

5. MARINE ALGAE OF DIEGO GARCIA

by Charles F. Rhyne

INTRODUCTION

The algal flora of Diego Garcia atoll seems after preliminary studies to compare closely with that found by earlier investigations (Hemsley, 1887; Gepp and Gepp, 1909; Weber-van Bosse, 1913; Reinbold, 1907) and with the floras of some adjacent islands and continental shores in the western Indian Ocean. Many new records of species on the atoll were established by the recent collection. Also, names of some entities in the 43 species collected around the turn of the century have been corrected when synonymy was noted by the author.

This list includes 115 known algal taxa from Diego Garcia. Seventy-one are new records for this central Indian Ocean atoll. These new records consist of 8 in the Myxophyceae, 30 in the Chlorophyceae, 9 in the Phaeophyceae and 25 in the Rhodophyceae. One new species of green alga is included, belonging to the new genus Struveopsis described elsewhere (Rhyne and Robinson, 1968). Earlier authors recorded 43 species, but only 14 of these were recollected by the writer. One terrestrial blue-green alga is included in this report.

Several entities have been purposely omitted for lack of sufficient data. Some groups, which are melobesioid corallines, Ceramium, Herposiphonia, Chondria, Sargassum, Turbinaria, Cladophora and Bryopsis, posed such taxonomic difficulty they are presently listed only by genera. Identifications of Halimeda are to be made later by Dr. Llewellyn H. Colinaux.

I wish to thank Dr. Francis Drouet, Academy of Natural Sciences, Philadelphia, for identifying the Myxophyceae and Mr. Roy T. Tsuda, University of Guam, for the annotated determinations of the genus Caulerpa. I am grateful to Dr. Harold Robinson, Department of Botany, Smithsonian Institution, who critically read the manuscript.

The bibliography does not include citations of the original descriptions of the species unless pertinent data or figures are used in the discussion of the species. Original citations for many of the species can be found in Dawson (1954).

All numbered specimens are deposited in the herbarium of the Smithsonian Institution (US). CR collection numbers are those of the author.

HABITAT DESCRIPTIONS

Collections were almost wholly intertidal with occasional shallow sublittoral ones (to 3.3 m). There was a general lack of substantial growth in deeper waters of the lagoon and the extremely treacherous conditions along the "Porolithon" ridge area made collecting nearly impossible there. Despite the ubiquity of many species throughout the reef environment, a short summary of habitat descriptions will be given and a note of certain niches that contained distinctive species.

A. Lagoon shore, east and west sides

By far the most frequent ecological situation was a sloping sand beach consisting of occasional exposed rock reefs at low water spring (LWS) tide. Coral pebbles and cobbles, a few centimeters to 20 cm in diameter, were either embedded in intertidal sand or kept in continuous motion by the pounding surf driven by the SE winds. The surf was particularly evident along the western side of the lagoon.

The intertidal zone along the NW lagoon shore was largely devoid of attached algae except for Enteromorpha and Giffordia duchassaigiana. However, just below the turbulent intertidal area, a prevalent benthic flora appeared. As shallowly as 0.3-0.5 m, Dictyota, Pocockiella papenfussii, Hypnea, Halimeda, a melobesioid red and long skeins of Schizothrix were attached on dead and dying portions of erect corals. Here patches of Cymodocea ciliata in 0.3-1.0 m of water supported the barest epiphytic flora with occurrences of Bryopsis. Cymodocea and a melobesioid alga covered large areas of coral in 1.0-2.5 m of water. In deeper water, 2.4-4.0 m, Microcoleus lyngbyaceus appeared on loose coral cobbles while Padina produced thick scattered clumps over small isolated outcrops of coral. Otherwise the loose sandy bottom appeared as a rather desolate habitat for algal growth.

As one walked along the high intertidal zone at LWS tide a few species were found frequently in the drift. Among the drift Cymodocea ciliata, Hypnea pannosa and Pocockiella papenfussii were generally attached to small coral cobbles and Jania decussata-dichotoma was intimately associated with Dictyota. Sprigs of Turbinaria and Sargassum were occasional along the high intertidal zone. At Point Marianne occasional clumps of drift Hypnea pannosa were washed about in the shallow embayment.

Shallow water, limestone cliffs, high turbidity and high insolation characterized the seemingly desolate southern portion of the lagoon shore, but under the 0.8-1.7 m high cliffs, a distinct flora could be observed in the cavities. At LWS tide some of these depressions were completely shaded and although exposed for periods up to 6 hours the extreme dampness supported thick growth of Cryptonemia, Cladophora socialis, Botryocladia skottsbergii, Valonia utricularis, Caulerpa peltata and Avrainvillea. Long skeins of Schizothrix mexicana, Halimeda,

Chaetomorpha, Bryopsis pennata, Codium geppii, Galaxaura filamentosa and Gelidiopsis intricata were observed hanging from the ceiling of these cavities. Also under the ledges Halimeda was extremely abundant with Cladophoropsis sundanensis growing profusely over exposed coral flats at LWS tide. Schizothrix arenaria formed a large moss-like felt covering expanses of slightly raised coral ledges that were exposed even at HWS tides.

In the lower intertidal to 0.5 m of water Hypnea pannosa was extremely abundant as scattered ball-like formations 20-45 cm in diameter. The cavity of these algal spheres afforded protection and a complete microenvironment for small fish, crab and shrimp.

Slightly NE of this southern tip of the lagoon Rhipidiphylon reticulatum was observed under ledges. In tide pools Schizothrix calcicola was locally common with the ever present Calothrix pilosa. In water to 1 m in depth Gelidiella acerosa, Boodlea composita, Galaxaura filamentosa and Herposiphonia were collected. Also Spyridia filamentosa was found extremely abundant as an epiphyte upon Cymodocea.

B. Islets

The Cymodocea beds surrounding three islets at the mouth of the lagoon yielded an abundant variety of algae. Dictyurus purpureus, Valonia ventricosa, Dictyospheria cavernosa, Caulerpa peltata and Acetabularia moebii were found in a distinct environment beneath a thick canopy of the seagrass leaves. Epiphytes such as Sphacelaria furcigera, Amphiroa fragilissima, Fosliella farinosa, Enteromorpha flexuosa, Microdictyon pseudohapteron, Champia parvula, Hypnea, Jania tenella and Lophosiphonia were seemingly specific for certain portions of Cymodocea. Melobesioids appeared commonly scattered about the bottom near the extensive Cymodocea beds.

C. Lagoon floor

SCUBA and free diving allowed observation and collection of the flora on the lagoon floor. In the northern portion dives ranged from 3-10 m and to 2-3 m in the southern portion. The deeper dives revealed a paucity of fleshy forms with some Halimeda and melobesioid algae predominating. The bottom at 10 m was composed of 80 % soft coral sediments. Toward the southern end of the lagoon a survey of the bottom in 2-3 m of water revealed large areas of sand with sizable depressions filled with drift Padina to a depth of 0.5 m. Also, isolated coral heads rose within 1.0-1.5 m of the surface and supported luxuriant growths of Sargassum, Turbinaria, Padina, Jania, Galaxaura and Dictyota. These coral heads were the only observed sites for attached Sargassum.

D. Ocean shore, east and west sides

An intermediate area between the true lagoon environment and the ocean side was observed at Eclipse Point. The location of the area afforded protection from daily heavy wave action at high tide. At LWS tide the reef was almost totally exposed with occasional tidal pools with 1-15 cm of water and large coral-conglomerate rocks breaking the surface. Cymodocea patches were scattered about, but individual plants were only 7-20 cm tall in contrast to the deeper placed plants on the lagoon side which reached 18-28 cm in height. Very fine calcareous silt settled over the entire reef flat camouflaging much of Schizothrix mexicana, Dictospheria, Boodlea composita, Gelidiella acerosa, Turbinaria, Laurencia, Jania capillacea, Herposiphonia and Cladophoropsis sundanensis which were common as a felt over the coral rocks. Larger coral rocks supported a significant number of plants on the lower surfaces where they were protected from the extremely high insolation. Melobesioids were common members of this micro-environment. Schizothrix calcicola, Microcoleus lyngbyaceus and Rivularia polyotis formed extensive patches over sandy areas, while Halimeda was scattered commonly over the reef flat area and appeared to be the dominant large species.

A large cemented beach-rock formation south of the preceding location yielded a substantially different flora related to the change in habitat type. Rock shelving extended ca. 100 m outward from the high intertidal zone to the "Porolithon" ridge, ranging in depth from zero to 0.6 m of water at LWS tide. Rivularia polyotis was found as dark gelatinous clumps on tops of coral rubble. Jania decussata-dichotoma was frequent in crevices, while Dictyospheria intermedia covered the sandy bottom at times, and Halimeda, as stubby plants, commonly grew from larger crevices. Cladophora, attached to coral rocks was the main element in the algal felt.

Along the extremely turbulent ocean side near the southern end of the atoll melobesioids were common at the edge of the ridge and as cast-up material. Microdictyon pseudohapteron, Boodlea composita, Schizothrix calcicola and Microcoleus lyngbyaceus were common entities covering large areas over coral cobbles along with the ever present dwarfed Turbinaria.

At Horsburgh Point, Botryocladia skottsbergii, Ralfsia, Caulerpa peltata and C. urvilliana were under ledges and in deep crevices formed by small limestone cliffs. At extreme low tides this area was left dry for several hours at a time, with only the deepest portions of the crevices remaining damp enough to support their unique floras. In 0.5-1.0 m of water Pocockiella papenfussii and Laurencia nidifica were observed as common patches over a flat rock bottom swept essentially clean by an extremely fast current running parallel to the shore.

Approximately 1 mile north of this area a wide reef flat with ca. 100 m of exposed coral and reef rock formation was observed. The vegetation was predominantly Jania and Laurencia with abundant clumps of melobesioids up to 20 cm in diameter.

Adjacent to East Point village the reef floor consisted of pavement-like surface with scattered coral rocks and boulders. What could be seen of a well-formed "Porolithon" ridge enticed the author to sample it, but wave action forced him to "observe" only. Jania, a melobesioid, Boodlea composita and Turbinaria were all common in 0.7-1.3 m of water while Gelidiella acerosa was abundant in the intertidal zone.

At Minni-Minni ca. 2 miles north of East Point village a flat coral reef appeared quite representative for the ocean side environment. However, this particular area along the outer reef edge and "Porolithon" ridge supported a rich diversity of forms not seen earlier. Unfortunately collecting was nearly impossible because of the strong surge and dangerous waves. Well-formed surge channels extending almost from the ridge to the sloping sand shore allowed good water circulation even at LWS tide. The collected vegetation was of a matted habit with Jania capillacea, Laurencia, Boodlea composita, Microdictyon pseudohapteron, Caulerpa urvilliana, Halimeda and melobesioids predominating. An unidentified peltate red alga was also collected in the extremely turbulent area between the ridge and reef proper.

COLLECTING STATIONS

Station 1. Coral reef flat on oceanside at Eclipse Point. 11 June 1967.

Station 1a. Cemented beach rock ledge ca. 200 m S of Sta. 1. 14 June 1967.

Station 2. Drift material along coral cobble and sand lagoon shore in vicinity of Northwest Point. 12 June 1967.

Station 3. Coral reef in 0.6-1.3 m of water along lagoon shore in vicinity of Northwest Point. 12, 13, 15, 17 June 1967.

Station 3a. In 2.4-4.0 m of water on sand-coral bottom at Sta. 3. 15 June 1967.

Station 3b. Drift material from Sta. 3. 14 June 1967.

Station 4. Lagoon side of West Island in shallow but thick Cymodocea beds. 16, 22 June 1967.

Station 5. On spur reef at West Island in 0.3-1.0 m of water amid sand and coral pieces and in 1-2 m of water on coral reef. 21 June 1967.

- Station 6. Lagoon shore ca. 2 miles S of East Point village in shallow reef area. 23 June 1967.
- Station 6a. Beach rock and sand shoreline ca. 100 m S of Sta. 6. 18 July 1967.
- Station 7. Epiphytic material on various substrates in 0.5-1.0 m depths along lagoon shore at East Point village. 26 June 1967; drift - 5 July 1967.
- Station 8. Drift material along seaward sand and coral cobble beach at East Point village. 26 June; 1, 3 July 1967.
- Station 9. Seaward side of the "Porolithon" ridge in 1.7-4.0 m of water at East Island. 27 June 1967.
- Station 10. Drift along sandy shoreline at Point Marianne. 28 June 1967. Epiphytic material in shallow intertidal area. 25 July 1967.
- Station 11. In 1.3-2.0 m of water on lagoon floor ca. 4 miles S of East Point village in Cymodocea beds and scattered coral heads. 29 June 1967.
- Station 12. In shallow recessed tidal lagoon ca. 6 miles S of East Point village. 29 June 1967.
- Station 13. Sand and coral cobble lagoon shore ca. 1.5 miles N of East Point village. 1, 4 July 1967.
- Station 14. Shallow coral flat area along seaward side at East Point village. 1, 5, 10 July 1967.
- Station 15. Sand and eroded coral ledge, lagoon shore ca. 1 mile S of East Point village. 4 July 1967.
- Station 16. Oceanside of "Porolithon" ridge in 2.0-3.5 m of water at Observation Point. 6 July 1967.
- Station 16a. Over disturbed sand and coral rock bottom in 0.3-1.0 m depths at Observation Point. 6 July 1967.
- Station 17. Exposed oceanside coral reef flat at LWS tide ca. 1 mile N of Horsburgh Point. 7 July 1967.
- Station 17a. Beach-rock and eroded coral cliff habitat at Horsburgh Point (CR-575 - CR-578). In 0.3-1.0 m of water (CR-579 - CR-582). 7 July 1967.
- Station 18. Coral reef flat and sand area in vicinity of southern-most tip of lagoon. 8 July 1967.

- Station 19. Lagoon side of East Island in 0.3-0.7 m depths at LWS tide.
9 July 1967.
- Station 20. In temporarily dried fresh water pond ca. 0.75 miles S
of East Point village. 12 July 1967.
- Station 21. Southern-most tip of lagoon, physically similar to Sta. 18.
12 July 1967.
- Station 22. Vicinity of southern-most tip of lagoon, physically similar
to Sta. 18. 13 July 1967.
- Station 23. Ca. 1 mile S of East Point village along lagoon shore in
0.3-0.7 m of water on sand and coral cobble bottom. 18 July 1967.
- Station 24. In large shallow recessed tidal lagoon ca. 3 miles S of
East Point village. 18 July 1967.
- Station 25. Highly exposed oceanside reef flat ca. 3-4 miles N of
southern tip of atoll on W side. 19 July 1967.
- Station 26. Beach-rock and sand lagoon shore ca. 3 miles N of southern
tip on W side. 19 July 1967.
- Station 27. Seaward coral reef flat exposed at LWS tide ca. 1 mile N
of Cust Point. 20, 21 July 1967.
- Station 28. Thick Cymodocea beds and rich coral area in 0.7-2.7 m depths
on lagoon side ca. 1 mile N of Cust Point. 20, 21, 22 July 1967.
- Station 29. Seaward reef flat exposed at LWS tide at Minni-Minni. 24
July 1967.
- Station 30. In 10 m of water on lagoon floor ca. 1 mile due S of East
Island. 26 July 1967.
- Station 31. In 8.3 m of water on lagoon floor ca. 1500 m SSW of
Observation Point. 27 July 1967.
- Station 32. In 5 m of water on lagoon floor ca. 1500 m SE of Eclipse
Point. 27 July 1967.

SYSTEMATIC LIST

Myxophyceae

Calothrix crustacea Schousb. & Thur.

Stations: 12, locally common in tide pools, CR-515; 21,
consolidated over sand, CR-624a; 23, abundant on beach-rock
exposed at LWS tide, CR-697, CR-698.

Calothrix pilosa Harv.

Stations: 12, extensive growth over beach-rock, CR-516; 18, abundant on coral flat, CR-588; 23, over beach-rock, CR-697.

Microcoleus lyngbyaceus (Kütz.) Crouan

Earlier records: Reinbold 1907 (as Hydrocoleum lyngbyaceum Kütz.)

Stations: 1, CR-355; 3a, CR-410; 6, CR-468, CR-475; 13, CR-526; 14, CR-538, CR-558; 23, CR-698, CR-699; 6a, CR-701, CR-702; 25, CR-719; all common over sand or coral substrates.

Nostoc commune Vauch.

Stations: 3, terrestrial, abundant over sandy soil, CR-387.

Rivularia polyotis (J. Ag.) Born. & Flah.

Stations: 1, over sand, CR-356; 1a, common on coral rocks, CR-395; 14, common on coral rocks, CR-552.

Schizothrix arenaria (Berk.) Gom.

Stations: 18, abundant over coral flats exposed at LWS tide, CR-588; 20, on soil of temporary brackish pond, CR-623; 21, over sand, CR-624a; 25, common over coral rocks, CR-719.

Schizothrix calcicola (Ag.) Gom.

Stations: 1, CR-355; 1a, CR-395; 12, CR-515; 14, CR-552, CR-558; 20, CR-623; 21, CR-624a; 23, CR-697; CR-698; CR-699; 25, CR-719; all common over sand or coral substrates.

Schizothrix mexicana Gom.

Stations: 1, CR-339; 2, CR-361; 3, CR-377, CR-384; 17, CR-573; 21, CR-634; 22, CR-644; all common over coral rocks or under ledges.

Scytomena hofmannii Ag.

Stations: 20, locally abundant on soil of temporary brackish pond, CR-623.

ChlorophyceaeAcetabularia moebii Solms-Laubach

Stations: 4, rare, at base of Cymodocea bed mixed with larger algae, CR-431. Plants ca. 6-7 cm tall; disks ca. 2 mm in diameter with ca. 13 rays with rounded tips; rays calcified together.

Avrainvillea sp. cf. A. amadelpa Gepp & Gepp 1911: 42, pl. 14, figs. 112-115.

Stations: 12, CR-508; 21, CR-633; rare under ledges at both stations.

Seemingly dwarfed specimens of A. amadelpa but also rather close to A. lacerata (Harv.) J. Ag. Plants to 2.5 cm tall, of a spongy texture and somewhat zonate; frond filaments without tenaculæ, ca. 15-25 μ in diameter.

Boodlea composita (Harvey) Brand; Dawson 1954: 390, fig. 9c, f.

Stations: 1, common over sandy area, CR-343; 12, common over coral and beach-rock, CR-510, CR-519; 14, common over coral reef, CR-564, CR-559; 25, common as tufts over coral rocks, CR-718; 29, common over reef flat exposed at LWS tide, CR-782.

Filaments ranging in size from 250-400 μ in diameter as a short felt over the substrate. The dry material appears to differ somewhat from other herbarium specimens; however, dimensions and habit of the wet material indicate B. composita.

Boodlea vanbossei Reinbold; Dawson 1956: 29, fig. 6.

Earlier records: Reinbold 1907.

Bryopsis pennata Lamx. var. leprieurii (Kütz.) Collins & Hervey; Taylor 1960: 132. Stations: 21, infrequent from ceiling of ledge, CR-635.

Almost identical with CR-700 except that numerous vacant spaces exist along main axis.

Bryopsis pennata Lamx. var. secunda (Harv.) Collins & Hervey; Taylor 1960: 132, pl. 9, fig. 12.

Stations: 6a, mixed with various other matted algal forms, CR-700.

Main axis 200-275 μ in diameter, pinnae ca. 60-80 μ in diameter, plants ca. 3-5 cm tall with strong secund branching in many areas.

Bryopsis sp. #1

Stations: 14, over coral rocks, CR-554, CR-606.

Main axis to 1 mm in diameter; with pinnae 40-60 μ in diameter and 2-3 mm long; plants 2-3 cm tall; material seems to indicate pinnae situated at random around branch. Possibly close to B. hypnoides.

Bryopsis sp. #2

Stations: 3, locally infrequent in sand in Cymodocea beds, CR-435.

Plumose habit with distichous branching; pinnae arranged as characteristic of B. indica, but generally only at lower portions of thallus, main axis ca. 300 μ in diameter, pinnae 50-75 μ in diameter.

Caulerpa antoensis Yamada 1944: 27, pl. 1, fig. 1; Dawson 1956: 36, fig. 20.

Stations: 4, rare over sand in Cymodocea beds, CR-430.

The cylindrical rhizome bears numerous short rhizoids which are firmly attached to fine sand particles. The simple or branched foliar branches, about 1 cm high, possess apiculate ramuli which are distinctly upcurved and arranged in a verticillate manner.

Caulerpa cupressoides (Vahl) Weber-van Bosse

Earlier records: Reinbold 1907.

Caulerpa cupressoides Weber-van Bosse var. mamillosa f. nuda Weber-van Bosse

Earlier records: Gepp and Gepp 1909, on reef exposed at dead low tide.

Caulerpa freycinetii Ag. var. typica f. spiralis Weber-van Bosse

Earlier records: Gepp and Gepp 1909, on reef exposed at dead low tide.

Caulerpa mamillosa Mont.

Earlier records: Hemsley 1887.

Caulerpa peltata Lamx. 1809: 145; Taylor 1950: 65.

Stations: 4, rare over sand in Cymodocea bed, CR-429; 14, infrequent under large coral rocks, CR-539; 17a, infrequent under ledges, CR-578; 21, frequent under ledges, CR-632.

The branched cylindrical rhizomes, about 0.5-1.0 mm in diameter, bear single entire peltate ramuli which are about 2-4 mm in height. Occasionally the ramuli may be branched.

Caulerpa racemosa var. peltata (Lamx.) Eubank 1946: 421, fig. 2r.

Stations: 14, infrequent, with other matted forms, CR-560.

The ramuli on this specimen consist of two morphological forms, the "turbinata" type and the "peltata" type. Past field observations in Hawaii and Guam have revealed that C. racemosa v. peltata and C. peltata are two different entities. The former can be differentiated from the latter by the presence of the peltate ramuli on an erect axis as opposed to the ramuli occurring directly on the rhizome in the latter species.

Caulerpa serrulata var. typica (Weber-van Bosse) Tseng 1936: 178, pl. 1; Eubank 1946: 418.

Stations: 1, CR-353; 3a, CR-412; 5, CR-438; 6, CR-469; 11, CR-504; 13, CR-532; 16a, CR-569; all over sand or coral rocks.

The twisted serrated flattened foliar branches, about 1.0-4.5 cm in height, may arise singly, dichotomously or irregularly.

Caulerpa urvilliana Montagne 1845: 21; Taylor 1950: 62, pl. 31, fig. 2.

Stations: 16a, locally frequent on coral rocks and on sand, CR-570; 17a, over coral rocks and abundant in drift, CR-579, 25, frequent in drift, CR-715; 29, frequent over reef flat, CR-786.

The specimens seem to be referable to v. typica f. tristicha (J. Ag.) Weber-van Bosse. The foliar portion branches near the base and reaches a height of 6 cm.

Chaetomorpha aerea (Dillw.) Kütz.

Earlier records: Reinbold 1907.

Chaetomorpha gracilis Kütz.; Taylor 1960: 70.

Stations: 12, locally abundant under tree exposed at LWS tide, CR-513; 21, infrequent under ledge, CR-638.

Filaments ca. 55-80 μ in diameter, cells 150-275 μ long, walls 5-15 μ thick.

Chaetomorpha sp. cf. C. brachygona Harvey; Taylor 1960: 70, pl. 2, fig. 9.

Stations: 6a, locally frequent over soft bottom in 0.3-0.7 m of water, CR-703.

Filaments ca. 110-135 μ in diameter, cells 115-225 μ long, cell walls 15-25 μ thick, no basal cell observed.

Chaetomorpha sp.

Stations: 6, common over intertidal coral cobbles, CR-462; 7, abundant over small coral rocks, CR-547.

Filaments ca. 140-200 μ in diameter, cells mostly shorter than broad or equal; basal cell in CR-462 ca. 350 μ long and ca. 100 μ in diameter.

Cladophora demissa J. Ag.

Earlier records: Hemsley 1887.

Cladophora socialis Kütz.; Børgesen 1946: 28; Dawson 1956: 24.

Stations: 12, common under ledges, CR-511; 21, abundant over various coral substrates, CR-624b; 21, abundant under ledges, CR-629.

Branches ca. 75-110 μ in diameter, with cells ca. 0.8-3.0 mm long, some rhizoidal processes observed; Børgesen used the name C. patentiramea f. longiarticulata for this plant in earlier works.

Cladophora sp. #1

Stations: 3b, one piece, CR-390; 6a, locally common over bottom in 0.3-0.7 m of water, CR-704.

Branches ca. 100-150 μ in diameter, cells 0.5-3.0 mm long. This may be a robust form of C. socialis.

Cladophora sp. #2

Stations: 24, very common in tufts over bottom, CR-708.

Cells ca. 75-125 μ in diameter and seemingly larger at one end than at the other, 250-400 μ long.

Cladophoropsis sundanensis Reinbold: Dawson 1956: 31.

Earlier records: Reinbold 1907.

Stations: 1, locally frequent over coral and sand substrates, CR-349; 6, common over sand and coral substrates, CR-470, CR-473, CR-476; 18, very common over reef flat exposed at LWS tide, CR-589; 21, frequent over reef flat exposed at LWS tide, CR-640.

All specimens but those of CR-349 seem to be rather robust forms of the species as branch size was 105-165 μ in diameter. At first C. limicola Setchell was thought to compare well by description. However, owing to previous collections on Diego Garcia and the fact that Dawson (1956) states that C. sundanensis can approach 175 μ in branch diameter, the specimens are placed here.

Codium geppii O. C. Schmidt; Børgesen 1946: 49, figs. 195-199.

Stations: 8, infrequent over coral cobbles, CR-489; 14 infrequent over large coral rocks, CR-534; 21, locally common under ledges, CR-637.

Utricles ca. 400-750 μ long, 150-325 μ in diameter; end wall ca. 1 μ thick; CR-489 and CR-534 branches to 2 mm in diameter; CR-637 with branches 2-4 mm in diameter, appearing as a much more robust and luxuriantly formed specimen, with gametangia ca. 250 μ long and 50-60 μ in diameter.

Dictyospheria cavernosa (Forsk.) Børg.; Taylor 1950: 43, pl. 27, fig. 2; Dawson 1954: 388, fig. 8i.

Earlier records: Reinbold 1907 [as Dictyospheria favulosa (Mert.?) Dcne.]

Stations: 1a, infrequent, CR-402; 4 infrequent in Cymodocea beds, CR-417; 6, locally infrequent, CR-465.

Dictyospheria intermedia Weber-van Bosse; Taylor 1950: 42.

Stations: 1, along sides and under surfaces of large coral rock, CR-342; 1a, frequent over sand bottom, CR-403; 6, locally infrequent, CR-464; 11, in Cymodocea bed, CR-499; 28, very common over coral rocks, CR-726; 31, on coral rock, CR-795.

It is difficult to be sure that internal spines were not present.

Enteromorpha flexuosa (Wulfen ex Roth) J. Ag. cf. subsp. flexuosa:

Bliding 1963: 73, figs. 38-41.

Stations: 4, infrequent on Cymodocea stems, CR-422; 6, common over coral cobbles in intertidal zone, CR-461; 14, distinct band over coral rocks at low water mark, CR-553.

Short tufted tubular thalli to 3 cm tall with dense branching generally from lower portion of main axis only; branches to 1 mm in diameter; cells in longitudinal order, 15-30 μ long, 12-22 μ in diameter; 2-4 pyrenoids.

Enteromorpha flexuosa (Wulfen ex Roth) J. Ag. cf. subsp. paradoxa
(Dillwyn) Bliding; Bliding 1963: 79, figs. 42-45.

Stations: 3b, one piece over coral rocks in intertidal zone,
CR-388; 21, epiphytic upon Cocos pinnae, CR-624; 23, epiphytic
upon Casuarina twigs in 0.3 m depths, CR-692.

Tufts to 3-4 cm tall; filaments thin, 125-300 μ in diameter; cells
in longitudinal order, sometimes in transverse order; cells ca. 15 μ
square to 12-20 μ in diameter, 18-30 μ long; 1-5 pyrenoids; a much more
finely branched and elongate form than subsp. flexuosa.

Enteromorpha lingulata J. A.

Earlier records: Reinbold 1907.

In discussing the determination of E. lingulata, Reinbold relates
these specimens closely to E. crinita.

Halimeda incrassata (Ell. & Sol.) Lamx.

Earlier records: Reinbold 1907.

Halimeda opuntia Lamx.

Earlier records: Hemsley, 1887; Gepp & Gepp 1909.

Halimeda opuntia f. typica E. S. Barton (verging towards f. cordata and
triloba)

Earlier records: Gepp & Gepp 1909.

Halimeda tuna (Ell. & Sol.) Lamx.

Earlier records: Reinbold 1907.

Microdictyon pseudohapteron Gepp & Gepp 1909: 165, pl. 22, figs. 1-4;

Dawson 1956: 36.

Stations: 4, locally common on Cymodocea stems, CR-423; 17a, drift,
CR-582; 25, CR-716; 27, CR-724; 29, CR-783; all common on or
under large coral rocks.

Segments to 260 μ in diameter, ca. to 400 μ long; ends of
anastomosing membranes crenulate in appearance.

Microdictyon pseudohapteron Gepp & Gepp cf. f. luciparense Setchell 1929:
549, figs. 72-75.

Stations: 4, locally infrequent on Cymodocea stems, CR-447.

Segments to 200 μ in diameter, to 500 μ long, with seemingly a wider
mesh than in the type.

Noemeris mucosa Howe 1909: 84, pl. 1, fig. 5 & pl. 5, figs. 1-14.

Stations: 1a, rare in sand, CR-396; 28, locally frequent over
coral rocks, CR-729.

Length of primary branches ca. 300-500 μ long; 50-75 μ in diameter; plants 6-13 mm tall.

Rhipidiphyllon reticulatum (Askenasy) Heydrich; Taylor 1950: 45; Dawson 1956: 32, fig. 10.

Stations: 4, infrequent on Cymodocea stems, CR-424a; 12, infrequent under ledges, CR-509.

Lower cells to 175 μ in diameter with anastomosing branchlets.

Struvea anastomosans (Harv.) Piccone & Grunow; Egerod 1952: 359, pl. 31, fig. 4a-h.

Station: 22, on bivalve shell, CR-649.

With definite anastomosing habit and tenaculae; plants to 3 cm tall; stripe ca. 275-300 μ in diameter.

Struveopsis chagoensis Rhyne & H. Robinson 1968: 472, figs. 1-3.

Stations: 4, epiphytic upon Cymodocea, in 0.3-0.7 m of water, CR-421 (holotype-US); infrequent as epiphyte in Cymodocea bed, CR-450.

Valonia utricularis (Roth) C. Ag.

Earlier records: Reinbold 1907.

Stations: 12, associated with other larger algae, CR-505; 17a, infrequent on beach rock, CR-577; 21, very common under ledges, CR-631; 28, common as epiphyte on Cymodocea, CR-737.

The form of V. aegagropila was somewhat observed in CR-372, CR-505 and CR-577; however, these specimens are still probably dwarf forms of V. utricularis.

Valonia ventricosa J. Ag.

Stations: 4, infrequent in Cymodocea beds, CR-415, CR-445.

Spherical cells to 15 mm in diameter.

Valoniopsis pachynema (Martens) Børg.

Stations: 12, infrequent as epiphyte on larger algae, CR-520; 8, epiphytic on melobesioid alga, CR-545.

Highly contorted branching, branches up to 900 μ in diameter.

Phaeophyceae

Dictyota barteyresiana Lamx.

Earlier records: Reinbold 1907.

Dictyota sp. cf. D. divaricata Lamx.

Stations: 6, locally frequent under ledges, CR-456; 23, drift, CR-691.

Plants short to 5-6 cm tall; upper branches extremely narrow.

Dictyota sp. cf. D. friabilis Setchell 1926: 91, pl. 13, figs. 4-7, pl. 20, fig. 1; Dawson 1954: 401, 16a, b.

Stations: 2, common in drift, CR-370; 3, abundant on coral, CR-378; 11, frequent as epiphyte on Sargassum and Turbinaria, CR-503; 22, locally abundant patches, CR-642.

The low growing with conerescent thalli are as in D. friabilis Setch. Sporangia in our material measure ca. 80 μ in diameter, whereas in D. friabilis, Setchell indicates 160 μ .

Giffordia duchassaingiana (Grunow) Taylor; Dawson 1956: 43, fig. 32, (as Ectocarpus indicus Sonder in Zollinger).

Stations: 7, epiphytic upon Cymodocea, CR-494b; 23, over sand bottom in 0.3-0.7 m depths, CR-693; 10, locally frequent on various substrates in sand, CR-792.

Hydroclathrus clathratus (Bory) Howe

Earlier records: Reinbold 1907 (as Hydroclathrus cancellatus Bory)

Stations: 6, scattered in 0.3-0.7 m of water, CR-466; 13, locally abundant in drift, CR-528; 21, one clump in 0.3-0.7 m depths, CR-636.

Padina commersonii Bory

Earlier records: Reinbold 1907.

Stations: 2, drift, CR-368; 6, abundant over sand bottom, CR-457; 7, drift over sand bottom, CR-495; 11, abundant as drift over sand bottom, CR-498.

Padina sp. cf. P. tetrastomatica Hauck; Misra 1966: 158, fig. 84.

Stations: 13, very common in drift, CR-525.

Padina sp.

Stations: 3, scattered over small reef patches, CR-411.

Completely void of incrusting lime, but perhaps a form of P. commersonii.

Pocockiella papenfussii Taylor 1950: 98, pl. 54, fig. 2; Dawson 1956: 44.

Stations: 2, CR-359; 3, CR-375; 4, CR-416; 8, CR-546; 17a, CR-580; 19, CR-601; 28, CR-725. Most are common on coral or Cymodocea in 0.3-0.7 m depths.

Thalli to 325+ μ thick; ca. 8-9 cell tiers high.

Pocockiella variegata (Lamx.) Papenfuss

Earlier records: Gepp & Gepp 1909 (as Zonaria variegata Mart.)
in lagoon.

Stations: 11, epiphytic upon Dictyospheria, CR-500.

Thallus, 140-160 μ thick.

Ralfsia sp.

Stations: 17a, infrequently matting floors under ledges, CR-576.

The habit and internal structure agree with the genus Ralfsia; however, without fertile material, a determination is not possible.

Rosenvingea intricata (J. Ag.) Børg.; Misra 1966: 125.

Stations: 6, infrequent under ledges, CR-467.

Hollow thallus with small superficial cells, 15-25 μ long; larger cells beneath, (100)-175-200-(300) μ long, 75-125 μ in diameter.

Sargassum subrepandum (Forsk.) Kütz.

Earlier records: Reinbold 1907.

Sargassum spp.

Stations: 2, CR-366; 13, CR-530; 7, CR-550; all as drift; 11, attached and locally abundant on scattered coral heads; seemingly sterile, CR-496.

Sphacelaria furcigera Kütz.

Stations: 4, common as epiphyte on Cymodocea stems, CR-418.

Sphacelaria novae-hollandiae G. Sonder; Dawson 1954: 399, fig. 14g.

Stations: 3, epiphytic growth on coconut husks, CR-379.

Propagulum 90-110 μ long; 65-80 μ wide at tip with corner cells divided as in Dawson's figure. Filaments however, are only 15-20 μ in diameter rather than 50-70 μ as described by Børgesen 1941: 45.

Turbinaria conoides (J. Ag.) var. conoides f. laticuspidata Taylor;

Taylor 1966: 97.

Earlier records: Hemsley 1887 (as Turbinaria vulgaris var. decurrens J. Ag.)

Turbinaria ornata J. Ag.

Earlier records: Gepp & Gepp 1909, on reefs exposed at dead low tide.

Turbinaria trialata Kütz.

Earlier records: Reinbold 1907.

Turbinaria spp.

Stations: 1, CR-345; 2, CR-369; 6, CR-455; 11, CR-497; 14, CR-561; 6a, CR-705; 28, CR-734; most as stubby growth on various coral substrates.

All specimens are evesiculate and many seemingly dwarfed. Most are without dentate, lateral longitudinal ridges.

Rhodophyceae

Amphiroa fragilissima (L.) Lamx.; Dawson 1954: 430, fig. 40g, h.

Stations: 4, in Cymodocea beds, CR-419.

Segments ca. 300 μ in diameter with evident nodal swellings.

Amphiroa sp. cf. A. anastomosans Weber-van Bosse; Dawson 1956: 50, fig. 45.

Stations: 6, locally abundant over beach rock, CR-459.

Segments ca. 250 μ in diameter, perhaps a little larger for this species, fertile.

Amphisbetema indica (J. Ag.) Weber-van Bosse 1913a: 133, pl. 13, fig. 24, pl. 14, fig. 34, and text fig.

Earlier records: Hemsley 1887 (as Dasya indica J. Ag.); Weber-van Bosse 1913a.

Stations: 14, drift, CR-541; 19, locally abundant on coral reef in 0.3-0.7 m depths, CR-600.

Botryocladia skottsbergii (Børg.) Levring

Stations: 12, CR-506; 17a, CR-575; 21, CR-630; all as infrequent tufts under limestone ledges.

Centroceras clavulatum (Ag.) Mont.

Stations: 13, CR-531, CR-548; common over coral rocks in 0.3-0.7 m of water.

Ceramium repens Harvey

Earlier records: Reinbold 1907.

Ceramium spp.

The collections have not yet been determined to species.

Champia compressa Harvey

Earlier records: Reinbold 1907.

Champia parvula (Ag.) Harvey

Stations: 4, locally frequent on Cymodocea stems, CR-424, rather dwarfed.

Champia sp.

Stations: 14, one piece, CR-563.

Cystocarps 475-525 μ in diameter, somewhat urceolate; wall with one layer of cells, these being 20-30 μ in diameter with smaller ones interspersed, 7-10 μ in diameter; branches concrescent here and there, to 1+ mm in diameter. This specimen has some characters of C. salicornioides and compressa, but may be a rather robust form of C. parvula.

Chondria pumila Vickers; Weber-van Bosse 1913a: 125, pl. 12, fig. 8.

Earlier records: Weber-van Bosse 1913a.

Chondria spp.

Stations: 2, drift, CR-363; 18, frequent over coral cobbles, CR-587.

Cryptonemia sp. cf. C. crenulata J. Ag.

Stations: 21, locally frequent under limestone ledges, CR-628, CR-628a.

Thallus ca. 200 μ thick, filamentous medulla and inner cortex.

Dictyurus purpurascens Bory

Earlier records: Weber-van Bosse 1913a.

Stations: 4, locally abundant in Cymodocea beds, CR-414; 5, infrequent under ledges, CR-442; 4, locally frequent in Cymodocea bed, CR-448.

Fosliella sp. cf. F. farinosa (Lamx.) Howe; Dawson 1954: 425, fig. 37c.

Stations: 2, CR-358; 4, CR-420; 19, CR-601a; all as epiphytes on Cymodocea blades and Pocockiella thalli.

Galaxaura filamentosa Chou; Chou 1945: 39, pl. 1, figs. 1-6, pl. 6, fig. 1; Dawson 1954: 419, fig. 30a.

Stations: 1, CR-360; 11, CR-502; 12, CR-512; 12, CR-521; 14, CR-535; 22, CR-643; epiphytes on other algae, Cymodocea or various coral substrates.

Gelidiella acerosa (Forsk.) Feldm. & Hamel

Earlier records: Weber-van Bosse 1928 (as Gelidiopsis rigida (Vahl) Weber-van Bosse) on reefs.

Stations: 1, CR-344; 6, CR-458; 8, CR-488; 12, CR-518; 10, CR-605; 21, CR-625; 28, CR-739; generally frequent to common over various coral and beach-rock substrates.

Gelidiella sp. cf. G. myrioclada (Børg.) Feldm. & Hamel; Dawson 1954: 473.

Stations: 21, abundant over coral cobbles, CR-625a; 21, abundant over sand flats, CR-627.

Branches ca. 150-200 μ in diameter; wiry texture; with apical cell; no rhizoids observed.

Gelidiopsis intricata (Ag.) Vickers; Dawson 1954: 423, fig. 34a-d.

Stations: 6, locally common over coral rocks, CR-471; 18, very common on beach-rock, exposed at LWS tide, CR-585; 28, frequent as wiry tufts under ledges, CR-647, CR-648; 23, frequent in 0.3-0.7 m of water, CR-694.

Branches 150-250 μ in diameter; with no apparent apical cell; tough wiry texture; tetrahedral tetraspores, ca. 30-40 μ in diameter; sporangia terminally placed, ca 430 μ wide, 700 μ long.

Gelidiopsis variabilis (Grev.) Schm.

Earlier records: Reinbold 1907.

Gelidium crinale (Turn.) Lamx.

Earlier records: Reinbold 1907; Weber-van Bosse 1913a.

Gelidium crinale var. perpusillum Picc. & Grun. in Piccone;

Earlier records: Reinbold 1907.

Stations: 26, locally common on beach-rock, exposed at LWS tide, CR-722.

Small tufts to 5 mm tall; branches 75-125 μ in diameter; with bilocular cystocarps.

Gelidium sp. cf. G. pusillum (Stackh.) Le Jolis; Dawson 1954: 420, fig. 31a-c.

Stations: 3b, one piece over coral rock, CR-389; 3, locally frequent on various coral substrates, CR-408; 6 locally common on coral rocks, CR-472.

Stubby growth to 1 cm tall; rhizoids seemingly concentrated in medulla; branches compressed to 1+ mm; with bilocular cystocarps in CR-408.

Herposiphonia tenella (Ag.) Ambronn; Børg. 1918; 286, figs. 287-289; Dawson 1954: 452, fig. 59a.

Stations: 3, epiphytic on Halimeda, CR-381.

Main axis ca. 100-125 μ in diameter, with ca. 8-10 pericentral cells that are 125-135 μ long; branching regular with a branch per cell over most of the plant; branches 50-75 μ in diameter.

Herposiphonia sp. #1

Stations: 13, on tree trunk in water, CR-527; 15, abundant over beach rock cobble, CR-549.

Herposiphonia sp. #2

Stations: 1, CR-348; 8, CR-491; 12, CR-522; frequent to common over various coral substrates.

Hypnea hamulosa (Turn.) Mont.

Earlier records: Reinbold 1907 (this may possibly be Hypnea valentiae (Turn.) Mont. as discussed in Dawson 1961: 239).

Hypnea pannosa J. Ag.; Tanaka 1941: 247, fig. 20; Dawson 1956: 51, fig. 46.

Earlier records: Reinbold 1907.

Stations: 2, drift, CR-365; 3, frequent in crevices of corals, CR-376; 10 infrequent in drift, CR-482; 7, on steel pilings, CR-492.

The following specimens seem referable to H. pannosa but with reservations. 4, locally frequent on Cymodocea stems, CR-425; 26, drift, CR-721: both as dwarfed material; 2, drift, CR-364; 6, entangled with other matted forms, CR-474; 12, infrequent over coral cobbles, CR-514; 18, abundant over coral cobbles, CR-583. The last four specimens were sterile.

Tetrasporic areas when found were only near lower portions of thallus near holdfast; sporangial areas were variable, being observed in some cases to encircle the branchlet, in other to form saddle-shaped sori as described for H. nidulans, or to be concentrated on one side as described for H. pannosa. Dawson 1961: 237, concludes that H. pannosa J. Ag. and H. nidulans Setchell are conspecific and should be known under the name H. pannosa.

Jania capillacea Harvey; Dawson 1954: 432, fig. 41a, b.

Stations: 1, frequent as epiphyte on Cymodocea and on various coral substrates, CR-347; 1, locally common on Halimeda, CR-350; 28, common Cymodocea, CR-736; 29 common over reef flat exposed at LWS tide, CR-780.

Segments ca. 100 μ in diameter, widely spreading branches at dichotomies.

Jania decussata-dichotoma (Yendo) Yendo; Dawson 1956: 49, fig. 44.

Stations: 2, drift, CR-367; 1a, frequent in crevices of coral rock, CR-398; 6, locally abundant as matted growth on beach-rock, CR-460; 8, abundant in drift, CR-490; 11, abundant on Cymodocea stems CR-501.

Fertile branches ca. 100-175 μ in diameter; segments generally 4-7 diameters long; with characteristic branching habit; conceptacles ca. 300 μ long, 400 μ in diameter.

Jania tenella Kütz.; Dawson 1956: 49, fig. 43.

Earlier records: Reinbold 1907 [as Corallina tenella (Kütz.) Heydr.]

Stations: 4, abundant on Cymodocea stems, CR-426.

Fertile segments terminal, ca. 100 μ in diameter.

Laurencia perforata Mont.

Earlier records: Reinbold 1907.

Laurencia pygmaea Weber-van Bosse 1913a: 122, pl. 12, fig. 6; Dawson 1954: 458, fig. 62k.

Earlier records: Weber-van Bosse 1913a.

Stations: 18, infrequent over coral cobbles, CR-592.

Repent, lax habit; branches 125-200 μ in diameter, somewhat constricted at their bases; surface cells ca. 20 μ in diameter, 30 μ long, other up to 80 μ long. Additional structures could not be seen clearly in cross sections.

Laurencia spinulifera Kütz.

Earlier records: Weber-van Bosse 1913a.

Laurencia sp. cf. L. nidifica J. Ag.; Yamada 1931: 202; Cribb 1958: 168, pl. 5, fig. 12; pl. 6, fig. 1-3.

Stations: 1, infrequent over various coral substrates, CR-346; 1a, drift, CR-397; 8, CR-487; 17, frequent over reef flat, CR-574; 17a, abundant over coral bottom in 0.3-0.7 m depths, CR-581; 29, on reef flat near "Porolithon" ridge, CR-784.

Branches ca. 450-750 μ in diameter; low matted entangled habit; with some lenticular thickening in a few specimens; tetraspores 60-100 μ in diameter.

Laurencia sp. cf. L. obtusa (Huds.) Lamx. var. ?; Yamada 1931: 222, pl. 16, figs. a-c; pl. 17, figs. a-c; Cribb 1958: 173, pl. 9, fig. 3.

Stations: 29, matted growth on reef flat near "Porolithon" ridge, CR-781.

Seemingly a member of the Cartilagineae; short stubby habit with branches to 3 mm in diameter, somewhat compressed in places, with tuberculate-like branchlets. See also L. corymbosa, L. parvipapillata & L. paniculata.

Liagora sp.

Stations: 29, frequent at edge of coral reef in 0.1-0.3 m depths, CR-779.

Possibly dwarfed L. ceranoides or L. rugosa.

Lithophyllum kaiseri Heydrich; Foslie 1907: 104.

Earlier records: Reinbold 1907.

Lithophyllum simulans Foslie

Earlier records: Reinbold 1907

cf. Lophosiphonia villum (J. Ag.) Setch. & Gardn.

Stations: 4, on Cymodocea stems, CR-432.

Main axis 50-60 μ in diameter; four pericentral cells 100-125 μ long; branches mostly simple but with some secondary branching, ca. 60 μ in diameter; branch pericentral cells ca 75 μ long; nonseptate rhizoids arising in many cases in middle of axis cells, irregularly placed in other cases; rhizoids do not seem to have a cross wall between themselves and main axis cells.

Neogoniolithon myriocarpum (Fosl.) Setch. & Mason; Dawson 1954: 428, fig. 39b.

Earlier records: Reinbold 1907 (as Goniolithon myriocarpon Foslie).

Peyssonelia calcea Heydrich; Weber-van Bosse 1921: 277, fig. 94; Dawson 1954: 425, fig. 37a.

Stations: 28, infrequent on coral reef in 1.3-2.3 m depths, CR-733.

Yellow-brown in color with very thick calcification.

Peyssonelia sp.

Stations: 22, infrequent on coral rocks, CR-646.

Large incrusting thalli but loosely adhering with septated rhizoids; thallus ca. 100-125 μ thick, seemingly closest to P. squammaria (Gmel.) Dcne. Sterile fragments.

Polysiphonia sp. cf. P. ferulacea Suhringar

Stations: 7, on Cymodocea stem, CR-493a.

Main axis ca. 175-200 μ in diameter with 4 pericentral cells; cells 150-170 μ long; tetraspores 45-50 μ in diameter

Porolithon oncodes (Heydrich) Foslie; Taylor 1950: 125, pls. 9, 61, 62 & 63.

Earlier records: Reinbold 1907 (as Lithophyllum onkodes Heydr.)

Spyridia filamentosa (Wulf.) Harvey

Stations: 7, CR-493; 12, CR-517; 13, CR-529; 21, CR-626; 23, CR-690; 10, CR-793: most as epiphytes on Cymodocea.

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