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ADDITIONAL RECORDS OF MARINE BENTHIC ALGAE FROM YAP,
WESTERN CAROLINE ISLANDS

by Roy T. Tsuda and Mary S. Belk

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INTRODUCTION

Yap (9°25'N. Lat., 138°02'E. Long.) consists of four closely grouped islands separated by narrow shallow channels. Encircling these islands is a barrier reef with seven major channels that provide water circulation to the lagoon from the outside. The air temperature ranges from 25°C in January to 28°C in September, and the rainfall ranges from 1.14 inches (2.9 cm) in January to 36.86 inches (93.6 cm) in December. Gressitt (1954) provides details on the terrestrial topography.

Past records of marine benthic algae from Yap can be found in nine papers (Reinbold, 1901; Okamura, 1904, 1916; Schmidt, 1928; Tokida, 1939; Hollenberg, 1968a, 1968b; Trono, 1968, 1969) where a total of 83 species have been listed. It is of interest to note that none of these authors have personally made any algal collections on Yap.

The purpose of this paper is to present a listing of the unreported species of marine benthic algae from Yap that the senior author collected while on an *Acanthaster planci* (crown-of-thorns starfish) survey trip during November 24 to December 1, 1970. Twenty-three species are listed in this paper, thereby increasing the total number of species known from this island group by 28 percent. A total of 106 species (8 Cyanophyta, 41 Chlorophyta, 15 Phaeophyta, and 42 Rhodophyta) are now known from Yap. It should be pointed out that these collections are reported here strictly for phytogeographic purpose. It is only through the continual collecting and reporting of additional species that a flora of a given area may one day be said to be "well-known" floristically. All specimens are cataloged in the University of Guam Herbarium.

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STATION DESCRIPTIONS

- STATION 1: Seaward terrace outside barrier reef, 3 m deep, 4 km SW of Tomil Harbor entrance, XI-24-70.
- 2: Inner lagoon reef, *Enhalus* bed, 1 m deep, Nimpoi, XI-25-70.
- 3: Inner lagoon reef, *Enhalus* bed, 1-2 m deep, Pelak, XI-25-70.
- 4: Outer lagoon reef, 1-2 m deep, Pelak, XI-25-70.
- 5: Outer lagoon reef, dead *Acropora* bed, 2 m deep, Tomil Harbor, XI-27-70.
- 6: Outer lagoon reef, 2 m deep, SW of Tomil Channel, XI-28-70.
- 7: Inner lagoon reef, 1-2 m deep, Garin I., XI-28-70.
- 8: Inner lagoon reef, *Enhalus* bed, 1-2 m deep, between Map I. and Rumung I., XI-29-70.
- 9: Lagoon channel, deep hole, 10-13 m deep, off USCG Beach, 2.5 km S of Gofenu Entrance, XI-29-70.
- 10: Outer lagoon reef, 1-2 m deep, Tomil Harbor, XI-30-70.
- 11: Intertidal zone at shoreline, NE of Pelak Entrance, XII-1-70.

SPECIES LISTING

DIVISION CYANOPHYTA (blue-green algae)

Order Oscillatoriales

Calothrix confervicola (Roth) Ag.

Sta. 10 (RT 4048, mixed with *Microcoleus lyngbyaceus*).

Calothrix pilosa Bornet & Flahault

Sta. 2 (RT 3969, mixed with *Microcoleus lyngbyaceus* and sand).

Hormothamnion solutum Bornet & Flahault

Sta. 2 (RT 3961b, epiphytic on *Avrainvillea erecta*), Sta. 10 (RT 4048, mixed with *Microcoleus lyngbyaceus*)

Schizothrix mexicana Gomont

Sta. 7 (RT 4003, tufts on coral), Sta. 9 (RT 4025, loose filaments on coral).

Spirulina subsalsa Gomont

Sta. 10 (RT 4048, mixed with *Microcoleus lyngbyaceus*).

DIVISION CHLOROPHYTA (green algae)

Order Ulotrichales

Enteromorpha kylinii Bliding
Sta. 5 (RT 3989)

Order Cladophorales

Chaetomorpha crassa (Ag.) Kütz.
Sta. 3 (RT 3978)

Order Siphonales

Avrainvillea lacerata Harvey
Sta. 10 (RT 4042)

Bryopsis pennata Lamx.
Sta. 1 (RT 3955b, epiphytic on *Laurencia* sp.)

Caulerpa elongata Weber van Bosse
Sta. 9 (RT 4021), Sta. 10 (RT 4041).

Halimeda gigas Taylor
Sta. 5 (RT 3984), Sta. 7 (RT 4005c), Sta. 8 (RT 4018c), Sta. 9 (RT 4022b)

Halimeda simulans Howe
Sta. 2 (RT 3988), Sta. 7 (RT 4005b).

Order Siphonocladales

Dictyosphaeria vershuysii Weber van Bosse
Sta. 2 (RT 3970)

Order Dasycladales

Neomeris vanbosseae Howe
Sta. 8 (RT 4014), Sta. 11 (RT 4049)

DIVISION PHAEOPHYTA (brown algae)

Order Ectocarpales

Ectocarpus indicus Sonder
Sta. 7 (RT 4006c, epiphytic on *Padina minor*).

Order Dictyotales

Dictyota apiculata J. Ag.
Sta. 8 (RT 4013b).

Dictyota cervicornis Kütz.
Sta. 2 (RT 3959), Sta. 7 (RT 4008), Sta. 8 (RT 4013a).

Padina minor Yamada
Sta. 8 RT 4017, Sta. 11 - RT 4050.

DIVISION RHODOPHYTA (red algae)

Order Cryptonemiales

Metagoniolithon sp.

Sta. 2 (RT 3967), Sta. 6 (RT 3996).

These specimens represent the second collection of this genus from Micronesia and are presently being examined by Dr. H. William Johansen of Clark University, Massachusetts.

Order Gelidiales

Gelidium pulchellum (Turn.) Kütz.

Sta. 10 (RT 4039).

Order Ceramiales

Laurencia majuscula (Harvey) Lucas

Sta. 9 (RT 4026, identified by Dr. Y. Saito of Hokkaido University).

Laurencia sp.

Sta. 1 (RT 3955a), Sta. 3 (RT 3979), Sta. 4 (RT 3982).

According to Dr. Saito, these specimens are similar externally to *L. papillosa* but lack the characteristic palisade cortical cells. This species will be described as "new" in a future paper after additional fertile specimens are examined.

Polysiphonia scopulorum Harvey

Sta. 9 (RT 4029).

DISCUSSION

The most conspicuous marine plant in the predominantly sandy inner lagoon reef is *Enhalus acoroides*, which forms a band of about 50 meters or more around the entire coast of the four islands. Various algal species, e.g., *Dictyota cervicornis*, *Halimeda opuntia*, *Halimeda macroloba* and *Caulerpa racemosa*, are found interspersed among the *Enhalus*.

Although the navigable lagoon channel which surrounds the inner reef possesses a sandy substratum with almost no algae, several larger depressions, 13 meters deep, are found east of Gagil and west of Rumung Island. The dominant algae along the coral rim of these depressions are *Caulerpa elongata*, *Halimeda gigas*, *Tydemania expeditionis* and *Rhipilia orientalis*.

The outer lagoon reef consists of patches of live corals interspersed with sand pockets and coral rubble. *Microcoleus lyngbyaceus* and *Caulerpa urvilliana* are the most conspicuous algae inhabiting the sand pockets, while *Polysiphonia scopulorum* and *Gelidiopsis intricata* cover the branches of dead *Acropora*. *Valonia ventricosa* and *Actinotrichia fragilis* are abundant among the coral rubble in this zone. However, algae are almost non-existent in the live coral areas. Likewise, the reef margin, seaward reef front and the seaward submarine terrace, possess very few algae except for crustose corallines.

The marine flora on the reefs of Yap is very limited in terms of standing crop. This situation is not at all unusual since other islands which possess live corals reveal this same condition. Although a direct correlation seems to exist between the greater diversity of fishes and a live reef, a negative correlation is present between a smaller algal number and a live reef situation. An obvious reason for a greater algal flora on dead reefs is the larger settling surface available to the algal spores and zygotes.

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