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Technical Report

A PRELIMINARY CHECKLIST OF THE MARINE BENTHIC MACROALGAE OF ROTUMA

by

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INTRODUCTION

Rotuma (Fig. 1) is a small volcanic island about 465 km north of the main Fiji group, and is located at 12°30' South; 177°05' East. It occupies about 44 km^2, and lies in fair isolation from other island groups. Being six degrees North of Fiji, Rotuma experiences a rather more equatorial climate, and is quite distinct in terms of its structure, age and geography (Woodhall, 1987). It is encircled by a mostly fringing reef about 16 km^2 in area, which supports a varied algal flora.

To the author's knowledge, no phycological investigation of Rotuma took place prior to the present research, although the nearby Fijian algal flora has been fairly well studied (*vide* South and Kasahara, 1992). Hence this present checklist represents the first record of the Rotuman algal flora, which is dealt with in more detail by N'Yeurt (1993), South and N'Yeurt (1992) and South *et al*. (1993).

METHODS

Extensive algal collections were made on Rotuman reefs from January 1992 to May 1992, and also from December 1992 to February 1993, as part of the author's MSc Thesis project. Owing to the absence of diving, collections were limited to intertidal benthic habitats. Specimens were preserved in 5% formaldehyde in seawater, and shipped back to the University in Suva for eventual identification. Voucher specimens of all identified algae were deposited in the Phycological Herbarium, South Pacific Regional Herbarium, as either pressed specimens or slide collections. Statistical analysis on the results was carried out, including the computation of

Jaccard Indices (Hoek, 1975) as a means of comparison between floras at different locations, namely between Fiji and Rotuma.

LIST OF SPECIES

A total of one hundred and six species are listed, comprising twenty-one Cyanophyceae, forty Rhodophyceae, nine Phaeophyceae and thirty-six Chlorophyceae. Taxa preceded by an asterisk (*) are new records for the Fijian algal flora, comprising forty-five taxa. A cross (+) indicates potentially new species.

The systematic order adopted, wherever possible, is that of Silva *et al.* (1987). Genera are listed alphabetically within each family, and species are listed alphabetically within each genus. The Cyanophyceae section broadly follows the classification in Bourrelly (1970) and most of the specimens were personally reviewed by B.A. Whitton during his visit to Fiji in March-April 1993.

SYSTEMATIC LIST

CYANOPHYCEAE

CHROOCOCCALES

Chroococcaceae

Aphanocapsa Nägeli
**Aphanocapsa* sp.
Gomphosphaeria Kützing
**Gomphosphaeria* sp.

Entophysalidaceae

Entophysalis Kützing
**Entophysalis* sp.

PLEUROCAPSALES

Hyellaceae

Pleurocapsa Thuret ex Hauck
**Pleurocapsa* sp.
Dermocarpa P. Crouan et H. Crouan
**Dermocarpa* sp.
Oncobyrsa Meneghini

**Oncobyrsa* sp.

CHAMAESIPHONALES

Chamaesiphonaceae

Chamaesiphon A. Braun et Grunow
**Chamaesiphon* sp.

Siphononemataceae

Siphononema Geitler
**Siphononema polonicum* Geitler

NOSTOCALES

Nostocaceae

Anabaena Bory de St. Vincent
**Anabaena* sp.

Oscillatoriaceae

Lyngbya C. Agardh
**Lyngbya aestuarii* (Mertens) Lieberman
Lyngbya "epiphytica" Hieron
Lyngbya majuscula (Dillwyn) Harvey
Oscillatoria Vaucher
**Oscillatoria* sp.
Schizothrix Kützing
**Schizothrix* sp.
Spirulina Turpin
**Spirulina tenerrima* Kützing
**Spirulina subtilissima* Kützing
Symploca Kützing
Symploca sp.?

Rivulariaceae

Calothrix C. Agardh
Calothrix sp.
Homoeothrix (Thuret) Kirchner
**Homoeothrix* sp.

Scytonemataceae

Tolypothrix Kützing
Tolypothrix sp.
Plectonema Thuret
Plectonema sp.

CHLOROPHYCEAE

ULVALES

Ulvaceae

Enteromorpha Link in Nees
Enteromorpha flexuosa (Wulfen) J. Agardh

CLADOPHORALES

Cladophoraceae

Cladophora Kützing
**Cladophora conferta* P. Crouan et H. Crouan
Rhizoclonium Kützing
**Rhizoclonium africanum* Kützing
**Rhizoclonium grande* Børgesen

SIPHONOCLADALES

Boodleaceae

Boodlea Murray et De Toni
**Boodlea coacta* (Dickie) Murray et De Toni
Struvea Sonder
Struvea anastomosans (Harvey) Piccone et Grunow ex Piccone

Siphonocladaceae

Boergesenia J. Feldmann
Boergesenia forbesii (Harvey) J. Feldmann
Cladophoropsis Børgesen
Cladophoropsis sundanensis Reinbold

Valoniaceae

Dictyosphaeria Decaisne ex Endlicher
Dictyosphaeria cavernosa (Forsskål) Børgesen
Valonia C. Agardh
Valonia aegagropila C. Agardh
Ventricaria Olsen et West
Ventricaria ventricosa (J. Agardh) Olsen et West

BRYOPSIDALES

Bryopsidaceae

Bryopsis Lamouroux
Bryopsis harveyana J. Agardh
**Bryopsis plumosa* (Hudson) C. Agardh

Caulerpaceae

Caulerpa Lamouroux
Caulerpa cupressoides (Vahl) C. Agardh
var. *lycopodium* Weber-van Bosse
*var. *lycopodium* (Weber-van Bosse) f. *elegans* (P. Crouan et H. Crouan) Weber-van Bosse
var. *mamillosa* (Montagne) Weber-van Bosse
Caulerpa racemosa (Forsskål) J. Agardh
var. *clavifera* (Turner) Weber-van Bosse
var. *peltata* (Lamouroux) Eubank
*var. *turbinata* (J. Agardh) Eubank
var. *uvifera* (Turner) J. Agardh
intermediate variety between vars. *turbinata* (J. Agardh) Eubank and *peltata* (Lamouroux) Eubank
Caulerpa serrulata (Forsskål) J. Agardh
*var. *boryana* (J. Agardh) Gilbert f. *occidentalis* (Weber-van Bosse) Yamada et Tanaka

Codiaceae

Codium Stackhouse
Codium arabicum Kützing
Codium bulbopilum Setchell
+ **Codium* sp. nov.

Halimediaceae

Halimeda Lamouroux
Halimeda bikinensis W.R. Taylor
Halimeda cuneata Hering
Halimeda discoidea Decaisne
Halimeda macrophysa Askenasy
**Halimeda micronesica* Yamada
Halimeda opuntia (Linnaeus) Lamouroux
var. *opuntia* (Decaisne) J. Agardh
var. *hederacea* (Barton) Hillis
Halimeda simulans Howe
Halimeda taenicola W.R. Taylor
Halimeda tuna (Ellis et Solander) Lamouroux

Udoteaceae

Avrainvillea Decaisne
Avrainvillea amadelpha (Montagne) Gepp et Gepp
+ **Avrainvillea rotumensis* N'Yeurt, Littler et Littler
Chlorodesmis Harvey et Bailey
Chlorodesmis hildebrandtii A. Gepp et E.S. Gepp
**Chlorodesmis major* Zanardini
Rhipidosiphon Montagne
Rhipidosiphon javensis Montagne
Rhipilia Kützing
**Rhipilia* sp.

DASYCLADALES

Polyphysaceae

Acetabularia Lamouroux
Acetabularia parvula Solms-Laubach

Dasycladaceae

Neomeris Lamouroux
Neomeris vanbosseae Howe

PHAEOPHYCEAE

ECTOCARPALES
Ectocarpaceae

Hincksia J.E. Gray
**Hincksia breviarticulata* (J. Agardh) P.C. Silva

SPHACELARIALES
Sphacelariaceae

Sphacelaria Lyngbye
Sphacelaria rigidula Kützing

DICTYOTALES
Dictyotaceae

Dictyopteris Lamouroux
Dictyopteris repens (Okamura) Børgesen
Dictyota Lamouroux
Dictyota friabilis Setchell
Dilophus J. Agardh
Dilophus radicans Okamura
Lobophora J. Agardh
Lobophora variegata (Lamouroux) Womersley

DICTYOSIPHONALES
Chnoosporaceae

Chnoospora J. Agardh
**Chnoospora minima* (Hering) Papenfuss

FUCALES
Sargassaceae

Sargassum C. Agardh
Sargassum polycystum C. Agardh
Turbinaria Lamouroux
Turbinaria ornata (Turner) J. Agardh

RHODOPHYCEAE
Bangiophycidae
BANGIALES
Erythropeltidaceae

Erythrotrichia J.E. Areschoug
Erythrotrichia carnea (Dillwyn) J.Agardh

Florideophycidae
ACROCHAETIALES
Acrochaetiaceae

Audouinella Bory
**Audouinella polyblasta* (Rosenvinge) J. Price, Lawson et John

BONNEMAISONIALES
Galaxauraceae

Actinotrichia Decaisne
Actinotrichia fragilis (Forsskål) Børgesen

GELIDIALES
Gelidiellaceae

Gelidiella Feldmann et Hamel
Gelidiella acerosa (Forsskål) Feldmann et Hamel
Gelidium Lamouroux
Gelidium pusillum (Stackhouse) Le Jolis

NEMALIALES
Liagoraceae

Liagora Lamouroux
**Liagora valida* Harvey

CRYPTONEMIALES
Peyssonneliaceae

Peyssonnelia Decaisne
Peyssonnelia sp.

CORALLINALES

Corallinaceae

Cheilosporum (Decaisne) Zanardini
Cheilosporum spectabile Harvey ex Grunow
Fosliella Howe
Fosliella farinosa (Lamouroux) Howe
Jania Lamouroux
Jania adhaerens Lamouroux
**Jania rubens* (Linnaeus) Lamouroux
Lithophyllum Philippi
**Lithophyllum tamiense* Heydrich

GIGARTINALES

Gracilariaceae

Gelidiopsis Schmitz
Gelidiopsis intricata (C. Agardh) Vickers
Gracilaria Greville
Gracilaria sp. aff *G. textorii* (Suringar) De Toni

Solieriaceae

Meristotheca J. Agardh
**Meristotheca procumbens* P. Gabrielson et Kraft

RHODYMENIALES

Champiaceae

Champia Desvaux
Champia parvula (C. Agardh) Harvey

Rhodymeniaceae

Coelarthrum Børgesen
**Coelarthrum boergesenii* Weber-van Bosse
Coelothrix Børgesen

**Coelothrix irregularis* (Harvey) Børgesen
Rhodymenia Greville
**Rhodymenia divaricata* Dawson

CERAMIALES

Ceramiaceae

Centroceras Kützing
Centroceras apiculatum Yamada
Centroceras clavulatum (C. Agardh) Montagne
Ceramium Roth
**Ceramium codii* (Richards) Mazoyer
Ceramium mazatlanense Dawson
Ceramium vagans P.C. Silva
**Ceramium zacae* Setchell et Gardner
Griffithsia C. Agardh
**Griffithsia subcylindrica* Okamura
Wrangelia C. Agardh
Wrangelia argus (Montagne) Montagne

Dasyaceae

Heterosiphonia Montagne
Heterosiphonia crispella (C. Agardh) Wynne
var. *laxa* (Børgesen) Wynne
Heterosiphonia subsecunda (Suhr) Falkenberg

Delesseriaceae

Hypoglossum Kützing
**Hypoglossum caloglossoides* Wynne et Kraft
Martensia Hering
Martensia elegans Hering

Rhodomelaceae

Amansia Lamouroux
Amansia glomerata C. Agardh
Bostrychia Montagne
Bostrychia tenella (Lamouroux) J. Agardh
Chondria C. Agardh

Chondria dasyphylla (Woodward) C. Agardh
**Chondria sedifolia* Harvey
**Chondria simpliciuscula* Weber-van Bosse

Herposiphonia Nägeli
Herposiphonia secunda (C. Agardh) Ambronn f. *tenella* (C. Agardh) Wynne
Laurencia Lamouroux
**Laurencia venusta* Yamada
Laurencia sp.
Polysiphonia Greville
Polysiphonia scopulorum Harvey
var. *scopulorum* (Harvey) Hollenberg

DISCUSSION

From the present list, it follows that forty-five fully identified taxa, or about 42% of the total Rotuman algal flora listed, represent new records for Fiji while two (*Avrainvillea* N'Yeurt, Littler et Littler, *Codium* sp.) represent new species, to be described elsewhere. Figure 3 shows the composition of the four main groups of Rotuman algae, while figure 4 compares the respective compositions of the Fijian and Rotuman algal floras. Figure 2 presents a summary of algal species at each station sampled; see N'Yeurt (1993) for further explanations. From Table I, It is immediately clear that the Fijian flora is much larger in terms of number of species; however the apparent impoverishment of the Rotuman flora is almost certainly a consequence of the lack of subtidal collections. Looking at Jaccard comparison indices (Table II; Figure 5), it appears that the Rotuman flora is quite dissimilar to the Fijian algal flora (P_o = 18.3); however once again this is largely a result of the vast size difference of the two floras and the absence of Rotuman subtidal collections, particularly Rhodophyta. It is pertinent to note that the two floras are most comparable in terms of Chlorophyta (P_g = 27.5), which are mostly found in intertidal habitats.

A particularly interesting observation is that one species of Rhodophyta found in Rotuma (*Meristotheca procumbens* P. Gabrielson et Kraft) represents the first observed record outside the type locality (Lord Howe Island; *vide* Gabrielson and Kraft, 1984), while a number of the Rotuman species are otherwise typically occuring in Northern Pacific waters. The latter biogeographic considerations are dealt with in more detail in N'Yeurt (1993).

The present preliminary research revealed quite interesting aspects of the Rotuman algal flora, providing an impetus for further work in this area. In particular, it would be most useful to obtain subtidal collections from Rotuman waters, especially Rhodophyta, in order to reassess biogeographical comparisons of the Rotuman flora with neighbouring island groups.

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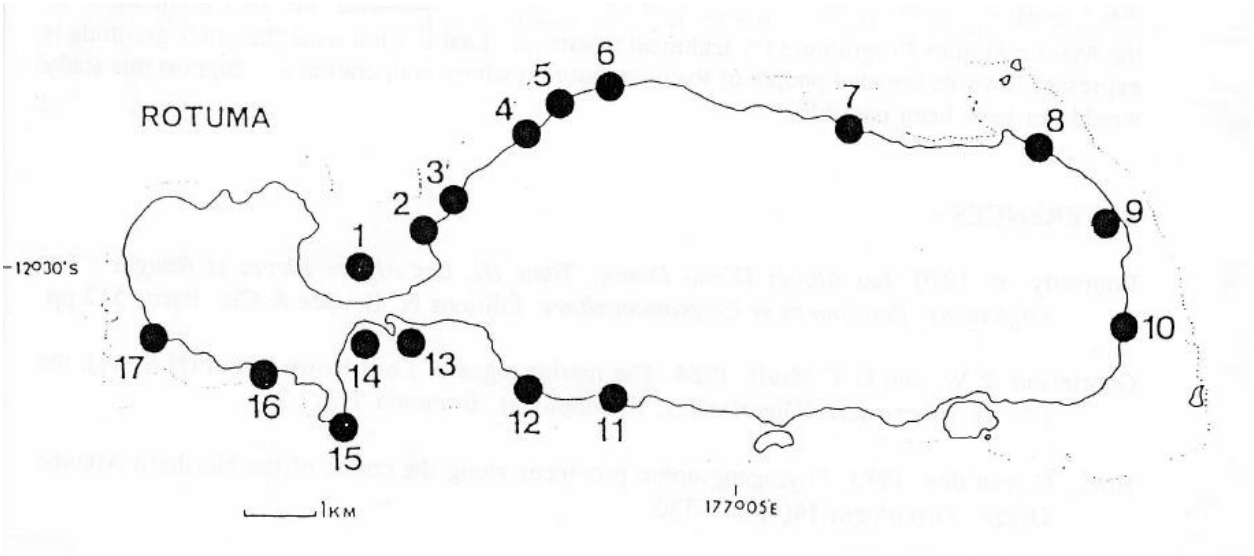


Figure 1

LEGEND TO LOCATIONS ON MAP

1. Maka Bay	2. 'Ahau	3. Jölmea	4. Mea
5. Ropure	6. Hoféa	7. Lopta	8. Oinafa
9. Paptea	10. Noa'tau	11. Tua'koi	12. Saolei
13. Isilepi	14. Hapmafau Bay	15. Kelega	16. Fapufa
17. Losa			

Table I

Numbers of Algal Species : Fiji and Rotuma

	Fiji *	**Rotuma**	**New Records**	**Shared Species**
All Species	314	106	45	66
Cyanophyceae	12	21	15	6
Chlorophyceae	94	36	13	28
Phaeophyceae	38	9	2	7
Rhodophyceae	170	40	16	25

* Excludes species occurring in Rotuma and not in Fiji.

Table II

Flora Comparisons : Fiji and Rotuma

	Jaccard Index (P)
All Species	18.3
Cyanophyceae	N/A
Chlorophyceae	27.5
Phaeophyceae	4.4
Rhodophyceae	13.5

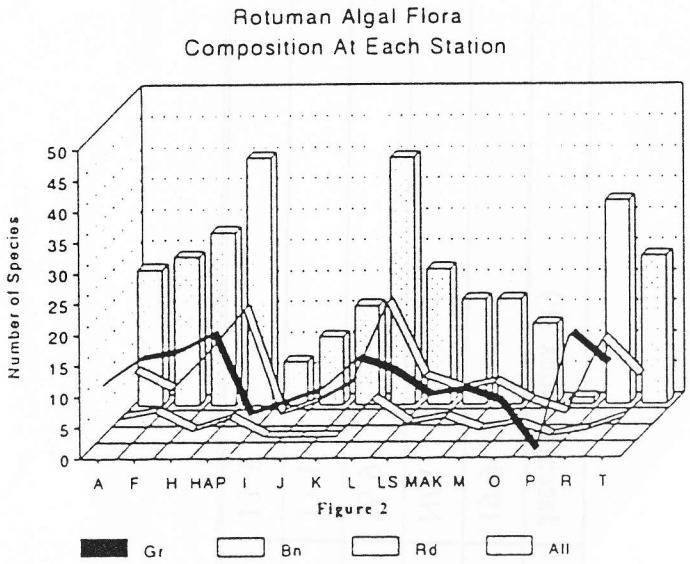
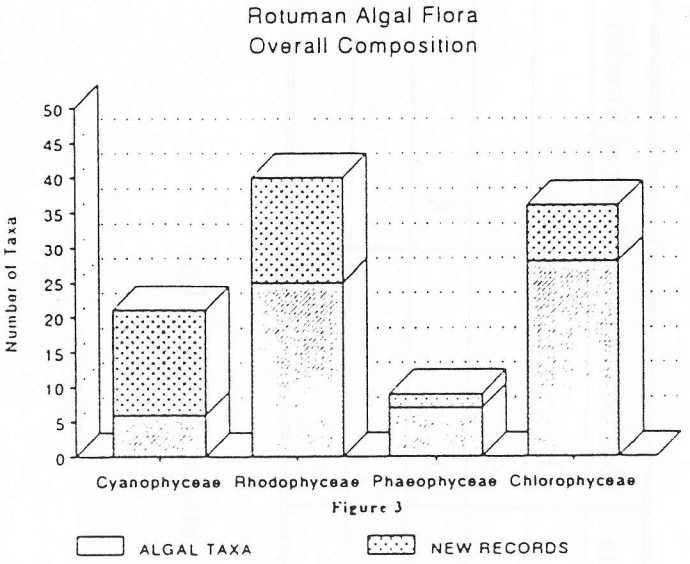


Figure 2



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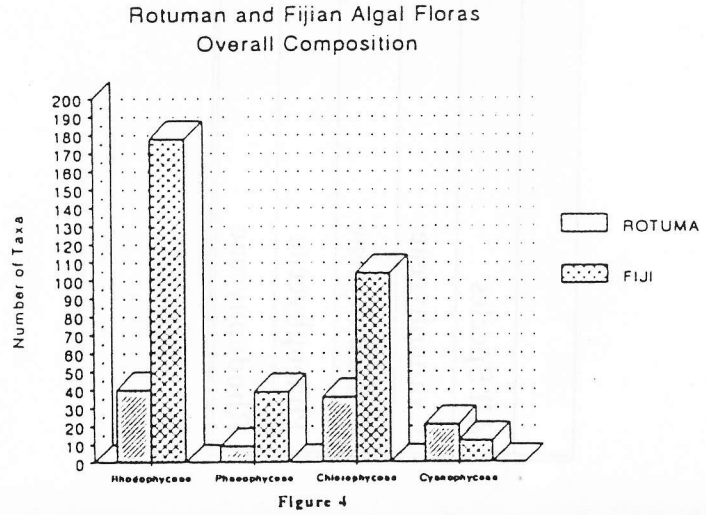

Figure 4

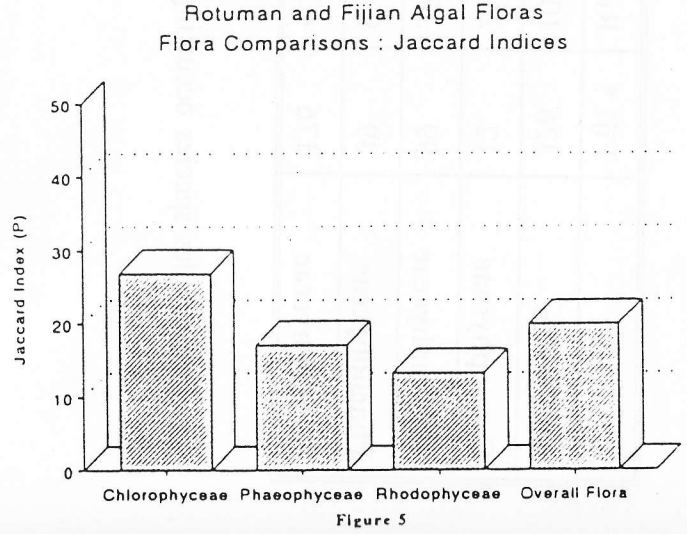

Figure 5