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MARINE BENTHIC MACROALGAE OF PAPUA NEW GUINEA: CHLOROPHYCEAE (A CHECK LIST)

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Introduction

During the Keiten-maru expedition to Papua New Guinea in 1989, the present author investigated the distribution of marine benthic macroalgae for the development of marine fishery resources at 11 stations on the northern and southern coasts of the mainland of Papua New Guinea.

This expedition was conducted by the Kagoshima University Research Center for the South Pacific. As the collected algal materials have not yet been sufficiently analyzed and identified, this paper provides only a preliminary checklist and outline of the field observations of the marine algae at a number of localities on the northern and southern coasts of mainland Papua New Guinea.

There has been little research carried out on marine benthic macroalgae of Papua New Guinea. The first report of marine benthic algae from Papua New Guinea was made by HEYDRICH (1892). Thirty-six years later SCHMIDT (1928) published a marine algal flora of the northern part of Papua New Guinea. In 1983, the present author joined the Kagoshima-maru Expedition to Papua New Guinea conducted by the Kagoshima University Research Center for the South Pacific and reported marine benthic green algal flora of the northern and southern coasts of Papua New Guinea (ENOMOTO & AJISAKA, 1984). The paper on the Caulerpaceae of the Madang Province which was published by COPPEJANS & MEINESZ (1988) is the only detailed account available for the northern coast. Recently KING (1990) reported the macroalgal flora associated with the mangrove vegetation of Papua New Guinea.

Materials and Methods

On the northern coast of the mainland, algal collections and field observations were made in November 1989 at 2 points at Finschhafen, 3 points on Salamaua Peninsula and 8 points in Madang as shown in Table 1.

On the southern coast of the mainland, investigations were made in December 1989 at 8 points in Bootless Inlet as shown in Table 1.

Algal collection and field observations were made by SCUBA diving or by snorkeling. Collected materials were immediately fixed with formalin and transported to Japan for analysis and identification. Most of the collected materials were then preserved as dried specimens. All of the specimens are deposited in the herbarium of Marine Biological Station, Faculty of Science, Kobe University.

Table 1. Investigated stations and dates.

No.	Investigated station	Date
01	Finschhafen (2 points), Morobe	Nov.24,1989
02	Salamaua Peninsula (3 points), Morobe	Nov.26,1989
03	Dallman Passage (4 points), Madang	Nov.27,1989
04	Nagada Passage (1 point), Madang	Nov.28,1989
05	Klanket Island (1 point), Madang	Nov.29,1989
06	Wonad Island (1 points), Madang	Nov.29,1989
07	Tab Island (1 point), Madang	Nov.29,1989
08	Padana Nahua Passage (2 points), Bootless	Dec.02,1989
09	Lotoata Island (2 points), Bootless	Dec.03,1989
10	Motupore Island (3 points), Bootless	Dec.03,1989
11	Manunua (Lion) Island (1 point), Bootless	Dec.04,1989

Results

1. The marine benthic green macroalgae which were collected at each station are listed in Table 2.

2. The field observations at each investigated station were noted as follows:

1) Finschhafen; The seawater is relatively clear. The biomass of marine macroalgae is rather poor. Only small growths of green algae such as *Halimeda, Anadyomene, Dictyosphaeria* and brown algae such as *Sargassm* and *Turbinaria* are found. Useful marine algae are not found.

2) Madang; The seawater is generally transparent. The corals are well developed. However, in shallow water, the algal biomass is extremely poor, while small young thalli of macroalgae are found abundantly. At a depth of 15–20 m green algae such as *Halimeda, Chlorodesmis, Dictyosphaeria* and *Caulerpa* are observed. Small quantities of useful red algae such as *Hypnea* and *Eucheuma* are also found, but their biomass is extremely small. The amount is insufficient for algal industrial development. Previous investigations (1983) of the same tide pool near Dallman Passage in Madang revealed an abundant growth of green algae. Present observations reveal that polluted muddy water flows from the coastal areas into the pool and the marine algae have completely disappeared. The seawater around the tide pool is also polluted and environmental destruction has surely proceeded.

3) Salamaua; The seawater is clean at the northern point of the peninsula. The marine algae are fairly abundant. At the southeastern coast of the peninsula, water transparency decreases and the growth of corals and benthic macroalgae becomes scarce. Green algae such as *Valoniopsis, Dictyosphaeria, Caulerpa, Neomeris etc.* are found on rocks at the intertidal zone. However, their biomass is quite poor. In this region, the author could not find significant quantities of useful marine algae for possible fishery development.

4) Bootless Inlet; On the southern coast of Papua New Guinea, at Bootless Inlet, near Port Moresby, a cosiderable amount of marine algae is found to be growing on the reef at Padana Nahua Passage near the opening of the Bay. In particular, large amounts of *Sargassum* and *Turbinaria* are found.

On the east coast of Lotoata and in the southern part of Motupore, fairly large amounts of *Sargassm* and *Turbinaria* are found while other marine algae are extremely scarce.

Table 2. A checklist of marine benthic green macroalgae from Papua New Guinea collected during Keiten-maru Expedition in 1989.

Locality / Species name	1	2	3	4	5	6	8	11
Cladophora sp.	+							
Ventricaria ventricosa	+	+						
Valonia aegagropila								+
Valoniopsis pachynema		+						
Boergesenia forbesii	+	+						
Dictyosphaeria cavernosa			+	+	+	+		+
Dictyosphaeria versluysii	+		+	+	+	+	+	
Dictyosphaeria australis								+
Boodlea coacta	+							
Cladophoropsis vaucvheriaeformis		+			+			
Anadyomene wrightii	+	+			+			
Neomeris annulata		+						
Caulerpa webiana					+			
Caulerpa sertularioides		+						
Caulerpa serrulata	+	+		+				
Caulerpa racemosa var. macrophysa		+						
Caulerpa racemosa var. chemnitzia		+						
Caulerpa peltata		+						
Caulerpa lentillifera var. condensata		+						
Caulerpa subserrata						+		
Chlorodesmis comosa			+	+	+	+		+
Chlorodesmis caespitosa			+		+	+		
Bryopsis sp.	+							
Udotea argentea		+						
Udotea javensis						+		
Halimeda macroloba	+			+	+	+	+	+
Halimeda opuntia	+		+	+	+	+	+	+
Halimeda simulans				+				
Halimeda macrophysa	+	+	+	+	+	+	+	+
Halimeda gracilis	+			+	+	+	+	
Halimeda incrassata								+
Halimeda micronesica				+				
Codium sp.					+			

Note: Green macroalgae were not observed at the Station 7, 9, and 10.

On the northeastern coast of Motupore, a large amount of *Sargassum* is found, while other marine algae are observed to be scarce and very poor in quality.

On the east coast of Manunua (Lion Island) there is almost no growth of algae until a depth of 3 meters. However, further diving reveals algal growth in patches and small clumps of *Sargassum* at a depth of 20 meters.

Compared with previous observations at these stations in 1983 (ENOMOTO & AJISAKA, 1984), water transparency and the growth of marine algae has decreased in both quality and quantity.

Present investigation reveals inadequate deposits of useful marine algae to justify fishery development.

Discussion and Conclusion

The present invesigation reveals that the presence of biomass of useful marine macroalgae and predictable growth patterns do not justify algal fishery development along the northern and southern coasts of Papua New Guinea. However, moderate harvest yields could be sustained by establishing a mariculture project; if proper stations are set up, suitable facilities such as pool culture systems are introduced and suitable species of useful marine algae are carefully selected. Recently the successful result of mariculture of a useful marine alga *Laminaria* with the pumped-up deep-water system was reported in Japan (FUJITA, 1990). It seems that such a pumping-up deep-water system or OTEC (Ocean Thermal Energy Conversion) system would be suitable for algal mariculture on the northern coast of Papua New Guinea where the seacoast drops very steeply.

References

COPPEJANS, E & MEINESZ, A. 1988. Blumea, 33: 186–196.

ENOMOTO, S & AJISAKA, T. 1984. "Marine benthic algae of Papua New Guinea: chlorophyceae (preliminary report)." Prompt rept. 3rd scient. surv. South Pac., (ed. NAKANO, K. et al.), 35–38. Kagoshima Univ. Res. Center S. Pac., Kagoshima.

FUJITA, D. 1990. Jpn. J. Phycol., 38: 189–191.

HEYDRICH, F. 1892. Ber. Deutsch. Bot. Ges., 10: 458–485.

KING, R.J. 1990. Botanica Marina, 33: 55–62.

SCHMIDT, O.C. 1928. Hedwigia, 68: 18–86.