

Marine green algae (Chlorophyta) from the north coast of Papua New Guinea¹

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Abstract — The marine benthic green algae of the north coast of Papua New Guinea (mainly from Madang province) are documented, based on collections made by the first author between 1980 and 1990. All records (118 taxa) are listed with bibliographic, taxonomic, nomenclatural and biogeographical notes. Identification keys are added for genera represented by at least two species. Representatives of the Pseudocodiaceae and some Udoteaceae are illustrated. The green algal flora of the north coast appears to be much richer than that of the south coast where 72 taxa, including 19 unchecked records from literature, are recorded from the Port Moresby area. © 2001 Adac/Éditions scientifiques et médicales Elsevier SAS

Chlorophyta / Papua New Guinea / checklist / identification keys

Résumé — Les algues vertes benthiques de la côte Nord de la Papouasie Nouvelle-Guinée (surtout de la province de Madang) sont documentées, sur la base des collections du premier auteur, effectuées entre 1980 et 1990. Pour chaque espèce (118 taxons) des données bibliographiques, taxinomiques, nomenclaturales et biogéographiques sont ajoutées. Les genres représentés par au moins deux espèces sont pourvus de clés d'identification. Les Pseudocodiacées et certaines Udoteacées sont illustrées. La flore des algues vertes de la côte Nord est beaucoup plus riche que celle de la côte Sud où 72 taxons, dont 19 espèces mentionnées dans la littérature mais qui n'ont pas fait l'objet d'un contrôle de la part des auteurs, ont été recensées de la région de Port Moresby. © 2001 Adac/Éditions scientifiques et médicales Elsevier SAS

Chlorophyta / Papouasie Nouvelle Guinée / liste d'espèces annotée / clefs d'identification

INTRODUCTION

New Guinea, the second largest island of the world, is situated north of Australia, just under the equator. It is the last of the string of islands spilling down from South-East Asia into the Pacific. The western half of the island is Irian Jaya (part of Indonesia), the eastern part constitutes Papua New Guinea (PNG) (Map 1A). Numerous islands lie along its north and east coasts, the most important ones being the islands of the Bismarck Archipelago (including New Ireland), New Britain and Bougainville Island.

This paper is dedicated to René Delépine upon the occasion of his retirement.

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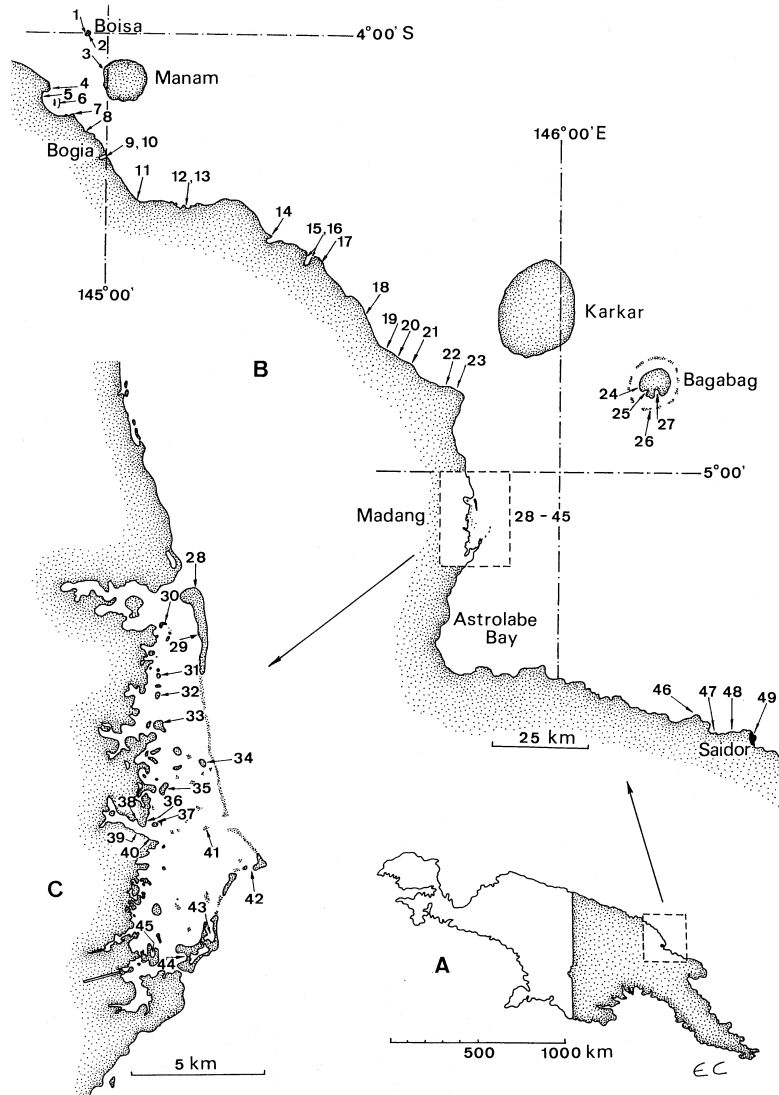
Together with the Solomon Archipelago, Vanuatu (= the New Hebrides), Fiji and New Caledonia, PNG belongs to the geographic region of Melanesia. Biogeographically, botanists include New Guinea in Malesia, a region that also includes the Malayan peninsula, Indonesia and the Philippines (excluding the Solomon Archipelago, Vanuatu and New Caledonia). Geomorphologically PNG is characterized by a central spine composed of a high range of mountains, running from West to East, with peaks over 4 000 m. In places the central mountains descend right to the sea in a series of diminishing foothills, while in other regions broad expanses of mangrove swamps or flat grassland fringe the coast. PNG lies in the Pacific volcano belt but the active volcanoes are not on the main land mass; they form islands along the north coast, with a typical cone-shaped morphology and names such as Bam, Blup Blup, etc.

Madang province (Map 1B) consists of a fertile coastal strip backed by some of the most rugged mountains in PNG, the Adelbert and Schrader ranges to the north and the Finisterre ranges to the south. The coast, approximately 300 km long, from Awar in the northwest to Malalamai in the southeast varies from rocky platforms (including intertidal pools) exposed to the ocean swell, over sheltered rocky bays (Ulingan Bay) to wide sandy bays (Hansa Bay and Astrolabe Bay) or silty estuaries with mangrove vegetation. Just north of the Madang peninsula (Map 1C) a continuously submerged barrier reef protects a wide lagoon containing numerous small islands and submerged patch reefs. The presence of the American Biological Station at Nagada Harbour makes this area very accessible for research. Submerged patch reefs as well as a small fringing reef (exposed at extreme low water) and a protected lagoon are also present around Laing Island in Hansa Bay (Map 1D) where the Belgian Biological Station was situated, allowing easy access to that area. The coast south and east of Madang (Astrolabe Bay) is mainly sandy, with local rocky outcrops (Saidor area). This region can only be reached in the dry season by 4x4 cars because of the numerous estuaries covered by boulders and the lack of bridges. The volcanic islands along the Madang coast (Manam, Karkar, Bagabag, Long Island) are characterized by (sub)vertical drop-offs with crystal clear water.

The presence of two biological stations along the coast of the Madang province and the availability of a coastal road in that province prompted to organise four expeditions to this area for marine phycological research over a period of ten years. The large diversity of marine biotopes (each of them including several habitats) over this relatively restricted coastline ensures its representativeness for the north coast of Papua New Guinea. It certainly does not mean, however, that our checklists cannot be completed by collecting in other sites such as the more remote islands.

Millar *et al.* (1999) review the history of marine algal exploration in Papua New Guinea (PNG), mainly carried out in the 19th and early 20th centuries. A list of floristic works and checklists from the tropical Western Pacific region was published in Coppejans & Millar (2000). The recently published work of Kraft (2000) on the Chlorophyta from Lord Howe Island (SW-Pacific) and Huisman's (2000) book on *Marine plants of Australia* should now be added to that list.

Recently published accounts of the algal flora from the north coast of PNG deal with the green algal genus *Caulerpa* (Coppejans & Meinesz, 1988; Coppejans, 1992), the macroalgae associated with seagrass meadows (Heijs & Brouns, 1986), and mangrove communities (King, 1990). A brief list of marine Chlorophyta (Enomoto & Ohba, 1992) and a study of the Siphonocladales (Leliaert *et al.*, 1998) also include species from PNG, as do annotated checklists of the Rhodophyta (Coppejans & Millar, 2000), including 151 identified species, and Phaeophyta (Coppejans *et al.*, 2001), including 34 identified species. The seaweed flora of the south coast of PNG was recently covered by Coppejans *et al.* (1995a, 1995b) and Millar *et al.* (1999).



Map 1. – A. Position of Madang Province in Papua New Guinea (boundaries approximate). – B: Coast of Madang Province with sampling stations; 1: Boisa N; 2: Boisa S; 3: Manam (Baliau); 4: Awar Point; 5: Awar; 6: Laing Isld; 7: Hansa Point; (4–7 = Hansa Bay); 8: Malagere Isld; 9: Bogia Bay; 10: Kolakola & Reamuna Islets; 11: Suaru; 12: Chirimosh Isld; 13: Hatzfeldthafen; 14: Malala Village; 15: Ulingan Bay, W; 16: same, E; 17: Neptune Point; 18: Murukinam; 19: Sarang Harbour; 20: Walog; 21: Megiar Harbour; 22: Mugil Harbour; 23: hole in the wall; 24: Badilu Village; 25: Christmas Bay; 26: New Year's Bay; 27: The Pinnacle; 46: Cape Iris, Baliau; 47: Suit; 48: Gumbi Bay; 49: Saidor. – C. Detail of the Madang lagoon area with sampling stations; 28: Sek Isld, N; 29: Sek Isld, W; 30: Megas Isld; 31: D'Lole Isld; 32: Tausch Isld; 33: Malamal Isld; 34: Wongat Isld; 35: Demasa Isld; 36: Jais Aben Resort; 37: Gosem Isld; 38: Christensen Research Institute; 39: in front of CRI; 40: in front of Gosem Isld; 41: Padoz Tinan; 42: Tab Isld; 43: Kranket Isld, enclosed bay; 44: Kranket Isld, SW-bay; 45: Beliau Isld.

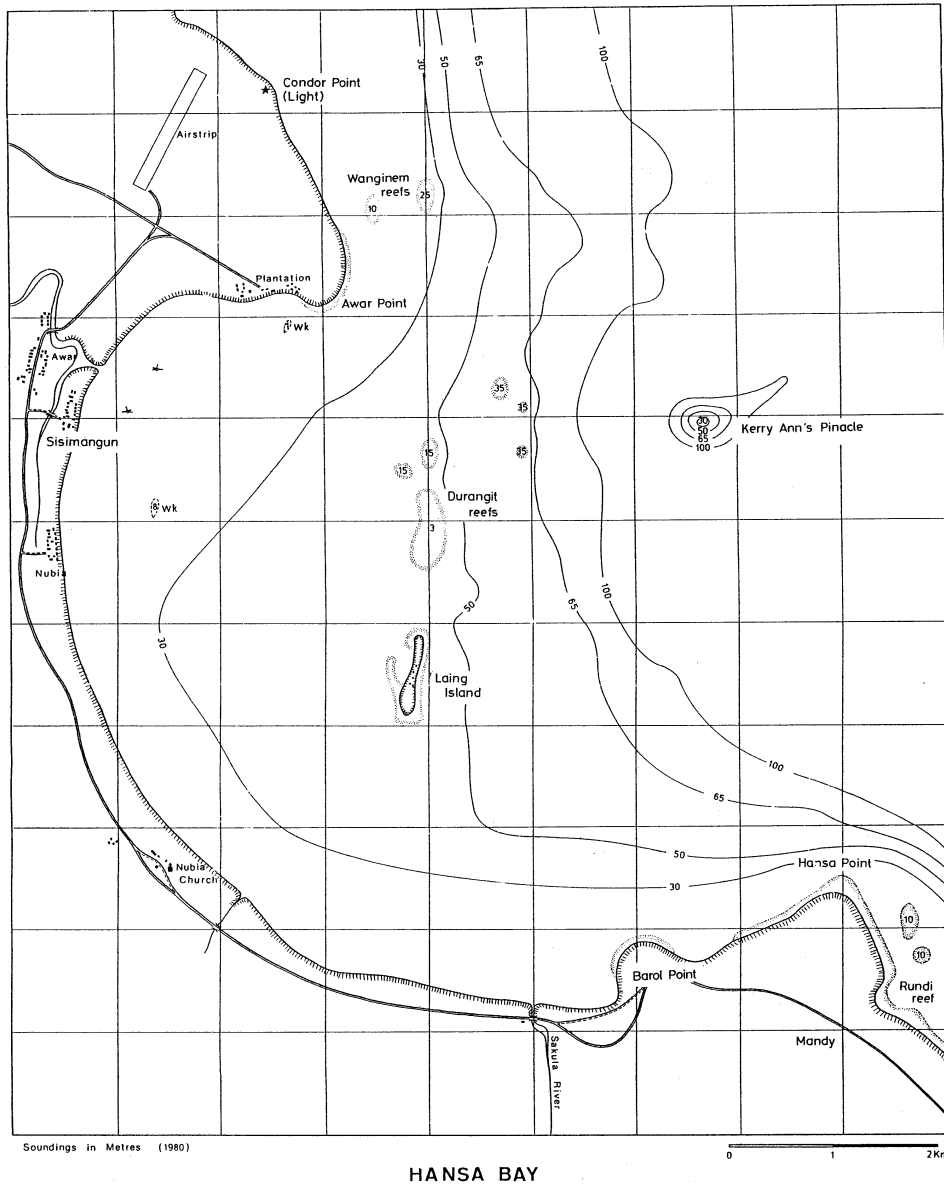
MATERIAL AND METHODS

All collection localities listed in this paper are included in map 1 (A–D). Four collecting expeditions were spread over a 10-year period (June–August 1980, July–August 1986, June–August 1988, July–August 1990, the last in collaboration with W.F. Prud'homme van Reine), with on-site laboratories and accommodation provided by the Laing Island Biological Station (Hansa Bay, Bogia) and the Christensen Research Institute (Nagada Harbour, Madang). The majority of the collecting was carried out along the coast between Hansa Bay and Madang, but in 1986 the research was extended to the Saidor area (Astrolabe Bay). The locations of the collecting sites, according to the Papua New Guinea 1:100 000 Topographic Survey Maps, are given Tab. 1. They are indicated approximately on map 1B, C and 2. From W to E the following maps were used: Watam (7890), Nubia (7889), Manam (7989), Adelbert (7988), Karkar (8088), Madang (8087), Bagabag (8188), Saidor (8186).

At all localities, both intertidal and shallow subtidal collections were made by snorkeling. SCUBA-diving, down to 50 m depth, was mainly done in the areas around the biological stations. This fieldwork resulted in approximately 2 350 herbarium vouchers and numerous formalin-preserved seaweed specimens. The main collection is deposited in the herbarium of the Ghent University (GENT) with selected duplicate specimens deposited in the herbarium of the University of Papua New Guinea (UPNG). Duplicates from the 1990 collections are also deposited in the Nationaal Herbarium Nederland, Universiteit Leiden branch (L), the Herbarium of the Christensen Research Institute (Madang, PNG) and in the herbarium of Lae (PNG). As the four collecting expeditions took place in the same season, a number of seasonal species most probably are absent from this list. Moreover, small species (turf algae, epiphytic species) have been collected only sporadically. Herbarium abbreviations follow Holmgren *et al.* (1990).

ARRANGEMENT AND FORMAT OF THE LIST

The systematic arrangement of orders essentially follows that of Silva *et al.* (1996); families, genera and species are arranged alphabetically. Identification keys to species level are only provided for those genera represented by more than one species along the N-PNG coast. For each species, references are given to publications dealing with Indo-Pacific algae, where a description and/or illustration can be found corresponding to our specimen(s). Although Littler and Littler's (2000) publication is on the Caribbean seaweeds, we add references to their illustrations and short descriptions because of their excellent quality. The type locality is mentioned as at least one distributional record. Taxa that are cited for descriptions and illustrations which are listed 'as' refer to misapplied names or ' = ' where they are synonyms. Many species were illustrated in Coppejans *et al.* (1995a). Voucher specimens of Coppejans (HEC = Herbarium Eric Coppejans), filed in GENT, and of Coppejans and Prud'homme van Reine (Copp & PvR), filed in GENT and L, are then cited. Due to the large number of specimens collected from many sites, we have chosen to limit to five the number of vouchers listed for each species. These are chosen to reflect the broad distribution within the study area and include three locations along the mainland coast and (where available) two from remote islands (Manam, Boisa, and Bagabag). Supplementary collections are mentioned under "other collection sites in N-PNG". The distribution in the SW-Pacific, from the Philippines southwards to Lord Howe Island (Australia, SW-Pacific) and



Map 2. – Detailed map of Hansa Bay (4–7 on Map 1B) with Laing Island and the main surrounding reefs.

including Malaysia, is given. The biogeographical list is not exhaustive: not all species lists for the region have been included, and only a single reference per species per region is mentioned. The countries or regions are placed alphabetically. Notes regarding various aspects of taxonomy, systematics, nomenclature, or aberrant characters, are added. The dimensions mentioned here are always those of our specimens rather than the full ranges that might appear in the literature.

RESULTS

Order Ulvales

Family Ulvaceae

Enteromorpha Link

Key to the species from N-PNG

- 1a. Thallus unbranched 2
- 1b. Thallus branched 3
 - 2a. Thallus tubular, without constrictions, 0.5–1 mm in diameter, 20–30 cm long *E. kylinii*
 - 2b. Thallus intestiniform, inflated, with numerous constrictions, frequently containing air bubbles in the central cavity, several mm in diameter, up to 10 cm long *E. intestinalis*
- 3a. Cells with a single (occasionally 2) pyrenoid(s) *E. compressa*
- 3b. Cells usually with 2–5 pyrenoids 4
 - 4a. Short and spiniform laterals numerous *E. muscoides*
 - 4b. Spiniform laterals absent; uniseriate laterals numerous 5
- 5a. Thallus almost filiform (only a few cells in diameter), very densely branched, without marked main axis *E. multiramosa*
- 5b. Conspicuous main axis present, not densely branched, beset with uniseriate laterals *E. flexuosa* subsp. *paradoxa*

Enteromorpha compressa (Linnaeus) Nees 1820: Index

References: Bliding (1963: 132–139, figs 82–86); Kraft (2000: 521, fig. 5A–F); Littler & Littler (2000: 300, 301 + figs); Huisman (2000: 230 + figs).

Type locality: Europe.

Vouchers: HEC 7609, 27.6.1988: Mugil Harbour & Vidani Island; HEC 7621, 27.6.1988: Neptune Point; HEC 7995, 26.7.1988: Saidor area, Cape Iris-Biliau.

Distribution in SW-Pacific: N-Australia (Lewis, 1987: 4), Fiji (N'Yeurt *et al.*, 1996: 58), Lord Howe Island (Kraft, 2000: 521), Malaysia (Phang, 1986: 25), Micronesia (Tsuda & Wray, 1977: 97), Papua New Guinea (this paper), Philippines (Silva *et al.*, 1987: 91), Taiwan (Lewis & Norris, 1987: 7), Vietnam (Nguyên *et al.*, 1993: 50).

Note: Morphologically our material agrees best with Bliding's (*loc. cit.*) illustration 85 c.

Enteromorpha flexuosa (Wulfen) J. Agardh subsp. *paradoxa* (C. Agardh) Bliding 1963: 79

References: Bliding (1963: 79–85, figs 42–45); Kraft (2000: 525, fig. 7F); Littler & Littler (2000: 302, 303 + figs).

Syntype localities: Bangor, Caenarvon, Wales; Brighton, East Sussex, England.

Vouchers: HEC 4373, 17.6.1980: Laing Island, lagoon; HEC 4654, 13.8.1980: Hansa Bay, Durangit Reef; HEC 7893, 21.7.1988: Bogia Bay, between the coast and Kolakola Island; Copp & PvR 13798, 22.8.1990: lagoon between Sarang Harbour and Walog.

Distribution in SW-Pacific: Fiji (N'Yeurt *et al.*, 1996: 58), Lord Howe Island (Kraft, 2000: 525), Papua New Guinea (this paper), Philippines (Silva *et al.*, 1987: 92).

Enteromorpha intestinalis (Linnaeus) Nees 1820: Index

References: Bliding (1963: 139–141, figs 87–88); Calumpang & Meñez (1996: 107, + fig.); Trono (1997: 6, fig. 1); Littler & Littler (2000: 302, 303 + figs).

Type locality: “in Mari omni”.

Voucher: Copp & PvR 13364, 23.7.1990: Medibur.

Distribution in SW-Pacific: N-Australia (Lewis, 1987: 4), Fiji (N'Yeurt *et al.*, 1996: 58), Malaysia (Phang, 1986: 25), Micronesia (Tsuda & Wray, 1977: 97), Philippines (Silva *et al.*, 1987: 92), Singapore (Teo & Wee, 1983: 31), Taiwan (Lewis & Norris, 1987: 7), Thailand (Lewmanomont & Ogawa, 1995: 50), Vietnam (Dawson, 1954: 383).

Enteromorpha kylinii Bliding 1948: 199–204, figs 1–3

References: Bliding (1963: 103–106, figs 61–63).

Type locality: Kristineberg, Sweden.

Vouchers: HEC 4356, 13.6.1980 & HEC 4386, 22.6.1980 & HEC 6579, 22.8.1986: Laing Island; HEC 7665, 2.7.1988: Hansa Bay, Barol Point.

Distribution in SW-Pacific: N-Australia (Lewis, 1987: 4), Caroline Islands (Trono, 1968: 152), Micronesia (Tsuda & Wray, 1977: 97), Papua New Guinea (this paper), Vietnam (Nguyên *et al.*, 1993: 52).

Notes: Our specimens correspond with Bliding's (*loc. cit.*) description and illustrations, as well as with European specimens deposited in GENT: thallus tubular, with a homogeneous diameter of 0.5 to 1 mm, unbranched and without any proliferations, several dm long, forming intricate “loose-lying” masses (in fact attached to small shell or coral fragments) on the silty–sandy substratum; rather square cells in marked longitudinal rows (no transverse rows), each cell containing (1–)2–3 pyrenoids. All our specimens from PNG were collected at (12–)30–40 m depth.

The tropical taxon frequently called *E. kylinii*, as described and illustrated by Jaasund (1976: 1, fig. 1) or Dawson (1954: 384, fig. 5), clearly belongs to another species which is richly branched at the bases.

Enteromorpha multiramosa Bliding 1960: 177, figs 4, 5

References: Bliding (1963: 116, figs 71a–h, 72a–d); Millar & Kraft (1994: 422); Kraft (2000: 526, fig. 9).

Type locality: Split, Yugoslavia.

Vouchers: HEC 7617, 27.6.1988: Neptune Point; HEC 7692, 5.7.1988: Laing Island; HEC 7904, 21.7.1988: Hatzfeldthafen; HEC 7940, 25.7.1988: Saidor area, Gumbi Bay; Copp & PvR 13077, 10.7.1990: Beliau Island, W-bay.

Other collection sites in N-PNG: Mugil Harbour & Vidani Island; Sarang harbour; Hansa Bay, Awar.

Distribution in SW-Pacific: Lord Howe Island (Kraft, 2000: 526), Papua New Guinea (this paper).

Enteromorpha muscoides (Clemente) Cremades *in* Cremades & Pérez-Cirera 1990: 489

References: Bliding [1963: 119–127, figs 73–78 (= *E. ramulosa* (J.E. Smith) Hooker)].

Type locality: Baltic Sea, Germany.

Vouchers: HEC 7622, 27.6.1988: Neptune Point; HEC 7871, 19.7.1988 & Copp & PvR 13361, 23.7.1990: Medibur.

Distribution in SW-Pacific: Papua New Guinea (this paper), Philippines [Silva *et al.*, 1987: 91 (= *E. ramulosa*)].

Ulva Linnaeus**Key to the species from N-PNG**

- 1a. Blades regularly perforated, resulting in a net-like structure *U. reticulata*
 1b. Blades not perforated 2
 2a. Thallus divided into narrow straps *U. fasciata*
 2b. Thallus composed of small, crisp, undulated bladelets, forming small rosettes .. *U. rigida*

Ulva fasciata Delile 1813: 297, pl. 58, fig. 5

References: Jaasund (1976: 5, figs 9A–C); Trono (1997: 10, fig. 3); Littler & Littler (2000: 304, 305 + figs).

Type locality: Alexandria, Egypt.

Voucher: HEC 7619, 27.6.1988: Neptune Point.

Distribution in SW-Pacific: N-Australia (Lewis, 1987: 4), Papua New Guinea (this paper), Philippines (Silva *et al.*, 1987: 93), Singapore (Teo & Wee, 1983: 27), Taiwan (Lewis & Norris, 1987: 7).

Ulva reticulata Forsskål 1775: 187

References: Coppejans *et al.* (1995a: 102, fig. 43); Lewmanomont & Ogawa (1995: 60, + fig.); Calumpang & Meñez (1996: 101, + fig.); Trono (1997: 14, fig. 6).

Syntype localities: 'Gomphodae' (Al-Qunfudhah), Saudi Arabia; Mokha, Yemen.

Voucher: Copp & PvR 13867, 30.8.1990: Madang Harbour.

Distribution in SW-Pacific: N-Australia (Lewis, 1987: 4), Indonesia (Coppejans & Prud'homme van Reine, 1992a: 170), Malaysia (Phang, 1986: 26), Papua New Guinea (Coppejans *et al.*, 1995a: 102), Philippines (Silva *et al.*, 1987: 94), Singapore (Teo & Wee, 1983: 23), Taiwan (Lewis & Norris, 1987: 7), Thailand (Lewmanomont & Ogawa, 1995: 60).

Ulva rigida C. Agardh 1822: 410

References: Jaasund [1976: 3, figs 8A–C (f. *tropica* Jaasund *nomen invalidum*)]; Trono (1997: 14).

Lectotype locality: Cadiz, Spain.

Voucher: HEC 7607, 27.6.1988: Mugil Harbour & Vidani Island.

Distribution in SW-Pacific: N-Australia (Lewis, 1987: 4), Lord Howe Island (Kraft, 2000: 532), Papua New Guinea (this paper), Philippines (Silva *et al.*, 1987: 94), Taiwan (Lewis & Norris, 1987: 7).

Note: Phillips (1984, 1988) already pointed out that Australian specimens identified as *Ulva rigida* are not completely similar to samples from Brittany. Coat *et al.* (1998: 84) confirm that the published Australian *Ulva* ITS-sequence does not relate to the Brittany *U. rigida*. Our specimens are very small (bladelets 0.5 to 1 cm in diameter) and have a smooth surface, with rare marginal teeth, growing as dark green rosettes; transverse sections above the rhizoidal part show palissade-like cells, each cell being 40–50 µm long, 7–15 µm broad and mostly containing 2–4 pyrenoids.

Order Cladophorales

The genera which were traditionally placed in the order Siphonocladales (Egerod, 1952: *Anadyomene*, *Boergesenia*, *Boodlea*, *Dictyosphaeria*, *Microdictyon*, *Phyllodictyon*, *Struvea*, *Valonia* and *Ventricaria*) have been studied in detail along the north and south coast of Papua New Guinea by Leliaert *et al.* (1998).

Family Anadyomenaceae

Anadyomene Lamouroux

Anadyomene plicata C. Agardh 1823: 400–401

References: Weber-van Bosse (1913: 75, figs 16, 17); Sartoni (1992: 292, figs 2, 3); Trono (1997: 17, fig. 7); Leliaert *et al.* (1998: 179–180, figs 1–3).

Type locality: 'Ravak', Island Waigeo, Moluccas, Indonesia.

Vouchers: HEC 4225, 26.5.1980: Laing Island; HEC 7713, 7.7.1988: Boisa Island, N-coast; HEC 7994, 26.7.1988: Saidor area, Cape Iris-Biliau; Copp & PvR 13259, 19.7.1990: Ruo Island; Copp & PvR 13529, 21.7.1990: Bagabag, Christmas Bay.

Other collection sites in N-PNG: Murukinam; patch reef between Sinub Island and Wongat Island; Neptunus Point; Boisa Island.

Distribution in SW-Pacific: N-Australia (Lewis, 1987: 6), Indonesia (Weber-van Bosse, 1913: 75), Malaysia (Phang, 1994: 125), Papua New Guinea (Leliaert *et al.*, 1998: 179), Philippines (Silva *et al.*, 1987: 94).

Note: As pointed out by Leliaert *et al.* (1998), the *Anadyomene*-specimens from the South coast of Papua New Guinea identified as *A. wrightii* Harvey *ex* J.E. Gray (Coppejans *et al.*, 1995a: 94) also belong to this species. *Anadyomene plicata* and *A. wrightii* are both Indo-Pacific species which differ in a few characters: the diameter of the veins is larger in *A. wrightii* (150–220 µm versus 75–150 µm in *A. plicata*), and the veins of *A. wrightii* are composed of 2–3 cells whereas they consist of a single cell (occasionally two) in *A. plicata*.

Microdictyon Decaisne

Microdictyon palmeri Setchell 1925: 106

References: Setchell (1929: 535–539, figs 57–62); Leliaert *et al.* (1998: 182, figs 9, 10).

Type locality: Guadalupe Island, Mexico, Pacific Ocean.

Vouchers: HEC 4690, 17.8.1980: Hansa Bay, The Pinnacle; Copp & PvR 13485, 2.8.1990: Bagabag, NW-point of Christmas Bay; Copp & PvR 13653, 8.8.1990: Bagabag, Badilu village.

Distribution in SW-Pacific: Papua New Guinea (Leliaert *et al.*, 1998: 182).

Note: *Microdictyon palmeri* was placed in the *Annuliferae* group, section *Calodictyon* on account of the anastomosis by means of smooth rings on the cell apices, the flabellate branching pattern and basal attachment of the blade (Setchell, 1929: 478, 502, 535). The species differs from others in the section *Calodictyon* by its delicate, light green blades. *Microdictyon palmeri* resembles *M. japonicum* Setchell but can be distinguished by its more regular venation, coarser filaments, sharper angle of branching and larger meshes.

Fam. Cladophoraceae

Chaetomorpha Kützing**Key to the species from N-PNG**

- 1a. Filaments epilithic, solitary or in clusters 2
- 1b. Filaments forming entangled, free-floating mats 3
 - 2a. Filaments straight, up to 625 µm in diameter, basal cell with annular constrictions *C. antennina*
 - 2b. Filaments coiled at the base, up to 900 µm in diameter at the distal end, basal cell lacking annular constrictions *C. spiralis*
- 3a. Cell diameter 400–650 µm *C. crassa*
- 3b. Cell diameter smaller than 400 µm 4

- 4a. Cell diameter 175–275(– 375) μm *C. linum*
 4b. Cell diameter 30–50 μm *C. gracilis*

Chaetomorpha antennina (Bory de Saint-Vincent) Kützing 1847: 166

References: Egerod (1974: 134–135, figs 6–8); Sartoni (1992: 297, fig. 4C); Nguyễn *et al.* (1993: 66, fig. 44); Trono (1997: 18); Lewmanomont & Ogawa (1995: 41, + fig.); Kraft (2000: 538, figs 13A–C); Littler & Littler (2000: 316, 317 + figs).

Type locality: Réunion.

Vouchers: HEC 6573, 20.8.1986: Bogia Bay; HEC 7618, 27.6.1988: Neptune Point; HEC 7727, 7.7.1988: Boisa Island, N-coast.

Distribution in SW-Pacific: N-Australia (Lewis, 1987: 10), Lord Howe Island (Kraft, 2000: 538), Malaysia (Phang, 1986: 22), Micronesia (Tsuda & Wray, 1977: 95), New Caledonia (Garrigue & Tsuda, 1988: 58), Papua New Guinea (this paper), Philippines (Silva *et al.*, 1997: 96), Solomon Islands (Womersley & Bailey, 1970: 262), Taiwan (Lewis & Norris, 1987: 8), Thailand (Lewmanomont & Ogawa, 1995: 41), Vietnam (Dawson, 1954: 386).

Note: This species occurs in most warm seas and is easily recognizable by the caespitose stiff tufts, relatively broad, erect and straight filaments (diameter: 375–625 μm), and long basal cells (up to 5 mm) with annular constrictions.

Chaetomorpha crassa (C. Agardh) Kützing 1845: 204

References: Littler *et al.* (1989: 32, fig. 2, p. 33); Nguyễn *et al.* (1993: 65, fig. 42); Lewmanomont & Ogawa (1995: 42, + fig); Calumpong & Meñez (1996: 110, + fig); Trono (1997: 18, fig. 8); Littler & Littler (2000: 318, 319 + figs).

Syntype localities: Trieste and Venezia, Italy; England.

Vouchers: HEC 4655, 13.8.1980: Hansa Bay, Awar Point; HEC 7990, 26.7.1988: Saidor area, Cape Iris-Biliau; Copp & PvR 13299, 21.7.1990: Neptunus Point; Copp & PvR 13728, 18.8.1990: Bay in front of Malala village.

Distribution in SW-Pacific: N-Australia (Lewis, 1987: 11), Caroline Islands (Trono, 1968: 164), Fiji (N'Yeurt *et al.*, 1996: 59), Indonesia (Verheij & Prud'homme van Reine, 1993: 416), Micronesia (Tsuda & Wray, 1977: 95), Papua New Guinea (Heijs & Brouns, 1986: 38), Philippines (Silva *et al.*, 1987: 96; Trono, 1997: 18), Singapore (Teo & Wee, 1983: 38), Solomon Islands (Womersley & Bailey, 1970: 262), Thailand (Lewmanomont & Ogawa, 1995: 42); Vietnam (Dawson, 1954: 386).

Note: This widespread species is characterized by entangled, broad filaments (diameter: 400–650 μm). Price [1967, *cit. in* Burrows (1991: 140)] argues that *C. crassa* might be conspecific with *C. linum* but this synonymy remains uncertain (Burrows *loc. cit.*).

Chaetomorpha gracilis Kützing 1845: 203

References: Børgesen (1913: 19, fig. 6); Durairatnam (1961: 19–20); Kraft (2000: 542, fig. 14B); Littler & Littler (2000: 318, 319 + figs).

Type locality: Trieste, Italy.

Vouchers: HEC 7872, 19.7.1988: Medibur; Copp & PvR 13362, 23.7.1990 & Copp & PvR 13363, 23.7.1990: Medibur.

Distribution in SW-Pacific: Lord Howe Island (Kraft, 2000: 542), Papua New Guinea (this paper), Philippines (Silva *et al.*, 1987: 96), Singapore (Teo & Wee, 1983: 38).

Note: Thalli forming large floating mats composed of densely entangled filaments 30–50 μm in diameter.

Chaetomorpha linum (O.F. Müller) Kützing 1845: 204

References: Egerod (1974: 135, fig. 9); Womersley (1984: 176, pl. 13: fig. 2; figs 54D, 57A); Burrows (1991: 138–140, fig. 39); Nguyễn *et al.* (1993: 65, fig. 43); Littler & Littler (2000: 318, 319 + figs).

Syntype localities: Nakskov Fjord and Rødby Fjord, Denmark.

Vouchers: HEC 4616, 9.8.1980: between Kanamur and Bagania; HEC 7873, 19.7.1988: Medibur.

Distribution in SW-Pacific: N-Australia (Lewis, 1987: 11), Fiji (N'Yeurt *et al.*, 1996: 59), Indonesia (Weber-van Bosse, 1913: 84), Micronesia (Tsuda & Wray, 1977: 95), New Caledonia (Garrigue & Tsuda, 1988: 58), Papua New Guinea (this paper), Philippines (Silva *et al.*, 1997: 96), Singapore (Teo & Wee, 1983: 38), Solomon Islands (Womersley & Bailey, 1970: 263), Taiwan (Lewis & Norris, 1987: 8); Vietnam (Nguyên *et al.*, 1993: 65).

Note: *Chaetomorpha linum* is widely distributed in warm and temperate seas. The species is characterized by unattached, entangled filaments [diameter: 175–275(–375) µm]. Some authors [e.g. Burrows (1991: 138–140)] treat *C. linum* as an unattached form of *C. aerea* (Dillwyn) Kützing or as synonymous with *C. crassa* (see there).

Chaetomorpha spiralis Okamura 1903: 131–132

References: Okamura (1912: 162, pl. 95); Tseng (1984: 262, pl. 130, fig. 3); Sartoni (1992: 299, fig. 5A); Nguyên *et al.* (1993: 67, fig. 45); Coppejans *et al.* (2000: 62, fig. 24).

Type locality: Nemoto, Boshu Province [Chiba Prefecture], Japan.

Vouchers: HEC 7996, 26.7.1988, Saidor area, Cape Iris-Biliau; Copp & PvR 13815, 22.8.1990, hole in wall.

Distribution in SW-Pacific: N-Australia (Lewis, 1987: 11), Malaysia (Phang, 1986: 23), Papua New Guinea (Heijs & Brouns, 1986: 38), Philippines (Silva *et al.*, 1997: 97), Taiwan (Lewis & Norris, 1987: 8); Vietnam (Nguyên *et al.*, 1993: 67).

Note: This distinctive species has rigid filaments which are much coiled and contorted towards the thallus base.

Cladophora Kützing

Key to the species from N-PNG

- 1a. Thalli epilithic or epiphytic; composed of free, erect filaments 2
- 1b. Thalli epilithic, cushion-like, composed of densely interwoven branch systems; branching unilateral or in opposite pairs; rhizoidal cells frequent *C. sibogae*
 - 2a. Thalli delicate; diameter of the main axis < 110 µm; apical cell diameter < 80 µm . 3
 - 2b. Thalli coarse; branching with 2–5 laterals per cell; diameter of the main axis > 150 µm; apical cell diameter > 100 µm 4
- 3a. Branching unilateral, opposite or ternate; l/w-ratio of the cells up to 14; diameter of apical cells 18–25 µm; rhizoids absent *C. crystallina*
- 3b. Branching pseudodichotomous; l/w-ratio of the cells up to 65; diameter of apical cells 60–80 µm; many cells cut off a single rhizoid distally *C. socialis*
- 4a. Diameter of the main filaments 150–250 µm; apical cell diameter 100–180 µm
..... *C. saviniana*
- 4b. Diameter of the main filaments 300–600 µm; apical cell diameter 250–350 µm
..... *C. cf. ohkuboana*

Cladophora crystallina (Roth) Kützing 1843: 267

References: Kützing (1854: 4, pl. 19, fig. II); Dawson (1956: 33, fig. 13b,c); Chapman (1961: 84, fig. 94).

Type locality: near Wismar, Germany.

Vouchers: HEC 7548, 22.6.1988: Wongat Island, sheltered side; HEC 7669, 2.7.1988: Laing Island; HEC 7781, 14.7.1988: Malagere Island (Potsdam Harbour); HEC 7785, 15.7.1988: Hansa Bay, close to Awar Point; Copp & PvR 13590, 5.8.1990: N of Tab Island, landward slope of barrier reef.

Distribution in SW-Pacific: Micronesia (Tsuda & Wray, 1977: 95), Papua New Guinea (this paper), Philippines (Silva *et al.*, 1987: 97).

Notes: Culture studies of Van den Hoek (1963: 148) showed that *C. crystallina* might be conspecific with either *C. glomerata* (Linnaeus) Kützing or *C. vagabunda* (Linnaeus) Van den Hoek. This delicate species is characterised by an acropetally organized branching system, which is often falcate or refracto-falcate; basal filaments of 90–110 µm diameter and ultimate branchlets of 18–25 µm diameter. The branching pattern and cell dimensions of our specimens correspond with the descriptions and illustrations of this species by Dawson (*loc. cit.*) and Chapman (*loc. cit.*).

Cladophora* cf. *ohkuboana Holmes 1896: 249, pl. 10: fig. 1

References: Okamura (1935: 47, pl. 325, figs 1–3); Tseng [1984: 260, pl. 129, fig. 2 (« *C. ohkuboana* »)]; Sakai (1964: 15, fig. 2, pl. I, 2); Kraft (2000: 554, figs 18D–E); Van den Hoek & Chihara (2000: 84–88, figs 35, 36); Wynne (2000: 216–217, fig. 25).

Type locality: Japan.

Vouchers: HEC 4307, 4.6.1980: Hansa Bay, Bisalpap Reef; HEC 7773, 14.7.1988: Malagere Island (Potsdam Harbour); HEC 7939, 25.7.1988: Saidor area, Gumbi Bay; HEC 8036, 1.8.1988: Ulingan Bay, W-side; Copp & PvR 13659, 15.8.1990: N of Tab Island, landward slope of barrier reef; Copp & PvR, 18.8.1990: Mugil Harbour.

Distribution in SW-Pacific: Lord Howe Island (Kraft, 2000: 554), Papua New Guinea (this paper).

Note: The dimensions and other morphological characters are in good agreement with the descriptions and illustrations of the species by Okamura (*loc. cit.*), Tseng (*loc. cit.*) and Kraft (*loc. cit.*). The last author describes the branching pattern with 1 or 2 laterals arising from almost every primary segment; in our specimens, sometimes up to 3 laterals arise from the basal segments. The specimens identified as *Cladophora* sp. 1 (Coppejans *et al.*, 1995a: 95, fig. 37) also belong to this species.

Cladophora saviniana Børgesen 1948: 10–13, figs 3, 4, pl. I: fig. 1

Reference: Jaasund (1976: 7, fig. 13).

Type locality: Savinia, Mauritius.

Voucher: HEC 8083, 15.6.1988: Murukinam.

Distribution in SW-Pacific: Papua New Guinea (this paper).

Note: This species forms dense, erect, dark green tufts up to 5 cm high; branching is apical and the filaments are directed straight upward as depicted by Børgesen (1948).

Cladophora sibogae Reinbold 1905: 146

References: Egerod (1974: 138, figs 22–27); Jaasund (1976: 7, fig. 14); Sartoni (1986: 361, fig. 3E); Van den Hoek & Chihara (2000: 42–44, fig. 17).

Syntype localities: Indonesia: Banda islands, Moluccas and Dongola [Donggala, Paloe Bay], Celebes.

Vouchers: HEC 8005, 28.7.1988: seaward side of Wongat Island; Copp & PvR 13814, 22.8.1990, hole in the wall.

Distribution in SW-Pacific: Micronesia (Tsuda & Wray, 1977: 96), Papua New Guinea (this paper), Philippines (Silva *et al.*, 1987: 99), Solomon Islands (Womersley & Bailey, 1970: 264), Taiwan (Lewis & Norris, 1987: 8).

Note: Thallus forming dense, dark green cushions, growing in the supralittoral fringe (highest part of the *Bostrychietum*) or woolly tufts when growing continuously submerged. Branching regularly opposite, rhizoidal branches present, cell diameter 80–160 µm.

Cladophora socialis Kützing 1849: 416

References: Van den Hoek (1982: 52–57, figs 30–40), Sartoni (1992: 302–304, fig. 6A,B), Van den Hoek & Chihara (2000: 40–42, fig. 16).

Type locality: Tahiti.

Vouchers: HEC 4399, 23.6.1980: Laing Island, lagoon; HEC 7992, 26.7.1988: Saidor area, Cape Iris-Biliau.

Distribution in SW-Pacific: N-Australia (Lewis, 1987: 14), Indonesia (Weber-van Bosse, 1913: 82), Micronesia (Tsuda & Wray, 1977: 96), New Caledonia (Garrigue & Tsuda, 1988: 59), Papua New Guinea (Enomoto & Ohba, 1992: 23), Solomon Islands (Womersley & Bailey, 1970: 264), Vietnam [Dawson, 1954: 388 (= *C. patentiramea* f. *longiarticulata*)].

Note: This species has been reported from Indonesia as *Cladophora patentiramea* (Montagne) Kützing f. *longiarticulata* Reinbold, which has been reduced to synonymy with *C. socialis* by Børgesen (1946: 28).

Rhizoclonium Kützing***Rhizoclonium africanum*** Kützing 1853: 21, pl. 67: fig. II

References: Egerod (1974: 135–136, figs 10–12); Sartoni (1986: 361, fig. 3C); Sartoni (1992: 305, fig. 7A); Kraft (2000: 542, figs 14C–E).

Type locality: ‘Senegambien’ (Senegal or Gambia).

Voucher: HEC 7947, 25.7.1988: Saidor area, Gumbi Bay.

Distribution in SW-Pacific: Fiji (N’Yeurt *et al.*, 1996: 59), Lord Howe Island (Kraft, 2000: 542), Papua New Guinea (this paper), Philippines (Silva *et al.*, 1987: 99), Solomon Islands (Womersley & Bailey, 1970: 265).

Fam. Siphonocladaceae

Boergesenia J. Feldmann***Boergesenia forbesii*** (Harvey) J. Feldmann 1938: 1503–1504

References: Sartoni (1992: 306, fig. 7b); Lewmanomont & Ogawa (1995: 27, + fig.); Calumpong & Meñez (1996: 92, + fig.); Trono (1997: 21, fig. 10); Leliaert *et al.* (1998: 184, fig. 13); Huisman (2000: 237 + fig.).

Syntype localities: Ryukyu-retto, Japan; Sri Lanka.

Vouchers: HEC 7620, 27.6.1988: Neptune Point; HEC 7845, 18.7.1988: Hansa Bay, Barol Point; HEC 7911, 25.7.1988: Saidor area, Gumbi Bay; Copp & PvR 13506, 2.8.1990: Bagabag, NW-point of Christmas Bay; Copp & PvR 13598, 7.8.1990: Nagada Harbour in front of Gosem Island; Copp & PvR 13831, 22.8.1990: Mugil Harbour.

Distribution in SW-Pacific: N-Australia (Lewis, 1987: 9), Caroline Islands (Trono, 1968: 157), Fiji (N’Yeurt *et al.*, 1996: 60), Indonesia (Verheij & Prud’homme van Reine, 1993: 416), Micronesia (Tsuda & Wray, 1977: 93), New Caledonia (Garrigue & Tsuda, 1988: 56), Papua New Guinea (Heijs & Brouns, 1986: 38), Philippines (Silva *et al.*, 1997: 100), Solomon Islands (Womersley & Bailey, 1970: 268), Taiwan (Lewis & Norris, 1987: 10), Thailand (Lewmanomont & Ogawa, 1995: 27), Vietnam (Dawson, 1954: 388).

Boodlea G. Murray & De Toni**Key to the species from N-PNG**

- 1a. Thalli spongy or cushion-like; branching predominantly unilateral, irregular *B. composita*
 1b. Thalli flat, blades predominantly unistratose; branching opposite, in a single plane, regular (in older parts of the blade branching can become three-dimensional, forming flat cushion-like thalli) *B. montagnei*

Boodlea composita (Harvey) Brand 1904: 187–190

References: Magruder & Hunt (1979: 17, top fig., p. 16); Tseng (1984: 276, pl. 137, fig. 1); Lewmanomont & Ogawa (1995: 26 + fig.); Calumpong & Meñez (1996: 110, + fig.); Trono (1997: 22, fig. 11); Leliaert *et al.* (1998: 184, figs 14–20); Kraft (2000: 569, figs 24A–C); Littler & Littler (2000: 326, 327 + figs); Huisman (2000: 238 + figs).

Type locality: Mauritius.

Vouchers: HEC 6602, 23.8.1986: Boisa Island; HEC 7903, 21.7.1988: Hatzfeldthafen; HEC 7934 (p.p.), 25.7.1988: Saidor area, Gumbi Bay; Copp & PvR 13262, 19.7.1990: Ruo Island; Copp & PvR 13509 (p.p.), 2.8.1990: Bagabag, NW-point of Christmas Bay.

Other collection sites in N-PNG: Mugil Harbour; W of Malamal Island; patch reef SW of Wongat Island; Island N of Demasa Island; between Sinub Island and Wongat Island; Medibur.

Distribution in SW-Pacific: N-Australia (Lewis, 1987: 6), Caroline Islands (Trono, 1968: 161), Fiji (N'Yeurt *et al.*, 1996: 60), Indonesia (Verheij & Prud'homme van Reine, 1993: 415), Lord Howe Island (Kraft, 2000: 569), Malaysia (Phang, 1986: 26), Micronesia (Tsuda & Wray, 1977: 93), New Caledonia (Garrigue & Tsuda, 1988: 56), Papua New Guinea (Heijs & Brouns, 1986: 38), Philippines (Silva *et al.*, 1997: 100), Solomon Islands (Womersley & Bailey, 1970: 269), Taiwan (Lewis & Norris, 1987: 10), Thailand (Lewmanomont & Ogawa, 1995: 26), Vietnam (Dawson, 1954: 390).

Note: HEC 6602 and HEC 7610 correspond very well with the original description of *Boodlea kaeneana* Brand (1904: 190–191, pl. 4: figs 36–39), which has been synonymised with *B. composita* by Egerod (1952: 362). Branching in *B. kaeneana* is more irregular than in *B. composita* and predominantly unilateral, whereas in *B. composita* it is often regular and mainly opposite. Formation of cross walls in the unilateral branches is usually delayed in *B. kaeneana*, giving it a *Cladophoropsis*-like appearance; the delay in cross-wall formation is not frequent in *B. composita*.

Boodlea montagnei (Harvey ex J. Gray) Egerod 1952: 332, footnote

References: Setchell [1929: 573–580, figs 97–105 (= *Microdictyon montagnei* Harvey ex J. Gray)]; Sartoni (1992: 307, fig. 7D).

Type locality: Tonga.

Vouchers: HEC 4431, 25.6.1980: Laing Island; HEC 6535, 18.8.1986: Megiar Harbour; HEC 7934 (p.p.), 25.7.1988: Saidor area, Gumbi Bay; Copp & PvR 13508, 2.8.1990: Bagabag, NW-point of Christmas Bay; Copp & PvR 13588, 5.8.1990: barrier reef N of Tab Island.

Other collection sites in N-PNG: Hansa Bay, Durangit Reef; Kranket Island; Nagada Harbour; Sarang Harbour.

Distribution in SW-Pacific: N-Australia (Lewis, 1987: 6), Indonesia [Weber-van Bosse, 1913: 67 (= *Microdictyon montagnei*)], Malaysia [Phang, 1986: 27 (= *M. montagnei*)], Papua New Guinea (this paper), Philippines (Silva *et al.*, 1987: 100), Singapore [Teo & Wee, 1983: 41 (= *M. montagnei*)], Solomon Islands (Womersley & Bailey, 1970: 270), Taiwan (Lewis & Norris, 1987: 10).

Note: These specimens were wrongly identified as *B. composita* in Leliaert *et al.* (1998: 184–186, figs 14, 15, 19, 20). *Boodlea montagnei* is characterized by flat, unistratose blades, composed of regularly oppositely branching filaments. In older parts of the blade branching can become three-dimensional, forming cushion-like thalli. The specimens identified as *Microdictyon* sp. (Coppejans *et al.*, 1995a) also belong to this species.

***Cladophoropsis* Børgesen**

Cladophoropsis javanica (Kützing) P. Silva *in* Silva, Basson *et* Moe 1996: 792

References: Teo & Wee [1983: 45, fig. 41 (= *C. zollingeri* (Kützing) Reinbold)].

Type locality: Java, Indonesia.

Vouchers: HEC 7520, 21.6.1988: barrier reef close to Wongat Island; HEC 7605, 27.6.1988: Mugil Harbour.

Distribution in SW-Pacific: (all = *C. zollingeri*) Indonesia (Weber-van Bosse, 1913: 76), Micronesia (Tsuda & Wray, 1977: 96), Papua New Guinea (this paper), Philippines (Silva *et al.*, 1987: 101), Singapore (Teo & Wee, 1983: 45), Solomon Islands (Womersley & Bailey, 1970: 268), Taiwan (Lewis & Norris, 1987: 10).

Note: According to Silva *et al.* (1996: 792) *Aegagropila javanica* was based on a collection by Zollinger. On transferring the name to *Cladophora*, Kützing was obligated to change the epithet because of the existence of *Cladophora javanica* Kützing. When the species is transferred to another genus, however, the original epithet must be restored.

Dictyosphaeria* Decaisne ex Endlicher*Key to the species from N-PNG**

- 1a. Undisrupted thalli hollow, older specimens cup-shaped *D. cavernosa*
 1b. Thalli solid, extremely tough *D. versluysii*

Dictyosphaeria cavernosa (Forsskål) Børgesen 1932: 2

References: Magruder & Hunt (1979: 27, fig. 1, p. 26); Tseng (1984: 268, pl. 133, fig. 5); Lewmanomont & Ogawa (1995: 48, + fig.); Calumpong & Meñez (1996: 98, + fig.); Trono (1997: 24, fig. 12); Leliaert *et al.* (1998: 188, figs 30–33); Kraft (2000: 578, figs 27A–B); Littler & Littler (2000: 332, 333 + figs); Huisman (2000: 240 + fig.).

Syntype localities: 'Gomfodae' (Al-Qunfudhah), Saudi Arabia; Mokha, Yemen.

Vouchers: HEC 7912, 25.7.1988: Saidor area, Gumbi Bay; Copp & PvR 13076, 10.7.1990: Beliau Island, W-bay; Copp & PvR 13490, 2.8.1990: Bagabag, NW-point of Christmas Bay.

Distribution in SW-Pacific: N-Australia (Lewis, 1987: 7), Caroline Islands (Trono, 1968: 157), Fiji (N'Yeurt *et al.*, 1996: 60), Indonesia (Verheij & Prud'homme van Reine, 1993: 416), Lord Howe Island (Kraft, 2000: 578), Malaysia [Phang, 1986: 27 (= *D. favulosa* (C. Agardh) Decaisne)], Micronesia (Tsuda & Wray, 1977: 96), New Caledonia (Garrigue & Tsuda, 1988: 59), Papua New Guinea (Coppejans *et al.*, 1995a: 98), Philippines (Silva *et al.*, 1987: 101), Singapore (Teo & Wee, 1983: 43), Solomon Islands (Womersley & Bailey, 1970: 267), Thailand (Lewmanomont & Ogawa, 1995: 28), Vietnam (Dawson, 1954: 388).

Dictyosphaeria versluysii Weber-van Bosse 1905: 144

References: Magruder & Hunt (1979: 27, middle fig., p. 26); Tseng (1984: 270, pl. 134, fig. 2); Trono (1997: 25, fig. 13); Leliaert *et al.* (1998: 190, figs 37–39); Littler & Littler (2000: 334, 334 + figs).

Syntype localities: several reefs in the Malaysian Archipelago.

Vouchers: HEC 4254, 28.5.1980: Laing Island; Copp & PvR 13153, 14.7.1990: patch reef SW of Wongat Island; Copp & PvR 13286, 20.7.1990: between Tausch Island and Sek Island; Copp & PvR 13540, 2.8.1990: Bagabag, New Year's Bay; Copp & PvR 13740, 18.8.1990: bay at Malala village; Copp & PvR 13813, 22.8.1990: Mugil Harbour.

Distribution in SW-Pacific: N-Australia (Lewis, 1987: 8), Caroline Islands (Trono, 1968: 158), Fiji (N'Yeurt *et al.*, 1996: 60), Indonesia (Verheij & Prud'homme van Reine, 1993: 417), Micronesia (Tsuda & Wray, 1977: 97), New Caledonia (Garrigue & Tsuda, 1988:

59), Papua New Guinea (Coppejans *et al.*, 1995a: 98), Philippines (Silva *et al.*, 1987: 102); Solomon Islands (Womersley & Bailey, 1970: 267), Vietnam (Dawson, 1954: 388).

***Phyllocladion* J.E. Gray**

Key to the species of *Phyllocladion* and *Struvea* from N-PNG

- 1a. Stipe conspicuous, with basal annular constrictions; blades triangular to elliptical; laterals produced by segregative cell division *Struvea elegans*
 1b. Stipe without annular constrictions; blades elliptical or irregular; laterals produced by centripetal wall ingrowths 2
 2a. Blade length < 2 cm; diameter apical cells < 120 µm .. *Phyllocladion anastomosans*
 2b. Blade length 2–12 cm; diameter apical cells > 250 µm *Phyllocladion* sp.

Phyllocladion anastomosans (Harvey) Kraft & Wynne 1996: 131, figs 16–25

References: Tseng (1984: 276, pl. 137, fig. 2); Nguyễn *et al.* [1993: 88, fig. 60 (= *Struvea anastomosans* (Harvey) Piccone & Grunow)]; Coppejans *et al.* (1995a: 96, fig. 38); Lewmanomont & Ogawa [1995: 57, + fig. (= *S. anastomosans*)]; Trono [1997: 23 (= *S. anastomosans*)]; Leliaert *et al.* (1998: 186, figs 23, 24); Littler & Littler (2000: 328, 329 + figs).

Type locality: Fremantle, western Australia.

Vouchers: HEC 4492, 15.7.1980 & HEC 6670, 10.7.1986 & HEC 6675, 10.7.1986: Laing Island; Copp & PvR 13466, 1.8.1990: N of Wongat Island; Copp & PvR 13541, 2.8.1990: Bagabag, New Year's Bay; Copp & PvR 13586, 5.8.1990: N of Tab Island.

Distribution in SW-Pacific: (all = *Struvea anastomosans*) N-Australia (Lewis, 1987: 7), Caroline Islands (Trono, 1968: 162), Fiji (N'Yeurt *et al.*, 1996: 59), Malaysia (Phang, 1986: 27), Micronesia (Tsuda & Wray, 1977: 100), Papua New Guinea (Coppejans *et al.*, 1995a: 96), Philippines (Silva *et al.*, 1987: 101), Solomon Islands (Womersley & Bailey, 1970: 270), Taiwan (Lewis & Norris, 1987: 10), Thailand (Lewmanomont & Ogawa, 1995: 57), Vietnam (Dawson, 1954: 390).

***Phyllocladion* sp.**

Vouchers: HEC 4548, 22.7.1980 & HEC 4696, 18.8.1980 & HEC 7760, 13.7.1988: Laing Island.

Note: These specimens were identified as *Phyllocladion gardineri* (A. Gepp & E. Gepp) Kraft & Wynne in Leliaert *et al.* (1998: 187, figs 25–27), mainly based on the scarce literature data. Examination of the type specimen of *P. gardineri*, however, showed that our specimens differ from this species in various characters. The blades of *P. gardineri* have an entire margin and are composed of irregularly branching coarse filaments; the stipe has annular constrictions over the entire length. The PNG-specimens have blades with open margins, composed of regularly, oppositely branched slender filaments; the stipes lack annular constrictions. This taxon is currently under study.

***Spongocladia* Areschoug**

Spongocladia vaucheriaeformis Areschoug 1854: 202, pl. II

References: Børgesen (1948: 23–24, figs A, B); Sartoni (1992: 313–314, figs 9C, 10); Lewmanomont & Ogawa (1995: 45, + fig.), Kraft (2000: 576, figs 26A–E); Huisman (2000: 241 + fig.).

Type locality: Mauritius.

Vouchers: HEC 7547, 22.6.1988: Wongat Island, sheltered side; HEC 7571, 23.6.1988: Kranket Island, enclosed bay; HEC 7697, 6.7.1988: Malagere Island (Potsdam Harbour); HEC 7811, 16.7.1988: Manam; Copp & PvR 13050, 9.7.1990: Nagada Harbour; Copp & PvR 13621, 8.8.1990: Bagabag, S.E. point of Christmas Bay.

Distribution in SW-Pacific: N-Australia (Lewis, 1987: 10), Fiji [N'Yeurt *et al.*, 1996: 60 (= *Cladophoropsis vaucheriaeformis* (Areschoug) Papenfuss)], Indonesia [Coppejans & Prud'homme van Reine, 1992a: 171 (= *C. vaucheriaeformis*)], Lord Howe Island (Kraft, 2000: 576), Micronesia (Tsuda & Wray, 1977: 100), New Caledonia (Garrigue & Tsuda, 1988: 60), Papua New Guinea [Enomoto & Ohba, 1992: 23 (= *C. vaucheriaeformis*)], Philippines [Silva *et al.*, 1987: 101 (= *C. vaucheriaeformis*)], Solomon Islands [Womersley & Bailey, 1970: 269, Thailand [Lewmanomont & Ogawa, 1995: 45 (= *C. vaucheriaeformis*)].

Discussion: We follow Millar & Kraft (1994: 430) and Silva *et al.* (1996: 797) in recognizing the separation of *Spongocladia* from *Cladophoropsis*.

Struvea Sonder

See identification key of *Phyllocladion*.

Struvea elegans Børgesen 1912: 264, figs 13, 14

References: Børgesen (1913: 51–54, figs 37, 38); Leliaert *et al.* (1998: 187, figs 28, 29); Littler & Littler (2000: 328, 329 + figs).

Syntype localities: several in Virgin Islands.

Vouchers: HEC 4395, 22.6.1980 & HEC 6450, 8.1986 & HEC 6460, 8.1986: Laing Island; HEC 7734, 7.7.1988: Boisa Island, S-coast; Copp & PvR 13587, 5.8.1990: N of Tab Island.

Distribution in SW-Pacific: Papua New Guinea (Leliaert *et al.*, 1998: 187).

Ventricaria Olsen & J. West

Ventricaria ventricosa (J. Agardh) Olsen & J. West 1988: 104, figs 1–4

References: Sartoni (1992: 323, fig. 14E); Lewmanomont & Ogawa [1995: 63, + fig. (= *Valonia ventricosa* J. Agardh)]; Calumpong & Meñez (1996: 92, + fig.); Trono [1997: 28, fig. 16 (= *Valonia ventricosa*)]; Leliaert *et al.* (1998: 193); Littler & Littler (2000: 336, 337 + figs); Huisman (2000: 243 + fig.).

Lectotype locality: Guadeloupe, West Indies.

Vouchers: HEC 4235, 27.5.1980: Laing Island; HEC 7567, 23.6.1988: Kranket Island, enclosed bay; HEC 7932, 25.7.1988: Saidor area, Gumbi Bay; HEC 8076, 7.8.1988: W of Malamal Island; Copp & PvR 13491, 2.8.1990: Bagabag, NW-point of Christmas Bay. *Other collection sites in N-PNG:* Hansa Bay, Awar Point; Nagada Harbour.

Distribution in SW-Pacific: N-Australia [Lewis, 1987: 8 (= *Valonia ventricosa*)], Caroline Islands [Trono, 1968: 155 (= *Valonia ventricosa*)], Fiji (N'Yeurt *et al.*, 1996: 61), Indonesia (Verheij & Prud'homme van Reine, 1993: 418), Malaysia [Phang, 1986: 28 (= *Valonia ventricosa*)], Micronesia [Tsuda & Wray, 1977: 100 (*Valonia ventricosa*)], New Caledonia (Garrigue & Tsuda, 1988: 61), Papua New Guinea (Coppejans *et al.*, 1995a: 99), Philippines [Silva *et al.*, 1987: 103 (= *Valonia ventricosa*)], Solomon Islands [Womersley & Bailey, 1970: 267 (= *Valonia ventricosa*)], Thailand [Lewmanomont & Ogawa, 1995: 63 (= *Valonia ventricosa*)]; Vietnam [Dawson, 1954: 388 (= *Valonia ventricosa*)].

Family Valoniaceae

Valonia C. Agardh

Key to the species from N-PNG

- 1a. Thallus prostrate (cells 'creeping'), cells irregularly shaped, often arcuate; branching distal or lateral; tenacula randomly arranged along the cell walls *V. utricularis*
- 1b. Thallus hemispherical (cells radially placed); branching distal, fastigiate, regular, ditto polychotomous, tenacula grouped in circles *V. fastigiata*

Valonia fastigiata Harvey ex J. Agardh 1887: 101, pl. 1: fig. 5

References: Coppejans *et al.* (1995a: 98, fig. 39); Trono (1997: 27, fig. 15); Leliaert *et al.* (1998: 192, figs 42–44).

Syntype localities: Sri Lanka; Tonga.

Vouchers: HEC 7602, 27.6.1988: Mugil Harbour & Vidari Island; HEC 7782, 13.7.1988: Laing Island; Copp & PvR 13333, 21.7.1990: Hatzfeldhafen; Copp & PvR 13667, 5.8.1990: N of Tab Island.

Distribution in SW-Pacific: N-Australia (Lewis, 1987: 8), Fiji (N'Yeurt *et al.*, 1996: 61), Caroline Islands (Trono, 1968: 156), Indonesia (Verheij & Prud'homme van Reine, 1993: 417), Malaysia (Phang, 1986: 27), Micronesia (Tsuda & Wray, 1977: 100), New Caledonia (Garrigue & Tsuda, 1988: 61), Papua New Guinea (Coppejans *et al.*, 1995a: 98), Philippines (Silva *et al.*, 1987: 102), Solomon Islands (Womersley & Bailey, 1970: 266), Taiwan (Lewis & Norris, 1987: 11).

Valonia utricularis (Roth) C. Agardh 1823: 431

References: Taylor (1960: 112, pl. 9, fig. 10); Egerod (1974: 139–140, fig. 28); Leliaert *et al.* (1998: 192, fig. 45); Littler & Littler (2000: 340, 341 + figs).

Type locality: Mediterranean Sea.

Vouchers: HEC 4234, 27.5.1980 & HEC 7478, 17.6.1988: Laing Island; HEC 7916, 25.7.1988: Saidor area, Gumbi Bay; Copp & PvR 13511, Bagabag, NW-point of Christmas Bay; Copp & PvR 13812, 22.8.1990: Mugil Harbour.

Distribution in SW-Pacific: Caroline Islands (Trono, 1968: 156), Fiji (N'Yeurt *et al.*, 1996: 61), Indonesia (Coppejans & Prud'homme van Reine, 1992a: 172), Malaysia (Phang, 1986: 28), Papua New Guinea (Coppejans *et al.*, 1995a: 99), Philippines (Silva *et al.*, 1987: 103), Taiwan (Lewis & Norris, 1987: 11).

Order Bryopsidales

Family Bryopsidaceae

Bryopsis Lamouroux

Key to the species from N-PNG

- 1a. Ramuli of last order in all directions, resulting in three-dimensional apical parts . *B. hypnoides*
- 1b. Ramuli of last order distichous or unilateral, resulting in apical plumules; the complete thallus can be three-dimensional 2
 - 2a. Thallus stout (up to 24 cm long), main axis 700 µm wide at the base, pinnae 200 µm in diameter *Bryopsis* sp.
 - 2b. Thallus more delicate and diameter of main axis (345–500 µm) and pinnae (100–160 µm) markedly smaller 3
- 3a. Outline of the plumule triangular; pinnules on 2 double, opposite rows *B. plumosa*
- 3b. Outline of the plumule not triangular but linear, obovate to ovate, pinnules on 2 single or double, opposite rows 4
 - 4a. Plants small, 1–3 cm, plumule oblongate to ovate, 1–3 mm broad and 2–8 mm long *B. indica*
 - 4b. Plants larger, plumule linear-lanceolate, sometimes bent, 1–9 mm broad and 1.5 to 3 cm long 5
- 5a. Main axis mostly straight, ramuli clearly distichous, on 2 opposite (sometimes double) rows *B. pennata* var. *pennata*
- 5b. Main axis generally curved, ramuli unilateral or partly distichous *B. pennata* var. *secunda*

Bryopsis hypnoides Lamouroux 1809: 333

References: Coppejans & Van den heede (1996: 50, figs 2, 3, 6); Littler & Littler (2000: 342, 343 + figs).

Type locality: Mediterranean coast of France (near Cette [current spelling 'Sète'; since 1927]).

Vouchers: HEC 4382, 19.6.1980 & HEC 4493, 15.7.1980: Laing Island; Copp & PvR 13439, 27.7.1990: barrier reef, N of Wongat Island; Copp & PvR 13666, 15.8.1990: barrier reef, N of Tab Island; Copp & PvR 13757, 19.8.1990: Hansa Bay, Awar.

Distribution in SW-Pacific: N-Australia (Lewis, 1987: 16), Micronesia (Tsuda & Wray, 1977: 93), Papua New Guinea (this paper), Vietnam (Nguyên *et al.*, 1993: 104).

Bryopsis indica A. Gepp & E. Gepp 1908: 169–170, pl. 22: figs 10, 11

References: Coppejans *et al.* (1995a: 74, fig. 1); Coppejans & Van den heede (1996: 52, figs 4, 7); Kraft (2000: 627, figs 41A–C).

Syntype localities: Chagos Archipelago; Coetivy Reef; Mauritius; Sri Lanka.

Voucher: HEC 4566, 23.7.1980: Hansa Bay, Barol Point.

Distribution in SW-Pacific: N-Australia (Lewis, 1987: 16), Indonesia (Weber-van Bosse, 1913: 93), Lord Howe Island (Kraft, 2000: 627), Micronesia (Tsuda & Wray, 1977: 93), Papua New Guinea (Coppejans *et al.*, 1995a: 75), Philippines (Silva *et al.*, 1987: 103), Singapore (Teo & Wee, 1983: 49), Solomon Islands (Womersley & Bailey, 1970: 271), Taiwan (Lewis & Norris, 1987: 10), Vietnam (Nguyên *et al.*, 1993: 104).

Bryopsis pennata Lamouroux 1809: 333

References: Dawson (1954: 393, fig. 11b), Coppejans & Van den heede (1996: 52, figs 8, 9, 12, 16, 20), Lewmanomont & Ogawa (1995: 28, + fig.); Littler & Littler (2000: 342, 343 + figs).

Type locality: Antilles, West Indies.

Vouchers: HEC 4268, 31.5.1980: Laing Island; HEC 6605, 23.8.1986: Boisa Island; Copp & PvR 13135, 13.7.1990: Kranket Island, enclosed bay; Copp & PvR 13261, 19.7.1990: patch reef seaward of Ruo Island; Copp & PvR 13655, 10.8.1990: Nagada Harbour.

Distribution in SW-Pacific: N-Australia (Lewis, 1987: 17), Indonesia (Coppejans & Prud'homme van Reine, 1992a: 172), Malaysia (Phang, 1986: 20), Micronesia (Tsuda & Wray, 1977: 93), New Caledonia (Garrigue & Tsuda, 1988: 57), Papua New Guinea (Heijs & Brouns, 1986: 38), Philippines (Silva *et al.*, 1987: 103), Singapore (Teo & Wee, 1983: 47), Thailand (Lewmanomont & Ogawa, 1995: 28); Vietnam (Dawson, 1954: 393).

Note: In some specimens (Copp & PvR 13135 & 13261) plumules of the var. *secunda*-type are mixed with the var. *pennata*-type. The identification was then based on the dominant form. This observation supports the statement in Coppejans & Van den heede (1996: 54) that varietal distinction within this species is artificial.

Bryopsis pennata var. *secunda* (Harvey) Collins & Hervey 1917: 62

References: Coppejans & Van den heede (1996: 56, figs 11, 14); Littler & Littler (2000: 342, 343 + figs).

Syntype localities: Key West and Sand Key, Florida, USA.

Vouchers: HEC 7831, 16.7.1988: Manam, Baliau; HEC 7962, 25.7.1988: Saidor area, Suit.

Distribution in SW-Pacific: N-Australia (Lewis, 1987: 17), Fiji [N'Yeurt *et al.*, 1996: 61 (= *B. harveyana* J. Agardh)], Indonesia (Coppejans & Prud'homme van Reine, 1992a: 172), Papua New Guinea [Enomoto & Ohba, 1992: 23 (= *B. harveyana*)], Philippines (Silva *et al.*, 1987: 103), Singapore (Teo & Wee, 1983: 49), Taiwan [Lewis & Norris, 1987: 10 (= *B. harveyana*)].

Bryopsis plumosa (Hudson) C. Agardh 1823: 448

References: Coppejans & Van den heede (1996: 56, figs 15, 19); Littler & Littler (2000: 344, 345 + figs); Huisman (2000: 245 + fig.).

Type locality: Exmouth, Devon, England.

Vouchers: HEC 7684, 5.7.1988: Laing Island; Copp & PvR 13210, 17.7.1990: barrier reef S of Wongat Island.

Distribution in SW-Pacific: N-Australia (Lewis, 1987: 17), Fiji (N'Yeurt *et al.*, 1996: 61), Indonesia (Verheij & Prud'homme van Reine, 1993: 389), Malaysia (Phang, 1986: 20), Micronesia (Tsuda & Wray, 1977: 93), Papua New Guinea (this paper), Philippines (Silva *et al.*, 1987: 103), Taiwan (Lewis & Norris, 1987: 10), Vietnam (Nguy en *et al.*, 1993: 104).

***Bryopsis* sp.**

Vouchers: HEC 4317, 9.6.1980 & HEC 7630, 29.6.1988: Laing Island; HEC 4610, 9.8.1980: between Kanamur and Bagania; HEC 6499, 17.8.1986: Suaru; HEC 6650, 20.8.1986: HEC 6550, 20.8.1986: Ulingan Bay (W-side); HEC 7712, 7.7.1988, Boisa Island, N-coast; HEC 7807, 16.7.1988: Manam; HEC 8079, 15.6.1988, Murukinam; Copp & PvR 13295, 21.7.1990: Neptunus Point; Copp & PvR 13772, 20.8.1990: Boisa Island, N-coast.

Notes: This taxon forms large intricate tufts composed of numerous, course erect main axes (15–24 cm long, 700 µm wide close to the base) bearing irregularly placed (sometimes opposite or even verticillate) side branches; pinnules of the last order are extremely variable: from almost absent (HEC 7807), to long and percurrent with the main axis (HEC 8079b) or pinnately arranged in the upper quarter of the thallus, with bare parts in the plumules (as in *B. pennata* var. *leprieurii*) or partly unilaterally placed (as in *B. pennata* var. *secunda*) (Copp & PvR 13772). The pinnae are 200 µm diam., either uniformly 2–3 mm long (especially in the median parts of the pinnules, between bare parts), or gradually becoming shorter (in the apical parts of the pinnules) or extremely variable in length within a single 'plumule'. The apical part of the main axes is generally bare, resulting in an extruding main axis. Thalli are bright green and always collected from strongly wave-exposed, vertical walls of the infralittoral fringe (only accessible at low tide and with smooth sea). It is locally abundant.

Pseudobryopsis Berthold emend. Henne & Schnetter**Key to the species from N-PNG**

- 1a. Axes 100–160 µm in diameter; ramuli basally not swollen; gametangia single or two per ramulus, distant from the base of the ramulus *Pseudobryopsis gracilis*
 1b. Axes 200–450 µm in diameter; ramuli basally swollen; gametangia single, near the base of the ramulus *Pseudobryopsis solomonensis*

Pseudobryopsis gracilis Womersley & Bailey 1970: 273, fig. 3

References: Henne & Schnetter (1999: Tabs 1, 2).

Type locality: Yandina, Russel Island, Solomon Islands.

Vouchers: Copp & PvR 13348, 23.7.1990: Sarang Harbour.

Distribution in SW-Pacific: Papua New Guinea (this paper), Solomon Islands (Womersley & Bailey, 1970: 273).

Pseudobryopsis solomonensis Womersley & Bailey 1970: 272, fig. 2

References: Egerod (1975: 56, fig. 24), Henne & Schnetter (1999: Tabs 1, 2, fig. 29).

Type locality: Matieu Island, New Georgia, Solomon Islands.

Vouchers: HEC 4398, 23.6.1980: Laing Island, lagoon; Copp & PvR 13241, 18.7.1990: patch reef between Sinub Island and Wongat Island; Copp & PvR 13264, 19.7.1990: patch reef seaward of Ruo Island.

Distribution in SW-Pacific: Papua New Guinea (this paper), Solomon Islands (Womersley & Bailey, 1970: 272).

Family Caulerpaceae

Caulerpa Lamouroux

Key to the species from N-PNG

Prostrate branches are called stolonoids, erect branches assimilators, their main axis rachis, the compressed parts fronds and the side branchlets ramuli.

- 1a. Assimilators entire, blade-like, unbranched and ribbon-like (rarely proliferating from the middle part), lanceolate, provided with small marginal teeth that are generally in pairs *C. biserrulata*
- 1b. Assimilators variously branched, divided or incised 2
 - 2a. Ramuli either peltate or vesicle-like (spherical, clavate or turbinate) 3
 - 2b. Ramuli filiform or spiny or strap-like and with dentate margin or strongly compressed and with pinnate aspect 16
- 3a. Ramuli peltate (stalk-like lower portion abruptly expanded into a horizontally spread structure) 4
- 3b. Ramuli not peltate but vesicle-like 5
 - 4a. Horizontally spread structure disciform with entire margin . *C. racemosa* var. *peltata*
 - 4b. Horizontally spread structure like a snow crystal .. *C. filicoides* var. *andamanensis*
- 5a. Ramuli gradually enlarged from base to apex (clavate), with rounded or flattened apex 6
- 5b. Ramuli (sub-)spherical and sessile on the erect shoots or abruptly expanded into a (sub-)spherical top from the terete or constricted stalk-like lower portion 11
 - 6a. Apices of ramuli flattened *C. racemosa* var. *turbinata*
 - 6b. Apices of ramuli rounded 7
- 7a. Ramuli in longitudinal rows (or sometimes rare to absent, but then the rachis markedly compressed) 8
- 7b. Ramuli randomly radially arranged 10
 - 8a. Rachis at least partly compressed to complanate (sometimes even foliose), with some (rare) opposite vesicle-like branchlets (sometimes even completely naked) *C. racemosa* var. *lamourouxii*
 - 8b. Rachis completely terete, vesicle-like ramuli numerous 9
- 9a. Thallus stout, stolon thick, rhizoidal branches well developed, assimilators 15–20 mm wide; branchlets ± wide-angled, on 2, 3 or 4 rows *C. racemosa* var. *macra*
- 9b. Thallus more slender, assimilators up to 10 mm wide; ramuli narrow-angled, always on 2 opposite rows *C. racemosa* var. *corynephora*
 - 10a. Ramuli crowded, almost cylindrical at the base of the assimilators, becoming clavate and even pyriform higher up *C. racemosa* var. *laetevirens*
 - 10b. Ramuli not crowded, provided with a slender pedicel that is at least as long as the diameter of the markedly inflated part *C. racemosa* var. *occidentalis*
- 11a. Vesicle-like ramuli small (up to 2 mm in diameter), never in 2 opposite rows; with either a constricted pedicel or plastids with pyrenoids 12
- 11b. Vesicle-like ramuli larger; sometimes in two opposite rows; constricted pedicels and plastids with pyrenoids absent 13

- 12a. Stalk-like portion of the ramuli markedly constricted; numerous vesicle-like ramuli very densely packed, \pm in longitudinal rows along the rachis; plastids without pyrenoids *C. lentillifera*
- 12b. Stalk-like portion of the ramuli not constricted; vesicle-like ramuli less numerous, more irregularly grouped than in 12a; plastids with pyrenoids *C. microphysa*
- 13a. Rachis compressed, (sub-)sessile spherical ramuli either extremely rare and irregularly placed (to absent) or more frequent and (sub-)opposite; assimilators frequently at least partly naked *C. racemosa* var. *lamourouxii*
- 13b. Rachis terete, ramuli numerous, densely set (without naked portions along the rachis, except for the basal part) 14
- 14a. Ramuli in 2 opposite longitudinal rows, dorsiventrally compressed (blunt apices), blackish green; plastids with pyrenoids *C. opposita*
- 14b. Ramuli not on longitudinal rows; plastids without pyrenoids 15
- 15a. Ramuli with a slender pedicel which is at least as long as the diameter of the markedly inflated part, resulting in a slender habit .. *C. racemosa* var. *occidentalis*
- 15b. Pedicels shorter, resulting in a more stout habit; assimilators either short (1–2 cm), bearing only a few ramuli, resulting in a prostrate thallus or longer and bearing numerous ramuli; spherical part of the ramuli 1–2 mm wide (or more), shortly stipitate *C. racemosa* var. *racemosa*
- 16a. Ramuli in whorls 17
- 16b. Ramuli not in whorls but dichotomous or opposite 18
- 17a. Verticils conspicuous, well separated; ramuli rather long and elegant, supple, with (2–)3(–4) terminal mucrons; stoloniferous parts naked *C. verticillata*
- 17b. Verticils small and crowded, resulting in a lycopod-like aspect; ramuli short and stiff, pseudodichotomous with a single mucron on each apex; stoloniferous parts also (partly) covered by short ramuli *C. elongata* f. *elongata*
- 18a. Assimilators markedly compressed 19
- 18b. Assimilators terete or only slightly compressed; the ramuli also terete, reduced to mucrons or compressed 22
- 19a. Assimilators strap-like, generally unbranched, thin, with deeply lobed, smooth margins *C. manorensis*
- 19b. Assimilators (pseudo-)dichotomous with toothed margins; teeth varying from long and terete (short branchlets) to short and broadly attached 20
- 20a. Assimilators with long (several cm) unbranched terete stipe and long, narrow, (sub-) dichotomous, compressed, straight, vertical fronds; marginal teeth very small, distant *C. serrulata* var. *boryana* f. *occidentalis*
- 20b. Frond shortly stipitate (< 1 cm) 21
- 21a. Assimilators generally spirally twisted and \pm horizontally spread, marginal teeth well marked and serial *C. serrulata* var. *serrulata*
- 21b. Assimilators generally not twisted, vertical; margin set by upwardly curved, mucronate ramuli *C. serrulata* var. *pectinata*
- 22a. Ramuli terete, spiny or reduced to mucrons 23
- 22b. Ramuli complanate (at least slightly compressed dorsoventrally) 31
- 23a. Ramuli (sub-)dichotomous, mucronate 24
- 23b. Ramuli not ramified 25
- 24a. Stolonoids also (partly) covered by ramuli *C. elongata* f. *disticha*
- 24b. Stolonoids without ramuli but with numerous rhizoids *C. webbiana* f. *disticha*
- 25a. Ramuli short (1–3 mm), spiniform, in 2 opposite or 3 longitudinal rows, or reduced to irregularly placed mucrons 26
- 25b. Ramuli longer (4–5 mm), in 2 opposite rows 30

- 26a. Assimilators cylindrical, subdichotomous, frequently irregularly curled, covered by numerous perpendicularly placed mucronate warts *C. urvilleana*
- 26b. Ramuli more developed, directed towards the apex of the rachis, in longitudinal rows, at least in part of the frond 27
- 27a. At least the basal ramuli markedly inflated, generally not longer than the diameter of the rachis, densely packed *C. cupressoides* var. *mamillosa*
- 27b. Ramuli not markedly inflated but terete 28
- 28a. Assimilators rather robust, spiniform ramuli up to twice as long as the diameter of the rachis, slightly constricted at the base, generally at least in some fronds in 3 longitudinal rows *C. cupressoides* var. *cupressoides*
- 28b. Assimilators rather slender, ramuli not constricted at the base, in 2 opposite rows 29
- 29a. Ramuli up to twice as long as the diameter of the rachis
..... *C. cupressoides* var. *lycopodium* f. *disticha*
- 29b. Ramuli generally 3–4 (but up to 6) times as long as the diameter of the rachis
..... *C. cupressoides* var. *lycopodium* f. *elegans*
- 30a. Total width of the assimilators not exceeding 4 mm
..... *C. cupressoides* var. *lycopodium* f. *elegans*
- 30b. Total width of the assimilators generally 10–15 cm (rarely down to 7 mm)
..... *C. sertularioides*
- 31a. Ramuli sickle-shaped, slightly constricted at the base, with straight parallel sides in the middle part, upwardly curved and gradually tapering into a spine at the apex; ramuli not overlapping *C. taxifolia*
- 31b. Ramuli markedly wider in the middle part, without parallel sides, rather abruptly tapering into an upwardly curved terminal spine; ramuli frequently touching or even overlapping in their widest part *C. mexicana*
- {]Para5}This genus has been studied in detail along the N-coast of Papua New Guinea (Coppejans & Meinesz, 1988, Coppejans, 1992).

Caulerpa biserrulata Sonder 1871: 64, pl. 2, figs 10–12

References: Coppejans & Meinesz [1988: 184, figs 35–38 (as *C. brachypus* Harvey)]; Coppejans (1992: 388–389); Coppejans *et al.* (1995a: 74, figs 3, 4); Kraft (2000: 595, figs 32A–B).

Type locality: Cape York, Australia.

Vouchers: HEC 6556, 20.8.1986 & HEC 8015, 1.8.1988: Ulingan Bay, W-side; HEC 8081, 15.6.1988: Murukinam; Copp & PvR 13686, 18.8.1990: Mugil Harbour.

Distribution in SW-Pacific: N-Australia (Lewis, 1987: 20), Lord Howe Island (Kraft, 2000: 595), New Caledonia (Garrigue & Tsuda, 1988: 57), Papua New Guinea (Coppejans, 1992: 388).

Caulerpa cupressoides (Vahl) C. Agardh 1817: 38 var. *cupressoides*

References: Coppejans & Beeckman (1990: 113, figs 3–7); Coppejans (1992: 389, fig. 1c); Coppejans & Prud'homme van Reine (1992b: 673, figs 2a, 8a); Lewmanomont & Ogawa (1995: 30, + fig.); Trono (1997: 31, fig. 18); Verheij & Prud'homme van Reine (1993: 393, pl. 1: 2); Kraft (2000: 597, figs 32C–E); Littler & Littler (2000: 358, 359 + figs); Huisman (2000: 250 + fig.).

Type locality: St. Croix, Virgin Islands.

Vouchers: HEC 6489, 17.8.1986: Suaru; HEC 6544, 20.8.1986: Ulingan Bay, W-side; Copp & PvR 13718, 18.8.1990: Malala Bay.

Distribution in SW-Pacific: N-Australia (Lewis, 1987: 20), Caroline Islands (Trono, 1968: 170), Fiji (N'Yeurt *et al.*, 1996: 61), Indonesia (Verheij & Prud'homme van Reine, 1993: 393), Lord Howe Island (Kraft, 2000: 597), Micronesia (Tsuda & Wray, 1977: 94), New

Caledonia (Garrigue & Tsuda, 1988: 57), Papua New Guinea (Enomoto & Ohba, 1992: 23), Solomon Islands (Womersley & Bailey, 1970: 274), Thailand (Lewmanomont & Ogawa, 1995: 28).

Caulerpa cupressoides* var. *lycopodium Weber-van Bosse f. *disticha* Weber-van Bosse 1898: pl. 27, fig. 14

References: Coppejans [1992: 389, fig. 1b (= ecad *lycopodium-disticha*)]; Coppejans & Prud'homme van Reine [1992b: 673, figs 2c–d, 10a–b (= ecad *lycopodium-disticha*)].

Syntype localities: Guadeloupe, West Indies; Florida, USA.

Vouchers: HEC 6531, 18.8.1986: Megiar Harbour; Copp & PvR 13039, 9.7.1990: Nagada Harbour; Copp & PvR 13326, 21.7.1990: Ulingan Bay, W-side; Copp & PvR 13800, 22.8.1990: lagoon between Sarang Harbour and Walog.

Distribution in SW-Pacific: N-Australia [Lewis, 1987: 21 (= var. *lycopodium*)], Fiji (N'Yeurt *et al.*, 1996: 61), Indonesia (Coppejans & Prud'homme van Reine, 1992b: 173), Papua New Guinea [Coppejans 1992: 389 (= ecad *lycopodium-disticha*)], Philippines (Silva *et al.*, 1987: 105).

Caulerpa cupressoides* var. *lycopodium* f. *elegans (Crouan frat.) Weber-van Bosse 1898: 336

References: Coppejans [1992: 391, fig. 1a (= ecad *lycopodium-elegans*)]; Coppejans & Prud'homme van Reine [1992b: 679, figs 2e, 11a (= ecad *lycopodium-elegans*)]; Kraft (2000: 598, fig. 32E).

Type locality: Guadeloupe, West Indies.

Voucher: Copp & PvR 13601, 7.8.1990: Nagada Harbour, in front of Gosem Island.

Distribution in SW-Pacific: Indonesia (Coppejans & Prud'homme van Reine, 1992b: 173), Lord Howe Island (Kraft, 2000: 598), New Caledonia (Garrigue & Tsuda, 1988: 57), Papua New Guinea [Coppejans, 1992: 391 (= ecad *lycopodium-elegans*)], Philippines (Silva *et al.*, 1987: 105).

Intermediate between var. *lycopodium* f. *disticha* and var. *lycopodium* f. *elegans*

Voucher: HEC 7504a, 20.6.1988: Madang, Nagada Harbour.

Intermediate between var. *cupressoides* and var. *lycopodium* f. *disticha*

Vouchers: HEC 7464, 17.6.1988: Kolakola & Reamuna Islet; HEC 7880, 21.7.1988: Hatzfeldhafen; Copp & PvR 13600, 7.8.1990: Nagada Harbour, in front of Gosem Island; Copp & PvR 13637, 8.8.1990: Bagabag, SE-point of Christmas Bay.

Caulerpa cupressoides* var. *mamillosa (Montagne) Weber-van Bosse 1898: 332

References: Coppejans & Prud'homme van Reine [1992b: 679, fig. 3a, 8b, (= ecad *mamillosa*)]; Kraft (2000: 597, figs 32C–D); Littler & Littler (2000: 360, 361 + figs).

Syntype localities: Agalega Islands; Mangareva, Iles Gambier, French Polynesia.

Voucher: Copp & PvR 13718, 18.8.1990: Malala.

Distribution in SW-Pacific: N-Australia (Lewis, 1987: 21), E.-Australia (Kraft, 2000: 597), Fiji (N'Yeurt *et al.*, 1996: 61), Indonesia (Coppejans & Prud'homme van Reine, 1992b: 173), Papua New Guinea (Coppejans, 1992: 391 (= ecad *mamillosa*)), Solomon Islands (Womersley & Bailey, 1970: 275).

Caulerpa elongata* f. *elongata Weber-van Bosse 1898: 271–272

References: Coppejans & Meinesz (1988: 184, figs 3–4); Coppejans & Beeckman (1990: 114, figs 8–11); Coppejans [1992: 393, figs 3B–F (= ecad *elongata*)]; Coppejans & Prud'homme van Reine (1992b: 686 figs 4D, 12A); Verheij & Prud'homme van Reine (1993: 393, pl. 1: 3).

Syntype localities: Macassar (Ujung Pandang), Celebes, Indonesia; Tongatapu, Tonga.

Vouchers: HEC 4224, 26.5.1980: Laing Island, lagoon; HEC 6513, 17.8.1986: Suaru; HEC 7449, 17.6.1988: Kolakola & Reamuna Islet; HEC 7953, 25.7.1988: Saidor area, Suit; Copp & PvR 13660, 15.8.1990: barrier reef, N of Tab Island.

Other collection sites in N-PNG: Wongat Island; barrier reef, close to Wongat Island.

Distribution in SW-Pacific: Indonesia (Verheij & Prud'homme van Reine, 1993: 393), Micronesia (Tsuda & Wray, 1977: 94), Papua New Guinea (Coppejans & Meinesz, 1988: 184), Philippines (Silva *et al.*, 1987: 105).

Caulerpa elongata Weber-van Bosse f. *disticha* W.R. Taylor 1950: 204

References: Coppejans (1992: 393, fig. 3A).

Type locality: Bock Island, Rongerik Atoll, Marshall Islands.

Vouchers: HEC 4226, 26.5.1980 & HEC 6469, 15.8.1986: Laing Island, lagoon; Copp & PvR 13486, 2.8.1990: Bagabag, NW-point of Christmas Bay.

Distribution in SW-Pacific: Papua New Guinea [Coppejans, 1992: 393 (= ecad *disticha*)].

Intermediate between *C. elongata* f. *elongata* and f. *disticha*

Vouchers: HEC 7522, 21.6.1988: barrier reef, N of Wongat Island; Copp & PvR 13572, 5.8.1990: N of Tab Island.

Caulerpa filicoides Yamada var. *andamanensis* W.R. Taylor 1966: 154–156, fig. 1

References: Coppejans & Meinesz (1988: 184, figs 12–14); Coppejans *et al.* (2000: 66, fig. 27).

Type locality: northeast of Ritchie's Archipelago, Andaman Islands.

Vouchers: HEC 4681, 16.8.1980: Manam, Borda Reef; HEC 4724, 24.8.1980: Manam, Baliau; HEC 6555, 20.8.1986: Ulingan Bay, W-side; HEC 8033, 1.8.1988: Ulingan Bay, W-side; Copp & PvR 13556, 2.8.1990: Bagabag, The Pinnacle; Copp & PvR 13768, 20.8.1990: Boisa Island, N-coast.

Distribution in SW-Pacific: Micronesia [Tsuda & Wray, 1977: 94 (*C. filicoides*)], Papua New Guinea (Coppejans & Meinesz, 1988: 184).

Caulerpa lentillifera J. Agardh 1837: 173

References: Coppejans & Meinesz (1988: 184, figs 39–41); Coppejans & Beeckman (1989: 383, figs 1–3); Coppejans & Prud'homme van Reine (1992b: 690, figs 4E–F, 14A, B); Verheij & Prud'homme van Reine (1993: 393, pl. 1: 4); Lewmanomont & Ogawa (1995: 31, + fig.); Calumpong & Meñez (1996: 114, + fig.); Trono (1997: 33, fig. 19); Huisman (2000: 253 + fig.).

Type locality: Eritrea.

Vouchers: HEC 6528, 18.8.1986: Megiar Harbour; HEC 7563, 23.6.1988: Kranket Island, enclosed bay; HEC 7938, 25.7.1988: Saidor area, Gumbi Bay; HEC 8039, 2.8.1988: Nagada Harbour; Copp & PvR 13530, 2.8.1990: Bagabag, New Year's Bay.

Other collection sites in N-PNG: patch reef in front of Nagada Harbour; Saidor area, Suit; Beliau Island; island N of Demasa Island.

Distribution in SW-Pacific: N-Australia (Lewis, 1987: 22), Indonesia (Verheij & Prud'homme van Reine, 1993: 393), Malaysia (Phang, 1986: 21), Micronesia (Tsuda & Wray, 1977: 94), New Caledonia (Garrigue & Tsuda, 1988: 57), Papua New Guinea (Enomoto & Ohba, 1992: 23), Philippines (Silva *et al.*, 1987: 105), Singapore (Teo & Wee, 1983: 58), Solomon Islands (Womersley & Bailey, 1970: 275), Thailand (Lewmanomont & Ogawa, 1995: 31).

Caulerpa manorensis Nizamuddin 1964: 210–211, figs 7, 7a, pl. 8

References: Coppejans & Meinesz (1988: 186, figs 5–11); Verheij & Prud'homme van Reine (1993: 394, pl. 1: 6); Coppejans *et al.* (1995a: 76, fig. 2).

Type locality: Manora, Karachi, Pakistan.

Vouchers: HEC 4355, 13.6.1980: Laing Island; HEC 4645, 13.8.1980: Hansa Bay, Durangit Reef; HEC 7779, 14.7.1988: Malagere Island (Potsdam Harbour); HEC 7890, 21.7.1988: Bogia Bay; Copp & PvR 13799, 22.8.1990: lagoon between Sarang Harbour and Walog.

Other collection sites in N-PNG: Hansa Bay, between two wrecks; Hansa Bay, Awar.

Distribution in SW-Pacific: Indonesia (Verheij & Prud'homme van Reine, 1993: 394), Papua New Guinea (Coppejans & Meinesz, 1988: 186; Coppejans *et al.*, 1995a: 76).

Caulerpa mexicana Sonder ex Kützing 1849: 496

References: Coppejans & Beeckman (1990: 118, figs 14–18, 34–35); Coppejans [1992: 406, figs 8C–G (= *C. taxifolia* ecad *mexicana*)]; Coppejans & Prud'homme van Reine [1992b: 706, figs 6A, 22A (= *C. taxifolia* ecad *mexicana*)]; Lewmanomont & Ogawa [1995: 32, + fig., and 29, + fig. (= *C. crassifolia* (*C. Agardh*) J. Agardh)]; Littler & Littler (2000: 364, 365 + figs); Huisman (2000: 253 + fig.).

Type locality: Mexico.

Vouchers: HEC 6489, 17.8.1986: Suaru; Copp & PvR 13589, 5.8.1990: barrier reef N of Tab Island.

Distribution in SW-Pacific: Fiji (N'Yeurt *et al.*, 1996: 62), Indonesia [Weber-van Bosse, 1913: 99 (= *C. crassifolia*)], Malaysia [Phang, 1986: 21 (= *C. crassifolia*)], Micronesia (Tsuda, 1981: 214), Papua New Guinea [Coppejans, 1992: 406 (= *C. taxifolia* ecad *mexicana*)], Philippines (Silva *et al.*, 1987: 106), Thailand (Lewmanomont & Ogawa, 1995: 29 & 32).

Caulerpa microphysa (Weber-van Bosse) J. Feldmann 1955: 430

References: Coppejans & Meinesz (1988: 190, figs 15–17); Coppejans & Prud'homme van Reine (1992b: 692); Littler & Littler (2000: 364, 365 + figs).

Type locality: Macassar (Ujung Pandang), Celebes.

Vouchers: HEC 4273: 1.6.1980: Laing Island; HEC 4723, 24.8.1980: Manam, Baliau; HEC 7970, 26.7.1988, Saidor area, Cape Iris-Biliau; Copp & PvR 13197, 17.7.1990: S of Wongat Island; Copp & PvR 13646, 8.8.1990: Bagabag, in front of Badilu.

Other collection sites in N-PNG: Hansa Bay, Purar Reef & Barol Point; Manam, Borda Reef; Kerry Ann's Pinnacle; Malagere Island (Potsdam Harbour); Tab Island.

Distribution in SW-Pacific: Fiji (N'Yeurt *et al.*, 1996: 62), Indonesia (Coppejans & Prud'homme van Reine, 1992b: 173), New Caledonia (Garrigue & Tsuda, 1988: 57), Papua New Guinea (Coppejans & Meinesz, 1988: 190), Philippines (Silva *et al.*, 1987: 106).

Caulerpa opposita Coppejans & Meinesz 1988: 190, figs 18–21

References: Verheij & Prud'homme van Reine (1993: 394, pl. 1: 7).

Type locality: Laing Island, Papua New Guinea.

Vouchers: HEC 4245, 28.5.1980: Laing Island; HEC 4680, 16.8.1980: Manam, Borda Reef; HEC 4688, 17.8.1980: Kerry Ann's Pinnacle; HEC 7971, 26.7.1988: Saidor area, Cape Iris-Biliau; HEC 8051, 3.8.1988: Kranket Island, SW-bay; Copp & PvR 13615, 8.8.1990: Bagabag, SE-Point of Christmas Bay.

Other collection sites in N-PNG: Manam, Baliau; Bogia, Outer Legoarant Island; Suaru; barrier reef, close to Wongat Island; patch reef Padoz Tinan; Ulingan Bay, W-side; patch reef SW of Wongat Island; patch reef between Tausch Island & Sek Island; Bagabag, in front of Badilu; Megas Island; Mugil Harbour.

Distribution in SW-Pacific: Indonesia (Verheij & Prud'homme van Reine, 1993: 394), Papua New Guinea (Enomoto & Ohba, 1992: 23).

Caulerpa racemosa (Forsskål) J. Agardh 1873: 35–36

References: Coppejans & Meinesz [1988: 191, figs 22–23 (= ecad *clavifera*)]; Coppejans & Beeckman [1989: 384, fig. 4 (= var. *clavifera* f. *macrophysa*)]; Coppejans [1992: 401, figs 4C, D (= ecad *racemosa*)]; Coppejans & Prud'homme van Reine [1992b: 698, figs 18A, B (= ecad *racemosa*)]; Nguyễn *et al.* (1993: 100, fig. 69); Verheij & Prud'homme van Reine (1993: 396, pl. 2: 5); Coppejans *et al.* [1995a: 78, fig. 7 (= ecad *racemosa*)]; Lewmanomont & Ogawa [1995: 33, + fig. (as *C. microphysa*) and 35, + fig. (= var. *macrophysa*)]; Calumpang & Meñez (1996: 115, + fig.); Trono (1997: 36, fig. 22B), Kraft (2000: 602, figs 34A–D); Littler & Littler (2000: 370, 371 + figs).

Type locality: Suez, Egypt.

Vouchers: HEC 4722, 24.8.1980: Manam, Baliau; HEC 4736, 28.8.1980: Laing Island; HEC 6552, 20.8.1986: Ulingan Bay, W-side; HEC 7913, 25.7.1988: Saidor area, Gumbi Bay; Copp & PvR 13489, 2.8.1990: Bagabag, NW-point of Christmas Bay.

Other collection sites in N-PNG: Boisa Island; between Kanamur and Bagania; Sek Island, sheltered side; Gosem Island; Malagere Island (Potsdam Harbour); Nagada Harbour; Mugil Harbour; hole in the wall; Kranket Island, enclosed bay.

Distribution in SW-Pacific: N-Australia (Lewis, 1987: 22), Caroline Islands (Trono, 1968: 171), Fiji (N'Yeurt *et al.*, 1996: 62), Indonesia (Verheij & Prud'homme van Reine, 1993: 394), Lord Howe Island (Kraft, 2000: 602), Malaysia (Phang, 1986: 21), Micronesia (Tsuda & Wray, 1977: 95), New Caledonia (Garrigue & Tsuda, 1988: 57), Papua New Guinea [Enomoto & Ohba, 1992: 23 (= var. *clavifera* (Turner) Weber-van Bosse)], Philippines (Silva *et al.*, 1987: 106), Singapore [Teo & Wee, 1983: 63 (= var. *clavifera*)], Solomon Islands [Womersley & Bailey, 1970: 276 (= var. *macrophysa*)], Taiwan (Lewis & Norris, 1987: 9), Thailand [Lewmanomont & Ogawa, 1995: 33, 35 (as *C. microphysa* and var. *macrophysa*)]; Vietnam (Dawson, 1954: 388).

Caulerpa racemosa* var. *corynephora (Montagne) Weber-van Bosse 1898: 364, pl. 33: figs 10–13

References: Coppejans [1992: 397, fig. 4A (= ecad *corynephora*)]; Coppejans & Prud'homme van Reine [1992b: 693, fig. 15A (= ecad *corynephora*)]; Verheij & Prud'homme van Reine (1993: 395, pl. 1: 8); Lewmanomont & Ogawa (1995: 34, + fig.).

Type locality: Toud Island, Torres Strait, Australia.

Vouchers: HEC 7543, 22.6.1988: barrier reef, N of Wongat Island; Copp & PvR 13198, 17.7.1990: barrier reef, N of Wongat Island.

Distribution in SW-Pacific: N-Australia (Lewis, 1987: 23), Indonesia (Verheij & Prud'homme van Reine, 1993: 395), New Caledonia (Garrigue & Tsuda, 1988: 57), Papua New Guinea [Coppejans, 1992: 397 (= ecad *corynephora*)], Philippines (Silva *et al.*, 1987: 107), Thailand (Lewmanomont & Ogawa, 1995: 34);

Caulerpa racemosa* var. *laetevirens (Montagne) Weber-van Bosse 1898: 366, 367, pl. 33: figs 16, 20

References: Coppejans & Beeckman (1989: 386, figs 21–23); Coppejans & Prud'homme van Reine [1992b: 693, figs 16A, B, C (= ecad *laetevirens*)]; Verheij & Prud'homme van Reine (1993: 393, pl. 1: 9); Kraft (2000: 604, fig. 34C); Huisman (2000: 254 + fig.).

Type locality: Toud Island, Torres Strait, Australia.

Voucher: Copp & PvR 13297, 21.7.1990: Neptunus Point.

Distribution in SW-Pacific: N-Australia (Lewis, 1987: 23), Fiji (N'Yeurt *et al.*, 1996: 62), Indonesia (Verheij & Prud'homme van Reine, 1993: 395), Lord Howe Island (Kraft, 2000: 604), Malaysia (Phang, 1986: 22), New Caledonia (Garrigue & Tsuda, 1988: 57), Papua New Guinea [Coppejans, 1992: 397 (= ecad *laetevirens*)], Philippines (Silva *et al.*, 1987: 107), Solomon Islands (Womersley & Bailey, 1970: 275), Taiwan (Lewis & Norris, 1987: 9).

Note: Silva *et al.* (1996) considers this taxon as synonymous with *C. peltata*. Because of the presence of intermediates in our collections, we prefer to consider both taxa, *laetevirens* and *peltata*, as varieties of *C. racemosa*.

Intermediate between var. *laetevirens* and var. *turbinata*

Reference: Coppejans (1992: 399).

Voucher: Copp & PvR 13617, 8.8.1990: Bagabag, SE-point of Christmas Bay.

Caulerpa racemosa* var. *lamourouxii (Turner) Weber-van Bosse 1898: 369, pl. 32: figs 1–4

References: Coppejans & Beeckman (1989: 388, figs 7–20); Coppejans [1992: 399, fig. 4B (= ecad *lamourouxii*)]; Coppejans & Prud'homme van Reine [1992b: 693, fig. 15B (= ecad *lamourouxii*)]; Verheij & Prud'homme van Reine (1993: 396, pl. 2: 1); Prud'homme van Reine *et al.* (1996: 88); Trono (1997: 36, fig. 22A); Huisman (2000: 255 + fig.).

Type locality: Red Sea.

Vouchers: HEC 6540, 20.8.1986 & HEC 8019, 1.8.1988: W-side of Ulingan Bay; HEC 8068, 7.8.1988: W of Malamal Island; Copp & PvR 13310, 21.7.1990: patch reef between Tausch & Sek Island; Copp & PvR 13847, 29.8.1990: Bay of Demasa Island.

Distribution in SW-Pacific: N-Australia (Lewis, 1987: 24), Indonesia (Verheij & Prud'homme van Reine, 1993: 396), New Caledonia (Garrigue & Tsuda, 1988: 58), Papua New Guinea [Coppejans, 1992: 399 (= ecad *lamourouxii*)], Philippines (Silva *et al.*, 1987: 107).

Caulerpa racemosa* var. *macra Weber-van Bosse 1913: 106, fig. 26

References: Coppejans [1992: 399, fig. 5 (= ecad *macra*)].

Syntype localities: Moluccas, Indonesia: Fau Islet, Gebe Island and Mayalabit Bay, Waigeo Island.

Vouchers: HEC 7479, 20.6.1988: Nagada Harbour; HEC 7566, 23.6.1988: Kranket Island, enclosed bay; HEC 8052, 3.8.1988: Kranket Island, SW-bay; Copp & PvR 13072, 10.7.1990: Beliau Island.

Distribution in SW-Pacific: Indonesia (Weber-van Bosse, 1913: 106), Papua New Guinea (Enomoto & Ohba, 1992: 23), Philippines (Silva *et al.*, 1987: 107).

Caulerpa racemosa* var. *occidentalis (J. Agardh) Børgesen 1907: 379, figs 28, 29

References: Coppejans & Beeckman (1989: 384, figs 5, 6); Coppejans [1992: 399, fig. 4B (= ecad *occidentalis*)]; Verheij & Prud'homme van Reine (1993: 396, pl. 2: 3); Littler & Littler (2000: 370, 371 + figs).

Type locality: upper Gulf of Mexico to Recife, Brazil.

Voucher: HEC 7480, 20.6.1988: Nagada Harbour.

Distribution in SW-Pacific: N-Australia (Lewis, 1987: 24), Fiji (N'Yeurt *et al.*, 1996: 62), Indonesia (Verheij & Prud'homme van Reine, 1993: 396), Papua New Guinea (Heijs & Brouns, 1986: 38), Philippines (Silva *et al.*, 1987: 108), Solomon Islands (Womersley & Bailey, 1970: 276), Taiwan (Lewis & Norris, 1987: 9).

Caulerpa racemosa* var. *peltata (Lamouroux) Eubank in Stephenson 1944: 349

References: Coppejans & Meinesz (1988: 191, fig. 24); Coppejans & Beeckman (1989: 388, figs 27–29); Coppejans [1992: 401 (= ecad *peltata*)]; Coppejans & Prud'homme van Reine [1992b: 696, fig. 17B (= ecad *peltata*)]; Nguyễn *et al.* [1993: 101, fig. 71 (= *C. peltata* Lamouroux)]; Verheij & Prud'homme van Reine (1993: 396, pl. 2: 4); Coppejans *et al.* [1995a: 78, fig. 6 (= ecad *peltata*)]; Lewmanomont & Ogawa (1995: 36, + fig.); Trono [1997: 35, fig. 21 (= *C. peltata*)]; Kraft (2000: 604, fig. 34D); Littler & Littler (2000: 372, 373 + figs); Huisman (2000: 256 + fig.).

Type locality: Antilles, West Indies.

Vouchers: HEC 4402, 23.6.1980: Laing Island; HEC 7482, 20.6.1988: Nagada Harbour; HEC 7914, 25.7.1988: Saidor area, Gumbi Bay; HEC 8080, 15.6.1988: Murukinam; Copp & PvR 13542, 2.8.1990: Bagabag, New Year's Bay.

Other collection sites in N-PNG: Hansa Bay, Barol Point; Megiar Harbour.

Distribution in SW-Pacific: N-Australia [Lewis, 1987: 22 (= *C. peltata*)], Caroline Islands [Trono, 1968: 169 (= *C. peltata*)], Fiji (N'Yeurt *et al.*, 1996: 62), Indonesia (Verheij & Prud'homme van Reine, 1993: 396), Lord Howe Island (Kraft, 2000: 601), Malaysia [Phang, 1986: 21 (= *C. peltata*)], Micronesia [Tsuda & Wray, 1977: 94 (= *C. peltata*)], New Caledonia (Garrigue & Tsuda, 1988: 57), Papua New Guinea (Enomoto & Ohba, 1992: 23), Philippines (Silva *et al.*, 1987: 108), Singapore [Teo & Wee, 1983: 57 (= *C. peltata*)], Solomon Islands [Womersley & Bailey, 1970: 275 (= *C. peltata*)], Taiwan (Lewis & Norris, 1987: 9), Thailand (Lewmanomont & Ogawa, 1995: 36); Vietnam [Nguy n *et al.*, 1993: 101 (= *C. peltata*)].

Note: see note on *C. racemosa* var. *laetevirens*.

Caulerpa racemosa* var. *turbinata (J. Agardh) Eubank 1946: 420–421, figs 2o–q

References: Coppejans & Beeckman (1989: 386, figs 24–26); Coppejans [1992: 401 (= ecad *turbinata*)]; Coppejans & Prud'homme van Reine [1992b: 698, figs 19A, B (= ecad *turbinata*)]; Verheij & Prud'homme van Reine (1993: 396, pl. 2: 6); Huisman (2000: 256 + fig.).

Type locality: Near Tor, Sinai Peninsula, Egypt.

Vouchers: HEC 8060, 4.8.1988: D'Lole Island; HEC 8071, 7.8.1988: W of Malamal Island; Copp & PvR 13616, 8.8.1990: Bagabag, SE-point of Christmas Bay.

Distribution in SW-Pacific: N-Australia (Lewis, 1987: 24), Fiji (N'Yeurt *et al.*, 1996: 62), Indonesia (Verheij & Prud'homme van Reine, 1993: 396), Papua New Guinea (Coppejans, 1992: 401), Philippines (Silva *et al.*, 1987: 108), Taiwan (Lewis & Norris, 1987: 9).

Intermediate between *Caulerpa racemosa* var. *peltata* and var. *turbinata*

Voucher: HEC 6530b, 17.8.1986: Megiar Harbour; HEC 7481, 20.6.1988: Nagada Harbour.

Distribution in SW-Pacific: Fiji (N'Yeurt *et al.*, 1996: 62).

Caulerpa serrulata (Forssk l) J. Agardh 1837: 174

References: Coppejans & Meinesz [1988: 191, figs 25, 26 (= var. *serrulata*)]; Coppejans & Beeckman (1990: 120, figs 24–25); Coppejans [1992: 403 (= ecad *serrulata*)]; Coppejans & Prud'homme van Reine [1992b: 703, fig. 20B (= ecad *serrulata*)]; Verheij & Prud'homme van Reine (1993: 397, pl. 2: 8); Coppejans *et al.*, 1995a: 78, figs 9, 10); Lewmanomont & Ogawa (1995: 37, + fig.); Calumpang & Me nez (1996: 116, + fig.); Trono (1997: 39, fig. 23); Littler & Littler (2000: 372, 373 + figs); Huisman (2000: 257 + fig.).

Type locality: Mokha, Yemen.

Vouchers: HEC 4231, 27.5.1980: Laing Island; HEC 4286, 2.6.1980: Hansa Bay, Bisalpap Reef; HEC 4669, 24.8.1980: Manam, Baliau; HEC 7925, 25.7.1988: Saidor area, Gumbi Bay; HEC 8023, 1.8.1988: Ulingan Bay, W-side; Copp & PvR 13481, 2.8.1990: Bagabag, NW-point of Christmas Bay.

Other collection sites in N-PNG: Hansa Bay, Purar Reef; Hansa Point, seaward side of Purar Reef; Manam, Borda Reef; Suaru; Megiar Harbour; Ulingan Bay, W-side; Kolakola & Reamuna Islet; Madang, Nagada Harbour; barrier reef, close to Wongat Island; Boisa Island, N-coast; W of Malamal Island; island N of Demasa Island; S. of Wongat Island; Tab Island; Mugil Harbour; bay in front of Malala village; hole in the wall.

Distribution in SW-Pacific: N-Australia (Lewis, 1987: 24), Caroline Islands (Trono, 1968: 169), Fiji (N'Yeurt *et al.*, 1996: 62), Indonesia (Verheij & Prud'homme van Reine, 1993: 397), Malaysia (Phang, 1986: 22), Micronesia (Tsuda & Wray, 1977: 95), New Caledonia (Garrigue & Tsuda, 1988: 58), Papua New Guinea (Enomoto & Ohba, 1992: 23), Philippines (Silva *et al.*, 1987: 108), Singapore (Teo & Wee, 1983: 61), Solomon Islands (Womersley & Bailey, 1970: 276), Taiwan (Lewis & Norris, 1987: 9); Thailand (Lewmanomont & Ogawa, 1995: 37); Vietnam (Dawson, 1954: 393).

Caulerpa serrulata* var. *boryana (J. Agardh) Gilbert f. ***occidentalis*** (Weber-van Bosse) Yamada & Tanaka 1938: 62

References: Coppejans [1992: 403, fig. 7 (= ecad *boryana-occidentalis*)].

Type locality: Guadeloupe.

Vouchers: HEC 7501, 20.6.1988 & Copp & PvR 13051, 9.7.1990: Madang, Nagada Harbour.

Distribution in SW-Pacific: N-Australia [Lewis, 1987: 25 (*var. boryana*)], Fiji (N'Yeurt *et al.*, 1996: 62), Indonesia (Coppejans & Prud'homme van Reine, 1992b: 174), Papua New Guinea [Coppejans, 1992, 403 (= ecad *boryana-occidentalis*)], Philippines (Silva *et al.*, 1987: 109).

Caulerpa serrulata* var. *pectinata (Weber-van Bosse) Taylor 1960: 146

References: Coppejans & Meinesz (1988: 192, figs 27, 28).

Type locality: Guadeloupe.

Vouchers: HEC 4506, 17.7.1980: Bogia Bay, Outer Legoarrant Island; HEC 4573, 22.7.1980 & HEC 6459, 8.1986 & HEC 7687, 5.7.1988, Laing Island.

Distribution in SW-Pacific: Indonesia [Weber-van Bosse, 1913: 102 (= *C. freycinetii* (C. Agardh) Weber-van Bosse var. *pectinata*)], Papua New Guinea (Coppejans & Meinesz, 1988: 192), Philippines (Silva *et al.*, 1987: 109).

Caulerpa sertularioides (S. Gmelin) Howe 1905: 576

References: Coppejans & Meinesz (1988: 192, fig. 29); Coppejans & Beeckman (1990: 120, figs 26–27); Coppejans & Prud'homme van Reine (1992b: 704, fig. 21A); Verheij & Prud'homme van Reine (1993: 397, pl. 3: 1); Coppejans *et al.* (1995a: 80, fig. 8); Lewmanomont & Ogawa (1995: 38, + fig.); Calumpong & Meñez (1996: 116, + fig.); De Clerck & Coppejans (1996: 208, figs 2–3, 11); Trono (1997: 40, fig. 24); Littler & Littler (2000: 374, 375 + figs); Huisman (2000: 258 + fig.).

Type locality: 'in coralliis americanis'.

Vouchers: HEC 4422, 25.6.1980: Laing Island; HEC 7450, 17.6.1988: Kolakola & Reamuna Islet; HEC 7526, 21.6.1988: barrier reef, close to Wongat Island; HEC 7695, 6.7.1988: Malagere Island (Potsdam Harbour); HEC 7952, 25.7.1988: Saidor area, Suit. *Other collection sites in N-PNG*: Megiar Harbour; Bogia Bay; Madang, Nagada Harbour; Gosem Island; Nagada Harbour; Beliau Island, W-bay; S of Wongat Island; patch reef between Tausch Island and Sek Island.

Distribution in SW-Pacific: N-Australia (Lewis, 1987: 25), Caroline Islands (Trono, 1968: 168), Fiji (N'Yeurt *et al.*, 1996: 63), Indonesia (Verheij & Prud'homme van Reine, 1993: 397), Malaysia (Phang, 1986: 22), Micronesia (Tsuda & Wray, 1977: 95), New Caledonia (Garrigue & Tsuda, 1988: 58), Papua New Guinea (Enomoto & Ohba, 1992: 23), Philippines (Silva *et al.*, 1987: 109), Singapore (Teo & Wee, 1983: 59), Solomon Islands (Womersley & Bailey, 1970: 277), Taiwan (Lewis & Norris, 1987: 9), Thailand (Lewmanomont & Ogawa, 1995: 38).

Caulerpa taxifolia (Vahl) C. Agardh 1817: XXII

References: Coppejans & Beeckman (1990: 122, figs 36–39); Coppejans [1992: 406, figs 8A, B (= ecad *taxifolia*)]; Coppejans & Prud'homme van Reine [1992b: 706, figs 6B,

22B (= *ecad taxifolia*); Nguyễn *et al.* (1993: 98, fig. 66); Verheij & Prud'homme van Reine (1993: 398, pl. 3: 3); Coppejans *et al.* (1995a: 80, fig. 11); Lewmanomont & Ogawa (1995: 39, + fig.); Calumpang & Meñez (1996: 116, + fig.); Trono (1997: 40, fig. 24); Kraft (2000: 604, figs 34E, 35A); Littler & Littler (2000: 376, 377 + figs); Huisman (2000: 259 + fig.).

Type locality: St. Croix, Virgin Islands.

Vouchers: HEC 7483, 20.6.1988: Madang, Nagada Harbour; HEC 7969, 26.7.1988, Saidor area, Cape Iris-Biliau; HEC 8061, 4.8.1988: D'Lole Island; Copp & PvR 13199, 17.7.1990: Wongat Island, S-coast; Copp & PvR 13844, 28.8.1990: barrier reef N of Tab Island.

Distribution in SW-Pacific: N-Australia (Lewis, 1987: 25), Caroline Islands (Trono, 1968: 168), Fiji (N'Yeurt *et al.*, 1996: 63), Indonesia (Verheij & Prud'homme van Reine, 1993: 398), Lord Howe Island (Kraft, 2000: 604), Malaysia (Phang, 1986: 22), Micronesia (Tsuda & Wray, 1977: 95), New Caledonia (Garrigue & Tsuda, 1988: 58), Papua New Guinea (Heijs & Brouns, 1986: 38), Philippines (Silva *et al.*, 1987: 111), Singapore (Teo & Wee, 1983: 58), Taiwan (Lewis & Norris, 1987: 9), Thailand (Lewmanomont & Ogawa, 1995: 39); Vietnam (Nguyễn *et al.*, 1993: 98).

Caulerpa urvilleana Montagne 1845: 21

References: Coppejans [1992: 391, fig. 2 (= *C. cupressoides* *ecad urvilleana*)]; Coppejans & Prud'homme van Reine [1992b: 686, figs 3b, 11b (= *C. cupressoides* *ecad urvilleana*)]; Trono (1997: 43, fig. 26).

Type locality: Toud Island, Torres Strait, Australia.

Voucher: Copp & PvR 13720, 18.8.1990: Malala.

Distribution in SW-Pacific: N-Australia (Lewis, 1987: 25), Caroline Islands (Trono, 1968: 170), Fiji (N'Yeurt *et al.*, 1996: 63), Indonesia [Coppejans & Prud'homme van Reine, 1992b: 173 (= *C. cupressoides* var. *urvilliana*)], Micronesia (Tsuda & Wray, 1977: 95), New Caledonia (Garrigue & Tsuda, 1988: 58), Papua New Guinea [Coppejans, 1992: 391 (= *C. cupressoides* *ecad urvilliana*)], Philippines (Silva *et al.*, 1987: 111), Solomon Islands (Womersley & Bailey, 1970: 278).

Caulerpa verticillata J. Agardh 1847: 6

References: Coppejans & Meinesz (1988: 194, figs 30–34); Coppejans & Beeckman (1990: 124, figs 28–32); Coppejans & Prud'homme van Reine (1992b: 708, fig. 21B); Verheij & Prud'homme van Reine (1993: 398, pl. 3: 4); Lewmanomont & Ogawa (1995: 40, + fig.); Trono (1997: 43, fig. 26); Littler & Littler (2000: 376, 377 + figs).

Type locality: not specified.

Vouchers: HEC 4697, 18.8.1980: Laing Island, W-coast; HEC 7569, 23.6.1988: Kranket Island, enclosed bay; HEC 7758, 14.7.1988: Malagere Island (Potsdam Harbour); HEC 8062, 4.8.1988: D'Lole Island; Copp & PvR 13456, 30.7.1990: barrier reef, N of Wongat Island; Copp & PvR 13618, 8.8.1990: Bagabag, SE-point of Christmas Bay.

Distribution in SW-Pacific: N-Australia (Lewis, 1987: 26), Caroline Islands (Trono, 1968: 167), Fiji (N'Yeurt *et al.*, 1996: 63), Indonesia (Verheij & Prud'homme van Reine, 1993: 398), Malaysia (Phang, 1986: 22), Micronesia (Tsuda & Wray, 1977: 95), New Caledonia (Garrigue & Tsuda, 1988: 58), Papua New Guinea (Coppejans & Meinesz, 1988: 194), Philippines (Silva *et al.*, 1987: 111), Singapore (Teo & Wee, 1983: 60), Solomon Islands (Womersley & Bailey, 1970: 278), Thailand (Lewmanomont & Ogawa, 1995: 40); Vietnam (Dawson, 1954: 392).

***Caulerpa webbiana* Montagne f. *disticha* Vickers 1896: 300**

References: Coppejans [1992: 406, fig. 9 (= ecad *disticha*)]; Coppejans *et al.* (1995a: 81, figs 13, 14); Kraft [2000, 607, fig. 35D (= var. *disticha* Vickers)]; Littler & Littler (2000: 380, 381 + figs).

Type locality: Indonesia.

Voucher: Copp & PvR 13656, 15.8.1990: barrier reef, N of Tab Island.

Distribution in SW-Pacific: N-Australia [Lewis, 1987: 26 (*C. webbiana*)], Lord Howe Island (Kraft, 2000: 607), Micronesia [Tsuda & Wray, 1977: 95 (*C. webbiana*)], New Caledonia (Garrigue & Tsuda, 1988: 58), Papua New Guinea [Coppejans, 1992: 406 (= ecad *disticha*)], Solomon Islands [Womersley & Bailey, 1970: 278 (*C. webbiana*)], Taiwan (Lewis & Norris, 1987: 9).

Family Codiaceae

Codium* Stackhouse*Key to the species from N-PNG**

- 1a. Thallus irregularly lobed, not composed of cylindrical branches *C. arabicum*
- 1b. Thallus composed of cylindrical or slightly compressed branches 2
 - 2a. Thallus erect *C. cf. extricatum*
 - 2b. Thallus repent (several points of attachment) 3
- 3a. Utricles 70–150 µm in diameter *C. cf. prostratum*
- 3b. Utricles (100 –)150–300 µm in diameter 4
 - 4a. Thallus compressed and expanded at the dichotomies *C. cf. tenue*
 - 4b. Thallus not compressed nor expanded at the dichotomies 5
- 5a. Branches 2–4 mm in diameter, interdichotomies 2–5 cm long *C. edule*
- 5b. Branches 1.5–2 mm in diameter, interdichotomies 0.3–2.5 cm long ... *C. geppiorum*

***Codium arabicum* Kützting 1856: 35, pl. 100: fig. 2**

References: Magruder & Hunt (1979: 25, top fig. p. 24); Tseng (1984: 296, pl. 147, fig. 2); Nguyễn *et al.* (1993: 92, fig. 93); Verheij & Prud'homme van Reine (1993: 399, pl. 3: 5); Coppejans *et al.* (1995a: 82, fig. 16); Lewmanomont & Ogawa (1995: 46, + fig.); Van den heede & Coppejans (1996: 391, figs 1, 5, 7); Calumpong & Meñez (1996: 118, + fig.); Trono (1997: 45, fig. 28); Kraft (2000: 588, fig. 31A).

Type locality: Tor, Sinai Peninsula, Egypt.

Voucher: HEC 7789, 15.7.1988: Laing Island.

Distribution in SW-Pacific: N-Australia (Lewis, 1987: 17), Caroline Islands (Trono, 1968: 190), Fiji (N'Yeurt *et al.*, 1996: 63), Indonesia (Verheij & Prud'homme van Reine, 1993: 399), Lord Howe Island (Kraft, 2000: 588), Malaysia (Phang, 1986: 24), Micronesia (Tsuda & Wray, 1977: 96), New Caledonia (Garrigue & Tsuda, 1988: 59), Papua New Guinea (Coppejans *et al.*, 1995a: 82), Philippines (Silva *et al.*, 1987: 111), Singapore (Teo & Wee, 1983: 50), Taiwan (Lewis & Norris, 1987: 8), Thailand (Lewmanomont & Ogawa, 1995: 46); Vietnam (Nguyễn *et al.*, 1993: 92).

***Codium edule* P. Silva 1952: 392–395, fig. 18, pl. 35b**

References: Magruder & Hunt (1979: 25, + fig.); Trono (1997: 48, figs 29, 30).

Type locality: Waikiki, Oahu, Hawaiian Islands.

Vouchers: Copp & PvR 13369, 21.7.1990: Hatzfeldthafen; Copp & PvR 13391, 15.7.1990: patch reef SW of Wongat Island.

Distribution in SW-Pacific: Caroline Islands (Trono, 1968: 190), Indonesia (Verheij & Prud'homme van Reine, 1993: 399), Micronesia (Tsuda & Wray, 1977: 96), Papua New Guinea (Heijs & Brouns, 1986: 38), Philippines (Silva *et al.*, 1987: 112).

Codium* cf. *extricatum P. Silva 1959: 145–147, fig. 17, pls XIII, XIV

Reference: Simons (1977: 21, fig. 37).

Type locality: Qolora River, Eastern Cape Province, South Africa.

Voucher: HEC 7677, 4.7.1988: Hansa Bay, Barol Point.

Distribution in SW-Pacific: N-Australia (Lewis, 1987: 18), Papua New Guinea (this paper).

Codium* *geppiorum O. Schmidt 1923: 50, fig. 33

References: Lewmanomont & Ogawa [1995: 47, + fig. ('*C. geppii*')]; Calumpang & Meñez [1996: 119, + fig. ('*C. geppii*')]; Van den heede & Coppejans (1996: 400, figs 11, 16); Huisman (2000: 260 + figs).

Syntype localities: Kai Islands and Celebes, Indonesia.

Vouchers: HEC 4232, 27.5.1980: Laing Island; HEC 7726, 7.7.1988, Boisa Island, N-coast; HEC 7942, 25.7.1988: Saidor area, Gumbi Bay; HEC 8084, 15.6.1988, Murukinam; Copp & PvR 13817, 22.8.1990: hole in the wall.

Other collection sites in N-PNG: Suaru; Manam, Baliau; Saidor area, Cape Iris-Biliau; patch reef SW of Wongat Island.

Distribution in SW-Pacific: (all '*C. geppii*') N-Australia (Lewis, 1987: 18), Fiji (N'Yeurt *et al.*, 1996: 63), Indonesia (Verheij & Prud'homme van Reine, 1993: 400), Malaysia (Phang, 1986: 24), Micronesia (Tsuda & Wray, 1977: 96), New Caledonia (Garrigue & Tsuda, 1988: 59), Papua New Guinea (this paper), Philippines (Silva *et al.*, 1987: 11), Singapore (Teo & Wee, 1983: 50), Solomon Islands (Womersley & Bailey, 1970: 274), Thailand (Lewmanomont & Ogawa, 1995: 47); Vietnam (Dawson, 1954: 395).

Codium* cf. *prostratum Levring 1938: 16–17, figs 8A–D, pl. IV: fig. 11

References: Van den heede & Coppejans (1996: 405, figs 20–24).

Type locality: Isipingo Beach, near Durban, South Africa.

Vouchers: HEC 6497, 17.8.1986: Suaru; HEC 8042, 2.8.1988: Nagada Harbour.

Distribution in SW-Pacific: Papua New Guinea (this paper).

Note: This species has never been reported from the SW Pacific before, but has been mentioned from tropical regions in the Indian Ocean.

Codium* cf. *tenu (Kützing) Kützing 1856: 33–34, pl. 95: fig. 1

References: P. Silva (1959: 142, fig. 15); Coppejans *et al.* (1995a: 84, fig. 20).

Type locality: Cape of Good Hope, Eastern Cape Province, South Africa.

Vouchers: HEC 4244, 28.5.1980 & HEC 4366b, 14.6.1980 & HEC 4500, 16.7.1980 & HEC 4546, 22.7.1980 & HEC 4547, 22.7.1980: Laing Island; HEC 4658, 14.8.1980: Hansa Bay, Durangit Reef.

Distribution in SW-Pacific: Indonesia (Weber-van Bosse, 1913: 120), Micronesia (Tsuda & Wray, 1977: 96), Taiwan (Lewis & Norris, 1987: 9), Papua New Guinea (Coppejans *et al.*, 1995a: 84), Philippines (Silva *et al.*, 1987: 113 as a misapplied name).

Halimeda Lamouroux

Key to the species from N-PNG

Identification of *Halimeda* specimens should, ideally, be based on a combination of morphological and anatomical characters, especially in a species-rich (18 spp.) area like PNG. The field identification key presented here is based solely on morphological characters and therefore should be used with caution, especially in the *H. discoidea*–*H. tuna*–*H. gigas*-group.

Primary utricles are the outermost ones (surface layer); secondary and tertiary utricles are the more inward ones.

- 1a. Thallus erect, fixed by a generally well-developed pseudobulbous holdfast (> 1 cm long), growing on soft substrate (sand, mud) 2
- 1b. Thallus not fixed by a pseudobulbous holdfast, growing on hard substrate (rocks, corals, etc) 5
- 2a. At least the basal and some intermediate segments cylindrical 3
- 2b. At least all the suprabasal segments compressed, discoidal, reniform, cuneate or subrectangular 4
- 3a. Generally all the segments cylindrical, gradually smaller and thinner from the base towards the apex of the thallus *H. cylindracea*
- 3b. The basal segments cylindrical, the upper ones slightly compressed, still markedly longer than wide, most generally tridentate *H. ad incrasata*
- 4a. Thallus large (generally > 12 cm long), branching sparse, segments large (25 mm long, 25 mm wide), subcircular, cuneate, more rarely reniform, very thick (1–2 mm) *H. macroloba*
- 4b. Thallus smaller (generally < 10 cm long), frequently bushy because of the dense branching; segments smaller (15 mm long, 15–20 mm wide), reniform to subcircular, thin (0.5 mm) *H. borneensis*
- 5a. All segments similar, without differentiation in a basal region; fixed at several points by tufts of rhizoids 6
- 5b. Basal segments different from the upper ones, distinguishing a basal zone; fixation by a basal felt of rhizoids; supplementary, markedly smaller tufts of rhizoids possibly also present higher up on the thallus 8
- 6a. Successive segments in a single (or in parallel) plane(s) *H. gracilis*
- 6b. Successive segments perpendicular on each other 7
- 7a. Segments small (< 10 mm wide, 8 mm long), reniform to cuneate, well calcified and really brittle, plane, but sometimes with a slight undulation, thallus frequently extremely bushy and imbricated *H. opuntia*
- 7b. Segments large (> 12 mm wide, 10 mm long), frequently ivy-leaf like or reniform, extremely strongly calcified and breakable, frequently contorted; thallus mostly laxly branched *H. distorta*
- 8a. Thallus fixed by a very dense felt of rhizoids generated by the basal and suprabasal segments, accumulating sand, particles and segment fragments, covering the whole thallus base 9
- 8b. Thallus fixed by a lax network of basal rhizoids; presence of supplementary attachment points possible 10
- 9a. Basal rhizoidal felt extremely well developed, covering numerous segments of the thallus base, accumulating sand, particles and segment fragments in a dense filamentous covering; segments reniform to subrectangular, the basal ones free (not united), generally smaller than the others *H. renschii*
- 9b. Basal rhizoidal cover medium well developed, only covering the basal and suprabasal segments, only accumulating small particles; segments cuneate to diamond-shaped, becoming wider towards the thallus apex and becoming subcircular; the basal segments frequently united, larger than the others *H. melanesica*
- 10a. Segments generally large (20–30 mm wide, 20 mm long), reniform to cuneate; thallus erect, mostly laxly branched 11
- 10b. Segments generally small (< 10–15 mm wide, 10 mm long), cuneate to reniform; thallus more or less prostrate (at least partly), branching dense 15
- 11a. Calcification very strong at the base (living segments breakable), markedly and regularly decreasing towards the thallus apex; thallus frequently very large (20–40 cm long); segments generally numerous, cuneate and gradually thinner and smaller from base to apex of the thallus *H. lacunalis* f. *lata*

- 11b. Calcification relatively weak (living segments not breakable) and homogeneous all over the thallus; segments not numerous 12
- 12a. Thallus not or only slightly calcified; segments mainly cuneate, the apical ones subrectangular (3–5 times as long as wide) *H. discoidea* p.p.
- 12b. Calcification somewhat stronger (but living segments still not breakable); segments reniform to subcircular all over the thallus, rarely longer than wide 13
13. Only anatomical characters (except, maybe, for the coloration of the herbarium paper by the thallus of *H. discoidea* upon drying) and the size of the segments of *H. gigas* differentiate this form of *H. discoidea* from *H. tuna* and *H. gigas*
- 13a. Segments large (up to 31 mm long, 42 mm broad); utricles mainly in 2 layers, the peripheral ones 130–240 μm long, the secondary ones 60–120 μm long ... *H. gigas*
- 13b. Segments smaller, utricles in 2 layers but with different sizes than in 13a or mainly in 3 (2–4) layers 14
- 14a. Utricles in 2 distinct layers, the primary ones being very small (45–120 μm long), the secondary very large (100–350 μm long) *H. discoidea* p.p.
- 14b. Utricles in (2–)3(–4) layers, all of similar size (35–100 μm in diameter, 60–130 μm long) *H. tuna*
- 15a. Thallus generally small (10–12 cm) or, if larger (20 cm), strongly ramified, cushion-like; segments wider than long, thin (0.5 mm) and relatively large (> 8 mm) 16
- 15b. Thallus generally large (> 30 cm), elegant, segments mostly longer than (or as long as) wide 19
- 16a. No marked veins or ribs; basal segments larger than the apical ones 17
- 16b. Marked veins or ribs present; basal segments smaller than the apical ones 19
- 17a. Basal segment markedly larger than the others, fan-shaped, deeply crenulate and bearing numerous [10–15(–20)] branches; blue-green *H. micronesica*
- 17b. Basal segment sometimes larger than the others, but never with a crenulate margin, weakly polychotomous (rarely more than 6–8 segments formed by the basal segment) 18
- 18a. Segment surface rugose and appearing pitted because of the huge utricles, visible with the naked eye; segments 0.5–0.8 mm thick, dirty blue-green . *H. macrophysa*
- 18b. Segment surface smooth, segments extremely thin (< 0.3 mm), white and brittle *H. fragilis*
- 19a. Apical segments subrectangular to reniform, wider than long, smaller and narrower (up to slender and cylindrical) at the base *H. copiosa*
- 19b. Segments diamond-shaped in the apical regions, 1.5–2 times longer than wide, becoming cylindrical towards the base *H. minima*

Halimeda borneensis W.R. Taylor 1975: 81, figs 1–2

References: Hillis-Colinvaux (1980: 105–108, fig. 27).

Type locality: North Borneo, Pulau Gaya off the east coast, Cleland, Station 10.

Vouchers: HEC 6477, 17.8.1986: Suaru; HEC 6534, 18.8.1986: Megiar Harbour; HEC 7577, 24.6.1988: Gosem Island; Copp & PvR 13321, 21.7.1990: Ulingan bay, S side towards the open sea; Copp & PvR 13668, 15.8.1990: Madang, landward slope of barrier reef, N of Tab Island.

Other collection sites in N-PNG: N of Tab Island; Beliau Island: eastern bay; Madang, landward slope of the barrier reef, S of Wongat Island; W bay of Malamal Island; Demasa Island.

Distribution in SW-Pacific: N-Australia (Phillips *et al.* 1999:459), Indonesia (Taylor, 1975: 81), Papua New Guinea (this paper), S-W Pacific (Hillis-Colinvaux, 1980:106).

Halimeda copiosa Goreau & Graham 1967: 432–441, figs 1–10

References: Hillis-Colinvaux (1980: 118–120, fig. 33); Littler *et al.* (1989: 88, fig. 1, p. 89); Coppejans *et al.* (1995a: 84, fig. 21); Littler & Littler (2000: 398, 399 + figs).

Type locality: Jamaica, Parish of St Ann, Runaway Bay.

Vouchers: HEC 4255, 28.5.1980: Laing Island; HEC 4516, 17.7.1980: Bogia, Outer Legoarant Island; HEC 6596, 23.8.1986: Boisa Island, South coast; HEC 7593, 25.6.1988: Nagada Harbour; HEC 7915, 25.7.1988: Gumbi Bay (close to Saidor); Copp & PvR 13500, 2.8.1990: Bagabag, NW point of Christmas Bay.

Other collection sites in N-PNG: Hansa Bay, Besalpap reef, West of Barol Point, between Barol Point and Hansa Point; Hansa Point, Purar Reef; Madang, Nagada Harbour, on opposite side of CRI Buildings, Tripod Reef, seaward side of the patch reef between Sinub Island and Wongat Island, seaward side of the patch reef seaward of Ruo Island; Bagabag, New Year's Bay, the Pinacle, South of New Year's Bay; Mugil Harbour, between coast and Vidosi Island; South of Gosem Island.

Distribution in SW-Pacific: N-Australia (Lewis, 1987: 28), Fiji (N'Yeurt *et al.*, 1996: 63), Indonesia (Verheij & Prud'homme van Reine, 1993: 407), Micronesia (Tsuda & Wray, 1977: 97), New Caledonia (Garrigue & Tsuda, 1988: 59), Papua New Guinea (Enomoto & Ohba, 1992: 23), Philippines (Silva *et al.*, 1987: 114).

Halimeda cylindracea Decaisne 1842: 103

References: Hillis-Colinvaux (1980: 100–101, figs 4, 5, 104); Trono (1997: 52, fig. 32); Huisman (2000: 264 + fig.).

Type locality: Nosy-Bé, Perville, Madagascar.

Vouchers: HEC 4507, 17.7.1981: Bogia, Outer Legoarant Island; HEC 7458, 17.6.1988: Kola Kola & Reamuna Islet; HEC 13345, 23.7.1990: Sarang Harbour; Copp & PvR 13527, 2.8.1990: Bagabag, NW point of Christmas Bay; Copp & PvR 13551, 2.8.1990: Bagabag, New Year's Bay; Copp & PvR 13702, 18.8.1990: Mugil Harbour, between coast and Vidosi Island.

Distribution in SW-Pacific: N-Australia (Lewis, 1987: 28), Caroline Islands (Trono, 1968: 181), Fiji (N'Yeurt *et al.*, 1996: 64), Indonesia (Verheij & Prud'homme van Reine, 1993: 407), Micronesia (Tsuda & Wray, 1977: 97), New Caledonia (Garrigue & Tsuda, 1988: 59), Papua New Guinea (Enomoto & Ohba, 1992: 23), Philippines (Silva *et al.*, 1987: 114), Solomon Islands (Womersley & Bailey, 1970: 281).

Halimeda discoidea Decaisne 1842: 102

References: Magruder & Hunt (1979: 29, fig. 1, p. 18); Hillis-Colinvaux (1980: 136–139, fig. 41); Coppejans *et al.* (1995a: 85, fig. 22); Calumpong & Meñez (1996: 105, + fig.); Trono (1997: 53, fig. 33); Littler & Littler (2000: 400, 401 + figs).

Type locality: true provenance not known.

Vouchers: HEC 4271, 1.6.1980: Laing Island; HEC 6546, 20.8.1986: Madang Province, Ulingan Bay, W side; HEC 7931, 25.7.1988: Saidor area, Gumbi Bay; HEC 8048, 3.8.1988: Kranket Island, SW-bay; Copp & PvR 13044, 9.7.1990: Madang, Nagada Harbour;.

Other collection sites in N-PNG: Hansa Bay, Durangit Reef; Suaru, Bogia Bay, Kola Kola and Reamuna Islets; Madang, Beliau Island, western bay, S of Wongat Island, seaward of the patch reef between Tausch Island and Sek Island, N of Tab Island, S of Gosem Island; Ulingan Bay, S side towards the open sea; bay in front of Malala village.

Distribution in SW-Pacific: N-Australia (Lewis, 1987: 28), Caroline Islands (Trono, 1968: 183), Fiji (N'Yeurt *et al.*, 1996: 64), Indonesia (Verheij & Prud'homme van Reine, 1993: 407), Malaysia (Phang, 1986: 24), Micronesia (Tsuda & Wray, 1977: 97), New Caledonia

(Garrigue & Tsuda, 1988: 59), Papua New Guinea (Enomoto & Ohba, 1992: 23), Philippines (Silva *et al.*, 1987: 114), Solomon Islands (Womersley & Bailey, 1970: 281), Taiwan (Lewis & Norris, 1987: 9).

Note: Most of our samples stain the herbarium paper brownish upon drying.

Halimeda distorta (Yamada) L. H. Colinvaux 1968: 33. figs 4, 6

References: Hillis-Colinvaux (1980: 120–122, fig. 34).

Type locality: Caroline Islands, near Ponape, lagoon of Ants Atoll.

Vouchers: HEC 4335, 11.6.1980: Hansa Point, Purar reef; HEC 4693, 17.8.1980: Hansa Bay, The Pinnacle; HEC 7528, 21.6.1988: fringing reef close to Wongat Island; HEC 7559, 23.6.1988: Kranket Island, enclosed bay; Copp & PvR 13499, 2.8.1990: Bagabag, NW point of Christmas Bay.

Other collection sites in N-PNG: Bogia, outer Legoarant Island; Boisa, N-coast; Kranket Island, SW bay, enclosed bay; Nagada Harbour; Bagabag, in front of Bedilu village (W coast).

Distribution in SW-Pacific: N-Australia (Lewis, 1987: 28), Caroline Islands (Colinvaux, 1968: 33), Indonesia (Verheij & Prud'homme van Reine, 1993: 407), Micronesia (Tsuda & Wray, 1977: 97), Papua New Guinea (this paper).

Halimeda fragilis W.R. Taylor 1950: 88–89, 207, pl. 48: fig. 2

References: Hillis-Colinvaux (1980: 151–152, fig. 47); Coppejans *et al.* (1995a: 86, fig. 23); Trono (1997: 54–55, fig. 34).

Type locality: Eniwetok Atoll, Marshall Islands.

Vouchers: HEC 4255, 28.5.1980: Laing Island; HEC 4338, 11.6.1980: Hansa Point, Purar Reef; HEC 4512, 17.7.1980: Outer Legoarant Island, Bogia, N side; Copp & PvR 13145, 13.7.1990: patch reef SW of Wongat Island; Copp & PvR 13571, 5.8.1990: landward slope of the barrier reef, N of Tab Island.

Other collection sites in N-PNG: Hansa Bay, Besalpap Reef, The Pinnacle, between Barol Point and Hansa Point, Barol Point; Madang, seaward side of the patch reef between Gosem Island and Tripod Reef, reef S of Wongat, landward barrier reef slope.

Distribution in SW-Pacific: N-Australia (Lewis, 1987: 29), Caroline Islands (Trono, 1968: 185), Fiji (N'Yeurt *et al.*, 1996: 64), Micronesia (Tsuda & Wray, 1977: 98), Papua New Guinea (Coppejans *et al.*, 1995a: 86), Philippines (Silva *et al.*, 1987: 114).

Halimeda gigas W.R. Taylor 1950: 84, pl. 44

References: Hillis-Colinvaux (1980: 132–134, fig. 39).

Type locality: Eniwetok Atoll, Marshall Islands.

Vouchers: HEC 7525, 21.6.1988: close to Wongat Island; HEC 7590, 25.6.1988: Nagada Harbour; HEC 7972, 26.7.1988: Astrolabe Bay, Cape Iris-Biliau; Copp & PvR 13282, 20.7.1990: seaward of the patch reef between Tausch Island and Sek Island; Copp & PvR 13393, 15.7.1990: Wongat Island.

Distribution in SW-Pacific: N-Australia (Lewis, 1987: 29), Indonesia (Verheij & Prud'homme van Reine, 1993: 408), Marshall Islands (Taylor, 1950: 84), Micronesia (Tsuda & Wray, 1977: 98), Papua New Guinea (Heijs & Brouns, 1986: 38), Philippines (Silva *et al.*, 1987: 114).

Halimeda gracilis Harvey *ex* J. Agardh 1887: 82

References: Hillis-Colinvaux (1980: 144–147, fig. 44); Coppejans *et al.* (1995a: 86, fig. 24); Littler & Littler (2000: 402, 403 + figs).

Type locality: Sri Lanka.

Vouchers: HEC 4284 b, 2.6.1980: Hansa Bay, Besalpap reef; HEC 7463, 17.6.1988: Bogia Bay, Kola Kola Islet and Reamuna Islet; HEC 7832, 16.7.1988: Manam Babian; Copp & PvR 13255, 19.2.1990: seaward side of the patch reef seawards of Ruo Island; Copp & PvR 13346, 23.7.1990: Sarang Harbour.

Other collection sites in N-PNG: Hansa Point, Purar Reef; S of Gosem Island.

Distribution in SW-Pacific: N-Australia (Lewis, 1987: 29), Caroline Islands (Trono, 1968: 186), Indonesia (Verheij & Prud'homme van Reine, 1993: 408), Micronesia (Tsuda & Wray, 1977: 98), New Caledonia (Garrigue & Tsuda, 1988: 59), Papua New Guinea (Enomoto & Ohba, 1992: 23), Philippines (Silva *et al.*, 1987: 114), Solomon Islands (Womersley & Bailey, 1970: 281), Vietnam (Dawson, 1954: 396).

Halimeda incrassata (Ellis) Lamouroux 1816, 307

References: Hillis-Colinvaux (1980: 93–96, fig. 22); Littler & Littler (2000: 402, 403 + figs).

Type locality: Jamaica.

Vouchers: HEC 4270, 1.6.1980: Laing Island, inward reef slope; HEC 6502, 17.8.1986: Suaru; HEC 7527, 21.6.1988: fringing reef, close to Wongat Island; HEC 7883, 21.7.1988: Bogia Bay; Copp & PvR 13429, 29.7.1990: Ulimet Island.

Other collection sites in N-PNG: Madang, landward slope of the barrier reef, S of Wongat Island, seaward of the patch reef between Tausch Island and Sek Island, N of Tab Island, landward slope of barrier reef.

Distribution in SW-Pacific: N-Australia (Lewis, 1987: 29), Caroline Islands (Trono, 1968: 180), Fiji (N'Yeurt *et al.*, 1996: 64), Indonesia [Coppejans & Prud'homme van Reine, 1992a: 175 (*H. ad incrassata*)], Micronesia (Tsuda & Wray, 1977: 98), Papua New Guinea (this paper), Philippines (Silva *et al.*, 1987: 115), Solomon Islands (Womersley & Bailey, 1970: 282).

Halimeda lacunalis W.R. Taylor f. *lata* (W.R. Taylor) Hillis 1959: 349, pls 1, 5–7, 9

References: Hillis-Colinvaux (1980: 129–132, fig. 38b); Coppejans *et al.* (1995a: 85, fig. 22).

Type locality: Bikini Atoll, Enyu Island, Marshall Islands.

Vouchers: HEC 4340, 11.6.1980: Hansa Point, Purar reef; Copp & PvR 13086, 10.7.1990, Gosem Island; Copp & PvR 13318, 21.7.1990: Ulingan Bay, S side towards the open sea; Copp & PvR 13493, 2.8.1990: Bagabag, NW point of Christmas Bay; Copp & PvR 13687, 18.8.1990: Mugil Harbour, between the coast and Vidosi Island.

Other collection sites in N-PNG: Bogia, Outer Legoarant Island, N side of the island; Madang, Nagada Harbour, seaward of the patch reef between Tausch Island and Sek Island, S of Gosem Island.

Distribution in SW-Pacific: N-Australia [Lewis, 1987: 29 (*H. lacunalis*)], Indonesia [Coppejans & Prud'homme van Reine, 1992a: 175 (*H. lacunalis*)], Micronesia [Tsuda & Wray, 1977: 98 (*H. lacunalis*)], Papua New Guinea [Enomoto & Ohba, 1992: 23 (*H. lacunalis*)], Philippines [Silva *et al.*, 1987: 115 (*H. lacunalis*)].

Halimeda macroloba Decaisne 1841: 118

References: Hillis-Colinvaux (1980: 108–110, fig. 28); Tseng (1984: 288, pl. 143, fig. 4); Coppejans *et al.* (1995a: 86, fig. 26); Lewmanomont & Ogawa (1995: 51, + fig.); Calumpong & Meñez (1996: 105, + fig.); Trono (1997: 57, fig. 36).

Type locality: Red Sea.

Vouchers: HEC 6554, 20.8.1986: Ulingan Bay, W side; HEC 7776, 13.7.1988: Laing Island; HEC 7989, 26.7.1988: Astrolabe Bay, Cape Iris-Biliau; Copp & PvR 13638, 8.8.1990: Bagabag, New Year's Bay; Copp & PvR 13787 (fertile), 22.8.1990: lagoon between Sarang Harbour and Walog.

Other collection sites in N-PNG: Suaru; Bogia Bay, Kolakola & Reamuna Islets; Madang, Nagada Harbour, Kranket Island, Beliau Island, W bay; bay in front of Malala village; Demasa Island.

Distribution in SW-Pacific: N-Australia (Lewis, 1987: 30), Caroline Islands (Trono, 1968: 185), Fiji (N'Yeurt *et al.*, 1996: 64), Indonesia (Verheij & Prud'homme van Reine, 1993: 408), Micronesia (Tsuda & Wray, 1977: 98), New Caledonia (Garrigue & Tsuda, 1988: 60), Papua New Guinea (Enomoto & Ohba, 1992: 23), Philippines (Silva *et al.*, 1987: 115), Solomon Islands (Womersley & Bailey, 1970: 282), Taiwan (Lewis & Norris, 1987: 9), Thailand (Lewmanomont & Ogawa, 1995: 51).

Halimeda macrophysa Askenasy 1888: 14, pl. 4: figs 1–4

References: Hillis-Colinvaux (1980: 134–136, figs 40a, b); Coppejans *et al.* (1995a: 86, fig. 26); Trono (1997: 58, fig. 37).

Type locality: Matuku Island, Fiji Islands.

Vouchers: HEC 4258, 29.5.1980: Laing Island; HEC 7546, 22.6.1988: Wongat Island, sheltered side; Copp & PvR 13494, 2.8.1990: Bagabag, NW point of Christmas Bay Copp & PvR 13704, 18.8.1990: Mugil Harbour, between coast and Vidosi Island; Copp & PvR 13808, 22.8.1990: hole in the wall, close to Mugil Harbour.

Other collection sites in N-PNG: Hansa Bay, Barol Point; Hansa Point, Purar Reef; Bogia, Outer Legoarant Island, Kolakola and Reamuna Islets; Madang, patch reef in the middle of the lagoon, patch reef SW of Wongat Island, seaward of the patch reef between Tausch Island and Sek Island, S side of Sinub Island, reef S of Wongat, landward reef slope; Bagabag, The Pinacle, S of the New Year's Bay.

Distribution in SW-Pacific: N-Australia (Lewis, 1987: 30), Caroline Islands (Trono, 1968: 184), Fiji (N'Yeurt *et al.*, 1996: 64), Indonesia (Verheij & Prud'homme van Reine, 1993: 408), Micronesia (Tsuda & Wray, 1977: 98), Papua New Guinea (Enomoto & Ohba, 1992: 23), New Caledonia (Garrigue & Tsuda, 1988: 60), Philippines (Silva *et al.*, 1987: 115), Solomon Islands (Womersley & Bailey, 1970: 282).

Halimeda melanesica Valet 1966: 680, figs 1, 2, pl. 1

References: Hillis-Colinvaux (1980: 153–154, fig. 48); Coppejans *et al.* (2000: 73, fig. 28).

Type locality: Loyalty Islands, vicinity of Luengoni, Lifou.

Vouchers: HEC 7589, 25.6.1988: Nagada Harbour; HEC 7648, 1.7.1988: Hansa Bay, Barol Point; HEC 8026, 1.8.1988: Ulingan Bay; Copp & PvR 13398, 15.7.1990: patch reef SW of Wongat Island, landward reef slope; Copp & PvR 13492, 2.8.1990: Bagabag, NW point of Christmas Bay.

Other collection sites in N-PNG: Bogia, Outer Legoarant Island; Hansa Bay, Awar plantation, patch reef W of Barol Point; W side of Ulingan Bay; Bogia Bay, Kola-Kola and Reamuna Islets; Madang, sheltered side of Island of Wongat, sheltered side of Sek Island, patch reef, SW of Wongat Island, seaward of the patch reef between Tausch Island and Sek Island, Nagada Harbour, in front of Gosem Island; Suaru; Mugil Harbour, between the coast and Vidosi Island; bay in front of Malala village.

Distribution in SW-Pacific: N-Australia (Lewis, 1987: 30), Indonesia (Verheij & Prud'homme van Reine, 1993: 409), New Caledonia (Garrigue & Tsuda, 1988: 60), Papua New Guinea (Enomoto & Ohba, 1992: 23).

Halimeda micronesica Yamada 1941: 121, fig. 15

References: Hillis-Colinvaux (1980: 149–151, fig. 46).

Type locality: Ant Atoll, near Ponape Island, Caroline Islands.

Vouchers: HEC 4513, 17.7.1980: Outer Legoarant Island, Bogia, S side; HEC 7461, 17.6.1988: Bogia Bay, Kola-Kola & Reamuna Islets; Copp & PvR 13147, 13.7.1990:

patch reef SW of Wongat Island; Copp & PvR 13206, 17.7.1990: landward slope of the barrier reef, S of Wongat Island; Copp & PvR 13497, 2.8.1990: Bagabag, NW point of Christmas Bay.

Other collection sites in N-PNG: Madang, seaward of Ruo Island, seaward of the patch reef between Tausch Island and Sek Island, seaward side of fringing reef of Tab Island, reef S of Wongat Island, landward reef slope.

Distribution in SW-Pacific: N-Australia (Lewis, 1987: 30), Caroline Islands (Trono, 1968: 186), Fiji (N'Yeurt *et al.*, 1996: 64), Indonesia (Verheij & Prud'homme van Reine, 1993: 409), Micronesia (Tsuda & Wray, 1977: 98), Papua New Guinea (Enomoto & Ohba, 1992: 23), Philippines (Silva *et al.*, 1987: 115), Solomon Islands (Womersley & Bailey, 1970: 282).

Halimeda minima (W.R. Taylor) Colinvaux 1968: 32, figs 5, 6

References: Hillis-Colinvaux (1980: 113–115, fig. 30), Coppejans & Prud'homme van Reine (1992a: 176); Drew (1995: 144).

Type locality: Bikini Lagoon, Bikini Atoll, Marshall Islands.

Vouchers: Copp & PvR 13498, 2.8.1990: Bagabag, NW point of Christmas Bay; Copp & PvR 13631, 8.8.1990: Bagabag, SE point of Christmas Bay.

Distribution in SW-Pacific: N-Australia (Lewis, 1987: 30), Fiji (N'Yeurt *et al.*, 1996: 64), Indonesia (Coppejans & Prud'homme van Reine, 1992a: 176), Papua New Guinea (this paper).

Halimeda opuntia (Linnaeus) Lamouroux 1816: 308

References: Magruder & Hunt (1979: 29, fig. 2, p. 28); Hillis-Colinvaux (1980: 110–112, figs 19, 51, 92); Tseng (1984: 290, pl. 144, fig. 2); Coppejans *et al.* (1995a: 86, fig. 27); Lewmanomont & Ogawa (1995: 52, + fig.); Calumpong & Meñez (1996: 103, + fig.); Trono (1997: 59, fig. 38); Littler & Littler (2000: 406, 407 + figs).

Lectotype locality: Jamaica.

Vouchers: HEC 4735, 28.8.1980: Laing Island; HEC 7485, 20.6.1988: Nagada Harbour; HEC 7565, 23.6.1988: Kranket Island, enclosed bay; HEC 8077, 7.8.1988: W of Malamal Island; Copp & PvR 13863, 29.8.1990: S of Gosem Island.

Other collection sites in N-PNG: Madang, Beliau Island (E creek), Kranket Island (enclosed bay), Demasa Island.

Distribution in SW-Pacific: N-Australia (Lewis, 1987: 30), Caroline Islands (Trono, 1968: 178), Fiji (N'Yeurt *et al.*, 1996: 64), Indonesia (Verheij & Prud'homme van Reine, 1993: 409), Malaysia (Phang, 1986: 24), Micronesia (Tsuda & Wray, 1977: 98), New Caledonia (Garrigue & Tsuda, 1988: 60), Papua New Guinea (Enomoto & Ohba, 1992: 23), Philippines (Silva *et al.*, 1987: 115), Singapore (Teo & Wee, 1983: 53), Solomon Islands (Womersley & Bailey, 1970: 282), Taiwan (Lewis & Norris, 1987: 9); Thailand (Lewmanomont & Ogawa, 1995: 52).

Halimeda renschii Hauck 1886: 167–168

References: Hillis-Colinvaux (1980: 115–116, fig. 31).

Type locality: “Pomoni, Comoro-Insel Johanna” [Domoni, Ndzouani, Comoro Islands].

Vouchers: HEC 7529, 21.6.1988: fringing reef, close to Wongat Island; Copp & PvR 13213, 18.7.1990: seaward side of the patch reef between Sinub Island and Wongat Island; Copp & PvR 13347, 23.7.1990: Sarang Harbour; Copp & PvR 13399, 15.7.1990: patch reef SW of Wongat Island, landward slope; Copp & PvR 13578, 5.8.1990: N of Tab Island, landward slope of the barrier reef.

Other collection sites in N-PNG: Madang, patch reef SW of Wongat Island; Paddock Reef, off Nagada Harbour.

Distribution in SW-Pacific: N-Australia (Lewis, 1987: 31), Fiji (N'Yeurt *et al.*, 1996: 64), Indonesia [Weber-van Bosse, 1913: 122 (= *H. opuntia* f. *renschii* (Hauck) Barton)], Papua New Guinea (this paper), Philippines (Silva *et al.*, 1987: 116), Solomon Islands [Womersley & Bailey, 1970: 283 (= *H. opuntia* var. *renschii*)], Taiwan (Lewis & Norris, 1987: 9), Vietnam (Dawson, 1954: 395).

Halimeda tuna (Ellis & Solander) Lamouroux 1816: 309

References: Hillis-Colinvaux (1980: 122–124, fig. 35); Trono (1997: 63, fig. 41); Littler & Littler (2000: 408, 409 + figs).

Type locality: Mediterranean Sea.

Vouchers: HEC 4502, 16.7.1980: Laing Island; HEC 4669, 15.8.1980: Manam, Borda Reef; HEC 7457, 17.6.1988: Kolakola & Reamuna Islets; HEC 7486, 20.6.1988: Madang, Nagada Harbour; Copp & PvR 13552, 2.8.1990: Bagabag, New Year's Bay.

Other collection sites in N-PNG: Bogia, Outer Legoarant Island; Hansa Bay, Awar plantation, patch reef W of Barol Point, Barol Point; Manam, Baliau; Suaru; Boisa Island; Madang, patch reef in the middle of the lagoon, Gosem Island, N of Tab Island, patch reef SW of Wongat Island, between Big and Little Tab Island, seaward side of the patch reef between Sinub Island and Wongat Island, seaward side of the patch reef seaward of Ruo Island; Hatzfeldhafen; Bagabag, The Pinacle, S of New Year's Bay; Mugil Harbour, between coast and Vidosi Island.

Distribution in SW-Pacific: N-Australia (Lewis, 1987: 32), Caroline Islands (Trono, 1968: 182), Fiji (N'Yeurt *et al.*, 1996: 65), Indonesia (Verheij & Prud'homme van Reine, 1993: 411), Malaysia (Phang, 1986: 24), Micronesia (Tsuda & Wray, 1977: 99), New Caledonia (Garrigue & Tsuda, 1988: 60), Papua New Guinea (Heijs & Brouns, 1986: 38), Philippines (Silva *et al.*, 1987: 116), Singapore (Teo & Wee, 1983: 52), Solomon Islands (Womersley & Bailey, 1970: 284).

Family Pseudocodiaceae

Pseudocodium Weber-van Bosse

Pseudocodium differs from *Codium* by the total absence of cellulosic plugs in the central filaments and the presence of amyloplasts.

Pseudocodium floridanum Dawes & Mathieson 1972: 273–277, figs 1–6 Figs 1–10

Type locality: Egmont Key, mouth of Tampa Bay, Florida.

Vouchers: HEC 4392, 22.6.1980: Laing Island, N-coast, –40/–30 m; HEC 4648, 13.8.1980: Hansa Bay, Durangit Reef, –37 m.

Distribution in SW-Pacific: Indonesia (Verheij & Prud'homme van Reine, 1993: 411), Papua New Guinea (this paper).

Notes: Three species of *Pseudocodium* have been described worldwide: *P. de-vriesii* Weber-van Bosse from South Africa, *P. australasicum* Womersley from Australia and *P. floridanum* from Florida. The material from Papua New Guinea agrees in all characters with *P. floridanum*, which results in a markedly disjunct geographic distribution. Since our collections, this species has also been reported from Indonesia (Verheij & Prud'homme van Reine, 1993: 411). The specimens in Florida were collected between 37 and 40 m depth.

Family Udoteaceae

Avrainvillea Decaisne

Notes: Our collection of *Avrainvillea* from Papua New Guinea contains numerous specimens which belong to the *A. amadelph*–*A. lacerata*–*A. longicaulis* group. Their habits are quite divergent but their anatomies are rather similar. We temporarily group

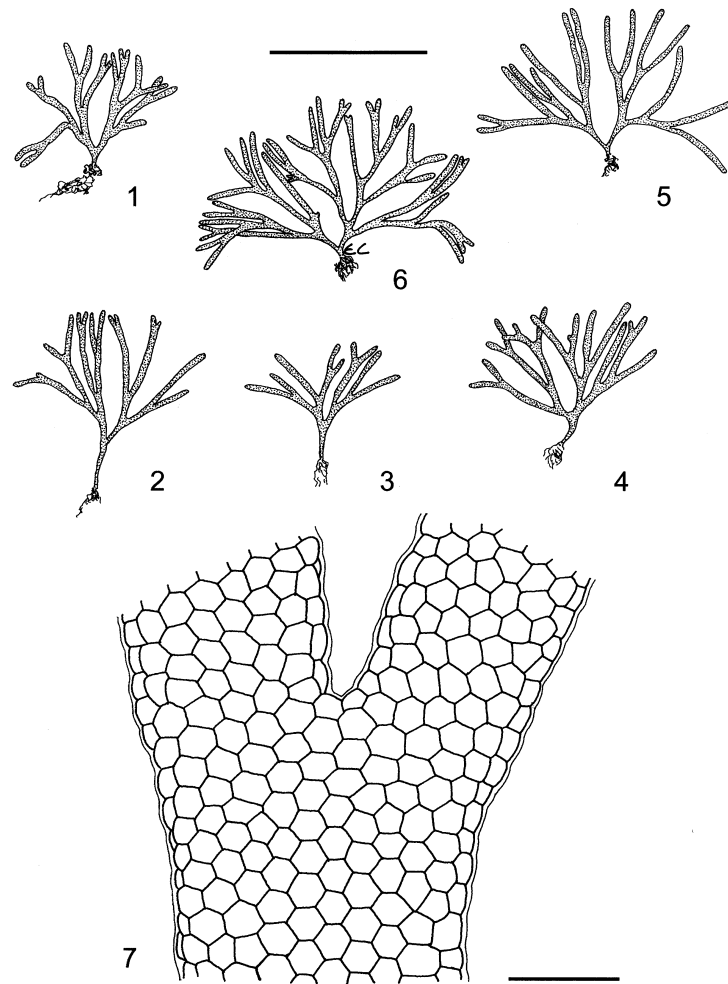
them under *A. lacerata*. On the other hand, our collections also contain a large number of specimens belonging to the *A. erecta*-*A. obscura*-complex, including a slender deep-water form. They are grouped under *A. obscura*. A detailed comparative study of the *Avrainvillea*-collection from Papua New Guinea and type specimens is being undertaken and will be reported separately.

Avrainvillea lacerata Harvey ex J. Agardh 1887: 54

References: Coppejans & Prud'homme van Reine (1989b: 125, pl. 2, figs 1-17); Lewmanomont & Ogawa (1995: 23 + fig.); Trono (1997: 67, fig. 44).

Type locality: Tonga.

Vouchers: HEC 4288, 2.6.1980: Hansa Bay, Bisalpap Reef; HEC 4372, 17.6.1980 & HEC 6452, 15.8.1986 & HEC 7689, 5.7.1988: Laing Island; HEC 6476, 17.8.1986:



Figs 1-7. *Pseudocodium floridanum* (after HEC 4648). Fig. 1-6. Habit (bar = 2 cm). Fig. 7. Surface view of an intercalary dichotomy: polygonal surfaces of the utricles (bar = 500 μ m).

Suaru; HEC 7540, 22.6.1988: Wongat Island, sheltered side; HEC 7954, 25.7.1988: Saidor area, Suit; HEC 7965, 26.7.1988: Saidor area, Cape Iris-Biliau; HEC 8053, 3.8.1988: Kranket Island, SW-bay; Copp & PvR 13408a, 26.7.1990: patch reef between Tausch Island and Sek Island; Copp & PvR 13438, 27.7.1990: landward slope of barrier reef, N of Wongat Island; Copp & PvR 13574, 5.8.1990: landward slope of barrier reef, N of Tab Island.

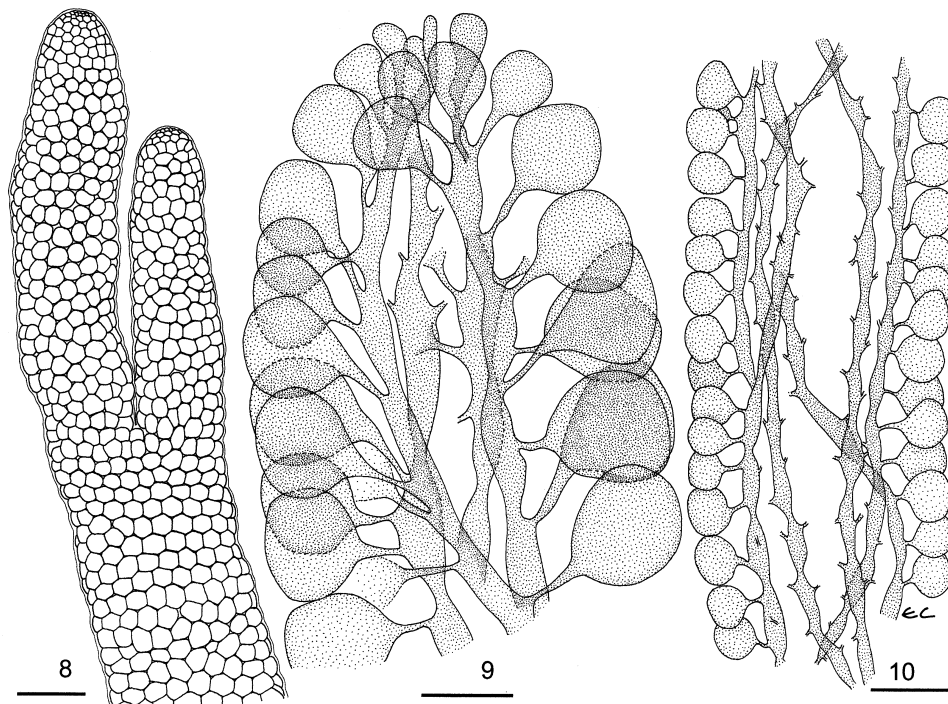
Distribution in SW-Pacific: N-Australia (Lewis, 1987: 27), Caroline Islands (Trono, 1968: 175), Indonesia (Verheij & Prud'homme van Reine, 1993: 403), New Caledonia (Garrigue & Tsuda, 1988: 56), Papua New Guinea (Heijs, 1985: 300), Philippines (Silva *et al.*, 1987: 117), Solomon Islands (Womersley & Bailey, 1970: 280), Thailand (Lewmanomont & Ogawa, 1995: 23).

Avrainvillea obscura (C. Agardh) J. Agardh 1887: 53–54

References: Coppejans & Prud'homme van Reine (1989b: 121, pl. 2, fig. 18–37); Coppejans *et al.* (1995a: 88, fig. 30); Lewmanomont & Ogawa [1995: 25 + fig. and 23 + fig. (*A. erecta* (Berkeley) A. Gepp & E. Gepp)]; Trono (1997: 66, fig. 43).

Type locality: Guam, Mariana Islands.

Vouchers: HEC 4277, 1.6.1980: Laing Island (between–12 and–40 m); HEC 6472 & 6475, 17.8.1986: Suaru (infralittoral fringe); HEC 7499, 20.6.1988: Madang, Nagada



Figs 8–10. *Pseudocodium floridanum* (after HEC 4648). Fig. 8. Surface view of a dichotomy of last order: rounded utricles in the (sub)apical parts, becoming more polygonal downwards (bar = 500 µm). Fig. 9. Detail of an apex with longitudinal filaments and utricles (the utricles from the upper and lower surface have been deleted) (bar = 100 µm). Fig. 10. Optical longitudinal section of an intercalary part: longitudinal filaments and (optically) lateral utricles (most of the utricles have been deleted) (bar = 250 µm).

Harbour (infralittoral fringe); HEC 7976, 26.7.1988: Saidor area, Cape Iris-Biliau; Copp & PvR 13376, 25.7.1990: patch reef SW of Wongat Island (– 25 m).

Other collection sites in N-PNG: Hansa Bay, between Awar River and Awar plantation (– 10 m), between the two wrecks (– 4 to – 8 m), Barol Point (– 32 m); Bogia Bay (infralittoral fringe and – 22 m); Saidor area, Gumbi Bay (infralittoral fringe), Suit (infralittoral fringe); Ulingan Bay, W-side (– 18 m); Madang, Nagada Harbour, seaward of patch reef between Tausch Island and Sek Island (between – 20 and – 22 m), landward slope of barrier reef, N of Tab Island (– 22 m); lagoon between Sarang Harbour and Walog (– 15 m).

Distribution in SW-Pacific: N-Australia [Lewis, 1987: 26 (*A. erecta*)], Caroline Islands [Trono, 1968: 174 (*A. erecta*)], Fiji [N'Yeurt *et al.*, 1996: 65 (*A. erecta*)], Indonesia (Verheij & Prud'homme van Reine, 1993: 401), Malaysia [Phang, 1986: 23 (*A. erecta*)], Micronesia (Tsuda & Wray, 1977: 93), New Caledonia (Garrigue & Tsuda, 1988: 56), Papua New Guinea (Heijs & Brouns, 1986: 38), Philippines (Silva *et al.*, 1987: 117), Singapore [Teo & Wee, 1983: 54 (*A. erecta*)], Solomon Islands [Womersley & Bailey, 1970: 279 (*A. erecta*)], Thailand [Lewmanomont & Ogawa (1995: 25)]; Vietnam [Dawson, 1954: 388 (*A. erecta*)].

Chlorodesmis Harvey & Bailey

Key to the species from N-PNG

- 1a. Portions of the siphons containing numerous acicular crystals *C. caespitosa*
 1b. No such crystals in the siphons 2
 2a. Supporting segment of the dichotomy convex (not truncated); supradichotomic constrictions very unequally situated *C. fastigiata*
 2b. Supporting segment of the dichotomy truncated; supradichotomic constrictions at the same level *C. hildenbrandtii*

Chlorodesmis caespitosa J. Agardh 1887: 49–50 Figs 11–14

References: Ducker (1967: 157, pls 3, 12, 13, 14, 19).

Type locality: Colombo, Sri Lanka.

Vouchers: HEC 6505, 17.8.1986: Suaru.

Distribution in SW-Pacific: N-Australia (Lewis, 1987: 27), Papua New Guinea (this paper), Philippines (Silva *et al.*, 1987: 118), Taiwan (Lewis & Norris, 1987: 9).

Note: The specimens HEC 6505 contain dense aggregations of the typical acicular (spindle-like) crystals in localised portions of the siphons.

Chlorodesmis fastigiata (C. Agardh) Ducker 1969: 17, fig. 1 Figs 22–31

References: Ducker [1967: 160, pls 4, 5, 15 (= *C. comosa* Harvey & Bailey)], Coppejans & Prud'homme van Reine (1989b: 127, pl. 3, figs 1–4, 12); Verheij & Prud'homme van Reine (1993: 405, fig. 4a); Coppejans *et al.* (1995a: 90, fig. 28); Trono (1997: 71, fig. 48); Huisman (2000: 263 + fig.).

Type locality: Mariana Islands.

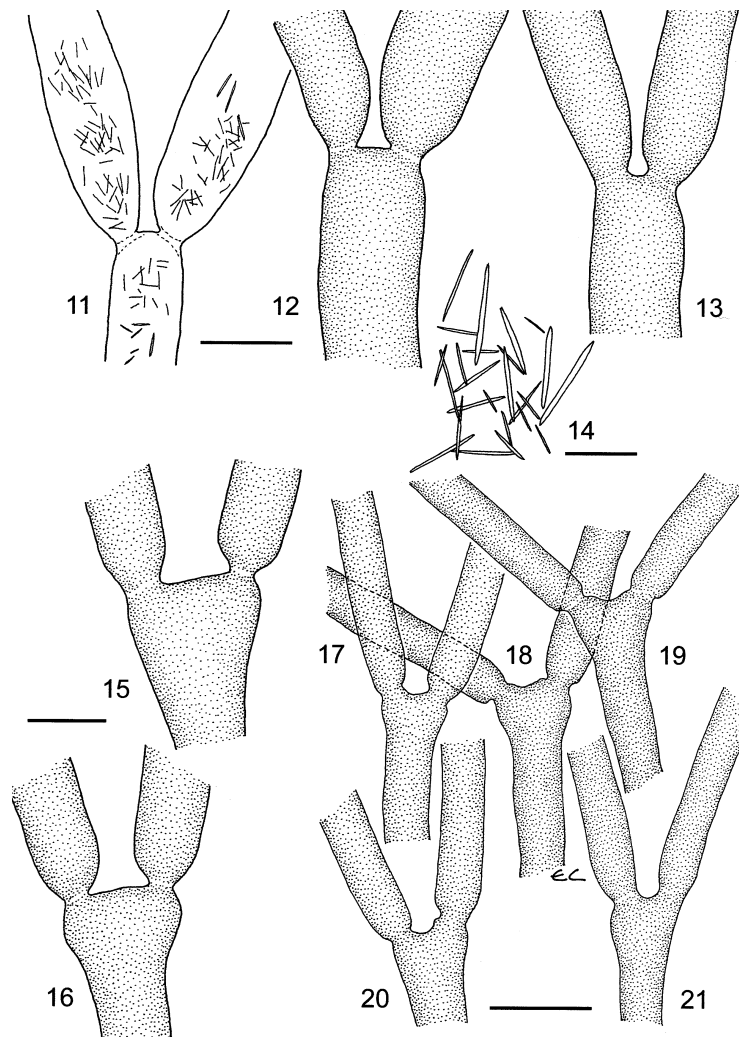
Vouchers: HEC 4476, 14.7.1980: Laing Island, E-coast; HEC 7599, 26.6.1988: Madang, patch reef Yazı Tinan; HEC 7806, 16.7.1988: Manam, –18 m; Copp & PvR 13296, 21.7.1990: Neptunus Point; Copp & PvR 13397, 15.7.1990: patch reef SW of Wongat Island.

Other collection sites in N-PNG: Madang, between Big and Little Tab Island, seaward side of patch reef seaward of Ruo Island; Sarang Harbour; bay in front of Malala Village; Hansa Bay, Awar plantation, boulders just under low water mark; hole in the wall.

Distribution in SW-Pacific: N-Australia (Lewis, 1987: 27), Caroline Islands [Trono, 1968: 172 (= *C. comosa*)], Fiji (N'Yeurt *et al.*, 1996: 65), Indonesia (Verheij & Prud'homme van

Reine, 1993: 405), Micronesia (Tsuda & Wray, 1977: 95), New Caledonia (Garrigue & Tsuda, 1988: 58), Papua New Guinea (Enomoto & Ohba, 1992: 23), Philippines (Silva *et al.*, 1987: 118), Solomon Islands (Womersley & Bailey, 1970: 279), Taiwan [Lewis & Norris, 1987: 9 (= *C. comosa*)].

Note: Copp & PvR 13758: fertile material.



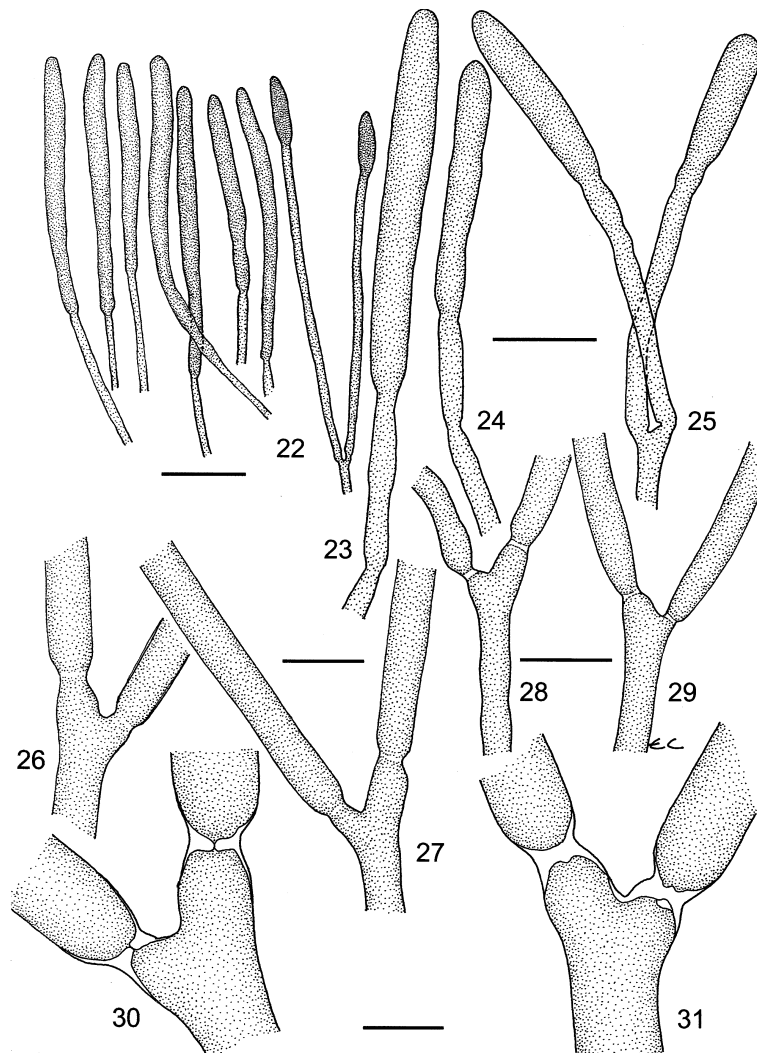
Figs 11–14. *Chlorodesmis caespitosa* (after HEC 6505). Figs 11–13. Details of dichotomies: supporting segment more or less truncated, supradichotomic constrictions at the same level (bar = 250 μ m). Fig. 11. Part of the thallus with numerous crystals. Fig. 14. Detail of the spindle-shaped crystals (bar = 50 μ m).

Figs 15–21. *Chlorodesmis hildebrandtii*: details of dichotomies. Figs 15–16 (after Copp & PvR 13488): supporting segment markedly truncate, supradichotomic constrictions at the same level (bar = 100 μ m). Figs 17–21 (after Copp & PvR 13343): supporting segment convex (bar = 250 μ m).

Chlorodesmis hildebrandtii A. Gepp & E. Gepp 1911: 16, 137, pl. VIII: fig. 74 Figs 15–21

References: Ducker (1967: 164, pls 6, 16), Coppejans & Prud'homme van Reine (1989b: 127, pl. 3, figs 5–11); Verheij & Prud'homme van Reine (1993: 405, fig. 4b); Trono (1997: 72, fig. 49).

Lectotype locality: "Johanna, Pomona" (Domoni on Ndzuani Island, Comoro Islands).



Figs 22–31. *Chlorodesmis fastigiata* (22–27 after Copp & PvR 13758; 28, 29 after HEC 4476; 30, 31 after HEC 7599). Figs 22–25. Terminal inflated sporangia (Fig. 22: bar = 1 mm, Figs 23–25: bar = 500 µm). Figs 26–31. Details of dichotomies: supporting segment convex at the top, supra-dichotomic constrictions on markedly unequal level (Figs 26–27: bar = 200 µm, Figs 28–29: bar = 250 µm, Figs 30–31: bar = 100 µm)

Vouchers: HEC 7815, 16.7.1988: Manam, on Bryozoans, -1 m; Copp & PvR 13343, 22.7.1990: Laing Island; Copp & PvR 13488, 2.8.1990: Bagabag, NW-point of Christmas Bay, -10 m, epiphytic on *Halimeda* and on a sponge; Copp & PvR 13630, 8.8.1990: Bagabag, SE-point of Christmas Bay; Copp & PvR 13652, 8.8.1990: Bagabag, in front of Bedilu Village.

Distribution in SW-Pacific: N-Australia (Lewis, 1987: 27), Caroline Islands (Trono, 1968: 172), Fiji (N'Yeurt *et al.*, 1996: 65), Indonesia (Verheij & Prud'homme van Reine, 1993: 405), Micronesia (Tsuda & Wray, 1977: 95), Papua New Guinea (this paper), Philippines (Silva *et al.*, 1987: 118), Thailand (Lewmanomont & Ogawa, 1995: 43), Vietnam (Dawson, 1954: 394)

***Rhipidosiphon* Montagne**

See identification key of *Udotea*.

***Rhipidosiphon javensis* Montagne 1842: 15 Figs 32–34**

References: Coppejans & Prud'homme van Reine [1989b: 139, pl. 10, figs 3–9, (= *Udotea javensis* (Montagne) A. Gepp & E. Gepp)]; Littler & Littler (1990: 33, 35 + figs); Lewmanomont & Ogawa [1995: 59, + fig. (= *U. javensis*)]; Trono [1997: 77 (= *U. javensis*)].

Type locality: Leiden Island (Nyamuk-besar) near Jakarta, Java, Indonesia.

Vouchers: HEC 7837, 17.7.1988: Hansa Bay, Durangit Reef; HEC 7955b, 25.7.1988: Saidor area, Suit.

Distribution in SW-Pacific: N-Australia [Lewis, 1987: 34 (= *U. javensis*)], Caroline Islands [Trono, 1968: 187 (= *U. javensis*)], Fiji (N'Yeurt *et al.*, 1996: 65), Indonesia (Verheij & Prud'homme van Reine, 1993: 412), Malaysia [Phang, 1986: 24 (= *U. javensis*)], Micronesia [Tsuda & Wray, 1977: 100 (= *U. javensis*)], New Caledonia [Garrigue & Tsuda, 1988: 61 (= *U. javensis*)], Papua New Guinea (Enomoto & Ohba, 1992: 23), Philippines [Silva *et al.*, 1987: 119 (= *U. javensis*)], Singapore [Teo & Wee, 1983: 54 (= *U. javensis*)], Solomon Islands [Womersley & Bailey, 1970: 280 (= *U. javensis*)], Thailand [Lewmanomont & Ogawa, 1995: 59 (= *U. javensis*)], Vietnam (Dawson, 1954: 395).

Note: Littler & Littler (1990: 33) resurrected the genus *Rhipidosiphon*, which is characterized by an upright, monosiphonous, basally uncalcified, uncorticated stipe, fine hyaline rhizoids and a fan-shaped, calcified, unistratose, terminal blade. All *Udotea*-species have distinctly corticated, completely calcified stipes made up of multiple, central, longitudinal siphons, usually surrounded by lateral appendages.

***Rhipilia* Kützing**

Key to the species from N-PNG

- 1a. Tenacula with 2(–3) prongs *R. orientalis*
 1b. Tenacula with (2–)4–5(–6) prongs *R. nigrescens*

***Rhipilia nigrescens* Coppejans & Prud'homme van Reine 1990: 261–262**

References: Coppejans & Prud'homme van Reine (1989b: 131, pl. 5: figs 1–31); Millar & Kraft (2001).

Type locality: Indonesia: Tukang Besi Islands, W coast of Binongko.

Voucher: Copp & PvR 13554 (*pro parte*), 2.8.1990: Bagabag, The Pinacle, -30 m.

Distribution in SW-Pacific: Indonesia (Coppejans & Prud'homme van Reine, 1990: 261), Papua New Guinea (this paper).

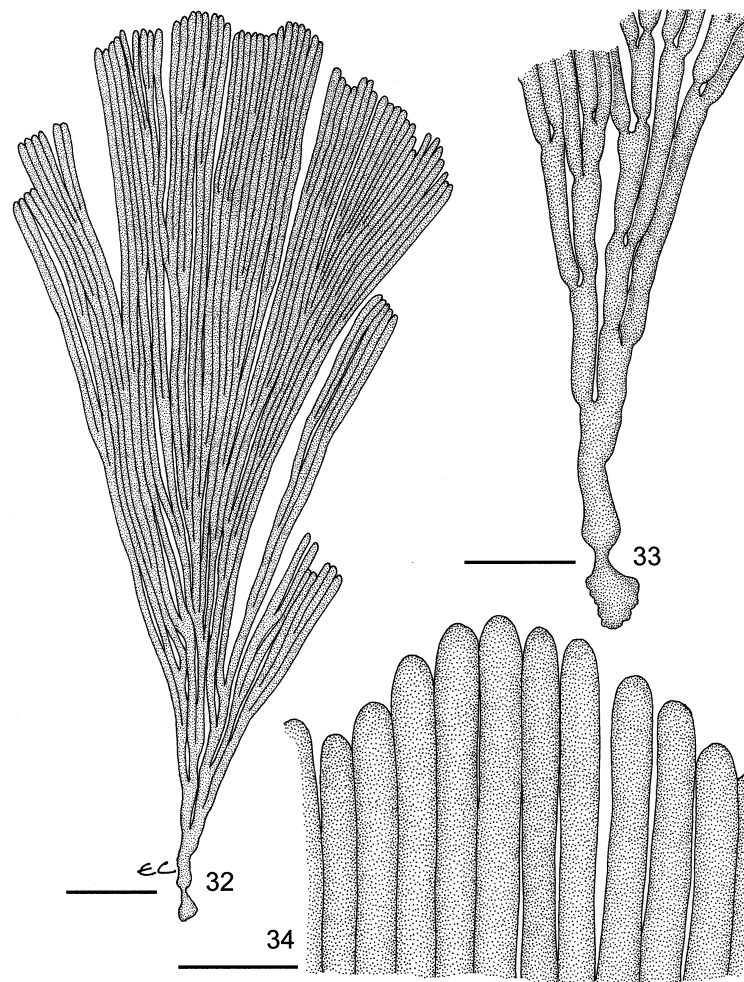
Note: First citation from outside the type locality. *Rhipilia nigrescens* is not recorded from the south coast of PNG in Coppejans *et al.* (1995), although some specimens are present in our collections: HEC 10403, 2.8.1994: Port Moresby area, W-point of Bootless Inlet.

Rhipilia orientalis A. Gepp & E. Gepp 1911: 57, 140, pl. 16: figs 134–136 Figs 35–52

References: Coppejans & Prud'homme van Reine (1989b: 131, pl. 6, figs 1–18), Coppejans *et al.* (1995a: 90, fig. 31).

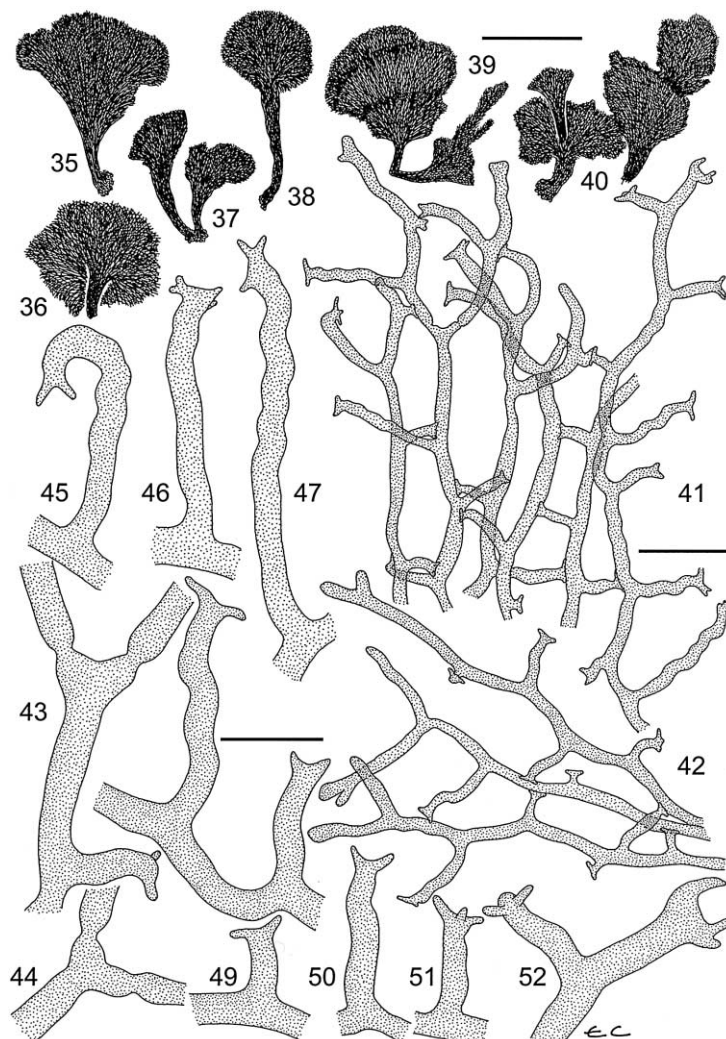
Syntype localities: Indonesia: Fau Islet, Gebe Island, Moluccas and Sebangkatan Island, Balabalangan Islands.

Vouchers: HEC 7587, 25.6.1988: Madang area, patch reef Padoz Tinan; Copp & PvR 13480, 2.8.1990: Bagabag, Christmas Bay, NW-point, –5/–40 m !; Copp & PvR 13554 (*pro parte*), 2.8.1990: Bagabag, The Pinnacle, –30 m.

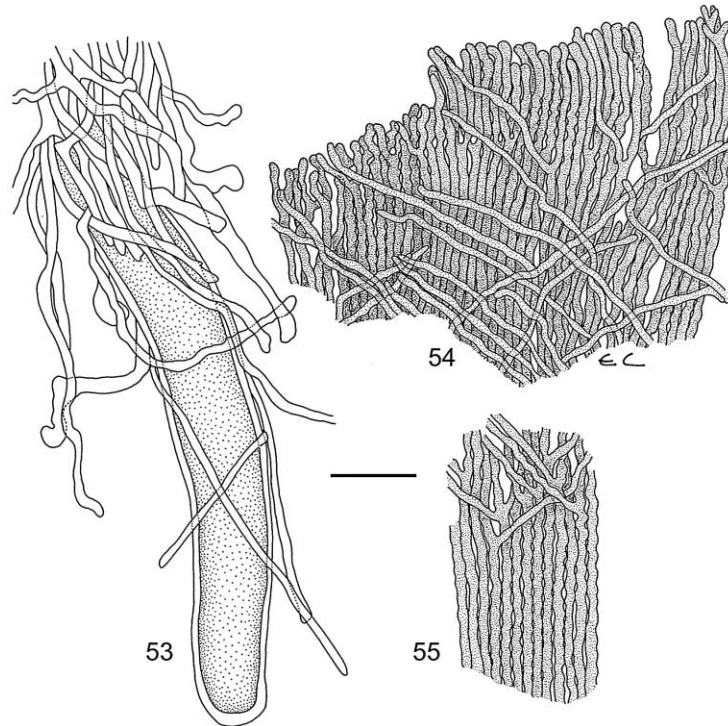


Figs 32–34. *Rhipidosiphon javensis* (after HEC 7837). Fig. 32. Habit of a whole specimen (bar = 500 µm). Fig. 33. Detail of the base (bar = 250 µm). Fig. 34. Detail of the frond margin (bar = 100 µm).

Distribution in SW-Pacific: N-Australia (Lewis, 1987: 33), Caroline Islands (Trono, 1968: 177), Fiji (N'Yeurt *et al.*, 1996: 65), Indonesia (Verheij & Prud'homme van Reine, 1993: 412), Micronesia (Tsuda & Wray, 1977: 99), Papua New Guinea (Coppejans *et al.*, 1995a: 90), Solomon Islands (Womersley & Bailey, 1970: 279).



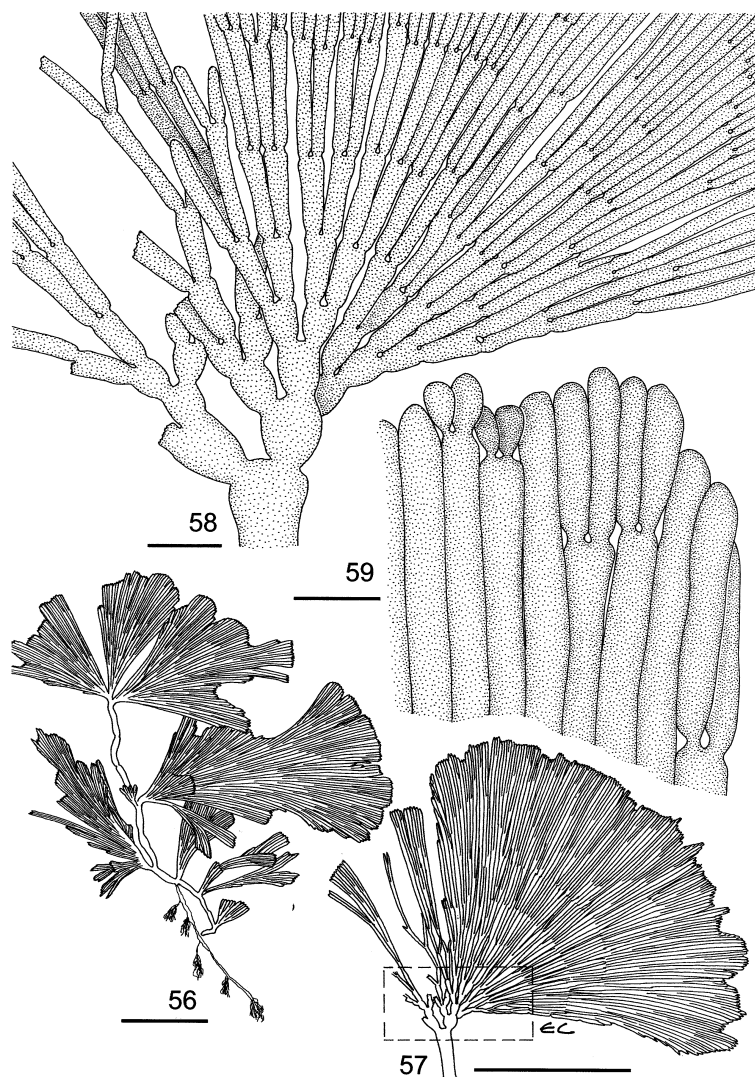
Figs 35–52. *Rhipilia orientalis* (after HEC 7587). Figs 35–40. Habit (anastomosing specimens in 40) (bar = 2 cm). Figs 41–42. Details of marginal parts of the flabellum with side branchlets (provided with tenacula) on the main filaments (bar = 250 µm); Figs 43–44. Dichotomies of main filaments with supradichotomic constrictions (and a side branchlet in 43) (bar = 100 µm); Figs 45–52. Side branchlets with tenacula with 2–3(–4) prongs (bar = 100 µm).

Rhipiliopsis A. Gepp & E. Gepp***Rhipiliopsis gracilis*** Kraft 1986: 55, figs 17–21 Figs 53–55*References:* Coppejans & Prud'homme van Reine (1989b: 133, pl. 7, figs 1–5). Coppejans *et al.* (1995a: 92, fig. 32).*Type locality:* The Canyons, Heron Island, Australia.*Voucher:* Copp & PvR 13566, 2.8.1990: Bagabag, The Pinnacle, –30 m.*Distribution in SW-Pacific:* Papua New Guinea (Coppejans *et al.*, 1995a: 92).*Note:* *Rhipiliopsis papuensis* Coppejans, De Clerck & Leliaert (1999: 378), described from the south coast of PNG is not present in our collections from the north coast.***Tydemania*** Weber-van Bosse***Tydemania expeditionis*** Weber-van Bosse 1901: 139–140 Figs 56–59*References:* Tseng (1984: 292, pl. 145, fig. 2); Coppejans & Prud'homme van Reine (1989b: 135, pl. 8: figs 1–3); Coppejans *et al.* (1995a: 92, figs 33–34); Calumpong & Meñez (1996: 106, + fig.); Trono (1997: 73, fig. 50).*Syntype localities:* Various in Indonesia.

Figs 53–55. *Rhipiliopsis gracilis* (after Copp & PvR 13566). Fig. 53. Monosiphonous base of the thallus with downwardly growing corticating filaments. Fig. 54. Detail of thallus margin with \pm perpendicularly arranged lateral filaments. Fig. 55. Detail of a median part of the flabellum: regularly sinuous longitudinal filaments with basal parts of some laterals. (bar = 100 μ m).

Vouchers: HEC 7500, 20.6.1988: Madang, Nagada Harbour; HEC 7564, 23.6.1988: Kranket Island, enclosed bay; HEC 7966, 26.7.1988: Saidor area, Cape Iris-Biliau; Copp & PvR 13478 & 13479: Bagabag, NW point of Christmas Bay; Copp & PvR 13823, 22.8.1990: hole in the wall (close to Mugil Harbour).

Other collection sites in N-PNG: Madang, Kranket Island (SW-bay), W of Malamal Island, Beliau Island, E-creek, island N of Demasa Island; Sarang Harbour; Bagabag, The Pinacle, in front of Bedilu village.



Figs 56–59. *Tydemania expeditionis* (after HEC 7966). Fig. 56. Habit of a small specimen with flabellae (bar = 5 mm). Fig. 57. Detail of a single flabellum (bar = 5 mm). Fig. 58. Detail of the base of a flabellum (bar = 500 μ m). Fig. 59. Detail of the margin of a flabellum (bar = 150 μ m).

Distribution in SW-Pacific: N-Australia (Lewis, 1987: 33), Caroline Islands (Trono, 1968: 189), Fiji (N'Yeurt *et al.*, 1996: 66), Indonesia (Verheij & Prud'homme van Reine, 1993: 412), Malaysia (Phang, 1994: 126), Micronesia (Tsuda & Wray, 1977: 100), New Caledonia (Garrigue & Tsuda, 1988: 61), Papua New Guinea (Coppejans *et al.*, 1995a: 92), Philippines (Silva *et al.*, 1987: 118), Solomon Islands (Womersley & Bailey, 1970: 281).

Notes: As already stated in Coppejans & Prud'homme van Reine (1989b: 135) and Coppejans *et al.* (1995a: 92), well illuminated specimens (from shallow areas) have the typical *T. expeditionis* morphology of superimposed verticils of loose, radially arranged dichotomous filaments, arranged in all directions resulting in a bead necklace-like structure. Shaded specimens (from caves or from deeper areas) exhibit verticils of *Udotea*-like fan-shaped bladelets (up to 4 cm long, Copp & PvR 13641), in which the filaments lie in a single plane and are contiguous within each flabellum (figs 56–59). Such plants were originally described as *T. gardineri* A. Gepp & E. Gepp. As our collections also include intermediates (HEC 7966), and as we were able to induce fan-shaped bladelets on 'typical' plants in shaded aquaria, we follow Meinesz (1981: 64) in synonymizing the two species.

Udotea Lamouroux

Key to the species of *Udotea* and *Rhipidosiphon* from N-PNG

- 1a. Blade filaments without appendages 2
- 1b. Blade filaments with appendages 4
 - 2a. Filaments of the flabellum in several layers (frond polystromatic) *U. orientalis*
 - 2b. Filaments of the flabellum in a single layer (frond monostromatic) 3
- 3a. Filament diameter 40–45 μ m *Rhipidosiphon javensis*
- 3b. Filament diameter 60–75 μ m *U. glaucescens*
 - 4a. Blade filament appendages pear-shaped or oblong (not ramified) . *U. argentea* var. *spumosa*
 - 4b. Blade filament appendages irregularly divided and lobed . *U. argentea* var. *argentea*

Udotea argentea Zanardini 1858: 290, pl. 12, fig. 1 Figs 60–67

References: Trono (1997: 75, fig. 51); Huisman (2000: 268 + figs).

Type locality: Suez, Egypt.

Vouchers: HEC 7572, 23.6.1988: Kranket Island, enclosed bay; HEC 7696, 6.7.1988: Malagere Island (Potsdam Harbour); HEC 7877, 21.7.1988: Hatzfeldthafen; HEC 7973, 26.7.1988: Saidor area, Cape Iris-Bilian; Copp & PvR 13619: Bagabag, Christmas Bay, SW-point.

Other collection sites in N-PNG: Suaru (tending to var. *spumosa*); Megiar Harbour; Kolakola & Reamuna Islet; Madang, Nagada Harbour; Mugil Harbour; Saidor area, Gumbi Bay; Ulingan Bay, W-side; Demasa Island Bay.

Distribution in SW-Pacific: N-Australia (Lewis, 1987: 33), Caroline Islands (Trono, 1968: 189), Indonesia (Verheij & Prud'homme van Reine, 1993: 413), Micronesia (Tsuda & Wray, 1977: 100), Papua New Guinea (Heijs & Brouns, 1986: 38), Philippines (Silva *et al.*, 1987: 118).

Udotea argentea var. *spumosa* A. Gepp & E. Gepp 1911: 126, 144

References: Coppejans & Prud'homme van Reine (1989b: 137, pl. 9: figs 1–6).

Syntype localities: Tanah Djampeah and Salayer Islands, Indonesia; Pearl Bank, Tawitawi Prov., Sulu Archipelago.

Vouchers: Copp & PvR 13081, 10.7.1990: Beliau Island, E-creek; Copp & PvR 13127, 13.7.1990: Kranket Island.

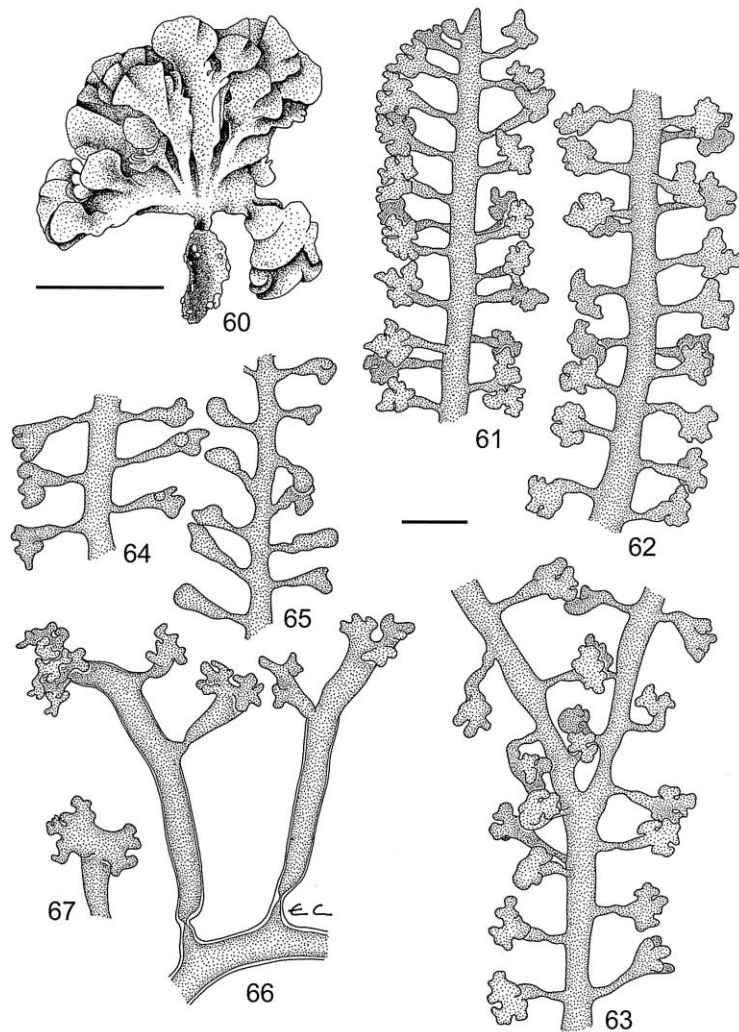
Distribution in SW-Pacific: Indonesia (Coppejans & Prud'homme van Reine, 1992a: 177), Papua New Guinea (this paper), Philippines (Silva *et al.*, 1987: 119).

Udotea glaucescens Harvey *ex* J. Agardh 1887: 70–71

Reference: Coppejans & Prud'homme van Reine (1989b: 139, pl. 10, figs 3–9).

Type locality: Tonga.

Vouchers: HEC 7759, 14.7.1988: Malagere Island (Potsdam Harbour).



Figs 60–67. *Udotea argentea*. Fig. 60. Habit (after HEC 6525) (bar = 5 cm). Figs 61–63. *U. argentea* var. *argentea*: lateral appendages of longitudinal filaments of the flabellum, deeply incised (after HEC 7696). Figs 64–65. *U. argentea* tending to var. *spumosa*: lateral appendages less incised to clavate (after HEC 6496). Figs 66–67. *U. argentea* (after HEC 7572). Lateral appendages of the filaments of the stipe.

Distribution in SW-Pacific: N-Australia (Lewis, 1987: 33), Fiji (N'Yeurt *et al.*, 1996: 66), Indonesia (Verheij & Prud'homme van Reine, 1993: 414), Papua New Guinea (this paper), Philippines (Silva *et al.*, 1987: 119).

Udotea orientalis A. Gepp & E. Gepp 1911: 119–120, 142–143, pl. 1: fig. 4 Figs 68–81
References: Coppejans & Prud'homme van Reine (1989b: 140, pl. 10, figs 11–16); Calumpong & Meñez (1996: 102, + fig.); Trono (1997: 78, fig. 53).

Syntype localities: various in Indian and Pacific oceans; Indonesia; Philippine islands.

Vouchers: HEC 4357, 13.6.1980 & HEC 7626, 29.6.1988 & Copp & PvR 13339, 22.7.1990: Laing Island; HEC 4642, 13.8.1980: Hansa Bay, Durangit Reef; HEC 7891, 21.7.1988: Bogia Bay, between the coast and Kolakola Island.

Distribution in SW-Pacific: N-Australia (Lewis, 1987: 34), Indonesia (Verheij & Prud'homme van Reine, 1993: 415), Micronesia (Tsuda & Wray, 1977: 100), New Caledonia (Garrigue & Tsuda, 1988: 61), Papua New Guinea (Coppejans *et al.*, 1995a: 93), Philippines (Silva *et al.*, 1987: 119).

Note: All collections are from deeper waters: between 16–40 m depths.

Order Dasycladales

Family Dasycladaceae

Bornetella Munier-Chalmas

Bornetella oligospora Solms-Laubach 1892: 87–90, pl. 9: figs 1–4, 6, 7

References: Valet (1969: 589, pl. 4: figs 3–4, pl. 5: figs 1–3, pl. 7: figs 1–3, pl. 14, pl. 15: figs 4 & 6, pl. 24: figs 5–6, pl. 27: figs 5–8, pl. 41: figs 8–10); Coppejans & Prud'homme van Reine (1989a: 125, figs 27–40); Berger & Kaeffer (1992: 95); Calumpong & Meñez (1996: 94, + fig.); Trono (1997: 80, fig. 55); Huisman (2000: 271 + fig.).

Syntype localities: Indonesia: Macassar (Ujung Pandang), Celebes and Bari, Flores.

Vouchers: HEC 4432, 25.6.1980: Laing Island, lagoon; HEC 7513, 20.6.1988: patch reef in front of Nagada Harbour; HEC 7863, 19.7.1988: Suaru; Copp & PvR 13476, 1.8.1990: barrier reef N of Wongat Island; Copp & PvR 13507, 2.8.1990: Bagabag, NW-point of Christmas Bay.

Other collection sites in N-PNG: patch reef between Sinub Island and Wongat Island, patch reef seaward of Ruo Island, patch reef between Tausch Island and Sek Island.

Distribution in SW-Pacific: N-Australia (Lewis, 1987: 35), Fiji (N'Yeurt *et al.*, 1996: 66), Indonesia (Coppejans & Prud'homme van Reine, 1992a: 178), Micronesia (Tsuda & Wray, 1977: 93), New Caledonia (Garrigue & Tsuda, 1988: 57), Papua New Guinea (Heijs & Brouns, 1986: 38), Philippines (Silva *et al.*, 1987: 120), Vietnam (Dawson, 1954: 396).

Cymopolia Lamouroux

Cymopolia van-bosseae Solms-Laubach 1892: 77–79, pl. 8, figs 9, 10, 14–16

References: Valet (1969: 602, pl. 40: figs 6–8); Coppejans & Prud'homme van Reine (1989a: 125, figs 41–43); Berger & Kaeffer (1992: 122, figs 3.44–3.46); Trono (1997: 82, fig. 57).

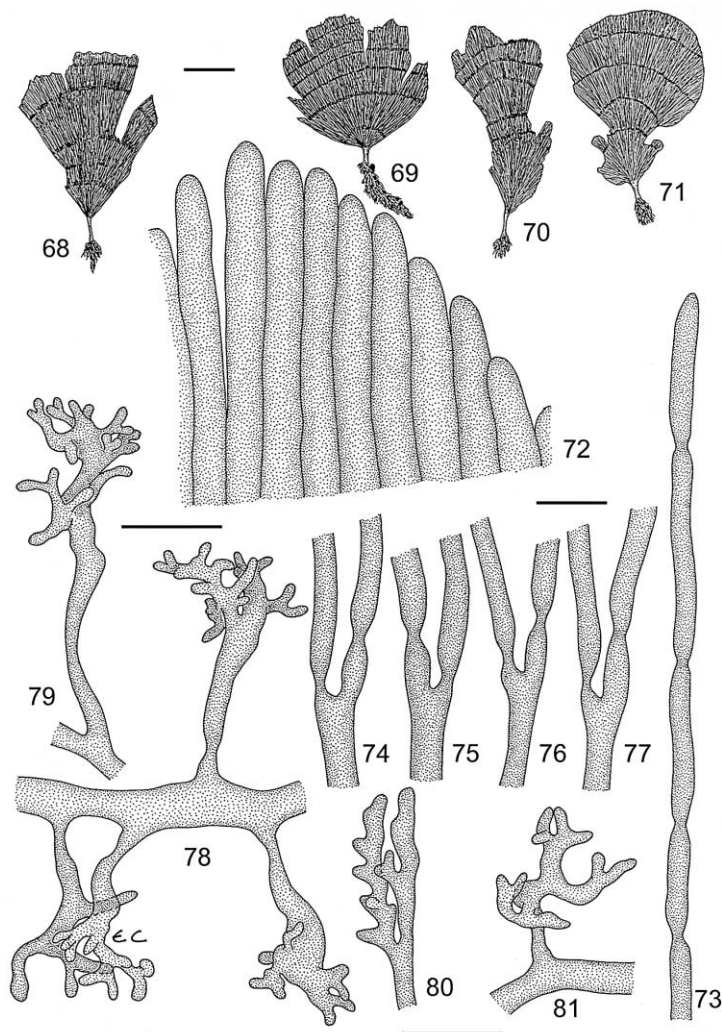
Type locality: Maumere, Flores, Indonesia.

Vouchers: HEC 7475, 17.6.1988 & HEC 7784, 15.7.1988: Hansa Bay, close to Awar Point.

Distribution in SW-Pacific: Indonesia (Coppejans & Prud'homme van Reine, 1992a: 178), Papua New Guinea (this paper), Philippines (Silva *et al.*, 1987: 120).

Neomeris Lamouroux**Key to the species from N-PNG**

- 1a. Base of the thallus showing discontinuous annular rings; gametangia oblong *N. annulata*
 1b. No basal annular rings; gametangia oval to spherical 2
 2a. First order ramuli laterally coherent by flabellate calcified lamellae ... *N. dumetosa*
 2b. First order ramuli free though calcified 3



Figs 68–81. *Udotea orientalis* (Figs 68–72 after HEC 7626, Figs 73–81 after HEC 4357). Figs 68–71. Habit (bar = 1 cm). Fig. 72. Detail of the thallus margin (bar = 100 µm). Fig. 73. Apical, unramified part of a flabellum filament with constrictions (bar = 100 µm). Figs 74–77. Details of dichotomies of flabellum filaments with supradichotomic constrictions on markedly different levels (bar as Fig. 73). Figs 78–81. Stipe filaments with appendages (bar as Fig. 72).

- 3a. Apices of the first order ramuli markedly trifurcate; gametangia spherical; cellulosic plug variable but mostly with a downward pointed spine or cone *N. van-bosseae*
 3b. Apices of the first order ramuli clavate or with flattened sides; gametangia oval to subspherical; cellulosic plug composed of a ring in the pedicel of the gametangium *N. bilimbata*

Neomeris annulata Dickie 1874: 198

References: Valet (1969: 593, pl. 15: fig. 5, pl. 34: fig. 5); Coppejans & Prud'homme van Reine (1989a: 127, figs 44–48); Berger & Kaeffer (1992: 107, fig. 3.35a); Calumpong & Meñez (1996: 94, + fig.); Trono (1997: 83, fig. 58); Littler & Littler (2000: 438, 439 + figs).

Type locality: Mauritius.

Vouchers: HEC 7615, 27.6.1988: Mugil Harbour; HEC 7639, 29.6.1988: Laing Island; HEC 7792, 16.7.1988: Manam; HEC 7985, 26.7.1988: Saidor area, Cape Iris-Biliau; Copp & PvR 13573b, 5.8.1990: barrier reef, N of Tab Island.

Other collection sites in N-PNG: Bogia Bay; Kolakola & Reamuna Islet; Malagere Island (Potsdam Harbour); barrier reef, N of Wongat Island; Sarang Harbour.

Distribution in SW-Pacific: N-Australia (Lewis, 1987: 35), Indonesia (Verheij & Prud'homme van Reine, 1993: 419), Malaysia (Phang, 1986: 25), Micronesia (Tsuda & Wray, 1977: 99), New Caledonia (Garrigue & Tsuda, 1988: 60), Papua New Guinea (Heijs & Brouns, 1986: 38), Philippines (Silva *et al.*, 1987: 121), Singapore (Teo & Wee, 1983: 44), Solomon Islands (Womersley & Bailey, 1970: 287), Taiwan (Lewis & Norris, 1987: 11), Vietnam (Dawson, 1954: 396).

Neomeris bilimbata Koster 1937: 221–223, pl. 15, figs 1, 4, 5

References: Valet (1969: 599, pl. 3: figs 1–2, pl. 35: fig. 6, pl. 42, figs 13, 15–16); Coppejans & Prud'homme van Reine (1989a: 127, figs 49–62); Berger & Kaeffer (1992: 108); Kraft (2000: 633, figs 42C–D).

Type locality: Itu Aba, Tizard Bank, South China Sea.

Vouchers: HEC 7497, 20.6.1988: Madang, Nagada Harbour; HEC 7568, 23.6.1988: Kranket Island, enclosed bay; HEC 7862, 19.7.1988: Suaru; Copp & PvR 13137, 13.7.1990: Nagada Harbour; Copp & PvR 13327, 21.7.1990: Ulingan Bay, S-side.

Distribution in SW-Pacific: Indonesia (Coppejans & Prud'homme van Reine, 1992a: 178), Lord Howe Island (Kraft, 2000: 633), Micronesia (Tsuda & Wray, 1977: 99), New Caledonia (Garrigue & Tsuda, 1988: 60), Papua New Guinea (this paper).

Neomeris dumetosa Lamouroux 1816: 243, pl. 7: fig. 8

References: Valet (1969: 595, pl. 35: figs 3, 4); Berger & Kaeffer (1992: 109, figs 3.34, 3.35b–d, 3.36–3.38).

Type locality: Antilles, West Indies.

Vouchers: HEC 7703a, 6.7.1988: Malagere Island (Potsdam Harbour).

Distribution in SW-Pacific: Indonesia (Weber-van Bosse, 1913: 88), Micronesia (Tsuda & Wray, 1977: 99), Papua New Guinea (this paper).

Neomeris van-bosseae Howe 1909: 80–82, pl. 1: figs 4, 7; pl. 5: figs 17–19

References: Valet (1969: 596, pl. 35: figs 2, 5, pl. 42: figs 4–7, 10–12, 14); Coppejans & Prud'homme van Reine (1989a: 127, figs 63–71); Berger & Kaeffer (1992: 108); Lewmanomont & Ogawa (1995: 56, + fig); Calumpong & Meñez (1996: 95, + fig.); Trono (1997: 85, fig. 59); Huisman (2000: 272 + fig.).

Type locality: Sikka, Flores, Indonesia.

Vouchers: HEC 4403, 23.6.1980: Laing Island; HEC 7736, 7.7.1988: Boisa Island, S-coast; HEC 7957, 25.7.1988: Saidor area, Suit; Copp & PvR 13448, 27.7.1990: barrier reef, N of Wongat Island; Copp & PvR 13539, 2.8.1990: Bagabag, New Year's Bay.

Other collection sites in N-PNG: Suaru; Hansa Bay, Barol Point; Bogia Bay; Malagere Island (Potsdam Harbour); Manam; barrier reef, N of Tab Island.

Distribution in SW-Pacific: N-Australia (Lewis, 1987: 36), Caroline Islands (Trono, 1968: 191), Fiji (N'Yeurt *et al.*, 1996: 67), Indonesia (Verheij & Prud'homme van Reine, 1993: 419), Micronesia (Tsuda & Wray, 1977: 99), New Caledonia (Garrigue & Tsuda, 1988: 60), Papua New Guinea (Heijs & Brouns, 1986: 38), Philippines (Silva *et al.*, 1987: 121), Solomon Islands (Womersley & Bailey, 1970: 287), Thailand (Lewmanomont & Ogawa, 1995: 56).

Family Polyphysaceae

Acetabularia Lamouroux

Acetabularia dentata Solms-Laubach 1895: 22–24, pl. 1, fig. 11

References: Valet (1969: 614, pl. 10: figs 1–2, pl. 18: figs 1, 4–6, pl. 30: figs 3–5, pl. 31, fig. 6, pl. 37: figs 2, 4–6, pl. 44: figs 1–6); Coppejans & Prud'homme van Reine (1989a: 123, figs 1–11); Berger & Kaefer (1992: 148, figs 3.63, 3.64); Calumpang & Meñez (1996: 99, + fig.); Trono (1997: 88, fig. 61).

Syntype localities: various in Indonesia.

Voucher: Copp & PvR 13354, 23.7.1990: Sarang Harbour.

Distribution in SW-Pacific: Fiji (N'Yeurt *et al.*, 1996: 66), Indonesia (Verheij & Prud'homme van Reine, 1993: 418), New Caledonia (Garrigue & Tsuda, 1988: 56); Papua New Guinea (this paper), Philippines (Silva *et al.*, 1987: 121), Solomon Islands (Womersley & Bailey, 1970: 284).

DISCUSSION

A comparison of the number of Chlorophyceae with other regions in the SW-Pacific (Tab. 2) shows that the number of chlorophycean taxa (118) collected along the coast of Madang Province (approximately 300 km long), on the north coast of Papua New Guinea, is similar to regions with a comparable coast length. It should be emphasized that microscopic epi- and endophytes have not been included in this checklist. They constitute 8 out of 62 species at Lord Howe Island (Kraft, 2000). The species composition along the Madang coast is markedly richer than that of the south coast of PNG (Port Moresby area, Coppejans *et al.*, 1995a; 72 species), whereas the phaeophycean (N-coast: 36, S-coast: 42) and the rhodophycean floras (N-coast: 151, S-coast: 161) of this area are slightly poorer. The major differences in species numbers are in the genera *Caulerpa* (N-coast: 29 taxa, S-coast: 15), *Halimeda* (N-coast: 18 species, S-coast: 11), *Udotea/Rhipidosiphon* (N-coast: 5 species, S-coast: 1), *Bryopsis* (N-coast: 6 taxa, S-coast: 1) and *Chaetomorpha* (N-coast: 5 species, S-coast: 2). The genus *Pseudobryopsis* is represented by 2 species along the N-coast but is absent from our collections from the S-coast. In contrast, some genera or species from the S-coast were not observed along the N-coast (unchecked identifications from literature are indicated as 'in lit.'): *Boodleopsis pusilla* (Collins) Taylor, Joly & Bernatowicz, *Bornetella nitida* Munier-Chalmas *ex* Sonder (in lit.), *Codium capitatum* P.C. Silva, *C. divaricatum* Holmes (in lit.), *C. intricatum* Okamura (in lit.), *C. ovale* Zanardini, *C. repens* (Crouan) Vickers, *Entocladia viridis* Reinke (in lit.), *Halimeda bikinensis* W.R. Taylor (in lit.), *H. velasquezii* W.R. Taylor (in lit.), *Phaeophila dendroides* (Crouan *frat*) Batters (in lit.), *Rhipiliopsis papuensis* Coppejans, De Clerck & Leliaert, *Valonia aegagropila* C. Agardh (in lit.).

Tab. 1

<i>Location</i>	<i>Map</i>	<i>Coordinates</i>	<i>coord. S</i>	<i>coord. E</i>	<i>Nr on map</i>	
AWAR:	Nubia	BR 607413	5° 17	147° 38	5	
AWAR POINT:	Nubia	BR 633425	4°08	144°52	4	
BAGABAG	Badilu village	Bagabag	DQ 109 703	4°48	146°12	24
	Christmas Bay		DQ 118 678	4°49	146°12	25
	New Year's Bay		DQ 148 673	4°49	146°14	26
	The Pinnacle		DQ 150 641			27
BELIAU ISLAND	Madang	CQ 675 252	5°12	145°49	45	
BOGIA BAY	Nubia	BR 746 250	4°18	144°58	9	
BOISA	N	Watam	BR 733 583	4°00	144°58	1
	S	Nubia	BR 743 572			2
CAPE IRIS - BILIAU	Saidor	DP 270 838	5°35	146°20	46	
CHIRIMOSH ISLAND	Manam	CR 003 138	4°23	145°14	12	
DEMASA ISLAND	Madang	CQ 677 313			35	
D'LOLE ISLAND	Madang	CQ 676 355	5°11	145°49	31	
GOSEM ISLAND	Madang	CQ 675 298	5°09	145°50	37	
GUMBI BAY	Saidor	DP 368 795	5°37	146°26	48	
HANSA POINT	Nubia	BR 685 363	4°11	144°54	7	
HATZFELDTHAFEN	Manam	CR 013 140	4°24	145°13	13	
HOLE IN THE WALL	Karkar	CR 660 650			23	
JAIS ABEN RESORT	Madang	CQ 673 299			36	
KOLAKOLA & REAMUNA ISLETS	Nubia	BR 754 258 & BR 754 261	4°17	144°59	10	
KRANKET ISLAND	enclosed bay	Madang	CQ 697 257	5°12	145°49	43
	S-W bay	Madang	CQ 685 248			44
LAING ISLAND	Nubia	BR 637 385	4°11	144°52	6	
MALAGERE ISLAND	Nubia	BR 715 322	4°14	144°57	8	
MALALA VILLAGE	Manam	CR 182 094	4°27	145°22	14	
MALAMAL ISLAND	Madang	CQ 675 336	5°07	145°48	33	
MANAM	Nubia	BR 770 528	4°05	145°02	3	
MEGAS ISLAND	(Alexishafen)	Madang	CQ 679 375	5°05	145°50	30
MEGIAR HARBOUR	Karkar	CR 632 678	4°49	145°46	21	
MUGIL HARBOUR	Karkar	CR 641 659	4°50	145°47	22	
MURUKINAM	Karkar	CR 415 873	4°38	145°34	18	
NAGADA HARBOUR	CRI area	Madang	CQ 668 299	5°10	145°49	38
	in front of CRI	Madang	CQ 668 296			39

Tab. 1 continued

<i>Location</i>	<i>Map</i>	<i>Coordinates</i>	<i>coord. S</i>	<i>coord. E</i>	<i>Nr on map</i>	
Location	Map	Coordinates	coord. S	coord. E	Nr on map	
	in front of Gosem Island	Madang	CQ 675 293		40	
NEPTUNE POINT		Manam	CR 284 030	4°29	145°49	17
PADOZ TINAN	(submerged patch reef)	Madang	CQ 688 300			41
PIG ISLAND	(see TAB ISLAND)					
SAIDOR		Saidor	DP 417 770	5°38	146°28	49
SARANG HARBOUR		Karkar	CR 722 565	4°46	145°42	19
	W		CQ 690 370	5°06	145°49	29
SEK ISLAND		Madang				
	N		CQ 688 388			28
SUARU		Manam	BR 881 161	4°23	145°05	11
SUIT		Saidor	DP 327 792	5°37	146°24	47
TAB ISLAND	(= PIG ISLAND)	Madang	CQ 713 285	5°08	145°49	42
TAUSCH ISLAND		Madang	CQ 675 348	5°07	145°49	32
	W		CR 247 032	4°29	145°25	16
ULINGAN BAY		Manam				
	E		CR 251 026			17
WALOG		Karkar	CR 572 712	4°48	145°43	20
WONGAT ISLAND	(WONAD ISLD)	Madang	CQ 692 322	5°08	145°49	34

The majority of the species documented here are fairly typical for the tropical western Pacific region. However, several records constitute substantial range extensions and are therefore noteworthy. These include *Pseudocodium floridanum* from Florida (recently also recorded from Indonesia), *Microdictyon palmeri* from Guadalupe Island (off the W-coast of Mexico), *Cladophora saviniana* from Mauritius (but mentioned from other areas in the Indian Ocean: Andaman Islands, Kenya, Madagascar, Yemen), *Struvea elegans* from the Virgin Islands (but cited from other localities in the Atlantic Ocean: Puerto Rico, Florida), as well as from the Indian Ocean (Mauritius, Seychelles, Réunion), and *Rhipiliopsis gracilis* (Australia, S-coast of PNG).

Some species are recorded here from outside their type localities for the first time: *Pseudobryopsis gracilis* (from the Solomon Islands), *Caulerpa elongata* f. *disticha* (from the Marshall Islands), and *Rhipilia nigrescens* (from Indonesia).

Possible new taxa (*Phyllodictyon* sp. and *Bryopsis* sp.) are currently being studied.

This paper is the last checklist of seaweed collections from Papua New Guinea (south coast: Port Moresby area, north coast: Madang Province), made by phycologists

Tab. 2. Comparison of the number of Chlorophyta from N-Papua New Guinea with other regions in the SW-Pacific.

<i>Region</i>	<i>Reference</i>	<i># taxa</i>
Northern Papua New Guinea	This paper; Heijs, 1985; King, 1990	118
Southern Papua New Guinea	Coppejans <i>et al.</i> , 1995a	72
Northern Australia	Lewis J., 1987	219
Eastern Australia	Kraft, 2000	62
Caroline Islands	Trono, 1968; Trono, 1971	75
Fiji	South & Kasahara, 1992; N'Yeurt <i>et al.</i> , 1996	113
Indonesia	Weber-van Bosse, 1913; Coppejans & Prud'homme van Reine, 1991; Verheij & Prud'homme van Reine, 1993	164
Malaysia	Silva <i>et al.</i> , 1996 (IO)	53
	Phang & Wee, 1991; Phang, 1986, 1994	78
Micronesia	Tsuda & Wray, 1977; Tsuda, 1981	192
Philippines	Silva <i>et al.</i> , 1987; Calumpong & Meñez, 1996; Trono, 1997	249
Solomon Islands	Womersley & Bailey, 1970	76
Thailand	Lewmanomont & Ogawa, 1995	42
Vietnam	Dawson, 1954	45
	Nguyen <i>et al.</i> , 1993	61

from Ghent University and mainly deposited in GENT. New taxa in Rhodo-, Phaeo- and Chlorophyta from that region are being studied and will be published separately.

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TAXONOMIC INDEX

Names in italics are mentioned as synonyms in this list

- Acetabularia: *
 africanum (Rhizoclonium): *
 amadelpa (Avrainvillea): *
 Anadyomene: *
 anastomosans (Phyllocladon): *
 andamanensis (Caulerpa, var.): *
 annulata (Neomeris): *
 antennina (Chaetomorpha): *
 arabicum (Codium): *
 argentea (Udotea): *
 Avrainvillea: *
 bilimbata (Neomeris): *
 biserrulata (Caulerpa): *
 Boergesenia: *
 Boodlea: *
 borneensis (Halimeda): *
 Bornetella: *
 boryana (Caulerpa, var.): *
 Bryopsis: *
 caespitosa (Chlorodesmis): *
 Caulerpa: *
 cavernosa (Dictyosphaeria): *
 Chaetomorpha: *
 Chlorodesmis: *
 Cladophora: *
 Cladophoropsis: *
 Codium: *
 composita (Boodlea): *
 compressa (Enteromorpha)
 copiosa (Halimeda): *
 corynephora (Caulerpa, var.): *
 crassa (Chaetomorpha): *
 crystallina (Cladophora): *
 cupressoides (Caulerpa): *
 cylindracea (Halimeda): *
 dentata (Acetabularia): *
 Dictyosphaeria: *
 discoidea (Halimeda): *
 disticha (Caulerpa, forma): *
 disticha (Caulerpa, forma): *
 disticha (Caulerpa, forma): *
 distorta (Halimeda): *
 dumetosa (Neomeris): *
 edule (Codium): *
 elegans (Struvea): *
 elegans (Caulerpa, forma)
 elongata (Caulerpa): *
 Enteromorpha: *
 erecta (Avrainvillea): *
 expeditionis (Tydemanina): *
 extricatum (Codium): *
 fasciata (Ulva): *
 fastigiata (Chlorodesmis): *
 fastigiata (Valonia)
 filicoides (Caulerpa): *
 flexuosa (Enteromorpha): *
 floridanum (Pseudocodium): *
 forbesii (Boergesenia): *
 fragilis (Halimeda): *
geppii (Codium): *
 geppiorum (Codium): *
 glaucescens (Udotea): *
 gracilis (Chaetomorpha): *
 gracilis (Halimeda): *
 gracilis (Pseudobryopsis)
 gracilis (Rhipiliopsis): *
 Halimeda: *
harveyana (Bryopsis): *
 hildenbrandtii (Chlorodesmis): *
 hypnoides (Bryopsis): *
 incrassata (Halimeda): *
 indica (Bryopsis): *
 intestinalis (Enteromorpha): *
 javanica (Cladophoropsis): *
 javensis (Rhipidosiphon): *
 kylinii (Enteromorpha)
 lacerata (Avrainvillea): *
 lacunalis (Halimeda): *
 laetevirens (Caulerpa, var.): *
 lamourouxii (Caulerpa, var.): *
 lata (Caulerpa, forma): *
 lentillifera (Caulerpa): *
 linum (Chaetomorpha): *
 longicaulis (Avrainvillea): *
 lycopodium (Caulerpa, var.): *
 macra (Caulerpa, var.): *
 macroloba (Halimeda): *
 macrophysa (Halimeda): *
 mamillosa (Caulerpa, var.): *
 manorensis (Caulerpa): *
 melanesica (Halimeda): *
 mexicana (Caulerpa): *
 Microdictyon: *
 micronesica (Halimeda): *

- microphysa* (Caulerpa): *
minima (Halimeda): *
montagnei (Boodlea): *
multiramosa (Enteromorpha): *
muscoides (Enteromorpha): *
nigrescens (Rhipilia): *
obscura (Avrainvillea): *
occidentalis (Caulerpa, var.): *
occidentalis (Caulerpa, forma): *
ohkuboana (Cladophora): *
oligospora (Bornetella): *
opposita (Caulerpa): *
opuntia (Halimeda): *
orientalis (Rhipilia): *
orientalis (Udotea): *
palmeri (Microdictyon): *
paradoxa (Enteromorpha, subsp.)
patientiramea (Cladophora): *
pectinata (Caulerpa, var.): *
peltata (Caulerpa, var.): *
pennata (Bryopsis): *
Phyllodictyon: *
plicata (Anadyomene): *
plumosa (Bryopsis): *
prostratum (Codium): *
Pseudobryopsis: *
Pseudocodium: *
racemosa (Caulerpa): *
ramulosa (Enteromorpha): *
renschii (Halimeda): *
reticulata (Ulva): *
Rhipidosiphon: *
Rhipilia: *
Rhipiliopsis: *
Rhizoclonium: *
rigida (Ulva): *
saviniana (Cladophora): *
secunda (Bryopsis, var.): *
serrulata (Caulerpa): *
sertularioides (Caulerpa): *
sibogae (Cladophora): *
socialis (Cladophora): *
solomonensis (Pseudobryopsis): *
spiralis (Chaetomorpha): *
Spongocladia: *
spumosa (Udotea, var.): *
Struvea: *
taxifolia (Caulerpa): *
tenue (Codium): *
tuna (Halimeda): *
turbinata (Caulerpa, var.): *
Tydemanina: *
Udotea: *
Ulva: *
urvilleana (Caulerpa): *
utricularis (Valonia): *
Valonia: *
van-bosseae (Cymopolia): *
van-bosseae (Neomeris): *
vaucheriaeformis (Spongocladia): *
Ventricaria: *
ventricosa (Ventricaria)
versluysii (Dictyosphaeria): *
verticillata (Caulerpa): *
webbiana (Caulerpa): *
wrightii (Anadyomene)
zollingeri (Cladophoropsis): *