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CONTRIBUTION TO THE STUDY OF THE MARINE ALGAE OF CEYLON

by

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INTRODUCTION

DESCRIPTIONS of Ceylon marine algae are scattered through a range of scientific publications which are not readily available to students and research workers in Ceylon. There are few detailed studies in Algal taxonomy and the general distribution of algae in Ceylon has not been studied thoroughly. Some work has been done by foreign phycologists each of whom was in the island for a few months only and experienced difficulty in collecting specimens from different parts of Ceylon.

Harvey was the pioneer in the study of marine algae in Ceylon. He visited Ceylon in 1853 and collected marine algae from Trincomalee, Weligama and Galle. His collections are preserved at Trinity College, Dublin, and duplicates at the Royal Riksmuseum in Stockholm, and in the algal herbarium of J. G. Agardh in Lund. Collections of marine algae were also made by W. Ferguson and are preserved in the British Museum. Duplicates of his collection are also kept in the herbarium at Peradeniya and in the herbarium of J. G. Agardh in Lund. Professor Nils Svedelius stayed in Ceylon for about ten months and studied the algal vegetation at Galle. The results of his investigations were published in two important papers, The *Caulerpas* of Ceylon (Ecological and Systematic studies of the Ceylon species of *Caulerpa* in Ceylon Marine Biological Reports, No. 4, 1906) and the algal vegetation in the coral reef at Galle (Ueber die Algenvegetation eines Ceylonischen Korallenriffes mit besonderer Rücksicht auf ihre Periodizitat in Botaniska Studier tillagnade F. R. Kjellman den 4, November 1906, Uppsala). Miss Ethel S. Barton (Mrs. A. Gepp) has published a small list of marine algae, collected by Professor Herdman in 1902, in the Ceylon Pearl Oyster Fisheries, 1903, Supplementary Reports, No. II. Some specimens included in her list were from the diaries of Professors Herdman and Hornell. This is not a critical list for she accepted records without any attempts to eliminate incorrect identifications. The most important paper so far published is that of Dr. Boergesen who visited India in 1927-28, and made a short trip to Ceylon. He examined the coral reefs at Galle and collected algae near Galle. In 1936 he published a paper on " Some Marine Algae From Ceylon " in The Ceylon Journal of Science, Section A, Botany, Volume 12, Part 2. His collections were made from a small area from the southern coast of Ceylon and not from other parts of Ceylon, so that there were many algae from Ceylon not included in his list. Very few collections of algae from the north of Ceylon were made by phycologists who visited Ceylon.

In 1952 the Ministry of Industries and Fisheries, Ceylon became interested in the study of marine algae with the view to utilising those of economic importance. Accordingly the author was requested to carry out a systematic survey of the seaweed beds and seaweed resources of the Ceylon coast. For this purpose the coast of Ceylon was divided into the following sections, as suggested by Dr. C. C. John then Deputy Director of Fisheries, Ceylon :—

1. Jaffna peninsula coast and Jaffna lagoon.
2. Jaffna islands and adjoining seas.
3. The Gulf of Mannar including Pearl Banks.
4. Region between Kalpitiya and Ambalangoda.
5. Region between Ambalangoda and Hambantota.
6. East Coast, namely Mullaitivu and Trincomalee.

The survey was mostly confined to the inshore waters. However some algae were dredged in the off-shore waters during the pearl surveys

in March 1956 and 1958. The investigations reveal that there were many species of algae in the west coast of Ceylon, but very few in the east coast since this coast is made up of long sandy beaches and sheltered bays. The most common seaweeds found in Ceylon are the brown seaweeds belonging to the genus *Sargassum*. They grow on rocks and other solid objects, but are easily broken loose from the stratum of attachment during heavy monsoon seasons and are washed ashore. Some float about in the ocean in large quantities. Extensive beds of seaweeds are found in Jaffna, Palk Strait, Gulf of Mannar, Pearl Bank off Silvathurai and along the south-west coast of Ceylon extending from Ambalangoda to Galle. The extent of the beds and intensity of growth diminish progressively as we move from north to south along the west coast.

In the present contribution to the study of algae from Ceylon, I propose to enumerate all the species belonging to the Chlorophyceae, Phaephyceae and Rhodophyceae examined by me.

My collections are from all parts of Ceylon. However I am paying special attention to the algal flora of Jaffna and its surrounding islands as well as the algae that were dredged during the pearl surveys carried out in 1956 and 1958. The flora of the Jaffna peninsula and the surrounding islands are interesting in that specimens were collected from shallow lagoons, tide pool rocks, and sandy pockets as well as the coast exposed to the open sea.

Some of the species recorded earlier are now not recognised as specially distinct, some of the specific names used earlier are considered to be synonyms, while the names of some of the genera have been changed recently. The references to scientific literature are not restricted to original literature but also include general publications.

LOCALITIES

THE materials of the present work were collected from the places indicated below—

Northern Coast : Point Pedro, Kankesanturai, Keerimalai, Senthamkulam, Karainagar, Jaffna lagoon and the surrounding islands of Mundativu, Pungudutivu, Kayts and Delft.

Eastern Coast : Mullaitivu, Kuchchaveli, Trincomalee and Mutur Bay.

Southern Coast : Hambantota, Tangalle, Dondra Head, Matara and Weligama.

Western Coast : Pearl Banks in the Gulf of Mannar, Kalpitiya lagoon, Bambalapitiya, Colpetty, Wellawatte, Dehiwala, Mount Lavinia, Ambalangoda, Beruwala, Hikkaduwa and Galle.

REMARKS

IN the present Ceylon marine algal investigation I have examined 47 species of Chlorophyceae, 42 species of Phaeophyceae and 85 species of Rhodophyceae. This shows that the Rhodophyceae is by far the largest group in my collection. The total species of 174 belong to 35 families and 78 genera of which 8 families and 17 genera belong to the Chlorophyceae, 7 families and 18 genera to the Phaeophyceae, and 20 families and 43 genera to the Rhodophyceae. The largest family is the Rhodomelaceae which have 10 genera and 19 species. Then comes the Sargassaceae with 4 genera and 18 species, and the Dictyotaceae having 7 genera and 17 species. This is followed by the Gracilariaceae with 3 genera and 16 species.

Murray (1887) has included in his catalogue 223 species of Ceylon Algae of which 15 belong to the Cyanophyceae and fresh water algae. However some of the species recorded earlier are not recognised as specially distinct and some of the species recorded earlier are considered to be synonyms. Boergesen (1936) in his paper on "Some Marine Algae from Ceylon" has listed only 68 species of which 21 belong to the Chlorophyceae, 8 to the Phaeophyceae and 39 to the Rhodophyceae. His list included 27 species not included in Murray's list. As far as I am aware 261 species of marine algae excluding the Cyanophyceae and diatoms have been recorded for Ceylon by various algologists.

In the present paper there are 174 species of marine algae belonging to the Chlorophyceae, Phaeophyceae and Rhodophyceae. Of these 54 species have not been recorded in Ceylon before. These were composed of 10 species belonging to the Chlorophyceae, 11 to the Phaeophyceae and 34 to the Rhodophyceae. Most of these species were collected from places which are not easily accessible. Thus the Ceylon marine algal flora recorded up till now is 316.

As regards the distribution of marine algae in Ceylon most of the red algae are found growing in the southern and western parts of Ceylon where the coast is rocky and fringed with coral reef. These coasts, especially the reefs, present a different picture during the two different monsoons. During the south-west monsoon the sea is very rough and huge waves break on the edge of the reef and rocks. Due to the violent waves many algae are torn off and cast on the shores. Thus the algal vegetation along these coasts shows a series of floristic deviations and several species appear which are not found during the north-east monsoon. In the northern coast the shores are shallow with sandy beaches in most places, and Chlorophyceae are abundant. The northern coast is also rich in brown algae and *Sargassum* are found in large quantities here as well as in the Pearl Banks in the Gulf of Mannar. It is rather strange that very few algae are found in the north-east of Ceylon especially in Trincomalee where the rocks appear to be good places for algal growth. However, large quantities of *Gracilaria verrucosa* and *Hypnea Valentiae* are cast ashore in the eastern coast from August to September during the north-east monsoon. The monsoons play an important role in the algal vegetation of Ceylon and some of the algae found during the north-east monsoon disappear during the south-west monsoon and vice versa.

As regards the world distribution of Ceylon marine algae, several species are found in the algal flora of India, the Indian Malayan Archipelago, Mauritius and Japan. A complete list of the marine algae so far recorded and their distribution in India, Mauritius, Danish West Indies, Japan, Mediterranean Sea, Atlantic Ocean and Red Sea, are given in a separate table which follows. Most of the Japanese marine algae common to Ceylon are from the southern coast of Japan. A direct relation seems to exist between winds and the appearance of algae in the southern coast of Japan and the west coast of Ceylon.

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LIST OF THE SPECIES OF THE ALGAL FLORA OF CEYLON AND THE OUTLINE OF THEIR DISTRIBUTION

(The mark (*) indicates the plants examined by me, while the others were reported by other algologists but not examined by me. The mark (†) indicates that the plant is present in the region.)

Region / Name of Species	India	Mauritius	Danish West Indies	Japan	Mediterranean Sea	Atlantic Ocean	Red Sea
CHLOROPHYCEAE							
ULVALES							
**Ulva lactuca* L.	†	†	†	†			
**Ulva fasciata* Delile	†	†	†		†	†	
**Ulva reticulata* Forssk.	†			†			†
**Ulva rigida* Agardh						†	
**Ulva fenestrata* Post et Rupr.							
Ulva latissima L.	†	†					
**Enteromopha compressa* (L.) Grev.	†	†		†			
**Enteromorpha intestinalis* (L.) Link	†			†			
**Enteromorpha prolifera* (Mueller) J. Ag.	†	†		†	†		
Enteromorpha bulbosa (Suhr) Kuetz.							
Endoderme virde (Rk.) Lagerh.		†	†				
CLADOPHORALES							
**Rhizoclonium riparium* (Roth) Harvey							
Rhizoclonium kockianum Kuetz.	†	†	†				
Rhizoclonium fontinale Kuetz.							
Cladophora mauritiana Kuetz.							
Cladophora heteropsis Kuetz.							
Cladophora valonioides Sond.							
**Cladophora (aegagropila)* Sibogae Reinbold				†			
**Cladophora fascicularis* (Mert.) Kuetz.		†		†			
**Cladophora saracenia* Boergs.	†						
**Cladophora colabense* Boergs.	†						
Cladophora prolifera Kuetz.		†					
**Chaetomorpha antennia* Kuetz.	†	†	†	†		†	
**Chaetomopha aerea* (Dillw.) Kuetz.	†	†	†	†			
**Chaetomorpha crassa* (Ag.) Kuetz.	†		†	†			
Chaetomorpha implexa Kuetz.					†	†	
Chaetomorpha obscura Kjellman							
**Chaetomorpha indica* Kuetz.	†	†					
**Chaetomorpha brachiona* Harvey				†		†	
**Chaetomopha clavata* (Ag.) Kuetz	†						
**Chaetomorpha gracilis* Kuetz.		†	†	†	†		
SIPHONALES							
**Halimeda tuna* (Ell. & Sol.) Lamour.	†	†	†	†			
**Halimeda macroloba* Decaisne	†			†			†
**Halimeda gracilis* Harvey	†		†				
**Halimeda opuntia* (L.) Lamour.	†	†	†	†			†
Codium tenue Kuetz.	†	†		†			†
Codium ovale Zanard.							
**Codium adhaerens* (Cabr.) Agardh		†		†	†		†
**Codium geppei* Schmidt		†					
**Codium tomentosum* Stackhouse	†	†	†	†			
**Codium fragile* (Suring) Hariot				†			
**Codium repens* (Croun.) Vickers		†		†			
Codium coronatum Setchell	†	†					
**Bryopsis hypnoides* Lamour.		†		†			
Bryopsis plumosa Agardh	†	†	†	†			
**Bryopsis pennata* Lamour.	†						

Region / Name of Species	India	Mauritius	Danish West Indies	Japan	Mediterranean Sea	Atlantic Ocean	Red Sea
SIPHONALES (*contd.*)							
**Udotea flabellum* (Ell. & Sol.) Howe	†	†	†				
**Caulerpa crassifolia* (Ag.) J. Ag.	†	†	†				
**Caulerpa taxifolia* (Vahl) Agardh	†		†				
**Caulerpa sertularioides* (Gmelin) Howe	†	†	†			†	†
**Caulerpa cupressoides* (Vahl) Agardh	†	†	†			†	
**Caulerpa uvifera* (Turner) J. Ag.		†		†			
**Caulerpa peltata* (Turner) Lamour.	†	†	†	†			
**Caulerpa chemnitzia* (Esper) Lamour.	†					†	
**Caulerpa scalpeliformis* (Brown) Weber Van Bosse	†	†				†	
**Caulerpa Fergusonni* Murray	†						
Caulerpa macrophysa Sond.						†	
Caulerpa plumaris Forssk.	†	†				†	
Caulerpa verticillata J. Ag.	†		†				
Caulerpa Freycinetti C. Ag.	†	†	†			†	†
Caulerpa Lessonii Bory	†						
Caulerpa clavifera (Turn.) C. Ag.	†	†	†	†		†	†
Caulerpa corynephora Mont.	†						
Caulerpa laetevirens Mont.	†	†	†	†			†
Caulerpa dichotoma Svedelius							
Caulerpa nummularia (Harvey) Rke.	†	†		†			
Caulerpa imbricata Kjellm.	†						
Caulerpa parvula Svedelius	†						
C. longistipitata (W.V.B.)	†						
Caulerpa sedoides (R.Br.) C. Ag.	†		†				
Avrainvillea Rideyi A & E. S. Gepp		†					
Avrainvillea papuana Murr. et Boodle	†	†					
SIPHONOCLADALES							
Struvea anastomosans (Harvey) Piccone	†	†	†	†			
Valonia fastigiata Harvey		†					
**Valonia utricularis* (Roth) Ag.		†	†	†	†	†	
Boergesenia Forbesii (Harvey) Feldm.	†	†		†			
**Dictyospheria cavernosa* (Forssk.) Boergs.	†	†	†	†			
**Cladophoropsis membranacea* (Ag.) Boergs.			†				
**Ernodesmis verticillata* (Kuetz.) Boergs.		†	†				
**Valoniopsis pachynema* (Martens) Boergs.	†	†		†			
**Anadyomene stellata* (Wulfen) Ag.			†		†		
Microdictyon Agardhianum Dne.	†	†					
DASYCLADALES							
**Acetabularia crenulata* Lamour.			†				
Acetabularia mediterranea Lamour.							
PHAEOPHYCEAE							
Ectocarpales							
Ectocarpus columellaris Boergs.							
Ectocarpus ceylanicus Boergs.							
Ectocarpus arabicus Kuetz.	†	†					†
Ectocarpus indicus Sond.	†	†					
Ectocarpus macrocarpus Crouan.							
**Ectocarpus breviarticulatus* J. Ag.	†	†	†				
**Ralfsia ceylanica* Harvey							
SPHACELARIALES							
Sphacelaria furcigera Kuetz.	†	†	†	†			
CHORDARIALES							
Cladosiphon erythraeus J. Ag.		†					†

Region Name of Species	India	Mauri-tius	Danish West Indies	Japan	Medi-terranean Sea	Atlantic Ocean	Red Sea
DICTYOSIPHONALES							
**Rosenvingea intricata* (J. Ag.) Boergs.	†	†	†				
**Colpomenia sinuosa* (Roth) Derbes and Solier	†	†	†	†	†	†	
**Hydroclathrus clathratus* (Bory) Howe	†	†	†	†			
Asperococcus orientalis J. Ag.							
**Chnoospora fastigiata* J. Ag.	†	†				†	
DICTYOTALES							
**Dictyota dichotoma* (Huds.) Lamour.	†	†		†			
**Dictyota ciliata* J. Ag.			†				
**Dictyota Bartayresiana* Lamour.	†	†	†	†			
**Dictyota crenulata* J. Ag.			†				
**Dictyota indica* Sond.		†	†	†			
**Dictyota maxima* Zanardini	†			†			
**Dictyota atomaria* Hauck	†						
Dictyota acuminata Kuetz.							†
Dictyota fasciola Lamb.					†		
Dictyota ceylanica Kuetz.							
Spathoglossum Schroederi (J. Ag.)						†	
**Spathoglossum asperum* J. Ag.	†	†					
Glossophora Kunthi Ag.							
**Stoechospermum marginatum* (Ag.) Kuetz.	†						†
Stoechospermum patens Hering							†
Stoechospermum maculatum J. Ag.	†	†					
Stoechospermum Suhrii Kuetz.							
Pocockiella variegata (Lamouroux) Papenfuss	†	†	†	†			
**Stypopodium zonale* (Lamouroux) Papenfuss			†	†		†	
**Dictyopteris Woodwardii* (Brown) J. Ag.	†						
**Dictyopteris polypoides* (Desf.) Ag.					†	†	
**Dictyopteris delicatula* Lamour.	†					†	
**Padina pavonia* (L) Lamour.		†					
**Padina commersonii* Bory	†	†		†			
**Padina tetrastromatica* Hauck	†	†					
FUCALES							
**Cystoseira triquetra* (L) J. Ag.	†						†
Cystoseira articulata Ag.	†			†			
Cystophyllum muricatum (Turn) J. Ag.	†	†					
**Turbinaria conoides* Kuetz.	†			†			
**Turbinaria ornata* J. Ag.	†	†		†			
Sargassum asperifolium Her. et Mart.							†
**Sargassum tenerrimum* J. Ag.	†						
**Sargassum cinereum* J. Ag.							
**Sargassum carpophyllum* J. Ag.	†						
**Sargassum crassifolium* J. Ag.		†		†			
**Sargassum cristaefolium* Ag.	†	†		†			
**Sargassum ilicifolium* (Turn.) C. Ag.	†	†		†			†
**Sargassum Swartzii* (Turner) C. Ag.	†						
**Sargassum Wightii* (Grev.)	†						
**Sargassum cervicone* Grev.	†			†			
**Sargassum polycystum* C. Ag.	†			†			
**Sargassum piluliferum* (Turn) Ag.				†			
**Sargassum Binderi* Sond.	†						
**Sargassum virgatum* (Mert.) Ag.	†						
Sargassum tenui J. Ag.	†						
Sargassum marginatum J. Ag.	†						
Sargassum spinifex C. Ag.	†	†					
Sargassum squarrosum Greville	†						
Sargassum biserrula J. Ag.	†						
Sargassum microcystum J. Ag.	†	†					
Sargassum myriocystum J. Ag.							†

Region Name of Species	India	Mauritius	Danish West Indies	Japan	Mediterranean Sea	Atlantic Ocean	Red Sea
RHODOPHYCEAE							
BANGIALES							
**Erythorotrichia carnea* (Dillw.) J. Ag.	†	†	†	†			
Erythrocladia subintegra Rosenv.	†	—	†	†			
Porphyra umbilicalis (L.) J. Ag.				†			
**Porphyra suborbiculata* Kjellman							
NEMALIONALES							
Nemalion attenuatum J. Ag.							
**Dermonema Frappieri* (Mont. & Mill.). Boergs.	†	†		†			
**Liagora pulverulenta* Ag.	†	†	†			†	
Liagora viscida Forssk.				†	†	†	
Liagora orientalis J. Ag.				†			
**Acrochaetium sargassicola* Boergs.	†						
Chantransia Saviana (Menegh) Ardiss.		†					
Brachycladia marginata (Soland) Schm.							
**Scinaia furcellata* (Turner) Bivonia				†	†		
Scinaia carnosa Harvey							
**Actinotrichia fragilis* (Forssk.) Boergs.	†	†		†			
Galaxaura fragiliss Lamour.	†			†			†
**Galaxaura rugosa* (Sol.) Lamour.		†	†			†	
Galaxaura lapidescens (Soland.) Lamour.			†				
Galaxaura Pikeana Dickie		†					
Galaxaura obtusata Lamour.		†		†			
GELIDIALES							
Pterocladia lucida (R. Br.) J. Ag.							
**Gelidiella acerosa* (Forssk) Feld. and Hamel	†	†		†		†	
**Gelidium pusillum* (Stackhouse) Le Jolis	†	†		†			
**Gelidium heteroplatos* Boergs.	†	†					
**Gelidium micropterum* Kuetz.	†		†			†	
**Gelidiopsis repens* (Kuetz.) Schimitz	†			†			
**Gelidiopsis variabilis* (Grev.) Schmitz	†	†		†			
CRYPTOMENIALES							
Melobesia zonalis (Crouan) Fosl.							
Dermatolithon pustulatum (Lamour.) Fosl.				†	†	†	
Amphiroa fragilissima Lamour.	†	†	†	†			
**Amphiro rigida* Lamour.			†	†	†		
Amphiroa dilatata Lamour.				†			
Amphiroa anceps Lamour.	†						
Amphiroa Bowerbankii Harvey							
Amphiroa anastomosans Web. V. Bosse							
Cheilospermum cultratum (Harvey) Aresch.		†					
Cheilospermum pulchellum Harvey							
Arthocardia capensis Leach							
**Jania natelensis* Harvey var. tenuior Harvey				†			
Jania micrarthrodia Lamour.		†					
**Chondrococcus Hornemanni* (Mert.) Schmitz	†	†		†			
**Peyssonnelia rubra* (Greville) J. Ag.	†		†	†	†		
**Grateloupia felicina* (Wulf.) Ag.	†	†	†	†	†		
**Carpopeltis rigida* (Harv.) Schmitz	†			†			
**Halymenia polydactyle* Boergs.	†						
**Halymenia porphyroides* Boergs.	†						
**Halymenia dilatata* Zan.	†			†			
**Halymenia Durvillaei* Bory var. ceylanica Kuetz.				†			
Halymenia platycarpa Ag.							
Halymenia Floresia Clem.	†			†	†	†	
Halymenia imbricata (Dickie) Murray							
Halymenia amoeina Bory							
Halymenia dubia Bory							
**Polyopes ligulatus* (Harv.) Schmitz							
Corynomorpha prismatica J. Ag.	†						

Region / Name of Species	India	Mauritius	Danish West Indies	Japan	Mediterranean Sea	Atlantic Ocean	Red Sea
GIGARTINALES							
Agardhiella tenera (J. Ag.) Schmitz			†				†
Agardhiella robusta (Grev.) Boergs.	†	†					
Euryomma platycarpa (Harv.) Schmitz							
**Ahnfeltia furcellata* Okamura				†			
**Ahnfeltia plicata* (Hudson) Fries	†			†			
**Gymnogongrus pygmaeus* (Grev.) J. Ag.	†						
**Gymnogongrus glomeratus* J. Ag.		†					
Gymnogongrus vermicularis (Turn.) J. Ag.	—	†					
Phyllophora Maillardi Mont. et M.							
**Gigartina acicularis* J. Ag.	†	—	†			†	†
Kallymenia perforata J. Ag.	†		†				
**Meristotheca papulosa* (Mont) J. Ag.	†	†		†			†
**Ceratodictyon spongiosum* Zanardini				†			
**Hypnea pannosa* J. Ag.	†	†		†			
**Hypnea hamulosa* (Turn.) Mont.		†		†			†
**Hypnea cervicornis* J. Ag.			†	†		†	
**Hypnea musciformis* (Wulf.) Lamour.	†	†	†	†			
**Hypnea Valentiae* (Turn.) Mont.	†	†		†			
**Hypnea Saidana* Holmes							
**Hypnea cenomyce* J. Ag.				†			
Hypnea spinella Ag.							
**Gracilaria corticata* J. Ag.	†	†					†
**Gracilaria foliifera* (Forsskl.) Boergs.	†	†					
**Gracilaria crassa* (Harv.) J. Ag.	†	†		†			
**Gracilaria Fergusonii* J. Ag.	†						
**Gracilaria arcuata* Zan.	†	†		†			
**Gracilaria Textori* Suring.				†			
**Gracilaria cylindrica* Boergs.			†				
**Gracilaria gigas* Harvey				†			
**Gracilaria cacalia* (J. Ag.) Boergs.	†						†
**Gracilaria verrucosa* (Huds.) Papenfuss	†	†	†	†		†	
**Gracilaria edulis* (Gmel.) Silva	†	†		†			
**Gracilaria bursa-pastoris* (Gmel.) Silva			†	†			
**Gracilaria minor* (Sond.) comb. nova.	†		†	†			
Gracilaria multiparita Clem.					†	†	
Gracilaria obtusa J. Ag.	†			†			
**Sarcodia ceylanica* Harvey				†			
RHODYMENIALES							
Chrysymenia uvaria Wulf.	†		†			†	
Chrysymenia obovata Sond.		†					
**Champia parvula* (Ag.) Harvey	†		†	†	†	†	
Champia affinis, Hook et Harv.							
Campia ceylanica Harvey							
**Champia compressa* Harvey	†	†					
**Champia globulifera* Boergs.	†						
Gastroclonium opuntia (J. Ag.) Kuetz.							
CERAMIALES							
Callithamnion purpuriferum J. Ag.							
Griffithsia thyrsigera (Thwait.) Grun.							
Griffithsia opuntioides J. Ag.			†				
Griffithsia corallina J. Ag.				†	†	†	
**Centroceras clavulatum* (Ag.) Schmitz	†	†	†	†			
Carpoblepharis ceylanica Harvey							
Euptilota Fergusonii Cotton							
Crouania attenuata J. Ag.		†	†	†			
**Ceramium truncatum* Boergs.	†	†	†	†			
**Ceramium transversale* Collins and Harvey	†	†	†	†			
**Ceramium Taylorii* Dawson							
**Ceramium strictum* Grev. et Harvey	†	†	†				
**Ceramium fastigiatum* (Roth) Harvey			†				
Ceramium miniatum Suhr.	†						

Region / Name of Species	India	Mauritius	Danish West Indies	Japan	Mediterranean Sea	Atlantic Ocean	Red Sea
CERAMIALES (*contd.*)							
**Spridia insignis* J. Ag.	†						
**Spyridia filamentosa* (Wulf.) Harvey	†	†	†	†			
**Spyridia aculeata* (Schimp.) Kuetz.	†		†	†			
**Calaglossa Leprieurii* (Mont.) J. Ag.	†	†	†	†		†	
Nitophyllum unciniatum (Turn.) J. Ag.							
Nitophyllum marginale Harvey	†						
Claudea multifida Harvey		†					
Vanvoorstia spectabilis Harvey	†	†		†			
Vanvoorstia coccinea Harvey							
Dasya stuposa J. Ag.							
Dasya Hussoniana Mont.							†
Dasya villosa Harvey		†		†			
**Dasya naccarioides* Harvey							
Bryothamnion Seaforthii Kuetz.			†				
Martensia fragilis Harvey	†						
Rhodomela crassiculis Harvey							
Dictyurus purpurascens Bory	†	†					
Heterosiphonia struthiopenna J. Ag.							
Lopocladia Lallemandi (Mont.) Schmitz	†			†			†
**Laurenci · heteroclada* Harvey				†			
**Laurencia intermedia* Yamada				†			
**Laurencia obtusa* (Huds.) Lamour.	†	†	†	†			
**Laurencia paniculata* (Agardh) J. Ag.	†			†			
**Laurencia platyclada* Boergs.	†						
**Laurencia ceylanica* J. Ag.	†			†			
**Laurencia Poitei* (Lamour.) Howe			†	†			
Laurencia papillosa (Forssk.) Grev.	†	†	†	†			
Laurencia perforata (Bory) Mont.		†		†			
Laurencia hybrida J. Ag.				†	†	†	
Laurencia concinna Mont.				†			
Laurencia Brongniartii J. Ag.				†			
Laurencia fastigiata Mont.				†	†		
**Roschera glomerulata* (Ag.) Web. V. Bosse	†	†		†			
**Bryocladia Thwaitessi* Harvey	†						
**Chondria dasyphylla* (Woodw.) Ag.	†	†	†	†			
**Herposiphonia tenella* (Ag.) Naegel.	†	†	†	†			
**Herposiphonia secunda* (Ag.) Naegel.	†	†	†	†	†	†	
Murrayella periclados (Ag.) Schmitz.	†	†	†				
**Bostrychia tenella* (Vahl.) J. Ag.	†	†	†	†		†	
**Acanthophora delile* Lamour.	†				†		†
Acanthophora dendroides Harvey	†						
**Acanthophora spicifera* (Vahl) Boergs.	†	†	†				
**Leveillea jungermannioides* (Mart. et Her.) Harv.		†					†
**Neurymenia fraxinifolia* (*Mert.*) J. Ag.	†			†			
Ophiocladus simpliciusculus (Crouan) Falkenberg					†	†	
Polysiphonia utricularis Zanard.							†
**Polysiphonia mollis* Hook. et Harv.		†					
Polysiphonia corymbosa J. Ag.	†	†					
Polysiphonia ferulacea Suhr.	†	†	†	†		†	
Polysiphonia rigidula Kuetz.							
Tolypiocladia glomerulata (Ag.) Schmitz.							
Haloplegma preissi Sond.		†					
Ptilota Fergusonii Grun.							

	Ceylon	India	Mauritius	Dan. West Ind.	Japan	Mediter. Sea	Atlantic Ocean	Red Sea
Chlorophyceae	84	51	45	32	32	8	14	9
Phaeophyceae	65	41	25	11	19	3	6	8
Phodophyceae	166	79	59	39	76	16	20	11
Total	315	171	129	82	127	27	40	28

LIST OF MARINE ALGAE NEW TO CEYLON

CHLOROPHYCEAE

1. *Enteromorpha interstinalis* (L.) Link
2. *Enteromorpha prolifera* (Mueller) J. Agardh
3. *Rhizoclonium riparium* (Roth) Harvey
4. *Cladophora* (*aegagropila*) *Sibogae* Reinbold
5. *Cladophora fascicularis* (Mert.) Kuetz.
6. *Cladophora saracenia* Boergesen
7. *Cladophora colabense* Boergesen
8. *Chaetomorpha gracilis* Kuetz.
9. *Cladophoropsis membrancea* (Ag.) Boergesen
10. *Ernodesmis verticillata* (Kuetz.) Boergesen

PHAEOPHYCEAE

11. *Ectocarpus breviarticulatus* J. Agardh
12. *Rosenvingea intricata* (J. Ag.) Boergesen
13. *Dictyota ciliata* J. Agardh
14. *Dictyota bartayresiana* Lamour.
15. *Dictyota indica* Sond.
16. *Dictyota maxima* Zanardini
17. *Dictyota atomaria* Hauck
18. *Dictyopteris Woodwardii* (Brown) J. Agardh
19. *Pocockiella variegata* (Lamour.) Papenfuss
20. *Sargassum Swartzii* (Turner) Agardh
21. *Sargassum virgatum* (Mert.) Agardh

RHODOPHYCEAE

22. *Acrochaetium sargassicola* Boergesen
23. *Actinotrichia fragilis* (Forssk.) Boergesen
24. *Gelidium pusillum* (Stackhouse) Le Jollis
25. *Gelidium heteroplatos* Boergesen
26. *Gelidiella acerosa* (Forssk.) Feld. and Hamel
27. *Halymenia polydactyle* Boergesen
28. *Halymenia porphyroides* Boergesen
29. *Ahnfeltia furcellata* Okamura
30. *Ceratodictyon spongiosum* Zanardini
31. *Hypnea cervicornis* J. Agardh
32. *Hypnea musciformis* (Wulf.) Lamour.
33. *Hypnea Valentiae* (Turn.) Mont.
34. *Hypnea saidana* Holmes
35. *Hypnea cenomyce* J. Agardh
36. *Gracilaria Fergusonii* Boergesen
37. *Gracilaria arcuata* Zan.
38. *Gracilaria Textori* Suring.
39. *Gracilaria cylindrica* Boergesen
40. *Gracilaria gigas* Harvey
41. *Gracilaria minor* (Sond.) comb. nova
42. *Champia globulifera* Boergesen
43. *Ceramium strictum* Grev. at Harvey
44. *Ceramium transversale* Collins and Harvey
45. *Ceramium Taylorii* Dawson
46. *Spyridia filamentosa* (Wulf.) Harvey
47. *Spyridia aculeata* (Schimp.) Kuetz.
48. *Laurencia intermedia* Yamada
49. *Laurencia paniculata* (Agardh) J. Ag.
50. *Laurencia platyclada* Boergesen
51. *Laurencia Poitei* (Lamour.) Howe
52. *Roschera glomerulata* (Ag.) Weber Van Bosse
53. *Herposiphonia tenella* (Ag.) Naegel.
54. *Chondria dasyphylla* (Woodw.) Agardh

DESCRIPTIONS OF SPECIES EXAMINED

DIVISION I. CHLOROPHYTA PASCHER

Class I. Chlorophyceae Kuetzing

ORDER I. ULVALES *BLACKMAN ET TANSLEY*

FAMILY I. ULVACEAE GREVILLE

1. *Ulva* Linnaeus

Key to the species of *Ulva*

1. Fronds narrow with reticulate tissue and profusely perforated ..... 1. *Ulva reticulata*

1. Fronds variously shaped 2

2. Cells square or nearly so in cross section ..... 2. *Ulva lactuca*

2. Cells distinctly vertical in cross section 3

3. Fronds broad in proportion to height 4

3. Fronds narrow in proportion to height ..... 5.

4. Fronds apparently regularly and abundantly perforated .....3.

Ulva fenesterata

4. Fronds with distinct short cylindrical stipe short ovate, plane usually cleft with no perforations ..... 4. *Ulva rigida*

5. Thallus divided into many narrow lobes with the margins irregularly dentate or sinuate ..... 5. *Ulva fasciata*

1. *Ulva reticulata* Forsk.

1775, Flora Aegypt-arab., p. 187 ; J. Agardh 1883 Till Algernes Systematic, 3. p. 166, Kuetz. 1856, Tab. Phycol. Vol. VI, pl. 29.

The specimen resembles Kuetzing's figure 1 a, but reticular tissue is slightly broader in the Ceylon specimen. In transverse section of thallus, cells almost square with thin cuticula ; thallus profusely perforated and 40–45μ thick. They were found entangled with other algae.

Distribution in Ceylon : Jaffna lagoon and Matara.

Geog. distribution : Indian Ocean, Japan, Australia, Red Sea and Pacific Coast of America.

2. *Ulva lactuca* Linnaeus

(Plate I, Fig. 3)

1753, Sp. Plant, Vol. 2, p. 1163 ; Thuret 1854, Note Syn. *Ulva lactuca* p. 24 ; Thuret and Bornet 1878, Etudes phyc. p. 5, pl. 2. 3 ; Collins 1909, Green algae p. 214, f. 75 ; Setchell and Gardner 1920, Mar. Alg. Pac. Coast, Chlorophyceae p. 265.

Fronds short, usually broader than long, blades more or less ovate, at times laciniate. Fronds attached from a disk from a broad and attenuate base, generally deeply and irregularly split, light to dark green in colour, delicate in texture, margins plane or ruffled, membrane 40–50μ thick usually 40μ, cells, in section nearly square with rounded angles or slightly elongated, chloroplasts cup shaped. Growing attached to rocks in the littoral region.

Distribution in Ceylon : Mullaitivu and Galle.

Geog. distribution : Indian Ocean, Alaska to Mexico.

3. *Ulva fenestrata* Post. et Rupr.

(Plate I, Fig. 2 ; Plate XXI, Fig. 1)

1840, III. Alg., p. 21, pl. 37 ; Setchell and Gardner 1920, Mar. Alg. Pac. Coast of N. America p. 267.

Fronds many free and expanded with small rounded or elongated openings with undulate edges, margins often wavy, membrane up to 65μ ; cells thick, in transverse section slightly vertically elongated, about 20μ high by 16μ broad in thicker sections. The characteristic feature is the presence of regular holes with undulate edges. Found growing on rocks on the littoral belts.

Distribution in Ceylon : Kankesanthurai and Mandativu.

Geog. distribution : Indian Ocean and Alaska to Puget Sound, Washington.

3——J. N. R 12429 (10/60)

4. *Ulva rigida* Agardh

1822, Sp. Vol. I, part 2, p. 410, *Ulva lactuca* var. rigida. Le Jollis Alg. Mar. Cherb., 1863, p. 38 ; Collins, Green Alg. of North America, 1909, p. 215 ; Setchell and Gardner, Chlorophyceae Part II, Mar. Alg. of N. America, 1920, p. 270 ; G. M. Smith, Mar. Alg. of Mont. Pen. California, 1944, p. 47.

Frond 5–8 cm. tall, dark-green, blades lanceolate or ovate lanceolate, firm and stiff with distinct stipe ; membrane 60–120*a* thick ; cells in cross section vertically elongated, 1·5 to 3 times the breadth, chloroplasts cup-shaped usually filling outer two thirds of cell. The specimens resemble *Ulva conglobata* Kjellm. and *Ulva fasciata* forma *caespitosa* Setchell in habit and structure, but in these two algae the cells are only slightly elongated, as such they may be referred to forms of *U. lactuca*. According to Setchell *Ulva rigida* is a rigid plant with deeply divided lobes, rather thick, and with cells vertically elongated in section. This specimen agrees with Setchell's description. Grows on rocks or epiphytic on other algae.

Distribution in Ceylon : Galle.

Geog. distribution : Atlantic Ocean, Alaska (Uyak Bay) to Baja California, (La Paz).

5. *Ulva fasciata* Delile

(Plate I, Fig. 1)

1813, Flora d'Egypte, Paris. p. 153, pl. LXIII, fig. 5 ; Harvey 1858, Nereis Boreali Americana, Part 3, Smithsonian Contrib. knowledge, Vol. X, p. 1858 ; Collins 1905–9 ; Green Algae of North America, p. 216.

Frond divided into more or less linear segments, margin smooth or undulate ; in cross section the two layers of cells separate somewhat at the margin, which is rounded with a small space between the rows. Thickness of membrane about 80*a*. Frond is similar to *U. lactuca* and *U. dactylifera*. It differs from *U. dactylifera* in being not much raffled in the margins of the frond and in the basal portion. Found attached to rocks in the littoral belt.

Distribution in Ceylon : Colombo to Galle.

Geog. distribution : Indian Ocean, Mediterranean Sea. Tropical Atlantic and Pacific Ocean.

2. *Enteromorpha* Link

Key to the species of *Enteromorpha*

1. Plants simple, infrequently or sparingly proliferous, cells in surface view 9–15μ .... 1. *Enteromorpha intestinalis*

1. Plants clearly branched.....2

2. Branches restricted towards base of the plant, irregularly placed .... 2. *Enteromorpha compressa*

2. Branches scattered, cells in younger parts always in longitudinal rows .... 3. *Enteromorpha prolifera*

1. *Enteromorpha intestinalis* (L.) Link

(Plate I, Figs. 4–6)

1820, Epistola, p. 5 ; J. Agardh, Till Alg. Syst. part 3, 1833, p. 131 ; Collins, Green Alg. of N. Amer. 1909, p. 204 ; Setchell and Gardner, 1920, Mar. Alg. of N. Amer. p. 252, *Ulva intestinalis*, Linnaeus, Flo. Suec., Ed. II, 1755, p. 418.

Frond simple, with a few branches similar to the main frond at the base ; occasionally a few proliferations, sometimes compressed and contorted. Cells in surface view 10–16μ in diameter, thickness of membrane varies 20–50μ thick. Cells in transverse section vertically rounded oblong, about 13–18μ deep. They grow attached to stones and shells.

Distribution in Ceylon : Keerimalai and Kankesanthurai.

Geog. distribution : Widely distributed.

2. *Enteromorpha compressa* (L.) Greville

(Plate I, Fig. 7)

1830, Alg. Brit., p. 180, pl. 18 ; Collins, Green Algae of North Amer. p. 201 ; Mar. Alg. Vancouver Islands, 1913 p. 101 ; Setchell and Gardner, Alg. of North-west America, 1903, p. 221 ; Hauck, Meeresalgen p. 428 ; *Ulva compressa* Linnaeus, Fl. Suec., Ed. II, 1755, p. 433.

Plants generally grow gregariously, attached, bright to dark green in colour. Fronds tubular more or less compressed, sometimes constricted varying much in dimensions ; branches usually simple or spreading above, 2–10 mm. wide, in either case narrowed at the base, similar in

appearance to the main stem ; cells small 9–15μ diameter, rounded subquadrate and placed irregularly in adult plants, the walls not thickened. Membrane 15–20μ thick and cells vertically elongate in transverse section.

Distribution in Ceylon : Mandativu, Jaffna lagoon.

Geog. distribution : Europe, America, Tasmania, Indian Ocean and Pacific Ocean.

3. *Enteromorpha prolifera* (Mueller) J. Agardh

(Plate I, Fig. 8)

1833, Till Algernes Systematic, part 3, p. 129, pl. 4, f. 103–104 ; Collins, Green Alg. of N. Amer. 1909, p. 202, Setchell and Gardner 1920, Mar. Alg. of N. Amer. part II, p. 255 ; *Ulva prolifera*, Mueller in Fl. Dan., Vol. 5, fasc. 13, 1778, pl. 763, f. I.

Frond long usually tufted or compressed or tubular more or less abundantly proliferously branched, branches vary much in length and diameter. Cells 10–12μ thick in diameter, in the younger parts always arranged in longitudinal series, which may become less distinct in older parts, membrane 15–18μ thick but firm, and cells rounded, sub-angular 10–20μ in diameter. *E. prolifera* resembles *E. intestinalis* in habit, but they possess smaller cells than *E. intestinalis* and cells arranged in longitudinal rows in lower portion at least, and in the branches. Grows on rocks in sheltered areas.

Distribution in Ceylon : Kankesanthurai.

Geog. distribution : North America, Bermuda, Indian Ocean and Japan.

ORDER 2. **CLADOPHORALES** *FRITSCH*

FAMILY 1. **CLADOPHORACEÆ** (HASSALL) DE TONI

3. *Rhizoclonium* Kuetzing

1. Rhizoclonium riparium (Roth) Harvey

1849, Phyc. Brit. Vol. 2., pl. 23 ; Collins, 1909, Green Algae of North America p. 328 ; Smith, 1944, Marine Algae of Mont. Peninsula p. 63, pl. 7, fig. 4 ; Taylor, 1957, Marine Algae of North East Coast of North America, p. 81, pl. 1, fig. 3.

Plants growing in a felt-like layer spreading considerably on stones and rocks. The filaments are regularly with one to many tapering rhizoidal branches 20–30μ in diameter. The cells are cylindrical 20–30μ broad and with a length 1–5 times the breadth. My specimen has a close resemblance to variety *implexum* (Dillwyn) Rosenvinge (Phyc. Bor. Amer. 266 ; Rosenvinge 1893, Groenlands Havalger p. 915 as *R. implexum*) in that the branches are lacking.

Distribution in Ceylon : Jaffna lagoon.

Geog. distribution : North-eastern coast of North America.

4. *Chaetomorpha* Kuetzing

Key to the species of *Chaetomorpha*

1. Filaments horizontal and entangled.....2
1. Filaments erect 3
2. Cells of filaments less than 100μ .... 1. *Chaetomorpha gracilis*
2. Cells of filaments 125–175μ .... 2. *Chaetomorpha brachyona*
2. Cells of filaments 400–650μ ....3. *Chaetomorpha crassa*
3. Cells of filaments below 400μ, cells 1–2 diameters long ..... 4 *Chaetomorpha aerea*
3. Cells of filaments more than 400μ 4
4. Basal cell annulated ..... 5 *Chaetomorpha antennina*
4. Basal cell not annulated ..... 6 *Chaetomorpha clavata*

1. *Chaetomorpha gracilis* Kuetzing

1845, Phycologica germanica p. 203 ; 1849, Species Algarum p. 276 ; 1853, Tab. Phycol. Vol. 3. pl. 52, fig. 1 ; Hauck, Meeresalgen p. 440 ; Reinke 1889, Algen Flora der westlichen Ostsee Deutschen Anthelis p. 84 ; Boergesen 1913, Danish West Indies Vol. 1. p. 19.

Plants are filamentous and entangled among other algae or forms a spongy mass, light green in colour. Filaments are 30-70μ thick and the length of the cells about 2-4 times the diameter. The specimen has a close resemblance to *Chaetomorpha indica* Kuetzing but differs in that *Chaetomorpha indica* have cells whose length is usually half the breadth and only in

very rare cases about twice as long as broad, and the filaments are a little narrowed at the cross walls.

Distribution in Ceylon : Pungudutivu.

Geog. distribution : France, Singapore, Mediterranean Sea, Mauritius.

2. *Chaetomorpha brachyona* Harvey

(Plate III, Fig. 6)

1858, Ner. Bor. Americana, p. 84, Pl. XLVI. A ; *Rhizoclonium capillare* Vickers 1908, Phyc. Barb., Pl. XI, figs. 1–3.

Filaments are free, entangled, curved or twisted from a strata on the rocks or among other algae. Cells 125–175μ diameter, uniformly nearly as long as broad except after dividing.

Distribution in Ceylon : Delft and Senthamkulam.

Geog. distribution : West Indies, Mexico, Florida.

3. *Chaetomorpha crassa* (Ag.) Kuetz.

1845, Phycologica, p. 204, Tab. Phyc. Vol. III, tab. 59, Collins, 1909, Green Alg. of N. Amer., p. 324.

Filaments entangled, cells cylindrical, or slightly inflated ; cells as long as broad, sometimes cells twice as long as broad, 400–650μ thick usually entangled with other algae. In Ceylon large quantities are cast ashore in the northern part during the monsoons.

Distribution in Ceylon : Kankesanturai, Keerimalai, Senthamkulam, Karaitivu, Mullaitivu, Beruwala, Weligama, Galle.

Geog. distribution : Indian Ocean, Pacific Ocean, Mediterranean, and coast of Europe.

4. *Chaetomorpha aerea* (Dillw.) Kuetz.

(Plate I, Fig. 10)

1849, Sp. Alg., p. 379 ; Collins, 1909, Green Alg. of N. Amer. p. 324 ; *Conferva aerea* Dillwyn, Brit. Conf., 1809, pl. 80 ; Setchell and Gardner, 1920a, p. 200, pl. 14, fig. 9–12.

Plants gregarious, filaments erect, tall, dark green becoming yellow later, cylindrical throughout except at the base where it is tapering, attached to the substratum by rhizoids, which later coalesce into a solid disc. Cells 125–350μ diameter, cylindrical, almost spherical in the fertile segments, 1–2 diameter long, basal segments much longer, membrane hyaline, thick at times lamellate, chromatophores at first continuous finely fenestrate, zoospores formed at the upper cells of the filament. This specimen was collected from a rock pool in Galle.

Distribution in Ceylon : Galle and Jaffna Lagoon.

Geog. distribution : Throughout all the warm and temperate oceans, Mauritius and N. America.

5. *Chaetomorpha antennina* (Bory) Kuetz.

(Plate I, Figs. 11–13 ; Plate III, Fig. 4)

Kuetzing, Spec. Alg. 1849, p. 379 ; Vickers 1908, Phyc. Barbadensis p. 19, Pl. VIII ; Boergesen, Mar. Alg. Danish West Indies, Vol. I, 1913, p. 16, figs. 4–5 ; 1940, Marine Algae from Mauritius, Chlorophyceae, p. 37–39 ; *Conferva antennina* Bory, Voyage, 1804, p. 161 ; *Chaetomorpha media* (Ag.) Kuetz. 1849, Species Algarum, p. 380 ; Hauck, Meeresalgen von Puerto Rico (Engler's Bot. Jahrb., Vol. IX, 1888, p. 468) ; Boergesen Mar. Alg. from Canary islands, Chlorophyceae p. 37, figs. 9–10 ; 1936, Some Marine Algae from Ceylon p. 64.

For a long time it has been disputed whether *Chaetomorpha antennina* Bory described by Bory from Reunion was a different species of the plant found in the West Indies. Bory examined the type specimen of *Chaetomorpha anntennina* in Museum d'Naturelle and described the species from Reunion as a species other than that from the West Indies in his paper on " The Marine Algae of Peru " (1914, p. 37). He stated that the basal cell was shorter in *Chaetomorpha antennina* from West Indies than the type from Reunion. As a result Boergesen described the species from India and Ceylon as *Chaetomorpha media*. Later Boergesen examined a tube containing *Chaetomorpha* in Dr. Vanghan's collection and found that filaments contained basal cells up to a length of 15–16 mm. but these were not found in all the filaments and in some the length was 3–4 mm. only and various lengths occurred in the different elements. This was so in the Ceylon specimens examined by me. I received two types of this species from Ceylon. Those collected at Mount Lavinia were small reaching

a height of 2·5 cm. and grew in tufts. Although Boergesen described the basal cells as being about 6–7 mm. long in my specimen the basal cells varied from 2·5–6 mm. in length. The base of the basal cell varies from 180–200μ and the top from 500–550μ thick while the cells in the upper parts are about 500μ thick and 2–4 times the diameter in length. The specimens collected at Hambantota and Beruwela were 8–10 cm. long. According to Boergesen the basal cells had a length of 4·5 mm. but in my specimens they varied from 5–6 mm. The base of the basal cell was about 200μ thick and its thickest about 450μ broad. They were attached to the substratum by irregularly ramified rhizoids. The walls of the basal cell are thick and annular thickenings were found in both forms but not always.

Distribution in Ceylon : Mount Lavinia, Beruwela and Hambantota.

Geog. distribution : Mauritius, Reunion, West Indies, Atlantic and Pacific coast of Mexico, Africa.

6. *Chaetomorpha clavata* (Ag.) Kuetzing

(Plate III, Fig. 5)

1847, Bot. Zeit., Vol. 5 p. 166 ; Vickers 1908 Phyc. Barb. p. 17, Pl. VII ; Collins 1909 Green Alg. of N. Amer., Vol. 2, p. 323.

Filaments erect and stiff up to 60 cm. in height, cells at the base 500–750μ in diameter gradually increasing to 1 mm. at the tip, those of the upper part about as long as broad more or less moniliform, very much inflated cells 550–600μ thick. Found growing in the muddy bottom.

Distribution in Ceylon : Senthamkulam.

Geog. distribution : West Indies, Atlantic and Pacific coasts of Mexico, Indian, Pacific and Atlantic Ocean, Japan, Pacific coast of America.

5. *Cladophora* Kuetzing

Key to the species of *Cladophora*

1. Fronds in spherical clumps 2

1. Fronds in spherical clumps filaments main branch 120–150μ in diameter .....

1. *Cladophora* (*aegagropila*) Sibogae. Reinbold

2. Fronds reaching a height of 30 cm. or more, main filaments 200–250μ, ends of branches beset with long densely fasciculate ramuli 2–4 mm. long .....2. *Cladophora fascicularis.*

2. Fronds reaching a height of 15 cm. or less 3

3. Main filaments up to 100μ in diameter, ramuli short of 1–4 cells at the apex .....

3. *Cladophora colabense.*

3. Main filaments up to 200μ in diameter with irregular ramification ..... 4. *Cladophora saracenia.*

1. *Cladophora* (*aegagropila*) Sibogae Reinbold

(Plate II, Fig. 2)

Eininge neue Chlorophyc. aus dem Ind. Ozean (Nouva Notarasia Ser. 16) 1905, p. 146 ; in Weber Van Bosse's Liste des alg. du Siboga vol. I (1913) p. 81 ; Yamada, Phyto geogr. relations between Chlorophyceae of Marion Carol. and Marshall Isl. and those of Malayan Archipelago, Australia and Japan (proceed. of the three Pan Pacif. Sci. Congress 1926) p. 964 and 965 ; Okamura, on the marine algae from Kotosho Bull. of Biogeogr. Soc. of Japan, Vol. 2, 1931, p. 96.

The plant forms dark green cushions and the body is rigid. Lower part of plant dichotomous, upper part often branched, branch and branchlets often opposite or verticillate branching only on one side in the upper portion. All branches more or less compressed, rhizoids thread like and coiled often from the upper branch. Cells of main branch 120–150μ thick and those of branchlets 40–100μ thick. The length of cells 6–8 times as long as broad sometimes 2–4 times as long as broad. Cells of the upper frond are mostly constricted.

Distribution in Ceylon : Mandativu.

Geog. distribution : Indian Ocean, Japan, Caroline, Dongola.

2. *Cladophora fascicularis* (Mert.) Kuetz.

(Plate II, Fig. 1)

Kuetz. Phyc. gen. p. 268, 1843 ; Vickers 1908, Phyc. Barb. p. 18, Pl. XIII ; Collins Green Algae of North America, 1909, p. 265 ; V. J. Chapman, 1956, Marine Algae of New Zealand, Journ. of Linnean Society of London, Botany,

Vol. IV, No. 360 p. 447, fig. 98 ; *Conferva fascicularis* Montagne, 1839, p. 4, Pl. VII, fig. 1.

Plants filamentous reaching a length of 30 cm. or more. Main filaments and principal branches flexuous sparingly alternately branched. Ends of the branches are beset with long densely fasciculate ramuli about 2–4 mm. long. Main filaments 200–250μ sometimes up to 350μ in diameter. Cells 2–4 times as long as broad ; ramuli 70–130μ diameter, 1–5 times as long as broad. My specimens have a close resemblance to Vicker's fig. 1, Pl. XII in Phy. Barb. 1908.

Distribution in Ceylon : Senthamkulam, Jaffna.

Geog. distribution : N. Carolina, Bermuda, Florida, West Indies, Brazil, Peru, Red Sea, South Australia, Japan.

3. *Cladophora colabense* Boergesen

(Plate III, Fig. 3)

1935, List of Marine Algae from Bombay. Biologiske Meddelelser XII, 2. p. 19-22, figs. 9 and 10.

Plants growing in tufts reaching a height of about 15 cm. The main filament about 80-100μ gradually decreasing to about 50μ at the apex. The main filaments are divided at shorter or longer intervals and give off single or two branches from the same joint. Main filaments are 4-7 times the diameter. Long rows of ramuli are given off from the upper parts of the thallus. These are usually issued unilaterally, sometimes two opposite ramuli are given off. According to Boergesen the ramuli are short, consisting of 1-3 cells but in my specimen there are ramuli with 4 cells also. The ramuli are about 30μ thick with obtuse apices, usually protruding with thick walls.

Distribution in Ceylon : Delft island near Jaffna.

Geog. distribution : Indian Ocean.

4. *Cladophora Saracenia* Boergesen

(Plate. II, Figs. 3, 4)

1935, List of Marine Algae from Bombay, Biologiske Meddelelser XII, 2. p. 16-19, figs. 7 and 8.

Plants forming roundish tufts attaining a height of about 10 cm. They are composed of irregularly ramified and much interwoven filaments. The main filaments 100-200μ in diameter and length of the cells 5-10 times the diameter. Branches are given off irregularly on all sides and some of them become main filaments. The short branching systems are given off from each cell in the main branch or at small intervals. Branches are given off on one side or in opposite sides. The short shoots are richly branched and incurved. In most of the short shoots ramuli are given off unilaterally on the convex side of the incurved axis. Near the apex ramuli are 30-60μ thick. Apices are obtuse.

Distribution in Ceylon : Keerimalai.

Geog. distribution : Indian Ocean.

ORDER 3. **SIPHONALES** (*GREVILLE*) *OLTMANS*

FAMILY 1. **CODIACEAE** (TRAVIS) ZANARD.

6. *Codium* Stackhouse

Key to the species of *Codium*

1. Plants forming a continued expanded incrustation prostrate 2

1. Plants not forming a continuous expanded incrustation erect 3

2. Utricles 50-70μ sometimes 100μ diameter ..... 1. *Codium adhaerens*

2. Plant cylindrical, slender procumbent, creeping utricles broad and pyriform 50-200μ in diameter ..... 2. *Codium Geppei*

2. Utricles long narrow and clavate 175-225μ in diameter ..... 3. *Codium repens*

3. Plants cylindrical or compressed, utricle blunt or smooth ..... 4. *Codium tomentosum*

3. Plants cylindrical or compressed, all or part of utricle mucronate ..... 5. *Codium fragile*

1. *Codium adhaerens* (Cabr.) Agardh

(Plate IV, Fig. 1)

1822, Species Algarum Vol. I, part 2., p. 457 ; Harvey 1846-51, Phyc. Brit. Pl. XXXV. A ; Collins 1905 Green Alg. of N. Amer. p. 387.

Thallus expands forming an incrustation layer closely attached to the substratum, dark green with rounded lobes the filaments and utricles united by gelatine, utricles clavate 50-60μ, rarely 100μ diameter. This species was found attached to the rocks in the Jaffna lagoon.

Distribution in Ceylon : Jaffna lagoon, Mandativu.

Geog. distribution : Red Sea, Mauritius, Friendly Islands, Mediterranean, Bermuda, West Indies, British Channel, Asia.

2. *Codium Geppei* Schmidt

(Plate IV, Fig. 4 ; Plate XX, Fig. 2)

1923, Beitr. zur Kenntnis der Gattung *Codium* Stach., Bibl. Bot. Heft 91, p. 50. Bergesen 1936, Some Mar. Alg. from Ceylon, p. 68. *Codium divaricatum* Gepp. The Codiaceae of the Siboga Expedition 1911, p. 136, figs. 195-199.

Thallus procumbent, creeping attached by rhizoids here and there to the substratum. Thallus 1·5-3 mm. thick, divaricate-dichotomously branched, slender throughout. Utricles of external stratum obovatoclavate or elongated fusiform, small up to 360μ in length and 50-200μ broad thin walled all round. Plants found in exposed locality on rocks at Kankesanturai, usually washed ashore during the monsoons. It differs from *C. repens* in the shape of the peripheral utricles which are short broad and pyriform while those of *C. repens* are long narrow and clavate resembling *C. tomentosum*. It resembles *C. tenue* in slender habit, but differs from it in having more bushy ramifications, and the utricles are pyriform and only about half as wide as those of *C. tenue*. In *C. tenue* utricles are turbinate and truncate above.

Distribution in Ceylon : Kankesanturai, Point Pedro.

Geog. distribution : Malayan Archipelago, Celebes, Mauritius.

3. *Codium tomentosum* Stackhouse

(Plate IV, Fig. 2 ; Plate XX, Fig. 1)

1801, Ner. Brit. (fasc. 3), p. XXIV, pl. 7 ; Howe, Phyc. Studies V. 1911, p. 493, Collins, Green Algae, 1905, p. 388 ; Harvey Phyc. Brit. 1846 pl. 93 ; Vickers, 1908, Phyc. Barb. p. 22, pl. 26 ; Setchell and Gardner, 1920, p. 174.

Thallus erect dichotomously branched, branches terete but frequently flattened at dichotomies, utricles obovate clavate, 100-150μ rarely 200μ in diameter, about 5-8 times as long as the diameter, apex obtuse, unarmed, apical wall moderately thickened. Gametangia ovoid or oblong or fusiform 100-200μ diameter, 500-650μ long ; apex obtuse unarmed apical wall moderately thickened.

Distribution in Ceylon : Karaitivu and Pearl Bank in the Gulf of Mannar.

Geog. distribution : Europe, Asia, Africa, Morocco, and Algeria.

4. *Codium fragile* (Suring) Hariot

(Plate IV, Fig. 3)

1889, " Algues du Cap. Horn. p. 22" ; *Codium mucronatum*, J. Agardh. 1886, Till Algernes Syst. V, pp. 43-44 ; Setchell, W. A. and Gardner, N. L. Algae of N. W. America, 1903, p. 232.

Fronds with one to several cylindrical dichtomously branched erect shoots arising from a broad spongy disc, 25-40 cm. high, 2-10 mm. in diameter, glossy dark green, finely rugose on the surface or at times densely tomentose with long hyaline hairs, utricles cylindrical or more often clavate, 150-350μ occasionally 630μ in maximum diameter and 5-10 times as long as broad, provided at least when young with a more or less distinct spine like thickening, gametangia female fusiform 1-3 to each utricle, 250-450μ long and 75-150μ in diameter. The mucronate tip of the plant is subject to extreme variation.

Distribution in Ceylon : Kankesanturai.

Geog. distribution : Pacific Ocean, N. America, Japan, Indian Ocean.

5. *Codium repens* (Crouan) Vickers

(Plate IV, Fig. 5)

1908, Phyc. Barb. p. 23 Pl. XXXIX ; Collins, 1928, p. 308 Taylor, 1928, Marine Algae of Florida, p. 80 (Pl. 6, fig. 8, Pl. 7 fig. 8).

Plants prostrate, 6-12 cm. in diameter attached by rhizoidal filaments at intervals, irregular or dichotomously branched, branches entangled 3-5 mm. in diameter, flattened

dorsiventrally. Utricles clavate or cylindrical about 500-1000μ in length and 150-300μ in diameter, terminal walls hardly thickened.

Distribution in Ceylon : Galle.

Geog. distribution : Barbados, Guadelopa, N. America.

7. *Halimeda* Lamouroux

Key to species of *Halimeda*

A. Central filaments do not fuse, but communicate directly with one another by means of large open pits. Filaments at apex of node hang together under treatment 1

B. Central filaments fuse usually in pairs or in threes very rarely more at the apex of each joint. Filaments separate easily under treatment 2

1. Joints flat, broad, oval or rounded in outline ..... 1. *Halimeda macroloba.*

2. Filaments fuse in pairs, joints ribbed and much calcified 3

2. Filaments fuse in twos or threes, very rarely more branching di-or trichotomously in the next joint. Joints not ribbed, slightly calcified flat discoid or cuneate 4

3. Fusion incomplete limited to the surface of contact of lateral walls ....2 *Halimeda opuntia.*

3. Fusion complete, fused portion branches later trichotomously in the next joint .....3 *Halimeda gracilis.*

4. Lateral walls of adjacent peripheral cells in contact for a very small fraction of their length ..... 4. *Halimeda tuna.*

1. *Halimeda macroloba* Decaisne

(Plate XXI, Fig. 3)

1841, Arch. Museum, Hist. Nat. Paris p. 118 ; Harvey, 1863, Phyc. Austral. vol. Tab. 267 ; J. Ag. 1887, Till Algernes Systematic VIII, p. 81 ; Barton 1901. The genus *Halimeda*, p. 24, fig. 33-38.

Frond varies in length from 7-16 cm. not deeply calcified, branched in one plane. Root generally bulbous or little elongated. Joint immediately above root short, thick, subcylindrical and stalk–like ; other joints very irregular, subcylindrical and stalk–like ; other joints very irregular discoid, oval cuneate, or transversely rounded, not ribbed, thick, sessile, margin thick, entire or slightly crenualted. Largest joint about 20 mm. long, 29 mm. broad, about 1 mm. thick. Peripheral cells 30-37μ across. Surface view 75-150μ long held together by chalky matrix.

Distribution in Ceylon : Dondra Head.

Geog. distribution : Red Sea, Indian Ocean, Pacific Ocean Australia, Japan.

2. *Halimeda opuntia* (L.) Lamouroux

(Plate VI, Figs. 1, 2)

1812, Bull. Soc. Philom., Vol. III, p. 186 ; Harvey 1858, Ner Ber. Amer., part 3, p. 23, pl. XI. B ; Vickers 1908, Phyc. Bard. p. 25. Pl. XXXV ; Collins, 1905, Green Alg. of N. Amer. p. 300 ; Barton 1901. The genus *Halimeda*, Siboga Expeditie p. 19.

Plants 10–25 cm. high, but usually 10 cm. high, branched sparingly in one plane, to a thick tuft with numerous radiating branches ; segments much calcified very variable in shape, with intermediate forms, discoid, cordate, or trilobed, more or less ribbed. Size varies to about 12 mm. long 20 mm. broad, 75 mm. thick between the ribs. Peripheral cells 20–50μ diameter in surface view, rarely 60μ long.

forma *typica* an irregular mass ; much branched and in more than one plane, distinctly ribbed, so that the upper rounded margin appears waved ; lower margin forming more or less of a right angle with a midrib joints not overlapping each other.

forma *cordata* J. Ag. Joints rounded, prolonged below into two well marked auricles, which overlap the lower joint.

forma *triloba* Decne. Joints markedly trilobed, segments deeply cut, thick, ribs distinct. They grow attached to rocks in shallow waters.

Distribution in Ceylon : Matara, Mullaitivu, Gulf of Mannar.

Geog. distribution : Throughout warm seas and tropical seas, Japan and North America.

3. *Halimeda gracilis* Harvey

Ceylon Algae No. 72 ; Barton 1901, The Genus *Halimeda*, Siboga Expedities, p 22; Vickers, 1908, Phyc. Barb. p. 24, pl. XXXIV ; Collins 1905, Green Alg. of N. Amer. p. 399.

Fronds of varying length up to 40 cm.; much calcified below, upper segments less, branched in one plane ; segments cuneate to subcylindrical not ribbed, 1/2–9 mm. long, 1 1/2–11 mm. wide. Filaments of central strands fused in pairs, single fused filaments branching later trichotomously, peripheral utricles 30—45μ diameter.

Barton 1902, reported that the fruit of *H. gracilis* grow out in small, short tufts from the margin of a point, but these tufts are con fined to those points on the margin at which the branches of the central strands emerge, and these branches instead of continuing their course so as to form a new side joint, grow out into tufts of fruiting filaments. The distinguishing feature of *H. gracilis* lies in the complete fusion of the filaments of the central strands in pairs at the apex of a joint. When the fused portion is destined, however, to bear sporangiophores instead, it branches dichotomously to form two sporangiophores, from which the sporongia emerge all round and form a kind of raceme.

Distribution in Ceylon : Bentota, Galle, Gulf of Mannar.

Geog. distribution : Indian Ocean and Pacific Ocean.

4. *Halimeda tuna* (Ell. & Sol.) Lamouroux

1812, Bull. Soc. Philom., Vol. III, p. 186 ; Harvey 1858, Ner. Bor. Americana, part III, p. 25, pl. XL. A; Collins, Green Algae of N. Amer. 1905, p. 400 ; Barton, The genus *Halimeda*, Siboga Expedities, 1901, p. II.

Plants usually not exceeding 20 cm. in height, generally about 10 cm., moderately calcified, branching in one plane, root short more or less bulbous, a few of the lower segments thick, the others thin, about 1 mm. varying in form but mostly cuneate, not ribbed, margin entire. Peripheral utricles 30–70μ diameter adherent for one twenty fifth to one tenth of their length, rather easily separable ; utricles of subcortical layer 35–110μ diameter, sporangia globose to pyriform, 200–330μ diameter, deep green, borne on simple or forked pedicels, on margin or surface of the segments. They are attached to rocks in shallow waters. This specimen was dredged from a depth of about 10–15 fathoms in the Pearl Banks.

Distribution in Ceylon : Point Pedro, and in the Pearl Bank in the Gulf of Mannar.

Geog. distribution : Europe, N. America, Indian Ocean, Pacific Ocean, North Atlantic, West Indies, Brazil and Japan.

8. *Udotea* Lamouroux

1. *Udotea flabellum* (Ell. and Sol.) Howe

(Plate XX, Fig. 2)

1904, Notes on Bahaman algae, Bull. Torr. Bot. Club, Vol. XXXI, p. 93 ; Lamouroux, 1816, Hist. des polyp. p. 311, pl. XII, fig. I, Harvey 1858, Ner. Bor. Amer. p. 26 ; Gepp, 1911, The Codiaceae of the Shiboga expedition LXII, p. 131, figs. 26–28.

Frond up to 21 cm. high, usually calcified, root mass bulbous to elongate, stipe simple short 16 mm. long to 5 mm. thick, flattened above, variable in its outer appearance, flabellum entire and cuneate-reniform, suborbicular or divide into a few similar lobes, mostly irregularly lobed and with many proliferations, longitudinal filaments of the flabellum flexuous, rather distant their short ramuli forming a cortical layer, the whole covered with a stony incrustation. They occur in shallow lagoons growing on the muddy bottom. It is found also in deeper areas up to a depth of 40 meters growing on the loose sandy bottom.

Distribution in Ceylon : Jaffna lagoon.

Geog. distribution : Friendly Islands, Bermuda, West Indies, Red Sea, Indian Ocean, N. America.

FAMILY 2. **BRYOPSIDIACEAE** (BORY) DE TONI

9. *Bryopsis* Lamouroux

Key to species of *Bryopsis*

1. Erect branches pinnately branched..... 1. *Bryopsis pennata.*

2. Erect branches radially branched..... 2. *Bryopsis hypnoides*

1. *Bryopsis pennata* Lamouroux

(Plate V, Fig. 3)

1809, Journ. de Bot. p. 134 ; J. Agardh 1887, Till Algernes Systematik, VIII, p. 23.

Frond erect, 4–7 mm. high, with small pinnules, feather–like aranged in two rows on

the axis, pinnules leaf-like, linear lanceolate branches in two vertical rows, pinnules at the base equal in length to those at the centre.

Distribution in Ceylon : Matara and Tangalle.

Geog. distribution : West Indies, Malayan Archipelago.

2. *Bryopsis hypnoides* Lamouroux

Mem. sur trois nouv. generes, 1809 a, vol, 2, p. 135, pl. I, f. 2a, b ; Setchell and Gardner. Alg. of N. America 1903, p. 230 ; Harvey, Phyc. Brit. 1846, pl. 119 ; Vickers, Phyc. Barb. 1908, p. 30, pl. 53, f. 1. 2 ; Smith 1944, Mar. alg. of Mont. Pen. p. 73.

Frond more or less erect reaching a height up to 10 cm. It is pale green in colour. Branching of axis profuse and radial. Branches are irregularly placed, becoming progressively smaller with not much difference between the lesser branches and the slender branchlets. Long rhizoids are found at the bases of lower branches which grow downward along the axis.

Distribution in Ceylon : Galle, Keerimalai.

Geog. distribution : British Channel, West Indies, N. America, Japan, Bermuda.

FAMILY 3. CAULERPACEAE REICHENB

10. *Caulerpa* Lamouroux

Key to the species of *Caulerpa*

A. Pinnate fronds with linear lanceolate outline.....1.

1. Pinnules flat ..... 1. *Caulerpa crassifolia.*

1. Pinnules mucronate or tapering at tip.....2.

2. Pinnules narrow at base and tapering to tip..... 2. *Caulerpa taxifolia.*

2. Pinnules at the base somewhat larger than the curved and mucronate tip.....3. *Caulerpa sertularioides.*

B. Terete or compressed fronds.....3.

3. Frond beset with ramuli varying from long clavate to spherical pedicellate..... 4. *Caulerpa uvifera.*

3. Frond with short peltate ramuli..... 5. *Caulerpa peltata.*

3. Frond with long peltate ramuli..... 6. *Caulerpa cheminitzia.*

3. Frond more or less angled, with short ramuli of various forms, the lowest always rostriform.....7. *Caulerpa cupressoides.*

3. Frond large scarcely or clearly dented .....8. *Caulerpa scalpelliformis.*

C. Fronds vesicular.....4.

4. Vertical axes jointed.....9. *Caulerpa Fergusonii.*

The *Caulerpas* of Ceylon have been dealt very well by Nils Svedelius in his monograph on " Some Species of *Caulerpas* from Ceylon " in 1906. I have not come across any new species of *caulerpas*. However I shall list below the *caulerpas* I have collected with brief descriptions as the papers of Svedelius and Collins are not readily available now.

1. *Caulepa crassifolia* (Ag.) J. G. Agardh

1872, Till Algernes Systematik, I, p. 13 ; M. A. Howe, 1905 a, Phycological studies II., p. 574 ; Svedelius, l. c., p. III ; Boergesen, l. c. p. 130; Syn. *Caulerpa pinnata*, Weber V. Bosse 1898, Monographie des *Caulerpes*, p. 289 ; *Caulerpa Harveyana* Kuetzing, Tab. Phyc. VII, pl. III ; *Caulerpa Mexicana* Sond. Murray catalouge p. 38 ; Collins, 1905, Green Alg. of N. America. p. 413 ; Svedelius 1906, Ceylon species of *Caulerpa*, p. III.

Stolon creeping, naked, frond is on the top of a pedicel which is cylindrical or flattened, from creeping horizontal axis several assimilators are given off and these have very clear proliferations, sometimes petiole wanting, leaf linear lanceolate, pinnate up to 10 cm. high, pinnules opposite, plane, at the base as wide as at the middle, erect, top rounded or mucronate. Grows at a depth, varying from 1–10 meters.

Distribution of Ceylon : Weligama, Pearl Banks in the Gulf of Mannar especially from North Moderagam Paar.

Geog. distribution : Indian Ocean, Pacific Ocean, Atlantic Ocean from the West Indies to Canaries.

2. *Caulerpa taxifolia* (Vahl) Agardh

1822, Species Algarum, p. 435 ; Weber V. Bosse 1898, Monographie des *Caulerpas*. p. 292 ; Vickers, 1908, Phycologia Barbadensis p. 26, Pl. XLI ; Greville 1853, p. 2, Pl. I, fig. I ; Collins, species of *caulerpas*, p. 112.

This specimen was dredged from the Pearl Banks and it belongs to the forma *tristichophylla*, where some of the assimilators have the pinnules at the base clearly arranged in three rows. Several forms of *C. taxifolia* are found in the shores of Ceylon. In forma *typica* the pinnules are sickle-shaped, curved upwards, 4 to 5 times as long as the breadth of the main axis. Syn. *Caulerpa falcata*. Kuetzing Tab. Phyc. VII. 5. V. ; in forma *asplenoides* the pinnules are straight and not sickle-shaped, usually found in deep water. Forma *interrupta* is similar to forma *asplenoides* but smaller and in the main axis there are naked parts between the pinnules. This form is formed by repeated rhythmical point growth of the assimilator. In all forms of *C. taxifolia* stolons are naked and creeping, fronds in one plane lanceolate linear, simple or branched pinnate up to 30 cm. long, opposite, erect, contracted at the base, and long attenuate at the tip, ending in a short mucro, rachis slender. It is similar to *C. sertularioides* but have characteristic sickle-shaped narrow pinnules arranged oppositely and contracted at the base.

Distribution in Ceylon : Matara, Colombo, Pearl Banks.

Geog. distribution : Indian Ocean, West Indies, Flores, Australia, Sandwich Islands.

3. *Caulerpa sertularioides* (Gmelin) Howe

1905 a., Phycol. Studies II, p. 576 ; Vickers, 1908, Phycologia Barbadensis p. 26, Pl. XLII. ; C. *plumaris*, Harvey, 1858, Ner. Bor. Americana part III. p. 17, Weber V. Bosse 1898, p. 294, pl. XXIV, figs. 5-6 ; Collins 1905, Green Algae of N. Amer. p. 414 ; Svedelius, 1906, Ceylon species of *Caulerpa*, p. 114.

Stolons naked and creeping, frond simple or branched, pinnate, pinnules opposite or subopposite, cylindrical or compressed ; base slightly larger than the apex which is curved and mucronate, rachis narrow, distance between the pinnules equal to the width of the pinnule. The specimen I collected is forma *longiseta* with long narrow pinnules in close rows, 2-3 cm. high. They grow in tufts on exposed rocks in the littoral region at a depth varying from 1·5–15 meters. In forma *brevis* the leaves are 1 cm. in height.

Distribution in Ceylon : Tangalle, Weligama, Galle, Colombo, Jaffna, and Trincomalee.

Geog. distribution : Red Sea, Indian Ocean, Friendly Islands, and West Indies.

4. *Caulerpa uvifera* (Turner) J. Ag.

1872. *Caulerpa racemosa* var. *uvifera*., Till Algernes Syst. Vol. IX, p. 35 ; Collins 1905 420 ; Svedelius 1906, Ceylon species of *Caulerpas*. p. 121.

Frond delicate simple or branched with dense multiseriate ramuli, usually obovoid, sometimes globular. In Ceylon *C. uvifera* is restricted to the littoral region. It is found in large quantities on the beaches of Kankesanturai washed ashore from deep areas. It has a richly developed root system than *C. racemosa*. The root branches are longer and more branched into innumerable fine root branchlets and adhere firmly to sand and shell particles.

Distribution in Ceylon : Bentota, Kankesanturai and Jaffna Islands.

Geog. distribution : Indian Ocean, Pacific Ocean and Atlantic West Indies.

5. *Caulerpa peltata* (Turn.) Lamouroux.

1809, Memoire surles *Caulerpes*. Journ. de Bot. Vol. II, Pl. III, fig. 2; J. Agardh 1872, Till Algernes Syst. I, p. 37 ; Weber V Bosse, Monographie des *Caulerpes*, 1898, p. 372, Pl. XXXI, figs. 9-11, XXXII, fig. 8 ; Svedelius, 1906, Ceylon species of *Caulerpas*. p. 131.

Stolon naked, creeping, robust or delicate, branched. Axis long and horizontal giving rise to vertical axes with numerous peltate branchlets, with a diameter from 3-8 mm. usually 3 mm. The disc-shaped branchlets are more or less closely set, but they radiate in

all directions with the peltate assimilation discs directly obliquely upwards. Length of vertical axis varies from 1-10 cm.

Distribution in Ceylon: Kankesanturai, Galle.

Geog. distribution: Indian Ocean, Pacific Ocean, Red Sea, Canary Islands and West Indies.

6. *Caulerpa chemnitzia* (Esper) Lamouroux

J. G. Agardh, 1872, Till Algernes Systematic. I, p. 36; Syn. *C. racemosa* var. *Chemnitzia*, Weber V Bosse 1898, Monographie des *Caulerpes*. p. 370; Svedelius 1906, Ceylon species of *Caulerpas*. p. 129.

This species is a transition form between *C. racemosa* (Weber V Bosse) and *C. Peltata*. But it possess branchlets of different kinds. At the base of the vertical axis they are partly cylindrical, but gradually becomes broader and trumpet-shaped upwards. The branchlets vary very much, sometimes cylindrical basal axes are few, and sometimes trumpet-shaped axes begin very early and constitute major branchlets. In Ceylon species the branchlets developed higher are spherical. Characteristic features are that the first formed and earliest developed branches are cylindrical, but later form trumpet-shaped swellings with flattened points. Usually found in deeper waters.

Distribution in Ceylon: Kankesanturai, Mandativu and Jaffna lagoon.

Geog. distribution: Red Sea, Indian Ocean and Atlantic West Indies.

7. *Caulerpa cupressoides* (Vahl) Agardh

1822, Species Algarum, p. 411; Weber V. Bosse 1898, Mon. des *Caulerpes*, p. 323, Pls. XVII and XVIII; Harvey 1858. Ner. Bor. Amer. 3, p. 21, Pl. XXXIX. B; Collins, 1905, p. 416; Svedelius 1906, Ceylon species of *Caulerpa* p. 115.

Stolon thick and naked, frond cylindrical at the base, complanated above, branches regular erect or slightly spreading or irregular with dichotomous branching surrounded by ramuli which are di- tri- or multiseriate, sub navicular in form with broad base at the central axis and rounded dorsally; other ramuli ovoid conical, compressed or even cylindrical always mucronate. Characteristic feature is the great regularity with which the sub navicular pinnules are arranged in three rows along the main axis, occasionally branch with the pinnules in two rows.

Distribution in Ceylon: Kankesanturai and Pearl Bank in the Gulf of Mannar.

Geog. distribution: Indian Ocean, Pacific Ocean, Atlantic West Indies.

8. *Caulerpa scalpelliformis* (R. Brown) Weber V. Bosse

1898, Monographie des *Caulerpes*, p. 298, Svedelius 1906, Ceylon species of *Caulerpas*, p. 109.

forma *intermedia* Weber V. Bosse.

forma *denticulata* (decaisne) Weber V. Bosse.

These are large forms, attaining as much as 36 cm. in length. Fronds lanceolate-linear, lobes varying considerably in shape scarcely dentated and slightly curved upwards, mostly straight, sometimes short and broad, clearly dented but not curved. Some different forms occur in the same or different leaf from the same rhizome. Most Ceylon species belong to forma *intermedia*. Regenerating shoots is characteristic of this species. These arise from the points of the lobes or median part of the lamina. As described by Svedelius numerous veins run through the centre of the leaf and from them fan-shaped veinlets run into the lobes, but curve back again towards the main veins. This feature is characteristic of *C. scalpelliformis*.

Distribution in Ceylon: Pearl Banks in the Gulf of Mannar.

Geog. distribution: Indian Ocean, Mauritius, Australia, Tasmania, West coast of Africa.

9. *Caulerpa Fergusonii* Murray

1891, On new species of *Caulerpa*. Trans. of the Linn. Soc. of London, 2nd series, Vol. III, Botany, London, p. 212, pl. 53, fig. I; Weber V. Bosse, 1898, Monographie des *Caulerpes*, p. 398; Svedelius 1906, Ceylon Species of *Caulerpas*, p. 140; Okamura, 1914, Vol. III. Icones of Japanese Algae, p. 120, Pl. CXXX. figs. 10–14.

Stolon naked and cylindrical, vertical axis simple or alternately branched, compressed elongated up to 22 cm. in length, articulated in

short distance, with cuneate obovoid joints which measure 6–7 mm. in length, ramenta compressed, obovate, tapering below, rounded at apex, distichous and opposite, arising from every articulation, about 1 cm. long, 5–6 mm. broad. Substance juicy and membranaceous. The plant is closely related to *C. cactoides*.

Distribution in Ceylon : Pearl Banks in the Gulf of Mannar.

Geog. distribution : Indian Ocean, Japan.

ORDER I. SIPHONOCLADALES *(BLACKMAN AND TRANSLEY*

FAMILY 1. VALONIACÆ NAEG

SUB-FAMILY 1. VALONICEÆ BOERGESEN

11. *Valonia* Ginnani

1. *Valonia utricularis* Agardh

1822, Species Algarum I. p. 431 ; Kuetzing, Pl. LXXVI, fig. 2b-e, 1856 ; J. Agardh, Till Algernes Systematic VIII, p. 98 ; Collins, Green Algae of North America, 1909, p. 173.

Vescicle stout, cylindrical-clavate with similar proliferations, peripheral cells cut off at the apex of the vescicle grow out into branches which may give rise to tertiary ones. Lower parts of fronds decumbent or creeping among other algae, then erect up to 6 cm. high often forming dense tufts, membranes dark green. This specimen was dredged from a depth of 15 meters in the Pearl Banks. They were found attached to small soft stones.

Distribution in Ceylon : Pearl Banks in the Gulf of Mannar.

Geog. distribution : Mediterranean, Altantic coast of Spain and Madaira, Bermuda, Bahama Europe.

12. *Dictyosphaeria* Decaisne

1. *Dictyosphaeria cavernosa* (Forssk.) Boergesen

1932, A revision of Forsskal's algae mentioned in the Flora Aegypticaco-Arabica p. 2 ; Boergesen 1946, An additional list of species to part I., Chlorophyceae in some Marine Algae from Mauritius, Biol. Medd. Dan. Vid. Selsk. 20 No. 6, p. 13 ; *Dictyosphaeria favulosa* (C. Agardh) Decaisne, 1842, p. 32 ; Harvey 1958, Ner. Bor. Americana p. 50, Pl. XLIV B ; Vickers 1908, p. 21, Pl. XXII ; Taylor, 1928· Mar. Alg. of Florida, p. 72 (Plate 5, figs. 10, 25 ; Plate II, fig. 15).

The original species in *Ulva cavernosa* Forssk. C. Agardh mentioned *Ulva cavernosa* in Species Algarum p. 426 as "Miki ignota species" and in Systema Algarum p. 190 as a species enquirenda. The plants are 1–7 cm. in diameter consisting of a single layer of cells or irregularly more than one layer, increase by internal division of cells or by budding cells, 1–1 mm. in diameter attached laterally by tentaculae. The characteristic feature is the alternately placed hapteras along the margin of the cells.

Distribution in Ceylon : Pearl Banks in the Gulf of Mannar.

Geog. distribution : West Indies, Mexico, India, Pacific Ocean and Mauritius.

SUB-FAMILY 2. BOODLEAE BOERGESEN

13. *Cladophoropsis* Boergesen

1. *Cladophoropsis membranacea* (Ag.) Boergesen

(Plate III, Figs. 1, 2)

1905, Boergesen, contri. a la conn. du Genra *Siphonocladus* Sch. Acad. Roy. Sci. Denmark, p. 27 ; Vickers, 1908, Phyc. Barb. p. 20, Pl. XVII ; *Siponocladus membranaceous* (Ag.) Bornet in Joun. de Botanique, vol. I, 1887, p. 56.

Plants occur as aegagropila-like clumps lying loose in the bottom and cast ashore in large quantities. or epiphytic on other algae. They form cushions or clumps which consist of numerous filaments woven together and sometimes fixed by means of rhizoids or tenacula. Ramification of filaments irregular, branches grow from all sides, sometimes only from the apex of the filament, several branches grow out secundly, cells have a very different length, short and long cells mixed together. Diameter of filament from 150-280μ. Zoosporangia are formed in some cases and zoospores escape through a pore from a lateral outgrowth. Found in shallow waters and in exposed places.

Distribution in Ceylon : Keerimalai, Galle.

Geog. distribution : Indian Ocean, Florida, West Indies.

SUB-FAMILY 3. **SIPONOCLADEAE** BOERGESEN

14. *Ernodesmis* Boergesen

1. *Ernodesmis verticillata* (Kuetz.) Boergs.

(Plate V, Fig. 4)

1912, Some Chlorophyceae from Danish West Indies, II, Botanisk Tiddsskrift, 32. Bd. p. 259 ; *Valonia verticillata* Kuetz. Species Algarum, p. 508 ; Tab. Phycol., Vol. VI, p. 88, J. Agardh 1887, Till Algernes Systematik. VIII, p. 100 ; *Valonia aegagrophila elongata*, C. Agardh, 1822, Species algarum, p. 430.

Plant fixed to ground by irregularly ramified and septated rhizoids, annular corrugations occur in the lowermost stalk leaving a small passage open in the middle of the cell. Main stalk broadly rounded, sometimes little swollen, bears a bundle of branches 5-8 sometimes more, branches similar to mother cell, clavate, thinnest at the base. Branches separated by conclave wall from the mother cell. In the upper ends the branches again are ramified. Reproduction whole cell transformed into sporangium and perhaps zoospores escape through numerous pores formed in the cell wall. The plant occurs not only fixed but also in aegagropila-like clumps and are often cast ashore. In such cases the basal part is usually lacking.

Distribution in Ceylon : Moderagam Paar in the Pearl Bank.

Geog. distribution : West Indies, Brazil.

SUB-FAMILY 4. **ANADYOMENCEAE** BOERGESEN

15. *Valoniopsis* Boergesen

1. *Valoniopsis pachynema* (Martens) Boergs.

(Plate V, Figs. 1, 2)

1934, Some marine algae of the northern part of the Arabian Sea. pp. 10-17, figs. 1, 2 ; *Valonia confervoides* Harvey, Alg. Ceylon exsicc. no. 73 (nomen nudum) ; J. Agardh 1887, Till Algernes Systematik, p. 100, *Bryopsis pachynema* Martens, Die Preu. Exped. nach Ostasien, Bot. Theil. Die Tange von G. V. Martens, p. 24, pl. IV, fig. 2 (1866).

Thallus forms dense tufts on rocks about 3 cm. high. Thallus consists of cylindrical filaments about 600-700μ thick, filaments placed more or less vertically but many grow out in various directions between the upward directed filaments, thus felted cushions are formed. Cushions fastened to rocks by haptera. When division is going to take place in the filament the uppermost end becomes a little thicker and the internal cell content accumulates into a spherical mass which becomes separated by a wall and begins to grow in length. After development 2 cupola-like outgrowths appear just below the wall and become swollen with cell content and are separated by walls and soon begin to grow. Cells contain roundish or polygonal chromatophores with elongated corners forming a more or less coherent net. Numerous roundish nuclei are scattered under the chromatophores. The thick wall is composed of several layers.

Distribution in Ceylon : Galle, Dehiwala, Keerimalai, Mandativu.

Geog. distribution : West Indies, India, Australia and Malayan Archipelago.

16. *Anadyomene* Lamouroux

1. *Anadyomene stellata* (Wulfen) Agardh

(Plate V, Fig. 5)

1822, Species Algarum, Vol. I, p. 400 ; Vickers 1908, Phyc. Barb. p. 21, Pl. XXI ; *A. flabellata*, Harvey 1858, Ner. Bor. Americana, p. 49, Pl. XLIVA ; Collins, 1909, Green Alg. of N. America, p. 365, pl. 14, fig. 125.

Frond often tufted 5-6 cm. tall and 8-10 cm. diameter with foliaceous expanded lobes, usually ovate or reniform in outline. They consist of a single layer of cells, stipe produced into palmately arranged clavate cells forming similarly dividing series throughout the frond, interspaces filled with similar oblong cells issuing at right angles to the ribs and forming a continuous membrane. Frequently found in rock crevices or found on rocks and corals.

Distribution in Ceylon : Galle.

Geog. distribution : Mediterranean Sea, Bermuda, West Indies, and S. America

ORDER 5. **DASYCLADIALES** *FELDMANN*

FAMILY 1. **DASYCLADIACEAE** (ENDL.) CRAMER

17. *Acetabularia* Lamouroux

1. *Acetabularia crenulata* Lamouroux

(Plate V, Figs. 6, 7)

1816, Histoire des polypiers coralligenes flexibles vulgairement nommes zoophytes Caen. p. 249 ; Harvey 1858, Ner. Bor. Americana Vol. X., p. 40, Pl. XLII. A ; Vickers 1908, Phyc. Barb. p. 29, Pl. XLVIII ; *A. Caraibica* Kuetzing, Tab. Phy. Vol. 6 p. 33, Pl. XCIII.

Stipe up to 10 cm. high bearing a terminal disc, which is basin-shaped, rarely flat, strongly calcified, with crenulate margin 6-15 mm. diameter and often several other discs at various points or nodes showing the position of former discs, rays 30-80 firmly united, ends attached with a short cupola-like apiculum at the middle, corona superior, 15-26 mm. diameter with hair scars on each ray ; aplanospores 75-140μ in diameter, 300-500 in a sporangium. Stipes with a single disc. *A. crenulata* varies much as to the shape of the apex of the rays. Rounded and emerginate apices are common. But the Ceylon species are emarginate.

Distribution in Ceylon : Senthamkulam, Jaffna lagoon and Kankesanturai.

Geog. distribution : West Indies, North America.

DIVISION 2. PHAEOPHYTA PASCHER

Class 1. Phaeophyceae Hauck

Sub-class I. Phaeosporeae Thuret

ORDER I. **SPHACELARIALES** *OLTMANNS*

FAMILY I. **SPACELARIACEAE** REINKE (EMEND) OLTMANNS

1. *Sphacelaria Lyngbye*

1. *Sphacelaria furcigera* Kuetzing

(Plate VI, Figs. 4-7)

1855, Tab. Phyc. Vol. 5, p. 27, pl. 90 fig. 2 ; Reinke Beitr. zur vergal. Anat. u. Morph. de Sphacel. 1891, p. 14, pl. 4, figs. 5-13 ; Setchell and Gardner, Marine Algae, Gulf of California 1924, p. 724, Pl. 19, figs. 58 ; Sauvageau, Rem. sur les Sphac. 1901, p. 156.

Filaments erect and closely tufted up to 1 cm. in height and growth by an apical cell. The terminal hairs sometimes take the place of the terminal cell. Erect filaments 15-45μ in diameter, usually about 35μ in diameter below bearing slender propagulae whose stalk is attached to the axis by a poorly developed pedicellar joint. Stalk of propagulum about 800μ long and 25μ in diameter. It bears at its summit two slender spreading arms about 450μ in length, rays about 5-8 cells not attenuated towards the apices.

The present species were found epiphytic on *Sargassum*.

Distribution in Ceylon : Colpetty, Bambalapitiya, Mullaitivu and Pearl Banks in the Gulf of Mannar.

Geog. distribution : Florida, Gulf of California, Indian, Pacific and Atlantic Ocean and the European seas.

ORDER 2. **ECTOCARPALES** *SETCHELL AND GARDNER*

FAMILY I. **RALFSIACEAE** KJELLMAN

2. *Ralfsia* Berkeley

1. *Ralfsia Ceylanica* Harvey

Harvey No. 59.

This alga was not distributed with Harvey's numbered sets, but the British Museum possesses a specimen which had been sent to Professor Dickie from Trinity College Herbarium, by Ferguson. I have received a few fragments of this specimen from Mrs. Y. M. Butler, British Museum. On examining this species I find that it has a close resemblance to *R. pacifica* Hollenburg (mss) and to *R. verrucosa* Anderson of (Areschoug) J. Ag. in that the thallus has the upper surface with radial or concentric ridges. Cells of the lower portion of the thallus about 15μ broad and in upwardly curving rows with cells in the upper portion of thallus about 10μ broad and in vertical rows. The gametophytic plant with uniseriate gametangium about 80μ long. I have not examined the sporophytic plant. Since the material I have is rather scanty I am unable to decide whether this species is a synonym of *R. pacifica*

Hollen. and *R. verrucosa* Anderson. This can be decided if I happen to collect them in future in Ceylon.

Geog. distribution : Indian Ocean.

FAMILY 2. ECTOCARPACEAE HARVEY

3. *Ectocarpus* Lyngbye

1. *Ectocarpus breviarticulatus* J. Ag.

(Plate VI, Figs. 10, 11)

Nya algen fraan Mexico, Ofversigt af K. Vetensk-Akad. Forhandl. 1847, p. 17 ; Boergesen, Mar. Alg. Dan. West Indies Vol. I, p. 173, fig. 136, 1913 ; South Indian Marine Algal Flora II, 1937, p. 312 ; 1908 Phyc. Barb. Part II, Pl. 29.

Plants form law dense tufts about 2-4 cm. high attached to rocks or other suitable substratum and are composed of thin or thick rope-like spongy masses. The plants become twisted together by means of bent ramuli and numerous hooks spread along the main filaments. Sometimes thin rhizoids are found in place of ramuli or hooks. Growth takes place from any point of the filament. The filaments are about 25-30μ thick and the cells about 1-2 times their diameter in length, and contain discoid chromatophores. The plurilocular sporangia are barrel-shaped or somewhat ovoid and placed nearly at right angles to the filament and stalk consists of only a single cell. Length of sporangium about 60μ and 50-60μ broad. This species occurs on exposed places on rocks and stones.

Distribution in Ceylon : Mandativu.

Geog. distribution : Mexico, West Indies, Indian Ocean.

ORDER 3. DICTYOSIPHONALES *SETCHELL AND GARDNER*

FAMILY I. SCYTOSIPHONACEAE FOSILE

4. *Rosenvingea* Boergesen

1. *Rosenvingea intricata* (J. Ag.) Boergesen

(Plate VII, Fig. 6 ; Plate XXII. Fig. 2)

1914, Marine Algae of Danish West Indies p. 182 ; Vickers, 1908, Phyc. Barb. p. 41, Pl. 24 as *Striaria intricata ;* Taylor, 1928, Marine Algae of Florida, p. III, Pl. 15,. figs. 15-17 ; *Encoelium intricatum* Kuetz. Spec. Alg. p. 551, Tab. Phycol. Vol. 9, Tab. 5 ; *Hydroclathrus intricatus* Heydr., Beitr. Algenflora von Ostasien, p. 286. (Hedwigia 33, 1894.)

Plants form intricated tufts as irregularly ramified filaments felted together, tubular cylindrical or somewhat flattened alternately or subdichotomously, branching abundantly in the upper portion, branches 1-10 mm. in diameter, generally contorted, cells of the epidermis angular. In transverse section it consists of large cells near the cavity and small cells near the periphery. These cells are covered by a layer of polygonal cells about 14μ broad and each containing a disc-shaped, roundish or slightly lobed chromatophores. Sporangia somewhat clavate in shape about 15-16μ long and 5-7μ broad. Hairs are present in small groups or are scattered.

Distribution in Ceylon : Mandativu, Delft and Pearl Banks in the Gulf of Mannar.

Geog. distribution : Indian Ocean, Florida, Danish West Indies.

5. *Colpomenia* Derbes and Solier

1. *Colpomenia sinuosa* (Roth) Derbes and Solier

(Fig. 1)

1856, Memoire sur quelques points de la Physiologie des Algques, p. II, pl. 22, figs. 18-20 ; Boergesen, 1914, Marine Algae of Danish West Indies, p. 176, figs. 138 ; Setchell and Gardner, Algae of N. W. America, 1903, p. 242 ; Taylor, 1928, Marine Algae of Florida p. 110, Pl. 7. fig. I, Pl. 19, figs. 3 and 4 ; Smith, 1944, p. 128, Pl. 20. fig. I ; *Ulva sinuosa* Roth, 1806, Catalecta Botanica III, p. 327, tab. XII, fig. A ; *Encoelium sinuosum* Ag., Spec. Alg. I, p. 146 ; Systema p. 267 ; Kuetzing, Spec. Alg. p. 552 ; Tab. Phycol. Vol. IX, pl. 8.

Frond rounded and inflated hollow rigid and somewhat coriaceous, size and shape irregular and lobed, solitary or clustered, when large 3-5 cm. in diameter, wall 0·3 to 0·4 mm. in thickness, surface much convoluted folded at maturity with tubercles ; walls composed internally of nearly coloured cells up to 180μ in diameter with small cells 4-8μ in diameter towards the surface richly filled with chromatophores. Plurilocular sporangia in dense groups scattered all over the surface layer being formed round the depressed group of hairs.

Sporangia cylindrical or clavate and paraphyses obovate. This specimen was found growing in sheltered areas on the rocks.

Distribution in Ceylon : Galle.

Geog. distribution : India, Japan, England, Florida, widely distributed in the warm seas.

6. *Hydroclathrus* Bory

1. *Hydroclathrus clathratus* (Bory) Howe

1920, The Bahama Flora, New York, p. 590 ; Taylor, 1928, Marine Algae of Florida, p. II, Pl. 15. fig. 19, Pl. 19. fig. I ; 1942, Caribbean mar. Algae p. 52 ; *Hydroclathrus cancellatus* Bory " Dict. class VIII, p. 419 ", Harvey, 1852, p. 21, Pl. 9, figs. A, 1-3 ; Vickers, 1908, Phyc. Barb. p. 41, Pl. 23 ; Boergesen, 1914, Mar. Alg. Danish West Indies, p. 177 ; *Enocoelium clathratum* Ag. Spec. Alg. p. 412 ; *Asperococcus clathratus* J. Ag., Spec. Alg. I. p. 75.

Plants spreading forming expansions attached by under surface to rocks ; becoming hollow and irregularly lobed perforate and net-like. The young fronds are somewhat pressed together and have small rounded holes. The holes expand and grow wider as the membrane expands and new holes are also formed in the interspaces so that the whole membrane becomes bag-like and converted into a delicate lace network. The margin around each hole is involute. Walls about 0·2-0·3 mm. thick composed of a central parenchyma of cells 50-150μ in diameter with small ones towards the surface layer richly provided with chromatophores, hairs found in the depressions of the sori. These specimens were found in the lagoons at a depth of 1-2 meters.

Distribution in Ceylon : Kalpitiya lagoon and Jaffna lagoon.

Geog. distribution : Tropical seas, Netherlands, West Indies, Aruba Island, Venezuela, Florida, Japan.

FAMILY 2. **CHNOOSPORACEAE** SETCHELL AND GARDNER

7. *Chnoospora* J. Ag.

1. *Chnoospora fastigiata* J. Ag.

(Plate VI, Figs. 8, 9, Plate XXII, Fig. 1)

1847, Nya Alg., p. 7 ; Setchell and Gardner, Marine algae of California 1924, p. 728 ; *Chnoospora fastigata* var. *pacifica* J. Ag. Spec. Alg. 1848 p. 171-172 ; Barton, On the fruit of *Chnoospora fastigiata*, 1898a, p. 507 ; Taylor 1942, as *C. pacifica* in Caribbean Marine Algae p. 51.

Plants growing in gregarious tufts attaining a height of 10 cm. or more, attached to the substratum by means of a solid disc-shaped holdfast. They are dark brown in colour, wiry, and branching irregularly dichotomous, somewhat expanded below in forks 2–4 mm. wide 1 mm. thick in acute angles. They were found growing on rocks in the intertidal region. These specimens were found growing in abundance on rocks.

Distribution in Ceylon : Matara, Hambantota and Keerimalai.

Geog. distribution : Indian and Pacific Ocean, Japan, Australia, West Indies.

Sub-class 2. Aplanosporeae Setchell and Gardner

ORDER 4. **DICTYOTALES** *KJELLMAN*

FAMILY 1. **DICTYOTACEAE** HARVEY

8. *Stoechospermum* Kuetzing

1. *Stoechospermum marginatum* (Ag.) Kuetzing

(Plate VII, Fig. 7)

1843, Phycologia gener. p. 339 ; Spec. Alg. 1849, p. 560 ; Tab. Phyc. Vol. IX, tab. 40, fig. I ; *Zonaria marginata* Ag. Systema, p. 266 ; *Stoechospermum patens* J. Ag., Spec. Alg. Vol. I, p. 97 ; Kuetzing Tab. Phyc. Vol. IX, Pl. 40, fig. 2 ; Boergesen, 1932, Some Indian Green and Brown Algae, Ind. Bot. Soc. Vol. 9, p. 67, fig. 8.

Fronds grow in tufts reaching a height of 12 cm. or more. The base consists of irregularly ramified and bent decumbent branches woven together. They are attached to the substratum by means of numerous rhizoids. Spathulate outgrowths are given off from the decumbent branches and they generally grow upwards like erect parts of the thallus. Plants have marginal growth. In transverse section greater part consists of large parenchymatous cells in the middle covered by two layers of small cells. Large groups of hairs are scattered on both sides of the thallus. Tetrasporangia arranged in longitudinal rows with irregular outlines towards the margin. A great number of *Acrochaetium*

4——J. N. R 12429 (10/60)

and *Erythrotrichia* species were attached to both surfaces of the thallus. They were found growing on rocks.

Distribution in Ceylon : Colpetty, Mandativu.

Geog. distribution : India, Red Sea.

9. *Spathoglossum* Kuetzing

1. *Spathoglossum asperum* J. Ag.

1894, Analecta algologica Cont. I, p. 36 ; Boergessen 1935, List of Marine Algae from Bombay p. 35 ; Alg. Mauritius, II, 1941, p. 48.

Plants are bushy reaching a height of 10–30 cm. Thallus palmate, strap-shaped and divided in an irregular manner into numerous large and smaller lobes. They are elongate linear lanceolate tapering downwards into a more or less acute base and upwards with an acute or rounded apex. Other lobes become broadened out irregularly and are deeply cleft. Short spines are found along the margin of the lobes more densely on the lower part of the thallus. The surface of the thallus is smooth and surface cells seen from above are arranged in more or less distinct rows. They are quadratic about 30–40μ broad. Fructiferous organs scattered on the surface of the thallus. Plant greenish in colour.

Distribution in Ceylon : Delft.

Geog. distribution : Indian Ocean, Mauritius.

10. *Pocockiella* Papenfuss

1. *Pocockiella variegata* (Lamouroux) Papenfuss

(Plate VII, Fig. 9)

1943, American Journ. of Botany 30, p. 467, figs. 1–14 ; *Gymnosorus variegatus* J. Ag. 1894, Analecta Algologica Cont. I, p. 11 ; *Gymnosorus collaris* J. Ag., ibid ; *Zonaria variegata* Taylor 1928, p. 124, pl. 15, figs. 20 to 22, Pl. 17, fig. 4 ; *Aglaozonia canariensis* Setchell and Gardner, 1930, p. 147.

Plants crustaceous about 5–6 cm. tall attached by monoliform rhizoids on the under surface. Thallus cleft becoming triangular to sub-orbicular up to 4 cm. broad, blades light brown. They consist of a marginal row of apical cells which develop into a single layer of large central medullary cubical cells. Upper cortex of a single layer of small cells 8–14μ long and 10–12μ broad in surface view. Subcortical layer of larger cells, upper submedullary layer of thin cells of the same lateral dimensions. The number of subepidermal layers usually equal on both sides of the blade, marginal growing cells very large 40–45μ wide, the lower segments dividing less than the upper. The specimens were attached to the rocks in the sub-littoral region.

Distribution in Ceylon : Kankesanturai and Colpetty.

Geog. distribution : Mexico, Ecuador, Pacific and Indian Ocean, Japan.

11. *Stypopodium* Kuetzing

1. *Stypopodium Zonale* (Lamouroux) Papenfuss

(Plate VII, Fig. 8.)

1940, Notes on South African Marine Algae I, p. 205, Botanisca Notiser ; *Stypopodium lobatum* J. Ag. Analecta Cont. I, 1894, p. 20 ; *Zonaria lobata* J. Ag., C. Ag., 1824, Systema Algarum p. 265 ; J. Ag. 1848, Sp. I, p. 109, Till Algernes Syst. II, 1872, p. 46 ; Harvey, 1852, Ner. Bor. Amer. t. VII. C ; *Zonaria zonata* C. Ag. Syn. Alg. Scand. XX, 1817 ; *Zonaria zonalis* Howe in Britton Flora of Bermuda, p. 507, 1918 ; *Stypopodium fuliginosum* Kuetz, Tab. Phyc. IX, 1859, t. 63, f I ; *Spathoglossum multiparitum*, Tab. Phyc. IX, 1859, t. 50.

Thallus 10 cm. or more attached to the substratum by an irregular holdfast and rhizoids on the branches. Thallus cleft into segments which are narrowly cuneate to linear from slender stalk-like base, sometimes broadly triangular blades are arranged irregularly. Each medullary cell is covered by a layer composed of several epidermal cells. Paraphyses are absent in the sporangial sorus and sporangia bordering the hair zones and producing only 4 spores. Specimens were cast ashore during the monsoon.

Distribution in Ceylon : Mullaitivu.

Geog. distribution : West Indies, South Africa, Canaries, Bermuda, Florida, Brazil to Cape of Good Hope.

12. *Dictyopteris* Lamoroux

Key to the species of *Dictyopteris*

1. Margin of frond fringed with minute spine-like teeth.....1. *D. Woodwardii*
1. Margin entire 2
2. Plants small, irregularly dichotomous branching with broadly round sinuses..... 2. *D. delicatula*
2. Plants large, dichotomously branched with obtuse apex.....3 *D. polypoides*

1. *Dictyopteris Woodwardii* (Brown) J. Ag.

(Plate XXIII)

Spec. I, p. 116 ; Kuetzing, Tab. Phyc. Vol. IX, tab. 53, fig. 2 ; *Fucus woodwardii* Brown in Turner, Fuci tab. 158.

Plants of medium size attaining a height of 15–25 cm. Fronds repeatedly dichotomously branching with distinct midrib, flat about 0·6–0·7 cm. wide, membranaceous, margin fringed with spine-like teeth. Midrib passes through the whole frond but lower part stiff and black, growing pale gradually to the same colour as the frond. Surface is perforated all over on both sides with minute black scattered pores which give off short white jointed fibres, apices are bifid with short obtuse segments. The intermediate space between spines being circular, almost crenulate. The membrane at the base usually worn away by the attrition of the waves, and the midrib is naked and has the appearance of a stipe. It is pale olive green in colour and light brownish grass green on drying. The specimens were cast ashore.

Distribution in Ceylon : Point Pedro and Kankesanturai.

Geog. distribution : Australia, China.

2. *Dictyopteris delicatula* Lamouroux

1809 in Journ. Philom. No. 20, tab. 6 fig. B ; Vickers 1908, Phyc. Barb. p. 35, Pl. 3 ; Boergesen 1914, Marine Algae of Danish West Indies p. 216, figs. 166–167 ; *Neurocarpus delicatulus* (Lam.) Kuetz, Taylor, Marine Algae of Florida p. 121, Pl. 17, fig. 7 and Pl. 19, fig. 6 ; Setchell and Gardner, Mar. Alg. of the Rev. islands, 1930, p. 149.

Plants of small size or indefinitely spreading, generally entangled among other algae attached to the substratum by means of rhizoids. Thallus dichotomously or irregularly branched with broadly round sinuses, when in contact they are united by rhizoids. Branches 0·5–2 mm. wide, margin nearly entire. The thallus consists of two layers of cells except the midrib and inconspicuous marginal ribs. Hairs present on one side of the thallus placed in roundish or oval groups and occur on both sides of the midrib. Sori in single rows on both sides of the midrib. This specimen was dredged from a depth of 5–7 fathoms.

Distribution in Ceylon : Pearl Banks in the Gulf of Mannar.

Geog. distribution : Florida, Bermuda, West Indies, Brazil, Mexico and the Malayan Archipelago.

3. *Dictyopteris polypodioides* (Desf.) Ag.

1820 as *Haliseris polypoides* Ag. Sp. I, p. 142, 1824, Syst. p. 262 ; Grev. 1830 Alg., Brit. t. XIX ; J. Ag. 1848, Sp. I, p. 117 ; Kuetz, 1843, Phyc. gener. p. 340, t. 23 ; 1849, Sp. p. 261, 1859 Tab. Phyc. IX, t. 53, f. I, Ardiss, 1883, Phyc. Med. I, p. 488 ; *Dictyopteris elongata* et *D. polypodioides* Lamouroux 1809, in Desv. Journ. II, p. 421 ; Lamouroux, 1805, Diss. p. 32, t. 24, f. 1–2.

Fronds arising from the base and attaining a height of 20 cm. or more. Lamina 0·5–1 cm. in width, several times dichotomously branched, margin entire, apex obtuse with distinct midrib, surface dotted with tufts of white filaments issuing from minute pores. Sporangia linear oblong forming a linear series on each side of the midrib. Ovate sporangia solitary or scattered over the frond or aggregated forming oblong spots. The specimens were dredged from a depth of 10 meters.

Distribution in Ceylon : Pearl Banks in the Gulf of Mannar.

Geog. distribution : Mediterranean, Atlantic, Southern Ocean (Tasmania), Britain.

13. *Padina* Adanson

Key to the species of *Padina*

1. Thallus with alternating arrangement of rows of hairs and rows of tetrasporangia found just above the rows of hairs ..... 1. *P. commersonii*

1. Fructiferous organs found on both sides of a row of hairs.....2

2. Fructiferous organs developed at every other row of hairs only.....2
P. pavonia

2. Fructiferous organs developed along each row of hairs.....3. *P. tetrastromatica*

1. *Padina commersonii* Bory

(Plate VII, Figs. 1–3 ; Plate XXV)

1828, Voyage de la Coquille p. 114 ; J. Agardh, Spec. Alg., Vol. I, p. 113 ; Till Algernes Systematik, V. p. 119 ; Hauck in Hedwigia 1887, p. 42 and p. 44 ; Weber Van Bosse A, Liste des Algues. d. Siboga Part I, p. 178, fig. 51 ; Boergesen 1930, Some Indian Brown and Green Algae, Journ. Bot. Soc. Vol. IX, Nos. 2 and 3, p. 170 ; 1936, Some Marine Algae from Ceylon, Cey. Jour. of Sci. Vol. II, p. 77.

Plants erect in several clusters arising from the base. Rows of hairs and rows of tetrasporangia are alternately arranged. Tetrasporangia are found just above the rows of hairs and indusium is absent. Thallus is composed of a layer of smaller cells above and a layer of bigger cells below. In older parts, the bigger cells become gradually divided by transverse walls into two cells. Thus thallus is composed of three layers of cells. They were found growing on rocks.

Distribution in Ceylon : Kankesanturai, Keerimalai.

Geog. distribution : Mauritius, India, Tonga Islands, Malayan Archipelago, Australia.

2. *Padina pavonia* (L) Lamour.

(Plate XXVI, Fig. 2)

Dict. class d' hist. nat. XII, p. 589 ; Gaill. Dict. e' hist. nat. LIII, p. 371 ; Greville, 1830, Algae Britanniaceae p. 62. Tab. 10, Lamour, Essai, p. 57, *Zonaria pavonia* Ag. Sp. Alg. V. I. 1820, p. 125 ; Syst. Alg. 1824, p. 263.

Fronds kidney-shaped almost sessile, subentire or deeply lobed, usually pulverulent on one or both sides, the margins revolute, concentric lines numerous, several fronds arise from the base in erect tufts 5–12 cm. high, sometimes stipulate when young, width of lobes greater than the length. Each lobe 2·5 cm. or more in diameter. Entire frond marked with concentric zones, usually covered with white pulverulent substance ; margin revolute. Fructifications blackish ovate sporangia somewhat erect, each fixed to the base of its pellucid case. Usually yellowish or reddish olive in colour.

Distribution in Ceylon : Galle and Jaffna lagoon.

Geog. distribution : Throughout the warm seas.

3. *Padina tetrastromatica* Hauck

(Plate VII, Figs. 4, 5 ; Plate XXVI, Fig. 1)

1887, Ueber einige von J. M. Hilderbrandt im Rothen Meere und Indischen Ocean gesammelte Algen (Hedwigia p. 43) ; Weber Van Bosse, 1913, Algues du Siboga, I, p. 180 ; Boergesen 1930, Journ. Ind. Bot. Soc., Vol. IX; p. 172, fig. 10 and plate II, 1936, Ceylon Journ., of Science, Section A, Vol. XII, Part 2.

Plant erect in several clusters varying in size reaching a height of 12 cm. or more. The thallus often lobed and divided into narrow section which are 1–2 cm. broad. They are conspicuously zonate due to the rows of fructiferous organs. They are arranged on both sides of a narrow row of hairs. Hairs are usually seen only in the young thallus and in older parts rudimentary or absent. Fructiferous organs are developed along each row of hairs and indusium is absent. Rows of the fructiferous organs and the rows of hairs together are about 0·5 mm. broad and sterile part in between 2·5 mm. broad. In cross section thallus consists usually of two layers of cells and three layers of cells near the base. The thallus near the margin consisted of 4 layers of cells. Surface cells rectangular 40–50μ long and 20–25μ broad. The plant agrees with Boergesen's description of the Indian species but 4 layers of cells were seen occasionally but not in the whole thallus as described by Madame Weber (1913) or in the greater part of the thallus as described by Hauck.

Distribution in Ceylon : Galle and Jaffna.

Geog. distribution : Somaliland, Malayan Archipelago, India.

14. *Dictyota* Lamouroux

Key to the species of *Dictyota*

1. Thallus entire or somewhat proliferous 2
1. Thallus with teeth along the margins 3
2. Internodes less than 4 times longer than broad, upper dichotomies broad about 80 degrees.....1 *D. bartayresiana*
2. Internodes less than 4 times longer than broad, upper dichotomies narrower about 10–60 degrees 5
3. Thallus with crenulate margin.....2 *D. crenulata*
3. Thallus in which the margin is not crenulate 4
4. Thallus with subcylindrical teeth on the margin ..... 3 *D. ciliata*
4. Thallus with cuneate base broadening upwards with acute ciliate teeth on the margins of the lobes, basal thallus more than 1 cm. in width usually .....4 *D. atomaria*
4. Thallus in which the base is not cuneate and base usually less than 1 cm. margins provided sparingly with teeth ..... 5 *D. maxima*
5. Internodes 5 to 10 times as long as broad.....6
5. Internodes 15–20 times as long as broad 7
6. Plants larger, lower portion a little dark below, upper angles about 15 to 45 degrees.....6 *D. dichotoma*
7. Upper ends not ending in fibrillar tendrils.....7 *D. indica*

1. *Dictyota Bartayresiana* Lamouroux

1809, Exposition des caracteres du genera *Dictycta* in Journ. de Bot., t. II p. 43 ; J. Ag. Sp. I, 1920, p. 94 ; Till Algernes Systematic V. 1882, p. 57 ; Kuetz. Tab. Phyc. IX, t. 16 ; Vickers, 1908, Phyc. Barb. Pl. XII, figs. 1–4, XIII, figs. 1–5 ; Boergesen, 1934, Mar. Alg. Arabian Sea. p. 29.

Plants generally low dense branches usually complanate entangled 2–6 mm. broad, dichotomies equal angle 45–90° usually about 80°, lobes ending in acute sometimes rounded summits. They form loose clumps attached to the substratum by means of rhizoids. Fructiferous organs solitary or scattered over the surface of the thallus. They occurred in shallow waters growing loose covering the sandy bottom.

Distribution in Ceylon : Delft island (Jaffna).

Geog. distribution : West Indies, Indian Ocean, Tropical Australia.

2. *Dictyota crenulata* J. Ag.

1847, Nya, Alg. p. 7 ; Setchell and Gardner 1924, Gulf of California, p. 730, pl. 18, figs. 50–51 ; *Dictyota bartayresiana* var. *denticulata* Kuetz. 1859, Tab. Phyc. Ix, p. 8 ; Vickers, 1908, Phyc. Barb. Pl. XVI ; Boergesen 1914, Danish West Indies p. 212, fig. 162–153 ; Dawson, 1944 Marine Algae, Gulf of California p. 228 ; Taylor, 1945, Pac. Mar. Algae p. 90, pl. 10, fig. 1.

Fronds small in size attached to a stupose base, dichotomously ramified with wide sinuses, segments linear, margins crenulate, dentate along the margin of lobe, narrow below, tongue-shaped above, areolae rectangular or quadrate, sori sparingly scattered over the whole surface of the segments, antheridia and oogonia occur on both sides of the frond. Found growing on rocks in sheltered areas.

Distribution in Ceylon : Galle.

Geog. distribution : Mexico, California, Pacific Ocean, West Indies.

3. *Dictyota ciliata* J. Ag.

(Plate XXIV)

1841, In Historiam Alg. Symbolae (Linnaea) XV, p. 5 ; Till Algernes Systematik V. 1882, p. 94 ; Analecta Algologica cont. I, p. 75 ; Harvey, 1852, Ner. Bor. Amer. p. 110, pl. VIIIA ; Kuetz, Tab. Phy. Vol. IX, pl. 27 ; Vickers 1908, Phyc. Barb. pl. XVII.

Plants reaching a height of about 15 cm. or more rather dichotomously branched, the angles narrow rounded to acute, usually flat and spirally twisted. Fronds 7–8 mm. below and 3–5 mm. in breadth above the forking, margins subentire to closely and rather ciliate. Proliferations along the margin are seen when growing in sheltered places. Tetrasporangia occur in scattered groups on both sides of the frond usually up to 10 sporangia in each sorus.

Oogonia are found in roundish sori and antheridia in larger oblong to oval sori on both sides of the thallus. Antheridia about 50μ long and 30–35μ broad. This species was found growing in muddy bottom in a sheltered area.

Distribution in Ceylon : Senthamkulam (Jaffna).

Geog. distribution : West Indies, Vera Cruz, Red Sea.

4. *Dictyota atomaria* Hauck

(Plate VII, Fig. 10)

1884, Cenni sopra alcune Alghe dell' oceano Indiano in atte de Museo Civico de Storia Naturale, Vol. VII ; Trieste p. 235 ; Boergesen, 1932 Some Indian Green and Brown Algae, p. 69, figs. 9–10, Plate 2.

Plants grow in tufts fixed to the substratum by means of rhizoids. They reach a height varying from 15–45 cm. Thallus dichotomously branched, segments 1–3 cm. in breadth. Erect parts of thallus have a cuneate base which gradually broaden upwards, acute ciliate teeth are round on the margin of the lobes, absent in young plants. Thallus is very thin and fragile, apex rounded. Proliferations may occur from the margins in the lower parts of the thallus. Fructiferous organs appear on both sides of the thallus giving a spotted appearance. Tetrasporangia solitary or a few together in small groups. Antheridia occur in irregularly shaped groups and margin surrounded by one or two rows of sterile colourless cells. Oogonia are formed in small groups scattered on the surface of the thallus. This alga is usually found growing on rocks.

Distribution in Ceylon : Mullaitivu and in the Pearl Banks in the Gulf of Mannar.

Geog. distribution : Indian Ocean and in Danish West Indies.

5. *Dictyota maxima* Zanardini

Phycearum indicarum pugillus, p. 4, No. 2. pl. I, figs. 1–3 ; Boergesen, 1935, List of Mar. Alg. from Bombay, p. 38 ; 1937, Contrib. S. Indian Marine Algal Flora II.

Fronds with dichotomously branching thallus divided into broad lobes. Margins are provided sparingly with small teeth. Fructiferous organs scattered on both sides of the thallus. Tetrasporangia spread over the whole surface This specimen was dredged from a depth of 10 meters.

Distribution in Ceylon : Pearl Banks in the Gulf of Mannar.

Geog. distribution : Sarawak, India.

6. *Dictyota dichotoma* (Huds.) Lamour.

(Plate VII, Fig. 11)

1809 in Desv. Journ. de Bot. II, p. 42 ; J. Agardh 1848, Spec. Gen. p. 92 ; Hauck, 1885, Die Meeresalgen Deut, undt Oest. p. 304, fig. 126, Yamada 1925, Stud. uber die Meeresalgen von der insel Formosa p. 253 ; Newton, 1931, Handbook of British Seaweeds, p. 212, fig. 134 ; Taylor, 1928, Marine Algae of Florida, p. 119, Plate 16, fig. 14.

Plants erect and regularly dichotomously branched, angle of dichotomy narrow usually 15 to 45°, ribbon-like thallus attaining a height of 20 cm. or more in robust species, attached to substratum by irregularly shaped rhizome-like holdfast. Growth by a single biconvex apical cell. In mature thallus small cells at surface contain many chromatophores and those in the median layer few chromatophores, erect unbranched hairs present in old thallus. Gametophytes are heterothallic and with sex organs borne in elliptical sori on both sides. Fertile male and female plants distinguished by deeper colour of oogonial sori. Antheridia in male sorus developed from artificial thallus cell. Oogonium also developed from superficial thallus 25–50 oogonia in oogonial sorus. Sporangia borne on both sides of the thallus in poorly developed sori not surrounded by involcures as in the case of antheridium. Found growing on rocks.

Distribution in Ceylon : Galle.

Geog. distribution : Mediterranean Sea, Atlantic Ocean, West Indies, Red Sea, India, Japan.

7. *Dictyota indica* Sond.

(Plate XVIII, Fig. 2)

In Kuetzing Tab. Phycol. vol. IX, p. 8. tab. 17, fig. I ; Vickers 1908, Phyc. Barb. pl. XVIII ; Boergesen, 1914, Marine Algae of Danish West Indies, p. 211.

Plants erect dichotomously branched attaining a height of 12 cm. or more, internodes 10 to 20 times as long as broad, branches 1–1·5 mm. broad not tapering. Thallus somewhat twisted. Tetrasporangia scattered in small groups of 2–3 and found on both sides of the fronds. Usually grows in deeper areas. Some specimens were dredged from a depth of 15 meters in the Pearl Banks.

Distribution in Ceylon : Keerimalai and Pearl Banks in the Gulf of Mannar.

Geog. distribution : Danish West Indies.

Sub-class 3. Cyclosporeae Areschoug

ORDER : FUCALES *KYLIN*

FAMILY : SARGASSACEAE DE TONI

15. *Cystophyllum* J. Ag.

1. *Cystophyllum muricatum* (Turner) J. Ag.

1848, Spec. Alg. I, p. 231 ; *Fucus muricatus* Turner, 1809, Hist. Fuc. 11, p. 108, tab. 112 ; Agardh, 1820 Sp. 66 ; 1824, Syst. p. 285 ; *Cystoseira trinodes* Ag., 1821, Icon. ined. t. 12 ; Sonder, 1838, pl. Preiss 11, p. 159 ; Boergesen, 1933, Indian brown and green algae Bombay 111, p. 9.

Frond of moderate size reaching a height of 30 cm. or more with a cylindrical filiform stem irregularly branched, branches similar gradually attenuated from the base to the apex. Upper parts of plants are usually destitute of leaves and beset with distichous branches. Leaves distichous, mostly alternate sessile linear about 3–4 cm. in length and 3–4 mm. in width with thin blackish midrib, apex rounded, margins entire, vescicles innate with the lesser branches, 1–3 in each with short intervening spaces, monoliform subglobose perforated with mucifluous spores internally hollow and empty. The whole plant is beset with minute horizontal processes resembling the rudiments of stems and branches which give the plant a muricated appearance. Fructification terminal consisting of cylindrical receptacles 3–4 mm. long, solitary with unequal surface and spotted with small pores under which are embedded spherical tubercles and containing a single sporangium. Plants brown and opaque turning brownish black on drying. These specimens were cast ashore during the monsoon.

Distribution in Ceylon : Mandativu.

Geog. distribution : Indian Ocean, New Holland, Japan, Malayan Archipelago.

16. *Cystoseira* C. Agardh

1. *Cystoseira triquetra* (L) J. Ag.

1851, Spec. Alg. I, p. 215 ; *Fucus triquetra* L. Mant. p. 312 ; Turner, 1808, Hist. Fuc. I, p. 72, tab. 34 ; *Hormophysa triquetra* (L) Kuetz. Phyc. gen. p. 359 ; 1860, Tab. Phyc. X, p. 22, t. 60, f. 1 ; Setchell and Gardner, 1935, Cal. Acad. of Sciences 4th series, vol. 21, p. 264 ; *Fucus articulatus* Forssk, 1775, Flora Aegyptiaco-Arabica, p. 191.

Plants reaching a height of 30 cm. or more about 3–4 mm. in breadth throughout, irregularly branched with a cylindrical midrib wedged with a triple membrane and with small teeth along the margins, branches arise from the angles of the frond. They grow in clusters, some simple, the others divided again. Vescicles immersed in the middle of the substance of the branches, smaller ones oblong and solitary separated from each other by a space so that the whole branch has a moniliform appearance. It is three-sided like the fronds, being winged with a triple membrane which is perforated with numerous mucifluous spores, internally hollow. These specimens were cast ashore along with other algae.

Distribution in Ceylon : Mandativu, Karativu, Hambantota.

Geog. distribution : Cape of Good Hope, Red Sea, Malayan Archipelago, Australia, Japan and America.

17. *Turbinaria* Lamouroux

Key to the species of *Turbinaria*

1. Branches at the base longer than those at the top giving a subpyramidal outline ..... 1. *T. ornata*

2. Branches at the base not longer than those at the top with densely crowded leaves growing together all round the stem ..... 2. *T. conoides*

1. *Turbinaria Ornata* J. Ag.

(Plate XXVII)

1851, Sp. I, p. 266; Barton 1891, Syst. struct. acct. of *Turbinaria*, p. 219; *Fucus turbinatus* var. *ornatus* Turner, 1808, vol. I, p. 50, t. 24 f.c.h.; *Turbinaria denudata* Bory 1828, Voy. Coquille p. 117 ex parte; *Turbinaria denudata* var. *Javanica* Mont. in Ann. Sc. Nat. Bot. 1857, p. 142.

Plants attached to the rocks by a thin expanded disc with numerous long incurved fibres. Numerous fronds arise from the base attaining a height of 50 cm. or more; provided with filiform flexuose undivided stem between cylindrical and compressed beset from the base to the apex with branches in an irregularly spiral direction. Branches are simple and those near the root are generally longer than those at the apex about 7–8 cm. or more, the rest shortening gradually so that the plant assumes a sub pyramidal outline. They are naked near the bases and rough with the remains of broken peduncles, while the rest are covered with vescicles and fruits. Vescicles are borne on compressed petioles, perforated with muscifluous spores, triangular, the angles acute, slightly winged and toothed or nearly obsolete, hollow within terminated by a triangular or cordate membrane, either flat or convex wider than the vescicles notched all round with minute teeth. Fructification growing on the branches and the petiole of the vescicles, clustered composed of cylindrical vescicles, simple or forked collected into a raceme. Plants olive-brown in colour becoming dark red when dried. The specimens were found growing on rocks.

Distribution in Ceylon: Galle and Mandativu.

Geog. distribution: Japan, Indian Ocean, Java, Philppines, Hawaii, Tahiti, Australia.

2. *Turbinaria conoides* Kuetzing

1860, Tab. Phyc. 10. p. 24, t. 66; Barton 1891, Syst, Struct. Account of Turbin. p. 217, t. 54, f. I; *Fucus turbinatus* L. Sp. Plant II, p. 1160; *Turbinaria denudata* Bory, 1928, Voy. Conquille par M. L. I, Duperrey pp. 97–136, *Turbinaria vulgaris* var. *conoides* J. Ag., 1851, Sp. I, p. 267.

Plants attached to substratum by means of rhizoids and reaching a height of about 25 cm. or more. The rhizoids are branched and densely crowded together. The stem is erect, cylindrical about 3 mm. thick with densely crowded leaves growing close together all round the stem except at the base giving a characteristic appearance of the species. The spaces between the leaves are filled with receptacles which are branched and grow in corymbose clusters from the base of the petiole. Branching is monopodial. Vescicles arise from the junction of the stalk and lamina. Plant hermophrodite and dioecious. Antheridia grow on comparatively thick branched hairs. In addition to branched hairs there are unbranched paraphyses in the fertile conceptacles. These specimens were detached from the rocks and were found floating in the lagoon.

Distribution in Ceylon: Delft, Pungudutivu.

Geog. distribution: Sumatra, Singapore, India.

18. *Sargassum* J. Ag.

Key to the species of *Eusargassum*

1. Inflorescences of mixed receptacles, vescicles and leaves 3
1. Inflorescences not of mixed receptacles vescicles and leaves 2
2. Receptacles denate or spiny (at least oogonial) 5
2. Receptacles neither dentate or spiny....13
3. Older receptacle prolonged into leaf or vescicle ..... 1. *S. carpophyllum*
3. Receptacles not prolonged into vescicles or leaf 4
4. Costa vanishing at or below the middle .....2. *S. cinerum*
4. Costa vanishing above the middle and gradually becoming indistinct ....3 *S. tenerrimum*
5. Inflorescene without sterile axis..... 6
5. Inflorescene with more or less sterile axis..... 7
6. Axes of the branches and branchlets flattened above, branchlets disposed in two rows from the margin..... 8
6. Axes of branches at least filiform in the branchlets above, branchlets given off in almost all directions, those below flattened and branchlets sub distichous 12

7. Receptacles loosely arranged and leaves smaller than *S. crassifolium*.....4. *S. ilicifolium*

8. Vescicles slightly ellipsoidal on flattened petioles longer than its own length.... 9

8. Vescicles slightly spherical in the adult plant on petiole about or equal to its own length 11

9. Vescicles borne in dense globose clusters in which the outer ones are longer than the inner ones giving a tassel-like appearance .....5. *S. Wightii*

9. Vescicles not having a tassel-like appearance..... 10

10. Leaves more than 5 mm. wide..... ..... 6. *S. Cervicone*

10. Leaves less than 5 mm. wide..... ..... 7. *S. Swartzii*

11. Leaves at base more than 4 cm. in length, sharply serrate, vescicles borne on leaf like petioles .....8 *S. Binderi*

12. Cryptostomata of the leaves mostly conspicuous, leaves not crisped..... ..... 9. *S. crassifolium*

12. Cryptostomata of the leaves inconspicuous or minute or nearly absent with leaves very much crisped..... .....10. *S. cristaefolium*

13. Inflorescenece squarrose-cymose without sterile axes 14

14. Axes of the branches filiform above, compressed below branches given off from submargins .....11. *S. virgatum*

15. Fertile branches axillary often with short receptacles, cylindrical in outline, vescicles usually densly crowded..... ..... 12. *S. polycystum*

The key given above is partly adopted from J. G. Agardh and partly from Setchell Hong Kong Sea weeds.

1. *Sargassum carpophyllum* J. Ag.

(Plate VIII, Figs. 4-7)

1848, Spec. Alg. I, p. 304, 1889, Spec. Sargas. Austral. p. 82 t. XXV. II ; Setchell and Gardner, 1935, Hong Kong Seaweeds, IV, p. 7, Pl. 3, 4, and 9, figs. 5 and 8.

The name of this species was first proposed by J. G. Agardh in 1848 (Spec. Alg. I, 304) for a group of plants and mentions one in his own herbarium as a technical type and it is probable that his illustration in Spec. Sargas. Austral. p. 82, Pl. XXV, II is from the Ceylon specimen rather than from Australia as my specimen has a close resemblance to it.

The plants I possess are very slender and beautiful. I am not able to see the holdfast but the stem of the primary branches are decompoundly composite, filiform and very slender 0·5-1 mm. in thickness smooth and rounded and are beset with similar branches about 3-4 cm. long. Basal leaves are 2-2·5 cm. long and 2 mm. wide sometimes 0·5 mm. broad while the upper leaves are 1·5 cm. long and about 1–2 mm. broad. Leaves serrate-dentate linear lanceolate attenuated to a blunt point with distinct midrib, with cryptostomata scattered on both sides of the midrib. The vescicles are spherical not apiculate borne on a short cylindrical pedicel about 2 mm. in length which is shorter than the length of the vescicle. Receptacles supra axillary, lanceoid cylindrical, furcate in young ones while in older outer fork prolonged into a leaflet or vescicle, the interior into a receptacular branch. These specimens were cast ashore.

Distribution in Ceylon : Delft island (Jaffna).

Geog. distribution : Australia, Hong Kong.

2. *Sargassum cinereum* J. Ag.

(Plate VIII, Figs. 1-3)

1848, Spec. Alg. p. 305 ; 1889, Spec. Sargas. Austral. p. 84 ; Grunow, 1915, Addit. ad. cog. Sarg. p. 378.

Plants of moderate size with thin and membranaceous leaves. Leaves at the base 15-18 mm. long and 4-5 mm. wide, rounded at the tips and cuneate at the base with costa disappearing above the middle of the leaf, leaves wavy and entire or sometimes with a few coarse teeth. Upper leaves smaller cuneate lanceolate 11-15 mm. long and 2-3 mm. broad, coarsely dentate partly curved or oblique Single row of cryptostomata scattered on both sides of the midrib. Vescicles about 4 mm.

long and 3-4 mm. broad. Receptacles single or 2-3 together in a short leafy and vesciculiferous raceme.

Distribution in Ceylon : Colpetty.

Geog. distribution : Hong Kong.

2. *Sargassum cinereum* J. Ag. var. *berberifolia* Grun.

1915, Grunow A, Additamenta ad cognitionem Sargassorum p. 378 ; Boergesen 1933, Journ. Bot. Soc. Vol. XII, No. I, p. 13.

The type locality of this specimen is Hong Kong. Grunow has divided the species *cinereum* into three varieties all of which were from Hong Kong. According to him all these varieties were oogonial short and cylindrical. My specimens seem to agree with the description of Grunow but the receptacles in my specimen are young and as such it is difficult to know whether it is oogonial or bisexual.

The stem of the main branch is glabrous and flattened about 2 mm. broad giving off scondary branches about 12-15 cm. on both sides of the stem. The stem of the secondary branches is less flattened and about 1 mm. broad. These branches are beset with short branchlets 2-4 cm. in length. The leaves are about 2·5 cm. long and 4-8 mm. broad, apex obtuse with cuneate base with a short stipe, midrib gradually disappearing below the apex with cryptostomata scattered on both sides of the midrib. Vescicles are spherical about 4 mm. long and 3 mm. broad borne on cylindrical pedicels usually shorter than itself though sometimes vescicles are smaller. Receptacles separate single or 2 or 3 in a short vesciculiferous raceme. In my specimens receptacles are immature. The specimens were cast ashore during the monsoons.

Distribution in Ceylon : Mandativu.

Geog. distribution : Indian Ocean.

3. *Sargassum tenerrimum* J. Ag.

(Plate VIII, Figs. 8-10)

1848, Spec. Alg. I p. 305 ; 1889, Spec-Sargas. Austral. p. 83 ; Kuetzing, Spec. Alg. p. 626 ; *Sargassum Campbellianum* Grev. Alg. Orient. in Ann. and Magaz. Nat. Hist. II, p. 274, pl. V and Trans. Bot. Soc. 3, pl. VII ; Grunow, Additamenta, 1915, p. 370 ; Boergesen, 1933, Ind. Bot. Soc. p. II, fig. 6 ; Setchell, 1935, Hong Kong Seaweeds p. 8, figs. 5 and 6.

The type locality of this specimen is Bombay. *Sargassum Campbellianum* Grev. has a close resemblance to this species. Agardh (1889) refers to *S. Campbellianum* as a synonym of his species in " Species Sargassorum Australica ". Grunow refers to Greville's species as a variety of Campbellianum Grev. of *Sargassum tenerrimum*. I have not seen the type specimens of *S. Campbellianum* but my specimens have a close resemblance to his figure.

Sargassum tenerrimum is a delicate plant which adheres to paper when dried. They attain a height of 50 cm. or more and are attached to the substratum by means of a disc-shaped holdfast. Stems cylindrical filiform about 0·5 mm. in width. The branches arising several together from the short basal primary axis. The branches are beset with similar branches, 3–8 cm. long. These branches are clothed with leaves and receptacles. Leaves are petiolate, the leaves in the lower part 4-5 cm. long and 5-6 mm. broad while the upper leaves vary from 1·5-2·5 cm. in length and 3-4 mm. broad. They are linear or linear lanceolate in shape with a narrow or rounded apex, thin and membranaceous, translucent with a narrow base which is cuneate. Margin dentato-serrate, presence of a distinct midrib with small cryptostomatas scattered on both sides. Occasionally a single sharp tooth is found at the base of the leaf. Vescicles are nearly spherical about 3-4 mm. long on pedicels shorter than themselves. Receptacles axillary, linear oblong or fusiform, undividing or forming lax racemes, margins serrate, the younger furcate on branch prolonged into a leaflet. Dredged from a depth of 15 meters.

Distribution in Ceylon : Pearl Bank in the Gulf of Mannar.

Geog. distribution : India, Australia, Hong Kong, Arabian Sea.

4. *Sargassum ilicifolium* (Turn) C. Ag. var. *conduplicatum* Grun.

(Plate X, Figs. 9-11)

Reinbold in Weber van Bosse's Liste alg. Siboga, Vol. I, 1913, p. 160 ; Grunow, Additam.

ad cognit. Sarg. (1915) p. 405; Y. Yamada, 1942, Notes on *Sargassums* from the Southern parts of Japan III, in Japanese, fig. 27.

Plants of moderate size reaching a height of 30 cm. or more attached to the substratum by means of disc-shaped holdfast. Several long erect branches arise from a very short main axis about 5 mm. in length and these are beset with small branchlets up to 3 cm. in length. The stem of the erect branch is about 1 mm. in thickness and slightly flattened while the stem of the shorter branchlets are about half the thickness of the stem of erect branches. Leaves cuneate oblong or ovate obtuse, sharply dentate acorn-shaped, 3-17 mm. long 3-8 mm. wide. Receptacles female or bisexual in sub cymose racemes, male often longer double-edged acutely dentate. Vescicles few borne on slightly flattened petiole. They are 3-4 mm. in diameter awn-shaped and shorter than the length of the petiole.

Unlike in *S. crassifolium* and *S. cristaefolium* the receptacles are loosely arranged. They were found growing on rocks.

Distribution in Ceylon: Bambalapitiya and Pearl Banks in the Gulf of Mannar.

Geog. distribution: Indian Ocean, Japan.

5. *Sargassum Wightii* (Grev.) var. *sublinearis* Grunow

(Plate VIII, Figs. 11-18; Plate IX, Fig. 1)

J. Ag. Spec. Alg. 1848, p. 329; Spec. Sarg. Austral. 1889 p. 86; Grev. Alg. Orient. in Ann. and Magaz. of Nat. Hist. Vol. III, p. 217, pl. IX and Edinb. Bot. Soc. Trans. Vol. III, p. 95, Pl. X; Grunow, 1915, Additamenta p. 382, No. 81.

Plants reaching a height of 40 cm. or more attached to the substratum by an expanded rhizoidal disc. Several erect branches are given off, the stems of which are 2 mm. below and gradually tapering towards the apex.

They give off rather long branches, which in turn are beset with shorter branchlets 2-5 cm. in length and the stem is filiform. Leaves vary from 4-6 cm. in length and 2-3 mm. broad equally attenuated at each extremity acute, entire, repando dentate, midrib present with few scattered stomata in the larger leaves and at the margins in the younger leaves. Vescicles elliptical apiculate borne on a dilated petiole longer than itself. Vescicles 5-6 mm. long and 3-4 mm. broad. In young plants they are found in the axils of the leaves but later found along with the fructification. Sometimes they take the place of the leaves. Receptacles axillary, filiform, compressed and very much divided, the exterior branches the longest so that racemes have a cymose or tassel-shaped appearance, the basal rounded and smooth and the apex sparingly dented, each with its own pedicel or separated. The length varies from 5 to 13 mm. In some cases in addition to producing axillary racemes the receptacles terminate in a large raceme ane bear tassel-like axillary racemes. Male and female in the same plant.

There is another variety with longer and broader leaves. Long erect branches arise from the base the stem of which is flattened 1-2 mm. broad and they are beset with smaller branchlets 4-5 cm. long with filiform stems less than 1 mm. wide. The leaves are long 5-6 cm. long and 3-8 mm. broad, margin entire or sinuate dentate with a distinct midrib on either side of which are arranged cryptostomata in more or less linear series. Vescicles more or less spherical about 4-5 mm. wide, apiculate borne on pedicel about twice the length of the vescicle or more. In young plants they arise from the axils of cauline leaves later accompanying the fructification. Receptacles axillary filiform compressed very much divided. They have a tassel-like appearance and vary in length from 5 to 8 mm. in length. Colour dark olivaceous.

The type locality of this species is India. *Sargassum Swartzii* (Turn) C. Ag. and *Sargassum Wightii* Grev. are closely related and the only difference I could notice was the tassel-shaped appearance of the receptacles in *S. Wightii* which is not so in *S. Swartzii* and further the receptacles are longer in the former than in the latter. However the large and broad-leaved species of *S. Wightii* differ from *S. Swartzii* in which the leaves are very much narrower like *S. Wightii* (Grev.) var. *sub-inearis*. They were found growing on rocks.

Distribution in Ceylon: Kankesanturai.

Geog. distribution: Indian Ocean.

6. *Sargassum cervicone* Grev.

(Plate IX, Figs. 16–18)

1848 Alg. Orient in Ann. and Magaz. of Nat. Hist. Vol. III, p. 217, pl. IX and in Edinb. Soc. Trans. Vol. III, p. 96, pl. X ; J. Ag., 1889, Spec. Sarg. Austral. p. 81 ; *S. Swartzii* B *ovatum* Ag. Syst. 1824, p. 296 ; *S. Binderi* (partim) J. Ag. Sp. Alg. I, 1822, p. 328.

Plants reaching a height of 40 cm. or more attached to the substratum by a callous disc. They give off branches in a distichous manner the ones at the base longer than those above. The stems are flattened 1–2 mm. in thickness. The ramuli-bearing the fruits are short and arranged distichously. Leaves petiolate-varying in length from 3 to 7 cm. and 6 to 10 mm. broad. Sometimes the leaves at the base of the primary axis longer, linear lanceolate equally attenuated at both ends, entire or rarely furnished with sharp teeth upwards. The upper leaves on the branches about 2·5 cm. in length and 6–8 mm. wide, more acute and sharply toothed also provided with midrib and pores. Vescicles are borne on dilated foliaceous petioles about the same length as the vescicle which is somewhat elliptical. Receptacles about 2·5–4 mm. long, axillary forming pedunculate more or less divided racemes which are compressed, irregular in shape and toothed. They were found growing on rocks.

Distribution in Ceylon : Hikkaduwa, Hambantota, Beruwela.

Geog. distribution : Indian Ocean.

7. *Sargassum Swartzii* (Turner) Agardh

(Plate IX, Figs. 2–10)

C. Ag. Spec. Alg. 1821 p. II ; Syst. Alg. 1824 p. 296 ; J. Ag. Spec. Alg. 1848, p. 328 ; Spec. Sarg. Austral. 1889 p. 85 ; Kuetzing Tab. Phyc. vol. II, 1861 pl. 18 ; Grunow, Addit. ad cognit Sarg. 1915, p. 381 ; Reinbold in Weber V. Bosses Liste des alg. du Siboga, Vol. I (1913) p. 157 ; Setchell, Hong Kong Seaweeds V, 1936, p. 3 ; *Fucus Swartzii* Turner, Hit. Fuc. Vol. 4, 1819 p. 48 ; Yamada 1942, Notes on *Sargassum* from the Southern parts of Japan I in Japanese, page 371, fig. 1 ; *Sacutifolium* Grev. Alg. Orient. in Ann. and Magaz. of Nat. Hist. Vol. III, p. 256, pl. X, Edinb. Bot. Soc. Trans, Vol. III, p. 98, Pl. XI.

The type locality of this species is unknown. This species was first described-by Turner (1819) as *Fucus Swartzii* and later as *Sargassum Swartzii* by C. Agardh (1821). According to Setchell in Hongkong Seaweeds V (1936) in old and luxuriant plants the lower broad lanceolate, costate leaves may disappear and the dissimilar upper leaves may alone be present or accompanied by flattened ones. *S. Swartzii* resembles *S. acutifolium.* J. Agardh in Spec. Sargas. Austral. (1889) has considered *S. acutifolium* Grev. as a synonym of *S. Swartzii* Turn. I have gone through the descriptions and figures of both species and do not find any difference except that the leaves in my specimens have a rather entire margin like that of *S. acutifolium* Grev. In other respects it agrees with *S. Swartzii* Turner.

Plants reaching a height of 60 cm. or more attached to the substratum by a disc-shaped holdfast. The primary axis is very short and stout giving off several erect branches whose stems are plano compressed about 3 mm. below and 2 mm. above. These give off secondary branches about 2–3 cm. apart and about 8–12 cm. long, bifarious, compressed below and cylindrical above, which in turn bears bifariously very short branchlets about 4–5 cm. long bearing leaves, vescicles and inflorescenses. Leaves alternate those at the bases 5–6 cm. long, linear, acuminated at the apex with a distict midrib and few scattered stomata, while those above are about half the length of basal leaves often cylindrical and filiform with indistinct midrib or absent and cryptostomata arranged along the margins. The leaves accompanying the fructification are very slender and capillary. In well developed plants the size of the vescicles vary from small to very minute above, elliptical, apiculate and borne on flat mid-ribbed petiole about 5–10 mm. or more long. Both vescicles and petiole are slightly glandular with cryptostomata. Sometimes vescicles occur at the extremity of the leaf. The receptacles are in slightly racemose or cymose clusters, three or more together at the base of the leaves. They are oblong or linear, furcate, slightly flattened more or less dentate especially at the apex. Male and female reproductive organs found in the same receptacle. They were found in abundance growing on rocks.

Distribution in Ceylon : Mandativu, Karativu, Jaffna lagoon.

Geog. distribution : Indian Ocean, Holland, Hong Kong and Japan.

8. *Sargassum Binderi* Sond.

(Plate IX, Figs. 11–15 ; Plate X, Figs. 1, 2)

J. Ag. 1848, Spec. Alg. I, p. 328 ; 1889, Spec. Sarg. Austral. p. 87, t. XXVI, II.

Plants rather small erect branches arising from a very short main axis. Stem of branches flat or compressed 2–3 mm. broad with leaves arranged distichously. Leaves at the base of the stem 4–6 cm. in length and 8–10 mm. broad while the upper leaves are smaller 2–4 cm. in length and 4–6 mm. broad, shape lanceolate, sharply serrate, sometimes linear at other times oblong, midrib glandular in a double row. Vescicles borne on flattened petioles like the leaves. Vescicles spherical or ellipsoidal and apiculate. Receptacles axillary, aggregated in dense cymes, branches flat, margin warty dentate. They were cast shore during the monsoons.

Distribution in Ceylon : Delft Island (Jaffna).

Geog. distribution : Indian Ocean, Java, Philippines, Australia.

9. *Sargassum crassifolium* J. Ag.

(Plate X, Figs. 6–8)

1848 Spec. Alg. I, p. 326 ; 1889, Species Sargassorum Australiae p. 89 ; Reinbold in Weber V. Bosse's Liste des alg. du Siboga vol. I, 1913, p. 158 ; Grunow, Addit. ad cognit. Sarg. 1915, p. 390 ; Yamada 1942, Notes on *Sargassum* from the southern parts of Japan 2 (in Japanese), p. 511, fig. 14.

Plants reaching a height of 30 cm. or more attached to the substratum by means of a disc-shaped holdfast. Stems rough and flattened about 2–3 mm. broad. Petioles of leaves rounded and arranged on the sides of the branches. The branches several arising together and these are beset with similar branchlets 5–6 cm. in length. Fronds oblong elliptical with dentate acute margins, teeth bifid, midrib not distinct present only at the base disappearing above the middle, upper ends of the leaves are double-edged. Leaves at the base 2–2·5 cm. long and 1–1·3 cm. broad while the leaves near the apex are about 15–20 mm. long and 8–10 mm. broad. Cryptostomata few but conspicuous. Vescicles are long 4–5 mm. in length ellipsoidal and apiculate borne on partly inflated petiole. Receptacles are slightly longer than the vescicle. They are formed in dense compact forked racemose-cymose globose clusters in the axils of leaves. Receptacles possess wart-like teeth. This specimen resembles Yamada's figures 14 and 15 in the notes on *Sargassum* from the Southern parts of Japan (1942). These plants were found growing on rocks.

Distribution in Ceylon : Beruwela.

Geog. distribution : Africa, Australia, Indian Ocean, and Japan.

10. *Sargassum cristaefolium* Ag.

(Plate X, Figs. 3-5)

1820, Spec. Alg. p. 13 ; 1824, Syst. p. 297 ; J. Ag. 1848, Spec. Alg. I, p. 325 ; 1889, Spec. Sarg. Austral. p. 91 ; Reinbold, Sargassen vom Indischen Archipel (1891) pag. 70-71, non aliorum *Sargassum ilicifolium* Harv., Alg. Cey. No. 103.

Rachis of leaves two-edged along the margins arranged distichously close together along the entire branches. The branchlets 3-5 cm. in length arranged alternately on both sides of the main stem which is rounded or slightly compressed about 1 mm. wide. Leaves very much crisped 10-15 mm. in length and 5-8 mm. wide double-edged at the apex, oblong elliptical, obtuse apex, midrib gradually disappearing above, sharply dentate, teeth double edged, cryptostomata very few and inconspicuous or absent, vescicles spherical, mucifluous flattened in the margins, borne on short petioles. Receptacles are borne in dense globose forked racemose-cymose clusters in the axils as in *S. crassifolium*. They grow in the sub littoral belt attached to rocks.

Distribution in Ceylon : Hikkaduwa, Galle.

Geog. distribution : Australia, Philippines, Indian Ocean.

11. *Sargassum virgatum* (Mert.) Ag.

(Plate X, Figs. 12, 13)

1824, Syst. p. 296 ; J. Ag. 1848 Spec. Alg. I, p. 333 ; 1889, Spec. Sarg. Austral. p. 103 ; Kuetz. Sp. p. 611 ; *S. leptophyllum* Grev. Alg. Orient. in Ann. and Magaz. of Nat. Hist. vol. III, p. 504, t. XI ; *Fucus virgatus* Mert., Mem. p. 6.

Plants reaching a height of 45 cm. or more attached to the substratum by a callous disc. Erect branches about 30 cm. in length or more arise from a short primary axis about 2-2·5 cm. in length. The stem is flat 2-3 mm. at the base gradually becoming thinner towards the apex. These in turn are beset with branchlets 5-8 cm. long the stem of which are filiform and less than 1 mm. in width. Leaves at the base 2·5-3 mm. in length and 3 mm. wide but these are very few. Those above 1-2 cm. in length and 1-2 mm. wide, linear attenuated, entire with faint nerve and few pores. Young leaves ovate or elliptical. Vescicles numerous, not apiculate, oval tuberculated with prominent pores, those at the base about 2-3 mm. wide those above much smaller borne on petioles 3-5 mm. long. Receptacles numerous axillary about 2 mm. in length cylindrical, oblong or cuneate or partly divided forming branched raceme along with the vescicles. They were cast ashore during the monsoons.

Distribution in Ceylon : Keerimalai.

Geog. distribution : Indian Ocean.

12. *Sargassum polycystum* C. Ag.

(Plate X, Figs. 14-18)

1824 Syst. Alg. p. 304 ; J. Ag. 1848, Spec. Alg. I, p. 310 ; 1889 Spec. Sarg. Austral. p. 119, Grunow, Addit. ad cognit. Sarg. 1913, p. 444, Reinbold in Weber V. Bosse's Liste des. alg. du Siboga, vol. I, p. 169 ; Setchell, Templeton exped. Mar. Plants 1935, p. 266 ; *S. microphyllum* Yendo (non Ag.) Fuc. of Japan, 1907, p. 137 ; Okamura Mar. alg. Kotosho, 1931, p. 108 ; Yamada, Meeresalg. Formosa II, 1925, p. 247 ; 1942, Notes on *Sargassum* from southern part of Japan I (in Japanese), figs. 5 and 6.

Fronds reaching a height of 50 cm. or more attached to the substratum by means of dense elongated branched root-like rhizoids. Several erect long primary branches 10-15 cm. long are given off from the base and these are beset with smaller fructiferous ramuli with fibrilar stems. The stem of the primary branches as well as the branchlets are rough with short processes thus giving the plant a muricated appearance. Leaves are ovate oblong or narrow lanceolate obtuse or acute remotely dentate about 2-2·5 cm. below and 1-1·5 cm. above, membranaceous or rigid with cryptostomata scattered on both sides of the midrib. Clusters of receptacles and vescicles arise from the axil of the leaf. Vescicles small and numerous with prominent pores and borne on filiform stalks 1-2 mm. long and arising from the lower ramification of the racemes. Receptacles forming racemes about 6-12 mm. long filiform and elongated. Sometimes receptacles are foliaceous towards the upper extremity resembling linear leaves toothed at the margin.

I have come across a small specimen which is densely muricated with prominent pores and apiculus excentric which has a close resemblance to *Sargassum myriocystum* J. Ag. but due to scanty material I prefer to place them under *S. polycystum* for the present. They were found growing on rocks in the sub-littoral belt.

Distribution in Ceylon : Mandativu, Keerimalai, and Matara.

Geog. distribution : Singapore, Australia, Indian Ocean and Japan.

13. *Sargassum piluliferum* (Turner) Ag.

Spec. p. 27 ; 1848 J. Ag., Spec. Alg. I, p. 289 ; 1889, Spec. Sarg. Austral. p. 55 ; Kuetz., Sp. p. 616, Tab. Phyc. XI, t. 33 ; *Fucus piluliferum* Turner, Hist. Fuc. Tab. 65 ; Yendo, 1907, The Fuc. of Japan, p. 54, Pl. VI. Fig. 1-7.

I have only a fragment of this specimen which was collected from a small island near Jaffna.

The roots I have not seen, the stem flattened about 2 mm. wide uniformly and undivided beset with short branchlets in a spirally alternate order separated from each other at intervals of about 15 to 25 mm. branchlets 3-5 cm. long. The stem of branchlets about 1 mm. wide. Leaves are found only on the branches arranged loosely and alternately, apparently dichotomously branched 2-4 times or sometimes simple with pointed apices margins entire with a thin blackish midrib. Vescicles scattered over the branches, generally situated in the axils of the leaves and borne on filiform stalks more than three times the length of the vescicle Vescicle spherical about 4 mm. in diameter smooth and rounded. Sometimes the apical portion of bifurcated leaflet ends in a vescicle. Receptacles ramose and spirally arranged on

the ultimate ramulets. They are cylindrical more or less tapering upwards about 2-3 mm. long on stalks 1 mm. in length. A fragment of the specimen was collected from the shore.

Distribution in Ceylon : Delft island near Jaffna.

Geog. distribution : America and Japan.

DIVISION 3. RHODOPHYTA PASCHER

Class : Rhodophyceae Ruprecht

Sub-class I. Bangioideae De-Toni

ORDER I. BANGIALES *SCHMITZ ET HAUPTFLEISCH*

FAMILY I. ERYTHROTRICHIEAE ROSENVINGE

1. *Erythrotrichia* Areschoug

1. *Erythrotrichia carnea* (Dillwyn) J. Ag.

(Plate XI, Figs. 3, 4)

1883, Till Algernes Systematic Pl. 35, figs. 3–7 ; Boergesen, Marine Algae of Danish West Indies II, 1915, p. 7 ; 1936, Some Marine Algae from Ceylon, p. 79 ; Contrib. South Indian Mar. Algal Flora, 1937, p. 28 ; Tanaka 1952, Syst. study of the Japanese Protoflorideae, 1952, p. 14, fig. 7.

Plants simple filamentous erect usually epiphytic attached by a basal cell which becomes lobed, lobes extended to short ramified rhizoids, 0·5 to 2 cm. high, 12–27μ in diameter usually uniseriate attached to the host plant by means of short ramified rhizines radiating in all directions on the surface. Cells usually quadrate with rounded angles slightly longer than broad and contain a star-shaped chloroplast with a central pyrenoid, cell wall gelatinous. Reproduction by monosporangia usually cut off by an oblique wall near the distal end of the cell. Monospores spherical and contain granular contents.

My specimens were found epiphytic on *Padina* and *Stoechospermum*.

Distribution in Ceylon : Colpetty and Bambalapitiya.

Geog. distribution : North America, Bermuda Denmark, Indian Ocean, Atlantic Ocean and Japan.

FAMILY 2. BANGIACEAE (ZANARD.) BERTHOLD

2. *Porphyra* Agardh

1. *Porphyra suborbiculata* Kjellman

1897, Japan art af. Slagt. Porphyra, p. 10, t. 1, figs. 1–3, T. 2, figs. 5–9, t. 7, figs. 4–7 ; De Toni, Syll. Alg. IV, 1897, p. 15 ; Tseng Econ. Seaw. Amoy 1936, p. 34 ; Segawa, On Mar. Susaki, Prov. Izu and its vicinity, 1935, p. 71 ; Tanaka, 1952, The Japanese Protoflorideae, p. 31, pl. III, 2–4 and fig. 16.

Plants membranous attached to the substratum by rhizines. They are ovate or reniform with a very minute stipe. Frond 3–10 cm. high and 3–8 cm. broad, margin undulate with very minute spinulate processes at the margins ; base cordate, monostromatic, vegetative parts of fronds 28–50μ thick, cells in surface view angular with rounded corners, in transverse section quadrate with rounded angles, slightly higher than broad, cells contain a star-shaped chloroplast and with a central pyrenoid, monoecious, sporocarp and antheridia in irregular patches arranged in the margin of the frond. There are 32 carpospores in each cystocarp. Cystocarpic area deep red in colour and antheridial area yellowish. Grows on rocks in the upper littoral belt on the coast.

Distribution in Ceylon : Coral reef near Galle.

Geog. distribution : Japan and China.

Sub-class 2. Florideae (Lamour.) Schmitz et Hauptfleich

ORDER I NEMALIONALES SCHMITZ

FAMILY I. HELMINTHOCLADIACEAE (HARVEY) SCHMITZ

3. *Dermonema* (Greville) Schmitz

1. *Dermonema Frappieri* (Mont. et Millard.) Boergesen

(Plate XXVIII)

1942, Some marine Algae from Mauritius III, Rhodophyceae p. 42, fig. 21 ; *Cladosiphon Frappieri* Mont. et Millard, 1862, p. 20, pl. XXVI, fig. 1 ; *Dermoneme gracilis* (Mart.) Schmitz in Heydrich Algenfl. Ost. Asien. Hedwigia 33 p. 287, Weber Van Bosse Alg.

Siboga p. 204 ; 1853 in Harvey Algae Ceylonicae N. r. 93 ; Svedelius, 1906, as *D. Dichotoma* in Botanisk studier p. 210, fig. 210 ; Kylin, 1954, Die Gattungen der Rhodophyceen p. 106-107, fig. 61-62 ; *Cymnophloea gracilis* Martens, tange d. Preuss. Exp. n. Ost. Asien 1866, p. 146 ; Kuetzing, 1867, Tab. Phycol. Vcl. 17, tab. 1.

Fronds short and erect reaching a height of 4 to 9 cm. firm in texture, dichotomously branched thalli, erect even when exposed to the tide, presence of a cylinder of thick walled mechanical cells running longitudinally at the periphery of the loose medulla. Carpogonial branches three-celled and possess elongate gonimoblasts. According to Boergesen (1942) the specimen from Mauritius is about half the size of those from Ceylon.

Distribution in Ceylon : Coral reef in Galle.

Geog. distribution : Indian Ocean, Formosa, N. Guinea and Mauritius.

4. *Liagora* Lamouroux

1. *Liagora pulverulenta* C. Ag.

(Plate XI, Fig. 5)

Species Algarum 1821-2, p. 396 ; Agardh J., Epicrisis, 1876, p. 516 ; Analecta Algologica Continatio III, 1896, p. 101 ; Boergesen, 1915-6 Marine Algae Danish West Indies, p. 80-85, figs. 87-92.

Plants more or less dichotomously branched but with many irregular proliferations here and there. The assimilatory filaments are short about 300μ long and forked 3-6 times and having a corymbose outline. The lower portion of the filament cylindrical about 10μ thick but gradually tapers towards the upper end and has a diameter of 3-6μ Apical cells are oval or spherical and having a diameter of 10-12μ. Long thin hyaline hairs are often found in the summits of the young filaments. These hairs are clavate when young with much protoplasm in the thickened end but later becomes cylindrical and elongated. Thin filaments are found running along between the central filaments and the lowermost cells of the assimilating filaments. The filaments of the medullary tissue subcylindrical, barrel-shaped having a diameter of about 100μ. Many thin ones run in the mucilage between the larger filaments. Antheridia are developed in the ends of the assimilating filaments and are small and oblong. Cystocarps were found in the middle of the assimilating filaments. Filaments which develop from the cell beneath that upon which the carpogonial filament is placed are several times forked and bent inwards and surround the young cystocarp. In mature cystocarp they are present like a whorl of filaments having a collar like appearance as described by Boergesen. Antheridia and cystocarps were found in the same plant.

Distribution in Ceylon : Pearl Banks in the Gulf of Mannar.

Geog. distribution : Danish West Indies, Gulf of Mexico.

FAMILY 2. **CHAETANGIACEAE** SCHMITZ

5. *Scinaia* Bivonia

1. *Scinaia furcellata* (Turner) Bivonia

(Plate XI, Fig 6 ; Plate XXVIII, Fig. 2)

1822, in " Iride (Palermo), C. icone, Flora Vol. I p. 135 ", J. Agardh, 1852, Spec. Alg., vol. 2, p. 422 ; ibid. Vol. 3, 1, p. 512, 1876 ; Harvey, Ner. Bor. Americana Part II, p. 136, 1853 ; Farlow, 1881, Proc. Amer. Acad. vol. 10 p. 367 ; Hauck Meeresalgen, p. 61, 1885 ; De Toni, Syll. Alg. Vol. 4, sect. 1, p. 104, 1897 ; Setchell, 1914, The *Scinaia* Assemblage, Univ. Calif. Publications in Botany, Vol. 6, No. 5, p. 90-97, Pl. 10, figs. 1-12 ; Pl. 14, figs. 41-43.

Plants reaching a height of 2-8 cm., several times dichotomously branched, branches cylindrical and continuous and slightly attenuated upwards, contracted at their bases, apices blunt or slightly acute. The axis of the frond is made up of large filaments parallel to one another or very loosely entwined and surrounded by few slender corticating filaments. The cortex is composed of the epidermal layer, the hypodermal layer and a layer of corticating filaments. The corticating layer is broad and made up of slender filaments arising from the cells of the ascending filaments and from those of the hypodermal layer. The slender filaments are vertical, oblique or horizontal and loosely arranged. The hypodermal layer consists of 2-3 layers of coloured cells which are spherical, ovoid or clavate. The epidermis consists of cells which are coloured. In mature plants they are inversely pear-shaped the outer end being obtusely rounded and the inner

end contracted. These hyaline cells of the epidermis form the utricle. Carpospores are numerous immersed and scattered in pericarps. These specimens were dredged from the Pearl Banks and I also received a specimen from Professor Koshi of Jaffna College which was collected in the Jaffna lagoon.

Distribution in Ceylon : Pearl Banks in the Gulf of Mannar, and Jaffna lagoon.

Geog. distribution : Indian Ocean, Australia, Japan, Atlantic and Mediterranean, N. America.

6. *Galaxaura* Lamouroux

1. *Galaxaura rugosa* (Ellis and Solander) Lamouroux

1816, Historie des Polypiers coralligenes flexibles p. 263 ; J. Agardh, 1876, Epicrisis p. 528 ; Kuetzing, 1868, Tab. Phycol. Vol. VIII, tab. 33, fig. 1 ; Kjellman 1900, Floride-Slagtet *Galaxaura* Svenska Vent. Akad. Handl. 33, No. 1, p. 55 ; Boergesen, 1916, Marine Algae Danish West Indies p. 100, fig. 105-107 ; *Corallina rugosa*, Solander in Ellis and D. Solander, " The Natural History of many curious and uncommon zoophytes, London, 1786, p. 115, tab. 22, fig. 3.

Plants regularly dichotomous, internodes of the same length. Hairs sometimes present in older parts 15-18μ in diameter, surface smooth, annulations present. Assimilatory filaments are the most striking feature compared to other species. Usually grows in sheltered areas at moderate depths in shallow waters. Kjellmann has not given any descriptions or figures but refers to the description of J. Agardh in Epicrisis and to the figures of Ellis and Solander p. 115, tab. 22, fig. 3 and of Kuetzing in Tabulae Phycologiceae, vol. 8, tab. 23, fig. 1. However when referring to forms formerly considered as *Galaxaura rugosa* he pointed out how it differs from this species. The specimens I have show the differences Kjellman has noted. This species closely resembles *G. squalida* Kjellman but differ in not possessing the well developed annular groups of hairs found in *G. squalida*. Also the reddish tinge originating from the hairs of *G. squalida* is lacking. In transverse section the peripheral tissue consists of 3-4 layers of cells, the innermost cells of which were the largest.

Distribution in Ceylon : Pearl Banks in the Gulf of Mannar.

Geog. distribution : West Indies, Tropical Atlantic, Mauritius, S. Andamans, China, Tahiti, and Caribbean.

7. *Actinotrichia* Decaisne

1. *Actinotrichia fragilis* (Forssk.) Boergesen

1932, A revison of Forsskaals Algae (Dansk. Bot. Arkiv. Bd. 8, p. 6, pl. I, fig. 4 ; *Fucus fragilis* Forssk. l c. p. 190 ; *Actinotrichia rigida* (Lamx.) Decaisne, Sur les Corallines in Ann. Sc. Nat. II, Ser. Bot., vol. 18, 1842 ; p. 118 ; Okamura Icones IV, 1916, p. 30, pl. CLVIII, figs. 17-18 ; Weber Van Bosse, 1921, Liste des Algues Du Siboga II, Rhodophyceae, p. 207.

Fronds calcified reaching a height of about 7-8 cm. growing in masses, branches cylindrical, repeatedly dichotomously branched with patent or acute axils, branches ending in blunt apices with dense whorls of coloured hairs which are simple and branches closely arising in short distances in a horizontal direction. Hairs consist of a single row of cylindrical cells ending in thick blunt apices. Annural marks are often found due to the falling down of these hairs. Colour purplish red becoming yellowish with age.

Distribution in Ceylon : Pearl Bank in the Gulf of Mannar.

Geog. distribution : Red Sea, Indian ocean, Pacific ocean, Japan.

FAMILY 3. CHANTRANSIACEAE (KUETZ.) TREV.

8. *Acrochaetium* Naegeli

1. *Acrochaetium sargassicola* Boergesen

(Plate XI, Figs. 1, 2)

1932, Some Indian Rhodophyceae esp. from the shores of the Bombay Presidency, Kew Bull. No. 3, p. 115, figs. 3-5.

Plants reaching a height of about 1-2 mm. The plant is embedded in the tissue of the host plant by means of a small disc which is oblong cylindrical and slightly narrowed in the middle. The length of the cells about 24-28μ and breadth about 12-15μ.

5——J. N. R 12429 (10/60)

Erect filaments about 20-25μ long and 10 to 13μ broad. Cells at the apex 7-9μ in diameter and apical cells rounded. Branches are given off irregularly on all sides. Cells contain a parietal chloroplast and a single protruding pyrenoid. Sporangia ellipsoidal in shape sometimes terminating in a filament. They are about 12μ thick and 15-20μ long. Antheridia are developed on short branchlets. Branchlets short of 5-6 cells. Ramuli with antheridia produced on upper side of these cells. Carpogonia rare and monsporangia occur in the same plant. The plants were found growing on *Padina* and *Stoechospermum*.

Distribution in Ceylon : Colpetty.

Geog. distribution : Indian Ocean.

ORDER 2. GELIDIALES *KYLIN*

FAMILY : GELIDIACEAE KUETZING

9. *Gelidiella* Feldmann and Hamel

1. *Gelidiella acerosa* (Forsskl) Feldman and Hamel

(Plate XI, Fig. 10)

1934, Observation sur quelques Gelidiacees, Rev. gener Bot. T. 46. Paris p. 528 ; Boergesen 1936, Mar. Alg. of Ceylon, p. 80 ; *Fucus acerosus* Forssk. Fl. Aegypt Arab. 1775 p. 190 ; *Echinocaulon acerosum* (Forssk.) Boergesen, Rev. Forssk. Alg. 1932, p. 5 ; " *Gelidium rigidum* Grev. in Montagne, Agues de Cuba p. 19 ".

Plants from 5-9 cm. in height, basal part decumbent bearing erect secondary branches which are usually arcuate, irregularly or sparingly branched ; main axis cylindrical flattened above bearing alternate pinnate or sometimes secund filiform branchlets. Plants are rigid wiry and cartilaginous. Rhizines not present in the cortical cells in section. Tetrasporangia placed on stichidium like portions on the tips of the branchlets.

Mostly found in the intertidal zones on rocks and corals. They are found in large quantities in the northern coast of Ceylon.

Distribution in Ceylon : Mandativu and Kankesanturai.

Geog. distribution : Bermuda, Florida to Brazil, Japan, India and in most of the warm seas.

10. *Gelidium* Lamouroux

Key to the species of *Gelidium*

1. Plants 1·2 cm. in height 2
1. Plants reaching a height of 4-6 cm. 3
2. Erect branches pinnately branched axis and branches compressed, tetrasporangia arranged irregularly on branch tips ..... 1. *G. pusillum*
3. Thallus alternately terete and compressed, tetrasporangia scattered on the upper compressed branches and pinnules ..... 2. *G. heteroplatos*
3. Thallus not arranged as above, with sunken growing point bi- or tripinnate .... 3. *G. corneum*

1. *Gelidium pusillum* (Stackhouse) Le Jollis

(Plate XIII, Figs. 1-5)

1863, List. Alg. Cherb. p. 139 ; *Fucus pusillus* 1801, Stackhouse 1809, Nereis Brittanica p. 17, pl. 6 ; Kuetz., 1868, Tab. Phycol. XVIII, 37 ; Feldman and Hamel, 1936, Floridees de France, Rev. Algologique 9, p. 112 ; Boergesen, 1933, Kew Bull. No. 3, p. 114.

Plants grow in tufts 1-2 cm. high, thallus freely branched with erect branches. Horizontal rhizome like branches cylindrical 0·2 mm. in diameter, erect branches pinnately branched, the axis and branches compressed about 1 mm. in width distinctly narrowed at the base. Tetrasporangia irregularly arranged on branch tips.

Fronds on exposed rocks in the littoral zone.

Distribution in Ceylon : Hikkadua.

Geog. distribution : India, West Coast of Europe, Mediterranean Sea, Malayan Archipelago, Japan.

2. *Gelidium heteroplatos* Boergs.

(Plate XII, Figs. 5-7)

1934, Some Indian Rhodophyceae of the Presidency of Bombay IV, Kew Bulletin No. 1, p. 3-4, fig. 3.

Plants form dense tufts on rocks 4-6 cm. high. Thallus alternately terete and compressed. The width of the compressed parts 600-800μ. Filaments distichously and irregularly branched, the branches alternate, secund or rarely opposite. Branches narrow at the

base terete or compressed which gradually broaden upwards and tapering near the apex. In surface view peripheral cells oval roundish 4-6μ diameter. In transverse section oval oblong about 12μ long and 6μ broad. Below these are 3-4 layers of coloured oval roundish cells, the larger ones elongate cylindrical. The uncoloured medullary tissue consists of long sub-cylindrical intertwisted cells of variable size between which are rhizoids. Tetrasporangia scattered on the upper compressed branches and pinnules, and are 26μ broad and 42μ long.

Distribution in Ceylon : Beruwela, Matara.

Geog. distribution : Indian Ocean.

3. *Gelidium corneum* (Huds.) Lamouroux

1813, Essai. p. 41 ; Boergesen 1916, Mar. Alg. of Danish West Indies, p. 114, fig. 124 ; *Fucus corneus* Huds., 1778, Fl Angl. 585 ; Turner, Fuci Vol. IV, 1819, p. 146.

Plants reaching a height of about 4-6 cm. Thallus flat 1–2 mm. broad, apices blunt, somewhat sunken growing point, bi- or tri-pinnate, mostly bipinnate sometimes branches absent from parts of thallus, irregular. In transverse section medullary layer consists of long cylindrical colourless cells and cortical layer of short red coloured cells radially arranged around the periphery of the thallus. Hyphae like filaments found between cells of the medullary layer.

Plants are usually found in sheltered areas.

Distribution in Ceylon : Galle.

Geog. distribution : Atlantic Ocean, Mediterranean Ocean and Indian Ocean.

ORDER 1. CRYPTOMENIALES *SCHMITZ*

FAMILY I. CORALLINACEAE (GRAY) HARVEY

11. *Jania* Lamouroux

1. *Jania natalensis* Harvey var. *tenuior*

" Ceylon Alg. exsicc. No. 25 " ; Yendo, 1905, Corallinae Journ. Coll. of Science, Tokyo Vol. XX, Art 12, p. 39 ; Harvey 1847, Ner. Bor. Australia p. 107 ; Aresch in J. Ag. Sp, II, 1851, p. 558.

Fronds 4-8 cm. high, clustered and erect, dichotomous with acute axils, rigid with acute apex with all joints cylindrical, lowermost 2-3 times the diameter, those above 6–8 times the diameter in length. Cystocarps not known. I was not able to observe any cystocarps in. my specimens in spite of careful examination.

Distribution in Ceylon : Kankesanturai, Mandativu and Galle.

Geog. distribution : Port Natal, South Africa, Australia and Japan.

12. *Amphiroa* Lamouroux

1. *Amphiroa rigida* Lamouroux

1816, Hist des Polyp. corall. flexibl. p. 297, tab. XI, fig. I ; Zanardini G., 1871, Iconographia Vol. 3, p. 79, tab. 99, fig. B ; Yendo, 1902, Corallinae verae Japoniceae, p. 6, pl. I, figs. 5-6, Pl. IV, fig. 4 ; Revised list of Corallinae 1905, p. 3 ; Boergesen 1916 Mar. Alg. Dan. West Indies p. 182-5, figs. 171, 172.

Plants grow in tufts reaching a height of 5-6 cm. and well ramified with regular dichotomous branching. Basal filaments thicker than apical region which is about half the diameter of the base. Colour lightish red with a bluish tinge at the top. Branches spreading angle of dichotomy obtuse, sometimes acute. Joints long about 1–1·5 cm. cylindrical and bifurcate at the upper ends, usually no dichotomous branching in the upper end, but filaments are divided by nodes in a similar way as in ramified parts of the thallus. In section central strand consists of two rows of long cells alternating regularly with one row of short cells. Long cells 100μ in length and short ones 20μ. Cortical tissue consists of several layers of short cells, shortest at the periphery.

Distribution in Ceylon : Dondra head.

Geog. distribution : Mediterranean sea, West Indies, Japan.

FAMILY 2. RHIZOPHILLIDACEAE SCHMITZ

13. *Chondrococcus* Kuetzing

1. *Chondrococcus Hornemanni* (Mert.) Schmitz

(Plate XII, Figs. 1, 2)

1895 in Engler Bot. Jahrb. XXI, p. 170 ; Boergesen in Kew Bull. 1933, No. 3, p. 117 ; *Fucus Hornemanni* Mert. in Gottinger Gel. Anzeiger No. 64, 1815 ; *Desmia Hornemanni* Lyngb., Hydrophytolog. Dan. p. 35, tab. 7c., 1819 ; E. S. Barton in Journ. Bot. 1896, p. 460 ; Okamura Icones Vol. 4, p. 58.

Fronds caespitose arising from a small disc 4-5 times pinnately branched in distichio-alternate manner, subflabellately expanded linear, compressed or thickened below, ecostate 12-15 cm. high and 1-2 mm. broad. Main branches irregularly alternate rather naked below, lower branches long becoming short above, all branches similar, with sharp or deltoideo-obtuse, simple or divaricated teeth. All branches arising on roundish axils straight or rolled up at the apices. Glandular cells with yellowish contents scattered beneath the cortex. Tetrasporangia forming irregular roundish nemathecia, slightly elevated and often arranged in a row along the margins or in the intramarginal surfaces of the branches, cystocarpic warts, similar in shape to tetrasporic nemathecia.

Distribution in Ceylon : Pearl Banks, Bambalapitiya, and Galle.

Geog. distribution : Pacific Ocean, Indian Ocean, Japan.

FAMILY 3. SQUAMARIACEAE HAUCK

14. *Peyssonnelia* Decaisne

1. *Peyssonnelia rubra* (Greville) J. Ag.

1852, Spec. Alg. II, p. 502 ; 1876 ; Epicr. Flor. p. 386 ; De Toni, Syll. Alg. Vol. V, sect. 4, 1905, p. 1696 ; Boergesen, 1916, Marine Algae of Danish West Indies p. 146 ; 1936, Ceylon Marine Algae p. 82.

Plants membranaceous, lobed, light pinkish red, incrustrated with carbonate of lime between the rhizoids and in the basal mucous layer, makes the plant very brittle and calcareous, rhizoids unicellular. Hypothallium not sharply defined. Perithallium composed of laterally joined vertical rows of cells. Marginal cells viewed in radial section as high as the hypothallic cells.

This specimen was dredged from a depth of about 15 meters.

Distribution in Ceylon ; Galle, Pearl Banks in the Gulf of Mannar.

Geog. distribution : West Indies, Mediterranean Sea, Atlantic Ocean, Indian Ocean, and Malayan Archipelago.

FAMILY 4. GRATELOPIACEAE SCHMITZ

15. *Grateloupia* C. Agardh

1. *Grateloupia filicinia* (Wulf.) Ag.

1822, Spec. Alg. p. 223 ; Systema, p. 241 ; Greville 1830, Alg. Brit. p. 151, pl. 16 ; Harvey 1849 Phycol. Brit. Pl. C ; Kuetzing, 1867, Tab. Phycol. Vol. XVII, pl. 2? ; J. Ag. Spec. II, 1851, p. 180 ; Epicr. 1876, p. 153 ; Boergesen 1915, Mar. Alg. Danish West Indies p. 123 ; 1935, List of Marine Algae Bombay, p. 53 ; 1936, Some Marine Algae from Ceylon p. 83 ; *Fucus filicinus* (Wulf.) Ag. in Jacquin, Collectania, Vol. III, 1789, p. 157, fig. 2.

Fronds grow in tufts on rocks reaching a height of 5–15 cm. Pinnate or bipinnate, main stem linear, attenuated about 2-3 mm. wide, unequal in breadth in different parts. Ramification monopodial. Plants are very variable with long branches in some specimens and short in others. Some specimens with broad thallus while others are filiform. In both cases the thallus is hollow. In transverse section the medulla is very loose in the middle but denser towards the periphery where it grows evenly over the cortical layer. Filaments in the medullary 7–9μ thick, irregularly subdichotomous, ramified and felted between each other. Numerous tetraspores are formed in the cortex of the thallus and are cruciately divided. Antheridia and cystocarps formed in the same plant as described by Berthold. Antheridia formed as outgrowths of the peripheral cells in the cortical layer. Spermatia are small and spherical. Cystocarps develop over the whole surface of the thallus. They are spherical and spores are discharged by means of a pore through the cortical layer. Carpospores densely crowded together forming a spherical body about 20μ in diameter. The plants are pinkish or purplish red, bluish green, dark red, red-violet or red-brown in colour and usually grows in more sheltered areas.

Distribution in Ceylon : Galle.

Geog. distribution : Indian ocean, Pacific and Atlantic oceans, Mediterranean sea, Cape of Good Hope.

16. *Carpopeltis* Schmitz

1. *Carpopeltis rigida* (Harvey) Schmitz

1895 Mar. Florid. v. Deutsch-Ost. Afrika p. 168 ; Heydr. 1907 Einige Algen V, Loo-choo Ber. d. Deutsch Bot. Gessel XXV, p. 64 ;

Cryptonemia rigida, Harvey, " Alg. exsicc. n. 51 " ; Okamura 1912, Icones of Japanese Algae, Vol II, p. 63, Pl. LXVI ; Boergesen, 1943, Some Marine Algae from Mauritius, p. 27 ; *Phyllophora Maillardi* Mont. et Millard ; Algnes Reunion, 1862, p. 8, pl. 24 ; *Suhria ? Zollingeri* (Sonder) Grun., Alg. Novara, 1870, p. 82, t. X, fig. 3.

The plant was first named as *Cryptonemia rigida* by Harvey in Alg. Ceylon Exsiccatae no. 51, as nomen nudum and later described by J. Agardh (1876). It was previously described as a new species *Phyllophora Maillardi* by Montagne and Millard. on the algae of Reunion. In 1870 Grunow described it as *Suhria (?) Zollingeri* on the material from Nicobar. Boergesen examined the original specimen *Phyllophora Maillardi* M. et M. the specimens of Harvey's plant and those of Ceylon he had collected and compared with specimens from Reunion. According to him the plant from Reunion and the plant from Ceylon are the same.

Plants are dichotomously branched, cartilaginous, mostly pennate here and there arising from a disc-shaped haptera. Lower part of frond with a midrib, absent in the upper part, stem slightly cylindrical. Plants 5–7 cm. high, 3–4 mm. in breadth, branches divide pinnately dichotomously in fan-shaped clusters, terminal parts dense and branched dichotomously, proliferous branches issued from both surfaces. In transverse section the cortical layer consists of short densely placed anticlinal more or less furcated filaments composed of oblong cells. The cells towards the inner cortex larger than those at the periphery. This takes place gradually, and the cells towards the periphery are rounded at first, but later become irregularly shaped. The innermost part of tissue is composed of thick walled densely interwoven filaments among which rhizoids are intermingled. Tetrasporangia and cystocarps produced beneath the apex of the terminal segments, colour purplish red or yellow.

Distribution in Ceylon ; Dondra Head, Galle.

Geog. distribution : East coast of Africa, India, Japan, and the Malayan Archipelago.

17. *Polyopes* J. Agardh

1. *Polyopes ligulatus* (Harv.) Schm.

Englers Bot. Jahrb. 21, 1895, p. 166 ; *Gymnogongrus ligulatus* Harvey, " Cey. Alg. No. 50 " ; *Cryptonemia ligulata* (Harvey) J. Ag., Spec. Alg. Vol. III. 1876, p. 162 ; Boergesen, 1936, Some Marine Algae from Ceylon p. 83.

Plants form tufts on rocks, dichotomously branched, segments strap-shaped and sometimes constricted slightly, cartilaginous. In transverse section medulla dense, filamentous and spongy netlike, cortex firm, dense of anticlinal rows of cells, smaller cells towards the periphery, tetrasporangia in nemathecia ; cystocarps small immersed in the thickened branch tips.

Distribution in Ceylon : Galle.

Geog. distribution : Malayan Archipelago.

18. *Halymenia* C. Agardh

Key to the species of *Halymenia*

1. Thalli broad, cordate or oblong leaf-like 2

1. Thalli narrow, forked with a divided blade 3

2. Base of thallus broadly cordate ..... 1. *H. porphyroides*

2. Base of thallus reniform .... 2. *H. dilatata*

3. Thalli with numerous proliferations from the margins but more abundant in the apices ..... 3. *H. ceylanica*

3. Thalli repeatedly forked with no proliferations ..... 4. *H. polydactyla*

1. *Halymenia porphyroides* Boerg.

1932, Indian Rhodophyceae Bombay Presidency, Kew Bull. 3, p. 120 ; Syn. *Callymenia Harveyana* J. Ag. in Syst. Alg. hod. advers. 1888, p. 40 ; 1851, Spec. Alg. II, p. 288 ; non *Halymenia Harveyana* J. Ag., Anal. Algology 1892, pp. 55.

Plant with short stipe, gradully becoming leaf-like lamina attached to rocks by means of a small disc. Base of thallus broadly cordate. Thallus elastic with roundish, sinuate and waved edges and becomes gradually more or less lobed. Colour light red. In transverse section the peripheral layer on both sides composed of 3-4 rows of small cells, those towards the centre being larger, vigorous filaments connecting the layers on both sides are found in the central muscilaginous tissue, stellate cells found in the cortex. Tetrasporangia scattered on the cortical layer and are cruciately

divided. Cystocarps scattered in the interior of the thallus. A single cluster of carpospores formed from an auxiliary cell, and surrounding filaments unite to form a loose-walled urceolate cavity. Carpospores escape through ostiole.

Distribution in Ceylon : Pearl Banks in the Gulf of Mannar.

Geog. distribution : Indian Ocean.

2. *Halymenia dilatata* Zan.

In Flora, 1851, p. 35 ; Plant Mar. Rubr enum. p. 72, tab. III, fig. I ; J. Agardh, Analecta Algologica, 1892, p. 63 ; Okamura, Icones, Vol. IV, p. 109, pl. 176 et 177, figs. 3-4 ; Boergesen, 1933, Contrib. S. Indian Mar. Alg. Flora III, p. 214.

Fronds arising from a scutate disc, abruptly expanding with reniform base into a suborbicular membranaceous structure, sometimes broadly oblong undulate curled, simple or more or less lobed becoming 15-20 cm. in breadth and height. Margin entire, crenulate or roughly subdentate, sinuose or fimbricated with ligulate lobules and more or less crisped, sometimes with small papilose or ligulate processes. In transverse section the cortical layer is composed of small roundish or oblong cells with thin irregularly bent filaments running in all directions into the slimy interior. Tetrasporangia scattered over the whole surface of the frond. Cystocarps occur in small dots densely scattered all over the surface of the frond. Colour purplish red with irregularly-shaped small patches. The plant is very slimy.

Distribution in Ceylon : Delft island.

Geog. distribution : Red Sea, Somaliland, Malayan Archipelago and Japan.

3. *Halymenia ceylanica* Kuetz.

(Plate XXX, Fig. 1)

Halymenia Durvillaei Bory var. *ceylonica* (Kuetz.) Wever, 1921, Alques Siboga p. 235 pl. VIII, fig. I ; *Halymenia ceylanica* Kuetz 1866, Tab. Phyc. Vol. 16, tab. 93. ; " Ceyl. Alg No. 39 "

I have compared my specimens with the specimens determined by Okamura kept at the herbarium of the Tokyo University of Fisheries and my specimens resemble this.

Plant, soft and membranaceous, frond 1-1·5 cm. in diameter with lateral branches about 1 cm. in width with numerous narrow proliferations from the margins but more abundant at the apices. Proliferations flattened 1-3 cm. in width and 2-4 cm. in length.

Distribution in Ceylon : Pearl Banks in the Gulf of Mannar.

Geog. distribution : Japan.

4. *Halymenia polydactyla* Boergesen

(Plate XI, Fig. 7 ; Plate XII, Fig. 3)

1932, Some Indian Rhodophyceae, Bombay Presidency, Kew Bull. No. 3, p. 122.

Plants of moderate size. Thallus repeatedly forked, fastigate, segments terete, compressed 5-7 mm. thick. Thallus below the forks 12-15 mm. Upper ends of forks obtuse. Colour reddish or dark purple of tough constituency. In transverse section wall composed of small thick walled cells, roundish polygonal when seen from above. Beneath are large stellate cells. Cells short rayed near periphery, long rayed towards the interior forming a loose tissue in the mucilaginous interior of the tubes. Gland cells issuing stellate cells are present here and there. Tetrasporangia occur in the epidermal tissue and are of variable size and shape, roundish to oblong. Only a fragment of this plant was dredged from the Pearl Bank.

Distribution in Ceylon : Karativu Paar in the Pearl Banks in the Gulf of Mannar.

Geog. distribution : India and Jedan Islands.

ORDER 4. **GIGARTINALES** *SCHMITZ (EMEND) KYLIN*

FAMILY 1. **SOLIERIACEAE** KYLIN

19. *Meristotheca* J. Ag.

1. *Meristotheca papulosa* (Mont.) J. Ag.

(Plate XXIX)

J. Agardh, Bidr. Florid. System 1848, p. 143 ; Epicrisis, 1876, p. 584 ; Weber van Bosse, 1828, Algues Siboga p. 402, fig. 182 ; Kylin, 1932, Die Florideenordn. Gigartinales p. 25, pl. 12, fig. 27 ; Boergesen, 1934, Indian Rhodophyceae of Bombay Presidency IV, Kew Bull. No. J, p. 13-16, fig. 10-11 ; *Callymenia papulosa*

Mont., 1849, Pug. Alg. Yemensium in Ann. Sc. Nat. 3 ser 13, p. 246 ; *Euhymenia papulosa,* Kuetz, 1867, Tab. Phyc. 17, t. 73.

Plants foliose with small papillae on the surface. The margin is irregularly sinuate and dentate and several proliferations are present. The thallus is brick red in colour and cartilaginous. In transverse section peripheral layer of small assimilating cells with large roundish oval storage cells in the centre. The medullary tissue in the middle consists of loosely interwoven filaments. Spherical cystocarps scattered upon the flat surface along the margin. Tetrasporangia spread over the surface and zonately divided.

Distribution in Ceylon : Galle.

Geog. distribution : Red Sea, Coast of Somali, India, Malayan Archipelago.

FAMILY 2. **HYPNEACEAE** HARVEY

20. *Hypnea* Lamouroux

Key to the species of *Hypnea*

A. Fronds intricate and caespitose, alternatively branched branches and branchlets caespitose erect not intricate.

1. Apex of the branches genrally hamate ..... 1. *H. musciformis*

1. Apex of branches straight 2

2. Fronds generally complanate ..... 2. *H. Saidana*

2. Fronds terete or sub terete 3

3. Principal axis not percurrent, upper ends of branches thing and antler like ..... 3. *H. cervicornis*

3. Principal axis percurrent upper ends of branches not antler like 4

4. Fronds slender, spinous branchlets long ..... 4. *H. Valentiae*

4. Fronds rigid, spinous branchlets thick and short ..... 5. *H. hamulosa*

B. Fronds consisting of intricate cushion-like portion and fertile upper branches.

1. Vegetative part matted, tetrasporangia borne on the side of branchlet ..... 6. *H. pannosa*

2. Vegetative plant not matted, tetrasporangia borne around the branchlet ..... 7. *H. cenomyce*

1. *Hypnea musciformis* (Wulf.) Lamour.

1813, Lamouroux, Essai Thallas., p. 43, Kuetzing Spec. Alg. 1849, p. 758; Tab. Phycol, Vol. 18, tab. 19 ; J. Agardh, Epicr, 1876, p. 561 ; *Fucus musciformis* Wulf. in " Jacquin, Collectanea, III, p. 154, tab. 14 fig. 3 " ; Esper. 1800, Icones Fuc. tab. 93 ; Turner, 1809 Fuci. tab. 127.

Plants epiphytic upon larger algae, usually entangled and attached by mean of tendrils. They are numerous and spreading up to about 18 cm. They are irregularly branched from the base, branches cylindrical broader at the base gradually tapering above. Numerous branches about 8 cm. or more in length and these are beset with smaller ones. The primary shoot as well as the branches are covered with ramuli which are of the same texture, some placed close together while others at short distances away, the upper ones sometimes secund. Usually they are about 2-3 mm. long sometimes longer, apices slightly twisted as tendrils. The plant resembles *H. japonica* Tanaka in being membranous and slender. Ramuli bearing tetraspores incrassated, pod-like in the middle, those with conceptacles spinescent, divaricately branched.

Distribution in Ceylon: Karativu, Mandativu, Delft, Jaffna lagoon.

Geog. distribution : Adriatic sea, West Indies, New Zealand, Normandy, Egypt, Indian Ocean.

2. *Hypnea Saidana* Holmes

New Mar. Alg. Japan (Journ. Linn. Soc. Bot., vol. 31, 1895, p. 256 pl. II, fig. 3 ; De Toni, Syll. Alg. IV, 1897, p. 483 ; Okamura, Icon. Japan Alg., vol. 2, no. 2, 1909 p. 24, pl. 57, figs. 1-10 ; Tanaka, 1941, Sci. pap. of the Instit. of Algological Research, Hok. Univ. Vol. 2, No. 2. p. 239.

Fronds forming rounded mass reaching a height of 6-10 cm. and width 1-2 mm. They are compalanate membranaceous or slightly cartilaginous. Main branches, flexuose more or less dichotomous with alternate branches which are mostly curved with numerous short thorn-like branchlets. Tetrasporangia formed around the basal swollen part of branchlets, tetraspores irregularly zonate. Colour blood red or yellowish red. The plant grows on rocks in exposed places.

Distribution in Ceylon : Beruwela.

Geog. distribution : Japan.

3. *Hypnea cerviconis* J. Ag.

Epicr. 1876 p. 564; Harvey, Ner. Bor. Amer. II, 1853, p. 125; Okamura, Icon. Japan Alg. Vol. IV, 1916, p. 35, pl. 159 figs. 6-9, pl. 160, figs. 1-5; Boergesen, Mar. Alg. Dan. West Indies 1920, p. 383; Mar. Alg. Can. Islands 1929 p. 84; Taylor, Mar. Alg. of Florida 1928, p. 156, pl. 22, fig. II; Tanaka 1941. The genus *Hypnea* from Japan, Sci. Pap. Instit. of Algological Res. Hok. Univ. Vol. II. No. 2., p. 241.

Plants form bushes composed of numerous loosely arranged filaments. There is no distinct main branch, all branches being almost the same size and rather thin, branching rather irregularly in divaricato-dichotomous manner, attached to the substratum by means of disc-like attachments. Upper portion of ramification have an antler-like appearance and thus branches decrease in length towards the top. Fertile branches projecting beyond the tuft; tetrasporangia in the middle or swollen part ending in a simple or branching point. Cystocarps solitary or aggregate. Antheridia in the basal swollen part of the ultimate branchlets. Colour purplish red or brick red sometimes green in the upper portion.

These specimens are found in abundance in the Jaffna lagoon.

Distribution in Ceylon: Jaffna lagoon, Karativu, Keerimalai and Pearl Banks in the Gulf of Mannar.

Geog. distribution: Easter Island, Brazil, Chile, Australia, and Pacific Ocean.

4. *Hypnea Valentiae* (Turn.) Mont.

1852, J. Agardh, Spec. Alg. II, 540; Hauck, Ueber ein. v. I. M. Hilderbrandt im Rothen Meere u. Ind. Ocean gesamm. Algen in Hedwigia 26, 20, 1883; Boergesen, 1934 Indian Rhodophyceae, Kew. Bull. No. I, p. 17.

Fronds arise from a callous disc with incurved creeping fibres and reaching a height of 10 cm. or more, cylindrical filiform, flexuose. Plants undivided or 2 or 3 times dichotomously branched. Branches at intervals of 1 mm. are beset with slightly incurved spiniform ramuli, broad at the base and acute at the apex. Tetrasporangia are borne on branchlets in the base or middle. Cystocarps borne on branchlets near the apex. Hauck has pointed out in Hedwigia 26, 1887, p. 20, that several species formerly considered separate namely *H. seticulosa* J. Ag.; *H. charoides* Lamx. and *H. divaricata* Kuetz. are referred to *H. Valentiae* (Turn.) Mont. (*Fucus Valentiae* Turner "Fuci" tab. 78, vol. II, 1807). In the above species I have followed the suggestion of Hauck. I have some specimens which agree with the description of *H. charoides* Lamx. as described by Tanaka but I have placed them under *H. Valentiae* (Turner) Mont.

Distribution in Ceylon: Karativu, Mandativu, Delft.

Geog. distribution: Indian Ocean, Red Sea, Australia, Japan and Tasmania.

5. *Hypnea hamulosa* (Turn.) Mont.

(Plate XV, Figs. 10, 11)

"Pug. Alg. Yemens n. 16"; J. Agardh, Spec. Alg. II, 1852, p. 447; Epicr. 1876, p. 563; Zanardini, Pl. Mar. Rubr. 1858, p. 270, n. 97; Grunow, Algen der Fidschi. Tonga und Samoa-Inseln (1874) p. 39; Weber Van Bosse, Liste alg. Siboga, IV, 1928, p. 453 fig. 191; Syn. *Fucus hamulosus* Turner, 1809, Hist. Fuci. T. 79; Tanaka, 1941, The genus *Hypnea* from Japan, p. 245, fig. 17.

Fronds slender, cylindrical or slightly compressed reaching a height of 8-10 cm. Branches are scattered loosely entangled alternately or irregularly and are beset with short and long spinous branchlets. Branching simple di- or trichotomous. The entire frond is more or less clothed with ramuli with acuminated segments. Tetrasporangia are present in the basal swollen part of the short branchlets. Colour pale transparent bright red slightly tinged with brown. My specimen has a close resemblance to Turner's figure in Hist. Fuc. t. 79.

The present species is found in abundance washed on the shores between Trincomalee and Kuchaveli during the North East Monsoon.

Distribution in Ceylon: Kuchaveli.

Geog. distribution: Indian Ocean, Pacific Ocean, Cape of Good Hope, Red Sea, Japan.

6. *Hypnea pannosa* J. Agardh

(Plate XV, Fig. 9)

Spec. Alg. II, 1852, p. 453; Epicr. 1876, p. 565; Harvey, Ner. Bor. Amer. 1853, p. 125; Okamura, Icon. Jap. Alg. Vol. I, no. 2,

1907, p. 47. Taylor Mar. Alg. Florid, 1928 p. 156; Boergesen, Mar. Alg. Cey. 1936 p. 84; Contrib. South Ind. Mar. Alg. Flora II, 1937, p. 326; Tanaka, 1941, Sci. Pap. Instit. of Alg. Research, Hok. Univ. Vol. 2, No. 2, p. 247.

Plants pulvinate, sub cartilaginous, intricately branched, branches attached to each other, the exterior ones conical acuminate forming dense matted tufts on the rocks. Fertile branches emerging from the mat, naked below pyramidal branched above, those bearing the tetraspores subunilaterally warted at the base and pad-like below the apex containing a single or more sori; tetraspores irregularly zonate; colour purplish red.

Distribution in Ceylon: Delft island, Galle.

Geog. distribution: Mexico, Pacific ocean, Indian ocean, Japan.

7. *Hypnea Cenomyce* J. Ag.

Spec. Alg. II, 1852, p. 452; Epicr, 1876, p. 564; De Toni, Syll. Alg. IV, 1900, p. 481; Tanaka, 1941, Sci. Papers of Alg. Res. Hokkaido University Vol. II. No. 2, p. 250.

Plants reaching a height of 5 cm. cylindrical, 0·5-1 mm. in width. The basal part of the frond is cushion-shaped and forms expansions on rocks and coral and gives off branches which are irregularly arranged, sometimes sub paniculate. Ultimate branches are spinous about 1 mm. long and 0·5 mm. thick with acute apex, sometimes discoid. Cystocarps are subcylindrical, solitary or in groups of 2 or 3 on the branches or branchlets.

The plant resembles *H. hamulosa* but can be distinguished by the presence of cushion-like mass at the base.

Distribution in Ceylon: Jaffna lagoon.

Geog. distribution: Australia, Japan.

FAMILY 3. **PHYLLOPHORACEAE** KYLIN

21. *Anfeltia* Fries

Key to the species of *Ahnfeltia*

1. Proliferous branches present occasionally 2

1. Proliferous branches completely absent 3

2. Two arms of dichotomy often arcuate ..... 1. *A. plicata*

3. All branches ending in equal height, furcellate and fastigiate..... 2. *A. furcellata*

1. *Ahnfeltia plicata* (Hudson) Fries

1835, Corpus florarum provincialium Suciae, p, 310; Harvey, 1853, Phy. Bor. Amer. p. 163; *Fucus plicatus* 1762, Flora Anglica, p. 470; Smith, 1944, Mar. Alg. Mont. Pen. p. 271; Taylor, 1957, Mar. Alg. N. E. Coast of North America p. 275.

Plants form dense tufts arising from a thin disc reaching a height of about 12-15 cm., dichotomous or unilateral to irregularly branched, branches cylindrical up to 0·5 mm. in diameter and 5-10 times dichotomous with an interval of 5-10 mm. between successive dichotomies. Proliferous branches are short when present and borne anywhere on the branches. Nemathecia forming oblong swellings on the branches constituted of radi ting rows of cells, the outer in localised spots forming monosporangia.

Distribution in Ceylon: Matara.

Geog. distribution: N. Atlantic Ocean, Brazil, S. America, and Indian Ocean.

2. *Ahnfeltia furcellata* Okamura

1933, Icones of Japanese Algae Vol. VII, No. II, p. 16, 17, Pl. 310, figs. 6-10.

Fronds of moderate size growing in tufts from a callous disc. Fronds terete, lower portion naked and stem-like for more or less long distances, branches widely parted regularly dichotomous decompound widely parted with forks which come close together. All branches end in equal heights, furcellate with blunt apices and fastigate in ultimate segments. In section the medulla pseudoparenchymatous with isodiametric cells and cortex parenchymatous with much smaller anticlinal cell rows. Cystocarps swollen immersed in the terminal segments.

Distribution in Ceylon: Beruwela.

Geog. distribution: Japan.

22. *Gymnogongrus* Martius

Key to the species of *Gymnogongrus*

1. Fronds cylindrical below, apex blunt and compressed ..... 1. *G. pygmaeus*

1. Fronds flattened or compressed below terminal apex crenulate and recurved .... 2. *G. glomeratus*

1. *Gymnogongrus pygmaeus* (Grev.) J. Ag.

Spec. Alg. II, p. 317 ; Epicrisis, 1876, p. 209 ; Kuetzing, Tab. Phyc. Vol. XIX, t. 64 ; *Chondrus pygmaeus* Grev. in M. S. in Hb. Hooker ; Boergesen, 1936, Some Mar. Alg. of Ceylon p. 88 ; 1937, Contrib. to South Ind. Mar. Alg. Flora II p. 329.

Plants of small size, bushy growing from a disc-shaped holdfast. Fronds with cylindrical branches below, erect branches horny and firm repeatedly dichotomously branched, apex blunt and compressed. Cystocarps form protuberances on the thallus, the cystocarps are large and numerous, carpospores arranged in groups surrounded by rhizoid-like filaments embedded in the slime. They were found growing with a species of *Gelidium*.

Distribution in Ceylon : Bambalapitiya, Galle.

Geog. distribution : India, Japan.

2. *Gymnogongrus glomeratus* J. Ag.

1849, in Act. Holm. Oefvers p. 88 ; Sp. II, p. 322 ; Epicrisis 1876, p. 212, *Chondrus rhodophyllus* Kuetz. Tab. Phyc. XVII, 1867, t. 62.

Frond compressed below, above in dense dichotomous branching clusters, flabellate, branches dense and overlapping ; segments short and linear, terminal apex crenulate and recurved. Cystocarps numerous hemispherical forming protuberances on the thallus.

Distribution in Ceylon : Matara.

Geog. distribution : Mauritius, Cape of Good Hope.

FAMILY 4. **GIGARTINACEAE** SCHMITZ (EMEND) KYLIN

23. *Gigartina* Stackhouse

1. *Gigartina acicularis* (Wulf.) Lamouroux

(Plate XXXI, Fig. 1)

1813, Essai Thalassiophytes p. 48 ; J. Ag. 1851, Spec. Alg. Vol. II, p. 263 ; Epicrisis p. 190 ; Kuetzing, 1868, Tab. Phy. Vol. XVIII, t. I ; *Fucus acidularis* Wulf. Crypt. aquate. 1803, p. 63, No. 50 ; Boergesen, 1936, Some Marine Algae from Ceylon p. 88.

Fronds tufted 2-4 inches in height divided somewhat dichotomously into spreading branches of nearly equal length forming a roundish general outline, branches cylindrical acuminated divided dichotomously again or irregularly or pinnated with acute ramuli up to an inch or more long. Sometimes bearing minute scattered spines, often ramuli partly secund and branches curved inwards at the apex. Cystocarps spherical sessile scattered upon the ramuli.

Distribution in Ceylon : Galle.

Geog. distribution : Mediterranean Sea, Atlantic Ocean, Australia, Cuba, Danish West Indies.

FAMILY 5. **GRACILARIACEAE** KYLIN

24. *Gracilaria* Greville

Key to the species of *Gracilaria*

A. Plants in which the thalli are not constricted distinctly.....1

1. Plants in which the thalli are cylindrical or slightly compressed 2

1. Plants in which the thalli are flattened 9

2. Branches arched and decumbent developing haptera on reaching substratum .... 1. *G. crassa*

2. Branches not as above.....3

3. Branches cylindrical with obtuse apex and with narrow constrictions on the branches.... ..... 2. *G. cylindrica*

3. Branches with no narrow constrictions 4

4. Branches extremely divergent, often arcuated flexous or corymbose ..... 3. *G. arcuata*

4. Branches not arcuate 5

5. Plants ramified only at about half the height of the erect shoots which are divided several times pseudodichotomously and branches grow in a fan-like manner ....4. *G. Fergusonii*

5. Plants not as above 6

6. In transverse section inner cells thin-walled 7

6. In transverse section inner cells thick-walled 8

7. Epidermal cells large and thin, cortical cells layer sharply defined..... ..... 5. *G. bursa-pastoris*

7. Epidermal cells small, inner cells large gradually becoming smaller outwards..... ..... 6. *G. gigas*

8. Habit indefinite, base of branch constricted and branching variable..... ..... 7. *G. verrucosa*

8. Habit tufty to half tufty, branches hardly constricted at the base, branching pinnate divaricately or somewhat corymbose, thallus sometimes flattened..... 8. *G. edulis*

9. Thallus more than 1 cm. wide, usually lobed with blunt or ligulate apices..... .....9. *G. Textorii*

9. Thalli less than 1 cm. wide 10

10. Thalli regularly dichotomous and fastigate with firm cartilaginous consistency.... ..... 10. *G. corticata*

10. Thalli not regularly dichotomous and not with firm cartilaginous consistency..... ..... 11. *G. folilifera*

B. Plants in which the thalli are constricted distinctly 11

11. Thallus with unconstricted branched axis but strongly constricted branchlets..... ..... 12. *G. cacalia*

11. Thallus in which axis and branchlets are distinctly constricted with swollen nodes.... ..... 13. *G. minor*

1. Gracilaria crassa (Harv.) J. Ag.

(Plate XIV, Fig. 6)

Harvey, " Alg. Ceylon exsic., no. 29 "; J. Agardh, Epicrisis, 1876, p. 427; De Toni, Syll. Alg. IV, 1900, p. 439; Weber Van Bosse, Liste des Alg. du Siboga IV, 1928, p. 421; Yamada, Notes on some Jap. Alg. V, 1933, p. 281, pl. 13; fig. 10; Boergesen, Some Mar. Alg. from Ceylon, 1936, p. 86 fig. 8; Some Marine Algae from Mauritius IV, 1953, p. 33; Ohmi, 1958, Species of *Gracilaria* and *Gracilariopsis* p. 25, pl. V, D-E, and Text-fig, II.

The specimens collected at Hikkadua near Galle is very similar to that described as *Corallopsis opuntia* by Svedelius along with figures in his Algen vegetation of Ceylon p. 192-3 and figs. 4 and 5. This specimen does not have the characteristic constrictions of the genus *Corallopsis*. The plant is thick and cartilaginous, thallus terete about 3 mm. thick, succulent, dichotomously branched, the branches are arched and decumbent. When they strike the rocks they develop hapteras and are firmly attached to it. In transverse section the cortex consists of two layers of pigmented cells the outermost ones anticlinally disposed. Elliptical gland cells are present as described by Ohmi. The medullary cells are large and have thin walls making the thallus collapse and giving a canaliculate appearance. They are found growing in the littoral zones in exposed places between the tides. The specimens collected from Puttalam lagoon and Mandativu have a more sinuated thallus with small narrow constrictions here and there. They are irregularly dichotomously divided and the thallus is more cylindrical. According to Boergesen (1952) it is evident that *Corallopsis opuntia* and *Gracilaria crassa* is the same species.

Distribution in Ceylon; Hikkaduwa, Galle, Mandativu, Nainativu, and Puttalam lagoon.

Geog. distribution : Malayan Archipelago, Vietnam, Japan, Mauritius.

2. Gracilaria cylindrica Boergesen

1915, Marine Algae of Dan. West Indies, Vol. II, p. 375-77, figs. 364-365; *Gracilaria Blodgetti* Borg., Some new or little known West Indian Florideae (Bot. Tidsskrift Vol. 30, 1909 p. 18).

Plants reaching a height of 15 cm. or more attached to the substratum by means of a small disc. The main stem is thin near the base and reaches its normal width of 1·5-2 mm. The branches are issued from all sides and branching is irregular with shorter or longer distances between the branches. The cylindrical branches are interrupted by narrowing of the branches at the bases, and constriction in the branches itself is rather common. The branches are similar to the main axis. The branches at first are thin but later reach the normal size of the thallus. The branches do not give off any branchlets but sometimes a few

are observed. It is fleshy and succulent often collapsing completely on drying. In transverse section most of the cells are thin and transparent with very thin walls. They become smaller towards the periphery and are surrounded by a cortical layer of one or two layers of rather thick-walled cells. This specimen was dredged from a depth of about 18 meters.

Distribution in Ceylon : Pearl Bank in the Gulf of Mannar.

Geog. distribution : Danish West Indies.

3. *Gracilaria arcuata* Zanard.

1858, Plant. mar. Rubri enum., p. 265, n.82, t.5, f.2; De Toni, syll. alg. IV, 1900, p. 439; Vol. VI, 1924, p. 252; Okamura, Icon. Jap. Alg. VI. 1931, p. 40, pl. 272; Boergesen, Some Marine Algae from Mauritius III (2) 1943, p. 69, f. 35; Ohmi, 1958, Species of *Gracilaria* and *Gracilariopsis* p. 23, pl. V, A-C, and text fig. 10.

Plants reaching a height of about 10 cm., and 3-4 mm. broad. Fronds cylindrical, irregularly pinnate with branches usually close to each other and some portions appear dichtomous. Branches not constricted at the base, extremely divergent, flexous or corymbose in general outline. Branches are curved and possess secund branches or branches arising from the curved side. In transverse section the cortex consisits of 3 to 4 layers of cells, the outermost two layers are very small, roundish or oblong and pigmented. The third and fourth layer of cells adjoining these are five to six times larger, roundish in shape. The medulla consists of 5-6 layers of roundish cells about 5-9 times the size of the inner cortical cells. Tetraspores are scattered over the entire surface of the frond. Cystocarps and antheridia were not observed in my specimens. Plants brownish red in colour with a membranaceous and fleshy substance.

Distribution in Ceylon : Kankesanthurai, Mandativu.

Geog. distribution : Mauritius, India, Red Sea, Mediterranean Sea, Malayan Archipelago.

4. *Gracilaria Fergusonii* J. Ag.

1901, Spec. Alg. Vol. III, p. 60 ; Boergesen 1938, Journ. of Ind. Botanical Society, Vol. XVII, No. 4, p. 222.

The plants grow in dense tufts reaching a height of about 7 cm. from a more or less expanded disc. Both young and old shoots are given off from the same disc and intermingled. The thallus is cylindrical, occasionally narrowed. The thallus is in the lower region is about 2 mm. in thickness and gradually tapers towards the apex and is about 1.5 mm. in thickness at the upper ends. Apices are broadly rounded. The plants are profusely ramified only at about half the height of the erect shoots. The shoots are divided into three or more branches which in turn are divided several times pseudodichotomously. The branches grow in a fan-like manner in about the same plane and become shorter upwards. In transverse section the medullary layer consist of small thick wall cells of nearly the same size, but at the surface the cells are smaller and oblong. The cortical layer consists of very small cells covered by a cuticle. The plants resemble *Gracilaria crassa*, however their habitat are quite different and further in transverse sections cells of the medullary tissue in *G. crassa* are more than twice that of *G. Fergusonii* and have thin walls.

Distribution in Ceylon : Keerimalai.

Geog. distribution : Indian Ocean.

5. *Gracilaria bursa-pastoris* (Gmel.) Silva

1952, A review of nomenclatural conservation of algae from the point of view of the type method, p. 265 ; Ohmi 1958, The species of *Gracilaria* and *Gracilariopsis* from Japan and adjacent waters, Mem. of Fac. of Fish. Hokk. Univ. Vol. 6, p. 18, Pl. III, C–IV, B, text. fig. 7 ; *Gracilaria compressa* (C. Ag.) Greville, Alg. Brit., 1830, p. 125 ; Harvey, Phyc. Brit. II, 1849, tab. 205 ; J. Ag., Spec. Alg. II, 1852, p. 593 ; Epicrisis, 1876, p. 417 ; De Toni, 1900, Syll. Alg. IV. p. 438 ; Boergesen, 1920, Mar. Alg. Dan. West Ind. p. 374 ; Okamura, Icon. Jap. Alg. V, 1927, p. 160, pl. 242, figs. 5-10 ; Taylor, 1928, Mar. Alg. Florida p. 152 ; *Fucus bursa-pastoris* Gmel., Hist. Fuc. 1768, p. 121, pl. 8, fig. 3.

Fronds erect in tufts 15-30 cm. or more in length, 2-3 mm. thick attenuated at the base and apex, attenuated from the base in a manner between dichotomous and pinnated. Main branches long somewhat curved and gradually tapering to a subulate point. They arise

alternately or subsecundly with patent and rounded axils from unconstricted insertions. In transverse section the frond consists of thin-walled rounded cells covered by a layer or two layers of smaller pigmented cells. The medullary layer consists of 6-7 layers with smaller cells towards the outside gradually becoming larger towards the centre. Cystocarps sessile globo-hemispherical or conical with a prominent oriface. Fronds soft and cartilaginous or membranaceous, fragile adhering to paper on drying. It is closely allied to *Gracilaria verrucosa*. It can be distinguished from *Gracilaria verrucosa* which have regular secund branches, constricted base of the segments and non-dichotomous segments. Cortical cells many more cells than *G. bursa-pastoris* which is made up of thin layer of sharply defined inner cells.

Distribution in Ceylon : Karativu, Delft.

Geog. distribution : Warm Atlantic Ocean, Mediterranean Sea, Great Britain, India and Japan.

6. *Gracilaria gigas* Harvey

Harvey, 1859 Alg. Wright, in Proceed. Amer. Acad. IV, p. 330, n. 24 ; De Toni, 1895, Phyc. Jap., p.28, n. 54 ; 1900, Syll. Alg. IV, p. 454 ; Okamura, Icon. Jap. Alg. V, 1923, p. 1923, p. 159, pl. 241-242, figs. 1-4 ; Segawa, On Mar. Alg. Susaki, Prov. Idzu., 1935, p. 81 ; Ohmi, 1958, Species of *Gracilaria* and *Gracilariopsis*, p. 10, pl. I, E–II, A, and Text. fig. 3.

Fronds solitary or in tufts, cylindrical branches given off on all sides in an alternate and secund manner ; irregularly and sparingly branched at short intervals and furnished with filiform ramuli attenuating into a fine apex. They are thick and fleshy, somewhat translucent, purplish red in colour and reach a height of 20-30 cm. with a diameter of 2-3 mm. In transverse section the cortex consists of 6-8 layers of pigmented cells of which the outermost cells are cuboid in shape and are anticlinally disposed, the inner cortex consists of 3-4 layers of periclinally oblong cells. The cells are thin-walled and the inner cells are larger than the cortical cells. Tetrasporangia are oval or oblong in shape and are scattered over the surface of the frond. The plant closely resembles *G. verrucosa* and a thickened frond of *G. bursa-pastoris*. Unlike *G. verrucosa*, *G. gigas* does not have inner thickened cells. It can be distinguished from *G. bursa-pastoris* which has a layer of large epidermal cells and thin cortical layer sharply defined.

Distribution in Ceylon : Delft.

Geog. distribution : Japan.

7. *Gracilaria verrucosa* (Huds.) Papenfuss

(Plate XIV, Fig. 7)

1950, Review of the genera of algae described by Stackhouse p. 195 ; Ohmi, 1958, Species of *Gracilaria* and *Gracilariopsis*, Mem. Fac. Fish., Hokk. Univ. Vol. 6, No. I, p. 6, Pl. I, A-D, text figs. 1-2 ; *Gracilaria confervoides* (L.) Greville, Alg. Brit., 1830, p. 123 ; Harvey, Phyc. Brit. I, 1846, pl. 65 ; J. Agardh, Spec. Alg. II (2), 1852, p. 587 ; Epicrisis, 1876, p. 413 ; De Toni, Syll. Alg. IV, 1900, p. 431 ; May, 1948, The Algal Genus *Gracilaria* in Australia, C. S. I. R. Bull. No. 235, p. 18 ; Dawson, Northeast Pacif. Gracilariaceae, 1949, p. 13, pl. 15 ; *Fucus confervoides* L., Sp. plant. ed. II, 1763, p. 1629 ; Turner, 1809, Fuc. tab. 84 ; *Fucus verrucosus* Huds. Flora Anglica, 1762, p. 470.

Fronds extremely variable in size and colour and in the habitat in which they are found. Many fronds arise from the same base cylindrical and filiform reaching a height from 8-15 cm. Growth indefinite, branching irregular often secund or dichotomous, branches uniform in width throughout, the plant tapering at the apices, sometimes divided near the bottom into a few simple branches, sometimes almost fastigiate at others dichotomous, smaller branches irregularly scattered either few or numerous, remote or crowded. They are spreading attenuated at both ends. In transverse section the cortex consists of two or three layers of small cells and a thick medullary tissue of round or isodiametric cells. The outermost cortical cells are heavily pigmented and more or less anticlinally elongated. Transition from inner medulla to outer cortex abrupt. The cells of the medulla are thick walled. Cystocarps sessile and hemispherical with a subacute prominent oriface. Tetrasporangia densely scattered over the greatest part of the frond. Colour varies from yellow, green, purple to red. The specimens were found in quiet estuarine waters as well as the open sea and sandy bottom.

Distribution in Ceylon : Trincomalee, Mutur, Mannar, Puttalam lagoon and Jaffna lagoon,

Geog. distribution : Distributed in all the warm seas.

8. *Gracilaria edulis* (Gmelin) Silva

(Plate XIV, Figs. 4, 5)

1952, A review of nomenclatural conservation in the algae from the point of view of the type method, p. 293 ; Ohmi, 1958, Species of *Gracilaria* and *Gracilariopsis*, Mem. Fac. Fish. Hokkaido Univ. Vol. 6, No. 1, p. 16, Pl. III, B, and text fig. 6 ; *Gracilaria lichenoides* (L) Harvey in Lond. Journ. III, p. 445 ; J. Ag., Sp. Alg. II, 1852, p. 558 ; Epicrisis, 1876, p. 412 ; De Toni, Syll. Alg. IV., 1900, p. 430 ; Okamura, Icon. Jap. Alg. VI, 1931, p. 39, pl. 271, figs. 1-5 : May, 1948, C. S. I. R. Bull. 235, p. 27 ; *Fucus edulis* Gmel. Hist. Fuc., 1768, p. 113.

Plants grow in tufts, several branches arising from the base of the plant and most branches arising irregularly from about that level. These branches bear, branchlets so that the upper half of the plant bears more branchlets. Thallus usually terete 2-2·5 mm. in diameter, very rarely flattened reaching a height of 10–30 cm. Branches gradually attenuating to a sharp point. They are irregular often dichotomous and in parts distichous pinnate, sometimes in part secund. In some varieties constrictions are found at the branch insertions. Width of branch varies from 0·5 to 2 mm. but usually about 1·5 mm. becoming narrower towards the apex. In transverse section the medulla is composed of 4-5 layers of large rounded cells bordered by two layers of small peripheral cortical cells. There is a distinct junction between the large central cells and the small peripheral cells. Cystocarps hemispherical with slight beaks at the ostiole. Tetrasporangia ovoid or oblong densely scattered on the surface of the frond. The plants are yellow to green in colour becoming purple on drying. The thallus collapses on drying. *Gracilaria edulis* shows many varieties and are usually found in lagoons. They are also found in the open sea.

Distribution in Ceylon : Puttalam lagoon, Mannar, Mandativu, and Jaffna lagoon.

Geog. distribution : India, Australia, Japan, East Indies, Pacific Ocean.

9. *Gracilaria Textorii* (Suringar) J. Agardh

Sp. Alg. III, I, Epicr., 1876, p. 426 ; De Toni, Syll. Alg. IV, 1900, p. 449 ; Okamura, Illust. Mar. Alg. Jap., I (5), 1901, p. 65, pl. 23 ; Inagaki, Mar. Red. Alg. Oshoro Bay, Hokkaido and its adj. waters, 1933, p. 37, fig. 12 ; Ohmi. Contr. Knowledge of Gracilariaceae from Japan I, 1955, p. 320, pls. 1-6 ; 1958, Species of *Gracilaria* and *Gracilariopsis* p. 40, figs. 20-2, *Sphaerococcus* (Rhodymenia) *Textorii* Suring., Index praecursorius., 1867, p. 259 ; *Gracilaria vivesii* Howe, phyc. Stud. V, 1911, p. 503, pl. 30, 33 ; Dawson. Stud. N. E. Pac. Gracil, 1949, p. 34, pl. 2, figs. 4–6, pl.14, figs. 1–6, pl. 15, figs. 1–6 ; *Gracilaria johnstonii* Set. et Gard. Mar. Alg. in Exped. Calif. Acad. Sci. to Gulf of Calif. in 1921, 1924, p. 752, pl. 22, figs. 11-14, pl. 60 ; Dawson, Mar. Alg. Gulf of Calif., 1944, p. 293 ; *Gracilaria sinicola* Set. et Gard., l.c., 1924, p. 752, pl. 62 *G. vivipara* Set. et Gard., lc. 1924, p. 750, pl. 24 figs., 28, 29, pl. 63.

Plants reaching a height of 10 cm. or more attached to the substratum by a disc. Stem cylindrical expanding into a leaf-like frond. Frond flat coriaceous, dichotomously or palmately lobed with broad linear patent segments whose axils are rounded. Segments 1–3 cm. in width usually ending in a blunt or sometimes in acute or bifid apices. Terminal segments divided repeatedly in a dichotomous manner. Thallus membranous, margin entire, sometimes undulated often provided with proliferous segments. In transverse section inner cells are large and thick-walled, elongated between margins and extremely covered by a few layers of cortical cells. There is an abrupt transition from the large medullary cells to the small cells of the cortex. Occasionally colourless hairs are present on frond surface. Tetrasporangia densely scattered over both surfaces of the frond. Cystocarps hemispherical and densely scattered over both surfaces of the frond. Pericarp thick of many layers of cells. Male fronds not available.

Distribution in Ceylon : Hambantota.

Geog. distribution : Japan, Northeast Pacific.

10. *Gracilaria corticata* J. Ag.

1852 Spec. Alg. II, p. 602 ; Epicr. 1876, p. 423 ; *Rhodomenia corticata* J.Ag. Symbolae in Linnaea, XV, p. 14, 1841 ; Boerg. 1933 Kew Bull. No. 3. p. 124 ; 1936, Some Marine Algae from Ceylon, Ceylon Journal of Science, Vol. XII, Part II,

p. 86; 1938. South Indian Mar. Algal Flora, Ind. Bot. Society Vol. XVII, No. 4, p. 225.

As pointed out by J. G. Agardh and Boergesen the species has a close resemblance to *G. folilifera* and it is rather difficult to separate the two groups. Most of my specimens agree with the description of J. Agardh and I have come across two forms, those having a narrow almost linear thallus and those with broader thallus which probably J. Agardh refers to Harveys Ceylon Algae No. 28. The plant grows in tufts reaching a height of 10 cm. or more. Except for the upper parts they are rigid and cartilaginous. They are regularly di- or tri-partite and the segments are narrow 1–2 mm. wide and in some cases up to 3–4 mm. Apices of segments are acute and sometimes proliferous, proliferations being given off from the apex of the thallus. The characteristic feature is the regularly dichotomous and fastigiate thallus with a firm and cartilaginous consistency.

Distribution in Ceylon: Mount Lavinia, Chilaw, Hambantota, Keerimalai.

Geog. distribution: Indian Ocean, Red Sea.

10a. *Gracilaria corticata* variety *ramalinoides* J. Ag.

(Plate XXX, Fig. 2)

1848, Spec. Alg. II, pt. I, p. 602; Epicrisis 1876, 424; Boergesen 1933, Indian Rhodophyceae Kew Bull. No. 3, p. 124.

The specimens are red in colour growing in tufts up to about 15 cm. high. They are irregularly branched and branches become shorter upwards like short spines. Thallus compressed very cartilaginous. In section inner cells larger with two layers of small cells towards the periphery. My specimens agree with Kuetzing's figure of *Gracilaria spinescens* (Tab. Phycol. XVIII 1868, t.79). This plant is rather common in the northern coast of Ceylon.

Distribution in Ceylon: Keerimalai, Kankesanthurai, Sethukulam.

Geog. distribution: Indian Ocean, Red Sea.

11. *Gracilaria folilifera* (Forssk.) Boergs.

(Plate XXXI, Fig. 2)

1932 in Dansk. Bot. Arkiv. VIII No. 2, p. 7, fig. I; *Fucus filiifer* Forsskal, Fl. Aegypt Arabica p. 191; *Gracilaria multiparita* (Clem.) J. Ag. var. *granatea* 1852, Spec. Alg. 2, p. 600 *Fucus granateus* Turner, 1819, Fuci Hist. Tab. 215.

As mentioned earlier under *G. corticata*, the differentiation of the broad species of *G. corticata* and this species is rather difficult except that in *G. corticata* the thallus is regularly dichotomous and fastigiate with a firm and cartilaginous consistency. My specimen has a close resemblance to the figure of *Fucus granateus* of Turner but not to *Fucus aerginosus*. Fronds numerous from the base reaching a height of about 15 cm. They are repeatedly dichotomously divided or in a palmate manner, margins entire, apex bi- or trifid with short acuminated segments. Thallus narrow at the base gradually becoming broader upwards about 3 mm. in width. Colour green gradually becoming red. Thallus rather thin and membranaceous.

Distribution in Ceylon: Beruwela.

Geog. distribution: Atlantic coasts of Europe and America, Mediterranean Sea, Red Sea, Indian Ocean.

12. *Gracilaria cacalia* (J. Agardh) Dawson

1954, Notes on Pac. mar. Algal, Bull. Southern Acad. of Sciences, Vol. 53, Part 1, p. 2; J. Ag., 1852 Spec. Alg. 2. 583; Epicrisis, 1876, 409; Boergesen, 1934, Kew Bull. No. I, p. 8; *Corallopsis salicornia* Decne. 1841, Plantes Arab. 184.

Plants of moderate size whose lower parts are branched irregularly. Branches slightly or not attenuated at the base. One or two branchlets are given off from the depressions on the summits of branches which are swollen. Branchlets are elongate clavate, narrow at the base and swollen at the apex which in turn are beset with similar but smaller branchlets. Adventitious branchlets are given off occasionally from all parts of the thallus. In transverse section a thick cuticle is present below which are 1–3 layers of small-celled assimilating tissue; the cells in the centre are large and parenchymatous, but the cells next to the periphery are small and contain a few scattered chromatophores.

Distribution in Ceylon: Puttalam lagoon.

Geog. distribution: Red Sea, North coast of Java, Thursday Island, and Indian Ocean.

12. *Gracilaria minor* (Sond.), Comb. nova

(Plate XIV, Figs. 1–3)

Corallopsis minor (Sond.) J. Ag., 1876, Epicrisis p. 409. De Toni, 1897, Syll. Alg. IV, I, p. 459 ; *Corallopsis salicornia* var. *minor* Sond., 1871, Alg. Trop. Austral. p. 24, t. 3, f. 6–11.

Frond stalked below soon becoming constricted and articulated above. Segments 4–6 times the diameter in length ; apex swollen and inflated with 2–6 cystocarps in each segment. I was fortunate in getting a plant with cystocarps in one segment of the plant only. A longitudinal section of the cystocarp showed the characteristic features of the gracilariaceae in that the nutritive filaments extend to the pericarp. As suggested by Dawson (1954) that extreme constriction is insufficient reason for generic segregation, the generic name of the plant is reduced to *Gracilaria*. The plants grow in the same manner as *Gracilaria crassa* and has arch-shaped downwardly bent branches, which when they touch a suitable substratum become fixed, and form dense cushions on rocks.

Distribution in Ceylon : Mandativu and Nainativu.

Geog. distribution : Australia, Holland, Japan.

25. *Gelidiopsis* Schmitz

Key to the species of *Gelidiopsis*

1. Frond filiform flattened above, repeatedly dichotomously branched, fan-shaped in appearance .....1. *Gelidiopsis repens.*

2. Frond uniform cylindrical throughout, slightly irregularly branched .....2. *Gelidiopsis variabilis.*

1. *Gelidiopsis repens* (Kuetz.) Schmitz

1895, in Engler's Bot. Jahrb. XVI, p. 148 ; Weber Van Bosse, Alg. Siboga, p. 425 ; Kuetz. Tab. Phycol. Vol. 18, 1868, pl. 60; *Gelidium acrocarpum* Harvey, Alg. Ceylon No. 34 ; Kuetz. Tab. Phy. Vol. 19, 1869, pl. 23 ; J. Ag. Spec. Alg. Vol. III, 1876, p. 552; Boergesen, 1937, Contrib. S. Ind. Mar. Algal Flora II, p. 321; 1936, Some Mar. Algae from Ceylon p. 81.

Fronds erect and filiform, dichotomously branched several times partly fan-shaped, apex of the segments often narrow. In transverse section the medullary tissue is composed of long thin cells. Cortex cells are rounded, larger cells towards the centre and smaller cells towards the periphery. Tetrasporangia dispersed in the cortex of the branched terminus. Cystocarps oval produced on branch terminals.

Distribution in Ceylon : Hikkadua, Victoria Park (Galle).

Geog. distribution : Indian and Pacific Oceans.

2. *Gelidiopsis variabilis* (Greville) Schmitsz

(Plate XI, Figs. 8–9)

In Engler's Bot. Jahrb. Vol. 21, 1895-6 p. 148 Feldmann J. in Recueil de traveaux, Cryptogamiques dedies a Louis Mangin, Paris, p. 156 ; *Gelidium variabile* (Grev.) J. Ag. Spec. Alg. II, p. 468 ; Kuetzing, 1869, Tab. Phyc. Vol. 19, tab. c and D ; *Gigartina variabilis* Grev. Mscr. in Hb. Hookeri ; Boergesen 1936, Cey. Mar. Alg. p. 81; 1937, Contrib. S. Ind. Mar. Alg. Flora II, p. 321.

Plants of very small size growing in tufts and reaching a height of 3–5 cm. Filaments vary in length from 100μ to 500μ ; fronds terete filiform, branches sub-simple cylindrical, slightly irregularly branched ; tetrasporangia produced on branch terminals which are obtuse. Cystocarps oval and borne on branch terminals.

Distribution in Ceylon : Matara, Beruwela, Galle, Pearl Banks.

Geog. distribution : Indian Ocean.

26. *Ceratodictyon* Zanardini

1. *Ceratodictyon spongiosum* Zanardini

1878, Phyceae papuanae n.8 ; *Spongia cartilaginea*, Esper fide semper Nat. Existenzbed. d. Thiere II, p. 177-191 ; *Marchesettia spongiodes* Hauck, Sopra alc. Alghe dell' Oceano Indiano 1882, p. 3, n. 3, t. III ; Hedwigia, 1889 p. 175.

Fronds irregular, various mode of branching with thin branches, cylindrical, densely entangled and fused with each other. Cells evidently radially arranged, medullary tissue composed of thin long cells. Cortical cells large in the

centre and small towards the periphery; medullary tissue loose, cells of growing apex radially arranged. Branchlet producing cystocarp protrude from the spongy tissue of the frond. Sterile part and fruitiferous part are different in appearance. Tetrasporangia are produced in nemathecia which are inflated. Cystocarps are produced on lateral side of branch. The specimens were collected from a sheltered area.

Distribution in Ceylon: Pungudutivu.

Geog. distribution: Indian Ocean, Pacific Ocean, Japan.

FAMILY 6. SARCODIACEAE KYLIN

Sarcodia J. Agardh

27. *Sarcodia ceylanica* (J. Ag.) Kylin

(Plate XIII, Figs. 6, 7)

1932, Die Florid. Gigartinales, Lund, Avd. 2, Vol. 28, No. 8, p. 56, Pl. 21, fig. 52; *Carpococcus ceylonensis* J. Ag. Analecta Algologica, Cont. V, 1889 p. 46; Boergesen 1937. S. Indian Mar. Algal Flora II, p. 326.

Plants of moderate size 10–20 cm. or more, solitary or tufted arising from a scutate disc with cuneate base, 3–4 times dichotomously branched, thallus irregularly shaped along the margins, segments widely parted with round axils, some broadly linear, others widely cuneate varying from 5–10 mm. to 4–5 cm. in breadth with blunt truncated ligulate or bifid apices. Margin smooth and entire or with wart-like thickenings or papulose processes, often with simple ligulate or once or twice forked, cuneate proliferations, frond very much thickened when old. Tetrasporangia scattered over the entire surface of the frond. In transverse section cortical layer consists of very small cells arranged in vertical rows, and below this is a tissue of cells growing larger and stellate inwards, a filamentous medullary tissue is found in the centre. Numerous cystocarps are developed on both the flat sides of the thallus along or within the margin. Cystocarps subglobular and protrude much.

Distribution in Ceylon: Galle, Hikkaduwa.

Geog. distribution: India, Japan, New Zealand.

ORDER 5. RHODYMENIALES *SCHMITZ*

FAMILY I. CHAMPIACEAE BLIDING

28. *Champia* Desvaux

Key to the species of *Champia*

1. Plants with decumbent branches .....1. *Champia globulifera*

1. Plants in which the branches are not decumbent 2

2. Plants forming globose tufts irregularly branched.....2. *Champia parvula.*

1. *Champia globulifera* Boergesen

1937, Contrib. to study of South Indian Marine Algal Flora Ind. Bot. Society. Vol. XVI, No. 6, p. 330, figs. 5–7.

Plants form dense tufts 5–8 cm. high several shoots given off from a basal disc. Decumbent branches form new discs which gives rise to new tufts. Branches solitary, opposite or verticillate and given off in all directions. Main shoots about 2 mm. in diameter, branches slightly narrower, narrowed at the base and taper slowly towards the upper ends. apex obtuse. Plants clearly constricted at the diaphragms, segments barrel shaped and about as long as broad but generally shorter upward. Structurally composed of two layers of cells, the larger cells of the walls becoming covered more or less completely by a cortical layer composed of rather large cells. Cystocarps globose and scattered on the thallus; tetrasporangia scattered in the walls of the branches.

Distribution in Ceylon: Karativu.

Geog. distribution: Indian Ocean.

2. *Champia parvula* (Ag.) Harvey

1853, Ner. Bor. Amer. Vol. II, p. 76; *Chondria parvula* Ag. 1824, Systema Algarum p. 207; Boergesen, 1937, Contrib. to South Ind. Mar. Alg. Flora II, p. 330.

Plants form dense globose tufts, often intricate 3–10 cm. tall, pinkish brown or greenish in colour. Fronds irregularly branched, branches occasionally somewhat pinnately compounded, mostly alternate branching, branches and ramuli patent, linear ending in a blunt point, hollow segments cask-shaped, tetrasporangia scattered in the segments.

Distribution in Ceylon; Galle.

Geog. distribution: Most warm seas, Bermuda, Florida to Northern Massachusetts.

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ORDER 6. CERMIALES *OLTMANNS*

FAMILY I. CERAMIACEAE (BONNEM.) NAEGELI

29. *Centroceras* Kuetz.

1. *Centroceras clavulatum* (C. Ag.) Montagne

1846, Explor. sc. de l'Algeries, I, p. 140; J. Ag. 1851, Spec. Alg. p. 148 ; 876 Epicrisis p. 108 ; Harvey 1853, Ner. Bor. Amer. Part II, p. 211, tab. 336 ; Boergesen 1915–20, Marine Alg. Danish West Indies, p. 241 ; Taylor, 1928, Marine Algae of Florida p. 189, pl. 28, figs. 6 and 7.

Fronds form loose tufts or clumps attached to the substratum by means of rhizoids. Branching dichotomous, equal or unequal, ultimate dichotomies forcipate. Filaments 50–75μ in diameter ; central axis of large cells surrounded by regular cortex of longitudinally seriate rectangular cells, nodes with prominent spines which are usually two-celled. Tetrasporangia verticillate in the terminal segments of axillary torulose proliferations. Plants found in sheltered places in spongy masses.

Distribution in Ceylon : Mount Lavinia, Keerimalai.

Geog. distribution : Throughout all warm seas.

30. *Ceramium* (Roth) Lyngbye

Key to the species of *Ceramium*

1. Apex of filaments erect and non forcipate .....2.

1. Apex of filaments distinctly incurved .....3.

2. Cortex aggregated at the apex with no bare zones, outer cortical cells of nodal band not separated into two groups by a horizontal line.....1. *Ceramium truncatum*

2. Cortex at apex with bare zones, outer cortical cells of nodal band separated into two groups by a layer of horizontal clear space at about the lower third of the node..... 2. *Ceramium Taylorii.*

3. Nodal cortication showing a series of notably transversely elongated cells ....3. *Ceramium transversale*

3. Nodal cortication with no notable series of transversely elongated cells and plants relatively tall reaching a height of 8 cm..... .....4. *Ceramium strictum.*

1. *Ceramium truncatum* Boergesen

(Plate XV, Fig. 7)

1936, Some marine Algae from Ceylon, Cey. Journ. of Science, Bot. Vol. XII, 1936, p. 91 figs. 11–12.

Plants form dense tufts about a few cm. high on the host plant. It is densely dichotomously branched, apices of filaments erect and not incurved. Cortication in the lower part distinct with no outgrowths from the margin but at the apex cortex aggregated without bare zone. Adult cells 170–180μ high and 80–100μ broad. Parts of axial cells uncovered, shorter than the height of zones. Tetrasporangia occur in transverse or subverticillate rows. Fronds epiphytic on *Gracilaria corticata.*

Distribution in Ceylon : Bambalapitiya, Galle.

Geog. distribution : Indian Ocean.

2. *Ceramium Taylorii* Dawson

(Plate XV, Figs. 1–3, Fig. 8)

1950, A review of *Ceramium* along the Pacific Coast of North America with special reference to its Mexican representatives, Farlowia 4 (I) p.127, Pl.2, fig.13, Pl. 4., figs. 31–33 ; *Ceramium fastigiatum* Harvey, as interpreted by Taylor, 1945, Pac. Mar. Alg. p. 271 (in part) ; Hollenberg., 1948, Notes on Pacific Marine Algae, Madrono 9 (5) ; p.158 as *Ceramium gracillimum* Griffith & Harvey.

Plants are epiphytic attached to the host plant by means of rhizoids from the ventral nodal surface. Plants very small the erect parts about 5 mm. high, 150–180μ below and 60–80μ above in diameter. The alternately branched tips are divergent, non forcipate and slightly incurved when young. Cortical bands about two-third as long as broad separated by internodal spaces about 140–160μ below and 20–40μ above and outer cortical cells of nodal band separated into two groups by a layer of horizontal clear space at about the lower third of the node. The plant was sterile. As described by Dawson *Ceramium fastigiatum* resembles *Ceramium Taylorii* in size habit, and appearance of cortical bands. However they are quite distinct in structure of the cortex. in *C. Taylorii* the cortex is divided by a horizontal line usually in the lower third into two parts in which division does not obscure or disrupt this

line. No such division is observed in *C. fastigiatum*. The plant has a close resemblance to *C. Masonii* in that the number of cell rows in the lower third cortical is one, but the cells are angular and not distinctly horizontally elongated as in *C. Masonii*. The plant was found epiphytic on *Gracilaria corticata*.

Distribution in Ceylon : Mount Lavinia.

Geog. distribution : Baja California, Mexico.

3. *Ceramium transversale* Collins & Harvey

(Plate XV, Figs. 5, 6)

1917 Alg. Bermuda, Proceed. of Amer. Acad. of Arts and Sciences. Vol. 53, p.147, pl.V, figs. 29–31 ; Boergesen 1916, Marine Algae, Danish West Indies Vol. II p. 243 fig. 233 ; H.E. Peterson, Report on Danish Oceonographical expedition 1908–10, Algae p. 14, fig. 5 ; *Ceramium byssoideum* Harv. 1853 ; Ner. Bor. Amer. p. 218.

Plants epiphytic, nodal cortication showing a notable series of transversely elongated cells in the lower portion of each band ; filaments 60–80μ in diameter the branches spreading, lower internodes 6–8 times as long as broad ; tetrasporangia emergent, inflating lower portions of the nodal band, branching chiefly dichotomous. The specimens were found epiphytic on *Pocockiella variegata*.

Distribution in Ceylon : Galle, Kollupitiya.

Geog. distribution : West Indies, Mediterranean Sea, Indian Ocean.

4. *Ceramium strictum* Grev. et Harvey

(Plate XV, Fig. 4)

1849, Phycologia Brit. pl. 334 ; J. Agardh, 1851, Spec. Vol. II, p.123 ; Epicr. 1876, p. 97 ; Boergesen, 1918, Marine Algae, Danish West Indies, p. 243.

Plants grow in tufts up to 8 cm. high ; nodes distinct, branches rather slender, regularly dichotomous with few lateral proliferations, tips of branches forcipitate ; axial cells reach a length up to 400μ, breadth about 100μ. Zones 50–60μ high and 70–120μ broad. Tetraspores arranged verticillately and often developed in the nearly straight summits of the filaments. The specimen was dredged from a depth of 15 feet.

Distribution in Ceylon : Pearl Banks in the Gulf of Mannar.

Geog. distribution : Warmer shores of Atlantic Ocean, Mediterranean Sea and Indian Ocean, North America.

31. *Spyridia* Harvey

Key to the species of *Spyridia*

1. Branches with lateral spines in the upper nodes, branch tips tapered, sometimes recurved or tendriliform but not swollen .....1. *Spyridia filamentosa*

1. Branches with one or more recurved spines on the upper nodes of young branches .....2.

2. Branch tips swollen and often uncinate .....2. *Spyridia aculeata.*

2. Branch tips not swollen with spreading spines.....3. *Spyridia insignis.*

1. *Spyridia filamentosa* (Wulf.) Harvey

1833, in Hooker, Brit. Flora, Vol. II, p. 336 ; 1841 Manual Brit. Alg. p.101 ; Phylogica Britannica, pl. 46 ; 1853, Ner. Bor. Amer. Part II, p. 204 ; Boergesen 1915 Mar. Alg. Dan. West Indies p. 233, fig. 222–226.

Plants bushy attached to the substratum by means of a disc-shaped holdfast. Plants ramified on all sides and have corticated branches and branchlets. Ramuli in some cases have a broad base and taper evenly upwards while in others it is of uniform breadth throughout. They end in attenuate or short spines and in some as long as broad. Individuals bearing cystocarps distinct from those that bear antheridia and have more dense habit. Cystocarp bilobed. Specimens were found entangled with *Hypnea*.

Distribution in Ceylon : Hambantota.

Geog. distribution : West Indies, Atlantic Ocean, Mediterranean Sea, Red Sea, Indian Ocean.

2. *Spyridia aculeata* (Schimp) Kuetz.

1843 Phycologia generalis. p. 377 ; 1849, Spec. Alg. p. 668 ; 1867, Tab. Phyc. Vol. XII, pl. 51, figs. a-b ; J. Agardh J. Spec. Alg. Vol. II, part II, p. 342 ; Epicrisis, 1876, p. 271 ; Harvey, Ner. Bor. Amer. 1853, part II, p. 285.

Plants densely ramified, branchlets and ramuli issue from both sides of the branches giving a feather-like appearance. Thalli terete densely corticated, rarely present in ramuli, cells at base as long as broad; ramuli end in mucronate tip and spines developed below turn downwards.

Distribution in Ceylon: Pearl Banks in the Gulf of Mannar.

Geog. distribution: West Indies, Southern Atlantic shores of Europe, Mediterranean Sea, Red Sea.

3. *Spyridia insignis* J. Ag.

(Plate XVII, Figs. 1, 2)

1851, Spec. II, p. 344; Epicrisis 1876, p. 272; *Spyridia ericoides* Kuetz. in Bot Zeit. 1847, p. 37; Tab. Phycol. 1867, Vol. XII, tab. 52a-b; *Spyridia tetracantha* Kuetz. Tab. Phycol. 1862, Vol. XII, tab. 52d-e; *Bindera insignis* J. Ag. Adversaria. p. 36.

Frond terete, densely ramified branches abruptly tapering towards the base, apex mucronate with 2–4 spines spreading out. I was not able to observe much difference between *Spyridia insignis* J. Ag. and *Spyridia aculeata* (Schimp) Kuetz. except in external appearance.

Distribution in Ceylon: Dondra Head (Matara).

Geog. distribution: India, Africa.

FAMILY 3. DELESSERIACEAE (NAEGELI) SCHMITZ

32. *Caloglossa* (Harvey) J. Agardh

1. *Caloglossa Leprieurii* (Mont.) J. Agardh

1876, Epicrisis p. 499; Erika Post, 1936 Systematische and planzengeographische Notizen zur *Botrychia Caloglossa* Association (Revue Algologique) vol. 9, p. 51; *Delesseria Leprieurii* Mont. in Ann. Sc. Nat. Bot. Ser. 2, Vol. 23, p. 196, tab. V., fig. I: Harvey, 1853, Ner. Bor. Amer. p. 98; Farlow, 1881, Mar. Alg. of New England p. 163.

Plants spreading or tufted, 4–5 cm. across, blades about 2 mm. broad, constricted at the forkings; individual segments lanceolate 4–6 mm. long, sometimes linear, attenuate, more rarely ovate with rhizoids at the constrictions, secondary segments or blades formed here or proliferously from the midrib of the blades.

Distribution in Ceylon: Pearl Banks in the Gulf of Mannar, and near Kelani River.

Geog. distribution: Widely distributed, N. America and Indian Ocean.

FAMILY 4. DASYACEAE ROSENBERG

33. *Dasya* C. Agardh

1. *Dasya naccarioides* Harvey

(Plate XIX, Fig. 1)

In Hooker London Journ. Bot., Vol. 3, p. 432: 1844, Algae Tasmania, London, Journ. of Bot. Vol. III, p. 302; 1847, Ner. Australia Lond. p. 63, t. XXII; 1864, Kuetz. Tab. Phyc. XIV, t. 64.

Frond 20–30 cm. in length or more, cartilaginous shrinking on drying, quite bare of ramuli without numerous undivided elongated lateral branches throughout with second or third series in pinnate or bipinnate manner, ultimate branches are setaceous 6–13 mm. long, erect, patent naked at the base, but upper half densely clothed with flaccid single-tubed jointed ramuli. The ramuli many times dichotomous with patent axils, their lower parts thick with short joints, their upper parts very slender and attenuated with much larger joints. Stichidia borne on the ramuli, pedicellate ovate acute or mucronate. Colour of frond pale red.

Distribution in Ceylon: Pearl Banks in the Gulf of Mannar.

Geog. distribution: Australia.

FAMILY 5. RHODOMELACEAE HARVEY

34. *Roschera* Sond.

1. *Roschera glomerulata* (Ag.) Web. Van Bosse

(Plate XIX, Figs. 7–9)

1914, Rhodophyceae Percy Staden Trust Exp. p. 289; Liste Siboga, p. 359; Okamura 1922, Icon. Jap. Alg. Vol. 4, p. 155, tab. 188; Boergesen, in Kew Bull. 1931, p. 17, fig. II *Hutchinsia glomerulata* C. Ag. Sp. Alg. II, 1828, p. 102; *Tolypocladia glomerulata* Schmitz. in Engler Bot. Jahrb, vol. 21, p. 160; Falkenburg, 1901, Rhodomelaceen p. 177 tab. 21, fig. 27–29.

Fronds entangled among other algae. They are erect and laterally branched and have four pericentral cells. Branch of unlimited growth surrounded throughout the whole length with spirally arranged 1/4 alternately branched. Branches of limited growth or lateral branches look like star-shaped glomerules. Branches widely parted or horizontal. Branches which remain short have a small basal part but produce short thorn-like branchlets, from which trichoblasts arise. These are monosiphonous unbranched filaments the cells of which are first short and coloured but gradually the upper ones become colourless and die away. In trichoblasts destined to become androphores the two lowermost cells remain undivided. The upper ones of these elongate forming together with the small one below the stalk of the antheridial strand. The other cells become polysiphonous and after repeated division forms a somewhat oblique oblong body. Plants brownish red in colour.

Distribution in Ceylon : Keerimalai.

Geog. distribution : Indian and Pacific Ocean and Japan.

35. *Leveillea* Decaisne

1. *Leveillea jungermannioides* (Mart. et Hering) Harvey

(Plate XIX, Figs. 12–14)

1855, Some account of Marine Botany in the colony of Western Australia, Trans. act. Irish Acad. Vol. 22, p. 539 ; Boergesen, 1937, Contrib. to S. Indian Mar. Algal Flora II, p. 354., Scagel 1953, Morph. Study of some Dorsiventral Rhodomelaceae, Univ. Cal. Press Vol. 27, No.I, p. 51.

Plants reaching a height of 3–4 cm. consisting of several dorsiventral main axes which are prostrate. They are attached to the substratum by means of holdfasts along the ventral surface of the main axes. Numerous leaf-like branches occur in two longitudinal laterodorsal series along the axes. The determinate branches alternate regularly from side to side along the indeterminate axis and occasionally two consecutive determinate laterals both produce an indeterminate branch. The plant resembles in habit, the jungermanniaceous liverwort. The plant was found growing epiphytically on *Sargassum*.

Distribution in Ceylon : Jaffna lagoon.

Geog. distribution : Red Sea, Indian Ocean, Australia, Japan, New Guinea, Hawaii and Formosa.

36. *Neurymenia* J. Agardh

1. *Neurymenia fraxinifolia* (Mert.) J. Ag.

1803, Sp. II, part 3, p. 1135 ; Falkenberg 1901, Rhodomelaceen des Golfes p. 444, t. 7, figs. 20–29 ; *Delessaria fraxinifolia* Grev. 1830 Alg. Brit. Syn. p. XLVII ; *Dictymenia fraxinifolia* Decaisne 1841 Pl. Arab. p. 174 ; Harvey 1855, Mar. Bot. of Western Australia, Trans. Irish Acad. 22, p. 538; 1858–63, Phyc. Australica tab. CXXIV.

Fronds leaf-like with a distinct midrib and parallel veins attached to a cylindrical stem. Leaves simple or pinnately lobed, linear oblong. Branching takes place by means of similar segments formed repeatedly from both surfaces of the midrib. The lamina becomes decayed in older plants and the midrib becomes a stipe. Stem simple or branched. *Lamina* 8–15 cm. in length and 10–16 mm. broad. Lamina obtuse at the bases, emerginate and rounded at the apices slightly undulated serrated through out ; teeth along the margins spinose with subulate and recurved ramuli, similar processes also arise along the veins and midribs. Stichidia linear or lanceolate, acute shortly stipitate containing a double row of tetrasporangia. Specimens red in colour becoming reddish brown on drying.

Distribution in Ceylon: Galle, Pearl Banks in the Gulf of Mannar.

Geog. distribution : Indian Ocean, Japan, Australia.

37. *Bostrychia* Montagne

1. *Bostrychia tenella* (Vahl) J. Ag.

1863, Spec. gen. II, Pt. 3, p. 869 ; 1897, Anal Algologica cont. IV, p. 83 ; Boergesen, Mar Alg. Dan. West. Ind., Vol. II, p. 300–302 ; 1937 Contrib. Stud. Mar. Alg. Flora, II, p. 351 Falkenberg, 1901, Rhodomelaceen des Golfes von Neapeal, p. 515 ; Post, 1936, Systemische und pflanzengeographische Notizen zur *Bostrychia Calaglossa* Association, Rev. Alg. 9 p. 25 ; *Fucus tenellus* Vahl, Endeel kryptogamiske Planter fra St. Croix (Skr. af Naturl. Selskab. 5 te Bd. Kobenhavn), 1802, p. 45.

Fronds reaching a height of about 2·5 cm, The vegetative parts of thallus filaments are monosiphonous or nearly so but in the fruiting parts they are short and polysiphonous in the lower half portion or even higher. Plant attached to the substratum by means of rhizoids given off from any part of the filaments. It has 6–8 pericentral cells but fewer upwards in the branches. In cross section central and pericentral cells have very thick and stratified walls. Stichidia are formed from the ends of the ramuli and have mostly four, sometimes fewer verticillated sporangia in each segment. Cystocarps placed on summits of side branches. They are spherical and urceolate. The specimens were found in sheltered areas growing on stones and rocks in the lagoons.

Distribution in Ceylon : Jaffna lagoon.

Geog. distribution : widely distributed.

38. *Bryocladia* Schmitz

1. *Bryocladia Thwaitesii* (Harvey) De-Ton

(Plate XVIII, Figs. 1–3)

Polysiphonia Thwaitesii Harvey, " List of Ceylon Algae, n. 15 ; De Toni, 1903, Syll. IV, 968 ; Kuetzing, Tab. Phycol. XIV, 1864, tab. 46, figs. d-g ; Boergesen 1937, Contrib. S. Ind. Mar. Alg. Flora, Ind. Bot. Soc. Vol. XVI, No. 6, p. 349.

Plants grow in tufts reaching a height of 4·5 cm. The bases consist of decumbent creeping filaments felted together and are fixed to the substratum by means of vigorous unicellular rhizoids ending in a flat disc with irregular outlines. Erect shoots are given off from the decumbent creeping filaments which are ramified and bend upwards. The basal filaments and the erect ones are devoid of any cortical layer ; number of pericentral cells vary up to 11 in vigorous filaments. Erect filaments have monopodial growth. In the lower part they are quite unbranched or nearly so with several bare segments between those that carry branches, they become densely ramified higher up. Branches given off from almost every segment and placed in a spiral to the left. Branches are ramified several times. In the lower parts the branches are only a few or absent but placed densely higher up. Side branches are often unbranched and spine-like or provided with a few spiral-like branchlets at the upper ends. Branches curve slightly towards main axis. Tetrasporangia are found in the upper spine like branchlets one in each segment and in a straight line. The specimens were found intermingled with other algae.

Distribution in Ceylon : Wellawatte, Bambalapitiya.

Geog. distribution : Indian Ocean.

39. *Polysiphonia* Greville

1. *Polysiphonia mollis* Hook et Harvey

(Plate XVI, Figs. 9–11)

1842, Ner Australia p. 43 ; Harvey, 1855 Account of Marine Botany of Western Australia p. 539 ; Kuetz., 1849 Sp. p. 823 ; 1863. Tab. Phyc. XIII. t. 88 f. a-c ; J. Ag., 1863, Sp. II, 3, p. 968.

Fronds erect reaching a height of about 15 cm., setaceous at the base and becoming capillary and slender above. Fronds are very much branched the primary branch sub-dichotomous but become inconspicuous, the branches and ramuli are decompounded in an irregular dichotomous manner, the ultimate ramuli simple elongate and erect, patent and fibriliferous. In the lower part of the stem the articulations are short while those of the principal divisions are twice as long as broad. In the smaller branches divisions are shorter. Stem formed of four large tubes surrounding a minute central cavity. The specimen was sterile. It was dredged from a depth of 15 feet. It is closely allied to *P. tongatensis* Harvey, however ramification differs. It is difficult to delimit these two species.

Distribution in Ceylon: Pearl Banks in the Gulf of Mannar.

Geog. distribution : Australia, Tasmania.

40. *Herposiphonia* Naegeli

Key to the species of *Herposiphonia*

1. Main axes or long branches with some of the nodes regularly without a branchlet or a branch rudiment, the apices strongly upcurved, diameter 75–150μ, branchlets generally with 7–8 pericentral cells .....1. *H. secunda.*

2. Main axes or long branches with a branchlet or a branch rudiment from each node, apices of the main branches slightly upcurved, branchlets generally with 12–14 pericentral cells .....2. *H. tenella.*

1. *Herposiphonia secunda* Ag. Naeg.

Boergesen. 1918, Marine Algae Danish West Indies, p. 288–291, and, 1920, p. 469–472, fig. 428 ; Falkenb., 1901, Rhodomelaceen des Golfes, p. 307, pl. 3, fig. II.

Plants form dense felted covers on other algae. Main axes or long branches with some of the nodes regularly without a branchlet or a branch rudiment. The apices strongly upcurved, the diameter 75–150μ, branchlets generally with 7–8 pericentral cells. Number of segments few in the branchlets.

Distribution in Ceylon : Hikkaduwa.

Geog. distribution : Danish West Indies.

2. *Herposiphonia tenella* (Ag.) Naegl.

(Plate XVIII, Figs. 4–6)

Herposiphonia in Schleiden und Nagaeli, Zeichr. f. wissensch Bot., 3–4 Heft. Zurich, 1846, p. 238 ; Falkenberg, 1901, Rhodomelaceen p. 304 ; Boergesen 1918, Mar. Algae Dan. West Ind. Vol. II, p. 286 and 1920, p. 472 figs. 287–8, 430–1 ; 1936, Ceylon Mar. Algae, p.95 ; Okamura, 1932, Icones of Jap. Algae p. 23, Pl. CCLXIV ; Kuetz., 1862 Tab. Phyc. XII, t. 30B.

Plants epiphytes forming dense tufts on other algae. Summits of the decumbent main stem are curved upwards and inwards turning its curved side to the substratum. Segments cut off from the apical cell and younger branchlets begin to grow in a monosiphonous manner and segments are developed into central and pericentral cells. Simple rhizoids are given off from the ventral side of the stem from the foremost end of the pericentral cell of the main stem. Two types of branches are found on the dorsal side. One of indefinite growth which can grow to a main filament like the main stem. The other is a branch of limited growth placed alternately on both sides of the main stem, one on each segment and are placed three segments between those bearing long shoots. The short shoots are more developed than long shoots at first and curled towards the inrolled end of stem. Number of segments in short shoot 10–14 and diameter of stem 50–75μ and the short about 50μ.

Distribution in Ceylon : Bambalapitiya, Mount Lavinia.

Geog. distribution : Mediterranean Sea, Morocco, West Indies, Bermuda, Japan.

41. *Acanthophora* Lamouroux

Key to the species of *Acanthophora*

1. Main axis spineless, tetraspores developed in stichidial ramuli with spines.....1. *Acanthophora spicifera.*

2. Main axis with spines, tetraspores developed on spineless ovate rounded stichidia ..... 2. *Acanthophora Delilei*

1. *Acanthophora spicifera* (Vahl) Boergesen

(Plate XIX, Figs. 2–6)

1918, Some new or little known algae of West Indies p. 259 ; 1818, Mar. Alg. Danish West Indies Vol. II, p. 259, figs. 253–255 ; Kylin, 1954, Die Gattungen der Rhodophyceen p. 582, fig. 441 ; *Acanthophora Thierii* Lamour., 1813, Essai sur les generes p. 44 ; Harvey 1847, Ner. Australia p. 34 (quoad descript), Boergesen, 1936, Algae from Ceylon p. 94.

Plants bushy and erect reaching a height of about 20 cm. Erect filaments are given off from a lobed disc which is irregularly lobed. Spines absent in main filamentous branches. Branchlets arranged spirally upon the filaments. Spines found mostly in upper ends of branchlets, branches issued from the basal cell of the trichoblast. The stiff cylindrical branches have five pericentral cells and a broad cortex, tetrasporangia in short lateral branches. Pericarp urn-shaped sub-sessile in the axil of spine-like branchlet.

Distribution in Ceylon : Keerimalai, Kankesanthurai.

Geog. distribution ; West Indies, Malayan Archipelago, Indian Ocean.

2. *Acanthophora delilei* Lamouroux

(Plate XXXII)

1901, Falkenberg, Rhodomelaceen des Golfes, p. 227, tab. 22, figs. 2, 3 *Cystosira acanthophora* Kuetzing, Tab. Phyc. XV, 75, a–c ; 1843, Phycol. generalis Tab. 52, 4.

Plants erect cylindrical and tall reaching a height of 10–15 cm. with spines on the main stem, attached to the substratum by means of rhizoids. Central axis surrounded by five pericentral cells covered by a soft tissue. The cortical part becomes small-celled towards the surface. Growing apex a little protruded often,

in the apical groove. Tetraspores developed in stichidial ramuli which are spineless ovate and rounded.

Distribution in Ceylon : Mandativu, Karativu.

Geog. distribution : Mediterranean Sea, Black Sea, Red Sea, shores of Somali, Indian Ocean.

42. *Laurencia* Lamouroux

Key to the species of *Laurencia*

1. Surface cells elongated radially and arranged like palisade cells in cross section....2

1. Surface cells neither elongated radially nor arranged like palisade cells in cross section of branchlets 5

2. Branches and branchlets covered very densely sooner or later with very short wart-like ultimate branchlets.....3

2. Branches with branchlets not as above....4

3. When young branchlets very loose, only in age covered densely with wart-like branchlets ..... 1 *L. intermedia*

3. Branches covered with wart-like branchlets even when young ..... 2. *L. papillosa*

4. Branches with branchlets not abundant ultimate branchlets very short....3. *L. paniculata*

5. Fronds not clearly compressed 6

5. Fronds densely compressed 9

6. Lenticular thickening absent, if present very few in the walls of the medullary cells 7

7. Stichidial branchlets compound, fronds not cartilaginous with percurrent axis ..... 4. *L. heterocladia*

7. Stichidial branchlets simple 8

8. Fronda not cartilaginous with percurrent axis ultimate branchlets clavate ....5. *L. obtusa*

8. Fronds not cartilaginous but without percurrent axis, fronds often slightly compound .....6. *L. Poitei*

9. Short tuberculate branchlets profuse and conspicuous .....7. *L. ceylanica*

9. Tuberculate branches present sometimes but not so profusely and conspicuously as in *L. ceylanica* .....8. *L. platyclada*

1. *Laurencia intermedia* Yamada

(Plate XVI, Fig. 7)

1931, Notes on *Laurencia* with special reference to Japan, Univ. Of Calif. Publications, Vol. 16, No. 7, p. 191, Pl. I, fig. c, Pl. II.

Fronds about 5 cm. high, cylindrical, paniculately branched branches are given off in all directions, branches clavate, both branches and branchlets are covered densely with wart-like branchlets. Surface cells in section arranged like palisade cells not projecting. No medullary lenticular thickenings in the walls of the medullary cells, stichidia like the ultimate sterile branchlets. Cystocarps and antheridia are not known.

This plant belcngs to the palisadae and according to Yamada they resemble *L. paniculata* J. Ag. and *L. papillosa* Grev. They resemble *L. paniculata* J. Ag. when young but when they become older the branch and branchlets are covered with wart-like branchlets resembling *L. papillosa* Grev. Since the plant when young does not possess dense wart-like branchlets as in *L. papillosa* Grev. and since *L. paniculata* J. Ag. does not possess dense wart-like branchlets, it is better to place the plant under *L. intermedia* as described by Yamada.

Distribution in Ceylon : Kotegoda (Matara).

Geog. distribution : Japan.

2. *Laurencia papillosa* (Forsskal) Greville

(Plate XVI, Figs. 1–3)

Greville 1830, Alg. Brit. p. 52 ; J. Ag. 1863, Spec. Alg. II, p. 756 ; Kuetzing, 1849, Spec. Alg. p. 665 ; 1865, Tab. Phyc. Vol. 15, pl. 62 ; Boergesen, 1918, Dan. West. Indies, p. 246, fig. 236 ; Yamada 1931, Notes on *Laurencia*, p. 190 ; *Fucus papillosus* Forssk. 1775, Fl. Aegypt. Arab. p. 70.

Plants reaching a height of a few centimeters and attached firmly to the rocks by means of a broad rather thin disc from which several erect branches are given off. Thallus cartilaginous irregularly branched and covered densely with tuberculate branchlets. In transverse section the peripheral cells are radially elongated like palisade cells. In surface view not projecting, cell-walls very thick. No lenticular thickenings in the walls of the medullary ecells.

Distribution in Ceylon : Kankesanturai.

Geog. distribution : Atlantic Ocean, Mediterranean Sea, Red Sea, Sandwich Islands.

3. *Laurencia paniculata* (Agardh) J. Ag.

(Plate XVII, Figs. 3, 4)

1862, Spec. Alg. vol. 2, p. 755 ; 1876, Epicr., p. 651 ; Yamada, 1931, Univ. of Cal. Press, p. 192 ; *Chondria obtusa* var. *paniculata* Agardh, 1822, Spec. Alg., p. 343 ; *Laurencia thuyoides* Kuetzing, 1865, Tab. Phyc. Vol. 15, p. 26, pl. 74, figs. A & B ; *L. paniculata* J. Ag., Boergesen 1936, Cey. Mar. Algae, p. 53 ; 1938, Journ. Ind. Bot. Soc. Vol. XVII, No. 4, p. 230.

The plants reach a height of 5–6 cm. in height, branches few, paniculate pinnate, the ultimate branchlets are short and wart-like disposed very loosely. In transverse section the peripheral surface cells are elongated radially and palisade-like with thick walls.

Distribution in Ceylon : Mandativu, Galle.

Geog. distribution : Indian Ocean, Mediterranean Sea, New Caledonia, Japan, Malayan Archipelago, Adriatic Sea.

4. *Laurencia heterocladia* Harvey

(Plate XVII, Fig. 8)

1854, Account of Marine Botany of the Colony of Western Austr. Trans. Irish Acad., vol. 22, p. 544 ; J. Ag., 1876, Epicr. p. 647 ; Y. Yamada, 1931, Notes on *Laurencia*, Univ. Cal. Press p. 238.

Fronds growing in dense tufts from creeping shoots, terete, rigid and tough, purplish in colour, younger sometimes secundly branched with erect branches and branchlets. The adults usually panicled above, branches issued on all sides, long and spreading, ramuli alternate and spirally inserted. In section peripheral cells not arranged like palisade cells and do not project in surface view. I have not observed any lenticular thickenings in the walls of the medullary cells.

Distribution in Ceylon : Hambantota.

Geog. distribution : Australia, Japan.

5. *Laurencia obtusa* (Huds.) Lamour.

(Plate XVII, Fig. 5)

Essai in Annales du Museum d'Hist. Nat. Vol. 20, 1813, p. 130 ; Greville, 1830, Alg. Brit. p. 111 ; 1849–51, Harvey, 1849, Phyc. Brit. Pl., 148 ; Kuetzing 1849, Spec. Alg. p. 854 ; 1865, Tab. Phyc. Vol. 15, Pl. 54–55 ; J. Ag. 1863 ; Spec. Alg. Vol. 2, p. 750 ; 1876, Epicr. p. 653, Yamada, 1931, Univ. of Cal. Bot. Pub. Vol. 16, p. 222, Pl. 16, figs. a, b, c, Pl. 17, figs. a, b, c, *Fucus obtusus* Hudson, 1778, Flora angl. p. 586, Turner, 1808, Hist Fuc. Pl. 21.

Fronds arising from a small disc with a few root-like fibres. Fronds several arising from the same base, soft and cylindrical, filiform about 1–2 mm. wide, much branched from the base, branches few usually pinnate. In transverse section radially elongated cells are absent and no medullary lenticular thickenings are found in the walls of the medullary cells. According to Yamada who has examined Harvey's Ceylon Algae No. 20 and Ferguson's Ceylon Algae Nos. 159 and 334, as well as Iyengar's collection from Dwarka, the specie has a close resemblance to *L. Okamurai* Yamada but can be easily distinguished as there are lenticular thickenings in *L. Okamurai* Yamada.

Distribution in Ceylon : Hikkaduwa.

Geog. distribution : Atlantic Ocean, Mediterranean Sea.

6. *Laurencia Poitie* (Lamour.) Howe

(Plate XVI, Fig. 8)

1905, Phycological studies II, in Bull. Torr. Bot. Club Vol. 32, p. 583 ; Yamada, 1931, Notes on Laurencia, p. 219, Pl. 15, fig. a ; *Fucus Poitei* Lamour., Disserations sur plus, especes de *Fucus* Agen 1805, p. 63, tab. 31, figs 2–3. *Laurencia gemmifera*, Harvey Nereis Bor. Amer, part II, 1852, p. 73, tab. 18B ; *Laurencia tuberculosa* J. Ag. Spec. Alg. Vol. II, p. III, 1863, p. 760 ; *Laurencia mexicana* Kuetz., Tab-Phycology Vol. XV, 1865, p. 25, tab. 70, figs. c, d.

Fronds growing in loose bundles. Thallus of plant rather cartilaginous, terete fragile flexuous and irregularly branched. Irregular branches very variable in length, pinnate or bipinnate and scattered with small tubercle-like spirally disposed truncate ramuli, secondary branches are given off at a distance of 2–2·5 cm. In transverse section central axis not very distinct. The peripheral cells are round and subquadratic not elongated radially or arranged like palisade cells, and there are no lenticular thickenings in the walls of the medullary cells.

Distribution in Ceylon : Kankesanturai.

Geog. distribution : Britain, West Indies.

7. *Laurencia ceylanica* J. Ag.

(Plate XVII, Figs. 6, 7)

1876, Epicr. p. 660 ; *Laurencia* sp., Harvey's Ceylon Alg. No. 17 ; Yamada, 1931, Notes on *Laurencia*, p. 244, pl. 30, fig. a.

Plants about 3–6 cm. high and 2–3 mm. broad attached to the rocks by a disc-shaped holdfast. They have characteristic short tuberculate ultimate branchlets. Branching takes place from the base as well as above, margin of fertile branches not undulate. In transverse section of the branches surface cells are radially elongated and somewhat palisade-like but in surface view they are quite smooth.

Distribution in Ceylon : Hambantota, Hikkaduwa.

Geog. distribution : Indian Ocean, Japan, Hawaii, Copenhagen.

8. *Laurencia platyclada* Boerg.

(Plate XVI, Figs. 4–6)

1934, Some Ind. Rhodoph. from the shores of the Presidency of Bombay IV, Kew Bullet. No. I, p. 21, fig. 13, Pl. III.

Plants with irregular branching and having a breadth of 1·2–2·5 mm. Thallus broad with irregular ramification and large sessile cystocarps spread over the surface. Sometimes tuberculate branchlets are present. Thallus flat about twice as broad as thick. In section peripheral cells as long as broad, walls being slightly convex. I have not seen any lenticular thickening in the medullary tissue. Stichidial branches are short. The description agrees with that of Boergesen. The specimen resembles *Laurencia flexuosa* Kuetz. but this is much narrower than *L. platyclada* Boer. It has a slight resemblance to *L. ceylanica* J. Ag. in having short tuberculate branchlets but this characteristic is far more numerous in *L. ceylanica* J. Ag.

Distribution in Ceylon : Kankesanturai, Keerimalai.

Geog. distribution : Indian Ocean.

43. *Chondria* C. Agardh

1. *Chondria dasyphylla* (Woodw.) Ag.

(Plate XIX, Figs. 10, 11)

Sp. Alg., p. 350 ; *Fucus dasphyllus* Woodw. in Transact Linn. Soc. II, p. 239, pl. 23, figs. 1–3 ; Harvey, 1853, Ner. Bor Americana, p. 20 ; Farlow, 1881, Mar. Alg. of New England p. 166 ; Taylor, 1928a, Mar. Alg. of Florida p. 170.

Plants bushy reaching a height of about 20 cm., light brownish purple in colour. Many long similar branches are given off from the main branch, main branch 1–2 mm. in diameter, branchlets single or clustered contracted at the base, obtuse, retuse at the apex with conspicuous tufts of trichoblasts, tetrasporangia borne in the tips of fertile branchlets, spermatangial clusters flat, transversely oval developed from a portion of trichoblast. Pericarps lateral the branchlets with short stalk or 2–3 on branchlet.

Distribution in Ceylon : Pearl Banks in the Gulf of Mannar.

Geog. distribution : Widely distributed in warm seas, North America, Japan, Indian Ocean.