner cortical cells 4-5  $\mu\text{m}$  in diameter. Carpogonial branches not seen. Auxiliary cells formed in branched bushy ampullae, Gonimoblasts simple, each consisting of several successively maturing gonimolobes 10-15  $\mu\text{m}$  in diameter surrounded by lax sterile filaments, located in outer medulla below a narrow carpostome flanked by elongate sterile cells. Plants do not adhere well to paper when dry.

**Remarks:** Growing subtidally, at about 20 m depth. The small stellate inner cortical cells, palisade-like outer cortical cells and spatulate to cuneate, papery thin blades distinguish this species from *H. actinophysa*. *Halymenia nukuhivensis* sets itself apart by its strap-shaped basal portion from which are issued cuneate or irregularly subdichotomous blades, in contrast to the mostly simple, lobed habits of other species. It is also characterized by its dense, palisade-like outer cortex and the mostly equal proportion of anti-clinal, periclinal and oblique medullary filaments, which is unusual among the genus *Halymenia* where anti-clinal filaments are usually dominant. So far in French Polynesia, only known from the northern Marquesas group.

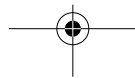
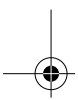
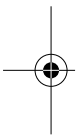
**Corallinales** P.C. Silva *et* H.W. Johansen

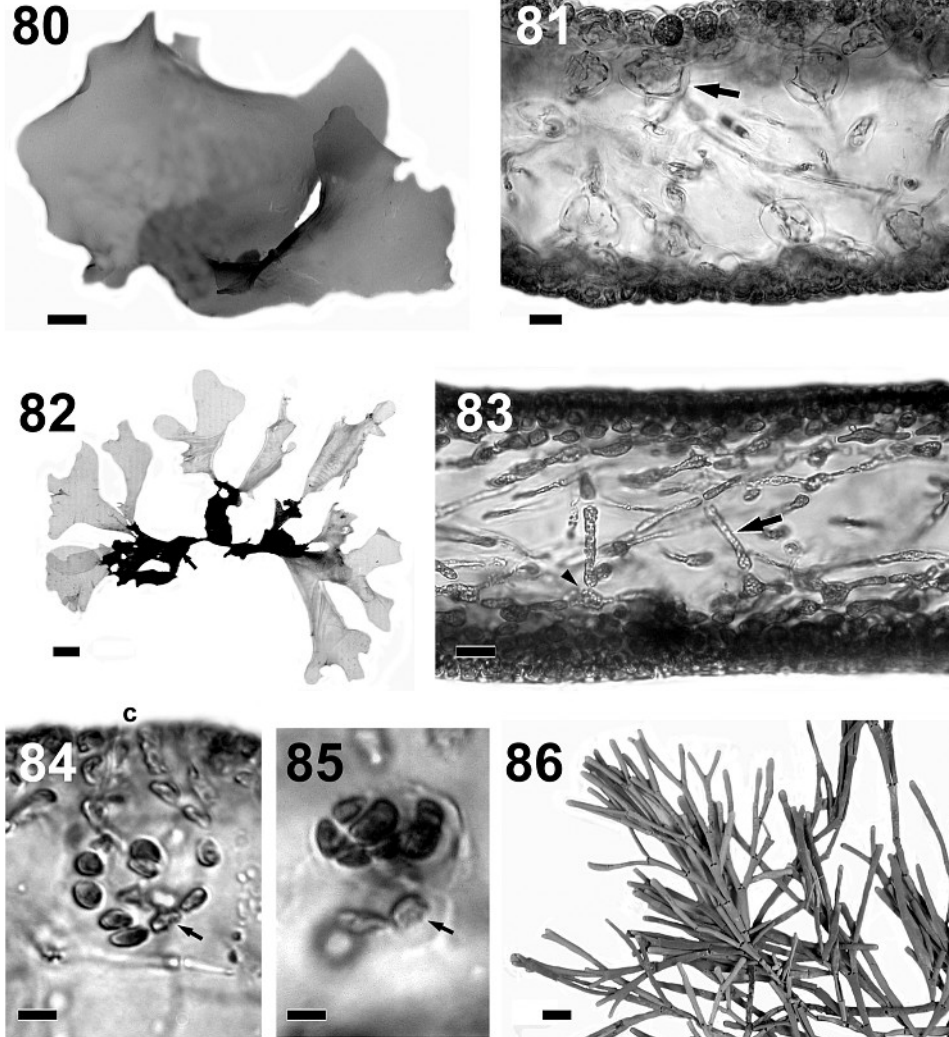
**Corallinaceae** J.V. Lamouroux

***Amphiroa*** J.V. Lamouroux

**Key to the French Polynesian species of *Amphiroa***

- 1a. All branches terete to subterete; genicula never swollen. . . . . *A. valonioides*
- 1b. Some or all branches flattened and / or winged; genicula swollen or not so . . . 2
  - 2a. Thallus bushy and divaricately branched, colour violet; genicula not swollen; intergenicula irregularly strongly flattened and winged *A. foliacea*
  - 2b. Thallus erect, regularly dichotomously branched, colour deep pink, genicula swollen; intergenicula regularly complanate and smooth. . . . . *A. anceps*





Figs 80-86. **80.** *Halymenia actinophylla*: habit of living plant (UPF 2720). Scale = 5 mm. **81.** *Halymenia actinophylla*: cross section of thallus, showing mace-like inner cortical cell (arrow) (UPF 3481). Scale = 50  $\mu$ m. **82.** *Halymenia nukuhivensis*: habit of pressed plant (UPF 575). Scale = 5 mm. **83.** *Halymenia nukuhivensis*: cross section of thallus, showing periclinal medullary filament (arrow) amidst anticlinal and oblique filaments (UPF 575). Scale = 15  $\mu$ m. **84.** *Halymenia nukuhivensis*: early gonimoblast, showing auxiliary cell (arrow) and narrow carpostome (c) (UPF 575). Scale = 20  $\mu$ m. **85.** *Halymenia nukuhivensis*: more mature gonimoblast, showing auxiliary cell (arrow) (UPF 575). Scale = 20  $\mu$ m. **86.** *Amphiroa anceps*: habit of pressed specimen (UPF 3021). Scale = 4 mm.

***Amphiroa anceps*** (Lamarck) Decaisne, 1842:125. French Polynesia: Payri *et al.*, 2000: 180; Malaysia: Weber-van Bosse 1904: 93, pl. 16, figs 6-8; India: Børgesen, 1934: 7; Eastern Australia: Millar, 1990: 315, figs 9A-H; Indian Ocean: Silva *et al.*, 1996: 219. (Fig. 86)

**Basionym:** *Corallina anceps* Lamarck, 1815: 238 (type locality: Norfolk Island).

**Material examined:** Tahara'a, Tahiti: 18 May 1996, *leg. C. E. Payri*, UPF 695; 14 Apr. 1997, *leg. A. D. R. N'Yeurt*, UPF 224, 225, 327; 27 Nov. 2005, *leg. A. D. R. N'Yeurt & A. Pham*, UPF 3021; Trou du Souffleur, Papenoo, 27 Nov. 2005, *leg. A. D. R. N'Yeurt & A. Pham*, UPF 3020.

Thallus calcified and articulated, consisting of erect and smooth clumps to 15 cm high, dark pink in colour. Axes erect, regularly dichotomously branched with very narrow fork angles. Segments 3-6 mm long and 1-1.5 mm broad, slightly complanate, with swollen articulations. Conceptacles scattered on surface of the segments, with the cavities divided in two or three portions by anticlinal filaments. Tetrasporangia clavate, zonately divided, up to 75 µm long and 25 µm wide.

**Remarks:** Forming sparse clumps on hard substrata along exposed shores, in the shallow subtidal or in intertidal pools. *Amphiroa anceps* is characterised by its thin, subterete intergenicula becoming slightly flattened distally, and bearing three calcified teeth proximal to the genicula (Weber-van Bosse, 1904).

\****Amphiroa foliacea*** J.V. Lamouroux in Quoy *et* Gaimard, 1824: 628, pl. 93 figs 2-3 (type locality: Mariana Islands). Viêt Nam: Dawson, 1954: 430, fig. 40c; Hawaiian Islands: Johansen in Abbott, 1999a: 178, figs 44C, 45B; Indian Ocean: Silva *et al.*, 1996: 222; Samoa: Skelton & South, 2002a: 140, fig. 4D; 2007: 40, figs 47-51, 796; Papua New Guinea: Littler & Littler, 2003: 26. (Fig. 87)

**Heterotypic synonym** (according to Johansen in Abbott, 1999a: 178): *Amphiroa tribulus* (J. Ellis *et* Solander) J.V. Lamouroux, 1816: 302. French Polynesia: Payri *et al.*, 2000: 182; Indian Ocean: Silva *et al.*, 1996: 225; Fiji: N'Yeurt, 2001: 761, figs 131, 134-135; Littler & Littler, 2003: 26; Wallis Islands: N'Yeurt & Payri, 2004: 379.

**Material examined:** Afaahiti, Tahiti, *leg. A. D. R. N'Yeurt*: 7 Jun 1997, UPF 227; 10 Jun 1997, UPF 228.

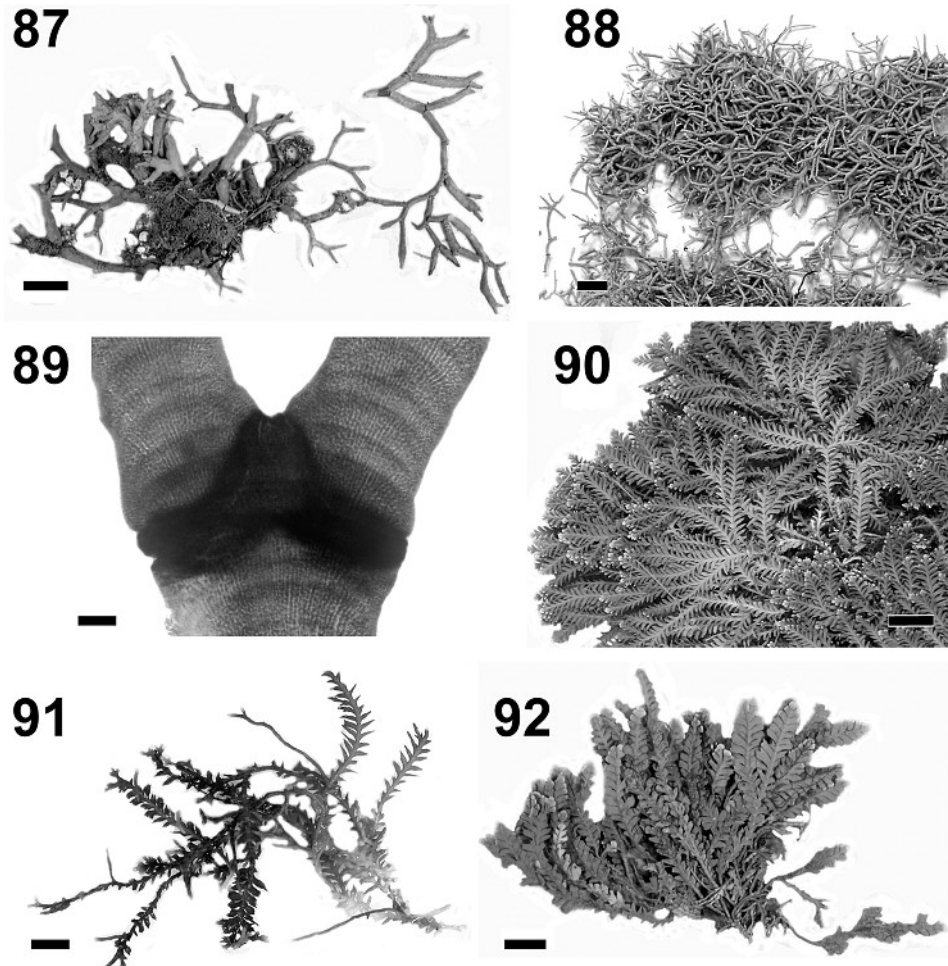
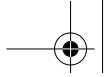
Thallus to 35 mm high, purple-pink, forming loose, mostly decumbent clumps of flattened, heavily calcified, irregularly dichotomously branched axes. Genicula not swollen; intergenicula 2-4 mm long and 1-2 mm in diameter, terete, subterete or flattened, with the edges at times so flattened as to give a keeled, raised appearance to the middle section. Conceptacles minute, scattered on intergenicula.

**Remarks:** Growing on hard surfaces on the fringing reefs of high islands; so far in French Polynesia only reported from Afaahiti District, Tahiti. Several flattened tropical species of *Amphiroa*, such as *A. tribulus* and *A. misakiensis* Yendo, are possibly conspecific with the highly polymorphic species *A. foliacea* (Abbott, 1999a: 178). Moreover, according to Woelkerling & Nelson (2004: 64), the status and taxonomic placement of *Corallina tribulus* J. Ellis *et* Solander, the basionym of *A. tribulus*, are uncertain.

\****Amphiroa valonioides*** Yendo, 1902: 5, pl. 1 figs 1-3, pl. 4 fig. 1 (syntype localities: Japan). Gulf of California: Norris & Johansen, 1981: 20, figs 1f, 6, 12d, 13b, 15a, 16, 17; Hawaiian Islands: Abbott, 1999a: 180, figs 44E, 45D. (Figs 88-89)

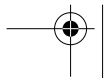
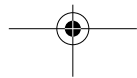
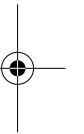
**Misapplied name:** *Valonia fragilissima* Linnaeus. French Polynesia, according to Payri *et al.* (2000: 182).

**Material examined:** Temae, Moorea, 14 Jun. 1984, *leg. C. E. Payri*, UPF 2898; Tahara'a, Tahiti, 14 Apr. 1997, *leg. A. D. R. N'Yeurt*, UPF 226; Motu Irioa, Moorea, 1 Jul. 1997, *leg. A. D. R. N'Yeurt*, UPF 3094; Gambier Islands: Mt. Mokoto, Mangareva, 27 Sep. 1997, *leg. J. Starmer*, UPF 620; Rikitea, Mangareva, 15 Nov. 2000, *leg. A. D. R. N'Yeurt*, UPF 932; Rikitea, Mangareva, 19 Nov. 2000, *leg. A. D. R. N'Yeurt*, UPF 926; Taku, Mangareva,



Figs 87-92. **87.** *Amphiroa foliacea*: habit, showing flattened narrow axes (UPF 227). Scale = 6 mm. **88.** *Amphiroa valonioides*: habit (UPF 2898) Scale = 5 mm. **89.** *Amphiroa valonioides*: detail of decalcified genicula, showing absence of swelling (UPF 3351). Scale = 100  $\mu$ m. **90.** *Cheilosporum acutilobum*: habit of Tahitian plant (UPF 234). Scale = 5 mm. **91.** *Jania acutiloba*: detail of axes of plant from Rurutu (UPF 3006). Scale = 3 mm. **92.** *Jania spectabile*: habit (UPF 238). Scale = 5 mm.

21 Nov. 2000, leg. A. D. R. N'Yeurt, UPF 790; Taravai, 20 Nov. 2000, leg. A. D. R. N'Yeurt, UPF 931; Airport Pontoon, Motu Totegegigie, 22 Nov. 2000, leg. A. D. R. N'Yeurt, UPF 789; Povai, Bora Bora, 16 Aug. 2002, leg. A. D. R. N'Yeurt & D. Schneider, UPF 2542; Hotel Bora Bora Lagoon, Bora Bora, 17 Aug. 2002, leg. A. D. R. N'Yeurt & D. Schneider, UPF 2547; Mohio, Bora Bora, 21 Aug. 2002, leg. A. D. R. N'Yeurt & D. Schneider, UPF 2602; Mei Point, Rapa, 26 Nov. 2002, leg. C. E. Payri, UPF 2383; Tauna Islet, Rapa, 27 Nov. 2002, leg. C. E. Payri, UPF 2388; Northern reef slope, Rapa, 28 Nov. 2002, leg. J. L. Menou, UPF 2416; Passe Miri Miri, Raiatea, leg. C. E. Payri, UPF 3949; Tiahura, Moorea, 1 Oct. 2004, leg. A. D. R. N'Yeurt & A. Pham, UPF 3026; Punaauia PK 18, 5 Mar. 2005, leg. A. D. R. N'Yeurt & A. Pham, UPF 3074.





Thallus calcified and articulated, consisting of erect clumps to 5 cm high, whitish-pink and heavily calcified. Axes terete to subterete, brittle. Dichotomies Y-shaped; intergenicula 1-4 mm long and 0.3-0.5 mm in diameter. Genticula with a single tier, smooth, never swollen. Conceptacles scattered on intergenicula surface.

**Remarks:** A common component of the turf on the reef flat and reef crest of high islands, it offers a micro-habitat for a range of smaller algal species (such as *Ceramium* spp. and *Nemalion* sp.). Surprisingly, there have been no reports of this genus, let alone the species, from the atolls of the Tuamotu archipelago. Similarly, the genus *Amphiroa* was absent from the flora of the island of Rotuma, north of Fiji (N'Yeurt, 1996) although it is commonly found in other parts of Fiji (South & Skelton, 2003) as well as neighbouring Wallis Island (N'Yeurt & Payri, 2004). Aside from the Society Group, species of *Amphiroa* occur further south in the Gambier and Australs. *Amphiroa valonioides* can be readily distinguished from superficially similar *A. fragilissima* by its smooth, never swollen genicula with a single tier of cells. The species seems to be restricted to Japan and the eastern Pacific, with *A. fragilissima* found in the western Pacific (e.g. Fiji, Solomon Islands; pers. obs.).

**Corallina** Linnaeus

\***Corallina elongata** J. Ellis et Solander, 1786: 119 (type locality: Cornwall, England). Hawaiian Islands: Abbott, 1999a: 183, figs 46A-B, 47A. **(Figs 93-94)**

**Material examined:** Temae, Moorea, 25 Nov. 1995, leg. A. D. R. N'Yeurt, UPF 246; Taharaa, Tahiti, 14 Apr. 1997, leg. A. D. R. N'Yeurt, UPF 245, 247; Afaahiti, Tahiti, leg. A. D. R. N'Yeurt: 7 Jun. 1997, UPF 248; 16 Nov. 2004, UPF 2910; Punaauia, Tahiti, 6 Jul. 1997, leg. C. E. Payri, UPF 244; Rurutu, Australs, 18 Aug. 2000, leg. C. E. Payri, UPF 732; Tiahura, Moorea, 1 Oct. 2004, leg. A. D. R. N'Yeurt & A. Pham, UPF 3039; Punaauia PK 13, 10 Oct. 2004, leg. A. D. R. N'Yeurt & H. Pouira, UPF 3108, 3115; Trou du Souffleur, Papenoo, Tahiti, 27 Nov. 2005, leg. A. D. R. N'Yeurt & A. Pham, UPF 3017, 3139.

Thallus 1-3 cm high, consisting of clusters of distally pinnately branched, compressed axes emergent from a crustose holdfast. Intergenicula wedge-shaped, 0.8-1 mm long and 0.5-1 mm wide, with a pair of narrow, upward-pointing projections; bearing 1-2 lateral branches on each side. Main axes of French Polynesian plants not percurrent, similar in thickness and width to secondary axes. Medullary cells in tiers of 10-20 per intergeniculum. Conceptacles usually axial and terminal on lateral branches, sometimes pseudolateral on surface of intergenicula. Male conceptacles lacking surmounting branchlets; female and tetrasporangial conceptacles bearing occasional surmounting branchlets.

**Remarks:** A relatively common component of the fringing reef flora in exposed localities of high islands (Society, northern Australs). *Corallina elongata* can be distinguished from similar-looking *Jania subulata* (J. Ellis et Solander) N'Yeurt et Payri by its more numerous tiers of medullary cells (10 or more) per intergeniculum and its non-percurrent main axes.

**Hydrolithon** (Foslie) Foslie

**Key to the French Polynesian species of *Hydrolithon***

- 1a. Thalli epiphytic on fleshy algae.....2
- 1b. Thalli epilithic, or on corals or other hard substrata .....3
  - 2a. Thallus forming imbricating layers.....*H. boreale*



- 2b. Thallus not forming imbricating layers ..... *H. farinosum*
- 3a. Thalli with trichocytes organized into circular, pustulent patches..... 4
- 3b. Thalli with or without trichocytes, when present not organized into circular, pustulent patches ..... 5
- 4a. Thallus unbranched, mainly flat. .... *H. onkodes*
- 4b. Thallus branched and three-dimensional..... *H. gardineri*
  - 5a. Plants mainly with massive and rounded protuberances, occurring as rhodoliths, bluish-lavender colour, small conceptacles..... *H. reinboldii*
  - 5b. Plants crustose, can be verrucose but not branched, with conceptacles just visible with a hand lens ..... 6
- 6a. Plants crustose, covered by numerous tiny conceptacles that fall out leaving scars, plants deep red, found usually overgrown by larger crustose algae..... *H. samoëense*
- 6b. Plants with larger conceptacles, that do not fall out leaving scars..... 7
  - 7a. Plants mainly light brown in colour, surface tessellate, covered with polygonal patterns, conceptacles generally located within tessellate patches ..... *H. murakoshii*
  - 7b. Plants mainly deep purple to purple red, becoming greenish-brown when dried; surface not tessellate..... *H. rupestre*

***Hydrolithon boreale*** (Foslie) Y.M. Chamberlain, 1994: 116-119, figs 3B, 50, 51, 66. French Polynesia: Payri *et al.*, 2000: 188; Indian Ocean: Silva *et al.*, 1996: 235.

**Basionym:** *Melobesia farinosa* J.V. Lamouroux f. *borealis* Foslie, 1905: 96 (type locality: Roundstone, Co. Galway, Ireland).

**Material examined:** Moorea, leg. C. E. Payri, In Herb UPF.

Thallus entirely bistratose, up to 5 mm in diameter, pink-purple in colour; flat, encrusting and adherent, with imbricating layers, partly unconsolidated, with margins entire usually with concentric rings. Cells in surface view oblong, up to 29 µm long and 17 µm wide.

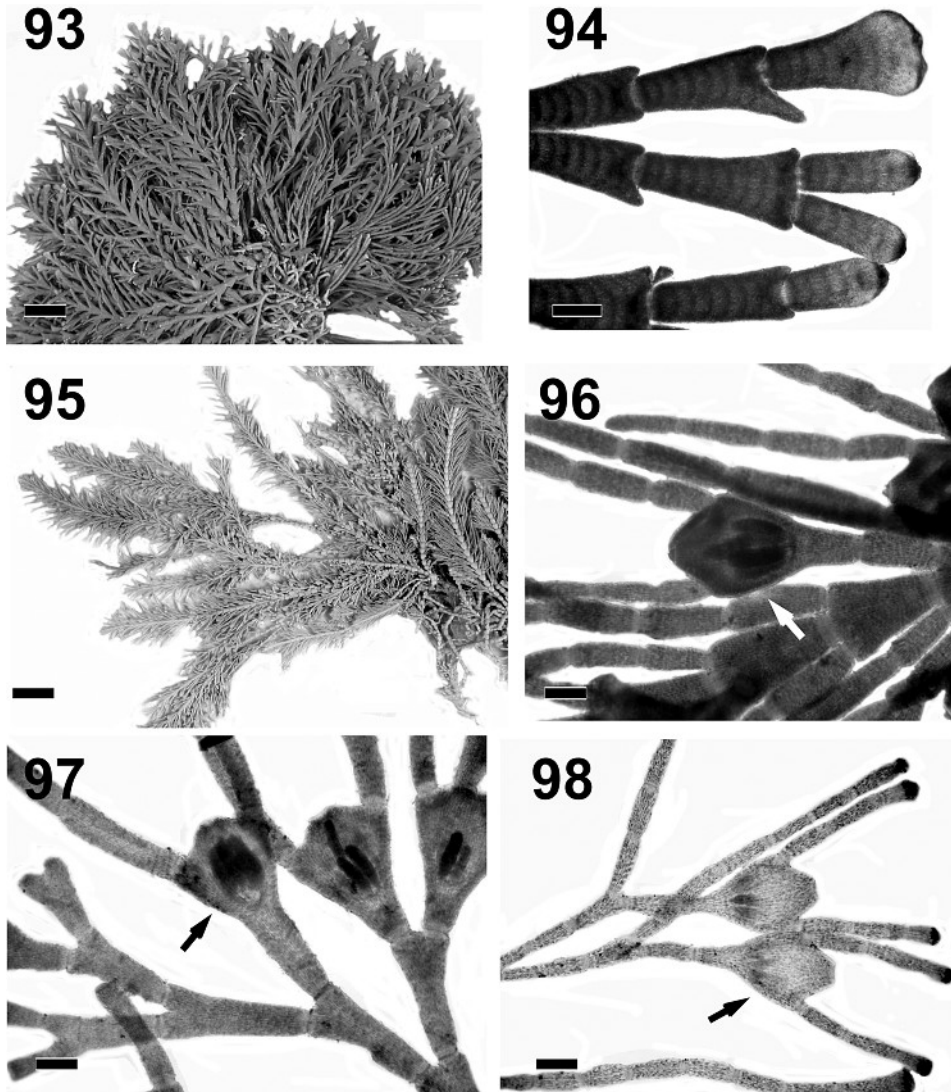
**Remarks:** Epiphytic on larger macroalgae such as *Cryptonemia umbraticola*.

***Hydrolithon farinosum*** (J.V. Lamouroux) Penrose *et* Y. M. Chamberlain, 1993: 295 figs 3A; 54; 55. French Polynesia: Payri *et al.*, 2000: 188; Indian Ocean: Silva *et al.*, 1996: 236; Rotuma Island: N'Yeurt, 1996: 412, fig. 140; Bermuda: Schneider & Searles, 1997: 189, figs 1-3; Great Barrier Reef, Australia: Ringeltaube & Harvey, 2000: 437, figs 12-13; Fiji: Littler & Littler, 2003: 30; Wallis Islands: N'Yeurt & Payri, 2004: 379; Samoa: Skelton & South, 2007: 47, figs 74-76.

**Basionym:** *Melobesia farinosa* J.V. Lamouroux, 1816: 315, pl. XI1 fig. 3 (type locality: Mediterranean Sea according to Chamberlain, 1983: 343).

**Heterotypic synonym:** *Fosliella farinosa* (J.V. Lamouroux) M. Howe, 1920: 588; Bikini Atoll: W.R. Taylor, 1950: 132; 1960: 388; Viêt Nam: Dawson, 1954: 425, fig. 37c; Marshall Islands: Dawson, 1956: 49; 1957: 114; Pacific Mexico: Dawson, 1960: 30, pl. 21, fig. 1; pl. 22, fig. 1; Jamaica: Chapman, 1963: 91, fig. 92; Caroline Islands: Trono, 1969: 51; Solomon Islands: Womersley & Bailey, 1970: 309; Guam: Gordon *et al.*, 1976: 255, figs 1-4; Britain: Chamberlain, 1977: 344, figs 1-20; Europe: Coppejans, 1978: 56, pl. 1 figs a-h, pl. 2 figs a-e, pl. 3 figs a-d, pl. 4 figs a-d, pl. 5 figs a-d; Great Barrier Reef, Australia: Cribb, 1983: 48, pl. 51, figs 1, 2; Belize: Littler & Littler, 1997: 29, fig. 17.



Marine algal flora of French Polynesia III. Rhodophyta,  
with additions to the Phaeophyceae and Chlorophyta

Figs 93-98. **93.** *Corallina elongata*: habit (UPF 3108). Scale = 4 mm. **94.** *Corallina elongata*: detail of decalcified upper axes, showing wedge-shaped intergenicula (UPF 246). Scale = 1 mm. **95.** *Jania subulata*: habit (UPF 1931). Scale = 2 mm. **96.** *Jania subulata*: detail of decalcified upper axes, showing conceptacle (arrow) terminal on intergenicula (UPF 1931). Scale = 500  $\mu$ m. **97.** *Jania adhaerens*: detail of decalcified axis, showing tetrasporangial conceptacle (arrow) (UPF 3257). Scale = 150  $\mu$ m. **98.** *Jania pumila*: detail of decalcified axis, showing tetrasporangial conceptacle (arrow) (UPF 3256). Scale = 150  $\mu$ m.

**Material examined:** Moorea, Tahiti, leg. C. E. Payri, In Herb UPF.

Thallus up to 2 mm in diameter, pink-mauve; flat, encrusting and adherent, with lobed or rounded margins, entirely bistratose. Cells in surface view quadrangular, up to 20  $\mu$ m long and 12  $\mu$ m wide.



**Remarks:** Frequently epiphytic on larger macroalgae such as *Sargassum* spp. and *Valonia ventricosa*.

***Hydrolithon gardineri*** (Foslie) Verheij *et* Prud'homme van Reine, 1993: 451. French Polynesia: Payri *et al.*, 2000: 190; Indian Ocean: Silva *et al.*, 1996: 237.

**Basionym:** *Lithophyllum gardineri* Foslie, 1907: 30-31 (syntype localities: Chagos Archipelago; Coetivy Reef, Seychelles. According to Silva *et al.*, 1996: 237, the lectotype locality is Coetivy Reef, Seychelles according to Adey & Lebednik, 1967).

**Material examined:** Rangiroa, *leg. C. E. Payri, In Herb UPF.*

Thallus highly branched, to 15 cm across and 15 cm high, forming massive coralloid heads, with an extensive basal crust. Branches massive and subdichotomously divided, mostly perpendicular to the thallus surface. Branch tips 2-4 mm in diameter, usually rounded (never pointed), becoming fused distally. Colour whitish- to deep-pink, surface mostly smooth but with granular areas due to the presence of fields of trichocysts (swollen, colourless cells), which are visible using a hand lens.

**Remarks:** Growing on the reef flat and the outer reef slope up to 15 m deep. The plants are usually solitary and sparse, and found only in atolls.

***Hydrolithon murakoshii*** Iryu *et* Matsuda, 1996: 528 (type locality: off Kabira, Ishigaki-jima, Ryukyu Islands, Japan). French Polynesia: Payri *et al.*, 2000: 190; Fiji: Littler & Littler, 2003: 32; Wallis Islands: N'Yeurt & Payri, 2004: 379.

**Material examined:** Moorea; Tahiti, *leg. C. E. Payri, In Herb UPF.*

Thallus up to 20 cm across, forming extensive unbranched crusts, firmly adhering to the substratum. Colour light brown, with a tessellate surface, covered with polygonal patterns. Conceptacles barely visible with a hand lens, mainly distributed within the polygons.

**Remarks:** Common in shallow water along the reef ridge and on the reef crest, also on intertidal stones at exposed sites.

***Hydrolithon onkodes*** (Heydrich) Penrose *et* Woelkerling, 1992: 81, figs 4-5. French Polynesia: Payri *et al.*, 2000: 192; 2001: 223; Guam: Gordon *et al.*, 1976: 266, pl. IX figs 1-4; South Africa: Keats & Chamberlain, 1994: 8, figs 1-19; Mauritius: Ballesteros & Afonso-Carrillo, 1995: 209, fig. 12; Indian Ocean: Silva *et al.*, 1996: 238; South Australia: Womersley, 1996: 261, fig. 119A-D; Great Barrier Reef, Australia: Ringeltaube & Harvey, 2000: 438, figs 14-16; Wallis Islands: N'Yeurt & Payri, 2004: 379; Samoa: Skelton & South, 2007: 47, fig. 77.

**Basionym:** *Lithothamnion onkodes* Heydrich, 1897a: 6-7, pl. 1: figs 11 (type locality: Tami Island, Gulf of Huon, Papua New Guinea according to Woelkerling, 1998: 357).

**Material examined:** Society; Tuamotu, *leg. C. E. Payri, In Herb UPF.*

Thallus encrusting and solitary, up to 10 cm in diameter and 1-10 mm thick, unbranched and lacking protuberances. Colour pink-yellowish in well-lit situation; surface smooth, but frequently scarred due to grazing by sea urchins and parrot fishes; texture rough due to abundant fields of trichocysts (swollen, colourless cells 63-130  $\mu$ m in diameter) on the surface, visible with hand lens. Conceptacles slightly raised, up to 150  $\mu$ m wide.

**Remarks:** One of the most common coralline algae in lagoons and down to 20 m on the outer slope. This species is particularly abundant on the reef crest, especially in atolls where it is the dominant component of the algal ridge.

***Hydrolithon reinboldii*** (Weber-van Bosse *et* Foslie) Foslie, 1909: 55. French Polynesia: Payri *et al.*, 2000: 192; Viêt Nam: Dawson, 1954: 425, fig. 37b; Mexico: Dawson, 1960: 28, pl. 20 figs 1-2, pl. 21 fig. 2; Guam: Gordon *et al.*, 1976: 255, pl. III





figs 5-6, pl. IV figs 1-3; Hawaiian Islands: Adey *et al.*, 1982: 25, figs 14-16a; Indian Ocean: Silva *et al.*, 1996: 239; Great Barrier Reef, Australia: Ringeltaube & Harvey, 2000: 439, figs 17-20; Gulf of California: Cruz-Ayala *et al.*, 2001: 191; Papua New Guinea: Littler & Littler, 2003: 32; Wallis Islands: N'Yeurt & Payri, 2004: 379.

**Basionym:** *Lithophyllum reinboldii* Weber-van Bosse *et* Foslie in Foslie, 1901: 5 (lectotype locality: Muaras Reef, East Kalimantan, Indonesia according to Silva *et al.*, 1996: 239).

**Homotypic synonym:** *Porolithon reinboldii* (Weber-van Bosse *et* Foslie) Lemoine, 1911: 166. Kei Islands: Weber-van Bosse, 1926: 116, fig. 25.

**Material examined:** Tahiti; Tuamotu, *leg. C. E. Payri, In Herb* UPF.

Thallus encrusting and firmly adherent, 2-4 mm thick, often forming rhodoliths; colour bluish lavender or purplish. Crusts flat to highly mamillate; excrescences rounded, 2-10 mm in diameter and up to 10 mm high, often anastomosing. Surface smooth, trichocysts occurring singly. Conceptacles small.

**Remarks:** Growing mostly in shallow areas, in the lagoon and on the outer slope down to 15 m deep. It forms simple crusts on the reef substratum as well as on coral rubble or pebbles, but can also form massive rhodoliths. Sometimes associated with *Neogoniolithon frutescens*. *Hydrolithon reinboldii* can be distinguished by its trichocysts that occur singly, not in pustulent patches as in *H. onkodes*.

***Hydrolithon rupestre*** (Foslie) Penrose, 1996: 265, fig. 121. French Polynesia: Payri *et al.*, 2000: 194; South Australia: Penrose in Womersley, 1996: 265, fig. 121A-C; Wallis Islands: N'Yeurt & Payri, 2004: 379.

**Basionym:** *Lithophyllum rupestre* Foslie, 1907: 26 (type locality: Ocean Beach, Sorrento, Victoria according to Woelkerling & Campbell, 1992: 100).

**Material examined:** Moorea, *leg. C. E. Payri, In Herb* UPF.

Thallus encrusting, verrucose, not extensive. Colour deep purple to purple-red, becoming greenish-brown when dried. Conceptacles barely visible with a hand lens, with a white line surrounding the pore. In vertical fracture as seen under a dissection microscope, thallus showing numerous rows of more or less circular cavities representing buried conceptacles.

**Remarks:** Growing on hard substrata in the lagoon.

***Hydrolithon samoëense*** (Foslie) Keats *et* Y. M. Chamberlain, 1994: 15, figs 31-54. French Polynesia: Payri *et al.*, 2000: 194; Indian Ocean: Silva *et al.*, 1996: 240.

**Basionym:** *Lithophyllum samoëense* Foslie, 1906: 20 (Lectotype locality: Satana, Savai'i Island, Western Samoa according to Chamberlain, 1994: 126).

**Material examined:** Tahiti; Takapoto, *leg. C. E. Payri, In Herb* UPF.

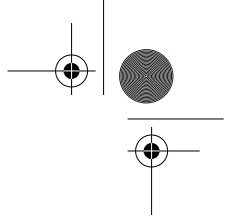
Thallus encrusting, up to 10 cm in diameter, pink to purplish-red in colour, strongly adherent to the substratum; lacking protuberances. Plants flat and thin, circular in shape, and become laterally joined to each other. Surface of the thallus covered with low bumps, corresponding to numerous small disc-like conceptacles, and is typically pock-marked resulting from the falling out of old conceptacles.

**Remarks:** Commonly found epilithic on rocks and dead corals in exposed areas, usually associated with rhodoliths and coral rubble. Plants are usually overgrown by more vigorous coralline crusts such as *Neogoniolithon* spp.

#### ***Jania* J.V. Lamouroux**

Species boundaries among tropical representatives of *Jania* are vague, and the genus is in need of systematic revision (Abbott, 1999a). Morphological





characters such as intergenicula distance, number of unbranched genicula and thallus diameter are used to delineate the various French Polynesian species. Kim *et al.* (2007) recently transferred the genera *Cheilosporum* and *Haliptilon* into *Jania* following molecular phylogenetic studies of the Janieae.

**Key to the French Polynesian species of *Jania*** (including species formerly placed in *Cheilosporum* (Decaisne) Zanardini)

- 1a. Axes flattened or compressed ..... 5
- 1b. Axes terete ..... 2
  - 2a. Thallus epilithic, forming cushions ..... 3
  - 2b. Thallus epiphytic, not forming cushions. .... 4
- 3a. Thallus rigid; axes narrow, 80-90  $\mu\text{m}$  in diameter; angle of branching 80-90°; calcification even; intergenicula short, 400-600  $\mu\text{m}$  ..... *J. rubens*
- 3b. Thallus flexible; axes wide, 200-300  $\mu\text{m}$  in diameter; angle of branching narrow, 45-60°; calcification annulate; intergenicula long, 800-1000  $\mu\text{m}$  ..... *J. articulata*
- 4a. Intergenicula 80-140  $\mu\text{m}$  in diameter and 900-1200  $\mu\text{m}$  long; up to 2 unbranched genicula between successive dichotomies ..... *J. adhaerens*
- 4b. Intergenicula 70-80  $\mu\text{m}$  in diameter and 500-800  $\mu\text{m}$  long; 3-4 unbranched genicula between successive dichotomies ..... *J. pumila*
  - 5a. Axes flattened, dichotomous ..... 6
  - 5b. Axes compressed, bipinnate ..... *J. subulata*
- 6a. Thallus 1-2 cm high; intergenicula 0.3-0.5 mm long and 1-1.5 mm wide; colour dark purple ..... *J. acutiloba*
- 6b. Thallus 3-5 cm high; intergenicula 1-1.5 mm long and 2-6 mm wide; colour pinkish ..... *J. spectabile*

***Jania acutiloba*** (Decaisne) J.H. Kim, Guiry *et* H.-G. Choi 2007: 1317. (**Figs 90-91**)

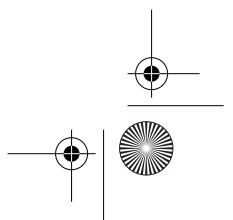
**Basionym:** *Amphiroa acutiloba* Decaisne, 1842: 125 (type locality: Mauritius).

**Homotypic synonym** (according to Kim *et al.*, 2007): *Cheilosporum acutilobum* (Decaisne) Piccone, 1886: 66. French Polynesia: Payri *et al.*, 2000: 184; Mauritius: Børgesen, 1943: 19, fig. 5a-c; 1950: 7, fig. 1; Seychelles: Wynne, 1995: 270, fig. 7; Indian Ocean: Silva *et al.*, 1996: 227; Fiji: N'Yeurt, 2001: 763, figs 136, 154; Samoa: Skelton & South, 2002a: 140; 2007: 42, figs 58-61; American Samoa: Littler & Littler, 2003: 28.

**Heterotypic synonym** (according to Srimanobhas *et al.*, 1990: 104): *Cheilosporum jungermannioides* Ruprecht ex Areschoug, 1852: 546, 547 (type locality: Tahiti). French Polynesia: Setchell, 1926: 106; Japan: Segawa, 1941: 450, figs 1-4; Mauritius: Børgesen, 1953: 26, fig. 7.

**Material examined:** Arue, Tahiti, 24 May 1922, *leg.* W. A. Setchell, & H. E. Parks, BM 840818; Tahara'a, Tahiti: 17 Jun. 1922, *leg.* W. A. Setchell, & H. E. Parks, BM 840819, BM 840791; 18 May 1996, *leg.* C. E. Payri, UPF 692; 14 Apr. 1997, *leg.* A. D. R. N'Yeurt & C. E. Payri, UPF 234, 235; 27 Nov. 2005, *leg.* A. D. R. N'Yeurt & A. Pham, UPF 3016; Maraa, Tahiti, 28 Sep. 1928, *leg.* C. Crossland, BM 840817; Punaauia, Tahiti, 6 Jul. 1997, *leg.* C. E. Payri, UPF 236; Rurutu, Australs, 18 Aug. 2000, *leg.* C. E. Payri, UPF 760; Passe Miri Miri, Raiatea, 8 mar. 2003, *leg.* C. E. Payri, UPF 3956; Moerai, Rurutu, 20 Jul. 2005, *leg.* J. Peterano & N. Jebel, UPF 3006.

Thallus 15 to 20 mm high, dark purple with delicate, dichotomously branched, distally tapered axes consisting of a series of calcified, upwardly-





pointing intergenicula 0.3-0.5 mm long and 1-1.5 mm wide. Lobe angle (Johansen, 1977: 176, fig. 26) 41-42° (this study). Medullary cells in tiers of six. Conceptacles 300-400 µm in diameter, located within fertile intergenicula.

**Remarks:** Growing in clumps, on rocky ledges and hanging from coralline growths in exposed areas of the reef crest and to depths of 10 m, often mixed with *J. spectabile*. So far in French Polynesia, only reported from the high islands of the Society and northern Australs (Raiatea, Tahiti, Rurutu). Based on molecular phylogenetic studies of genera within the Janieae, Kim *et al.* (2007) concluded that the Janieae includes only a single genus, *Jania*, and that reproductive rather than vegetative characters are of phylogenetic importance to delimit genera within the Corallinoideae. They also proposed the transfer of *Cheilosporum acutilobum* to the genus *Jania*.

***Jania adhaerens*** J.V. Lamouroux, 1816: 270 (type locality: Mediterranean Sea). French Polynesia: Setchell, 1926: 106; Indian Ocean: Silva *et al.*, 1996: 240; N'Yeurt & Payri, 1997: 890; Great Barrier Reef, Australia: Price & Scott, 1992: 48, fig. 12A-C; Rotuma: N'Yeurt, 1996: 413, fig. 126; Belize: Littler & Littler, 1997: 31, fig. 19; Hawaiian Islands: Abbott, 1999a: 187, fig. 48A; Fiji: N'Yeurt, 2001: 765; Littler & Littler, 2003: 32; Samoa: Skelton & South, 2002a: 141, fig. 6D-F; 2007: 45, figs 66-69. **(Fig. 97)**

**Material examined:** Iri Bay, Rapa, 16 Nov. 2002, *leg. J. L. Menou*, UPF 3257 RPS59, 3543; Rapa, 28 Nov. 2002, *leg. J. L. Menou*, UPF 2414.

Thallus minute, chalk-white, to 20 mm high, calcified, composed of terete to subterete, dichotomously branched axes 70-140 µm in diameter arising from a small crustose holdfast. Intergenicula (300)900-1200 µm long. Angle of branching 40-50°. Up to 2 unbranched genicula between successive dichotomies. Branch apices blunt, not markedly inflated. Tetrasporangial conceptacles to 350 µm wide and 400 µm high, terminal on intergenicula, with two surmounting branchlets. Tetrasporangia zonately divided, 40-60 µm wide and 130-210 µm long.

**Remarks:** Growing at depths of 3-31 m, epiphytic on other algae or on coral debris.

\****Jania articulata*** N'Yeurt *et* Payri, 2009: 15, figs 7-15 (type locality: Fangatau Atoll, Tuamotu, French Polynesia). **(Figs 100-102)**

**Material examined:** Fangatau Atoll, Tuamotu, 17 May 2003, *leg. C. E. Payri*, UPF 2710; Tauhunu, Manihiki, Cook Islands, 15 Jul. 1974, *leg. G. MacRaid*, WELT A028446.

Thallus reddish-orange to cream-coloured, pliable, forming clumps to 15 mm high and 20-30 mm wide, consisting of numerous jointed branches composed of calcified intergenicula; calcification distinctly annulate. Holdfast small and inconspicuous, embedded in coralline algal substratum. Branches with a core of medullary filaments with cells organized in tiers 40-50 µm apart, surrounded by a cortex of small rounded cells. Axes (200)300-400(600) µm in diameter, with very frequent genicula (uncalcified regions). Branching dichotomous, sometimes trichotomous in basal portions of thallus; dichotomies slightly offset. Intergenicula 400-1000 µm long; genicula numerous; between 4 to 11(22) unbranched genicula between successive dichotomies. Intergenicular length: width ratio small, between 1.3 and 2.5. Intergenicula with (4)6-11(13) tiers of clear cylindrical cells 150-160 µm long and 5-6 µm in diameter; genicula composed of a single tier of densely packed elongate cylindrical cells 400-420 µm long and 5-6 µm in diameter. Cortical cells (6)8-10(12) µm in diameter, supported by elongate, cylindrical subcortical cells 25-30 µm long. Branch apices rounded, not inflated, 150-200 µm in diameter. Angle of branching 45-60°. Tetrasporangial conceptacles single-chambered and swollen, terminal on intergenicular apices, to 500 µm wide and 400 µm high, with 2 surmounting branchlets. Tetrasporangia zonately divided, to 200 µm long and 80 µm wide.



**Remarks:** Growing on the outer reef flat, epiphytic on crustose coralline algae. The large branch diameter, annulate calcification with constricted, flexible genicula are distinctive characters of this unusual species within the genus *Jania*. It may superficially resemble some species of *Amphiroa*, but in the latter genus branching is irregularly dichotomous, axes are usually more than 1 mm wide, and the reproductive structures are invariably borne on the intergenicular surfaces, whereas in *Jania* they occur in single, swollen chambers terminal on intergenicular apices (Norris & Johansen, 1981). Also, *J. articulata* has a much larger axis diameter than other morphology similar species in the genus and sets itself apart by the very large number of unbranched genicula (up to 22) between successive intergenicular dichotomies, imparting the distinctive soft, pliable texture. The intergenicular length:width ratio of *J. articulata* is also considerable smaller than in other species. Another distinctive character is the sometimes trichotomous branching, not reported in any other *Jania* species. This species has also been found in older, only recently identified collections from the Cook Islands housed in WELT.

***Jania pumila*** J.V. Lamouroux, 1816: 269 (type locality: Red Sea). French Polynesia (Moorea): Taylor, 1973: 38. Indian Ocean: Silva *et al.*, 1996: 243; Hawaiian Islands: Abbott, 1999a: 189, fig. 48C; Samoa: Skelton & South, 2007: 46, figs 70-73. **(Fig. 98)**

**Material examined:** Rapa, Australs, 18 Oct. 2000, *leg. V. Clouard*, UPF RPS56, RPS58.

Thallus calcified, to 15 mm high, epiphytic, consisting of dichotomously branched terete to compressed axes 70-80  $\mu$ m in diameter. Intergenicula 500-800  $\mu$ m long; angle of branching narrow, 30-40°. Branch apices rounded, sometimes clavate, to 120  $\mu$ m in diameter. Three to four unbranched genicula between successive dichotomies. Tetrasporangial conceptacles to 350  $\mu$ m wide and 400  $\mu$ m high, terminal on intergenicula, with two surmounting branchlets. Tetrasporangia zonately divided, 40-50  $\mu$ m wide and 150-180  $\mu$ m long.

**Remarks:** Epiphytic on *Sargassum* sp.

***Jania rubens*** (Linnaeus) J.V. Lamouroux, 1816: 272, pl. 9, figs 6, 7. French Polynesia: Taylor, 1973: 38; N'Yeurt & Payri, 1997: 890; India: Børgesen, 1934: 7; Indian Ocean: Silva *et al.*, 1996: 244; Rotuma: N'Yeurt, 1996: 413, figs 125a-c, 141; Fiji: Littler & Littler, 2003: 34. **(Fig. 99)**

**Basionym:** *Corallina rubens* Linnaeus, 1758: 806 (type locality: Europe).

**Heterotypic synonym:** *Jania corniculata* (Linnaeus) J.V. Lamouroux, 1812: 186. French Polynesia: Setchell, 1926: 107.

**Material examined:** Motu Totegegie, Gambiers, 22 Nov. 2000, *leg. A. D. R. N'Yeurt*, UPF 794.

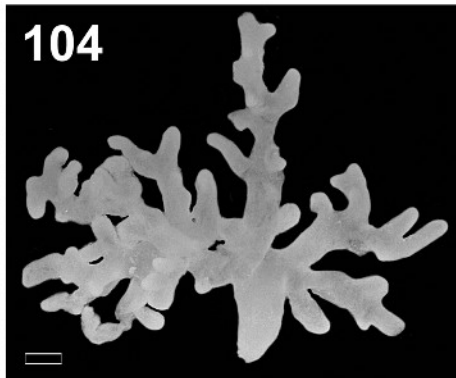
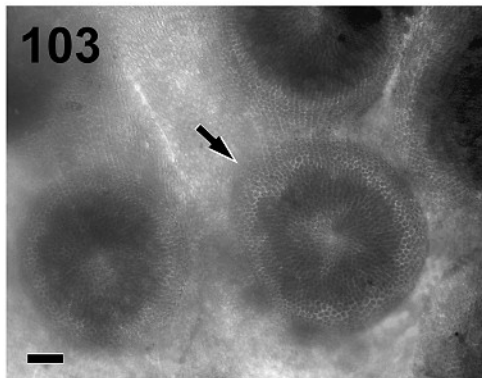
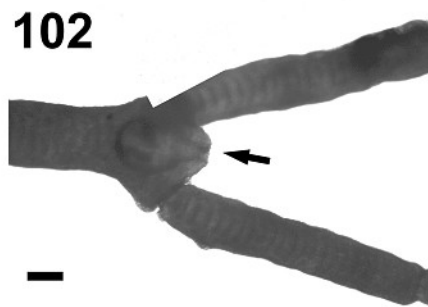
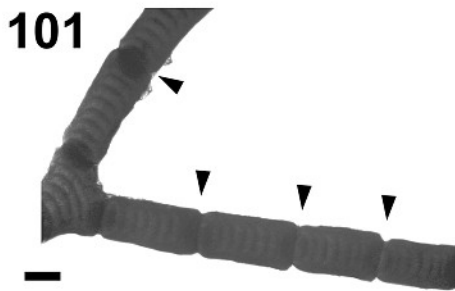
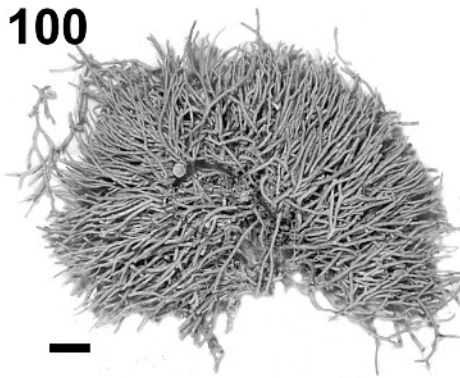
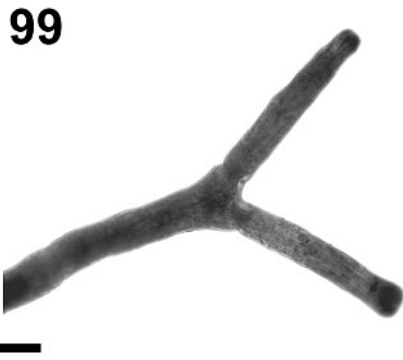
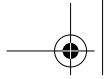
Thallus calcified, forming dense purplish matted clumps to 20 mm high and 30-40 mm wide, composed of terete, dichotomously branched axes 80-90  $\mu$ m in diameter. Intergenicula short, 400-600  $\mu$ m long. Between 5 and 10 unbranched genicula between successive dichotomies. Angle of branching 80-90°. Reproduction not seen.

**Remarks:** Forming dense matted clumps on the fringing reef. Many authors consider *J. corniculata* as a variety of *J. rubens* (*J. rubens* var. *corniculata* (Linnaeus) Yendo).

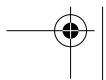
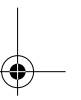
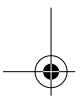
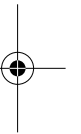
***Jania spectabile*** (Harvey ex Grunow) J.H. Kim, Guiry et H.-G. Choi 2007: 1318.

**(Fig. 92)**

**Basionym:** *Cheilosporum spectabile* Harvey ex Grunow, 1874: 41 (type locality: Tonga). French Polynesia: Payri *et al.*, 2000: 184; India: Børgesen, 1935: 51, fig. 23;



Figs 99-104. **99.** *Jania rubens*: decalcified upper branch (UPF 794). Scale = 100  $\mu$ m. **100.** *Jania articulata*: Habit of pressed plant, showing distinct annulate nature of branches (UPF 2710). Scale = 3 mm. **101.** *Jania articulata*: view of decalcified terminal axis, showing large number of unbranched genicula (arrowheads) between dichotomies (UPF 2710). Scale = 200  $\mu$ m. **102.** *Jania articulata*: view of decalcified fertile branch node, showing swollen, terminal tetrasporangial conceptacle with a narrow ostiole (arrow) (UPF 2710). Scale = 200  $\mu$ m. **103.** *Titanoderma pustulatum*: detail showing pustulate uniporate conceptacle (arrow) on thallus surface (UPF S106). Scale = 80  $\mu$ m. **104.** *Renouxia antillana*: habit of liquid-preserved plant (UPF 3191). Scale = 10 mm.





Solomon Islands: Womersley & Bailey, 1970: 314, pl. 26, fig. 22; Rotuma Island: N'Yeurt, 1996: 411, figs 117, 124; Indian Ocean: Silva *et al.*, 1996: 230; Philippines: Kraft *et al.*, 1999: 9, fig. 9; Fiji: N'Yeurt, 2001: 765, figs 137, 157; Samoa: Skelton & South, 2002a: 141, fig 6A-C; 2007: 44, figs 62-65.

**Material examined:** Paea, Tahiti, c. 1992, *leg. B. Bourgeois*, UPF 237; Afaahiti, Tahiti: 10 Jun. 1997, *leg. A. D. R. N'Yeurt*, UPF 239; 16 Nov. 2004, *leg. A. D. R. N'Yeurt & A. Pham*, UPF 2901; Taharaa, Tahiti: 6 Jun. 1997, *leg. J. Orempuller*, UPF 238; 27 Nov. 2005, *leg. A. D. R. N'Yeurt & A. Pham*, UPF 3018; Taone, Tahiti, 2 Mar. 1998, *leg. J. Orempuller*, UPF 3102.

Thallus 30 to 60 mm high, light pinkish, consisting of relatively robust, dichotomously branched, non-tapered axes with calcified, upward-pointing intergenicula 1-1.5 mm long and 2-6 mm wide. Lobe angle 40-41° (this study).

**Remarks:** Growing in clumps, on rocky ledges and hanging from coralline growths in exposed areas of the reef crest and to depths of 10 m on the island of Tahiti, often mixed with *J. acutiloba*, from which it can be distinguished by its wider, stouter non-tapered axes.

\**Jania subulata* (J. Ellis *et Solander*) N'Yeurt *et Payri*, **comb. nov.** (Figs 95-96)

**Basionym:** *Corallina subulata* J. Ellis *et Solander*, 1786: 119 (type locality: West Indies).

**Homotypic synonym:** *Haliptilon subulatum* (J. Ellis *et Solander*) W. H. Johansen, 1970: 79, figs 10, 12. Hawaiian Islands: Abbott, 1999a: 185, figs 46C-D, 47B-C; Indian Ocean: Silva *et al.*, 1996: 234.

**Material examined:** Tedside, Pitcairn Island, 28 Aug. 1997, *leg. J. Starmer*, UPF 646; Rapa, Australs, 4 Nov. 2002, *leg. C. E. Payri*, UPF 1931; Tarakoi Islet, Rapa, Australs, 5 Nov. 2002, *leg. C. E. Payri*, UPF 2911, 2912, 3354.

Thallus 30-50 mm high, consisting of sparsely branched, markedly percurrent compressed dichotomous axes, bearing pinnate to dichotomous laterals. Main axes naked below, plumose distally, attached via entangled basal stolons. Intergenicula of percurrent axes stocky and bead-like, 0.4-0.5 mm long and 0.3-0.5 mm wide. Lateral branches filiform, 0.1-0.3 mm in diameter, abaxially curved, with acute apices. Conceptacles axial, terminal on fertile intergenicula, protuberant. Female and tetrasporangial conceptacles with two surmounting branchlets.

**Remarks:** Growing at depths of 15-20 m, on coralline debris. So far in Polynesia, only known from the Hawaiian Islands, Rapa Island in the southern Australs, and Pitcairn Island. The concept of the *Janieae* having been extended by Kim *et al.* (2007) and the genus *Haliptilon* having been transferred under *Jania*, the new combination *Jania subulata* is warranted for *Haliptilon subulatum* (H.-G. Choi, pers. com.). *Jania subulata* might be conspecific with *J. rosea* (Lamarck) Decaisne, but affinities between these two species remain unclear until type material of the former has been found (Millar, 1990: 320). Despite the apparent non-extant nature of the type specimen, Abbott (1999a: 186) provides some credible arguments from the literature for the validation of *Corallina subulata*.

### *Mastophora* Decaisne

*Mastophora pacifica* (Heydrich) Foslie, 1903: 25. French Polynesia: Payri *et al.*, 2000: 196; South Australia: Woelkerling in Womersley, 1996: 248, figs 111A-E, 112A-E, 113A-B; Great Barrier Reef, Australia: Ringeltaube & Harvey, 2000: 441, figs 21, 22; Papua New Guinea: Littler & Littler, 2003: 40; Wallis Islands: N'Yeurt & Payri, 2004: 380.

**Basionym:** *Melobesia pacifica* Heydrich, 1901: 529 (type locality: Hawaiian Islands according to Woelkerling, 1998: 378).





**Material examined:** Afaahiti, Tahiti, 8 Jun. 1997, *leg. A. D. R. N'Yeurt*, UPF 346; Tupai, 3 Jul. 2002, *leg. C. Vermeot*, UPF 2489; Povai, Bora Bora, 16 Aug. 2002, *leg. A. D. R. N'Yeurt & D. Schneider*, UPF 2539; Mohio, Bora Bora, 21 Aug. 2002, *leg. A. D. R. N'Yeurt & D. Schneider*, UPF 2603.

Thallus forming loosely attached, thin and delicate, brittle, leafy crusts up to 40 mm across. Colour pink to deep red; blades loosely overlapping and adhering to each other. Conceptacles large and conical, visible to the naked eye on thallus surface.

**Remarks:** Growing sheltered from wave action, within crevices and under corals in the lagoon, and along the reef front.

*Neogoniolithon* Setchell *et* L.R. Mason

**Key to the French Polynesian species of *Neogoniolithon***

- 1a. Thalli forming short branches . . . . . *N. brassica-florida*
- 1b. Thalli unbranched . . . . . 2
  - 2a. Thalli solid, flat or lumpy or somewhat leafy, becoming thick, pale blue or grey, with large and prominent conical conceptacles . . . . . *N. fosliei*
  - 2b. Thalli comprising thin, leafy layers, not becoming thick, conceptacles prominent with long beaks . . . . . *N. megalocystum*

*Neogoniolithon brassica-florida* (Harvey) Setchell *et* L.R. Mason, 1943: 91. Indian Ocean: Silva *et al.*, 1996: 261; Great Barrier Reef, Australia: Ringeltaube & Harvey, 2000: 441, figs 23-27.

**Basionym:** *Melobesia brassica-florida* Harvey, 1849: 110 (type locality: Algoa Bay, Cape Province, South Africa).

**Heterotypic synonyms:** *Goniolithon frutescens* Foslie, 1900c: 9-12 (Lectotype locality: Male Atoll, Maldives according to Woelkerling (1993: 59) but cited as Funafuti, Tuvalu by South & Skelton, 2003).

*Neogoniolithon frutescens* (Foslie) Setchell *et* L. R. Mason, 1943: 91. French Polynesia: Payri *et al.*, 2000: 200; Guam: Gordon *et al.*, 1976: 263, pl. 7 figs 2-4, pl. 8 figs 1-3.

**Material examined:** Tiahura, Moorea, 28 Sep. 2004, *leg. A. D. R. N'Yeurt & A. Pham*, in *Herb.* UPF.

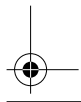
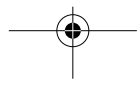
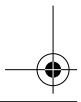
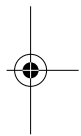
Thallus encrusting, pink to cream in colour, with many short and slender branches arising from a basal crust; often forming rhodoliths. Branches up to 1-2 cm high and 1-3 mm in diameter, simple or subdichotomously branched, with pointed apices. Conceptacles usually at tips of branches.

**Remarks:** Growing in the lagoon on coral fragments, in areas with strong current. Often rhodoliths are found partially buried in the sand and associated with *Hydrolithon reinboldii*. A large population grows at Tiahura barrier reef on Moorea Island.

*Neogoniolithon fosliei* (Heydrich) Setchell *et* L.R. Mason, 1943: 90; pl.9, figs 1-5. French Polynesia: Payri *et al.*, 2000: 198; Guam: Gordon *et al.*, 1976: 261, pl. 6 figs 2-5, pl. 7 fig. 1; Hawaiian Islands: Adey *et al.*, 1982: 23, figs 10, 11c, 13; Fiji: Littler & Littler, 2003: 44.

**Basionym:** *Lithothamnion fosliei* Heydrich, 1897a: 58-60, fig. 1, pl. III: figs. 9-11 (type locality: Tor, Sinai Peninsula, Egypt).

**Material examined:** Moorea; Tahiti, *leg. C. E. Payri*, in *Herb.* UPF.





Thallus encrusting and tightly adhering to the substratum, up to 10-20 cm in diameter and 5 mm thick; pale blue or greyish in colour. Surface smooth, with prominent large conical conceptacles.

**Remarks:** Commonly found in lagoons and on the inner or outer reef flats of the Society Islands. *Neogoniolithon fosliei* was previously considered a synonym of *Neogoniolithon brassica-florida*, but both species were found to be distinct after molecular studies by Kato *et al.* (2009).

***Neogoniolithon megalocystum*** (Weber-van Bosse *et* Foslie) Setchell *et* L.R. Mason, 1943: 90. French Polynesia: Payri *et al.*, 2000: 200; Solomon Islands: Womersley & Bailey, 1970: 311, pl. 26 fig. 21; Comoro Islands, Indian Ocean: Silva *et al.*, 1996: 264.

**Basionym:** *Goniolithon megalocystum* Foslie, 1904: 48-49, fig. 20, pl. 9: figs 8, 9 (type locality: near Kawio Island (Pulau Meares), Karkaralong Islands, Indonesia).

**Material examined:** Tiahura, Moorea, *leg. C. E. Payri, in Herb. UPF.*

Thallus pinkish mauve when exposed to light, greyish brown in shade, composed of thin lamellate layers loosely attached to the substratum. Conceptacles prominent on upper surface, with long, thin, beak-like ostioles.

**Remarks:** Growing on hard substratum within the barrier reef. The long, beak-like ostioles of the female plants characterize this species within the genus.

***Pneophyllum* Kützing**

***Pneophyllum conicum*** (E.Y. Dawson) Keats, Y.M. Chamberlain *et* Baba, 1997: 264, figs 1-33. French Polynesia: Payri *et al.*, 2000: 202; Fiji: Littler & Littler, 2003: 48; Wallis Islands: N'Yeurt & Payri, 2004: 380.

**Basionym:** *Hydrolithon conicum* E. Y. Dawson, 1960: 27, pl. 19: figs 1-3 (type locality: Binnars Cove, Isla Socorro, Revillagigedo Archipelago, Mexico according to South & Skelton, 2003).

**Homotypic synonyms:** *Neogoniolithon conicum* (E. Y. Dawson) Gordon, Masaki *et* Akioka. Guam: Gordon *et al.*, 1976: 259, pl. IV figs 6-8, pl. VI fig. 1

*Paragoniolithon conicum* (E. Y. Dawson) W. H. Adey, Townsend *et* Boykins. Hawaiian Islands: Adey *et al.*, 1982: 13, figs 6-7.

**Material examined:** Moorea; Tahiti; Takapoto; Rangiroa, *leg. C. E. Payri, in Herb. UPF;* Tarakoi Islet, Rapa, 5 Nov. 2002, *leg. C. E. Payri, UPF 3404 RPS 189;* Rukuaga, Rapa, 30 Nov. 2002, *leg. J. L. Menou, UPF 3292 RPS 83.*

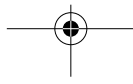
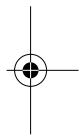
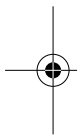
Thallus up to 10 cm across and several mm thick, forming an unbranched crust firmly attached to the substratum, with somewhat lobed margins. Colour yellowish-pink to dark red. Surface texture somewhat rough due to patches of trichocysts, distributed especially around the conceptacles. Trichocysts and white scales visible under the dissection microscope. Conceptacles conical, small and low, barely visible with a hand lens.

**Remarks:** This species is common on hard substrata in the lagoon and on the outer slope down to at least 25 m. It is one of the most frequent crustose coralline algae, usually overgrowing and killing encrusting corals.

***Lithophyllum* Philippi**

**Key to the French Polynesian species of *Lithophyllum***

- 1a. Thallus spherical and massive, branches terete to flattened .....  
 ..... *L. kotschyannum*





- 1b. Thallus encrusting, not branched .....2
  - 2a. Thallus yellowish in bright light .....*L. flavescens*
  - 2b. Thallus chalky blue in appearance.....*L. insipidum*

***Lithophyllum flavescens*** Keats, 1997: 357, figs 23- 39 (type locality: Nukulau Island, Suva Lagoon, Fiji). French Polynesia: Payri *et al.*, 2000: 204.

**Material examined:** Tiahura, Moorea; Tahiti, *leg. C. E. Payri, in Herb.* UPF.

Thallus encrusting, up to 3-4 cm across and 1-3 mm thick, colour yellowish, firmly adherent to the substratum. Thallus surface often with chalky white patches, becoming matt-chalky when dried and frequently parasitized by microborer organisms. Conceptacles flush to faintly raised, not visible to the naked eye.

**Remarks:** Growing in shallow water, in the barrier reef on coral heads and on the algal ridge, forming mixed populations with *Lithophyllum insipidum* and *Hydrolithon onkodes* with which it could be mistaken, especially with the very yellowish forms of *H. onkodes* growing in bright light.

***Lithophyllum insipidum*** W.H. Adey, Townsend *et* Boykins, 1982: 44, figs 23, 29 (type locality: Waikiki, Oahu, Hawaiian Islands). French Polynesia: Payri *et al.*, 2000: 206; Fiji: Keats, 1997: 352, figs 1-22.

**Material examined:** Tiahura, Moorea; Tahiti, *leg. C. E. Payri, in Herb.* UPF.

Thallus encrusting and flat, up to 50-80 mm wide and 10 mm thick, blue-lavender in colour, firmly adherent to the substratum, with the surface usually becoming dull and irregularly tessellated with a chalky appearance when dried. Conceptacles flush to faintly raised with respect to the thallus surface.

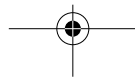
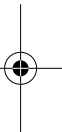
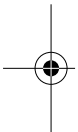
**Remarks:** Growing in shallow waters, on coral heads within the barrier reef, and less frequently on the algal ridge, forming mixed populations with *Lithophyllum insipidum* and *Hydrolithon onkodes*. *Lithophyllum insipidum* could be confused with flat specimens of *H. reinboldii*, because of the blue colour and the tessellate surface. However, *H. reinboldii* differs in having a thinner thallus (2-4 mm) and a smooth surface with trichocysts present.

***Lithophyllum kotschyannum*** Unger, 1858: 22, pl 5, figs 15-16 (type locality: Gulf of Bahrain, Persian Gulf). French Polynesia: Payri *et al.*, 2000: 206; Guam: Gordon *et al.*, 1976: 267, pl. 9 figs 5-6, pl. 10 figs 1-2; Hawaiian Islands: Adey *et al.*, 1982: 37, figs 23-25; Mauritius: Ballesteros & Afonso-Carrillo, 1995: 207, fig. 2; Indian Ocean: Silva *et al.*, 1996: 248.

**Material examined:** Tiahura, Moorea; Tahiti, *leg. C. E. Payri, in Herb.* UPF.

Thallus forming massive coralloid heads up to 20 cm across and 10 cm high, sometimes with an extensive basal crust; highly branched, consisting of repeated subdichotomies. Colour whitish-pink over the surface, and purple within the thallus. Branch forms varying from short simple knobs to broad and flat branches. The branch tips are 2-4 mm broad and 1-3 mm thick, usually rounded (never pointed) and becoming upwardly fused.

**Remarks:** Growing on the inner and outer barrier reef, and down to 20 m deep on the outer reef slope. The plants are usually single and sparse. This is the only branched *Lithophyllum* species in French Polynesia, and the most massive branched form in the reefs of high islands such as Tahiti and Moorea. In atolls, the ecological niche of this species seems to be occupied by *Hydrolithon gardineri*. According to Woelkerling & Nelson (2004), the taxonomy of this species is uncertain.





**Mesophyllum** Lemoine

**Key to the French Polynesian species of *Mesophyllum***

- 1a. Thallus forming short protuberances . . . . . *M. erubescens*
- 1b. Thallus lacking protuberances . . . . . *M. funafutiense*

***Mesophyllum erubescens*** (Foslie) Lemoine, 1928: 252. French Polynesia: Payri *et al.*, 2000: 208; Guam: Gordon *et al.*, 1976: 252, pl. 1 figs 5-8; South Africa: Keats & Chamberlain, 1994: 175, figs 1-42; Mauritius: Ballesteros & Afonso-Carrillo, 1995: 209, fig. 11; Indian Ocean: Silva *et al.*, 1996: 256; Great Barrier Reef, Australia: Ringeltaube & Harvey, 2000: 445, figs 34-37.

**Basionym:** *Lithothamnion erubescens* Foslie, 1900: 9 (type locality: Chaloup Bay, Fernando de Noronha Island, Pernambuco, Brazil).

**Material examined:** Tiahura, Moorea; Tahara'a, Tahiti, *leg. C. E. Payri, in Herb.* UPF.

Thallus massive, consisting of a flat crust developing many short, terete to flattened protuberances up to 100 mm high and 1-2 mm in diameter. Protuberances frequently fused, and sometimes branched. Sporangial conceptacles raised, often crowded on the protuberances. Surface of sporangial conceptacles characteristically with numerous tiny pores which are barely visible under the dissecting microscope.

**Remarks:** Growing mainly in dim light environment, at depths of 10-20 m, on dead corals and reef walls, but also on the reef ridge in *Sargassum* beds; occurring mixed with other crustose coralline algae.

***Mesophyllum funafutiense*** (Foslie) Verheij, 1993: 238. French Polynesia: Payri *et al.*, 2000: 209.

**Basionym:** *Lithothamnion philippii* Foslie f. *funafutiense* Foslie, 1899: 3 ('*funafutiensis*') (type locality: Funafuti, Tuvalu).

**Material examined:** Tiahura, Moorea, *leg. C. E. Payri, in Herb.* UPF.

Thallus forming a reddish-brown, firmly adherent, extensive thin crust, lacking any protuberances. Margins adherent and circular. Surface texture lumpy, with numerous dome-shaped, strongly raised sporangial conceptacles which are visible to the naked eye. The surface of sporangial conceptacles is covered with numerous tiny pores.

**Remarks:** Growing on dead corals in the lagoon, on the reef crest underneath *Sargassum* beds and on the outer reef slope to 15 m deep.

***Titanoderma*** Nägeli

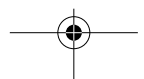
***Titanoderma pustulatum*** (J.V. Lamouroux) Nägeli, 1858: 532, footnote. Belize: Littler & Littler, 1997: 35, fig. 24; Indian Ocean: Silva *et al.*, 1996: 274; Fiji: Littler & Littler, 2003: 50; South & Skelton, 2003: 726. **(Fig. 103)**

**Basionym:** *Melobesia pustulata* J.V. Lamouroux, 1816: 315, pl. XII, fig. 2 (type locality: France).

**Homotypic synonym** (according to Bailey, 1999): *Lithophyllum pustulatum* (J.V. Lamouroux) Foslie, 1904: 8. French Polynesia: Payri & N'Yeurt, 1997: 891; Southern Australia: Womersley, 1996: 227, figs 100A-F, 101A-C; Great Barrier Reef, Australia: Ringeltaube & Harvey, 2000: 434, figs 5-6.

**Material examined:** Marquesas, c. 1995, *leg. Anonymous*, UPF 492 S106.

Thallus pink, encrusting, 15-50 mm across and 0.5-1.5 mm thick, with a lumpy texture. Organization dorsiventral, with a ventral layer of branched, laterally attached filaments terminating in epithallial cells 5-12 µm in diameter.





Female uniporate conceptacles pustulate, 290-350 µm in diameter, scattered on thallus surface, with terminal carposporangia about 15 µm in diameter and 70 µm long.

**Remarks:** Epiphytic on fleshy macroalgae (e.g.? *Grateloupia* sp.). The genus *Titanoderma* was subsumed into *Lithophyllum* by Campbell & Woelkerling (1990) due to the absence of reliable morphological characters to separate the two genera, but resurrected by Bailey (1999) based on molecular phylogenetic evidence. The extensive synonymy of the cosmopolitan species *T. pustulatum* is outlined in Guiry & Guiry (2007).

### **Sporolithaceae** Verheij

#### ***Sporolithon*** Heydrich

#### **Key to the French Polynesian species of *Sporolithon***

- 1a. Thallus red to pink, with sori pronouncedly raised, bearing a large pore visible with a hand lens ..... *S. episoredion*  
 1b. Thallus red to brown, with sori raised or flush, bearing small pores .....  
 ..... *S. ptychoides*

***Sporolithon episoredion*** (W.H. Adey, Townsend *et* Boykins) Verheij, 1992: 501. French Polynesia: Payri *et al.*, 2000: 210.

**Basionym:** *Archaeolithothamnion episoredion* W.H. Adey, Townsend *et* Boykins 1982: 50-52 (type locality: St Rogatien Bank, Hawaii).

**Material examined:** Takapoto, *leg. C. E. Payri, in Herb.* UPF.

Thallus encrusting, red to pink in colour, with a flat glossy surface sometimes with protuberances and presence of scales of sloughing cells. Sporangia in very much raised sori occurring in patches, with large pores visible with a hand lens. Old buried sori are visible within the thallus in vertical fracture under the dissecting microscope.

**Remarks:** Growing on hard substratum, mixed with other coralline algae. In lagoons, found on old *Acropora*, on the algal crest.

***Sporolithon ptychoides*** Heydrich, 1897b: 67-69, figs. 2, 3, pl. III: figs. 20-23 (type locality: Tor, Sinai Peninsula, Egypt). French Polynesia: Payri *et al.*, 2000: 211; Indian Ocean: Silva *et al.*, 1996: 277.

**Material examined:** Moorea; Tahiti; Takapoto, *leg. C. E. Payri, in Herb.* UPF.

Thallus forming extensive crusts, firmly to weakly attached on the substratum, with a glossy, flat surface at times lumpy, with frequent scales of sloughing cells. Colour reddish brown to dark brown, with pinkish spots corresponding to reproductive areas. Sporangia in slightly raised sori, with small pores. Old buried sori are visible as layers of small pods within the thallus, in vertical fracture under the dissection microscope.

**Remarks:** Growing on hard substratum and overgrowing most other coralline algae, found in lagoons along the reef crest, on the algal crest and on the outer slope in grooves down to 20 m deep.

### **Rhodogorgonales** Fredericq, J.N. Norris *et* C. Pueschel

#### **Rhodogorgonaceae** Fredericq, J.N. Norris *et* C. Pueschel

#### ***Renouxia*** Fredericq *et* J.N. Norris





***Renouxia antillana*** S. Fredericq et J.N. Norris, 1995: 329, figs 1-42 (type locality: Ilet à Caret (between Grande Terre and Basse Terre), Grand Cul de Sac Marin, Guadeloupe). French Polynesia: Payri *et al.*, 2000: 226; Thailand: Liao & Aungtonya, 2000: 77, fig. 2; Fiji: N'Yeurt, 2001: 806, figs 239-241; American Samoa: Littler & Littler, 2003: 68 (as *Renouxia* sp.); Puerto Rico: Ballantine *et al.*, 2004: 335, fig. 1.

(Figs 104-105)

**Material examined:** Entre deux Baies, Moorea, 12 Dec. 1995, *leg. A. D. R. N'Yeurt & J. Orempuller*, UPF 3191.

Thallus to 35 mm high, light pink-orange and extremely slippery and gelatinous, attached to the substratum via a small basal holdfast about 3 mm in diameter. Erect axes 4-10 mm in diameter, irregularly branched with blunt, non-tapered tips. Internal structure filamentous, with light calcification (special calciferous cells are scattered at a certain depth within the thallus). Cortical filaments fasciculate, pseudodichotomously branched, with rectilinear cells 4-6  $\mu$ m in diameter and 16-32  $\mu$ m long. Reproduction not seen in French Polynesian material, but reported elsewhere (Fredericq & Norris, 1995; N'Yeurt, 2001).

**Remarks:** A rare plant, in French Polynesia only found in Moorea attached to coralline surfaces in crevices on the outer reef slope, at depths of 15 to 20 m. The uncommon appearance and texture of this alga makes it easy to be mistaken for a soft coral.

#### **Gigartinales** F. Schmitz

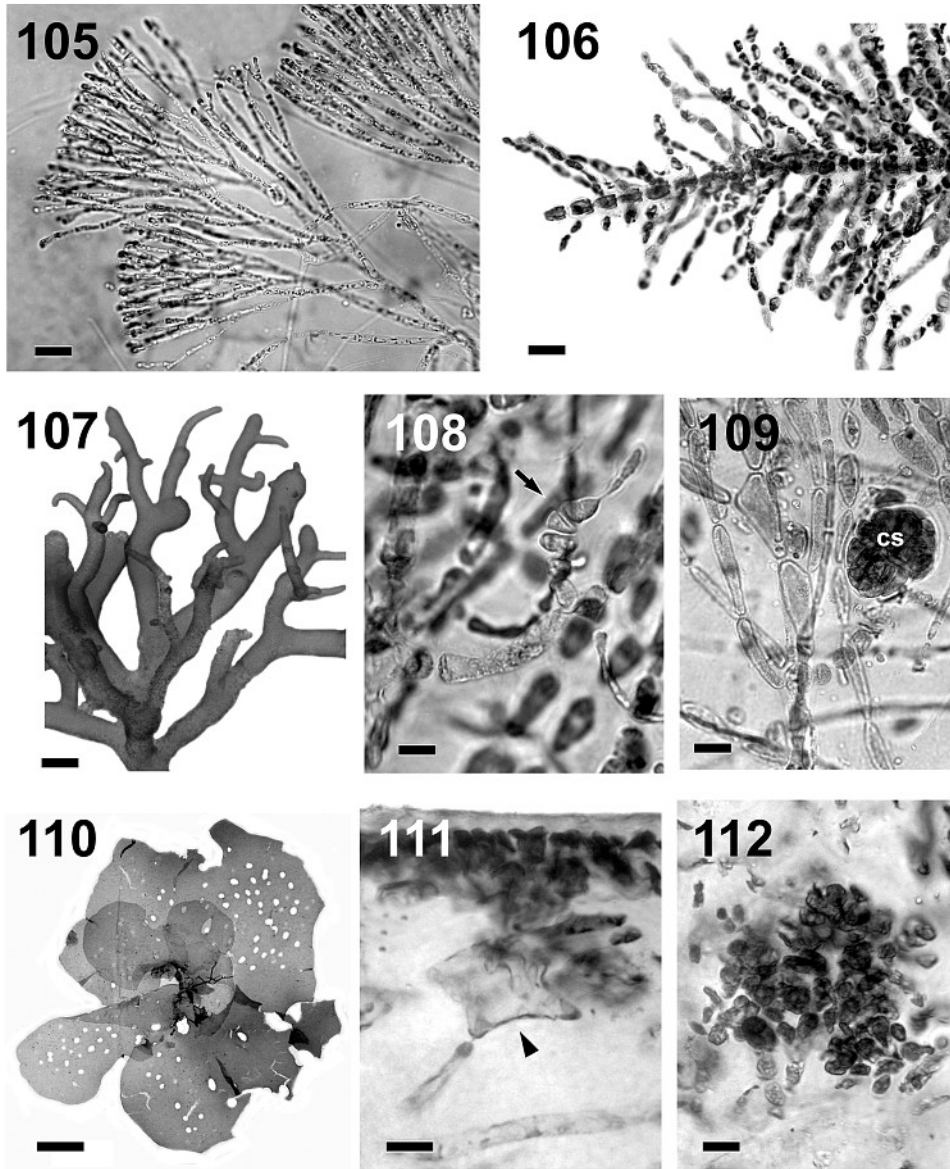
#### **Gloiosiphoniaceae** F. Schmitz

#### ***Peleophycus*** I.A. Abbott

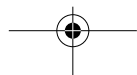
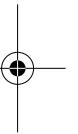
\****Peleophycus multiprocarpium*** I.A. Abbott, 1984: 327 (type locality: O'ahu, Hawaii). Hawaiian Islands: Abbott, 1999a: 111, fig. 23A-E. (Figs 106-109)

**Material examined:** east oceanic plateau, Rapa, Australs, 05 Nov. 2002, *leg. J. L. Menou*, UPF 1942, 2279, 2280, 2284, 2285, 3310 RPS97, 3311 RPS97, 3311 RPS98, 3312 RPS99, 3313 RPS100, 3353 RPS139; southeast oceanic plateau, Rapa, Australs, 08 Nov. 2002, *leg. J. L. Menou*, BM 000806235, UPF 3357 RPS143; northeast oceanic plateau, Rapa, Australs, 14 Nov. 2002, *leg. J. L. Menou*, UPF 2209, 3359 RPS145; between Patagaroa and Mei Points, Rapa, 18 Nov. 2002, *leg. C. E. Payri*, UPF 2278, 3320 RPS107; exit of Hau'rei Bay, Rapa, 22 Nov. 2002, *leg. J. L. Menou*, UPF 2281, 3307 RPS94; eastern oceanic slope, Rapa, 23 Nov. 2002, *leg. J. L. Menou*, UPF 2282, 2283, 2286, 2287, 3228 RPS32, 3306 RPS93, 3309 RPS96; cliffs at Rukuaga Point, Rapa, 30 Nov. 2002, *leg. J. L. Menou*, UPF 3198 RPS2.

Thallus erect and terete, 200-250 mm high, reddish-pink, with a soft, mucilaginous, slippery texture and fuzzy margins, attached to the substratum via a single, discoid holdfast. Structure uniaxial, with dense, irregularly pinnate branching about a percurrent main axis 5-10 mm in diameter. Adheres well to paper when dry, with a rough surface texture. Determinate branches elongate and spindle-shaped, basally constricted, 4-8 mm in diameter in the second order, becoming about 1 mm in the third order and down to 500  $\mu$ m in the ultimate branchlets. Axial cells elongate and prominent, to 0.5 mm wide and 1 mm long, invested with radial to spiral whorls of 4 lateral branchlets 5-8  $\mu$ m in diameter. Cells of latter-order branchlets oval to spherical. Plants monoecious; spermatia 1.5-2  $\mu$ m in diameter, terminal on whorl branchlets. Carpogonial branches attached to basal cells of lateral branches, composed of 4 to 5 subrectangular cells, moderately to strongly curved, with a short trichogyne. Auxiliary cells are terminal; connecting filaments are absent and the carpogonium undergoes division following fertilization, with one of the derivative cells fusing with the auxiliary cell. Mature cystocarps 50-80  $\mu$ m, composed of several masses of evenly maturing carposporangia 8-12  $\mu$ m in diameter. Tetrasporangia not seen.



Figs 105-112. **105.** *Renouxia antillana*: detail of fasciculate cortical filaments (UPF 3191). Scale = 20  $\mu$ m. **106.** *Peleophycus multiprocarpium*: detail of upper axis, showing uniaxial, irregularly pinnate nature (UPF 2278). Scale = 1 mm. **107.** *Peleophycus multiprocarpium*: habit of fresh plant (UPF 1942). Scale = 10 mm. **108.** *Peleophycus multiprocarpium*: carpogonial branch, showing trichogyne (arrow) (UPF 2278). Scale = 10  $\mu$ m. **109.** *Peleophycus multiprocarpium*: young carposporophyte, with carposporangial mass (CS) (UPF 2278). Scale = 10  $\mu$ m. **110.** *Kallymenia thompsonii*: habit of pressed plant (UPF 1912) showing perforate thallus. Scale = 10 mm. **111.** *Kallymenia thompsonii*: transverse section of thallus showing short-armed trapezoidal inner cortical cell (arrowhead) (UPF 3961). Scale = 40  $\mu$ m. **112.** *Kallymenia thompsonii*: mature cystocarp embedded in medulla (UPF 3961). Scale = 40  $\mu$ m.





**Remarks:** Growing at depths of 22 to 68 m, relatively common in deeper water on the outer reef slope. In French Polynesia, only recorded from the southern Australs island of Rapa. This is the first report of this species outside of the type locality of Hawaii, and the first tropical member of its family. *Peleophycus multiprocarpium* is characterised by a strongly uniaxial structure, pinnate branches and curved carpogonial branches issued from the basal cells of lateral branches. It can be distinguished from the superficially similar genus *Trichogloea* Kützing by the calcified, multiaxial nature of the latter, as well as differences in cystocarp structure. The placement of *Peleophycus* within the family Gloiosiphoniaceae was recently questioned by Withall & Saunders (2006) based on different post-fertilization reproductive features, requiring more studies.

#### **Kallymeniaceae** (J. Agardh) Kylin

##### ***Kallymenia*** J. Agardh

***Kallymenia thompsonii*** I.A. Abbott *et* McDermid, 2002: 151, figs 2-11 (type locality: Northwest Pass, Midway Atoll). **(Figs 110-112)**

**Material examined:** Île aux Chèvres, Rapa, Australs, 04 Nov. 2002, *leg. C. E. Payri*, UPF 1914; Rarapai Islet, 04 Nov. 2002, *leg. J. L. Menou*, UPF 1912, 3516 RPS294, 3961; southeast oceanic plateau, Rapa, Australs, 08 Nov. 2002, *leg. J. L. Menou*, UPF 2718, 3498 RPS276, 3520 RPS298, 3521 RPS299.

Thallus light pink in colour, 30-70 mm broad, consisting of rosettes of foliose, irregularly lobed blades with numerous small scattered perforations (0.5)1.0-2.0(2.5) mm in diameter. Thallus margins smooth, slightly undulate and non-perforate, with usually rounded lobes. Attachment to the substratum via a short, small inconspicuous basal stipe, with rhizoidal secondary attachments between some lobes. Texture firm-gelatinous, adhering well to paper when dry. Blade diameter 250-300 µm, consisting of a central medullary region of thick lax filaments 8-13 µm in diameter and 50-80 µm long, issued from non-stellate, short-armed trapezoidal inner cortical cells (50)60-80(120) µm in diameter. Cortex 2-layered, of pigmented cells 3-6 µm in diameter. Cystocarps 180-200 µm in diameter, embedded in medulla, with a dense mass of ovoid carposporangia 5-13 µm in diameter.

**Remarks:** Growing at a depth of 20 to 52 m on coral debris. The pink rosettes of finely perforated blades is distinctive for this species. It is superficially similar to *Kallymenia cribrogloea* Womersley *et* R.E. Norris from Tasmania, but in this species the perforations are more regularly arranged and larger, up to 20 mm in diameter in central regions of the blade. The two species also differ in carpogonial branch structure and stellate cell morphology (Womersley, 1994: 231). *Kallymenia cribrosa* Harvey (1855) from Western and Southern Australia differs in having undivided, non-rosette forming, smooth blades, more than 2 cortical cell layers, and stellate inner cortical cells.

#### **Rhizophyllidaceae** F. Schmitz

##### ***Portieria*** Zanardini

\****Portieria hornemannii*** (Lyngbye) P.C. Silva *in* P.C. Silva, Meñez *et* R.L. Moe, 1987: 39, 129; Australia: Millar, 1990: 359, fig. 20A-B; Indonesia: Verheij & Prud'homme van Reine, 1993: 192, pl. 17, fig. 8; Indian Ocean: Silva *et al.*, 1996: 215; Philippines: Meñez *et al.*, 1996: 161 figs 162, figs 2-12; Hawaiian Islands: Abbott, 1999a: 127, fig. 29A-D; Fiji: N'Yeurt, 2001: 779, figs 147-149; Littler & Littler, 2003: 84. **(Figs 113-114)**





**Basionym:** *Desmia hornemannii* Lyngbye, 1819: 35, pl. 7C (type locality: Red Sea). Mauritius: Børgesen, 1943: 13.

**Homotypic synonym:** *Chondrococcus hornemannii* (Lyngbye) F. Schmitz, 1895: 140. 168-170 (*'hornemanni'*). Fiji: Kasahara, 1985: 53, pl. 9, fig. 3, pl. 15, fig. E.

**Material examined:** Bora Bora, Apr. 1990, leg. C. E. Payri, UPF 363, 481 S95; Mohio, Bora Bora, 21 Aug. 2002, leg. A. D. R. N'Yeurt & D. Schneider, UPF 2598.

Thallus 40-60 mm high, consisting of several flattened axes 0.6–1.5 mm wide and 0.4-0.5 mm in diameter, attached to the substratum by a discoid basal holdfast. Branching alternate to subdichotomous or pinnate, in a single plane up to 7 orders; ultimate branches slightly tapered with strongly incurved apices. Simple dentations scarce on laterals. Medulla of clear, large cells 90-200 µm in diameter. Cortex 2- 3-layered, composed of small, strongly pigmented cells 9-10 µm in diameter, with an abrupt transition from medulla to cortex. Spherical to ovoid yellowish gland cells up to 30 µm in diameter are abundantly scattered beneath the surface of the thallus, located in depressions surrounded by a ring of cortical cells. Reproduction not seen in French Polynesian plants, but reported as having irregularly cruciate to zonate tetrasporangia in nemathecium and unique hemispherical, plurilocular cystocarpic nemathecium in Millar (1990) for Australian plants, and confirmed by our personal observations of Solomon Islands material.

**Remarks:** Growing inside crevices on coral heads in the lagoon, 1.5-10 m depth. A rare alga, so far in French Polynesia only represented by two collections of the island of Bora Bora, 12 years apart. The distinctively pungent odour of this alga when fresh may act as a deterrent to herbivores (pers. obs.).

#### Solieriaceae J. Agardh

We follow here Saunders *et al.* (2004) who advocated maintaining the family Solieriaceae separate from the family Areschouggiaceae J. Agardh.

#### *Sarconema* Zanardini

The taxonomy and morphology of this genus was revised in detail by Papenfuss & Edelstein (1974), whose nomenclature we follow here.

***Sarconema filiforme*** (Sonder) Kylin, 1932: 22-23. French Polynesia: Payri *et al.*, 2000: 220. India: Børgesen, 1934: 11, fig. 7; Mauritius: Børgesen, 1943: 39; Red Sea, Africa, Pakistan, India, Australia, Samoa: Papenfuss & Edelstein, 1974: 41, figs 1-3, 13, 20-25; Australia: Millar, 1990: 346, fig. 21B; Indian Ocean: Silva *et al.*, 1996: 336; Wallis Islands: N'Yeurt & Payri, 2004: 381. **(Figs 115-117)**

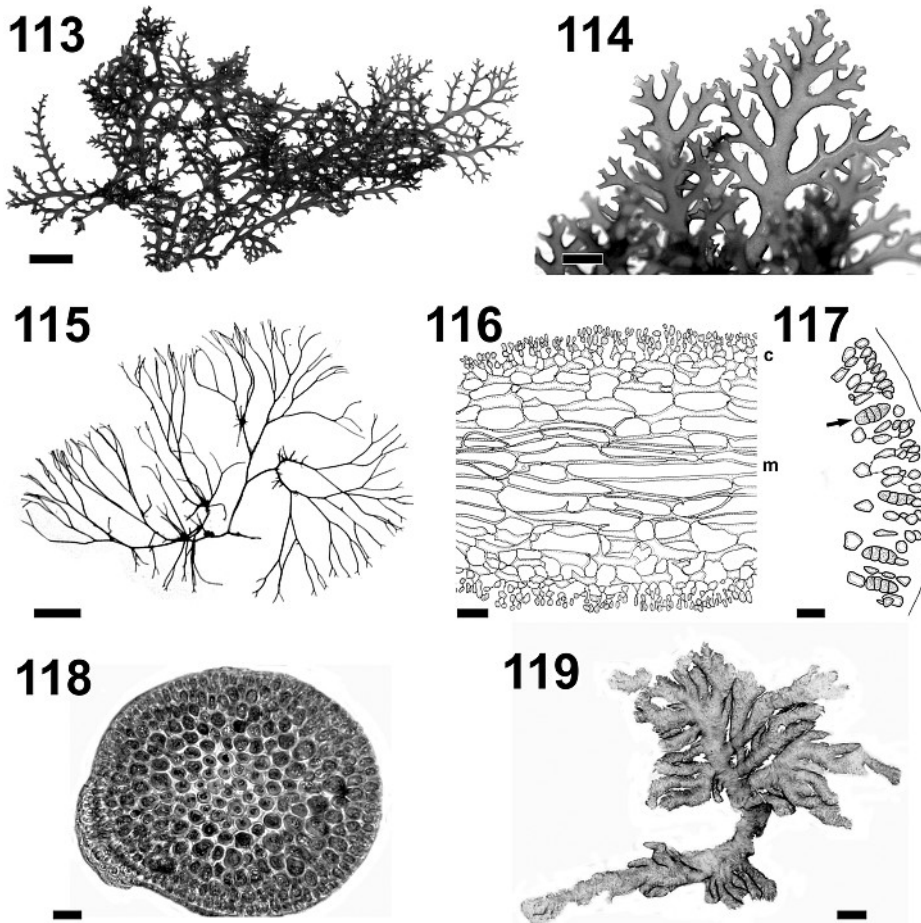
**Basionym:** *Dicranema filiforme* Sonder, 1845: 56 (type locality: Western Australia).

**Heterotypic synonyms:** *Dicranema setaceum* Sonder, 1871: 58 (type locality: Port Denison, Queensland, Australia). Papenfuss & Edelstein, 1974: 41, fig. 24.

*Dicranema setaceum* Sonder var. *upolense* Grunow, 1874: 43 (type locality: Upolu, Samoa). Papenfuss & Edelstein, 1974: 41, fig. 25. *Sarconema furcatum* Børgesen, 1934: 12, figs 8, pl. II upper figure (type locality: Karachi, Pakistan). *Sarconema furcellatum* Zanardini, 1858: 264, pl. 10 fig. 1 (syntype localities: Bernice, Egypt; Suakin, Sudan). India: Børgesen, 1932: 11, fig. 7; 1934: 10.

**Material examined:** Port Phaeton, Afaahiti, Tahiti, 24 Jun. 1922, leg. W. A. Setchell & H. E. Parks, UC 261235 (fragments embedded within *Cladophora sericea* (Hudson) Kützinger); Botanical Gardens, Papeari, Tahiti, leg. A. D. R. N'Yeurt: 22 Oct. 1995, UPF 368, 528 S142, 530 S144; 27 Apr. 1997, UPF 369 / BM 806227, UPF 370-372.

Thallus to 6 cm high, maroon-red or yellowish-red, lubricous, soft and flexuous, composed of dichotomously branched, erect and terete axes 300-500 µm in diameter. The branch tips are pointed and characteristically bifurcate or forked.



Figs 113-119. **113.** *Portieria hornemannii*: habit of pressed plant from Bora Bora (UPF 2598). Scale = 5 mm. **114.** *Portieria hornemannii*: detail of ultimate branches of freshly-collected plant (UPF 2598), showing incurved apices. Scale = 2 mm. **115.** *Sarconema filiforme*: habit of pressed plant (UPF 371). Scale = 10 mm. **116.** *Sarconema filiforme*: longitudinal section of thallus, showing pseudoparenchymatous cortex (c) enclosing laterally pit-connected filamentous medulla (m) (UPF 371). Scale = 25  $\mu$ m. **117.** *Sarconema filiforme*: transverse section of cortex, showing zonate tetrasporangia (arrow) (UPF 371). Scale = 10  $\mu$ m. **118.** *Wurdemannia miniata*: transverse section of thallus (UPF 3410), showing gradual transition from medulla to cortex. Scale = 20  $\mu$ m. **119.** *Dudresnaya hawaiiensis*: habit (UPF 816). Scale = 6 mm.

Inner medulla filamentous, composed of thick, laterally pit-connected intertwined filamentous cells 4-5  $\mu$ m in diameter; inner cortex pseudoparenchymatous, composed of irregularly shaped cells to 50-60  $\mu$ m long and 10-20  $\mu$ m in diameter, gradually decreasing in size to an outer cortex consisting of one or two layers of small, compact pigmented cells 5-6  $\mu$ m in diameter. Tetrasporangia zonately divided about 30  $\mu$ m long and 20  $\mu$ m in diameter, scattered in the outer cortex.

**Remarks:** From a single collection, growing attached to rocks and pebbles at the mouth of a small estuary in the Papeari Botanical Gardens, Tahiti. This distinctive



species can be recognised by its lubricous, terete thalli with bifurcate tips. The tetrasporophytes are maroon-red in colour, while sterile plants are usually yellowish-red. Following renovation works at the Papeari Botanical Gardens after 1997, this population has since vanished. Isolated populations might still be found further east, for instance in Afaahiti, where fragments were unintentionally collected by H. E. Parks and W. A. Setchell in 1922, along with *Cladophora sericea* (Hudson) Kützing (N'Yeurt & Payri, 2007: 23, fig. 26). This is the fifth 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.

### *Wurdemannia* Harvey

Previously listed as *incertae sedis* in familial placement, *Wurdemannia*'s appurtenance to the family Solieriaceae has been demonstrated by molecular data (Saunders *et al.*, 2004).

\**Wurdemannia miniata* (Sprengel) Feldmann *et* Hamel, 1934: 544. Hawaiian Islands: Abbott, 1947: 204, figs 6, 7b; 1999: 238; Viêt Nam: Dawson, 1954: 424, fig. 35; Brazil: Joly *et al.*, 1965: 131, pl. 1 fig. 3, pl. 3 figs 6-8; Arabian Sea: Nizamuddin & Gessner, 1970: 8, pl. 11 fig. 32, pl. 13 fig. 38; Fiji: Kapraun & Bowden, 1978: 201, fig. 17; South & Skelton, 2003: 740; Indonesia: Hatta & Prud'homme van Reine, 1990: 375, fig. 14a-f; Great Barrier Reef, Australia: Price & Scott, 1992: 31, fig. 6A-E; Indian Ocean: Silva *et al.*, 1996: 557; Micronesia: Lobban & Tsuda, 2003: 79. **(Fig. 118)**

**Basionym:** *Sphaerococcus miniatus* Sprengel, 1827: 340 (type locality: Mediterranean France).

**Material examined:** Rapa Island, Australs, 04 Nov. 2002, *leg. C. E. Payri*, UPF 3426 RPS204, 3612, 3631; Tarakoi Islet, Rapa, 05 Nov. 2002, *leg. C. E. Payri*, UPF 3410 RPS194, 3600.

Thallus forming entangled clumps to 40 mm high, consisting of terete to compressed, smooth wiry axes (150)280-300(340) µm in diameter. Branching is irregular in all planes, without any basal constrictions. Medulla consisting of thick-walled, lightly pigmented spherical cells 15-30 µm in diameter, gradually decreasing in size towards the cortex with pigmented cells 5-10 µm in diameter. Reproduction not seen.

**Remarks:** Growing at depths of 0.5-20 m, on coral debris. An inconspicuous but relatively ubiquitous component of most tropical turf floras, including neighbouring Cook Islands (pers. obs.).

### Dumontiaceae Bory

*Dudresnaya* P.L. *et* H.M. Crouan

*Dudresnaya hawaiiensis* R.K.S. Lee, 1963: 315-319, figs 1-12 (type locality: Kaneohe Bay, Oahu, Hawaiian Islands). French Polynesia: Payri *et al.*, 2000: 212; Great Barrier Reef; Lord Howe Island, Australia: Robins & Kraft, 1985: 15, figs 44-89; South Africa: Norris, 1992c: 3, figs 7-10; Fiji: South & Skelton, 2003: 727; American Samoa: Littler & Littler, 2003: 72; Samoa: Skelton & South, 2007: 55.

**(Figs 119-124)**

**Material examined:** Tiahura, Moorea, 18 Feb. 1992, *leg. Anon.*, UPF 287; Entre deux Baies, Moorea, *leg. A. D. R. N'Yeurt & J. Orempuller*, 02 Dec. 1995, UPF 568 S182, 14 Dec. 1995, UPF L3194; Papa Whisky beacon Islet, Punaauia, Tahiti, 10 Nov. 1999, *leg. S. Andréfouët*, UPF 841, 842, 2929; Akamaru, Gambiers, 17 Nov. 2000, *leg. A. D. R. N'Yeurt*, UPF 816; Tauna Islet, Rapa, 04 Nov. 2002, *leg. C. E. Payri*, UPF 1977, 1978; 27 Nov. 2002, *leg. C. E.*



*Payri*, UPF 2267, 3338 RPS125, 3577; Tarakoi Point, Rapa, 06 Nov. 2002, *leg. C. E. Payri*, UPF 2264, 3321 RPS108; Rarapai Islet, Rapa, 30 Nov. 2002, *leg. J. L. Menou*, UPF 2265, 2266, 2268, 2269, 2270, 3308, 3315 RPS102; 04 Nov. 2002, *leg. J. L. Menou*, UPF 2271, 3314 RPS101; Karapoo Rahi, Rapa, 01 Nov. 2002, *leg. J. L. Menou*, UPF 2275.

Thallus solitary, erect, to 180 mm high, composed of reddish-pink, translucent, compressed, irregularly radially branched soft gelatinous axes to 25 mm in diameter. Apices bluntly spinose; thallus margins fuzzy due to the presence of exserted cortical filaments surrounded by a mucilaginous matrix. Basal holdfast is inconspicuous and diminutive, not perennial or cartilaginous. Central axial filaments 5-80  $\mu\text{m}$  in diameter, hardly percurrent, composed of cells 30-800  $\mu\text{m}$  long, from which are issued 2-5 whorls of sub-alternate to subdichotomous cortical filaments, which sometimes branch further in an opposite manner. Basal portions of cortical filaments often produce simple to sparsely branched downward rhizoids to 10  $\mu\text{m}$  in diameter. Plants monoecious; carpogonial branches 5-15 cells long, arising directly on primary axes in place of normal vegetative filaments, nearly moniliform in mid 'nutritive' sections, where it is surrounded by a clear, thick mucilaginous coating. Trichogyne flexuous, to 160  $\mu\text{m}$  long. Mature cystocarps 130-180  $\mu\text{m}$  in diameter, composed of a compact mass of angular carposporangia 8-13  $\mu\text{m}$  in diameter, incompletely encircling the auxiliary-cell filament. Spermatangia occurring in double whorls on terminal or subterminal cortical cells. Tetrasporangia not seen in French Polynesian plants, but reported as zonately divided, to 15  $\mu\text{m}$  in diameter and 35  $\mu\text{m}$  long, usually in unequally maturing pairs, alternately issued from cortical cells in Hawaiian plants (Abbott, 1999).

**Remarks:** Growing at depths of 13-45 m, on the outer reef slope. The lack of a perennial holdfast, the elongate cylindrical branches never becoming globose, zonately divided tetrasporangia, and the presence of a thick mucilaginous coating around the carpogonial branches distinguish this species from superficially similar *Gibsmithia hawaiiensis*, which also has exserted cortical filaments.

### *Gibsmithia* Doty

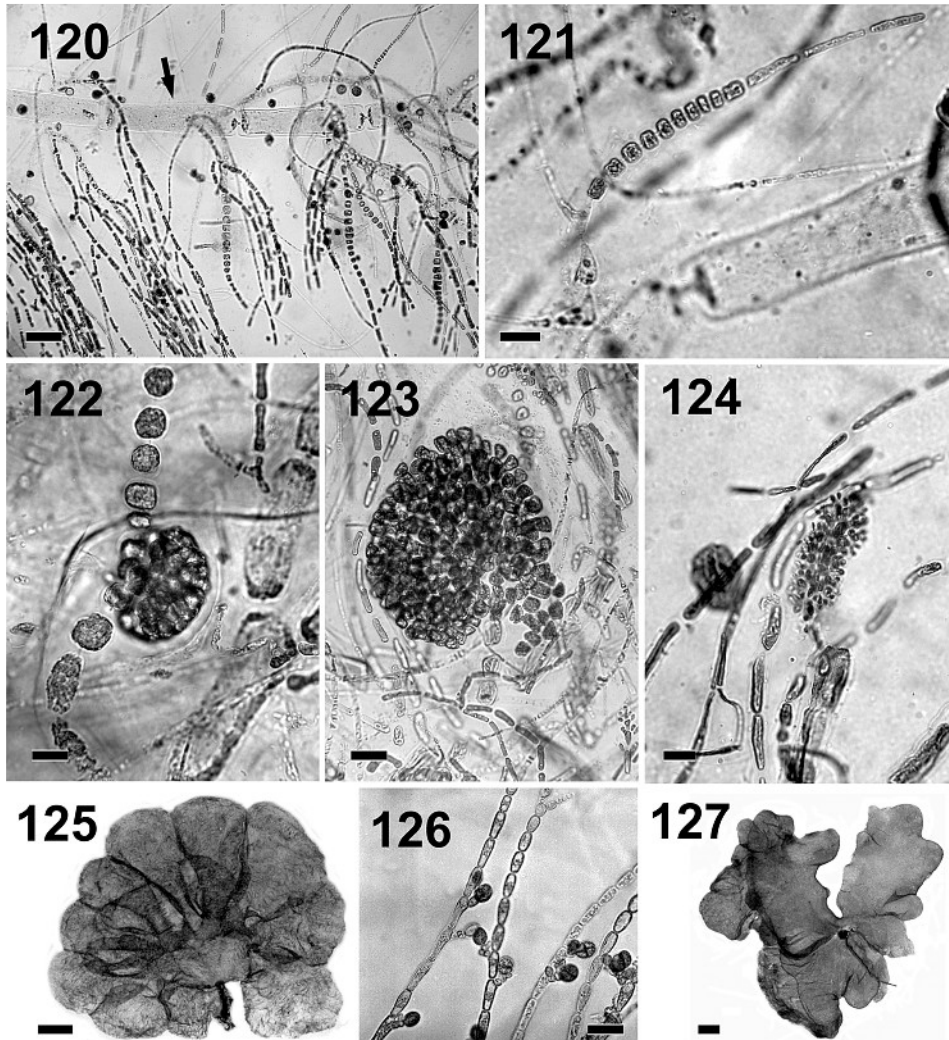
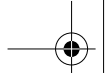
#### Key to the French Polynesian species of *Gibsmithia*

- 1a. Thallus with a perennial cartilaginous stipe; cortical filaments exserted . . . . .  
 . . . . . *G. hawaiiensis*
- 1b. Thallus lacking a cartilaginous stipe; cortical surface uniform . . . . . *G. larkumii*

*Gibsmithia hawaiiensis* Doty, 1963: 458, figs 1-17 (type locality: Waikiki, Honolulu, Oahu, Hawaiian Islands). French Polynesia: Karam-Kerimian, 1976: 22, pl. I figs 1-5, pl. II figs 1-4; Payri *et al.*, 2000: 212; Australia: Kraft, 1986: 425, figs 2-22; Seychelles: Silva *et al.*, 1996: 185; Papua New Guinea: Millar *et al.*, 1999: 560, fig. 2A; South Africa: De Clerck *et al.*, 2002: 421, fig. 35; Fiji: Littler & Littler, 2003: 74; Guam: Lobban & Tsuda, 2003: 64, fig. 6. **(Figs 125-126)**

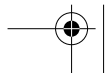
**Material examined:** Punaauia, Tahiti, 5 Oct. 1995, *leg. A. D. R. N'Yeurt*, UPF 285, 490 S104, 491 S105; Tiahura, Moorea, 25 Nov. 1995, *leg. A. D. R. N'Yeurt*, UPF 286, 489 S103; Punaauia, *leg. S. Andréfouët*, 10 Jan. 1998, UPF 609, 10 Nov. 1999, UPF 833.

Thallus to 8 cm high and 4 cm broad, light pink to brownish, soft and gelatinous. Branches subspherical when young but becoming lobed and lacerate when mature, to 25 mm wide and 50 mm long. Stipe coriaceous and cylindrical, to 3 mm in diameter; perennial, simple or once or twice dichotomous. Medullary filaments 5-12  $\mu\text{m}$  wide and up to 400  $\mu\text{m}$  long, colourless and subdichotomously



Figs 120-127. **120.** *Dudresnaya hawaiiensis*: central axial filament (arrow) surrounded by cortical fascicles (UPF 3338). Scale = 50  $\mu$ m. **121.** *Dudresnaya hawaiiensis*: carpogonial branch (UPF 3338). Scale = 20  $\mu$ m. **122.** *Dudresnaya hawaiiensis*: developing carposporophyte on auxiliary-cell filament (UPF 3321). Scale = 10  $\mu$ m. **123.** *Dudresnaya hawaiiensis*: mature carposporophyte (UPF 3314). Scale = 20  $\mu$ m. **124.** *Dudresnaya hawaiiensis*: spermataangia in whorls on terminal cortical cells (UPF 3314). Scale = 10  $\mu$ m. **125.** *Gibsmithia hawaiiensis*: habit of pressed plant (UPF 833). Scale = 6 mm. **126.** *Gibsmithia hawaiiensis*: detail of sessile tetrasporangia shortly pedicellate along exserted cortical filaments (UPF 489). Scale = 40  $\mu$ m. **127.** *Gibsmithia larkumii*: habit of pressed plant (UPF 1967). Scale = 5 mm.

branched. Assimilatory filaments of cortical region composed of rectilinear to spherical cells 5-15  $\mu$ m in diameter and 10-40  $\mu$ m long, enveloped in a gelatinous matrix, and characteristically exserted from the thallus surface, giving a furry appearance. Plants dioecious; carpogonial filaments straight, 6-13 cells long, borne





on basal cells of inner cortical filaments, lacking a thick mucilaginous coating. Cystocarps globular, about 50 µm in diameter. Spermatia 2-3 µm in diameter, in dense heads to 80 µm long on exerted spermatangial axes up to nine cells long. Tetrasporangia cruciately divided, 20-25 µm in diameter, sessile or shortly pedicellate along exerted cortical filaments.

**Remarks:** A seasonal species, with gametophytes and tetrasporophytes found during the warm season in coral crevices on the external reef slope down to 20 m depth in the Society Islands. Karam-Kerimian (1976: 21) reported more than one species of *Gibsmithia* with exerted filaments in French Polynesia, but Kraft (1984: 432) and our own observations would preclude this opinion.

\**Gibsmithia larkumii* Kraft, 1986: 439, figs 44-58 (type locality: The 'Keyhole', One Tree Island, Queensland, Australia). Papua New Guinea: Millar *et al.*, 1999: 560, fig. 2B. **(Figs 127-134)**

**Material examined:** Tauna Islet, Rapa, 4 Nov. 2002, *leg. C. E. Payri*, UPF 1975; Tarakoi Islet, Rapa, 5 Nov. 2002, *leg. C. E. Payri*, UPF 2004; Eastern oceanic plateau, Rapa, 5 Nov. 2002, *leg. J. L. Menou*, UPF 1967 / BM 806237, 1973, 1974; Southeastern oceanic plateau, Rapa, 8 Nov. 2002, *leg. J. L. Menou*, UPF 2075-2079; Between Patagaroa and Mei Pts, Rapa, 18 Nov. 2002, *leg. C. E. Payri*, UPF 2224; Eastern oceanic slope, Rapa, 23 Nov. 2002, *leg. J. L. Menou*, UPF 2326, 2327; Exit of Ha'urei Bay, Rapa, 26 Nov. 2002, *leg. J. L. Menou*, UPF 2333-2335; Mei Pt., Rapa, 26 Nov. 2002, *leg. C. E. Payri*, UPF 2379, 3962; Tauna Islet, Rapa, 27 Nov. 2002, *leg. C. E. Payri*, UPF 2380, 2387, 3576; Northern slope, Rapa Iti, 28 Nov. 2002, *leg. J. L. Menou*, UPF 2409; Rarapai Islet, 30 Nov. 2002, *leg. J. L. Menou*, UPF 2443.

Thallus 3-15 cm long, flaccid and gelatinous, with erect, highly irregularly lobed or subdichotomous, basally tapering axes 4-25 mm in diameter. Holdfast an expanded, non-perennial filamentous disk, 2-8 mm in diameter. Cortical filaments pseudodichotomously branched, consisting of shortly rectilinear to ovoid cells 5-10 µm in diameter and 10-25 µm long, becoming progressively shorter towards the surface. Apical cells blunt. Carpogonial filaments 6-10 cells long; carpo-sporophyte 100-250 µm in diameter, with angular to ovoid carposporangia. Spermatangia (reported here for the first time) 2-3 µm in diameter, in subapical brush-like clusters on spermatangial axes 2-3 cortical cells long. Tetrasporangia cruciately divided, 18-25 µm in diameter, borne singly on apical cells of cortical filaments.

**Remarks:** Growing at depths of 20-68 m, so far in French Polynesia only reported from the southern Austral Island of Rapa. *Gibsmithia larkumii* is easily distinguished by the lack of a cartilaginous stalk present in other members of the genus. This is the second report of this species outside of the Australian type locality, and the first for the central-eastern Pacific region. Interestingly, this species is not reported from the Hawaiian Islands, while another common Pacific *Gibsmithia* species (*G. dotyi* Kraft & R.W. Ricker, present in Fiji and Hawaii) is not found in French Polynesia to date.

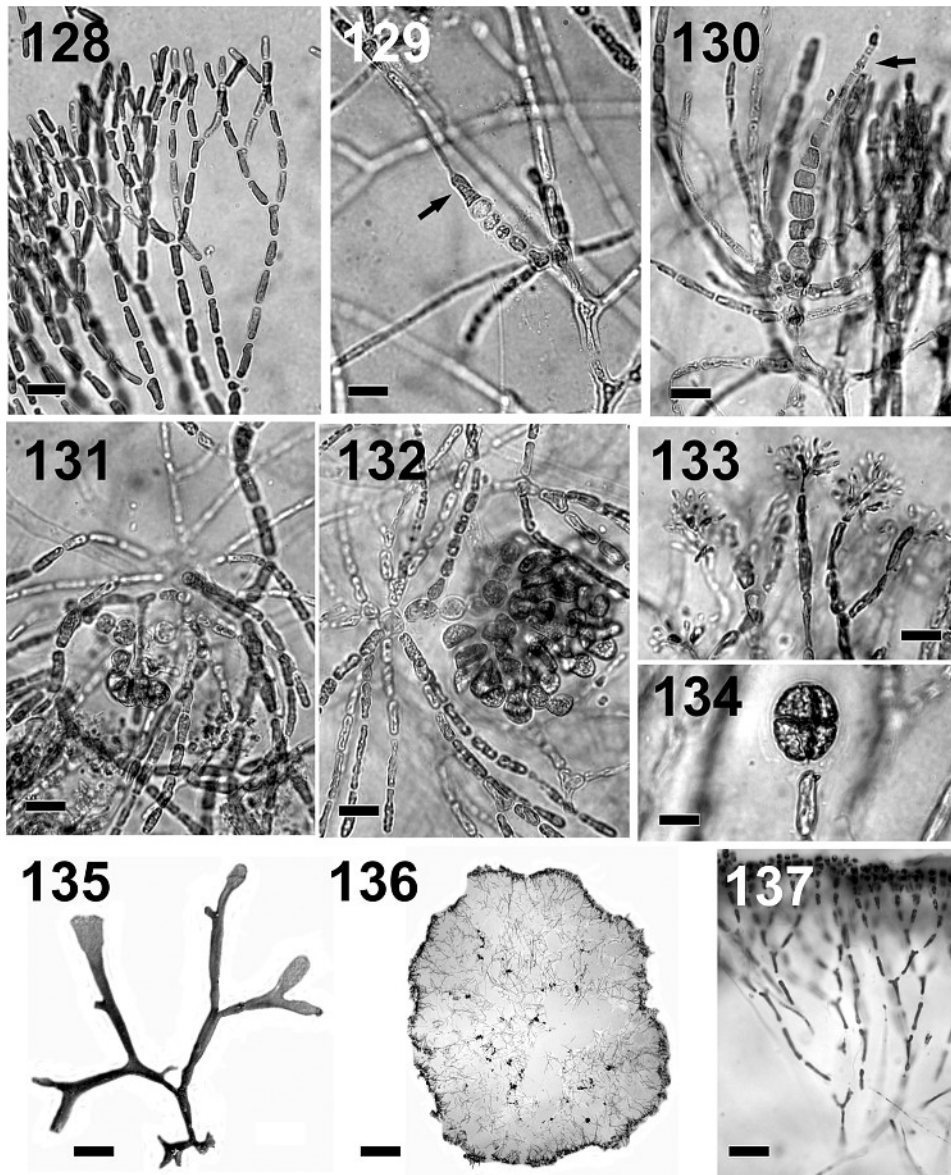
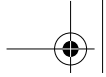
#### *Incertae sedis*

\**Gloiophloea articulata* Weber-van Bosse, 1913: 112, pl. 12 fig. 1, pl. 14 figs 26, 27; Huisman, 1987: 170, figs 7-8; New Caledonia: Millar & Payri, 2006: 156, figs 5-6.

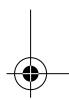
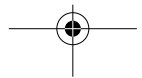
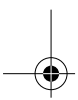
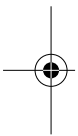
**(Figs 135-137)**

**Material examined:** Cargados Carajos, Mauritius, 1905, -65 m, *leg. J. S. Gardiner*, L 0535736 (holotype); Neilson Bank, Australs, 12 Nov. 2002, *leg. IRD* (carpogonial), UPF 4011; Ringold Reef, Fiji, 21 May 2007, -72 m, *leg. C. Payri* (spermatangial), IRD 2465.

Thallus reddish-brown, 18-20 mm high, erect and cartilaginous, composed of linear, subdichotomously branched terete to compressed axes 700-1000 µm in diameter. Axes regularly slightly constricted, with softer, expanded



Figs 128-137. **128.** *Gibsmithia larkumii*: cortical filaments (UPF 3336). Scale = 20  $\mu$ m. **129.** *Gibsmithia larkumii*: carpogonial filament, showing long trichogyne (arrow) (UPF 3336). Scale = 20  $\mu$ m. **130.** *Gibsmithia larkumii*: another view of a carpogonial filament (arrow) (UPF 2333). Scale = 20  $\mu$ m. **131.** *Gibsmithia larkumii*: early gonimoblast stage (UPF 2333). Scale = 20  $\mu$ m. **132.** *Gibsmithia larkumii*: young carposporophyte (UPF 2333). Scale = 20  $\mu$ m. **133.** *Gibsmithia larkumii*: spermatangia in subapical clusters (UPF 3458). Scale = 20  $\mu$ m. **134.** *Gibsmithia larkumii*: cruciate tetrasporangia terminal on cortical filament (UPF 3454). Scale = 20  $\mu$ m. **135.** *Gloiophloea articulata*: habit of pressed plant (UPF 4011). Scale = 2 mm. **136.** *Gloiophloea articulata*: transverse section of thallus (UPF 4011). Scale = 100  $\mu$ m. **137.** *Gloiophloea articulata*: cortical fascicles (UPF 4011). Scale = 25  $\mu$ m.





branch tips usually with a shallow depression or indentation (but not an actual apical pit); attachment to the substratum is via a small, terete stipe lacking haptera or rhizoids. Cortex dense, composed of adpressed, subdichotomously branched fascicles of elongate to isodiametric cells 4-5 µm in diameter. Refractive gland cells are absent from the cortex. Medulla lax, composed of entangled cylindrical segments 2.5-3.0 µm in diameter and 22-25 µm long, loosely filling the internal cavity. Mostly periclinal rhizoidal filaments are often produced by cells of the cortex and inner medulla. Carpogonial branches 3-celled, on inner medullary adventitious rhizoidal filaments.

**Remarks:** Dredged from a depth of 80 m, on coral debris. From its inception, the generic affinity of *Gloiocladia articulata* has been in doubt owing to the lack of fertile material. Some studies (Huisman 1987; Huisman *et al.* 2004) suggested that it belongs in the newly erected family Scinaiceae, or could be a species of *Nemastoma* J. Agardh. Preliminary sequence data of New Caledonian material of '*G. articulata*' suggest an affinity with the Dumontiaceae, being closely related to *Kraftia* and *Gibsmithia* (Millar & Payri, 2006). Clearly more studies, both morphological and molecular, are required to firmly place this entity. The French Polynesian plants, while showing the general characters associated with *G. articulata* (such as the disposition and branching of cortical fascicles, the loose medullary matrix with periclinal rhizoidal filaments) is markedly smaller in stature, with somewhat smaller, more rounded and lax cortical cells, and thinner, less refractive outer medullary filaments. However, the absence of more material precludes a better understanding of Polynesian populations of this plant. *Gloiophloea articulata* mainly differs from superficially similar *Adelophycus corneus* (J. Agardh) Kraft by the lack of highly refractive gland cells in the cortex (Womersley & Kraft in Womersley, 1994). It differs from the type species of *Gloiophloea*, *G. scinaoides* J. Agardh, by the absence of a distinct apical pit from which cortical fascicles arise, cortical cells in files of closely appressing fascicles, and loosely arranged medullary filaments (Huisman, 1985).

#### **Nemastomataceae** F. Schmitz

##### ***Predaea*** G. De Toni

#### **Key to the French Polynesian species of *Predaea***

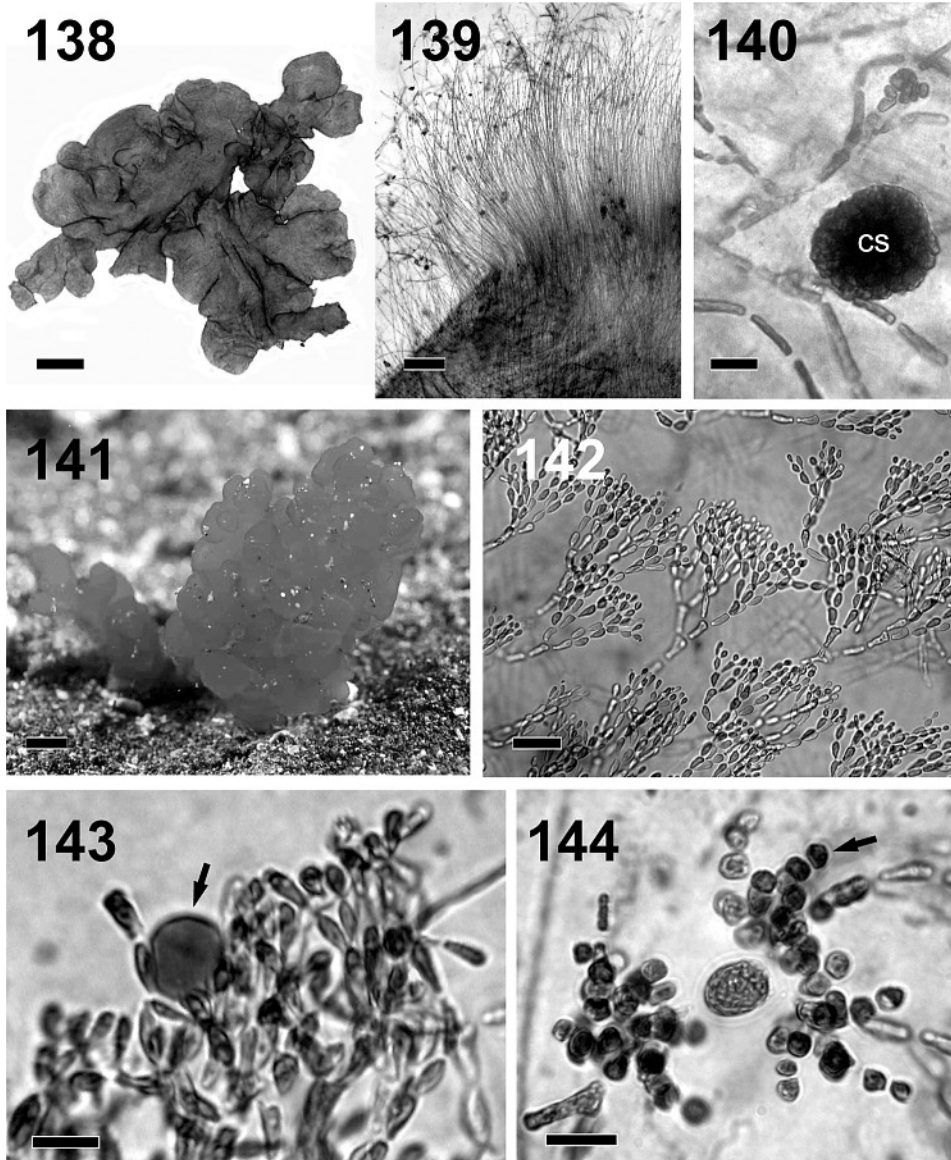
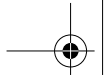
- 1a. Cortical filaments prominently exerted from 'furry' thallus surface . . . . . *P. incraspeda*
- 1b. Cortical filaments not exerted, surface smooth . . . . . 2
  - 2a. Branchlets tapering, numerous and short with bright orange tips; cortical filament cells rectilinear, gland cells absent . . . . . *P. weldii*
  - 2b. Branchlets ovoid, few with broad tips of same colour as rest of thallus; cortical filament cells sub-moniliform, ovoid to lacunate; gland cells present . . . . . *P. laciniosa*

\****Predaea incraspeda*** Kraft, 1984: 3, figs 1-14 (type locality: Old Gulch, Lord Howe Island, Australia). **(Figs 138-140)**

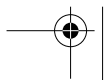
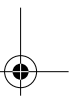
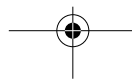
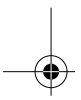
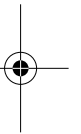
**Material examined:** off "Papa Whisky" beacon, Punaauia, Tahiti, 10 Nov. 1999, *leg. S. Andréfouët*, UPF 836 (cystocarpic).

Thallus 12-14 cm high, broadly lobed and flattened, reddish-pink in colour. Surface with a furry texture, due to the presence of prominently exerted cortical assimilatory filaments which protrude 1-25 cells in length. Medullary





Figs 138-144. **138.** *Predaea incraspeda*: habit of pressed plant (UPF 836). Scale = 20 mm. **139.** *Predaea incraspeda*: detail of exserted cortical filaments (UPF 836). Scale = 20  $\mu$ m. **140.** *Predaea incraspeda*: carposporophyte (UPF 836). Scale = 10  $\mu$ m. **141.** *Predaea laciniosa*: habit of plant *in situ* in Marquesas (UPF 3193). Scale = 5 mm. **142.** *Predaea laciniosa*: cortical filaments (UPF 3192). Scale = 10  $\mu$ m. **143.** *Predaea laciniosa*: intercalary refractive gland cell (arrow) (UPF 3192). Scale = 20  $\mu$ m. **144.** *Predaea laciniosa*: early gonimoblast, showing carposporangia (arrow) (UPF 3192). Scale = 20  $\mu$ m.



filaments colourless, to 3  $\mu\text{m}$  wide and up to 200  $\mu\text{m}$  in length. Cortical fascicles composed of rectilinear cells (10)25-30  $\mu\text{m}$  long and (2)3-5  $\mu\text{m}$  in diameter, with a tapering apical cell, and often extended into long blunt-ended filaments to 450  $\mu\text{m}$  long that protrude from the thallus surface. Plant monoecious. Carpogonial branch 2-3-celled; auxiliary cells distal to supporting cells of carpogonial branches; nutritive cells in clusters of up to 5, on one or both vegetative cells two cell layers distal to auxiliary cell. Mature cystocarps 60-90  $\mu\text{m}$  in diameter, with a mass of carposporangia 5-8  $\mu\text{m}$  in diameter each. Spermatangia in dense tufts at the end of short assimilatory filaments.

**Remarks:** Growing on the outer reef slope, at a depth of 45 m. This is the first record of this species outside of the type locality in Australia. The French Polynesian plants appear bigger (up to 14 cm long) compared to the length of 2 cm reported for the Australian material in Kraft (1984), however the latter was based on a single, immature collection and may not reflect population variations.

***Predaea laciniosa*** Kraft, 1984: 11, figs 25-35 (type locality: Coral Gardens, Heron Island, Australia). French Polynesia: Payri *et al.*, 2000: 214; Hawaiian Islands: Abbott, 1996: 154, fig. 25; 1999: 153, fig. 37A-C; Arabian Sea: Schils & Coppejans, 2002: 259, figs 18-27; Papua New Guinea: Littler & Littler, 2003: 78. **(Figs 141-144)**

**Material examined:** Tiahura, Moorea, 1 Jul. 1997, *leg. A. D. R. N'Yeurt*, UPF 3192; Nuku-Hiva, Marquesas, 1997, *leg. J. Orempuller*, UPF 3193.

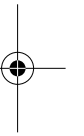
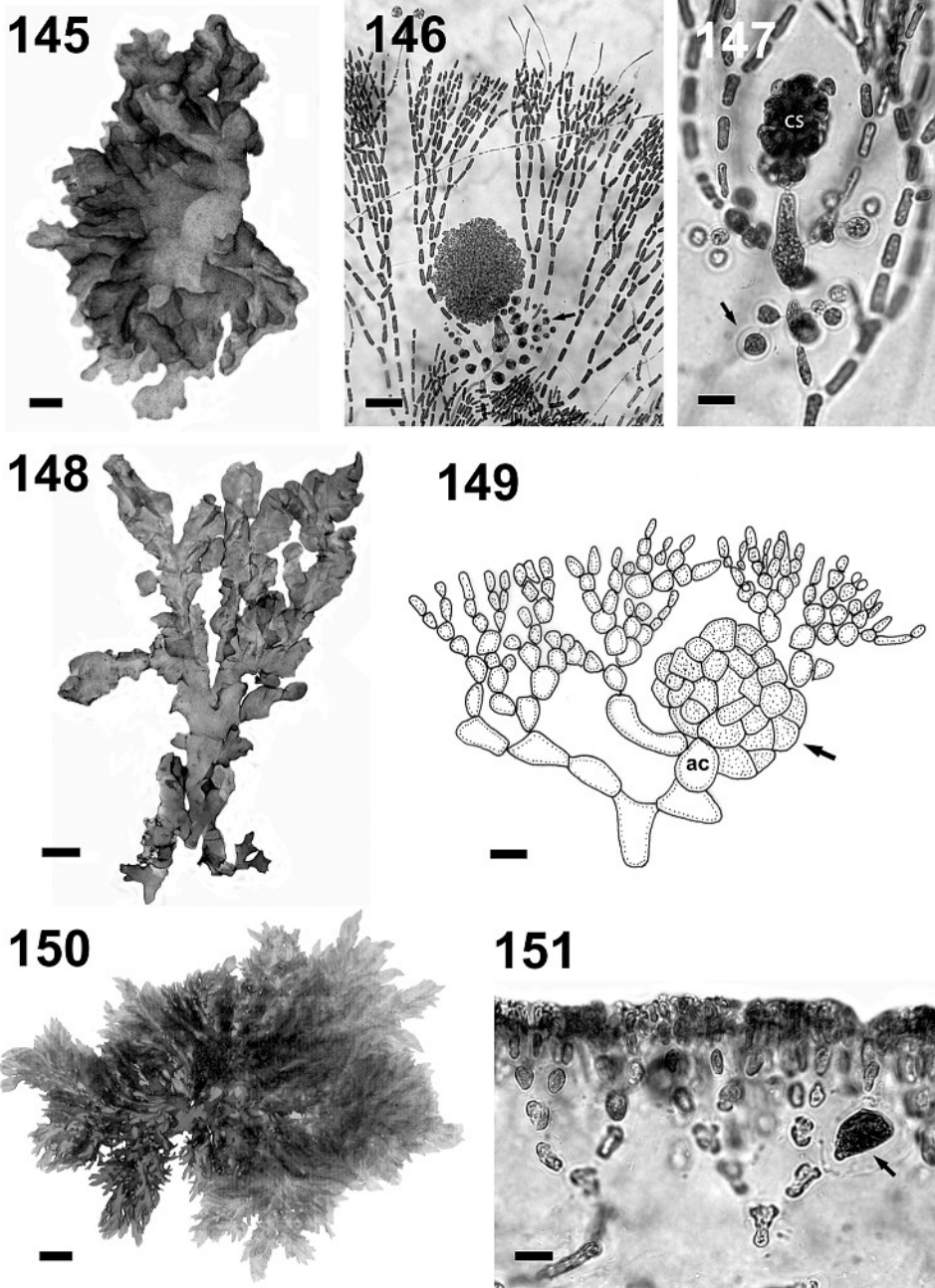
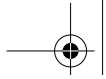
Thallus to 40 mm high and 20 mm broad, bright pinkish red, soft and gelatinous, usually with a lobed, characteristically ruffled appearance. The plants grow erect, attached via a small basal holdfast. The surface is smooth, not furry, with the internal structure consisting of compact, sub-moniliform, pseudodichotomously branched filaments composed of 4-6 layers of lacunate (teardrop-shaped) cells 2.5-3.0  $\mu\text{m}$  in diameter. Refractive spherical gland cells 22-25  $\mu\text{m}$  in diameter abundant, intercalary in cortex. Carpogonial branch 3-celled; auxiliary cells with 3-6 clusters of nutritive cell filaments. Mature carposporophyte spherical, 80-90  $\mu\text{m}$  in diameter, with 1-3 outwardly-directed gonimolobes. Spermatangia spherical, usually in pairs on terminal cortical cells.

**Remarks:** Growing solitarily, attached to dead coral or rocks in crevices on the outer reef wall, at depths of 15 to 25 m.

\****Predaea weldii*** Kraft *et I.A.* Abbott, 1971: 194, figs 1-15 (type locality: Kaneohe Bay, Oahu Island, Hawaii). Australia: Kraft, 1984: 15, figs 36-42; Puerto Rico: Ballantine & Aponte, 1997: 40, fig. 2; Hawaiian Islands: Abbott, 1999a: 153, fig. 37D-F; Papua New Guinea: Coppejans & Millar, 2000: 324, fig. 14; South Africa: De Clerck *et al.*, 2002: 423, figs 36-39; Fiji: N'Yeurt, 2001: 783, figs 183a-c, 228; Littler & Littler, 2003: 78; Samoa: Skelton & South, 2007: 64, fig. 103.

**(Figs 145-147)**

Figs 145-151. **145.** *Predaea weldii*: habit of pressed plant (UPF 1968). Scale = 3 mm. **146.** *Predaea weldii*: Mature cystocarp surrounded by cortical fascicles, showing nutritive cell clusters (arrow) on cells proximal to the auxiliary cell (UPF 3630). Scale = 25  $\mu\text{m}$ . **147.** *Predaea weldii*: early carposporophyte (cs) showing nutritive cells (arrow) surrounding auxiliary cell (ax) (UPF 3630). Scale = 10  $\mu\text{m}$ . **148.** *Platoma abbotianum*: habit of pressed plant (UPF 611). Scale = 20 mm. **149.** *Platoma abbotianum*: outer cortex, showing mature carposporophyte (arrow) issued from auxiliary cell (ac) (UPF 611). Scale = 25  $\mu\text{m}$ . **150.** *Platoma cyclocolpum*: habit of pressed plant from the Gambier archipelago (UPF 820). Scale = 10 mm. **151.** *Platoma cyclocolpum*: transverse section of cortex, showing intercalary refractive gland cell (arrow) (UPF 3396). Scale = 20  $\mu\text{m}$ .





**Possible heterotypic synonym:** (according to John *et al.*, 2004; also see note in Kraft, 1984: 20):

*Predaea pusilla* (Berthold) Feldmann, 1942: 111 (type locality: Napoli, Italy).

**Material examined:** Tauna Islet, Rapa, 4 Nov. 2002, *leg. C. E. Payri*, UPF 1976; Eastern oceanic plateau, Rapa, 5 Nov. 2002, *leg. J. L. Menou*, UPF 1968; Tarakoi Pt., Rapa, 6 Nov. 2002, *leg. C. E. Payri*, UPF 2014; exit of Ha'urei Bay, Rapa, 22 Nov. 2002, *leg. J. L. Menou*, UPF 2292; Tauna islet, Rapa, 27 Nov. 2002, *leg. C. E. Payri*, UPF 3575.

Thallus 6-12 cm wide, gelatinous and erect from a broad discoid holdfast; with numerous short, blunt tapering, generally vertically aligned branchlets with characteristic bright-orange tips in life. Cortex consisting of pseudodichotomously branched filaments with characteristic rectilinearly shaped cortical cells  $4\text{-}5 \times 16\text{-}20 \mu\text{m}$ . Gland cells absent. Carpo gonial branch 3-celled; auxiliary cells elongated and intercalary on inner cortical filaments. Proximal cells to the auxiliary cells produce a few sparse clusters of subspherical nutritive cells  $5\text{-}7 \mu\text{m}$  in diameter. Mature cystocarps  $114\text{-}120 \mu\text{m}$  in diameter, subspherical to obovoid; carposporangia  $7\text{-}12 \mu\text{m}$  in diameter. Spermatangia spherical, usually terminal on cortical cells.

**Remarks:** Growing at depths of 15-52 m, on coralline debris. The bright-orange, pointed branch tips in living material are characteristic of this species in the field. So far in French Polynesia, only reported from the southern Australs island of Rapa. Kraft (1984: 20) had doubts about the conspecificity between *P. pusilla* and *P. weldii*, while John *et al.* (2004) considered them to be the same species, but fell short of making them synonyms. However, since *P. pusilla* predates *P. weldii*, the correct name of the species in this case would be *P. pusilla*, with *P. weldii* as a later heterotypic synonym (G. Furnari, pers. comm.). Pending further studies, we prefer to maintain both species distinct as their type localities are widely disparate.

**Schizymeniaceae** (F. Schmitz & Hauptfleisch) Masuda *et* Guiry

*Platoma* Schousboe *ex* F. Schmitz

**Key to the French Polynesian species of *Platoma***

- 1a. Thallus stipitate; branching dichotomous from immediate proximal portions of blade; gland cells absent. . . . . *P. abbotianum*
- 1b. Thallus lacking a stipe; branching irregular to subdichotomous, in distal portions of blade; gland cells present. . . . . *P. cyclocolpum*

***Platoma abbotianum*** J.N. Norris *et* Bucher, 1977: 157, figs 1-9 ("*abbotiana*") (type locality: southeast end of Isla Mejía, Puerto Refugio, Isla Angel de la Garda, Mexico). French Polynesia: Payri *et al.*, 2000: 214 ("*abbotiana*"). **(Figs 148-149)**

**Material examined:** Punaauia, Tahiti, *leg. S. Andréfouët*: 3 Jan. 1998, UPF 611; 10 Nov. 1999, UPF 837-840.

Thallus erect, to 35 cm high and 20 cm wide, rose-red in colour, ruffled and flattened, arising from a short stipe and discoid holdfast. Texture firm but gelatinous and slippery, 15-20 mm in thickness. Branching dichotomous from immediately above the stipe, and becoming irregularly lobed in older portions of the thallus; blade apices blunt and rounded. Outer cortex composed of rectangular to ovoid cells about  $6 \times 12 \mu\text{m}$ ; inner structure filamentous, with sparingly branched septate filaments composed of cells about  $18 \times 32 \mu\text{m}$ . Peculiar X-shaped cells sometimes found in inner medulla. Gland cells absent. Female thalli with globose carposporophytes  $76\text{-}80 \mu\text{m}$  in diameter in outer cortex.

**Remarks:** Found growing on the outer reef slope, at depths of 35 m, in association with *Gibsmithia*, predominantly in the hot season. The French Polynesian thalli correspond well with the original description of? *P. abbotianum*, but since the



latter is a North Pacific species not yet reported elsewhere in the literature, critical molecular studies would be desirable to confirm their identification.

\**Platoma cyclocolpum* (Montagne) F. Schmitz, 1889: 453. Ardré, 1980: 125, pl. 7 figs 65-67; Masuda & Guiry, 1994: 194-201, figs 1-34; Huisman, 1999; N'Yeurt, 2001: 781, figs 169-173; Wallis Islands: Payri *et al.*, 2002: 50, pl. 4 fig. 6; N'Yeurt & Payri, 2004: 381.

(Figs 150-151)

**Basionym:** *Halymenia cyclocolpa* Montagne, 1841: 163 (lectotype locality: Tangier, Algeria).

**Heterotypic synonym** (according to Huisman, 1999): *Nemastoma damaecorne* Harvey, 1855: 557.

**Material examined:** Akamaru, Gambier, 17 Nov. 2000, *leg. A. D. R. N'Yeurt*, UPF 820 / BM 806229, UPF 821; Rapa Iti, 4 Nov. 2002, *leg. C. E. Payri*, UPF 3604; Tarakoi Islet, Rapa, 5 Nov. 2002, *leg. C. E. Payri*, UPF 1985, 3591, 3592; Exit of Ha'urei Bay, Rapa, 26 Nov. 2002, *leg. J. L. Menou*, UPF 2336.

Thallus compressed, to 8 cm high, 1-2 mm thick and 12 cm wide, arising from a single discoid basal holdfast. Texture gelatinous but firm; habit highly polymorphic, branching irregular to pseudodichotomous with rounded to tapered bifurcate apices. Medulla consisting of sparingly branched filaments with elongate cells 42-45  $\mu\text{m}$  long and 6.5-7  $\mu\text{m}$  wide; cortical filaments composed of progressively smaller obovate to elliptical or cuneate cells 4.5-8  $\mu\text{m}$  in diameter. Spherical to ovoid, intercalary, yellowish refractive gland cells 18-25  $\mu\text{m}$  are common in cortex. Carpogonial branch 3 cells long; carposporophyte subspherical, 73-75  $\mu\text{m}$  in diameter, composed entirely of carposporangia 11-12  $\mu\text{m}$  in diameter; surrounded by an involucre of 1-2 elongate, arcuate filaments issued from proximal cells of cortical fascicles on the auxiliary cell. Spermatangia cut off from outer cortical cells.

**Remarks:** Growing at depths of 15-45 m, so far in French Polynesia only reported from the Gambier and southern Australs. The proposal of conserving the name *Platoma* as being of neuter gender proposed by Athanasiadis (2000: 809), was recommended by the Nomenclatural Committee for Algae (Compère, 2003: 340) and later approved by the General Committee at the XVII International Botanical Congress (McNeill *et al.*, 2006: 798).

*Titanophora* (J. Agardh) J. Feldmann

*Titanophora weberae* Børgesen, 1943: 39, fig. 13 (type locality: Sele Strait, Irian Jaya, Indonesia). French Polynesia: Payri *et al.*, 2000: 216; Indian Ocean: Mshigeni & Papenfuss, 1980: 780, figs 1, 3B; Indonesia: Verheij & Prud'homme van Reine, 1993: 187, pl. 16, fig. 6; Norfolk Island: Millar, 1999: 507, fig. 24; Papua New Guinea: Millar *et al.*, 1999: 563, fig. 3E; Fiji: N'Yeurt, 2001: 784, figs 175, 177, 179, 180b-e; Littler & Littler, 2003: 88; Samoa: Skelton & South, 2007: 65, figs 117-119.

(Figs 152-153)

**Heterotypic synonym** (according to N'Yeurt, 2001): *Titanophora pulchra* E.Y. Dawson, 1954: 433, figs 45, 46a, b. (type locality: Cau Da harbor area, Viêt Nam).

**Material examined:** Moorea, c. 1995, *leg. Anonymous*, UPF 376, 377; Punaauia, Tahiti, 10 Jan. 1998, *leg. S. Andréfouët*, UPF 605, 607; Paea, Tahiti, 22 Feb. 2002, *leg. C. E. Payri*, UPF 2931.

Thallus to 23 cm high and 615-885  $\mu\text{m}$  thick, deep pinkish-red, consisting of thick, flattened irregularly lobed or pseudodichotomously branched blades up to 20 cm wide at the base, tough and skin-like in texture, attached to the substratum via a small discoid holdfast. Surface warty, reddish-pink in colour, with scattered pointed excrescences. Medulla moderately to strongly calcified,





appearing whitish in cross-section, consisting of branched or unbranched filaments 3–6  $\mu\text{m}$  in diameter. Cortex consisting of radially elongated cells 3.5–4  $\times$  7–10  $\mu\text{m}$ . Innermost cortical cells subrectangular to oval, 7–10  $\mu\text{m}$  in diameter. Large, oblong to globular, non-granular, yellow intercalary gland cells 15–16  $\mu\text{m}$  in diameter are scattered abundantly in the cortical layer. Cystocarps scattered over the thallus surface, with a distinct single ostiole. Mature carposporophyte 50–58  $\mu\text{m}$  in diameter, with branched involucrel filaments. Carpospores spherical to subrectangular, 10–13  $\mu\text{m}$  in diameter. Antheridia not seen in French Polynesian plants, but reported as paired on cortical cells (N'Yeurt, 2001).

**Remarks:** A relatively rare and possibly seasonal alga, found on the outer reef slope at depths of 18 to 30 m in the warmer months (December–January). Various authors (Norris, 1992c; Masuda & Guiry, 1995; Kraft *et al.* 1999; Schils & Coppejans, 2002) proposed the merger of *T. weberae* with *Titanophora pikeana* (Dickie) Feldmann, an earlier name for a morphologically and anatomically similar species. However, Doty *et al.* (1974), Mshigeni & Papenfuss (1980), N'Yeurt (2001) and Littler & Littler (2003) maintain both species separate, citing consistent morphological differences. *Titanophora weberae* from Fiji and French Polynesia has very broad (up to 20 cm wide at the base), flattened branches with prominent surface excrescences, whereas *T. pikeana* from the same locality (Fiji) has subterete branches no wider than 2 cm, which are always smooth (pers. obs.). Molecular studies could provide a clearer resolution to these taxonomic questions.

#### Areschougiaceae J. Agardh

##### *Meristotheca* J. Agardh

*Meristotheca procumbens* P.W. Gabrielson *et* Kraft, 1984: 241, figs 14A–D, 15A–F, 16A–D, 17A–F (type locality: Lord Howe I., Australia). French Polynesia: Payri *et al.*, 2000: 220; Rotuma Island: N'Yeurt, 1995: 248, figs 3–10; N'Yeurt, 1996: 416, figs 137, 142–147, 203–205; Fiji: N'Yeurt, 2001: 793, figs 208, 209, 231; Littler & Littler, 2003: 92; Samoa: Skelton & South, 2002a: 142; 2007: 63, figs 88–90; Wallis Islands: N'Yeurt & Payri, 2004: 381. **(Figs 154–155)**

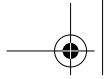
**Material examined:** Tiahura, Moorea, 14 Jun. 1984, *leg.* C. E. Payri, UPF 2884, 2886; Afaahiti, Tahiti, 7 Jun. 1997, *leg.* A. D. R. N'Yeurt, UPF 350, 351 / BM 773665; Tiahura, Moorea, 1 Oct. 2004, *leg.* A. D. R. N'Yeurt & A. Pham, UPF 3059; Tematapi Pt., Rapa, 1 Nov. 2002, *leg.* J. L. Menou, UPF 1867; Arago Bank, Australs, -100 m, 20 Nov. 2002, *leg.* I. R. D., UPF 4012.

Thallus 60 to 120 mm across, deep-pink and turgid, with a decumbent habit. The cartilaginous, smooth blades are flattened; irregularly branched or lobed, with an iridescent sheen on the upper surface. The edges are often ruffled, with multiple haptera or attachment pads issued from the margins and underside of the thallus. Blade 780–820  $\mu\text{m}$  thick, composed of an inner medulla of septate and branched rhizoidal filaments 2.5–4  $\mu\text{m}$  in diameter and elongate medullary cells 60–75  $\mu\text{m}$  in diameter. Outer medullary cells 16–32  $\mu\text{m}$  in diameter, characteristically stellate in shape. Cortex grading from large, unpigmented stellate-ovate cells 10–14  $\mu\text{m}$  in diameter to a surface layer of small, pigmented uninucleate and elliptical cells 3–4  $\times$  11–13  $\mu\text{m}$ . Reproduction not seen.

**Remarks:** A relatively rare plant, growing exposed to strong water currents in *Sargassum* beds on fringing reefs on the outer reef slope. An edible species, being eaten (raw or cooked) in other parts of the Pacific (N'Yeurt, 1995; 1996).

#### Cystocloniaceae Kützing *emend.* Saunders *et al.*

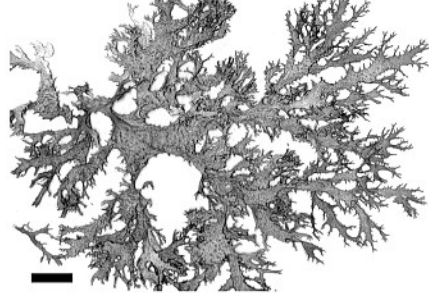
The Hypneaceae, questionably distinct from the Cystocloniaceae on anatomical grounds, were recently subsumed into the latter family by Saunders *et al.* (2004) based on small-subunit rDNA sequence studies.



**152**



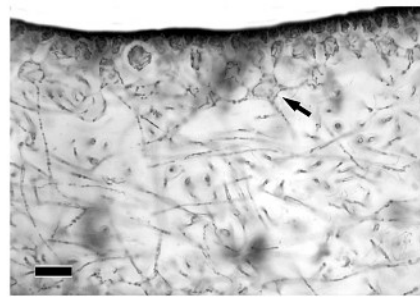
**153**



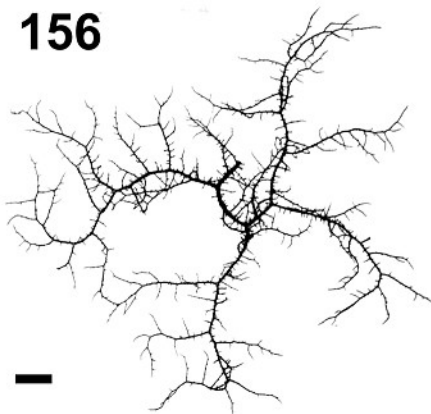
**154**



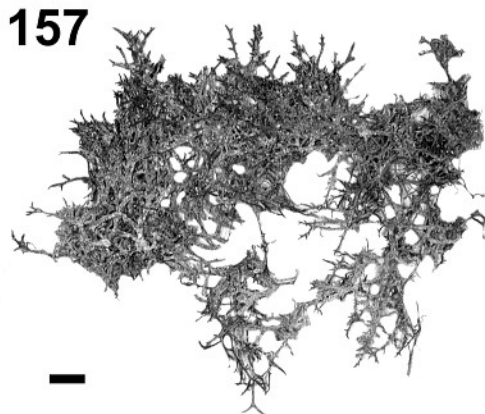
**155**



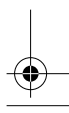
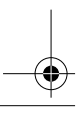
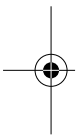
**156**



**157**



Figs 152-157. **152.** *Titanophora weberae*: habit of freshly-collected plant (UPF 2931). Scale = 10 mm. **153.** *Titanophora weberae*: habit of pressed plant (UPF 605). Scale = 20 mm. **154.** *Meristotheca procumbens*: habit of liquid-preserved deepwater plant from the Australs (UPF 4012). Scale = 10 mm. **155.** *Meristotheca procumbens*: transverse section showing stellate outer medullary cell (arrow) (UPF 4012). Scale = 25  $\mu$ m. **156.** *Hypnea esperi*: habit of pressed plant (UPF 324). Scale = 10 mm. **157.** *Hypnea pannosa*: habit of pressed plant (UPF 2915). Scale = 6 mm.



**Hypnea** J.V. Lamouroux**Key to the French Polynesian species of *Hypnea***

- 1a. Thallus compressed, branches mostly in one plane, curved and secund . . . . . *H. saidana*  
 1b. Thallus terete to compressed, branching in more than one plane. . . . . 2  
   2a. Thallus forming cushions; main branches less than 0.5 mm in diameter;  
       secondary branchlets sharply pointed, arcuate. . . . . *H. spinella*  
   2b. Thallus solitary or in loose clumps; main branches to 1.5 mm in diameter . 3  
 3a. Thallus yellowish green; main axes becoming very slender distally; proliferous  
       short secondary branchlets abundant, giving a delicate, spiky appearance to  
       thallus. . . . . *H. esperi*  
 3b. Thallus purplish red; main axes remaining approximately of same diameter  
       throughout; secondary branchlets not proliferous; thallus robust in  
       appearance. . . . . *H. pannosa*

\**Hypnea esperi* Bory de Saint-Vincent, 1828: 157-158, *nom. illeg.* (type locality: Mauritius). Easter Island: Børgesen, 1924: 306, fig. 48; Japan: Tanaka, 1941: 243, fig. 15A-D; Viêt Nam: Dawson, 1954: 436, fig. 46h-j; Caroline Islands: Trono, 1969; Philippines: Reyes, 1978: 136, pl. 10 fig. 3a-b; Indian Ocean: Silva *et al.*, 1996: 298; Fiji: Littler & Littler, 2003: 74. **(Fig. 156)**

**Misapplied name:** *Hypnea spinella* (C. Agardh) Kützing. French Polynesia: Payri *et al.*, 2000: 224.

**Material examined:** Punaauia, Tahiti, 10 Oct. 1995, *leg. A. D. R. N'Yeurt*, UPF 326; Hotel Beachcomber, Faa'a, Tahiti, 13 Apr. 1997, *leg. A. D. R. N'Yeurt*, UPF 316; Botanical Gardens, Papeari, Tahiti, 27 Apr. 1997, *leg. A. D. R. N'Yeurt*, UPF 317; Taapuna, Tahiti, 7 May 1997, *leg. A. D. R. N'Yeurt*, UPF 320, 324; Opunohu, Moorea, 30 Sep. 2004, *leg. A. D. R. N'Yeurt*, UPF 2950.

Thallus to 15 cm across, forming light-red to yellowish green loosely entangled balls or filiform tufts which may or may not be attached. Individual axes terete and dichotomously-divaricately branched, 0.3-1 mm in diameter, with abundant small, simple to bifurcate side-branchlets imparting a furry, spiky appearance to the thallus. Main axes are coarse in lower parts and very slender above, and sometimes bend upwards or downwards, making the thallus entangled. Medulla consisting of 2-3 layers of progressively smaller clear subquadrate cells 100-220 µm in diameter, surrounded by a pigmented cortical layer of cells 25-30 µm in diameter. Lenticular thickenings not seen. Tetrasporangial sori girdle-like, proximal to median on proliferous side branchlets, with zonately divided tetrasporangia.

**Remarks:** Commonly found in shallow, calm waters of lagoons of high islands. Species of slender *Hypnea* are edible, being commonly consumed raw or variously cooked in other parts of the Pacific and Asia (South, 1993; Novaczek, 2001: 23). The French Polynesian plants agree well with those described from Fiji (Littler & Littler, 2003). The entity described as *Hypnea cervicornis* J. Agardh from Hawaii in Abbott (1999a: 113) might also correspond to *H. esperi*, rather than to the former species whose taxonomic position is uncertain, being currently considered a synonym of *H. spinella* (C. Agardh) Kützing (Haroun & Prud'homme van Reine, 1993; Yamagishi & Masuda, 1997; Furnari *et al.*, 2003). There is some controversy concerning the validity of the name *H. esperi*, and a new name may need to be given (South, 2004: 138).





***Hypnea pannosa*** J. Agardh, 1847: 14 (type locality: San Agustín, Oaxaca, Mexico). French Polynesia: Payri *et al.*, 2000: 222; Marshall Islands: Dawson, 1956: 51, fig. 46; Viêt Nam: Tanaka & Ho, 1962: 37, fig. 13A-C; Great Barrier Reef, Australia: Price & Scott, 1992: 38; Indian Ocean: Silva *et al.*, 1996: 304; China: Bangmei & Yongqiang, 1997: 203, figs 33-38; Japan: Yamagishi & Masuda, 1997: 145, figs 22-25; Taiwan: Chiang, 1997: 173, fig. 14; Thailand: Lewmanomont, 1997: 185, figs 17-19; Hawaiian Islands: Abbott, 1999a: 117, fig. 25A; Fiji: *non* N'Yeurt, 2001: 780; Littler & Littler, 2003: 76; Samoa: Skelton & South, 2002a: 143, fig. 7D; 2007: 57, figs 100-102, 769-770; Wallis Islands: N'Yeurt & Payri, 2004: 381. **(Fig. 157-158)**

**Heterotypic synonym** (given by Dawson, 1961; Womersley & Bailey, 1970): *Hypnea nidulans* Setchell, 1924: 161, fig. 30 (type locality: Tutuila Island, American Samoa); Viêt Nam: Dawson, 1954: 438, fig. 46e-g; Rotuma Island: N'Yeurt, 1996: 415, fig. 136; Fiji: Littler & Littler, 2003: 74.

**Material examined:** Taharaa, Tahiti, 14 Apr. 1997, *leg. A. D. R. N'Yeurt*, UPF 319; Afaahiti, Tahiti: 10 Jun. 1997, *leg. A. D. R. N'Yeurt*, UPF 318; 16 Nov. 2004, *leg. A. D. R. N'Yeurt & A. Pham*, UPF 2915; Arue, Tahiti, 7 May 1997, *leg. C. E. Payri*, UPF 325; Rurutu, Australs, 18 Aug. 2000, *leg. C. E. Payri*, UPF 759; Tauna Islet, Rapa, Australs, 27 Nov. 2002, *leg. C. E. Payri*, UPF 3573.

Thallus purple-red in colour, in matted clumps, brittle and cartilaginous, to 20 mm high, composed of terete to distally compressed, arcuate branches to 1.5 mm in diameter. Axes irregularly branched in many planes, with pointed tips. Medulla consisting of cells up to 200 µm in diameter, with some lenticular thickenings present. Inner cortical cells 22-30 µm in diameter; pigmented outer epidermal cells 8-10 µm in diameter. Apical cell prominent, to 10 µm in diameter. Tetrasporangia zonately divided, in tetrasporangial stichidia that usually encircle the side-branchlets but are also sometimes saddle-shaped or unilateral.

**Remarks:** Growing in clumps within crevices and on coral heads, in the lagoon and on the reef flats of high islands. *Hypnea pannosa* can easily be distinguished in the field by its purplish colour and relatively brittle, wide branches. Records of this species from Fiji (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 taxonomy of the heteromorphic genus *Hypnea* is complex (Yamagishi & Masuda, 2000; South, 2004) and the relationships among Pacific populations of *H. pannosa*, *H. nidulans* and other often confused species would best be clarified with molecular studies.

***Hypnea saidana*** Holmes, 1896: 256, pl. 11 figs 3a, b (type locality: Enoshima, Japan). French Polynesia: Payri *et al.*, 2000: 224; Japan: Tanaka, 1941: 239, text figs 11-12; Yamagishi & Masuda, 1997: 147, 26-29; Australia: Millar, 1990: 351, fig. 23A-C; Seychelles: Wynne, 1995: 276, fig. 16; Sri Lanka: Silva *et al.*, 1996: 306.

**(Fig. 159)**

**Material examined:** Ua-Huka, Marquesas, n.d., *leg. E.P.H.E.*, UPF 323; Nuku-Hiva, Marquesas, 1997, *leg. J. Orempuller*, UPF 586.

Thallus in matted clumps, to 40 mm high, yellowish-red and cartilaginous, composed of strongly compressed to flattened, arcuate axes 1-2 mm wide and branched in a single plane. Branches often entangled and fused with each other, and having short, secondary branchlets mostly one side (secund) or on opposite sides at different levels (alternate) giving a spiky appearance to the thallus. Medulla composed of 4-5 layers of clear, thin-walled ellipsoid cells 50-80 µm in diameter; cortex 1-2 layered, composed of pigmented cells 20-25 µm in diameter. Lenticular thickenings absent in medullary cells. Tetrasporangia zonately divided, in saddle-shaped stichidia proximal or median on ultimate branchlets.



**Remarks:** A relatively rare but locally abundant plant, so far only recorded in French Polynesia from subtidal habitats of Nuku Hiva in the Marquesas Islands, where it is epiphytic on *Halimeda* or growing on coralline surfaces.

***Hypnea spinella*** (C. Agardh) Kützing, 1847: 23. Australia: Millar, 1990: 352, fig. 23D; Great Barrier Reef, Australia: Price & Scott, 1992: 40, figs 9B, 10A-F; Indian Ocean: Silva *et al.*, 1996: 306; China: Bangmei & Yongqiang, 1997: 204, figs 39-42; Taiwan: Chiang, 1997: 175, fig. 15; Hawaiian Islands: Abbott, 1999a: 117, fig. 25B-E; Papua New Guinea: Littler & Littler, 2003: 76; Wallis Islands: N'Yeurt & Payri, 2004: 381. **(Fig. 160)**

**Basionym:** *Sphaerococcus spinellus* C. Agardh 1822: (1822-1823): 323-324 (type locality: West Indies).

**Misapplied name:** *Hypnea pannosa* J. Agardh. French Polynesia: Payri *et al.*, 2000: 222, fig. p. 223 lower.

**Material examined:** Taharaa, Tahiti: 14 Apr. 1997, *leg. A. D. R. N'Yeurt & C. E. Payri*, UPF 315, 321; 30 Mar. 1998, *leg. A. D. R. N'Yeurt*, UPF 705; 22 Apr. 1998, *leg. C. E. Payri*, UPF 716; 5 May 2002, *leg. C. E. Payri*, UPF 3941; 27 Nov. 2005, *leg. A. D. R. N'Yeurt & A. Pham*, UPF 3171; Arue, Tahiti, n.d., *leg. E. Deslandes*, UPF 322; Vairao, Tahiti, 20 Mar. 1998, *leg. J. Orempuller*, UPF 595; Taravai, Gambier, 20 Nov. 2000, *leg. A. D. R. N'Yeurt*, UPF 861; Mangareva, Gambier, 19 Nov. 2000, *leg. A. D. R. N'Yeurt*, UPF 900; Punaauia PK18, Tahiti, 13 Apr. 2002, *leg. A. D. R. N'Yeurt*, UPF 3106; Matira, Bora Bora, 16 Aug. 2002, *leg. A. D. R. N'Yeurt & D. Schneider*, UPF 2527; Hotel Bora Bora Lagoon, Bora Bora, 17 Aug. 2002, *leg. A. D. R. N'Yeurt & D. Schneider*, UPF 2559; Tematapi Pt., Rapa, 1 Nov. 2002, *leg. J. L. Menou*, UPF 1868; Tarakoi Islet, Rapa, 5 Nov. 2002, *leg. C. E. Payri*, UPF 3586; Iri Bay, Rapa, 16 Nov. 2002, *leg. J. L. Menou*, UPF 3263, 3544; Mei Pt., Rapa, 26 Nov. 2002, *leg. C. E. Payri*, UPF 2384; Tauna Islet, Rapa, 27 Nov. 2002, *leg. C. E. Payri*, UPF 2399, 3567, 3578, 3601; Rapa Iti, 28 Nov. 2002, *leg. J. L. Menou*, UPF 2400; Rarapai Islet, Rapa, 30 Nov. 2002, *leg. J. L. Menou*, UPF 2432, 2433; Tiahura, Moorea, 1 Oct. 2004, *leg. A. D. R. N'Yeurt & A. Pham*, UPF 2951; Afaahiti, Tahiti, 16 Nov. 2004, *leg. A. D. R. N'Yeurt & A. Pham*, UPF 2914; Trou du Souffleur, Papenoo, Tahiti, *leg. A. D. R. N'Yeurt & A. Pham*: 3 Mar. 2005, UPF 2973; 27 Nov. 2005, UPF 3151, 3152.

Thallus forming entangled cushions 30-60 mm broad, bright reddish in colour, composed of terete, non-percurrent axes less than 400 µm in diameter, sometimes secondarily attached to each other laterally. Branching irregular, with numerous short (1-4 mm long) sharply pointed, arcuate and basally truncate secondary branchlets. Medullary cells 30-50 µm in diameter, becoming progressively smaller towards the periphery. Lenticular thickenings sometimes present. Cortical cells 12-15 µm in diameter, in surface view elongate, brick-like. Tetrasporangial sori terminal, proximal or girdling ultimate branchlets; tetrasporangia zonately divided, to 20 µm in diameter and 40 µm long.

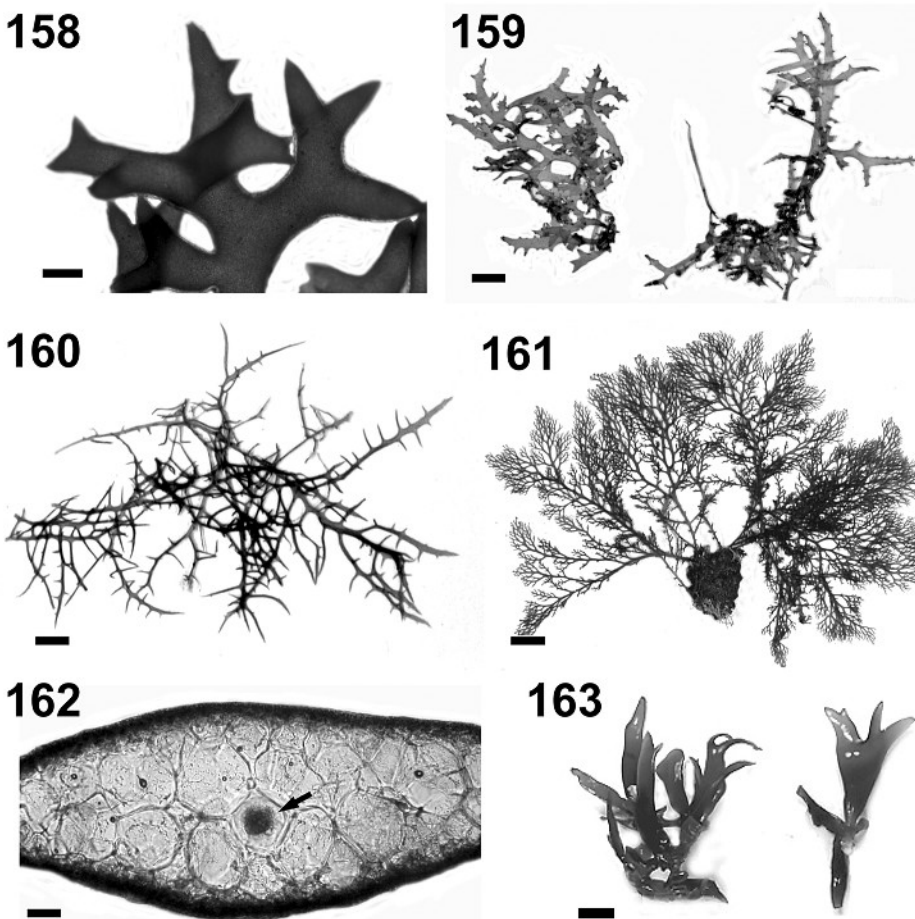
**Remarks:** this is the most common minute *Hypnea* species in the collections, ubiquitous in most habitats. The French Polynesia material agrees with the concept of *H. spinella* in Price & Scott (1992) and Abbott (1999a). The record and photograph of this species from French Polynesia in Payri *et al.* (2000: 223, 224, 225) actually represents *H. esperi*; the correct photograph for French Polynesian *H. spinella* is on p. 223 (lower), as *H. pannosa*.

**Plocamiales** G.W. Saunders *et* Kraft

**Plocamiaceae** Kützing

***Plocamium*** J.V. Lamouroux

***Plocamium sandvicense*** J. Agardh, 1892: 95 (type locality: O'ahu, Hawaiian Islands). **(Figs 161-162)**



Figs 158-163. **158.** *Hypnea pannosa*: detail of ultimate branchlets of fresh plant from Papenoo (UPF). Scale = 1 mm. **159.** *Hypnea saidana*: habit (UPF 323). Scale = 5 mm. **160.** *Hypnea spinella*: habit (UPF 3578). Scale = 2 mm. **161.** *Plocamium sandvicense*: habit (UPF 3022) Scale = 8 mm. **162.** *Plocamium sandvicense*: transverse section of branchlet, showing axial cell (arrow) (UPF 3022). Scale = 10  $\mu$ m. **163.** *Gracilaria abbottiana*: habit of freshly-collected plants (UPF 3132). Scale = 5 mm.

**Misapplied name:** *Plocamium cartilagineum* (Linnaeus) Dixon. French Polynesia: Payri *et al.*, 2000: 226.

**Material examined:** Tahara'a, Tahiti, 14 Apr. 1997, *leg. A. D. R. N'Yeurt & C. E. Payri*, UPF 356, 357; 6 Jun. 1997, *leg. A. D. R. N'Yeurt*, UPF 355; Trou du Souffleur, Papenoo, Tahiti, 27 Nov. 2005, *leg. A. D. R. N'Yeurt & A. Pham*, UPF 3022, 3023, 3024, 3025, 3150.

Thallus to 60 mm high, erect and deep pinkish-red with an iridescent sheen in life, cartilaginous and lubricous. Axes slender, strongly compressed to flattened, 0.5-1.5 mm in diameter, naked below but branched in alternate series of 2 above, in a single plane. Lateral branchlets with entire or serrate margins, usually incurved at the apex. Internal structure cellular, with one to two layers of small pigmented cortical cells 4-5  $\mu$ m long and 2.5-3  $\mu$ m in diameter, and 1-3 layers



of large clear medullary cells 8-20 µm in diameter. Tetrasporangia not seen in Tahitian plants, but reported to occur in clusters of elongate, adaxial stichidia for Hawaiian Islands plants.

**Remarks:** A relatively rare plant, growing firmly? attached to rocks or other hard surfaces in crevices or tide pools in the lower littoral. The French Polynesian plants were never collected fertile, but their vegetative morphology and habit are in good agreement with the Hawaiian Islands plants. *Plocamium cartilagineum* (Linnaeus) Dixon (reported from Fiji, N'Yeurt, 2001: 799, figs 222, 227, 229; South & Skelton, 2003: 730) differs in a larger, more slender thallus with broader branches alternating in series of 3 to 5, and the absence of incurved branch apices (South & Adams, 1979: 124, Womersley, 1994: 389). *Plocamium angustum* (J. Agardh) J. D. Hooker et Harvey from Fiji and South Australia differs from *P. sandvicense* in its larger thallus and otherwise disposed tetrasporangial stichidia (South & Skelton, 2003: 730, Womersley, 1994: 378). Molecular studies on Japanese members of the genus (Yano et al., 2005) revealed the presence of cryptic species, and the same could well apply to South Pacific populations.

**Gracilariales** Fredericq et Hommersand

**Gracilariaceae** Nägeli

**Gracilaria** Greville

**Key to the French Polynesian species of *Gracilaria***

- 1a. Thallus strongly compressed, decumbent and often palmately branched; found usually in exposed habitats of the reef crest and fore-reef. . . . . *G. abbottiana*
- 1b. Thallus terete, erect and never palmately branched; found usually in estuaries and areas of calm turbid waters. . . . . *G. parvispora*

***Gracilaria abbottiana*** Hoyle, 1978: 299, figs 1-6 (type locality: Black Point, Oahu Island, Hawaii). French Polynesia: Payri et al., 2000: 218. **(Fig. 163)**

**Material examined:** Taharaa, Tahiti: 14 Apr. 1997, leg. A. D. R. N'Yeurt & C. E. Payri, UPF 290; 30 Mar. 1998, leg. A. D. R. N'Yeurt, UPF 681; 22 Apr. 1998, leg. A. D. R. N'Yeurt & C. E. Payri, UPF 715; 05 May 2002, leg. C. E. Payri, UPF 3942; 27 Nov. 2005, leg. A. D. R. N'Yeurt & A. Pham, UPF 3132; Motu Nono, Afaahiti, Tahiti, 8 Jun. 1997, leg. A. D. R. N'Yeurt, UPF 556; Afaahiti, Tahiti, 10 Jun. 1997, leg. A. D. R. N'Yeurt, UPF 291.

Thallus 15 to 50 mm high, deep-red to maroon, decumbent, dichotomously or palmately branched. The branches are 1-5 mm wide, with the ends often incurved and twisted. Texture strongly cartilaginous, smooth. Axes to 700 µm thick, medulla composed of 10-12 layers of clear cells 200-220 µm in diameter, surrounded by 1-2 layers of small pigmented cells. Tetrasporophyte with cruciately-divided tetrasporangia on the dorsal surface only, embedded in the outer cortex.

**Remarks:** Growing strongly adhering to the substratum on fringing reefs, where it occurs in small tide pools and crevices in the rock or coral (Taharaa, Afaahiti: Tahiti). This species is superficially similar to another flattened Hawaiian *Gracilaria* species, *G. dawsonii* Hoyle (1994). Male plants and biochemical composition analysis are critical to distinguish both species; however the pointed, incurved apices and twisted branches of *G. abbottiana* differ from the straight, obtuse branches of *D. dawsonii*.



\**Gracilaria parvispora* I.A. Abbott, 1985: 119. 120, fig. 1 (type locality: Kaneohe Bay, Oahu, Hawaiian Islands). Hawaiian Islands: Abbott, 1999a: 213, fig. 59A-C.

(Fig. 164)

**Misapplied name:** *Gracilaria verrucosa* (Hudson) Papenfuss. French Polynesia: Payri *et al.*, 2000: 218.

**Material examined:** estuary besides Hotel Beachcomber, Faa'a, Tahiti, *leg. A. D. R. N'Yeurt*: 13 Apr. 1997, UPF 296, 297, 299; 4 May 1997, UPF 298; 7 May 1997, UPF 294, 295; Taone, Tahiti, 7 May 1997, *leg. J. Orepuller*, UPF 293; Opunohu, Moorea: 30 Jun. 1997, *leg. A. D. R. N'Yeurt*, UPF 292, 3099; Aug. 2000, *leg. C. E. Payri*, UPF 726.

Thallus to 20 cm high, forming soft, reddish-brown to purplish-pink erect clumps. Axes terete, 1-4 mm wide, becoming slender distally, prominently irregularly unilaterally branched up to three orders, with tapered pointed apices. Medulla composed of large, progressively smaller clear cells 90-140 µm in diameter; outer cortex pigmented, composed of one layer of cells. Tetrasporangia scattered in cortex, about 25 µm in diameter. Cystocarps large, up to 2.5 mm in diameter, scattered on surface of axes.

**Remarks:** This alga is abundant in calm nutrient-rich waters of estuaries and bays of high islands in the Society Group, where it is often seasonally dominant, covering large areas during the warmer months (December-January). This is also a potentially edible species. The prominent unilateral branching with slender second- and third-order branches is characteristic of this species.

#### Rhodymeniales F. Schmitz

#### Champiaceae Kützing

#### *Champia* Desvaux

#### Key to the French Polynesian species of *Champia*

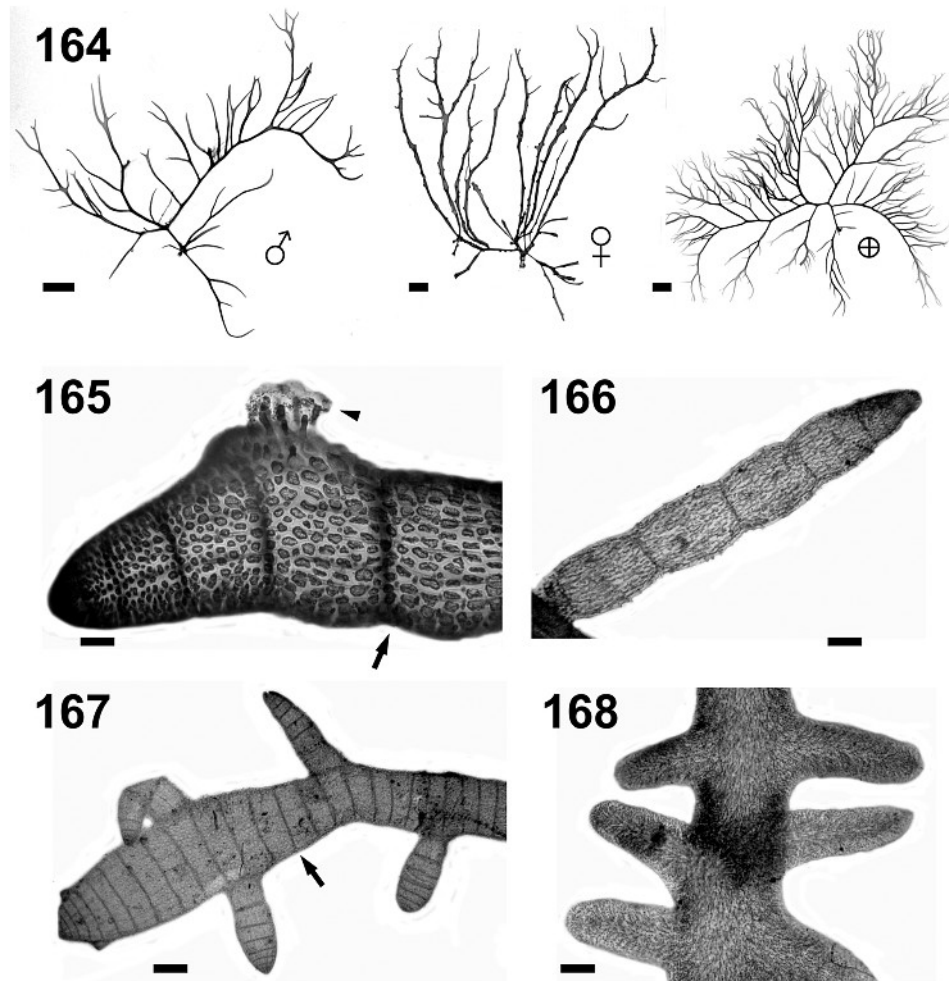
- 1a. Thallus terete; segments barrel-shaped . . . . . *C. parvula*
- 1b. Thallus compressed to flattened; segments not barrel-shaped . . . . . 2
  - 2a. Thallus compressed, not iridescent; apical segments constricted at diaphragms which are more than 7 cells across . . . . . *C. compressa*
  - 2b. Thallus strongly flattened and iridescent; apical segments not constricted at diaphragms which are less than 5 cells across . . . . . *C. vieillardii*

\**Champia compressa* Harvey, 1838: 402 (type locality: Muysenberg, South Africa). Mariana Islands: Okamura, 1916: 10, fig. 8a-b; Venezuela: Díaz-Piferrer, 1970: 175, fig. 42; Australia: Millar, 1990: 371, fig. 30A-D; Indian Ocean: Silva *et al.*, 1996: 345; Papua New Guinea: Coppejans & Millar, 2000: 324, figs 19-20; Malaysia: Masuda *et al.*, 2001a: 84, figs 14-17; Samoa: Skelton & South, 2002a: 143, fig. 7E-F; 2007: 68, figs 120-125; Fiji: Littler & Littler, 2003: 102; Wallis Islands: N'Yeurt & Payri, 2004: 382.

(Fig. 165)

**Material examined:** Iri Bay, Rapa, Australs, 16 Nov. 2002, *leg. J. L. Menou*, UPF 3542; Rukuaga Point, Rapa, 30 Nov. 2002, *leg. J. L. Menou*, UPF 3290 RPS82.

Thallus to 15 mm high and 2 mm wide, with oppositely branched, hollow, mucilage-filled compressed axes attached to the substratum via simple hapteroid pads. Base of branches terete; axes clearly segmented, with diaphragms 8-10 cells across; constricted. Branches tapered at bases and apices, broader in median parts. Medulla consisting of longitudinal filaments 10-20 µm in diameter and 50-180 µm long, mostly at periphery of diaphragms, usually bearing one or two spherical gland cells 6-12 µm in diameter. Cortex composed of both large inner rectangular cells 25-50 µm wide and 35-40 µm long, and small outer isodiametric cells



Figs 164-168. **164.** *Gracilaria parvispora*: habits of male (UPF 296), female (UPF 293) and tetrasporic (UPF 299) plants. Scales = 6 mm. **165.** *Champia compressa*: detail of branch apex, showing hapteroid attachment (arrowhead) and constricted diaphragm (arrow) (UPF 3290). Scale = 50  $\mu$ m. **166.** *Champia parvula*: habit of young plant (epiphytic on UPF 4009). Scale = 500  $\mu$ m. **167.** *Champia vieillardii*: habit (UPF 511), showing unstricted diaphragm. Scale = 1 mm. **168.** *Gloiocladia iyoensis*: habit (UPF 3392). Scale = 250  $\mu$ m.

10-30  $\mu$ m in diameter. Tetrasporangia in sori, tetrahedrally divided, to 50  $\mu$ m in diameter, intercalary on outer cortical cells. Cystocarps to 500  $\mu$ m in diameter, with a conspicuous beak-like ostiole.

**Remarks:** Growing at depths of 3 to 10 m, so far in French Polynesia only found on the island of Rapa in the southern Australs. This species can be confused with *Champia vieillardii*, but *C. compressa* is less flattened, and has diaphragms which are longer and distinctly constricted (Millar, 1990: 372-373; Masuda *et al.*, 2001a: 85).

*Champia parvula* (C. Agardh) Harvey, 1853: 76. French Polynesia: Payri *et al.*, 2000: 238; Viêt Nam: Dawson, 1954: 443, fig. 52c; Taiwan: Chiang, 1962: 147, pl. 4

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fig. 5; Fiji: Kapraun & Bowden, 1978: 201, fig. 28; N'Yeurt, 2001: 808, fig. 238; Littler & Littler, 2003: 102; Australia: Millar, 1990: 371, fig. 29G-H; Price & Scott, 1992: 55, fig. 14A-E; Womersley, 1996: 129-131, figs 54A-C; Seychelles: Wynne, 1995: 283, figs 20-21; Indian Ocean: Silva *et al.*, 1996: 346; Rotuma Island: N'Yeurt, 1996: 417, fig. 160; Belize: Littler & Littler, 1997: 41, fig. 38; Hawaiian Islands: Abbott, 1999a: 218, fig. 60A-C; Papua New Guinea: Millar *et al.*, 1999: 564, fig. 4C; Samoa: Skelton & South, 2002a: 143, fig. 8A-C; 2007: 68, figs 126-133. **(Fig. 166)**

**Basionym:** *Chondria parvula* C. Agardh, 1824: 207 (type locality: Cadíz, Spain).

**Material examined:** Taapuna, Tahiti, 15 Sep. 1995, *leg. A. D. R. N'Yeurt*, UPF 405 S19, 409 S23; Punaauia, Tahiti, 25 Sep. 1995, *leg. A. D. R. N'Yeurt*, UPF 408 S22; Botanical Gardens, Papeari, Tahiti, 22 Oct. 1995, *leg. A. D. R. N'Yeurt*, UPF 407 S21, 410 S24; Tiahura, Moorea, 25 Nov. 1995, *leg. A. D. R. N'Yeurt*, UPF 512 S126.

Thallus forming prostrate, secondarily attached entangled mats to 80 mm wide, reddish-brown, composed of a chain of hollow, mucilage-filled, barrel-shaped terete segments 1-1.5 mm in diameter. Axes up to 30 mm long, alternately, radially or irregularly branched, with tapered, blunt apices. Diaphragms 8-10 cells across, constricted. Medulla consisting of longitudinal filaments 8-15  $\mu\text{m}$  in diameter and 80-300  $\mu\text{m}$  long, at periphery of diaphragms, usually with one or two spherical gland cells 10-18  $\mu\text{m}$  in diameter. Cortex of both large, inner isodiametrical to ellipsoid cells 25-40  $\mu\text{m}$  in diameter and small outer isodiametric cells 10-18  $\mu\text{m}$  in diameter. Tetrasporangia tetrahedrally divided, to 80  $\mu\text{m}$  in diameter, submerged and scattered in branch surface. Cystocarps to 500  $\mu\text{m}$  in diameter, with a conspicuous ostiole.

**Remarks:** Commonly found as an epiphyte on larger algae (such as *Halimeda*) or occurring in loose entangled clumps on coral heads in the lagoon of high islands.

***Champia vieillardii*** Kützing, 1866: 14, pl. 37 figs e, f (type locality: Wagap, New Caledonia). French Polynesia: Payri *et al.*, 2000: 238; Viêt Nam: Dawson, 1954: 443, figs 52e, 53; Australia: Millar, 1990: 539, fig. 30E-F; Price & Scott, 1992: 57, figs 15A-C, 16A, B; Canary Islands: González-Ruiz *et al.*, 1995: 27, fig. 9; Seychelles: Wynne, 1995: 285, figs 22-24; Indian Ocean: Silva *et al.*, 1996: 348; Hawaiian Islands: Abbott, 1999a: 218, fig. 60D-F; Norfolk Island: Millar, 1999: 511, fig. 36; Fiji: N'Yeurt, 2001: 809, figs 230, 237; Malaysia: Masuda *et al.*, 2001a: 86, figs 18-20; Solomon Islands: Littler & Littler, 2003: 104. **(Fig. 167)**

**Material examined:** Tiahura, Moorea, 25 Nov. 1995, *leg. A. D. R. N'Yeurt*, UPF 511 S125.

Thallus to 20 mm high, pale-red to reddish-brown with an iridescent sheen when alive, consisting of strongly flattened, distally broader, unconstricted segmented axes branched alternately to oppositely in a single plane, up to four orders. Branching mostly from base of thallus. Axes hollow and mucilage-filled, 1-3 mm wide, basally terete and flattened in median portion, tapered both proximally and distally, with obtuse apices. Medulla consisting of longitudinal filaments 15-20  $\mu\text{m}$  in diameter and 80-200  $\mu\text{m}$  long, mostly at periphery of diaphragms, usually bearing one or two spherical gland cells 10-12  $\mu\text{m}$  in diameter. Cortex composed of both large inner rectangular cells 25-70  $\mu\text{m}$  wide and 40-60  $\mu\text{m}$  long, and small outer isodiametric cells 15-40  $\mu\text{m}$  in diameter. Diaphragms short, 3-4 cells across, not constricted. Reproduction not seen, but assumed as for genus.

**Remarks:** Growing on dead coral and other hard surfaces or as an epiphyte in the lagoon and at depths of 20 m on the outer reef slope of high islands. In the field, this species can be readily recognized by the iridescent, strongly flattened blades branched in a single plane.



**Faucheaceae** I.M. Strachan, G.W. Saunders *et* G.T. Kraft

***Gloiocladia*** J. Agardh *emend.* C. Rodríguez-Prieto, D.W. Freshwater *et* N. Sánchez

Rodríguez-Prieto *et al.* (2007) re-assessed the genus *Gloiocladia*, notably transferring all species of *Faucha* Montagne *et* Bory to *Gloiocladia* based on molecular data.

**Key to the French Polynesian species of *Gloiocladia***

- 1a. Thallus pinkish-red; base of side branchlets of same diameter as main axis . . .  
 ..... *G. iyoensis*
- 1b. Thallus reddish-brown; base of branches half the diameter of main axis. . . . .  
 ..... *G. sp. inedit*

***Gloiocladia iyoensis*** (Okamura) R.E. Norris, 1991: 587, figs 14-23 (South Africa). French Polynesia: Payri *et al.*, 2000: 234; Hawaiian Islands: Abbott, 1999a: 223, fig. 61E-F. **(Fig 168)**

**Basionym:** *Gloioderma iyoense* Okamura, 1934: (1933-1942): 27-28, pl. 315: figs. 11-16 ('*iyoensis*') (type locality: Otateba, Ehime Prefecture, Japan). Japan: Segawa, 1938: 147; Yamada, 1941: 202, fig. 7.

**Material examined:** Tiahura, Moorea, 30 Jun. 1997, *leg. A. D. R. N'Yeurt*, UPF 566 S180, 572 S186; Tauna Islet, Rapa, 4 Nov. 2002, *leg. C. E. Payri*, UPF 3392 RPS177.

Thallus to 11 mm long and 2 mm wide, delicate, light reddish-pink in colour, with a soft, rubbery texture. Attachment to the substratum via strap-shaped, blunt-ended attachment rhizoids issued from the ventral main axes. Main axes percurrent, composed of compressed, elongate lobes with irregularly pinnate side branchlets with blunt apices. Base of secondary branchlets about 500 µm wide, of same diameter as the main axis. Medullary cells large, oval-elongate, about 60 µm in diameter and 100 µm long, organized in a central core, surrounded by a perpendicularly aligned cortex of loosely coherent, dichotomously branched filaments composed of small obovoid, teardrop-shaped cells 2-3 µm in diameter and 4-5 µm long. Subcortical cells elongate, forming a secondarily pit-connected network. Tetrasporangia scattered distally in the outer cortex.

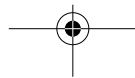
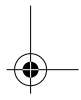
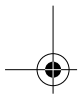
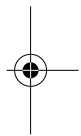
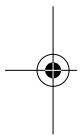
**Remarks:** Epiphytic on larger algae on the outer reef slope of high islands, at depths of 15 to 20 m.

**\**Gloiocladia* sp. inedit.** **(Figs 169-170)**

**Material examined:** eastern oceanic plate, Rapa, Australs, 5 Nov. 2002, *leg. J. L. Menou*, UPF 1971, 3488 RPS266; Rarapai Islet, Rapa, 30 Nov. 2002, *leg. J. L. Menou*, UPF 2441, 3485 RPS263, 3486 RPS264, 3493 RPS271.

Thallus reddish brown, soft cartilaginous, to 30 mm long, with a compressed, percurrent main axis 400-500 µm in diameter, bearing mostly regularly pinnate, subcylindrical to compressed, blunt-ended side branchlets 220-250 µm in diameter, at regular intervals of about 500 µm. Strap-like rhizoids absent; attachment to the substratum via discrete pad-like structures lateral on basal portions of main axes. Medullary cells large, oval-elongate, about 50 µm in diameter and 80 µm long, organized in a central core, surrounded by a cortex of loosely coherent, short, dichotomously branched filaments composed of small obovoid, teardrop-shaped cells 2-3 µm in diameter and 3-4 µm long. Subcortical cells stellate to elongate, forming a secondarily pit-connected network. Reproduction not seen.

**Remarks:** Growing at depths of 32 to 57 m, so far only recorded from the southern Australs (off the island of Rapa). The large medullary cells organized in a central core, surrounded by a cortex of loosely coherent, short, dichotomously branched







filaments is typical of the genus *Gloiocladia*. This deepwater species is unlike any other described in the genus, and is characterised by its distinctly regular pinnate branching and secondary branchlets of half the diameter of the main percurrent axis. The lack of fertile material precludes a more detailed description at this stage.

***Halichrysis*** (J. Agardh) F. Schmitz

\****Halichrysis cf. conrescens*** (J. Agardh) De Toni, 1900: 535. (Figs 171-172)

**Basionym:** *Chrysymenia conrescens* J. Agardh, 1885: 48 (type locality: New South Wales, Australia).

**Misapplied names** (according to Saunders *et al.*, 2006): *Halichrysis irregularis* (Kützinger) A. Millar in Millar & Prud'homme van Reine, 2005: 542, fig. 5 (New Caledonia). *Drouetia coalescens* (Farlow) G. De Toni, 1938: 27. Australia: Millar, 1990: 366, figs 28A-D. *Halichrysis coalescens* (Farlow) R.E. Norris *et al.* Millar in Norris, 1991: 583, 585, 587, figs 7-13 (South Africa). French Polynesia: Payri *et al.*, 2000: 236; Hawaiian Islands: Abbott, 1999a: 235, fig. 66A-C; Fiji: N'Yeurt, 2001: 812, figs 220, 221, 234; Littler & Littler, 2003: 116.

**Material examined:** Entre deux Baies, Moorea, 12 Dec. 1995, *leg. J. Orempuller*, UPF 312; Punaauia, Tahiti, 5 Oct. 1995, *leg. A. D. R. N'Yeurt*, UPF 382.

Thallus to 25 mm wide, creamy-pink with a metallic iridescence, composed of flattened, stipitate sub-peltate blades 200-350 µm thick, with a central stalk and one to several marginal or submarginal cortical outgrowths forming secondary attachments to the substratum. Adjacent blades are laterally fused, forming continuous colonies to 15 cm across. Medulla 3- to 4-layered, composed of clear ovoid to angular cells 50-150 µm in diameter surrounded by a sharply defined cortex of 1-3 layers of progressively smaller pigmented cells 3-10 µm in diameter. Clusters of translucent, spherical cells present on the dorsal side, responsible for the iridescent, mucilaginous texture of the thallus. Reproduction not seen in French Polynesian material, but assumed as for genus (Huvé & Huvé, 1977): carpogonial branch 3-celled; tetrasporangia terminal on short lateral filament, cruciately divided, in continuous sori lacking paraphyses; spermatangia in superficial patches.

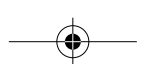
**Remarks:** Growing on coralline and rocky surfaces in turbulent areas and on the outer reef slope of high islands, at depths of 15 to 20 m. The iridescent, stipitate, laterally fused thalli are characteristic in the field. According to Saunders *et al.* (2006), who recently clarified generic concepts in *Halichrysis* and other Rhodymeniaceae, the new combination *Halichrysis irregularis* by Millar (in Millar & Prud'homme van Reine, 2005) was based on a misidentification of an eastern Australian species of *Asteromenia* Huisman *et al.* Millar, and the South Pacific material most closely resembles *H. conrescens* although further critical studies are required to confirm its identity.

**Lomentariaceae** J. Agardh

***Gelidiopsis*** F. Schmitz

**Key to the French Polynesian species of *Gelidiopsis***

- 1a. Axes cylindrical throughout, including at dichotomies . . . . . *G. variabilis*
- 1b. Axes cylindrical or compressed; dichotomies always compressed . . . . . 2
  - 2a. Axes cylindrical, not palmately branched . . . . . *G. intricata*
  - 2b. Axes compressed, palmately branched above . . . . . *G. scoparia*

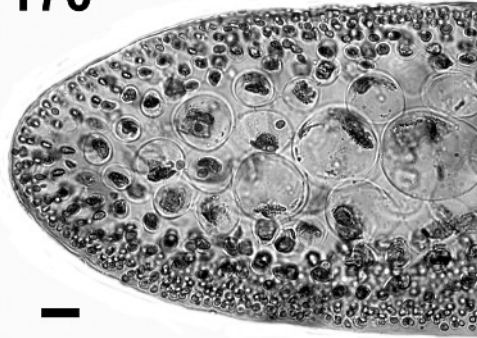




**169**



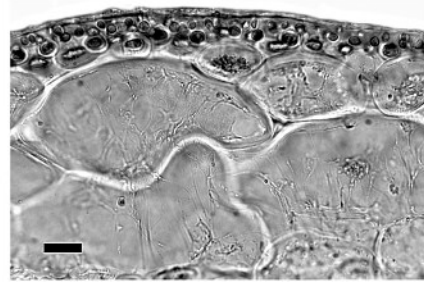
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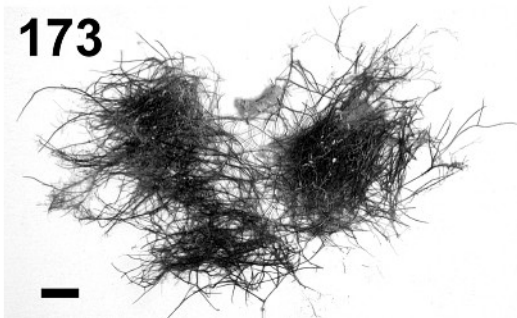
**171**



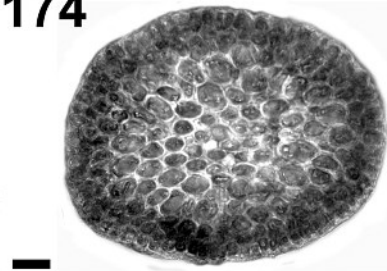
**172**



**173**



**174**



Figs 169-174. **169.** *Gloiocladia* sp.: habit showing pinnate branching (UPF 1971). Scale = 2 mm. **170.** *Gloiocladia* sp.: transverse section of branchlet, showing large medullary cells surrounded by a cortex of loosely coherent, obovoid cells (UPF 1971). Scale = 25  $\mu$ m. **171.** *Halichrysis* sp. cf. *H. conrescens*: habit of pressed plant (UPF 312). Scale = 3 mm. **172.** *Halichrysis* sp. cf. *H. conrescens*: transverse section showing sharply demarcated medulla and cortex (UPF 312). Scale = 20  $\mu$ m. **173.** *Gelidiopsis intricata*: habit of pressed material (UPF 2508). Scale = 5 mm. **174.** *Gelidiopsis intricata*: transverse section of thallus (UPF 3029). Scale = 20  $\mu$ m.

*Gelidiopsis intricata* (C. Agardh) Vickers, 1905: 61. French Polynesia: Payri *et al.*, 2000: 232; Viêt Nam: Dawson, 1954: 423, fig. 34a-d; Great Barrier Reef, Australia: Price & Scott, 1992: 51, fig. 13A-F; Indian Ocean: Silva *et al.*, 1996: 360; Rotuma Island: N'Yeurt, 1996: 417, fig. 192; Belize: Littler & Littler, 1997: 47, fig. 44;

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Hawaiian Islands: Abbott, 1999a: 221, fig. 61A; Fiji: N'Yeurt, 2001: 810; Samoa: Skelton & South, 2002a: 144, fig. 8D-G; 2007: 79, figs 163-167. (Figs 173-174)

**Basionym:** *Sphaerococcus intricatus* C. Agardh, 1822: 333 (syntype localities: Mauritius; Hawaiian Island; "Ravak" (Lawak); Waigeo Island; Moluccas; Indonesia).

**Material examined:** Bounty Bay, Pitcairn Island, 8 Jul. 1997, leg. J. Starmar, UPF 649; Motu Totegegie, Gambier, 22 Nov. 2000, leg. A. D. R. N'Yeurt, UPF 793, 929; Mangareva, Gambier, 18 Nov. 2000, leg. A. D. R. N'Yeurt, UPF 798, 923; Taiohae, Nuku-Hiva, Marquesas, 15 May 2002, leg. S. Sidolle, UPF 2716; Aquarium, Bora Bora, 15 Aug. 2002, leg. A. D. R. N'Yeurt & D. Schneider, UPF 2507, 2508; Motu Marara, Bora Bora, 16 Aug. 2002, leg. A. D. R. N'Yeurt & D. Schneider, UPF 2536; Hotel Bora Bora Lagoon, Bora Bora, 17 Aug. 2002, leg. A. D. R. N'Yeurt & D. Schneider, UPF 2566; Tiahura, Moorea, 28 Sep. 2004, leg. A. D. R. N'Yeurt & A. Pham, UPF 3029.

Thallus to 50 mm high, reddish-green to purple, stiff and wiry in texture. Creeping basal axes give rise to terete, sparsely branched erect axes 250-300 µm in diameter which are often laterally fused in several places. Lower branches terete, upper parts dichotomously branched, flattened at dichotomies. Branch apices blunt and tapered, with no distinct apical cell. Medulla composed of small cells 7-10 µm in diameter, surrounded by a layer of elongated cortical cells 2-5 µm in diameter. Tetrasporangial sori 530-950 µm in diameter, terminal on spatulate branchlets, containing cruciate tetraspores 23-24 µm in diameter.

**Remarks:** A common alga on coral heads in the lagoon of high islands in the Society group.

*Gelidiopsis scoparia* (Montagne et Millardet) De Toni, 1900: 410-411.

(Figs 175-176)

**Basionym:** *Gelidium scoparium* Montagne et Millardet, 1862: 13-14, pl. XXVII: fig. 1 (type locality: Réunion).

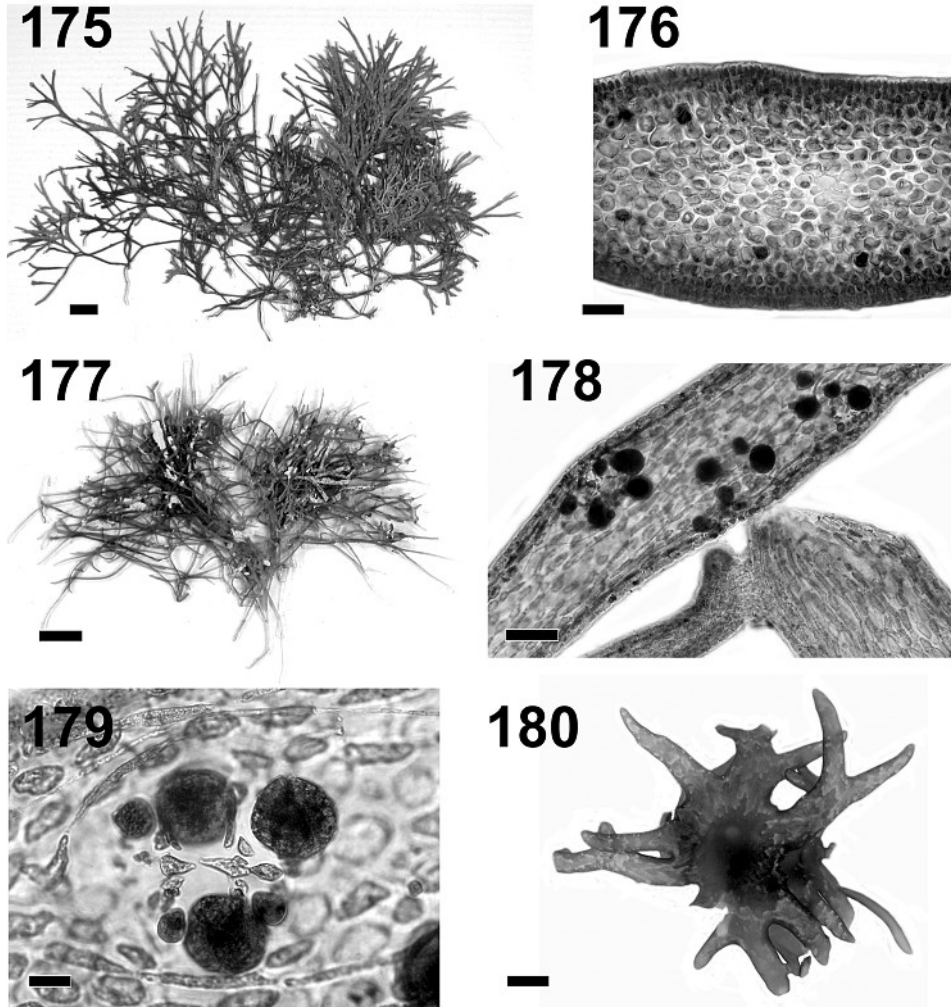
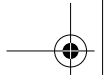
**Heterotypic synonyms:** *Ceratodictyon repens* (Kützing) R.E. Norris, 1987: 245. *Gelidiopsis acrocarpa* (Harvey ex Kützing) De Toni, 1900: 411. New Caledonia: Garrigue & Tsuda, 1988: 65.

*Gelidiopsis repens* (Kützing) Weber-van Bosse, 1928: 425, 426. French Polynesia: Payri et al., 2000: 232; Mauritius: Børgesen, 1954: 20, fig. 6; Marshall Islands: Dawson, 1956: 46, fig. 37; Taiwan: Chiang, 1962: 146, pl. 4 figs 3-4; Seychelles: Wynne, 1995: 282, 328, fig. 19; Fiji: N'Yeurt, 2001: 810, figs 152, 153a, b; Mozambique: Coppejans et al., 2002: 343; Samoa: Skelton & South, 2007: 79, figs 168-174. *Gelidium acrocarpum* Harvey ex Kützing, 1869: 8, pl. 23 figs a-b. French Polynesia: Payri & N'Yeurt, 1997: 888. *Gelidium repens* Kützing, 1868: 21, pl. 60, figs a, b (type locality: Wagap, New Caledonia).

**Material examined:** Taharaa, Tahiti, 18 May 1996, leg. C. E. Payri, UPF 696, 697; Nuku-Hiva, Marquesas, 1997, leg. J. Orempuller, UPF 585; Afaahiti, Tahiti, 7 Jun. 1997, leg. A. D. R. N'Yeurt, UPF 283; Taharaa, Tahiti, 27 Nov. 2005, leg. A. D. R. N'Yeurt & A. Pham, UPF 3131, 3168.

Thallus to 40 mm high, deep reddish-maroon, wiry and flexible. Axes ligulate, compressed below and distally flattened; dichotomously branched and palmate above, 0.5-1 mm wide and 254-330 µm thick. Branch tips usually forked and sharp. Medulla composed of clear ovoid to spherical cells 11-20 µm in diameter; outer cortex of small pigmented subrectangular cells 4-7 µm in diameter. Tetrasporophyte with reproductive structures in bulb-like swellings at the end of erect branches.

**Remarks:** Commonly found growing on coral heads and hard surfaces, in the lagoon and down to 20 m depth. *Gelidiopsis scoparia* is a common and very variable tropical species. The Polynesian plants agree well with those described in



Figs 175-180. **175.** *Gelidiopsis scoparia*: habit (UPF 283). Scale = 5 mm. **176.** *Gelidiopsis scoparia*: transverse section of thallus, showing medulla and cortex (UPF 3131). Scale = 40  $\mu$ m. **177.** *Gelidiopsis variabilis*: habit (UPF 3584). Scale = 4 mm. **178.** *Lomentaria corallicola*: detail of elongated fertile axis with embedded tetrasporangia (UPF 3446). Scale = 100  $\mu$ m. **179.** *Lomentaria corallicola*: detail of tetrasporangial sorus (UPF 3446). Scale = 25  $\mu$ m. **180.** *Asteromenia anastomosans*: habit of fresh plant (UPF 1928). Scale = 10 mm.

Børgesen (1952, fig. 13 and 1954, fig. 6) from Mauritius. There seems to be at least two forms of this plant, one delicate with broad flattened portions another larger with filiform extensions to the flat portions. Both these and intermediate forms have been observed in collections from various localities in the South Pacific, and they do not seem to merit varietal status as the morphology of the plants appears to be controlled by environmental conditions such as degree of exposure or depth (N'Yeurt, 2001). *Gelidiopsis repens* appears to us not to differ significantly from



*G. scoparia*, the earliest available name for this entity. Ateweberhan & Prud'homme van Reine (2005: 87) have put *G. repens* in synonymy with *G. variabilis*, based on unpublished research by A. M. Hatta, but surprisingly make no mention of *G. scoparia*. Skelton & South (2007: 83) noted that Hawaiian *G. scoparia* material they examined in BISH showed a high degree of variability encompassing *G. repens*, *G. scoparia* and *G. variabilis*. It could well be that all entities in question are conspecific (in which case the earliest available name would become *G. variabilis*), but the issue would need to be addressed with a detailed morphological and molecular study.

\**Gelidiopsis variabilis* (J. Agardh) F. Schmitz, 1895: 148. Pacific Mexico: Dawson, 1961: 201, pl. 9 fig. 2; Sri Lanka: Durairatnam, 1961: 64, pl. 11 figs 8-9; Indian Ocean: Silva *et al.*, 1996: 362; Belize: Littler & Littler, 1997: 47, fig. 47; Hawaiian Islands: Abbott, 1999a: 222, fig. 61C-D. **(Fig. 177)**

Basionym: *Gelidium variabile* Greville *ex* J. Agardh, 1851: 468 (type locality: Madras, India).

Material examined: Tarakoi Islet, Rapa, Australs, 5 Nov. 2002, *leg. C. E. Payri*, UPF 3363 RPS 149, 3584.

Thallus erect, tuft-like, to 30-50 mm high, consisting of entirely terete, irregularly divided axes 50-120  $\mu$ m in diameter. Medulla consisting of rounded, uniformly sized small cells 15-20  $\mu$ m in diameter, surrounded by a 2- 4-layered cortex of progressively smaller pigmented cells 3-5  $\mu$ m in diameter. Tetrasporangia cruciately divided, in apical stichidia to 80  $\mu$ m in diameter and 150  $\mu$ m long.

**Remarks:** Growing at depths of 15-20 m, on coral debris. So far in French Polynesia, only reported from the southern Austral island of Rapa. This species has been suggested to be conspecific with *G. intricata* (Abbott, 1999a: 221; Skelton & South, 2002a: 144) (see also note above). However, Coppejans *et al.* (2002: 343) report *G. variabilis* from Mozambique as being taller (up to 11cm high), less rigid, with rare, irregular or (sub)opposite branching, palmately divided, with mostly cylindrical or slightly compressed axes lacking markedly compressed parts. The French Polynesian plants are mostly cylindrical and not compressed at dichotomies, and thus retained within *G. variabilis* pending future, preferably molecular, studies on this group.

#### *Lomentaria* Lyngbye

*Lomentaria corallicola* Børgesen, 1939: 113, figs 30-32 (type locality: Kharg Island, Iran). French Polynesia: Payri *et al.*, 2000: 236; Great Barrier Reef, Australia: Price & Scott, 1992: 63, fig. 18A-E; Indian Ocean: Silva *et al.*, 1996: 351; Fiji: N'Yeurt, 2001: 811, figs 223, 224; American Samoa: Littler & Littler, 2003: 106; Samoa: Skelton & South, 2007: 75, figs 153-155. **(Figs 178-179)**

**Material examined:** Punaauia, Tahiti, 05 Oct. 1995, *leg. A. D. R. N'Yeurt*, UPF 464 S78, 465 S79; Tikehau, 07 Nov. 1995, *leg. A. D. R. N'Yeurt*, UPF 510 S124; Ha'urei Bay, Rapa, 11 Nov. 2002, *leg. A. D. R. N'Yeurt & C. E. Payri*, UPF 3446 RPS224, 3447 RPS225.

Thallus to 5 mm high, light pink, composed of arcuate creeping axes 200-250  $\mu$ m in diameter bearing occasional erect, basally constricted, apically obtuse branches 140-200  $\mu$ m in diameter. Adjacent axes often fuse laterally with each other, and the tips of branches make secondary connections to the substratum and other branches. Axes generally terete and hollow, composed of a filamentous medulla and transverse multi-layered cellular septa. Cortex consisting of cells of variable size; the larger elliptical cells 25-38  $\times$  16-19  $\mu$ m; the smaller rounded



polygonal in shape, 4-12  $\mu\text{m}$  in diameter. Tetrasporangia in isolated surface sori on elongate branches.

**Remarks:** Growing on coral debris or as an epiphyte larger algae (such as *Halimeda*) in intertidal and subtidal habitats to depths of 20 m, both in high island and atoll habitats. The French Polynesian material is in good agreement with the descriptions of the species in Børgesen (1939) and N'Yeurt (2001). Abbott (1999a: 224) reports *Lomentaria hakodatensis* Yendo from Hawaii, but remarks that species boundaries in the genus are vague and the relationships between the Hawaiian and French Polynesia populations are not clear at this stage, except that the Hawaiian plants seem to be larger with longer, less arched axes. A superficially similar-looking Australian species in the Champiaceae, *Dictyothamnion saltatum* Millar (1990: 375), differs from *L. corallicola* in its regularly arched ("saltate") habit, and the presence of tetrasporangia borne intercalarily in unmodified cortex, unlike the surface sori of the Polynesian plants.

#### **Rhodymeniaceae** Harvey

##### ***Asteromenia*** Huisman *et al.* Millar

\****Asteromenia anastomosans*** (Weber-van Bosse) G.W. Saunders, C.E. Lane, C.W. Schneider *et Kraft* 2006: 1593, figs 36-41. **(Figs 180-181)**

**Basionym:** *Rhodymenia*(?) *anastomosans* Weber-van Bosse, 1926: 150-151, fig. 39 (type locality: Kai Islands, Indonesia). Marshall Islands: Dawson, 1956: 52, fig. 49.

**Misapplied name:** *Asteromenia peltata* (W.R. Taylor) Huisman *et al.* Millar, 1996: 139-144, figs 2, 3, 7-9, 11, 14. Norfolk Island: Millar, 1999: 508, fig. 35; Papua New Guinea: Coppejans & Millar, 2000: 325, figs 22-24.

**Material examined:** Rapa Iti, Australs, 4 Nov. 2002, *leg. C. E. Payri*, UPF 1928; Tarakoi Islet, Rapa, 5 Nov. 2002, *leg. C. E. Payri*, UPF 3581, 3587.

Thallus reddish pink to greenish iridescent in colour, composed of cartilaginous, stipitate, irregularly peltate to ligulate blades 30-40 mm wide, 200-400 (800)  $\mu\text{m}$  thick, closely pressed to the substratum. Stipe perennial, to 10 mm long and 1.5 mm thick. The blades can be of very variable morphology, from almost regularly peltate to highly dissected with subdichotomous, bifid or strap-shaped extensions, often making secondary attachments with the substratum and adjacent thalli. Medulla compact, composed of up to 6 layers of roughly isodiametric ovoid to subrectangular cells 60-150  $\mu\text{m}$  wide and 60-300  $\mu\text{m}$  long, becoming progressively smaller towards a cortex composed of 2-4 layers of obovoid pigmented cells 3-6  $\mu\text{m}$  in diameter. Reproduction not seen.

**Remarks:** Growing gregariously at the base of cliffs at 1-3 m depth, in exposed habitats just below the *Sargassum* belts. So far in French Polynesia only reported from the island of Rapa. According to Huisman & Millar (1996), *Asteromenia* is distinguished from the superficially similar-looking genus *Halichrysis* by the presence of intercalary tetrasporangia in an unmodified cortex, 4-celled carpogonial branches, ampulliform cystocarps with adventitious filaments, and a lack of chains of intercalating cells in the medulla. Further clarifications and species reassignments on the genera *Halichrysis*, *Asteromenia* and *Drouetia* were made by Saunders *et al.* (2006) based on new morphological and molecular evidence. Unfortunately, our collections were sterile and critical reproductive features could not be checked, hence the material is tentatively placed in *Asteromenia anastomosans* based on overall vegetative morphology and habit at this stage. Another species of this genus, *Asteromenia pseudocoalescens* G.W. Saunders, C.E. Lane, C.W. Schneider *et Kraft*, was recently found from Moorea Island collections and will be described in detail elsewhere.

**Botryocladia** J. Agardh

**Botryocladia skottsbergii** (Børgesen) Levring, 1941: 645. French Polynesia: Payri *et al.*, 2000: 228; Marshall Islands: Dawson, 1956: 52, fig. 48; Indian Ocean: Silva *et al.*, 1996: 354; Hawaiian Islands: Abbott, 1999a: 226, fig. 63A-B; Philippines: Kraft *et al.*, 1999: 19, fig. 31; Fiji: N'Yeurt, 2001: 811, figs 232, 233a-b; Papua New Guinea: Littler & Littler, 2003: 108; Samoa: Skelton & South, 2007: 76, figs 156-158. **(Figs 182-183)**

**Basionym:** *Chrysymenia skottsbergii* Børgesen, 1924: 307, figs. 49, 50 (type locality: Easter Island).

**Material examined:** Punaauia, Tahiti, 5 Oct. 1995, *leg. A. D. R. N'Yeurt*, UPF 231, 536 S150; Rapa Iti, Australs, 4 Nov. 2002, *leg. C. E. Payri*, UPF 1930, 1953, 1954, 3610; Tarakoi Islet, Rapa, 5 Nov. 2002, *leg. C. E. Payri*, UPF 3362 RPS148, 3582; Iri Bay, Rapa, 16 Nov. 2002, *leg. J. L. Menou*, UPF 2217, 3963.

Thallus 4-18 mm high, deep brownish-red, consisting of ovate to pyriform hollow vesicles 2-2.5 mm wide and 3-9 mm long issued from a terete, creeping axis 0.3-0.5 mm wide. Walls of vesicle 95-116  $\mu\text{m}$  thick, consisting of innermost ovate, colourless cells 30-70  $\mu\text{m}$  in diameter and outermost ovate to subrectangular cortical cells 2.5-4  $\mu\text{m}$  wide and 4-11  $\mu\text{m}$  long. Elongate and pyriform "gland cells" up to 60  $\mu\text{m}$  long often project into the inner cavity of the vesicles.

**Remarks:** Found growing on coralline surfaces, on the barrier reef and on the outer reef slope of high islands, to 20 m depth.

**Chamaebotrys** Huisman

**Chamaebotrys boergesenii** (Weber-van Bosse) Huisman, 1996: 106, figs 35-38, 40-42. French Polynesia: Payri *et al.*, 2000: 230; Hawaiian Islands: Abbott, 1999a: 228, figs 63E-G; Fiji: N'Yeurt, 2001: 812, figs 218, 235, 236; Littler & Littler, 2003: 110; Malaysia: Masuda *et al.* 2001: 81, figs 1-6; Oman: Wynne, 2001: 355, figs 17-18, 20; Wallis Islands: N'Yeurt & Payri, 2004: 382; Samoa: Skelton & South, 2007: 77, figs 159-160. **(Fig. 184)**

**Basionym:** *Coelarthrum boergesenii* Weber-van Bosse, 1928: 473-474, figs. 207, 208 (syntype locality: Sailus-Besar, Isles Paternoster, Indian Ocean). Mauritius: Børgesen, 1944: 18, fig. 12; Marshall Islands: Dawson, 1956: 51, fig. 47; Hawaiian Islands: Abbott & Littler, 1969: 168, fig. 4; Tanzania: Mshigeni & Papenfuss, 1981: 471, figs 1-9; Australia: Cribb, 1983: 68, pl. 20 figs 1-4; South Africa: Norris, 1986: 539, figs 6-8; Indian Ocean: Silva *et al.*, 1996: 357; Rotuma Island: N'Yeurt, 1996: 418, fig. 138a-b.

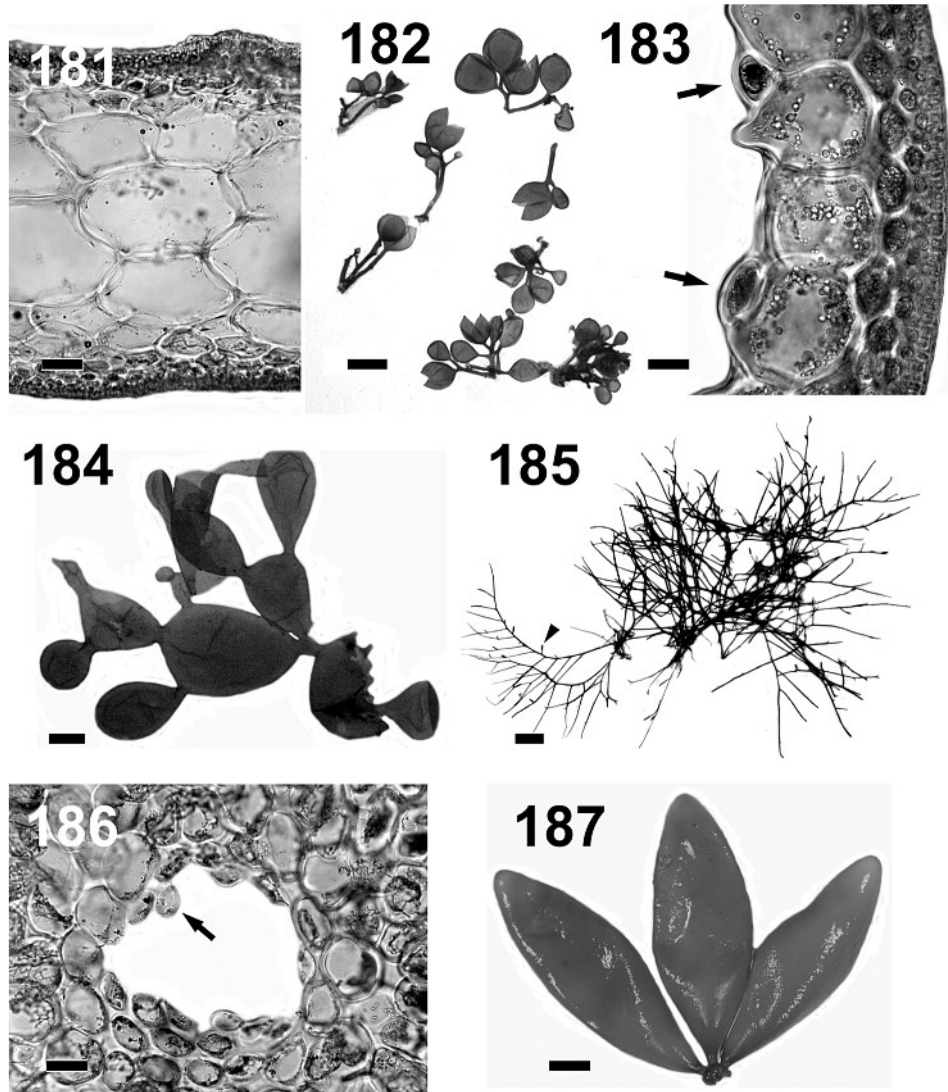
**Material examined:** Tiahura, Moorea, *leg. A. D. R. N'Yeurt*: 12 Dec. 1995, UPF 233, 561 S175; 01 Jul. 1997, UPF 565 S179.

Thallus to 30 mm high, deep-red and turgid, composed of hollow dichotomously branched ovoid vesicles 3-5 mm high which are often laterally fused with each other. Walls of the vesicles composed of two layers of cells: the outer layer continuous and composed of obovoid cells 14-15  $\mu\text{m}$  in diameter; the inner layer of much larger, closely-spaced ovoid cells 28-44  $\mu\text{m}$  in diameter. Tetrasporangia cruciately divided, 20-25  $\mu\text{m}$  in diameter, located in nemathecial sori, sometimes making a single connection to an adjacent cell.

**Remarks:** A relatively uncommon species, found in patches on the outer reef slope of high islands, at depths of 10 to 15 m. The genus *Chamaebotrys* mainly differs from *Coelarthrum* by the presence of terminal tetrasporangia in nemathecia, being scattered in the latter genus (Huisman, 1996).

**Coelothrix** Børgesen

**Coelothrix irregularis** (Harvey) Børgesen, 1920: 389, figs 373, 374. French Polynesia: Payri *et al.*, 2000: 230; Mauritius: Børgesen, 1944: 17, fig. 11b; Marshall



Figs 181-187. **181.** *Asteromenia anastomosans*: transverse section of thallus (UPF 1928). Scale = 10  $\mu$ m. **182.** *Botryocladia skottsbergii*: habit of pressed plants (UPF 1953). Scale = 5 mm. **183.** *Botryocladia skottsbergii*: transverse section of thallus, showing two gland cells (arrows) projecting into the inner cavity (UPF 1953). Scale = 50  $\mu$ m. **184.** *Chamaebotrys boergesenii*: habit (UPF 561). Scale = 1 mm. **185.** *Coelothrix irregularis*: habit of pressed plant (UPF 243). Scale = 5 mm. **186.** *Coelothrix irregularis*: transverse section of thallus showing gland cell (arrow) projecting into cavity (UPF 3825). Scale = 100  $\mu$ m. **187.** *Gloiosaccion brownii*: habit of freshly-collected plant (UPF 2274). Scale = 5 mm.

Islands: Dawson, 1957a: 115, fig. 23b; Brazil: Joly *et al.*, 1963: 12, pl. 4 figs 1-4; Caroline Islands: Trono, 1969: 66, pl. 6 fig. 6, pl. 7 fig. 5; Canary Islands: Afonso-Carrillo *et al.*, 1992: 284, figs 3-4; Great Barrier Reef, Australia: Price & Scott,





1992: 60, fig. 17A-D; Indian Ocean: Silva *et al.*, 1996: 358; Rotuma Island: N'Yeurt, 1996: 419, fig. 195a-b; Belize: Littler & Littler, 1997: 43, fig. 41; Hawaiian Islands: Abbott, 1999a: 233, fig. 65A-D; Samoa: Skelton & South, 2002a: 145; Wallis Islands: N'Yeurt & Payri, 2004: 382; Samoa: Skelton & South, 2007: 78, figs 161-162. **(Figs 185-186)**

**Basionym:** *Cordylecladia irregularis* Harvey, 1853: 156 (type locality: Key West, Florida, U. S. A).

**Material examined:** Punaauia PK18, 10 May 1997, *leg. A. D. R. N'Yeurt*, UPF 243, 527 S141; Tiahura, Moorea, 28 Sep. 2004, *leg. A. D. R. N'Yeurt & A. Pham*, UPF 3047.

Thallus to 40 mm high, reddish with a bluish iridescence, composed of erect, cartilaginous, terete axes 250-450  $\mu\text{m}$  in diameter, with obtuse, divergent apices. Axes sparsely oppositely to alternately branched, with a central cavity up to 200  $\mu\text{m}$  in diameter, surrounded by a progressively denser layer of 4-5 medullary cells 45-60  $\mu\text{m}$  in diameter, and a single layer of pigmented cortical cells 15-25  $\mu\text{m}$  in diameter. Subspherical gland cells 45-60  $\mu\text{m}$  in diameter are often seen to project from the innermost medullary cells into the central cavity of the axes.

**Remarks:** Commonly found growing on coral heads and in crevices in the lagoon, and on the outer reef slope of high islands, to depths of 15 m. A related species, *Coelothrix indica* Børgesen (1944) from Mauritius, is possibly conspecific with *C. irregularis*.

#### *Gloiosaccion* Harvey

\**Gloiosaccion brownii* Harvey, 1859: pl. 83 (type localities: Georgetown, Tasmania). Australia: Womersley, 1996: 53, fig. 17A-E; Huisman, 2000: 120.

**(Figs 187-189)**

**Material examined:** Akananue Bay, Rapa, Australs, 02 Nov. 2002, *leg. C. E. Payri*, UPF 3237 RPS41, 3526; exit of Tupua'i Bay, Rapa, 02 Nov. 2002, *leg. J. L. Menou*, UPF 3266 RPS65, 3279 RPS66 (tetrasporic), 3548, 3550, 3551; Tarakoi Islet, Rapa, 05 Nov. 2002, *leg. C. E. Payri*, UPF 2021, 2022; Rukuaga Point, Rapa, 30 Nov. 2002, *leg. J. L. Menou*, UPF 2272, 2273, 3279 RPS76 (spermatangial), 3557, 3558.

Thallus dark reddish brown to yellowish, composed of one to several (up to 5) saccate, simple or at times furcate, spindle-shaped bladders 15-55 mm high and (3)5-15 mm broad, tapered at both ends. Attachment to the substratum is via a small discoid holdfast to 3 mm in diameter. Texture mucilaginous, adhering well to paper and having a rough surface consistency when dry. Structure multiaxial; cortex 35-130  $\mu\text{m}$  thick, consisting of anticlinal filaments composed of 3-8 pigmented ovoid cells 2-5  $\mu\text{m}$  in diameter. Inner cortical cells non-pigmented, ovoid, 10-20  $\mu\text{m}$  in diameter. Medulla 1-3 cells thick, of irregularly ovoid clear cells 120-300  $\mu\text{m}$  in diameter. Clusters of gland cells 25-40  $\mu\text{m}$  in diameter are sometimes present on inner medullary cells. Plants dioecious; spermatangia to 2  $\mu\text{m}$  in diameter, in scattered sori cut off from outer cortical cells. Tetrasporangia 20-30  $\mu\text{m}$  in diameter, decussate, scattered in outer cortex. Female plants not seen in French Polynesian material.

**Remarks:** Growing at depths of 0.5-20 m, at the base of cliffs and on coral debris. This distinctive alga has so far only been reported in French Polynesia from Rapa Island in the southern Australs, and it is the first record of this plant outside of Australia.



**Rhodymenia** Greville

**Key to the French Polynesian species of *Rhodymenia***

- 1a. Thallus stoloniferous, or subdichotomously or bifurcately branched . . . . . 2
- 1b. Thallus foliose, not subdichotomously or bifurcately branched . . . . . 5
  - 2a. Lower thallus stoloniferous and subterete, with simple erect axes. . . . .
    - . . . . . *R. leptophylla*
  - 2b. Thallus subdichotomously branched and complanate . . . . . 3
- 3a. Thallus 20-30 mm high; axes 190-210 µm . . . . . *R. sp. inedit 2*
- 3b. Thallus 40-60 mm high; axes 400-2000 µm in diameter. . . . . 4
  - 4a. Axes 400-450 µm in diameter, narrowly subdichotomously branched. . . . .
    - . . . . . *R. sonderi*
  - 4b. Axes 1000-2000 µm in diameter, irregularly strap-shaped. . . . . *R. corallina*
- 5a. Thallus irregularly lacerately branched . . . . . *R. halymenioides*
- 5b. Thallus simple, lanceolate . . . . . *R. sp. inedit 1*

\****Rhodymenia corallina*** (Bory de Saint-Vincent) Greville, 1830: xlvi (‘*Rhodomenia*’). Peru: Howe, 1914; Dawson *et al.*, 1964: 124 pls 50, 51; Indonesia: Verheij & Prud’homme van Reine, 1993; Tanzania: Silva *et al.*, 1996: 369; Papua New Guinea: Littler & Littler, 2003: 118. **(Figs 190-191)**

**Basionym:** *Sphaerococcus corallina* Bory de Saint-Vincent, 1828: 175-176 (‘*corallinus*’) (type locality: Concepción, Chile).

**Material examined:** Ngatangia, Rarotonga, Cook Islands, 10 Feb. 1999, *leg. A. D. R. N'Yeurt*, UPF 945; Rapa, Australs, 18 Nov. 2002, *leg. M. Adjeroud*, UPF 3533; Tauna Islet, Rapa, 27 Nov. 2002, *leg. C. E. Payri*, UPF 3317 RPS104, 3564.

Thallus to 50 mm high, composed of dark red, widely dichotomous, flattened, strap-shaped cylindrical axes 1-2 mm wide. Axes (120)150-160(170) µm thick, with a 2-3 layered medulla of large clear cells 50-80 µm in diameter abruptly grading in to a 2-layered cortex of pigmented cells 5-10 µm in diameter. Apices bluntly rounded. Holdfast inconspicuous. Cystocarps mamillate, not ampulliform, scattered on blade surface. *Tela arachnoidea* not present.

**Remarks:** Growing down to 20 m deep, entwined with other algae (usually *Amphiroa* spp.) on coral debris. The French Polynesian material is in good accord with Indonesian plants described in Verheij & Prud’homme van Reine (1993), and Papua New Guinean plants in Littler & Littler (2003). According to Dalen & Saunders (2007), several records of *R. corallina* from South America and elsewhere actually represent species of the genus *Leptofaucha*. Unlike *Rhodymenia*, *Leptofaucha* has a well-developed *tela arachnoidea* present in the cystocarp cavity, which is not the case in the Rapa plants.

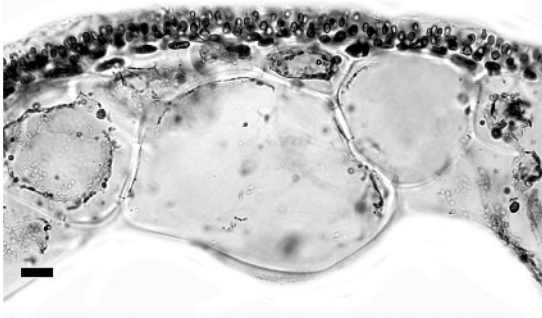
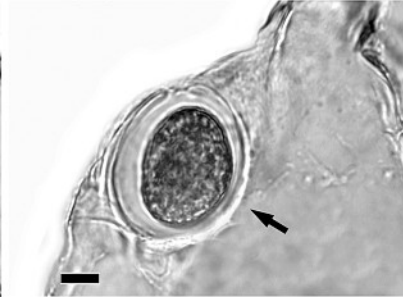
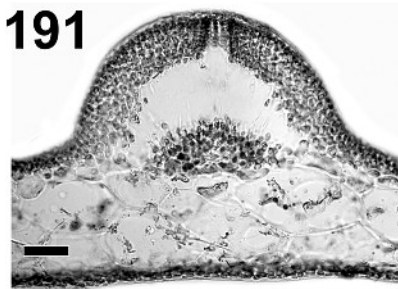
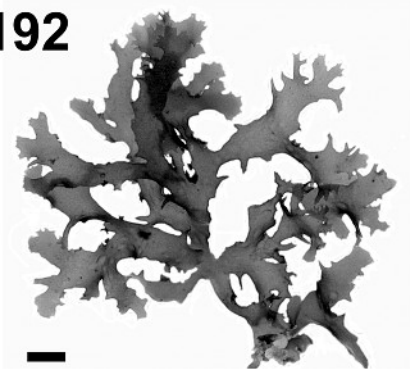
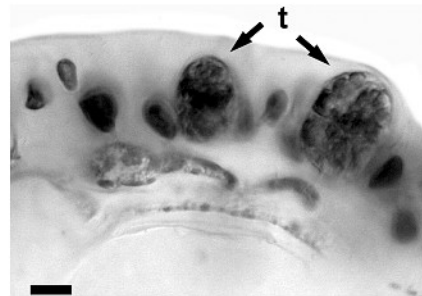
\****Rhodymenia halymenioides*** (J. Agardh) Womersley, 1996: 84, fig. 31A-F.

**(Figs 192-193)**

**Basionym:** *Epymenia halymenioides* J. Agardh, 1876: 694 (type locality: Orford, Tasmania, Australia).

**Material examined:** eastern oceanic plateau, Rapa, Australs, 05 Nov. 2002, *leg. J. L. Menou*, UPF 1964, 3487 RPS265; south-eastern oceanic plateau, Rapa, Australs, 08 Nov. 2002, *leg. J. L. Menou*, UPF 2083, 3489 RPS267, 3965; Rarapai Islet, Rapa, 30 Nov. 2002, *leg. J. L. Menou*, UPF 2431.

Thallus foliose and irregularly lacerate, 20-30 mm broad, reddish pink in colour, with a smooth surface and short cuneate base. Blade 200-270 µm in

**188****189****190****191****192****193**

Figs 188-193. **188.** *Gloiosaccion brownii*: transverse section of thallus showing large colourless medullary cells (UPF 3237). Scale = 10  $\mu$ m. **189.** *Gloiosaccion brownii*: detail of gland cell (arrow) on inner medullary cell (UPF 3279). Scale = 20  $\mu$ m. **190.** *Rhodymenia corallina*: habit of freshly-collected plant (UPF 3564). Scale = 2 mm. **191.** *Rhodymenia corallina*: transverse section showing mamillate cystocarp lacking *tela arachnoidea*, and large medullary cells (UPF 3564). Scale = 50  $\mu$ m. **192.** *Rhodymenia halymenioides*: habit of freshly-collected plant (UPF 1964). Scale = 3 mm. **193.** *Rhodymenia halymenioides*: transverse section of cortex showing embedded tetrasporangia (t) (UPF 1964). Scale = 20  $\mu$ m.

diameter, with 1-2 layers of small pigmented outer cortical cells 5-7  $\mu$ m in diameter. Inner cortical cells 10-20  $\mu$ m in diameter, surrounding a 3-4 celled medullary layer composed of clear ovoid cells 30-100  $\mu$ m in diameter. Tetrasporangia scattered in outer cortex, 20-25  $\mu$ m in diameter.

**Remarks:** Growing at depths of 32-57 m, on coral debris on the outer oceanic slope. The southern Australs report is the first for this species outside of the Tasmanian type locality.

\**Rhodymenia leptophylla* J. Agardh, 1878: 20 (type locality: Bay of Islands, New Zealand). Eastern Australia: Millar, 1990: 368, fig. 27C; Southern Australia: Womersley, 1996: 73, pl. 1 fig. 4, fig. 25A-F; Hawaiian Islands: Abbott, 1999a: 236, fig. 66D-F. **(Figs 194-195)**

**Heterotypic synonym** (according to Millar, 1990): *Rhodymenia leptophylloides* E.Y. Dawson, 1941: 144, pl. 20, fig. 18; pl. 27, fig. 39 (type locality: Hawaii).

**Material examined:** Mac Donald Bank, southern Australs, 04 Nov. 2002, *leg. IRD*, UPF 2122, 2123, 3434 RPS212, 3490 RPS268, 3491 RPS269, 3507 RPS285; Rukuaga Point, Rapa, 30 Nov. 2002, *leg. J. L. Menou*, UPF 2428, 3291 RPS83, 3505 RPS283, 3559.

Thallus forming entangled reddish-brown to orange clumps 6-30 cm wide, consisting of a subterete prostrate stoloniferous portion giving rise to simple to occasionally flabellate or bifurcate, compressed blades 1-5 mm wide. Blades (20)40-150(250)  $\mu\text{m}$  in diameter, with a central medullary region of 4-6 layers of clear ovoid cells 20-60  $\mu\text{m}$  in diameter, with an abrupt transition to a cortical region composed of 2-4 layers of progressively smaller cells 2.5-10  $\mu\text{m}$  in diameter. Reproduction not seen.

**Remarks:** Growing at a depth of 10 m at the base of cliffs, or dredged from a depth of 60-80 m on a submarine bank. So far in French Polynesia only recorded from the southern Australs localities of Rapa and Mac Donald Bank. The deeper water populations from 60-80 m form large entangled clumps to 30 cm in diameter, with a distinctive orange mineral deposit, identified as siderite or ferrihydrite (ferrous hydroxide) (Yves Fouquet at IFREMER, pers. com.). The disjunct distribution of this species stresses the need for molecular studies (Abbott, 1999a).

\**Rhodymenia sonderi* P.C. Silva in Silva, Basson & Moe, 1996: 370. Western Australia: Huisman, 2000: 122. **(Figs 196-197)**

**Heterotypic synonym:** *Rhodymenia australis* Sonder, 1845: 56 *nom. illeg.* (type locality: Western Australia). Eastern Australia: Millar, 1990: 367, fig. 27D; Southern Australia: Womersley, 1996: 75, fig. 26A-F.

**Material examined:** Between Matarepe & Takaraotaranga Points, Rapa, Australs, 09 Nov. 2002, *leg. C. E. Payri*, UPF 2088, 3503 RPS281, 3504 RPS282.

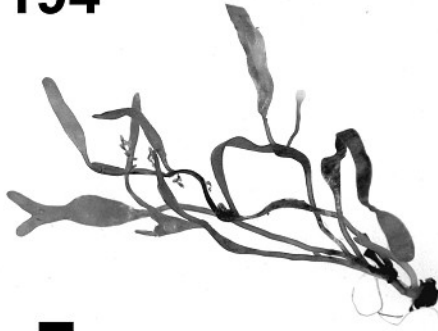
Thallus 50-60 mm high, dark reddish brown, cartilaginous, consisting of complanate, narrowly subdichotomously branched axes (1.5)2.0-3.0 mm wide and 400-450  $\mu\text{m}$  in diameter. Base of plant tapered, with a single small basal holdfast. Medulla consisting of 4-5 layers of clear cells 50-170  $\mu\text{m}$  in diameter, abruptly transiting to a cortical layer about 20  $\mu\text{m}$  thick, consisting of 3-4 layers of small pigmented cells (2.5)3.0-5.0(10)  $\mu\text{m}$  in diameter. Spermatia about 1  $\mu\text{m}$  in diameter, cut off from outer cortical cells.

**Remarks:** Growing at a depth of 30 m, on coral debris. The imbricated, elongated axes of this species are distinctive. The southern Australs material is in good accord with Australian plants in the literature.

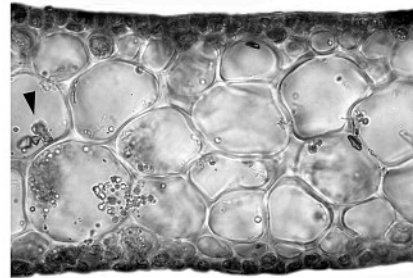
\**Rhodymenia* sp. inedit 1 **(Figs 198-199)**

**Material examined:** eastern oceanic plateau, Rapa, Australs, 05 Nov. 2002, *leg. J. L. Menou*, UPF 1970, 3519 RPS297, 3523 RPS301, 3964; Rapa, 08 Nov. 2002, *leg. IRD*, UPF 3436 RPS214, 3479 RPS257, 3618; Rarapai Islet, Rapa, 11 Nov. 2002, *leg. C. E. Payri*, UPF 2115; northeast oceanic plateau, Rapa, Australs, 14 Nov. 2002, *leg. J. L. Menou*, UPF 2210, 3522 RPS300; Rarapai Islet, Rapa, 30 Nov. 2002, *leg. J. L. Menou*, UPF 2434, 3509 RPS287.

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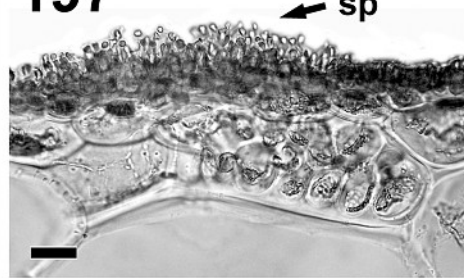
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Figs 194-199. **194.** *Rhodymenia leptophylla*: habit of freshly-collected plant (UPF 2122). Scale = 5 mm. **195.** *Rhodymenia leptophylla*: transverse section of thallus (UPF 2122), showing ferrous hydroxide crystal (arrowhead). Scale = 30  $\mu$ m. **196.** *Rhodymenia sonderi*: habit of freshly-collected plant (UPF 2088). Scale = 3 mm. **197.** *Rhodymenia sonderi*: transverse section of thallus, showing spermatia (arrow, sp) cut off from outer cortical cells (UPF 2088). Scale = 10  $\mu$ m. **198.** *Rhodymenia* sp. inedit 1: habit of freshly-collected plant (UPF 2434). Scale = 2 mm. **199.** *Rhodymenia* sp. inedit 1: transverse section of thallus (UPF 2434). Scale = 25  $\mu$ m.

Thallus deep reddish-pink, 25-30 mm wide, of thin, complanate irregularly subdichotomous axes 1-2 mm wide. Diameter of branches 190-210  $\mu$ m; medulla of 2-3 layers of clear ovoid cells 50-100  $\mu$ m in diameter, surrounded by 2-3 layers of small pigmented subspherical cortical cells 5-8  $\mu$ m in diameter. Reproduction not seen.



**Remarks:** Growing at depths of 32-100 m, on the outer reef slope and oceanic plateau of the southern Austral island of Rapa. One of the most common deepwater medium-sized red foliose alga in the collections. The unavailability of fertile collections preclude a more detailed description of this apparently new entity.

**\**Rhodymenia* sp. inedit 2**

(Figs 200-202)

**Material examined:** Arago Bank, Australs, 20 Nov. 2002, *leg. I.R.D.*, UPF 4006.

Thallus simple and lanceolate, 3-4 mm wide and 5-8 mm high, deep red in colour. The base of the plant is cuneate, and it is attached to the substratum via a terete stipe about 500  $\mu\text{m}$  wide and 2-3 mm long. Structure composed of one to two layers of large ovoid colourless medullary cells 300-600  $\mu\text{m}$  in diameter, surrounded by a clearly demarcated cortical region of pigmented, ovoid to spherical cortical cells 5-10  $\mu\text{m}$  in diameter. Material sterile.

**Remarks:** Growing on coralline algae debris at a depth of 110 m, associated with *Padina stipitata* Tanaka *et* Nozawa and *Codium saccatum* Okamura, both new records for French Polynesia. The simple, lanceolate thallus of this diminutive species is distinctive.

**Ceramiales Oltmanns**

**Ceramiaceae Dumortier**

***Anotrichium* Nägeli**

***Anotrichium tenue*** (C. Agardh) Nägeli, 1862: 399. French Polynesia: N'Yeurt & Payri, 1997: 894; Payri *et al.*, 2000: 240; Australia: Baldock, 1976: 407, 408 figs 59-64; Belize: Norris & Bucher, 1982: 203, fig. 103; South Africa: Norris & Aken, 1985: 60, figs 19-21; Indian Ocean: Silva *et al.*, 1996: 376; Hawaiian Islands: Abbott, 1999a: 247, fig. 68D; Viêt Nam: Abbott *et al.*, 2002: 302, fig 4; Samoa: Skelton & South, 2002a: 145, fig. 9A-F; 2007: 120, figs 299-301; Wallis Islands: N'Yeurt & Payri, 2004: 382. (Fig. 203)

**Basionym:** *Griffithsia tenuis* C. Agardh, 1828: 131 ('*Griffithsia*') (type locality: Venezia, Italy). French Polynesia: Payri, 1987.

**Synonym:** *Griffithsia tenuis* var. *thyrsigerum* (Thwaites ex Harvey) H. Kim *et* I.K. Lee in Lee, 1992: 159. Australia: Baldock, 1998: 340, figs 157A, 158A-F. *Callithamnion thyrsigerum* Thwaites ex Harvey, 1855: 559-560 (syntype localities: Rottneest Island and King George Sound, Western Australia; Sri Lanka).

**Material examined:** Tikehau, 7 Nov. 1995, *leg. A. D. R. N'Yeurt*, UPF 394 S8; below Mt. Mokoto, Mangareva, 27 Sep. 1997, *leg. J. Starmmer*, UPF 625; Atituiti, Mangareva, 19 Nov. 2000, *leg. A. D. R. N'Yeurt*, UPF 915.

Thallus to 15 mm long and 200-600  $\mu\text{m}$  wide, reddish-pink, composed of subcylindrical segments 150-500  $\mu\text{m}$  long. The main axis is creeping, and irregularly laterally to unilaterally branched. Ultimate segments are usually much shorter than the rest, and distally tapered. Tetrasporangia pedicellate, lateral on subultimate segments, 8-15 per whorl.

Figs 200-206. **200.** *Rhodymenia* sp. inedit 2: habit of pressed plant (UPF 4006). Scale = 1 mm. ▶

**201.** *Rhodymenia* sp. inedit 2: transverse section near thallus apex (UPF 4006). Scale = 15  $\mu\text{m}$ .

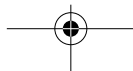
**202.** *Rhodymenia* sp. inedit 2: transverse section near thallus base (UPF 4006). Scale = 15  $\mu\text{m}$ . **203.**

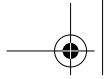
*Anotrichium tenue*: thallus apex showing lateral, pedicellate tetrasporangia (UPF 394).

Scale = 200  $\mu\text{m}$ . **204.** *Antithamnion decipiens*: general habit (UPF 3289). Scale = 50  $\mu\text{m}$ .

**205.** *Antithamnion decipiens*: detail of adaxial tetrasporangia (t) (UPF 3289). Scale = 30  $\mu\text{m}$ .

**206.** *Antithamnion decipiens*: gland cell (arrow) lateral on subterminal segment (UPF 3289). Scale = 40  $\mu\text{m}$ .

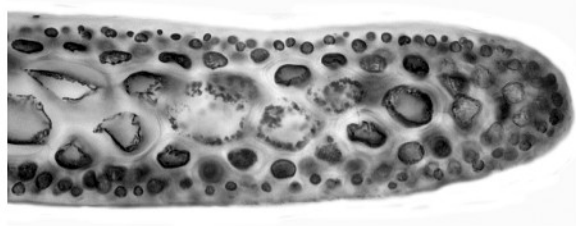




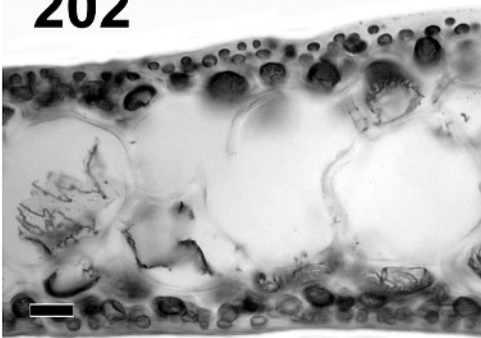
**200**



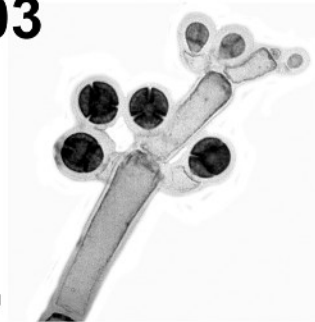
**201**



**202**



**203**



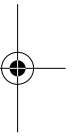
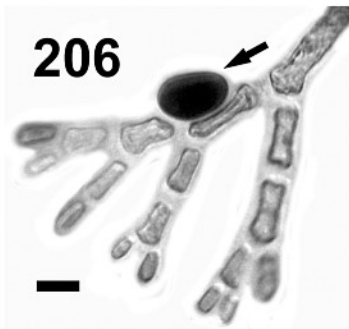
**204**



**205**



**206**





**Remarks:** Growing as an epiphyte on larger algae, in lagoons, intertidal? and subtidal to depths of 20 m. Lee (1992) defined several varieties within the circumscription of the *A. tenue* species complex, based on the number of tetraspores per whorl branchlets. Various authors (e.g. Cormaci *et al.*, 1994) sometimes consider these varieties as distinct species or synonyms of existing ones, but we prefer to follow the opinion of Baldock (1998: 342) for the concept of a single species with varieties, pending new (possibly molecular) evidence to the contrary. The French Polynesian plants have about 8-15 tetrasporangia per whorl, and thus fall within var. *thyrsigerum* following Lee (1992).

*Antithamnion* Nägeli

**Key to the French Polynesian species of *Antithamnion***

- 1a. Whorl branchlets equally developed on prostrate axis. . . . . *A. decipiens*
- 1b. Whorl branchlets unequally developed on prostrate axis . . . . . *A. lherminieri*

\****Antithamnion decipiens*** (J. Agardh) Athanasiadis, 1996: 151. Bermuda: Schneider & Searles, 1997: 13, figs 4-7; Hawaiian Islands: Abbott, 1999a: 250, fig. 69C-D. **(Figs 204-206)**

**Basionym:** *Callithamnion decipiens* J. Agardh, 1842: 70-71 (type locality: Nice, France).

**Material examined:** Rukuaga Point, Rapa, Australs, 30 Nov. 2002, leg. J. L. Menou, UPF RPS81.

Thallus 4-10 mm high, with erect determinate axes 25-40 µm in diameter issued from a short prostrate portion; whorl branches subdichotomously divided and equally developed even on prostrate portions, to 1000 µm in diameter. Tetrasporangia 40-70 µm in diameter, borne on adaxial side on second or third whorl branchlet segments. Gland cells 40-50 µm in diameter, ovoid, lateral on distal segments.

**Remarks:** Growing at a depth of 10 m, epiphytic on larger algae. The evenly developed whorl branchlets are characteristic of this species.

\****Antithamnion lherminieri*** (P.L. Crouan et H.M. Crouan) Bornet ex Nasr, 1941: 66, figs 9-10 (Red Sea); Marshall Islands: Dawson, 1956: 53, fig. 51; Mexico: Dawson, 1962: 18, pl. 5 fig. 5; Indian Ocean: Silva *et al.*, 1996: 378; Belize: Littler & Littler, 1997: 49, fig. 48; Bermuda: Schneider & Searles, 1997: 13, figs 1-3; Caribbean: Littler & Littler, 2000: 142; Samoa: Skelton & South, 2007: 84, figs 177-180. **(Figs 207-208)**

**Basionym:** *Callithamnion lherminieri* P.L. Crouan et H.M. Crouan in Mazé & Schramm, 1878: 144 (type locality: Anse de la Petite-Fontaine, Vieux-fort, Guadeloupe, West Indies).

**Homotypic synonym:** *Antithamnion antillanum* Børgesen, 1917: 226, figs 213-216. Brazil: Joly, 1965; Caroline Islands: Trono, 1969; Great Barrier Reef, Australia: Price & Scott, 1992: 69, fig. 20A-C; Seychelles: Wynne, 1995: 288, figs 28-30; Hawaiian Islands: Abbott, 1999a: 248, fig. 69A-B; Samoa: Skelton & South, 2002a: 146, fig. 10A-B.

**Material examined:** Tikehau, 07 Nov. 1995, leg. A. D. R. N'Yeurt, UPF S1 (spermatangial), S118; Entre deux Baies, Moorea, 25 Nov. 1995, leg. A. D. R. N'Yeurt & J. Orempuller, UPF S119 (tetrasporic).

Thallus to 650 µm high, with a creeping basal axis 20-30 µm in diameter composed of subcylindrical cells 80-100 µm long, giving rise to erect, alternately







branched determinate branchlets 10-20  $\mu\text{m}$  in diameter and 500-600  $\mu\text{m}$  long. Whorl branchlets unequally developed, with pairs of short and long branchlets on prostrate axis; the short branchlets often terminating in hapteroid holdfasts. Gland cells subspherical and refractive, 9-10  $\mu\text{m}$  in diameter, adaxial on basal segment of lateral branches. Male spermatangial stichidia adaxial on basal segment of lateral branches, 20-30  $\mu\text{m}$  in diameter and 80-90  $\mu\text{m}$  long, with whorls of spherical spermatia 1-2  $\mu\text{m}$  in diameter. Tetrasporangia elongate and cruciately divided, 40-50  $\mu\text{m}$  in diameter and 70-80  $\mu\text{m}$  long, adaxial on basal segment of lateral branches.

**Remarks:** Growing at a depth of 20 m, on coral debris. There has been some confusion in the literature concerning the correct name for this species, with many authors (e.g. Silva *et al.* 1987; Wynne 1995; Athanasiadis 1996; Abbott 1999a) using the name *A. antillanum* based on the interpretation that the original description of *Callithamnion lherminieri*, the basionym of *A. lherminieri*, consists of only four words and is hence too succinct to validate the species. However, according to Silva *et al.* (1996: 379), *C. lherminieri* can be considered a validly published name since the four words in question (describing thallus colouration) sufficiently and uniquely distinguish the species from the 13 others listed in the protologue publication.

#### *Antithamnionella* Lyle

*Antithamnionella breviramosa* (E.Y. Dawson) E.M. Wollaston in Womersley & A. Bailey, 1970: 322. U. S. A.: Wollaston, 1971: 84, figs 22-25; Schneider, 1984: 456, figs 2-5; Japan: Itono, 1977: 23, 83, figs. 8A-E, 34I, 43A-B, 49H, 53J-L; Curaçao: Stegenga & Vroman, 1987: 399, figs 2-6; Australia: Millar, 1990: 388, fig. 40A-D; Bermuda: Schneider & Searles, 1997: 19, fig. 18; Hawaiian Islands: Abbott, 1999a: 253, fig. 71A-C; Samoa: Skelton & South, 2002a: 146, figs 10C-D; 2007: 86, figs 181-185. **(Figs 209-211)**

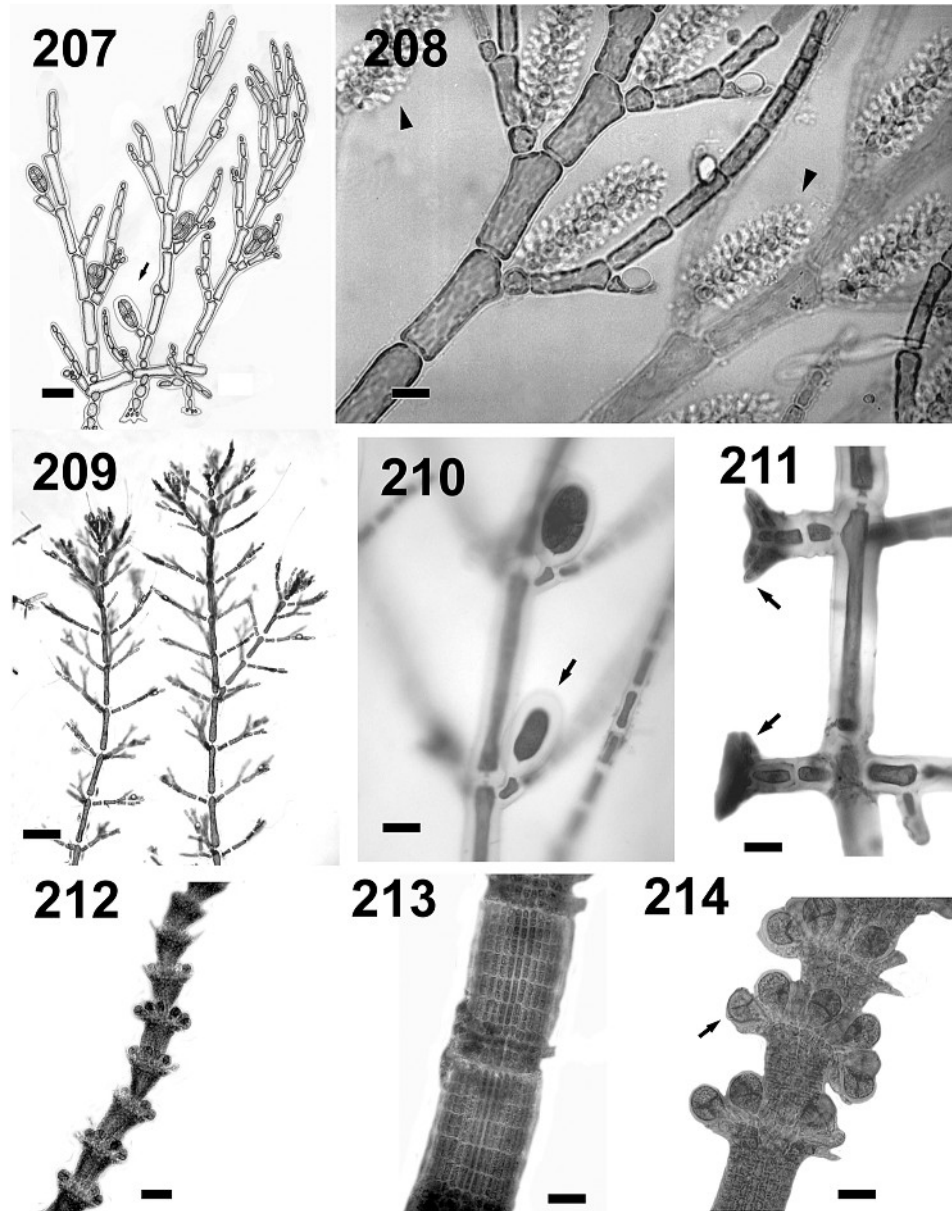
**Basionym:** *Antithamnion breviramosum* E.Y. Dawson, 1949: 14, figs 28, 57 (type locality: Santa Catalina Island, California U. S. A.).

**Homotypic synonym:** *Antithamnion breviramosum* var. *simplex* E.Y. Dawson, 1957a: 117, fig. 24c, d. French Polynesia: N'Yeurt & Payri, 1997: 894 ('*breviramosus*').

**Material examined:** Tepoto Sud, Tuamotu, 25 Sep. 1995, *leg. J. Orempuller*, UPF 388 S2, 499 S113; Entre deux Baies, Moorea 25 Nov. 1995, *leg. A. D. R. N'Yeurt & J. Orempuller*, UPF 520 S134; Rukuaga Point, Rapa, Australs, 30 Nov. 2002, *leg. J. L. Menou*, UPF 3283 RPS78.

Thallus creeping, to 5 mm long and 14-150  $\mu\text{m}$  in diameter, consisting of both erect and prostrate axes, attached to the substratum via multicellular rhizoids to 400  $\mu\text{m}$  long issued from the basal cell of subdichotomously branched whorl branchlets. Prostrate axes with 2-3 whorl branchlets per axial cell; erect axes to 2 mm high, with three (sometimes 2) whorl branchlets per axial cell; apices rounded. Gland cells ovoid, to 12  $\mu\text{m}$  in diameter and 16  $\mu\text{m}$  long, cut off from terminal cells of whorl branchlets. Tetrasporangia ovoid and cruciately divided, to 40  $\mu\text{m}$  in diameter, usually adaxial on basal cells of erect whorl branchlets.

**Remarks:** epiphytic on larger algae, at depths of 10-20 m. This species has been cited by Silva *et al.* (1996) as a synonym of the Mediterranean species *Antithamnionella elegans* (Berthold) J.H. Price et D.M. John in Price *et al.* (1986), but we concur with Abbott (1999a: 254) and Skelton & South (2002: 146) in maintaining this entity in *A. breviramosa* pending a critical study of Pacific material versus Mediterranean one. Athanasiadis (1996) gave some additional morphological criteria to distinguish both species apart.



Figs 207-214. **207.** *Antithamnion lherminieri*: camera-lucida drawing of general habit, showing cruciate tetrasporangia (arrow) (UPF 505). Scale = 50  $\mu$ m. **208.** *Antithamnion lherminieri*: detail of spermatangial whorls (arrowheads) adaxial on basal segment of lateral branches (UPF 387). Scale = 25  $\mu$ m. **209.** *Antithamnionella breviramosa*: general habit (UPF 3283). Scale = 50  $\mu$ m. **210.** *Antithamnionella breviramosa*: detail of adaxial ovoid tetrasporangia (arrow) (UPF 3283). Scale = 40  $\mu$ m. **211.** *Antithamnionella breviramosa*: multicellular rhizoids (arrowheads) issued from the basal cell of branched whorl branchlets (UPF 3283). Scale = 50  $\mu$ m. **212.** *Centroceras minutum*: habit of plant with tetrasporangia (UPF). Scale = 100  $\mu$ m. **213.** *Centroceras minutum*: detail of internodal cortication (UPF). Scale = 50  $\mu$ m. **214.** *Centroceras minutum*: detail of nodal tetrasporangia (arrow) (UPF). Scale = 50  $\mu$ m.

*Centroceras* Kützing**Key to the French Polynesian species of *Centroceras***

- 1a. Thallus to 40 mm high; apices usually in pairs, forcipate; axial cells with 12 to 14 periaxial cells; cortication in parallel longitudinal rows. . . . . *C. clavulatum*
- 1b. Thallus to 10 mm high; apices simple, not forcipate; axial cells with 6 to 8 periaxial cells; cortication in non-parallel longitudinal rows. . . . . *C. minutum*

***Centroceras clavulatum*** (C. Agardh) Montagne, 1846: 140. French Polynesia: Setchell, 1926: 105; N'Yeurt & Payri, 1997: 894; Payri *et al.* 2000: 240; India: Børgesen, 1934: 18; Viêt Nam: Dawson, 1954: 446, fig. 54b; Pacific Mexico: Dawson, 1962: 68, pl. 26 fig. 7, pl. 27 fig. 3; Peru: Dawson *et al.*, 1964: 78, pl. 62 figs D-E; Brazil: Alveal & Joly, 1968: 112, figs 1-4; Japan: Itono, 1977: 35, 118, 201 figs 16A-B, 39A-B; Korea: Boo & Lee, 1985: 298, figs 1-6; Australia: Millar, 1990: 390, fig. 40E-G; Price & Scott, 1992: 81, fig. 25A-E; Indian Ocean: Silva *et al.*, 1996: 387; Rotuma Island: N'Yeurt, 1996: 421, fig. 199; Belize: Littler & Littler, 1997: 49, fig. 49; Hawaiian Islands: Abbott, 1999a: 261, fig. 73A-F; Fiji: N'Yeurt, 2001: 816; Samoa: Skelton & South, 2007: 89, figs 192-197.

**Basionym:** *Ceramium clavulatum* C. Agardh, 1822: 2 (type locality: Callao, Peru).

**Material examined:** Motu aux Oiseaux, Tikehau, 6 Nov. 1995, *leg. A. D. R. N'Yeurt*, UPF 392 S6; Opunohu Bay, Moorea, *leg. A. D. R. N'Yeurt*: 01 Jul. 1997, UPF 232; 30 Sep. 2004, UPF 2948.

Thallus forming pinkish- to brownish-red mats or balls to 100 mm across, composed of terete, simple or subdichotomously branched, segmented axes 160-200 µm in diameter and up to 40 mm high, attached to the substratum via nodal multicellular rhizoids to 1 mm long. The main axes are fully corticated, with the branch tips claw-like or forcipate, usually in pairs, with terminal slender hyaline unicellular hairs. Internodal distance in mid-thallus 100-150 µm; nodes with up to 12 characteristic 1- to 2-celled verticillate spines up to 100 µm long, with a conical apical cell. Periaxial cells 12-14 per axial cell, elongate, to 12 µm in diameter and 35 µm long. Internodal cortication composed of a continuous layer of small subquadrate to rectangular cells to 12 µm in diameter and 30 µm long, in 25-30 parallel longitudinal files. Tetrasporangia protruding and surrounding nodes, to 50 µm in diameter, in whorls of up to 8 per node, with a few multicellular clear involucreal filaments. Other reproductive stages not seen.

**Remarks:** This alga is usually found growing as free-floating masses in the calm waters of estuaries, or in tide pools.

\****Centroceras minutum*** Y. Yamada, 1944: 42 (type locality: Ant Atoll, Caroline Islands). Marshall Islands: Dawson, 1956: 54, fig. 54; Caroline Islands: Trono, 1969: 73, pl. 9 figs 4-5; Ardré, 1987: 285, figs 30-37; Maldives: Wynne, 1993: 12, fig. 7; Seychelles: Wynne, 1995: 290, fig. 27; Hawaiian Islands: Abbott, 1999a: 262, fig. 73H-I; Fiji: N'Yeurt, 2001: 817, figs 249, 250; Wallis: N'Yeurt & Payri, 2004: 382. **(Figs 212-214)**

**Material examined:** exit of Ha'urei Bay, Rapa, Australs, 11 Nov. 2002, *leg. J. L. Menou*, UPF 3445 RPS223.

Thallus 8-10 mm high and 70-100 µm in diameter, simple to sparsely branched, attached to the substratum via multicellular rhizoids to 3 mm long. Axes fully corticated, with blunt, non-forcipate apices. Periaxial cells 6-8 per axial cell; internodal distance in mid-thallus 140-200 µm long and 70-100 µm thick. Internodal cortication composed of subrectangular cells 8-10 µm in diameter and 35-40 µm long, arranged in 16-20 non-parallel longitudinal rows. Nodes with up to 10 colourless, 2- or 3-celled spines. Tetrasporangia on nodes, 35-45 µm in



diameter, shortly pedicellate and in whorls of up to 8, with a single 3-celled clear involucre. Other reproductive stages not seen.

**Remarks:** Growing at a depth of 3 m, on detritic substrata; so far in French Polynesia only reported from Rapa Island in the Australs. *Centroceras minutum* is recognized here as distinct from *C. clavulatum* following Wynne (1993: 12), Abbott (1999a: 264) and N'Yeurt (2001: 817). The latter two authors examined authentic material of *C. minutum* from the type locality, and vouched for the distinctness of the species.

**Ceramium** Roth

**Key to the French Polynesian species of *Ceramium* (including look-alike genus *Gayliella*)**

- 1a. Thallus with claw-like or forcipate branch tips . . . . . 2
- 1b. Thallus with simple to sparsely branched, non-forciphate branch tips . . . . . 5
  - 2a. Nodes surrounded with verticillate, thin, hyaline, straight hair cells . . . . . *C. macrotrichum*
  - 2b. Nodes lacking hair cells, or if present curved, unilateral, thick and pigmented . . . . . 3
- 3a. Branching sympodial or nearly so, in a single plane . . . . . *C. borneense*
- 3b. Branching not sympodial, in several planes . . . . . 4
  - 4a. Nodes sparsely corticated, basipetal cells elongate, in transverse series . . . . . *Gayliella*
  - 4b. Nodes moderately corticated, basipetal cells not transversely elongate . . . . . *C. aduncum*
- 5a. Nodes with less than 5 rows of cortical cells; tetrasporangia unilateral . *C. codii*
- 5b. Nodes with more than 6 rows of cortical cells; tetrasporangia not unilateral . 6
  - 6a. Branching irregular; outer cortical cells minute and irregularly arranged, less than 8 µm in diameter; tetrasporangia verticillate . . . . . *C. vagans*
  - 6b. Branching simple to pseudodichotomous; outer cortical cells more than 10 µm in diameter, regularly arranged; tetrasporangia embedded, not verticillate . . . . . *C. upolense*

\**Ceramium aduncum* Nakamura, 1950: 158, figs. 2, 3 (type locality: Japan). Nakamura, 1965: 138, pl. II figs 1-2; Hawaiian Islands: Meneses, 1995: 166, figs 1-4; Abbott, 1999a: 266, fig. 74A-D; Viêt Nam: Abbott *et al.*, 2002: 303, figs 6-7.

(Fig. 215-217)

**Misapplied name:** *Ceramium clarionense* Setchell *et* N. L. Gardner. French Polynesia: N'Yeurt & Payri, 1997: 894.

**Material examined:** Paea, Tahiti, c. 1992, *leg. B. Bourgeois*, UPF 393 S7; Rukuaga Point, Rapa, 30 Nov. 2002, *leg. J. L. Menou*, UPF 3280 RPS77.

Thallus to 8 mm high, composed of pseudodichotomously branched, segmented erect axes to 30 µm in diameter arising from a well-developed creeping axis, from which are issued multicellular rhizoids. The erect branches are moderately corticated at the segment nodes only, and the branch tips are characteristically incurved or inrolled (circinate, claw-like). Pseudoperiaxial cells absent. Periaxial cells 6-11 per axial cell, each forming a pair of acropetal and basipetal filaments composed of up to 3 cells. Lower nodal bands often secondarily

thickened. Gland cells sometimes present in cortical bands. Tetrasporangia protruding abaxially from the upper parts of erect branches, lacking involucre. Carposporophyte nested at base of dichotomies in upper parts of thallus, with 2-3 surrounding determinate branches.

**Remarks:** Growing on coral debris or as an epiphyte on larger algae, in lagoon or subtidal habitats to depths of 10-20 m. A record of *Ceramium cruciatum* Collins et Hervey from Easter Island in Børgesen (1924: 297, fig. 37a-b) could refer to *C. aduncum*, in particular based on the adaxial nature of the tetrasporangia and the composition of the cortical bands.

*Ceramium borneense* Weber-van Bosse, 1923: 329-330 (type locality: Borneo Bank, Makassar Strait, Indonesia. Hawaiian Islands: Abbott, 1999a: 266, figs 74E-G; Samoa: Skelton & South, 2007: 93, figs 204-209. **(Fig. 218)**

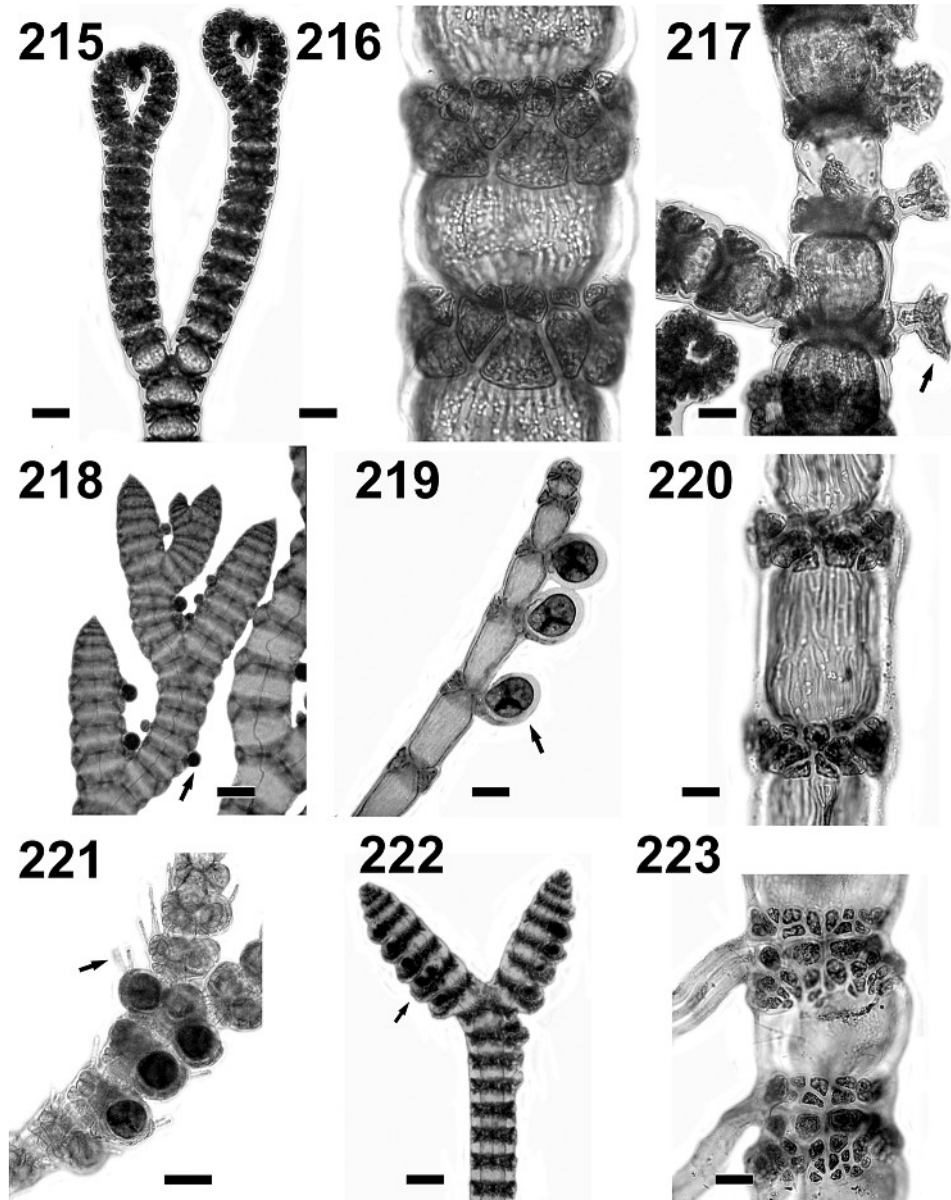
**Heterotypic synonyms** (given by South & Skelton, 2000; Skelton & South, 2007): *Ceramium subdichotomum* Weber-van Bosse, 1923: 333-335, fig. 125 (type locality: Muaras Reef, East Kalimantan, Indonesia). French Polynesia: Payri *et al.*, 2000: 250 ('*subdichotum*'); Seychelles: Wynne, 1995: 296, figs 44-45; Oman: Wynne, 1999: 195, figs 8-9; Samoa and Fiji: South & Skelton, 2000: 78, figs 74-79. *Ceramium sympodiale* E.Y. Dawson, 1957a: 121, fig. 27c-d (type locality: Rigili Island, Eniwetok Atoll, Marshall Islands). Solomon Islands: Womersley & Bailey, 1970: 324; Australia: Price & Scott, 1992: 109, fig. 35A-E.

**Material examined:** Punaauia, Tahiti, 25 Sep. 1995, *leg. A. D. R. N'Yeurt*, UPF 396 S10; off 'Papa Whisky' islet, Punaauia, Tahiti, 5 Oct. 1995, *leg. A. D. R. N'Yeurt*, UPF 513 S127; Entre deux Baies, Moorea, 25 Nov. 1995, *leg. A. D. R. N'Yeurt & J. Orempuller*, UPF 514 S128, 515 S129; Tiahura, Moorea, 12 Dec. 1995, *leg. A. D. R. N'Yeurt*, UPF 564 S178; Tupai, 3 Jul. 2002, *leg. C. Vermentot*, UPF 2484.

Thallus small, 3-6 mm high, iridescent pale brownish-red in life, composed of mostly erect axes to 250 µm wide which are sub-sympodially or sub-distichously branched in a single plane. Branch apices pointed and forcipate; cortical bands distinctly shorter than broad. Internodes 5-50 µm long, much reduced in upper parts of thallus. Periaxial cells 6-8 per axial cell; each pericentral cell dividing into 2 acropetal and 2 basipetal filaments. Tetrasporangia 25-35 µm in diameter, protruding and non-involucrate, adaxial on cortical cells of upper thallus. Gland cells numerous, issued from acropetal nodal cortical cells.

**Remarks:** Growing epiphytic on larger algae, in lagoons and in subtidal habitats. The sympodial-like, monoplanar branching, along with the solitary, unilaterally aligned tetrasporangia, are distinctive for this species. According to Meneses (1995) and Abbott (1999), *C. sympodiale* E.Y. Dawson (1957a: 121) is synonymous with *C. borneense*, based on the presence of gland cells in the type material of both species. However, these and previous authors made no mention of *C. subdichotomum* Weber-van Bosse (1923: 333-335), a species also possessing abundant gland cells, which was found to be conspecific with *C. sympodiale* by South & Skelton (2000) and is also mentioned by Wynne (1995; 1999) and Payri *et al.* (2000). According to Skelton & South (2007) and concurring with our own observations, *C. borneense* includes both *C. subdichotomum* and *C. sympodiale*.

*Ceramium codii* (H. Richards) Mazoyer, 1938: 324-325. French Polynesia: Payri *et al.*, 2000: 246; Japan: Nakamura, 1965: 124, fig. 1, pl. I fig. 1; Australia: Millar, 1990: 393, figs 41D-F, 43B; Price & Scott, 1992: 86, fig. 26A-D; Indian Ocean: Silva *et al.*, 1996: 393; Rotuma: N'Yeurt, 1996: 422, figs 155a-b, 166; Hawaiian Islands: Abbott, 1999a: 270, fig. 75D-F; Samoa & Fiji: South & Skelton, 2000: 56, figs 11-14; Samoa: Skelton & South, 2007: 94, figs 210-215. **(Figs 219-220)**



Figs 215-223. **215.** *Ceramium aduncum*: habit showing circinate axes (UPF 3333). Scale = 20  $\mu$ m. **216.** *Ceramium aduncum*: detail of nodal cortication (UPF 3333). Scale = 6  $\mu$ m. **217.** *Ceramium aduncum*: detail of creeping axis with multicellular rhizoid (arrow) (UPF 3333). Scale = 15  $\mu$ m. **218.** *Ceramium borneense*: habit showing characteristic sub-sympodial branching and protruding tetrasporangia (arrow) (UPF 396). Scale = 70  $\mu$ m. **219.** *Ceramium codii*: habit, showing strongly protruding tetrasporangia (arrow) (UPF). Scale = 30  $\mu$ m. **220.** *Ceramium codii*: detail of nodal cortication (UPF 3262). Scale = 10  $\mu$ m. **221.** *Ceramium macrotrichum*: habit, showing adaxial hyaline hair (arrow) and whorled tetrasporangia (UPF 493). Scale = 100  $\mu$ m. **222.** *Ceramium upolense*: general habit showing protruding tetrasporangia (arrowhead) (UPF 3369). Scale = 80  $\mu$ m. **223.** *Ceramium upolense*: detail of nodal cortication, showing lateral unicellular rhizoids issued from cortical cells (UPF 3369). Scale = 20  $\mu$ m.



**Basionym:** *Ceramothamnion codii* H. Richards, 1901: 264-265, pls 21, 22 (type locality: Bermuda). French Polynesia: Setchell, 1926: 105, pl. 22 fig. 2.

**Heterotypic synonym** (according to Millar, 1990 and South & Skelton, 2000): *Ceramium serpens* Setchell et N.L. Gardner, 1924: 775, pl. 27: fig. 58 (type locality: La Paz, Baja California, Mexico). Marshall Islands: Dawson, 1956: 54, fig. 53; Pacific Mexico: Dawson, 1962: 64, pl. 25 fig. 6; Seychelles: Wynne, 1995: 296, fig. 43; Hawaiian Islands: Abbott, 1999a: 281, fig. 79C.

**Material examined:** Rapa, Australs, 10 Oct. 2000, leg. V. Clouard, UPF 3255 RPS57; Iri Bay, Rapa, 16 Nov. 2002, leg. J. L. Menou, UPF 3262 RPS61.

Thallus to 800 µm high, composed of a branched creeping axis to 3 mm long giving rise to mostly simple, unbranched erect axes 20-30 µm in diameter, with very simple nodal cortication. Periaxial cells 4 per axial cell; each with 2 acropetal filaments only. Internodes relatively long of 25-40 µm. Branch tips simple, bluntly tapered. Tetrasporangia (including thick envelope) 40-50 µm in diameter, strongly protruding and borne singly and unilaterally at each nodal band in upper parts of the erect branches.

**Remarks:** Growing on coral debris or as an epiphyte on larger algae, in lagoon or subtidal habitats to depths of 15 m. This minute species of *Ceramium* is easily distinguished by its minimal nodal cortication, sparse to simple branching, and long internodes.

***Ceramium macrotrichum*** Feldmann-Mazoyer in Børgesen, 1952: 43, fig. 22 a-c (type locality: Riambel, near Souillac, Mauritius). French Polynesia: Payri *et al.*, 2000: 248. **(Fig. 221)**

**Material examined:** Temae, Moorea, 23 Nov. 1995, leg. A. D. R. N'Yeurt, UPF 493 S107.

Thallus to 4 mm high, composed of a creeping axis giving rise to erect branches 80-200 µm in diameter. Erect axes pseudodichotomously branched, with mostly forcipate or claw-like tips. Internodes short, to 30 µm long; periaxial cells 4-6; each periaxial cell issuing a pair of acropetal and basipetal filaments dividing once or twice more. Basipetal cells often elongate, 15-30 µm long. Conspicuous adaxial verticils of straight, cylindrical, hyaline hairs to 10 µm in diameter and 100 µm long with slightly inflated ends issued regularly from the outermost cortical node cells. Tetrasporangia spherical, to 75 µm in diameter, protruding, in whorls of 2-6 at cortical nodes, partially covered with an involucre of elongate, arcuate cortical cells.

**Remarks:** Growing as an epiphyte on *Dictyota* spp., on the fringing reef of Moorea Island. The prominent verticils of matchstick-like hairs are characteristic of this rarely-reported species. These hairs, unlike those in *C. flaccidum*, are thinner, hyaline and straight. As remarked by Feldmann-Mazoyer (1952), this species bears some similarities (especially with regards to the often elongated basipetal cortical cells) to the *C. flaccidum* complex, but differs from it by its wider, shorter axes, shorter internodes, and characteristic straight verticillate hairs.

\****Ceramium upolense*** South et Skelton, 2000: 81, figs 80-88 (type locality: Palolo Deep Marine Reserve, Upolu Island, Samoa). Australia: Price & Scott, 1992: 112, fig. 32A-E ('*Ceramium* sp. '); Wallis Islands: N'Yeurt & Payri, 2004: 383; Samoa: Skelton & South, 2007: 105, figs 251-259. **(Figs 222-224)**

**Material examined:** Tarakoi Islet, Rapa, Australs, 05 Nov. 2002, leg. C. E. Payri, UPF 3369 RPS154.

Thallus 3-4 mm high, consisting of mostly simple or sparsely subdichotomously branched axes with straight, moderately tapered apices and evenly developed nodal cortication bands. Attachment to the substratum via unicellular rhizoids issued laterally from cortical cells of prostrate axis. Erect axes



80-100  $\mu\text{m}$  in diameter, with internodes 25-50  $\mu\text{m}$  long. Cortical bands about 40  $\mu\text{m}$  long, symmetrical, with clearly even edges. Periaxial cells 6-7 per axial cell; each periaxial cell cutting 2 usually uneven acropetal and 2 basipetal corticating filament initials, which ultimately derive 1-2 acropetal and basipetal triangular to polygonal cortical cells. Basipetal cortical row often with two large, symmetrically disposed arching cells about 20  $\mu\text{m}$  long and 8  $\mu\text{m}$  wide. Tetrasporangia tetrahedrally divided, 30-40  $\mu\text{m}$  in diameter, partly protruding from cortical nodes, in whorls of 5-6 near branch apices.

**Remarks:** Growing at a depth of 15-20 m; so far in French Polynesia only reported from the southern Australs. The simple to sparsely branched, evenly corticated axes of this apparently widely distributed Pacific species are characteristic.

***Ceramium vagans*** P.C. Silva in Silva, Meñez & Moe, 1987: 56. French Polynesia: Payri *et al.*, 2000: 250; Seychelles: Silva *et al.*, 1996: 404; Rotuma: N'Yeurt, 1996: 423, figs 154, 158, 159, 162.; Samoa & Fiji: South & Skelton, 2000: 85, figs 89-93; Samoa: Skelton & South, 2007: 105, figs 260-264. **(Figs 225-226)**

**Replaced name:** *Ceramium vagabundum* E.Y. Dawson, 1957a: 121, fig. 27e (as *C. vagabunde*) (type locality: Parry Island, Eniwetok Atoll, Marshall Island); Viêt Nam: Dawson, 1954: 450, fig. 56b (as *Ceramium* sp.).

**Material examined:** Motu de la Passe, Tikehau, 7 Nov. 1995, *leg. A. D. R. N'Yeurt*, UPF 397 S11, 398 S12, 399 S13, 400 S14; Tarakoi Islet, Rapa, 05 Nov. 2002, *leg. C. E. Payri*, UPF 3361 RPS147.

Thallus 1.5-2.5 mm high, composed of a prostrate axis giving rise to erect, irregularly branched to simple axes 130-180  $\mu\text{m}$  in diameter with simple, fusiform apices. Internodes 30-70  $\mu\text{m}$  long, cortical bands evenly distributed, 35-40  $\mu\text{m}$  long, with even margins. Periaxial cells 5-6 per axial cells, polygonal to triangular, 15-20  $\mu\text{m}$  in diameter and aligned centrally in nodal band, giving rise both acropetally and basipetally to up to 3 rows of irregularly aligned small angular cortical cells 5-8  $\mu\text{m}$  in diameter. Tetrasporangia 25-45  $\mu\text{m}$  in diameter, cruciately divided, verticillate, in whorls of 4-6, protruding and partially covered with a prominent involucre of elongate cortical cells. Spermatangia in dense patches along surface of cortical bands.

**Remarks:** Epiphytic on *Halimeda* spp., to depths of 20 m. Superficially similar to *C. upolense* in possessing sparsely branched axes with even cortical nodes, *C. vagans* is characterised by its irregular branching, minute irregularly disposed outer cortical cells, and prominently involucre, verticillately arranged, cruciately divided tetrasporangia.

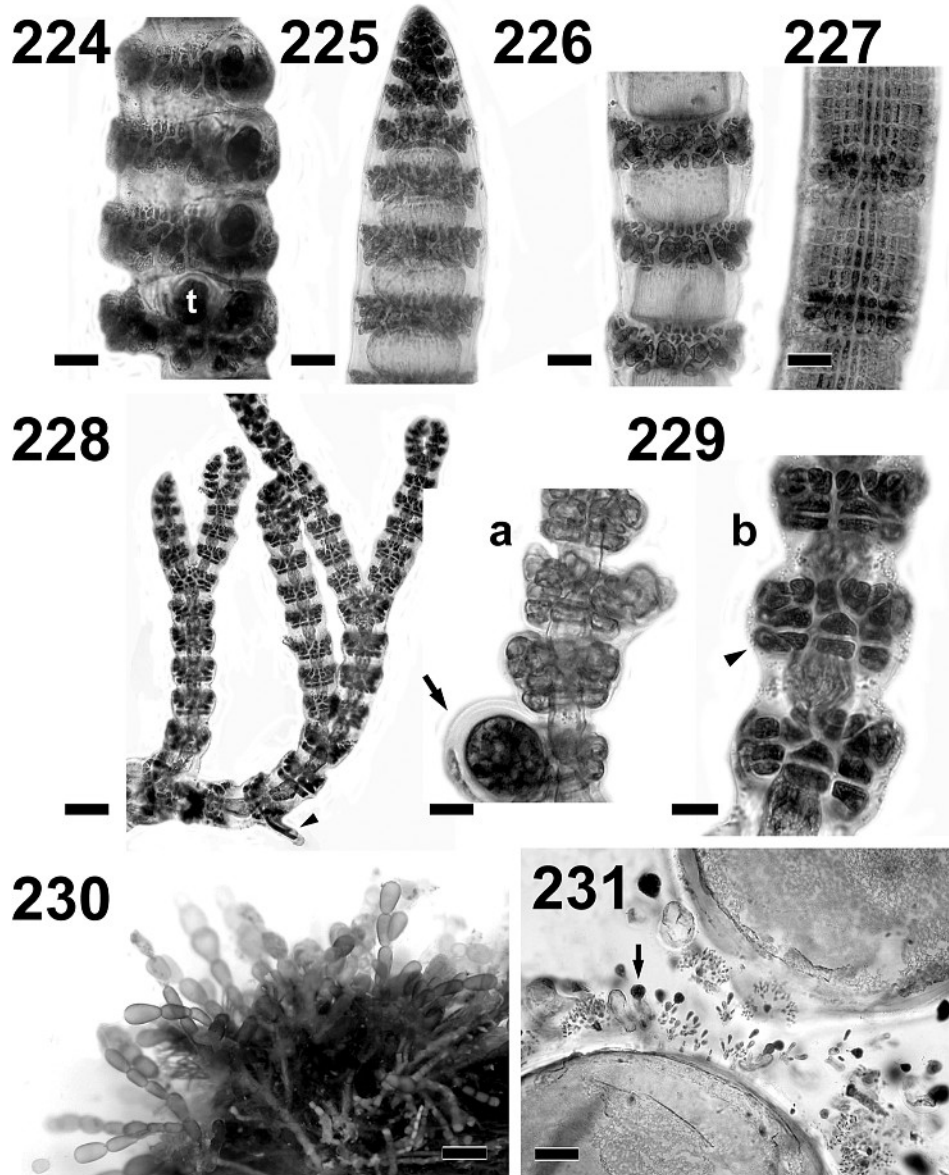
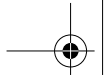
#### ***Corallophila*** Weber-van Bosse

***Corallophila kleiwegii*** Weber-van Bosse, 1923: 339, figs 129-130 (type locality: Nias Island, Sumatra, Indonesia). French Polynesia: N'Yeurt & Payri, 1997: 895; Australia: Price & Scott, 1992: 114, fig. 37A-E; Samoa: Skelton & South, 2002a: 149, fig. 11B; 2007: 111, figs 270-274; Micronesia: Lobban & Tsuda, 2003: 74.

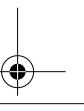
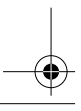
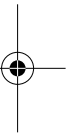
**(Fig. 227)**

**Heterotypic synonyms:** *Centroceras apiculatum* Yamada, 1944: 42 (type locality: Ant Atoll, Caroline Islands). Marshall Islands: Dawson, 1956: 55, fig. 55; Australia: Cribb, 1983: 75, pl. 26, fig. 1, pl. 57, figs 1-2; Price & Scott, 1992: 79, fig. 24A-D; Maldives: Wynne, 1993: 12, fig. 6; Rotuma Island: N'Yeurt, 1996: 420, figs 148-151, 163. *Corallophila apiculata* (Yamada) R.E. Norris, 1993: 395. French Polynesia: N'Yeurt & Payri, 1997: 895; Payri *et al.*, 2000: 242; Seychelles: Silva *et al.*, 1996: 405; Hawaiian Islands: Abbott, 1999a: 288, fig. 81A-C.





Figs 224-231. **224.** *Ceramium upolense*: cortical nodes with embedded tetrasporangia (t) (UPF 3369). Scale = 40  $\mu$ m. **225.** *Ceramium vagans*: habit showing fusiform apex (UPF 3361). Scale = 20  $\mu$ m. **226.** *Ceramium vagans*: detail of nodal cortication (UPF 3361). Scale = 20  $\mu$ m. **227.** *Corallophila kleiwegii*: detail of transverseley aligned axis cortication (UPF 389). Scale = 50  $\mu$ m. **228.** *Gayliella transversalis*: general habit, showing rhizoid issued from periaxial cell (arrowhead) (UPF 3369). Scale = 80  $\mu$ m. **229.** *Gayliella transversalis*: (a) detail showing adaxial tetrasporangia (arrowhead) (UPF 2484); (b) detail of nodal cortication and elongate basipetal cells (UPF 3369). Scale: a = 70  $\mu$ m, b = 20  $\mu$ m. **230.** *Griffithsia schousboei*: habit of freshly-collected plant (UPF 3370). Scale = 1 mm. **231.** *Griffithsia schousboei*: detail of cell articulation showing pedicellate tetrasporangia (arrow) (UPF 3370). Scale = 100  $\mu$ m.



**Material examined:** Vairao, Tahiti, 29 Oct. 1995, *leg. A. D. R. N'Yeurt*, UPF 389 S3, 390 S4; Motu aux Oiseaux, Tikehau, 06 Nov. 1995, *leg. A. D. R. N'Yeurt*, UPF 391 S5.

Thallus 10-15 mm high, dark reddish-brown, composed of epiphytic, creeping axes bearing several erect, simple to sparsely branched segmented axes 100-180  $\mu\text{m}$  in diameter. Attachment to the substratum via translucent rhizoids 25-30  $\mu\text{m}$  in diameter, projecting from the ventral surface of creeping axes. Spines absent; apices apiculate, non-forcipate, terminating in a large apical cell 10-12  $\mu\text{m}$  long. Periaxial cells 6-10 per axial cell; cortication in a distinct pattern of transversely aligned subrectangular cells 8-15  $\mu\text{m}$  in diameter in diameter at nodal points, and longitudinally aligned, elongate cells 15-20  $\mu\text{m}$  in diameter at internodes. Internodal distance 50-100  $\mu\text{m}$  in mid-thallus. Tetrasporangia cruciately divided, 30-35  $\mu\text{m}$  in diameter, up to 8 in whorls in erect axes or slightly expanded short lateral branches. Other reproductive stages not seen.

**Remarks:** Usually found growing as an epiphyte on other algae (such as *Halimeda*) or on coral debris in lagoons and subtidal habitats, to a depth of 20 m. *Centroceras apiculatum* Yamada was transferred to the genus *Corallophila* by Norris (1993). We find little significant differences between *Corallophila kleiwegii* and *C. apiculata* not warranting keeping them apart, with *C. kleiwegii* being the earlier available name for this common tropical entity. In his description of *Centroceras apiculatum* from the Caroline Islands, Yamada (1944) did not discuss the earlier Weber-van Bosse species from Indonesia, and the thallus diameters of both entities overlap widely, as reported also for Samoan material in Skelton & South (2007).

#### *Crouania* J. Agardh

*Crouania attenuata* (C. Agardh) J. Agardh, 1842: 83. French Polynesia: Grunow, 1867; N'Yeurt & Payri, 1997: 895; Australia: Price & Scott, 1992: 117; Micronesia: Lobban & Tsuda, 2003: 74; Samoa: Skelton & South, 2002a: 149; 2007: 113, figs 275-282.

**Basionym:** *Mesogloia attenuata* C. Agardh, 1824: 51 (lectotype locality: Brittany, France).

**Heterotypic synonym:** *Crouania minutissima* Yamada, 1944: 40-41 (type locality: Ant Atoll, near Ponape, Caroline Islands). Marshall Islands: Dawson, 1956: 55, fig. 56; Caroline Islands: Trono, 1969: 72, pl. 9 figs 1-2; Indian Ocean: Silva *et al.*, 1996: 407; Hawaiian Islands: Abbott, 1999a: 294, fig. 82E-G; Wallis Islands: N'Yeurt & Payri, 2004: 383.

**Misapplied name:** *Crouania capricornica* Saenger *et* E.M. Wollaston. French Polynesia: Payri *et al.*, 2000: 252.

**Material examined:** off 'Papa Whisky' islet, Punaauia, Tahiti, 05 Oct. 1995, *leg. A. D. R. N'Yeurt*, UPF 427 S41; Rukuaga Point, Rapa, 30 Nov. 2002, *leg. J. L. Menou*, UPF 3282 RPS78.

Thallus to 4 mm high, bright red and plumose, composed of a creeping axis giving rise to several erect, simple and sparsely branched axes to 100  $\mu\text{m}$  in diameter. The branches are covered with fur-like whorls of upwardly-curved side branchlets (three per axial cell). Tetrasporangia are borne singly at the base of the whorl branchlets.

**Remarks:** Found growing in localized patches on coral debris or epiphytic on larger algae (e.g. *Dictyota*) at depths of 10-20 m. The type and recent authentic material of *C. minutissima* was found to possess 3 whorl branchlets per axial cell, in contrast to the original description by Yamada of 4 whorl branchlets (Abbott, 1999a: 294). Thus, *Crouania capricornica* Saenger *et* E.M. Wollaston (1982: 79, pl.



6 figs 1-3) is very similar to *C. minutissima*, and may be conspecific (Skelton & South, 2002: 149; N'Yeurt & Payri, 2004: 383), although the branch apices are not incurved towards the apex in *C. capricornica*. The characters of *C. minutissima* overlap with those of *C. attenuata*, the earliest available name for this entity.

***Gayliella*** T. O. Cho, L. McIvor *et* S. M. Boo

Cho *et al.* (2008) recently revised the *Ceramium flaccidum* complex using molecular techniques, and erected the new genus *Gayliella*, characterised vegetatively by the production of three cortical initials per periaxial cell (the basal one of which divides horizontally), alternate branching, incomplete cortication and unicellular elongate rhizoids produced from periaxial cells. The presence of distinctly elongate basipetal cells in transverse series is characteristic of *C. flaccidum* complex. Given the European (Irish) type locality of this widespread species complex, molecular studies comparing South Pacific populations with Northern Hemisphere ones would be desirable. With one species in the French Polynesian flora.

\****Gayliella transversalis*** (Collins *et* Hervey) T. O. Cho *et* Fredericq, 2008: 727, figs 5a-n, 6a-e. **(Figs 228-229)**

**Basionym:** *Ceramium transversale* Collins *et* Hervey, 1917: 145, pl. V figs 29-31 (type locality: Spanish Rocks, Bermuda).

**Misapplied name:** *Ceramium flaccidum* (Harvey *ex* Kützing) Ardissonne, 1871: 40. French Polynesia: Payri *et al.*, 2000: 248; Australia: Cribb, 1983: 82, pl. 31, fig. 2, pl. 59, figs 1-4; Price & Scott, 1992: 89, fig. 27A-E; Hawaiian Islands: Abbott, 1999a: 274, fig. 76D-H; Samoa & Fiji: Skelton & South, 2000: 65, figs 32-39, 41-44; 2002: pl. II figs 8, 10, 12; Fiji: N'Yeurt, 2001: 817, fig. 253; Samoa: Skelton & South, 2007: 95, figs 216-221.

**Material examined:** Paea, Tahiti, c. 1992, *leg.* B. Bourgeois, UPF 395 S9.

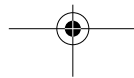
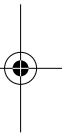
Thallus to 20 mm high, composed of mostly erect axes 80-100 µm in diameter. Axes irregularly, alternately or subdichotomously branched, slightly incurved, forcipate at the tips.

Axes moderately corticated; periaxial cells 6-7 per axial cell; each periaxial cell giving rise to a characteristically elongate basipetal cell 9-15 µm in diameter and 20-30 µm long, which undergoes two further divisions, and two acropetal filament (one of which is oblique), composed of spherical or dome-shaped cells, further dividing once only to give a total of 4 cells. Tetrasporangia tetrahedrally divided, borne in adaxial rows, strongly protruding with a full covering of acropetal cells. Prominent unilateral, uniseriate, curved, clavate pigmented hairs to 25 µm in diameter and 100 µm long are often found adaxially on cortical nodes of some French Polynesian plants.

**Remarks:** Usually found growing as an epiphyte on macroalgae (such as *Dictyota* or *Halimeda*), or on coralline surfaces, in the lagoon and to 15 m depth on the outer reef slope. The French Polynesian material has nodal bands with two acropetal and one basipetal filament, and adaxially borne tetrasporangia, thus agreeing with *Gayliella transversalis sensu* Cho *et al.* (2008). This entity is also widely reported from other South Pacific localities under the misapplied name *Ceramium flaccidum*.

***Griffithsia*** C. Agardh

\****Griffithsia schousboei*** Montagne *in* Webb, 1839: 11, pl. 10 (type locality: Mediterranean coast of France). Brazil: Joly *et al.*, 1965: 135, pl. 6 figs 1-11;





Curaçao: Stegenga & Vroman, 1987: 416, figs 46-49; South Africa: Norris & Molloy, 1988: 477, figs 1-4; Hawaiian Islands: Abbott, 1999a: 302, fig. 85A-B; Malaysia: Masuda *et al.*, 1999: 455, figs 24-28. **(Figs 230-231)**

**Misapplied name:** *Griffithsia ovalis* Harvey, 1855: 559 (type locality: King George Sound, Albany, Western Australia). French Polynesia: Payri *et al.*, 2000: 252.

**Material examined:** Kauehi, 22 Sep. 1995, *leg. J. Orempuller*, UPF 445 S59; Punaauia, Tahiti, 25 Sep. 1995, *leg. A. D. R. N'Yeurt*, UPF 447 S61; Tikehau, 07 Nov. 1995, *leg. A. D. R. N'Yeurt*, UPF 446 S60, 498 S112; Tarakoi Islet, Rapa, 05 Nov. 2002, *leg. C. E. Payri*, UPF 3370 RPS155.

Thallus pinkish-red, to 15 mm long, sparsely and irregularly to subdichotomously branched, consisting of chains of hollow, cylindrical to ovoid segments 600-900 µm long and 300-500 µm wide. Apical cell spherical, 200-250 µm in diameter. Tetrasporangia 45-50 µm in diameter, at cell articulations in upper parts of thallus, pedicellate, in clusters of 3-4, with conspicuous reniform involucre cells.

**Remarks:** Epiphytic on *Halimeda* and other algae, in the lagoon, passes and subtidally to 20 m depth. The irregularly branched cells of different sizes and shapes are characteristic of this species.

#### *Haloplegma* Montagne

***Haloplegma duperreyi*** Montagne, 1842: 258-261, pl. 7 fig. 1 (type locality: Martinique, West Indies). French Polynesia: Payri *et al.*, 2000: 254; India: Børgesen, 1931: 14, fig. 9a-c; Mauritius: Børgesen, 1945: 11, figs 3-8; 1952: 52, fig. 26; Cuba: Díaz-Piferrer, 1964: 366, fig. 12; Great Barrier Reef, Australia: Price & Scott, 1992: 127, fig. 43A-D; Indian Ocean: Silva *et al.*, 1996: 414; Southern Australia: Womersley, 1998: 282, fig. 133A-E; Hawaiian Islands: Abbott, 1999a: 305, fig. 86E; Norfolk Island: Millar, 1999: 515, fig. 39; Samoa: Skelton & South, 2002a: 150; 2007: 132, figs 340-345; American Samoa: Littler & Littler, 2003: 122; Fiji: South & Skelton, 2003: 734; Wallis Islands: N'Yeurt & Payri, 2004: 383.

**(Fig. 232)**

**Misapplied name:** *Martensia elegans* Hering, Rotuma: N'Yeurt, 1996: 427, fig. 131.

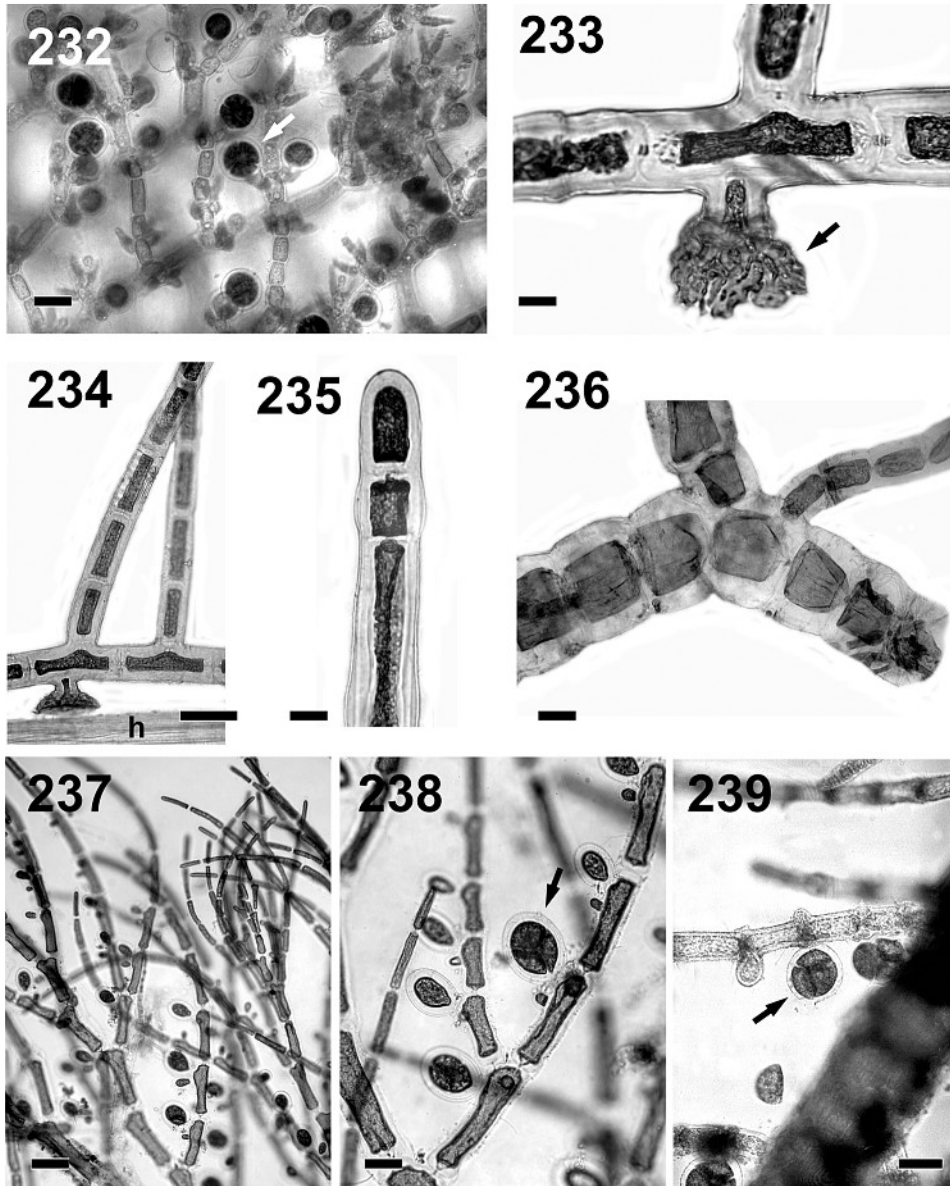
**Material examined:** Tiahura, Moorea: Jul. 1984, *leg. C. E. Payri*, UPF 487 S101; 25 Nov. 1995, *leg. A. D. R. N'Yeurt*, UPF 488 S102; 01 Jul. 1997, *leg. A. D. R. N'Yeurt*, UPF 313; Motu Totegegie, Gambier, 22 Nov. 2000, *leg. A. D. R. N'Yeurt*, UPF 803.

Thallus 10-40 mm across, brownish red, consisting of soft, flattened felt-like lobes made-up of a fine network of monosiphonous filaments about 40-50 µm in diameter, forming a three-dimensional network 60-170 µm in mesh size, attached to the substratum by irregularly disposed uniseriate rhizoids. Axial cells each producing 4 determinate laterals, two of which fuse with neighbouring laterals to form network; the other two freely projecting. Non-fusing laterals with 2 branches, one uniseriate and the other branched twice, with acute terminal cells. Tetrasporangia 30-35 µm in diameter, spherical, occurring singly and proximally on non-fusing lateral branchlets.

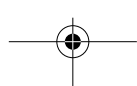
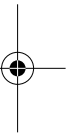
**Remarks:** Growing in crevices in the lagoon and on coralline surfaces at depths of 5-15 m on the outer reef slope of high islands.

#### *Ptilothamnion* Thuret

\****Ptilothamnion cladophorae*** (Yamada *et T. Tanaka*) G. Feldmann-Mazoyer, 1941: 375, footnote. India: Silva *et al.*, 1996: 423; Hawaiian Islands: Abbott, 1999a: 313, fig. 87I; Micronesia: Lobban & Tsuda, 2003: 74. **(Figs 233-235)**



Figs 232-239. **232.** *Haloplegma duperreyi*: detail of mesh network with tetrasporangia (arrow) on unfused branchlet (UPF 488). Scale = 30  $\mu$ m. **233.** *Ptilothamnion cladophorae*: detail of creeping filament and digitate haptera (arrow) (UPF 3296). Scale = 20  $\mu$ m. **234.** *Ptilothamnion cladophorae*: habit of plant attached via haptera to *Cladophora* host (h) (UPF 3296). Scale = 80  $\mu$ m. **235.** *Ptilothamnion cladophorae*: detail of apical region of erect axis (UPF 3296). Scale = 8  $\mu$ m. **236.** *Seirospora orientalis*: large basal cells of prostrate axis (UPF 3284). Scale = 60  $\mu$ m. **237.** *Seirospora orientalis*: gracile habit of upper axes of tetrasporic plant (UPF 3284). Scale = 25  $\mu$ m. **238.** *Seirospora orientalis*: adaxial tetrasporangia (arrow) on indeterminate branchlet (UPF 3284). Scale = 40  $\mu$ m. **239.** *Spyridia filamentosa*: detail of tetrasporangia (arrow) lateral on side branchlet (UPF 506). Scale = 60  $\mu$ m.





**Basionym:** *Spermothamnion cladophorae* Yamada et T. Tanaka, 1934: 342-344, figs 1, 2 (type locality: Garan-bi (Cape O-luan) and Kasho-to, Taiwan).

**Material examined:** Tauna Islet, Rapa, Australs, 27 Nov. 2002, leg. C. E. Payri, UPF 3296 RPS87.

Thallus 2.0-2.5(3.0) mm high, epiphytic, composed of creeping filaments giving rise to erect axes. Attachment to the host alga is via non-penetrating, finely digitate haptera to 50 µm in diameter, issued from creeping segments opposite erect determinate branches. Cells of prostrate axes 35-40 µm in diameter and 60-70 µm long, rectangular. Erect determinate axes (10)20-25(30) µm in diameter, simple, issued at nearly right angle from the central region of every second segment of prostrate axis. Reproduction not seen, but tetrasporangia reported as sessile and isolated on erect filaments for Hawaiian plants.

**Remarks:** Growing at a depth of 20 m, epiphytic on *Cladophora aokii* Yamada.

***Seirospora* Harvey**

\****Seirospora orientalis*** Kraft, 1988: 3, figs 2-25 (type locality: One Tree Island, Capricorn Group, Great Barrier Reef, Queensland, Australia). **(Figs 236-238)**

**Misapplied name** (Japanese record according to Kraft, 1988): *Seirospora occidentalis* Børgesen. French Polynesia: Payri et al., 2000: 254; Japan: Itono, 1971; 1977: 205, figs 19E, 41G, 62G.

**Material examined:** Opunohu Bay, Moorea, 24 Nov. 1995, leg. A. D. R. N'Yeurt, UPF 494 S108; Rukuaga Point, Rapa, Australs, 30 Nov. 2002, leg. J. L. Menou, UPF 3284 RPS79; Punaauia PK18, Tahiti, 08 Mar. 2006, leg. A. D. R. N'Yeurt, UPF 3970 S188.

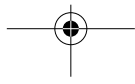
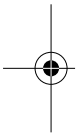
Thallus to 8 mm high, reddish-brown, gracile in outline, with a percurrent main axis. Attachment to the substratum via slender multicellular rhizoids 5-10 µm in diameter and 400-500 µm long, issued laterally from large basal cells of prostrate axis. Lowermost cell of prostrate axis cone-shaped, 120-180 µm in diameter proximally, tapering to 20 µm distally. Basal portion composed of subquadrate thick-walled cells 200-220 µm in diameter and 130-150 µm long, becoming 80-90 µm in diameter in mid parts of thallus, 12-20 µm above and tapering to 10 µm in ultimate branchlets. Branching sparse in lower portions, becoming denser and subdichotomous to radial with more blunt-tipped slender branches distally, often with terminal hairs. Cells of upper branchlets are 50-60 µm long, subrectangular. Mature tetrasporangia 30-50 µm in diameter, tetrahedrally divided and non-involucrate, occurring singly or in pairs adaxially on distal parts of cells of indeterminate branchlets. Gland cells absent.

**Remarks:** Epiphytic on *Spyridia filamentosa* and *Gracilaria parvispora* in the calm, shallow waters (1 m depth) of inner Opunohu Bay, Moorea or growing on *Chondria simpliciuscula* at 2 m depth in Punaauia lagoon, Tahiti. The characteristic ossuate, squarish basal cells of the percurrent main axis of this species are distinctive. Previous Japanese and Australian records of this entity as *Seirospora occidentalis* (a Caribbean species) were relegated to a new species, *S. orientalis*, by Kraft (1988) on the basis of vegetative and reproductive differences. The French Polynesian plant is in good accord with the description of Australian plants in Kraft (1988).

***Spyridia* Harvey**

**Key to the French Polynesian species of *Spyridia***

- 1a. Thallus 5-15 cm high, intertidal, forming large masses . . . . . *S. filamentosa*
- 1b. Thallus less than 1 cm high, subtidal, growing solitarily. . . . . *S. hypnoides*



***Spyridia filamentosa*** (Wulfen) Harvey in W.J. Hooker, 1833: 337. French Polynesia: Payri *et al.*, 2000: 256; India: Børgesen, 1931: 14; Japan: Segawa, 1938: 152.; Itono, 1977: 37, 123, 202, figs 17A-J, 40A-B; Viêt Nam: Dawson, 1954: 444, fig. 54i; Brazil: Joly, 1960: pl. 15 fig. 8a-b; Pacific Mexico: Dawson, 1962: 69, pl. 30 figs 1-3; Hommersand, 1963: 177, figs 4a-e, 5a-d, 6a-d, 7a-b, d-e, 8a-e, g-h, 9a-e, g, 10a-d; Venezuela: Díaz-Piferrer, 1970: 177, fig. 46; Australia: Womersley & Cartledge, 1975: 222, figs 1, 3A-B; Price & Scott, 1992: 131, fig. 45A-E; Womersley, 1998: 372, figs 171, 173A-B; Broadwater *et al.*, 1991: 190, figs 1-11; Indian Ocean: Silva *et al.*, 1996: 427; Hawaiian Islands: Abbott, 1999a: 313, fig. 88A-B; Fiji: Littler & Littler, 2003: 124; South & Skelton, 2003: 734; Wallis Islands: N'Yeurt & Payri, 2004: 383. **(Fig. 239)**

**Basionym:** *Fucus filamentosus* Wulfen, 1803: 64 (type locality: Adriatic Sea).

**Material examined:** Opunohu Bay, Moorea, 24 Nov. 1995, *leg. A. D. R. N'Yeurt*, UPF 506 S120; Taapuna, Tahiti, 16 May 1997, *leg. A. D. R. N'Yeurt & C. E. Payri*, UPF 374, 375; Botanical Gardens, Papeari, Tahiti, 01 Jun. 1997, *leg. A. D. R. N'Yeurt*, UPF 373; Rikitea, Mangareva, *leg. A. D. R. N'Yeurt*: 16 Nov. 2000, UPF 849 / BM 806223; 20 Nov. 2000, UPF 857; Rapa Iti, Australs, 04 Nov. 2002, *leg. C. E. Payri*, UPF 3416 RPS 200, 3608, 3630.

Thallus to 15 cm high, brownish-red and brittle-soft in texture, composed of plumose, terete axes 0.3-1 mm in diameter forming large entangled detached masses, or attached to the substratum via a small discoid holdfast. The main axes are unilaterally to irregularly branched up to 6 orders and fully corticated, while the upwardly-curved side branchlets are regularly segmented and corticated at the nodes only (1-3 cells wide), as in the genus *Ceramium*. Apical cells of main axes dome-shaped, 8-10 µm in diameter; axial cells ellipsoidal, 300-350 µm in diameter and 80-150 µm long. Periaxial cells subrectangular, 10-22 per distal end of axial cell, 20-40 µm in diameter and 40-70 µm long, each issuing 1-2 elongate basipetal cells 5-20 µm in diameter and 40-60 µm long, fully corticating internodes. Secondary branchlets to 2 mm long and 30-70 µm in diameter, spirally arranged, with nodal cortical bands 1-3 cells long. Apical cell conical. Tetrasporangia 25-55 µm in diameter, tetrahedrally divided and non-involucrate, strongly protruding, borne singly and laterally on the side branchlets. Spermatangia 3-5 µm in diameter, with unique 6-8 stalked appendages extending from the surface (Broadwater *et al.*, 1991), borne on cortical cells of elongate fertile segments of determinate laterals.

**Remarks:** Growing abundantly in calm, shallow waters of lagoons, estuaries or inner bays, where it occurs seasonally forming large, dominant mats in the cooler months (e.g. June to August, seasonally alternating with *Gracilaria parvispora* in Opunohu Bay, Moorea).

***Spyridia hypnoides*** (Bory de Saint-Vincent) Papenfuss, 1968: 281. French Polynesia: Payri *et al.*, 2000: 256. Fiji: Kapraun & Bowden, 1978: 201, pl. 5 figs 31-32; Indian Ocean: Silva *et al.*, 1996: 428; South & Skelton, 2003: 734. **(Fig. 240)**

**Basionym:** *Thamnophora hypnoides* Bory de Saint-Vincent, 1834: 175 (type locality: Cape Comorin, Tamil Nadu, India).

**Material examined:** Taapuna, Tahiti, 19 Sep. 1995, *leg. A. D. R. N'Yeurt*, UPF 485 S99; Hotel Bora Bora Lagoon, Bora Bora, 17 Aug. 2002, *leg. A. D. R. N'Yeurt & D. Schneider*, UPF 2562, 2568.

Thallus 5-10 mm long, with a fully corticated main axis 200-400 µm in diameter bearing thinner, segmented side branchlets 40-80 µm in diameter which are corticated at the nodes only. Side branchlets upwardly curved and irregularly alternately to radially arranged around main axis.

**Remarks:** A relatively rare species, growing solitarily as an epiphyte on larger species such as *Halimeda* in subtidal habitats to 15 m deep.

**Delesseriaceae** Bory**Hypoglossum** Kützing

***Hypoglossum simulans*** M.J. Wynne, I.R. Price *et* D.L. Ballantine, 1989: 31-32, figs 12-26 (type locality: Îlet de Pigeon, Malendure, west side of Basse-Terre, Guadeloupe, West Indies). French Polynesia: Payri *et al.*, 2000: 258; West Indies: Wynne, 1989: 515, figs 1H, 2A-E; Australia: Price & Scott, 1992: 140, fig. 48A-E; Maldives: Silva *et al.*, 1996: 459; Hawaiian Islands: Abbott, 1999a: 340, fig. 98A-B; Fiji: N'Yeurt, 2001: 832, figs 281, 282, 286; Malaysia: Masuda *et al.*, 2001b: 471, figs 12-16; Samoa: Skelton & South, 2002a: 152, fig. 12C-D, 2007: 160, figs 430-435; Papua New Guinea: Littler & Littler, 2003: 134; Wallis Islands: N'Yeurt & Payri, 2004: 384. **(Figs 241-245)**

**Misapplied name** (according to Price & Scott, 1992: 140): *Hypoglossum minimum* Yamada. Marshall Islands: Dawson, 1957a: 122, fig. 30c.

**Material examined:** Punaauia, Tahiti, 25 Sep. 1995, *leg. A. D. R. N'Yeurt*, UPF 461 S75; off 'Papa Whisky' islet, Punaauia, Tahiti, 05 Oct. 1995, *leg. A. D. R. N'Yeurt & S. Andréfouët*, UPF 460 S74, 462 S76, 463 S77; Tiahura, Moorea: 25 Nov. 1995, *leg. A. D. R. N'Yeurt*, UPF 500 S114, 501 S115, 502 S116; 01 Oct. 2004, *leg. A. D. R. N'Yeurt & A. Pham*, UPF 2952; Entre deux Baies, Moorea, 25 Nov. 1995, *leg. A. D. R. N'Yeurt & J. Orempuller*, UPF 503 S117; Tematapi Point, Rapa, 01 Nov. 2002, *leg. J. L. Menou*, UPF 1876; Tauna Islet, Rapa, 27 Nov. 2002, *leg. C. E. Payri*, UPF 3316, 3566, 3629; right exit of Ha'urei Bay, Rapa, 11 Nov. 2002, *leg. J. L. Menou*, UPF 3443 RPS221; northern slope of Rapa Iti, 28 Nov. 2002, *leg. J. L. Menou*, UPF 2417.

Thallus spreading and decumbent, consisting of narrow lanceolate blades to 15 mm long and 1.6 mm wide, attached to the substratum and other thalli by uni- or multicellular rhizoids issued from blade margins and apices. Lateral branches arising singly and endogenously from the midrib. Apices rounded to acute, with an apical cell 7-8 µm in diameter. Mature axial cells 330-350 µm long and 65-70 µm wide, flanked on either side by a pair of periaxial cells 290-315 µm long and 71-78 µm wide, cutting off second-order cell rows of which only the innermost cells bear third-order rows reaching the thallus margin. Marginal cells small and subrectangular, 26-35 µm long and 15-20 µm wide. Spermatia 2-3 µm in diameter, in sori on both sides of blade. Tetrasporangial sori elongate and centrally located atop main axial cell line; tetrasporangia tetrahedrally divided, 26-34 µm in diameter, shortly pedicellate in pairs or triplets on arms of chandelier-like structure formed of elongate filamentous cells, with 4-6 irregularly shaped cover cells. Cystocarps not seen.

**Remarks:** Usually found growing as an epiphyte on other algae, in subtidal habitats to 20 m depth.

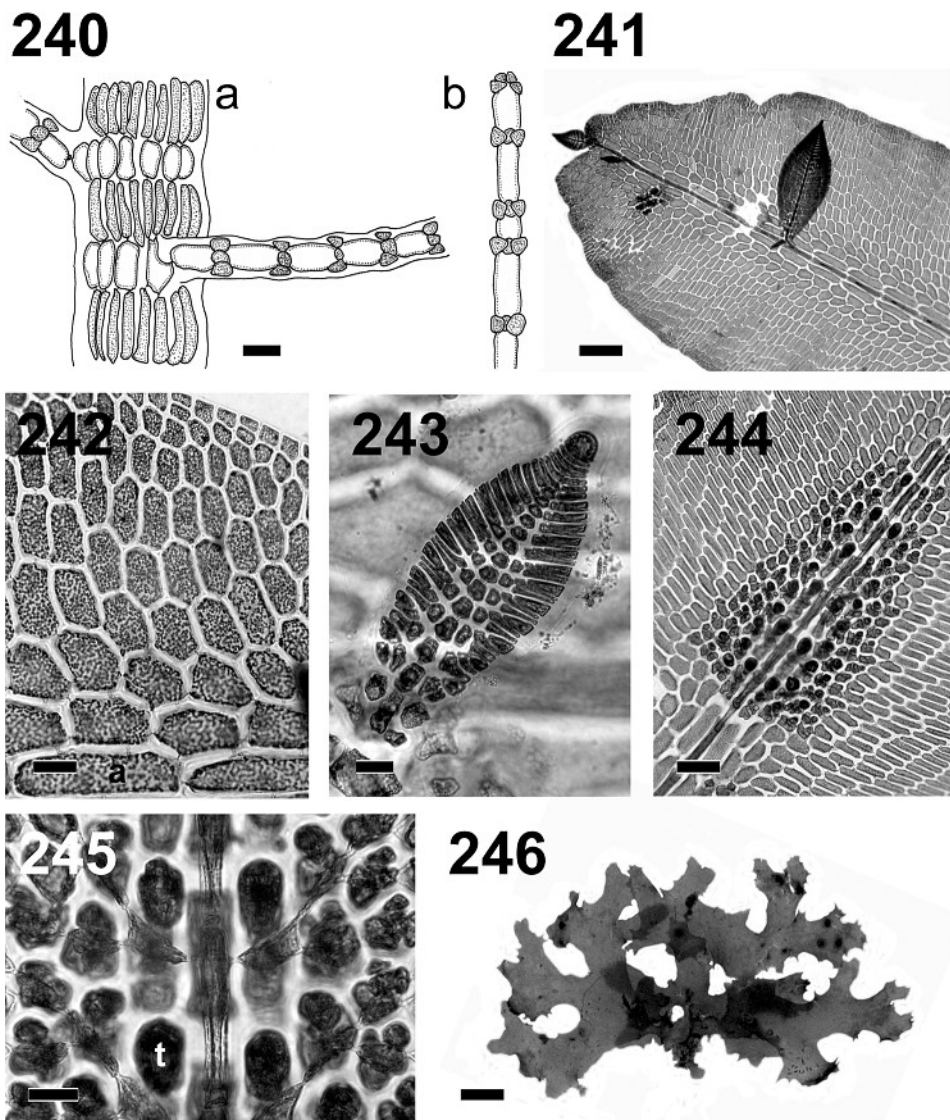
***Martensia*** Hering

\****Martensia fragilis*** Harvey, 1854: 145 (type locality: Belligam (Weligama), Sri Lanka). Svedelius, 1908: 12, figs 10-28, 47-48, 55-62; Marshall Islands: Dawson, 1956: 56, fig. 58; Australia: Millar, 1990: 418, figs 53C-E; Japan: Yoshida & Mikami; 1996: 101-103, figs 4-18; Papua New Guinea: Millar *et al.*; 1999: 570, fig. 5D; Norfolk Island: Millar, 1999: 570, fig. 5D; Malaysia: Masuda *et al.*, 2000: 571, figs 6-11; Samoa: Skelton & South, 2002a: 153, fig. 14A-D; 2007: 162, figs 436-440; Fiji: Littler & Littler, 2003: 136.

**Homotypic synonym:** *Hemitrema fragilis* (Harvey) E.Y. Dawson, 1957a: 123, fig. 28 (Marshall Islands).

**Heterotypic synonym** (given by Millar, 1990): *Martensia pavonia* (J. Agardh) J. Agardh, 1863: 831. West Indies: Børgesen, 1919: 348, figs 345-346; Caribbean:





Figs 240-246. **240.** *Spyridia hypnoides*: (a) detail of main axis with lateral branchlets and (b) detail of apical region of lateral branchlet showing sparse cortication (UPF 485). Scale = 25  $\mu$ m. **241.** *Hypoglossum simulans*: habit (UPF 3316). Scale = 300  $\mu$ m. **242.** *Hypoglossum simulans*: detail of axial cell (a) flanked by periaxial cell files (UPF 3316). Scale = 10  $\mu$ m. **243.** *Hypoglossum simulans*: lateral branches arising endogenously from the midrib (UPF 3443). Scale = 10  $\mu$ m. **244.** *Hypoglossum simulans*: tetrasporic sorus atop axial cell line (UPF 3443). Scale = 20  $\mu$ m. **245.** *Hypoglossum simulans*: detail of tetrasporangia on chandelier-like cellular network (UPF 3443). Scale = 40  $\mu$ m. **246.** *Myriogramme cartilaginea*: habit (UPF 2719). Scale = 2 mm.





Littler *et al.*, 1989: 134; Bucher & Norris, 1995: 17, fig. 22; Littler & Littler, 2000: 186; Australia: Price & Scott, 1992: 143, figs 49A–D.

**Misapplied name:** *Martensia elegans* Hering. French Polynesia: Payri *et al.*, 2000: 258.

**Material examined:** Taevarao, Moorea, 21. Oct. 2008, *leg. C.E. Payri, J.-L. Menou & L. Mattio*, UC 1947157; Tetuamotu Point, Moorea, 28 Oct. 2008, *leg. C.E. Payri, J.-L. Menou & L. Mattio*, UC 1947205.

Thallus 2-4 cm high, monostromatic when young, arising from a basal holdfast, consisting of subdichotomously branched, delicate pinkish-red lobes up to 20 mm wide. Periodic intercalary growth of the thallus producing grid-like meshwork, the mesh being the edges of bands extended at right angles to the plane of the blades, interconnected by anastomosing filaments from the mesh walls. Thallus margin smooth and convoluted, with leading membranous margins forming lobes 1-4 mm wide, at times producing further meshworks. Tetrasporangia 75-80  $\mu$ m in diameter, borne on both membranous and meshwork portions of thallus. Cystocarps globose, to 2 mm in diameter, on meshwork portion of thallus.

**Remarks:** Growing in patches on the outer slope down to 20 m depth, on the island of Moorea. Superficially similar-looking *Martensia elegans* Hering and *Martensia australis* Harvey can be distinguished from *M. fragilis* by their smooth or finely toothed, non-ruffled membranous margins, which never produce further meshwork (Millar, 1990). According to Masuda *et al.* (2000), fully grown plants are essential for morphological comparisons between species of *Martensia*.

#### *Myriogramme* Kylin

\**Myriogramme cartilaginea* (Harvey) Womersley, 2003: 111, fig. 49C-F.

(Figs 246-249)

**Basionym:** *Nitophyllum cartilagineum* Harvey, 1855: 549 (type locality: Garden Island, Western Australia).

**Material examined:** Rarapai Islet, Rapa, Australs, 30 Nov. 2002, *leg. J. L. Menou*, UPF 2719, 3480 RPS258, 3499 RPS277.

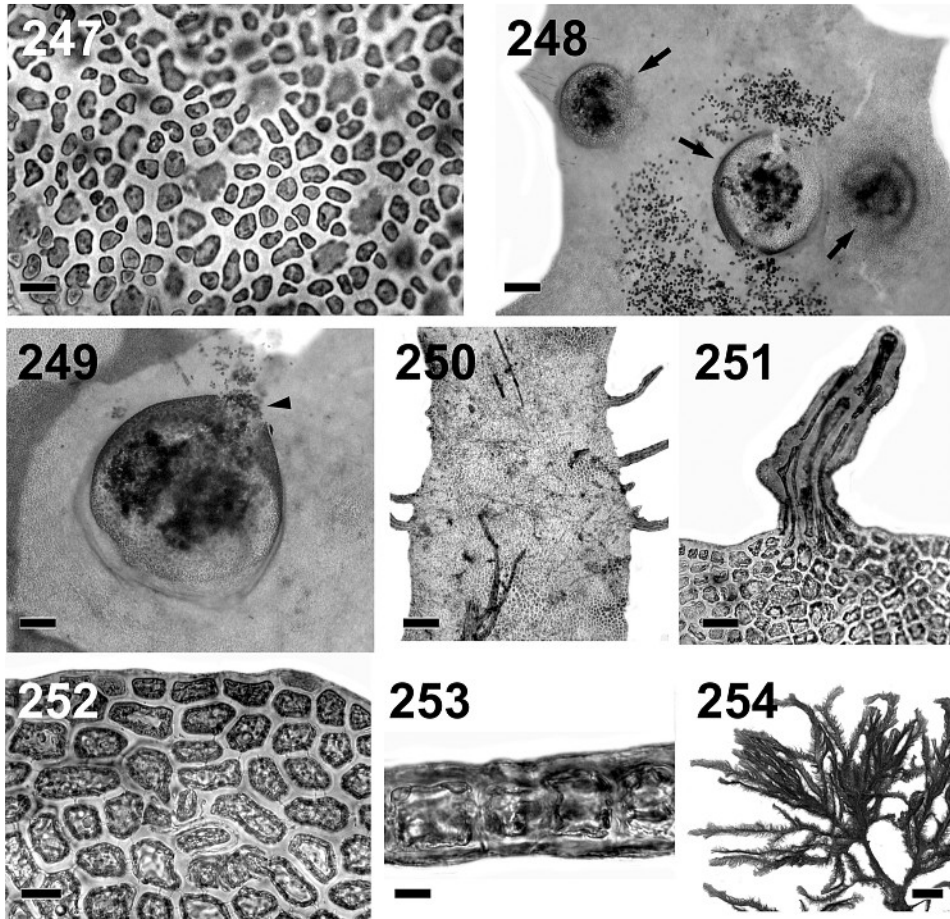
Thallus to 20 mm long, consisting of a cartilaginous, irregularly alternately branched complanate blade (1.5)2.0-2.5(3.0) mm wide and 40-50  $\mu$ m thick, issued from a discoid holdfast, with some short blunt to subacute marginal proliferations. Veins absent. Surface cells small and angular, 5-13  $\mu$ m in diameter. Thallus pluristromatic in mature portions. Plastids discoid. Cystocarps domed, 400-500  $\mu$ m in diameter, with a small ostiole, scattered on blade surface. Carposporophyte with an extensive basal fusion cell, much branched gonimoblasts and terminal chains of sequentially maturing ovoid to angular carposporangia 10-13  $\mu$ m in diameter. Other reproductive stages not seen.

**Remarks:** Growing at a depth of 32 m, in *Lobophora* beds. The previously unknown cystocarpic Rapa plant is of somewhat smaller dimensions, but otherwise in good vegetative morphological agreement with South Australian plants, described by Womersley (2003), and these records would represent an important range extension for this predominantly Western Australian species. Womersley (2003) ascribed *Nitophyllum cartilagineum* to the genus *Myriogramme* with doubt, and molecular studies on the *Myriogramme-Nitophyllum* group would be desirable to clarify the taxonomy.

#### *Nitophyllum* Greville

\**Nitophyllum adhaerens* M.J. Wynne, 1997: 215, figs 1-14 (type locality: Bocana Reef, Estacion Puerto Morelos, Quintana Roo State, Mexico). Hawaiian Islands:





Figs 247-254. **247.** *Myriogramme cartilaginea*: surface view of cortical cells (UPF 2719). Scale = 10  $\mu$ m. **248.** *Myriogramme cartilaginea*: domed cystocarps (arrows) on blade surface (UPF 2719). Scale = 150  $\mu$ m. **249.** *Myriogramme cartilaginea*: detail of cystocarp, showing small ostiole (arrowhead) (UPF 2719). Scale = 100  $\mu$ m. **250.** *Nitophyllum adhaerens*: habit, showing marginal rhizoids (UPF 3248). Scale = 100  $\mu$ m. **251.** *Nitophyllum adhaerens*: detail of marginal multicellular rhizoid (UPF 3248). Scale = 25  $\mu$ m. **252.** *Nitophyllum adhaerens*: surface view of blade (UPF 3444). Scale = 20  $\mu$ m. **253.** *Nitophyllum adhaerens*: transverse section showing monostromatic nature of blade (UPF 3329). Scale = 25  $\mu$ m. **254.** *Dasya anastomosans*: habit (UPF 3196). Scale = 3 mm.

Abbott, 1999a: 347, fig. 100E; Bermuda: Schneider, 2000: 462, figs 19-20; Fiji: Littler & Littler, 2003: 141 (as *Nitophyllum* sp.); Micronesia: Lobban & N'Yeurt, 2006: 85, 97, fig. 1c-d.

**Misapplied names:** *Myriogramme* sp. Fiji: South *et al.*, 1993: 191, figs 9-10. *Myriogramme carnea* (J. J. Rodriguez) Kylin. French Polynesia: N'Yeurt & Payri, 1997: 896.

**Material examined:** Punaauia, Tahiti, 25 Sep. 1995, *leg. A. D. R. N'Yeurt*, UPF 467 S81; Tikehau, Tuamotu, 07 Nov. 1995, *leg. A. D. R. N'Yeurt*, UPF 466 S80; Tiahura, Moorea, 25 Nov. 1995, *leg. A. D. R. N'Yeurt*, UPF 508 S122; Hau'rei Bay, Rapa, 11 Nov. 2002, *leg.*



*J. L. Menou*, UPF 3444 RPS222; Rapa, Australs, 18 Nov. 2002, *leg. M. Adjeroud*, UPF 2227, 3248 RPS52, 3513 RPS291, 3537; Mei Point, Rapa, 26 Nov. 2002, *leg. C. E. Payri*, UPF 2378, 3500 RPS278; Tauna Islet, Rapa, 27 Nov. 2002, *leg. C. E. Payri*, UPF 3328 RPS115, 3329 RPS116, 3571.

Thallus to 6 mm across and 40-50  $\mu\text{m}$  thick, prostrate and monostromatic, with smooth margins, attached to the substratum via multiple marginal multicellular bundled rhizoids 20-50  $\mu\text{m}$  in diameter and 200-800  $\mu\text{m}$  long. Cells angular in surface view, 10-12  $\mu\text{m}$  in diameter at the margins, becoming 20-50  $\mu\text{m}$  in middle portions of the blade. Veins and midrib absent. Plastids 2-3 per cell, discoid. Tetrasporangia tetrahedrally divided, 45-50  $\mu\text{m}$  in diameter, in several layers in large irregularly obovate sori, in distal areas of blade.

**Remarks:** Growing attached to other larger algae, at depths of 1-20 m. The prostrate, monostromatic thallus with smooth margins attached by multiple marginal rhizoids is characteristic of this widespread tropical species.

**Dasyaceae** Kützing

*Dasya* C. Agardh

**Key to the French Polynesian species of *Dasya***

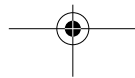
- 1a. Axes flattened; plant prostrate, fleshy ..... *D. palmatifida*
- 1b. Axes terete; plant erect, not fleshy ..... 2
  - 2a. Thallus to 10 cm high, reddish-brown, rigid and villous. . . . *D. anastomosans*
  - 2b. Thallus usually less than 4 cm high, not reddish-brown; not rigid or villous 3
- 3a. Main axis fully corticated ..... 5
- 3b. Main axis uncorticated or sparsely corticated ..... 4
  - 4a. Main axis not clearly defined; tetrasporangia non-involucrate . . . . *D. mollis*
  - 4b. Main axis clearly defined; tetrasporangia with triangular involucral cells  
..... *D. iyengarii*
- 5a. Main axis irregularly branched; pseudolaterals in distinct, spaced-out short whorls; tetrasporangial stichidia on pseudolaterals . . . . . *Dasya murrayana*
- 5b. Main axis alternately branched; pseudolaterals evenly distributed along main axis; tetrasporangial stichidia on main axis . . . . . *D. baillouviana*

***Dasya anastomosans*** (Weber-van Bosse) M.J. Wynne, 2002: 539; Wallis: N'Yeurt & Payri, 2004: 383; Samoa: Skelton & South, 2007: 144, figs 374-377. (**Fig. 254-255**)

**Basionym:** *Dasyopsis anastomosans* Weber-van Bosse, 1921: 309, pl. 7, fig. 10 (type locality: Indonesia).

**Heterotypic synonyms:** *Eupogodon anastomosans* (Weber-van Bosse) P.C. Silva in Silva *et al.*, 1987: 129. *Dasyopsis pilosa* Weber-van Bosse, 1923: 377-378, fig. 137 (lectotype locality: Waru, Seram, Moluccas, Indonesia). Viêt Nam: Dawson, 1954: 451, figs 56f, 57. *Dasya adhaerens* Yamada, 1944: 43-44, pl. 7, fig. 1 (type locality: Ant Atoll, Micronesia). *Eupogodon pilosus* (Weber-van Bosse) P.C. Silva in Silva *et al.*, 1987: 60, 130. *Dasya pilosa* (Weber-van Bosse) A.J.K. Millar, 1990: 433, figs 59D-G. Hawaiian Islands: Abbott, 1999a: 325, fig. 93A-E; French Polynesia: Payri *et al.*, 2000: 264; Indian Ocean: Silva *et al.*, 1996: 437; Fiji: Littler & Littler, 2003: 128.

**Material examined:** off 'Papa Whisky' islet, Punaauia, Tahiti, 05 Oct. 1995, *leg. A. D. R. N'Yeurt & S. Andréfouët*, UPF 439 S53; 10 Nov. 1999, *leg. S. Andréfouët*, UPF 834; Punaauia, Tahiti, 10 Oct. 1995, *leg. A. D. R. N'Yeurt*, UPF 252; Taharaa, Tahiti, 14 Apr.





1997, *leg. A. D. R. N'Yeurt & C. E. Payri*, UPF 253, 567 S181; Punaauia PK16, Tahiti, 10 Jan. 1998, *leg. S. Andréfouët*, UPF 610; Papenoo, Tahiti, 27 Nov. 2005, *leg. A. D. R. N'Yeurt & A. Pham*, UPF 3196.

Thallus to 10 cm high, reddish-brown, rigid but flexible, composed of dichotomously branched, villous axes to 2 mm in diameter, fully corticated and apically tapered. Main axes cartilaginous, naked below, but densely covered above with long monosiphonous filaments 25-30  $\mu\text{m}$  in diameter and 2-4 mm long, imparting a furry appearance to the plant. Pericentral cells 5-8; cortex composed of loosely consolidated, longitudinally aligned thin pigmented cells. Tetrasporangia occur four per segment in lanceolate stichidia to 250  $\mu\text{m}$  long, with sparse involucre around the tetrasporangia.

**Remarks:** Growing solitarily on the reef crest, in crevices and down to 15 m on the outer reef slope. The tortuous taxonomy of this species is discussed in Silva *et al.* (1996) and Wynne (2002).

*Dasya baillouviana* (S.G. Gmelin) Montagne, 1841: 165. French Polynesia: Payri *et al.*, 2000: 260. Gulf of California: Norris & Bucher, 1976: 19; Belize: Littler & Littler, 1997: 55, fig. 62. **(Figs 256-257)**

**Basionym:** *Fucus baillouviana* S.G. Gmelin, 1768: 165 (type locality: Mediterranean Sea).

**Material examined:** Kauehi, 20 Sep. 1995, *leg. J. Orepuller*, UPF 429 S43, 430 S44; Anarua Bay, Rapa, 07 Nov. 2002, *leg. C. E. Payri*, UPF 2049, 3496 RPS 274.

Thallus to 20 mm high, light red to pink, soft and delicate, composed of sparsely alternately branched fully corticated main axes to 300  $\mu\text{m}$  in diameter, with a strongly tapered apex. Secondary branchlets monosiphonous and dichotomously branched, distally tapered and adaxially curved. Tetrasporangia sparsely involucre, in lanceolate stichidia 300-400  $\mu\text{m}$  high borne on the main axes.

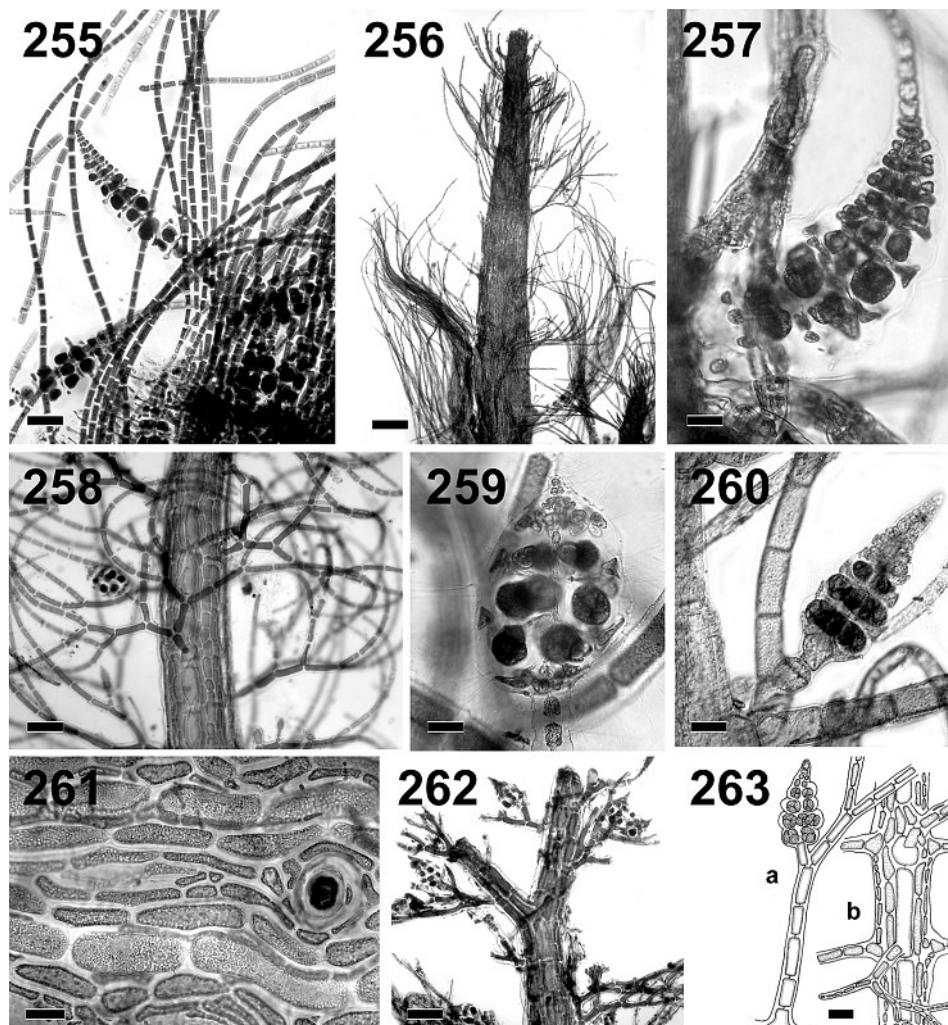
**Remarks:** Growing on coralline surfaces at depths of 10-20 m. The fully corticated main axes bearing tetrasporangial stichidia directly on them are characteristic of this species.

*Dasya iyengarii* Børgesen, 1937: 345, figs 16-17 (type locality: Pamban Bridge, Tamil Nadu, India). French Polynesia: Payri *et al.*, 2000: 262; Marshall Islands: Dawson, 1957a: 123, fig. 22b; Australia: Millar, 1990: 431, fig. 58A-F; Price & Scott 1992: 155, fig. 53A-D; Papua New Guinea: Millar *et al.*, 1999: 569, fig. 5B; Malaysia: Masuda *et al.*, 2003: 243, figs 1-9; Micronesia: Lobban & Tsuda, 2003: 75; Samoa: Skelton & South, 2007: 145, figs 386-391. **(Figs 258-261)**

**Material examined:** Kauehi, 20 Sep. 1995, *leg. J. Orepuller*, UPF 431 S45, 432 S46; Punaauia, Tahiti, 25 Sep. 1995, *leg. A. D. R. N'Yeurt*, UPF 428 S42; Motu Nono, Afaahiti, Tahiti, 08 Jun. 1997, *leg. A. D. R. N'Yeurt*, UPF 251, 550 S164; Hotel Bora Bora Lagoon, Bora Bora, 17 Aug. 2002, *leg. A. D. R. N'Yeurt & D. Schneider*, UPF 2560; Hotel Pearl Beach, Bora Bora, 17 Aug. 2002, *leg. A. D. R. N'Yeurt & D. Schneider*, UPF 2573; Tarakoi Islet, Rapa, 05 Nov. 2002, *leg. C. E. Payri*, UPF 3400 RPS185, 3593; Tupua'i Bay, Rapa, 02 Dec. 2002, *leg. J. L. Menou*, UPF 3268 RPS67.

Thallus to 20 mm high, light pink and plumose, composed of mostly uncorticated, percurrent main axes 150-200  $\mu\text{m}$  in diameter bearing spirally-arranged monosiphonous lateral branchlets. Side branchlets with a prominent basal cell, issued from each axial segment, divaricately branched, with tapered, strongly incurved tips. Tetrasporangia partially covered by sub-triangular involucre cells, in lanceolate stichidia 350-400  $\mu\text{m}$  long.

**Remarks:** Growing as an epiphyte on larger algae (e.g. *Halimeda*) on the reef flats and subtidally at depths of 10-20 m.



Figs 255-263. **255.** *Dasya anastomosans*: detail of lanceolate tetrasporangial stichidia (UPF 3196). Scale = 100  $\mu$ m. **256.** *Dasya baillouviana*: tapered apex of fully corticated main axis (UPF 2049). Scale = 200  $\mu$ m. **257.** *Dasya baillouviana*: tetrasporangial stichidia directly borne on main axis (UPF 2049). Scale = 50  $\mu$ m. **258.** *Dasya iyengarii*: main axis with spirally arranged monisiphonous branchlets (UPF 3268). Scale = 100  $\mu$ m. **259.** *Dasya iyengarii*: young tetrasporangial stichidia (UPF 3268). Scale = 30  $\mu$ m. **260.** *Dasya iyengarii*: mature tetrasporangial stichidia (UPF 428). Scale = 50  $\mu$ m. **261.** *Dasya iyengarii*: surface view of cortical cells (UPF 2049). Scale = 50  $\mu$ m. **262.** *Dasya mollis*: habit showing ill-defined main axis (UPF 2447). Scale = 100  $\mu$ m. **263.** *Dasya mollis*: camera-lucida drawing showing (a) tetrasporangial stichidia lacking involucre and (b) main axis cortication (UPF 433). Scale = 100  $\mu$ m.

*Dasya mollis* Harvey, 1853: 62 (type locality: Key West, Florida, U.S.A). French Polynesia: Payri *et al.*, 2000: 262. Marshall Islands: Dawson, 1957a: 123, fig. 29a; Belize: Littler & Littler, 1997: 57, fig. 64; Fiji: Littler & Littler, 2003: 126.

(Figs 262-265)

**Material examined:** Kauehi, 20 Sep. 1995, *leg. J. Orempuller*, UPF 433 S47, 434 S48; Tupua'i Bay, Rapa, 02 Dec. 2002, *leg. J. L. Menou*, UPF 2447, 3501 RPS279, 3524 RPS302.

Thallus to 40 mm high, light pink, delicate and plumose, composed of irregularly branched, moderately corticated, distally tapering and ill-defined main axes 300-900 µm in diameter. Axes covered with distally tapered, dichotomously branched whorled filamentous branchlets 30-40 µm in diameter and 1.3-1.6 mm long. Tetrasporangia occur in subcylindrical to fusiform stichidia to 300 µm long, lacking any involucre covering. Spermatangia in brush-like clusters in subapical regions of spermatangial branchlets transformed from pseudolaterals.

**Remarks:** Growing on coralline surfaces to depths of 20 m.

\**Dasya murrayana* I.A. Abbott *et* A.J.K. Millar *in* Abbott, 1998: 107-108, figs 23-26 (type locality: Kaua'i, Hawaiian Islands). Abbott, 1999a: 325, fig. 92D-G.

(Fig. 266)

**Material examined:** Mac Donald Bank, Australs, 04 Nov. 2002, *leg. I. R. D.*, UPF 3429 RPS207, 3430 RPS208, 3431 RPS209; Tarakoi islet, Rapa, 05 Nov. 2002, *leg. C. E. Payri*, UPF 3360 RPS146, 3367 RPS152, 3580.

Thallus 15-20 mm high, rigid and brownish-red in colour, erect from a discoid basal holdfast. Axes 250-350 µm in diameter, distally tapering and irregularly branched, fully corticated with irregularly shaped elongated cells. Pericentral cells 5; pseudolaterals bristle-like, subdichotomously branched, in clearly spaced, upwardly curved short whorls 1.5-2 mm long. Tetrasporangia 50-55 µm in diameter, in distally attenuated stichidia on proximal dichotomies of laterals.

**Remarks:** Growing at depths of 15-80 m; so far in French Polynesia only reported from the southern Australs. The erect habit, fully corticated axes and distinctly spaced-out, upwardly curved, bristle-like pseudolaterals are characteristic of this species.

\**Dasya palmatifida* (Weber-van Bosse) A.J.K. Millar *et* Coppejans, 2000: 329.

(Figs 271-277)

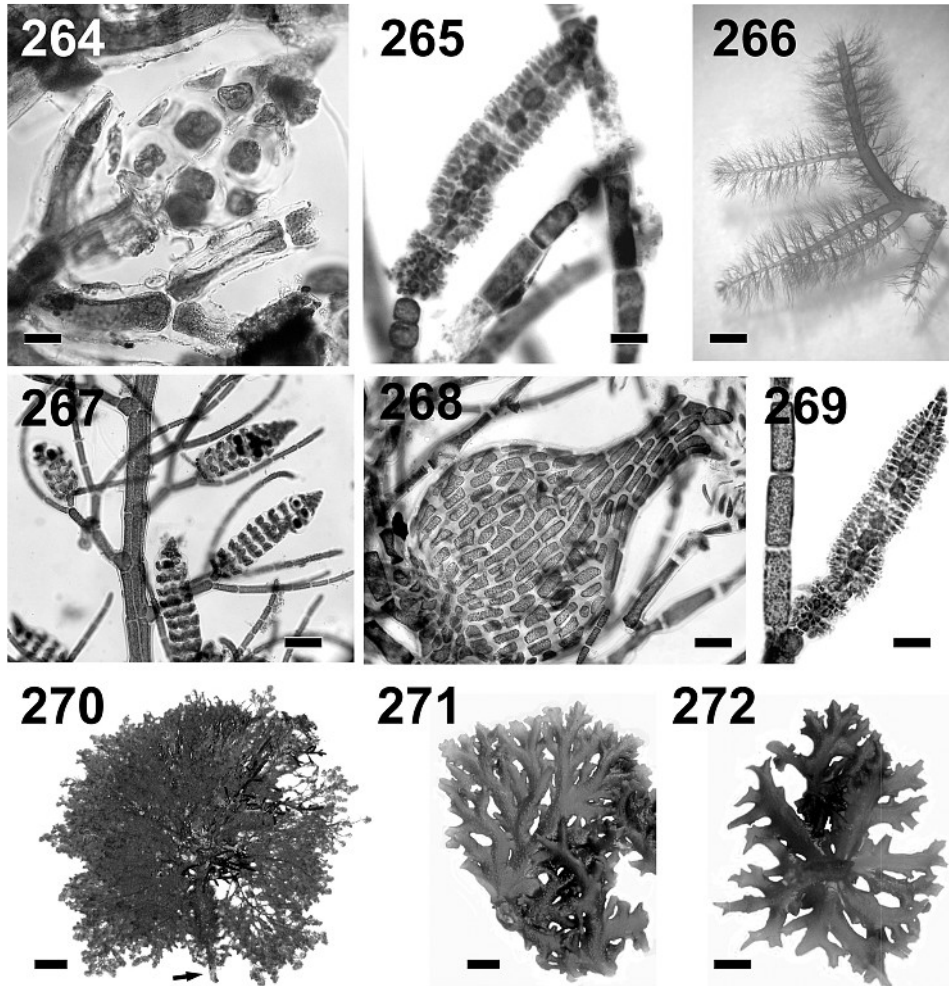
**Basionym:** *Dasyopsis palmatifida* Weber-van Bosse, 1913: 130, pl. 13 fig. 21 (syntype localities: Amirante Islands and Coetivy Reef, Seychelles; Salomon Island, Chagos Archipelago); Indonesia: Weber-van Bosse, 1923: 378, pl. 7 fig. 4.

**Homotypic synonyms:** *Eupogodon palmatifidus* (Weber-van Bosse) P.C. Silva *in* Silva *et al.*, 1987: 130; 1996: 439. (Papua New Guinea, *In Herb.* GENT).

**Heterotypic synonyms:** *Dasyopsis geppii* Weber-van Bosse, 1913: 130, pl. 13 figs 18-20; pl. 14 fig. 33 (syntype localities: Amirante Islands and Coetivy Reef, Seychelles; Salomon Island, Chagos Archipelago; Cargados Carajos Shoal, Mauritius); Marshall Islands: Dawson, 1957a: 123, fig. 29b. *Eupogodon geppii* (Weber-van Bosse) P.C. Silva *in* Silva *et al.*, 1987: 130; 1996: 439 (Philippines).

**Misapplied name:** *Exophyllum wentii* Weber-van Bosse; Hawaii: Hollenberg, 1968d: 81, figs 6-7; Abbott, 1999a: 363, fig. 105 D-H; French Polynesia: Payri *et al.*, 2000: 278; Samoa: Skelton & South, 2002a: 155, fig. 16C; 2007: 147, figs 392-397.

**Material examined:** Coetivy Reef, Seychelles, n.d. *leg. J. S. Gardiner* (slides of Isotypes from the Weber-van Bosse slide collection in L); Landu Bay, Roti Island, Lesser Sunda Islands, Timor, Indonesia, n.d. *leg. A. Weber-van Bosse* (L 938.7-400, spermatangial, Epitype); Waikiki, Hawaii: 1 Dec. 1954, *leg. J. Newhouse* (BISH 474629, spirit, spermatangial); Rigili Island, Eniwetok Atoll, Marshall Islands 2 September 1955, *leg. E. Y. Dawson* (EYD 14007, BISH 497764, pressed cystocarpic); Aniyaanii Island, Eniwetok Atoll, Marshall Islands 22 August 1955, *leg. E. Y. Dawson* (EYD 13728, BISH 498015 pressed + liquid preserved, spermatangial); Massa Island, Papua New Guinea, 24 June 1988, *leg. E. Coppejans*, GENT HEC 7573; Afaahiti, Tahiti, 7 Jun. 1997, *leg. A. D. R. N'Yeurt* (UPF 379, 380, 381, 712L); 10 Jun. 1997, *leg. A. D. R. N'Yeurt* (UPF 713L tetrasporic); 21 Feb. 1998, *leg. A. D. R.*



Figs 264-272. **264.** *Dasya mollis*: tetrasporangial stichidia (UPF 2447). Scale = 30  $\mu$ m. **265.** *Dasya mollis*: spermatangial stichidia (UPF 2447). Scale = 20  $\mu$ m. **266.** *Dasya murrayana*: habit of freshly-collected plant (UPF 3580). Scale = 1 mm. **267.** *Heterosiphonia crispella*: habit of tetrasporangial plant (UPF 3451). Scale = 200  $\mu$ m. **268.** *Heterosiphonia crispella*: urceolate cystocarp (UPF 3387). Scale = 20  $\mu$ m. **269.** *Heterosiphonia crispella*: spermatangial stichidia (UPF 3203). Scale = 20  $\mu$ m. **270.** *Heterosiphonia gibbesii*: habit of pressed plant, showing base of main axis (arrow) (UPF 679). Scale = 5 mm. **271.** *Dasya palmatifida*: habit of freshly-collected plant, ventral side (UPF 712b). Scale = 4 mm. **272.** *Dasya palmatifida*: habit of juvenile plant, ventral side (UPF 712a). Scale = 3 mm.

*N'Yeurt* (UPF 710L, UPF 711L); 23 May 2002, leg. A. D. R. *N'Yeurt* (UPF 3971L, cystocarpic); Namada, Viti Levu, Fiji, 14 Mar. 1998, leg. P. A. Skelton and G. R. South (SUVA-A 5478L, spermatangial); Palolo Deep, Samoa, 18 Sep. 1998, leg. P. A. Skelton (SUVA-A 5477L, spermatangial); Vaha'a'utu Pt., Wallis Island, 29 May 2002, leg. A.D.R. *N'Yeurt*, C.E. Payri & H. Verbruggen (UPF 1652); Pearl Reef, Fiji, 26 May 2007, leg. C. E. Payri (FJ07-897, IRD 2518, cystocarpic).





Thallus fleshy, 6-7 cm across and 2.5-3 mm thick, dorsiventral and procumbent, with an iridescent mottled dorsal surface and a keeled, slightly papillate median undersurface, adhering closely to the substratum via one to few thick ventral peg-like holdfasts. Branching cellulosympodial and imbricating, bilateral, growing congenitally into a leaf-like, somewhat palmatifid thallus with broadly dentate inwardly curved margins. Secondary hapteroid attachments to the substratum also occur via subterete apical portions of branches. Medulla composed of large, clear pigmented stellate cells 20-30  $\mu\text{m}$  in diameter surrounded by 2 to 3 layers of smaller, oblong and densely pigmented, usually exserted cortical cells 3-5  $\mu\text{m}$  in diameter. Occasional short hair cells with a bulbous base are present in the outer cortex. Axial cell 33-34  $\mu\text{m}$  in diameter, fusiform with 5-6 pericentral cells. Apical monosiphonous pseudolaterals pigmented, unbranched or basally subdichotomously branched, to 1 mm long and 14  $\mu\text{m}$  in diameter, composed of up to 20 cells. Subdichotomies of pseudolaterals with the basal wall of the two branch cells and the upper wall of the subtending cell or segment closely adhering in an inverse Y-shaped junction.

Reproductive bodies occur in discrete patches on the ventral and dorsal surface of the thallus, usually in a lateral position close to branch tips. Tetrasporangial stichidia are 255-425  $\mu\text{m}$  long and 125-150  $\mu\text{m}$  broad, usually rectilinear with a monosiphonous one- or two-celled pedicel. Tetrasporangia are 25-46  $\mu\text{m}$  in diameter, in whorls of 4 to 6, with one or two postsporangial cover cells per sporangium. Spermatangial heads cylindrical, to 450  $\mu\text{m}$  long and 115  $\mu\text{m}$  in diameter with 4 pericentral cells, terminal on subapical pseudolaterals, usually broadly curved with a blunt apex and sterile extension. Cystocarps are globose when young and gnarled, wart-like (1.2-1.6 mm in diameter) when mature, rectilinear on a distally tapered, prominently thick polysiphonous pedicel 0.6-3 mm in diameter and 0.6-2.4 mm long, occurring on branch surfaces and laterally, but not terminally. In some cases the pedicels are branched once, bearing two cystocarps. The ostiole is very small and only clearly noticeable in young cystocarps, with the narrow opening lined by a single row of kidney-shaped modified cortical cells. The mature pericarp has a gnarled surface appearance, and is 166-177  $\mu\text{m}$  thick and composed of a surface layer of small pigmented cells and 7-8 layers of secondarily pit-connected, stellate cells. Gonimoblast outwardly directed, with a basal fusion cell about 45  $\mu\text{m}$  long and 20  $\mu\text{m}$  in diameter. Carposporangia terminal and lateral, 11-26  $\mu\text{m}$  wide and 53-80  $\mu\text{m}$  long.

**Remarks:** Growing in shallow subtidal (0.5-1.0 m depths) heavily exposed habitats, on fringing reefs. Tahitian plants was found in a high-energy passage on a fringing reef with moderate to strong current, in association with *Sargassum* beds. The cryptic, mottled appearance of the dorsal surface of the thalli make them easily overlooked as they adhere tightly to the substratum. Individual plants are strongly imbricating and form secondary connections with the substratum and other plants via long or short strap-like haptera. Reproductive material was found at the onset of the cooler months (May, June). This species was previously misidentified in the tropical Pacific as *Exophyllum wentii* Weber-van Bosse (Indy *et al.*, 2006). Morphologically, the female structures of *D. palmatifida* fall well within the characters of the Dasyaceae (as defined in Womersley, 1998: 423) with the presence of a fusion cell, and basipetal development of terminal, single carposporangia on monopodial gonimoblast filaments, but are unique with respect to the gnarled, non-urceolate, prominently pedicellate cystocarps with a small ostiole. According to the *rbcL* molecular data and phylogenetic trees of N'Yeurt & Payri (unpublished), *D. palmatifida* clearly belongs in the Dasyaceae *sensu stricto* clade as defined by Choi *et al.* (2002), but stands out on a relatively long branch,



separate from the genera *Dasya* and *Eupogodon*. While there are not many *Dasya* rbcL sequences available to date, the use of those available (and new ones in progress) may be conclusive enough. Coppejans & Millar (2000) proposed that *Dasyopsis geppii* should be placed in the genus *Dasya* based on the radial organization of the apical region, but N'Yeurt & Payri (in prep) examined Dawson's material and the original Sealark Expedition Indian Ocean type material of *Dasyopsis geppii* and *D. palmatifida*, and found them to be morphologically distinct.

### *Heterosiphonia* Montagne

#### Key to the French Polynesian species of *Heterosiphonia*

- 1a. Thallus 3-6 cm high, bushy with blunt, short side branchlets. . . . . *H. gibbesii*  
 1b. Thallus less than 2 cm high, lax with long, pointed side branchlets . . . . .  
 . . . . . *H. crispella* var. *laxa*

***Heterosiphonia crispella*** (C. Agardh) M.J. Wynne var. *laxa* (Børgesen) M.J. Wynne, 1985b: 87. French Polynesia: Payri *et al.*, 2000: 266; Australia: Price & Scott, 1992: 161, fig. 56A-D; Maldives: Wynne, 1993: 15; Namibia: Lluh & Garreta, 1993: 468, fig. 4a-c; Antilles: Bucher & Norris, 1995: 18; Rotuma: N'Yeurt, 1996: 425, figs 175, 181; Malaysia: Yamagishi *et al.*, 2003: 540, figs 14-23.

(Figs 267-269)

**Basionym:** *Heterosiphonia wurdemannii* (J. Bailey ex Harvey) var. *laxa* Børgesen, 1919: 327, figs. 327, 328 (type locality: St. Croix, Virgin Islands). India: Børgesen, 1934: 29; Iran: Børgesen, 1939: 132, fig. 43; Bikini Atoll: Taylor, 1950: 140; Marshall Islands: Dawson, 1956: 57, fig. 60; 1957a: 124; Pacific Mexico: Dawson, 1963: 404, pl. 129(4), fig. 1; Solomon Islands: Womersley & Bailey, 1970: 329.

**Material examined:** Kauehi, 20 Sep. 1995, *leg. J. Orepuller*, UPF 458 S72; Punaauia, Tahiti, 20 Oct. 1995, *leg. A. D. R. N'Yeurt*, UPF 457 S71; Motu aux Oiseaux, Tikehau, 05 Nov. 1995, *leg. A. D. R. N'Yeurt*, UPF 459 S73; Vairao, Tahiti, 20 Mar. 1998, *leg. J. Orepuller*, UPF 594; Rikitea, Mangareva, Gambier, 20 Nov. 2000, *leg. A. D. R. N'Yeurt*, UPF 860; Tematapi Point, Rapa, 01 Nov. 2002, *leg. J. L. Menou*, UPF 3451 RPS229, 3627; Tauna Islet, Rapa, *leg. C. E. Payri*, 04 Nov. 2002, UPF 3387 RPS172, 3389 RPS174; Iri Bay, Rapa, 16 Nov. 2002, *leg. J. L. Menou*, UPF 3259 RPS 60; 27 Nov. 2002, UPF 2390, 3330 RPS117; Rukuaga Point, Rapa, 30 Nov. 2002, *leg. J. L. Menou*, UPF 3203 RPS7.

Thallus to 30 mm high, forming bright-red, tangled fluffy masses composed of irregularly dichotomously branched, non-corticated polysiphonous axes to 170 µm in diameter. Pericentral cells 4; secondary branchlets 4 to 7 times dichotomously branched, distally monosiphonous, occurring on every second segment. Tetrasporangia occur in fusiform stichidia to 250 µm high, at the end of the side branchlets. Cystocarps urceolate, with a long, narrow beaked ostiole.

**Remarks:** Growing as an epiphyte on coralline surfaces and larger algae such as *Halimeda* spp.

***Heterosiphonia gibbesii*** (Harvey) Falkenberg, 1901: 653. French Polynesia: Payri *et al.*, 2000: 266. Antilles: Bucher & Norris, 1995: 18; Caribbean: Littler & Littler, 2000: 180. (Fig. 270)

**Basionym:** *Dasya gibbesii* Harvey, 1853: 59, pl. 15A (type locality: Caribbean).

**Material examined:** Taharaa, Tahiti, 30 Mar. 1998, *leg. A. D. R.*, UPF 679; Motu Totegegie, Gambier, 22. Nov. 2000, *leg. A. D. R. N'Yeurt*, UPF 828, 928.

Thallus to 60 mm high, dark red to maroon, bushy and soft with plumose axes. Main axes percurrent, alternately branched, 1-1.5 mm in diameter. Branching



sparse in lower portions, becoming very dense distally. Side branchlets short and knobby, distally uniseriate, with blunt, incurved divaricate ends. Pericentral cells 6-10; axes corticated in lower portions of thallus. Tetrasporangial stichidia lanceolate, on lower parts of main axes.

**Remarks:** Epiphytic on *Laurencia flexilis* on the exposed reef crest or on concrete jetties, in the Society and Gambier groups. The French Polynesian record of this predominantly Caribbean species is apparently the first for the Pacific Ocean. The large 'pompom-like' bushy habit and short, knobby secondary branchlets are characteristic for this species. The French Polynesian plants are smaller and more densely branched, with shorter pseudolaterals than their Caribbean counterparts, and would merit closer comparative examination.

#### Rhodomelaceae Areschoug

#### *Acanthophora* J.V. Lamouroux

#### Key to the French Polynesian species of *Acanthophora*

- 1a. Thallus flattened and decumbent . . . . . *A. pacifica*  
1b. Thallus terete and erect . . . . . *A. spicifera*

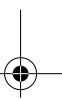
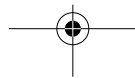
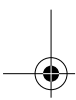
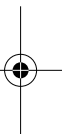
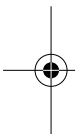
*Acanthophora pacifica* (Setchell) Kraft, 1979: 128, figs 1-6, 18-24. French Polynesia: Payri *et al.*, 2000: 268; De Jong *et al.*, 1999: 229; Hawaiian Islands: Abbott, 1999a: 353, fig. 102A-C; Fiji: N'Yeurt, 2001: 833, figs 293-299; Littler & Littler, 2003: 142; Samoa: Skelton & South, 2007: 170, figs 455-458. **(Figs 278-280)**

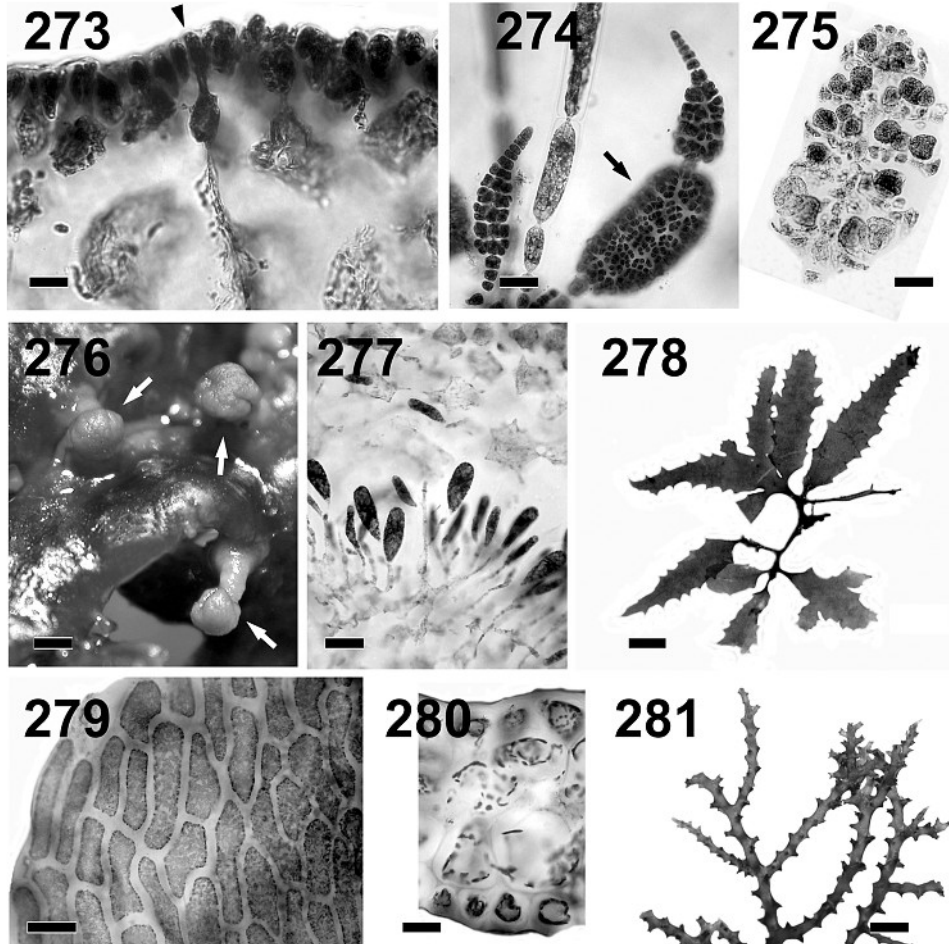
**Basionym:** *Cladhymenia pacifica* Setchell, 1926: 102, pl. 22 figs 3-4 (type locality: Arue Point, Tahiti).

**Material examined:** Tiahura, Moorea, 12 Dec. 1995, *leg. A. D. R. N'Yeurt*, UPF 220; Nuku-Hiva, Marquesas, 1997, *leg. J. Orempuller*, UPF 577; Rapa, 18 Nov. 2002, *leg. M. Adjeroud*, UPF 3246 RPS50, 3535.

Thallus 35-50 mm high, iridescent purplish-red to reddish-brown, composed of a proximally subterete, stoloniferous basal region 1-3 mm in diameter giving rise to flattened, lanceolate and iridescent blades 1-4 mm wide and 200-500 µm thick, with dentate margins and blade surfaces, and curved, filiform to pyramidal apices. Second-order branchlets 1-2 mm long, pinnately to subdichotomously branched, with dentate margins. Blades closely adherent to the substratum, with branch tips often making contact and fusing with adjacent thalli. Primary axial row 84-105 µm in diameter, surrounded by 5 pericentral cells 52-63 µm in diameter and a mixture of medullary and subcortical cells, with a single cortical layer of subrectangular to cuneate cells 11-20 × 31-42 µm. The walls of most inner cells except the cortical cells are more or less evenly thickened with refractive material. Tetrasporangia 80-100 µm in diameter, in whorls, in terete, spinulose stichidia located on secondary branchlets. Other reproductive stages not seen in French Polynesian plants.

**Remarks:** Growing on rocky and coralline surfaces at depths of 1-20 m on the reef crest and outer reef slope of high islands, widely distributed from the Marquesas to the Southern Australs. Kraft (1979) transferred this species from the genus *Cladhymenia* to *Acanthophora*, based on the radial branching of the main axes and the presence of adaxial, spinulous reproductive structures. More recently, De Jong *et al.* (1999: 229) suggested that the abaxial origin of the spines in this species, the only flattened member of the genus, is not comparable to other *Acanthophora* species, and is more like that which occurs in the genus *Chondria*. The presence of five pericentral cells in both *A. pacifica* and *Chondria*





Figs 273-281. **273.** *Dasya palmatifida*: transverse section of thallus (UPF 3971), showing cortical hair with a bulbous base (arrowhead). Scale = 5  $\mu$ m. **274.** *Dasya palmatifida*: spermatangial clusters (arrowhead) terminal on subapical pseudolaterals (UPF 712c). Note monosiphonous sterile extension. Scale = 100  $\mu$ m. **275.** *Dasya palmatifida*: tetrasporangial stichidia, showing up to six whorled tetrasporangia and monosiphonous pedicel (UPF 713d). Scale = 50  $\mu$ m. **276.** *Dasya palmatifida*: marginal cluster of mature, pedicellate cystocarps (arrows) (UPF 3971). Scale = 1 mm. **277.** *Dasya palmatifida*: detail of elongate, single carposporangia terminal on monopodially branched gonimoblast filaments (UPF 3971). Scale = 20  $\mu$ m. **278.** *Acanthophora pacifica*: habit of pressed plant (UPF 220). Scale = 3 mm. **279.** *Acanthophora pacifica*: surface view of cortical cells (UPF 4009). Scale = 50  $\mu$ m. **280.** *Acanthophora pacifica*: transverse section of thallus (UPF 4009) showing clear medullary and pigmented cortical cells. Scale = 20  $\mu$ m. **281.** *Acanthophora spicifera*: habit of freshly-collected plant from Bora Bora (UPF 2561). Scale = 5 mm.

species, as well as morphological similarities with such flattened species as *C. dangeardii* E.Y. Dawson, would tend to support this view. Molecular studies in the Rhodomelaceae could elucidate more firmly the generic affinities of *A. pacifica*.



***Acanthophora spicifera*** (Vahl) Børgesen, 1910: 201, figs 18A-C; 19A-E. French Polynesia: Payri *et al.*, 2000: 270; Viêt Nam: Dawson, 1954: 456, fig. 61a-b; Indian Ocean: Silva *et al.*, 1996: 470; Belize: Littler & Littler, 1997: 59, fig. 67; De Jong *et al.*, 1999: 231, figs 3, 33-39, 46; Hawaiian Islands: Abbott, 1999a: 355, fig. 102D-E; Fiji: South, 1993: 345; N'Yeurt, 2001: 835, fig. 284; Samoa: Skelton & South, 2002a: 153, figs 16A, 17A; 2007: 170, figs 459, 781; Solomon Islands: Littler & Littler, 2003: 142. **(Fig. 281)**

**Basionym:** *Fucus spicifer* Vahl, 1802: 44 ('*spicifera*') (type locality: St Croix, Virgin Is).

**Material examined:** Tiahura, Moorea, 13 Jun. 1984, *leg. C. E. Payri*, UPF 2784, 2799, 2876; Punaauia, Tahiti, 10 Oct. 1995, *leg. A. D. R. N'Yeurt*, UPF 221; Hotel Beachcomber, Faa'a, Tahiti, 13 Apr. 1997, *leg. A. D. R. N'Yeurt*, UPF 222; Hotel Bora Bora Lagoon, Bora Bora, 17 Aug. 2002, *leg. A. D. R. N'Yeurt & D. Schneider*, UPF 2561; Passe Miri Miri, Raiatea, *leg. C. E. Payri*, UPF 3947; Atimaono, Mataia, Tahiti, 11 Nov. 2004, *leg. A. D. R. N'Yeurt*, UPF 3122; Taharaa, Tahiti, 27 Nov. 2005, *leg. A. D. R. N'Yeurt & A. Pham*, UPF 3019, 3153.

Thallus to 15 cm high, light pink to yellowish-white, consisting of several brittle, erect cylindrical axes 0.6-3 mm in diameter issued from a large lobed basal disk. Main axes smooth or very sparingly covered with few spines; branching irregular to radial, with upper parts of branches spirally covered with spinulose ramuli. Branches not basally constricted, apices acute, often with dichotomously branched trichoblasts. Pericentral cells 5, surrounded by progressively smaller cortical cells. Outer cortical cells elongate, fibre-like. Cystocarps near the basal portions of spinulose branchlets; tetrasporangia 70-75 µm in diameter, in linear rows, in spinulose branchlets. Spermatangial plates borne on apical trichoblasts.

**Remarks:** Commonly found growing attached to coral rubbles, pebbles and other hard substrata in the lagoon and estuaries of the Society Group. *Acanthophora spicifera* is distinguished from other terete members of the genus by its mostly smooth, spineless main axes. This is an edible species, being eaten raw or cooked in other parts of the Pacific (South, 1993; Novaczek, 2001) but not reported as being consumed in French Polynesia.

***Amansia*** J.V. Lamouroux

***Amansia rhodantha*** (Harvey) J. Agardh, 1841: 26. French Polynesia: Payri *et al.*, 2000: 282; Indian Ocean: Silva *et al.*, 1996: 473; Malaysia: Masuda *et al.*, 2000: 188, figs 37-42; Fiji: N'Yeurt, 2001: 840, fig. 334a-b; Littler & Littler, 2003: 144.

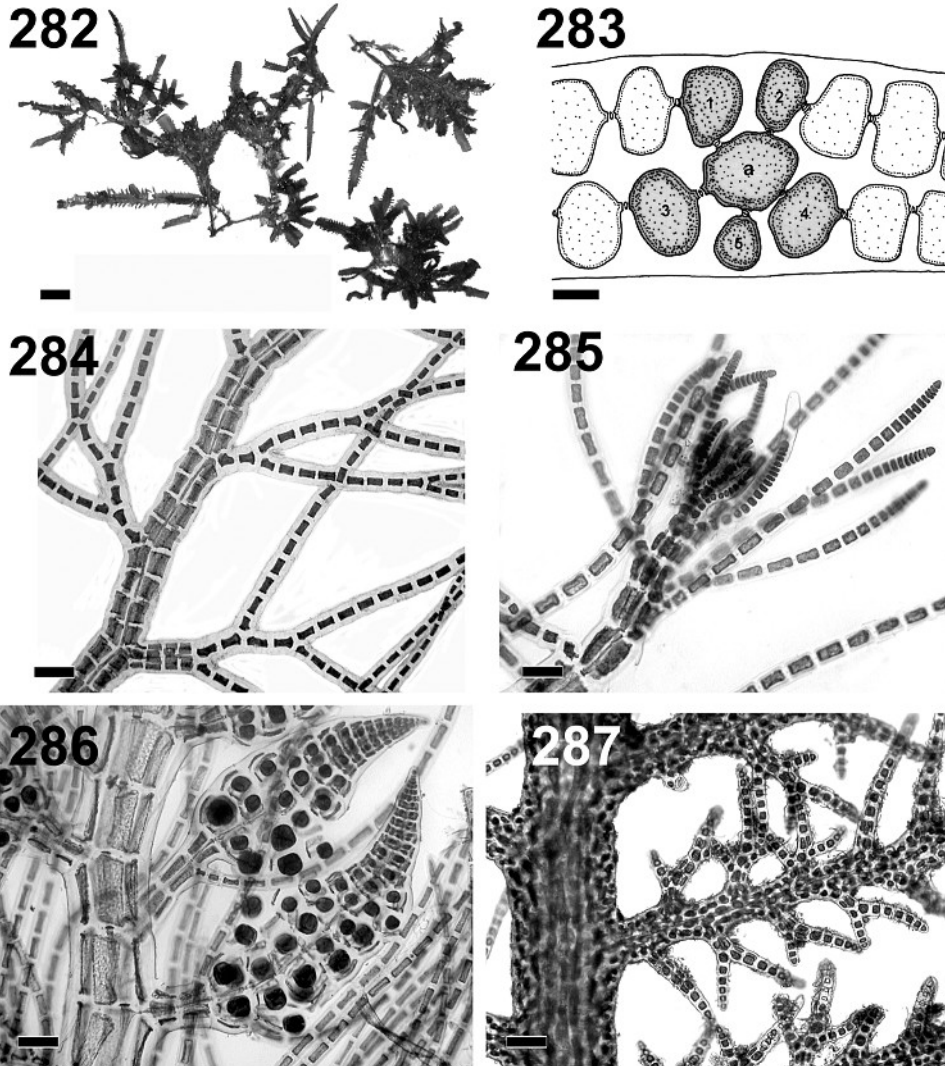
**(Figs 282-283)**

**Basionym:** *Delesseria rhodantha* Harvey, 1834: 151, 152, pl. CXXVI (type locality: Cap Malheureux, Mauritius).

**Heterotypic synonym** (according to N'Yeurt, 2002): *Amansia paloloensis* South *et* Skelton, 1999: 247, figs 2-14 (Type locality: Palolo Deep Marine Reserve, Apia, Samoa).

**Misapplied names:** *Amansia glomerata* C. Agardh, 1824: 194. Solomon Islands: Womersley & Bailey, 1970: 336; Samoa: Skelton & South, 2007: 166, figs 447-450. *Melanamansia glomerata* (C. Agardh) R.E. Norris, 1995: 67. Rotuma: N'Yeurt, 1996: 428, figs 127, 128, 185, 197, 198.

**Material examined:** Moorea, Aug. 1984, *leg. C. E. Payri*, EPHE 8-84; Tiahura, Moorea, 13 Dec. 1995, *leg. A. D. R. N'Yeurt*, UPF 348; Taharaa, Tahiti, 06 Jun. 1997, *leg. A. D. R. N'Yeurt*, UPF 347; Punaauia, Tahiti, 19 Mar. 1998, *leg. C. E. Payri*, UPF 583, 584; Punaauia PK 18, Tahiti, 02 Dec. 2000, *leg. A. D. R. N'Yeurt*, UPF 825, 826; Tiahura, Moorea, *leg. A. D. R. N'Yeurt & A. Pham*, 28 Sep. 2004, UPF 2939, 01 Oct. 2004, UPF 3057; Punaauia PK 18, 09 Oct. 2004, *leg. A. D. R. N'Yeurt & V. Pouira*, UPF 3125.



Figs 282-287. **282.** *Amansia rhodantha*: habit of pressed plant (UPF 584). Scale = 10 mm. **283.** *Amansia rhodantha*: transverse section showing axial cell (a) surrounded by five pericentral cells (1-5) (EPHE 8-84). Scale = 20  $\mu$ m. **284.** *Bostrychia moritziana*: habit of alternately branched main axis (UPF 3243). Scale = 100  $\mu$ m. **285.** *Bostrychia moritziana*: detail of apical region (UPF 3243). Scale = 100  $\mu$ m. **286.** *Bostrychia moritziana*: tetrasporangial stichidia (UPF 2608). Scale = 40  $\mu$ m. **287.** *Bostrychia tenella*: habit showing finely corticated main axis (UPF 3242). Scale = 50  $\mu$ m.

Thallus to 10 cm across, forming deep-red leafy rosettes. Blades crisped and lanceolate, up to 35 mm long and 6 mm wide, with serrated edges, a distinct midrib and characteristically inrolled tips. Main axis irregularly branched, stem-like and rigid in basal portions, to 0.8 mm in diameter. Central axial cell surrounded by five pericentral cells. Tetrasporangia occurring in curved,



trichotomously branched stichidia to 340 µm long borne marginally on the blades.

**Remarks:** Plant locally abundant, growing in the lagoon close to the reef crest, and on coral debris on the outer reef slope to depths of 15 m in the Society group. The taxonomic issues surrounding this species, and its relationship to the genus *Melanamansia* R.E. Norris (1988), were discussed in detail by N'Yeurt (2002) and Womersley (2003: 392). Womersley (2003) reported that the presence or absence of pseudopericentral cells, the main character used by Norris (1988) in segregating the genus *Melanamansia* from *Amansia*, was a variable feature in the type species of *Amansia*, *A. multifida* Lamouroux, and hence not supportive of the segregation of both genera. We prefer however, based on our opinion and that of Masuda *et al.* (2000) after looking at a suite of significant habit, anatomical and biochemical differences (including the consistent presence of pseudopericentral cells, ultimate branch size, thickness and morphology, colouration, branching of the tetrasporangial stichidia, and staining of the paper when dried), to maintain *Melanamansia glomerata* distinct from *A. rhodantha* until the availability of definitive molecular evidence resolve the generic status of these entities. This however, does not exclude the fact that other species previously assigned to *Melanamansia* on the basis of the presence or absence of pseudopericentral cells alone could well belong to *Amansia*. N'Yeurt (2002: 232, fig. 3) examined the Hawaiian lectotype specimen of *Amansia glomerata* C. Agardh, and found it to belong in the genus *Melanamansia*. To date, *Melanamansia* has not been found to occur in French Polynesia, although it is reported from as far away as Kenya, the Philippines, Vietnam, and co-exists with *A. rhodantha* populations in New Caledonia (N'Yeurt, 2002).

***Bostrychia* Montagne**

**Key to the French Polynesian species of *Bostrychia***

- 1a. Main axes wide and finely corticated, 130-250 µm in diameter; secondary branchlets plurisiphonous, tapered and short; branching up to three orders . . . . . *B. tenella*
- 2b. Main axes slender and ecorticate, 110-130 µm in diameter; secondary axes monosiphonous, long; branching to two orders . . . . . *B. moritziana*

\****Bostrychia moritziana*** (Sonder ex Kützing) J. Agardh, 1863: 862-863; Australia, New Caledonia, New Zealand, Tonga: King & Puttock, 1989: 29, figs 1a, 13a-e, 14a-b; Guatemala: Pedroche *et al.*; 1995: 112, fig. 2; Indian Ocean: Silva *et al.*, 1996: 474; Fiji, New Caledonia: Zuccarello *et al.*, 1999: 237, table 1. **(Figs 284-286)**

**Basionym:** *Polysiphonia moritziana* Sonder ex Kützing, 1849: 838 (syntype localities: Antilles; West Indies; French Guiana; Venezuela).

**Heterotypic synonyms** (according to King & Puttock, 1989): *Polysiphonia pauperula* Kützing (type locality: New Caledonia). *Bostrychia wardii* Harvey ex J. Agardh (type locality: Tonga).

**Material examined:** Rapa, 18 Nov. 2002, *leg. M. Adjeroud*, UPF 3243 RPS46; 3531; Tupua'i Bay Rapa, Australs, 02 Dec. 2002, *leg. J. L. Menou*, UPF 2445; Te Pari, Punaauia PK 12, Tahiti, 26 Oct. 2003, *leg. A. D. R. N'Yeurt*, UPF 2608, S189 (tetrasporic).

Thallus slender and forming prostrate mats, 5-20 mm high, ecorticate throughout. Main axes 120-130 µm in diameter, alternately branched up to 2 orders, with monosiphonous lateral branchlets 10-12 µm in diameter. Pericentral cells 4-6 in basal axes, 4-5 in upper fertile regions. Segments 60-80 µm long in main



axes, 30-40 µm long in monosiphonous branchlets. Tetrasporangial stichidia subapical to intercalary, 400-600 µm long and 180-210 µm in diameter. Tetrasporangia 30-50 µm in diameter.

**Remarks:** Growing from water-level to depths of 8 m, on coral debris or on the walls of rocky outcrops or shallow submarine caves. In French Polynesia, found on the island of Tahiti and the southern Austral island of Rapa. Interestingly, the genus *Bostrychia* has not been reported from the Hawaiian Islands to the north of French Polynesia, despite strong similarities in other components of both floras.

\**Bostrychia tenella* (J.V. Lamouroux) J. Agardh, 1863: 869; Falkenberg, 1901: 515, pl. 12, figs 10-13; Fiji: Kapraun & Bowden, 1978: 201, pl. 1 fig. 6, pl. 2 fig. 11; N'Yeurt, 2001: 840; Somalia: Sartoni, 1986: 373, fig. 8E; Australia, Palau, Solomon Islands, New Caledonia, Tonga: King & Puttock, 1989: 34; Indian Ocean: Silva *et al.*, 1996: 475; Rotuma: N'Yeurt, 1996: 429, figs 129, 186; Belize: Littler & Littler, 1997: 59, fig. 68; Samoa: Skelton & South, 2007: 169, figs 451-454. **(Figs 287-288)**

**Basionym:** *Plocamium tenellum* J.V. Lamouroux, 1813: 138 (type locality: St. Croix, Virgin Islands).

**Material examined:** Rapa, Australs, 18 Nov. 2002, *leg. M. Adjeroud*, UPF 3242 RPS46, 3530; Tupua'i Bay, Rapa, Australs, 02 Dec. 2002, *leg. J. L. Menou*, UPF 2734.

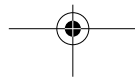
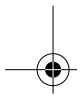
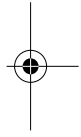
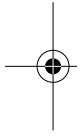
Thallus 5-10 mm high, prostrate with a dense network of lateral branchlets; main axis wide and percurrent, finely corticated throughout, 120-250 µm in diameter. Cortical cells irregularly ovoid, 5-10 µm in diameter. Branching alternate up to 3 orders; second-order branchlets 30-60 µm in diameter and 400-900 µm long, apically tapered, bearing short, mostly uncorticated third-order branchlets 10-20 µm in diameter and 30-150 µm long. Individual cells of ultimate branchlets about 10 µm in diameter. Reproductive structures not seen.

**Remarks:** Growing on the wall of a submarine cave, mixed with *Bostrychia moritziana*. The densely corticated axes and alternate branching up to three orders of this species is characteristic.

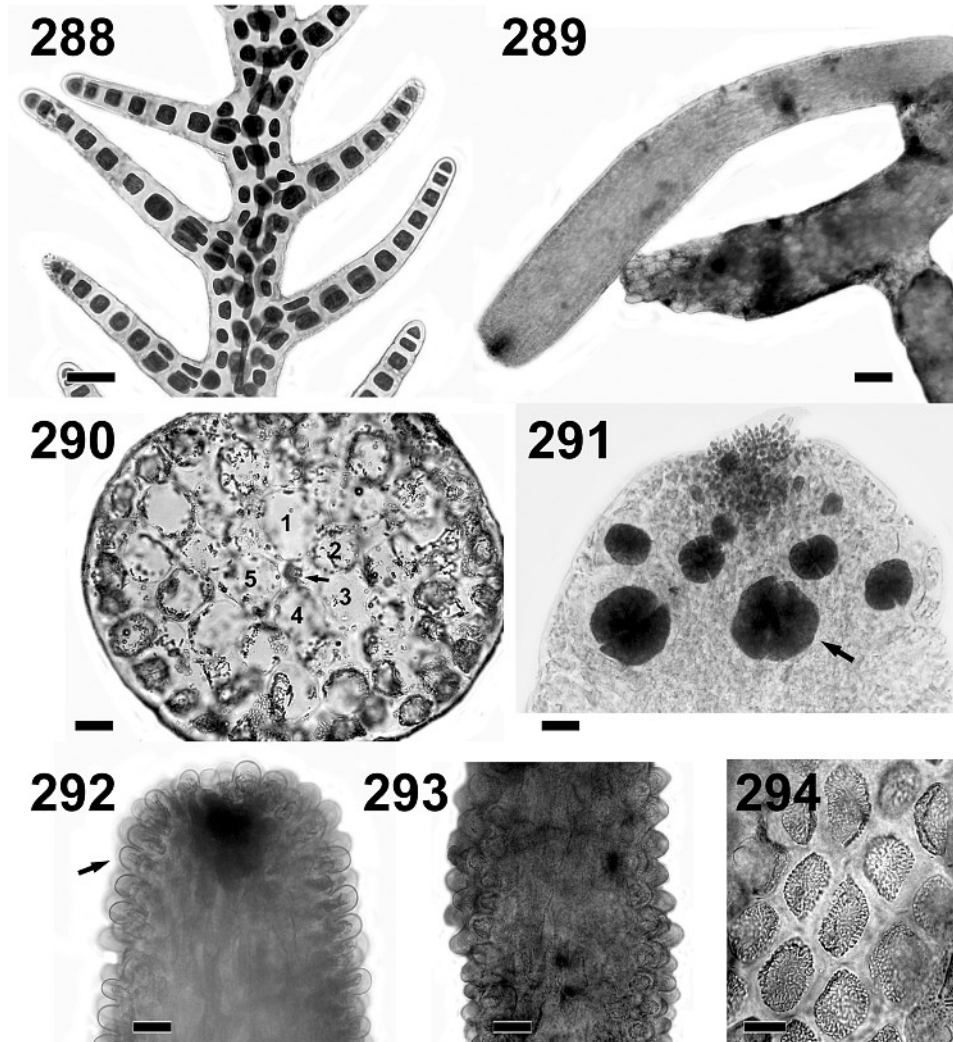
### *Chondria* C. Agardh

#### Key to the French Polynesian species of *Chondria*

- 1a. Main axes terete . . . . . 2
- 1b. Main axes flattened to compressed . . . . . 3
  - 2a. Thallus erect, to 50 mm high . . . . . 4
  - 2b. Thallus creeping, less than 4 mm high . . . . . 6
- 3a. Main axes creeping, less than 500 µm in diameter . . . . . 5
- 3b. Main axes erect, more than 900 µm in diameter . . . . . *C. dangeardii*
  - 4a. Thallus brownish-red, sparsely branched; axes arcuate . . . . . *C. arcuata*
  - 4b. Thallus yellowish, with straight, fusiform secondary branchlets . . . . . *C. dasyphylla*
- 5a. Axes compressed to flattened; lateral branchlets spindle-shaped, pointed . . . . . *C. minutula*
- 5b. Axes terete; lateral branchlets clavate and blunt, not spindle-shaped *C. repens*
  - 6a. Surface cells markedly protruding, isodiametric to lenticular in shape . . . . . *C. bullata*
  - 6b. Surface cells not projecting, elongate in shape . . . . . *C. simpliciuscula*







Figs 288-294. **288.** *Bostrychia tenella*: second- and third-order branchlets (UPF 3242). Scale = 20  $\mu$ m. **289.** *Chondria arcuata*: habit (UPF 3274). Scale = 250  $\mu$ m. **290.** *Chondria arcuata*: transverse section of erect branchlet, showing axial cell (arrow) surrounded by five pericentral cells (1-5) (UPF 3274). Scale = 50  $\mu$ m. **291.** *Chondria arcuata*: apical region of erect branchlet, showing scattered tetrasporangia (arrow) (UPF 3274). Scale = 40  $\mu$ m. **292.** *Chondria bullata*: apical region of branchlet, showing protruding cortical cells (arrow) (UPF 423). Scale = 60  $\mu$ m. **293.** *Chondria bullata*: median portion of branchlet, showing markedly protruding cortical cells (UPF 423). Scale = 70  $\mu$ m. **294.** *Chondria bullata*: surface cortical cells (UPF 423). Scale = 40  $\mu$ m.

\**Chondria arcuata* Hollenberg, 1945: 447, figs 2-4 (type locality: Laguna Beach, Orange County, California, U.S.A.). Pacific Mexico: Dawson, 1963: 442, pl. 167(42), figs 1-3; Hawaiian Islands: Abbott, 1999a: 357, fig. 103A; Southern Australia: Womersley, 2003: 427, fig. 186A-E; Wallis Islands: N'Yeurt & Payri, 2004: 384. **(Figs 289-291)**



**Material examined:** exit of Tupua'i Bay, Rapa, Australs, 02 Dec. 2002, *leg. J. L. Menou*, UPF 3274 RPS72, 3275 RPS73, 3555.

Thallus to 30 mm long, brownish-red in colour, with both creeping and erect axes. Prostrate axes 450-480  $\mu\text{m}$  in diameter, with sparse, simple erect axes 430-440  $\mu\text{m}$  in diameter in median portions, becoming up to 500  $\mu\text{m}$  in the clavate apical region. Axial cell typically surrounded by five pericentral cells, as per genus. Cortical cells subquadrate, 20-25(30)  $\mu\text{m}$  in diameter. Tetrasporangia 70-80  $\mu\text{m}$  in diameter, scattered in swollen clavate ends of determinate axes.

**Remarks:** Growing at a depth of 8 m, on coral debris. The long, arcuate, clavate, mostly unbranched, erect axes are characteristic for this species.

\**Chondria bullata* N'Yeurt *et* Payri, 2009: 20, figs 25-32 (type locality: Nihiru Atoll, Tuamotu, French Polynesia). **(Figs 292-294)**

**Material examined:** Nihiru, 01 Oct. 1995, *leg. J. Orempuller*, UPF 423 S37, 424 S38.

Thallus to 30 mm long, creeping, terete and irregularly branched to two orders. Primary axes (400)545-600(720)  $\mu\text{m}$  in diameter; secondary axes (280)320-360(384)  $\mu\text{m}$  in diameter, unstricted at the base, clavate shaped, with truncate apices. Trichoblasts scarce, but when present terminal in groups of 3-8 and dichotomously branched, 160-400  $\mu\text{m}$  high, composed of cylindrical cells 50-60  $\mu\text{m}$  long and 25-40  $\mu\text{m}$  in diameter. Surface cells (28)32-48(56)  $\mu\text{m}$  in diameter, isodiametric to lenticular in shape, markedly protruding by 5-16  $\mu\text{m}$  throughout the thallus, especially in younger apical portions. Axial cell terete, 30-40  $\mu\text{m}$  in diameter, surrounded by 5 elongate to ovoid pericentral cells 70-80  $\mu\text{m}$  in diameter. Tetrasporangia immersed in subapical portions of fertile branchlets, 50-120  $\mu\text{m}$  in diameter, tetrahedrally divided and laterally attached to parent cell. Gametangial material unknown.

**Remarks:** Growing on coral debris. Morphologically similar to *Chondria simpliciuscula*, this species is distinguished by its markedly projecting surface cells which are not elongated but isodiametric to lenticular. *Chondria bullata* differs from *C. repens* by its protruding, narrower cortical cells and lack of constrictions at the base of branchlets. The species has also been found in Fiji and Vanuatu (N'Yeurt & Payri, 2009).

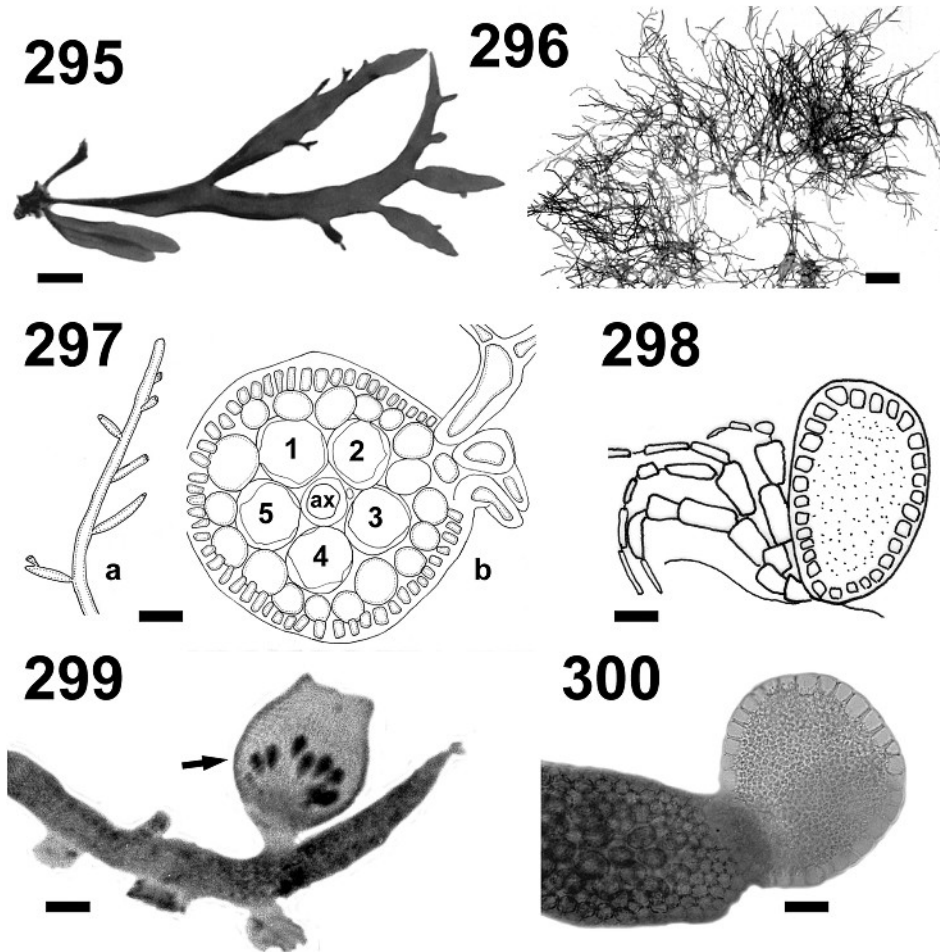
*Chondria dangeardii* E.Y. Dawson, 1954: 460, fig. 62f-g (Viêt Nam). French Polynesia: Payri *et al.*, 2000: 272; Australia: Price & Scott, 1992: 165, fig. 57A-D; Mauritius: Ballesteros, 1994: 538, fig. 2a-c; Hawaiian Islands: Abbott, 1999a: 359, fig. 103B-C; Norfolk Island: Millar, 1999: 520, fig. 56; Samoa: Skelton & South, 2002a: 155, fig. 17B; 2007: 173, figs 460-463. **(Fig. 295)**

**Basionym:** *Chondria platyclada* P.J.L. Dangeard, 1952: 303, pl. 21 figs A-I, *nom. illeg.* (type locality: Dakar, Senegal).

**Superfluous substitute name:** *Chondria confusa* G.W. Lawson *et* D.M. John, 1982: 327, pl. 56 figs 8-9 (Ghana, West Africa).

**Material examined:** Punaauia, Tahiti, 05 Oct. 1995, *leg. A. D. R. N'Yeurt*, UPF 240; Taharaa, Tahiti, 14 Apr. 1997, *leg. A. D. R. N'Yeurt*, UPF 241.

Thallus predominantly erect, to 20 mm high, purplish-red, consisting of flattened, incurved lanceolate axes 1-2.5 mm broad and 0.5-1.5 mm long, with tapered tips and smooth margins. Axes sparsely subdistichously branched; branchlets isomorphic with main creeping axes, basally constricted, with tapered to filiform apices and a sunken apical pit. Cortical cells elongate, 60-160  $\mu\text{m}$  long and 15-30  $\mu\text{m}$  wide. Tetrasporangia 100-120  $\mu\text{m}$  in diameter, in terete, sometimes bifidous subdistichous side branchlets. Cystocarps urn-shaped, to 1.2 mm in diameter, on diminutive side branchlets. Spermatangial plates 100-300  $\mu\text{m}$  in diameter, on apices of side branchlets.



Figs 295-300. **295.** *Chondria dangeardii*: habit of pressed plant (UPF 241). Scale = 2 mm. **296.** *Chondria dasyphylla*: habit of pressed plant (UPF 886). Scale = 5 mm. **297.** *Chondria dasyphylla*: (a) detail of secondary branchlet and (b) transverse section of branchlet of plant from Tahiti, showing axial cell (ax) surrounded by five pericentral cells (1-5) (UPF). Scale: a = 3 mm; b = 50  $\mu$ m. **298.** *Chondria dasyphylla*: spermatangial plate (UPF). Scale = 30  $\mu$ m. **299.** *Chondria minutula*: habit, showing urceolate cystocarp (arrow) (UPF 412). Scale = 300  $\mu$ m. **300.** *Chondria minutula*: spermatangial plate (UPF 417). Scale = 100  $\mu$ m.

**Remarks:** Growing closely-adhering to rocky or coralline surfaces in exposed areas of the reef crest, and down to 15 m on the outer reef slope of high islands in the Society Group. The coarse, fleshy, flattened and arcuate branches are characteristic of this species. *Chondria dangeardii* is a new name for *C. platyclada* P.J.L. Dangeard (1952), an illegitimate name being a later homonym of *C. platyclada* W.R. Taylor (1945: 295) from the Galapagos Islands (Dawson, 1954). *Chondria confusa* G.W. Lawson et D.M. John (1982) is a superfluous substitute new name for *C. platyclada*, as these authors were apparently unaware of Dawson's earlier treatment of this species (Price & Scott, 1992: 165).



***Chondria dasyphylla*** (Woodward) C. Agardh, 1817: XVIII. French Polynesia: Payri *et al.*, 2000: 274; India: Børgesen, 1933: 133, figs 15-16; Pacific Mexico: Dawson, 1963: 442, pl. 140 fig. 4, pl. 163; Indian Ocean: Silva *et al.*, 1996: 481; Rotuma Island: N'Yeurt, 1996: 430, figs 134, 188a-b; Fiji: South & Skelton, 2003: 738. **(Figs 296-298)**

**Basionym:** *Fucus dasyphyllus* Woodward, 1794: 239-241, pl. 23: figs. 1-3 (Lectotype locality: Yarmouth, Norfolk, England).

**Material examined:** Nengo-Nengo, Jun. 1996, *leg. J.-M. Zanini*, UPF 242; Papeari Botanical Gardens, Tahiti, 1 Jun. 1997, *leg. A. D. R. N'Yeurt*, in UPF (formalin); Taravai, Gambier, 20 Nov. 2000, *leg. A. D. R. N'Yeurt*, UPF 886; Mangareva, Gambier, 21 Nov. 2000, *leg. A. D. R. N'Yeurt*, UPF 899.

Thallus soft, erect, to 50 mm high, pinkish-red to yellowish-orange in colour, composed of axes 0.5-1 mm in diameter with moderate to profuse lateral branchlets. Secondary branchlets 0.5-2 mm long, single or clustered, constricted at the base and retuse at the apex, with a central pit bearing a tuft of trichoblasts. Axial cell 75-80 µm in diameter, surrounded by 5 large pericentral cells 125-150 µm in diameter. Cortex 2-layered; inner cortical cells large and ovoid, 50-100 µm in diameter; outer cortical cells smaller and elongate, 18-25 µm in diameter and 25-48 µm long, in a palisade-like layer, oblong-angular in surface view. Tetrasporangia 80-100 µm in diameter, scattered in distal portions of side branchlets; spermatangial plates to 100 µm wide and 150 µm high, terminal on branchlets. Cystocarps urceolate, non-pedicellate, to 500 µm wide and 650 µm high, on main axes at base of ultimate branchlets.

**Remarks:** Forming clumps to 170 mm wide on coralline substratum, in the lagoon of atolls and high islands to 15 m depth. The occurrence of this 'temperate European' species in tropical localities needs to be further investigated, as the temperate and tropical populations are most likely different species.

***Chondria minutula*** Weber-van Bosse, 1923: 349, pl. 10 figs 10-12 (type locality: Tanah-Djampeah, Flores Sea, Indonesia). French Polynesia: Payri *et al.*, 2000: 274; Marshall Islands: Dawson, 1957a: 124, fig. 30d-e; Australia: Price & Scott, 1992: 167, fig. 58A-E; Seychelles: Silva *et al.*, 1996: 483; Hawaiian Islands: Abbott, 1999a: 359, fig. 103D-F; Fiji: Littler & Littler, 2003: 146; Samoa: Skelton & South, 2007: 174, figs 464-467. **(Figs 299-300)**

**Material examined:** Tiahura, Moorea, c. 1982, *leg. C. E. Payri*, UPF 418 S32; Punaauia, Tahiti, 25 Sep. 1995, *leg. A. D. R. N'Yeurt*, UPF 413 S27, 414 S28; Nihiru, 01 Oct. 1995, *leg. J. Orempuller*, UPF 454 S68; Tikehau, 07 Nov. 1995, *leg. A. D. R. N'Yeurt*, UPF 411 S25, 412 S26, 415 S29, 416 S30, 417 S31, 420 S34.

Thallus 3.5-4.0 mm long, reddish brown, consisting of a subterete to compressed creeping axis to 300 µm in diameter and 10 mm long, bearing compressed to flattened, basally constricted branchlets to 65 µm broad. Branchlets simple or occasionally once-divided, with sharply tapering apices bearing thin, dichotomously branched trichoblasts around an exserted apical cell. Surface cells elongate and subcylindrical, to 25 µm in diameter and 80 µm long, densely arranged. Tetrasporangia 120-130 µm in diameter, embedded in the swollen tips of second or third-order branchlets. Spermatangial plates flattened, rounded, 200-300 µm in diameter, on apices of side branchlets. Cystocarps large and urceolate, to 1 mm in diameter, on first-order branchlets.

**Remarks:** A common epiphyte on larger algae such as *Halimeda* on the outer reef slope to 20 m depth. The compressed axes attached by fascicles of rhizoids, with flattened, basally constricted, fusiform side branchlets are characteristic of this species. *Chondria dangeardii* is superficially similar, but differs in being erect, with wider axes to 1.5 mm in diameter. *Chondria repens* from Easter Island is very



similar in habit, but differs in its terete axes, which are not as spindle-shaped as *C. minutula*, and in its blunt, depressed apices.

\**Chondria repens* Børgesen, 1924: 299, figs 40-41 (type locality: Easter Island). Viêt Nam: Dawson, 1954: 460, fig. 62d-e; Pacific Mexico: Dawson, 1963: 446, pl. 168(43) fig. 2; Kenya, Seychelles: Silva *et al.*, 1996: 484; Samoa: Skelton & South, 2002a: 155, fig. 17C; Papua New Guinea: Littler & Littler, 2003: 146.

(Fig. 301-303)

**Material examined:** Iri Bay, Rapa, Australs, 16 Nov. 2002, *leg. J. L. Menou*, UPF 3264 RPS63, 3545; Rukuaga Point, Rapa, 30 Nov. 2002, *leg. J. L. Menou*, UPF 3560; exit of Tupua'i Bay, Rapa, 02 Dec. 2002, *leg. J. L. Menou*, UPF 3273.

Thallus primarily prostrate, to 15 mm long, main axes terete, 250-300 µm in diameter, attached to the substratum by fascicles of unicellular rhizoids to 200 µm long and 10 µm in diameter. Erect axes terete, slightly pinched at the base, 200-220 µm in diameter, with blunt depressed apices. Apical cell about 10 µm in diameter, dome-shaped. Cortical cells thick-walled, of variable shape, ovoid to elongate, 80-120 µm long and 20-70 µm in diameter. Axial file distinct, with five pericentral cells. Tetrasporangia 20-30 µm in diameter, scattered in distal portions of determinate branches.

**Remarks:** Growing at depths of 3-10 m, creeping on coral debris. According to Gordon-Mills & Womersley (1987), *C. repens* might be more aptly placed in the genus *Laurencia*, as the original description does not clearly mention any conspicuous axial row of cells, and a critical examination of the type would be desirable. The Rapa plants, close to the type locality of *C. repens*, are in other respects very similar to Børgesen's description, and do show a distinct axial row of cells (Fig. 302), confirming its current generic placement.

*Chondria simpliciuscula* Weber-van Bosse, 1913: 125, pl. 12 figs 9-10 (type locality: Passe Houareau, Aldabra Island, Seychelles). French Polynesia: Payri *et al.*, 2000: 276; Australia: Price & Scott, 1992: 169, fig. 59A-E; Maldives: Silva *et al.*, 1996: 485; Rotuma: N'Yeurt, 1996: 431, figs 130, 133, 190a-b; Hawaiian Islands: Abbott, 1999a: 361, fig. 104A-F; Papua New Guinea: Littler & Littler, 2003: 146.

(Fig. 304)

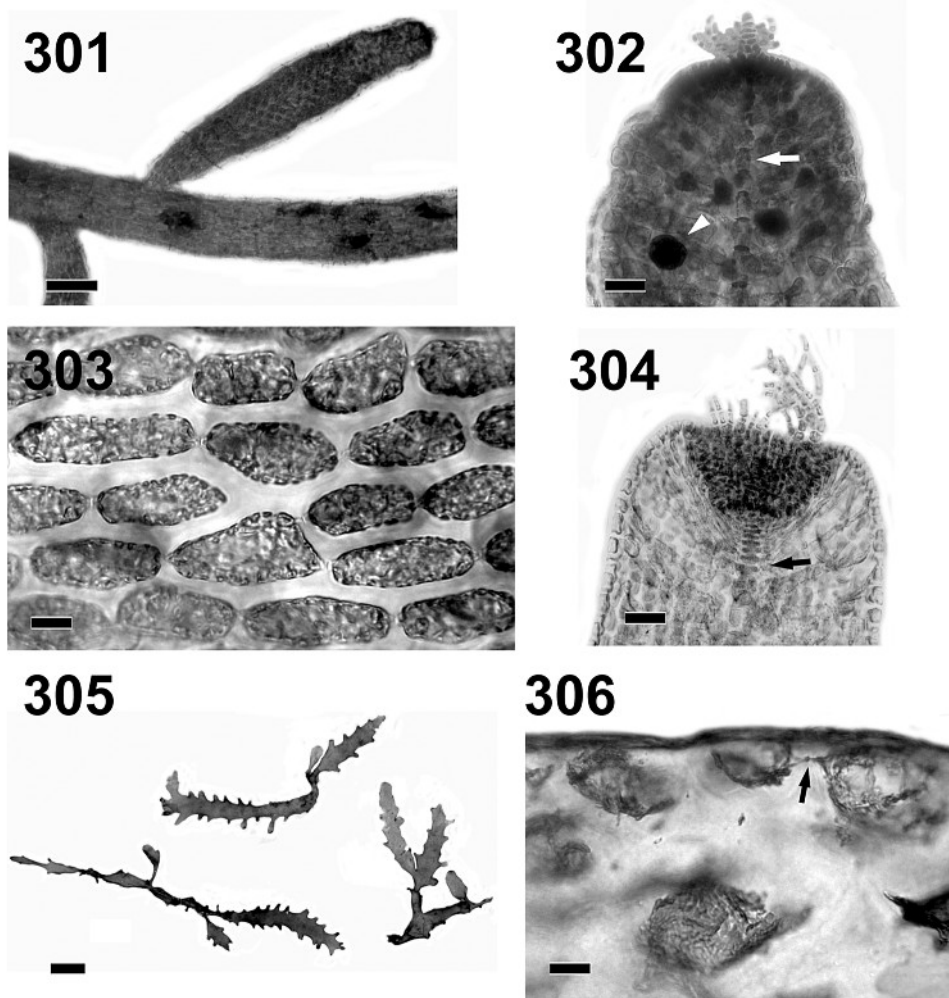
**Material examined:** Kauehi, 22 Sep. 1995, *leg. J. Orempuller*, UPF 419 S33; Punaauia, Tahiti, 25 Sep. 1995, *leg. A. D. R. N'Yeurt*, UPF 421 S35.

Thallus to 3 mm high, pinkish-red to yellowish brown, composed of creeping axes 300-500 µm in diameter bearing erect, simple cylindrical branchlets to 250 µm in diameter, with truncate apices and a sunken apical pit bearing thin, dichotomously branched trichoblasts. Base of erect branches unstricted or only slightly constricted. Surface cortical cells elongate to ellipsoidal in mature parts of thallus, polygonal to isodiametric near apices.

**Remarks:** A common epiphyte on algae such as *Halimeda* on the outer reef slope to 20 m depth. This species is superficially similar to *Chondria repens* from Easter Island. Both species are reported from Papua New Guinea by Littler & Littler (2003: 146), with *C. repens* being distinguished by its loosely knit thalli, not creeping as individual runners as does *C. simpliciuscula*.

*Chondrophycus* (J. Tokida *et Y. Saito*) Garbary *et J. Harper*

This genus, once considered a subgenus of *Laurencia* (Saito, 1967) mainly differs from the latter by the presence of two pericentral cells rather than four. The taxonomic issues surrounding the erection of the genus *Chondrophycus* are dealt with in Masuda *et al.* (1997), Nam (1999), Garbary & Harper (1998),



Figs 301-306. **301.** *Chondria repens*: habit (UPF 3264). Scale = 300  $\mu$ m. **302.** *Chondria repens*: optical section of apical region, showing axial row of cells (arrow) and tetrasporangia (arrowhead) (UPF 3264). Scale = 30  $\mu$ m. **303.** *Chondria repens*: surface view of cortical cells (UPF 3264). Scale = 50  $\mu$ m. **304.** *Chondria simpliciuscula*: apical region, showing axial file of cells (arrow) (UPF 419). Scale = 20  $\mu$ m. **305.** *Chondrophycus succisus*: habit of pressed plant (UPF 337). Scale = 5 mm. **306.** *Chondrophycus succisus*: transverse section showing secondary pit-connection (arrow) between cortical cells (UPF 337). Scale = 15  $\mu$ m.

Furnari *et al.* (2001) and Wynne *et al.* (2005). Several species of *Chondrophycus* were recently transferred to the new genus *Palisada* by Nam (2007) based on molecular data. One species occurs in French Polynesia.

\**Chondrophycus succisus* (Cribb) K.W. Nam, 1999: 463 ('*succisa*'). Samoa: Skelton & South, 2002a: 155; 2007: 178, figs 474-477; Wallis: N'Yeurt & Payri, 2004: 385; Oman: Wynne *et al.*, 2005: 500, figs 20-24. **(Figs 305-306)**



**Basionym:** *Laurencia succisa* Cribb, 1958: 163, pl. 1 figs 1-3 (type locality: Ball Bay, near Mackay, Queensland, Australia). French Polynesia: Payri *et al.*, 2000: 280; Great Barrier Reef, Australia: Price & Scott, 1992: 192, fig. 69A-D; Hawaiian Islands: Abbott, 1999a: 391, fig. 114C-D; Fiji: N'Yeurt, 2001: 845, figs 314, 316, 317. **Material examined:** Punaauia, Tahiti, 05 Oct. 1995, *leg. A. D. R. N'Yeurt*, UPF 337; 19 Mar. 1998, *leg. C. E. Payri*, UPF 704; Tupai, 03 Jul. 2002, *leg. C. Vermenot*, UPF 2482.

Thallus 10-25 mm high, deep red, decumbent to erect, composed of rigid, percurrent and compressed axes 3-4 mm in diameter. Axes with broad tips and curved slit-like distal grooves, bearing frequent, short and simple, distichous, mostly terete ultimate branchlets. Cortical cells flat-topped, 15-30 µm in diameter, not protruding. Secondary pit connections present between outer cortical cells. Medullary cells 50-150 µm in diameter, without lenticular thickenings. Adheres well to paper when dry.

**Remarks:** Growing pressed to coral debris, at depths of 15 to 30 m on the outer reef slope (Tahiti) or in the pass (Tupai). This species is easily recognizable by its broad, flattened axes and distal slit-like groove. Australian and Hawaiian plants of this species are reported without secondary pit connections between outer cortical cells, while these were clearly seen in French Polynesian material; hence the identification is tentative awaiting more detailed (preferably molecular) studies.

#### *Ditria* Hollenberg

\**Ditria reptans* Hollenberg, 1967: 208, fig. 4a-b (type locality: O'ahu, Hawaiian Islands). Hawaiian Islands: Abbott, 1999a: 363, fig. 105A-C. **(Fig. 307)**

**Misapplied name:** *Dipterosiphonia dendritica* (C. Agardh) F. Schmitz *in* Schmitz & Falkenberg. French Polynesia: Payri *et al.*, 2000: 276.

**Material examined:** Punaauia, Tahiti, 25 Sep. 1995, *leg. A. D. R. N'Yeurt*, UPF 437 S51; Tikioki, Rarotonga, Cook Islands, 09 Feb. 1999, *leg. A. D. R. N'Yeurt*, UPF CS131.

Thallus epiphytic, dorsiventral, to 15 mm high, reddish brown in colour, composed of a creeping main axis 190-220 µm in diameter, with segments about one diameter long, attached to the host alga by long unicellular, digitate ventral rhizoids to 700-800 µm long and 30-35 µm in diameter. Determinate lateral branches 1-5 mm long and 40-90 (150) µm in diameter, arising exogenously in an irregularly alternate, at times unilateral, with tapered and distally acute ends and a distinct hemispherical apical cell 10-12 µm in diameter. Apical trichoblasts rare, large and stocky, 20-40 µm high, divided up to 5 times.

**Remarks:** Growing on *Halimeda* spp. at a depth of 10-15 m, a single collection from the outer reef slope of Tahiti Island, Society Group. This distinctive alga, previously considered a Hawaiian endemic, is also reported from neighbouring Cook Islands (N'Yeurt, pers. obs.), but interestingly has not yet been recorded west of the Cook Islands in the South Pacific. *Ditria* differs from the morphologically similar genus *Dipterosiphonia* Schmitz *et* Falkenberg by its dorsiventral habit, having lateral branches not arising from every segment of the prostrate axes (or having dormant ventral lateral initials), no regular pattern of branch origin, and in having occasional trichoblasts arising from indeterminate branches (Hollenberg, 1967). *Ditria expleta* Huisman is unique in lacking dormant ventral lateral initials, and might not belong to the genus (Womersley, 2003: 310).

#### *Fernandosiphonia* Levring

This genus is based on *F. unilateralis* Levring from Juan Fernandez Island. It differs from *Polysiphonia* mainly by the unilateral mode of branching in its upper portions, and from *Neosiphonia* by alternate branches, origin of





spermatangial branches, cells of carpogonial branches, and other features. With one species in the French Polynesian flora.

\**Fernandosiphonia ecorticata* R.E. Norris, 1994: 438, figs 14-20 (type locality: Keokea Bay, Hawai'i). Hawaiian Islands: Abbott, 1999a: 366, fig. 106A-B.

(Figs 308-309)

**Material examined:** Rapa, Australs, 10 Oct. 2000, leg. V. Clouard, UPF 3254 RPS 57.

Thallus minute, 60-80 mm high, totally ecorticate, with a long erect axis issued from a complex digitate basal holdfast. Diameter of axes 200-300 µm, with 4 pericentral cells. Branching exogenous, unilateral but only obvious in upper portions. Trichoblasts colourless and deciduous, about 100 µm long. Tetrasporangia 80-90 µm in diameter, in distal areas of determinate branchlets.

**Remarks:** Growing as an epiphyte on *Sargassum* sp., on the southern Austral island of Rapa. The French Polynesian material lacks any cortication on either the creeping or erect axes, and is less than 10 mm high, thus conforming to *F. ecorticata*. This is the first report of this species outside of the type locality.

***Herposiphonia* Nägeli**

Species boundaries in this commonly occurring genus are at best ambiguous, and tropical members of this group are in dire need of revision, preferably from a molecular standpoint, to resolve issues of overlapping taxonomic characters and gain a better understanding of intraspecific variability. There are six species of *Herposiphonia* reported from French Polynesia. The record of *H. filifera* Hollenberg cited from Moorea Island in Payri (1987) could not be verified.

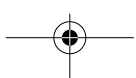
**Key to the French Polynesian species of *Herposiphonia***

- 1a. Main axes 40-70 µm in diameter . . . . . *H. delicatula*
- 1b. Main axes more than 90 µm in diameter. . . . . 2
  - 2b. Erect determinate axes in regular contiguous series of threes, alternating with a lateral branchlet every fourth segment; trichoblasts terminal. . . . . *H. secunda*
  - 2a. Creeping axis with erect branches and lateral branchlets alternating in other orders. . . . . 3
- 3a. Mature determinate axes 500 µm high or less, stout; apices straight, blunt . . . . . *H. parca*
- 3b. Mature determinate axes more than 500 µm long; slender; curved and tapered . . . . . 4
  - 4a. Determinate axes with 1-2 trichoblasts . . . . . *H. dendroidea*
  - 4b. Determinate axes with 3-5 trichoblasts . . . . . *H. pacifica*

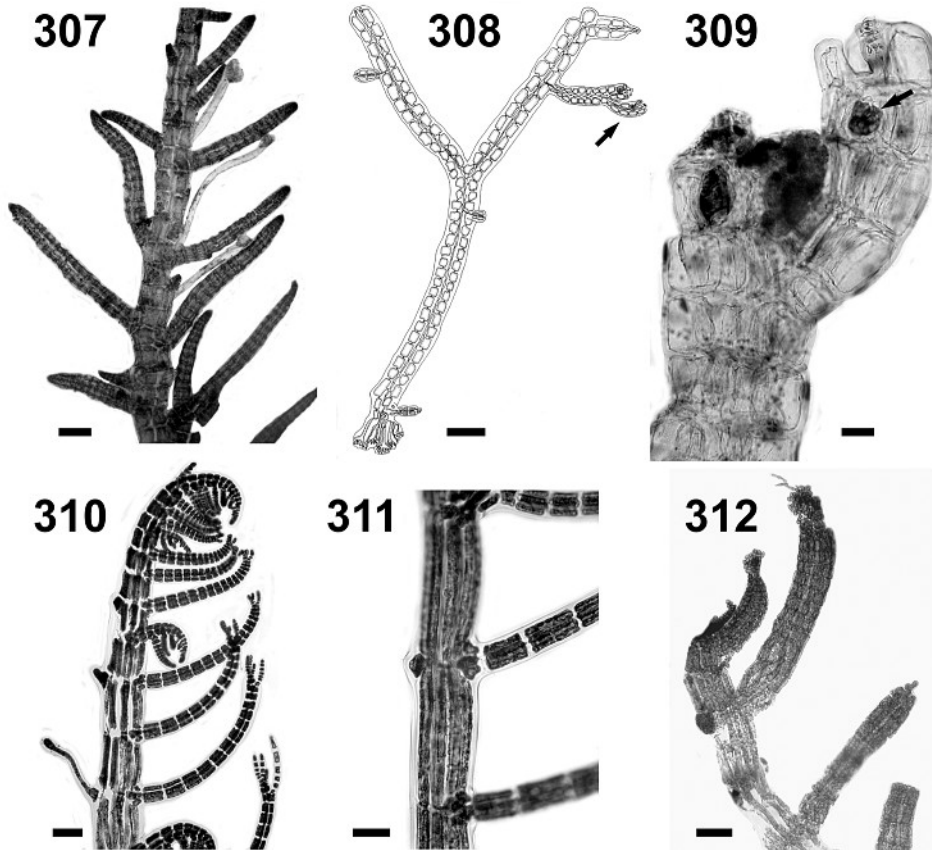
***Herposiphonia delicatula*** Hollenberg, 1968c: 540, 543 figs 1A-B, 2H, 3 (type locality: Falas Islet, Truk Island, Caroline Islands). French Polynesia: N'Yeurt & Payri, 1997: 897; Seychelles: Wynne, 1995: 303, fig. 56; Maldives: Silva *et al.*, 1996: 496; Hawaiian Islands: Hollenberg, 1968c: 540, figs 1A-B, 2H, 3; Abbott, 1999a: 371, fig. 107F-G. (Fig. 310-311)

**Material examined:** Iri Bay, Rapa, 16 Nov. 2002, leg. J. L. Menou, UPF 3261 RPS61.

Thallus slender, with a creeping main axis 40-70 µm in diameter composed of 7-8 pericentral cells, attached to the substratum via digitate rhizoids.







Figs 307-312. **307.** *Ditaria reptans*: habit (UPF 437). Scale = 200  $\mu\text{m}$ . **308.** *Fernandosiphonia ecorticata*: habit, showing tetrasporangial branchlet (arrow) (UPF 3254). Scale = 300  $\mu\text{m}$ . **309.** *Fernandosiphonia ecorticata*: detail of embedded tetrasporangia (UPF 3254). Scale = 100  $\mu\text{m}$ . **310.** *Herposiphonia delicatula*: habit (UPF 3261). Scale = 50  $\mu\text{m}$ . **311.** *Herposiphonia delicatula*: detail of creeping main axis (UPF 3261). Scale = 50  $\mu\text{m}$ . **312.** *Herposiphonia dendroidea*: habit (UPF 453). Scale = 100  $\mu\text{m}$ .

Erect determinate branches 25-30  $\mu\text{m}$  in diameter and 300-800  $\mu\text{m}$  long, in alternating series of three or four, and one indeterminate axis initial. Trichoblasts sparse and terminal, filiform, 300-400  $\mu\text{m}$  long. Tetrasporangia in linear series of 5-8 in median to proximal regions of determinate axes. Spermatangial stichidia lanceolate, subterminal, lacking a sterile tip.

**Remarks:** Growing at a depth of 3 m, epiphytic on *Gloiocladia* sp. The long, slender axes of this species are characteristic.

*Herposiphonia dendroidea* Hollenberg, 1968c: 543, figs 1C-E, G (type locality: Ngarumaoa Island, Raroia Atoll, Tuamotu Archipelago, French Polynesia). French Polynesia: N'Yeurt & Payri, 1997: 897; Indian Ocean: Silva *et al.*, 1996: 496. (Fig. 312)

**Material examined:** Motu aux Oiseaux, Tikehau, 05 Nov. 1995, leg. A. D. R. N'Yeurt, UPF 453 S67; Reka Reka, 09 Nov. 1996, leg. J. Orempuller, UPF 314, 361, 362.



Thallus to 15 mm long and 2 mm high, reddish brown, composed of a regularly segmented creeping axis to 110  $\mu\text{m}$  in diameter, attached to the substratum via round attachment pads issued from the base of every segment. Determinate laterals curved and tapered, arising from segments in irregular fashion, to 80  $\mu\text{m}$  in diameter, with two trichoblasts (one long terminal, and a much shorter subterminal) dichotomously branched, 1 mm long. Tetrasporangia in linear series, in distal regions of determinate axes. Spermatangial stichidia lanceolate, to 500  $\mu\text{m}$  long, subterminal.

**Remarks:** Growing in matted brownish tufts or as an epiphyte on algae and seagrass at the bottom of lagoons of atolls, to 20 m depth. This species has so far not been recorded outside of the Tuamotu archipelago in French Polynesia. Male plants, from Tikehau atoll, are found for the first time in this study; female plants remain unknown.

***Herposiphonia pacifica*** Hollenberg, 1968c: 549, figs 2A-B, 4, 19 (type locality: Maalaea, Maui, Hawaiian Islands). French Polynesia: Hollenberg, 1968c: 551 (Raroia Atoll); N'Yeurt & Payri, 1997: 897; Maldives: Silva *et al.*, 1996: 498; Hawaiian Islands: Abbott, 1999a: 374, fig. 108C-G.

**Voucher material:** Ngarumaoa, Raroia, 16 Jul. 1952, *leg. M. S. Doty & J. Newhouse*, US D.11217B,C.

Thallus to 15 mm high, forming tufts. Prostrate axes 100-170 (200)  $\mu\text{m}$  in diameter; indeterminate axes alternating at 3-5 segment intervals, with a single determinate axis in-between, separated from the series by a single node. Erect determinate axes simple, 60-90 (140)  $\mu\text{m}$  in diameter, curved and tapered, with 3-5 subterminal trichoblasts. Tetrasporangia in long series of 20-30, distal on determinate branches. Spermatangial stichidia lanceolate, to 560  $\mu\text{m}$  long, in acropetal succession at branch apices (Hollenberg, 1968c).

**Remarks:** This species has not been recollected in French Polynesia since the initial report from Raroia Atoll by Hollenberg (1968c).

***Herposiphonia parca*** Setchell, 1926: 103, pl. 20 fig. 2 (type locality: Arue Reef, Tahiti). French Polynesia: N'Yeurt & Payri, 1997: 897; Hawaiian Islands: Hollenberg, 1968c: 552; figs 2C, 16, 20, 22, 23; Indian Ocean: Silva *et al.*, 1996: 498; Abbott, 1999a: 374, fig. 108H-I; Seychelles: Wynne, 1995: 306, figs 59-60.

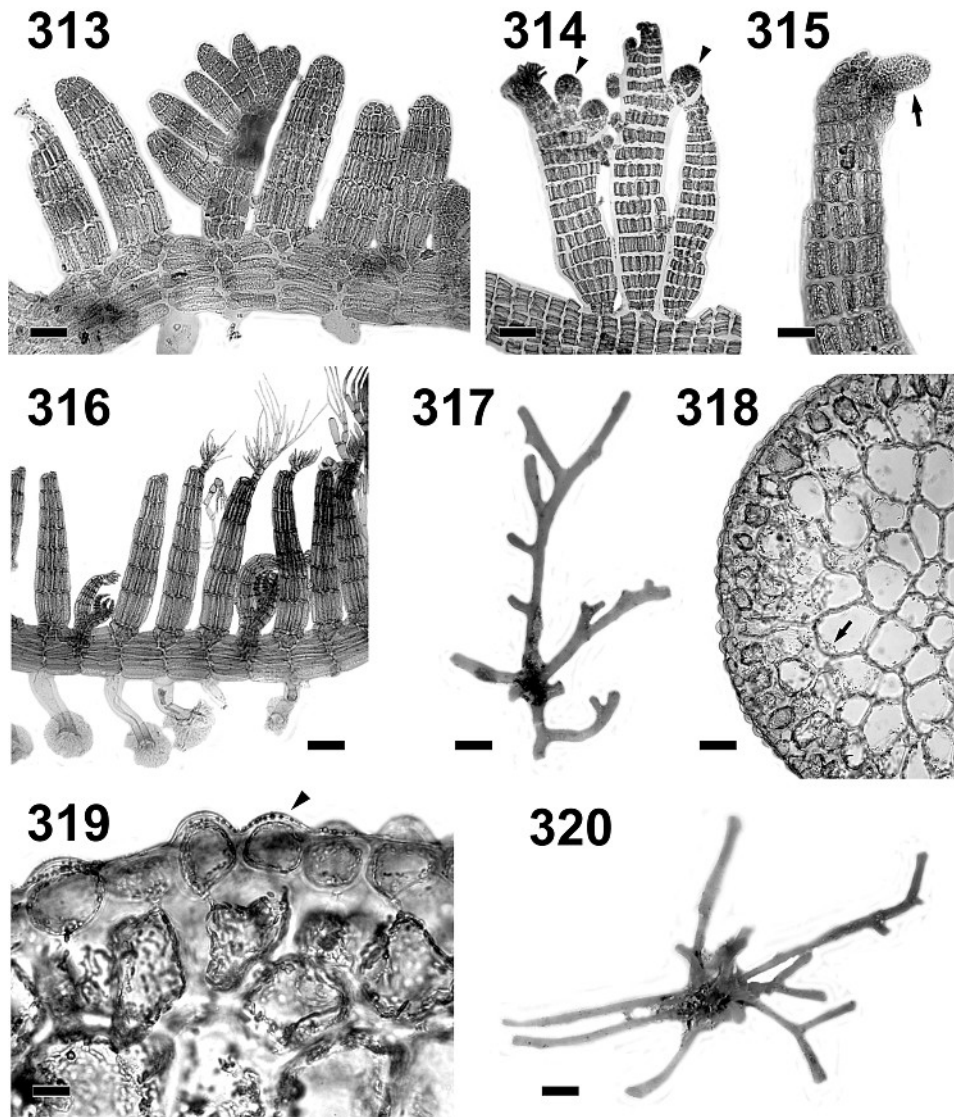
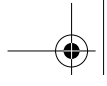
**(Figs 313-315)**

**Material examined:** Arue Reef, Tahiti, 27 Jun. 1922, *leg. W. A. Setchell & H. E. Parks*, UC 261147 (type); Paea, Tahiti, 1992, *leg. B. Bourgeois*, UPF 455 S69, 456 S70.

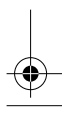
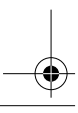
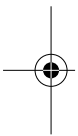
Thallus stout, to 660  $\mu\text{m}$  high, with prostrate indeterminate axes 140-160  $\mu\text{m}$  in diameter, bearing regular sequences of three determinate axes and successive indeterminate axes, usually without any bare nodes. Determinate branches arched when young, at times slightly basally constricted, simple and stout with blunt tips, to 500  $\mu\text{m}$  high and 140  $\mu\text{m}$  in diameter. Trichoblasts terminal, up to 400  $\mu\text{m}$  long, with delicate tips. Tetrasporangia in linear series of 5-6, in median to proximal areas of determinate axes. Spermatangial stichidia and cystocarps strictly terminal.

**Remarks:** The short and stout habit of this species is characteristic. In French Polynesia, it has only been recorded so far from the Society islands.

***Herposiphonia secunda*** (C. Agardh) Ambronn, 1880: 197. French Polynesia: N'Yeurt & Payri, 1997: 897; Australia: *non* Millar, 1990: 451, fig. 68A-C; Price & Scott, 1992: 175, fig. 62A-D; Seychelles: Wynne, 1995: 307, figs 57-58; Indian Ocean: Silva *et al.*, 1996: 499; Rotuma: N'Yeurt, 1996: 431, figs 200, 206. **(Fig. 316)**



Figs 313-320. **313.** *Herposiphonia parca*: habit of type specimen (UC 261147). Scale = 100  $\mu$ m. **314.** *Herposiphonia parca*: habit of female plant, showing terminal cystocarps (arrowheads) (UPF 455). Scale = 100  $\mu$ m. **315.** *Herposiphonia parca*: erect branchlet of male plant, with terminal spermatangial stichidia (arrow) (UPF 456). Scale = 50  $\mu$ m. **316.** *Herposiphonia secunda*: habit (UPF 452). Scale = 100  $\mu$ m. **317.** *Laurencia caraibica*: habit of pressed plant (UPF 3553). Scale = 1 mm. **318.** *Laurencia caraibica*: transverse section of axis (UPF 3270), showing medullary cells with moderate lenticular thickening (arrow). Scale = 50  $\mu$ m. **319.** *Laurencia caraibica*: angular, swollen cortical cells (arrowhead) (UPF 3270). Scale = 15  $\mu$ m. **320.** *Laurencia cervicornis*: habit of pressed plant (UPF 3554). Scale = 1 mm.





**Basionym:** *Hutchinsia secunda* C. Agardh, 1824: 149 (type locality: Mediterranean Sea).

**Heterotypic synonym:** *Herposiphonia tenella* (C. Agardh) Ambronn f. *secunda* (C. Agardh) Hollenberg, 1968c: 556 (French Polynesia: Raroia Atoll, Tuamotu). Hawaiian Islands: Abbott, 1999a: 376, fig. 109A-E.

**Material examined:** Punaauia, Tahiti, 25 Sep. 1995, leg. A. D. R. N'Yeurt, UPF 451 S65; Tikehau, 06 Nov. 1995, leg. A. D. R. N'Yeurt, UPF 452 S66.

Thallus to 10 mm long and 1 mm high, purplish brown, consisting of a regularly segmented creeping axis 130-150 µm in diameter from which arise erect determinate axes 250-560 µm long and 70-100 µm in diameter, in contiguous series of threes, alternating with a lateral branchlet every fourth segment. The creeping axis is attached to the substratum by concave, sucker-like holdfasts arising from the base of every segment. Erect branches 5-9 segments high, with 4 to 5 terminal, dichotomously branched trichoblasts 130-300 µm long. Tetrasporangia in linear series of 7-8 in distal regions of determinate axes. Procarps and cystocarps apical to subapical; spermatangial stichidia strictly terminal.

**Remarks:** A common epiphyte on larger algae such as *Dictyota* or *Halimeda*, in lagoons and subtidally down to 20 m. According to Masuda & Kogame (2000: 187) *Herposiphonia secunda* and *H. tenella*, often considered conspecific in the past, are distinct entities. *Herposiphonia tenella* is reported as having spiralled spermatangial branches with fertile portion consisting of 10 to 12 segments, while *H. secunda* has terminal spermatangial branches with fertile region consisting of 4 or 5 segments. Also, vegetative trichoblasts are spiralled in *H. tenella*, while they are terminal in *H. secunda* (Schneider & Searles, 1997: 198). The French Polynesian material has characters conforming to *H. secunda* as per the above criteria, while the record of East Australian *H. secunda* by Millar (1990) would rather refer to *H. tenella*, based on its spiralled trichoblasts. The record of *H. secunda* (C. Agardh) Ambronn f. *tenella* (C. Agardh) M.J. Wynne from the Hawaiian Islands (Hollenberg, 1968c; Abbott, 1999a) has terminal spermatangial branches and trichoblasts, thus being referable to *H. secunda*. On the other hand, the record of *H. secunda* f. *tenella* from Samoa (Skelton & South, 2007: 176, figs 468-473) is reported as having spiralled trichoblasts and spermatangial stichidia, thus belonging in *H. tenella*.

**Laurencia** Lamouroux

This large genus, consisting of 127 current species (Guiry & Guiry, 2008) is in dire need of revision in the South Pacific, to complement work done in other areas of the world (Masuda, 1997; McDermid, 1988; Abbott, 1999a; Furnari *et al.*, 2001; Masuda *et al.*, 2002; Nam, 2004; Wynne *et al.*, 2005). There are seven species reported from French Polynesia.

**Key to the French Polynesian species of *Laurencia***

- 1a. Thallus erect, 30-80 mm high, with long unbranched lower axes . . . . . 2
- 1b. Thallus creeping or forming turf-like clumps, usually less than 30 mm high . . 4
  - 2a. Axes compressed to flattened; branching irregularly distichous; cortical cells 9-10 µm in diameter; adheres well to paper when dry . . . . . *L. glandulifera*
  - 2b. Axes terete to subterete; branching sparse to irregular; cortical cells more than 12 µm in diameter; does not adhere well to paper when dry . . . . . 3
- 3a. Branching sparse; secondary pit connections present in outer cortex . . . . .
  - . . . . . *L. crustiformans*



- 3b. Branching irregularly alternate to radial; secondary pit connections absent . . .  
..... *L. flexilis*
- 4a. Cortical cells angular, swollen and rounded . . . . . *L. caraibica*
- 4b. Cortical cells flat-topped, not rounded . . . . . 5
- 5b. Axes 750-1100 µm in diameter, clavate, sparsely branched. . . . . *L. claviformis*
- 5a. Axes 500-650 µm in diameter . . . . . 6
- 6a. Axes terete to subterete, decumbent; lenticular thickenings present . . . . .  
..... *L. decumbens*
- 6b. Axes terete, clavate and bifurcate; lenticular thickenings absent . . . . .  
..... *L. cervicornis*

\**Laurencia caraibica* P.C. Silva, 1972: 205. Puerto Rico: Ballantine & Norris, 1989: 5, fig. 7; India: Silva *et al.*, 1996: 505; Belize: Littler & Littler, 1997: 63, fig. 73; Caribbean: Littler & Littler, 2000: 212; Guam: Lobban & Tsuda, 2003: 77.

(Figs 317-319)

**Basionym:** *Laurencia nana* M. Howe in Britton & Millespaugh, 1920: 556, *nom. illeg.* (type locality: Mariguana (Mayaguana), Bahamas). Marshall Islands: Dawson, 1957a: 124, fig. 30a.

**Material examined:** Tupua'i Bay, Rapa, Australs, 02 Dec. 2002, *leg. J. L. Menou*, UPF 3270 RPS 69, 3553.

Thallus 12-20 mm high, greenish brown, with irregularly dichotomous, compressed branches 750-1000 µm in diameter. Branching sparse, with axes sometimes anastomosing or making secondary connections to substratum. Medullary cells 50-90 µm in diameter, with slight to moderate lenticular thickenings; cortical cells 20-25 µm in diameter, ovoid, roundly angular and swollen.

**Remarks:** Growing at a depth of 8 m, on coral rubble. The rounded, angular swollen cortical cells and fragile, sparsely branched cartilaginous habit are characteristic for the species. This is the third report of this predominantly Caribbean species in the Pacific.

\**Laurencia cervicornis* Harvey, 1853: 73, pl. 18C (type locality: Key West, Florida). Caribbean: Littler & Littler, 2000: 212.

(Figs 320-321)

**Material examined:** Tupa'i Bay, Rapa, Australs, 02 Dec. 2002, *leg. J. L. Menou*, UPF 3271 RPS 70, 3554.

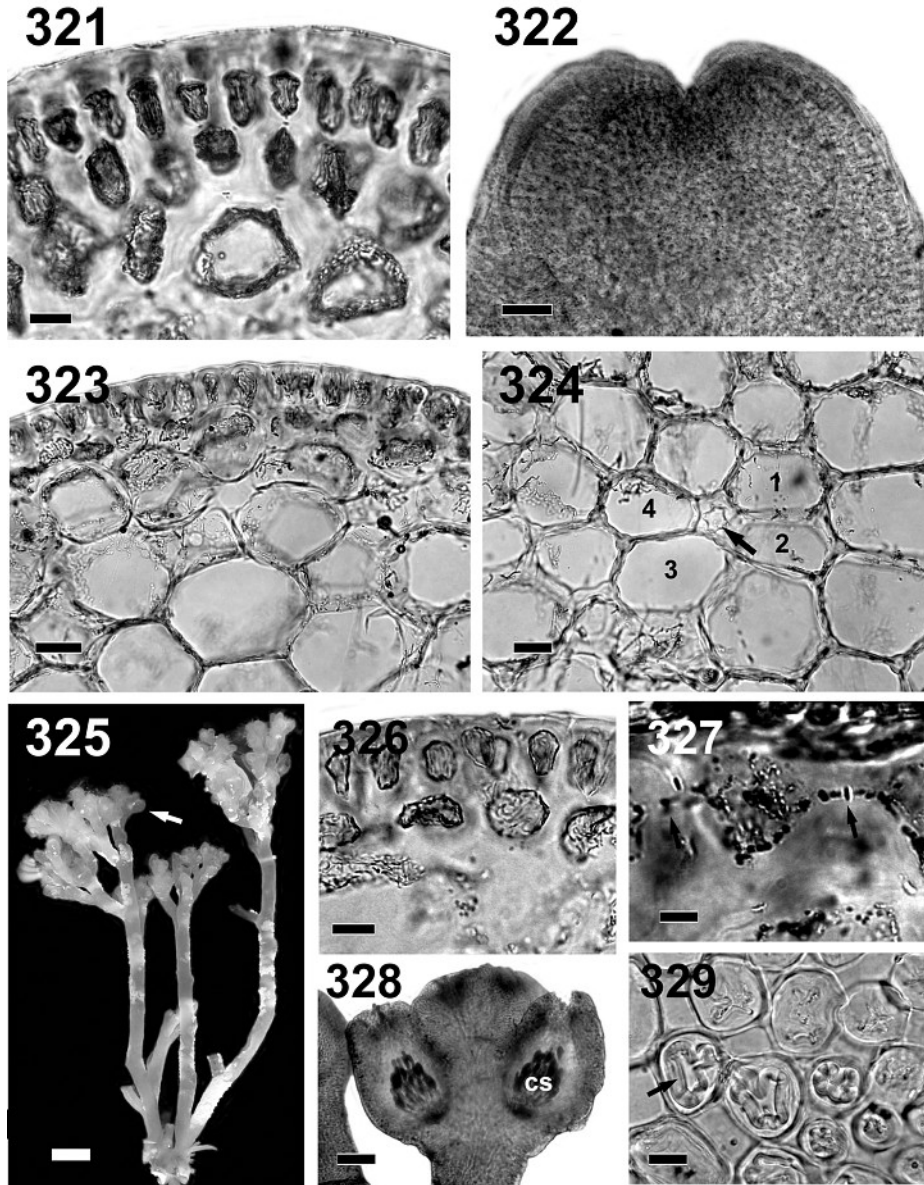
Thallus to 15 mm high, with terete axes 600-650 µm in diameter, forming reddish clumps. Branching irregular to subdichotomous; branches clavate, often with bifurcate ends. Cortical cells 12-20 µm in diameter, elongated, not rounded. Medullary cells 30-50 µm in diameter, without lenticular thickenings. Pericentral cells 4. Material sterile.

**Remarks:** Found at a depth of 8 m, on coral rubble. This is the first record for this species in the Pacific. *Laurencia cervicornis* was considered as synonym of *L. corallopsis* (Montagne) M. Howe (now *Chondrophyucus corallopsis* (Montagne) K.W. Nam) by Howe (1918) and Yamada (1931), the latter after examining the type material. Therefore, the taxonomic position of this species requires a re-investigation in order to ascertain its generic placement. The French Polynesian plants shows 4 pericentral cells, thus belonging in *Laurencia*, but the type material of *L. cervicornis* needs to be re-examined to confirm its generic affinities.

\**Laurencia claviformis* Børgesen, 1924: 298-299, fig. 39 a, b (type locality: Hanga Piko, Easter Island).

(Figs 322-324)





Figs 321-329. **321.** *Laurencia cervicornis*: transverse section, showing flat-topped cortical cells (UPF 3271). Scale = 20  $\mu$ m. **322.** *Laurencia claviformis*: indented apical region of axis (UPF 3269). Scale = 100  $\mu$ m. **323.** *Laurencia claviformis*: transverse section of axis (UPF 3269). Scale = 20  $\mu$ m. **324.** *Laurencia claviformis*: axial cell (arrow) surrounded by four pericentral cells (1-4) (UPF 3269). Scale = 25  $\mu$ m. **325.** *Laurencia crustiformans*: habit of formalin-preserved plant (UPF 3403), showing lateral cystocarp (arrow). Scale = 2 mm. **326.** *Laurencia crustiformans*: transverse section of cortex (UPF 3406) showing elongate cells. Scale = 20  $\mu$ m. **327.** *Laurencia crustiformans*: secondary pit connections (arrows) between outermost cortical cells (UPF 3406). Scale = 10  $\mu$ m. **328.** *Laurencia crustiformans*: detail of cystocarpic branchlet, showing carposporangia (cs) (UPF 3406). Scale = 500  $\mu$ m. **329.** *Laurencia crustiformans*: prominently thickened (arrow) medullary cells (UPF 3405). Scale = 25  $\mu$ m.



**Material examined:** Tupa'i Bay, Rapa, Australs, 02 Dec. 2002, leg. J. L. Menou, UPF 3269 RPS68, 3552.

Thallus 10-20 mm high, sparsely branched, consisting of erect, terete nail-like axes 750-1100  $\mu\text{m}$  in diameter. Branches clavate, hardly divided further, with indented apices. Cortical cells elongate-clavate,  $10 \times 13 \mu\text{m}$ , not rounded. Medullary cells 50-70  $\mu\text{m}$  in diameter, without lenticular thickenings. Pericentral cells 4, around a small, substellate axial cell 20-25  $\mu\text{m}$  in diameter.

**Remarks:** Found at a depth of 8 m, on coral rubble. It is of interest that this alga, whose type locality is Easter Island (Rapa Nui), was first reported in French Polynesia from neighbouring Rapa Iti Island. The French Polynesian material having four pericentral cells, it is retained in the genus *Laurencia*.

\**Laurencia crustiformans* McDermid, 1989: 352-359, figs. 2-8 (type locality: Lualualei Beach Park, Oahu, Hawaii). Great Barrier Reef, Australia: Price & Scott, 1992: 182, fig. 64A-B; Hawaiian Islands: Abbott, 1999a: 384, fig. 111F.

(Figs 325-329)

**Material examined:** Tarakoi Islet, Rapa, Australs, 05 Nov. 2002, leg. C. E. Payri, UPF 3403 RPS 188, 3405 RPS 189, 3406 RPS190.

Thallus 25-30 mm high, consisting of stiff, thick terete erect axes 850-900  $\mu\text{m}$  in diameter, arising from a thick basal crustose holdfast. Branching to few orders only, limited to distal regions of erect axes, with long unbranched basal portion and paniculate apices. Cortical cells elongate, not rounded,  $12 \times 20 \mu\text{m}$ . Secondary pit connections present in outermost cortical cells. Medullary cells 3050  $\mu\text{m}$  in diameter, prominently thickened but not lenticular. Pericentral cells 4. Cystocarps in groups of up to three, lateral on terminal branches, urceolate.

**Remarks:** Growing at a depth of 15-20 m, on coral rubble. This species is characterized by its long, basally unbranched erect axes arising from a crustose base. Cystocarps, unknown in Australian and Hawaiian plants, are reported for the first time in French Polynesian plants. The species is superficially similar to *L. flexilis* Setchell, but differs in that the latter species lacks secondary pit connections between cortical cells, and is more evenly branched.

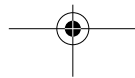
\**Laurencia decumbens* Kützing, 1863: 18, pl. 51 (type locality: New Caledonia). Seychelles: Wynne, 1995: 308, figs 61-62, 64-65; Indian Ocean: Silva *et al.*, 1996: 507; Hawaiian Islands: Abbott, 1999a: 384, fig. 111G-H; Papua New Guinea: Littler & Littler, 2003: 150; Bermuda: Schneider & Lane, 2005: 81, fig. 19. (Figs 330-331)

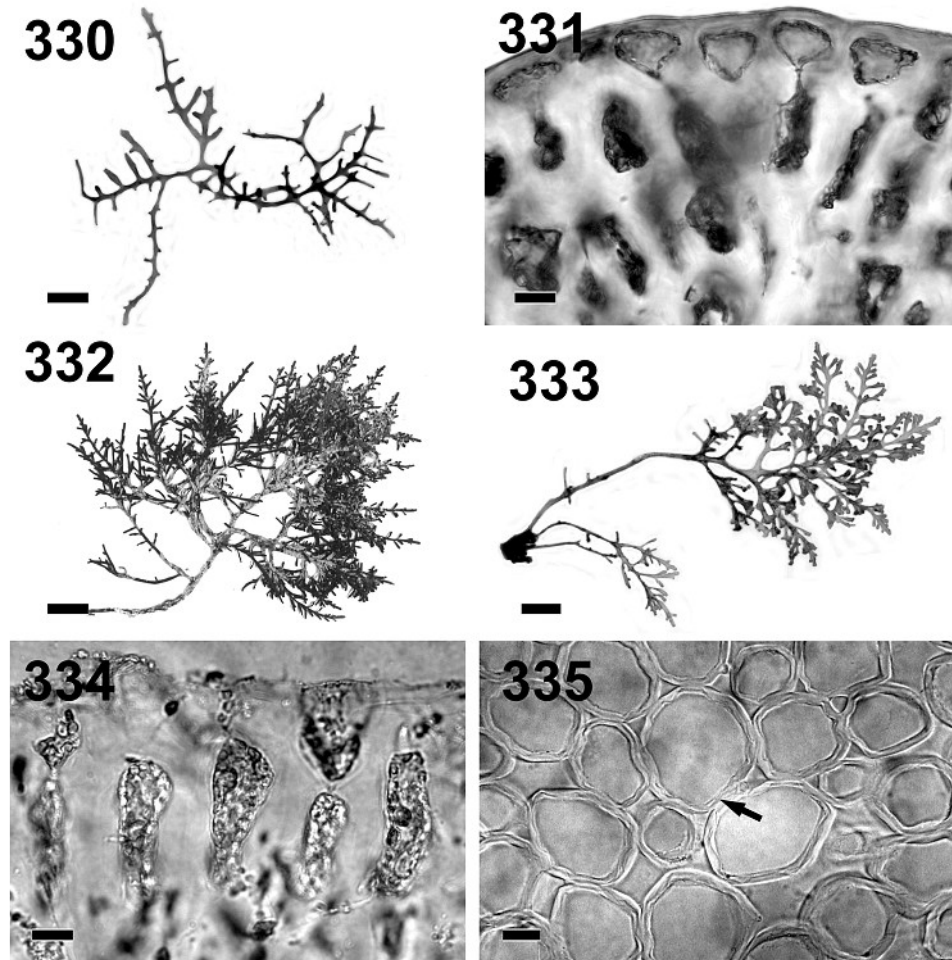
**Heterotypic synonym** (according to Wynne, 1995): *Laurencia pygmaea* Weber-van Bosse, 1913: 122, pl. 12: fig. 6 (type locality: Diego Garcia Atoll). Viêt Nam: Dawson, 1954: 458, fig. 62k; Malaysia: Yamagishi *et al.*, 2003: 542, figs 24-33.

**Material examined:** Iri Bay, Rapa, Australs, 16 Nov. 2002, leg. J. L. Menou, UPF 3250 RPS54, 3541.

Thallus 20-30 mm high, purplish red, forming decumbent, turf-like mats. Axes terete to subterete, 500-600  $\mu\text{m}$  in diameter, with secondary branches fusiform. Adheres well to paper when dry. Cortical cells  $10 \times 12 \mu\text{m}$ , flat-topped, not rounded. Medullary cells 40-50  $\mu\text{m}$  in diameter, with lenticular thickenings present.

**Remarks:** Found at a depth of 3 m. Wynne (1995) reduced *L. pygmaea* to a synonym of *L. decumbens*, but Yamagishi *et al.* (2003) prefer to maintain both species. In the absence of fertile material, the French Polynesian plants are tentatively placed in *L. decumbens* (the earlier name) based on the relative closeness to the type locality (New Caledonia), the presence of lenticular thickenings, and the flat-topped, non-protruding cortical cells.





Figs 330-335. **330.** *Laurencia decumbens*: habit of pressed plant (UPF 3541). Scale = 3 mm. **331.** *Laurencia decumbens*: transverse section of cortex, showing flat-topped cortical cells (UPF 3250). Scale = 10 μm. **332.** *Laurencia flexilis*: habit of pressed plant (UPF 702). Scale = 6 mm. **333.** *Laurencia glandulifera*: habit of pressed plant (UPF 3528). Scale = 5 mm. **334.** *Laurencia glandulifera*: transverse section of cortex, showing radially elongate cortical cells (UPF 3240). Scale = 10 μm. **335.** *Laurencia glandulifera*: uniformly thickened (arrow) medullary cells (UPF 3240). Scale = 10 μm.

*Laurencia flexilis* Setchell, 1926: 101, pl. 19 figs 1-6 (type locality: Reef at Taharaa Mountain, Tahiti, French Polynesia). French Polynesia: Payri *et al.*, 2000: 280; Mauritius: Børgesen, 1945: 56, figs 31-33; 1952: 66, fig. 33; Indian Ocean: Silva *et al.*, 1996: 510; Malaysia: Masuda *et al.*, 1999: 455, figs 29-34; Papua New Guinea: Littler & Littler, 2003: 152. **(Fig. 332)**

**Material examined:** Moorea, n.d., leg. E. Deslandes, UPF 532 S146; Tiahura, Moorea, 13 Jun. 1984, leg. C. E. Payri, UPF 2794, 2877; Trou du Souffleur, Papenoo, Tahiti, 18 Nov. 1995, leg. A. D. R. N'Yeurt, UPF 332; Temae, Moorea, 25 Nov. 1995, leg. A. D. R. N'Yeurt, UPF 333; Taharaa, Tahiti, 14 Apr. 1997, leg. A. D. R. N'Yeurt, UPF 336; Afaahiti, Tahiti,





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07 Jun. 1997, *leg. A. D. R. N'Yeurt*, UPF 335; Punaauia, Tahiti, 06 Jul. 1997, *leg. C. E. Payri*, UPF 334; Taharaa, Tahiti, 30 Mar. 1998, *leg. A. D. R. N'Yeurt*, UPF 702; Rurutu, Australs, 18 Aug. 2000, *leg. C. E. Payri*, UPF 729; Passe Miri Miri, Raiatea, 08 mar. 2003, *leg. C. E. Payri*, UPF 3946; Trou du Souffleur, Papenoo, Tahiti, 03 Mar. 2005, *leg. A. D. R. N'Yeurt & A. Pham*, UPF 2971; Taharaa, Tahiti, 27 Nov. 2005, *leg. A. D. R. N'Yeurt & A. Pham*, UPF 3134, 3156; Trou du Souffleur, Papenoo, Tahiti, 27 Nov. 2005, *leg. A. D. R. N'Yeurt & A. Pham*, UPF 3137, 3155.

Thallus to 80 mm high and 2-3 mm in diameter, dark purplish brown, cartilaginous but flexible. Main axes erect, terete and unbranched in lower portions but irregularly branched above, with short truncate side branchlets 0.51 mm long arranged in irregularly alternate to radial fashion around the distal portions of the axes. Cortical cells 12-30  $\mu\text{m}$  in diameter, radially elongate in loose palisade layer, flat-topped, not protruding. Secondary pit connections absent. Medullary cells 25-70  $\mu\text{m}$  in diameter, without lenticular thickenings. Does not adhere well to paper when dry.

**Remarks:** The most commonly found *Laurencia* species in French Polynesia, growing in dense clumps on rocks and wave benches close to the reef crest, in exposed habitats of the Society Group. To date unknown in the Tuamotu, Gambier and southern Australs.

\**Laurencia glandulifera* (Kützing) Kützing, 1849: 855. Indian Ocean: Silva *et al.*, 1996: 511; Hawaiian Islands: Abbott, 1999a: 386, fig. 112E-F; Fiji: N'Yeurt, 2001: 842, figs 226, 306, 307, 313, 315, 321; Littler & Littler, 2003: 153; South & Skelton, 2003: 739. **(Figs 333-335)**

**Basionym:** *Chondria glandulifera* Kützing, 1845: 329 (type locality: Trieste, Italy).  
**Material examined:** Akananue Bay, Rapa, Australs, 02 Nov. 2002, *leg. C. E. Payri*, UPF 3240 RPS44, 3528.

Thallus 50-60 mm high, with an unbranched lower portion about 1525 mm long arising from a discoid holdfast, and an irregularly alternately to distichously branched upper portion. Axes compressed to flattened, 600-850  $\mu\text{m}$  in diameter. Cortical cells radially elongate and flat-topped, 9-10  $\mu\text{m}$  in diameter; cortex rounded in some areas, but not projecting. Medullary cells 50-80  $\mu\text{m}$  in diameter, ovoid, uniformly thickened by about 5  $\mu\text{m}$ . Adheres well to paper when dry.

**Remarks:** Growing at a depth of 1-3 m, in *Sargassum* beds close to the shore. The long, unbranched lower axes and irregularly distichously densely branched upper portions are characteristic for this species.

*Neosiphonia* M.S. Kim *et* I.K. Lee

This genus, erected by Kim & Lee (1999), differs from *Polysiphonia* in having rhizoids cut off by a cross-wall from the pericentral cells, the production of lateral-branch initials and trichoblasts from successive segments in a spiral arrangement, three-celled carpogonial branches, spermatangial trichoblasts with a sterile lateral, and spiralled tetrasporangia. Further transfers to the genus were made by Abbott *et al.* (2002), Masuda & Kogame in Tani *et al.* (2003), Guimarães *et al.* (2004), Kim & Abbott (2006) and Skelton & South (2007). There are five species reported from French Polynesia.

**Key to the French Polynesian species of *Neosiphonia***

- 1a. Branch apices abruptly acute; axes 50-60  $\mu\text{m}$  in diameter . . . . . *N. apiculata*
- 1b. Branch apices not abruptly acute; axes more than 100  $\mu\text{m}$  in diameter . . . . . 2





- 2a. Thallus 60-100 mm high, usually of brackish water, slippery. . . *N. tongatensis*
- 2b. Thallus 4-50 µm high, not of brackish water or slippery . . . . . 3
- 3a. Median axes 350-500 µm in diameter, segments broader than long, apices tapered, paired and of unequal lengths . . . . . *N. ferulacea*
- 3b. Median axes 100-300 µm in diameter, segments longer than broad or isodiametric, with simple, unpaired erect axes . . . . . 4
- 4a. Thallus to 4 mm high, chiefly prostrate . . . . . *N. poko*
- 4b. Thallus to 10 mm high, chiefly erect . . . . . 5
- 5b. Thallus stiff, from a stilt-like holdfast; branching subdichotomous . . . . .  
. . . . . *N. sphaerocarpa*
- 5b. Thallus issued from a short prostrate axis; branching irregular. . . . *N. savatieri*

\**Neosiphonia apiculata* (Hollenberg) Masuda *et* Kogame *in* Tani *et al.*, 2003: 27, figs 12-25. **(Figs 336-338)**

**Basionym:** *Polysiphonia apiculata* Hollenberg, 1968a: 61, figs 1D, 8, 9 (type locality: O'ahu, Hawaii). Hawaiian Islands: Abbott, 1999a: 411, fig. 120C; Micronesia: Lobban & Tsuda, 2003: 78.

**Material examined:** Rikitea, Mangareva, Gambiers, 20 Nov. 2000, *leg. A. D. R. N'Yeurt*, UPF 859; Iri Bay, Rapa, 16 Nov. 2002, *leg. J. L. Menou*, UPF 3260 RPS61.

Thallus rigid, percurrent and erect, 8-10 mm high, with 4 pericentral cells. Axes ecorticate, 50-60 µm in diameter in basal portions, 20-30 µm in distal portions, pseudodichotomously branched, tapering abruptly at apices. Lateral branch initials produced from successive segments in a spiral manner. Rhizoids cut off from pericentral cells. Trichoblasts deciduous, produced in a spiral manner. Tetrasporangia 80-100 µm in diameter, in spiralled series of 5-8 in distal portion of axes. Spermatangial trichoblasts with a sterile lateral.

**Remarks:** Growing in intertidal turf, in the Gambier and southern Austral islands. *Polysiphonia apiculata* is characterized by branch apices that are abruptly acute to apiculate (Hollenberg, 1968). Tani *et al.* (2003) transferred this species to the genus *Neosiphonia* based on new observations from Malaysian material, notably the presence of spiralled tetrasporangia and spermatangial trichoblasts with a sterile lateral.

\**Neosiphonia ferulacea* (Suhr *ex* J. Agardh) Guimarães *et* Fujii *in* Guimarães *et al.*, 2004. **(Figs 339-340)**

**Basionym:** *Polysiphonia ferulacea* Suhr *ex* J. Agardh, 1863: 980 (type localities: Atlantic Mexico, North America, Guadeloupe, West Indies, Hawaiian Islands, Marquesas Islands, Australia).

**Heterotypic synonyms** (according to Skelton & South, 2007): *Lophosiphonia sparsa* Setchell, 1926: 103, pl. 21 figs 3, 4 (type locality: Arue Reef, Tahiti). *Neosiphonia hawaiiensis* (Hollenberg) M.S. Kim *et* I.A. Abbott, 2006: 34, figs 8-11. *Neosiphonia sparsa* (Setchell) I.A. Abbott *in* Abbott *et al.*, 2002: 312, figs 26-27. *Polysiphonia hawaiiensis* Hollenberg, 1968a: 66, figs 2F, 16, 41 (type locality: Waikiki, O'ahu, Hawai'i). French Polynesia: Hollenberg, 1968a: 67; Somalia: Silva *et al.*, 1996: 541; Hawaiian Islands: Abbott, 1999a: 416, fig. 122A-D. *Polysiphonia sparsa* (Setchell) Hollenberg, 1968a: 87, figs 5D, 23, 40. French Polynesia: Payri *et al.*, 2000: 288; Hawaiian Islands: Abbott, 1999a: 428, fig. 126E-F; Micronesia: Lobban & Tsuda, 2003: 79.

**Material examined:** Arue Reef, Tahiti, 27 Jun. 1922, *leg. W. A. Setchell & H. E. Parks*, UC 261144 (Holotype; tetrasporic); Arue, Tahiti, 15 Sep. 1952, *leg. M. S. Doty*, US D.12114.6 (as *Polysiphonia hawaiiensis*); Taapuna, Tahiti, 19 Sep. 1995,



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leg. A. D. R. N'Yeurt, UPF 477 S91; Punaauia, Tahiti, 10 Oct. 1995, leg. A. D. R. N'Yeurt, UPF 478 S92; Nengo Nengo, Jun. 1996, leg. J. M. Zanini, UPF 360, 547 S161; Rukuaga Point, Rapa, Australs, 30 Nov. 2002, leg. J. L. Menou, UPF 3197 RPS001.

Thallus to 6 mm high, brownish-red, consisting of erect, mostly alternately branched uncorticated axes 350-500 µm in diameter in median portions. Rhizoids ornately digitate, unicellular, separated from supporting pericentral cell by a cross-wall. Pericentral cells 4, characteristically wider than long, 110-120 × 90-100 µm. The branch tips are slightly curved adaxially, abruptly tapered in pairs of unequal lengths. Trichoblasts one per segment, 200-250 µm long, in spiral arrangement. Tetrasporangia to 80 µm in diameter, in spiral series of up to 12, embedded in the determinate axes. Gametophytes not seen.

**Remarks:** Growing on coral debris, at depths of 0.5-10 m. The second broadest *Neosiphonia* species in French Polynesia, *N. ferulacea* can be easily recognized by its pericentral cells which are wider than long, and the abruptly tapered paired apices of unequal length. The type material of *Lophosiphonia sparsa* Setchell in UC matches very well recent collections from Tahiti. According to Abbott (1999a: 428), *Polysiphonia ferulacea* Suhr ex J. Agardh might be conspecific with *N. sparsa*. However, according to Hollenberg (1968a: 87), *P. ferulacea* is a much larger plant, with longer segments, and has spermatangial branches with a characteristic sterile tip, a feature which was absent in Central Pacific plants collected (as *P. sparsa*) by Hollenberg and found by him to agree in vegetative characters with the tetrasporic type material of *L. sparsa* in UC. The presence or absence of a sterile tip on spermatangial branches was later found to be a variable character in Samoan plants (Skelton & South, 2007: 187, table 1) and both species were considered conspecific, along with *Neosiphonia hawaiiensis* and possibly *Polysiphonia blandii*. East Australian plants recorded as *Polysiphonia ferulacea* in Cribb (1983) and Price & Scott (1992: 202) have tetrasporangia in spiral series and spermatangial branches with a sterile lateral, thus placing them in *Neosiphonia*. *Polysiphonia ferulacea* from Brazil was transferred to *Neosiphonia* as *Neosiphonia ferulacea* (Suhr ex J. Agardh) Guimarães et Fujii in Guimarães et al. (2004), thus making *Neosiphonia ferulacea* (Suhr ex J. Agardh) Skelton et South (2007: 185) a superfluous combination.

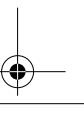
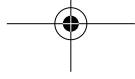
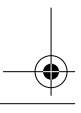
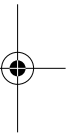
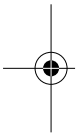
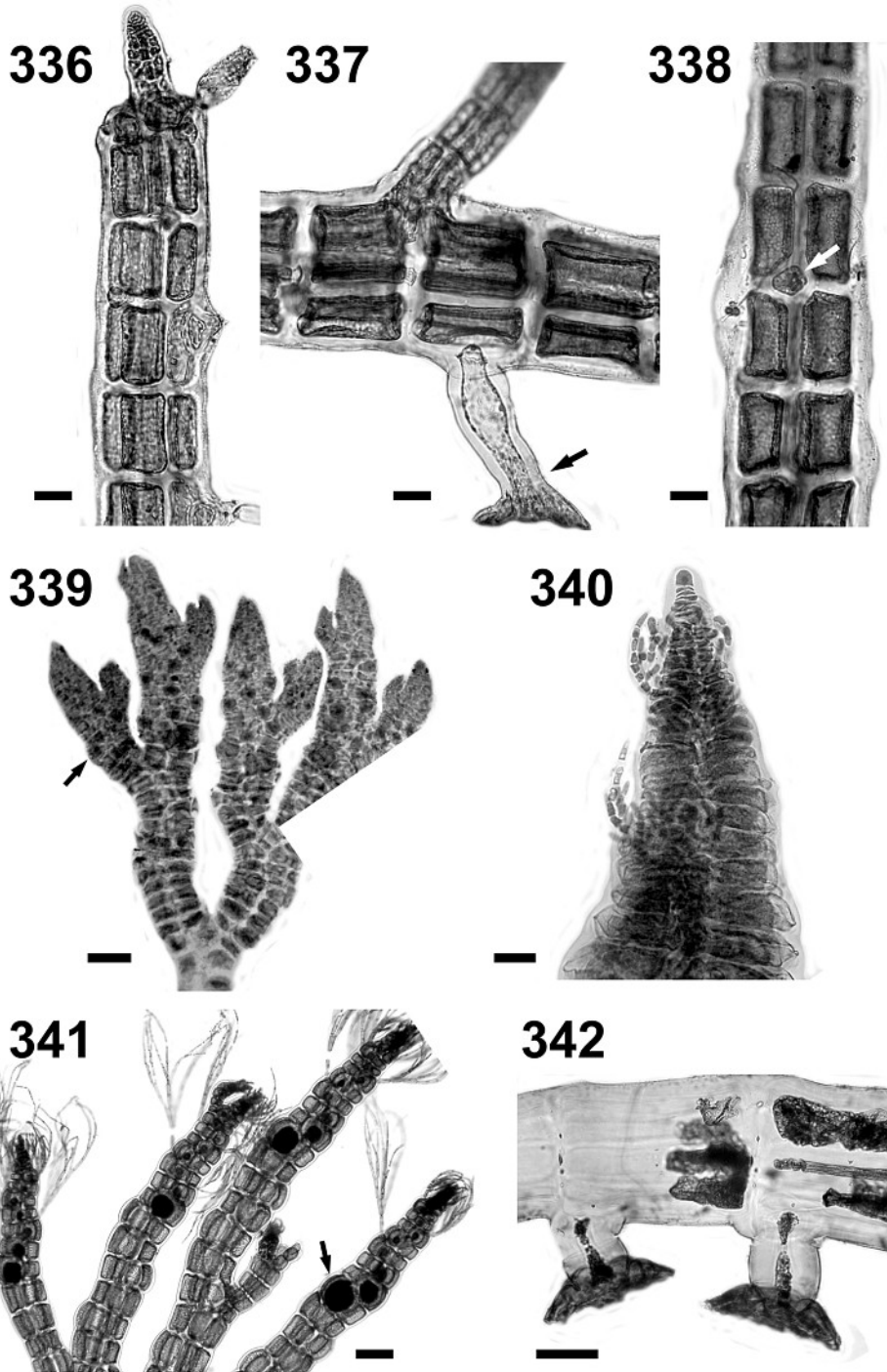
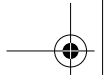
***Neosiphonia poko*** (Hollenberg) I.A. Abbott in Abbott et al., 2002: 312, figs 24-25 (Viêt Nam). **(Figs 341-342)**

**Basionym:** *Polysiphonia poko* Hollenberg, 1968a: 70, figs 3A, 15 (type locality: Johnston Atoll). French Polynesia: Hollenberg, 1968a: 70 (Raroia Atoll); Great Barrier Reef, Australia: Price & Scott, 1992: 209, fig. 76A-C; Hawaiian Islands: Abbott, 1999a: 421, fig. 123D-G; Micronesia: Lobban & Tsuda, 2003: 79.

**Material examined:** Tauna islet, Rapa, Australs, 27 Nov. 2002, leg. C. E. Payri, UPF 3327 RPS114.

Thallus to 4 mm high, ecorticate, with prostrate axes 200-210 µm in diameter, bearing mostly simple, erect determinate branches 100-130 µm in diameter. Pericentral cells 4, about 100 µm long. Rhizoids cut off from pericentral cells by a cross-wall. Trichoblasts numerous in distal portions of determinate axes, deciduous and lateral, to 500 µm long. Tetrasporangia 40-80 µm in diameter, spirally arranged in distal regions of determinate axes.

**Remarks:** Growing at a depth of 20 m, on the inner reef slope. Kraft & Abbott (2002) described a new genus of minute red algal parasite (*Neotenophycus ichthyosteus*) infecting *N. poko* plants from Johnston Atoll.



*Neosiphonia savatieri* (Hariot) M.S. Kim *et* I.K. Lee in Kim & Lee, 1999: 279. Micronesia: Lobban & Tsuda, 2003: 78; Samoa: Skelton & South, 2007: 189, figs 519-524.

**Basionym:** *Polysiphonia savatieri* Hariot, 1891: 226 (type locality: Yokosuka, Japan). French Polynesia: Hollenberg, 1968a: 77, figs 37, 38; Hawaiian Islands: Abbott, 1999a: 424, fig. 125B.

**Material examined:** Otetou, Raroia, 21 Aug. 1952, *leg. M. S. Doty & J. Newhouse*, US D.11858.3 (spermatangial), US D.118860B (tetrasporic).

Thallus to 10 mm high, with a short basal creeping portion about 200  $\mu$ m in diameter, ecorticate, giving rise to erect axes 80-140  $\mu$ m. Pericentral cells 4, 100-140  $\mu$ m long. Rhizoids unicellular, cut off by a cross-wall from the parent cell. Trichoblasts one per segment, about 100-140  $\mu$ m long. Tetrasporangia 50-60  $\mu$ m in diameter, in spiral series in swollen distal portions of erect branches. Cystocarps globular to urceolate, 130-220  $\mu$ m in diameter. Spermatangial branches sometimes with a sterile tip (Hollenberg, 1968a).

**Remarks:** Not recollected in French Polynesia since 1952. *Polysiphonia savatieri* was considered a variety of *P. japonica* Harvey by Yoon (1986), but Hollenberg (1968a), Abbott (1999a) and Skelton & South (2007) were of the opinion that the Hawaiian / Central Pacific populations were a different entity, possibly a variety of *Polysiphonia sphaerocarpa* Børgesen. The latter species, along with *P. savatieri*, were transferred to the genus *Neosiphonia* by Kim & Lee (1999) based on the presence of spiralled tetrasporangia, rhizoids cut off by a cross-wall, and the presence of a sterile tip in spermatangial stichidia.

*Neosiphonia sphaerocarpa* (Børgesen) M.S. Kim *et* I.K. Lee in Kim & Lee, 1999: 280. Viêt Nam: Abbott *et al.*, 2002: 312; Micronesia: Lobban & Tsuda, 2003: 78.

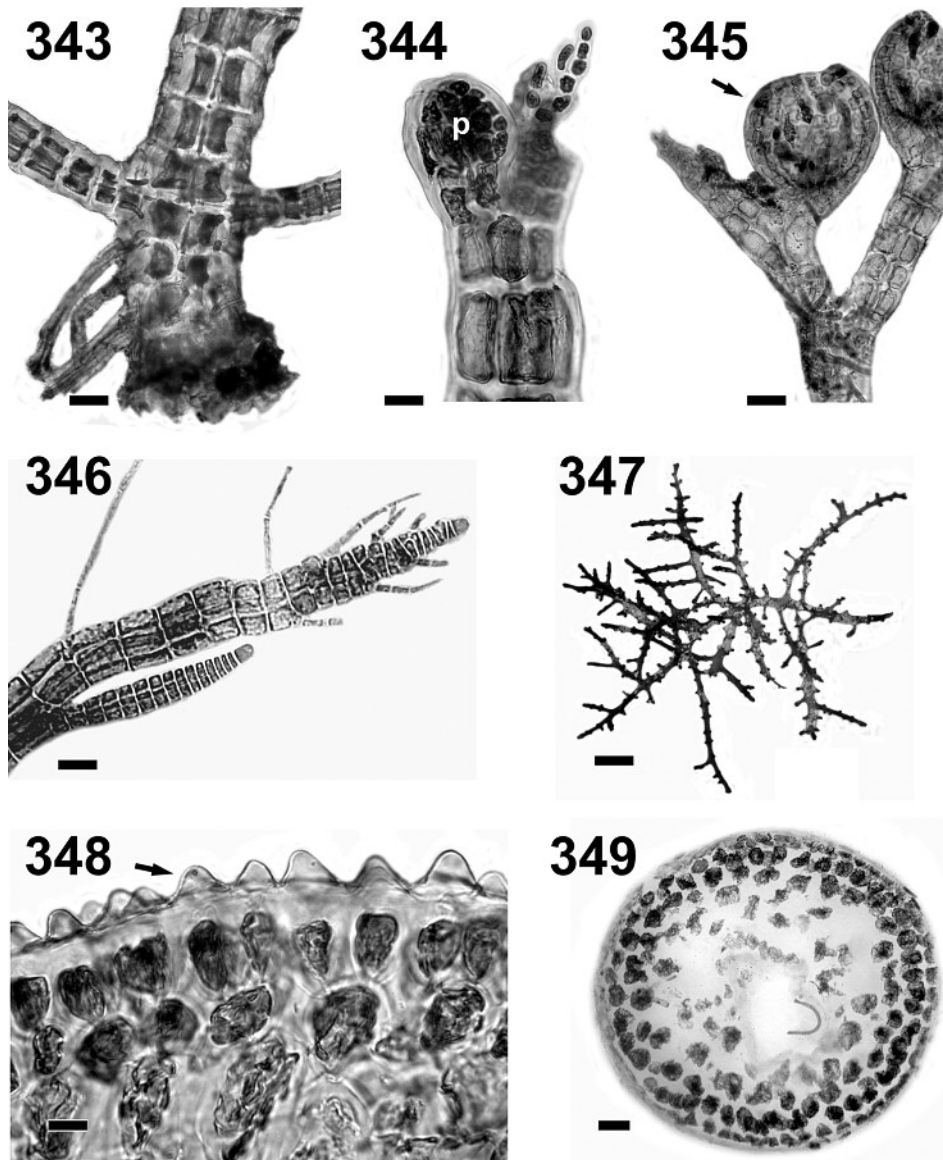
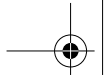
(Figs 343-345)

**Basionym:** *Polysiphonia sphaerocarpa* Børgesen, 1918: 321, figs 267-271 (type locality: St. Thomas, Virgin Islands). French Polynesia, Samoa, Kiribati, Micronesia: Hollenberg, 1968a: 87, figs 21, 26; Mauritius: Børgesen, 1954: 38, figs 16-17; Curaçao: Stegenga & Vroman, 1988: 307, figs 27-28; Australia: Millar, 1990: 446, fig. 66A-E; Price & Scott, 1992: 212, fig. 78A-D; Maldives, Seychelles: Silva *et al.*, 1996: 405; Hawaiian Islands: Abbott, 1999a: 428, fig. 127A-G.

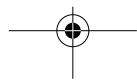
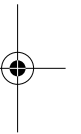
**Material examined:** Rukuaga Pt., Rapa, 30 Nov. 2002, *leg. J. L. Menou*, UPF 3281 RPS78; Rapa, 04 Nov. 2002, *leg. C. E. Payri*, UPF 3419 RPS203.

Thallus to 10 mm high, ecorticate, chiefly erect and stiff from a complex stilt-like holdfast composed of unicellular rhizoids, lacking a developed prostrate axis, with a basal diameter of about 400  $\mu$ m, becoming 250-280  $\mu$ m in median portions, and 100-150  $\mu$ m in distal areas. Pericentral cells 4, segments 1-1.5 diameters long. Branching subdichotomous to flabellate. Trichoblasts 100-300  $\mu$ m long, one per segment. Tetrasporangia 70-80  $\mu$ m in diameter, in spiral series. Cystocarps prominent, urceolate, 200-300  $\mu$ m in diameter.

- ◀ Figs 336-342. **336.** *Neosiphonia apiculata*: branch apex (UPF 3260). Scale = 10  $\mu$ m. **337.** *Neosiphonia apiculata*: creeping axis with rhizome (arrow) (UPF 3260). Scale = 20  $\mu$ m. **338.** *Neosiphonia apiculata*: erect axis with trichoblast scar (arrow) (UPF 3260). Scale = 10  $\mu$ m. **339.** *Neosiphonia ferulacea*: habit of Tahitian plant (type of *Lophosiphonia sparsa*, UC 261144), showing embedded tetrasporangia (arrow). Scale = 200  $\mu$ m. **340.** *Neosiphonia ferulacea*: branch apex showing abrupt tapering to apical cell (UPF 478). Scale = 20  $\mu$ m. **341.** *Neosiphonia poko*: determinate axes with spiralled tetrasporangia (arrow) (UPF 3327). Scale = 100  $\mu$ m. **342.** *Neosiphonia poko*: prostrate axis with short pad-like attachment rhizomes (UPF 3327). Scale = 100  $\mu$ m.



Figs 343-349. **343.** *Neosiphonia sphaerocarpa*: stilt-like holdfast region (UPF 3419). Scale = 130  $\mu$ m. **344.** *Neosiphonia sphaerocarpa*: procaryp on female axis (UPF 3419). Scale = 50  $\mu$ m. **345.** *Neosiphonia sphaerocarpa*: mature cystocarp (arrow) (UPF 3419). Scale = 100  $\mu$ m. **346.** *Neosiphonia tongatensis*: habit (UPF 476). Scale = 100  $\mu$ m. **347.** *Palisada parvipapillata*: habit of pressed plant (UPF 3120). Scale = 4 mm. **348.** *Palisada parvipapillata*: transverse section of cortex (UPF 3120) showing projecting cortical cell (arrow). Scale = 20  $\mu$ m. **349.** *Palisada perforata*: transverse section of thallus (UPF 562), showing absence of lenticular thickening in medulla. Scale = 20  $\mu$ m.





**Remarks:** Growing at depths of 1-10 m, in *Sargassum* beds. The stiff, erect habit and subdichotomous branching of this species is characteristic.

***Neosiphonia tongatensis*** (Harvey ex Kützing) M.S. Kim *et* I.K. Lee *in* Kim & Lee, 1999: 280. Micronesia: Lobban & Tsuda, 2003: 78. **(Fig. 346)**

**Basionym:** *Polysiphonia tongatensis* Harvey *ex* Kützing, 1864: 14, pl. 41: figs a-d (type locality: Tonga). French Polynesia: Setchell, 1926: 102; Viêt Nam: Dawson, 1954: 454, fig. 60d-e; Hawaiian Islands: Abbott, 1999a: 431, fig. 128D-E.

**Misapplied names:** *Polysiphonia mollis* J.D. Hooker *et* Harvey. Hollenberg, 1968a: 69 (not fig. 43). *Polysiphonia sertularioides* (Grateloup) J. Agardh, 1863: 969. French Polynesia: Payri *et al.*, 2000: 286.

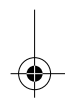
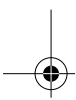
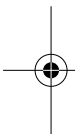
**Material examined:** Port Phaeton, Tahiti, 24 Jun. 1922, *leg. W. A. Setchell & H. E. Parks*, UC 261338 (examined by G. J. Hollenberg); Taapuna, Tahiti, 19 Sep. 1995, *leg. A. D. R. N'Yeurt*, UPF 476 S90; Hotel Beachcomber, Faa'a, Tahiti, 13 Apr. 1997, *leg. A. D. R. N'Yeurt*, UPF 358, 548 S162; Punaauia, Tahiti, 16 May 1997, *leg. A. D. R. N'Yeurt*, UPF 359; Punaauia, Tahiti, 15 Sep. 1997, *leg. C. E. Payri*, UPF 475 S89; Rikitea, Mangareva, Gambiers, 16 Nov. 2000, *leg. A. D. R. N'Yeurt*, UPF 850; Pinnacle Sofitel, Bora Bora, 15 Aug. 2002, *leg. A. D. R. N'Yeurt & Denis Schneider*, UPF 2493; Aquarium, Bora Bora, 15 Aug. 2002, *leg. A. D. R. N'Yeurt & Denis Schneider*, UPF 2509, 2510, 2511.

Thallus to 3-10 cm high, brownish red, soft and slippery, forming mostly erect, flexuous fleecy tufts. Basal portions 300-350 µm in diameter, ecorticate, giving rise to pseudodichotomously branched erect axes 120-180 µm in diameter in median to distal portions. Rhizoids unicellular, with simple or sucker-like tips, separated by a cross-wall from the parent cell. Pericentral cells 4, 140-350 µm long. Trichoblasts one per segment, in spiral arrangement, 100-250 µm long. Tetrasporangia borne in spiral series in swollen distal areas of erect branches; cystocarps to 300 µm in diameter, globose and cup-shaped, borne on the side of erect branches.

**Remarks:** Forming fleecy purplish-red tufts growing on rocks, pebbles and other surfaces in calm, often brackish waters of estuaries, bays and breakwaters of high islands in the Society and Gambiers groups, it is the largest and most conspicuous *Polysiphonia* species in the flora. This species was not recollected in Tahiti since Setchell and Park's visit in 1922. The latter record was interpreted as *P. mollis* by Hollenberg (1968a), but it was later shown to differ from authentic *P. mollis* material from south-eastern Australia by Womersley (1979), and hence returned to *P. tongatensis*. Isotype collections of *P. tongatensis* were examined in detail by Stegenga & Vroman (1988).

### ***Palisada*** Nam

The genus *Palisada* [formally validated by Nam (2007) based on molecular and morphological data in Nam (2006)] was separated from *Laurencia* on the basis of an apical cell which is always sunk in an apical pit; a central axis recognizable only near the apical cell; the formation of an extensive cortex; vegetative axial segments with two pericentral cells; spermatangial branches produced from one of two laterals on suprabaasal cell of trichoblasts; procarp-bearing segments with four or five pericentral cells; auxiliary cells normally formed after fertilization; tetrasporangial production from particular pericentral cells and a tetrasporangial axis with one sterile pericentral cell with the second pericentral cell being fertile. Three species occur in French Polynesia.





**Key to the French Polynesian species of *Palisada***

- 1a. Axes compressed, more than 1 mm wide; outermost cortical cells projecting . . . . . *P. parvipapillata*
- 1b. Axes terete, usually less than 1 mm wide; cortical cells not projecting . . . . . 2
  - 2a. Thallus encrusting, less than 15 mm high; cortical cells flat-topped . . . . . *P. perforata*
  - 2b. Thallus lax, 30-50 mm high; cortical cells elongate . . . . . *P. yamadana*

**\**Palisada parvipapillata*** (C.K. Tseng) K.W. Nam, 2007: 54. **(Figs 347-348)**

**Basionym:** *Laurencia parvipapillata* C. K. Tseng, 1943: 204, pl. IV (type locality: Cape d'Aguilar, Hong Kong). Viêt Nam: Dawson, 1954: 458, fig. 61g; Marshall Islands: Dawson, 1957a: 124; Indian Ocean: Silva *et al.*, 1996: 518; Japan, Viêt Nam, Malaysia: Masuda *et al.*, 1997; Hawaiian Islands: Abbott, 1999a: 391, fig. 114A-B; Fiji: N'Yeurt, 2001: 842, figs 309-312, 318.

**Homotypic synonym:** *Chondrophycus parvipapillatus* (C.K. Tseng) Garbary *et* J. Harper, 1998: 195. Philippines: Kraft *et al.*, 1999: 23; Fiji: Littler & Littler, 2003: 148; South & Skelton, 2003: 738.

**Material examined:** Motu Martin, Mahina, 15 Oct. 2003, *leg.* A. D. R. N'Yeurt, UPF 3120.

Thallus cartilaginous, up to 4 cm high and 2.5 mm wide, strongly compressed and pinnately branched with short compressed knobby laterals. Colour purplish-green, not adhering well to paper when dry. Cortex composed of markedly projecting outermost cells up to 21 µm broad and 57 µm long, elongated radially, in a palisade layer. Innermost cortical cells subspherical, 25-30 µm in diameter with frequent secondary pit-connections. Medullary cells subspherical, lenticular thickenings absent. *Corps en cerise* absent. Reproduction not seen.

**Remarks:** Growing on the fringing reef, 0.5 m depth on coral debris, so far in French Polynesia only known offshore from north-western Tahiti Island. The projecting tangential walls of the outer cortical cells impart a characteristic saw-tooth like appearance in cross-section. The characteristics of this species (as *Laurencia parvipapillata*) were outlined in detail by Masuda *et al.* (1997).

**\**Palisada perforata*** (Bory de Saint-Vincent) K.W. Nam, 2007: 54. **(Fig. 349)**

**Basionym:** *Fucus perforatus* Bory de Saint-Vincent, 1803: 305, pl. V: fig. 1 (type locality: Santa Cruz de Tenerife, Canary Islands).

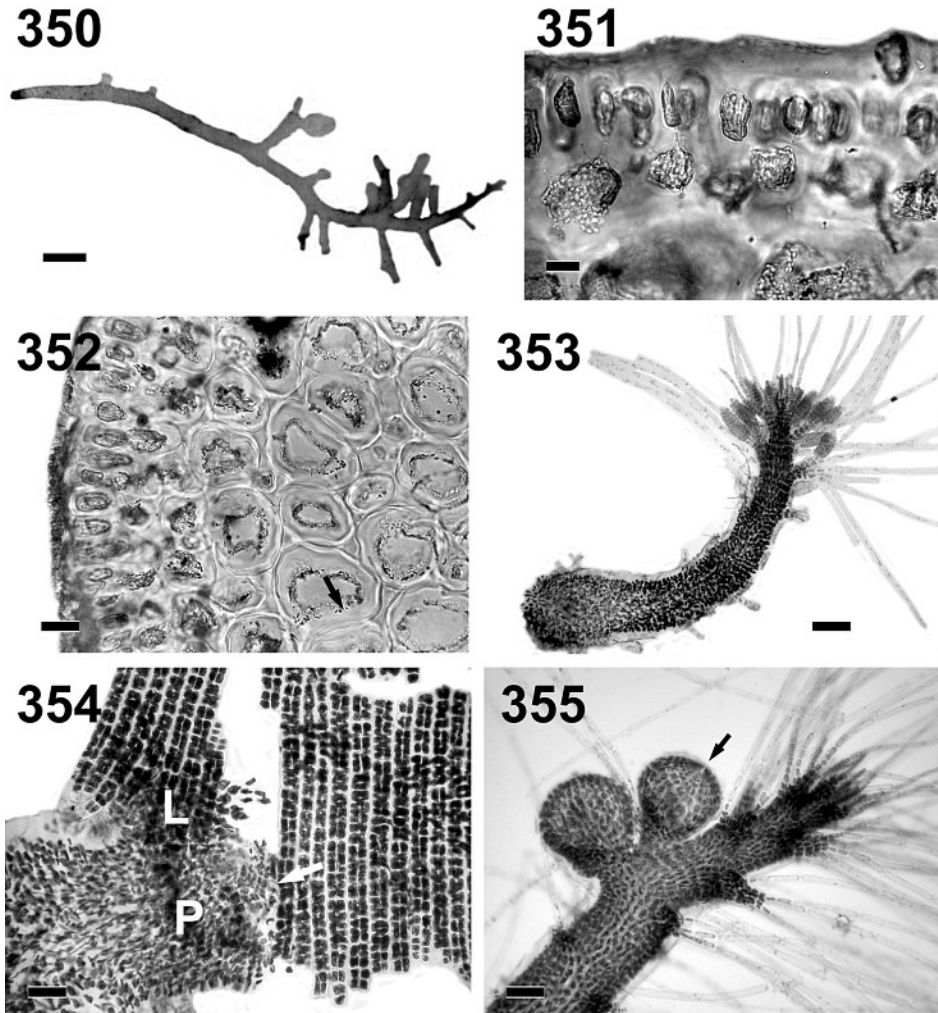
**Homotypic synonyms:** *Chondrophycus perforatus* (Bory de Saint-Vincent) K.W. Nam, 1999: 463 ('*perforata*'). Fiji: South & Skelton, 2003: 738; Tanzania: Oliveira *et al.*, 2005: 139. *Laurencia perforata* (Bory de Saint-Vincent) Montagne, 1840: 155. Great Barrier Reef, Australia: Price & Scott, 1992: 189, fig. 68A-D; Indian Ocean: Silva *et al.*, 1996: 519; Canary Islands: Masuda *et al.*, 1998: 274, figs 25-33.

**Material examined:** Entre deux Baies, Moorea, 14 Dec. 1995, *leg.* J. Orempuller & A. D. R. N'Yeurt, UPF 562 S176.

Thallus minute, rigid cartilaginous, to 15 mm high, with arcuate, secund, terete to subterete, sparsely branched axes 600-700 µm in diameter arising from a crust-like holdfast. Cortical cells flat-topped, not rounded, 12-20 µm in diameter, in a palisade layer, lacking secondary pit-connections. Medullary cells 40-60 µm in diameter, without lenticular thickenings.

**Remarks:** Forming turf on coral debris, at a depth of 10 m. Plants of this species from Australia (Price & Scott, 1992) have some protruding cortical cells, but these were not seen in the Moorea material and are not described for plants from other localities.





Figs 350-355. **350.** *Palisada yamadana*: habit of pressed plant (UPF 3613). Scale = 3 mm. **351.** *Palisada yamadana*: transverse section of cortex showing cells in a palisade layer (UPF 3613). Scale = 10  $\mu$ m. **352.** *Palisada yamadana*: transverse section of axis showing uniformly-thickened medullary cells (arrow) (UPF 3613). Scale = 50  $\mu$ m. **353.** *Phaeocolax kajimurae*: overall habit of tetrasporic plant (UPF 3200). Scale = 200  $\mu$ m. **354.** *Phaeocolax kajimurae*: detail showing attachment point (arrow) of *Phaeocolax* (P) to *Lobophora* host (L) (UPF 3200). Scale = 100  $\mu$ m. **355.** *Phaeocolax kajimurae*: apical region of female plant (UPF 3258) showing cystocarp (arrow). Scale = 200  $\mu$ m.

\**Palisada yamadana* (M. Howe) K.W. Nam, 2007: 54.

(Figs 350-352)

**Basionym:** *Laurencia yamadana* M. Howe, 1934: 37-38, fig. 4 (type locality: Kaneohe Bay, Oahu, Hawaiian Islands). Hawaiian Islands: Abbott, 1999a: 394, fig. 115C-D.

**Homotypic synonym:** *Chondrophyucus yamadanus* (M. Howe) K.W. Nam, 1999: 463.



**Material examined:** Rapa Island, Australs, 04 Nov. 2002, *leg. C. E. Payri*, UPF 3428 RPS 206, 3613.

Thallus 30-50 mm high, with terete main axes 900-1000  $\mu\text{m}$  in diameter, tapering towards the apex. Branching pinnate to bipinnate or radial, with secondary branchlets short and sometimes knob-like, 3-5 mm long. Adheres well to paper on drying. Cortical cells elongate, 8-10  $\times$  13-15  $\mu\text{m}$ , in a palisade layer, not rounded, without secondary pit-connections. Medullary cells 50-70  $\mu\text{m}$  in diameter, with uniformly thickened cell walls.

**Remarks:** Growing at water-line level on steep cliffs. The large diameter, tapered axes and uniformly thickened medullary cells are characteristic of this species.

### *Phaeocolax* Hollenberg

\**Phaeocolax kajimurae* Hollenberg, 1967: 211, fig. 2A-D ("*kajimurai*") (type locality: Diamond Head Beach, Oahu, Hawaii). Hawaiian Islands: Abbott, 1999a: 408, fig. 119H-I. **(Figs 353-360)**

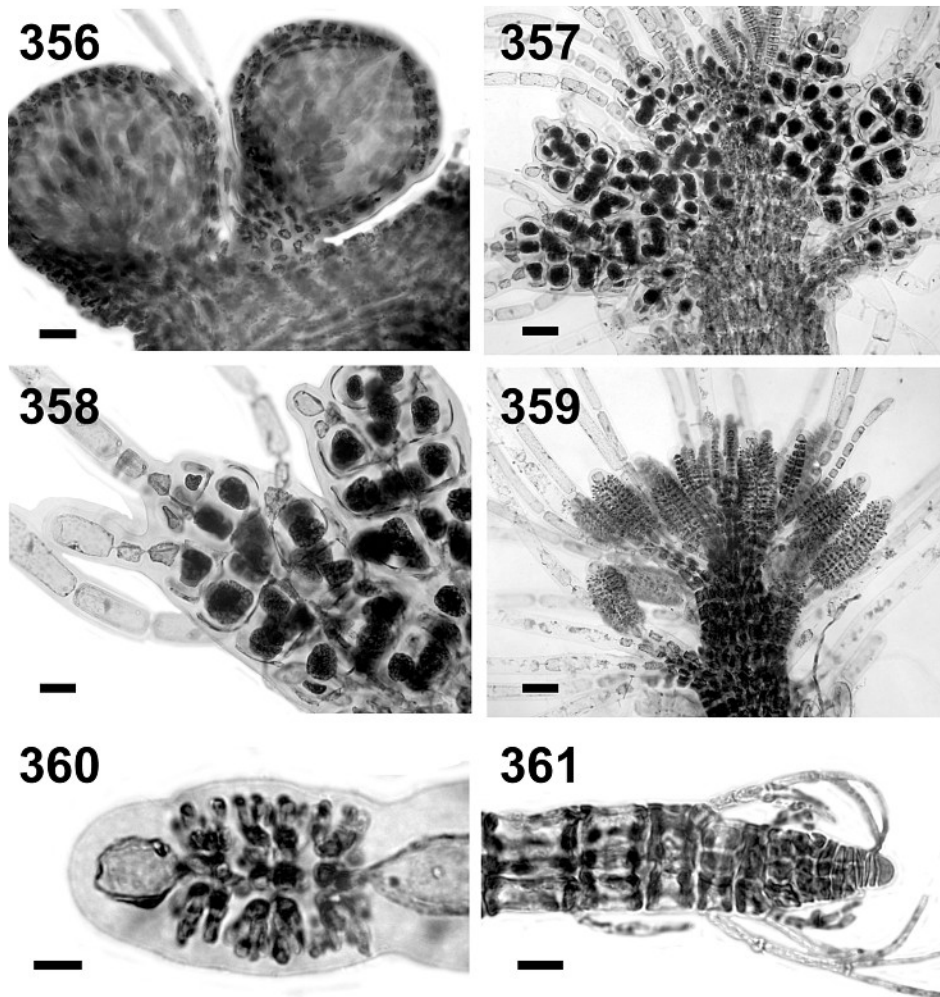
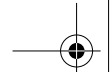
**Material examined:** Iri Bay, Rapa, Australs, 16 Nov. 2002, *leg. J. L. Menou*, UPF 3258 RPS60; Rukuaga Point, Rapa, 30 Nov. 2002, *leg. J. L. Menou*, UPF 3200 RPS04.

Plants minute and epiphytic, polysiphonous, growing attached to, but not penetrating the host brown alga (*Lobophora variegata* (J. V. Lamouroux) Womersley *ex* E. C. Oliveira). Thallus to 2.2 mm high and 400  $\mu\text{m}$  wide, simple or with few conical polysiphonous lateral branchlets, with a bulbous base and tapered apex, and usually markedly curved mid-axis. The bulbous base of the plant is deeply pigmented, with multiple secondary pit connections. Cells issued from the base of the thallus displace the surface cells of the host by splicing upper epidermal layers, to attain attachment. Numerous radially arranged trichoblasts 1-3 mm long and 10-20  $\mu\text{m}$  in diameter occur in apical regions of the thallus; cells of trichoblasts are 20-150  $\mu\text{m}$  in length and nearly quadrate in lower proximal regions. Male plants smallest, 1500-1700  $\mu\text{m}$  high and 150-200(300)  $\mu\text{m}$  in diameter. Spermatia about 1  $\mu\text{m}$  in diameter, on cob-shaped subterminal spermatangial heads 40-50  $\mu\text{m}$  in diameter and 90-150  $\mu\text{m}$  long, with a one- or two-celled pedicel and one-celled sterile tip, replacing entire trichoblasts. Tetrasporic plants largest, 2000-2300  $\mu\text{m}$  long and 270-350(400)  $\mu\text{m}$  in diameter. Tetrasporangia 20-30  $\mu\text{m}$  in diameter, in rows of 4-5(8) and up to 8 tiers, located in non-stichidial branchlets 100-140(170)  $\mu\text{m}$  in diameter and 200-350  $\mu\text{m}$  long. Female plants intermediate, 2000-2300  $\mu\text{m}$  long and 200-320(350)  $\mu\text{m}$  in diameter. Cystocarps spherical, 200-500  $\mu\text{m}$  in diameter, lateral and subterminal on branchlets; apex low conical with a small ostiole. Carposporangia laciniöse, 40-50  $\mu\text{m}$  long and 8-10  $\mu\text{m}$  in diameter.

**Remarks:** Epiphytic on *Lobophora variegata*, at depths of 3-10 m. All reproductive stages were found to co-exist. This is the first report of this distinctive minute species outside of the Hawaiian type locality. Considering the host-specificity of this species to *Lobophora variegata* in Hawaii and Rapa Island, two widely opposite localities of the Polynesian Triangle, populations of *Lobophora* in intervening localities need to be examined more thoroughly for the presence of *P. kajimurae*.

### *Polysiphonia* Greville

A genus of some 208 species worldwide (Guiry & Guiry, 2008), it is a frequent component of turf in many localities. *Polysiphonia* is characterized by rare or absent trichoblasts, non-septate rhizoids, spermatangial branches not normally subtended by trichoblasts, tetrasporangia occurring in non-spiralled,

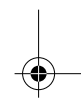
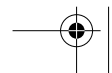
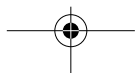
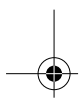
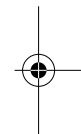


Figs 356-361. **356.** *Phaeocolax kajimurae*: mature cystocarps (UPF 3258). Scale = 50  $\mu$ m. **357.** *Phaeocolax kajimurae*: apical region of tetrasporic plants, showing numerous non-stichidial branchlets (UPF 3200). Scale = 100  $\mu$ m. **358.** *Phaeocolax kajimurae*: detail of tetrasporangial branchlets (UPF 3200). Scale = 30  $\mu$ m. **359.** *Phaeocolax kajimurae*: apical region of male plant, with numerous spermatangial branchlets (UPF 3258). Scale = 100  $\mu$ m. **360.** *Phaeocolax kajimurae*: cob-shaped subterminal spermatangial head (UPF 3258). Scale = 5  $\mu$ m. **361.** *Polysiphonia delicatula*: apical region of determinate branchlet (UPF 3204). Scale = 20  $\mu$ m.

straight rows and female plants with a four-celled carpogonial branch (Kim *et al.*, 2000). With six species in the French Polynesian flora.

**Key to the French Polynesian species of *Polysiphonia***

- 1a. Plants with 4 pericentral cells only .....2
- 1b. Plants with 5-10 pericentral cells. ....5





- 2a. Erect determinate axes 40-70  $\mu\text{m}$  long . . . . . 3
- 2b. Erect determinate axes 90-140  $\mu\text{m}$  long . . . . . 4
- 3a. Thallus to 5 mm high; delicate . . . . . *P. delicatula*
- 3b. Thallus to 10 mm high; coarse . . . . . *P. scopulorum*
- 4a. Branching delayed and cicatrigenous, from scar cells . . . . . *P. herpa*
- 4b. Branching exogenous, independent of trichoblasts . . . . . *P. upolensis*
- 5a. Thallus to 6 mm high; with 8-10 pericentral cells; rhizoids in broad connection to supporting pericentral cell . . . . . *P. dotyi*
- 5b. Thallus to 30 mm high; with 5 pericentral cells; rhizoids pit-connected to supporting pericentral cell. . . . . *P. homoia*

***Polysiphonia delicatula*** Hollenberg, 1968a: 62, fig. 1F (type locality: Pokai Bay, O'ahu, Hawaii). French Polynesia: Hollenberg, 1968a: 63; Seychelles: Wynne, 1995: 316; Schneider & Searles, 1998: 32, fig. 17; Hawaiian Islands: Abbott, 1999a: 412, fig. 120E; Micronesia: Lobban & Tsuda, 2003: 78. **(Fig. 361)**

**Material examined:** Rukuaga Point, Rapa, Australs, 30 Nov. 2002, leg. J. L. Menou, UPF 3204 RPS8.

Thallus delicate, to 5 mm high, mostly consisting of prostrate axes 70-80  $\mu\text{m}$  in diameter, ecorticate, with 4 pericentral cells. Erect determinate branchlets 40-70  $\mu\text{m}$  in diameter and up to 2.3 mm long, with delicate, short, rapidly deciduous trichoblasts to 230  $\mu\text{m}$  long, in a spiral sequence, leaving many scar cells in distal portions of thallus. Fertile material not seen.

**Remarks:** Growing at a depth of 10 m, at the base of cliffs. The delicate plants with very long determinate axes are characteristic of this species.

***Polysiphonia dotyi*** Hollenberg, 1968b: 198, figs 1A-B, 4-5 (type locality: Amen Island, Bikini Atoll, Marshall islands). French Polynesia: Payri *et al.*, 2000: 284; Micronesia: Lobban & Tsuda, 2003: 78. **(Figs 362-363)**

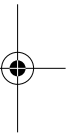
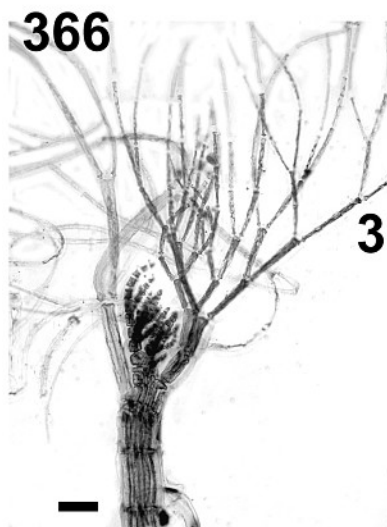
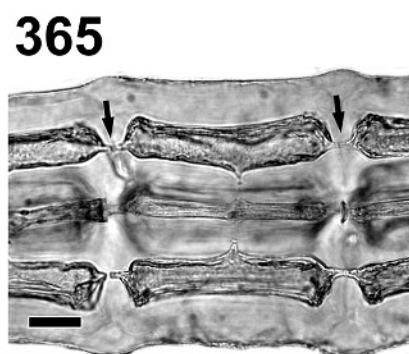
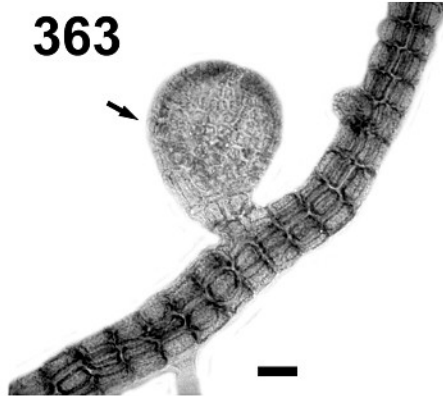
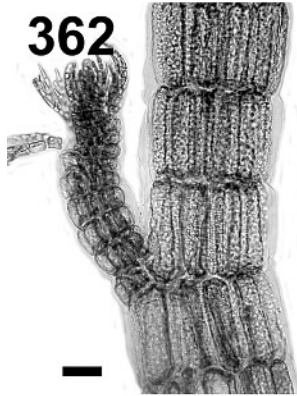
**Material examined:** Motu aux Oiseaux, Tikehau, 05 Nov. 1995, leg. A. D. R. N'Yeurt, UPF 470 S84, 471 S85.

Thallus to 5-6 mm high, pinkish, consisting of sparsely branched prostrate axes 130-150  $\mu\text{m}$  in diameter, bearing erect determinate axes 100-120  $\mu\text{m}$  in diameter. Pericentral cells 8-10, offset. Rhizoids unicellular and ornately digitate, 40-80  $\mu\text{m}$  in diameter and 200-450  $\mu\text{m}$  long, with a unique broadly open connection to the supporting pericentral cell. Trichoblasts rudimentary, to 1 mm long. Cystocarps subglobose, 200-300  $\mu\text{m}$  in diameter, lateral on determinate branchlets.

**Remarks:** Epiphytic on *Halimeda* spp. in lagoons, at a depth of 20 meters. The prominent rhizoids in broad connection with the offset pericentral cells are unique

Figs 362-369. **362.** *Polysiphonia dotyi*: detail of main axis with branchlet (UPF 471). Scale = 30  $\mu\text{m}$ . **363.** *Polysiphonia dotyi*: subglobose cystocarp on determinate branchlet (UPF 471). Scale = 100  $\mu\text{m}$ . **364.** *Polysiphonia homoia*: apical region of determinate axis (UPF 3420). Scale = 40  $\mu\text{m}$ . **365.** *Polysiphonia homoia*: detail of pericentral cells showing characteristic lateral pit-connections (arrows) (UPF 3420). Scale = 20  $\mu\text{m}$ . **366.** *Polysiphonia scopulorum*: apical region of determinate branchlet (UPF 507). Scale = 50  $\mu\text{m}$ . **367.** *Polysiphonia scopulorum*: spermatangial branches (UPF 474). Scale = 40  $\mu\text{m}$ . **368.** *Polysiphonia scopulorum*: straight series of tetrasporangia in determinate axis (UPF 472). Scale = 40  $\mu\text{m}$ . **369.** *Polysiphonia scopulorum*: mature cystocarp (UPF 473). Scale = 40  $\mu\text{m}$ .





features of this species among others in French Polynesia. Female plants are reported first from the present study.

***Polysiphonia herpa*** Hollenberg, 1968a: 68, figs. 1I, 2G (type locality: Near Otetou, Raroia Atoll, Tuamotu Archipelago). Australia: Price & Scott, 1992: 204, fig. 74A-B; Hawaiian Islands: Abbott, 1999a: 417, fig. 122E; Fiji: South & Skelton, 2003: 740; Micronesia: Lobban & Tsuda, 2003: 79.

**Homotypic synonym:** *Womersleyella herpa* (Hollenberg) R.E. Norris, 1992a: 70

**Material examined:** Otetou, Raroia Atoll, 21 Aug. 1952, leg. M. S. Doty & J. Newhouse, US D.11857.2.

Thallus reddish brown, chiefly prostrate ecorticate axes 100-140  $\mu\text{m}$  in diameter; erect determinate axes to 3 mm high and 90  $\mu\text{m}$  in diameter, arising cicatrigenously delayed from scar-cells. Pericentral cells 4, 60-140  $\mu\text{m}$  long, almost isodiametric. Rhizoids large, cut off by a cross-wall from supporting pericentral cell. Trichoblasts one per segment, minimally developed and deciduous, to 1.3 mm long. Reproductive structures unknown (Hollenberg, 1968a).

**Remarks:** This alga, characterised by its isodiametric pericentral cells and delayed branching, has not been recollected in French Polynesia since Doty and Newhouse's visit in 1952. Previously transferred to the genus *Womersleyella* by Norris (1992a) it was returned to *Polysiphonia* by Abbott (1999a). Since reproductive structures have never been observed, its generic affinity is tentative, although the presence of cross-walls in the rhizoids would hint at the species belonging in *Neosiphonia*.

\****Polysiphonia homoia*** Setchell *et* N.L. Gardner *in* Setchell & Gardner, 1930: 162 (type locality: Guadalupe Island, Lower California, Mexico). Hawaiian Islands: Hollenberg, 1968b: 201, fig. 2B; Abbott, 1999a: 417, fig. 122F-G. **(Figs 364-365)**

**Material examined:** Rapa Island, Australs, 04 Nov. 2002, leg. C. E. Payri, UPF 3420 RPS203.

Thallus to 30 mm high, decumbent, with prostrate axes 100-150  $\mu\text{m}$  in diameter, ecorticate, with 5 pericentral cells. Rhizoids pit-connected to outer pericentral cells, with lateral secondary pit-connections among adjacent pericentral cells. Erect determinate axes 50-80  $\mu\text{m}$  in diameter. Pericentral cell length in mid-portions about twice axis diameter. Trichoblasts irregularly disposed, to 500  $\mu\text{m}$  long. Reproductive structures not seen.

**Remarks:** Growing within *Sargassum* belts, at the base of cliffs.

***Polysiphonia scopulorum*** Harvey, 1855: 540 (type locality: Rottneest Island, Western Australia). French Polynesia: Hollenberg, 1968a: 81; Payri *et al.*, 2000: 286; Curaçao: Stegenga & Vroman, 1988: 307, figs 21-26, 29-31; Australia: Millar, 1990: 445, figs 65E-G; New Zealand: Adams, 1991: 413, fig. 1(1)A-F; Price & Scott, 1992: 210, fig. 77A-D; Hawaiian Islands: Abbott, 1999a: 425, fig. 125C-F; Fiji: Kapraun & Bowden, 1978: 201, figs 23-24 (*'scopularum'*); N'Yeurt, 2001: 837, figs 304, 308; Rotuma: N'Yeurt, 1996: 433, figs 207a-d; Micronesia: Lobban & Tsuda, 2003: 79. **(Figs 366-369)**

**Material examined:** Tiahura, Moorea, 1987, leg. C. E. Payri, UPF 472 S86, 473 S87; Taapuna, Tahiti, 19 Sep. 1995, leg. A. D. R. N'Yeurt, UPF 474 S88; Kauehi, Tuamotu, leg. J. Orempuller, UPF 507 S121.

Thallus to 10 mm high, brownish red, with ecorticate creeping axes 50-85  $\mu\text{m}$  in diameter giving rise to basally narrowed, erect determinate axes 40-60  $\mu\text{m}$  in diameter. Pericentral cells 4, about one diameter long. Rhizoids unicellular, with digitate tips, in open connection with the supporting pericentral cell. Trichoblasts rare, limited to apical regions; to 400  $\mu\text{m}$  long. Tetrasporangia 40-45  $\mu\text{m}$  in diameter, in straight series in swollen tips of erect determinate



branches; cystocarps globose and cup-shaped, borne on the side of erect branches. Spermatangial branches in pairs or from a trichoblast initial, with a single sterile terminal cell.

**Remarks:** Growing on rocks and coral debris in the lagoon and to 10 m depth on the outer reef slope. French Polynesian records in Hollenberg (1968a) include *P. scopulorum* vars *scopulorum* Hollenberg, *villum* (J. Agardh) Hollenberg, *minima* Hollenberg and *macrotrichia* Hollenberg. The latter variety has the type locality as Raroia Atoll, Tuamotu.

***Polysiphonis upolensis*** (Grunow) Hollenberg, 1968a: 94, figs 6D-E, 29, 35, 42. French Polynesia: Hollenberg, 1968a: 96; Great Barrier Reef, Australia: Price & Scott, 1992: 215, fig. 79A-E; Maldives: Silva *et al.*, 1996: 547; Hawaiian Islands: Abbott, 1999a: 434, fig. 129D-G; Samoa: Skelton & South, 2002a: 156; Micronesia: Lobban & Tsuda, 2003: 79.

**Basionym:** *Polysiphonia tongatensis* Harvey *ex* Kützing var. *upolensis* Grunow, 1874: 49 (type locality: Upolu, Samoa).

**Voucher material** (according to Hollenberg, 1968a): Paea, Tahiti, Jan. 1929, *leg. C. Crossland*, UC 792042, UC 791870 (as *P. tongatensis*); Ngarumaoa, Raroia Atoll, Jul. 1952, *leg. M. S. Doty & J. Newhouse*, US D.11215.3, D.11217A; Arue Point, Tahiti, 15 Sep. 1952, *leg. J. Randall*, US D.12103.1; Matavai Bay, Tahiti, 02 Apr. 1956, *leg. J. Randall*, US D.14699; Papetoai Bay, Moorea, 30 May 1956, *leg. J. Randall*, US D.14700.

Thallus 20-30 mm high, with an ecorticate, often nodulose prostrate basal portion 70-140 µm in diameter attached by unicellular, medially inflated, finely digitate rhizoids to 95 µm in diameter, cut off separately from pericentral cells. Pericentral cells 4, with segments 1-1.5 diameters long. Erect axes 100-120 µm in diameter, pseudodichotomously branched. Branching exogenous, independent from trichoblasts, or sometimes cicatrigenous. Trichoblasts delicate and deciduous, 200-700 µm long, at intervals of 2-3 segments. Tetrasporangia 60-80 µm in diameter, in slightly spiral series in distal portions of determinate axes. Cystocarps globular to ovoid, 150-275 µm in diameter, with non-enlarged ostiolar ring cells. Spermatangial branches with a 1-2-celled sterile tip (Hollenberg, 1968a).

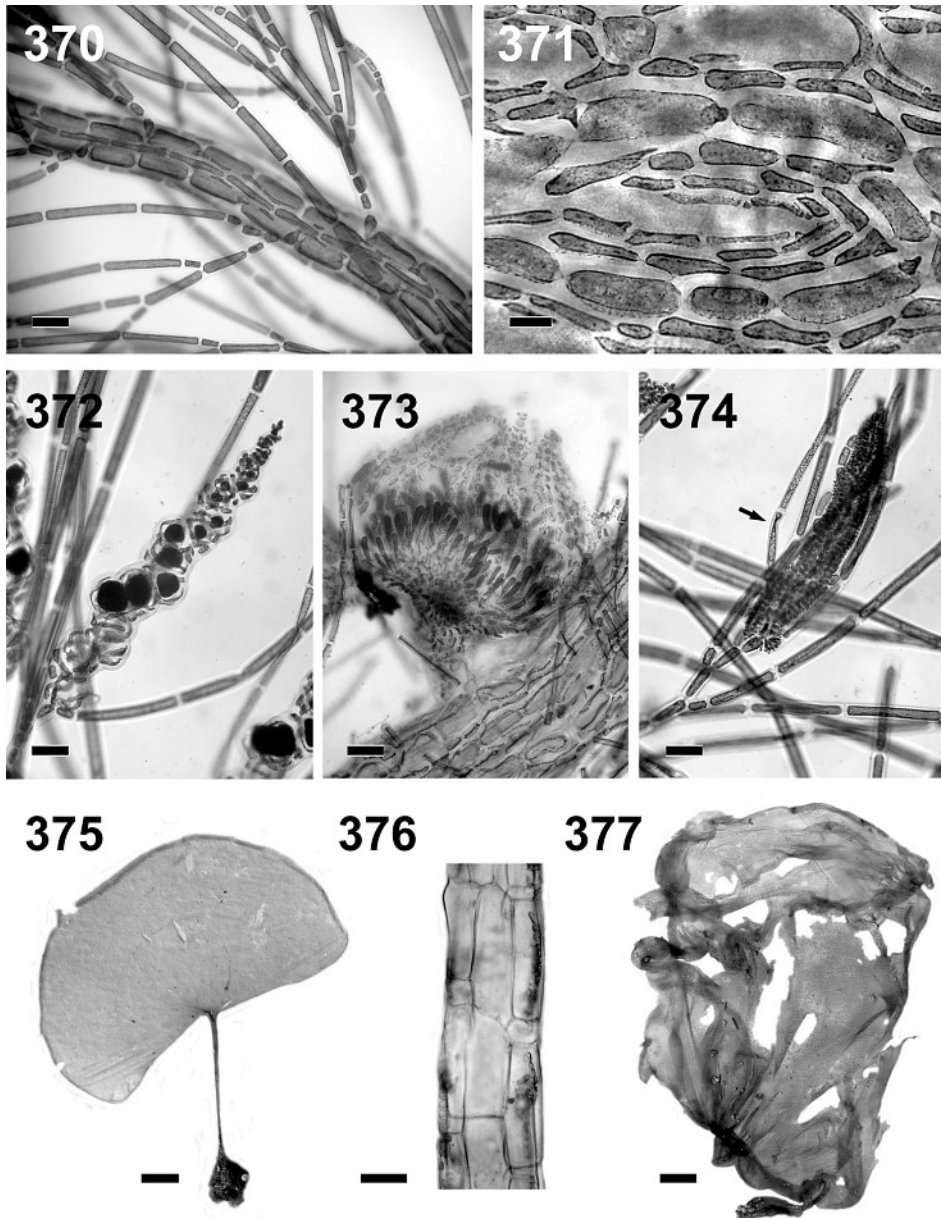
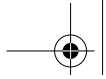
**Remarks:** Not recollected in French Polynesia since 1956. The dark-brown colour, decumbent habit, exogenous branching pattern and long branching intervals are characteristic of this species.

### ***Spirocladia*** Børgesen

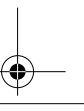
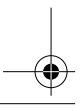
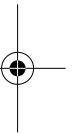
\****Spirocladia barodensis*** Børgesen, 1933: 3-16, figs 1-10 (type locality: Port Okha, Gujarat, India). Australia: Millar, 1990: 453, figs 70A-F; India: Silva *et al.*, 1996: 551; Hawaiian Islands: Abbott, 1999a: 438, fig. 131A, B; Fiji: N'Yeurt, 2001: 846, figs 326-329. **(Figs 370-374)**

**Material examined:** Mac Donald Bank, southern Australs, 04 Nov 2002, *leg. IRD*, UPF 3448 RPS226, 3449 RPS227, 3450 RPS228; Marotiri, Australs, 06 Nov. 2002, *leg. IRD*, UPF 2100 (cystocarpic), 2101, 2102, 2103, 2104 (spermatangial and tetrasporic), 2105 BM 000806238; 3213 RPS17; Entre deux Baies, Moorea, 15 Oct. 2008, *leg. C.E. Payri, J.-L. Menou & L. Mattio*, CP08-724 (UC), CP08-725 (PC), CP08-726 (UPF), CP08-728 (UC); Vaiepu Reef, Moorea, 22 Oct. 2008, *leg. C.E. Payri, J.-L. Menou & L. Mattio*, CP08-987 (UC).

Thallus 50-60 mm high, arising from a prostrate axis attached to the substratum via slightly digitate hapteroid discs 465-500 µm in diameter. Erect branches 215-225 µm in middle section, tapering to 30-85 µm near the apex; plumose and loosely tufted. Branching exogenous, sparse and lateral, with frequent fastigiately branched, monosiphonous, deciduous, determinate photosynthetic trichoblasts 16-20 µm in diameter. Structure uniaxial; branches



Figs 370-377. **370.** *Spirocladia barodensis*: habit of erect branchlet (UPF 3450). Scale = 200  $\mu$ m. **371.** *Spirocladia barodensis*: surface view of cortication (UPF 3450). Scale = 20  $\mu$ m. **372.** *Spirocladia barodensis*: spiralled tetrasporangia in trichoblastic stichidia (UPF 3450). Scale = 80  $\mu$ m. **373.** *Spirocladia barodensis*: mature cystocarp (UPF 3450). Scale = 40  $\mu$ m. **374.** *Spirocladia barodensis*: spermatangial head, showing sterile filament (arrow) (UPF 3450). Scale = 100  $\mu$ m. **375.** *Padina stipitata*: habit of pressed plant (UPF 4010). Scale = 4 mm. **376.** *Padina stipitata*: transverse section of blade (UPF 4010) showing tristromatic nature. Scale = 50  $\mu$ m. **377.** *Codium saccatum*: habit of pressed plant (UPF 4014). Scale = 30 mm.







polysiphonous, axial cell  $110-130 \times 32-40 \mu\text{m}$ , with 4 pericentral cells  $110-130 \times 40-48 \mu\text{m}$ , with rhizoidal cortical cells  $44-70 \times 12-20 \mu\text{m}$ , issued from pericentral cells on main axis. Spermatangial branches elongated and cylindrical,  $650-800 \times 80-110 \mu\text{m}$ , with sterile, simple monosiphonous filaments issued laterally. Tetrasporangia  $40-70 \mu\text{m}$  in diameter, spiralled in trichoblastic stichidia  $600-700 \mu\text{m}$  long. Spermatangial heads cylindrical,  $80-110 \mu\text{m}$  in diameter and  $650-800 \mu\text{m}$  long; spermatia intermixed with sterile filaments. Cystocarps broader than tall,  $600-700 \mu\text{m}$  in diameter and about  $400-500 \mu\text{m}$  high, developing on short lateral branches, with a narrow ostiole. Carposporangia obovoid,  $15-20 \mu\text{m}$  in diameter and about  $100 \mu\text{m}$  long.

**Remarks:** Growing at a depth of 52-110 m on submarine banks, in the southern austral waters, to the south of Rapa, and recently found also on the island of Moorea, Society Group. The French Polynesian plants have corticated axes, discoid basal holdfasts and monosiphonous lateral filaments on spermatangial stichidia, thus placing them in *S. barodensis* and are in good accord with Australian, Hawaiian and Fijian plants in Millar (1990), Abbott (1999) and N'Yeurt (2001), respectively.

#### *Womersleyella* Hollenberg

This genus, erected by Hollenberg (1967), is distinguished from *Polysiphonia* and *Neosiphonia* mainly by the following combination of characters: an indeterminate prostrate branching pattern, the absence of trichoblasts on prostrate axes, mostly simple or rarely branched erect determinate axes, unicellular rhizoids with multicellular tips, and tetrasporangia in slightly spiral series (Hollenberg, 1968a; Norris, 1992a). A single species reported from French Polynesia.

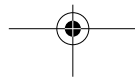
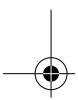
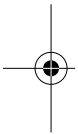
*Womersleyella setacea* (Hollenberg) R.E. Norris, 1992a: 70. Mediterranean: Athanasiadis, 1997: 473, fig. 1A-E; Maldives: Silva *et al.*, 1996: 556; Samoa: Skelton & South, 1999: 13; 2007: 193, figs 528-534; Canary Islands: Rojas-González & Afonso-Carrillo, 2000: 151, figs 19-22; Micronesia: Lobban & Tsuda, 2003: 79.

**Basionym:** *Polysiphonia setacea* Hollenberg, 1968a: 85, figs 5A-C (type locality: Oahu, Hawaiian Islands). French Polynesia: Hollenberg, 1968a: 86; Mediterranean: Airoldi *et al.*, 1994; Hawaiian Islands: Abbott, 1999a: 426, fig. 126A-C.

**Voucher material:** Tahiti, 12 Mar. 1956, *leg. J. Randall*, US D.14698.

Thallus narrow and bristle-like, to 10 mm high, arising from prostrate ecorticate axes to  $100 \mu\text{m}$  in diameter, attached to the substratum via unicellular or uniseriate rhizoids with multicellular tips. Pericentral cells 4, segments  $60-100 \mu\text{m}$  long. Erect determinate axes simple or branched a few times,  $65-100 \mu\text{m}$  in diameter. Trichoblasts coarse, dichotomously branched up to 3 orders, at intervals of 1 or 2-3 segments, quickly deciduous. Tetrasporangia in slightly spiral series of up to 30, in distal portions of erect determinate axes. Gametangial plants, previously unknown, were recently described in detail from Samoa by Skelton & South (2007: 193).

**Remarks:** This species was not recollected in French Polynesia since 1956. The long bristle-like filaments, rhizoids with multicellular tips, low, creeping, matted, prostrate axes and periclinally flattened, oblique pericentral cells are characteristic of *W. setacea*. The species was transferred from *Polysiphonia* to *Womersleyella* by Norris (1992a), but Abbott (1999a) was of the opinion that it should be returned to its original genus. Skelton & South (2007) recently described sexual plants from Samoa, and found the reproductive features to be close to that of *Polysiphonia*. However, *Womersleyella* can be segregated from *Polysiphonia* on the basis of its





rhizoids with multicellular tips, the absence of emergent trichoblasts on prostrate axes, and the presence of non-emergent branches on most segments of the prostrate axes (Hollenberg, 1967: 213; Skelton & South, 2007: 196).

**Phaeophyceae** Kjellman

**Dictyotales** Kjellman

**Dictyotaceae** Lamouroux ex Dumortier

**Padina** Adanson

\**Padina stipitata* Tanaka *et* Nozawa *in* Tanaka, 1960: 100, figs 8-10; pl. 5: figs A, B (type locality: Funauke, Iriomote Island, Ryukyu Islands, Okinawa Prefecture, Japan). Japan: Tanaka, 1962; Yoshida, 1998: 228, fig. 2-12A. **(Figs 375-376)**

**Material examined:** Southern Australs, Nov. 2002, *leg. I.R.D.*, -100 m, UPF 4010.

Thallus stipitate, 15-40 mm high and 15-30 mm broad, consisting of a flabellate, auriculate to lacerate blade 90-100  $\mu$ m in diameter. Stipe terete and thin, 5-20 mm long and 600-800  $\mu$ m in diameter, consisting of parenchymatous tissue, with a short, hairy discoid base and glabrous, cylindrical distal portion. Margins of the blade inrolled, entire, or irregularly lacerate in older plants. Cell layers 3, sometimes 4 in basal portions. Cortical cells rectangular, 42-50  $\mu$ m long and 21-28  $\mu$ m high; medullary cells larger than cortical cells, 125-128  $\mu$ m long and 35-42  $\mu$ m high. Material sterile.

**Remarks:** Dredged from a depth of 100 m in the southern Australs (vicinity of Marotiri and MacDonald submarine mount). The collection consists of three plants, ranging from juvenile to mature (entire, inrolled margins) and older (partly inrolled, lacerate margins). *Padina stipitata* can be clearly identified as the only member in the genus with a long, glabrous cylindrical stipe, and the French Polynesian plants are in excellent agreement with Japanese material in Hokkaido University Herbarium (SAP 054799 and 054804) examined on loan by the authors. Tanaka (1960) listed two collections from different localities in the species diagnosis for *P. stipitata*, and Yoshida (1998) later specified one specimen (SAP 052176) as the type. This represents the second record of this deepwater species outside of Japan, as it has been found from similar habitats in New Caledonia (Payri, pers. obs.).

**Chlorophyta** Wille

**Bryopsidales** J.H. Schaffner

**Codiaceae** (Trevisan) Zanardini

**Codium** Stackhouse

\**Codium saccatum* Okamura, 1915: 145, pl. 135: figs 1-5 (type locality: Futae, Amakusa-shoto, Kumamoto Prefecture, Japan). Japan: Chihara, 1975: 45; Silva *et al.*, 1997: 26, fig. 5; Yoshida, 1998: 134, fig. 1-12D; Marshall Islands: Dawson, 1957a: 107, fig. 11a; Lobban & Tsuda, 2003: 89; Hawaiian Islands: Abbott & Huisman, 2004: 112, fig. 41C. **(Fig. 374)**

**Material examined:** Arago Bank, Australs, 20 Nov. 2002, *leg. I.R.D.*, -120 m, UPF 4014.

Thallus forming a hollow, irregularly saccate mass to 33 cm high and 25 cm broad. Utricles large and clavate, 250-300  $\mu$ m in diameter and 500-600  $\mu$ m long, interconnected by cylindrical filaments 15-20  $\mu$ m in diameter. Constrictions present on connecting filaments near base of parent utricle. Reproduction not seen.

**Remarks:** Dredged from a depth of 120 meters; so far in French Polynesia only known from the southern Australs. This distinctive species has been lectotypified

by Silva *et al.* (1997), and has also been found in New Caledonia (Payri, unpubl. data). The deepwater Polynesian and New Caledonian plants, while having the typical saccate habit of *C. saccatum*, are considerably larger than those reported from Japan and other localities, which only attain sizes of 5-10 cm. The utricle dimensions are also somewhat larger, as they are quoted as 250-300  $\mu\text{m}$  long in other localities, while they were rarely below 400  $\mu\text{m}$  long in the Polynesian plants. Unfortunately the dredged Polynesian material was formalin-preserved and cannot be used in molecular analyses, and new collections for critical studies would be desirable to clarify its taxonomic status.

## DISCUSSION

This study has brought the total number of Rhodophyta known from French Polynesia to 195 species, with one addition each to the Chlorophyta and Phaeophyceae. Of these, 84 species (or 43 %) represent new records, and 7 species (or 3.6 %) are new or undescribed (Table 1). Together with the two previous studies on the Phaeophyceae and Chlorophyceae (N'Yeurt & Payri, 2006; 2007) the number of marine algae now known and documented from French Polynesia stands at 307 species.

The species distribution within the French Polynesian islands is very similar to what has been shown for the brown and green algal flora (N'Yeurt & Payri, 2006; 2007). The Society, Austral and Tuamotu groups display the richest floristic diversity (59, 48.2 and 21 % of the total Rhodophyta flora, respectively; Table 1). The Austral archipelago, Rapa and Marotiri islands (27° S), close to temperate waters, appear unique with 56 species (or 28.7 % of the total Rhodophyta flora) only recorded from these islands, including a number of species such as *Peleophycus multiprocarpium* and *Phaeocolax kajimurai* previously known only from the Hawaiian Islands in the northern Pacific. The green alga *Codium saccatum* and the distinctive brown alga *Padina stipitata* are other unique records from the southern Australs, the latter species only known before from Japan (type locality) and New Caledonia (Payri, 2006). The distinctive red alga *Gloiosaccion brownii* was found for the first time outside of its usual habitat in the temperate waters of Australia and extends considerably its distribution range to the eastern part of the Pacific Basin. Other species such as *Asparagopsis taxiformis* and *Champia parvula* are widely distributed and present in Hawaiian Islands and other tropical areas. The flora from the Marquesas and Gambier (4.6 and 9.7 % of the total Rhodophyta flora, respectively) are less rich, probably partly due to a limited sampling effort. In addition, the Marquesas lack typical reef habitats, which could explain the low recorded number of 9 taxa. Some species (especially small epiphytic Ceramiales such as species of *Polysiphonia* and *Herposiphonia*) seem to be restricted to the Tuamotu archipelago. The unique range of habitats and long geological history of these atolls could partly explain this occurrence.

Most of the French Polynesian red algae are species with a wide tropical Pacific distribution. The French Polynesian flora shows a high affinity with the Cook, Solomon and Samoan islands, with respectively 45.9, 45.8 and 37.6 % species shared between these regions (Table 2). Moreover, this study demonstrates a high similarity between the Australs and Hawaiian Islands floras



(e.g. the genera *Peleophycus*, *Phaeocolax*, *Jania*), but there is a notable absence of the otherwise ubiquitous species *Jania acutiloba* and *Jania spectabile* in the Hawaiian Islands flora. While many species previously considered as Hawaiian endemics have now been found in the Australs, their apparent absence in intervening localities (such as the Society islands) might be attributed to local ecological conditions e.g. seawater temperature, or simply a lack of collecting effort in the right localities. About a third (34.4 %) of the French Polynesian red algal flora is shared with the Hawaiian Islands (Table 2). The disjunct distribution patterns found for several subtropical to temperate species, possibly suggests some special oceanic current routes between the southern Australs, Hawaii and the Southern Australian region. Endemism being a difficult concept for highly dispersive organisms like marine algae, none of the Rhodophyta taxa identified to species level in this study were exclusively found in French Polynesia.

The similarity between the French Polynesian flora and some other tropical floras of the Pacific was calculated using Sørensen's Index [ $SI = 2x / (2x + y + z)$  where  $x$  is the number of shared species,  $y$  the number of the total species of the first island and  $z$  is the total species of the second island or group], and showed the greatest affinity with the Hawaiian Islands ( $SI = 0.30$ ), followed by the Cook Islands and Samoa ( $SI = 0.26$  each) and followed closely by the Solomon Islands ( $SI = 0.25$ ) and Fiji ( $SI = 0.24$ ). Wallis, Micronesia and Papua New Guinea has the lowest indices of similarity with the French Polynesian Rhodophyta flora ( $SI = 0.17$ ,  $0.17$  and  $0.14$ , respectively). The relatively high diversity of taxa in French Polynesia compared to several other tropical Pacific areas may simply reflect a better sampling effort, but it also highlights the high diversity of available habitats, ranging from high volcanic island to coral atolls, and the wide latitudinal distribution of the islands which encompass tropical waters in the Marquesas to temperate-cold waters in the southern part of the Australs.

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with additions to the Phaeophyceae and Chlorophyta

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with additions to the Phaeophyceae and Chlorophyta

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Table 1. Distribution of taxa within the different island groups

	<i>Australs</i>	<i>Gambier</i>	<i>Marquesas</i>	<i>Society</i>	<i>Tuamotu</i>
<i>Acanthophora pacifica</i>	1		1	1	
<i>Acanthophora spicifera</i>				1	
<i>Acrochaetium barbadense</i> *§	1				
<i>Acrochaetium microscopicum</i> *§	1				
<i>Actinotrichia fragilis</i>			1	1	
<i>Ahnfeltiopsis pygmaea</i> §					1
<i>Amansia rhodantha</i>				1	
<i>Amphiroa anceps</i>				1	
<i>Amphiroa foliacea</i> §				1	
<i>Amphiroa valonioides</i> §	1	1		1	
<i>Anotrichum tenue</i>		1			1
<i>Antithamnion decipiens</i> *§	1				
<i>Antithamnion lherminieri</i> §				1	1
<i>Antithamnionella breviramosa</i>	1			1	1
<i>Asparagopsis taxiformis</i>	1	1		1	
<i>Asteromenia anastomosans</i> *§	1				
<i>Asteromenia pseudocoalescens</i> *					
<i>Bostrychia moritzian</i> §	1			1	
<i>Bostrychia tenella</i> *§	1				
<i>Botryocladia skottsbergii</i>	1			1	
<i>Caulacanthus ustulatus</i> §	1			1	
<i>Centroceras clavulatum</i>				1	1
<i>Centroceras minutum</i> *§	1				
<i>Ceramium aduncum</i> §	1			1	
<i>Ceramium borneense</i>				1	
<i>Ceramium codii</i> *	1				
<i>Ceramium macrotrichum</i>				1	
<i>Ceramium upolense</i> *§	1				
<i>Ceramium vagans</i>	1				1
<i>Chamaebotrys boergesenii</i>				1	
<i>Champia compressa</i> *§	1				
<i>Champia parvula</i>				1	
<i>Champia vieillardii</i>				1	
<i>Chondria arcuata</i> *§	1				
<i>Chondria bullata</i> #§					1
<i>Chondria dangeardii</i>				1	
<i>Chondria dasyphylla</i>		1		1	1
<i>Chondria minutula</i>				1	1
<i>Chondria repens</i> *§	1				
<i>Chondria simpliciuscula</i>				1	1
<i>Chondrophyucus succisus</i> §				1	
<i>Codium saccatum</i> *§	1				
<i>Coelothrix irregularis</i>				1	
<i>Corallina elongata</i> §	1			1	

\* Taxa present only in Rapa and Marotiri islands in Australs (56 taxa)

§ New records for French Polynesia (84 taxa)

# New species (7 taxa)



Table 1. Distribution of taxa within the different island groups (*continued*)

	<i>Australs</i>	<i>Gambier</i>	<i>Marquesas</i>	<i>Society</i>	<i>Tuamotu</i>
<i>Corallophila kleiwegii</i>				1	1
<i>Corynocypris prostrata</i>				1	
<i>Crouania attenuata</i>	1			1	
<i>Cryptonemia lomation</i>				1	
<i>Cryptonemia umbraticola</i>	1			1	1
<i>Dasya anastomosans</i>				1	
<i>Dasya baillouviana</i>	1				1
<i>Dasya iyengarai</i>	1			1	1
<i>Dasya mollis</i>	1				1
<i>Dasya murrayana</i> *§	1				
<i>Dasya palmatifida</i> §				1	
<i>Dermonema virens</i>				1	
<i>Dichotomaria marginata</i>				1	
<i>Dichotomaria obtusata</i>				1	
<i>Ditria reptans</i> §				1	
<i>Dudresnaya hawaiiensis</i>	1	1		1	
<i>Erythrotrichia carnea</i> §	1			1	
<i>Fernandosiphonia ecorticata</i> *§	1				
<i>Galaxaura divaricata</i> §		1		1	
<i>Galaxaura filamentosa</i>		1		1	1
<i>Galaxaura rugosa</i>		1		1	
<i>Ganonema papenfussii</i> §					1
<i>Gayliella transversalis</i> §				1	
<i>Gelidiella acerosa</i>				1	
<i>Gelidiella machrisiana</i>	1				1
<i>Gelidiopsis intricata</i>		1	1	1	
<i>Gelidiopsis scoparia</i>			1	1	
<i>Gelidiopsis variabilis</i> *§	1				
<i>Gelidium isabelae</i> §				1	
<i>Gelidium samoense</i>				1	
<i>Gibsmithia hawaiiensis</i>				1	
<i>Gibsmithia larkunii</i> *§	1				
<i>Gloiocladia iyoensis</i>	1			1	
<i>Gloiocladia</i> sp. inedit <sup>#</sup> * §	1				
<i>Gloiophloea articulata</i> *§	1				
<i>Gloiosaccion brownii</i> *§	1				
<i>Gracilaria abbotiana</i>				1	
<i>Gracilaria parvispora</i> §				1	
<i>Grateloupia filicina</i>		1		1	
<i>Grateloupia phuquocensis</i>	1			1	
<i>Griffithsia schousboei</i> §	1			1	1
<i>Halichrysis</i> cf. <i>H. conrescens</i> §				1	
<i>Haloplegma duperreyi</i>		1		1	
<i>Halymenia actinophysa</i> *§	1				

\* Taxa present only in Rapa and Marotiri islands in Australs (56 taxa)

§ New records for French Polynesia (84 taxa)

# New species (7 taxa)



Marine algal flora of French Polynesia III. Rhodophyta,  
with additions to the Phaeophyceae and Chlorophyta

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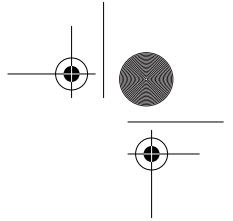
Table 1. Distribution of taxa within the different island groups (*continued*)

	<i>Australs</i>	<i>Gambier</i>	<i>Marquesas</i>	<i>Society</i>	<i>Tuamotu</i>
<i>Halymenia nukuhivensis</i> #§			1		
<i>Herposiphonia delicatula</i> *	1				
<i>Herposiphonia dendroidea</i>					1
<i>Herposiphonia pacifica</i>					1
<i>Herposiphonia parca</i>				1	
<i>Herposiphonia secunda</i>				1	1
<i>Heterosiphonia crispella</i> var. <i>laxa</i>	1	1		1	1
<i>Heterosiphonia gibbessi</i>		1		1	
<i>Hydrolithon boreale</i>				1	
<i>Hydrolithon farinosum</i>				1	
<i>Hydrolithon gardineri</i>					1
<i>Hydrolithon murakoshii</i>				1	
<i>Hydrolithon onkodes</i>				1	1
<i>Hydrolithon reinboldii</i>				1	1
<i>Hydrolithon rupestre</i>				1	
<i>Hydrolithon samoëense</i>				1	1
<i>Hypnea esperi</i> §				1	
<i>Hypnea pannosa</i>	1			1	
<i>Hypnea saidana</i>			1		
<i>Hypnea spinella</i>	1	1		1	
<i>Hypoglossum simulans</i>	1			1	
<i>Jania acutiloba</i>	1			1	
<i>Jania adhaerens</i> *	1				
<i>Jania articulata</i> #§					1
<i>Jania pumila</i> *	1				
<i>Jania rubens</i>		1			
<i>Jania spectabile</i>				1	
<i>Jania subulata</i> *§	1				
<i>Kallymenia thompsonii</i> *	1				
<i>Laurencia caraibica</i> *§	1				
<i>Laurencia cervicornis</i> *§	1				
<i>Laurencia claviformis</i> *§	1				
<i>Laurencia crustiformans</i> §	1				
<i>Laurencia decumbens</i> *§	1				
<i>Laurencia flexilis</i>	1			1	
<i>Laurencia glandulifera</i> *§	1				
<i>Liagora albicans</i> §					1
<i>Liagora ceranoides</i>					1
<i>Liagora divaricata</i> *§	1				
<i>Liagora</i> sp. <i>inedit</i> #*§	1				
<i>Lithophyllum flavescens</i>				1	
<i>Lithophyllum insipidum</i>				1	
<i>Lithophyllum kotschyianum</i>				1	
<i>Lomentaria corallicola</i>	1			1	1

\* Taxa present only in Rapa and Marotiri islands in Australs (56 taxa)

§ New records for French Polynesia (84 taxa)

# New species (7 taxa)

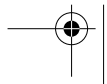
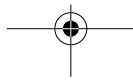
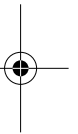
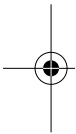
Table 1. Distribution of taxa within the different island groups (*continued*)

	<i>Australs</i>	<i>Gambier</i>	<i>Marquesas</i>	<i>Society</i>	<i>Tuamotu</i>
<i>Martensia fragilis</i> <sup>§</sup>				1	
<i>Mastophora pacifica</i>				1	
<i>Meristotheca procumbens</i>	1			1	
<i>Mesophyllum erubescens</i>				1	
<i>Mesophyllum funafutiense</i>				1	
<i>Myriogramme cartilaginea</i> *	1				
<i>Neogoniolithon brassica-florida</i>				1	
<i>Neogoniolithon fosliei</i>				1	
<i>Neogoniolithon megalocystum</i>				1	
<i>Neosiphonia apiculata</i>	1	1			
<i>Neosiphonia ferulacea</i>	1			1	1
<i>Neosiphonia poko</i> *	1				
<i>Neosiphonia savatieri</i>					1
<i>Neosiphonia sphaerocarpa</i> *	1				
<i>Neosiphonia tongatensis</i>		1		1	
<i>Nitophyllum adhaerens</i>	1			1	1
<i>Padina stipitata</i> *	1				
<i>Palisada parvipapillata</i>				1	
<i>Palisada perforata</i>				1	
<i>Palisada yamadana</i> *	1				
<i>Parviphycus antipae</i> *	1				
<i>Peleophycus multiprocarpium</i> *	1				
<i>Peyssonnelia bornetii</i>			1		
<i>Peyssonnelia inamoena</i>	1			1	
<i>Phaeocolax kajimurai</i> *	1				
<i>Platoma abbotianum</i>				1	
<i>Platoma cycloclpum</i>	1	1			
<i>Plocamium sandvicense</i>				1	
<i>Pneophyllum conicum</i>	1			1	
<i>Polysiphonia delicatula</i> *	1				
<i>Polysiphonia dotyi</i>					1
<i>Polysiphonia herpa</i>					1
<i>Polysiphonia homoia</i> *	1				
<i>Polysiphonia scopulorum</i>				1	1
<i>Polysiphonis upolensis</i>				1	1
<i>Portieria hornemannii</i>				1	
<i>Predaea incraspeda</i> <sup>§</sup>				1	
<i>Predaea laciniosa</i>			1	1	
<i>Predaea weldii</i> *	1				
<i>Pterocладиella caeruleascens</i>	1			1	1
<i>Pterocладиella caloglossoides</i> *	1				
<i>Ptilothamnion cladophorae</i> *	1				
<i>Renouxia antillana</i>				1	
<i>Rhodymenia corallina</i> *	1				

\* Taxa present only in Rapa and Marotiri islands in Australs (56 taxa)

§ New records for French Polynesia (84 taxa)

# New species (7 taxa)



Marine algal flora of French Polynesia III. Rhodophyta,  
with additions to the Phaeophyceae and ChlorophytaTable 1. Distribution of taxa within the different island groups (*continued*)

	<i>Australs</i>	<i>Gambier</i>	<i>Marquesas</i>	<i>Society</i>	<i>Tuamotu</i>
<i>Rhodymenia halymenioides</i> *	1				
<i>Rhodymenia leptophylla</i> *	1				
<i>Rhodymenia sonderi</i>	1				
<i>Rhodymenia</i> sp. inedit 1 <sup>#</sup> *	1				
<i>Rhodymenia</i> sp. inedit 2 <sup>#</sup> *	1				
<i>Sarconema filiforme</i>				1	
<i>Seirospora orientalis</i>	1			1	
<i>Spirocladia barodensis</i>	1			1	
<i>Sporolithon episoredion</i>					1
<i>Sporolithon ptychoides</i>				1	
<i>Spyridia filamentosa</i>	1	1		1	1
<i>Spyridia hypnoides</i>				1	
<i>Stylonema alsidii</i> *	1				
<i>Titanoderma pustulatum</i>			1		
<i>Titanophycus validus</i>				1	
<i>Titanophora weberae</i>				1	
<i>Trichogloea requienii</i> *	1				
<i>Tricleocarpa cylindrica</i> *	1				
<i>Womersleyella setacea</i>				1	
<i>Wurdemannia miniata</i> *	1				
<i>Yamadaella caenomyce</i>	1			1	
<b>Total nr of taxa per archipelago</b>	<b>94</b>	<b>19</b>	<b>9</b>	<b>115</b>	<b>41</b>

\* Taxa present only in Rapa and Marotiri islands in Australs (56 taxa)

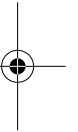
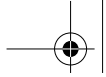
§ New records for French Polynesia (84 taxa)

# New species (7 taxa)

Table 2. Comparing the French Polynesian Rhodophyta flora with selected Pacific localities

Locality	Total nr of taxa in flora*	Nr of Rhodophyta in flora	Nr of Rhodophyta shared with FP	%	Sørensen Index	Sources
French Polynesia	307	195	-	-	-	N'Yeurt & Payri 1997; Payri et al. 2000; this study
Fiji & Rotuma	504	312	79	25.3	0.24	N'Yeurt et al., 1996; Littler & Littler, 2003; South & Skelton, 2003; N'Yeurt & Payri, unpubl.
Guam, Pohnpei, Ant atoll & Micronesia	564	324	53	16.4	0.17	Lobban & Tsuda, 2003; Lobban & N'Yeurt, 2007
Hawaiian Islands	508	343	118	34.4	0.30	Abbott, 1999a
Solomon Islands	200	107	49	45.8	0.25	Womersley & Bailey, 1970; Littler & Littler, 2003; N'Yeurt & Payri, unpubl.
Papua New Guinea	276	161	29	18.0	0.14	Millar et al., 1999; Coppejans & Millar, 2000; Littler & Littler, 2003
Cook Islands	209	122	56	45.9	0.26	Chapman, 1977; N'Yeurt, unpubl.
Samoa	298	178	67	37.6	0.26	Skelton & South 2002a, 2002b, 2007; Littler & Littler, 2003
Wallis	180	128	34	26.6	0.17	N'Yeurt & Payri, 2004
Vanuatu	272	164	39	23.8	0.18	N'Yeurt & Payri, unpubl.

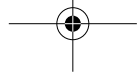
\* Excluding Cyanobacteria



Mise en page et impression

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Marine algal flora of French Polynesia III. Rhodophyta,  
with additions to the Phaeophyceae and Chlorophyta

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Table 1. Distribution of taxa within the different island groups

	<i>Australs</i>	<i>Gambier</i>	<i>Marquesas</i>	<i>Society</i>	<i>Tuamotu</i>
<i>Acanthophora pacifica</i>	1		1	1	
<i>Acanthophora spicifera</i>				1	
<i>Acrochaetium barbadense</i> *§	1				
<i>Acrochaetium microscopicum</i> *§	1				
<i>Actinotrichia fragilis</i>			1	1	
<i>Ahnfeltiopsis pygmaea</i> §					1
<i>Amansia rhodantha</i>				1	
<i>Amphiroa anceps</i>				1	
<i>Amphiroa foliacea</i> §				1	
<i>Amphiroa valonioides</i> §	1	1		1	
<i>Anotrichum tenue</i>		1			1
<i>Antithamnion decipiens</i> *§	1				
<i>Antithamnion lherminieri</i> §				1	1
<i>Antithamnionella breviramosa</i>	1			1	1
<i>Asparagopsis taxiformis</i>	1	1		1	
<i>Asteromenia anastomosans</i> *§	1				
<i>Asteromenia pseudocoalescens</i> *					
<i>Bostrychia moritzian</i> §	1			1	
<i>Bostrychia tenella</i> *§	1				
<i>Botryocladia skottsbergii</i>	1			1	
<i>Caulacanthus ustulatus</i> §	1			1	
<i>Centroceras clavulatum</i>				1	1
<i>Centroceras minutum</i> *§	1				
<i>Ceramium aduncum</i> §	1			1	
<i>Ceramium borneense</i>				1	
<i>Ceramium codii</i> *	1				
<i>Ceramium macrotrichum</i>				1	
<i>Ceramium upolense</i> *§	1				
<i>Ceramium vagans</i>	1				1
<i>Chamaebotrys boergesenii</i>				1	
<i>Champia compressa</i> *§	1				
<i>Champia parvula</i>				1	
<i>Champia vieillardii</i>				1	
<i>Chondria arcuata</i> *§	1				
<i>Chondria bullata</i> #§					1
<i>Chondria dangardii</i>				1	
<i>Chondria dasyphylla</i>		1		1	1
<i>Chondria minutula</i>				1	1
<i>Chondria repens</i> *§	1				
<i>Chondria simpliciuscula</i>				1	1
<i>Chondrophyucus succisus</i> §				1	
<i>Codium saccatum</i> *§	1				
<i>Coelothrix irregularis</i>				1	
<i>Corallina elongata</i> §	1			1	

\* Taxa present only in Rapa and Marotiri islands in Australs (56 taxa)

§ New records for French Polynesia (84 taxa)

# New species (7 taxa)

Table 1. Distribution of taxa within the different island groups (*continued*)

	<i>Australs</i>	<i>Gambier</i>	<i>Marquesas</i>	<i>Society</i>	<i>Tuamotu</i>
<i>Corallophila kleiwegii</i>				1	1
<i>Corynecystis prostrata</i>				1	
<i>Crouania attenuata</i>	1			1	
<i>Cryptonemia lomation</i>				1	
<i>Cryptonemia umbraticola</i>	1			1	1
<i>Dasya anastomosans</i>				1	
<i>Dasya baillouviana</i>	1				1
<i>Dasya iyengarii</i>	1			1	1
<i>Dasya mollis</i>	1				1
<i>Dasya murrayana</i> *§	1				
<i>Dasya palmatifida</i> §				1	
<i>Dermonema virens</i>				1	
<i>Dichotomaria marginata</i>				1	
<i>Dichotomaria obtusata</i>				1	
<i>Ditria reptans</i> §				1	
<i>Dudresnaya hawaiiensis</i>	1	1		1	
<i>Erythrotrichia carnea</i> §	1			1	
<i>Fernandosiphonia ecorticata</i> *§	1				
<i>Galaxaura divaricata</i> §		1		1	
<i>Galaxaura filamentosa</i>		1		1	1
<i>Galaxaura rugosa</i>		1		1	
<i>Ganonema papenfussii</i> §					1
<i>Gayliella transversalis</i> §				1	
<i>Gelidiella acerosa</i>				1	
<i>Gelidiella machrisiana</i>	1				1
<i>Gelidiopsis intricata</i>		1	1	1	
<i>Gelidiopsis scoparia</i>			1	1	
<i>Gelidiopsis variabilis</i> *§	1				
<i>Gelidium isabelae</i> §				1	
<i>Gelidium samoense</i>				1	
<i>Gibsmithia hawaiiensis</i>				1	
<i>Gibsmithia larkunii</i> *§	1				
<i>Gloiocladia iyoensis</i>	1			1	
<i>Gloiocladia</i> sp. inedit <sup>#</sup> * §	1				
<i>Gloiophloea articulata</i> *§	1				
<i>Gloiosaccion brownii</i> *§	1				
<i>Gracilaria abbotiana</i>				1	
<i>Gracilaria parvispora</i> §				1	
<i>Grateloupia filicina</i>		1		1	
<i>Grateloupia phuquocensis</i>	1			1	
<i>Griffithsia schousboei</i> §	1			1	1
<i>Halichrysis</i> cf. <i>H. conrescens</i> §				1	
<i>Haloplegma duperreyi</i>		1		1	
<i>Halymenia actinophysa</i> *§	1				

\* Taxa present only in Rapa and Marotiri islands in Australs (56 taxa)

§ New records for French Polynesia (84 taxa)

# New species (7 taxa)



Marine algal flora of French Polynesia III. Rhodophyta,  
with additions to the Phaeophyceae and Chlorophyta

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Table 1. Distribution of taxa within the different island groups (*continued*)

	<i>Australs</i>	<i>Gambier</i>	<i>Marquesas</i>	<i>Society</i>	<i>Tuamotu</i>
<i>Halymenia nukuhivensis</i> #§			1		
<i>Herposiphonia delicatula</i> *	1				
<i>Herposiphonia dendroidea</i>					1
<i>Herposiphonia pacifica</i>					1
<i>Herposiphonia parca</i>				1	
<i>Herposiphonia secunda</i>				1	1
<i>Heterosiphonia crispella</i> var. <i>laxa</i>	1	1		1	1
<i>Heterosiphonia gibbessi</i>		1		1	
<i>Hydrolithon boreale</i>				1	
<i>Hydrolithon farinosum</i>				1	
<i>Hydrolithon gardineri</i>					1
<i>Hydrolithon murakoshii</i>				1	
<i>Hydrolithon onkodes</i>				1	1
<i>Hydrolithon reinboldii</i>				1	1
<i>Hydrolithon rupestre</i>				1	
<i>Hydrolithon samoëense</i>				1	1
<i>Hypnea esperi</i> §				1	
<i>Hypnea pannosa</i>	1			1	
<i>Hypnea saidana</i>			1		
<i>Hypnea spinella</i>	1	1		1	
<i>Hypoglossum simulans</i>	1			1	
<i>Jania acutiloba</i>	1			1	
<i>Jania adhaerens</i> *	1				
<i>Jania articulata</i> #§					1
<i>Jania pumila</i> *	1				
<i>Jania rubens</i>		1			
<i>Jania spectabile</i>				1	
<i>Jania subulata</i> *§	1				
<i>Kallymenia thompsonii</i> *	1				
<i>Laurencia caraibica</i> *§	1				
<i>Laurencia cervicornis</i> *§	1				
<i>Laurencia claviformis</i> *§	1				
<i>Laurencia crustiformans</i> §	1				
<i>Laurencia decumbens</i> *§	1				
<i>Laurencia flexilis</i>	1			1	
<i>Laurencia glandulifera</i> *§	1				
<i>Liagora albicans</i> §					1
<i>Liagora ceranoides</i>					1
<i>Liagora divaricata</i> *§	1				
<i>Liagora</i> sp. <i>inedit</i> #*§	1				
<i>Lithophyllum flavescens</i>				1	
<i>Lithophyllum insipidum</i>				1	
<i>Lithophyllum kotschyianum</i>				1	
<i>Lomentaria corallicola</i>	1			1	1

\* Taxa present only in Rapa and Marotiri islands in Australs (56 taxa)

§ New records for French Polynesia (84 taxa)

# New species (7 taxa)



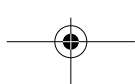
Table 1. Distribution of taxa within the different island groups (*continued*)

	<i>Australs</i>	<i>Gambier</i>	<i>Marquesas</i>	<i>Society</i>	<i>Tuamotu</i>
<i>Martensia fragilis</i> <sup>§</sup>				1	
<i>Mastophora pacifica</i>				1	
<i>Meristotheca procumbens</i>	1			1	
<i>Mesophyllum erubescens</i>				1	
<i>Mesophyllum funafutiense</i>				1	
<i>Myriogramme cartilaginea</i> *	1				
<i>Neogoniolithon brassica-florida</i>				1	
<i>Neogoniolithon fosliei</i>				1	
<i>Neogoniolithon megalocystum</i>				1	
<i>Neosiphonia apiculata</i>	1	1			
<i>Neosiphonia ferulacea</i>	1			1	1
<i>Neosiphonia poko</i> *	1				
<i>Neosiphonia savatieri</i>					1
<i>Neosiphonia sphaerocarpa</i> *	1				
<i>Neosiphonia tongatensis</i>		1		1	
<i>Nitophyllum adhaerens</i>	1			1	1
<i>Padina stipitata</i> *	1				
<i>Palisada parvipapillata</i>				1	
<i>Palisada perforata</i>				1	
<i>Palisada yamadana</i> *	1				
<i>Parviphycus antipae</i> *	1				
<i>Peleophycus multiprocarpium</i> *	1				
<i>Peyssonnelia bornetii</i>			1		
<i>Peyssonnelia inamoena</i>	1			1	
<i>Phaeocolax kajimurai</i> *	1				
<i>Platoma abbotianum</i>				1	
<i>Platoma cyclocolpum</i>	1	1			
<i>Plocamium sandvicense</i>				1	
<i>Pneophyllum conicum</i>	1			1	
<i>Polysiphonia delicatula</i> *	1				
<i>Polysiphonia dotyi</i>					1
<i>Polysiphonia herpa</i>					1
<i>Polysiphonia homoia</i> *	1				
<i>Polysiphonia scopulorum</i>				1	1
<i>Polysiphonis upolensis</i>				1	1
<i>Portieria hornemannii</i>				1	
<i>Predaea incraspeda</i> <sup>§</sup>				1	
<i>Predaea laciniosa</i>			1	1	
<i>Predaea weldii</i> *	1				
<i>Pterocладиella caeruleascens</i>	1			1	1
<i>Pterocладиella caloglossoides</i> *	1				
<i>Ptilothamnion cladophorae</i> *	1				
<i>Renouxia antillana</i>				1	
<i>Rhodymenia corallina</i> *	1				

\* Taxa present only in Rapa and Marotiri islands in Australs (56 taxa)

§ New records for French Polynesia (84 taxa)

# New species (7 taxa)



Marine algal flora of French Polynesia III. Rhodophyta,  
with additions to the Phaeophyceae and ChlorophytaTable 1. Distribution of taxa within the different island groups (*continued*)

	<i>Australs</i>	<i>Gambier</i>	<i>Marquesas</i>	<i>Society</i>	<i>Tuamotu</i>
<i>Rhodymenia halymenioides</i> *	1				
<i>Rhodymenia leptophylla</i> *	1				
<i>Rhodymenia sonderi</i>	1				
<i>Rhodymenia</i> sp. inedit 1 <sup>#</sup> *	1				
<i>Rhodymenia</i> sp. inedit 2 <sup>#</sup> *	1				
<i>Sarconema filiforme</i>				1	
<i>Seirospora orientalis</i>	1			1	
<i>Spirocladia barodensis</i>	1			1	
<i>Sporolithon episoredion</i>					1
<i>Sporolithon ptychoides</i>				1	
<i>Spyridia filamentosa</i>	1	1		1	1
<i>Spyridia hypnoides</i>				1	
<i>Stylonema alsidii</i> *	1				
<i>Titanoderma pustulatum</i>			1		
<i>Titanophycus validus</i>				1	
<i>Titanophora weberae</i>				1	
<i>Trichogloea requienii</i> *	1				
<i>Tricleocarpa cylindrica</i> *	1				
<i>Womersleyella setacea</i>				1	
<i>Wurdemannia miniata</i> *	1				
<i>Yamadaella caenomyce</i>	1			1	
<b>Total nr of taxa per archipelago</b>	<b>94</b>	<b>19</b>	<b>9</b>	<b>115</b>	<b>41</b>

\* Taxa present only in Rapa and Marotiri islands in Australs (56 taxa)

§ New records for French Polynesia (84 taxa)

# New species (7 taxa)

Table 2. Comparing the French Polynesian Rhodophyta flora with selected Pacific localities

Locality	Total nr of taxa in flora*	Nr of Rhodophyta in flora	Nr of Rhodophyta shared with FP	%	Sørensen Index	Sources
French Polynesia	307	195	-	-	-	N'Yeurt & Payri 1997; Payri et al. 2000; this study
Fiji & Rotuma	504	312	79	25.3	0.24	N'Yeurt et al., 1996; Littler & Littler, 2003; South & Skelton, 2003; N'Yeurt & Payri, unpubl.
Guam, Pohnpei, Ant atoll & Micronesia	564	324	53	16.4	0.17	Lobban & Tsuda, 2003; Lobban & N'Yeurt, 2007
Hawaiian Islands	508	343	118	34.4	0.30	Abbott, 1999a
Solomon Islands	200	107	49	45.8	0.25	Womersley & Bailey, 1970; Littler & Littler, 2003; N'Yeurt & Payri, unpubl.
Papua New Guinea	276	161	29	18.0	0.14	Millar et al., 1999; Coppejans & Millar, 2000; Littler & Littler, 2003
Cook Islands	209	122	56	45.9	0.26	Chapman, 1977; N'Yeurt, unpubl.
Samoa	298	178	67	37.6	0.26	Skelton & South 2002a, 2002b, 2007; Littler & Littler, 2003
Wallis	180	128	34	26.6	0.17	N'Yeurt & Payri, 2004
Vanuatu	272	164	39	23.8	0.18	N'Yeurt & Payri, unpubl.

\* Excluding Cyanobacteria



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