

Marine Red Algae from the North Coast of Papua New Guinea

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The marine benthic red algae of the north coast of Papua New Guinea are documented, and 27 of the 151 + species are illustrated. All taxa are listed with bibliographic, taxonomic, and biogeographic comments. Only two species are based on type specimens collected from Papua New Guinea (*Halymenia durvillei* and *Chryssymenia kaernbachii*). Apart from several new taxa identified in the collections, there are no endemic species known from these shores. As a result of this survey, *Laurencia columellaris* Børgesen is transferred to the genus *Chondrophycus*, and *Eupogodon palmatifidus* is transferred to the genus *Dasya*. The discovery of the Caribbean genus *Rhodogorgon* constitutes a major range extension as does that of the North Atlantic *Nitophyllum punctatum*. The deep-water alga *Renouxia*, also known from the south coast of Papua New Guinea, is now reported from the north coast, and *Polysiphonia polyphysa* is recorded for the first time since its discovery and description in the 1850s. The marine red algal flora appears to reflect a typical tropical western Pacific component.

Introduction

The tropical western Pacific region has received at least some attention regarding its marine benthic algae over the previous three decades. Floristic works and checklists have been published from several countries including the Philippines (Silva *et al.* 1987), Indonesia (Coppejans and Prud'homme van Reine 1992, Verheij and Prud'homme van Reine 1993), northern Australia (Lewis 1984, 1985, 1987), Taiwan (Lewis and Norris 1987), Thailand (Velasquez and Lewmanomont 1975, Lewmanomont and Ogawa 1995), Vietnam (Dawson 1954, Dinh *et al.* 1993), the Solomon Islands (Womersley and Bailey 1970), Micronesia (Tsuda and Wray 1977), and New Caledonia (Garrigue and Tsuda 1988). In marked contrast, however, the marine algae of Papua New Guinea are considerably less well known with some surveys from the southern coast only recently being published (Heijs 1985 a, 1985 b, Ohba and Enomoto 1992, Coppejans *et al.* 1995 a, 1995 b, Millar *et al.* 1999) where approximately 280 species are now documented.

For the history of marine algal exploration in Papua New Guinea, mainly carried out in the 19th and early 20th century, we refer to Millar *et al.* 1999.

Apart from two publications dealing with the green algal genus *Caulerpa* (Coppejans and Meinesz 1988; Coppejans 1992) and a short list of marine Chlorophyta (Enomoto and Ohba 1992), there are no recently published accounts of the algal flora from the north coast of Papua New Guinea. The present report deals with red algae, and projects are currently underway that deal with the brown (Phaeophyta) and

green algae (Chlorophyta). This growing research interest is a combined effect of the presence of two field stations (the Belgian Biological Station on Laing Island and the American Christensen Research Institute), and the successful procurement of funds specifically targeting taxonomic research by the first author. This has allowed easy access to and critical study of the marine algae of the northern coast over the past 20 years. Unfortunately, the recent closure of both biological stations will make future collections from this area difficult.

Survey methods

All collection localities listed in this paper are included in maps published by Coppejans and Meinesz (1988: figs 1, 2) and Coppejans (1992: map 1). The history of marine algal collections and collectors of Papua New Guinea (PNG) over the past 200 or so years is given by Millar *et al.* (1999). Four collecting expeditions were spread over a 10-year period (June–August 1980, July–August 1986, June–August 1988, July–August 1990) with on-site laboratories and accommodation being used at the Laing Island Biological Station (Hansa Bay, Bogia) and at 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). A single collection was made next to Lae Harbour. At all localities, both intertidal and subtidal SCUBA collections were made to depths of 50 m. This resulted in approximately 2350 herbar-

ium vouchers and numerous formalin preserved specimens. The main collection is deposited in the herbarium of the University of Ghent (GENT). Some duplicate specimens are deposited in the herbarium of the University of Papua New Guinea (UPNG) and in the National Herbarium of New South Wales, Australia (NSW). Duplicates from the 1990 collections are also deposited in the Herbarium of Leiden, the Netherlands (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) as well as non-geniculate Corallinaceae have been collected only sporadically.

Arrangement and format of the catalogue

The systematic arrangement of orders and families essentially follows that of Silva *et al.* (1996) except for the recognition of the Halymeniales Saunders *et Kraft* (1996). For each species, references are given to publications where a description and or illustration can be found corresponding to our specimen(s), and the type locality is given as at least one distributional record. References cited for descriptions and illustrations which are listed 'as' refer to misapplied names or '=' where they are synonyms. A selection of specimens from PNG are illustrated that are not extensively covered in previous publications. 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 (Leiden) 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). They are chronologically arranged. Notes regarding various aspects of taxonomy, systematics, nomenclature, or aberrant characters, and distribution are added.

Catalogue of the Marine Red Algae of the North Coast of Papua New Guinea

Class Rhodophyta
Subclass Bangiophycideae
Order Porphyridiales
Family Porphyridiaceae

Chroodactylon Hansgirg

Chroodactylon ornatum (C. Agardh) Basson 1979: 67.

Coppejans (1983: pl. 92); Cribb (1983: 9, pl. 1, figs 7–8); Womersley (1994: 23, fig. 1C).

Type locality: Lake Mälaren, near Stockholm, Sweden.

Voucher: HEC 6600 d, 27. 8. 1986: Boisa Island, epiphytic on *Ceramium*, on *Gelidiopsis repens*.

Stylonema Reinsch

Stylonema alsidii (Zanardini) K. Drew 1956: 72

Coppejans [1983: pl. 96, = *Goniotrichum alsidii* (Zanardini) Howe].

Type locality: Trieste, Italy.

Voucher: HEC 6600 e, 27. 8. 1986: Boisa Island, epiphytic on *Ceramium*, on *Gelidiopsis repens*.

Class Rhodophyta
Subclass Florideophycideae
Order Nemaliales
Family Galaxauraceae

Actinotrichia Decaisne

Actinotrichia fragilis (Forsskål) Børgesen 1932 a: 6.

Jaasund (1976: 65, fig. 131); Magruder and Hunt (1979: 57, fig. 2, p. 56); Tseng (1984: 58, pl. 32, fig. 1); Verheij and Prud'homme van Reine (1993: 439, pl. 14, fig. 1).

Type locality: Mokha, Yemen.

Vouchers: HEC 4301, 3. 6. 1980: Hansa Bay, Bisalpap Reef; HEC 7722, 7. 7. 1988, Boisa Island, N-coast; HEC 7908, 25. 7. 1988: Saidor area, Gumbi Bay; Copp & PvR 13300, 21. 7. 1990: Neptunus Point (close to Ulingan Bay); Copp & PvR 13549, 2. 8. 1990: Bagabag, New Year's Bay.

Note: In addition to the typical divaricate growth forms generally seen in this species, we also have some specimens (HEC 4614 and Copp & PvR 13300) with very small branching angles, but we are satisfied that both forms represent the same species.

Galaxaura Lamouroux

Galaxaura divaricata (Linnaeus) Huisman *et* Townsend 1993: 100, fig. 2.

T. Tanaka (1936: 147, figs 5,6, pl. 34, fig. 3, = *G. fasciculata* Kjellman); Womersley and Bailey (1970: 303, = *G. fasciculata*).

Type locality: Oceano Asiatico.

Vouchers: HEC 6532, 18. 8. 1986: Megiar Harbour; HEC 7749, 7. 7. 1988: Boisa Island, S. coast; HEC 8037, 1. 8. 1988: Ulingan Bay, W. side; Copp & PvR 13196, 16. 7. 1990: Nagada Harbour; Copp & PvR 13547, 2. 8. 1990: Bagabag, New Year's Bay.

Galaxaura filamentosa Chou *in* W. R. Taylor 1945: 139.

Chou (1945: 39, pl. I, figs 1–6, pl. VI, fig. 1); Magruder and Hunt (1979: 67, lower fig. on p. 66).

Type locality: Isla Clarión, Islas Revillagigedo, Mexico.

Vouchers: HEC 6568, 20. 8. 1986: Bogia Bay; HEC 7466, 17. 6. 1988: Bogia Bay, Kolakola Island; HEC

7650, 1. 7. 1988: Hansa Bay, Barol Point; HEC 7743, 7. 7. 1988: Boisa Island, S. coast; Copp & PvR 13313, 21. 7. 1990: Ulingan Bay, S. side; Copp & PvR 13580, 5. 8. 1990: landward slope of the barrier reef, N of Tab Island.

Galaxaura marginata (Ellis et Solander) Lamouroux 1816: 264.

Papenfuss *et al.* (1982: 411–415, figs 7–9, 24, 36, 37); Tseng (1984: 62, pl. 34, fig. 2, = *G. veprecula* Kjellman); Littler *et al.* (1989: 202, upper); Huisman and Borowitzka (1990: 157–161, figs 14–27); Millar (1990: 304–305, figs 6A–G); Cribb (1996: 81, ill. p. 80, lower).

Type locality: Bahamas.

Vouchers: HEC 4329, 10. 6. 1980: Hansa Bay, Awar Point; HEC 4665, 15. 8. 1980: Manam, Borda Reef; HEC 7924, 25. 7. 1988: Saidor area, Gumbi Bay; Copp & PvR 13102, 13. 7. 1990: Madang, Tripod Reef; Copp & PvR 13484, 2. 8. 1990: Bagabag, Christmas Bay, NW-point.

Galaxaura obtusata (Ellis et Solander) Lamouroux 1816: 262.

Papenfuss *et al.* (1982: 418–421, figs 14–16, 27, 39); Huisman and Borowitzka (1990: 161–163, figs 28–38); Millar (1990: 303, figs 5D–E); Verheij and Prud'homme van Reine (1993: 440, pl. 14, fig. 2); Cribb (1996: 83, ill. p. 82, upper); Millar *et al.* (1999: 552, fig. 1A).

Type locality: Bahamas.

Vouchers: HEC 4243, 28. 5. 1980: Laing Island; HEC 7583, 25. 6. 1988: Nagada Harbour; HEC 7647, 1. 7. 1988: Hansa Bay, Barol Point; HEC 7978, 26. 7. 1988: Saidor area, Cape Iris-Bilian; Copp & PvR 13218, 18. 7. 1990: patch reef between Sinub Island and Wongat Island.

Galaxaura rugosa (Ellis et Solander) Lamouroux 1816: 263.

Magruder and Hunt (1979: 69, fig. 1, p. 68); Papenfuss *et al.* (1982: 421–424, figs 17–19, 29, 40, 41, 45); Huisman and Borowitzka (1990: 153–157, figs 1–13); Verheij and Prud'homme van Reine (1993: 440, pl. 14: 3).

Type locality: Jamaica.

Vouchers: HEC 6508, 17. 8. 1986: Suaru; HEC 7813, 16. 7. 1988: Manam; HEC 7909, 25. 7. 1988: Saidor area, Gumbi Bay; Copp & PvR 13097, 10. 7. 1990: Gosem Island; Copp & PvR 13312, 21. 7. 1990: Ulingan Bay, S. side.

Note: Huisman and Borowitzka (1990) consider *G. subverticillata* Kjellman conspecific with this species based on the fact of the presence of intergrades between specimens with whorled vs. evenly distributed hairs. Littler and Littler (1997: 24), on the contrary, still distinguish both species because, in Belize, they find discrete populations with either whorled or evenly distributed cortical filaments, without in-

tergrades. In our collections, only HEC 6508 has pronounced verticillate filaments.

Scinaia Bivona-Bernardi

Scinaia hormoides Setchell 1914: 106, 125, pl. 12: figs 33–35; pl. 13: figs 36, 37. **Fig. 1***

Magruder and Hunt (1979: 93, upper fig. on p. 92); Trono (1997: 178, fig. 112).

Type locality: Haleiwa, Oahu, Hawaiian Islands.

Vouchers: HEC 4705, 19. 8. 1980: Laing Island, N. coast; HEC 4725, 24. 8. 1980: Manam, Baliau; HEC 7659, 3. 7. 1988: Hansa Bay, between Barol Point and Hansa Point.

Scinaia tsinglanensis Tseng 1941: 106–109, fig. 11, pl. 9.

Tseng (1984: 64, pl. 35, fig. 1); Huisman (1986: 282, 284, figs 36–47); Millar *et al.* (1999: 552, fig. 1B).

Type locality: Tsinglan-Kang, Hainan, China.

Voucher: Copp & PvR 13464, 1. 8. 1990: landward slope of the barrier reef N. of Wongat Island.

Tricleocarpa Huisman et Borowitzka

Tricleocarpa cylindrica (Ellis et Solander) Huisman et Borowitzka 1990: 164–168, figs 40–45, 50–52.

Magruder and Hunt (1979: 67, middle fig. on p. 66, = *Galaxaura fastigiata* Decaisne); Millar (1990: 306, figs 5A–C); Cribb (1996: 119, ill. p. 118, upper).

Type locality: West Indies.

Vouchers: HEC 7670, 4. 7. 1988: Hansa Bay, Barol Point; HEC 7741, 7. 7. 1988: Boisa, S. coast; HEC 7864, 19. 7. 1988: Suaru; HEC 7964, 25. 7. 1988: Saidor area, Suit; Copp & PvR 13545, 02. 8. 1990: Bagabag, New Year's Bay.

Tricleocarpa fragilis (Linnaeus) Huisman et Townsend 1993: 100, t. 2.

Tseng [1984: 60, pl. 33, fig. 1, = *Galaxaura oblongata* (Ellis et Solander) Lamouroux]; Huisman and Borowitzka [1990: 164–168, figs 40–45, 50–52 = *Tricleocarpa oblongata* (Ellis et Solander) Huisman et Borowitzka]; Verheij and Prud'homme van Reine (1993: 441, pl. 14: 5, 6); Millar *et al.* (1999: 553, fig. 1C).

Type locality: 'Oceano Americano' Jamaica *vide* Huisman and Townsend (1993: 99).

Vouchers: HEC 4246, 28. 5. 1980: Laing Island, lagoon passage; HEC 7532, 21. 6. 1988: landward slope of the barrier reef close to Wongat Island; HEC 7886, 21. 7. 1988: Bogia Bay, between the coast and Kola-kola Island; HEC 7979, 26. 7. 1988: Saidor area, Cape Iris – Bilian; Copp & PvR 13544, 2. 8. 1990: Bagabag, New Year's Bay.

* For Figures 1–32 see pages 334–337.

Family **Liagoraceae****Liagora** Lamouroux

Liagora bella Børgesen 1953: 21–25, figs 5, 6, pl. 2 (lower).

Type locality: Black River, La Preneuse, Mauritius.

Voucher: Copp & PvR 13414, 26. 7. 1990: patch reef between Tausch Island and Sek Island.

Order **Gelidiales**Family **Gelidiaceae****Gelidiella** J. Feldmann et G. Hamel

Gelidiella acerosa (Forsskål) J. Feldmann et G. Hamel 1934: 533.

Jaasund (1976: 71, fig. 142); Magruder and Hunt (1979: 69, fig. 2, p. 68); Cribb (1983: 29–30, pl. 6, fig. 1); Tseng (1984: 64, pl. 35, fig. 4); Littler *et al.* (1989: 172, upper); Price and Scott (1992: 25, 27, figs 4A–E); Cribb (1996: 83, ill. p. 82, lower).

Type locality: Mokha, Yemen.

Vouchers: HEC 4618, 9. 8. 1980: between Kanamur and Bagania; HEC 6515, 17. 8. 1986: Laing Island; HEC 7623, 27. 6. 1988: Neptune Point.

Gelidium Lamouroux

Gelidium pusillum (Stackhouse) Le Jolis 1863: 139.

Jaasund (1976: 71, fig. 144); Tseng (1984: 68, pl. 37, fig. 1); Littler *et al.* (1989: 170, lower); Hatta and Prud'homme van Reine (1991: 364, fig. 8); Womersley (1996: 133–136, figs 35E, 39E–K).

Type locality: Sidmouth, Devon, England.

Vouchers: Copp & PvR 13062, 9. 7. 1990: Nagada Harbour; Copp & PvR 13640, 8. 8. 1990: Bagabag, New Year's Bay.

Pterocladia Santelices et Hommersand

Pterocladia caerulescens (Kützing) Santelices et Hommersand 1997: 118.

Santelices [1976: 173 = *Pterocladia caerulescens* (Kützing) Santelices]; Magruder and Hunt (1979: 91, fig. 1, p. 90 = *Pterocladia caerulescens*); Cribb (1983: 34, pl. 6, fig. 3 = *Pterocladia caerulescens*); Hatta and Prud'homme van Reine (1991: 372–373, fig. 12 = *Pterocladia caerulescens*); Price and Scott (1992: 21–22, figs 3A–F = *Pterocladia caerulescens*).

Type locality: Wagap, New Caledonia.

Voucher: HEC 4606, 7. 8. 1980: Lae, close to the harbour area.

Order **Gracilariales**Family **Gracilariaceae****Congracilaria** Yamamoto

Congracilaria babae Yamamoto 1986: 287.

Yamamoto and Phang (1997: 91, figs 1–15).

Type locality: Oki, Erabu Island, between Amami Oshima and Okinawa Islands, Japan.

Voucher: HEC 7959 b, 25. 7. 1988: Saidor area – Suit.

Note: Plants were epiphytic on *Gracilaria salicornia* and are similar to the type specimen from southern Japan. Although this is the first report of a parasitic red alga for Papua New Guinea, the parasite is probably widespread in the warm waters of the western Pacific where its host species is found.

Gracilaria Greville

Gracilaria arcuata Zanardini var. *snackeyi* Weber-van Bosse 1928: 430, fig. 173.

Umamaheswara Rao (1972: 673, figs 1 a, b, pl. IIA, = var. *arcuata*); Chang and Xia (1976: 112, fig. 13–2); Trono *et al.* (1983: 32, fig. 7).

Type locality: Macassar, Celebes, Indonesia.

Vouchers: HEC 7541 and 7580, 24. 6. 1988: Madang, Nagada harbour; Copp & PvR. 13610, 7. 8. 1990: Madang, Nagada harbour in front of Gosem Island.

Note: Two forms may be recognized from among the collections. Forma *snackeyi* has a single holdfast with more distinct arcuate distal axes (HEC 7580 and Copp & PvR 13610). This form is usually encountered in subtidal (–5 m) habitats. On the other hand, forma *rhizophora* Børgesen (1943) exhibits a dense, clumpy habit that is anchored to the substrate by rhizomatous branches (HEC 7541). In the specimens on hand, attachment of prostrate branches to sponges is evident. The dense habit is most likely an adaptation to greater wave action encountered in shallower habitats. This observation is similar to that reported by Trono *et al.* (1983) in Philippine materials. *Gracilaria arcuata* (as var. *arcuata*) has been confirmed from the Great Barrier Reef by Withell *et al.* (1994: 345); however, records of *G. howensis* Lucas from Lord Howe Island may prove to represent *G. arcuata* var. *snackeyi* following further study.

Gracilaria edulis (S. Gmelin) P. Silva 1952: 293.

Umamaheswara Rao (1972: 681, pl. 1, fig. F); Yamamoto (1978: 132, pl. 49, fig. 1); Xia and Abbott (1987: 406, fig. 1–2, = *Polycavernosa fastigiata* Chang et B. Xia); Abbott *et al.* (1991: 23); Lewmanomont (1994: 138, fig. 4); Phang (1994: 127, figs 5, 9); Millar and Xia (1997: 104, figs 1–4).

Type locality: 'India orientalis'.

Voucher: HEC 7960, 25. 7. 1988: Saidor area – Suit.

Note: This species has often been confused with the superficially similar *G. coronopifolia* J. Agardh from which it differs in its cystocarpic detail. *Polycavernosa fastigiata* Chang et Xia, the generitype of *Polycavernosa* Chang et Xia has been relegated to synonymy under this species by Abbott *et al.* (1991).

Gracilaria rhodymenioides Millar 1997: 114, fig. 5–12.

Cribb (1996: 87, ill. p. 86 lower as *G. textorii*); Millar *et al.* (1999: 555, fig. 1E).

Type locality: Muttonbird Island, Coffs Harbour, New South Wales, Australia.

Vouchers: HEC 4306, 4. 6. 1980: Hansa Bay, Bisalpap Reef; HEC 4453, 28. 6. 1980: Laing Island, S. E. coast; Copp & PvR 13579, 5. 8. 1990: landward slope of the barrier reef, N. of Tab Island.

Note: This species was recently reported from the south coast of Papua New Guinea (Millar *et al.* 1999) and from Norfolk Island in the Coral Sea (Millar 1999). Cribb's (1996) record and illustration of *G. textorii* from Queensland would seem to better represent *G. rhodymenioides* with its regularly dichotomous branches.

Gracilaria rubra Chang *et* Xia 1976: 100, 160, figs 4, 5, pl. 1–2.

Tseng (1984: 106, pl. 56, fig. 4).

Type locality: Xinying, Lingao Xian, Hainan Island, Guangdong Province, China.

Vouchers: HEC 4626, 11. 8. 1980: Hansa Bay, between both wrecks; Copp & PvR 13754, 19. 8. 1990: Hansa Bay, close to Awar.

Note: The PNG specimens compare well with the original description in having very thin axes (0.5–1.0 mm diameter), sparse branching that tend to be secund, and branches that are abruptly constricted at the base. There are occasional notable internodal constrictions particularly towards the distal portions. This species is often difficult to distinguish from *G. tenuistipitata* Chang *et* Xia using vegetative characters. Comparing cystocarpic structures, *G. rubra* has numerous traversing cells from the pericarp to the gonimoblasts, whereas in *G. tenuistipitata*, they are rarely seen.

Gracilaria salicornia (C. Agardh) Dawson 1954: 4.

Magruder and Hunt (1974: 73, middle fig. p. 72); Chang and Xia (1976: 116, figs 18–20); Jaasund (1976: 85, fig. 171); Trono *et al.* (1983: 23, fig. 3); Tseng (1984: 108, pl. 57, fig. 1); Millar and Xia (1997: 106, figs 5–10).

Type locality: possibly Manila Harbour, Philippines.

Vouchers: HEC 4233, 27. 5. 1980: Laing Island; HEC 7495, 20. 6. 1988: Nagada harbour, bay of Jais Aben jetty; HEC 8069, 7. 8. 1988: W. of Malamal Island; Copp & PvR 13168, 15. 7. 1990: island N. of Demasa Island.

Note: A wide range of morphological variations is exhibited by the PNG specimens: from robust clumps (HEC 4233) reminiscent of *Corallopsis opuntia* J. Agardh, to forms with constrictions limited to distal portions of the plant (HEC 8069) as in *Gracilaria cacialia* (J. Agardh) Dawson. Still others are forms with typically long, clavate internodes, which are basally constricted (HEC 7495). Both *G. opuntia* and *G. cacialia* are among those species recognized as synonyms of *G. salicornia* by Xia (1986).

Gracilaria textorii (Suringar) De Toni 1895: 27.

Yamamoto (1978: 123, pls 12–14, pl. 42, figs 5–7, pl. 43, figs 1–4); Tseng (1984: 110, pl. 58, fig. 1); Millar (1997: 121, figs 20–24).

Type locality: Japan.

Voucher: Copp & PvR 13232, 18. 7. 1990: Madang, seaward side of the patch reef between Sinub Island and Wongat Island.

Note: This may well be a juvenile plant, but the membranous, complanate blades with subdichotomous branches topped with acute tips are characteristic of this species and are the basis for this identification.

Gracilaria vanbosseae (Abbott) Abbott, Zhang *et* Xia 1991: 23.

Abbott (1988: 152, figs 1, 2, = *Polycavernosa vanbosseae* Abbott).

Type locality: Jedan Island, Indonesia.

Vouchers: HEC 4435 b, 26. 6. 1980, HEC 4555, 22. 7. 1980, HEC 7680, 5. 7. 1988: Laing Island; Copp & PvR 13374, 15. 7. 1990: Madang, inner slope of patch reef, SW of Wongat Island; Copp & PvR 13437, 27. 7. 1990: landward slope of the barrier reef, N. of Wongat Island.

Note: This is apparently a deep-water species, having been collected in PNG at 18–32 m depths; the type specimen from Jedan Island, Indonesia, was collected from 10–11 m. This species was described by Abbott (1988) to accommodate western Pacific specimens erroneously identified as *G. cylindrica* Børgesen by Weber-van Bosse (1928: 432). Authentic material of the latter has since been synonymized under *G. blodgettii* Harvey by Fredericq and Norris (1992).

Gracilaria vieillardii P. Silva *in* P. Silva, Meñez *et* Moe 1987: 44.

Kützing (1869: 19. t. 51, figs e–g, = *Sphaerococcus denticulatus* Kützing); Withell *et al.* (1994: 307, figs 22–24).

Type locality: New Caledonia.

Vouchers: HEC 6510, 17. 8. 1986: Suaru; HEC 7471, 17. 6. 1988: Kolakola Islet.

Family Sarcodiaceae

Sarcodia J. Agardh

Sarcodia ciliata Zanardini 1874: 498, nr. 19. **Figs 3, 4**

Jaasund (1976: 91, fig. 182 as *S. montagneana* (J. Hooker *et* Harvey) J. Agardh); Millar and Kraft (1993: 25); Coppejans *et al.* (1997: 89, as *S. montagneana*).

Type locality: Lord Howe Island, New South Wales, Australia.

Vouchers: HEC 4607, 9. 8. 1980: between Kanamur and Bagania; HEC 6518, 17. 8. 1986: Suaru; HEC 7723, 7. 7. 1988: Boisa Island, N. coast; HEC 8091, 15. 6. 1988: Murukinam.

Note: This species is a common component of the Lord Howe Island flora, but has not previously been illustrated. *Sarcodia montagneana* has frequently been cited from the Indian Ocean, but most probably these are misidentifications of *S. ciliata*. The former is a New Zealand species (Adams, 1994: pl. 81) which has broad, regularly dichotomous blades with cystocarps scattered across the surfaces of the blade, whereas *S. ciliata* is overall narrower, more irregularly branched and has its cystocarps predominantly on the margins.

Order **Bonnemaisoniales**
Family **Bonnemaisoniaceae**

Asparagopsis Montagne

Asparagopsis taxiformis (Delile) Trevisan 1845: 45.

Magruder and Hunt (1979: 59, fig. 3, p. 58); Cribb (1983: 28, pl. 4, figs 1–2); Tseng (1984: 64, pl. 35, fig. 3); Littler *et al.* (1989: 152, upper); De Clerck and Coppejans (1996: 251, fig. 88); Cribb (1996: 69, ill. p. 68, lower).

Type locality: Alexandria, Egypt.

Vouchers: HEC 13827, 22. 8. 1990: lagoon between Sarang Harbour and Walog (gametophyte).

Order **Halymeniales**
Family **Halymeniaceae**

Carpopeltis Schmitz

Carpopeltis maillardii (Montagne *et* Millardet) Chiang 1970: 68, pl. 5C. **Fig. 8.**

Okamura [1909: pl. 66, = *C. rigida* (Harvey *ex* J. Agardh) Schmitz]; Reyes (1980: 132, pl. 8, fig. 2).

Type locality: Réunion.

Vouchers: HEC 4622, 9. 8. 1980: between Kanamur and Bagania; HEC 6482, 17. 8. 1986: Suaru; HEC 6603, 23. 8. 1986: Boisa Island; HEC 8093, 15. 6. 1988: Murukinam; Copp & PvR 13305: Neptunus Point (close to Ulingan Bay).

Cryptonemia J. Agardh

Cryptonemia denticulata J. Agardh 1851: addenda (337).

Calumpong and Meñez [1997: 181, ill. p. 182 as *C. crenulata* (J. Agardh) J. Agardh]; Millar *et al.* (1999: 557, fig. 2C, as *C. crenulata*).

Type locality: Basilan Island, near Zamboanga, Philippines.

Vouchers: HEC 4567, 23. 7. 1980: Hansa Bay, Barol Point; HEC 4728, 24. 8. 1980: Manam, Baliau; HEC 7946, 25. 7. 1988: Saidor area, Gumbi Bay; Copp & PvR 13056, 9. 7. 1990: Nagada Harbour; Copp & PvR 13643, 8. 8. 1990: Bagabag, in front of Bedilu.

Note: This species has been confused with *C. crenulata* which also has dentate margins. Based on the type specimens of these two species the blades of *C. denticulata* are less than 5 mm wide whereas those of

C. crenulata are up to 2 cm wide. Moreover *C. crenulata* was described from Florida.

Cryptonemia yendoii Weber-van Bosse 1921: 249, fig. 77.

Millar *et al.* (1999: 557, fig. 2D).

Type locality: Salayer Island, Indonesia.

Vouchers: HEC 4362 a, 14. 6. 1980: Laing Island, N-coast; HEC 4442, 28. 6. 1980: Laing Island, S. E. coast; Copp & PvR 13288, 20. 7. 1990: patch reef between Tausch and Sek Island; Copp & PvR 13445, 27. 7. 1990: landward slope of the barrier reef, N. of Wongat Island

Note: *Cryptonemia yendoii* and *C. decumbens* Weber-van Bosse would appear to be closely related species. The PNG specimens are similar to those illustrated by Verheij and Prud'homme van Reine (1993, pl. 16, fig. 7), which they identify as *C. decumbens*. Their illustration is very similar to that by Weber-van Bosse (1921: fig. 77) of *C. yendoii*. The two species differ mainly in their thallus thickness, with that of *C. decumbens* being 280–440 μm and that of *C. yendoii* being 20 μm (Weber-van Bosse 1921: 249). Our specimens, however, are 60–80 μm thick and thus are closer to *C. yendoii* in thickness. Moreover, they are erect rather than decumbent.

Grateloupia C. Agardh

Grateloupia filicina (Lamouroux) C. Agardh 1822: 223.

Magruder and Hunt (1979: 73, lower fig. p. 72); Tseng (1984: 94, pl. 50, fig. 2); Trono (1997: 183, fig. 116).

Type locality: Trieste, Italy.

Voucher: HEC 4604, 7. 8. 1980: Bay of Lae, harbour.

Halymenia C. Agardh

Halymenia durvillei Bory de Saint-Vincent 1828: 180, pl. 15.

Womersley and Bailey (1970: 315); Cribb (1983: 54–55, pl. 12, fig. 1); Verheij and Prud'homme van Reine (1993: 460, pl. 17, fig. 3); Wynne (1995: 274, fig. 10); Calumpong and Meñez (1997: 169, fig. p. 170 top); Trono (1997: 185, fig. 118).

Type locality: New Ireland, Papua New Guinea.

Vouchers: HEC 4571, 23. 7. 1980: Hansa Bay, Barol Point Reef; HEC 7586, 25. 6. 1988: Nagada Harbour; HEC 7744, 7. 7. 1988: Boisa Island, S. coast; HEC 7821, 16. 7. 1988: Manam, Baliau; HEC 7907, 25. 7. 1988: Saidor area, Gumbi Bay.

Halymenia floresia (Clemente y Rubio) C. Agardh 1817: XIX. **Fig. 10**

Littler *et al.* (1989: 134, lower); Cribb (1996: 91, ill. p. 90, lower).

Type locality: Cádiz, Spain.

Vouchers: HEC 4559, 23. 7. 1980, HEC 4560, 23. 7. 1980: Hansa Bay, Barol Point.

Halymenia maculata J. Agardh 1885: 12.

Børgesen (1950: 9–11, figs 2, 3); Dawson (1954: 432, fig. 44); Trono (1997: 187, fig. 119).

Type locality: Mauritius.

Vouchers: HEC 4684, 14. 8. 1980: Hansa Bay, Durangit Reef; HEC 7975, 26. 7. 1988: Saidor area, Cape Iris – Bilian; HEC 8027, 1. 8. 1988: Ulingan Bay, W. side; Copp & PvR 13131, 13. 7. 1990: Kran- ket Island, enclosed Bay; Copp & PvR 13810, 22. 8. 1990: Hole in the Wall, close to Mugil Harbour.

Halymenia porphyraeformis Parkinson 1980: 17.

Fig. 9

Børgesen (1932b: 120, figs 8, 9, pl. 3); Millar *et al.* (1999: 557, as *H. dilatata* Zanardini).

Type locality: Okha, Gujarat, India.

Vouchers: HEC 4561, 23. 7. 1980: Hansa Bay, Barol Point Reef; HEC 7467, 17. 6. 1988: Bogia Bay, Kolakola Island; HEC 7824, 16. 7. 1988: Manam, Baliau; Copp & PvR 13052, 9. 7. 1990: Nagada har- bour, in front of the CRI buildings.

Polyopes J. Agardh

Polyopes ligulatus (Harvey ex Kützing) De Toni 1905: 1596.

Fig. 11, 12

Kützing (1869: 23–24, t. 63, figs a, b, = *Gymno- gongrus ligulatus* Harvey ex Kützing); Desikachary *et al.* (1990: 266, pl. 41).

Type locality: Sri Lanka.

Vouchers: HEC 6587, 23. 8. 1986: Boisa Island; HEC 7718, 7. 7. 1988: Boisa, N. coast; HEC 7859, 19. 7. 1988: Suaru; Copp & PvR 13763, 19. 8. 1990: Hansa Bay, Awar Plantation; Copp & PvR 13778, 20. 8. 1990: Boisa Island, N. E. coast.

Note: The PNG specimens agree in all respects with isotype material in NSW (287603 = Harvey's *Ceylon Exsiccatae* nr 50), the only difference being that some of our specimens have more numerous marginal pro- liferations. The differences between *Prionitis formo- sana* (Okamura) Kawaguchi *et* Nguyen (1998: 396, figs 1–23) and *P. ligulatus* are not evident, and the species should be critically compared.

Sebdenia (J. Agardh) Berthold

Sebdenia flabellata (J. Agardh) Parkinson 1980: 12.

Fig. 13

Millar *et al.* (1999: 558, fig. 3F).

Type locality: Guadeloupe, West Indies.

Vouchers: HEC 4677, 16. 8. 1980: Manam, Borda Reef; HEC 7643, 1. 7. 1988: Hansa Bay, Barol Point; Copp & PvR 13219, 18. 7. 1990: patch reef between Sinub and Wongat Island; Copp & PvR 13605, 7. 8. 1990: Nagada Harbour, in front of Gosem Is- land; Copp & PvR 13843, 28. 8. 13843: landward slope of the barrier reef, N. of Tab Island.

Order **Corallinales**

Family **Corallinaceae**

Note: Non-geniculate representatives are not in- cluded.

Amphiroa Lamouroux

Amphiroa anceps (Lamarck) Decaisne 1842: 125.

Jaasund (1976: 125, fig. 253); Magruder and Hunt (1979: 95, fig. 2, p. 94); Cribb (1983: 135–136, pl. 68, fig. 4); Tseng (1984: 160, pl. 83, fig. 4); Verheij and Prud'homme van Reine (1993: 449, pl. 16, fig. 3).

Type locality: 'les mères Australes ou de la Nou- velle Hollande'.

Voucher: HEC 4615, 9. 8. 1980: between Kanamur and Bagania.

Amphiroa foliacea Lamouroux in Quoy *et* Gaimard 1824: 268, pl. 93, figs 2, 3.

Tseng (1984: 86, pl. 46, fig. 1); Cribb (1996: 69, ill. p. 68, upper); Trono (1997: 188, fig. 120).

Type locality: Mariana Islands.

Vouchers: Copp & PvR 13064, 9. 7. 1990: Nagada Harbour; Copp & PvR 13089, 10. 7. 1990: Nagada Harbour; Copp & PvR 13783, 20. 8. 1990: Boisa Is- land, N. coast.

Amphiroa fragilissima (Linnaeus) Lamouroux 1816: 298.

Magruder and Hunt (1979: 59, middle fig. p. 58); Tseng (1984: 86, pl. 46, fig. 2); Littler *et al.* (1989: 208, upper); Cribb (1996: 69, ill. p. 68, middle); Trono (1997: 189, fig. 121).

Type locality: Jamaica.

Voucher: HEC 7962b, 25. 7. 1988: Saidor area, Suit.

Cheilosporum (Decaisne) Zanardini

Cheilosporum acutilobum (Decaisne) Piccone 1886: 66.

Børgesen (1943: 19–21, fig. 5); Børgesen (1950: 7–8, fig. 1); Jaasund (1976: 81, fig. 163); Wynne (1995: 270, fig. 7).

Type locality: Mauritius.

Voucher: Copp & PvR 13563, 2. 8. 1990: Bagabag, The Pinnacle (S. of New Year's Bay).

Cheilosporum spectabile Harvey ex Grunow 1874: 41.

Womersley and Bailey (1970: 314, pl. 26, fig. 22); Cribb (1996: 75, ill. p. 74, upper).

Type locality: Tonga.

Vouchers: HEC 4251, 28. 5. 1980: Laing Island, la- goon passage; HEC 4613, 9. 8. 1980: between Kana- mur and Bagania; HEC 8087, 15. 6. 1988: Muriki- nam; Copp & PvR 13105, 13. 7. 1990: Madang la- goon, Tripod Reef; Copp & PvR 13360, 23. 7. 1990: Medibur.

Jania Lamouroux**Jania adhaerens** Lamouroux 1816: 270.

Womersley and Bailey (1970: 314); Cribb (1983: 47–48, pl. 10, figs 4–5); Price and Scott (1992: 48–50, figs 12A–C); Littler and Littler (1997: 31, fig. 19).

Type locality: Mediterranean Sea.*Voucher*: Copp & PvR 13543, 2. 8. 1990: Bagabag, New Year's Bay.**Jania unguolata** (Yendo) Yendo forma *brevior* (Yendo) Yendo 1905: 38.

Yendo (1902: 26–27, pl. III, fig. 9, pl. VII, fig. 9); Jaasund (1976: 77, fig. 155).

Type locality: Boshu Province, Chiba Prefecture, Japan.*Voucher*: Copp & PvR 13779, 20. 8. 1990: Boisa Island, N. coast.**Mastophora** Decaisne**Mastophora rosea** (C. Agardh) Setchell 1943: 129.

Turner and Woelkerling (1982: figs 5–8, 11, 14, 15, 26, 27, 31–35); Tseng (1984: 80, pl. 43, fig. 2).

Type locality: Guam, Mariana Islands.*Voucher*: HEC 7671, 4. 7. 1988: Hansa Bay, Barol Point.Order **Gigartinales**Family **Calosiphoniaceae****Schmitzia** P. Silva**Schmitzia** sp.

Fig. 18

Voucher: HEC 7641, 1. 7. 1988: Hansa Bay, Barol Point.*Note*: Three female specimens were collected, and they conform to the genus *Schmitzia* as interpreted by Millar (1990), Hawkes (1982) and Maggs and Guriy (1985), in which gonimoblasts arise directly on the connecting filament some distance from the auxiliary cells. They are not substantially the same as any of the described species and will be critically studied separately.Family **Dumontiaceae****Acrosymphyton** Sjöstedt**Acrosymphyton taylorii** Abbott 1962: 845–849, figs 1–9.

Fig. 2

Kraft (1981: 8, fig. 1.1); Shepley and Womersley (1983: 202, figs 1A, B, 3); Millar and Kraft (1984: 135, figs 2–10); Womersley (1994: 220, figs 68A, 69A–D).

Type locality: Hauula, Oahu, Hawaiian Islands.*Vouchers*: HEC 4664, 15. 8. 1980: Manam, Borda Reef; HEC 7796, 16. 7. 1988: Manam, Baliau.**Gibsmithia** Doty**Gibsmithia dotyi** Kraft *et* Ricker in Kraft 1986: 433, figs 23–43.

Fig. 5

Millar (1999: 504, fig. 20).

Type locality: Phillip Rock, Lord Howe Island, Australia.*Vouchers*: HEC 8017, 8018, 1. 8. 1988: Ulingan Bay, W. side; Copp & PvR 13155, 13. 7. 1990: patch reef S. W. of Wongat Island; Copp & PvR 13229, 18. 7. 1990: patch reef between Sinub Island and Wongat Island; Copp & PvR 13270, 20. 7. 1990: patch reef between Tausch Island and Sek Island; Copp & PvR 13690, 18. 8. 1990: Mugil Harbour, between the coast and Vidosi Island.*Note*: This species was recently recorded from the south coast of PNG by Millar *et al.* (1999) and from Norfolk Island in the South Pacific (Millar 1999). Its presence on the north coast extends its known range considerably farther.**Gibsmithia hawaiiensis** Doty 1963: 458–465, figs 1–17.Magruder and Hunt (1979: fig. 2, p. 70). Millar *et al.* (1999: 560, fig. 2A).*Type locality*: Honolulu, Oahu, Hawaiian Archipelago.*Vouchers*: HEC 4291, 2. 6. 1980: Hansa Bay, Bisalpap Reef; HEC 4663, 15. 8. 1980: Manam, Borda Reef; HEC 8016, 1. 8. 1988: Ulingan Bay, W. side; Copp & PvR 13410, 26. 7. 1990: patch reef between Tausch Island and Sek Island; Copp & PvR 13623, 8. 8. 1990: Bagabag, Christmas Bay.**Gibsmithia** sp.

Fig. 6

Vouchers: HEC 4259, 31. 5. 1980: Hansa Bay, Durangit reef; HEC 4334, 11. 6. 1980: Hansa Point, Purar Reef; HEC 7640, 1. 7. 1988: Hansa Bay, Barol Point.*Note*: This species lacks a cartilaginous stipe, which has traditionally characterised members of the genus. The PNG plants also look superficially similar to certain *Predaea* species, but the presence of an erect, isomorphic tetrasporophyte and the carposporophyte architecture characterises these specimens as belonging to the genus *Gibsmithia*. They are being critically studied separately.Family **Hypneaceae****Hypnea** Lamouroux**Hypnea cornuta** (Kützinger) J. Agardh 1851: 449–450.

Jaasund (1976: 99, fig. 200); Wynne (1995: 274, figs 9, 11).

Type locality: 'Locus natalis ignotus' ('ad oras Guineae').*Vouchers*: HEC 4628, 11. 8. 1980: Hansa Bay, between the 2 ship wrecks; Copp & PvR 13746, 19. 8. 1990: Hansa Bay, Awar, seagrass beds.

Hypnea pannosa J. Agardh 1847: 14.

Jaasund (1976: 97, fig. 196); Cribb (1983: 59–60, pl. 15, fig. 2–3); Tseng (1984: 100, fig. 1); Price and Scott (1992: 38, 40, figs 8A–D, 9A); Wynne (1995: 274, 276).

Type locality: San Agustín, Oaxaca, Mexico.

Vouchers: HEC 7492, 20. 6. 1988: Nagada Harbour; HEC 7834, 16. 7. 1988: Hansa Bay, Durangit Reef; HEC 7879, 21. 7. 1988: Hatzfeldhafen; HEC 7936, Saidor area, Gumbi Bay; Copp & PvR 13324, 21. 7. 1990: Ulingan Bay, S. side.

Hypnea saidana Holmes 1895: 256, pl. 11, figs 3 a, b.

Millar (1990: 351–352, figs 23A–C); Wynne (1995: 276, fig. 16).

Type locality: Enoshima, Kanagawa Prefecture, Japan.

Vouchers: HEC 4479, 14. 7. 1980: Laing Island, E. coast; HEC 4568, 23. 7. 1980: Hansa Bay, Barol Point Reef; Copp & PvR 13561, 2. 8. 1990: Bagabag, The Pinnacle.

Intermediates between *Hypnea pannosa* and *Hypnea saidana*:

Vouchers: HEC 4239, 27. 5. 1980: Laing Island, lagoon reef; HEC 6464, 15. 8. 1986: Laing Island; HEC 7737, 7. 7. 1988: Boisa Island, S. coast; Copp & PvR 13417, 26. 7. 1990: patch reef between Tausch and Sek Island.

Remark: According to Wynne (1995: 276) thalli of *H. pannosa* consist of axes only 1 mm in diameter, and form compact tufts of 1 to a few cm high, whereas these of *H. saidana* have axes of 2 mm thick and form clumps of a looser organization of 5–10 cm high. In our collections intermediates are present, with characters of both species, suggesting that *H. pannosa* and *H. saidana* might represent extreme growth forms of a single species, as suggested by Cribb (1983), and similar to the conclusion of Haroun and Prud'homme van Reine (1993: 122) on *H. cervicornis* J. Agardh and *H. spinella*.

Hypnea spinella (C. Agardh) Kützing 1847: 23.

Magruder and Hunt (1979: 79, fig. 1, p. 78 = *H. cervicornis*); Littler *et al.* (1989: 176, lower = *H. cervicornis*); Cribb (1983: 60–61, pl. 15, fig. 4); Millar (1990: 352–353, fig. 23D); Price and Scott (1992: 35–36, 40–44, figs 7A–E, 9B, 10A–F); Wynne (1995: 276, fig. 12).

Type locality: West Indies.

Voucher: Copp & PvR 13067, 9. 7. 1990: Nagada Harbour.

Note: The PNG specimens support the conclusion of Haroun and Prud'homme van Reine (1993) that *H. cervicornis* is little more than a loosely branched morph of the tightly branched *H. spinella*. This contrasts with Price and Scott's (1992) decision to maintain the two species as separate taxa.

Family Kallymeniaceae***Kallymenia*** J. Agardh

Kallymenia rosea Womersley *et* R. Norris 1971: 9, figs 13–18, 81, 82. **Fig. 7**

Millar (1999: 505, fig. 22).

Type locality: Botany Bay, New South Wales, Australia.

Vouchers: HEC 6455, 15. 8. 1986: Laing Island; HEC 7828, 16. 7. 1988: Manam, Baliu.

Note: Until recently, this species was thought to be endemic to the New South Wales coast of eastern Australia. It has recently been reported from Norfolk Island (Millar 1999), and we have also collected it from Bulusan, southern Luzon, the Philippines (pers. obs.).

Kallymenia sp.

Millar *et al.* (1999: 562, fig. 2E).

Vouchers: HEC 4518, 17. 7. 1980: Bogia, Outer Legoarant Island; HEC 4662, 15. 8. 1980: Manam, Borda Reef; HEC 7657, 3. 7. 1988: Hansa Bay, between Barol Point and Hansa Point; HEC 7797, HEC 7798, 16. 7. 1988: Manam; Copp & PvR 13661, 15. 8. 1990: landward slope of the barrier reef, N. of Tab Island.

Note: This identification is based on female material, which conforms to the genus *Kallymenia* as described and illustrated by Womersley and Norris (1971) whereby the carposporophyte consists of numerous carposporangia intermixed with filaments within the medulla. However, the blades are thick, flaccid and are filled with mucilage (i. e. are bullose), and this habit is unknown in the genus. This species is being studied separately.

Family Peyssonneliaceae***Peyssonnelia*** Decaisne

Note: There appear to be at least six species included in the present collection of some 30 vouchers. Attempts to identify these species using the existing literature were not successful. The tropical representatives are presently being revised by researchers in Ghent, and we are thus not prepared to list names at this stage.

Family Polyidaceae***Stenopeltis*** Itono *et* Yoshizaki

Stenopeltis gracilis (Yamada *et* Tanaka *in* Yamada) Itono *et* Yoshizaki 1992: 143, figs 1–9.

Syntype localities: Bonin Island, Japan; Kotosho, Taiwan.

Voucher: HEC 7658, 3. 7. 1988: Hansa Bay, between Barol Point and Hansa Point.

Family **Rhizophyllidaceae****Portieria** Zanardini

Portieria hornemannii (Lyngbye) P. Silva in P. Silva, Meñez *et Moe* 1987: 129.

Jaasund (1976: 75, fig. 149, = *Desmia pulvinata* J. Agardh); Magruder and Hunt (1979: 65, fig. 2, p. 64, = *Desmia hornemannii* Lyngbye); Tseng [1984: 70, pl. 38, fig. 2 = *Chondrococcus hornemannii* (Lyngbye) Schmitz]; Millar (1990: 359–360, figs 20A–B); Verheij and Prud'homme van Reine (1993: 464, pl. 17, fig. 8); Millar *et al.* (1999: 563, fig. 3B).

Type locality: probably Red Sea.

Vouchers: HEC 4328, 10. 6. 1980: Hansa Bay, Awar Point, Vagenim Reef; HEC 7825, 16. 7. 1988: Manam, Baliau; HEC 7944, 25. 7. 1988: Saidor area, Gumbi Bay; HEC 8090, 15. 6. 1988: Murukinam (broad growth form); Copp & PvR 13644, 8. 8. 1990: Bagabag, W. coast, in front of Bedilu village.

Note: The PNG specimens display a range of forms from broad main branches (up to 4 mm) to narrow branches (0.5 mm wide) but are mostly in the range of 1–2 mm wide.

Family **Nemastomataceae****Predaea** De Toni *fil.*

Predaea weldii Kraft *et Abbott* 1971: 194, figs 1, 2, 4–15. **Fig. 14**

Type locality: Kaneohe Bay, north shore of Oahu Island, Hawaii.

Voucher: HEC 4639, 13. 8. 1980: Hansa Bay, Durangit Reef; HEC 4686, 17. 8. 1980: Hansa Bay, The Pinnacle.

Predaea sp.**Fig. 15**

Vouchers: HEC 4299, 3. 6. 1980: Hansa Bay, Bisalpap Reef.

Note: The PNG species is morphologically similar to *P. feldmannii* Børgesen, which however, has the gonimoblast borne on the connecting filament in close proximity to the auxiliary cell. In the PNG species, the gonimoblast initial is borne directly on, and lateral to, the auxiliary cell. Critical studies on this species will be published separately.

Family **Phylloporaceae****Ahnfeltiopsis** P. Silva *et DeCew*

Ahnfeltiopsis concinna (J. Agardh) P. Silva *et DeCew* 1992: 577. **Fig. 16**

Masuda and Kogame (1998: figs 1–15).

Syntype localities: Hawaiian Islands.

Voucher: HEC 4605, 7. 8. 1980: Lae, close to the harbour.

Note: Apart from a slightly thinner cortex, PNG specimens agree in all respects with a Japanese specimen (number 1 in *Algae Marinae et Salsugineae Ex-*

siccatae) distributed by J. Tanaka. Masuda and Kogame (1998) found that gross morphological variability existed between Hawaiian and Japanese populations that could otherwise be crossed with positive results.

Family **Schizymeniaceae****Titanophora** (J. Agardh) J. Feldmann

Titanophora weberae Børgesen 1943: 39, fig. 3.

Mshigeni and Papenfuss (1980: 780–788, figs 1, 3–20); Verheij and Prud'homme van Reine (1993: 459, pl. 16, fig. 6); Millar *et al.* (1999: 563, fig. 3E).

Type locality: Sele Strait, Irian Jaya, Indonesia.

Vouchers: HEC 4252, 28. 5. 1980: Laing Island, lagoon passage; HEC 4661, 15. 8. 1980: Manam, Borda Reef; HEC 7980, 26. 7. 1988: Saidor area, Cape Iris – Bilian; Copp & PvR 13567, 5. 8. 1990: landward slope of the barrier reef, N. of Tab Island; Copp & PvR 13642: 8. 8. 1990: Bagabag, Bedilu.

Note: The morphological variability among the 18 specimens that we have examined from this coast is substantial. Thalli vary from lobed to branched blades or wide to narrow straps, and some have marginal and surface proliferations while others do not. Particularly variable is the degree of calcification, with some specimens being strongly calcified and whitish, and others less calcified and pinkish. Still other plants have sections of the blade that are calcified and sections that are completely uncalcified, with a clear-cut separation between the calcified and uncalcified sections. For the present, we choose to identify all these specimens as *T. weberae*, but it is clear that the genus is in need of critical revision.

Family **Solieriaceae****Callophycus** Trevisan

Callophycus serratus (Harvey *ex Kützing*) P. Silva 1957: 143.

Womersley and Bailey (1970: 319); Kraft (1984: 54–58, figs 2–16, 50); Millar *et al.* (1999: 564, fig. 4B).

Type locality: Tonga.

Vouchers: HEC 4498, 16. 7. 1980: Laing Island, S. E. coast; HEC 6539, 20. 8. 1986: Ulingan Bay, W. side; HEC 7855, 19. 7. 1988: Suaru; HEC 8059, 4. 8. 1988: Sek Point; Copp & PvR 13568, 5. 8. 1990: landward slope of the barrier reef, N. of Tab Island.

Order **Rhodymeniales**Family **Champiaceae****Champia** Desvaux

Champia compressa Harvey 1838: 402. **Figs 19, 20**

Cribb (1954: 25, pl. 4, fig. 3); Millar (1990: 371–373, figs 30A–D); Stegenga *et al.* (1997: 368, pl. 135, colour pl. 143).

Type locality: Muizenberg, False Bay, South Africa.
Vouchers: HEC 4360, 13. 6. 1980: Laing Island, N. coast; HEC 7844, 4. 4. 1988: Hansa Bay, Barol Point; HEC 7894, 21. 7. 1988: Bogia Bay, between the coast and Kolakola Island; Copp & PvR 13386, 15. 7. 1990: patch reef S. W. of Wongat Island; Copp & PvR 13440, 27. 7. 1990: landward slope of the barrier reef, N. of Wongat Island.

Note: After extensive comparisons between Korean specimens collected bimonthly, Park and Lee (1998: 91) showed that *C. bifida* Okamura (which consists of lax branching that is opposite at the base and alternate towards the apices) is nothing more than a growth form of typical *C. compressa* (in which branching is dense and opposite throughout). Within the PNG populations, we have found a similar variation between the two forms, which seems to be related to depth (shallow = *C. bifida* form and deep = *C. compressa* form). This contrasts with populations along the New South Wales coast of Australia where typical *C. compressa* is a shallow water and intertidal species.

Champia salicornioides Harvey 1853: 76–77, pl. 19B.
Fig. 21

Littler *et al.* (1989: 142, lower).

Type locality: Key West, Florida, U. S. A.

Vouchers: HEC 4454, 28. 6. 1980: Laing Island, S. E. coast; HEC 4640 a, 13. 8. 1980: Hansa Bay, Durangit Reef; HEC 4695, 17. 8. 1980: Hansa Bay, The Pinnacle; HEC 7644, 1. 7. 1988: Hansa Bay, Barol Point; Copp & PvR 13226, 18. 7. 1990: patch reef between Sinub Island and Wongat Island; Copp & PvR 13271, 20. 7. 1990: patch reef between Tausch Island and Sek Island.

Champia vieillardii Kützing 1866: 14, pl. 37, figs e, f.

Dawson (1954: 443, fig. 53); Millar (1990: 372, figs 30 E, F); Price and Scott (1992: 57, figs 15A–C, 16A–B).

Type locality: New Caledonia (*vide* Grunow, 1874: 34; Millar 1990: 372).

Vouchers: HEC 7836, 17. 7. 1988: Hansa Bay, Durangit Reef; HEC 7731, 7. 7. 1988: Boisa Island, S. coast; Copp & PvR 13709: 18. 8. 1990: Mugil Harbour, between the coast and Vidosi Island; HEC 7919, 25. 7. 1988: Saidor area, Gumbi Bay.

Family Lomentariaceae

Lomentaria Lyngbye

Lomentaria corallicola Børgesen 1939: 113, figs 30–32.

Cribb (1983: 71–72, pl. 21, figs 4–6); R. Norris (1987: 36–37, figs 5–8).

Type locality: Kharg Island, Iran.

Vouchers: HEC 4397, 22. 6. 1980: Laing Island, N. coast; HEC 4504, 16. 7. 1980: Laing Island, S. E.

coast; HEC 7896, 21. 7. 1988: Bogia Bay, between the coast and Kolakola Island.

Family Rhodymeniaceae

Asteromenia Huisman *et* Millar

Asteromenia peltata (W. R. Taylor) Huisman *et* Millar 1996: 138, figs 1–17. **Figs 22–24**

Taylor (1942: 113–114, pl. 3, fig. 9, pl. 16, figs 1–5; 1960: 477, pl. 54, figs 5–7 = *Fauchea peltata* W. R. Taylor); Nizamuddin and Gessner (1970: 10, pl. 14, figs 41, 42, pl. 19, fig. 56 as *Fauchea peltata*); Schneider [1975: 133–134, figs 2, 5, 6 = *Weberella peltata* (W. R. Taylor) Schneider]; Schneider and Searles [1991: 345, figs 406, 407 as *Halichrysis peltata* (W. R. Taylor) P. Huvé *et* H. Huvé].

Type locality: Tortuga Island, Venezuela.

Vouchers: HEC 4537, 19. 7. 1980: Hansa Bay, Barol Point; HEC 7519, 21. 6. 1988: Wongat Island; HEC 7868, 19. 7. 1988: Manam, Medibur; HEC 7984, 26. 7. 1988: Saidor, Cape Iris-Bilian; HEC 8089, 15. 6. 1988: Murukinam.

Note: The blade morphology is extremely variable among the many PNG specimens. Plants can be strictly peltate and have rounded, smooth margined blades (Fig. 22), or be acentrically placed on the stipe and have long, thin, dichotomous straps (Fig. 23), or have the stipe centrally placed and have star-like blades (Fig. 24) more typical of the bulk of populations described to date. These variations do not appear to be associated with changes in depth.

Botryocladia (J. Agardh) Kylin

Note: Two species, both represented in our collections by single, sterile, shortly-stipitate vesicles, are not included in this list.

Botryocladia skottsbergii (Børgesen) Levring 1941: 307, figs 49, 50.

Børgesen [1944: 23–26, figs 16–18, = *B. kuckuckii* (Weber-van Bosse) Yamada *et* T. Tanaka]; Jaasund (1976: 103, fig. 210); Trono (1997: 242, fig. 152).

Type locality: Isla de Pascua (Easter Island).

Voucher: HEC 8004, 28. 7. 1988: Wongat Island.

Note: Several of the PNG specimens agree well with *B. kuckuckii* (Weber-van Bosse) Yamada *et* Tanaka as described and illustrated by Børgesen (1944), but that species is considered a synonym of *B. skottsbergii* by Feldmann (1945) and Børgesen (1950).

Ceratodictyon Zanardini

Ceratodictyon spongiosum Zanardini 1878: 37.

Jaasund (1976: 89, fig. 179); Cribb (1983: 55–56, pl. 12, figs 3–4); Tseng (1984: 100, pl. 53, fig. 3); Price and Kraft (1991: 107–109, figs 1–13).

Type locality: Wokam, Aru Islands, Indonesia.

Vouchers: HEC 7473, 17. 6. 1988: Kolakola and Reamura Islet; HEC 6487, 17. 8. 1986: Laing Island;

Copp & PvR 13597, 7. 8. 1990: Nagada Harbour, in front of Gosem Island; Copp & PvR 13760, 19. 8. 1990: Hansa Bay, close to Awar Plantation.

Chrysomenia J. Agardh

Chrysomenia kaernbachii Grunow in Schumann et Hollrung 1889: 4. **Fig. 25**

Weber-van Bosse (1928: 469–470, figs 202, 203, pl. V, fig. 1); Cribb (1983: 67, pl. 19, fig. 1).

Type locality: Kelana, Papua New Guinea.

Vouchers: HEC 7576, 24. 6. 1988: Gosem Island; HEC 7675, 4. 7. 1988: Hansa Bay, Barol Point; HEC 7918, 25. 7. 1988: Saidor area, Gumbi Bay; Copp & PvR 13781, 20. 8. 1990: Boisa Island, N. coast; Copp & PvR 13809, 22. 8. 1990: Hole in the Wall, close to Mugil Harbour.

Note: Weber-van Bosse (1928: 469–471), in describing her Indonesian material, relates a specimen to *C. kaernbachii*, characterised by numerous internal filaments, especially around the cystocarps. She also describes a new species, *C. procumbens* Weber-van Bosse, distinguishing it from *C. kaernbachii* by the absence of internal filaments. Abbott and Littler (1970: 165–166) emphasise that this character is extremely variable, even within a thallus. Our material seems to be intermediate between both species and we therefore suspect that only one species is involved. Furthermore we also note a strong similarity with *C. okamurae* Yamada et Segawa (see Chihara 1975: 144).

Coelarthrum Børgesen

Coelarthrum cliftonii (Harvey) Kylin 1931: 15, fig. 4C.

Harvey (1858: pl. LVII, = *Chylocladia cliftonii* Harvey); Huisman (1996: 96, figs 1–15).

Type locality: Fremantle, Western Australia.

Voucher: HEC 7827, 16. 7. 1988: Manam, Baliu.

Coelarthrum decumbens Huisman 1996: 104, figs 26–34.

Millar (1999: 509, fig. 37).

Type locality: Neds Beach, Lord Howe Island, New South Wales, Australia.

Vouchers: Copp & PvR 13287, 20. 7. 1990: patch reef between Tausch and Sek Island; Copp & PvR 13449, 27. 7. 1990: landward slope of the barrier reef close to Wongat Island.

Note: This record considerably extends the known distribution of this species. It was recently recorded from Norfolk Island in the Coral Sea, its most easterly record (Millar 1999).

Gelidiopsis Schmitz

Gelidiopsis intricata (C. Agardh) Vickers 1905: 61.

Jaasund (1976: 87, fig. 177); Cribb (1983: 56–57, pl. 13, figs 1–2); Tseng (1984: 100, pl. 53, fig. 4); Price and Scott (1992: 51–52, figs 13A–F); Littler and Littler (1997: 47, fig. 44).

Syntype localities: Mauritius, Hawaiian Archipelago and Ravak, Indonesia.

Vouchers: HEC 4241, 27. 5. 1980: Laing Island, S. part of the lagoon; HEC 7516, 20. 6. 1988, Madang, patch reef in the middle of the lagoon in front of Nagada Harbour; HEC 7606, 27. 6. 1988: Mugil Harbour; Copp & PvR 13061, 9. 7. 1990: Nagada Harbour; Copp & PvR 13290, 20. 7. 1990: patch reef between Tausch Island and Sek Island.

Gelidiopsis repens (Kützing) Weber-van Bosse 1928: 425–426.

Kützing (1868: 21, pl. 60, figs a, b, = *Gelidium repens* Kützing); Jaasund [1976: 89, fig. 178, = *G. acrocarpa* (Harvey ex J. Agardh) Schmitz]; Wynne (1995: 282, 328, fig. 19).

Type locality: Wagap, New Caledonia.

Vouchers: HEC 4265, 31. 5. 1980: Hansa Bay, Durangit Reef; HEC 6599, 23. 8. 1986: Boisa Island; HEC 7963, 25. 7. 1988: Saidor area, Suit; HEC 8031, 1. 8. 1988: Ulingan Bay, W. side; Copp & PvR 13645, 8. 8. 1990: Bagabag, in front of Bedilu village.

Note: The PNG specimens compare closely with syntype material in NSW of Harvey's *Algae of Ceylon Exsiccatae* # 34 [as *Gelidiopsis acrocarpa* (Harvey ex Kützing) De Toni]. The distinction between *G. planicaulis* (W. R. Taylor) W. R. Taylor, as described and illustrated by Lawson and John (1982, 174, pl. 22, fig. 6) from the Atlantic Ocean, and our PNG material is not clear.

Gelidiopsis cf. **scoparia** (Montagne et Millardet) De Toni 1900: 410–411.

Kützing (1868: 16, pl. 46, figs d–f = *Gelidium scoparium* Montagne et Millardet); Littler and Littler (1997: 47, fig. 46).

Type locality: Réunion.

Voucher: Copp & PvR 13367, 23. 7. 1990: Medibur.

Note: The PNG specimens would appear to be a dwarf growth form of this otherwise larger species as they form extremely dense hemispherical cushions on the substrate (which may be a response to their surf zone habitat). They match Kützing's (1868: pl. 46, figs d–g) illustration in having compressed branches with numerous corymbose, terminal branchlets.

Halichrysis (J. Agardh) Schmitz

Halichrysis coalescens (Farlow) R. Norris et Millar in R. Norris 1991: 583, 585, 587, figs 7–13.

Taylor [1945: 249, pl. 66, figs 2–6, = *Drouetia coalescens* (Farlow) De Toni]; Millar (1990: 366, figs 28A–D, = *Drouetia coalescens*).

Type locality: Tagus Cove, Albemarle Island, Galapagos Islands.

Vouchers: HEC 6609, 23. 8. 1986: Boisa Island; HEC 8092, 15. 6. 1988: Murukinam.

Sciadophycus Dawson**Sciadophycus** sp.

Fig. 26

Vouchers: HEC 4444, HEC 4445, 28. 6. 1980: Laing Island, S. E. coast.

Note: This species has shield-like blades that branch dichotomously. There is no stipe, and in section the medulla is one- or occasionally two-layered with a thin monostromatic cortex. Tetrasporangia are terminally produced within raised nemathecia, the paraphyses being elongate and surrounding the individual tetrasporangia. Apart from the absence of a stipe, this matches the genus *Sciadophycus* as described by Dawson (1944). He emphasized the monostromatic nature of the medulla, which therefore differed from *Rhodymenia* in which the medulla is multilayered. Tetrasporangia are produced in nemathecia in both, but in *Rhodymenia*, a prominent stipe is generally present. The morphology and reproduction of the presently monotypic genus *Sciadophycus* is being revised by the second author, and this new species will be described as a result of that research.

Order Ceramiales

Family Ceramiaceae

Anotrichium Nägeli

Anotrichium planatum Millar 1990: 406, figs 48C–G.

Type locality: Muttonbird Island, Coffs Harbour, New South Wales, Australia.

Vouchers: HEC 4448, 28. 6. 1980: Laing Island, S. E. coast; HEC 4531, 18. 7. 1980: Laing Island, E-coast; HEC 7901, 21. 7. 1988: Bogia Bay, between the coast and Kolakola Island.

Note: This PNG record is a major range extension for a species initially thought to be endemic to the New South Wales coast of Australia.

Balliella Itono *et* Tanaka

Balliella crouanioides (Itono) Itono *et* Tanaka 1973: 250, figs 3–14, 18–22.

Itono (1971: 211–212, figs 2A, B, = *Antithamnion crouanioides* Itono).

Type locality: Mage Island, southern Japan.

Vouchers: HEC 4294, 3. 6. 1980: Hansa Bay, Bisalpap Reef; HEC 7830, 16. 7. 1988: Manam, Baliau; HEC 7986, 26. 7. 1988: Saidor area, Cape Iris – Bilian; Copp & PvR 13243, 18. 7. 1990: patch reef between Sinub Island and Wongat Island; Copp & PvR 13487, 2. 8. 1990: Bagabag, Christmas Bay, N. W. point.

Centroceras Kützing

Centroceras clavulatum (C. Agardh) Montagne 1846: 140.

Dawson (1954: 446, fig. 54h); Abbott and Hollenberg (1976: 604, fig. 547); Cribb (1983: 75, pl. 25, figs 2–3); Millar (1990: 390, figs 40E–G).

Type locality: Callao, Peru.

Voucher: Copp & PvR 13748, 19. 8. 1990: Hansa Bay, Awar.

Ceramium Roth

Ceramium fastigiatum Harvey forma *flaccidum* Petersen in Børgesen 1918: 241, fig. 231.

Nakamura (1965: 130: fig. 4); Itono (1972a: 78, fig. 7); Coppejans (1983: pl. 161).

Syntype localities: various in Virgin Islands.

Voucher: Copp & PvR 13408 b, 26. 7. 1990: patch reef between Sek Island and Tausch Island.

Note: Although our material is sterile, it matches very well the descriptions and illustrations of *C. fastigiatum* var. *flaccidum* by Itono (1972a), Nakamura (1965) and Coppejans (1983), which according to Silva *et al.* (1996: 392) may lie within the circumscription of *C. cimbricum* Petersen.

Ceramium codii (Richards) Mazoyer 1938: 324.

Jaasund (1976: 107, fig. 216); Coppejans (1983: pl. 156); Cribb (1983: 80–81, pl. 27, figs 1–4); Millar (1990: 393–394, figs 41D–F, 43B); Price and Scott (1992: 86–87, figs 26A–D).

Type locality: Bermuda.

Vouchers: Copp & PvR 13455 b: landward slope of the barrier reef, N. of Wongat Island; Copp & PvR 13749 b, 19. 8. 1990: Hansa Bay, Awar.

Ceramium* cf. *filicula Harvey *ex* Womersley 1978: 238–240, figs 4E, F, 15A–E (as *C. 'filiculum'*).

Millar (1990: 394, figs 41G–I, 44A–C).

Type locality: Port Noarlunga, South Australia.

Voucher: HEC 6600 c, 27. 8. 1986: Boisa Island.

Note: The PNG plants lack the groups of rhizoids that issue from prostrate axes, which are characteristic for this species but other morphological details match well.

Ceramium flaccidum (Kützing) Ardissonne 1871: 40.

Jaasund (1976: 105, figs 214A–E = *C. taylorii* Dawson); Cribb (1983: 82–83, pl. 31, fig. 2, pl. 59, figs 1–4); Millar (1990: 395–396, figs 42A–E, 43C–E); Price and Scott (1992: 89–90, figs 27A–E); Wynne (1995: 292–294, fig. 36).

Type locality: Kilkee, County Clare, Ireland.

Vouchers: HEC 6600 b, 27. 8. 1986: Boisa Island; HEC 7708, 5. 7. 1988: Laing Island.

Ceramium tenerrimum (G. Martens) Okamura 1921: 112–114, pl. 179: figs 1–7.

Feldmann-Mazoyer (1941: 289, figs 107, 108).

Type locality: Nagasaki, Japan.

Vouchers: Copp & PvR 13746 b, 19. 8. 1990: Hansa Bay, Awar, on *Hypnea cornuta*; Copp & PvR 13746 a; Copp & PvR 13794, Copp & PvR 13828 b, 22. 8. 1990: lagoon between Sarang Harbour and Walog.

Crouania J. Agardh

Crouania capricornica Saenger *et* Wollaston 1982: 79–82, pl. 6: figs 1–3.

Millar (1990: 384, figs 37A–F).

Type locality: Auckland Creek, Port Curtis, Queensland, Australia.

Vouchers: HEC 7668, 3. 7. 1988: Hansa Bay, between Barol Point and Hansa Point; Copp & PvR 13389, 15. 7. 1990: Wongat Island; Copp & PvR 13455, 27. 7. 1990: landward slope of the barrier reef, N. of Wongat Island.

Dasyphila Sonder

Dasyphila plumarioides Yendo 1920: 7.

Womersley and Bailey (1970: 326, fig. 9); Kraft and Wilson (1997: 139–146, figs 3–31); Millar *et al.* (1999: 567, fig. 4F).

Type locality: Hung-t'ou Island, Taiwan.

Voucher: HEC 8056, 4. 8. 1988: Sek Point.

Griffithsia C. Agardh

Griffithsia metcalfei Tseng 1942 b: 111–115, figs 5–9.

Abbott (1946: 440, pl. 2, figs 3–6); Millar (1990: 410, figs 50C, D).

Type locality: Yinggehai, Hainan, China.

Voucher: HEC 4706, 19. 8. 1980: Laing Island, N. coast.

Griffithsia subcylindrica Okamura 1930: 99, pl. 8.

Tseng (1942 b: 108, figs 2–3); Cribb (1983: 92, pl. 24, fig. 1); Millar (1990: 411, figs 50E–F).

Type locality: Hachijo-jima, Izu-shoto, Japan.

Vouchers: HEC 6516, 17. 8. 1986: Suaru; HEC 7444, 16. 6. 1988: Laing Island, lagoon; HEC 7663, 3. 7. 1988: Hansa Bay, between Barol Point and Hansa Point; HEC 7905, 21. 7. 1988: Hatzfeldthafen.

Griffithsia teges Harvey 1855: 559.

Baldock (1976: 541, figs 40–43, 84, 85).

Type locality: Fremantle, Western Australia.

Vouchers: Copp & PvR 13443: landward slope of the barrier reef N. of Wongat Island; Copp & PvR 13697: 18. 8. 1990: Mugil Harbour, between the coast and Vidosi Island.

Note: Although this represents a major range extension for this species, it has been recorded from Norfolk Island in the South Pacific by Millar (1999).

Haloplegma Montagne

Haloplegma duperreyi Montagne 1842: 258–261, pl. 7, fig. 1.

Cribb (1983: 92, pl. 28, figs 1–3); Tseng (1984: 130: pl. 68, fig. 4); Littler *et al.* (1989: 168, lower); Price and Scott (1992: 127–129, figs 43A–D).

Type locality: Martinique, West Indies.

Vouchers: HEC 4475, 14. 7. 1980: Laing Island; HEC 7661, 3. 7. 1988: Hansa Bay, between Barol

Point and Hansa Point; HEC 8006, 28. 7. 1988: Saidor area, Cape Iris – Bilian; Copp & PvR 13665, 15. 8. 1990: landward slope of the barrier reef, N. of Tab Island; Copp & PvR 13821, 22. 8. 1990: Hole in the Wall, close to Mugil Harbour.

Note: The PNG specimens have thalli that are regularly open-meshed, their filaments of limited growth are branched, and they match closely the illustrations in Kützing (1862: pl. 62 a–c).

Haloplegma preissii (Harvey) Montagne 1845: 149 footnote.

Kützing (1862: 19, pl. 63 d, e); Lucas and Perrin (1947: 336, fig. 163).

Type locality: Swan River Colony (Perth), Western Australia.

Voucher: HEC 4674, 16. 8. 1980: Manam, Borda Reef (–50 m).

Note: These specimens display very irregular meshes, the filaments of limited growth are mostly unbranched, and they match closely to the illustrations in Kützing (1862: pl. 63 d, e).

Spyridia Harvey

Spyridia filamentosa (Wulfen) Harvey 1833: 337.

Jaasund (1976: 111, fig. 224); Magruder and Hunt (1979: 93, fig. 3, p. 92); Cribb (1983: 94, pl. 26, figs 2–4; 1996: 117, ill. p. 116 upper); Tseng (1984: 132, pl. 69: fig. 3); Littler *et al.* (1989: 150, upper).

Type locality: Adriatic Sea.

Vouchers: HEC 4427, 25. 6. 1980: Laing Island; HEC 4627, 11. 8. 1980: Hansa Bay, between both ship wrecks; HEC 8054, 3. 8. 1988: Kranket Island, S. W. bay; Copp & PvR 13753, 19. 8. 1990: Hansa Bay, Awar; Copp & PvR 13790, 22. 8. 1990, between Sarang Harbour and Walog.

Wrangelia C. Agardh

Wrangelia argus (Montagne) Montagne 1856: 444. Littler *et al.* (1989: 146, lower).

Type locality: Roque del Gando, Canary Islands.

Vouchers: HEC 4675, 16. 8. 1990: Manam, Borda Reef; Copp & PvR 13390, 15. 7. 1990: Wongat Island; Copp & PvR 13457, 27. 7. 1990: landward slope of the barrier reef N. of Wongat Island.

Wrangelia plumosa Harvey 1844: 450.

Gordon (1972: 21, figs 4, 5, 10G, H, J, 51); Millar (1990: 401, figs 48A, B).

Type locality: Georgetown, Tasmania.

Voucher: HEC 6604, 23. 8. 1986: Boisa Island.

Note: This represents a major range extension for this species, which has, however, also been recorded from Norfolk Island in the South Pacific by Millar (1999).

Wrangelia tanegana Harvey 1860: 331.

Tseng (1942 a: 264–269, figs 4–7, pl. 10, = *W. tayloriana* Tseng); Millar (1999: 516, fig. 41).

Type locality: Tanega-shima, Osumi-shoto, Japan.

Vouchers: HEC 6456, 15. 8. 1986: Laing Island, lagoon; HEC 7653, 1. 7. 1988: Hansa Bay, Barol Point; Copp & PvR 13090, 10. 7. 1990: Nagada Harbour; Copp & PvR 13530, 2. 8. 1990: Bagabag, Christmas Bay, N. W. point.

Wrangelia velutina (Sonder) Harvey 1855: 546.

Fig. 28

Harvey (1858: pl. XLVI); Kützing (1862: 5, pl. 14, figs d–g); Lucas and Perrin (1947: 136, fig. 9); Gordon (1972: 27–29, 151, figs 6, 10I, 49C, 52).

Type locality: Western Australia.

Vouchers: HEC 4672, 15. 8. 1980: Manam, Borda Reef; HEC 6592, 23. 8. 1986: Boisa Island; HEC 7732, 7. 7. 1988: Boisa Island, S-coast; Copp & PvR 13764, 20. 8. 1990: Boisa Island, N. and N. E. coast.

Family Dasyaceae

Dasya C. Agardh

Dasya baillouviana (S. Gmelin) Montagne 1841: 165. Cribb (1983: 101, pl. 65, figs 1–4); Littler *et al.* (1989: 152, lower); Schneider and Searles (1991: 420, fig. 496).

Type locality: Mediterranean Sea.

Voucher: Copp & PvR 13459, 27. 7. 1990: landward slope of the barrier reef N. of Wongat Island.

Dasya iyengarai Børgesen 1937: 345, figs 16–17.

Cribb (1983: 103–104, pl. 64, figs 2–4); Millar (1990: 431–432, figs 58A–F); Price and Scott (1992: 154–156, figs 53A–D). Millar *et al.* (1999: 569, fig. 5B).

Type locality: Pamban Bridge, Tamil Nadu, India.

Vouchers: HEC 7771, 13. 7. 1988: Laing Island; HEC 7900, 21. 7. 1988: Bogia Bay, between coast and Kolakola Island; Copp & PvR 13454, 27. 7. 1990: landward slope of the barrier reef, N. of Wongat Island; Copp & PvR 13224, 18. 7. 1990: patch reef between Sinub Island and Wongat Island; Copp & PvR 13791, 22. 8. 1990: lagoon between Sarang Harbour and Walog.

Dasya kristeniae Abbott 1998: 105, figs 17–22.

Type locality: dredged near Necker Island, near Hawaii.

Vouchers: HEC 7899, 21. 7. 1988: Bogia Bay, between coast and Kolakola Island; Copp & PvR 13830, 22. 8. 1990: lagoon between Sarang Harbour and Walog.

Note: We identify this species as *D. kristeniae* because the PNG plants are completely ecorticate (except for small rhizoids at the very base), and the cystocarps have a distinct trumpet-like ostiole, characters reported by Abbott as being diagnostic.

Dasya palmatifida (Weber-van Bosse) Millar *et* Coppejans, *comb. nov.*

Basionym: *Dasyopsis palmatifidus* Weber-van Bosse (1913: 130, pl. 13, fig. 21); homotypic synonym: *Eupogodon palmatifidus* (Weber-van Bosse) P. Silva *in* P. Silva, Meñez *et* Moe (1987: 130); Millar (1996: 156, fig. 32).

Heterotypic synonyms: *Dasyopsis geppii* Weber-van Bosse (1914: 294, pl. 17, figs 18–20, pl. 18, fig. 33). *Eupogodon geppii* (Weber-van Bosse) P. Silva *in* P. Silva, Meñez *et* Moe (1987: 130).

Lectotype locality: 'doe, baei' Roti Island, W-Timor, *fide* Millar 1996: 146.

Voucher: HEC 7573, 24. 6. 1988: Massa Island.

Note: Millar (1996), in his comparisons between the dasyaceous genera, was unable to unequivocally confirm the placement of this species in the genus *Eupogodon* or elsewhere within the family. The single PNG specimen collected is a male gametophyte bearing spermatangial branches borne on monosiphonous pseudolaterals precisely as illustrated by Weber-van Bosse in her protologue of *Dasyopsis geppii* and *D. palmatifidus*. The apices of all branchlets and blades are clearly radially organised even though the blades are secondarily bilaterally organised. We examined the type specimen of *D. palmatifidus* (in L) and several fertile specimens of *D. geppii* collected by E. Y. Dawson from the Maldives (BISH, Hawaii). We concluded that *D. geppii* and *D. palmatifidus* are conspecific and that they represent a species of *Dasya*. Although *Dasya palmatifida* is prominently flattened, unlike the majority of *Dasya* species, *D. roslyniae* Millar *et* Chidgey (Millar 1996) is at least one other distinctly flattened species.

Heterosiphonia Montagne

Heterosiphonia crispella (C. Agardh) Wynne 1985 b: 87.

Jaasund [1976: 121, fig. 246 = *H. wurdemannii* (Bailey *ex* Harvey) Falkenberg]; Coppejans (1983: pl. 225, = *H. wurdemannii*); De Clerck and Coppejans (1996: 259, fig. 102).

Type locality: near Cádiz, Spain.

Voucher: HEC 7544 b, 22. 6. 1988: landward slope of the barrier reef, close to Wongat Island (mixed with *Nitophyllum* sp., HEC 7544 a).

Family Delesseriaceae

Caloglossa (Harvey) Martens

Caloglossa leprieurii (Montagne) Martens 1869: 234, 237.

Jaasund (1976: 117, fig. 238); Tseng (1984: 136, pl. 71, fig. 3); J. Tanaka and Chihara (1988: 98, fig. 10).

Type locality: Cayenne, French Guiana.

Voucher: Copp & PvR 13866, 29. 8. 1990: Nagada Harbour (mixed with *Bostrychia*).

Cottoniella Børgesen*Cottoniella amamiensis* Itono 1972b: 57–59, fig. 4.

Wynne and R. Norris (1991: 263–265, figs 7, 8).

Type locality: Tatsugo, Amami-oshima, Kagoshima Prefecture, Japan.*Voucher*: Copp & PvR 13475, 1. 8. 1990: landward slope of the barrier reef close to Wongat Island.*Frikkiella* Wynne *et* Schneider*Frikkiella* cf. *searlesii* Wynne *et* Schneider 1996: 78, figs 1, 2, 5, 8, 10, 13, 15, 16, 18–20.*Type locality*: St David's Island, Bermuda.*Voucher*: HEC 4361, 13. 6. 1980: Laing Island.

Note: The PNG species, of which we have only a few plants, displays the main features of the genus; i. e. lateral blades are initiated from random marginal cells and third-order cell rows are produced from only a few cells of the second-order (Wynne and Schneider 1996). The two described species of *Frikkiella* [*F. searlesii* and *F. pseudoprostrata* (Ballantine *et* Wynne) Wynne *et* Schneider] differ in apical organisation, shape of tetrasporangial sori and appearance of the cells of the alae. Because the PNG plants are sterile, we can only make comparisons based on the vegetative features. In *F. searlesii*, third-order rows are produced only from outer cells of the second-order cell rows, and the alae immediately adjacent to the midrib are distromatic. In *F. pseudoprostrata*, only the inner cells of the second order produce third-order rows, and the alae are monostromatic. The PNG species would thus be allied with *F. searlesii*. In addition, our plants share with *F. searlesii* polygonally shaped cells of the alae, and these differ from the laterally elongate cells of *F. pseudoprostrata*. Until tetrasporangial specimens are discovered, the identification of the PNG plants must remain tentative.

Hypoglossum Kützing*Hypoglossum anomalum* Wynne *et* Ballantine 1986: 189, figs 1–15.

Wynne and R. Norris (1991: 269, figs 19–22, 25).

Type locality: La Parguera, Puerto Rico.*Voucher*: HEC 4393, 22. 6. 1980: Laing Island.

Note: This distinctive species has now been reported from all three major oceans, including the Caribbean, eastern Australia (Wynne 1989), the Seychelles (Wynne *et al.* 1989, Wynne 1995) and South Africa (Wynne and R. Norris, 1991).

Hypoglossum heterocystideum (J. Agardh) J. Agardh 1898: 187.Womersley and Shepley [1982: 326, figs 1B, C, 4, as *H. hypoglossoides* (Harvey) Womersley *et* Shepley].*Type locality*: Port Phillip Heads, Victoria, Australia.*Voucher*: HEC 4450, 28. 6. 1980: Laing Island.

Note: The PNG material is sterile, but the gross morphological features are very similar to those of

H. heterocystideum, which has recently been collected from the Philippines (pers. obs.).

Hypoglossum sp.

Fig. 29

Vouchers: HEC 4417, 23. 6. 1980: Laing Island lagoon; HEC 7895, 21. 7. 1988: Bogia Bay, close to Kola Kola Island; HEC 7974, 26. 7. 1988: Saidor area: Cape Iris – Bilian; Copp & PvR 13233, 18. 7. 1990: patch reef between Sinub and Wongat Island; Copp & PvR 13710, 18. 8. 1990: Mugil Harbour.

Note: Within the genus *Hypoglossum*, species are divided into two groups: those in which all cells of the second-order cell rows bear third-order rows, and those in which only some cells of the second-order bear third-order rows. This PNG species would therefore be allied with the latter group, which contains 5 species according to Wynne *et al.* (1989), who point out that three additional species still remain of uncertain status due to inadequate descriptions of their apical development. The present species appears to differ from these 8 species in that the primary axial cell row (midrib) often continues growth without any substantial blade formation, becoming stolon-like. A close ally would be found in *H. simulans* Wynne, Price *et* Ballantine in that the PNG species produces a branch from the basal segment of the parent blade and thus gives the appearance of a pair of branches of the same order (see Wynne *et al.* 1989, figs 15, 20). In many other respects, the present species appears to be undescribed and will be the subject of further critical analyses.

Martensia Hering*Martensia australis* Harvey 1855: 537.

Harvey (1858: pl. VIII); Kützing (1869: 22, pl. 58); Millar (1990: 416, figs 52A–C).

Type locality: King George Sound, Western Australia.*Vouchers*: HEC 4219, 25. 5. 1980: Laing Island; HEC 8010, 26. 7. 1988: Saidor area, Cape Iris, Bilian.*Martensia fragilis* Harvey 1854: 145.

Littler *et al.* [1989: 134, upper = *M. pavonia* (J. Agardh) J. Agardh]; Millar (1990: 418–420, figs 53C–E); Price and Scott (1992: 143–144, figs 49A–D = *M. pavonia*); Yoshida and Mikami (1996: 101–103, figs 4–18); Millar (1999: 519, fig. 40); Millar *et al.* (1999: 570, fig. 5D).

Type locality: Belligam, Sri Lanka.

Vouchers: HEC 4274, 1. 6. 1980: Laing Island; Copp & PvR 13505, 2. 8. 1990: Bagabag, Christmas Bay; Copp & PvR 13570, 5. 8. 1990: landward slope of the barrier reef, N. of Tab Island; Copp & PvR 13701, 18. 8. 1990: Mugil Harbour.

Neomartensia Yoshida *et* Mikami*Neomartensia flabelliformis* (Harvey *ex* J. Agardh) Yoshida *et* Mikami 1996: 105–106, figs 3, 25–36.

Millar *et al.* (1999: 570, fig. 5E).

Type locality: Tonga.

Voucher: HEC 7512, 20. 6. 1988: patch reef in front of Jais Aben (Madang).

***Nitophyllum* Greville**

Nitophyllum punctatum (Stackhouse *in* Withering) Greville 1830: 47. **Fig. 30**

Harvey (1847: pl. CCII); Maggs and Hommersand (1993: 259, fig. 81).

Type locality: Weymouth, Dorset, England.

Vouchers: HEC 4396, 22. 6. 1980: Laing Island, N. coast; HEC 4447, 28. 6. 1980: Laing Island, S. E. coast; HEC 4497, 15. 7. 1980: Laing Island, S. E. coast; HEC 4530, 18. 7. 1980: Laing Island, E. coast; HEC 4731, 25. 8. 1980: Laing Island.

Note: This record represents a major range extension for the species, which was previously known from the North Atlantic and Indian Ocean.

***Vanvoorstia* Harvey**

Vanvoorstia spectabilis Harvey 1854: 144, pl. V.

Papenfuss (1937: 31–54, figs 28–54); Jaasund (1976: 119, fig. 240); Cribb (1983: 100, pl. 32, fig. 1, pl. 63, fig. 4); Millar *et al.* (1999: 570, fig. 5F).

Type locality: Belligam, Sri Lanka.

Vouchers: HEC 7822, 16. 7. 1988: Manam, Baliau; HEC 8101, 16. 6. 1988: Laing Island, lagoon-side of the reef.

***Zellera* Martens**

Zellera tawallina Martens 1868: 33, pl. VIII, fig. 3.

Verheij and Prud'homme van Reine (1993: 443, pl. 14, fig. 8); Millar *et al.* (1999: 570, fig. 6A).

Type locality: Tawaliketjil, Indonesia.

Vouchers: HEC 4325, 10. 6. 1980: Hansa Bay, Wanginem Reef; HEC 6585, 23. 8. 1986: Boisa Island; HEC 7906, 25. 7. 1988: Saidor area, Gumbi Bay; Copp & PvR 13413, 26. 7. 1990: patch reef between Tausch and Sek Island; Copp & PvR 13483, 2. 8. 1990: Bagabag, Christmas Bay, N. W. point.

Family **Rhodomelaceae**

***Acanthophora* Lamouroux**

Acanthophora spicifera (Vahl) Børgesen 1910: 201.

Jaasund (1976: 137, fig. 276); Magruder and Hunt (1979: 57, fig. 1, p. 56); Cribb (1983: 105–106, pl. 32, fig. 2); Tseng (1984: 142, pl. 74, fig. 2); Littler *et al.* (1989: 188, upper); Verheij and Prud'homme van Reine (1993: 444, pl. 15, fig. 2).

Type locality: St. Croix, Virgin Islands.

Vouchers: HEC 6607, 23. 8. 1986: Boisa Island; HEC 7491, 20. 6. 1988: Madang, Nagada Harbour; HEC 7875, 21. 7. 1988: Hatzfeldthafen; HEC 7937, 25. 7. 1988: Saidor area, Gumbi Bay; Copp & PvR 13512, 2. 8. 1990: Bagabag, Christmas Bay.

***Bostrychia* Montagne**

Bostrychia tenella (Lamouroux) J. Agardh 1863: 869–871.

Jaasund (1976: 127, fig. 258); Cribb (1983: 106–107, pl. 66, figs 3–4); Tseng (1984: 144, pl. 75, fig. 3); King and Puttock (1989: 34–37, figs 15A–D); Littler *et al.* (1989: 174, upper).

Type locality: St. Croix, Virgin Islands.

Vouchers: HEC 6559, 20. 8. 1986: Ulingan Bay, W. side; HEC 7616, 27. 6. 1988: Mugil Harbour; HEC 7945, 25. 7. 1988: Saidor area, Gumbi Bay; HEC 8003 a, b, 28. 7. 1988, Wongat Island; Copp & PvR 13866, 29. 8. 1990: Nagada Harbour.

***Chondria* C. Agardh**

Note: Within the present collections, there are seven different entities of which only two are clearly identifiable. The remainder are either sterile or represented by only a few specimens and do not match any descriptions in the literature. Tropical representatives of the genus have been dealt with only incidentally in monographs of temperate species (e. g. Gordon-Mills and Womersley 1987). Until better collections have been obtained, we are not prepared to give identifications to these particular species.

Chondria armata (Kützinger) Okamura 1907: 69, pl. XVI, figs 9–19.

Jaasund (1976: 135, fig. 272); Cribb (1983: 107–108, pl. 33, fig. 1); Tseng (1984: 144, pl. 75, fig. 4); Millar (1990: 459–460, figs 71A–B).

Type locality: Wagap, New Caledonia.

Vouchers: HEC 4621, 9. 8. 1980: between Kanamur and Bagania; 6466, 8. 1986: Laing Island; HEC 6586, 23. 8. 1986: Boisa Island; HEC 8086, 15. 6. 1988, Murukinam; Copp & PvR 13306, 21. 7. 1990: Neptunus Point (close to Ulingan Bay).

Chondria dangeardii Dawson 1954: 460, figs 62 f, g.

Millar (1999: 520, fig. 56).

Type locality: Dakar, Senegal.

Vouchers: HEC 7982, 26. 7. 1988: Saidor area, Cape Iris – Bilian; Copp & PvR 13422, 27. 7. 1990: Tab Island; Copp & PvR 13708, 18. 8. 1990: Mugil Harbour, between the coast and Vidosi Island.

Chondrophyucus (Tokida *et* Saito *in* Saito) Garbary *et* Harper

Note: The subgenus *Chondrophyucus* was recently raised to generic rank by Garbary and Harper (1998), who however, when making the new combinations, incorrectly declined the specific epithets as feminine when they should have been either masculine or neuter. In accordance with Art. 62.2(c) of the International Code of Botanical Nomenclature, compounds ending in -phycus should be treated as neuter since the Greek *phykos* is neuter. Traditionally, phycus has been treated as masculine more times than neuter (33/

23), and we therefore choose to accept the epithets as masculine.

Chondrophycus cartilagineus (Yamada) Garbary et Harper 1998: 194.

Yamada (1931: 230, text fig. o, pl. 19, fig. a, = *Laurencia cartilaginea* Yamada); Verheij and Prud'homme van Reine (1993: 446, pl. 15: 5, = *L. cartilaginea*).

Type locality: Chikuzen and Iyo Prefectures, Japan.

Vouchers: HEC 4240, 27. 5. 1980: Laing Island, lagoon reef; HEC 7881, 21. 7. 1988: Hatzfeldthafen; HEC 7933, 25. 7. 1988: Saidor area, Gumbi Bay; Copp & PvR 13353, 23. 7. 1990: Sarang Harbour.

Chondrophycus columellaris (Børgesen) *comb. nov.*

Basionym: *Laurencia columellaris* Børgesen 1945: 53–56, figs 28–30.

Jaasund (1976: 143, fig. 290).

Type locality: Réunion.

Voucher: HEC 7624, 27. 6. 1988: Neptune Point.

Note: Børgesen (1945) describes this species as having naked proximal portions of the axes and numerous short, determinate laterals in distal regions. The PNG specimens match these characters. Microscopic examination of our plants reveal that there are no secondary pit connections between the cortical cells and that there are two pericentral cells per axial cell. These features are now considered diagnostic for the genus *Chondrophycus* as interpreted by Garbary and Harper (1998) and we therefore transfer this species to that genus.

Chondrophycus intermedius (Yamada) Garbary et Harper 1998: 195.

Yamada (1931: 191–192, pl. 1, fig. c, pl. 2, = *Laurencia intermedia* Yamada); Chihara (1975: 160, upper left, = *L. intermedia*); Jaasund (1976: 139, fig. 282, pl. 11, = *L. intermedia*).

Type locality: Enoshima, Kanagawa Prefecture, Japan.

Voucher: HEC 10333, 29. 7. 1994: patch reef E. of Loloata Island.

Chondrophycus papillosus (C. Agardh) Garbary et Harper 1998: 195.

Jaasund (1976: 139, fig. 281); Littler *et al.* (1989: 182, lower); Verheij and Prud'homme van Reine (1993: 447, pl. 16: 2); De Clerck and Coppejans (1996: 263, figs 113–114); Millar *et al.* (1999: 572, fig. 6C). All = *Laurencia papillosa* (C. Agardh) Greville.

Type locality: Mokha, Yemen.

Vouchers: HEC 4608, 9. 8. 1980: between Kanamur and Baganja; HEC 6481, HEC 6507, 17. 8. 1986: Suraru; HEC 7651, 1. 7. 1988: Hansa Bay, Barol Point.

Herposiphonia Nägeli

Herposiphonia secunda (C. Agardh) Ambronn 1880: 197.

Hollenberg (1968 a: 555, fig. 14); Jaasund (1976: 129, fig. 262); Millar (1990: 451–452, figs 68A–C).

Type locality: Mediterranean Sea.

Vouchers: Copp & PvR 13167 b, 15. 7. 1990: Island N. of Demasa Island, epiphytic on *Galaxaura rugosa*.

Herposiphonia secunda forma *tenella* (C. Agardh)

Wynne 1985: 173, 175, figs 11, 12.

Type locality: Sicily.

Vouchers: HEC 4298 b, 3. 6. 1980: Hansa Bay, Bisalpap Reef; HEC 4377, 17. 6. 1980: Laing Island.

Laurencia Lamouroux

Laurencia brongniartii J. Agardh 1841: 20–21.

Millar (1990: 463, figs 74A–E); Verheij and Prud'homme van Reine (1993: 446, pl. 15: 4); Cribb (1996: 99, ill. p. 98, middle).

Type locality: Martinique, West Indies.

Voucher: HEC 7835, 17. 7. 1988: Hansa Bay, Durangit Reef.

Laurencia cf. distichophylla J. Agardh 1852: 762–763.

Jaasund (1976: 141, fig. 286, pl. 12); Saito and Womersley (1974: 841, fig. 22).

Type locality: 'in oceano australi?' (probably New Zealand).

Vouchers: HEC 6465, 15. 8. 1986: Laing Island; HEC 7468, 17. 6. 1988: Bogia Bay, Kolakola Island; Copp & PvR 13266, 19. 7. 1990: patch reef seaward of Ruo Island.

Note: The PNG plants display all the features of this species, except that they are often terete rather than being compressed as described by Saito and Womersley (1974), who mention that branches are not complanate when crowded, which is the habit mostly observed in our specimens.

Laurencia galtsoffi Howe 1934: 39, fig. 5.

Saito (1969: 151, fig. 4 b); Chang and Xia (1985: 56, text fig. 4, pl. 1, fig. 6); McDermid (1988: 233, figs 10, 11).

Syntype localities: Pearl and Hermes Reef, north-west Hawaiian Islands.

Voucher: HEC 7724, 7. 7. 1988: Boisa Island, N. coast.

Laurencia majuscula (Harvey) Lucas 1935: 223.

Saito and Womersley (1974: 820, figs 1A, 6); Cribb (1983: 120–121, pl. 37, fig. 3); Tseng (1984: 152, fig. 3); Wynne (1995: 310, 316, fig. 63); Millar *et al.* (1999, 572: fig. 6B).

Type locality: Rottnest Island, Western Australia.

Voucher: HEC 8007, 29. 7. 1988: Hansa Bay, Awar.

Laurencia obtusa (Hudson) Lamouroux 1813: 130.

Jaasund (1976: 143, fig. 289); Magruder and Hunt (1979: 81, fig. 2, p. 80); Tseng (1984: 152, pl. 79, fig. 4); Littler *et al.* (1989: 182, upper); Verheij and Prud'homme van Reine (1993: 447, pl. 16: 1); De Clerck and Coppejans (1996: 263, figs 110–112).

Type locality: unspecified, probably England.

Vouchers: HEC 4290, 2. 6. 1980: Hansa Bay, Bisalpap Reef; HEC 4327, 10. 6. 1980: Hansa Bay, Awar Point; HEC 4703, 19. 8. 1980: Laing Island, N. coast; HEC 7707, 5. 7. 1988: Laing Island; HEC 7774 a, 13. 7. 1988: Laing Island.

Laurencia pedicularioides Børgesen 1933: 136, pl. IX. Millar *et al.* (1999: 573, fig. 6D).

Type locality: Dwarka, Gujarat, India.

Vouchers: HEC 4275, 1. 6. 1980: Laing Island, lagoon; HEC 4519, 17. 7. 1980: Bogia, Outer Legoarant Island; HEC 8034, 1. 8. 1988: Ulingan Bay, W. side; Copp & PvR 13400, 26. 7. 1990: patch reef between Tausch and Sek Island; Copp & PvR 13625, 8. 8. 1990: Bagabag, Christmas Bay, S. E. point.

Laurencia tenera Tseng 1943: 200–202, pl. 1, fig. 6; pl. 2, figs 5, 6.

Type locality: Shek-O, Hong Kong.

Vouchers: HEC 4446: Laing Island, S. E. coast; HEC 7706, 5. 7. 1988: Laing Island; Copp & PvR 13583, 5. 8. 1990: landward slope of the barrier reef, N. of Tab Island.

Note: The PNG plants lack the anastomosing, hapteroidal branches that are said to be typical of this species, but all other reproductive and morphological features match well.

Leveillea Decaisne

Leveillea jungermannioides (Hering *et* Martens) Harvey 1855: 539.

Jaasund (1976: 131, fig. 265); Cribb (1983: 127128, pl. 32, figs 4); Tseng (1984: 156, pl. 81, fig. 3); Wynne (1995: 315, fig. 71); De Clerck and Coppejans (1996: 265, figs 127–128).

Type locality: El Tor, Egypt.

Voucher: HEC 7866 c, 19. 7. 1988: Suaru, epiphytic on *Sargassum* sp.

Lophocladia (J. Agardh) Schmitz

Lophocladia kuetzingii (Kuntze) P. Silva *in* P. Silva, Basson *et* Moe 1996: 524.

Kützing (1864: 26, pl. 71, figs e, f).

Type locality: Fremantle, Western Australia.

Vouchers: HEC 4380, 18. 6. 1980: Laing Island; HEC 4659, 14. 8. 1980: Hansa Bay, Durangit Reef; HEC 7688, 5. 7. 1988, Laing Island; Copp & PvR 13356, 23. 7. 1990: Sarang Harbour; Copp & PvR 13454, landward slope of barrier reef, N. of Wongat Island.

Note: Two growth forms, which appear to be depth-dependent, are distinguishable in the PNG collections: a rather dense shallow-water form and an elegant deep-water form.

Melanamansia R. Norris

Melanamansia glomerata (C. Agardh) R. Norris 1995: 66.

Magruder and Hunt (1979: 59, fig. 1, p. 58, = *Amansia glomerata* C. Agardh); Cribb (1983: 106, pl. 31, fig. 1, = *A. glomerata*); Tseng (1984: 142, pl. 74, fig. 4, = *A. glomerata*); Verheij and Prud'homme van Reine (1993: 444, pl. 15, fig. 3, = *A. glomerata*); Millar *et al.* (1999: 573, fig. 6E).

Type locality: Hawaiian Archipelago.

Vouchers: HEC 4227, 26. 5. 1980: Laing Island; HEC 7666, 3. 7. 1988: Hansa Bay, between Barol Point and Hansa Point; HEC 7820, 16. 7. 1988: Manam, Baliu; Copp & PvR 13595, 7. 8. 1990: Nagada Harbour, close to Gosem Island; Copp & PvR 13822, 22. 8. 1990: Hole in the Wall, close to Mugil Harbour.

Murrayella Schmitz

Murrayella pericladus (C. Agardh) Schmitz 1893: 227.

Jaasund (1976: 127, fig. 256); Lawson and John (1982: 348, pl. 57, figs 6–7); Wynne (1995: 315, figs 72, 73).

Type locality: St. Croix, Virgin Islands.

Vouchers: HEC 4221, 25. 5. 1980: Laing Island, S. lagoon; HEC 6558, 20. 8. 1986: Ulingan Bay, W. side.

Neurymenia J. Agardh

Neurymenia fraxinifolia (Mertens *ex* Turner) J. Agardh 1863: 1135.

Jaasund (1976: 133, fig. 271); R. Norris (1988: 273–276, figs 8–10).

Type locality: 'East Indies'.

Vouchers: HEC 4439, 27. 6. 1980: Laing Island, E. coast; HEC 4623, 9. 8. 1980: between Kanamur and Bagania; HEC 4666, 15. 8. 1980: Manam, Borda Reef; HEC 4687, 17. 8. 1980: Hansa Bay, The Pinnacle; HEC 6545, 20. 8. 1986: Ulingan Bay (W. side).

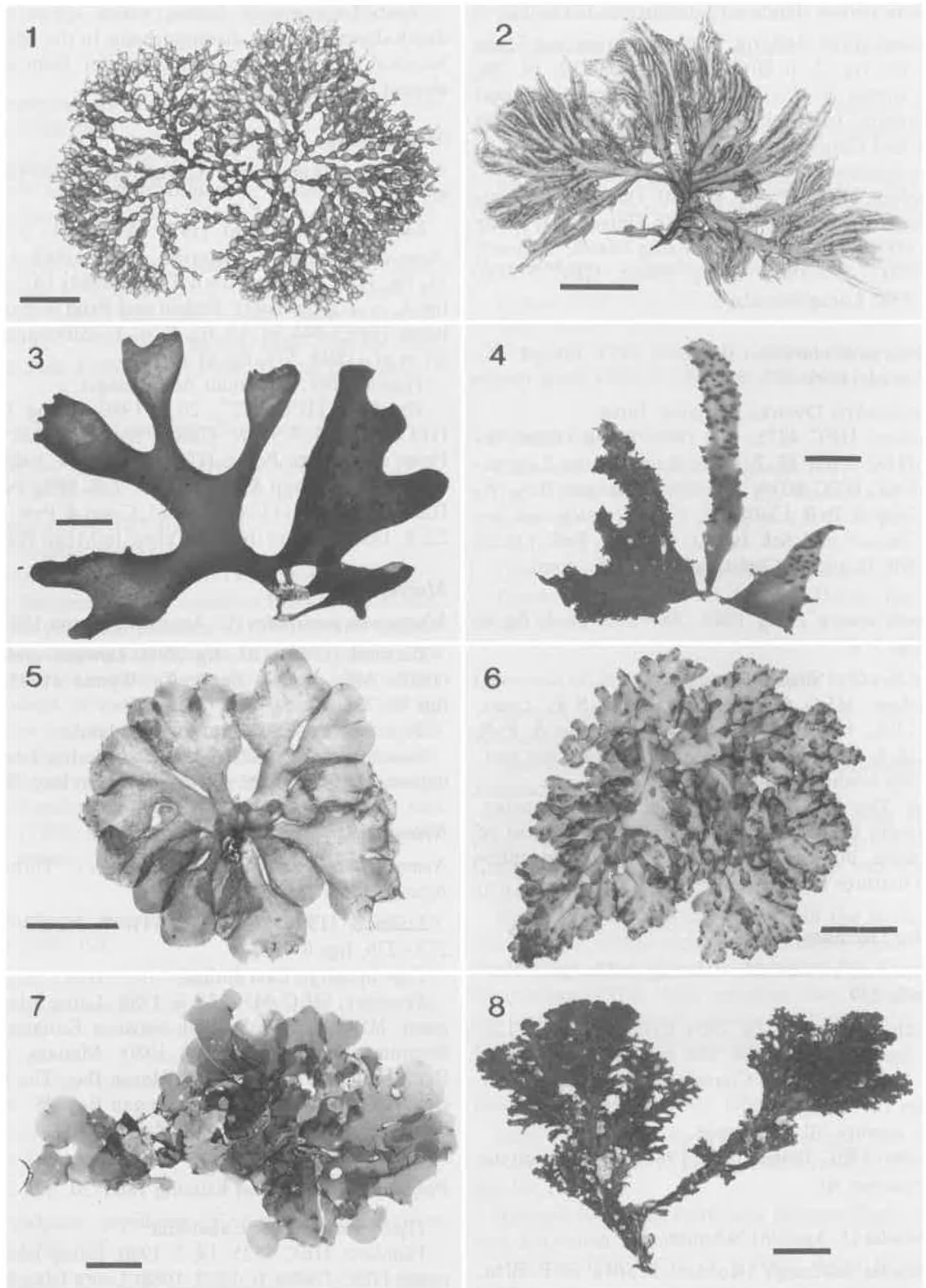
Polysiphonia Greville

Polysiphonia polyphysa Kützing 1863: 20, tab. 22 c, d.

Type locality: New Caledonia.

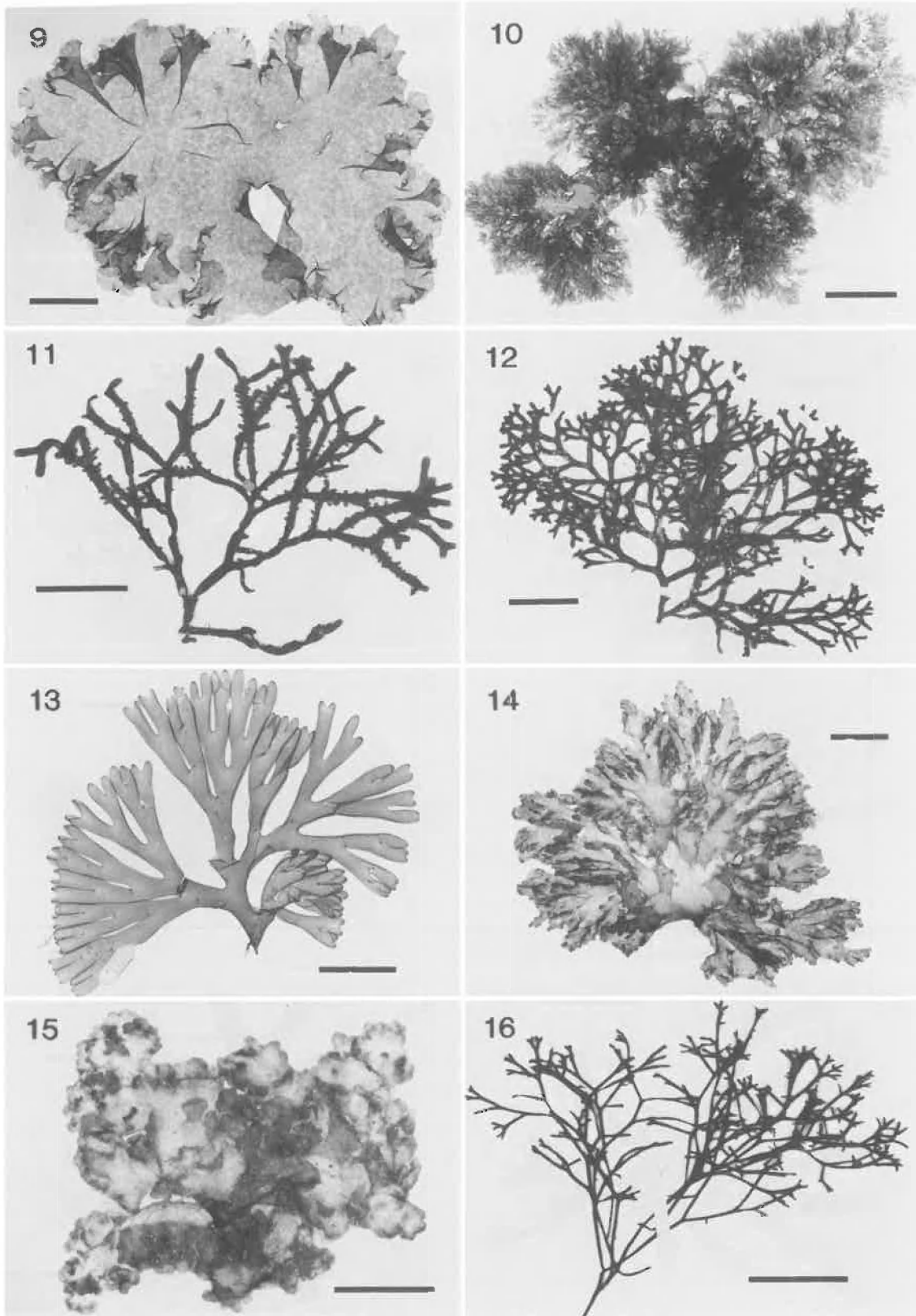
Vouchers: HEC 4525, 18. 7. 1980: Laing Island, E. coast; HEC 7769 a, b, 13. 7. 1988: Laing Island; HEC 7897, 21. 7. 1988: Bogia Bay, between the coast and Kolakola Island; HEC 8009, 29. 7. 1988: Hansa Bay, Awar; Copp & PvR 13828 a, 22. 8. 1990: lagoon between Sarang Harbour and Walog.

Note: This species is characterised by the possession of strictly 5 pericentral cells forming very short segments, acute apices, basally constricted laterals, unicellular rhizoids that are pit-connected to parental cells, and by the slightly spirally placed tetrasporan-



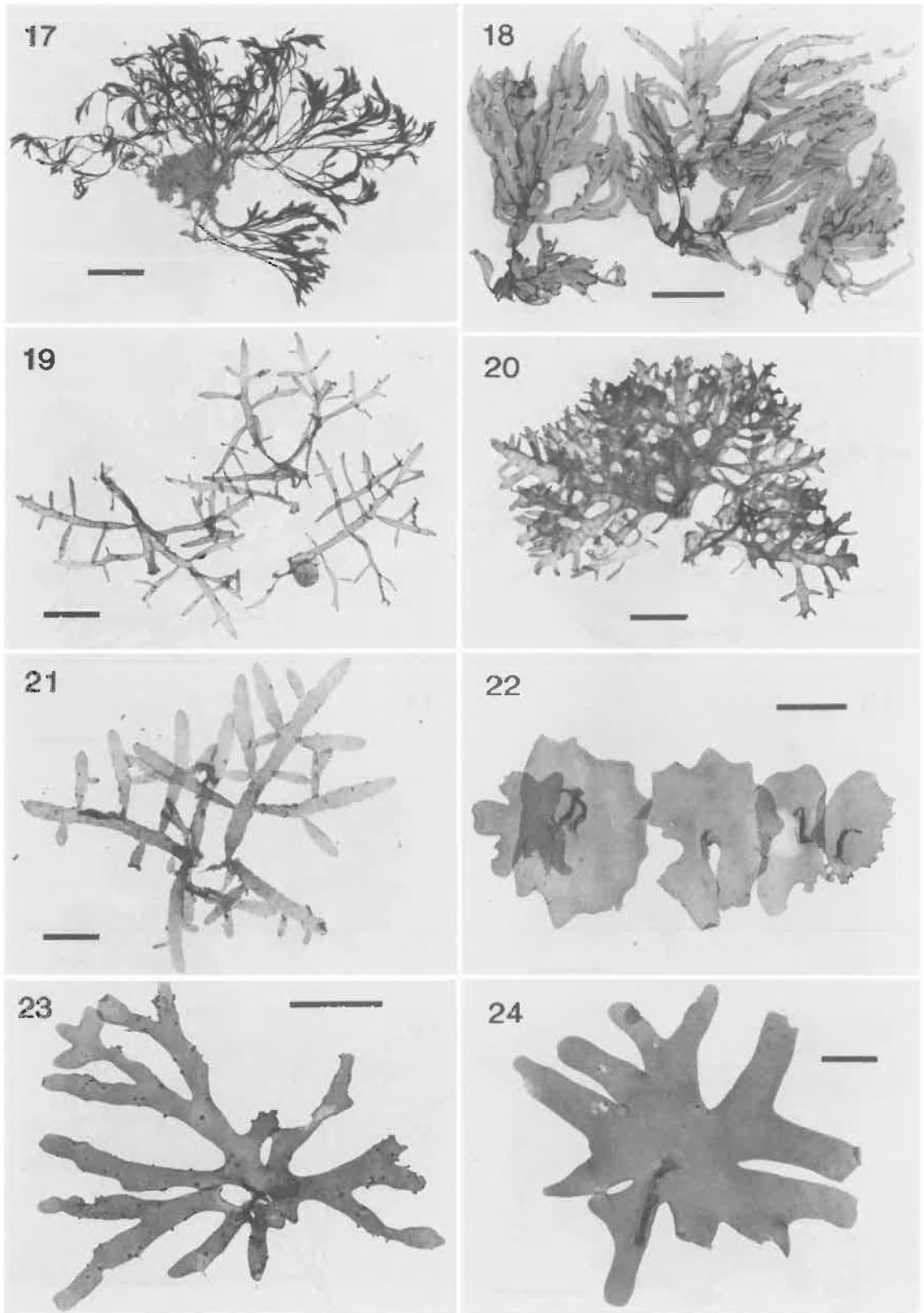
Figs 1–8. Red algae of PNG.

Fig. 1. *Scinaia hormoides* Setchell. HEC 7659. Scale = 20 mm. Fig. 2. *Acrosymphyton taylorii* Abbott. HEC 4664. Scale = 50 mm. Fig. 3. *Sarcodia ciliata* Zanardini. HEC 4607. Scale = 10 mm. Fig. 4. *Sarcodia ciliata* Zanardini. HEC 4607. Scale = 10 mm. Fig. 5. *Gibsmithia dotyi* Kraft et Ricker. Copp & PVR 13426(B). Scale = 20 mm. Fig. 6. *Gibsmithia* sp. HEC 7640. Scale = 30 mm. Fig. 7. *Kallymenia rosea* Womersley et Norris. HEC 7828. Scale = 10 mm. Fig. 8. *Carpopeltis maillardii* (Montagne et Millardet) Chiang. HEC 8093. Scale = 10 mm.



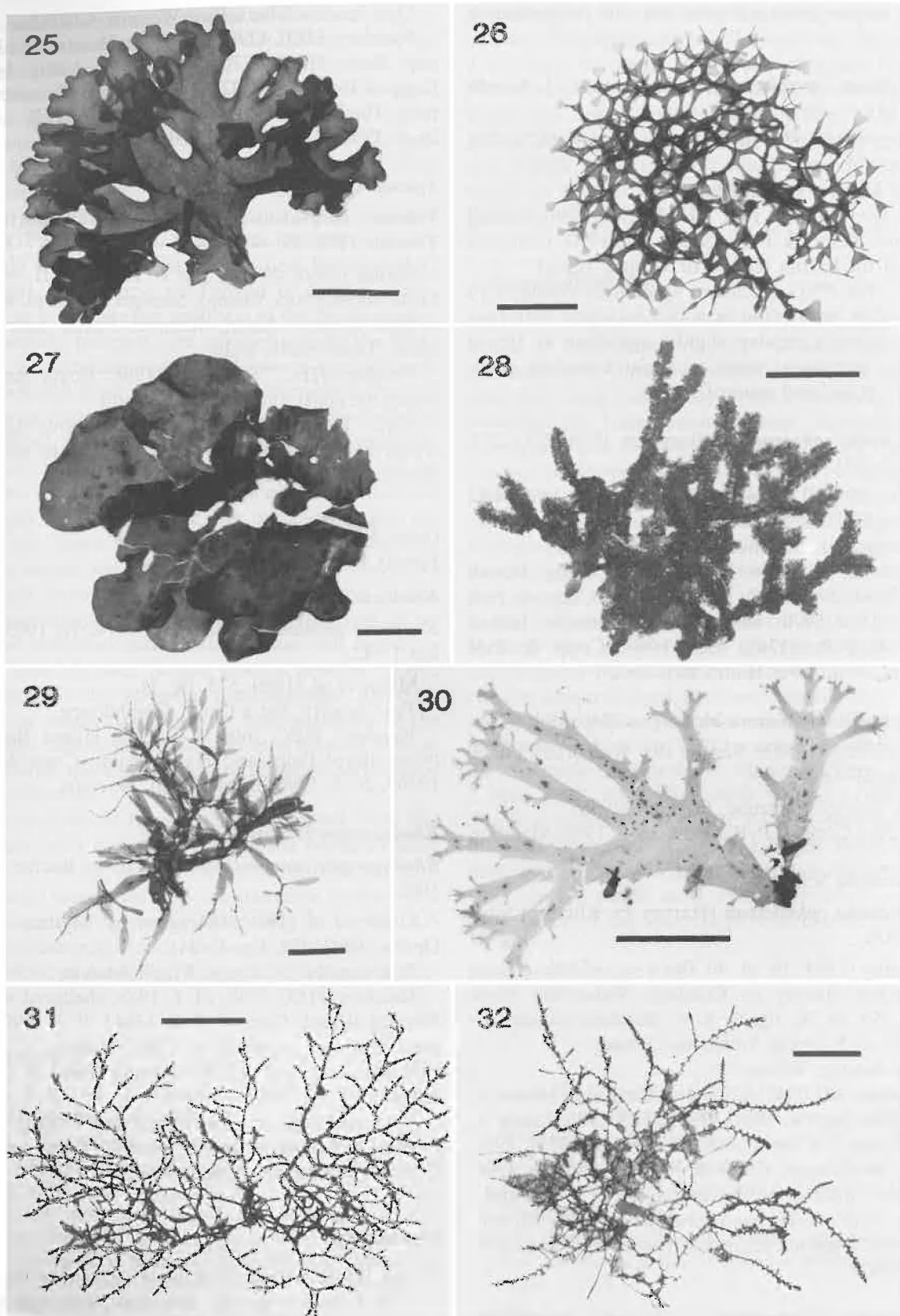
Figs 9–16. Red algae of PNG.

Fig. 9. *Halymenia porphyraeformis* Parkinson. HEC 4561. Scale = 30 mm. Fig. 10. *Halymenia floresii* (Clemente y Rubio) C. Agardh subsp. *harveyana* (J. Agardh) Womersley et J. Lewis. HEC 4559. Scale = 20 mm. Fig. 11. *Polyopes ligulatus* (Harvey ex Kützing) De Toni. HEC 6587. Scale = 20 mm. Fig. 12. *Polyopes ligulatus* (Harvey ex Kützing) De Toni. HEC 7859. Scale = 20 mm. Fig. 13. *Sebdenia flabellata* (J. Agardh) Parkinson. HEC 4677. Scale = 20 mm. Fig. 14. *Predaea weldii* Kraft et Abbott. HEC 4686. Scale = 20 mm. Fig. 15. *Predaea* sp. HEC 10171. Scale = 10 mm. Fig. 16. *Ahnfeltiopsis concinna* (J. Agardh) Silva et DeCew. HEC 4605. Scale = 20 mm.



Figs 17–24. Red algae of PNG.

Fig. 17. *Veleroa karuvalensis* (Varma) Krishnmurthy *et* Thomas. HEC 7898. Scale = 10 mm. Fig. 18. *Schmitzia* sp. HEC 7641. Scale = 40 mm. Fig. 19. *Champia compressa* Harvey. HEC 7844. Scale = 10 mm. Fig. 20. *Champia compressa* Harvey. Copp & PvR 13440(B). Scale = 5 mm. Fig. 21. *Champia salicornioides* Harvey. Copp & PvR 13271(B). Scale = 10 mm. Fig. 22. *Asteromenia peltata* (Taylor) Huisman *et* Millar. Copp & PvR 13101(B). Scale = 20 mm. Fig. 23. *Asteromenia peltata* (Taylor) Huisman *et* Millar. HEC 6304. Scale = 20 mm. Fig. 24. *Asteromenia peltata* (Taylor) Huisman *et* Millar. HEC 7984. Scale = 10 mm.



Figs 25–32. Red algae of PNG.

Fig. 25. *Chrysymenia kaernbachii* Grunow. HEC 7675. Scale = 20 mm. Fig. 26. *Sciadophycus* sp. HEC 4444. Scale = 20 mm. Fig. 27. Unknown genus. HEC 4717. Scale = 20 mm. Fig. 28. *Wrangelia velutina* (Sonder) Harvey. Copp & PvR 13764(B). Scale = 20 mm. Fig. 29. *Hypoglossum* sp. HEC 4417. Scale = 10 mm. Fig. 30. *Nitophyllum punctatum* (Stackhouse) Greville. HEC 4530. Scale = 10 mm. Fig. 31. *Tolypocladia calodictyon* (Harvey ex Kützing) Silva. HEC 8008. Scale = 30 mm. Fig. 32. *Tolypocladia glomerulata* (C. Agardh) Schmitz. Scale = 10 mm.

gia. It has not been collected since its description in 1863.

Polysiphonia sertularioides (Grateloup) J. Agardh 1863: 941.

Lauret (1967: 350, pls 2, 3); Womersley (1979: 478, figs 5A–D).

Type locality: Cette, France.

Voucher: Copp & PvR 13357, 23. 7. 1990: Sarang Harbour; Copp & PvR 13474, 1. 8. 1990: landward slope of the barrier reef N. of Wongat Island.

Note: The PNG specimens agree with Womersley's (1979: 478) description in which he states 'tetrasporangia forming regular, slightly spiralling to almost straight, prominent series in upper branches, occasionally in isolated rows of 3–6'.

Polysiphonia sphaerocarpa Børgesen 1918: 271–274, figs 267–271.

Cribb (1983: 134, pl. 71, fig. 1); Millar (1990: 446, figs 66A–E).

Type locality: St. Thomas, Virgin Islands.

Vouchers: HEC 7693, 5. 7. 1988: Laing Island; HEC 7694, 5. 7. 1988: Laing Island; Copp & PvR 13171, 15. 7. 1990: island N. of Demasa Island; Copp & PvR 13747, 19. 8. 1990, Copp & PvR 13749 a: 19. 8. 1990: Hansa Bay, Awar.

Polysiphonia subtilissima Montagne 1840: 199.

Hollenberg (1968 b: 92, fig. 19); Womersley (1979: 469, figs 2F–I).

Type locality: Cayenne, French Guyana.

Voucher: Copp & PvR 13359, 23. 7. 1990: Medibur.

Tolypocladia Schmitz

Tolypocladia calodictyon (Harvey ex Kützing) Silva 1952: 308. **Fig. 31**

Kützing (1864: 16, pl. 46, figs a–c, = *Polysiphonia calodictyon* Harvey ex Kützing); Weber-van Bosse [1923: 359, pl. X, figs 6–8, = *Roschera calodictyon* (Harvey ex Kützing) Weber-van Bosse].

Type locality: Tonga.

Vouchers: HEC 4218, 25. 5. 1980: Laing Island, S. part of the lagoon; HEC 4221, 25. 5. 1980: Laing Island, S. part of the lagoon; HEC 8008, 29. 7. 1988: Hansa Bay, Awar; Copp & PvR 13585, 5. 8. 1990: landward slope of the barrier reef N. of Tab Island.

Note: This species has lateral, determinate branchlets which anastomose, rather than being free as in *T. glomerulata*.

Tolypocladia glomerulata (C. Agardh) Schmitz in Schmitz et Falkenberg 1897: 441–442. **Fig. 32**

Jaasund (1976: 125, fig. 253); Magruder and Hunt (1979: 95, fig. 2, p. 94); Cribb (1983: 135–136, pl. 68, fig. 4; 1986: 117, ill. p. 116 middle); Tseng (1984: 160, pl. 83, fig. 4); Verheij and Prud'homme van Reine (1993: 449, pl. 16, fig. 3).

Type locality: Shark Bay, Western Australia.

Vouchers: HEC 4298, 3. 6. 1980: Hansa Bay, Bisalpap Reef; HEC 7770, 13. 7. 1988: Laing Island; Copp & PvR 13802, 22. 8. 1990: lagoon between Sarang Harbour and Walog; Copp & PvR 13838, 26. 8. 1990: Kranket Island Bay.

Veleroa Dawson

Veleroa karuvalensis (Varma) Krishnamurthy et Thomas 1971: 39–41, figs 26–37. **Fig. 17**

Varma (1960: 49–53, figs 1–14, pls I, II, = *Lynkiella karuvalensis* Varma); Saenger (1982: pl. 4).

Type locality: Karai, Karuval Paars, near Tuticorin, Tamil Nadu, India.

Voucher: HEC 7898, 21. 7. 1988: Bogia Bay, between the coast and Kolakola Island.

Note: The cylindrical, monosiphonous laterals, which have an inflated suprabasal cell are very distinctive for this species.

Order Rhodogorgonales

Family Rhodogorgonaceae

Renouxia Fredericq et J. N. Norris

Renouxia antillana Fredericq et J. Norris 1995: 329, figs 1–42.

Millar et al. (1999: 575, fig. 7).

Type locality: Ilet à Caret, Guadeloupe.

Vouchers: HEC 7660, 3. 7. 1988: Hansa Bay, between Barol Point and Hansa Point; Copp & PvR 13769, 20. 8. 1990: Boisa Island, N. coast.

Rhodogorgon J. Norris et Bucher

Rhodogorgon ramosissima J. Norris et Bucher 1989: 1053.

Littler et al. (1989: 184 upper as 'Mystery alga'); Ogden (1992: 471, figs 1–24).

Type locality: St. Croix, Virgin Islands.

Vouchers: HEC 7538, 21. 6. 1988: sheltered side of Wongat Island; Copp & PvR 13043, 9. 7. 1990: Nagada Harbour, opposite to CRI-buildings; Copp & PvR 13173, 15. 7. 1990: W. of small island N. of Demasa.

Note: Although originally described from the Caribbean, this species has previously been reported from the Philippines (Ogden 1992).

Discussion

Of the 151 (+) species documented in this list, only two have been originally described from specimens collected from the shores of Papua New Guinea (*Halymenia durvillei* and *Chrysymenia kaernbachii*). The former has since been recorded throughout the Pacific and Indian Oceans, but the only record of *Chrysymenia kaernbachii* since its discovery in the late 1800s is that of Cribb (1983) from the Great Barrier Reef. Many of the species have been documented

from nearby regions, but one of the taxa was recorded for the first time since its discovery and description, *Polysiphonia polyphysa* by Kützing in 1863 from New Caledonia. Although there are no endemic species known from these shores, 6 entities in our collections are demonstrably new species in the genera *Schmitzia*, *Gibsmithia*, *Kallymenia*, *Predaea*, *Sciadophycus* and *Hypoglossum*. One alga of as yet unknown affinity forms spreading, prostrate, flattened blades (Fig. 27) that are firm and leathery and very strongly attached to the substratum by secondary holdfasts. Cystocarps are formed in distinct nemathecia as is the case for members of the Peyssonneliaceae, which, however, are calcified unlike the PNG genus. Sequentially maturing lobes of carposporangia are borne from the apex of a columnar fusion cell similar to that seen in members of the Rhodymeniaceae. What is unusual about these carposporophytes, however, is that the fusion cells are surrounded by satellites of minute cells that appear to be bacterial in origin. After release of the carposporangia, the pericarpic tissue breaks down leaving volcano-like craters across the upper surface of the fronds. We have not formally described this new genus or the aforementioned new species in this treatment as we wish to continue critical studies that will require a much more detailed format than is possible in this checklist. We do, however, illustrate their habits to draw the readers attention to their existence in the hope that additional collections may already exist as unidentified species and genera in other herbaria or field collections.

The majority of the species documented from this coast are fairly typical for the tropical western Pacific region. However, several records constitute substantial range extensions and are therefore noteworthy. These include *Polyopes ligulatus* from Sri Lanka, *Velleroa karuvalensis* from India, *Haloplegma preissii* from Western Australia, *Wrangelia velutina* and *Grif-*

fithsia teges from southern Australia, and *Sarcodia ciliata*, *Gibsmithia dotyi*, *Coelarthrum decumbens*, *Kallymenia rosea* and *Anotrichium planatum* from the New South Wales coast (including Lord Howe Island). The largest extension and perhaps most unexpected discoveries are those of *Nitophyllum punctatum*, which until now was known mostly from the northern Atlantic, and the genus *Frikkiella* known from the western Atlantic.

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