

MERISTOTHECA PROCUMBENS
P. GABRIELSON ET KRAFT (GIGARTINALES,
SOLIERIACEAE): AN EDIBLE SEAWEED FROM
ROTUMA ISLAND

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ABSTRACT

The edible Rhodophyte *Meristotheca procumbens* P. Gabrielson et Kraft (Gigartinales, Solieriaceae), found for the first time outside its type locality of Lord Howe Island, Australia, is described from the island of Rotuma, South Pacific, where it is a favourite food item in the Rotuman diet. It is characterized by a procumbent thallus and stellate cortical cells. It is still unclear why this species does not occur elsewhere in the southwest Pacific, and possible biogeographic hypotheses are discussed.

INTRODUCTION

Rotuma Island (12° 30' S, 177° 05' E; Fig. 1) is a small volcanic island located about 465 km north of the Fiji group, to which it is politically attached. The only study of the Rotuman algal flora to date is that by the author (N'Yeurt, 1993) who listed some 106 taxa of intertidal and shallow benthic algae. Among these was reported the fleshy, decumbent rhodophyte *Meristotheca procumbens* P. Gabrielson et Kraft, which was previously known only from its type locality at Lord Howe Island (Gabrielson and Kraft, 1984). The alga is a popular edible seaweed on Rotuma, and is commonly eaten as a gel following boiling in coconut milk. To the author's knowledge however, it has not been reported before as a food item, although other species of *Meristotheca* are

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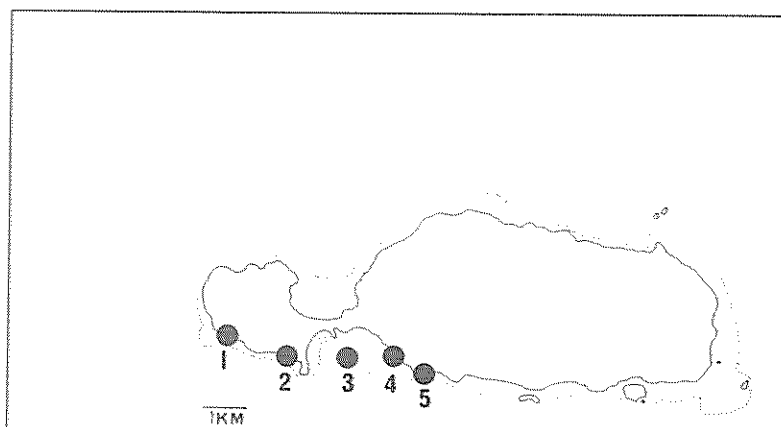


Fig. 1

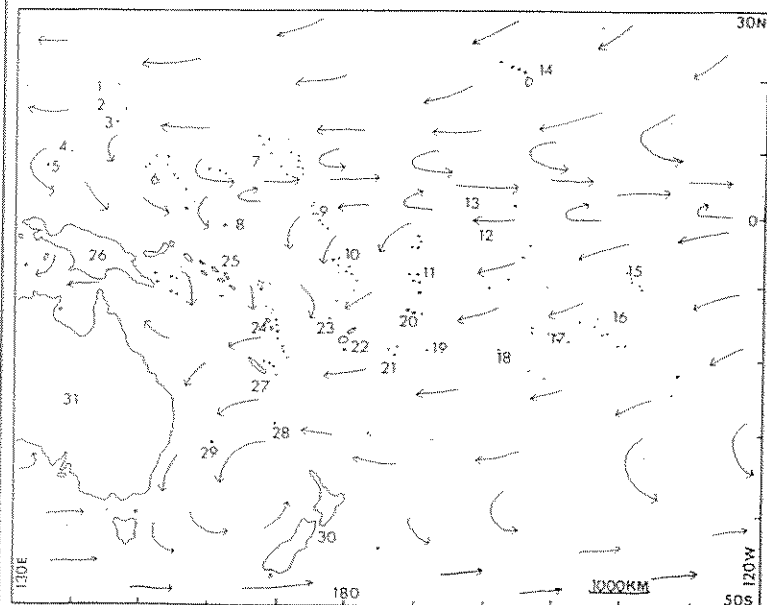


Fig. 2

consumed **Figure 1:** Map of Rotuma Island, with collecting sites.

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|-----------|-------------|------------|
| 1. Losa | 3. Hapmafau | 5. Tua'koi |
| 2. Faputa | 4. Savlei | |

Figure 2: Map of the tropical and sub-tropical western Pacific, showing prevailing ocean currents in January (adapted from Ash, 1992).

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|-------------------------|----------------------|
| 1. Mariana Islands | 17. Society Islands |
| 2. Saipan | 18. Cook Islands |
| 3. Guam | 19. Niue |
| 4. Yap | 20. Samoa |
| 5. Palau | 21. Tonga |
| 6. Caroline Islands | 22. Fiji |
| 7. Marshall Islands | 23. Rotuma Island |
| 8. Nauru | 24. Vanuatu |
| 9. Kiribati | 25. Solomon Islands |
| 10. Tuvalu | 26. Papua New Guinea |
| 11. Tokelau | 27. New Caledonia |
| 13. Line Islands | 28. Norfolk |
| 14. Hawaii | 29. Lord Howe |
| 15. Marquesas | 30. New Zealand |
| 16. Tuamoto Archipelago | 31. Australia |

elsewhere, for example in Japan (*Meristotheca papulosa*; Abbott 1988:141). Considering its abundance and importance as food on Rotuma, it is reasonable to question why this particular species does not occur on any other Pacific island, such as for example Fiji or in Micronesia. Such biogeographic considerations have been looked at in N'Yeurt (1993), and are discussed here.

MATERIALS AND METHODS

Algal collections were made on Rotuman reefs during 1992 and 1993, as part of the author's M. Sc. Thesis project (N'Yeurt, 1993). The plants were preserved in 5% formalin in seawater, and brought back to the laboratory in Suva for further processing. Hand-sections of the algae were used for general observation of internal anatomy. Slides were stained with either crystal violet or 1% aniline blue, and made permanent if necessary by embedding in glycerine jelly (Drury *et al.*, 1967) following impregnation of the material in

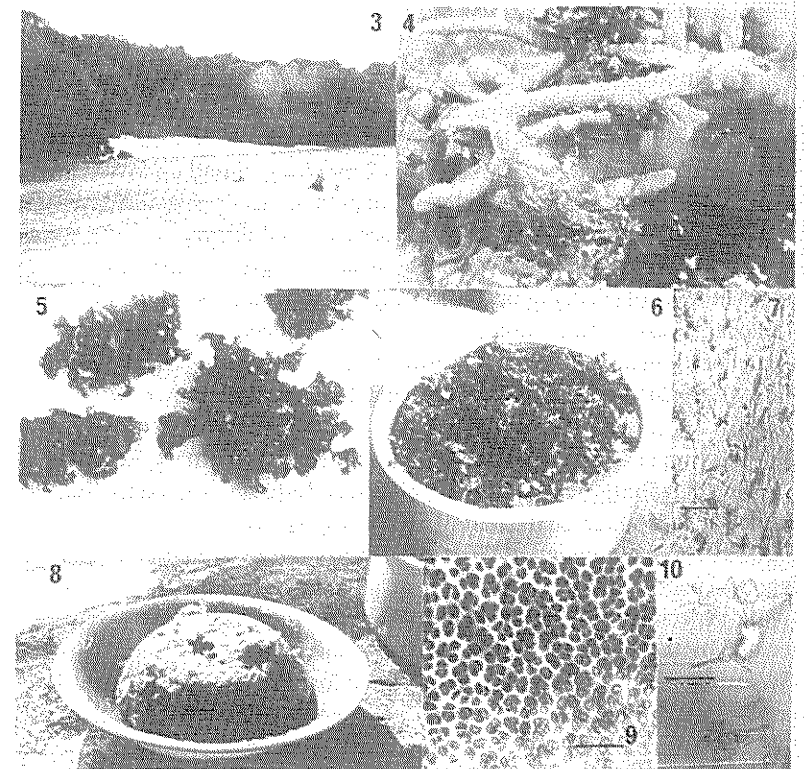
50% glycerol/water solution for 2-3h. Dried voucher specimens were deposited in the Phycological Herbarium, South Pacific Regional Herbarium, and are housed at the Institute of Marine Studies, The University of the South Pacific (USP).

RESULTS

Meristotheca procumbens P. Gabrielson et Kraft : Edible qualities

M. procumbens is commonly hand-collected from the intertidal reef flats by Rotuman women, to be made into a particularly esteemed dish ("Lum mie'ta"). This seaweed is typically found attached to the base of *Acropora* coral rubble (Fig. 4), the richest harvest being obtained at sites where the water depth is 0.5-1 m (Fig. 3). The alga is picked from the coral skeletons, and put into large bags. Once brought back to the collector's home, the seaweed ("Lumi" in Rotuman) is first soaked in seawater for 1-2 hours (Fig. 6), then carefully cleaned of coral debris and sand. The cleaned and drained material is then put into a large cooking pot, to which was previously added an amount of coconut milk and some lemon juice (the latter to remove the strong flavor inherent to the seaweed). The whole is then boiled briefly, with frequent stirring, until the seaweed has reduced by about three-quarters in volume and has taken a gel-like appearance (Fig. 8). At this stage, a number of condiments can be added, the most popular being chopped onions and fish flakes (either fresh or tinned). The dish can then be served, although it is usual to leave it overnight and consume it cold in the morning, as it is said to have a better flavour thus. The author's personal experience of this dish was quite pleasant, the preparation having no particular strong taste and endowed with an agreeable "nutty" flavor, with a texture comparable to jelly or soft pudding. The dish is also quite sustaining, and said to be very nutritive.

3. Typical habitat of *Meristotheca procumbens* (Losa, North-West Rotuman coast).
4. *M. procumbens* : habit in situ, showing attachment to base of *Acropora* coral.
5. *M. procumbens* : habit of living specimens shortly after collecting.
6. *M. procumbens* : plants soaked in seawater prior to cleaning.
7. *M. procumbens* : cross-section of thallus showing medullary region of stellate cells. Scale = 100 μ m.
8. The prepared dish "Lum mie'ta", ready for consumption.
9. *M. procumbens* : surface view of cortical cells. Scale = 20 μ m.
10. *M. procumbens* : detail of medullary stellate cells. Scale = 25 μ m.



TAXONOMIC DESCRIPTION

Meristotheca J. Agardh 1872

Meristotheca procumbens P. Gabrielson et Kraft [Figs 4, 5, 7, 9, 10]
Gabrielson and Kraft 1984:241, fig. 14A-D [type locality : Lord Howe Is.,
Australia]; Millar and Kraft 1993:26; N'Yeurt 1993:164, Figs 171; 176-181; 237-
238.

Fiji : New published record for Fiji. In Herb. Bernice P. Bishop Museum, Hawaii
[BISH 536995; 537010]. University of the South Pacific representative material:
USP 411; USP 351.

Plant deep-pink and turgid when fresh, procumbent, up to 10 cm in diameter,
irregularly branched and lobed. Thallus attached at various points to
supporting coral via terete haptera up to 2 mm long. Frond up to 800 μ m in
thickness, composed of an inner medulla of predominantly rhizoidal filaments
(40% of thallus) surrounded on both sides by equal thicknesses of a cortex
grading from large unpigmented stellate-ovate cells up to 95 μ m in diameter, to
a surface layer of small pigmented rectangular cortical cells up to 10 x 20 μ m.
Cystocarps absent from Rotuman specimens collected in May/ June and
December/ January, but reported present in this species by Gabrielson and
Kraft (1984:245) in Lord Howe specimens. Tetraspores unknown.

Distribution : Lord Howe Island, New South Wales (Australia), Rotuma.

Rotuma distribution : Fapufa [USP 411]; Hapmafau; Losa; Savlei; Tua'koi
[USP 351]. Common on the northwest and south coasts (see Fig. 1).

Habitat : found growing at the base of *Acropora* coral debris, in shallow
lagoonal waters or tide pools.

[Note : specimens of this genus (identified as *Meristotheca* sp.) were also
located by the author in the collections of the Bernice P. Bishop Museum
Herbarium in Hawaii, having been collected for W.E. Booth in October 1975
and August 1977. These specimens have been examined by the author, and
were ascertained to belong to the species *M. procumbens* P. Gabrielson et
Kraft. No other Rotuman algal collections had been made by Booth, despite
some unsuccessful attempts to culture Rotuman *M. procumbens* in Laucala
Bay, Suva (W.E. Booth, in lit.)].

DISCUSSION

Since *Meristotheca procumbens* is quite abundant in certain parts of the
Rotuman south coast (N'Yeurt, 1993), there needs to be a satisfactory

explanation as to why it has not been reported from islands between Rotuma
(12° 30' S) and Lord Howe Island (31° 33' S).

An examination of the main ocean current patterns in the southwest Pacific
(and hence the most probable dispersal routes for algae in the region) shows
there is a steady southwesterly flow from the equatorial region (Fig. 2), and
hence dispersal from more northerly latitudes towards more southerly ones
are favored, with the reverse route being highly unlikely (Ash, 1992; N'Yeurt,
1993). Hence, it would appear that the Lord Howe Island *M. procumbens*
ultimately originated from more northerly donor areas, with an intermediate
site at the higher latitude of Rotuma. Why it does not occur in the intervening
islands (eg. Fiji, Solomon Islands, New Caledonia) is open to question. It
could be that there are no suitable habitats for long-term settlement of *M.*
procumbens on these islands, or that the species did not manage to "hit"
these particular islands, a problem often encountered in long-distance
dispersal of algae (Hoek, 1987). Still another possibility would be that this
species does exist in the intervening islands, but has simply not yet been
found.

CONCLUSIONS

A number of interesting questions arise as to the origin and biogeographic
distribution of *M. procumbens* in the southwest Pacific, and these will
ultimately only be answered by more extensive algal collections and research
in the region. *Meristotheca procumbens* has a good economic potential,
being easily harvested and one hundred percent edible, warranting further
research into its possible development as an aquaculture species.

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