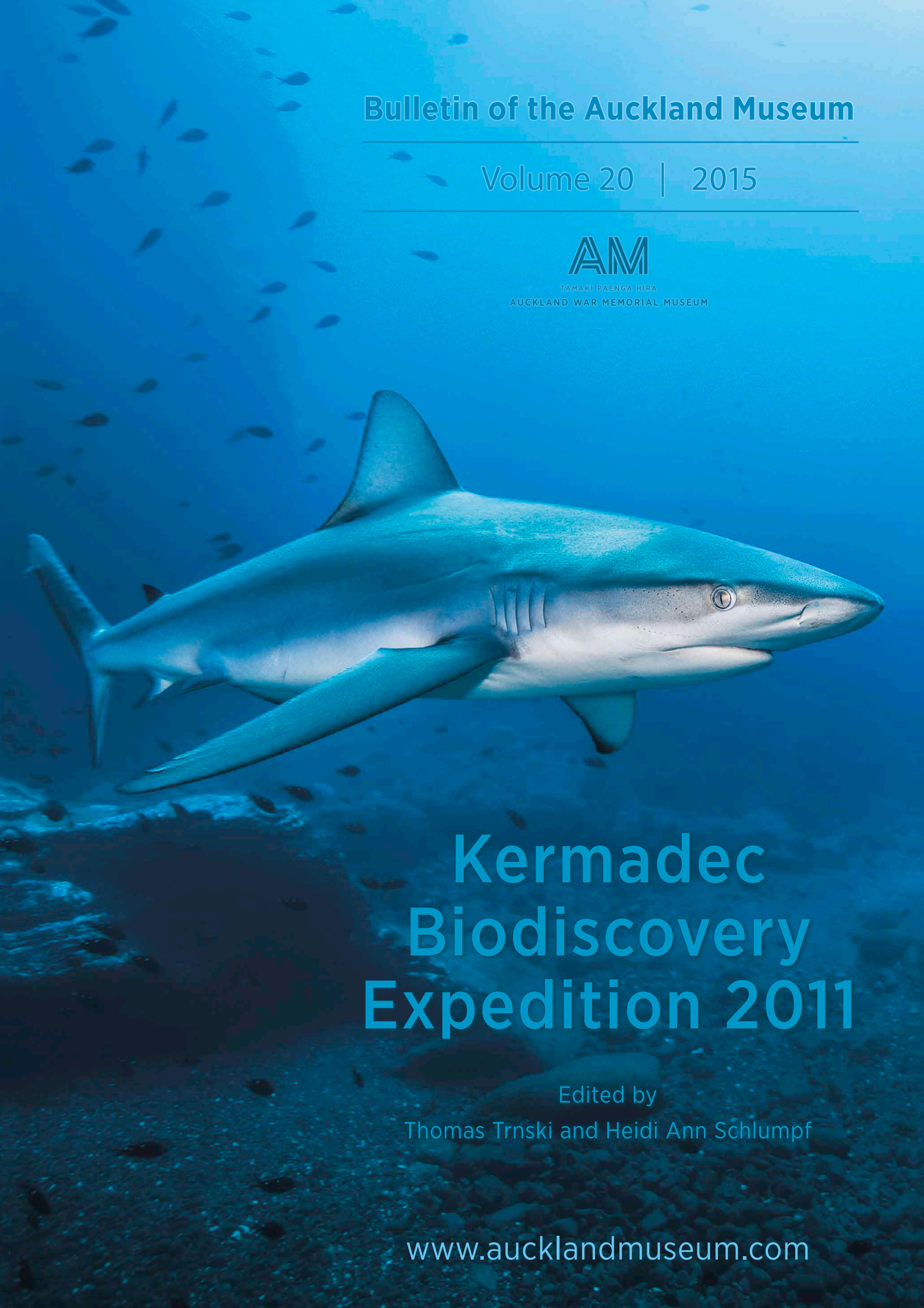




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Marine macroalgae of the Kermadec Islands

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Abstract

A list of the marine macroalgal flora of the Kermadec Islands has been compiled, based on specimens housed in the herbaria of the Museum of New Zealand Te Papa Tongarewa and Auckland Museum, with at least 154 taxa recorded (24 Chlorophyta (Prasinophyceae, Ulvophyceae), 32 Phaeophyceae, 98 Rhodophyta). More than half of the taxa reported here are known within the New Zealand region only from the Kermadec Islands (83 of 154 species). The macroalgal flora of the islands remains incompletely known and more than half of the taxa listed are known at the Kermadec Islands from only 1-3 specimens. Collections made in 1982 remain the most comprehensive sampling of the marine flora of the Kermadec Islands to date, both in terms of the number of sites and island groups visited, and in the thoroughness of the collecting effort. The collections made subsequently have been opportunistic, as an adjunct to other research or collecting activities, rather than being focused on detailed sampling of the macroalgal flora. This present list updates Nelson & Adams (1984) and includes new records for the islands (e.g., *Caulerpa sertularioides*, *Chaetomorpha aerea*, *Hildenbrandia* sp., *Sporolithon durum*, *Ralfsia* sp.), new records for New Zealand (e.g., *Codium saccatum*, *Gelidium isabelae*, *Lithophyllum prototypum*, *Zonaria diesingiana*), reports of new taxa published since 1984, as well as nomenclatural and taxonomic changes, and confirms previously unsubstantiated records of *Dictyopteris kermadecensis* and *Rhizoclonium* sp.

Keywords

Marine macroalgae; Kermadec Islands; Chlorophyta – Prasinophyceae, Ulvophyceae; Ochrophyta – Phaeophyceae; Rhodophyta – Bangiophyceae, Florideophyceae

INTRODUCTION

The volcanic Kermadec Islands are exposed to wind-driven waves and oceanic swells. There are relatively few sheltered areas in the island chain, and these are mainly found in parts of Raoul Island and the nearby islets. The majority of macroalgae at the islands are turf-forming and there are no kelp forests. The largest brown algae are species of *Sargassum* which appear to have an annual cycle of growth and are largest in spring and by autumn are small and inconspicuous. Many species in the flora have stonoliferous growth sending out runners that weave in and out of the turf, providing some protection from herbivory. There are many encrusting or prostrate species in the flora, growing on rock and shell rubble, cobbles, pumice and coral. Red algae make up more than half the flora and the vast majority of these are less than 2 cm in height. Francis & Nelson (2003) discuss the characteristics of the marine biota of the islands in more detail.

The first published report of macroalgae from the Kermadec Islands (29°–31° 30'S, 178°–179°W) was by Gepp & Gepp (1911) based on intertidal and drift collections made by W.R.B. Oliver during an expedition in 1908 as well as specimens that were collected when

the HMS *Herald* visited the islands in 1854 and had been deposited in the herbarium of the Royal Botanic Gardens Kew. Cotton (1912) reported 14 species, based on specimens housed at Kew collected during visits of HMS *Herald*, the HMS *Challenger* expedition in 1874, and 12 specimens received from Edith M. Smith. Sixty five species of macroalgae were listed from the Kermadec Islands by Chapman (1961) (as well as 12 Cyanobacteria), with new records coming from material collected during two expeditions by the Botany Department of the University of Auckland in 1956 and 1957.

In 1984 Nelson & Adams compiled a list of 144 vouchered species, as well as listing 20 additional records, either based on earlier unsubstantiated accounts, or species records that were based solely on drift material and which had not been found growing at the Kermadec Islands. The 1984 list was based largely on intertidal, SCUBA and dredge samples housed in WELT (now the Museum of New Zealand Te Papa Tongarewa, formerly National Museum of New Zealand) (Thiers 2014) collected by an expedition of the N.Z. Oceanographic Institute RV *Tangaroa* in March 1982, as well as dredge and intertidal collections made by several National Museum of New Zealand expeditions on the RV *Acheron* in the 1970s (1970, 1972, 1975, 1976).

In addition collections housed in other New Zealand herbaria were examined and representative material listed (Landcare – CHR, Auckland Museum – AK). Since 1982 additional opportunistic collections have been made and deposited either in WELT or AK. During the Kermadec Biodiscovery Expedition in May 2011, carried out by the Auckland War Memorial Museum and the Australian Museum, Sydney, twenty species were collected and voucher specimens have deposited in WELT and AK.

This present list updates Nelson & Adams (1984) and includes new records, reports of new taxa published since 1984, as well as nomenclatural and taxonomic changes, and confirms earlier records that had not been able to be substantiated previously.

METHODS

This list is based on specimens housed at WELT (1039 specimens – 623 red, 260 brown, 156 green), and AK (93 identified specimens), with some additional records from CHR (previously cited in Nelson & Adams 1984). (WELT specimens are listed with the prefix A.) Cited vouchers have been selected to represent species' distributions across the islands, seasonal occurrence as well as morphological variation, where material is available. The systematic arrangement of taxa in this list follows Broady *et al.* (2012); Harper *et al.* (2012) and Nelson (2012) for the green, brown and red algae respectively. Cyanobacteria are not included in this list. Habitat information is provided where these data are available.

Voucher specimens cited in Nelson & Adams (1984) as well as the wider Islands holdings of WELT and AK have been examined in the preparation of this list. Although we have attempted to identify material to species level, this has not been possible in a number of cases, either because of inadequate material (immature, sterile and/or fragmentary), or because of the state of taxonomic knowledge. Although some genera are well known in a wider context and have been the subject of revisions in the past two decades, detailed comparative study of many of the Kermadec Islands species has not yet been undertaken.

RESULTS

Assessment of collections and state of knowledge

We have listed 154 taxa: 24 green algae, 32 brown algae and 98 red algae. The majority of the records are based on specimens held in WELT, although 1 record is based on material held solely in AK, 4 records are from CHR, and 1 record is based on specimens housed in both AK and CHR. The collections made in 1982 remain the most comprehensive sampling of the marine flora of the Kermadec Islands to date, both in terms of the number of sites and island groups visited, and in the thoroughness of the collecting effort. Collections before and after have been opportunistic, and have been made as an adjunct to other research or collecting activities rather than being focused on detailed sampling of the flora. In addition, only the 1982 collection involved a trained phycologist as a collector.

As more than half of the taxa listed are known at the Kermadec Islands from only 1–3 specimens we consider that this list is incomplete. Many of the Kermadec Islands macroalgae are less than 1 cm in height and are easily overlooked by non-specialist collectors. Certain elements of the macroalgal flora are known to be particularly under-represented in collections because of the sampling techniques and methods used to date e.g., non-geniculate coralline algae, filamentous and microscopic species (under 2 mm). Dredge sampling in 1982 revealed that in the clear waters around the Kermadec Islands there were macroalgae at considerable depths, with samples found in excess of 200 m depth, well beyond the reach of divers, and these habitats remain very poorly sampled.

DISCUSSION

Characteristics of the Flora

Green Algae

Half of the green algae found on the Kermadec Islands are not found elsewhere in the New Zealand region. Both *Caulerpa* and *Codium* are well represented at the Kermadec Islands, including several species also known from the tropical and sub-tropical Pacific. In this list the species *Codium saccatum* is reported for the first time for the New Zealand flora, collected on a single occasion from Macauley Island, and *Caulerpa sertularioides* is reported for the Kermadec Islands for the first time. Recent studies on the genera *Codium* and *Caulerpa* are providing interesting insights (e.g., Verbruggen *et al.* 2007; Famà *et al.* 2002; Price 2011), and there is a need to compare Kermadec Islands material of these genera with the floras of the nearby Lord Howe Island (Kraft 2007) and Norfolk Island (Millar 1999) as well as taxa from other parts of the Indo-Pacific.

A study of New Zealand members of the Ulvaceae employing molecular sequence data revealed the presence of an undescribed species of *Umbraulva* from the Kermadec Islands, currently known from a single collection (Heesch *et al.* 2009). Intertidal and upper subtidal *Ulva* species could not be identified as no material was available to enable molecular sequencing, essential data for confirmation of species in this genus. Another new record reported here is the genus *Chaetomorpha*, again known currently from a single specimen, as well as the confirmation of the earlier record of the genus *Rhizoclonium*. Identification of species within the genera *Rhizoclonium* and *Cladophora* is problematic as these genera have simple morphology, few reliable distinguishing characters and also exhibit phenotypic plasticity. The current familial classification within the Cladophorales also requires revision as revealed by recent molecular data (Leliaert *et al.* 2007, 2009).

The presence of *Parvocaulis* (formerly *Acetabularia*) and *Boodlea composita* reflect the tropical and sub-tropical affinities of the Kermadec Islands flora. The unusual crustose alga *Palmophyllum umbracola*, recently discovered to be a member of the Prasinophyceae (Zechman *et al.* 2010), is found both at the Kermadec Islands and in the far north of the North Island. All three of these algae are also reported from Lord Howe Island (Kraft 2007).

Brown Algae

The Dictyotales are particularly well represented at the Kermadec Islands with more than sixteen species in eight genera. Several of these genera, e.g., *Dictyopteris*, *Padina*, *Stypodium* and *Taonia*, are known within the New Zealand region only from the Kermadec Islands. *Dictyopteris kermadecensis*, described by Cotton (1912) as endemic to the Kermadec Islands, was known solely from the type collection until 2004 when it was found again on Raoul Island. The relationship of this species to others in the genus needs to be examined in order to determine if it is restricted to these islands. Although research on New Zealand members of the Dictyotales employing molecular sequencing data is underway, the identity and relationships of many species have not been confirmed. Further collections and research are particularly required in *Dictyota*. The species *Zonaria diesingiana* is a new record for the New Zealand flora.

The genus *Sargassum* has been the subject of a number of recent studies in the Indo-Pacific. Four species are recorded here, two of which have been confirmed by molecular sequence analyses, *S. aquifolium* (previously as *S. cristaeifolium*) and *S. scabridum* (a new record) (Mattio & Payri 2009). Further work is required when additional collections are available. The genus *Ralfsia* is reported for the Kermadec Islands for the first time.

A number of large brown algae have been found in the drift at the Kermadec Islands, for example, *Durvillaea antarctica*, species of *Carpophyllum*, *Cystophora*, *Hormosira banksii* and its obligate epiphyte *Notheia anomala*, as well as *Perithalia capillaris*. As these species have never been found growing at the islands, we consider that they are not part of the Kermadec flora, unlike the kelp *Ecklonia radiata* which has been found growing subtidally at significant depths (33–38 m). *Ecklonia radiata* has been reported as an “episodic” member of the Lord Howe Island flora (Kraft 2009).

Red Algae

The order Nemaliales is very well represented at the Kermadec Islands, with a number of subtropical and tropical genera present that are not known from mainland New Zealand, but which are present on other island groups at a similar latitude, such as Lord Howe Island and Norfolk Island (Millar 1999; Huisman 2006). Taxonomic revisions of the tropical to sub-tropical genus *Galaxaura* in the Indo-Pacific (Huisman & Borowitzka 1990; Huisman & Townsend 1993; Huisman *et al.* 2004) have resulted in a number of changes in the genera and species recognised by Nelson & Adams (1984). The Kermadec Island material has not been subject to detailed study and further research is warranted.

Crustose red algae require further attention. *Hildenbrandia* is recorded here for the first time for the Kermadec Island flora, but both in this genus and *Peyssonnelia* there is currently insufficient material available to identify the species. The coralline red algae (belonging to Corallinales, Sporolithales) are notoriously difficult to collect and to identify. Although recently Farr *et al.* (2009) documented some of the Kermadec Island coralline algal flora, much of the

existing material available in herbaria is not able to be identified as it is either sterile or fragmentary. For full understanding of this ecologically important group of macroalgae (Nelson 2009) both targeted collections as well as molecular sequence analyses are essential. Farr *et al.* (2009) reported both *Mastophora pacifica* and *Pneophyllum coronatum* for the first time for the islands, and we here add *Sporolithon durum* as a new Kermadec Islands record and *Lithophyllum prototypum* as new to the islands and New Zealand.

Gelidium isabelae, described originally from the Galapagos Islands and recorded from throughout the Pacific and Indian Oceans, is reported for the New Zealand region for the first time. The species previously recorded as *Gelidium pusillum* is now placed in *Capreolia implexa* following Guiry & Womersley (1993). While it is clear that the order Rhodymeniales is well represented at the Kermadec Islands, there is insufficient material to advance our understanding of this group at present. Similarly there is a need for more material of members of the Ceramiales. Lin *et al.* (2010) revised the genus *Phycodrys* in New Zealand. The species previously reported in the New Zealand region as *Phycodrys profunda* was described as a new species, *Phycodrys adamsiae*. A single specimen of *Phycodrys* from 70 m depth has been collected at the Kermadec Islands but it has not been placed to species. The genus *Martensia* has been known from the Kermadec Islands from the early collections of Oliver. The species previously known as *M. fragilis* is widespread and common subtidally. Recent research suggests that this is an undescribed species (S.-M. Lin pers. comm.).

Relationships of the Flora

More than half of the taxa reported here are known within the New Zealand region only from the Kermadec Islands (83 of 154 species). The strongest affinities of the flora are with other warm-water regions of the Pacific and Indian Oceans. At present there is insufficient material available to analyse whether there are any trends in the flora within the Kermadec Islands chain, as more than half of the taxa recorded are known from three or fewer collections. The limited collections also mean that a number of taxa are only identified to genus as key features required to species level identifications are not available.

Within the New Zealand region the nearest group of islands are the Three Kings Islands immediately to the north of the North Island. The floras of the Three Kings and Kermadec Islands have a number of taxa in common (e.g., *Caulerpa sertularioides*, *Dictyota intermedia*) but also differ in a number of ways. The Three Kings Islands are home to a number of very distinctive endemic species, whereas although there are two species reported to be endemic to the Kermadec Islands (*Bryopsis kermadecensis* and *Dictyopteris kermadecensis*), both of these need further comparative study to confirm that they are restricted to the Kermadec Islands. The flora of the Three Kings Islands shares a large proportion of its species in common with the northern North Island, in addition to having a few

species that are known solely from these islands within the New Zealand region. Subtidally the Three Kings Islands are surrounded by lush forests of macroalgae, whereas at the Kermadec Islands the macroalgae are much less conspicuous, although they also play a key role in providing three dimensional habitat space for a range of fish and invertebrate species. There are few large species (i.e., over 15 cm in height) in the Kermadec Island macroalgal flora, with many species growing as turfs or partially prostrate in intertwined, multispecies assemblages. Nelson & Adams (1984) discussed the frequency of vegetative propagation and stoloniferous growth seen in members of the flora, as well as the apparently high grazing pressure which the macroalgae are subjected to.

Since the publication of Nelson & Adams (1984) a number of floristic studies of neighbouring areas in the Pacific have been published (e.g., Fiji – N'Yeurt & South 1997, N'Yeurt 2001; French Polynesia – N'Yeurt & Payri 2006, 2007, 2010; Norfolk Island – Millar 1999; Lord Howe Island and the southern Great Barrier Reef – Kraft 2007, 2009). Of these areas, the floras of Norfolk Island, Lord Howe Island and the Kermadec Islands have a number of features in common as well as some distinctive characteristics. These island groups lie at a similar latitude, and are about 800 km apart. The flora reported by Millar (1999) is larger than that found on the Kermadec Islands (236 species), and includes both more temperate as well as tropical to sub-tropical elements. Millar recorded that 19% of the Kermadec Island flora recorded by Nelson & Adams (1984) was also found on Norfolk Island, and 24% of the New Zealand flora recorded by Adams (1994) was present on Norfolk Island. The treatments of Kraft (2007, 2009) on the flora of Lord Howe Island provide detailed information on a flora which is likely to share many features with the Kermadec Islands flora. Detailed comparisons and analyses of the relationships of the flora are precluded because of the limited collections available from the Kermadec Islands and the lack of modern comparative studies on many of the species present.

Chlorophyta **Prasinophyceae** **Palmophyllales** **Palmophyllaceae**

***Palmophyllum umbracola* W.A.Nelson & K.G.Ryan**
Meyer Islands, 20/03/1982, *Singleton*, A012109; L'Esperance Rock, 28/03/1982, *Nelson*, A012678, A012679 (holotype and isotype).

Bright green cells embedded in a gelatinous matrix, forming vivid green patches on rock, 5–10 cm in diameter. Found in shallow, shaded subtidal areas and to depths of more than 70 m.

Note: Recent research has revealed that *Palmophyllum* belongs to a distinct and ancient lineage, and is a member of the Prasinophyceae (Zechman et al. 2010). Previously listed as *Palmophyllum* sp. this species was described by Nelson & Ryan (1986).

Ulvophyceae **Bryopsidales** **Bryopsidaceae**

***Bryopsis kermadecensis* V.J.Chapm.**

Meyer Islands, 21/03/1982, *Nelson*, A012064, also *Dawson*, A012066; Meyer Islands, Boat Harbour, 17/05/1991, *Anderson*, A032312.

Note: This is a provisional placement. Further research is required on this genus in the New Zealand region.

Caulerpaceae

***Caulerpa racemosa* (Forssk.) J.Agardh**

Raoul Island, 28/08/1972, *Climo*, A007729; Raoul Island, Milne Islets, 12/09/1976, *Baker*, A009528, also 14/05/2011, *Francis*, A032226; Meyer Islands, 21/03/1982, *Nelson*, A012089, also 05/1995, *Morley & Stace*, AK 223299; Meyer Islands, Boat Harbour, 7/11/2004, *Chadderton*, A032314; Macauley Island, 24/03/1982, *Singleton*, A012091; Cheeseman Island, 24/05/2011, *de Lange*, AK 327462.

Abundant with stolons threading through algal turfs.

Note: It is highly probable that more than one species is being grouped under *C. racemosa*. Further work required on this genus in New Zealand.

***Caulerpa sertularioides* (S.G.Gmelin) M.Howe**

Meyer Islands, 21/03/1982, *Nelson*, A012092, A012098, A012100.

Note: New record for the Kermadec Islands, previously recorded in the New Zealand region from the Three Kings Islands (Adams & Nelson 1985).

***Caulerpa webbiana* Mont.**

Raoul Island, Denham Bay, 22/03/1982, *Singleton*, A012103; Raoul Island, Boat Cove, 14/05/2011, *Francis*, A032224; Meyer Islands, 21/03/1982, *Nelson*, A012093, also 14/06/1991, *Anderson*, A032321.

In dense mats in sandy areas between rocks in intertidal pools and shallow subtidal.

***Codium* cf. *C. bursa* (Oliv.) C.Agardh**

Meyer Islands, Boat Harbour, 28/10/1975, *Black*, A011766.

***Codium capitatum* P.C.Silva & Womersley**

Raoul Island, Denham Bay, 22/03/1982, *Singleton*, A012080; Raoul Island, Milne Rocks, 7/06/1992, *Williamson*, A032331; Meyer Islands, 21/03/1982, *Nelson*, A012081; Nugent Island, 17/05/2011, *Duffy*, A032238; Macauley Island, 21/05/2011, *Francis*, A032236.

Dark green with a smooth surface adhering closely to rocks and boulders subtidal to 24 m.

Note: As *Codium arabicum* Kuetz. in Nelson & Adams (1984).

***Codium geppiorum* O.C.Schmidt**

Meyer Islands, 21/03/1982, *Dawson*, A012069; Macauley Island, 24/03/1982, *Hill*, A012075, also

21/05/2011, *Francis*, A032237; Macauley Island, West Bluff, 11/11/2004, *Duffy*, A032333.

Prostrate and branching, occurring in both intertidal pools and subtidally on rock faces.

Note: Previously recorded as *C. geppii*. (The epithet, which commemorates the Gepps, has been altered from the original genitive singular to the genitive plural.) Verbruggen *et al.* (2007: 244, 248) have found that there is cryptic diversity within material that has been identified as *C. geppiorum*, and further comparative study of the Kermadec Island material is required.

***Codium saccatum* Okamura**

Macauley Island, West Bluff, 11/11/2004, *Duffy*, A027208.

Note: New record for the New Zealand region.

***Codium spongiosum* Harv.**

Macauley Island, 24/03/1982, *Singleton*, A012077, also 1/06/1992, *Williamson*, A032336, 11/11/2004, *Duffy*, A023776.

Undulating bright green cushions surrounded by a silvery halo of long hairs, found subtidally to ca. 15 m depth.

Derbesiaceae

***Derbesia novae-zelandiae* V.J.Chapm.**

Raoul Island, Denham Bay, 22/03/1982, *Singleton*, A012027; Meyer Islands, 1908, *Oliver*, A001182; Meyer Islands, 21/03/1982, *Dawson*, A012024-25; Macauley Island, 24/03/1982, *Singleton*, A012026, 11/1970, *Yaldwyn*, A004067.

Epiphytic soft, dark green tufts found on various algae. The *Halicystis*-stage has not been found at the Kermadec Islands to date.

***Pedobesia clavaeformis* (J.Agardh) MacRaid & Womersley**

Meyer Islands, 20/03/1982, *Nelson*, A012028; Macauley Island, 24/03/1982, *Singleton*, A012036.

On shells and growing through coralline rubble to depths of 70 m.

Cladophorales

Anadyomenaceae

***Microdictyon umbilicatum* (Velley) Zanardini**

Raoul Island, close to east side of Meyer Islands, 11/09/1976, RV *Acheron*, A009515; Raoul Island, Denham Bay, 10/11/2004, *Duffy*, A023777.

On rubble substrates in deep water, recorded to 79 m depth.

Cladophoraceae

***Chaetomorpha aerea* (Dillwyn) Kuetz.**

Raoul Island, Fishing Rock, 18/05/2011, *Francis*, A032231.

Note: This is a new generic record for the Kermadec Islands.

***Cladophora herpestica* (Mont.) Kuetz.**

Raoul Island, Milne Islets, 12/09/1976, *Baker*, A009531;

Meyer Islands, 20/03/1982, *Nelson*, A012051; Macauley Island, 24/03/1982, *Singleton*, A012053.

Note: Previously placed in *Cladophoropsis*, the generic transfer was effected by Leliaert & Coppejans (2006).

***Cladophora* cf. *C. hawaiiiana* Tilden**

Raoul Island, Boat Cove, 14/05/2011, *Francis*, A032230; Meyer Islands, 1908, *Oliver*, A001491, also Meyer Islands, 21/03/1982, *Nelson*, A012038; Macauley Island, 24/03/1982, *Hill*, A012047, also 1/06/1992, *Williamson*, A032323.

Abundant dark green, dense tufts growing on rock and shell, in shallow subtidal to depths of 24 m.

Note: As *Cladophora prolifera* in Nelson & Adams (1984).

***Cladophora* cf. *C. socialis* Kuetz.**

Raoul Island, 22/03/1982, *Singleton*, A012059; Meyer Islands, 20/03/1982, *Nelson*, A012056.

Growing intertidally as low hemispherical tufts on rock surfaces.

***Rhizoclonium* sp.**

Meyer Island, Boat Harbour, 05/1995, *Morley*, AK 223294.

Note: Although this genus was recorded from the Kermadec Islands by Chapman (1961), Nelson & Adams (1984) had not been able to find any specimens to confirm its presence.

Siphonocladaceae

***Boodlea composita* (Harv.) F.Brand**

Meyer Islands, 21/03/1982, *Nelson*, A012019; L'Esperance Rock, 28/03/1982, *Singleton*, A012017.

In tufts amongst other algae, in the shallow subtidal zone.

Dasycladales

Polyphysaceae

Parvocaulis parvulus* (Solms) S.Berger *et al.

Meyer Islands, 20/03/1982, *Nelson*, A012020-21.

Small, solitary and inconspicuous plants.

Note: Previously listed as *Acetabularia*, the generic transfer was effected by Berger *et al.* (2003).

Ulvaes

Ulvaceae

***Ulva* spp. (tubular)**

Kermadec Islands, *Oliver*, 1908, A001192; Meyer Islands, 21/03/1982, *Hill*, A012015 (tubular), also 12/05/2011, *de Lange*, AK 327398.

Note: Recorded as *Enteromorpha* sp. in Nelson & Adams (1984), *Enteromorpha* spp. were transferred to *Ulva* by Hayden *et al.* (2003).

***Ulva* sp. (blade)**

Meyer Islands, 21/03/1982, *Nelson*, A012013-14; L'Esperance Rock, 28/02/1982, *Hill*, A012012.

***Umbraulva* sp. “Kermadecs” sensu Heesch *et al.* (2009).**

Raoul Island, Denham Bay, 10/11/2004, *Duffy*, A027319. Collected at ca. 16 m depth from a single site.

Note: This genus was recorded for New Zealand for the first time by Heesch *et al.* (2009).

**Ochrophyta
Phaeophyceae
Dictyotales
Dictyotaceae**

***Dictyopteris kermadecensis* (Cotton) Lindauer**

Raoul Island, Denham Bay, 10/11/2004, *Duffy*, A023745. On rock amongst large cobbles and sand at 27 m.

Note: This is the first record of this species since the original collection, made by E.M. Smith in 1908 and described by Cotton (1912).

***Dictyopteris repens* (Okamura) Boergesen**

Meyer Islands, Boat Harbour, 28/10/1975, RV *Acheron*, A009408; Macauley Island, 24/03/1982, *Singleton*, A012137/1; L’Esperance Rock, 28/03/1982, *Singleton & Hill*, A012138/1.

Prostrate, delicate plants growing in short algal turf up to depths of ca. 30 m.

***Dictyota bartayresiana* J.V.Lamour.**

Raoul Island, Denham Bay, 5/11/2004, *Chadderton*, A023768, also *Duffy*, A023740; Meyer Islands, Boat Harbour, 28/10/1975, RV *Acheron*, A009407; Meyer Islands, 14/06/1991, *Anderson*, A032339; Macauley Island, 24/03/1982, *Singleton*, A012169; L’Esperance Rock, 28/03/1982, *Singleton & Hill*, A012192.

Golden brown, delicate fronds, subtidal on rock and coral surfaces.

Note: As *D. bartayresii* in Nelson & Adams (1984). Lamouroux (1809) changed the epithet from *bartayresiana*, a change that Silva *et al.* (1987) determined was unwarranted.

***Dictyota implexa* (Desf.) J.V.Lamour.**

Raoul Island, Denham Bay, 22/03/1982, *Singleton*, A012191; Meyer Islands, 21/03/1982, *Nelson*, A012182, Macauley Island, 24/03/1982, *Singleton*, A012163.

Subtidal to 10 m, on rock and shells

Note: As *D. divaricata* J.V.Lamour. in Nelson & Adams (1984) (synonymy follows Tronholm *et al.* 2010).

***Dictyota intermedia* Zanardini**

Napier Island, near Raoul Island, 13/05/2011, *Francis*, A032219; Raoul Island, Milne Islets, 12/09/1976, *Baker*, A009532; Raoul Island, Denham Bay, 4/11/2004, *Duffy*, A023742; Meyer Islands, 20/03/1982, *Nelson*, A012134-5; Macauley Island, 24/03/1982, *Singleton*, A012146; NW Cheeseman Island, 24/05/2011, *Francis*, A032216; Curtis Island, 29/03/1982, *Nelson*, A012150; L’Esperance Rock, 28/03/1982, *Singleton*, A012148.

Conspicuous subtidally, abundant, in places forming thickets and providing shelter and camouflage for small fish and invertebrates.

Note: Previously recorded as *Dictyota prolifans* and *Dilophus intermedius* in Nelson & Adams (1984) (De Clerck 2003).

***Dictyota* sp. 1**

Macauley Island, 11/1970, *Yaldwyn*, A004068, A004071. Robust, up to 17 cm high, with thick dark brown axes, known only from drift.

Note: As *Dictyota* sp. in Nelson & Adams (1984).

***Dictyota* sp. 2**

Raoul Island, Milne Islets, 12/09/1976, *Baker*, A009526. Growing in low intertidal pools.

Note: As *Pachydictyon* sp. in Nelson & Adams (1984). Transfer to *Dictyota* in De Clerck *et al.* (2006).

***Dictyota* spp.**

Raoul Island, Denham Bay, 5/11/2004, *Duffy*, A023740, A023765; SW L’Esperance Rock, 26/05/2011, *Bedford*, A032218.

Note: At least three species of *Dictyota* have been distinguished by molecular sequence data and morphology. More material is required for characterisation of these taxa.

***Distromium didymothrix* Allender & Kraft**

Napier Island, near Raoul Island, 8/11/2004, *Duffy*, A032345; Raoul Island, Denham Bay, 5/11/2004, *Duffy*, A023767; Meyer Islands, 20/03/1982, *Nelson*, A012194; NW Cheeseman Island, 24/05/2011, *Francis*, A032217; L’Esperance Rock, 28/03/1982, *Singleton*, A012156; SW L’Esperance Rock, 26/05/2011, *Duffy*, A032223.

Lobed and branched, with deeply pigmented marginal cells, growing on rock and coral rubble, up to 40 m depth.

***Distromium skottsbergii* Levring**

Raoul Island, off Fleetwood Bluff, 10/1975, RV *Acheron*, A009405.

Known from a single collection dredged at 135 m depth.

***Distromium* sp.**

Meyer Islands, 21/03/1982, *Nelson*, A012139-40, A012144.

Shallow subtidal to ca. 9 m depth, flabellate and with a stipe, growing through compacted sand and between boulders.

***Lobophora variegata* (J.V.Lamour.) Womersley**

Meyer Islands, Boat Harbour, 28/10/1975, RV *Acheron*, A009404; Raoul Island, Denham Bay, 18/07/1993, *West*, A023772, 10/11/2004, *Duffy*, A023744; Macauley Island, 24/03/1982, *Hill*, A012127; Curtis Island, 29/03/1982, *Nelson*, A012132; L’Esperance Rock, 28/03/1982, *Singleton & Hill*, A012131.

Abundant, growing closely appressed to rock and rubble substrates, extending from low intertidal pools to depths of ca. 30 m.

Note: Includes the specimen recorded as *Lobophora* sp. in Nelson & Adams (1984).

***Padina fraseri* (Grev.) Grev.**

Meyer Islands, 20/03/1982, *Nelson*, A012200; Macauley Island, 24/03/1982, *Hill*, A012202; L'Esperance Rock, 28/03/1982, *Singleton*, A012203.

Inconspicuous, growing on rock and limpet shells.

Note: The identity of sterile plants recorded as *Padina* sp. in Nelson & Adams (1984) remain unconfirmed.

***Stypopodium australasicum* (Zanardini) Allender**

Macauley Island, 11/1970, *Yaldwyn*, A004063.

***Taonia australasica* J.Agardh**

Raoul Island, off Fleetwood Bluff, 25/10/1975, RV *Acheron*, A009406; Raoul Island, Denham Bay, 5/11/2004, *Duffy*, A023738; Meyer Islands, southwest, 6/06/1991, *Anderson*, A026864; Macauley Island, 28/07/1974, RV *Tangaroa*, A013344; West Macauley Island, 21/05/2011, *Francis*, A032221; NW Cheeseman Island, 24/05/2011, *Francis*, A032222; L'Esperance Rock, 28/03/1982, *Singleton*, A012139, A012140.

On rock faces and coral rubble extending from the upper subtidal zone to depths of ca. 30 m.

***Zonaria diesingiana* J.Agardh**

Meyer Islands, 2/06/1992, *Williamson*, A032337; Meyer Islands, Boat Harbour, 05/1995, *Morley & Stace*, AK 223303.

Note: This is a new record for the New Zealand region.

Sphacelariales**Sphacelariaceae*****Sphacelaria tribuloides* Menegh.**

Napier Island, 17/05/2011, *de Lange*, AK 327415; Macauley Island, 24/03/1982, *Hill*, A012221; L'Esperance Rock, 28/03/1982, *Singleton*, A012220.

Forming a dense turf ca. 1–1.5 cm high on shell and rock surfaces in the intertidal and shallow subtidal.

***Sphacelaria* sp.**

Meyer Islands, 21/03/1982, *Dawson*, A012219.

Stypocaulaceae***Halopteris* sp.**

Raoul Island, off Fleetwood Bluff, 10/1975, RV *Acheron*, A009412; L'Esperance Rock, 28/03/1982, RV *Tangaroa*, A012061.

Fucales**Sargassaceae*****Sargassum aquifolium* (Turner) C.Agardh**

Raoul Island, 10/2004, *Stanley*, A023190, also 11/2004, *Chadderton*, A0028413; Macauley Island, 22/05/2011, *de Lange*, AK 328109, also 23/05/2011, *de Lange*, AK 327453.

On low intertidal and upper subtidal rocks.

Note: Presence confirmed by Mattio & Payri (2009), previously recorded as *S. cristaefolium*.

***Sargassum scabridum* Hook.f. & Harv.**

Meyer Islands, 11/2005, *Duffy*, A028408-12.

Note: Presence at the Kermadec Islands confirmed by Mattio & Payri (2009).

Sargassum "tahitense" sensu Nelson & Adams 1984

Raoul Island, NE Hutchinson Bluff, 09/1976, RV *Acheron*, A009509.

Recorded from a single collection dredged at 29–36 m depth.

***Sargassum* sp.**

Macauley Island, 11/1970, *Yaldwyn*, WELT A004066.

Note: Further research and molecular sequence analyses are required to resolve the identification of Kermadec Islands *Sargassum* species.

Sporochnales**Sporochnaceae*****Sporochnus moorei* Harv.**

Meyer Islands, Boat Harbour, 28/10/1975, RV *Acheron*, A012703.

Dredged from deep water, 22–27 m, growing on pebbles.

Ralfsiales**Ralfsiaceae*****Ralfsia* sp.**

Raoul Island, Denham Bay, 22/03/1982, *Singleton*, A012662.

Note: New generic record for the Kermadec Islands.

Ectocarpales**Acinetosporaceae*****Feldmannia indica* (Sond.) Womersley & A.Bailey**

Raoul Island, Denham Bay, 22/03/1983, *Dawson*, A012702.

On limpet shells, intertidally.

***Feldmannia mitchelliae* (Harv.) H.-S.Kim**

Napier Island, 17/05/2011, *de Lange*, AK 327412; Raoul Island, Sunshine to Boat Cove coast, 16/05/2011, *de Lange*, AK 327437; Raoul Island, Denham Bay, 2/03/1982, *Singleton*, A012223; Meyer Islands, 20/03/1982, *Nelson*, A012224; Macauley Island, 24/03/1982, *Hill*, A012222.

Epiphytic on various subtidal algae.

Note: Previously as *Giffordia*, transferred to *Feldmannia* in Kim (2010).

Chordariaceae***Nemacystus novae-zelandiae* Kylin**

Raoul Island, Fishing Rock, 10/1944, *Sorenson*, CHR s.n.

Epiphytic on *Sargassum* fronds.

Scytosiphonaceae***Colpomenia sinuosa* (Mertens ex Roth) Derbès & Solier**

Raoul Island, Denham Bay, 10/11/2004, *Duffy*, A023778; Meyer Islands, 21/03/1982, *Nelson*, A012227; Macauley Island, 24/03/1982, *Hill*, A012228.

Petalonia binghamiae* (J.Agardh)*K.L.Vinogradova**

Raoul Island, Fishing Rock, 10/1944, *Sorenson*, CHR s.n. Intertidally on wave-beaten rocks.

Note: Previously listed as *Endarachne binghamiae*, synonymy after Boo (2010).

***Hydroclathrus clathratus* (C.Agardh) M.Howe**

Raoul Island, Fishing Rock, 10/1944, *Sorenson*, CHR s.n.; Kermadec Islands, 10/1975, RV *Acheron*, A009198; Stawell Shoal, Curtis Island, 25/05/2011, *Bedford*, A032249.

Loosely attached to rock surfaces and extending into deep water to ca. 44 m depth.

Laminariales**Lessoniaceae*****Ecklonia radiata* (C.Agardh) J.Agardh**

Macauley Island, 28/07/1974, RV *Tangaroa*, A013337-38.

Apparently attached and growing in deep water to ca. 35–38 m.

Drift Records of Brown Algae:

Species recorded solely from drift material and assumed not to be part of the Kermadec Islands flora as no attached populations have been found:

Carpophyllum angustifolium, *C. flexuosum*, *C. maschalocarpum*, *C. plumosum*; *Cystophora retroflexa*; *Durvillaea antarctica*; *Hormosira banksii*; *Notheia anomala*; *Perithalia capillaris*.

Rhodophyta**Bangiophyceae****Bangiales****Bangiaceae****‘Porphyra’ spp.**

Raoul Island, Boat Cove landing, west-facing rocks, 31/10/1994, *West*, A026715; Herald Islets, Dayrell Island, 18/05/2011, *de Lange*, AK 327418, AK 327420.

Note: The Bangiales has been revised with the recognition of a number of genera for bladed species (Sutherland *et al.* 2011). More than one species of bladed Bangiales has been found at the Kermadec Islands and it is probable that at least one of these belongs to the genus *Pyropia*. Further collections and molecular sequencing analyses are required.

Florideophyceae**Hildenbrandiales****Hildenbrandiaceae*****Hildenbrandia* sp.**

Raoul Island, Denham Bay, 22/03/1982, *Singleton*, A012705; Meyer Islands, 21/03/1982, *Nelson*, A012701, A012706.

Note: New generic record for the Kermadec Islands.

Corallinales**Corallinaceae*****Amphiroa anceps* (Lam.) Decne.**

Kermadec Islands, 1908, *Oliver*, A001177; Meyer Islands, 21/03/1982, *Nelson*, A012627, A012628.

***Corallina officinalis* L.**

Raoul Island, Denham Bay, 22/03/1982, *Singleton*, A012621; Meyer Islands, 21/03/1982, *Nelson*, A012692-94; Macauley Island, 11/11/2004, West Bluff, *Duffy*, A030068.

***Jania rosea* (Lam.) Decne. – (‘bottlebrush’ sensu Farr *et al.* 2009)**

Raoul Island, Denham Bay, 22/03/1982, *Singleton*, A012610/B, A012611; Meyer Islands, 21/03/1982, *Nelson*, A012616, *Hill*, A012612.

Note: As *Halitilon cuvieri* in Nelson & Adams (1984).

***Jania rosea* (Lam.) Decne. – (‘feather’ sensu Farr *et al.* 2009)**

Raoul Island, Fishing Rock, 28/08/1972, *Climo*, A007736; Raoul Island, Denham Bay, 22/03/1982, *Singleton*, A012610/A; Meyer Islands, 20/03/1982, *Singleton*, A012613; Macauley Island, 24/03/1982, *Hill*, A012617-18.

***Jania sagittata* (J.V.Lamour.) Blainv.**

Meyer Islands, 21/03/1982, *Nelson*, A012622-25; Macauley Island, 24/03/1982, *Hill*, A012626, also 21/05/2011, *Francis*, A032247.

Note: Formerly as *Cheilosporum sagittatum*.

***Jania* sp.**

Meyer Islands, 21/03/1982, *Nelson*, A012599.

Note: As *Jania unguolata* Yendo f. *brevior* (Yendo) Dawson in Nelson & Adams (1984).

***Jania* sp.**

Raoul Island, Denham Bay, 22/03/1982, *Singleton*, A012610/B, also 5/06/1992, *Williamson*, A032371.

Very finely branched epiphyte on *Jania rosea* and *Galaxaura filamentosa*.

***Lithophyllum prototypum* (Foslie) Foslie**

Meyer Island, 20/03/1982, *Nelson*, A022641, A022644.

Note: New record for New Zealand region.

***Lithophyllum* sp. 1**

Kermadec Islands, 28/03/1982, RV *Tangaroa*, A012646.

***Lithophyllum* sp. 2**

Kermadec Islands, 28/03/1982, RV *Tangaroa*, A012647-48.

Note: *Lithophyllum* sp. 1 & sp. 2 were from dredges taken at 70 m depth.

***Lithoporella melobesioides* (Foslie) Foslie**

Raoul Island, dredge, 22/03/1982, RV *Tangaroa*, A012645; Raoul Island, Denham Bay, 22/03/1982, *Singleton*, A012664.

***Mastophora pacifica* (Heydr.) Foslie**

Raoul Island, Denham Bay, 5/11/2004, *Duffy*, A029244; NW Meyer Is, 13/05/2011, *Francis*, A032245; Meyer Island, 20/03/1982, *Nelson*, A022649.

Note: Epiphytic on *Galaxaura filamentosa* (A032241), recorded for the Kermadec Islands and New Zealand region for the first time by Farr *et al.* (2009).

***Pneophyllum coronatum* (Rozanov) Penrose**

Note: Reported from the Kermadec Islands for the first time by Farr *et al.* (2009).

Note: Specimens recorded as *Hydrolithon*, *Neogoniolithon* and *Pseudolithophyllum* in Nelson & Adams (1984) require further study.

Hapalidiales**Hapalidiaceae*****Choreonema thuretii* (Bornet) F.Schmitz**

Meyer Islands, 21/03/1982, *Nelson*, A012614.

Parasitic, growing on *Jania rosea* ('bottlebrush').

Note: Specimens recorded as *Mesophyllum* spp. in Nelson & Adams (1984) require further study (Farr *et al.* 2009).

Sporolithales**Sporolithaceae*****Sporolithon durum* (Foslie) R.A.Towns. & Woelk.**

Meyer Islands, 12/09/1976, *Baker*, A009762, also 21/03/1982, *Dawson*, A012637.

Note: New record for the Kermadec Islands.

Acrochaetiales**Acrochaetiaceae****'*Audouinella* sp.?' sensu Nelson & Adams (1984)**

Raoul Island, Denham Bay, 1908, *Oliver*, Laing 1361 (in CHR), also VWL No. 9521 in AK.

Note: Identification of small epiphytes remains uncertain.

Nemaliales**Galaxauraceae*****Dichotomaria marginata* (J.Ellis & Sol.) Lam.**

Kermadec Islands, 1908, *Oliver*, A001620; Meyer Islands, 21/03/1982, *Dawson*, A012248-50.

In intertidal pools on rock.

Note: As *Galaxaura marginata* in Nelson & Adams (1984), transferred to *Dichotomaria* (Huisman *et al.*

2004). Kermadec Islands material needs to be compared with *D. australis*, distinguished by Huisman *et al.* (2004) for south-east Australian specimens previously identified as *G. marginata*.

***Galaxaura divaricata* (L.) Huisman & R.A.Towns.**

Meyer Islands, 21/03/1982, *Nelson*, A012259, A012260; Raoul Island, 28/08/1972, *Climo*, A007735; Macauley Island, 11/1970, *Yaldwyn*, A004070.

Conspicuous thalli found in both intertidal pools and on shallow, subtidal rocks.

Note: As *Galaxaura fasciculata* in Nelson & Adams (1984).

***Galaxaura filamentosa* R.C.Y.Chou**

Raoul Island, close to east side of Meyer Islands, 11/09/1976, RV *Acheron*, A009512; Raoul Island, Milne Islets, 7/06/1991, *Williamson*, A023754; Raoul Island, Denham Bay, 22/03/1982, *Singleton*, A012234-36; NW Meyer Islands, 13/05/2011, *Francis*, A032241; Meyer Islands, 20/03/1982, *Nelson*, A012238.

Abundant on rocks and coral found to depths of ca. 30 m.

Note: As *G. lapidescens* in Nelson & Adams (1984).

Many specimens have epiphytes of *Mastophora pacifica* and *Jania* sp.

***Galaxaura rugosa* (J.Ellis & Sol.) J.V.Lamour.**

Raoul Island, Denham Bay, 22/03/1982, *Singleton*, A012258; Raoul Island, Denham Bay, south side, 25/04/1990, RV *Akademik Alexander Nesmeyanov*, A025049; Meyer Islands, 20/03/1982, *Nelson*, A012252.

Found subtidally on rock and coral rubble to depths of ca. 15 m.

***Tricleocarpa cylindrica* (J.Ellis & Sol.) Huisman & Borow.**

Meyer Islands, 21/03/1982, *Nelson*, A012251; Raoul Island, Denham Bay, 22/03/1982, *Singleton*, A012264; Denham Bay, south side, 25/04/1990, *Asher*, A019627.

In intertidal pools and shallow subtidal.

Note: As *G. oblongata* in Nelson & Adams (1984).

Huisman & Borowitzka (1990) established a new genus for two species previously placed in *Galaxaura*.

Liagoraceae***Ganonema farinosum* (J.V.Lamour.) K.C.Fan & Yung C.Wang**

Raoul Island, Denham Bay, 25/04/1990, *Asher*, A019622-24, also 5/11/2004, *Chadderton*, A023779; Raoul Island, Boat Cove, 14/05/2011, *Francis*, A032234; Raoul Island, dredge, 03/1982, RV *Tangaroa*, A012268; Meyer Islands, 20/03/1982, *Nelson*, A012269-71.

On rock and coral rubble to depths of ca. 25 m.

Note: As *Liagora farinosa* in Nelson & Adams (1984) (Fan & Wang 1974).

***Liagora harveyana* Zeh**

Meyer Islands, 20/03/1982, *Nelson*, A012272, A012273; Curtis Island, Stawell Shoal, 25/05/2011, *Bedford*, A032233.

***Liagora* sp.**

NW Meyer Islands, 13/05/2011, *Francis*, A032240;
Meyer Islands, 10/1975, RV *Acheron*, A009417.
On intertidal and subtidal rocks.

***Nemalion helminthoides* (Velley) Batters**

Raoul Island, Fishing Rock, 10/1944, *Sorensen*, CHR
63860; Curtis Island, 23/10/1975, RV *Acheron*, A011437.
On intertidal, wave-exposed rocks.

Bonnemaisoniales
Bonnemaisoniaceae
***Asparagopsis taxiformis* (Delile) Trevis.**

Napier Island, 17/05/2011, *de Lange*, AK 327413; Raoul
Island, west of D'Arcy Point, 12/09/1976, RV *Acheron*,
A009504; Raoul Island, Denham Bay, 22/03/1982,
Singleton, A012276; Meyer Islands, 20/03/1982,
Singleton, A012277; Macauley Island, 11/1970,
Yaldwyn, A004072; West Macauley Island, 21/05/2011,
Francis, A032243; L'Esperance Rock, 28/03/1982,
Singleton, A012275.

Very abundant, found growing on rock faces and
on compacted sand and gravel, extending along the
substrate with stoloniferous growth.

***Delisea pulchra* (Grev.) Mont.**

Raoul Island, west of D'Arcy Point, 12/09/1976,
RV *Acheron*, A009506; Raoul Island, Denham Bay,
22/03/1982, *Singleton*, A012286-87; Meyer Islands,
21/03/1982, *Nelson*, A012288, also 05/1995, *Morley*
& *Stace*, AK 223305-06; Macauley Island, 24/03/1982,
Singleton, A012300; L'Esperance Rock, 28/03/1982,
Singleton, A012301-03.

Abundant on rock faces and found from the shallow
subtidal to depths of ca. 30 m, this is the largest species
of red algae found at the Kermadec Islands, reaching a
height of 25 cm or more.

Ceramiales
Callithamniaceae
***Callithamnion* sp.**

Meyer Islands, 21/03/1982, *Nelson*, A012498.

***Crouania* sp. cf. *C. capricornica* Saenger &
E.M.Woll.**

Meyer Islands, 21/03/1982, *Nelson*, A012476; Macauley
Island, 24/03/1982, *Singleton*, A012367.

Ceramiaceae***Antithamnion hubbsii* E.Y.Dawson**

L'Esperance Rock, 28/03/1982, *Nelson*, A012470-71.
Minute epiphyte on various algae, subtidal at 70 m.

***Antithamnion decipiens* (J.Agardh) Athanas.**

Meyer Islands, 21/03/1982, *Singleton*, A012699.
Small epiphyte on various algae, subtidal to 18 m.

Note: As *Antithamnion ogdeniae* I.A.Abbott in Nelson
& Adams (1984).

***Antithamnion* sp.**

Meyer Islands, 20/03/1982, *Nelson*, A016045.

***Antithamnionella breviramosa* (E.Y.Dawson)
E.M.Woll.**

Meyer Islands, 20/03/1982, *Nelson*, A012467;
L'Esperance Rock, 28/03/1982, *Singleton*, A012468.
Minute epiphyte on various algae, shallow subtidal.

Antithamnionella flagellata* (Børgesen)*I.A.Abbott**

Macauley Island, 24/03/1982, *Singleton*, A012466.
Minute epiphyte on *Pterocladia capillacea*.

***Balliella pseudocorticata* (E.Y.Dawson) D.N.Young**

L'Esperance Rock, 28/03/1982, *Nelson*, A012469.

Minute epiphyte on various algae.

Note: As *Antithamnion pseudocorticatum* Dawson in
Nelson & Adams (1984).

***Centroceras clavulatum* (C.Agardh) Mont.**

Meyer Islands, 21/03/1982, *Nelson*, A012503-05.

Small plants found in turf, often entangled with
articulated corallines and *Martensia*.

Note: Kermadec Islands specimens require further study
as recent research on *Centroceras* has revealed cryptic
diversity (Won *et al.* 2009).

***Ceramium codii* (Richards) Feldm.-Maz.**

Macauley Island, 24/03/1982, *Singleton*, A012465.
Minute epiphyte on various algae.

***Ceramium subdichotomum* Weber Bosse**

Meyer Islands, 21/03/1982, *Singleton*, A012460-61.
Small epiphyte, ca. 5 mm high, on *Dictyota*.

***Ceramium subverticillatum* (Grunow) Weber Bosse**

Raoul Island, northeast of Hutchinson Bluff, 10/09/1976,
RV *Acheron*, A009511; Macauley Island, 24/03/1982,
Singleton, A012464.

Small epiphyte, ca. 1 cm high, on various algae.

***Ceramium* spp.**

Raoul Island, Denham Bay, south side, 25/04/1990,
Asher, A019630; Meyer Islands, 21/03/1982, *Dawson*,
A012060.

Note: Earlier tentative identifications of *Ceramium* spp.
remain to be confirmed, awaiting further samples.

***Gayliella flaccida* (Harv. ex Kütz.) T.O.Cho &
L.J.McIvor**

Meyer Islands, 20/03/1982, *Nelson*, A012462-63.
Common epiphyte on various algae.

Note: As *Ceramium flaccidum* (Kütz.) Ardiss. in Nelson
& Adams (1984), further comparative study of Kermadec
Islands material identified as this species is required.

Dasyaceae***Dasya baillouviana* (Gmelin) Mont.**

Napier Island, 17/05/2011, *de Lange*, AK 327411; Raoul Island, Denham Bay, 22/03/1982, *Singleton*, A012578; Meyer Islands, 20/03/1982, *Nelson*, A012575; Macauley Island, 24/03/1982, *Singleton*, A012584, also 22/05/2011, *de Lange*, AK 327455; L'Esperance Rock, 28/03/1982, *Nelson & Singleton*, A012574.

Small plants growing in algal turf amongst other algae, subtidal to ca. 15 m.

Note: Listed as *Dasya pedicellata* in *Nelson & Adams* (1984) this species was re-identified by *Adams* (1994).

***Heterosiphonia* sp.**

Raoul Island, Denham Bay, 22/03/1982, *Singleton*, A012585; Meyer Island, 20/03/1982, *Nelson*, A012586; Macauley Island, 24/03/1982, *Hill*, A012587.

Epiphytic on various algae.

Note: As *Heterosiphonia wurdemannii* (J.Bailey ex Harvey) *Falkenb.* in *Nelson & Adams* (1984), now synonymised with *Heterosiphonia crispella* (C.Agardh) M.J.Wynne.

Delesseriaceae***Acrosorium* sp.**

Meyer Islands, 21/03/1982, *Nelson*, A012450-51; Macauley Island, 24/03/1982, *Hill*, A012454-55.

Epiphytic on various algae.

Note: As *Acrosorium uncinatum* in *Nelson & Adams* (1984).

***Hypoglossum* sp.**

Meyer Islands, 20/03/1982, *Nelson*, A012433-36.

Epiphytic on various algae.

***Martensia* sp.**

Raoul Island, Boat Cove landing, 6/06/1992, *Williamson*, A023756, also Sunshine- Boat Cove Coastline, 16/05/2011, *de Lange*, AK 327434; Raoul Island, Milne Islets, 7/06/1991, *Williamson*, A023753; Raoul Island, Denham Bay, 22/03/1982, *Hill*, A012437; Raoul Island, Chanter Island, 16/05/2011, *Francis*, A032235; Meyer Islands, 20/03/1982, *Nelson*, A012444-46; Macauley Island, 24/03/1982, A012511.

Common and abundant on rock substrates in intertidal pools and subtidally to depths of ca. 30 m.

Note: Recorded as *Martensia fragilis* Harv. in *Nelson & Adams* (1984), this is now recognised to be an undescribed species (pers. comm. S-M. Lin).

***Phycodrys* sp.**

Raoul Island, Smith Bluff, 25/10/1975, RV *Acheron*, A012704.

On pumice rubble dredged from 70 m depth.

Note: Kermadec Islands material needs to be compared in detail with *P. adamsiae* (previously referred to *P. profunda*) (Lin & Nelson 2010).

***Taenioma nanum* (Kütz.) Papenf.**

Meyer Islands, 21/03/1982, *Nelson*, A012524; L'Esperance Rock, 28/03/1982, *Singleton*, A012458.

Minute and creeping epiphyte on various algae.

Rhodomelaceae***Chondria* sp. 1**

Meyer Islands, 20/03/1982, *Nelson*, A012540-41; Raoul Island, Denham Bay, 22/03/1982, *Singleton*, A012547-48.

***Chondria* sp. 2**

Meyer Islands, 20/03/1982, *Hill*, A012550; Raoul Island, Fishing Rock, 28/08/1972, *Climo*, A007738.

Note: The genus *Chondria* from throughout the New Zealand region requires further study.

Cladhymania coronata* (Lindauer & Setchell)*Saenger**

Meyer Islands, 21/03/1982, *Nelson*, A012456.

***Dasyclonium flaccidum* (Harv.) Falkenb.**

Raoul Island, Denham Bay, 22/03/1982, *Singleton*, A012537.

On shell and coarse sand.

***Dasyclonium incisum* (J.Agardh) Kylin**

Raoul Island, 1908, *Oliver*, A001191; Meyer Islands, 21/03/1982, *Nelson*, A012590.

Epiphytic, frequently on *Pterocladia capillacea*.

***Dipterosiphonia parva* (Dickie) Skottsb. & Levring**

Raoul Island, Fishing Rock, 28/08/1972, *Climo*, A007742; Meyer Islands, 20/03/1982, *Nelson*, A012535; Macauley Island, 24/03/1982, *Hill*, A012531.

Epiphytic, frequently on *Pterocladia capillacea*.

***Herposiphonia secunda* f. *tenella* (C. Agardh) M.J. Wynne.**

Raoul Island, 28/08/1972, *Climo*, A007739; Meyer Islands, 20/03/1982, *Nelson*, A012526-27.

Note: As *Herposiphonia tenella* (C.Agardh) *Ambrohn* in *Nelson & Adams* (1984).

***Laurencia brongniartii* J.Agardh**

Raoul Island, (close to eastern Meyer Islands), 11/09/1976, RV *Acheron*, A009518; Raoul Island, Denham Bay, 22/03/1982, *Hill*, A012551; Meyer Islands, 20/03/1982, *Singleton*, A012555.

Amongst algal turf on large stones and rocks.

***Laurencia* sp. 1**

Raoul Island, Denham Bay, 22/03/1982, *Singleton*, A012566; Meyer Islands, 21/03/1982, *Dawson*, A012565; L'Esperance Rock, 28/03/1982, *Singleton*, A012567.

Small, partially compressed plants found amongst turf and covering rocks and shells.

***Laurencia* sp. 2**

Raoul Island, northeast of Hutchinson Bluff, 10/09/1976, RV *Acheron*, A009508.

Large, terete plants on pumice rubble in deep water, dredged from 29–36 m.

Note: The genus *Laurencia* from throughout the New Zealand region requires further study.

***Lophosiphonia prostrata* (Harv.) Falkenb.**

Meyer Island, 20/03/1982, *Nelson*, A012538.

Delicate plants growing closely appressed to the surface of *Placophora* and *Distromium* species.

Note: As *Polysiphonia* sp. in Nelson & Adams (1984), identified as *Lophosiphonia prostrata* in Adams (1994).

‘Lophothalieae’ (det. M.J.Parsons)

Raoul Island, west of D’Arcy Point, 12/09/1976, RV *Acheron*, A009501; Raoul Island, NW Meyer Island, 13/05/2011, *Francis*, A032229.

***Lophurella caespitosa* (Hook.f. & Harv.) Falkenb.**

Macauley Island, 24/03/1982, *Singleton*, A012700.

Small plants, ca. 1 cm high, growing on vertical rock faces.

***Neosiphonia apiculata* (Hollenb.) Masuda & Kogame**

Raoul Island, Denham Bay, 22/03/1982, *Hill*, A012522; Meyer Island, 20/03/1982, *Nelson*, A012525.

Small epiphytic species, creeping on bases of various algae.

Note: As *Polysiphonia apiculata* in Nelson & Adams (1984).

***Placophora binderi* (J.Agardh) J.Agardh**

Macauley Island, 24/03/1982, *Singleton*, A012514-16.

Closely attached to coral, shell and rock rubble.

***Polysiphonia hancockii* Dawson**

Raoul Island, Denham Bay, 22/03/1982, *Hill*, A012518;

Meyer Islands, 20/03/1982, *Singleton*, A012519;

Macauley Island, 24/03/1982, *Hill*, A012517.

Epiphytic on various algae.

***Polysiphonia scopulorum* Harv.**

Raoul Island, Denham Bay, 22/03/1982, *Singleton*, A012528; Meyer Islands, 20/03/1982, *Singleton*, A012530;

Macauley Island, 24/03/1982, *Singleton*, A012529.

Epiphytic and also forming a turf on rocks, shells and coral rubble.

Wrangeliaceae***Griffithsia monilis* Harv.**

Meyer Islands, 21/03/1982, *Nelson*, *Singleton* & *Hill*, A012507-10.

Small, solitary plants on rock and sponges, amongst other small algae.

***Pleonosporium globuliferum* Levring**

Kermadec Islands, 22/03/1982, RV *Tangaroa*, A012502; Meyer Islands, 21/03/1982, *Nelson*, A012499.

***Ptilothamnion* sp.?**

L’Esperance Rock, 03/1982, RV *Tangaroa*, A012496.

***Spongoclonium brownianum* (Harv.) J.Agardh**

Raoul Island, 1908, *Oliver*, Laing 1326 (in CHR).

***Wrangelia penicillata* (C.Agardh) C.Agardh**

Raoul Island, *Asher* & *Gillespie*, 24/04/1990, A019604; Raoul Island, Denham Bay, 4/11/2004, *Duffy*, A032391; Meyer Islands, 21/03/1982, *Nelson* & *Hill*, A012513; Meyer Islands, north, 21/7/1993, *West*, A032395; Macauley Island, 24/03/1982, *Hill*, A012479; L’Esperance Rock, 28/03/1982, *Singleton* & *Hill*, A012480.

Solitary plants on rock, subtidal to depths of 20 m.

Spyridiaceae***Spyridia filamentosa* (Wulfen) Harv.**

Meyer Islands, 21/03/1982, *Dawson*, A012472-74, also *Nelson*, A012475.

Forming patches on rock surfaces.

Gelidiales**Gelidiaceae*****Capreolia implexa* Guiry & Womersley**

Raoul Island, 24/08/1972, *Climo*, A007685; Meyer Island, 21/03/1982, *Dawson*, A012675.

As closely packed low turf on rock and shell in the intertidal zone.

Note: As *Gelidium pusillum* (Stackh.) Le Jol. in Nelson & Adams (1984).

***Gelidium isabelae* W.R.Taylor**

Raoul Island, Fishermans Rock, *Murray*, A019631; Meyer Islands, 21/03/1982, *Nelson*, A012676 (on *Patella*), also 12/05/2011, *de Lange*, AK 327397; Macauley Island, 22/05/2011, *de Lange*, AK 327457.

In dense tufts on rock and shells, in the intertidal and upper subtidal zones.

Note: New record for the New Zealand region.

***Gelidium longipes* J.Agardh**

Kermadec Islands, 1908, *Oliver*, A001618, AK 293351-53.

***Pterocladia capillacea* (S.G.Gmel.) Santel. & Hommers.**

Raoul Island, 28/08/1972, *Climo*, A007730; Meyer Islands, 21/03/1982, *Nelson*, A012305, also 12/05/2011, *de Lange*, AK 327399; Macauley Island, 24/03/1982, *Singleton*, A012314, also 22/05/2011, *de Lange*, AK 327459.

Note: As *Pterocladia capillacea* (Gmel.) Born. & Thuret in Nelson & Adams (1984), this species was transferred to *Pterocladia* by Santelices & Hommersand (1997). This is the most abundant intertidal red seaweed of any size at the Kermadec Islands, very variable in form and often reduced to the basal parts as a result of heavy grazing.

Gigartinales

Caulacanthaceae

Caulacanthus ustulatus (Turner) Kütz.
Raoul Island, 28/08/1972, *Climo*, A007740.

Dumontiaceae

Dudresnaya sp.
SW L'Esperance Rock, 26/05/2011, *Francis & Bedford*, A032242.
Note: New generic record for the Kermadec Islands.

Gigartinaceae

Chondracanthus chapmanii (Hook.f. & Harv.) Fredericq ?
Meyer Islands, 21/03/1982, *Nelson*, A012402-03; Macauley Island, 24/03/1982, *Singleton*, A012404-05; Curtis Island, 29/03/1982, *Nelson*, A012406.
Note: As '*Gigartina chapmanii* Hook.f. & Harv. ?' in Nelson & Adams (1984).

Gloiosiphonaceae

Hypnea esperi Bory
Raoul Island, Denham Bay, 4/11/2004, *Duffy*, A032390; Meyer Islands, 21/03/1982, *Nelson*, A012350, A012357-58; Meyer Islands, Boat Harbour, 7/11/2004, *Chadderton*, A032315; Macauley Island, 24/03/1982, *Hill*, A012345; L'Esperance Rock, 28/03/1982, *Singleton & Hill*, A012371; Curtis Island, 29/3/1982, *Nelson* A032370.

Solieriaceae

Solieria robusta (Grev.) Kylin
Raoul Island, Denham Bay, 22/03/1982, RV *Tangaroa*, A012408; Raoul Island, Smith Bluff, 10/1975, RV *Acheron*, A009418; Raoul Island, close to east side of Meyer Islands, 11/11/1976, RV *Acheron*, A009517.

Peyssonneliales

Peyssonneliaceae

Peyssonnelia sp.
Meyer Islands, 21/03/1982, *Nelson*, A012666, also *Dawson*, A012667 and 2/06/1992, *Williamson*, A032382.
Note: As *Peyssonnelia rubra* in Nelson & Adams (1984), this genus requires further attention.

Gracilariales

Gracilariaceae

Gracilaria sp.
Raoul Island, northeast of Hutchinson Bluff, 10/09/1976, RV *Acheron*, A009500; Macauley Island, 24/03/1982, *Singleton*, A012386.
Note: Further material is required before placement to species is possible.

Halymeniales

Halymeniaceae

Cryptonemia sp.
Raoul Island, northeast of Hutchinson Bluff, 10/09/1976, RV *Acheron*, A009510.

Cryptonemia cf. *C. umbraticola* E.Y.Dawson
Meyer Islands, 20/03/1982, *Singleton, Hill & Nelson*, A012383-85; Macauley Island, 24/03/1982, *Singleton*, A012382.

Halymeniaceae – *indet.*
Raoul Island, 11/09/1976, RV *Acheron*, A009516.

Nemastomatales

Nemastomaceae

Catenellopsis oligarthra (J.Agardh) V.J.Chapm.
Raoul Island, Fishing Rock, 10/1944, *Sorenson*, CHR s.n.

Schizymeniaceae

Schizymenia sp.?
Raoul Island, Fleetwood Bluff, 10/1975, RV *Acheron*, A009419; Raoul Island dredge, 22/03/1982, RV *Tangaroa*, A012363-64.

Plocamiales

Plocamiaceae

Plocamium hamatum J.Agardh
Raoul Island, Denham Bay, 22/03/1982, *Singleton*, A012332, also 5/11/2004, *Duffy*, A032379; Meyer Islands, 21/03/1982, *Nelson*, A012328-29; Macauley Island, 24/03/1982, *Singleton*, A012337, A012344.
On rock, pumice and coral rubble, extending from the shallow subtidal to depths of ca. 18 m.

Plocamium spp.
Raoul Island, close to east side of Meyer Islands, 11/09/1976, RV *Acheron*, A009520; Raoul Island, Denham Bay, east end, 12/09/1976, RV *Acheron*, A009523, A009524.
Note: Further research is required on species of *Plocamium* in the New Zealand region.

Rhodymeniales

Champiaceae

Champia parvula (C.Agardh) Harv.
Raoul Island, Denham Bay, 22/03/1982, *Singleton*, A012415; Meyer Islands, 21/03/1982, *Nelson*, A012411-14; Curtis Island, 29/03/1982, *Nelson*, A012410.
Inconspicuous, often tangled amongst other algae in low turf.
Note: Name reported worldwide and its application to Kermadec Islands material requires further investigation.

Faucheaeaceae***Faucheaceae* indet.**

Raoul Island, 22/03/1982, RV *Tangaroa*, A012373; Meyer Island, 20/03/1982, *Hill*, A012375; L'Esperance Rock, 28/03/1982, *Singleton*, A012374.

Note: Previously as "*Faucheia procumbens*?", the specimens require further study.

Lomentariaceae***Gelidiopsis intricata* (C.Agardh) Vickers**

Meyer Island, 21/03/1982, *Dawson*, A012688.

Rhodymeniaceae***Botryocladia skottsbergii* (Boergesen) Levring**

Raoul Island, 10/1975, RV *Acheron*, A010748; Raoul Island, Denham Bay, 22/03/1982, *Nelson & Hill*, A012424; Meyer Islands, 21/03/1982, *Hill*, A012421; Macauley Island, 24/03/1982, *Singleton*, A012427; L'Esperance Rock, 28/03/1982, *Singleton & Hill*, A012428.

Small plants found on non-geniculate corallines and sponges.

***Coelarthrum decumbens* Huisman**

Raoul Island, Denham Bay, east end, 12/11/1976, RV *Acheron*, A010349.

Note: As *Coelarthrum albertissii* in Nelson & Adams (1984).

***Gloiosaccion brownii* Harv.**

Raoul Island, 10/1975, RV *Acheron*, A010747.

Note: As *Botryocladia brownii* (Harv.) Silva in Nelson & Adams (1984).

***Rhodymenia* spp.**

Raoul Island, west of D'Arcy Point, 12/09/1976, RV *Acheron*, A009505; Raoul Island, Denham Bay, 22/03/1982, A012389; Meyer Island, 20/03/1982, *Hill*, A012391, also *Nelson*, A012392, *Hill*, A012399, also 21/03/1982, *Nelson*, A012390; Macauley Island, 24/03/1982, *Hill*, A012401, also 24/03/1982, *Singleton*, A012387-88, A012394-96.

Note: Further work is required on material recorded as *R. anastomans*, *R. leptophylla*, and *Epymenia marginifera* in Nelson & Adams (1984).

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