Rev. Biol. Trop., 27(2): 163-169, 1979

Notes on the Marine Algae of Guatemala *

by

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(Received for publication July 18, 1978)

Abstract: A total of 46 different species of marine algae was collected in Guatemala, 11 species of the Cyanophyta, 11 Chlorophyta, 1 Phaeophyta, and 23 Rhodophyta. Only *Enteromorpha flexuosa* and *Caloglossa leprieurii* were common to both coasts. A number of economically valuable phycocolloid algae were found on the Caribbean coast.

One of the most neglected areas of phycological research has been the peninsular areas of Central America. Dawson (1961a, 1961b) pointed out the lack of sufficient information on the marine floristics of the Pacific coast of Central America. Much more work has been done on the Caribbean coast of the peninsula which is summarized by Taylor (1960). Taylor, however, mentions that many reported records are questionable and that there are still large areas of the Caribbean coast which have been neglected with regards to marine floristic surveys. This lack of information is particularly unfortunate, as these studies are useful in evaluating future decisions regarding coastal management and economic possibilities of aquaculture. Doty (1973, 1977) has described how cultivation of economically important tropical algae is highly feasible, and is providing a source of revenue and independence for the rural poor of the Philippine islands.

In the summer of 1976 the senior author went to Guatemala with the purpose of making a marine floristic survey and also of evaluating the potential for aquaculture in Guatemala. Guatemala lies immediately south of Mexico, and north of Honduras and El Salvador (13.7^{o}-17.8^{o}N; 88.3^{o}-92.2^{o}W). It is predominately a mountainous country; however, both coasts are extensive lowlands subject to river run-off, especially during the rainy seasons.

DESCRIPTION OF COLLECTING SITES

The Pacific coast of Guatemala is essentially a long mangrove estuary with large numbers of rivers emptying into the estuary system. The waters in these estuaries range from fresh to brackish water. Near the chief Pacific seaport, San José, there is an extensive network of small canals. The beach areas of the

* This research was supported by a grant from the Alexander Dulles Bache Fund of the National Academy of Science.

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Guatemalan Pacific coast are composed of black volcanic sand. Except for the concrete pilings at the pier at San José, there is little hard substrate along the whole coast.

The Caribbean coast of Guatemala is characterized by having fewer estuaries than the Pacific coast. The large estuary and bay, Bahía Amatique, at the primary seaport, Puerto Barrios, is formed by the large lagoon, Lago de Izabal. The beaches are composed of fine calcareous sand. In a number of areas there are grass beds of *Thalassia testudinum*, which were not observed on the Pacific coast. The salinity of the Caribbean coastal areas appears to be mostly oceanic, with brackish water in the estuary.

The collecting sites are depicted in Figure 1. Collections were made in July and August of 1976. Specimens were preserved in 5% formalin-seawater.

Fig. 1. Map of Guatemala and collection sites (in inserts) for marine algae. A: Sipicate B: San José-wharf C; San José-canals D: Izatapa E: Puerto Barrios-seawall F: Puerto Barrios-swimming hole G: Puerto Barrios-grass bed.

Sipacate, (Site A): This mangrove area appeared to have waters of full oceanic salinity. A number of green as well as red algae were collected from the prop roots of red mangroves.

San José, Wharf (Site B): The area around the pier contained a few boulders, as well as some concrete rubble. This hard substrate, as well as the concrete pilings of the wharf, provide the only firm substrate for a number of algae.

San José, Canals (Site C): An extensive system of small interlacing canals with waters of fresh to brackish nature provided a habitat for a number of blue-green and green algae.

Izatapa, (Site D): A bridge near the edge of the town provided some substrate for a few brackish estuarine algae.

Puerto Barrios, Seawall (Site E): The seawall and a piling of rocks provided a suitable hard substrate for a large number of red and green algae. The salinity appeared to be oceanic and greatly enriched by sewage outfall.

Puerto Barrios, Swimming hole (Site F): At the town's communal swimming hole a small number of streams feed into a mangrove area. The prop roots of the mangroves supported several estuarine species of algae.

Puerto Barrios, Grass bed (Site G): Several miles north of Puerto Barrios a few patches of *Thalassia testudinum* were found. These grass beds offered a habitat for a number of algae.

RESULTS AND DISCUSSION

Forty six different species of marine algae were collected in Guatemala, 11 species of Chlorophyta, 11 of the Cyanophyta, 1 of the Phaeophyta, and 23 of the Rhodophyta. Seventeen species were collected from the Pacific coast, while 31 species were from the Caribbean coast. Only *Enteromorpha flexuosa* and *Caloglossa leprieurii* were common to both coasts. The species types, their habitats, collection sites, collection numbers, and source of identification are listed in Table 1. As the taxonomy of the blue-green algae is currently uncertain, the name of each specimen is given using the description of both Drouet (1968) and Desikachary (1959) where possible.

Dawson (1961b) found a total of 96 species of algae in Pacific El Salvador, which is immediately south of Guatemala. A number of Dawson's collecting sites were characterized by rocky outcroppings, in contrast to Guatemala which had only a little hard substrate in San José. This lack of hard substrate along the Guatemalan coast probably contributes to the lower species numbers. Mangrove estuaries in Dawson's El Salvador study yielded similar species to that of Guatemala. Taylor (1945) also found few species of algae in the mangrove areas of southern Pacific Mexico.

The species from the Caribbean coast were typical of the flora described for the Caribbean area (Taylor 1936, 1942, 1960). A number of economically important seaweeds were found on this coast, such as the agarophytes *Gracilaria* spp., and *Pterocladia bartlettii* and the carrageenan producing alga, *Hypnea*

TABLE 1

Species of marine algae collected in Guatemala, as well as their habitats, sources of identification, collection numbers, and collection sites (from the map, Figure 1)

species name	number & site	source of identification*	habitat
	PACIFIC COAST		
Rhodophyta			
Bostrychia radicans Mont. [1-2]	KTBGA-1 A,D 6,24,30	2,3,8,9,	Mangrove prop roots
Caloglossa leprieurii (Mont.) J.Ag.[1]	KTBGA-2 D	2,3,8,9	mangrove prop roots
Hildenbrandia prototypus Nardo	KTBGA-17 B	2,8	pier pilings
Erythrotrichia bangioidea Levring	KTBGA-29 D	2	*Bostrychia*
Clorophyta			
Ulva lobata (Kütz.) Setchell and Gardner	KTBGA-8 B	3,8,9	pier pilings
Enteromorpha flexuosa (Wulf.) J.Ag.	KTBGA-9 B	8,9	pier pilings
Chaetomorpha antennina (Bory) Kütz.	KTBGA-10 B	3,8	pier pilings
Enteromorpha salina Kütz.	KTBGA-11, B 12	8	pier pilings
Rhizoclonium riparium (Roth) Harvey	KTBGA-13, A,C,D 21, 19	8,9	canals and mangroves
Rhizoclonium kerneri Stockmayer	KTBGA-22 A	8,9	mangrove prop roots
Cyanophyta			
Lyngbya gracilis (Menegh.) Rabenh. or	KTBGA-5, A,C,D	4	mangrove prop
Schizothrix mexicana Gomont	23, 26	5	roots
Lyngbya aestuarii Lieb. ex Gomont or	KTBGA-6 D	4	mangrove prop
Microcoleus lyngbyaceus (Kütz.) Crouan		5	roots
Lyngbya infixa Fremy or	KTBGA-14 D	4	canals and on
Schizothrix calcicola Gomont		5	bridge
Lyngbya sordida (Zanard.) Gomont or	KTBGA-20, C	4	canals and
Microcoleus lyngbyaceus (Kütz.) Crouan	28	1,5	mangroves
Lyngbya mesotricha Skuja or	KTBGA-16 D	4	mangrove prop
Schizothrix calcicola Gomont		5	roots
Microcoleus lyngbyaceus (Kütz.) Crouan	KTBGA-28 D	1,5	mangroves
Entophysalis granulosa Kütz. or	KTBGA-25 A	4	epiphyte on
Entophysalis deusta Drouet and Daily		1	mussels
	CARIBBEAN COAST		
Phaeophyta			
Sargassum polyceratium Montagne	KTBGA-33 G	6,9	drift
Rhodophyta			
Laurencia corallopsis (Mont.) Howe	KTBGA-34, E, G 46,60	9	*Thalassia* epiphyte
Grateloupia filicina (Wulf.) C.Ag.	KTBGA-36 G	6,9	on sunken coconut tree
Ceramium corniculatum Mont.	KTBGA-36a G	9	epiphyte on *Grateloupia*

species name	number & site	source of identification*	habitat
Hypnea musciformis (Wulf.) Lamour.	KTBGA-39, E.G 45,48,59	6,9	drift
Polysiphonia subtilissima Mont.	KTBGA-40, E,G 67	9	*Thalassia* epiphyte
Polysiphonia howei Hollenberg	KTBGA-41, E,G 64,68	10	*Thalassia* beds, epiphytes on mussels
Griffithsia tenuis C. Ag.	KTBGA-42 G	9	*Thalassia* bed
Erythrotrichia carnea (Dillw.) J.Ag.	KTBGA-43 G	9	epiphyte on algae
Lophosiphonia saccorhiza Coll. and Harv.	KTBGA-47 G	1,9	*Thalassia* bed
Ceramium fastigiatum (Roth) Harv.	KTBGA-54 G	9	*Thalassia* bed
Fosliella lejolissii (Rosan.) Howe	KTBGA-55 G	7,9	*Thalassia* epiphyte
Falkenbergia hillebrandii (Born.) Falk.	KTBGA-56 E	9	epiphyte on a conch shell
Digenia simplex (Wulf.) C. Ag.	KTBGA-62 E	6,9	drift
Pterocladia bartlettii Taylor	KTBGA-63 E	9	seawall
Gracilaria verrucosa (Huds.) Papenfuss	KTBGA-73 G	9	*Thalassia* bed
Gracilaria foliifera (Forssk.) Borg.	KTBGA-32 G	9	small pier
Centroceras clavulatum (C. Ag.) Mont.	KTBGA-74 E	6,9	seawall
Bostrychia mortiziana (Sond.) J. Ag.	KTBGA-70 F	9	mangrove prop roots
Caloglossa leprieurii (Mont.) J. Ag.[1]	KTBGA-72 F	6,9	mangrove prop roots
Porphyra (?)	KTBGA-69 F	9	mangroves
Chlorophyta			
Cladophora delicatula Montagne	KTBGA-57 E	7,9	seawall
Cladophora crystallina (Roth) Kütz.	KTBGA-44, G 31	9	*Thalassia* beds
Enteromorpha lingulata J. Ag.	KTBGA-51 G	6,9	*Thalassia* beds
Enteromorpha flexuosa (Wulf.) J. Ag.	KTBGA-52 G	9	epiphyte on *Hypnea*
Acetabularia crenulata Lamour.	KTBGA-50 G	7,9	sandy substrates
Ulva lactuca Linnaeus	KTBGA-38 G	7,9	small pier
Cyanophyta			
Microcoleus chthonoplastes Thuret	KTBGA-49 G	4	epiphyte on *Polysiphonia*
Calothrix confervicola Kütz.	KTBGA-53 E	1,4	seawall
Anabaena fertilissima Rao	KTBGA-58 E	4	seawall
Oscillatoria sp.	KTBGA-71 F	4	mangrove prop roots

1 tetrasporic
2 cystocarpic

* Sources of identification: 1-Dawes 1974, 2-Dawson 1961b, 3-Dawson 1962, 4-Desikachary 1959, 5-Drouet 1968, 6-Taylor 1936, 7-Taylor 1942, 8-Taylor 1960, 9- M. Wynne and D. Kapraun, personal communication.

musciformis. Habitats such as *Thalassia* beds in waters of more oceanic salinity than found near Puerto Barrios could harbor species of *Penicillus, Caulerpa, Udotea,* and other associations described by Dawes (1974). Unfortunately, the collection trip to the Caribbean coast was made after exploring the Pacific coast, and only a short time was available.

The prospect of algal aquaculture in Guatemala is certainly feasible on the Caribbean coast, as evidenced by the valuable phycocolloid algae which were collected. Sites would have to be chosen carefully to avoid extensive river run-off during the rainy season. The prospect of algal aquaculture on the Pacific coast is less certain. Only extensive artificial reef building or engineering of the canal system might permit such a venture.

RESUMEN

Una totalidad de 46 especies de algas marinas fue recolectada en Guatemala, 11 especies de Cyanophyta, 11 de Chlorophyta, 1 de Phaeophyta, y 23 de Rhodophyta. Tanto *Enteromorpha flexuosa* como *Caloglossa leprieurii* fueron encontradas en ambas costas. Varias algas con ficocoloides de valor comercial fueron encontradas en la costa caribeña.

ACKNOWLEDGMENTS

We wish to express our thanks to the following people for their contributions: Dr. R. Pieper, who helped with the procurement of funds; Mr. R. Setzer, who provided valuable advice and consul; Dr. M. Wynne and Dr. D. Kapraun for advice and aid in identification of the Ceramiales; and Mr. W. Gardiner for the illustration. The senior author wishes to extend a very special thanks to the faculty and students of the Universidad del Valle de Guatemala for their hospitality and assistance.

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