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MARINE ALGÆ, RHODOPHYCEÆ, OF THE 'SEALARK' EXPEDITION, COLLECTED BY MR. J. STANLEY GARDINER, M.A.

BY

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(*Communicated by* Prof. J. Stanley Gardiner, M.A., F.R.S., F.L.S.)

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IV. *Marine Algæ*, Rhodophyceæ, *of the 'Sealark' Expedition, collected by Mr. J. Stanley Gardiner, M.A.*

By Mrs. A. Weber-van Bosse, *Ph.D.* (*Communicated by* Professor J. Stanley Gardiner, *M.A., F.R.S., F.L.S.*)

(Plates 12–14 and 1 text-figure.)

Read 5th June, 1913.

I. Introduction.

The algæ treated of in the following paper were collected by Mr. J. Stanley Gardiner during the Percy Sladen Trust Expedition to the Indian Ocean in 1905. It was at first intended that Mrs. A. Gepp should work out the collection, but she handed it over to me, and illness prevented her joining in the work, which we would only have been too glad to carry out together. She had, however, sorted the material before sending it to me.

The collection does not contain all the Rhodophyceæ collected by Mr. Stanley Gardiner; the *Lithothamnia* have been worked out by the late lamented Mr. Foslie. The literature on the algæ of this part of the Indian Ocean is scarce, for besides the paper by Mr. Foslie and the Report on the Chlorophyceæ and Phæophyceæ of the 'Sealark' Expedition by A. Gepp, M.A., F.L.S., and Mrs. E. Gepp, I only know of one paper in which more than a few algæ of this region are mentioned. Mr. Reinbold, in "Meeresalgen der Deutschen Tiefsee-Expedition," mentions 26 species of Rhodophyceæ from Diego Garcia and Mahé, 10 of which have been also collected by Mr. Stanley Gardiner. Besides this paper of Mr. Reinbold, I have found two other short references to algæ from Diego Garcia and the Seychelles. Mr. W. B. Hemsley adds a note on Algæ to his "Report on the Vegetation of Diego Garcia." Of the algæ named only *Dasya indica*, J. Ag., has any interest for us at present; it is the only Red alga mentioned. A note by "J. B." in 'Knowledge' treats only of Myxophyceæ, and may therefore be passed over in silence.

The 'Sealark' collection had special interest for me because I am just publishing, with the aid of Mr. Reinbold, the first part of a list of algæ collected during the 'Siboga' Expedition in the Malay Archipelago. This part contains the Myxophyceæ, Chlorophyceæ, and the Phæophyceæ; the second part, containing the Rhodophyceæ, will, I hope, follow soon. The study of a region so near to the Malay Archipelago afforded me great interest from a phyto-geographical standpoint. It had, however, one drawback; some species found by me in the 'Siboga' collection and recognized as new are also found in the Stanley Gardiner collection, and the faet that the paper on the algæ of the Indian Ocean will appear before the Siboga paper, will diminish the number of novelties in the latter. But this could not be avoided, and I have described the new species as fully as I could; only in one case, when the barren, small fragment could not possibly have been recognized apart from the fertile specimens of the 'Siboga' Expedition, have I referred to the forthcoming paper.

Amongst the algæ of the Indian Ocean I found species of two new genera, *Tapeinodasya* and *Oligocladus*, described for the first time from the Malay Archipelago in 'Les Annales du Jardin botanique de Buitenzorg,' vol. ix. 1910. It afforded me great pleasure to describe these species, which confirm the validity of my new genera. One genus, *Pseudendosiphonia*, is new in the present collection; it is most closely allied to *Endosiphonia*, and yet is so different that it can be easily distinguished; one species, *Dasya indica*, had to be described as a new genus—*Amphisbetema*.

Many of the algæ are barren, and can therefore not be specifically named; others are only fragments. I have given the generic names of all, because I think that, for our knowledge of the geographical distribution, even a generic name may have some value. The collection is rich in novelties; I often hesitated before describing a given alga as new, but when, after careful investigation, I could not identify it with any existing diagnosis, I felt I had no alternative. Of the novelties, which include one genus, 17 species, one variety and one form, 11 are from deep water, 2 from reef and deep water, 7 from reef alone. It may be well to recall here that Mr. and Mrs. Gepp found *Avrainvillea amadelpha* in material from reef and deep water. Many algæ appear to accommodate themselves to both modes of living. The 'Sealark' Expedition had, like the 'Siboga' Expedition, the advantage of the use of a dredge, and several hauls from deep water, where many Rhodophyceæ flourish, have given a rich harvest. The nature of the bottom surrounding the reefs and islands, whence these algæ come, has been treated in detail in the above-mentioned paper by Mr. Foslie. I think it therefore unnecessary to do this again.

The geographical distribution shows that a great resemblance exists between the algological flora of the Indian Ocean and that of the Malay Archipelago as well as that of the east coast of Africa. Of the 26 species found at Mahé and Diego Garcia by the "Deutsche Tiefsee-Expedition," 7 occur also at Dar-es-Salaam, and of the 8 other species collected at Dar-es-Salaam by that expedition 5 are found in the Stanley Gardiner collection *. But it is a puzzle to know how *Cladhymenia oblongifolia* and *Calliblepharis prolifera*, only known hitherto from New Zealand, and *Chondria pusilla*, only known from the West Indies, came to be inhabitants of the present region. It emphasizes the fact that the geographical distribution of algæ is a factor that should always be very carefully considered. The finding of *Peyssonnelia Harveyana*, known only from the Atlantic Ocean at Brest, puzzled me less, because it may be possible that the determination of the barren plant is erroneous. I have therefore queried it.

I have given a list of the localities with the algæ found at each, and a general list of all the Rhodophyceæ collected by Mr. Stanley Gardiner. The systematic observations on the different genera and species conclude the paper.

I wish here to express my sincere thanks to Mr. Stanley Gardiner for entrusting me with his collection, and to Messrs. Gepp and Cotton for the kind help they have given me; and I may perhaps add a word of deep-felt regret that Mrs. Gepp was unable to do her share of the work.

* The number of species common to both regions is probably far greater, for in the recently published paper by Br. Schröder, "Zellpflanzen von Ost-Afrika," Hedwigia, Bd. lii., four more species are mentioned, also found in the present collection.

II. List of Localities and Names of the Algæ found at each of them.

Chagos Archipelago: Diego Garcia, Egmont, Salomon, Peros (Île du Coin).

1. *Gelidium crinale* (Turn.), Lamx.; 2. *Gelidiopsis rigida* (Vahl), Web. v. B.; 3. *Hypnea pannosa*, J. Ag.; 4. *Laurencia obtusa* (Huds.), Lamx.; 5. *L. spinulifera*, Kütz.; 6. *L. pygmæa*, n. sp.; 7. *Chondria pumila*, Vick.; 8. *Herposiphonia prorepens* (Harv.), Schm.; 9. *Dasyopsis Geppii*, n. sp.; 10. *D. palmatifida*, n. sp.; 11. *Dictyurus purpurascens*, Bory; 12. *Antithamnion adnatum*, J. Ag.; 13. *Ceramium cinnabarinum* (Gratel.), Hauck; 14. *Reinboldiella Schmitziana* (Reinb.), de Toni; 15. *Peyssonnelia calcea*, Heydr.; 16. *Melobesia callithamnioides*, Falk.; 17. *Amphiroa fragilissima* (Linn.), Lamx.; 18. *Jania tenella*, Kütz.

Coetivy, reef.

1. *Chantransia Liagoræ*, n. sp.; 2. *Liagora orientalis*, J. Ag.; 3. *L. hawaiiana*, Butt.; 4. *Gelidium pannosum*, Grun.; 5. *Champia compressa*, Harv.; 6. *Laurencia obtusa* (Huds.), Lamx.; 7. *L. papillosa* (Forsk.), Grev., f. *australica* in herb. Kütz.; 8. *L. ceylanica*, J. Ag.; 9. *Oligocladus Prainii*, n. sp.; 10. *O. pusillus*, n. sp.; 11. *Dasyopsis aperta*, n. sp.; 12. *D. Geppii*, n. sp.; 13. *D. palmatifida*, n. sp.; 14. *Heterosiphonia* spec., fragment; 15. *Dictyurus purpurascens*, Bory; 16. *Jania tenella*, Kütz.

Seychelles Archipelago (various localities).

1. *Sarconema furcellatum*, Zan.; 2. *Gelidiopsis variabilis* (Grev.), Schm.; 3. *Corallopsis Cacalia*, J. Ag.; 4. *Hypnea Valentiæ*, Turn.; 5. *H. pannosa*, J. Ag.; 6. *Champia* spec.; 7. *Laurencia papillosa* (Forsk.), Grev., f. *australica* in herb. Kütz.; 8. *Acanthophora orientalis*, J. Ag.; 9. *Roschera* (*Tolypiocladia*) *glomerulata* (Ag.), n. comb., fragment; 10. *Peyssonnelia coccinea*, J. Ag.; 11. *P. biradiata*, n. sp.; 12. *Jania tenella*, Kütz.

Mahé, Cap Terné, reef.

1. *Dermonema dichotomum*, Harv.; 2. *Galaxaura fastigiata*, Decne.; 3. *Gelidiopsis rigida* (Vahl), Web. v. B.; 4. *Corallopsis Cacalia*, J. Ag.; 5. *Hypnea pannosa*, J. Ag.; 6. *Acanthophora orientalis*, J. Ag.; 7. *Amphiroa fragilissima* (Linn.), Lamx.; 8. *Jania tenella*, Kütz.

Praslin, reef.

1. *Galaxaura Liebmanni* (Aresch.), Kjellm.; 2. *Gelidiopsis rigida* (Vahl), Web. v. B.; 3. *Hypnea pannosa*, J. Ag.; 4. *Polysiphonia* spec., fragment; 5. *Amphiroa foliacea*, Lamx.; 6. *Jania tenella*, Kütz.

Amirante.

1. *Galaxaura veprecula*, Kjellm.; 2. *Iridæa* spec.; 3. *Polycœlia van Hoevellii*, n. sp., fragment; 4. *Gracilaria compressa* (Ag.), Grev.; 5. *Calliblepharis prolifera* (Harv.), J. Ag.; 6. *Hypnea* spec.; 7. *Champia compressa*, Harv.; 8. *Cœlarthrum Albertisii* (Picc.), Börg.; 9. *Hypoglossum* spec. (*spathulatum*, Kütz.?); 10. *Nitophyllum* spec.,

fragment; 11. *Laurencia ceylanica*, J. Ag.; 12. *Pseudendosiphonia Gardineri*, n. g., n. sp.; 13. *Cladhymenia oblongifolia*, Hook. et Harv.; 14. *Dasyopsis Geppii*, n. sp.; 15. *D. palmatifida*, n. sp.; 16. *Tapeinodasya Ethelæ*, n. sp.; 17. *Dictyurus purpurascens*, Bory; 18. *Griffithsia* spec., fragment; 19. *Cryptonemia seminervis*, J. Ag.; 20. *Peyssonnelia polymorpha* (Zan.), Schm., var. *Gardineri*, n. var.

ALDABRA (collected by J. C. F. Fryer).

1. *Galaxaura hawaiiana*, Butt.; 2. *Hypnea divaricata* (?), Grev.; 3. *H. pannosa*, J. Ag.; 4. *Laurencia nidifica*, J. Ag.; 5. *L. obtusa* (Huds.), Lamx.; 6. *L. papillosa*, (Forsk.), Grev., f. *australica* in herb. Kütz.; 7. *Chondria simpliciuscula*, n. sp.; 8. *Amphisbetema indica* (J. Ag.), n. n.; 9. *Spyridia filamentosa* (Wulf.), Harv., fragment; 10. *Halymenia polyclada*, A. & E. S. Gepp, var. *aldabradensis*, n. var.

SAYA DE MALHA.

1. *Galaxaura fastigiata*, Decne., fragment; 2. *G. obtusata* (Sol.), Lamx., fragment; 3. *Eucheuma Cottonii*, n. sp.; 4. *Fauchea microspora*, Born.; 5. *Gloioderma* (?) *expansa*, n. sp.; 6. *Chylocladia perpusilla*, n. sp.; 7. *Dictyurus purpurascens*, Bory; 8. *Cryptonemia seminervis*, J. Ag.; 9. *Cryptonemia* spec.; 10. *Peyssonnelia coccinea*, J. Ag.; 11. *P. Harveyana* (?), Crouan; 12. *Cruoriopsis cruciata*, Duf.

CARGADOS CARAJOS.

1. *Gloiophlœa articulata*, n. sp.; 2. *Iridæa* spec., fragment; 3. *Eucheuma Cottonii*, n. sp.; 4. *Dasyopsis Stanleyi*, n. sp.; 5. *D. Geppii*, n. sp.; 6. *Heterosiphonia Rendlei*, n. sp.; 7. *Dictyurus purpurascens*, Bory; 8. *Haloplegma Preissii*, Sond.; 9. *Ceramium* spec.

III. Systematic Survey of all the Algæ collected by Mr. J. Stanley Gardiner in the Indian Ocean.

FAMILY.	LOCALITY.	REEF OR LAGOON.	DEPTH.	DISTRIBUTION.
HELMINTHOCLADIACEÆ.				
1. *Chantransia Liagoræ*, n. sp.	Coetivy.	Reef.		
1. *Liagora orientalis*, J. Ag.	Coetivy.	Reef.	.....	Indian Ocean, Ceylon.
2. *Liagora hawaiiana*, Butt.	Coetivy.	Reef.	.....	Pacific Ocean, Laie Point, Koolauloa, Oahu.
1. *Dermonema dichotomum*, Harv.	Mahé, Terné.	Reef.	.....	Ceylon, Malay Archipelago, Formosa.
CHÆTANGIACEÆ.				
1. *Gloiophlœa* (?) *articulata*, n. sp.	Cargados Carajos.	.....	30–45 fms.	
1. *Galaxaura Liebmanni* (Ar.), Kjellm.	Praslin.	Reef.	.....	Gulf of Mexico.
2. *Galaxaura hawaiiana*, Butt.	Aldabra.	Passe Houareau, outside.	.....	Pacific Ocean, French Frigate Shoal, Bird Island.
3. *Galaxaura fastigiata*, Decne.	Mahé, Terné.	Reef.	.....	Pacific Ocean, Philippines; Malay Archipelago.
	Saya de Malha.	.....	Over 26 fms.	
4. *Galaxaura veprecula*, Kjellm.	Amirante.	.....	20–25 fms.	Indian Ocean, Madagascar.
5. *Galaxaura obtusata* (Sol.), Lamx.	Saya de Malha.	.....	26 fms.	Warm Atlantic, West Indies; Pacific Ocean, Loo Choo Isl., Japan.

Family.	Locality.	Reef or Lagoon.	Depth.	Distribution.
Gelidiaceæ.				
1. *Gelidium crinale* (Turn.), Lamx.	Diego Garcia.	Reef.	.....	Mediterranean; Red Sea.
2. *Gelidium pannosum*, Grun.	Coetivy.	Reef.	.....	Ceylon, Friendly Islands, Fiji, Tonga, and Samoa Islands.
Gigartinaceæ.				
1. *Iridæa* spec., ♀	Cargados Carajos.	.....	22 fms.	
	Amirante.	.....	20–25 fms.	
1. *Polycœlia van Hoevellii*, n. sp.	Amirante.	.....	30–100 fms.	Malay Archipelago.
Rhodophyllidaceæ.				
1. *Sarconema furcellatum*, Zan.	Seychelles, Long Isl.	Reef.	.....	Red Sea; Indian Ocean.
1. *Eucheuma Cottonii*, n. sp.	Cargados Carajos.	.....	26 fms.	Many species of *Eucheuma* occur on the east coast of Africa.
	Saya de Malha.	.....	25 fms.	
Sphærococcaceæ.				
1. *Gelidiopsis variabilis* (Grev.), Schm.	Seychelles, Long Isl.	Reef.	.....	Indian Ocean, east coast of Africa.
2. *Gelidiopsis rigida* (Vahl), Web. v. B.	Seychelles, Praslin	Reef.	.....	Tropical seas.
	Diego Garcia.			
	Mahé, Terné.			
1. *Gracilaria compressa* (Ag.), Grev.	Amirante.	.....	25 fms.	Atlantic Ocean; Mediterranean; Gulf of Mexico.
1. *Corallopsis Cacalia*, J. Ag.	Mahé, Terné.	Reef.	.....	Red Sea, east coast of Africa.
	Seychelles, Long Isl.	Reef.		
1. *Calliblepharis prolifera* (Harv.), J. Ag.	Amirante.	.....	25 fms.	New Zealand.
1. *Hypnea divaricata* (?), Grev.	Aldabra.	Lagoon.	.....	Gulf of Mexico; Pacific, Tongatabu.
2. *Hypnea Valentiæ* (Turn.), Mont.	Seychelles, Long Isl.	Reef.	.....	Red Sea; Indian Ocean; Port Denison.
3. *Hypnea pannosa*, J. Ag.	Chagos Archipelago.	Lagoon.	.....	Coast of Mexico; Mauritius; Ceylon; Tonga Archipelago; New Caledonia.
	Aldabra.	Reef.		
	Seychelles.	Reef.		
	Praslin.	Reef.		
	Mahé, Terné.	Reef.		
4. *Hypnea* spec.	Amirante.	.....	25 fms.	
Rhodymeniaceæ.				
1. *Fauchea microspora*, Born.	Saya de Malha.	.....	53 fms.	Mediterranean.
1. *Gloioderma* (?) *expansa*, n. sp.	Saya de Malha.	.....	53–55 fms.	
1. *Champia compressa*, Harv.	Amirante.	.....	20–25 fms.	Cape of Good Hope; Malay Archipelago; Pacific Ocean.
	Coetivy.	Reef.		
2. *Champia* spec.	Seychelles, Long Isl.	Reef.		
1. *Chylocladia perpusilla*, n. sp.	Saya de Malha.	.....	29 fms.	
1. *Cœlarthrum Albertisii* (Picc.), Börg.	Amirante.	.....	20 fms.	Canary Islands; Bermudas; Malay Archipelago.
Delesseriaceæ.				
1. *Hypoglossum* spec.	Amirante.	.....	25 fms.	
1. *Nitophyllum* spec.	Amirante.	.....	25 fms.	
Rhodomelaceæ.				
1. *Laurencia nidifica*, J. Ag.	Aldabra.	Reef.	.....	Sandwich Islands; Malay Archipelago.
2. *Laurencia obtusa* (Huds.), Lamx.	Aldabra.	Reef.	.....	Mediterranean; Fiji Islands; Malay Archipelago.
	Coetivy.			
	Egmont.			
3. *Laurencia papillosa* f. *australica*	Aldabra.	Reef.	.....	New Caledonia.
	Coetivy.	Reef.		
	Seychelles, Long Isl.	Reef.		
4. *Laurencia spinulifera*, Kütz.	Chagos Arch., Diego Garcia.	Reef.	.....	Indian Ocean.
5. *Laurencia pygmæa*, n. sp.	Chagos Arch., Diego Garcia.	Reef.		
6. *Laurencia ceylanica*, J. Ag.	Amirante.	.....	20 fms.	Ceylon; Malay Archipelago.
	Coetivy.	Reef.		
1. *Acanthophora orientalis*, J. Ag.	Mahé, Terné.	Reef.	.....	Zanzibar; Malay Archipelago; North Australia; Tonga Archipelago; Marianne Islands.
	Seychelles, Long Isl.	Reef.		
1. *Pseudendosiphonia Gardineri*, n.g., n.sp.	Amirante.	.....	25 fms.	
1. *Cladhymenia oblongifolia*, Hook. et Harv.	Amirante.	.....	25 fms.	New Zealand.
1. *Chondria pumila*, Vick.	Chagos Arch., Diego Garcia.	Reef.	.....	Barbados.
2. *Chondria simpliciuscula*, n. sp.	Aldabra.	Reef.		

Family.	Locality.	Reef or Lagoon.	Depth.	Distribution.
Rhodomelaceæ (*con.*).				
1. *Polysiphonia* spec.	Praslin.	Reef.		
1. *Roschera glomerulata* (Ag.), n. comb.	Seychelles, Long Isl.	Reef.	.....	[pelago. Zanzibar; Indian Ocean; Malay Archi-
1. *Herposiphonia prorepens* (Harv.), Schm.	Chagos Arch.	.....	.....	Algoa Bay; Western Australia.
1. *Oligocladus Prainii*, n. sp.	Coetivy.	Reef.		
2. *Oligocladus pusillus*, n. sp.	Coetivy.	Reef.		
1. *Dasyopsis Stanleyi*, n. sp.	Cargados Carajos.	.....	30 and 47 fms.	
2. *Dasyopsis aperta*, n. sp.	Coetivy.	Reef.		
	Cargados Carajos.	.....	47 fms.	
3. *Dasyopsis Geppii*, n. sp.	Amirante.	.....	20–25 fms.	
	Cargados Carajos.	.....	25 fms.	
	Coetivy.	Reef.		
	Chagos Arch.			
4. *Dasyopsis palmatifida*, n. sp.	Amirante.	.....	20–25 fms.	Malay Archipelago.
	Coetivy.	Reef.		
	Chagos Arch.			
1. *Tapeinodasya Ethelæ*, n. sp.	Amirante.	.....	20–25 fms.	
1. *Heterosiphonia Rendlei*, n. sp.	Cargados Carajos.	.....	47 fms.	
2. *Heterosiphonia* spec.	Coetivy.	Reef.		
1. *Dictyurus purpurascens*, Bory	Saya de Malha.		55 fms.	Cape Comorin; Indian Ocean, Mauritius, Ceylon; Malay Archipelago; Diego Garcia.
	Coetivy.	Reef.		
	Amirante.		30 fms.	
	Cargados Carajos.		30 and 47 fms.	
	Chagos Arch., Salomon.		22 fms.	
1. *Amphisbetema indica* (J. Ag.)	Aldabra.	Reef.	.....	Diego Garcia.
Ceramiaceæ.				
1. *Griffithsia* spec.	Amirante.	.....	20–25 fms.	
1. *Haloplegma Preissii*, Sond.	Cargados Carajos.	.....	20, 30, and 47 fms.	Western Australia, Tasmania; Malay Archipelago.
1. *Antithamnion adnatum*, J. Ag.	Salomon.	Reef.	.....	New Zealand; Malay Archipelago.
1. *Spyridia filamentosa* (Wulf.), Harv.	Aldabra.	Reef.	.....	Mediterranean; Red Sea; Dar-es-Salaam; Malay Archipelago; West Indies.
1. *Ceramium cinnabarinum* (Gratel.), Hck.	Salomon.	.....	.....	Mediterranean; Malay Archipelago.
2. *Ceramium* spec.	Cargados Carajos.	.....	47 fms.	
1. *Reinboldiella Schmitziana* (Rbd.), de Toni.	Chagos Arch., Egmont, Salomon.	Reef.	.....	Japan; Malay Archipelago.
Grateloupiaceæ.				
1. *Halymenia polyclada*, A. & E. S. Gepp, var. *aldabradensis*, n. v.	Aldabra.	Outer reef.		
1. *Cryptonemia seminervis*, J. Ag.	Amirante.	.....	20–25 fms.	Atlantic; Mediterranean; Red Sea.
	Saya de Malha.	.....	55 fms.	
2. *Cryptonemia* spec.	Saya de Malha.	.....	55 fms.	
Squamariaceæ.				
1. *Peyssonnelia coccinea*, J. Ag.	Seychelles.	.....	31 fms.	West coast of Australia; Malay Archipelago.
	Saya de Malha.	.....	55 fms.	
2. *Peyssonnelia Harveyana* (?), Crouan	Saya de Malha.	.....	55 fms.	Coast of France near Brest.
3. *Peyssonnelia calcea*, Heydr.	Egmont.	Reef.	.....	Tami, near German New Guinea; Malay Archipelago.
	Peros, Coin.			
4. *Peyssonnelia polymorpha* f. *Gardineri*, n. f.	Amirante.	.....	30, 45–60 fms.	
5. *Peyssonnelia biradiata*, n. sp.	Seychelles.	.....	31 fms.	Malay Archipelago.
6. *Peyssonnelia* spec.	Saya de Malha.			
1. *Cruoriopsis cruciata* (?), Duf.	Saya de Malha.	.....	29 fms.	Adriatic; Malay Archipelago.
Corallinaceæ.				
1. *Melobesia callithamnioides*, Falk.	Egmont.	Reef.	.....	Atlantic (?); Mediterranean.
1. *Amphiroa fragilissima*, Lamx.	Chagos Arch.	Reef.	.....	West Indies; Pacific; Malay Archipelago; Dar-es-Salaam.
	Mahé, Cap Terné.	Reef.		
2. *Amphiroa foliacea*, Lamx.	Praslin.	Reef.	.....	Marianne Islands; Malay Archipelago.
1. *Jania tenella*, Kütz.	Coetivy.	Reef.	.....	Malay Archipelago; Gulf of Mexico.
	Seychelles.	Reef.		
	Peros, Coin.	Reef.		
	Praslin.	Reef.		
	Mahé, Cap Terné.	Reef.		

IV. Systematic Account.

Fam. HELMINTHOCLADIACEÆ.

Chantransia (DC.), Schmitz.

1. Chantransia Liagoræ, n. sp.

Thallo endophytico et epiphytico, nano, cæspitibus globosis sparsis Liagoræ insidente, constante e filis hospitem intrantibus et filis erectis. Filis erectis parce ramosis, ramis post monosporangia terminalia delapsa egredientibus; pilis non visis, verisimiliter raris. Monosporangiis aut terminalibus aut lateralibus, pedicello ramoso suffultis, ramis denuo monosporangia ferentibus. Filis latis 6–8–12 μ, articulis 16–20 μ longis. Monosporangiis non maturis; antheridiis et carpogoniis non visis.

Coetivy, reef, on *Liagora hawaiiana*; in alcohol.

This little *Chantransia* forms a small tuft, which penetrates between the horizontal filaments of the *Liagora* and attaches itself at their base. I could detect no creeping filaments in the host plant giving rise to new tufts. It has a height of 1 mm., the axes are sparingly and irregularly branched and bear monospores both at the apex and laterally. After the monospore has fallen off, or perhaps while still *in situ*, the filament or branch that carries it grows out sideways. I also noted clusters of carpospores; these are not arranged in series as in *C. efflorescens*. The filaments have a breadth of 6–8, rarely of 12 μ, and their cells a length of up to 20 μ. On account of the algæ having been first preserved in formalin and afterwards in alcohol, it is difficult to judge the shape of the chromatophore.

I believe that this alga is a new species; there are, so far as I know, only two other species of *Chantransia* on *Liagora*, namely, *Ch. Barbadensis* and *Ch. Nemalionis*, which were found on *Liagora elongata* by Miss Vickers. Our alga differs from both species in the smaller size of its cells and filaments.

Liagora, Lamouroux.

1. Liagora orientalis, J. Ag.

J. Agardh, Analecta algologica, 1896, p. 99.

Coetivy, reef; in alcohol.

Distribution. Indian Ocean, Ceylon.

2. Liagora hawaiiana, Butt.

Butters, "*Liagora* and *Galaxaura*," Minnesota Bot. Studies, vol. iv. part 2, 1911, p. 169.

Coetivy, reef; in alcohol.

Distribution. Laie Point, Koolauloa, Oahu, Pacific Ocean.

Liagora hawaiiana belongs to the group of *Liagoræ* with dichotomously branched fronds. It differs from all known species of this group in having an articulate frond; at the top of the thallus the articulations are inconspicuous, but lower down they are

very distinct. The articulations are at the base of each dichotomy and the internodes are as a rule long.

Dermonema, Greville.

1. Dermonema dichotomum, Harv.

Harvey, Ceylon Algæ, n. 93.
Schmitz u. Hauptfleisch in Engler u. Prantl, Natürl. Pflanzenfam., Teil 1, Abt. 2, 1896, p. 335.
De Toni, Syll. Alg. vol. iv. sect. i. 1897, p. 102.

Terné Mahé; dry specimens.
Distribution. Ceylon; Formosa; Malay Archipelago.

Fam. CHÆTANGIACEÆ.

Gloiophlœa, J. Agardh.

1. Gloiophlœa (?) articulata, n. sp. (Plate 12. fig. 1; Plate 14. figs. 26, 27.)

Frondibus dichotomis, articulatis, usque ad 18 cm. altis, ramulos adventitios ex nodis orientes gerentibus; internodiis cylindraceis, subcompressis, ad basin contractis; internodio terminali apice rotundato. Frondibus constantibus e cylindro centrali filis hyalinis, tenuibus, peripheriam versus excurrentibus contexto. Filis per dichotomiam divisis, stratum periphericum cellularum minimarum moniliformium arcte conjunctarum et cuticula crassa coopertarum formantibus. Organis generationis ignotis.

Cargados Carajos, dry specimen, 30 fms.; in alcohol, 45 fms.

The algæ from Cargados Carajos are barren, the determination is therefore not beyond doubt, but the anatomical structure of these plants is so typical and so like that of the family Chætangiaceæ (Pl. 14. figs. 26, 27) that I should be very much surprised if the organs of fructification should prove these algæ to belong to another family. Amongst the Chætangiaceæ they stand nearest to *Gloiophlœa*. They are distinguished, however, from *Gloiophlœa scinaioides*—the only known species of the genus—by their articulate frond; the internodes are usually—though not always—contracted into a short pedicel-like node, and from this node adventitious branches may spring, but as a rule the branching is dichotomous. The peripheral layer consists of small cortical cells, covered by a rather thick cuticle; these small tightly adhering cortical cells distinguish the genus *Gloiophlœa* from the genus *Scinaia*.

Galaxaura, Lamouroux.

1. Galaxaura Liebmanni (Aresch.), Kjellm.

Areschoug, Phyceæ novæ, in Act. Reg. Soc. Scient. Upsal. ser. 3, vol. i. 1854, p. 356.
Kjellman, "Floridé Slägtet *Galaxaura*," in Kongl. Sv. Vet.-Akad. Handl. Bd. xxxiii. 1900, p. 46.

Praslin, reef; in alcohol.
Distribution. Mexico; Vera Cruz.

Though *Galaxaura Liebmanni* is only known from the West Indian tropical seas, the peculiar structure of the short cortical filaments and the compact outward appearance

of the algæ from Praslin seem to indicate that they belong to *G. Liebmanni* rather than to *G. collabens* from Australia, described by Kjellman as "solitaria, erecta et robusta." The plants from Praslin are short, intricate, and grow close together; the short cortical filaments consist, as a rule, of four cells only, and of these the lower one is by far the largest.

2. GALAXAURA HAWAIIANA, Butt. (Plate 13. fig. 25.)

Butters, "*Liagora* and *Galaxaura*," Minnesota Bot. Studies, vol. iv. part 2, 1911, p. 176.

Aldabra, reef, outside Passi Honakan.

Distribution. Pacific Ocean, French Frigate Shoal, Bird Island.

The algæ from Aldabra are very much like *Galaxaura hawaiiana*, Butt., and the differences between the description of *G. hawaiiana* (I have seen no type specimen) and the algæ from Aldabra are not, I think, sufficiently great to warrant the description of a new species. The algæ from Aldabra are a little longer (they have a length of 7 cm., a breadth of 2 mm.), and the long internodes are not tapering, but rounded or truncate. The frond is slightly but distinctly annulate, and in the dried specimens of a remarkable dark brown-red colour; the anatomical structure is like that of *G. hawaiiana*, Butt. Butters records *G. hawaiiana* from depths of 14–16 and 26 fathoms; the specimens from Aldabra were found at the outside of Passi Honakan. This difference of locality may perhaps account for the small differences observable in the two plants. I have given a figure of the Aldabra plant, which shows very well the long terminal internodes.

3. GALAXAURA FASTIGIATA, Decne.

Decaisne, Sur les Corallines, 1842, p. 16.

Kjellman, "Floridé Slägtet *Galaxaura*," in Kongl. Sv. Vet.-Akad. Handl. Bd. xxxiii. 1900, p. 64.

Terné Mahé; dry specimen.

Saya de Malha; fragment only.

Distribution. Pacific Ocean; Philippines; Malay Archipelago.

4. GALAXAURA VEPRECULA, Kjellm.

Kjellman, "Floridé Slägtet *Galaxaura*," in Kongl. Sv. Vet.-Akad. Handl. Bd. xxxiii. 1900, p. 80.

Amirante, 20–25 fms.; in alcohol.

Distribution. Indian Ocean, Madagascar.

5. GALAXAURA OBTUSATA (Sol.), Lamx.

Solander in Ellis, Zoophytes, 1786, p. 113.

Lamouroux, Polypiers coralligènes, 1816, p. 262.

Agardh, Epicrisis systematis Floridearum, 1876, p. 525.

Saya de Malha, 26 fms.; only a small specimen.

Distribution. Warm Atlantic, West Indies; Pacific Ocean, Loo Choo Islands, Japan.

Fam. GELIDIACEÆ.

Gelidium, Lamouroux.

1. Gelidium crinale (Turn.), Lamx.

De Toni, Syll. Alg. vol. iv. sect. i. 1897, p. 146.
Fucus crinalis, Turner, Hist. Fuc. tab. 198.

Chagos Archipelago, Diego Garcia, in alcohol; no indication of depth.
Distribution. Mediterranean; Red Sea.

2. Gelidium pannosum, Grun.

Grunow, Algen der Fiji, Tonga u. Samoa Inseln, 1874, p. 40.

Coetivy, reef, on a piece of coral; in alcohol.
Distribution. Upolu, Samoa Archipelago; Ceylon; Friendly Islands.

Fam. GIGARTINACEÆ.

Iridæa, Bory.

1. Iridæa spec.

Cargados Carajos, fragment with cystocarps, in alcohol, 22 fms.
Amirante, fragment with tetraspores, in alcohol, 20–25 fms.

The specimens from both localities are too fragmentary to allow of a specific determination, though the tetraspores being scattered among the peripheral cells indicate that the plant belongs to the subgenus *Rhodoglossum*, J. Ag. Both specimens are so alike in anatomical structure and outward appearance that, as far as can be judged from the small fragments, I feel almost certain that they belong to the same species.

Polycœlia, J. Agardh.

1. Polycœlia van Hœvellii, n. sp.

Amirante, 30–100 fms.; in alcohol.
Distribution. Malay Archipelago.

The species is represented in the collection by such a poor and barren fragment that I should have been unable to name it, had it not been for my studies on the rich material collected during the 'Siboga' Expedition in the Malay Archipelago. This alga will therefore be described and figured in the forthcoming paper on the 'Siboga' algæ.

Fam. RHODOPHYLLIDACEÆ.

Sarconema, Zanardini.

1. Sarconema furcellatum, Zan.

Zanardini, Plantæ Mar. Rubro Enum. p. 264.
De Toni, Syll. Alg. vol. iv. sect. i. 1897, p. 367.

Seychelles, Long Island.

Distribution. Red Sea; Indian Ocean.

Eucheuma, J. Agardh.

1. Eucheuma Cottonii, n. sp. (Plate 12. fig. 2.)

Thallo crasso, carnoso, depresso, decumbente, lateraliter et subdichotomice ramoso, latere superiore verrucis et tuberculis aggregatis, latere inferiore tuberculis remotioribus obsito. Verrucis nonnunquam forma irregulari; tuberculis vulgo parvis et rotundis, nonnunquam apiculatis. Regione mediana thalli ad apices e cellulis satis magnis hyphis circumdatis constante, hyphis infra item auctis et cellulas satis magnas formantibus; peripheriam versus cellulis diminutis et ibidem series breves formantibus. Organis fructificationis ignotis.

Saya de Malha, 25 fms.; in alcohol.

Cargados Carajos, 26 fms.; dry specimen.

E. Cottonii is unfortunately a barren plant, and shows, in a dry state, a great likeness to species of *Gracilaria*. I moistened it, to restore as much as possible its natural appearance, and was then struck by its great resemblance to *Eucheuma*. The figures are made from these moistened specimens, and show well the horizontally spread, laterally branched thallus, covered with warts and more or less pointed tubercles. The anatomical structure at the apex is also entirely different from that of *Gracilaria*, though, in a cross-section at some distance from the apex, only round, rather large, and somewhat thick-walled cells are to be seen. But these cells are of different origin to the primary large cells, for at the apex the latter are seen to be surrounded by narrow hyphæ, which grow out lower down into large cells and are then no longer discernible as hyphæ.

The genus *Eucheuma* is described by Schmitz in Engler u. Prantl, 'Pflanzen-Familien,' as having a central axis of slender elongated hyphæ. This axis is found, for instance, in *E. spinosum*. Agardh has, however, called attention to the fact that *E. Schrammi* has a structure in which "fila strati interioris sparsim inter cellulas strati intermedii quasi introducta obveniunt." Schmitz, again, supposes that *E. Schrammi*, Crouan, is not an *Eucheuma* but an *Euryomma*.

My studies on the *Eucheumata* of the Malay Archipelago seem to indicate that there are species of *Eucheuma* without a central axis of longitudinal hyphæ. The investigations are not complete, but it appears to me not improbable that the cylindrical erect species have an axis of narrow cells, and that in the flat prostrate species this is absent. I did not find an axis in any prostrate specimens of *Eucheuma* of which I was able to study the cystocarp. The whole question needs to be further investigated, but for the present it seems highly probable that the algæ from Saya de Malha and Cargados Carajos belong to the genus *Eucheuma*, and the name I propose for it is in kind remembrance of Mr. Cotton's friendly help.

Fam. SPHÆROCOCCACEÆ.

Gelidiopsis, Schmitz.

1. Gelidiopsis variabilis (Grev.), Schmitz.

Schmitz, Marine Florideen von Deutsch Ost-Afrika, in Engler's Bot. Jahrb. Bd. xxi. H. 1, 2, 1895, p. 148.

Seychelles, Long Island, reef.

Distribution. Indian Ocean; East coast of Africa.

2. Gelidiopsis rigida (Vahl), Web. v. B.

Recueil des Travaux botaniques Neérlandais, no. 1, 1905, p. 9.

Fucus rigidus, Vahl, in Naturh. Sellskabets Skrifter, v. p. 46.

Seychelles, reef; dry specimen.

Praslin, reef; dry specimen and in alcohol.

Diego Garcia, reef; dry specimen.

Terné Mahé, reef; dry specimen.

Distribution. Common in tropical seas.

In 1904 I wrote in the above-mentioned paper that it appeared to me that the well-known *Gelidium rigidum* of the tropical seas was not a *Gelidium*, but belonged to the genus *Gelidiopsis*. In 1909 Prof. Okamura gave, in his 'Icones of Japanese Algæ,' pl. lix., a figure of this alga and also of its large apical cell, and named it *Gelidium rigidum*. I had failed to detect this large apical cell, and its absence was one of the reasons why I thought that the alga could not be a *Gelidium*; I had seen no cystocarps. Quite recently, in 'Icones of Japanese Algæ,' vol. ii. No. 10, p. 188, Prof. Okamura has recalled his statement, made before he had seen my paper, and agrees with me in naming *Gelidium rigidum*, *Gelidiopsis rigida*. This alga varies in its ramification, the lateral branches being short or long, or sometimes unilaterally inserted. I believe, however, that these variations are only a form of growth.

Gelidiopsis being a feminine substantive in the Greek language, the adjective should have the feminine ending, and I made an error when I called the alga *Gelidiopsis rigidum* in 1904.

Gracilaria, Greville.

1. Gracilaria compressa (Ag.), Grev.

Agardh, Species Algarum, 1823, p. 308.

Greville, Algæ Britann. 1830, p. 125.

De Toni, Syll. Alg. vol. iv. sect. ii. 1900, p. 438.

Amirante, 25 fms.

Distribution. Atlantic Ocean; Mediterranean; Gulf of Mexico.

The specimen is rather slender for *G. compressa* and scantily branched, but I assume

that the great depth at which it was gathered may in some measure account for this. It bears cystocarps, and these have a little funnel at the top, exactly as in *G. compressa*.

Corallopsis, Greville.

1. Corallopsis Cacalia, J. Ag.

J. Agardh, Epicrisis systematis Floridearum, 1876, p. 409.
De Toni, Syll. Alg. vol. iv. sect. II. 1900, p. 459.

Terné Mahé; dry specimens.
Seychelles, Long Island; dry specimens.
Distribution. Red Sea.

The specimens of the Seychelles are more branched than those of Terné Mahé, still I believe that they belong to the same species; some branches recall those of *C. minor*.

Calliblepharis, Kützing.

1. Calliblepharis prolifera (Harv.), J. Ag. (Plate 12. fig. 3.)

Epicrisis systematis Floridearum, 1876, p. 432.
Rhodymenia prolifera, Harvey, in Flora Nova-Zeelandia, p. 249.

Amirante, 25 fms.; dry specimens.
Distribution. New Zealand.

Harvey described this alga under the name of *Rhodymenia prolifera*, but J. Agardh pointed out that the structure of the cystocarp was unlike that of *Rhodymenia* and similar to that of *Calliblepharis*. The alga differs, however, from the other species of this genus in bearing the cystocarps on the broad part of the thallus and not on special leaflets; Agardh called it therefore *Calliblepharis? prolifera*. As the specimens from Amirante were fertile, I studied the ripe cystocarps; they have the same structure as those of *Calliblepharis*, and I do not think that the absence of special leaflets should be a reason to maintain J. Agardh's note of interrogation.

It is remarkable to find *Calliblepharis prolifera* in Mr. Stanley Gardiner's collection, since it had previously only been found in New Zealand.

Hypnea, Lamouroux.

1. Hypnea (divaricata ?), Grev.

Greville, Alg. Brit. p. lix.
De Toni, Syll. Algarum, vol. iv. sect. II. 1900, p. 478.

Aldabra, fragment only, lagoon; dry specimen.
Distribution. Gulf of Mexico; Mascarenes (?); Tongatabu.

As far as I could judge by the small fragment, the specimen belonged to *H. divaricata*, Grev. It differed from *H. Valentiæ* in the absence of small stellate spines.

2. Hypnea Valentiæ (Turn.), Mont.

Cryptog. Canar. p. 161.
De Toni, Syll. Algarum, vol. iv. sect. II. 1900, p. 479.
Fucus Valentiæ, Turner, Historia Fucorum, 1809, tab. 78.

Seychelles, Long Island; dry specimen.
Distribution. Red Sea, Indian Ocean; Port Denison.

3. Hypnea pannosa, J. Ag.

J. Agardh, Alg. Liebman, p. 14.
Grunow, Algen der Fiji, Samoa u. Tonga Inseln, 1874, p. 39.

Aldabra; dry specimen.
Seychelles, reef; dry specimen.
Praslin; in alcohol.
Chagos Archipelago, Coin Peros, lagoon; in alcohol.
Terné Mahé, reef; dry specimen.
Distribution. Coast of Mexico; Mauritius; Ceylon; Tonga Archipelago; New Caledonia.

Among the specimens from Praslin were some overgrown by a sponge; the branches thus hemmed in were obviously less branched and more cylindrical than the free-growing ones. The specimens from Terné Mahé are exactly like those from Mexico in Kützing's herbarium and figured in Tab. Phyc., Band xviii. tab. 27. The specimens from the other localities are like those gathered by Harvey at the Friendly Islands, No. 44, and by Schmarda on the west coast of Ceylon. There is a difference between Harvey's and Schmarda's specimens, but both being barren I abstained from further examination.

4. Hypnea spec.

Amirante, 25 fms.
An indeterminable specimen, altered perhaps a little in consequence of the great depth at which it grew.

Fam. RHODYMENIACEÆ.

Fauchea, Montagne et Bory.

1. Fauchea microspora, Born.

Bornet in Rodriguez, Algas de las Baleares, 1889, p. 253, et in Bull. Soc. Bot. t. xxxvii. 1890, p. 142.

Saya de Malha, 53 fms.; dry specimens.
Distribution. Mediterranean.
The plants are all barren, but the whole outward appearance of these algæ corresponds so well with the description given by Bornet that I feel no doubt that they belong to this species.

Gloioderma, J. Agardh.

1. Gloioderma (?) expansa, n. sp. (Plate 14. figs. 28, 29.)

Thallo membranaceo, plano, verisimiliter horizontaliter expanso, margine proliferationibus in thallos juveniles excrescentibus. Thallo sæpe anastomosante, constante e strato unico cellularum maximarum centralium, utroque latere duobus stratis cellularum parvarum et uno strata cellularum minimarum peripheriçarum cincto. Cystocarpiis et antheridiis ignotis; tetrasporangiis in strato corticali parum mutato dispersis, cruciatis divisis.

Saya de Malha, 53–55 fms.; dry specimens.

This alga seems to be new to science, and I have referred it to the family of the Rhodymeniaceæ on account of its large central cells placed in one series only. Its outward appearance recalls *Rhodophyllis peltata*, Grun., of the Tonga Archipelago, but it differs from that alga in having only one series of large central cells, whilst all species of *Rhodophyllis* have two series. Amongst the Rhodymeniaceæ it belongs, I think, to the genus *Gloioderma*, because it has very small peripheral cells and cruciate tetrasporangia scattered in the cortical layer, which is, nevertheless, very little changed.

Unfortunately I have seen neither procarps, cystocarps, nor antheridia, and therefore the generic position of the alga remains uncertain. It needs to be further investigated, for it was gathered at a great depth (53–55 fms.), from which few Rhodophyceæ are known.

By its broad, membranous, unbranched frond, which bears excrescences along its margin, and sometimes, though rarely, on the frond itself, this alga is easily distinguished from all other species of *Gloioderma*, as these have mostly a dichotomous or pinnate ramification. The entirely different mode of growth of the alga from Saya de Malha, and the great depth at which it was gathered, almost suggest that it may be the type of a new genus.

Champia, Desvaux.

1. Champia compressa, Harv.

Harvey, Genera South African Plants, ed. 1, p. 402.
De Toni, Syll. Alg. vol. iv. sect. ii. p. 561.

Amirante, 20–25 fms.; small fragment, in alcohol.

Coetivy, reef; dry specimen.

Distribution. Cape of Good Hope; Ceylon; Malay Archipelago; Friendly Islands; Australia (?); New Caledonia.

2. Champia spec.

Seychelles, Long Island, reef; dry specimen.

A small specimen intermingled with *Gelidiopsis variabilis*. The simple main axis bears a few short branches, irregularly placed. Several main branches have grown

together, and cannot be separated without damage. The plant has distinct inflated articulations blunt at both sides, and is certainly different from *Champia compressa*. It strongly recalls *Ch. parvula*, especially the figure given by Kützing in his Tab. Phyc., Band xv. tab. 89, where *Ch. parvula* is figured under the name of *Lomentaria intertexta*. The plant from the Seychelles is, however, very small, having a height of only 1 cm., and it is barren.

Chylocladia, Greville.

1. Chylocladia perpusilla, n. sp. (Plate 12. figs. 4, 5.)

Thallo minusculo, decumbente, ramuloso, cavo, sine diaphragmate; ramo primario interne multis cellulis magnis; ramulis constantibus e strato unico peripherico cellularum magnarum et parvarum secundum quarum latus interne fila ramosa decurrunt, nonnunquam glandulas ferentia. Sporangiis in ramulorum dilatatorum, cavitatem prominentibus, nec in cavernis propriis sitis. Cystocarpiis et antheridiis ignotis. Thallo lato 0·5–0·6 m.

Saya de Malha, creeping on *Udotea*, 29 fms.

This tiny plant was found creeping on *Udotea*, though it did not appear to possess rhizoids. It has a main axis, from which spring slender ramuli, sometimes opposite, but mostly irregular; the specimen is, however, so small that it is impossible to say much as to its ramification. The main axis has a length of 1 cm. and a breadth of 600 μ, the branches have a length of 2–5 mm. The branches are entirely hollow, but the down-growing filaments that are proper to the genus bear glands (?); the main axis is filled with large cells, loosely attached to one another. I could see no diaphragms, neither in the branches nor at the base of the branches; the tetraspores are scattered over the inflated top of some branches; they protrude into the cavity of the branch, but they are not situated in a special hollow, as they are in *Lomentaria*.

On account of the position of the tetraspores and the absence of diaphragms, I believe that this little plant belongs to the genus *Chylocladia*. Its small size characterizes it as a new species.

Cœlarthrum, Börgesen.

1. Cœlarthrum (Albertisii ?) (Picc.), Börg.

"Some new or little-known West Indian Florideæ, II.," in Bot. Tidsskr. Bd. xxx. 1910, p. 189.
Lomentaria Albertisii, Piccone, Alghe in "Crociera del Corsaro," 1884, p. 37.

Amirante, 20 fms.; dry specimen.

Distribution. Canary Islands; Guadeloupe and Bermudas; West Indies; Malay Archipelago.

I think it very probable that the alga from Amirante is *Cœlarthrum Albertisii*, because I found that species amongst the 'Siboga' material. I cannot deny, however, that the specimen has smaller articulations than the type and that I did not see in my

preparations the peculiar glands described by Mr. Börgesen. In how far, however, these differences may depend upon the depth at which the plant was gathered, I do not venture to say. The specimen—and it is only a fragment—gives the impression of being still very young and therefore I wish to be doubly cautious in my opinion as to it.

Fam. DELESSERIACEÆ.

Hypoglossum, Kützing.

1. Hypoglossum spec.

Amirante, 25 fms.; dry specimen.

A fragment; probably *Hypoglossum spathulatum* (Kütz.), J. Ag. (*Delesseria hypoglossoides*, Harvey, Austral. Alg.), but the specimen is too badly preserved to be identified with certainty.

Nitophyllum, Greville.

1. Nitophyllum spec.

Amirante, 25 fms.

Only a poor fragment, attached to other algæ and indeterminable, but with a tetraspore-bearing sorus typical for this genus.

Fam. RHODOMELACEÆ.

Subfam. Laurencieæ.

Laurencia, Lamouroux.

1. Laurencia nidifica, J. Ag.

J. Agardh, Spec. Alg. ii. 1863, p. 749.
De Toni, Syll. Alg. vol. iv. sect. iii. 1903, p. 785.

Aldabra, reef.

Distribution. Sandwich Islands; Malay Archipelago.

2. Laurencia obtusa (Huds.), Lamx.

Essai de classification, p. 42.
De Toni, Syll. Alg. vol. iv. sect. iii. 1903, p. 791.
Fucus obtusus, Hudson, Flora Anglica, ed. iii. p. 586.

Aldabra, reef; dry specimens.

Coetivy, reef; dry specimen.

Egmont, reef and shoal; in alcohol.

Distribution. Mediterranean; Fiji Islands; Malay Archipelago.

Laurencia obtusa is represented by two forms in the Stanley Gardiner collection; from Aldabra there are three packets (nos. 4, 5, 8). No. 4 is the stoutest plant, no. 5 and

no. 8 are more slender, while the alga from Coetivy Reef is very much like specimens in Kützing's herbarium and named *L. obtusa* var. *racemosa*. The specimens from Egmont Reef are rather short, but they probably represent young plants. They show the characteristic branching of the species, and all the branches have blunt truncated apices.

3. LAURENCIA PAPILLOSA (Forsk.), Grev., f. AUSTRALICA, in herb. Kützing.

Aldabra, reef; dry specimen.

Seychelles, Long Island; dry specimen.

Distribution. New Caledonia.

I have been in doubt about these algæ for they differ from typical specimens of *L. papillosa*. They come near to two barren specimens from New Caledonia in Kützing's Herbarium. Mr. Stanley Gardiner's specimens being also barren, I abstained from giving a diagnosis.

4. LAURENCIA SPINULIFERA, Kütz.

Kützing, Tab. Phyc. Bd. xv. 1865, tab. 61, p. 22.

Chagos Archipelago, Diego Garcia; in alcohol.

Distribution. Indian Ocean.

The specimens come near to some forms of *L. obtusa*, but they are distinguished by their small size. I think that until all the forms of *L. obtusa* from the East Indies are better known, we may retain Kützing's species.

5. LAURENCIA PYGMÆA, n. sp. (Plate 12. fig. 6.)

Fronde tereti, filiformi, tenui, circa 1 cm. alta, pulvinatim cæspitosa, intricata; ramis primariis decumbentibus, secundariis erectiusculis; ramulis clavatis, truncatis. Ramis primariis usque ad 250 μ crassis, ramis secundariis et ramulis tetrasporiferis 100–150 μ crassis. Cystocarpiis et antheridiis non visis.

Chagos Archipelago, Diego Garcia, no indication of depth; in alcohol.

Laurencia pygmæa is distinguished by its size, which is indeed dwarf for a *Laurencia*. It grows in tufts, and the alcohol material looks as if it had grown on stones or shells and had been cut off with a knife. The thallus consists of decumbent branches—I have seen no rhizoids—which give off suberect ascending ones; these are branched irregularly. Sometimes the ramuli are subopposite, sometimes subverticillate or even single. They are always slender, and not particularly short as are the ramuli of *L. pannosa*, Zan. From this plant, *L. pygmæa* may also be known by its thalli, which, though intricate, are easily teased out under a pocket-lens, whereas in the case of *L. pannosa* this cannot be done, according to Zanardini, without damaging the frond. The mode of branching reminds me of *L. obtusa*, but the thallus is very slender, the main branches having a diameter of 200–250 μ and the side-branches and tetrasporiferous ramuli from 100–150 μ. Characteristic for this small alga are the swollen light-reflecting lateral membranes of the central cells. From *L. indica*, Hauck, it is easily known by its small size.

6. LAURENCIA CEYLANICA, J. Ag.

J. Agardh, Epicrisis Syst. 1876, p. 660.
De Toni, Syll. Alg. vol. iv. sect. III. 1903, p. 805.

Amirante, at 20 fms.; dried specimen and in alcohol.
Coetivy, reef; in alcohol.
Distribution. Ceylon.

Subfam. CHONDRIEÆ.

ACANTHOPHORA, Lamouroux.

1. ACANTHOPHORA ORIENTALIS, J. Ag.

J. Agardh, Species Algarum, ii. 1863, p. 820.
De Toni, Syll. Alg. vol. iv. sect. III. 1903, p. 822.
Börgesen, "Some new or little-known West Indian Florideæ, II.," in Bot. Tidsskr. Bd. XXX. 1910, p. 201.

Terné Mahé; dry specimen.
Seychelles, Long Island; dry specimen.
Distribution. Zanzibar; Malay Archipelago; North Australia; Tonga Archipelago; Marianne Islands.

Both specimens are full grown and large, but both are barren, and thus a study of the stichidia is out of the question. In a recent paper Mr. Börgesen has called attention to the fact that the name of *A. Thierii* ought to be changed to *A. spicifera* and that the antheridia of *A. orientalis* are very much like those of *A. spicifera*.

PSEUDENDOSIPHONIA, n. g.

Thallus radicibus parvis substrato affixus et verisimiliter horizontaliter expansus, constat ex axi principali, ramis lateralibus incremento infinito et ramis dorsalibus ventralibusque incremento finito. Ad apicem vegetationis axis principalis radiatim se findit; axis principalis postea etiam inferius bilateralis. Axes laterales eodem modo quo axis principalis nascuntur. Thallus formatus e cellula centrali et quatuor cellulis pericentralibus pluribus stratis cellularum corticalium peripheriam versus diminutarum cinctis. Cystocarpia et antheridia ignota. Stichidia in apice pedicelli monosiphonii, sporam unam in singulis segmentis continentia. Pedicellus monosiphonius ramificatus; stichidia nuda.

1. PSEUDENDOSIPHONIA GARDINERI, n. sp. (Plate 13. figs. 13–15; Plate 14. fig. 30.)

Stichidiis sparsis extra axillaribus; ceteroque confer diagnosin generis.
Amirante, 20–25 fms.; in alcohol.

Pseudendosiphonia Gardineri recalls, by its short thorny branches and its stichidia borne on a monosiphonous stalk, the genus *Endosiphonia*. It has, however, a different

habit, having a well defined stem and regularly placed lateral branches, whereas *Endosiphonia* has no definite stem nor regular ramification. Anatomically the genus is characterized by its four big pericentral cells (fig. 30, *p.c.*), surrounded by several layers of cortical cells which are always much smaller. In *Endosiphonia* the four pericentral cells are surrounded by cells of the same size.

The stem of *Pseudendosiphonia* is attached to small flat stones or particles of rock by means of small rhizoids and around it stand four branches with a divergence of $\frac{1}{4}$; they take their origin from the central cell and are therefore endogenous; the lateral ones are of unlimited growth (Langtriebe), the dorsal and ventral ones remain short (Kurztriebe). The lateral branches have the same development as the principal stem, but their side-branches remain at first short and give the plant a thorny appearance that strongly reminds one of *Endosiphonia*. At the top of some branches there are luxuriously developed trichoblasts ("leaves," Falkenberg), but on most they had fallen off, probably because they have so many side-branches and such large cells.

The stichidia bear a great resemblance to those of *Endosiphonia*, particularly to *E. clavigera*, for they are placed irregularly on the stem and branches (Pl. 13. fig. 14) and not in the axils of the latter. They spring from peripheral cells and have a monosiphonous pedicel, but this bears branches, which is not the case with *E. clavigera*. The stichidium itself was bare in all the specimens examined, but I think it likely that the branches of the pedicel may develop further stichidia. I noted at the top of these branches some divided cells that I thought would develop into stichidia, but no later stages were observed. The cells covering the tetraspores in the stichidium are not horizontally disposed as in *Endosiphonia* but are arranged more or less obliquely. It is not certain, however, how far this may change as the sporangium attains maturity. This alga differs from the genus *Endosiphonia* by its habit and anatomical structure, and though nearly related to it, I believe I am justified, on account of these differences, in describing it as a new genus.

I have great pleasure in dedicating this interesting species to Mr. J. Stanley Gardiner.

Cladhymenia, Hooker et Harvey.

1. Cladhymenia oblongifolia, Hook. et Harv. (Plate 12. fig. 7.)

Hooker et Harvey, Alg. Nov. Zel. no. 70.
De Toni, Syll. Alg. vol. iv. sect. iii. 1903, p. 850.

Amirante, 25 fms.; dry specimens and in alcohol.

Distribution. New Zealand.

The specimens from Amirante are small (Pl. 12. fig. 7) but identical with some that I received from Prof. J. Agardh from New Zealand under the name of *Cladhymenia oblongifolia*, var. I think that the small size of the Amirante specimens may be accounted for by the great depth from which they come.

Chondria, C. Agardh.

1. Chondria pumila, Vick. (Plate 12. fig. 8.).

Vickers, "Liste des algues marines de la Barbade," in Ann. d. Sc. Nat. 9me série, Bot. vol. i. p. 45.

Chagos Archipelago, Diego Garcia, no indication of depth; in alcohol.

Distribution. Barbados.

On comparing the *Chondria* from the Chagos Archipelago with *Ch. pumila*, Vick. from Barbados, I could detect no character whereby to distinguish it. I conclude, therefore, that they belong to one species even though the distance between the two localities is very great; but perhaps this minute plant will be detected later in intervening localities. Miss Vickers intended to give a figure, but her untimely death prevented her from carrying out this intention. I have therefore given an illustration of the Chagos plant.

2. Chondria simpliciuscula, n. sp. (Plate 12. figs. 9, 10.)

Thallo filiformi, repente, intricato, pauci ramoso; ramis interdum oppositis, plerumque singulis; apice filorum truncato, cellulis apicalibus in fovea crateriformi immersis. Cellula centrali et quinque cellulis pericentralibus uno aut duobus stratis cellularum corticalium circumdatis. Cellulis peripheriçis desuper visis ad apicem hexagonalibus, in parte inferiore cum pariete undulata et ea re moniliformi. Organis fructificationis non visis.

Aldabra, reef, on *Laurencia papillosa*.

This small species is characterized by its filaments being mostly horizontally disposed, sparingly branched, and bearing the tetrasporangia not in special stichidia but at the apex of ordinary branches, which ultimately may grow out into long vegetative shoots when the formation of tetraspores has ceased.

After having been dried *Ch. simpliciuscula* adhered firmly to the alga on which it had spread itself, but I detected no union between the two plants. It belongs to the section *Cœlochondria*, Falk., as is clearly shown by fig. 10 on Pl. 12.

Polysiphonia, Greville.

1. Polysiphonia spec.

Praslin, reef, on *Hypnea pannosa*.

A fragmentary specimen that I was unable to name.

Roschera, Sonder.

1. Roschera glomerulata (Ag.), n. comb.

Tolypiocladia glomerulata, Schmitz, Marine Florid. von Deutsch Ost-Afrika, 1895, p. 160.

Seychelles, Long Island; dry specimen.

Distribution. Zanzibar; Indian Ocean; Malay Archipelago.

A small fragment, attached to *Gelidiopsis variabilis*. In the 'Siboga' paper I hope to point out that Schmitz was perfectly right, when he supposed that *Roschera africana*, Sonder, and *Tolypiocladia glomerulata* belonged to the same genus. I have therefore made use in this paper of Sonder's older generic name.

Herposiphonia, Naegeli.

1. Herposiphonia prorepens (Harv.), Schm.

Harvey, Phycol. Australica, tab. 185 (B).

Chagos Archipelago.

Distribution. Algoa Bay; Western Australia.

After describing the present plant, Harvey adds: "This alga was first described from Algoa Bay, where it occurs on corallines. The Australian plant is more slender, with fewer tubes, but otherwise the same." The *Herposiphonia* on *Dasyopsis Geppii* has 8 pericentral tubes; it stands therefore nearest to Harvey's Australian form. My material is too scanty to make out whether these forms are specifically distinct from the Algoa plant, as some authors have thought probable.

Oligocladus, Weber-van Bosse.

1. Oligocladus Prainii *, n. sp. (Plate 14. fig. 31.)

Thallo filiformi repente, ramis normaliter dorsaliter exeuntibus, erectis, endogenis, ramulos unilaterales ferentibus. Filo constante ex uno ordine cellularum centrali et ex quattuor ordinibus cellularum pericentralibus. Trichoblasti desunt. Filis latis 120–200 μ, ramulis 12–80 μ. Organis fructificationis ignotis. Rhizoidis unicellularibus.

Coetivy, reef, on *Dasyopsis aperta*; in alcohol.

The alga that I have named *Oligocladus Prainii* belongs to the subfamily of the Herposiphoneæ, and is very nearly allied to the new genus *Oligocladus*, provisionally described in 'Annales du Jardin Botanique de Buitenzorg,' 1910, p. 31. The specimens were found growing among the penicilli of *Dasyopsis aperta* and are barren; the determination is therefore not quite certain, but in anatomical structure these algæ so closely resemble *O. Boldinghii*, Web. v. B., that I feel almost sure that they belong to this genus. I may also add, that in a few long branches I have seen a condensation of protoplasm in two cells of each segment. This reminded me of the two sporangia in each segment in *Oligocladus Boldinghii*, but in the present case I could not detect the slightest trace of division in the protoplasm. They were, however, too young, and I must leave it to future investigators to settle the question.

O. Prainii is a creeping filamentous alga with four pericentral cells, dorsally placed, endogenous branches, and unicellular exogenous ventral rhizoids. Thus far it is like *O. Boldinghii*. It differs from this alga in having no trichoblasts, but a naked, straight

* Named in honour of Sir David Prain, in remembrance of a lovely walk in the Botanical Gardens at Calcutta.

apical cell, and a much denser ramification. The absence of trichoblasts is no reason to separate *O. Prainii* from the genus *Oligocladus*, for in the genus *Polysiphonia* we find species with and without these organs.

The main axis of the plant was attached by means of its long rhizoids to the branches of *Dasyopsis*, and, as may be seen in fig. 31, the youngest part raises itself from its support, grows vertically upwards, though its apex shows a slight curve. The apical cell is rather long and cuts off the segments at its base by a transverse wall. These segments remain undivided for a long time—I have counted eight of them under the apical cell before the pericentral cells are begun to be cut off.

The dorsally placed branches arise irregularly with a distance of 3, 4, 6, 7, 8, 9, and even more segments between them; they bear branches of the second order on the side turned towards the main axis. In some cases I observed near the apex of the main axis long ramified branches alternating with short simple ones, but in later stages I could detect no further difference. Perhaps the long ones bear the tetrasporangia and the short ones remain sterile, but this is a mere suggestion. The first segment of the branches issuing from the main axis has only short pericentral cells; the second segment has pericentral cells of the normal size; all the branches of the first and second orders arise from the central tube. The size of the branches and of the main axis differs considerably according to the place where the measurement is taken. The main axis has a breadth of 120–200 μ; the branches 40–80 μ in the lower parts, but at the top only 12–20 μ; the segments are $1\frac{1}{2}$ times as long as the diameter, and at the top as long as broad.

At the top of the main axis all the branches are arranged on the dorsal side of the filament, but at some distance from the apex their position is sometimes altered; this is the result of a slight twisting of the cells of the main axis.

2. OLIGOCLADUS PUSILLUS, n. sp.

Thallo filiformi, repente; ramis erectis, endogenis, simplicibus, normaliter dorsaliter exeuntibus. Filis constantibus ex uno ordine cellularum centrali et quattuor ordinibus cellularum pericentralibus. Trichoblastis numerosis, filorum apices cingentibus. Filis latis 40–100 μ. Organis fructificationis ignotis. Rhizoidis unicellularibus.

Coetivy, reef, on *Dasyopsis aperta*; in alcohol.

Oligocladus pusillus, on account of the numerous trichoblasts that surround the slightly curved top, stands nearer to *O. Boldinghii* than *O. Prainii*. It is a smaller plant, though its filaments are broader. Its creeping filaments give off side-branches on the dorsal side at a distance of 5, 7, 12, 20 segments and even more. These ascending side-branches remain simple; when, however, they develop into creeping filaments, as occasionally happens, they likewise give off branches on their dorsal side. The creeping branches have a diameter of 100 μ, the side-branches a little less, and at the top of both the diameter sinks to 40 μ. The segments have a height of 80–100 μ, but this sinks at the top to 20 μ and even less.

Organs of fructification have not been observed.

Dasyopsis, Zanardini.

1. Dasyopsis Stanleyi, n. sp. (Plate 13. fig. 16.)

Thallo elongato, subdichotomo, pauce ramoso, penicillis longis, gracilibus cincto; ramificatione radiata, constante e penicillis basim versus deciduis, spinas non relinquentibus. Stichidiis oblongis et cystocarpiis ex penicillis orientibus. Antheridiis non visis. Thallo alto 16 cm. Habitu *Dasyæ elegantis*.

Cargados Carajos, 30 fms.; in alcohol and dry specimens.

To rightly understand the new species of *Dasyopsis*, it may be worth while to give a short account of the characters of the genus. *Dasyopsis* has a sympodial mode of growth; the stem or axis being composed of short branches with definite growth; these are pushed aside by their own first branch, and the distance between the base of the mother-branch and the point of insertion of its first branch varies in different species.

But this is a feature *Dasyopsis* has in common with all Dasyeæ; its special character consists in the absence of true pericentral cells. The cells that surround the central tube are not originally segments of this tube, as in the other Rhodomelaceæ, but they are downward-growing hyphæ, the mother-cell of which is cut off from the branch that is pushed aside when sympodial growth sets in (Pl. 14. fig. 32, *m*). The hyphæ may be of the same diameter as the central cells, in which case they resemble true pericentral cells, but they have quite a different origin. The displaced branches continue to develop, they are shorter or longer, naked or corticated, according to the species, and carry several monosiphonous filaments, the so-called penicillus, at the apex.

Dasyopsis Stanleyi consists of a subdichotomously divided principal axis or stem, carrying at indefinite intervals branches of unlimited growth, which may ramify again and are surrounded at the top by monosiphonous penicilli. This pretty alga so much resembles *Dasya elegans* that I felt at first inclined to take it for that species; after careful examination, however, I discovered that the plant has the characteristic structure of *Dasyopsis*; the branches of definite growth are separated by only one short segment from each other, and grow out in any direction from the main axis. As every branch or so-called penicillus gives off a downward-growing hypha, the central axis soon increases in thickness; true pericentral cells are of course absent.

The penicilli are composed of cells having a breadth of 6–13 μ; their length varies from being almost square at the base to 72 μ at the top. They are very delicate and soon fall off, unless they happen to bear cystocarps or stichidia at their base. The stichidia were very rare in my preparations; I observed only one but unfortunately lost it; I saw, however, that it was long and cuspidate. The cystocarps were numerous in fertile specimens.

2. Dasyopsis aperta, n. sp. (Plate 13. fig. 17; Plate 14. fig. 32.)

Thallo ex axibus principalibus primo surgentibus, postea decumbentibus constante, unde denuo rami adscendentes nascuntur. Apice axis principalis et ramorum penicillis ramulosis, monosiphoniis cincto, penicillorum pilis postea decidentibus, basi

monosiphonio brevi tantummodo restante. Thallo sympodiali, radiato; ramis cum divergentia $\frac{1}{4}$. Primo segmento libero ramorum ad basim satis magnam cellulam incremento basipetali disjungente. Cellulis centralibus magnis, hyphis numerosis angustis cinctis. Stichidiis ramulis penicillorum sessilibus; 8–10 sporas in unoquoque segmento ferentibus. Cystocarpiis et antheridiis ignotis.

Coetivy, reef; in alcohol.

This new *Dasyopsis* attains a height of 2·5 cm., and consists of a small tuft of primary ascending cylindrical axes or stems, that finally become horizontal and give rise to new ascending ones. The tufts, on growing older, become more or less intricate, but I never saw the fronds anastomose. *Dasyopsis aperta* is a good species for the study of the peculiar *Dasyopsis* structure, because the cells are large, even at the apex of the shoot. It is sufficient to spread the alga on the slide and to tear off carefully with a needle the surrounding penicilli to see plainly the row of central cells, each carrying a pushed aside apex and its first branch whose lowest cell builds up the sympodium. These branches stand spirally around the main axis, as far as I could ascertain, with a divergence of $\frac{1}{4}$, and carry long, incurved filaments at their top, which form together the penicillus. The first cell, after the branch has been pushed aside, cuts off a cell at its base (Pl. 14. fig. 32, *m*); this is the mother-cell of the downward growing hyphæ, which are at first almost as large as the cells of the central axis or tube. At the top of a stem or axis, where the mutual position of the different cells is still unaltered, the central tube appears to consist of a central and four pericentral cells, but on following the pseudo-pericentral cells to their origin, it will be clearly seen that they are downward growing hyphæ, arising from the first free cell of the pushed aside branch. The sympodial axis is afterwards covered by a thick layer of smaller hyphæ, which by growing between them alter the original position of the cells.

The stem or main axis is cylindrical, though tapering towards its apex, which is densely covered with penicilli; these, however, soon fall off, and the base of older stems is almost denuded, though not entirely, for remnants of the basal portion of the penicilli often remain.

The sessile stichidia are borne on the side-branches of the penicilli; they are cylindrical and, when the tetrasporangia have acquired their full size, a little torulose. I counted from 6–8 sporangia in different segments; and the whole is crowned by one or two barren cells. Neither cystocarps nor antheridia were seen.

There are, according to Falkenberg *, two other species of *Dasyopsis*, which, like *D. Stanleyi* and *D. aperta*, have penicilli facing every way, namely *Dasyopsis spinella* and *D. cervicornis*. From the first both *D. Stanleyi* and *D. aperta* differ in the absence of the little spines that have given *D. spinella* its specific name, and from *D. cervicornis* in the shape of their stem, cylindrical throughout, not angular at the insertion-point of the penicilli.

* Falkenberg, 'Die Rhodomelaceen des Golfes von Neapel,' 1901, p. 667.

3. Dasyopsis Geppii, n. sp. (Plate 13. figs. 18-20; Plate 14. fig. 33.)

Thallo carnoso, plano, palmato, inciso, horizontaliter expanso, sympodialiter constructo, ad apicem radioso; divergentia ignota. Penicillis lateralibus tantum bene evolutis, dorsalibus et ventralibus aliquamdiu conspicuis, postea evanescentibus. Ramis lateralibus pro parte cum axi principali coalitis. Strato corticali cellularum rotundarum aut angulosarum contiguarum. Antheridiis cylindricis in turmis in facie inferiori thalli sitis. Cystocarpiis et stichidiis ignotis.

Amirante, 20–25 fms.; in alcohol.

Cargados Carajos, 25 fms.

Chagos Archipelago, Solomon Island, no indication of depth; in alcohol.

Coetivy, reef.

Dasyopsis Geppii has a broad, flat, fleshy frond, slightly palmatifid and attached to the substratum by a thick pedicel (Pl. 13. figs. 18, 19). Its outward appearance differs entirely from any known species of *Dasyopsis*, and it is only by the study of the youngest segments of the frond that an insight into its anatomical structure is obtained. This is in principle like that of *Dasyopsis*, but differs in so far as the displaced branches, instead of turning in every direction, as they do in *D. Stanleyi*, spread themselves principally in a bilateral direction and grow congenitally into a leaf-like frond. The penicilli are situated on the margin of this frond, but also on its upper and lower surface; the cells of the filaments have a breadth of 16–28 μ, and a length of 32-88, 100, and 140 μ.

At the top of the different segments the penicilli are so closely packed together, in consequence of the smallness of the cells, that it is impossible to trace the central tube down into the frond or to observe the divergence of the penicilli around its apex (Pl. 14. fig. 33).

Dorsi-ventral organization does exist, though I could not trace it at the apex of the frond. The ventral side, that turned towards the substratum, bears antheridia at the base of old penicilli. The antheridia stand in groups of five and six together (Pl. 13. figs. 19, 20), and are borne on a monosiphonous pedicel. The dorsal side of the frond is barren in all my specimens. The position of the antheridia is interesting, for *D. Geppii* is both a reef and a deep-water plant. If it were only collected on the reef, one might infer that the antheridia kept to the ventral side to ensure protection from the sun, but since these algæ have been found with ventrally placed antheridia, not only on the reef but also in deep water, this explanation does not hold good. Dorsi-ventral organization of any kind was hitherto unknown in *Dasyopsis*.

I have great pleasure in dedicating this alga to my kind friend, Mr. Gepp, of the British Museum.

4. Dasyopsis palmatifida, n. sp. (Plate 13. fig. 21.)

Thallo carnoso, plano, profunde palmatifido, segmentis aut laciniis sæpe terminantibus in filamento cylindrico, substrato bulbo affixo. Segmentis ad apicem radiatis, postea horizontaliter expansis. Penicillis circum apicem thalli bene evolutis, infimis evanescentibus. Penicillis constantibus e filis multo crassioribus quam

penicillis *Dasyopsis Geppii*; filis stichidia in apicibus pedicellorum brevium monosiphoniorum circumdantibus. Stichidiis sporis numerosis. Cystocarpiis et antheridiis ignotis.

Amirante, 20–25 fms.; in alcohol.

Chagos Archipelago, Solomon Island; in alcohol.

Coetivy, reef; in alcohol.

Dasyopsis palmatifida resembles in essential points *D. Geppii*, but its frond is far more deeply palmatifid and the different segments often terminate in a cylindrical branch. These fasten themselves to any hard object and produce at that spot a little tubercle, which much resembles the thick pedicel of *D. Geppii*. I have considered the question whether *D. palmatifida* might not be the stichidia-bearing form of *D. Geppii*, but have been unable to solve it. In addition to its deeply palmatifid frond, *D. palmatifida* differs also from *D. Geppii* in the size of the filaments forming the penicilli; these cells having a length of 104–106 μ and a breadth of 12-20, 36-40 μ. Stichidia with tetrasporangia are borne at the base of the penicilli on monosiphonous pedicels; they have a blunt apex.

Tapeinodasya, Weber-van Bosse.

1. Tapeinodasya Ethelæ, n. sp. (Plate 13. figs. 22, 23.)

Thallo procumbente, constante e sympodio bilaterali; tertio quoque segmento aut ramulum lateralem spinosum incremento finito ferente, aut ramulum lateralem spinosum incremento sympodiali infinito. Ramulis adventitiis præterea ex axillis ramulorum spinosorum emergentibus sed parvis etiam adultis. Axi constante e cellula centrali cum quattuor cellulis pericentralibus; quo numero verumtamen cellularum pericentralium in segmentis sæpe majore ob concrescentiam ramulorum. Axi centrali cellulis corticalibus, peripheriam versus diminutis, cincto. Hyphis numerosis in parietibus inter cellulas pericentrales nascentibus. Organis fructificationis ignotis.

Amirante, 20–25 fms.; dry and in alcohol.

Tapeinodasya Ethelæ is the second known species of this genus; the type, *T. Bornetii*, being described in the 'Recueil des Travaux botaniques Néerlandais,' No. 1, 1904. The plant from Amirante differs in having a less dense ramification, which is, as a rule, bilateral. The branches have the outward appearance of little spines. At the top of the main axis they point outwards in three directions, but immediately below the growing-point the branches stand in two rows. In my preparations the distance between the succeeding branches in the sympodium is three cells, but I should not be surprised if in parts of the frond the distance amounted to only two cells, as in the other species, *T. Bornetii*, the number is known to vary. The branch that is displaced ends in a spine; it is either of definite growth and develops no further, or of indefinite growth, in which case it may give rise to a lateral sympodial branch. The branches grow congenitally with the main axis for one or two segments, and in a cross-section through such a segment a greater number of pericentral cells is visible.

The central cell is surrounded normally by four pericentral cells, but between these other large cells soon appear and numerous hyphæ develop in the membranes. I have not seen them enter the pericentral cells as they do in *T. Bornetii*, but it may be that this takes place in the basal part of the frond. A layer of small cortical cells surrounds the main axis. The latter has a winged appearance on account of the pericentral cells of the spine-like lateral branches growing sideways together with it for a few segments.

Adventitious branches appear occasionally on the dorsal side of the frond in the axil of lateral branches, but they remain short; in *T. Bornetii* these branches attain full development.

The characteristic dorsi-ventral organization of *T. Bornetii* is far less conspicuous in *T. Ethelæ*, and shows itself in barren specimens only in the rudimentary axillary branches. No organs of fructification were present, and it was only because I was familiar with the genus that I was able to name the specimens from Amirante.

Heterosiphonia, Montagne.

1. Heterosiphonia Rendlei, n. sp. (Plate 12. figs. 11, 12.)

Thallo fasciculato, pluribus ramis principalibus e callo basali surgentibus; ramis principalibus totis ecorticatis, pauce ramosis, penicillos ad segmentum quodque secundum, distichos et alternantes gerentibus. Cellulis pericentralibus 7–8–10. Penicillis ramulos unilaterales et stichidia potius obtusa quam acuta ferentibus tetrasporis instructis. Antheridiis et cystocarpiis ignotis. Thallo alto 8 cm.

Cargados Carajos, 47 fms.; dry specimen.

I believe *Heterosiphonia Rendlei* * to be a new species because none exists amongst the *Heterosiphoniæ ecorticatæ* that is exactly like it. It belongs to the small group with more than four pericentral cells, the branches or penicilli of which arise at a distance of two or three segments from each other and are turned regularly to the right and left. *H. Rendlei* stands nearest to *H. subsecundata* (Suhr), Falk., but differs in the pericentral cells not being transversely divided.

The principal axis has a height of about 8 cm.; it is erect and carries small horizontally spread penicilli which have unilateral monosiphonous branchlets incurved at the top. The number of pericentral cells in the main axis varies from 6–10, and the segments are three times as broad as long. In the penicilli the few basal polysiphonous segments are almost as long as broad or a little broader.

I have seen neither cystocarps nor antheridia, only stichidia, which are borne on the side-branches of the penicilli; they are elongated with a blunt apex.

2. Heterosiphonia spec.

Coetivy, reef; dry specimen.

This is a small specimen, 1 cm. high; it grows on *Codium*. I failed to recognize it amongst the described species and yet do not dare to describe it as new.

* Named in honour of Dr. Rendle, Keeper of the Botanical Department of the British Museum, renowned for the kind hospitality that it offers to every visitor.

AMPHISBETEMA, n. g.

Thallus constat e pede crasso rhizomatoideo, unde nascuntur axes erecti, corticati, regulariter sympodii modo compositi e ramis incremento finito conspicue monopodialibus dorso-ventraliter crescentibus. Axis constat ex una cellula centrali et sex cellulis pericentralibus, tribus aut quatuor ordinibus cellularum longitudine cellulæ primariæ pericentralium cinctis; quos ordines stratum corticale crassum e cellulis parenchymaticis fissis compositum cingit. Cystocarpia et antheridia ignota. Stichidia sporis verticillatis, æque ac in *Dasya* non omnino cellulis corticalibus obtectis.

1. AMPHISBETEMA INDICA (J. Ag.). (Plate 13. fig. 24; Plate 14. fig. 34, and text-fig.)

Dasya indica, J. Agardh, Till Alg. Syst. xi. 1890, p. 111.

Diagnosis the same as that of genus.

Aldabra, reef, Passi Honakan, outside; dry specimens.

Distribution. Diego Garcia.

The alga for which I propose the generic name of *Amphisbetema* was described in 1890 by J. Agardh under the name of *Dasya indica*; the structure of the stichidia, almost identical with that of *Dasya*, probably induced this eminent algologist to describe the plant under that name, for he was quite cognisant of the differences in ramification between his alga and other *Dasyæ*. In De Toni's 'Sylloge Algarum,' iv. p. 1146, 1903, *Dasya indica* has received the name of *Wilsonæa* (?) *indica*.

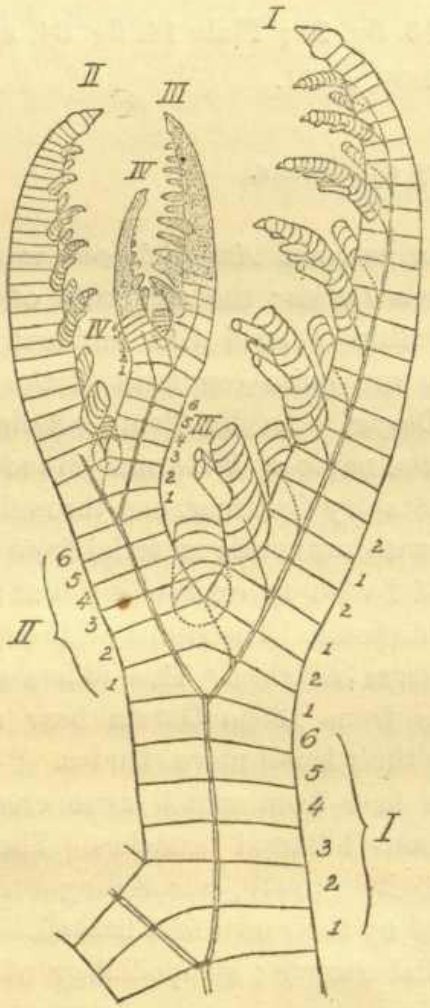
I found this alga in the collection of Mr. Stanley Gardiner, and through the kindness of Sir David Prain I was able to compare it with authentic material from Diego Garcia, now preserved in the Herbarium at Kew, and I wish to express my best thanks to him for so liberally placing this material at my disposal. The study of the type-specimens enabled me to identify my barren material from Aldabra. This differs only from the type in being a little stronger; the algæ from Diego Garcia bear stichidia with tetrasporangia, a fact which may account for their being more slender.

Amphisbetema has a strong rhizome-like base from which arise erect main axes, attaining a height of 8–9 cm., with distichous bilateral branches. These main axes are composed of branches or shoots of definite growth, succeeding each other at a distance of six segments to be then displaced by their own first branch. The branches have, as far as I could make out, monopodial growth; sympodial growth sets in only when each in turn is pushed aside. All the branches have a dorsi-ventral organization; their first branch of the second order is always inserted at a distance of six segments from the base, and all the succeeding ones at a distance of two segments; they stand in two rows on the ventral side of the branch, and only by subsequent growth do they ultimately take their bilateral position. The branches of the second order have the same ramification as the primary ones and are always turned to one side; each principal branch carries as a rule six pairs of branches of the second order; but the nearer to the apex the less do they develop.

After the formation of these six pairs of branches, the vigour of each mother-branch seems to be exhausted. At a distance of three or four cells from the apex,

a segment remains undivided: its contents, balled together, look like a large drop of oil and have a reddish-brown colour. The first segment succeeding this undivided cell may show a division into a central and pericentral cells, the next is undivided, and the ultimate one has usually the shape of a spine. Sometimes the top of a branch is crowned by a simple or ramified monosiphonous filament. I could find no explanation for this difference in development; the monosiphonous filaments are not trichoblasts, nor could any trace of these organs be detected. The large undivided cell, with the cells above it, fall off after a shorter or longer period, and the branch that carried them is blunt in consequence.

Fig. 1.



Schematic figure of apex of *Amphisbetema indica*, showing the sympodial growth of main axis and the monopodial growth of the displaced shoots. After 6 segments shoot I is pushed aside by its first branch, shoot II is also displaced after 6 segments by its first branch, and the other shoots follow in like manner. The displaced shoots carry side-branches at every second segment.

The axes have in each segment a central and six pericentral cells; in the last-formed side-branches this number may sink to four, but as a rule it is six. The pericentral cells, in common with those of *Endosiphonia* and *Melanothamnus*, cut off to the outside cells quite as long as themselves; and this may be repeated several times. In the branches the cells on the dorsal side are a little longer than those on the ventral, but this difference disappears with subsequent growth. The whole central strand is surrounded by a rather thick layer of parenchymatous cells. The peripheral cells are of equal size and elongated longitudinally, not radially as in *Melanothamnus*. Though the cortical layer is pretty

thick, the transverse membranes of the succeeding segments within are plainly visible, owing to the fact that the central strand consists of a large number of cells of equal length. The segments are short, and this fact gives, whenever the apex of a shoot is pushed aside, the impression that the main axis is divided into three branches. Careful examination will, however, show that this impression is erroneous, being brought about by the displaced shoot, its first branch—the new shoot—and its second branch standing very close together, owing to the short segments and the congenital growth of the first two segments.

My plants are barren: J. Agardh, however, described the stichidia, which he stated were like those of *Dasya* and bore verticillately developed tetraspores partially uncovered on the outside.

Amphisbetema has received its name * on account of the difficulty experienced in assigning to it its true systematic position. It has characters in common with several genera of Rhodomelaceæ and also with *Melanothamnus*, Born. et Falk., a genus of uncertain position so long as the organs of fructification remain unknown.

With *Streblocladia*, *Amphisbetema* agrees in the regular alternating mode of monopodial and sympodial growth; with *Melanothamnus* and *Endosiphonia* in the numerous secondary pericentral cells of equal length; with *Heterosiphonia* in the dorsi-ventral organization of its branches; and with *Dasya* in the structure of the stichidia.

The association of all these characters in one genus makes me inclined to consider *Amphisbetema* as an old form of Rhodomelaceæ which existed before the genera that have now developed one or more of the characters—in our new genus still blended together—in their own special way and to the exclusion of the other characters.

Dictyurus, Bory.

1. Dictyurus purpurascens, Bory.

Bory de St. Vincent, in Bélanger, Voy. Indes orient. p. 170.
Falkenberg, Die Rhodomelaceen, 1901, p. 675.
De Toni, Syll. Alg. vol. iv. sect. iii. 1903, p. 1173.

Saya de Malha, 55 fms.; dry specimen.
Coetivy, reef; dry specimen and in alcohol (fragment).
Cargados Carajos, 30 and 47 fms.; dry specimen and in alcohol.
Amirante, 30 fms.; in alcohol.
Chagos Archipelago, Solomon Isl., 22 fms.; in alcohol.

Distribution. Cape Comorin; Coast of India; Mauritius; Ceylon; Malay Archipelago.

Fam. CERAMIACEÆ.

Griffithsia, C. Agardh.

1. Griffithsia spec.

Amirante, 20–25 fms.; in alcohol.
Only a small fragment, but with the characteristic tetraspores of the genus.

* ἀμφισβήτημα, controversy, a point in dispute.

Haloplegma, Montagne.

1. **Haloplegma Preissii**, Sond.

Sonder, Alg. Preiss, p. 24.
Harvey, Phyc. Austr. 1859, tab. 79.
De Toni, Syll. Alg. vol. iv. sect. iii. 1903, p. 1366.

Cargados Carajos, at 22, 30, and 47 fms.; both dry and in alcohol.

Distribution. Western Australia; Tasmania, in the River Tamar above Georgetown; Malay Archipelago.

The specimens of *H. Preissii* from Cargados Carajos are shorter, less branched, and more flabellate than most plants found in the herbaria under that name. I have not ventured, however, to describe these specimens as new, for I have found no microscopic character to distinguish them from the type, the size of the main branches and the peripheral filaments being essentially the same in the different plants. The specimens from Cargados Carajos bear tetraspores; I have not seen cystocarps or antheridia, and it is possible that these may show differences in structure. Dr. Harvey, in his 'Phyc. Australica,' however, calls attention to the fact that the external form of *H. Preissii* is very variable. He found it growing in the River Tamar, a considerable distance above Georgetown, where it appeared at first to be a distinct species; but he was able to trace it down to the Heads of Port Dalrymple, and found that it blended into the usual variety. I feel very much inclined to think that the specimens from Cargados Carajos owe their small size in great measure to the depth at which they were gathered.

Antithamnion, Naegeli.

1. **Antithamnion adnatum**, J. Ag.

J. Agardh, Analecta algologica, 1892, p. 12.

Solomon Island.

Distribution. New Zealand; Malay Archipelago.

A small specimen with tetraspores, attached to *Herposiphonia*.

Spyridia, Harvey.

1. **Spyridia filamentosa** (Wulfen), Harv.

Harvey in Hooker, Brit. Flora, vol. ii. p. 337; Phycol. Brit. 1871, pl. xlvi.

Aldabra reef, outside Passi Honakan.

Distribution. West Indies; Mediterranean; Red Sea; Indian Ocean; Malay Archipelago.

Only a small fragment attached to *Amphisbetema indica*.

Ceramium (Roth), Lyngbye.

1. **Ceramium cinnabarinum** (Gratel.), Hauck.

Hauck, Die Meeresalgen von Deutschland, 1885, p. 112.

Solomon Island.

Distribution. Mediterranean; Malay Archipelago.

A small specimen amongst other Algæ.

2. CERAMIUM spec.

Cargados Carajos, 47 fms.
On *Heterosiphonia Rendlei*; barren specimens.

REINBOLDIELLA, De Toni.

1. REINBOLDIELLA SCHMITZIANA (Reinb.), De Toni.

Phyceæ japon. novæ, 1895, p. 35.
Gloiothamnion Schmitzianum, Reinbold, in Hedwigia, 1895, p. 205.

Chagos Archipelago, Egmont Reef; in alcohol. On *Gelidiopsis*.
Solomon Island. On *Gelidium*.
Distribution. Japan; Malay Archipelago.

Fam. GRATELOUPIACEÆ.

HALYMENIA (C. Ag.), J. Agardh.

1. HALYMENIA POLYCLADA, A. & E. S. Gepp.

Var. ALDABRADENSIS, n. var.—Thallo e callo basali subito cuneatim expanso 10 cm. alto, 4–5 cm. lato deinde palmati-partito constante; ramis usque ad 6 cm. longis, 0·5–1 cm. latis, ramulis lateralibus iterum iterumque subdichotomicis pinnatis, angustis.

Aldabra, outer reef; dry specimens.
Distribution. Christmas Island.

Halymenia polyclada belongs to Agardh's *Acanthymenia* section of *Halymenia*. According to Schmitz, it is highly probable that this group is identical with the genus *Gelinaria*, Sond. Schmitz is further of opinion that the differences existing in anatomical structure are sufficient to separate *Acanthymenia* from the genus *Halymenia*. So long, however, as we do not know the cystocarps of the genus *Gelinaria* I think it more expedient to follow Agardh, although ultimately we will probably have to follow Schmitz and call the species of the *Acanthymenia* group by the generic name of *Gelinaria*.

The specimens from Aldabra are very similar to *H. polyclada*, which is nearly allied to *H. formosa*. It has a subdichotomous ramification, but lateral ramuli are plentiful along the margins of the upper branches. In the lower part of the fronds the margins are almost entire. It is a stronger plant than *H. polyclada*, but has the same short stalk expanding suddenly into a broad frond. In how far *H. formosa*, *Durvillæi*, and *polyclada* are really good species, is a question that future investigations must decide.

Cryptonemia, J. Ag.

1. Cryptonemia seminervis (Ag.), J. Ag.

J. Agardh, Algæ Liebman. p. 11 in not.
De Toni, Syll. Alg. vol. iv. sect. iv. 1905, p. 1610.

Saya de Malha, 55 fms.; dry specimens.
Amirante; dry specimen.
Distribution. Mediterranean; Atlantic; Red Sea.

In a dry condition the plants appear to have no midrib, but on moistening a delicate midrib became distinctly visible, and this extended upwards to about the middle of the leaf. The plants are barren.

2. Cryptonemia spec.

Saya de Malha, 55 fms.; dry specimen.

A poor fragment, but differing from *Cryptonemia seminervis* by its much thicker frond and dark red colour.

Fam. SQUAMARIACEÆ.

It is much to be regretted that so many of the specimens of Squamariaceæ collected by Mr. J. Stanley Gardiner are sterile, for without fruit it is almost impossible to name the genera and species of this puzzling family. I happened to have studied a large collection of Indian *Peyssonneliæ* before I undertook to name the present collection, and this has helped me to recognize some of the species mentioned hereafter.

In my "List of the 'Siboga' Algæ" I will treat in detail of the *Peyssonneliæ*, and only mention here that I have found it of great help to keep up a distinction already hinted at by the late lamented Schmitz*, namely, a distinction based on the differences in arrangement of the filaments of the hypothallus. These horizontal filaments, which run over the substratum, give off the ascending vertical filaments of the perithallus, and Schmitz observed that some hypothalli consisted of straight filaments running close to one another (*Peyssonnelia*), and that others consisted of curved fan-shaped groups of filaments, as in the basal layer of *Cruoriella*. To these two subgenera, if I may distinguish them provisionally by such a name, I wish to add a third, differing in having no hypothallus proper, but a mesothallus, *i. e.*, a layer of cells occupying the middle of the thallus (as is the case, for instance, in *Ralfsia expansa*), which gives off branches both downward and upward. My investigations do not yet allow me to decide whether this division of the genus *Peyssonnelia*, based as it is upon anatomical characters, is supported by differences in the structure of the fruit. Sometimes this is the case, but my specimens are mostly barren.

For this third subgenus I should like to propose the name of *Ethelia*, in honour of my dear friend, Mrs. E. S. Gepp.

* Schmitz, "Marine Florideen von Deutsch Ost-Afrika," in Engler's Bot. Jahrbuch, Bd. xxi. Heft 1, 2, 1895, p. 173.

Peyssonnelia, Decaisne.

Subgen. Eupeyssonnelia, n. subg.

Hypothallus filis arcte iunctis, flabelli modo fusis, maxime erectis.

1. Peyssonnelia coccinea, J. Ag.

J. Agardh, Epicrisis Floridearum, 1896, p. 385.
De Toni, Syll. Alg. vol. iv. sect. iv. 1905, p. 1695.

Seychelles, 31 fms.; dry specimen.

Distribution. West coast of Australia; Malay Archipelago.

The specimen is small and sterile; it was only by comparing it with 'Siboga' material that I was able to name it.

2. Peyssonnelia Harveyana (?), Crouan. (Plate 14. fig. 35.)

Crouan in J. Agardh, Spec. Algarum, ii. 1852, p. 501.
De Toni, Syll. Alg. vol. iv. sect. iv. 1905, p. 1694.

Saya de Malha, 55 fms., on several dry, calcareous, little pebbles.

Distribution. Coast of France, near Brest.

The specimens are of a bright red colour and adhere firmly to the substratum; they approach both *P. conchicola* and *P. Harveyana*, but on account of the large cells of the hypothallus I feel inclined to regard it as *P. Harveyana*. With regard to distribution, it is more likely that they belong to *P. conchicola*, an inhabitant of the Red Sea.

The specimens are all barren, and it is impossible to name them with certainty.

3. Peyssonnelia calcea, Heydr.

Heydrich, "Neue Kalkalgen von Deutsch Neu-Guinea" in Biblioth. Bot. von Frank u. Luerssen, 1897, p. 10.

Egmont, reef; in alcohol.

Coin Peros; in alcohol.

Distribution. Tami, near German New Guinea; Malay Archipelago.

The specimens bear nemathecia with tetraspores.

4. Peyssonnelia polymorpha (Zan.), Schmitz.

Form Gardineri, n. f.—Thallo primo adhærente, deinde a substrato soluto, tubera forma diversa, sed superficie lævi formante, colore parum rubro cum siccatus est. Hypothallo cellulis longis 36–44–60 μ, latis 8–10–16 μ. Perithallo constante e seriebus cellularum sursum directarum, cellulis infimis majoribus, cellulis superioribus minoribus, longioribus aut brevioribus quam latis; latis 16–20–24 μ. Organis fructificationis ignotis.

Amirante, 30, 45–60 fms.; dry specimens.

The specimens from Amirante are nearly allied to *P. polymorpha*, but the loose thalli are smaller and the crusts are thinner than in the typical specimens of that species. The anatomical structure of the two algæ is much alike, as far as the vegetative thallus is

concerned, and reproductive organs were not to be found. The cells of the f. *Gardineri* are perhaps, on the whole, somewhat smaller than those of the type, and seen from above f. *Gardineri* is covered by a smooth peripheral layer, which *P. polymorpha* had lost in all the specimens I have seen.

I conclude that f. *Gardineri* is a deep-water form of *P. polymorpha*.

Subgen. Ethelia, n. subg.

Mesothallus filis rectis aut ramosis, sinuatis, utroque latere fila perithalli emittens.

5. Peyssonnelia biradiata, n. sp.

Thallo per substratum extento, tantum hic illic adhærente, coriaceo, rubro, rotundo, diametro 2 ad 3 centimetrum, constante e mesothallo et perithallo. Mesothallo constante e filis ramosis, sinuatis, parva flabella efficientibus. Perithallo constante e filis sursum et deorsum directis. Perithallo summo diviso in partem inferiorem obliquam, cellulis magnis, et in partem superiorem erectam, hic illic zonatam, cellulis parvis. Organis fructificationis ignotis.

Seychelles, 31 fms.; dry specimen.

Distribution. Malay Archipelago.

A small but characteristic specimen.

Among the algæ from Saya de Malha there are several specimens that I believe belong to the genus *Peyssonnelia*, but they are unfortunately barren. They have much in common with the *Peyssonneliæ* of the *Ethelia*-group, for they have a mesothallus that gives off branches both in a downward and upward direction (Pl. 14. fig. 36). They are furthermore much calcified, hard as stone, and attached to bits of coral.

But besides these features found among the *Ethelia*-group, the *Peyssonneliæ* from Saya de Malha are characterized by long filaments (Pl. 14. fig. 37) almost free from each other and covered by a layer of pectic substance, which colours red with ruthenium. The filaments are like those we find in the sori of other *Peyssonneliæ*, but in the new plants they are not confined to sori alone, but cover the whole upper surface. Although I made sections through all parts of the thallus, I could find no trace of fructification.

We know that the fronds of *Stragularia* species amongst the Ralfsiaceæ are covered by filaments, and it appears probable that we have here something analogous amongst the *Peyssonneliæ*; but until the reproductive organs are discovered it is difficult to speculate as to these structures. A doubt still lurks in my mind whether, after all, these filaments may not belong to an encrusting parasitic alga; but it is well worth while to call attention to these specimens.

Cruoriopsis, Dufour.

1. Cruoriopsis cruciata, Dufour.

Dufour, Elenc. Alg. Lig. p. 35, after De Toni.

De Toni, Syll. Alg. vol. iv. sect. iv. 1905, p. 1689.

Saya de Malha; dry specimen on *Udotea*.

Distribution. Adriatic; Malay Archipelago.

The alga is barren, but its resemblance to specimens from Nias, Sumatra, bearing cystocarps and antheridia, is so great that I believe they belong to the same species.

Fam. CORALLINACEÆ.

Melobesia, Lamouroux.

1. Melobesia callithamnioides, Falk.

Falkenberg, Die Meeresalg. d. Golfes v. Neapel, 1878, p. 265.

Egmont Reef, on different algæ; in alcohol.

Distribution. Atlantic, Brest?; Mediterranean.

Amphiroa, Lamouroux.

1. Amphiroa fragilissima (Linn.), Lamx.

Lamouroux, Pol. flexibles, p. 300.

A. Weber-van Bosse and M. Foslie, "The Corallinaceæ of the 'Siboga' Exped.," Monogr. lxi. 1904, p. 89.

Chagos Archipelago, Solomon Island; in alcohol.

Distribution. West Indies; Pacific; Malay Archipelago; Dar-es-Salaam.

2. Amphiroa foliacea, Lamx.

Lamouroux, Voyage de l'Uranie par Freycinet, Zoologie par Quoy et Gaimard, p. 628.

A. Weber-van Bosse and M. Foslie, "The Corallinaceæ of the 'Siboga' Exped.," Monogr. lxi. 1904, p. 92.

Praslin; in alcohol.

Distribution. Marianne Islands; Malay Archipelago.

Jania, Lamouroux.

1. Jania tenella, Kütz.

Kützing, Tab. Phyc. Bd. viii., 1858, tab. 85, p. 41.

Coetivy, reef; in alcohol.

Coin Peros; in alcohol.

Praslin; in alcohol.

Seychelles; dry specimens.

Distribution. Malay Archipelago; Gulf of Mexico.

EXPLANATION OF THE PLATES.

Plate 12.

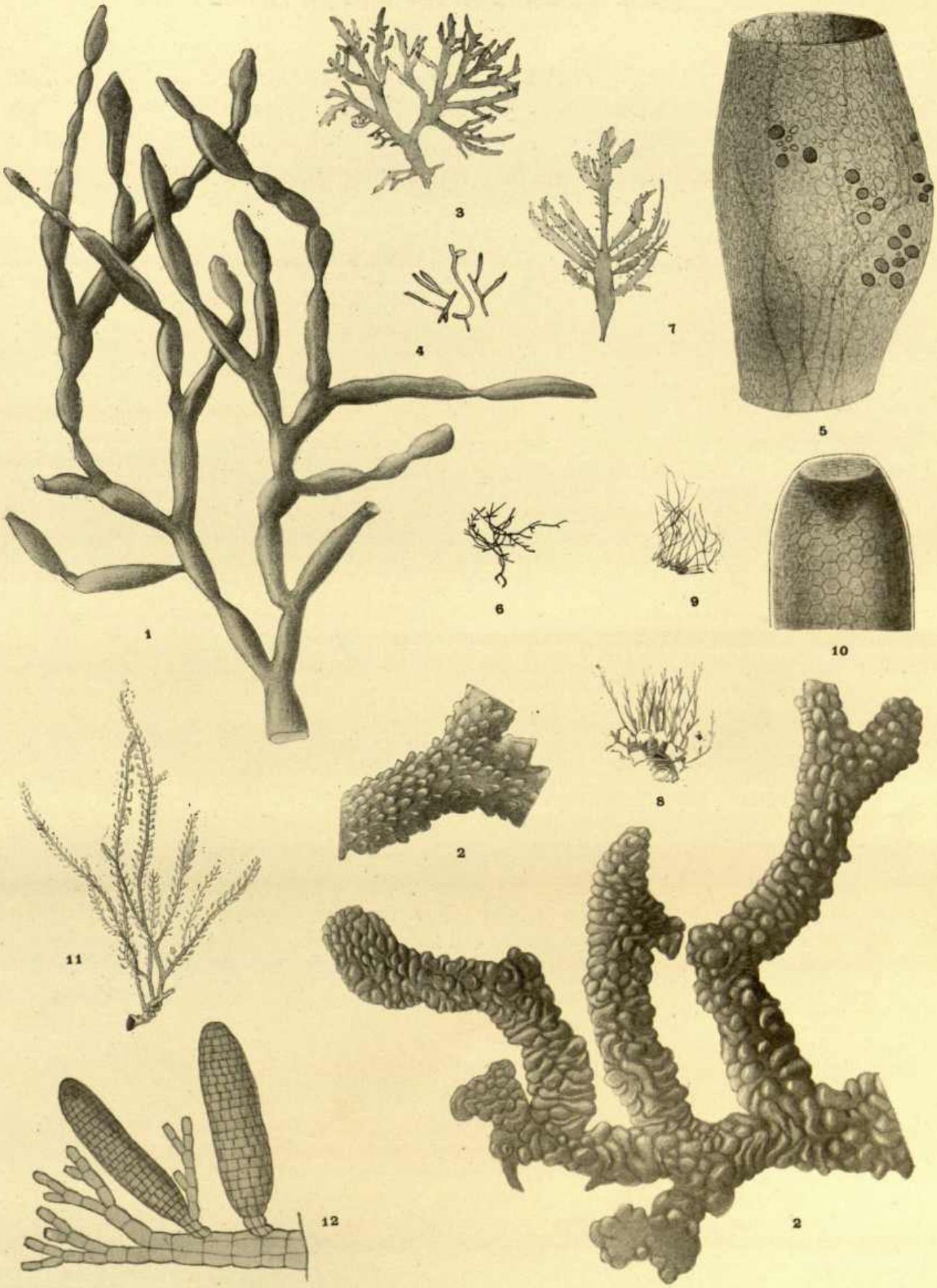
Fig. 1. *Gloiophlœa articulata*, n. sp. × $\frac{6}{5}$.
2. *Eucheuma Cottonii*, n. sp. Nat. size. Two forms.
3. *Calliblepharis prolifera*, J. Agardh. × $\frac{5}{4}$.
4. *Chylocladia perpusilla*, n. sp. × 2.
5. Fertile portion of a swollen ramulus of *Chylocladia perpusilla*. × 63.
6. *Laurencia pygmœa*, n. sp. × 2.
7. *Cladhymenia oblongifolia*. × $\frac{5}{4}$.
8. *Chondria pumila*, Vick. × $\frac{5}{4}$.
9. *Chondria simpliciuscula*, n. sp. × $\frac{5}{4}$.
10. „ „ Top of frond, with regular rows of hexagonal cells. × 80.
11. *Heterosiphonia Rendlei*, n. sp. × $\frac{5}{4}$.
12. Penicillus of *Heterosiphonia Rendlei*, with stichidia. × 24.

Plate 13.

Fig. 13. *Pseudendosiphonia Gardineri*, n. gen. et sp. × $\frac{5}{4}$.
14. Top of frond of *Ps. Gardineri*. × 12. *st.*=stichidia.
15. Stichidium of *Ps. Gardineri*. × 100.
16. *Dasyopsis Stanleyi*, n. sp. × $\frac{6}{5}$.
17. *Dasyopsis aperta*, n. sp. × $\frac{5}{4}$.
18. *Dasyopsis Geppii*, n. sp. × $\frac{5}{4}$.
19. „ „ Underside of thallus, with clusters of antheridia. × 4.
20. „ „ Antheridium.
21. *Dasyopsis palmatifida*, n. sp. × $\frac{5}{4}$.
22. *Tapeinodasya Ethelæ*, n. sp. × $\frac{5}{4}$.
23. „ „ Part of frond. × 11.
24. *Amphisbetema indica* (J. Ag.). Nat. size.
25. *Galaxaura hawaiiana*, Butt. Nat. size.

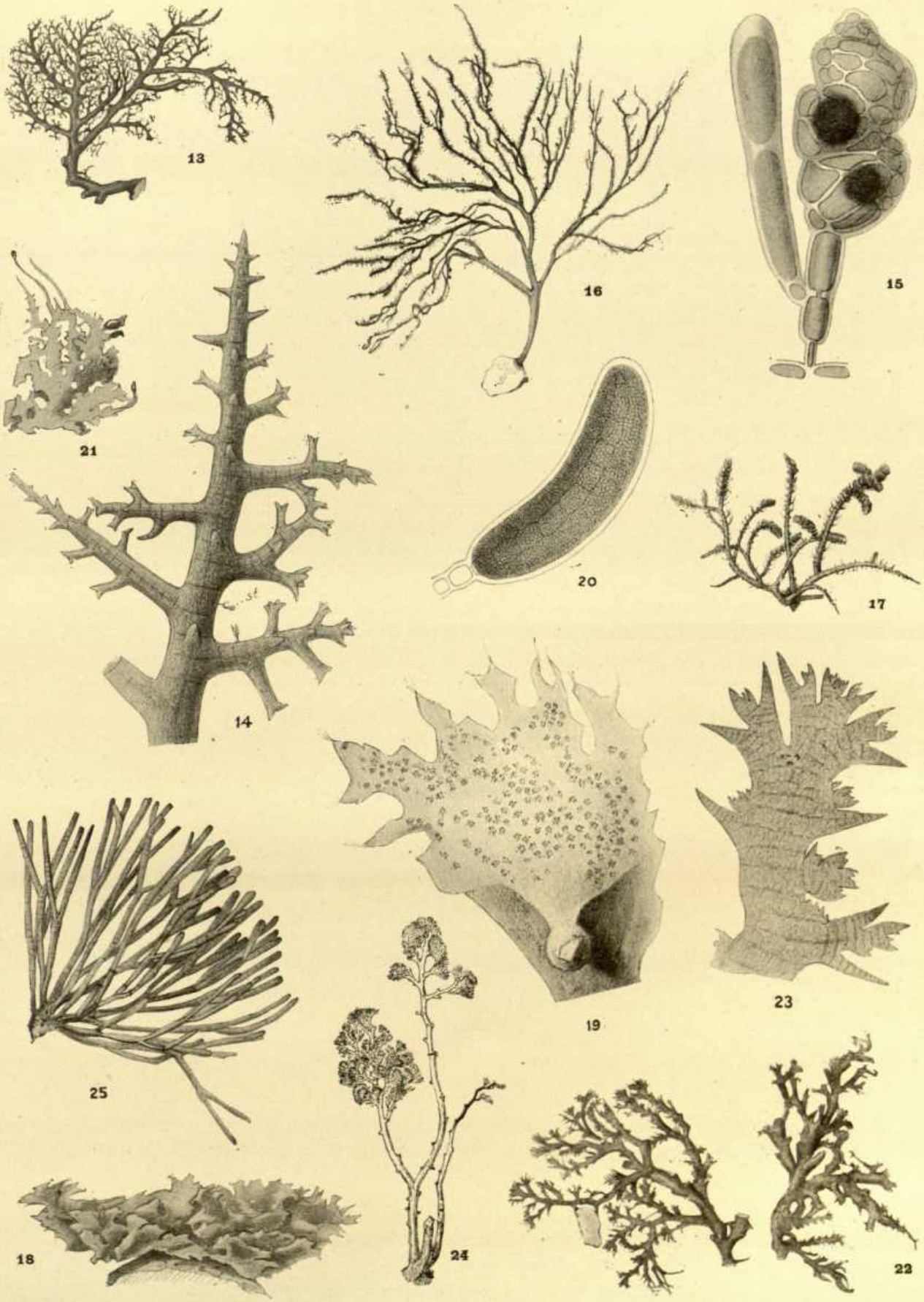
Plate 14.

Fig. 26. *Gloiophlœa articulata*, n. sp. Section through apex of frond. × 32.
27. „ „ Peripheral filament, showing small cortical cells. × 340.
28. *Gloioderma? expansa*. Nat. size.
29. „ „ Transverse section, showing large central cells. × 40.
30. *Pseudendosiphonia Gardineri*. Section through thallus. × 16. *c.*=central tube; *p.c.*=pericentral cells.
31. *Oligocladus Prainii*, n. sp. × 32.
32. *Dasyopsis aperta*, n. sp. Part of penicillus. × 46. *m.* = mother-cell of downward-growing hypha.
33. *Dasyopsis Geppii*, n. sp. Young displaced branch. × 130.
34. *Amphisbetema indica*. Apex of frond. × 24.
35. *Peyssonnelia Harveyana*. Transverse section. × 128.
36. *Peyssonnelia*? subgen. *Ethelia*. Section through thallus; highly magnified.
37. „ Young plant, section through upper part of thallus; highly magnified.



J. Obbes del.

MARINE ALGÆ FROM THE INDIAN OCEAN.



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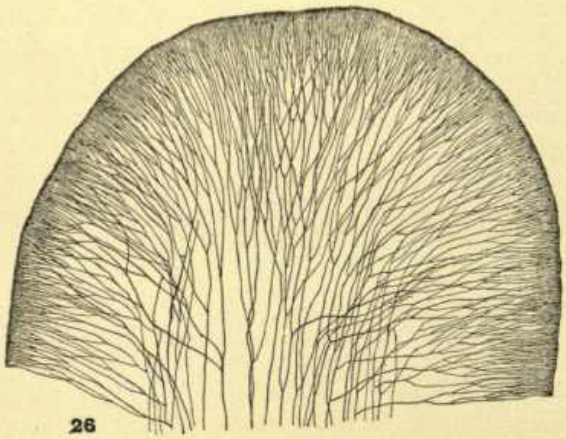
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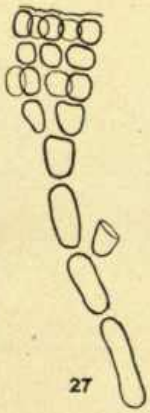
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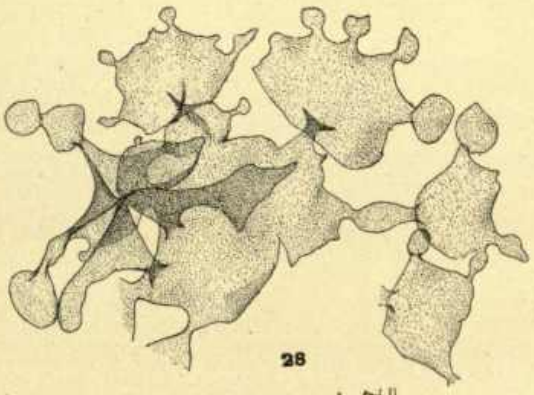
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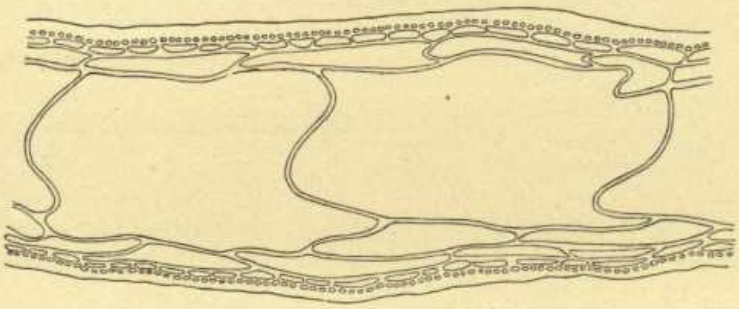
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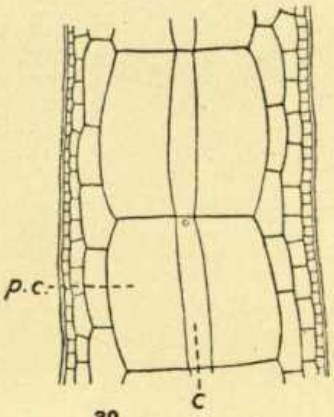

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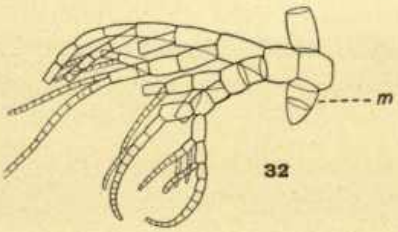

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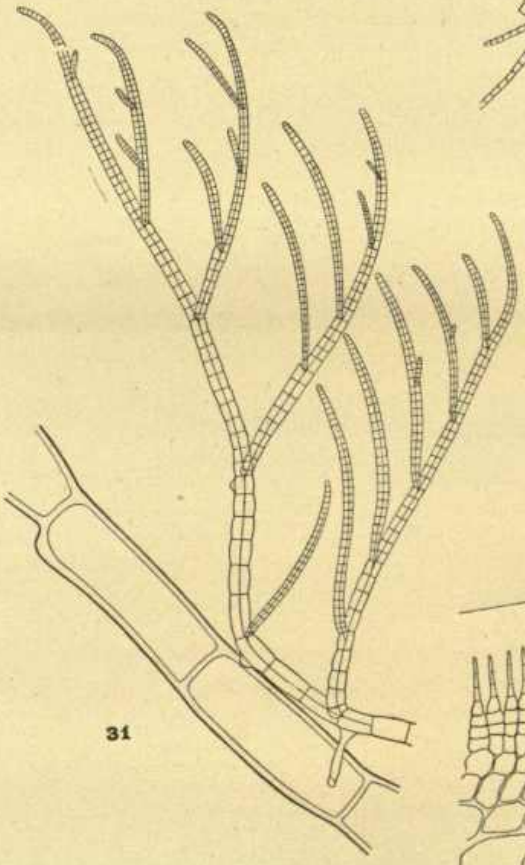
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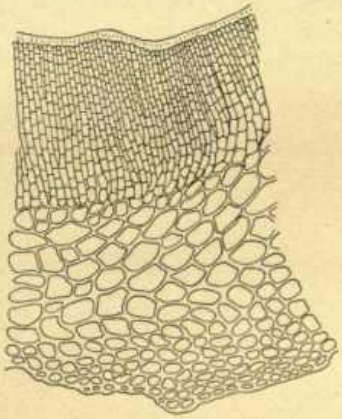
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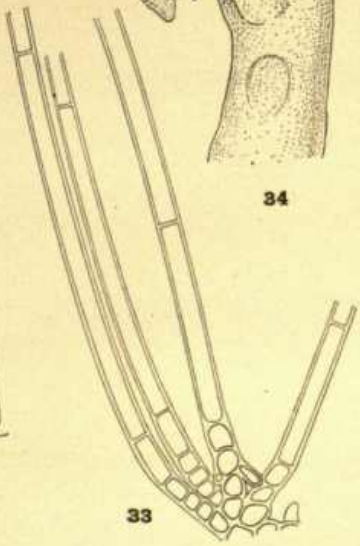
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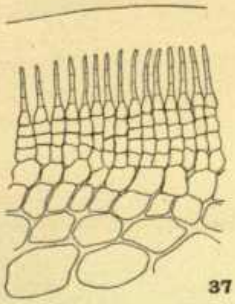
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J. Obbes del.

MARINE ALGÆ FROM THE INDIAN OCEAN.