9. Marine Algae from Easter Island.

By

F. BÖRGESEN.

With 50 text figures.

When Professor SKOTTSBERG asked me to work out his collection of algæ from Easter Island I undertook with pleasure this task, as the isolated situation of this island made its algal flora of a special interest.

The collection consisted of about 20 glasses, a few stones with crustaceous algæ and some dried specimens, mostly the same as contained in the glasses. All the material brought home was collected at low tide between high and low water mark and in one locality, Hanga Piko, on the west coast of the island; sublitoral algæ were only collected in tide-pools.

As is understood from this, it is a small collection only, and as several of the glasses contain the same large species, it was to be expected that the number of species could not be great.

At the examination of the glasses, however, fragments of other larger species were found upon and among the larger algæ, and also some smaller epiphytic and endophytic species. Alltogether 68 species have been listed. Regarding several of these species the material is so scarce that there was hardly enough for microscopic preparation, while it was quite insufficient for a more detailed examination, a circumstance likely to have an influence upon the exactness of the determination.

At all events, the present incomplete list of species shows that this very isolated island possesses a both rich and varied marine flora of which a more thorough investigation, including the sublitoral vegetation, is highly desirable.

If I would try to give my opinion on the more characteristic features of the algal flora, judging from the present material, I might say that many of the species are small creeping ones which by means of strong hapteres or rhizoids are able to fasten themselves to the substratum; such species are f. i. *Gelidium pusillum, Ptilothamnion Pluma, Laurencia claviformis, Chondria repens, Gymnogongrus aequicrassus, Hypnea Esperi, Herposiphonia tenella, Dictyopteris repens* etc. I have also come across proportionally many species of crustaceous algæ. On the whole most of the species are small, the largest one found is *Sargassum* spec. Many species form low tufts and have a cartilaginous

thallus. These different types of the thallus are most certainly adjustments to the very strong surf that continually beats the shores of this extremely exposed island.

As could be expected from the situation of the island, 27° s. Lat., the algal flora has a subtropical character with a few pronounced tropical forms f. i. *Halimeda Opuntia, Valonia ventricosa* and *Chnoospora fastigiata.* No *Caulerpa* was collected.

It is of a special interest to note that some species hitherto known only from the West Indies or adjacent parts of the Atlantic are found at the shores of Easter Island, thus contributing to the remarkable correspondance between the floras of the Pacific and of the West Indies. Regarding this question compare my remarks in »The marine Algæ of the Danish West Indies», vol. II, p. 491 etc.

Finally I want to express my best thanks to the specialists who kindly assisted me with the determination of certain groups. I am much indebted to Mme. Dr. A. WEBER VAN BOSSE and Mme. PAUL LEMOINE for having determined respectively the Squamariaceæ and the Lithothamniaceæ found in the collection, and to Dr. H. E. PETERSEN who took the trouble to name the small fragments found of *Ceramium.*

The drawings are for the most part made by mag. scient. O. ROSTRUP under my inspection.

Chlorophyceae.

Fam. Ulvaceae.

Ulva L.

U. Lactuca L.

LINNÉ, Spec. Plant. II, 1753, p. 1163.

The specimens are small, some few cm high only, forming low tufts, the thallus being folded, crisped and entangled as is often the case with this species on exposed localities.

Area of distribution. Seems to occur in all seas.

Fam. Chaetophoraceae.

Endoderma Lagerh.

E. viride (Reinke) Lagerh. — Fig. 1.

LAGERHEIM, G., Bidrag till Sveriges algflora (Öfvers. af K. Vetensk. Akad. Förh., 1883, p. 75). I. HUBER, Chaetophorées epiphyt. et endophyt. (Ann. Sc. Nat., 7. sér., Bot., tom. 16, 1892, p. 326). BÖRGESEN, F., The Mar. Alg. of the D. W. I., vol. I, p. 10, II, p. 416. — *Entocladia viridis* Reinke, in Bot. Zeit., 1879, p. 476, tab. 6, figs. 6—9.

In the thick walls of *Laurencia claviformis* an *Endoderma* was present, most likely referable to *E. viride*, which according to my concepcion of species

(l. c.) is a rather variable plant. Quite as in the West Indian plants the present one formed a reticular tissue, the endophyte utilising the larger place left above the walls of the peripheral cells in the host plant.

The cells are 8—15 μ long and 7—8 μ broad, of a rather irregular shape, often about oval, mostly as long as broad, but shorter ones are common too.

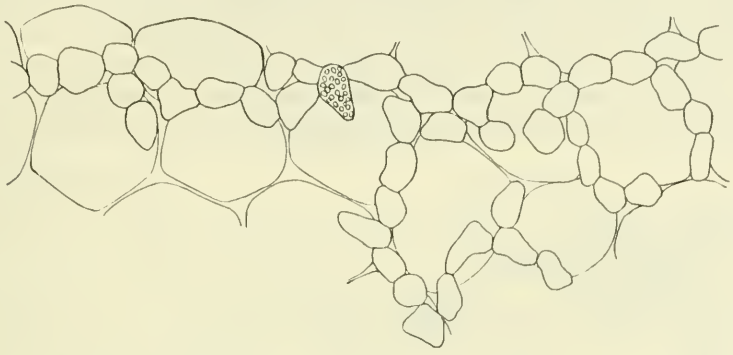

Fig. 1. *Endoderma viride* (Rke) Lagerh. from Laurencia claviformis. In one of the cells zoospores are seen. C. $^{400}/_{1}$.

The cells contain much starch. The shape of the chromatophore could not be determined, probably because the material had been kept too long in formaline.

Cells with zoospores were found now and then.

Area of distribution: Atlantic coasts of Europe and N. America, West Indies, Easter Island.

Fam. Cladophoraceae.

Cladophora Kütz.

C. spec.

Together with *Gelidium pusillum* a small *Cladophora* was found upon a shell. It had vigorous rhizoids deeply immersed in the substratum.

The basal cells were 2—3 mm long and 150—175 μ thick, the upper cells shorter, but a few cells only were developed. The cell walls were thick and stratified.

The largest plant found was 5 mm long.

C. *(Aegagropila)* **socialis** Kütz. — Fig. 2.

Kützing, Spec. Alg., p. 416. Tabulæ Phycologicæ, vol. IV, tab. 71. Reinbold in A. Weber van Bosse, Liste des Algues du Siboga, I Myxophyceae, Chlorophyceae, Phaeophyceae, p. 82.

To this species, originally described by Kützing from Tahiti, I refer a plant forming extensive, soft, *Vaucheria*-like tufts. On the upper side of these tufts the filaments are not much branched, often being quite simple for a considerable distance. The ramification is subdichotomous, the side branches

growing out at acute angles from the mother filaments and soon attaining the same strength as these.

In the upper part of the thallus the cells are of much variable length, 5—10—20 times as long as broad or even more. The diameter of the cells varies from 50—100 μ being mostly 70—80 μ.

The basal parts of the thallus have a different appearance. Here the cells are much shorter, the filaments (Fig. 2 a) are irregularly bent and curved, and much less regularly ramified; and furthermore we find here a great number of rhizoids. These rhizoids serve for the most part to attach the plant to the substratum but also to keep the whole thallus together as many of them fasten

Fig. 2. *Cladophora socialis* Kütz. Parts of plants showing ramification and formation of rhizoides. **a** c. $^{30}/_{1}$, **b**, **c** c. $^{65}/_{1}$.

themselves to other filaments. The rhizoids are sometimes long, sometimes short; in the long one cross walls are often present while the short ones have no cross walls. They generally end in a small coralliform disc. There is no cross wall separating the rhizoid from its mother cell.

The wall of the filaments is thin in the young parts of the thallus, thick and stratified in the older parts.

By its ramification and mode of growth as well as by the fact that the rhizoids are not cut off from their mother cells by cross walls this plant at the first glance reminds rather much of *Cladophoropsis*, but it is of course easily distinguished by the presence of cross walls at the base of the branches. Furthermore it must be remembered that the formation of cross walls in the filaments of *Aegagropila* takes place in the same way as f. i. in *Cladophora*,

while cell division in *Cladophoropsis* (as far I have been able to observe on preserved material of *Cl. membranacea*) is realised in the peculiar way I have called segregative cell division.

The species, originally found at Tahiti, has been collected at the Lucipara Islands by Mme. WEBER.

Area of distribution: Pacific Ocean, Malay Archipelago.

Fam. Valoniaceae.

Valonia Ginn.

V. ventricosa J. Ag.

Specimens as large as dove's eggs are found. They were fastened to other algæ and were also themselves very much utilized by epiphytes.

The specimens seem to agree very well with others collected by me in the West Indies (l. c., vol. I, p. 27). In both cases they were fastened to the substratum by means of rhizoids growing out from the small lentiform cells in the basal end of the large cell.

In some of the specimens a good number of small roundish cells were found enclosed in the large mother cell, as described by MURRAY.[1] On the base of my West Indian material I arrived at the conclusion that these bodies owed their origin to abnormal conditions, but after I have seen the Pacific specimens I agree with MURRAY in considering them as quite normal organs of vegetative reproduction formed by a kind of free cell division — segregative as I have called this peculiar division modus found in so many related tropical forms.

Another sample of algæ contained some few specimens of more elongated shape about 2 cm long and $^3/_4$—1 cm broad. I dare not say, if these specimens more rightly ought to be referred to *V. Forbesii* Harv. but had they come from the West Indies I would without doubt have considered them as forms of *V. ventricosa*. As is the case in this species they were covered by epiphytes, especially *Melobesiaceæ*, while *V. Forbesii*, according to Mme. WEBER[2], is less used as substratum.

Area of distribution: West Indies, Malayan Archipelago, Tahiti, Easter Island.

Rhipidiphyllon Heydr.

Rh. reticulatum (Asken.) Heydr. — Fig. 3, 4.

HEYDRICH, F., Beiträge zur Kenntnis der Algenflora von Ost-Asien besonders der Insel Formosa, Molukken- und Liu-kiu-Inseln. Hedwigia, 33. Bd., 1894, p. 281. — *Anadyomene reticulata* Askenasy, Forschungsreise S. M. S. »Gazelle» IV. Theil, Botanik (Algen), p. 5.

The thallus (Fig. 3) forms small, 2—4 mm broad, cristate and excentric bodies fixed by means of vigorous rhizoids to the host plant *(Galaxaura)*.

[1] MURRAY, G., On Halicystis and Valonia, in MURRAY, Phycological Memoirs, Part II, 1893, p. 50—1.

[2] WEBER-VAN BOSSE, A., Liste des algues du Siboga, I, Myxophyceae, Chlorophyceae, Phaeophyceae, p. 59.

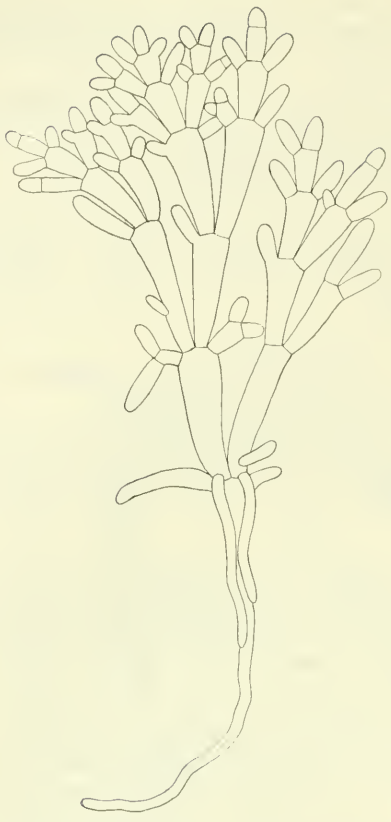

Fig. 3. Young plant of *Rhipidiphyllon reticulatum* (Asken.) Heydr., c. $^{30}/_{1}$.

The rhizoids grow out from the lowermost ends of the cells in the basal part of the plant (Fig. 4 b). They are irregularly bent and have thick walls. They grow downwards along the wall of the main cells and contribute highly to the strengthening of these. Reaching the host plant they become divided in several thinner filaments which are terminated by irregular coralliform lobes. I have not seen any cross walls in these rhizoids. From the base of the main cells even high up in the thallus such rhizoids are formed.

The growth of the plant is acropetal. The young cells are at first seen as small outgrowths upon the end of the mother-cell. These outgrowths are often rather large before they become separated by a wall (comp. Fig. 3). The ramification always takes place in the same plane.

When the apex of a cell touches the neighbour branch it becomes fastened to it by a thick cellulose ring, formed in the same way as in *Microdictyon umbilicatum* (Fig. 4 a).

The large cells are about 200 μ wide and as much as 600 μ long. The cells contain a wall plasma with numerous chromatophores forming a dense network. Numerous pyrenoids are regularly distributed in the chromatophores.

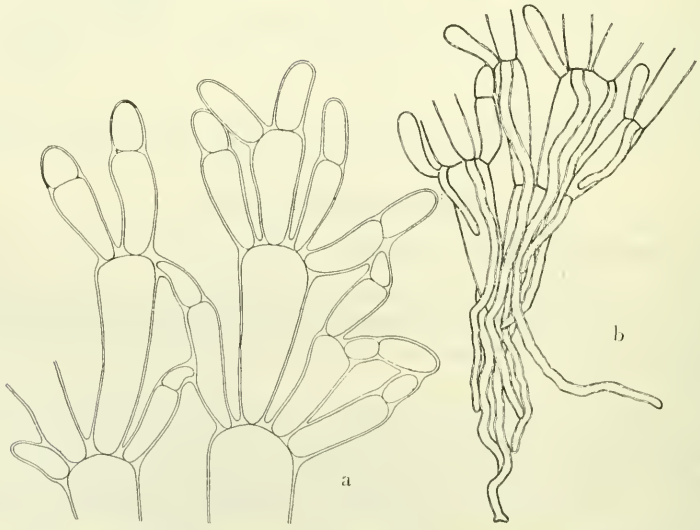

Fig. 4. *Rhipidiphyllon reticulatum* (Asken.) Heydr. **a** summit of plant, c. $^{60}/_{1}$; **b** base of small specimen, c. $^{30}/_{1}$.

The flabelliform mode of ramification reminds very much of *Anadyomene*, but in *Rhipidiphyllon* the space between the large cells remains open no small cells being formed here. ASKENASY described the plant as an *Anadyomene*, but I think HEYDRICH was right in making it the type of a new genus.

Rhipidiphyllon differs from *Microdictyon* mainly by its acropetal, fanshaped ramification resulting from the fact that the new cells are produced from the upper end of the mothercell, all being directed upwards under acute angles and all lying in the same plane. It also differs in the less regular and less frequent junction of the cells. *Rhipidiphyllon* is also a much smaller plant; the largest specimens I have seen are about 5—6 mm in diameter, as stated by ASKENASY.

It seems to me rather doubtful if the plant so beautifully figured by OKAMURA in his »Illustrations of the Marine Algæ of Japan», Vol. 1, no. 6, pl. 30 really belongs to this genus. I am much more inclined to consider this a *Microdictyon*. The shape of the thallus, the mode of ramification, the shorter and less marked main cells, the more spreading branches, not distinctly gathered at the end of the main cells with much larger angles between them, and the lowermost being directed downwards, all suggests *Microdictyon*.

Area of distribution: West Australia, Formosa, Easter Island.

Microdictyon Dcne.

M. umbilicatum (Vell.) Zanard. — Fig. 5.

ZANARDINI, Iconographia, Phycologica Adriatica, vol. I, p. 79, tab. XIX, 1860.

Some few small fragments were found growing on *Hypnea*.

Regarding the limitation of species in *Microdictyon* there still is some uncertainty, as pointed out by REINBOLD.[1] In the treatise quoted below he points out that the network arises in three different ways, namely by means of a simple anastomosis (»Verdickungsring», BITTER) as is the case in *M. umbilicatum*, by pseudohapters, the attach-

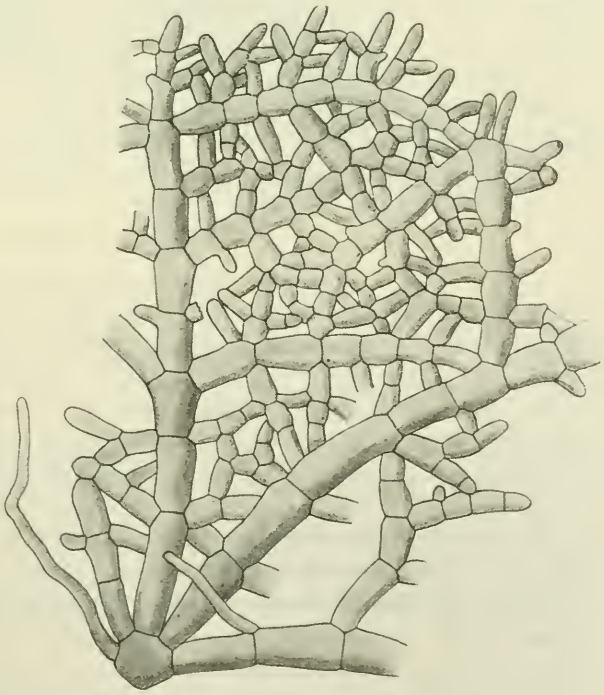

Fig. 5. *Microdictyon umbilicatum* (Vell.) Zanard., part of specimen, c. $^{25}/_{1}$.

[1] REINBOLD, TH., in A. WEBER VAN BOSSE, Liste Algues Siboga, I, p. 66.

ment points being crenulated cell-ends as is the case in *M. pseudohapteron* Gepp and finally by means of true tenacula as found in *M. Montagnei* Dcne.

Regarding the mode of net formation the present plant quite agreed with *M. umbilicatum* and therefore I do not hesitate to refer it to this species. It agrees very well with my West Indian specimens and specimens from Cadiz.

Area of distribution: Mediterranean Sea, West Indies, Red Sea, Australia, Sandwich Islands etc.

Fam. Codiaceae.

Halimeda Lamx.

H. Opuntia Lamx. forma **Reinschii** (Hauck) Barton.

Barton, E. S., The genus Halimeda, p 21. Okamura, K., Icones, vol. III, pl. 148. — *Halimeda Reinschii* Hauck, Ueber einige von I. M. Hildebrandt im Rothen Meere und Indischen Ocean gesammelte Algen. (Hedwigia, 1886, p. 167.)

The specimens gathered seem to agree very well with the description of Hauck and the figures of Mrs. Gepp (Miss Barton). It is a rather small plant forming compact tufts ca. 5—6 cm high. The base consists of a short stem from which branches are issued in all directions. The lowermost joints are often broader than long and very thick, followed by a few ones nearly cylindrical and longer than broad, but soon the joints again become shorter, broader than long and trilobed. Higher up again the joint grow smaller, thinner, nearly roundish or ovate and sometimes Hightly trilobed, sometimes not. The midrib is very indistinct. The joints in the lower part are mostly about 2—3 mm long and 3—4 mm broad, higher up 5—6 mm long and 4—5 mm broad; the uppermost are about 4 mm high and 3 mm broad.

Area of distribution: Indian Sea, Easter Island.

Fam. Phyllosiphonaceae.

Ostreobium Born. et Flah.

O. Quekettii Born. et Flah.

Bornet, E. et Ch. Flahault, Sur quelques plantes vivant dans le teste calc. des Mollusques (Bull. Soc. bot. Fr., T. 36, 1889).

This species was found in a small *Spirorbis,* the shell being quite green-coloured by the occurrence of the alga.

Area of distribution: Europe, North America etc. most likely cosmopolitan.

Phaeophyceae.

Fam. Ectocarpaceae.

Ectocarpus Lyngb.

E. Chnoosporae nov. spec. — Fig. 6.

Thallus pulvinulos parvos ca. 1 $^1/_2$ mm latos formans, e filis repentibus et filis erectis constructus. Fila repentia irregulariter ramosa et plus minus coherentia e cellulis oblongis ca. 15—20 μ. latis et 24—28 μ. longis composita. Fila

Fig. 6. *Ectocarpus Chnoosporae* nov. spec., parts of plants, c. $^{200}/_1$.

erecta ca. 1 mm alta, in parte basali e cellulis 8—10 μ. latis et 25—30 μ. longis in superiori parte e longioribus formata, simplicia aut in inferiori parte ramosa; rami aut longi, erecti, aut breves sporangia plurilocularia gerunt. Sporangia subfusiformia, ca. 100 μ. longa et 25 μ. lata.

On the thallus of *Chnoospora fastigiata* J. Ag. var. *pacifica* J. Ag. a small brown alga was found which seems to me most naturally to come near the crustshaped *Ectocarpi* quoted by OLTMANNS, Morphologie u. Biologie der Meeresalgen, 2. edition, p. 10, mentioned from the posthumous manuscript of KUCKUCK. As examples of the gradual reduction of the thallus of *Ectocarpus* he mentions two species, *Ectocarpus faeröensis* and *speciosus*, originally described by me under *Myrionema* in accordance with the at that time recent work of SAUVAGEAU on the Myrionemaceae. Later, these species were referred to various genera by various investigators; now KUCKUCK simply has included them in *Ectocarpus*.

The basal part of the plant consists of a monostromatic tissue composed of irregularly curved and ramified creeping filaments growing gradually more or less tightly together. The cells of the basal layer are about 15—20 μ thick and 24—28 μ long. From these cells erect filaments arise. These are mostly simple having a zone of growth somewhat above their base. Here the cells are short with intercalary divisions. Upwards they gradually increase in length, the chromatophores become less developed and the ends of the filaments become hairlike, gradually dying off.

These assimilating filaments measure about 8—10 μ at their base, the length of the cells being 25—30 μ. In the zone of divisions the cells are about 16 μ wide and mostly shorter than long. Keeping about the same width the upper cells attain length of about 65 μ. The filaments are up to 1 mm long. Most of the assimilating filaments are simple but sometimes carry a single equally developed branch near their base; in the upper part they are always undivided. Near the base they also carry short filaments bearing terminal plurilocular sporangia. These filaments consist mostly of a single or of two cells. Now and then, too, a plurilocular sporangium is borne on a short filament arising directly from the basal filaments.

In one specimen (Fig. 6 b) two small sessile gametangia were observed at some distance from the base and one sporangium on each of the filaments, somewhat recalling the genus *Gononema* Kuck. und Skottsb.[1] The plurilocular sporangia are ovate-spindleshaped, about 100 μ long and 25 μ broad. In the fresh divided cells, the chromatophores form several roundish discs, in the older cells oblong bodies or short staffs.

This new *Ectocarpus* evidently comes near *Compsonema fasciculatum* and *C. coniferum*, described by SETCHELL and GARDNER in Phycological Contributions II to IV (University of California Publications, vol. 7, 1922), but the present plant is much larger and also shows several differences in the shape of sporangia, assimilatory filaments etc.

Area of distribution: Endemic.

E. breviarticulatus J. Ag. — Fig. 7.

I. AGARDH, Nya alger från Mexico (Öfversigt af K. Vetensk.-Akad. Förhandl., 1847, p. 7). BÖRGESEN, F., Marine Algae of the D. W. I, vol. I, p. 173. — *Ectocarpus hamatus* Cr. in MAZÉ et SCHRAMM, Essai de classification des algues de la Guadeloupe, 2e Edit. 1870—77, p. 111; VICKERS, A., Phycologia Barbadensis, part 11, pl. 29.

The specimens found quite agree with the West Indian plant.

The filaments are about 30 μ thick. The length of the cells is rather variable. Near the summit of the filaments and generally in the periphery of the tufts the cells mostly are about as long as broad, while in the main filaments in the interior of the tufts the cells are often more than twice as long as broad.

[1] SKOTTSBERG, C., Bot. Ergebnisse d. schwed. Exp. nach Patagonien und dem Feuerlande. VIII. Marine Algae. 1. Phaeophyceae, p. 9.

The plurilocular sporangia (Fig. 7 b) are roundish-quadrangular or obovate. Commonly they are about 40 μ long and 35 μ broad as is also the case in the West Indian form, the measure given by me (l. c.) drawn from a rather large sporangium.

So far one is able to judge from material kept so long in formaline, there appears to be several shorter or longer ribbon like chromatophores, irregularly bent and with branches of different length in the young parts of the filaments, while in the older ones the chromatophores are more like small roundish or somewhat irregularly shaped discs.

From Mrs. GEPP's description and figures[1] of *Ectocarpus spongiosus* Dickie[2] I feel convinced that this species is the same as *E. breviarticulatus*, originally described by I. AGARDH in 1847 on specimens collected by LIEBMANN at St. Augustin, Mexico.

Area of distribution: Pacific coast of Mexico, West Indies, Indian Ocean, Easter Island.

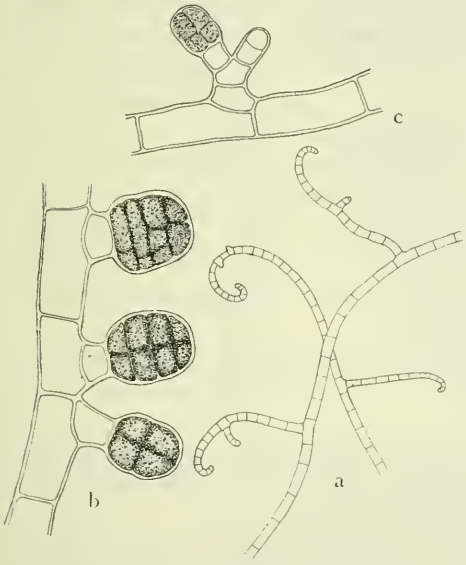

Fig. 7. *Ectocarpus breviarticulatus* J. Ag. **a** sterile filaments, c. $^{45}/_{1}$; **b** (c. $^{250}/_{1}$) and **c** (c. $^{200}/_{1}$) pluriocular sporangia.

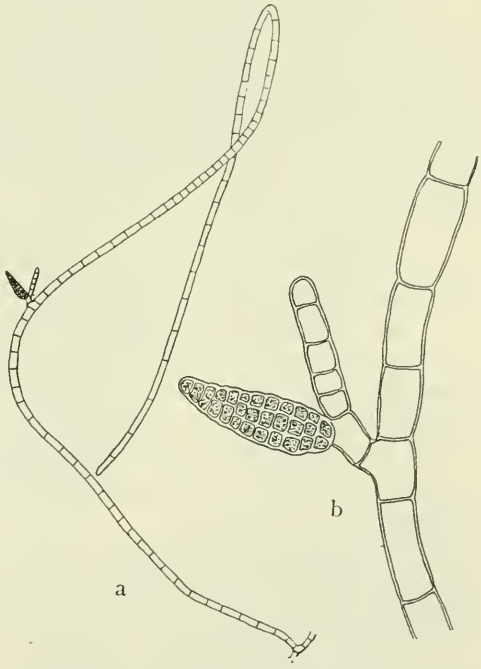

Fig. 8. *Ectocarpus* sp. **a** filament with plurilocular sporangium, c. $^{45}/_{1}$; **b** the sporangium, c. $^{200}/_{1}$.

E. spec. — Fig. 8.

The figure represents all the material found, and I would not have mentioned the plant if it had not shown so much likeness to another »*Ectocarpus* spec.» mentioned by Mme. WEBER in the »Phaeophyceae of the Siboga», p. 131.

[1] BARTON, ETHEL S., List of Marine Algae collected at the Maldive and Laccadive Islands by I. S. Gardiner (Journ. Linn. Soc.-Bot., vol. 35, p. 479).

[2] DICKIE, G., On the Algae of Mauritius (Journ. Linn. Soc., Bot., vol. 14, 1875, p. 191).

The plant was attached to *Nitophyllum* spec. From the decumbent short filament, the long erect one arises. At the base the filament was 12 μ thick, somewhat higher up 19 μ, a litle above the sporangium 24 μ. Along the intercalary growth-zone the width is about 23 μ; from here the filament evenly tapers into a pseudo-hair like prolongation with cells about 15 μ thick and 80 μ long.

The plurilocular sporangium is ovate fusiform, 80 μ long and 24 μ broad. It was placed upon the basal cell of a short branch. In the plant of Mme. WEBER the sporangia are sometimes sessile, sometimes placed upon a short pedicel.

Fam. Ralfsiaceae.

Mesospora Weber van Bosse.

M. Van-Bosseae nov. spec.[1] — Fig. 9.

Thallus 2—3 cm et ultra altus e disco basali et filis erectis constructus. Discus basalis e filis repentibus coherentibus subdichotomo divisis compositus unde fila erecta oriuntur. Fila erecta in parte basali e cellulis latioribus quam altis et plus minus cohaerentibus stratum subparenchymaticum formantibus, in parte superiori libera, subclavata e cellulis cylindricis ca. 24 μ longis et 8—11 μ latis, ad apicem versus cellulis gradatim latioribus ad 16 μ latas composita.

Sporangia plurilocularia in superiori parte filorum formata.

Through the great kindness of Mme. WEBER I have been able to compare my plant with original material from the Siboga-Expedition.

By means of this and the detailed description of Mme. WEBER I have convinced myself that the plant from Easter Island, even if it agrees with the Malayan one in many respects, nevertheless differs essentially in others, making it necessary to regard it as a new species.

The plant grows on stones to which it adheres firmly with its whole lower surface. It forms dark brown or nearly black crusts as much as 2—3 cm in diameter or even more.

The basal part of our plant is formed of several brown layers of old decayed tissue, often including blue green algae, in transverse section presenting a picture very like that found in fig. 43 of Mme. WEBER.

I have succeeded in finding a small marginal portion, represented in fig. 9 b. It is composed of creeping, congenital filaments growing in length by means of a top cell. By transverse walls these filaments are divided into more or less isodiametric cells. The filaments are about 10—15 μ thick, the top-cell often 20 μ or more. The filaments are radiant to all sides and by and by, as the disc expands and the width of the outermost ends of the filaments increases the cells show longitudinal walls, the filaments thus becoming dichotomously divided.

At a very early stage erect filaments arise from every cell of the basal stratum. These erect filament grow vertically, standing quite close together.

[1] I have the great pleasure to name this species in honour of Mme. Dr. A. WEBER VAN BOSSE, the indefatigable explorer of the algal flora of the Malayan Archipelago.

In the basal part the cells are broader than long and more or less coherent, forming a nearly parenchymatic tissue (Fig. 9 a). While this horizontal layer in Mme. WEBER's plant is composed only of 1—4 layers of cells, ten or even more are not uncommon in my plant. The cells are considerably broader than long, ca. 18 μ broad and only 7 μ high. The filaments composed of these cells are now and then dichotomously divided; generally they are vertical, but now and then parts of the tissue occur with curved filaments.

Above this tissue the filaments become thinner and at the same time mutually free in their whole length. In this respect our plant differs essentially

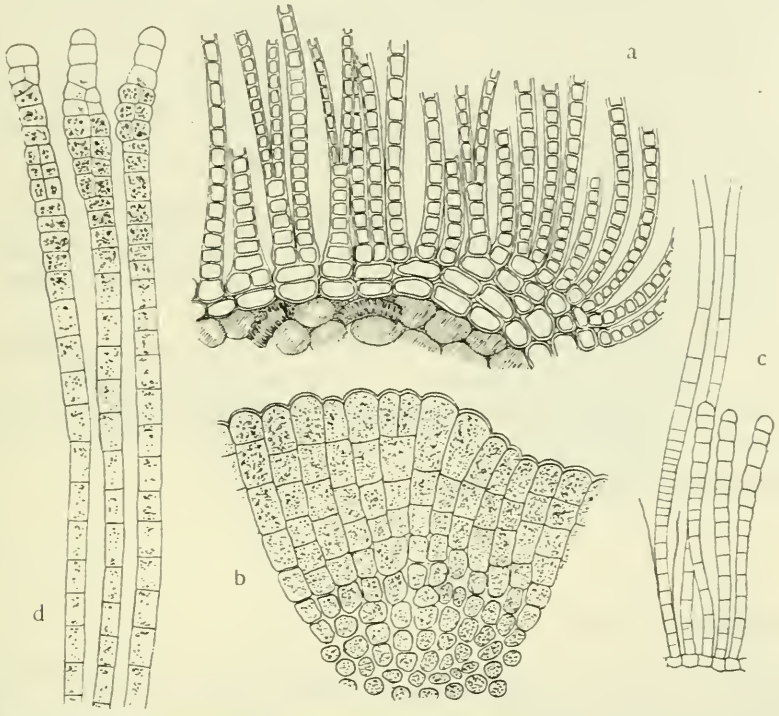

Fig. 9. *Mesospora Van-Bosseae* nov. spec. **a** transverse section of thallus, c. $^{200}/_{1}$; **b** part of margin seen from above, c. $^{150}/_{1}$; **c** assimilating filaments and hairs, c. $^{150}/_{1}$; **d** formation of plurilocular sporangia, c. $^{200}/_{1}$.

from that of Mme. WEBER, who describes her plant in the following way: »Les filaments verticaux, claviformes qui la composent ont de 10—20 cellules, ils sont libres dans la partie basale et mediane, mais adhèrent fortement entr'eux au sommet, couvert d'une couche mucilagineuse assez épaisse». In our plant as explained above the basal parts of the filaments adhere rather firmly while upwards the filaments become quite free, only imbedded in mucilage.

At the base of the free part of the filaments the cells are cylindrical and as much as 24 μ long and 8—11 μ wide; higher up the cells grow shorter, mostly broader than long, the width of the filaments being about 16 μ. The filaments consist of about 20—30 cells. Thus, they are a good deal longer than in *Mesospora Schmidtii;* furthermore the shape of the cells is

different, being nearly cylindrical with thin walls in our plant, while, in Mme. WEBER's plant, they are barrelshaped and thickwalled.

Now and then groups of hairs occur (Fig. 9 c); the hairs are about 10 μ thick at the base and composed of cells longer than broad; their growth-zone lies a little below the surface of the thallus and consists of quite short cells, densely filled with protoplasm and chromatophores; thence the cells quickly become long and colourless. At their base the hairs are covered by a single or some few sheaths.

Unilocular sporangia were not present.

On the other hand I have found some structures (Fig. 9 d) in the upper end of the filaments, similar to those observed by Mme. WEBER who regards them to be plurilocular sporangia. In my material they were not so regularly divided as in the Indian plant. They very much reminded of those found by me in *Ralfsia expansa*.[1] In spite of a diligent search I have not succeeded in finding emptied plurilocular sporangia, but nevertheless I feel convinced that we have to do with such organs.

By reason of the thick walls in *Mesospora Schmidtii* a bursting of the wall takes place at the formation of the plurilocular sporangia as is easily seen in the drawings of Mme. WEBER, in our plant with its thin walls such a bursting is not visible.

The cells contain an irregularly lobed and bent plate-like chromatophore in which a single or two refractive pyrenoid-like bodies are present. In one of the specimens, sometimes in almost every filament, a cell with homogeneous, yellow brown contents was found.

Area of distribution: Endemic.

Ralfsia Berk.

R. expansa J. Ag.

AGARDH, J., Spec. Alg., vol. 1, p. 63. BÖRGESEN, F., Two crustaceous brown algae from the Danish West Indies (Nuova Notarisia, Serie 23, 1912, p. 123).

The specimens found are not quite typically developed and I have hesitated to decide whether they are most naturally referable to *R. verrucosa* or to *R. expansa*. It must be remembered that REINKE, in »Algenflora» p. 48, mentions that he has found a marked bilaterality in specimens of *R. verrucosa* from Cherbourg.

Now, a transverse section of one of the specimens found mostly showed no bilaterality at all while in the other specimen contained in the collection this character vas better developed, being often in good accordance with the figure of Mme. WEBER. As compared with my West Indian specimens the Pacific ones had upon the whole a much thinner thallus.

In one of the specimens unilocular sporangia were present; they were about 24 μ broad and 65 μ long, in shape and size approaching those I have found in specimens from St. Thomas (l. c. fig. 2 a). At the base of the sporangia a small cell was present just as in the West Indian plant; as I have

[1] Compare my figure 148 c in »Marine Algae of the D. W. I.», vol. I, p 191.

pointed out (l. c.) this pedicel is not mentioned in the description of KUCKUCK[1] nor figured in REINKE's Atlas, pl. 5—6; but it is present in HARVEY's figure in »Phycologia Brit.», pl. 98; this character is, perhaps, not a reliable one.

Area of distribution: West Indies, Malayan Archipelago, Easter Island.

Fam. Elachistaceae.

Elachista(?) spec. — Fig. 10.

On an old basal part of a *Sargassum*(?) a small brown alga was found which might perhaps be referred to the genus *Elachista* as it shows a good

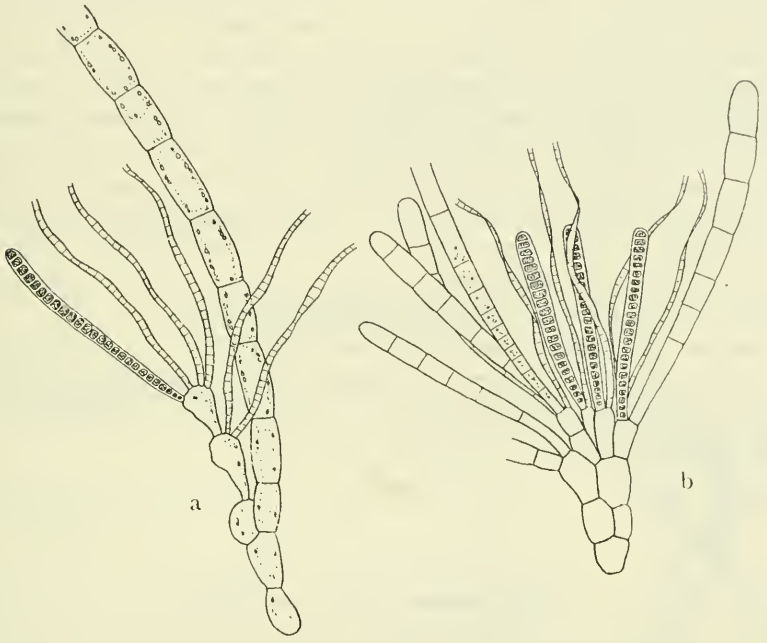

Fig. 10. *Elachista*(?) spec. Fragments with assimilatory filaments, mature and empty plurilocular sporangia; in **b** the basal part of a hair. C. $^{250}/_{1}$.

deal of likeness to *Elachista rosarioides* and *E. pusilla* described by SKOTTSBERG in Bot. Ergebn. d. schwed. Exp. nach Patagonien und dem Feuerland, 1907—9, VIII. Marine Algae, 1. Phaeophyceae, p. 21—23.

The plant forms small tufts. The basal part is endophytic, consisting of thin-walled, more or less barrel-shaped cells, about 15 μ wide and of almost the same length.

From the basal part arise hairs, long assimilating filaments, and shorter fertile branches.

The assimilating filaments are rather thin at their base, about 4—7 μ, with cells up to 30 μ long. Upwards the thickness increases to about 12—18 μ; at the same time the cells are proportionally shorter as they mostly keep the

[1] KUCKUCK, P., Bemerkungen zur marinen Algenvegetation von Helgoland, I, p. 244.

same length as found in the thinner part of the filament. In the young yet growing filaments the zone of cell division lies a little above their base, where shorter cells with rich contents are observed. The cells contain a number of roundish, oval, discformed chromatophores. The length of the vegetative filaments is about 300 μ.

The fructiferous filaments are branched from their base and composed of very irregular thin-walled cells. These cells are more or less pear-shaped, thin below and broadly rounded above, where often several branches are given off. The cells are about 8—12 μ broad and 20 μ long. From the uppermost of these cells the plurilocular sporangia arise. The sporangia are almost cylindrical, uniseriate, about 8 μ thick and up to 200, generally 150 μ long. The remains of empty sporangia are long preserved. When a sporangium is emptied a new one is formed at the side of the other one, and one cell may often bear 5—6 or more emptied sporangia besides a sporiferous one.

Unilocular sporangia were not observed. Hairs occur, but were not common.

As mentioned above the present plant seems to show some likeness to the *Elachista*-forms, described by SKOTTSBERG.[1] Also the Easter Island plant is more or less endophytic and shows no difference between assimilating filaments and paraphyses, contrary to *E. fucicola*. Particularly it seems to agree with a plant from Station 17 b of SKOTTSBERG (fig. 10 c) but differs by the narrower sporangia and the more cylindrical vegetative cells. Further, the assimilating filaments in the plant from the Easter Island are shorter.

It cannot be denied that the present plant shows a striking likeness to *Myriactis moniliformis* (Fosl.) Kylin, and highly favours the supposition of SKOTTSBERG that all these forms, even if they do not belong to one genus, must be regarded as nearly related to each other.

Fam. Encoeliaceae.

Colpomenia Derb. et Sol.

C. sinuosa (Roth) Derb. et Sol.

DERBÈS, A., and A. I. I. SOLIER, Mémoire sur quelques points de la Physiologie des Algues, p. 11 (here incorrectly called *sinuata*); BÖRGESEN, Mar. Algae of the D. W. I., vol. I, p. 176. — *Ulva sinuosa* Roth, Catalecta Botanica, III, p. 327, tab. XII.

Some few large specimens were present in the collection. They were fertile with plurilocular sporangia in irregular groups scattered over the surface of the thallus, as in the West Indian specimens. Still, there are some points of difference. For instance, I have not been able to find any club-shaped paraphyses so nicely developed in the West Indian form (comp. my fig. 138) and described by MITCHELL in MURRAY's Phycological Memoirs, p. 53.

Further, according to MITCHELL and my own observations the plurilocular sporangia are formed round the cryptostomata, while in the material from

[1] Professor SKOTTSBERG kindly sent me some slides of these species so I have been able to compare my plant with the authentic material.

Easter Island the sori do not seem to be restricted to the vicinity of these but are formed everywhere on the surface of the thallus. Otherwise, the Pacific specimens agree very well with West Indian ones.

Area of distribution: Widely spread in all warmer seas.

Hydroclathrus Bory.

H. cancellatus Bory.

Bory, Dict. class. VIII, p. 419. Harvey, Phycologia Australica, pl. 98; Nereis, p. 120, tab. IX A. Thuret et Bornet, Études phycologiques, 1878, p. 12. Mitchell, M. in Murray, Phycol. Memoirs, p. 53.

The specimens found agree very well with West Indian plants. The thallus consists of a medulla of large roundish-polygonal cells, and a small-celled cortex. Where two strings of the network come into contact the epidermal cells grow out in a rhizoid-like fashion, uniting in this way different parts of the net work of the thallus. Compare my fig. 139, l. c. The material was sterile.

Area of distribution: Seems to occur in all warm seas.

Chnoospora J. Ag.

C. fastigiata J. Ag. var. **pacifica** J. Ag. — Fig. 11, 12.

Agardh, J., Spec. Alg., vol. 1, 1848, p. 171. — *Chnoospora pacifica* J. Ag., Nya alger från Mexico (Öfvers. K. Vetensk.-Akad. Förh., 1847, p. 7).

Some small specimens of a brown alga, richly provided with cryptostomata, from which long hairs protrude giving the plant a nearly moniliform appearance, seem to be referable to the genus *Chnoospora* as a small form of *Chn. fastigiata* var. *pacifica*.

The largest specimen was about 6 cm high, the others 4 to 5. The plant is fastened to the substratum by means of a rather large irregularly shaped disc from which the erect shoots arise.

The ramification is mostly dichotomous, sometimes tri-polychotomous but rather irregular, with the whole branch system more or less fastigiate, even if a tendency to lie in the same plane is rather obvious.

In the basal part the branches are about 1 mm thick, rarely more, higher up thinner. The thallus is a little compressed, the transverse section being oval.

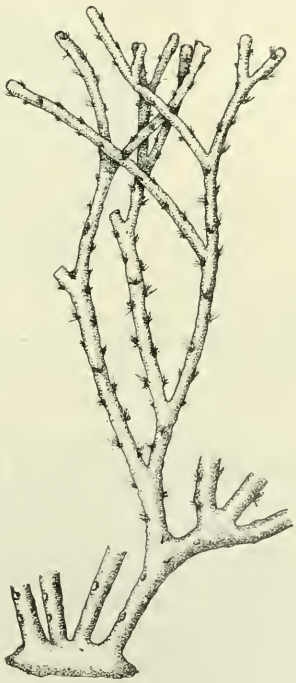

Fig. 11. *Chnoospora fastigiata* J. Ag. Part of a plant, c. $^2/_1$.

Scattered over the whole surface there are cryptostomata, generally rather shallow depressions, from the bottom of which hairs grow out to form rather long and dense, brushlike tufts. The blunt summit of the thallus has no hair-groups contrary to SKOTTSBERG's *Cladochroa*.

A transverse section of the thallus (Fig. 12 d) exhibits a cortical layer of oblong or short cylindrical cells, having nearly the same aspect on a longitudinal section; the parenchymatic tissue inside consists of rather thickwalled cells, oblong to subcylindrical in longitudinal, more sphærical in transverse sections.

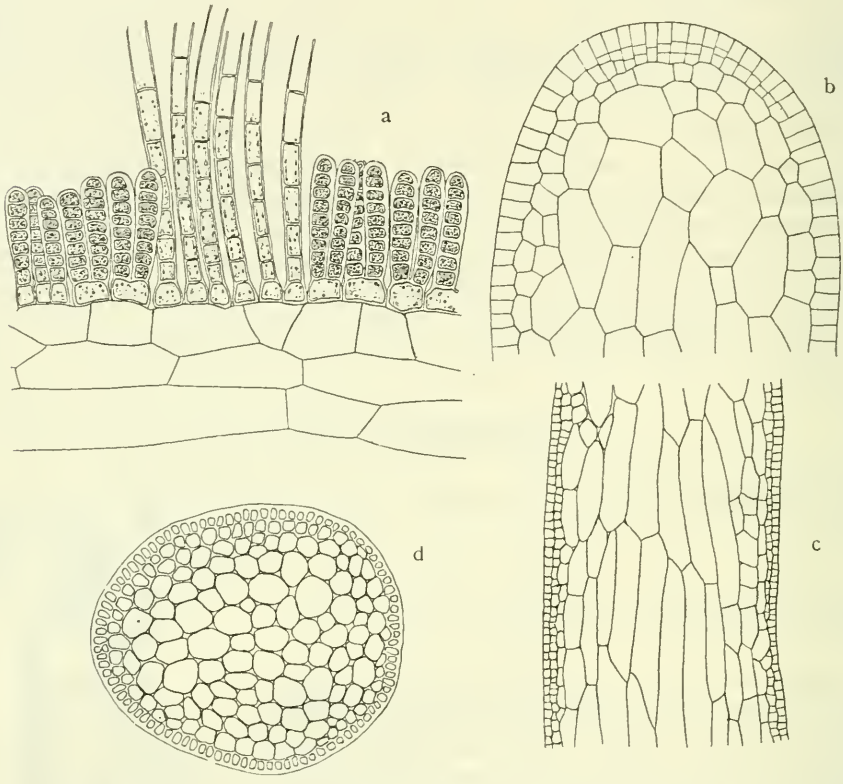

Fig. 12. *Chnoospora fastigiata* J. Ag. **a** Transverse section of the thallus with plurilocular sporangia and hairs, c. $^{400}/_{1}$; **b** longitudinal section of apex of a branch, c. $^{360}/_{1}$; **c** longitudinal section of thallus, c. $^{140}/_{1}$; **d** transverse section of thallus, c. $^{140}/_{1}$.

In the growth-point no marked top cell is present. As figure 12 b shows, the longitudinal growth takes place by means of a series of cells at the apex of the filaments, the lower part of these cells being gradually cut off.

The figure of the growth point in our plant is very like those of *Scytothamnus australis* and *Coilodesme bulligera* (comp. OLTMANNS, Morphologie und Biologie der Algen, vol. II, 1922, p. 62) as drawn by KUCKUCK and found among his posthumous prepatory notes to the great work on the Phaeophyceae that was never completed, much to the regret of all algologists. According to OLTMANNS the notes of KUCKUCK regarding this matter are quite fragmentary.

As to the fructification this has been cleared up long ago by the late Mrs. GEPP.[1] The plurilocular sporangia (Fig. 12 a) are formed around the trichostomata; the surface cells grow out to cylindrical or somewhat clavate bodies which are divided by transverse walls into small cells in which the gametes are formed.

Area of distribution: *Chnoospora fastigiata* has been found in several localities in the Pacific and on the coast of Venezuela in the Atlantic Ocean.

Fam. Sphacelariaceae.

Sphacelaria spec.

Only some few sterile filaments, even without propagula, were observed; they cannot be determined.

Fam. Dictyotaceae.

Dictyopteris Lamx.

D. repens (Okamura). — Fig. 13.

Haliseris repens Okamura, List of Marine Algae collected in Caroline and Marianne Islands, 1915 (Bot. Magaz., vol. 30, 1916, p. 8, pl. 1, figs. 7—18).

This pretty little plant was found creeping upon the base of *Galaxaura paschalis* and other algae. The specimens found seem to correspond very well with the description of OKAMURA. The thallus consists of two layers of cells except in the midrib (Fig. 13 a); a sclerenchymatic rib along the margin of the thallus, as found in *D. delicatula*, is not present here. Besides this difference it further differs from the West Indian plant, to which it otherwise shows a great resemblance, by the fact that the hair-groups, well developed and regularly scattered in the West Indian plant, are mostly wanting in the Pacific one or, when present, poorly developed and placed without order.

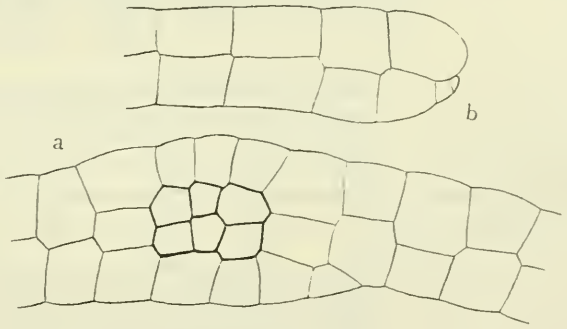

Fig. 13. *Dictyopteris repens* (Okam.) Cross sections of thallus, a through the midrib, b through margin. c. $^{200}/_{1}$.

Rhizoids like those in the W. I. plant are frequent; they grow out from the midrib and from the margin of the thallus. The rhizoids have a long stalk composed of cells about 100 μ long and 33 μ broad being somewhat narrowed at the cross walls. They end in a small coralliform disc.

Unfortunately all the material was sterile.

Area of distribution: Pacific Ocean

[1] BARTON, ETHEL S., On the fruit of Chnoospora fastigiata J. Ag. (Journ. Linn. Soc., Bot. vol. 33, 1897/8, p. 507, pl. 28).

Zonaria Drapern.

Z. variegata (Lamx.) Mert. — Fig. 14.

Mertens in Martius, Icones plant. cryptog., p. 6, tab. 11, fig. 11. Richards, H. M., Notes on Zonaria variegata Lamx. (Proc. of the Amer. Acad. of Arts and Sciences, 1890). Sauvageau, C., Observations sur quelques Dictyot. et sur un Aglaozonia nouveau (Bull. de la Station biol. d'Arcachon, 8 année, 1904—05). Börgesen, F., Marine Alg. D. W. I., vol. I, p. 197. — *Dictyota variegata* Lamx., Essai, p. 57, tab. V, figs. 7—9. *Gymnosorus variegatus* (Lamx.) J. Ag., Analecta algol., cont. I, p. 11, 1894.

The specimens collected agree very well with those from the West Indies. They are 7—8 cm in diameter or even more; when dried they have a dark nearly black-brown colour and their consistency is tough and rather stiff.

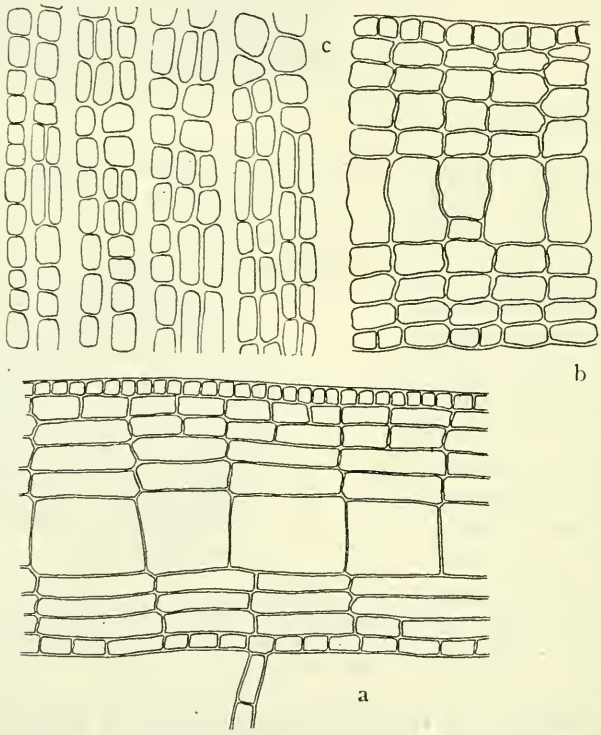

Fig. 14. *Zonaria variegata* (Lamx.) Mert. a, b transverse sections, c. $^{175}/_{1}$: a radial, b tangential; c upper surface of thallus, seen from above, c. $^{200}/_{1}$.

The thallus is about 150—200 μ thick. When examined from above the epidermal cells are seen to be arranged very regularly in rows (Fig. 14 c). The marginal rows consist of rather long rectangular cells, but these cells become soon divided by longitudinal and transverse walls into smaller cells, each row gradually getting composed of from two to four rows of small cells. These cells have rounded corners and are filled with chromatophores.

The epidermal layer on the lower side of the thallus is also composed of long rows of cells, but here the cells mostly remain undivided or they become divided now and then by a longitudinal wall into two cells, and many of the cells are not divided at all. The rows of rectangular cells, longer than broad, are upon the whole much more distinct here than on the upper side.

Fig. 14 a shows a radial transverse section of the thallus. The large cells in the centre are about 60 μ high and 80 μ broad. On the upper side 3—4 or even more flat cells are cut of. The uppermost of these cells are divided into smaller cells, forming the epidermal layer. From the lower side of the large cells also 3—4 cells are cut off; the lowermost, especially the epidermal ones, are again divided into smaller cells though fewer than in the epidermal layer above.

A tangential section of the thallus (Fig. 14 b) shows that the width of the cells in each layer is only about half of that found in the radial section, and the vertical walls are seen to be more or less distinctly undulated.

From the epidermal cells below numerous rhizoids grow out having the same moniliform appearance as those in the West Indian plant, and terminated by a coralliform disc. Scattered hairs occur in small groups on the upper side.

The specimens are sterile.

Ralfsia ceylanica Harv., described and figured by Mrs. GEPP[1], was later regarded by Mrs. and Mr. GEPP[2] as a creeping form of *Zonaria variegata*. After having seen the rather thick form from Easter Island, I feel inclined to adopt this view. In an earlier paper[3] I referred it to *Aglaozonia canariensis* Sauvag., which is, in several respects, very similar.

Area of distribution: Seems to occur in all warmer seas.

Z. crenata J. Ag.

J. AGARDH, Till Algernes Systematik (Lunds Univers. Årsskr., T. IX, 1872, p. 48).

A single large specimen is contained in the collection. As expressed by J. AGARDH (l. c.) this species takes an intermediar position between *Zonaria flava* and *Z. Turneriana*, a view confirmed by the Easter Island specimen.

The specimen was sterile.

Area of distribution: West Australia, Malayan Archipelago etc.

Fam. Fucaceae.

Sargassum Ag.

S. nov. spec., to be described by L. G. SJÖSTEDT in a separate paper. Very common, forming extensive associations in the lower litoral region.

Area of distribution: Endemic.

[1] BARTON, E. S., List of Marine Algae collected at the Maldive and Laccadive Islands by I. S. Gardiner (Journ. Linn. Soc., Bot., vol. 35).

[2] Marine Algae and Marine Phanerogams of the »Sealark» Expedition (Transactions of the Linnean Soc. of London, 2. Ser., Zool, vol. XII, part 4, 1909).

[3] BÖRGESEN, F., Two crustaceous brown algae from the Danish West Indies (Nuova Notarisia, Serie 23, 1912).

Rhodophyceae.

Fam. Bangiaceae.

Goniotrichum Kütz.

G. elegans (Chauv.) Le Jolis.

Le Jolis, Alg. mar. Cherb., p. 103. Rosenvinge, L. Kolderup, The marine of Algae of Denmark, Part I, 1909, p. 75, where literature, synonyms etc. are also quoted.

Of this species some smaller specimens are found growing epiphytic upon *Herposiphonia tenella*.

The specimens seem to agree very well with the description and figures of Rosenvinge. In a few of the filaments several rows of cells occurred quite in accordance with the figures D. and E. of this author.

Area of distribution: Europe, Mediterranean Sea, Maroc, West Indies, Peru, Easter Island.

Erythrotrichia Areschoug.

E. carnea (Dillw.) J. Ag.

J. Agardh, Till Algernes Systematik, VI, Ulvaceae (Lunds Univ. Årsskrift, vol. XIX, 1883, p. 15). Rosenvinge, Mar. Algae of Denmark, part 1, 1909, p. 67. — *Conferva carnea* Dillwyn, Brit. Conf., 1809, pl. 84. *Conferva ceramicola* Lyngb., Hydrophytol., 1819, p. 144, pl. 48 D. *Bangia ceramicola* Chauvin, Recherch. sur l'org. de plus. genr. d'Algues, Caen 1842, p. 29—30; Harvey, Phycol. Brit., pl. 317. *Erythrotrichia ceramicola* Aresch., Phyc. Scand., 1850, p. 210; Le Jolis, Alg. mar. Cherb., 1880, p 103, pl. 3, figs. 1—2; Berthold, G., Die Bangiaceen des Golfes von Neapel, 1882, p. 25.

Some small specimens are found epiphytic on *Jania tenella* and *Callithamnion paschale*. The plants seem to be in good accordance with the description of Rosenvinge, l. c. The filaments are about 24 μ thick. Their base was quite like the figure of Rosenvinge (l. c. fig. 8). The cells were mostly rather short, rarely longer than wide.

The spore-formation takes place in the well-known manner by means of an oblique wall at the upper end of the cells.

Area of distribution: Atlantic coast of Europe and North America, Mediterranean Sea, Maroc, West Indies, West coast of North America etc.

Erythrocladia Rosenv.

E. subintegra Rosenv.

Rosenvinge, L. Kolderup, The marine Algae of Denmark, Part I, 1909, p. 73.

Specimens quite like Rosenvinge's figure of older plants and young ones like those I have figured (Marine Algae of D. W. I., vol. II, p. 7—9, fig. 3 a, b) were found on *Cladophora* spec., mentioned above, p. 249.

Area of distribution: Denmark, West Indies, etc. Most probably widely spread.

E. vagans nov. spec. — Fig. 15.

Thallus divaricatus in superficie corticis hospitis (*Cruoriella* spec.) vage circumrepens, e filamentis irregulariter ramosis compositus.

Ramificatio aut alterna aut secunda, longa parte filamentorum nuda.

Cellulis aut cylindricis, ca. 4—5 latis et 30 μ vel ultra longis, aut magis irregulariter formatis, curvatis sinuosis, raro furcatis.

Chromatophora parietalia lobata.

Sporangia fere rotundata, ca. 4 μ lata.

The plant (Fig. 15) described here was found on a sterile crust of a *Cruoriella*. It creeps divaricately in the thick epidermal walls of the host forming, when systems of branches from different plants meet, a more or less dense network above the cells of the host.

The filaments are irregularly ramified sending out a side branch now and then at both sides (Fig. 15 c). The branches are sometimes alternate, sometimes more secund; often a branch is borne by every cell in the filament, often, too, long series of cells are destitute of branches. The filaments have apical growth; when the apical cell has reached some length it is divided by a transverse wall into two cells.

The cells sometimes are quite or almost cylindrical, about 4—5 μ broad and often more than 30 μ long, but oftener very irregular in shape, curved, sinuated, even subfurcate. In the cells a well developed parietal, lobed chromatophore is present, now and then leaving a space free; no pyrenoids were observed with certainty.

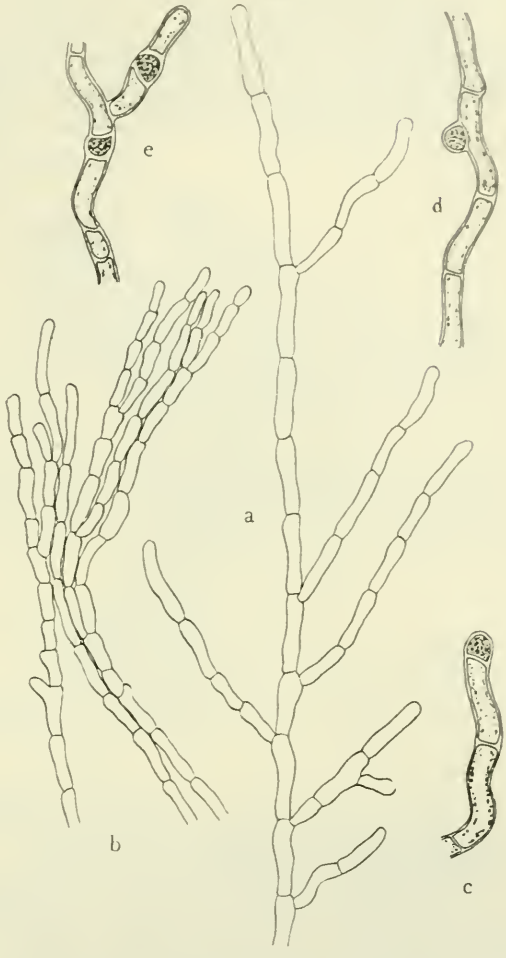

Fig. 15. *Erythrocladia vagans* nov. spec. a and b parts of the thallus, c. $^{220}/_{1}$; c, d and e parts of filaments with sporangia, c. $^{400}/_{1}$.

The sporangia (Fig. 15 c, d, e) are cut off from the vegetative cells by means of an oblique curved wall, in accordance with the description of ROSENVINGE. As the figure shows, the formation of the sporangia takes place both in the apical cell and in the intercalary cells; in one case the outgrowth of a sinuated cell had become transformed into a sporangium (Fig. 15 d). The spores are roundish, or somewhat flattened on one side and measure about 4 μ

in diameter; the colour is denser and more deeply red than in the sterile cells, and no chromatophore could be distinguished.

The dried plant has a fine rose colour.

Area of distribution: Endemic.

E. Laurenciae nov. spec. — Fig. 16.

Thallus suborbicularis, e filamentis irregulariter radiantibus et ramosis compositus, in circuitu thalli inter se liberis, in media parte plus minus connatis. Ramificatio aut alterna, aut secunda sat irregularis.

Cellulae oblongae-subcylindricae, 4—5 μ latae et 8—10—12 μ longae.

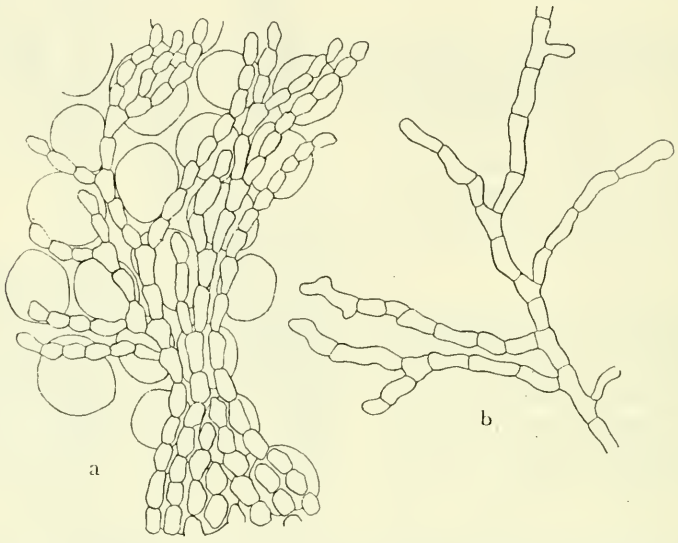

Fig. 16. *Erythrocladia Laurenciae* nov. spec. Parts of thallus; in a the tissue of the host is visible. C. $^{400}/_{1}$.

In the thick epidermal walls of *Laurencia claviformis* another representative of the genus *Erythrocladia* was found.

The plant has long ramose filaments with apical growth and these filaments radiate from the centre in all directions covering a more or less extensive area, probably as much as 1 mm across.

The ramification is rather irregular, lateral or alternate. In some specimens it happens that the alternate branching is so regular that the branch with its branchlets gets a pennate appearance. In the centre of the plant the filaments gradually combine to form a more or less coherent layer (Fig. 16 a).

The cells are oblong-subcylindrical, often a little curved so that the filaments get sinuated; cells 4—5 μ wide and generally 2—2 $^{1}/_{2}$ times as long. In the older parts of the thallus the cells get proportionally shorter and thicker, 8—10 μ wide and about as long or a little more. They contain an irregularly lobed parietal chromatophore with one or sometimes two pyrenoids.

In some instances a roundish cell were found cut off from mother cell by an oblique wall. Such cells having more dense and homogeneous contents

than the vegetative cells I regard them as asexual sporangia. They are about 5 μ in diameter.

E. Laurenciae comes near the preceding one but differs by its shorter and proportionally thicker cells, by its richer ramification and by the development of a coherent layer in the centre of the thallus.

Area of distribution: Endemic.

Fam. Helminthocladiaceae.

Acrochaetium Naeg.

A. *(Chantransia)* **moniliforme** Rosenv. — Fig. 17 a.

Rosenvinge, L. Kolderup, Mar. Algae of Denmark, Part I, p. 99.

The enormous distance between Easter Island and the original locality certainly aroused some doubt as to the identity; still, the few specimens observed seem to answer so well to the description and figures of Rosenvinge that it seems natural to bring them to his species.

From the basal spore, that does not differ much from other cells, several filaments arise. The cells are swollen in their middle, about 10—11 μ long and 8—9 μ wide. In one of the plants a long hair was found. The cell contents was very dense; the pyrenoids situated a little above the centre of the cells suggest a stellate chromatophore.

The plants are epiphytic on *Dictyopteris repens*.

Regarding the affinities between this species and *Acrochaetium catenulatum* Howe[1] or *A. crassipes* Börgs.[2], compare Howe's and my own remarks ll. cc.

Area of distribution: Denmark, Easter Island.

A. discoideum nov. spec. — Fig. 17 b—d.

Thallus epiphyticus, caespitosus, usque ad 300 μ altus. Pars basalis disciformis, unistratosa substrato (ɔ: foliis *Sargassi*) firme adhaerens, e filis repentibus ramosis, initio inter se discretis, postea plus minus confluentibus constructa.

Cellulae filorum repentium irregulariter curvatae aut plus minus tumidae, lat. 3—4 μ, long. 9—12 μ, diametro triplo fere longiores.

Fila erecta, e disco basali orta, simplicia, stricta, usque ad 200—300 μ et ultra alta, superne gradatim in pseudopila transformata, e cellulis cylidricis ca. 6—8 μ latis et (in parte basali) ca. 15 μ longis composita.

Sporangia oblonge-ovata aut in disco sessilia aut pedicellata, ca. 11—13 μ longa et 6—8 μ lata.

This species was found on a leaf of a dried specimen of *Sargassum*, whose surface it nearly covers. The basal layer spreads widely over the surface of the substratum to which it is firmly attached. A single plant may reach more

[1] Howe, M. A., Mar. Algae of Peru, p. 84.

[2] Börgesen, F., Marine Algae of the D. W. I., vol. II, p. 20.

than $^1/_2$ mm in diameter, perhaps even more, but it is difficult to tell the exact size as the plants gradually get fused together.

The basal layer is composed of irregularly ramose filaments which are free at the margin, otherwise forming a monostromatic disc. The disc cells measure 3—4 μ across and 9—12 μ in length; often they are curved and bent.

From this basal layer erect long assimilating filaments and sporangia arise.

The assimilating filaments are simple, straight and composed of cells about 6—8 μ wide and 15 μ long in the lower part; upwards the cells grow longer

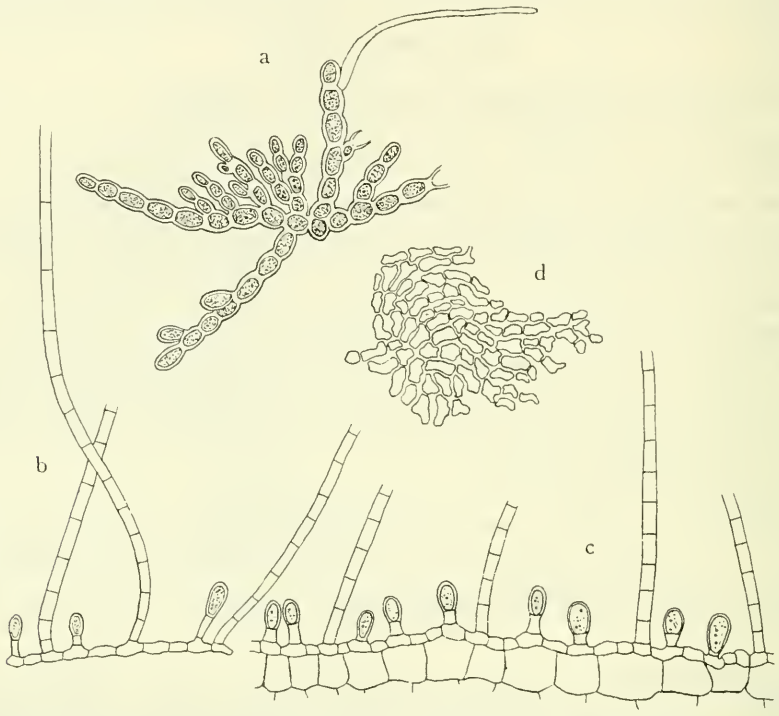

Fig. 17. **a** *Acrochaetium moniliforme* Rosenv., a single plant with sporangia (two emptied) and a hair, c. $^{400}/_1$. **b**—**d** *A. discoideum* nov. spec.: **b**, **c** sections through plants, in **c** the superficial cells of the host; **d** part of horizontal disc; all c. $^{400}/_1$.

and become almost colourless. The assimilating filaments attain a length of about 200—300 μ.

The sporangia are sometimes sessile, sometimes pedicellate. They are oblong-ovate, about 11—13 μ long and 6—8 μ across.

Regarding the cell contents this was in a bad condition, the material having been dried, but the chromatophore seems to be parietal with a parietal pyrenoid.

This species must be compared with *Chantransia leptonema* and *Ch. reducta* of ROSENVINGE, both exhibiting about the same mode of growth but differing materially in other respects from *A. discoideum*.

Area of distribution: Endemic.

A. Ralfsiae nov. spec. — Fig. 18, 19.

Thallus caespitulosus, $^1/_2$—1 mm altus, e filis endophyticis robustioribus moniliformibus et filis erectis liberis tenuioribus compositus.

Fila endophytica inter assimilatores hospitis *(Ralfsiae expansae)* immersa, ramosa, plus minus aggregata, e cellulis subglobosis-ovalibus, long. 20—22 μ, lat. 16—20 μ composita.

Fila libera erecta versus apicem gradatim attenuata, e cellulis cylindricis, 7 μ latis et 18—20—27 μ longis composita, statim a basi sparse et irregulariter ramosa. Rami aut longiores pluricellulares, aut unicellulares sporangiferi.

Sporangia oblonge-lanceolata, 9—12 μ lata et 17—20 μ longa.

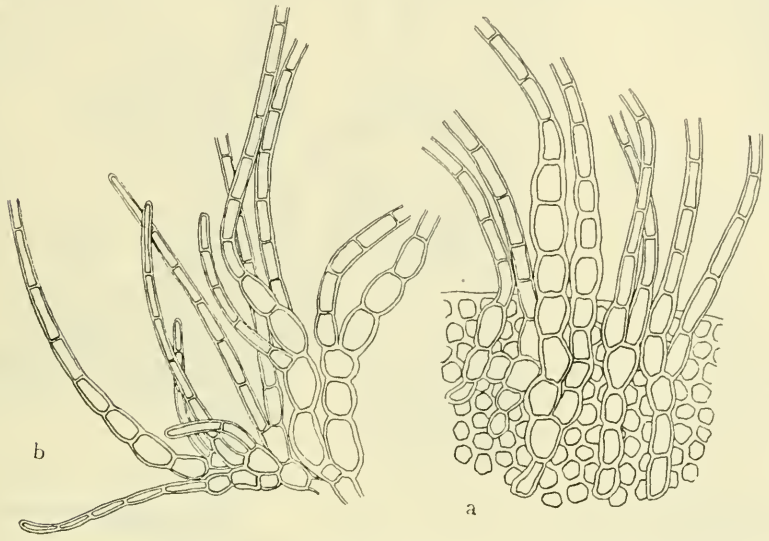

Fig. 18. *Acrochaetium Ralfsiae* nov. spec. Basal parts, in **a** immersed into the tissue of the host. C. $^{300}/_1$.

On a dried specimen of *Ralfsia expansa* this *Acrochaetium* was growing in great numbers, having a vigorously developed basal part of the thallus imbedded in the tissue of the host plant.

This endophytic basal part (Fig. 18 a and 19 a) consists of large cells mostly as long as broad or a little longer; their diameter is 20 μ; they are often swollen in the middle, the endophytic filaments thereby getting a moniliform appearance. The cell wall is very thick. The filaments are as a rule vertically arranged, the branches growing out at acute angles and more or less parallel with each other, but often also somewhat bent, finally forming a bundle in the tissue of the host. Arrived at the surface or a little above the filaments quickly decrease in size at the same time generally developing a few side branches.

The filaments in the free part of the plant are about 7 μ thick and the cells 20—27 μ long. The filaments now and then carry a side-branch, but as a rule they are not much branched. The branches are sometimes seriate but mostly without any order. Some of the branches may grow out to long filaments

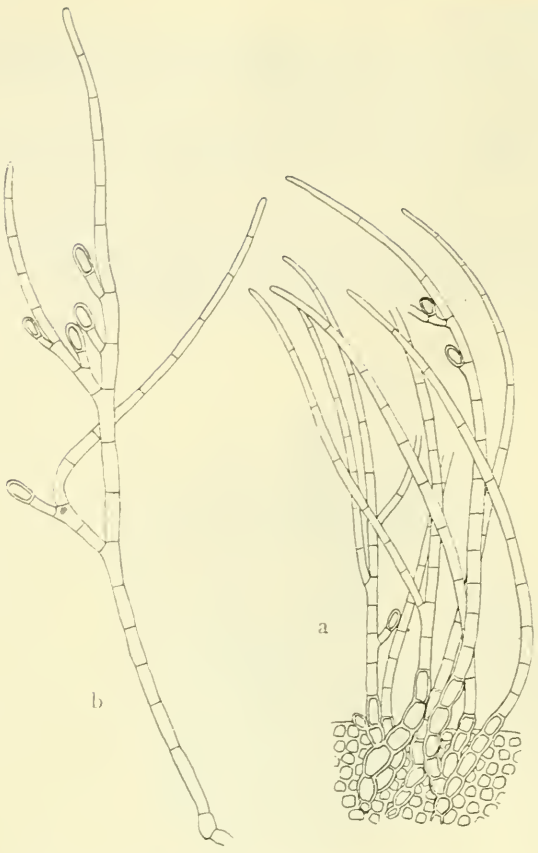

Fig. 19. *Acrochaetium Ralfsiae* nov. spec. a plants with sporangia, c. $^{250}/_{1}$; b a branch, c. $^{300}/_{1}$.

like the mother filament, but most of them remain short consisting of a single cell with a terminal sporangium.

The sporangia are oblong-lanceolate, 9—12 μ thick and 17—20 μ long.

The filaments taper a little toward their summit; most of them end in a broadly rounded cell, but some are narrowed into a pseudo-hair-like cell, which is 40—50 μ long or even longer and only 1 μ thick near the tip.

The length of the whole plant is about $^{1}/_{2}$—1 mm.

The cells contain a well developed parietal chromatophore with a large parietal pyrenoid.

By its more or less densely clustered endophytic filaments the West Indian *Acr. phaeophizum* reminds somewhat of this species, but in all other respects it differs widely.

Area of distribution: Endemic.

Fam. Chaetangiaceae.

Galaxaura J. Ag.

Sectio I. **Rhodura** Kjellm.

G. collabens J. Ag. — Fig. 20.

J. Agardh, Till Algernes Systematik, VII, p. 74. Kjellman, F. R., Om Floridé-Slägtet Galaxaura, p. 46.

Some rather large specimens (Fig. 20 a), 6–7 cm high, densely covered with short assimilating filaments are referable to this species as being in good accordance with the description of Kjellman.

The assimilating filaments are evenly distributed over the surface of the thallus. The plant is irregularly subdichotomously ramified, the joints being of rather variable length, 1—1 $^{1}/_{2}$ cm long or more, sometimes as much as 3 cm long acc. to Kjellman. The thallus is terete, often a little thickened toward the apex, the uppermost joints becoming slightly clavate.

The plant is richly incrusted with lime; in the dried specimens the branch ends collapse.

The colour of the dried plant is a dark red-brown.

The short assimilating filaments usually consist of 3 cells, but 4 cells are not uncommon: compare Fig. 20 b, a character to which KJELLMAN attaches much importance. The basal cells in the filaments are spherical, about 50 μ across, or a little longer than broad; the following cells gradually decrease to about 20 μ.

In the long assimilating filaments the basal cells have nearly the same size as those in the short filaments; in the cylindrical part the cells are about 16 μ thick and $1^1/_2$—2 times as long, and slightly constricted at the cross walls.

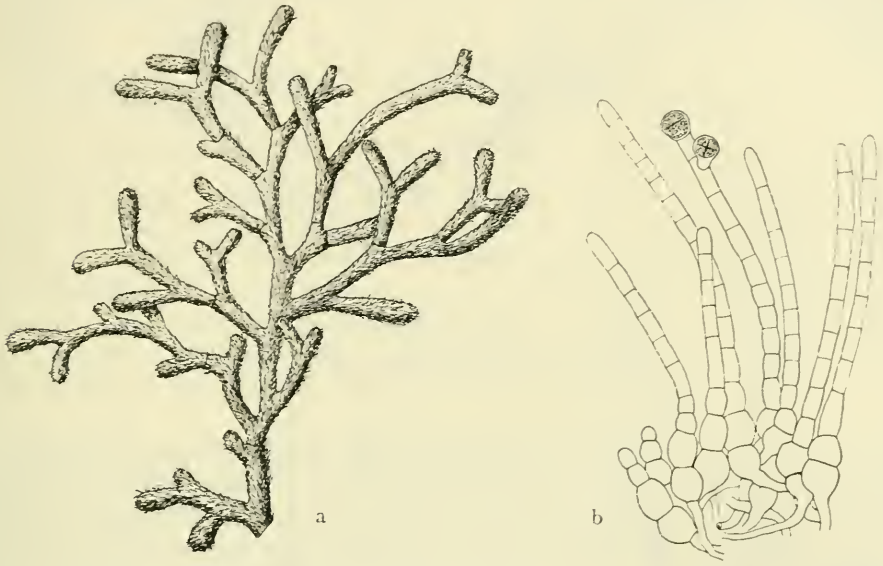

Fig. 20. *Galaxaura collabens* J. Ag. a part of specimen, c. $^2/_1$; b assimilating filaments with tetrasporangia, c. $^{135}/_1$.

The plant is tetrasporic. The tetrasporangia (Fig. 20 b) are mostly terminal on the long assimilating filaments; but now and then lateral occur, developed from the subterminal cells. The tetrasporangium is nearly spherical in shape, its diameter being 32 μ.

Most likely this plant is the tetrasporic form of the following one.

Area of distribution: West Australia, Easter Island.

Sectio II. **Microthoë** Dcne, J. Ag.

G. spec. — Fig. 21, 22.

A rather large form, about 10 cm high, forming a rounded, but rather open bush.

From the broad basal disc a great number of branches arise. They are irregularly subdichotomously divided with joints of very variable length. The

Fig. 21. *Galaxaura* spec., part of specimen, c. 1.5/1.

plant is strongly incrusted with lime. The thallus is terete and the surface is in parts nearly glabrous, but mostly covered by short stiff reddish assimilating filaments scattered evenly and densely over the surface, no annulation being visible.

The colour of the dried plant is when denudate a greyish-green while the parts covered with assimilating filaments have a sordid red-brown tinge. In the spirit material the whole thallus is, as said above, terete while in the dried material the youngest parts collapse.

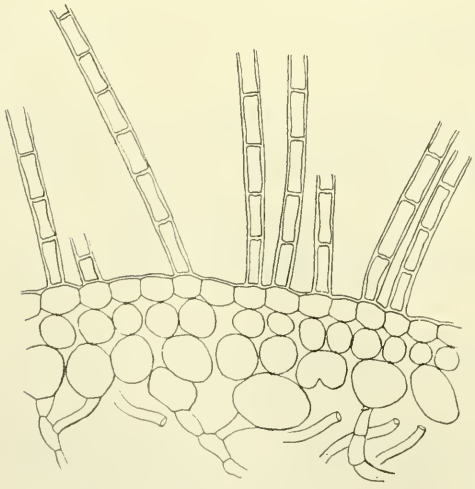

Fig. 22. *Galaxaura* spec. (same as in fig. 21). Cross section of thallus showing short assimilating filaments, c. 200/1.

The transverse section shows that the medullary tissue consists of thick-walled filaments more or less subdichotomously branched and woven together. Their diameter varies round 12 μ, but thinner and thicker ones are present.

Innermost the peripheric tissue (Fig. 22) is composed of large roundish or irregularly lobed cells, carrying quite short, often dichotomously branched filaments of 2—3 cells. The lower cells of these branches are larger and about

spherical, while the peripheric ones are short, more or less triangular in transverse section, seen from above 5—7-angled and densely united. Now and then short assimilating filaments grow out from the peripheral cells. These filaments reach a length of about 250 μ; they are composed of 7—10—15 cells, 25—30 μ long and about 16—18 μ thick.

In one of the dried specimens cystocarps were present, what agrees with HOWE's statement that all forms belonging to the group *Microthoë* are either antheridial or cystocarpic, while the corresponding tetrasporic plant is to be found in the group *Rhodura*.

Therefore it is highly probable that this plant is nothing else than the sexual form of the preceding species.

Sectio III. **Brachycladia** Sonder.

G. paschalis nov. spec. — Fig. 23—25.

Galaxaura frutescens, 5—6 cm alta e ramis erectis, teretibusque a disco basali ortis composita. Rami in parte basali subnudi dein filis assimilatoribus longis distincte in verticillas ca. 5 mm latas dispositis instructi, superne subglabri, subdichotome ramosi, articulati, articulis longitudine variabili 5—8 mm longis.

In parte basali ramorum axis centralis e filamentis irregulariter ramosis et inter se contextis composita exstat; tela peripherica e filis aut longis aut brevibus constructa; fila longa cylindrica e cellulis 24 μ crassis et 80 μ longis composita, fila brevia e 3—6 cellulis basalibus majoribus oblongis versus apicem minoribus et subsphaericis constructa; in superiori parte ramorum tela peripherica e cellulis oblongo-subcylindricis formata est.

This plant belongs to the group *Brachycladia* of KJELLMAN. Fig. 23 represents part of the thallus.

The erect shoots arise from a broad basal disc and reach a heigth of about 5—6 cm. Just as in the other species of this group, the lower and upper parts of the thallus are different as regards both outer appearance and anatomical structure.

The lower stemlike portion is $1^1/_2$—2 cm high in our species; it is ornated with long hairs nicely arranged in discriminate whorls;

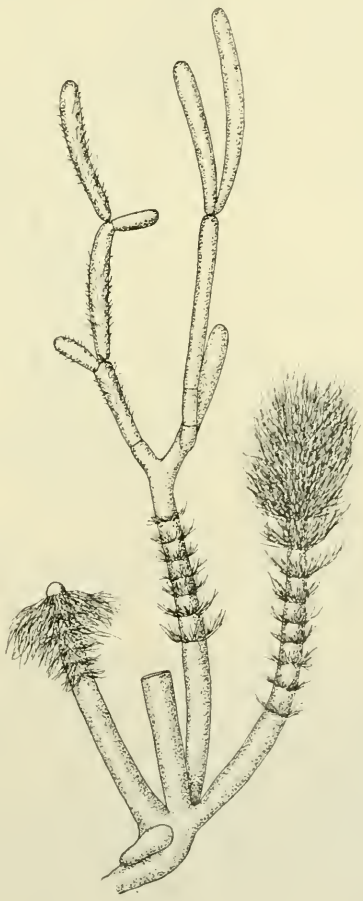

Fig. 23. *Galaxaura paschalis* nov. spec., part of specimen, c. $^3/_1$.

the upper, well developed whorls are often more than 5 mm broad; downwards the hairs gradually die away and fall off.

This basal part, always unbranched it appears, bears the glabrous repeatedly subdichotomous upper part of the thallus. It is terete and jointed, with joints of varying length, from 5 to 8 mm. At the summit and also at the ends of the joints now and then a more or less well developed whorl of hairs is present.

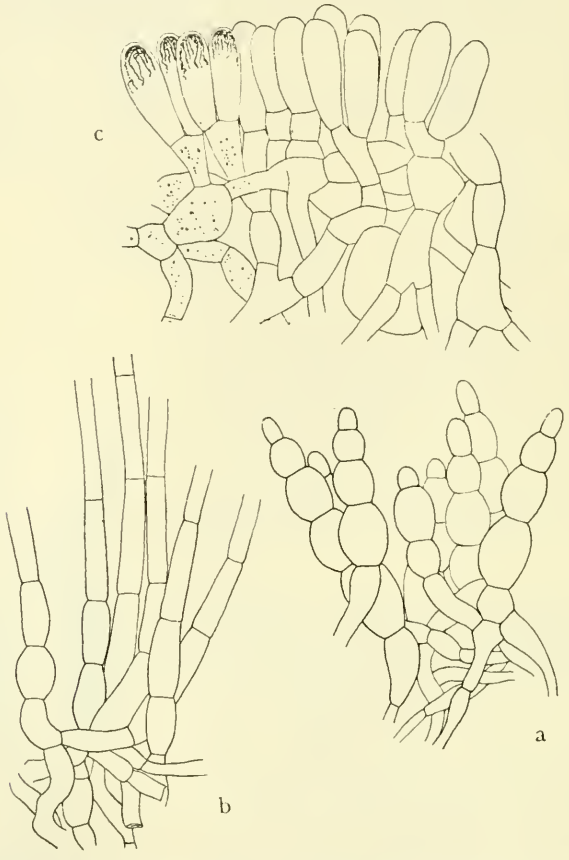

Fig. 24. *Galaxaura paschalis* nov. spec. **a**—**b** fragments of thallus with short (**a**, c. $^{135}/_{1}$) and long (**b**, c. $^{135}/_{1}$) assimilating filaments; **c** cross section in the upper part of a branch, c. $^{250}/_{1}$.

The anatomy of the basal part (Fig. 24 a, b) reminds very much of what we find in the group *Rhodura*. The whorls consist of long assimilating filaments with shorter ones intermingled. The short assimilating filaments (Figs. 24 a, 25) are composed of 3—4 or more roundish oval cells; the uppermost are smallest, almost spherical or a little longer than broad, about 20—25 μ thick, the lowermost oblong and much larger, up to 60 μ thick. The long assimilating filaments (Fig. 24 b) have basal cells of nearly the same shape as those found in the short ones; the cylindrical part consists of cells about 24 μ thick and 80 μ long. They have rather thick walls and are only very little narrowed at the cross walls.

The stem portions between the hair whorls consist of short assimilating filaments only. In the uppermost glabrous part of the thallus the structure of the peripheric tissue is quite different (Fig. 24 c). It is composed of oblong-subcylindrical cells, about 60 μ long and 24 μ broad and closely packed together. The tissue in the interior of the whole thallus is composed of long irregularly bent subdichotomous filaments woven together.

Of species with terete thallus only one, *G. lenta*, is listed by KJELLMAN in his work of *Galaxaura*. The present species is quite different. With regard to the basal part our plant looks rather like *G. arborea* Kjellm., but in other respects this species differs greatly from the present one.

Area of distribution: Endemic.

Fig. 25. *Galaxaura paschalis* nov. spec. Short and long assimilating filaments, c. $^{175}/_{1}$.

Fam. Gelidiaceae.

Gelidium Lamour.

G. pusillum (Stackh.) Le Jolis. — Fig. 26.

LE JOLIS, Liste, p. 139. — *Gelidium repens* Okamura in Bot. Mag., vol. 13, 1899, p. 7, pl. II, figs. 5—8.

This small plant, well known from the coast of Europe, has been found by OKAMURA at the coasts of Japan and Australia and was at first regarded by him as a new species. But in a later paper: List of marine Algae collected in Caroline Islands and Australia (Bot. Mag., vol. 18, 1904, p. 86–87) OKAMURA rightly referred his species to *G. pusillum*.

Quite as is the case with the plant of OKAMURA the plant from the Easter

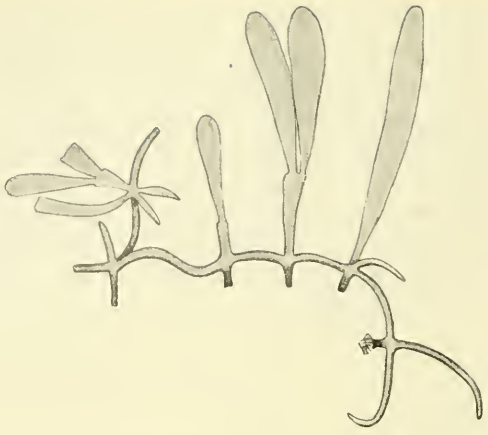

Fig. 26. *Gelidium pusillum* (Stackh.) Le Jol. Part of a plant; most of the rhizoids are broken, c. 12/1.

Island is most like the form called *Acrocarpus pusillus* by KÜTZING in his »Tabulæ», vol. 18, pl. 37, and not *Acrocarpus pulvinatus*. The Easter Island specimen grew on a small shell and was two—three mm high. The creeping rhizome-like part of the thallus was terete and about 11 μ thick. Is was firmly attached to the substratum by means of vigorous rhizoids deeply sunk into the shell. Opposite the rhizoids, from the upper side of the rhizome, erect leaf-like shoots grow out, at first single, later often more or less cespitose.

Tetrasporangia are formed in the tips of the leaf-like branches.

The Easter Island plant certainly comes very near var. *conchicola* Piccone and Grunow, Algol. Eritrea (N. Giorn. Bot. Ital., vol. 16, 1884, p. 316); comp. OKAMURA, List of Mar. Algae collected in the Caroline and Marianne Islands (Bot. Mag., vol. 30, 1916, p. 9, fig. 6). It also resembles var. *minuscula* Weber van Bosse, Alg. Siboga, p. 226.

Area of distribution: Atlantic and Mediterranean coast of Europe, Maroc, Japan, Australia, Easter Island.

Caulacanthus Kütz.

C. spinellus (Hook. f. et Harv.) Kütz. — Figs. 27, 28.

KÜTZING, Species Alg., p. 753. — *Rhodomela*? *spinella* Hook. f. et Harv.; HOOKER, J. D. and W. H. HARVEY, Algae Novae Zelandiae (The London Journal of Botany, vol. IV, 1845, p. 534).

A few sterile fragments of an irregularly ramified filamentous alga belong I think to this species. The branches, arranged without any order at all are sometimes short, spine-like, sometimes prolonged.

The thallus grows by means of an oblique top cell from which a tissue is formed consisting of a central row of cylindrical cells, encircled by some smaller ones which again gradually pass into a cortical layer of small cells. On a longitudinal section the cells of the central tube measure about 25—40 μ across and 100—150 μ in length, according to the strength of the axis. These large cells contain bundles of raphides. The cells next to these are also rather long about twice their own width; the following are shorter and shorter, as we proceed toward the surface.

The thallus is from 150 μ—200 μ thick. It is fixed to the substratum by means of small discs growing out everywhere from the surface of the thallus and composed of a bundle of rhizoids. By means of such discs also branches of the same individual get united. In this respect it quite agrees with *Wurde-*

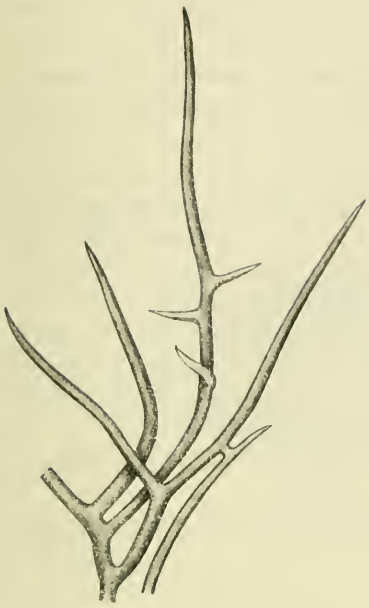

Fig. 27. *Caulacanthus spinellus* (Hook. f. et Harv.) Kütz. Part of specimen, c. $^{17}/_{1}$.

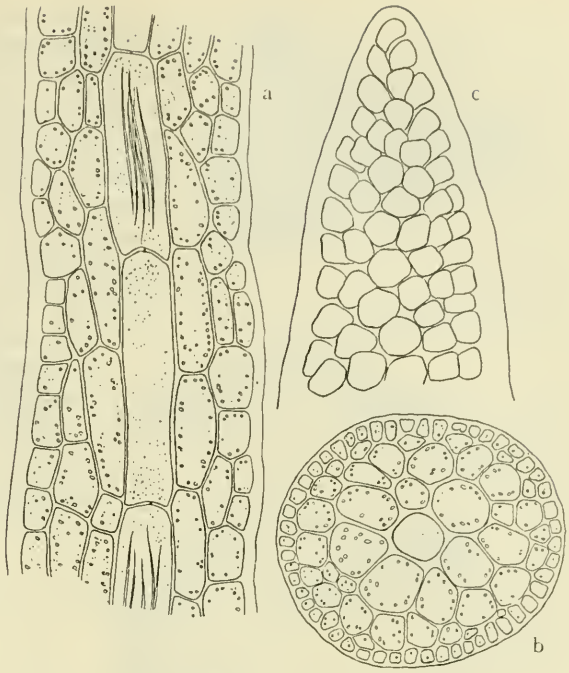

Fig. 28. *Caulacanthus spinellus* (Hook. f. et Harv.) Kütz. **a** longitudinal (c. $^{250}/_{1}$) and **b** transverse section of thallus (c. $^{170}/_{1}$); **c** apex, c. $^{450}/_{1}$.

mannia setacea to which it bears a considerable external resemblance; the anatomy is, however, essentially different.[1]

Caulacanthus indicus Weber v. Bosse is a much larger plant, the thallus being 1—2 mm broad; in its outer habit it seems quite to agree with the present plant, having the same antler-like ramification and the same discs by means of which it attaches itself to other algae etc.

Area of distribution: New Zealand, Easter Island.

Fam. Rhizophyllidaceae.

Rhizophyllis Kütz.

Rh. pacifica nov. spec. — Fig. 29—31.

Thallus crustæformis, membranaceo-corneus, margine irregulariter lobato, lobis anastomosantibus, rhizoideis perlongis numerosis ex parte thalli deorsum vergente natis adfixus.

Thallus dorsiventralis, e stratis duobus compositus, stratum superius corticale e cellulis 2—3 minoribus constat in filamenta ordinatis; inter ea glandulae majores sparsae sunt.

[1] Compare my figures in Mar. Alg. D. W. I., vol. II, p. 369.

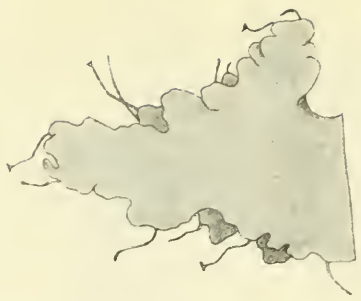

Fig. 29. *Rhizophyllis pacifica* nov. spec., part of plant, c. $^{17}/_{1}$.

Stratum inferius crassius parenchymaticum e cellulis rotundatis majoribus et minoribus inter se mixtis formatum est; hic illic cellulae majores in series ordinatae occurrunt.

Tetrasporangia in nemathecia explanata e cellulis corticalibus orta, irregulariter zonatim divisa.

On a piece of a *Lithothamnion* a small fragment (scarcely more than $^{1}/_{2}$ square cm) of a crustaceous alga was found, which I refer with some hesitation to the genus *Rhizophyllis*.

It forms an irregularly lobed crust about 250 μ. thick, the lobes overlapping each other. The surface is uneven, somewhat crispate (Fig. 29). It is easily detached from the substratum, to which it is fastened by means of numerous rhizoids; these rhizoids grow out everywhere, not only from the lower surface, but also from the margin.

The concistency of the thallus is fleshy-cartilaginous. No incrustation of lime is found.

Fig. 29 shows a piece of the thallus with the margin; the numerous small lobes more or less overlapping each other and at last fused together are clearly shown.

The thallus has a distinct dorsiventral structure (Fig. 30, 31). It seems to increase in size by marginal divisions, performed by all the cells of the margin (Fig. 31 d); in any case no distinct top-cell was observed in the material at hand. Fig. 31 d illustrates the margin. It is seen that the cells near the margin are mostly arranged in rows; sometimes these rows are nearly parallel, sometimes diverging. The cells are smallest at the periphery. Generally they are cut off by cross walls parallel to the periphery, but sometimes, too, by oblique walls. All the cells are rather uniformly developed and have tick walls, giving the impression that the growth has ceased for the present.

A transverse section of the thallus (Fig. 30) shows a cortical layer above and a thick parenchymatic tissue below. The latter consists of roundish cells of very different size, up to c. 40 μ. or more in diameter; the cells are largest in the middle, smaller upwards and downwards, they have thick walls and contain much starch, especially in the upper part of the tissue.

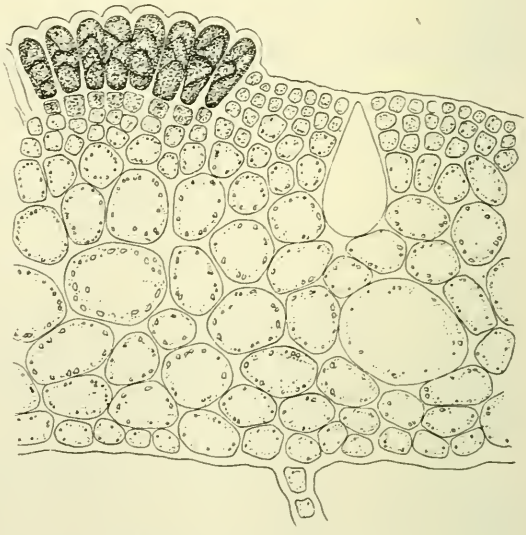

Fig. 30. *Rhizophyllis pacifica* nov. spec. Cross section with a tetrasporangium sorus and a gland-cell. C. $^{250}/_{1}$.

In the parenchymatic tissue in the central part of the thallus

long rows of large cells are present (Fig. 31 a); they are bent here and there and their occurrence seems upon the whole to be rather accidental, parts of the thallus being quite destitute of such cell-rows. They are formed by large, subcylindrical to barrelshaped, thick-walled cells, about 100 μ long and 65 μ across. In the scarce material I have not been able to follow them to the margin or to explain how they are formed. In the description of *Rhizophyllis* in ENGLER & PRANTL, Natürl. Pflanzenfam., I. Teil, VI. Abt., p. 531, the mid-rib is described as follows: »der Bauchseite genähert verläuft in der Thallusmitte eine gegliederte Centralachse, 2-zeilig alternierend in die Zähne und Lappen des Thallusrandes hinein verzweigt». If we compare this description with that

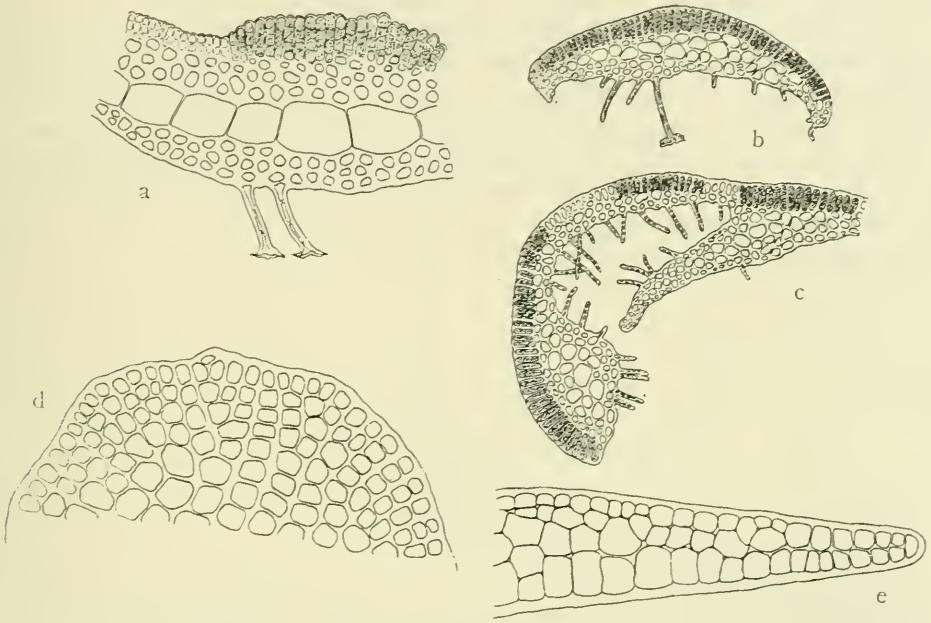

Fig. 31. *Rhizophyllis pacifica* nov. spec. a—c transverse sections of thallus; d marginal portion e cross section of margin. a c. $^{80}/_{1}$, b, c $^{60}/_{1}$, d $^{185}/_{1}$, e $^{270}/_{1}$.

given above, there is a considerable difference, as I have not observed any branches from the tube of the long cells, nor is it arranged in such a way that it can be called a »Centralachse».

The parenchymatic tissue gradually passes into the cortical layer above. The latter is composed of small rounded cells arranged close together in short rows of 2—3 cells which become smaller toward the surface. Seen from above they form a very dense epidermal layer composed of quite small cells, only 4—5 μ in diameter and with very thick walls. The epidermal cells of the lower surface are larger, polygonal and c. 40—50 μ across.

Scattered in the cortical layer we finally come across the large characteristic gland-cells (Fig. 30). They are oval-pyriform, often even somewhat lageniform, c. 35 μ wide and 75 μ long, with their broadly rounded base sunk deep down into the parenchymatic tissue, penetrating with their attenuated summit between the cortical cells to just below the upper surface of thallus, leaving a small

porus open above their mouth-like upper end. When the thallus is seen from above the gland cells are easily observable as clear bodies between the dark cortical cells. They are uniformly scattered over the thallus, and contain a clear mucilage.

The tetrasporangia (Figs. 30, 31) are formed in large sori on the surface of the thallus. The sporangia are elongate-ovoid, often slightly tapering toward the base, and transversly divided by oblique, often somewhat curved walls into four spores. The sporangia measure c. 40 × 17 μ.

As the plant was preserved in alcohol, nothing is known about the colour in a fresh stete.

Neither cystocarps nor antheridia were found.

According to the descriptions of SCHMITZ, HAUCK and DE TONI and to my observations on dried material, *Rh. Squamariae* bears considerable resemblance to the new species in its anatomical structure. On the other hand, characters like the irregular crust-shaped thallus, the (presumably) marginal growth etc. remove *Rh. pacifica* from the Mediterranean species. The generic position of the former remains uncertain as long as we have not seen a more complete material, including sexual plants.

Area of distribution: Endemic.

Fam. Squamariaceae.

By Mme. Dr. A. WEBER VAN BOSSE.

Cruoriopsis Duf.

C. de Zwaanii Web. v. B.

WEBER VAN BOSSE, Liste des Algues du Siboga, Rhodophyceae, prem. partie 1921, p. 267.

In all essential points the alga of Easter Island resembles *Cr. de Zwaanii*, but I have seen only tetrasporic plants. It may be that plants bearing cystocarps are different from *Cr. de Zwaanii*.

Area of distribution: Island Nias, west coast of Sumatra, Easter Island.

Ethelia W. v. B.

E. pacifica nov. spec.

Thallo substrato affixo, ± 300 μ crasso, constante e mesothallo et perithallo superiore et inferiore. Mesothallo constante e filamentis ramosis, flabelliformibus. Perithallo superiore constante e filamentis obliquis in parte basali, terminatis in partem superiorem satis latam erectam. Perithallo inferiore solum filamentis obliquis munito, quorum pluria exeunt in rhizoidea.

Cellulis perithalli superioris ± 3—6 μ latis et 8—9 μ altis, cellulis perithalli inferioris 5—9 μ latis et 18 μ altis. Organis fructificationis non visis.

Thallus adhering firmly to the substratum ± 300 μ thick, consisting of a mesothallus and a perithallus superior and inferior. Mesothallus consisting of flabella-like branched filaments. Perithallus superior consisting of oblique filaments in the basal part, ending in a pretty broad straight upper part.

Perithallus inferior having only oblique filaments, many of these running out in rhizoids.

Cells of perithallus superior ± 3—6 μ broad and 8—9 μ high. Cells of perithallus inferior 5—9 μ broad and 18 μ high.

Organs of fructification not observed.

As long as the organs of fructification are unknown it will remain doubtful whether an alga, with a midlayer of cells giving off ascending and descending filaments, is a representative of the genus *Ethelia* (the type of which is *E. Fosliei*) or a representative of the genera *Cruoriella* or *Peyssonnelia* and differing from the types of these genera no more than *Ralfsia deusta* differs from *Ralfsia clavata*.[1] *Ethelia Fosliei* has a mesothallus with an extremely well defined perithallus superior and inferior and nemathecia with paraphyses that have top-cells adhering together and covering almost the tetrasporangium in a young state. The new alga from Easter Island does not give any light on this matter as none of my many slides showed signs of fructification. Its anatomical structure mostly resembles *Ethelia (Peyssonnelia) biradiata* from the Indian Ocean. It differs from this alga by its mode of growth, for *E. pacifica* adheres firmly to the substratum whereas *E. biradiata* may be very easily detached and seems even here and there to lie loose on the substratum while growing. The thallus of *E. pacifica* adheres so firmly that I found it impossible to make a good slide through the thallus, unless I cut the substratum at the same time. The decalcifying of the substratum, consisting mostly of worm tubes, required much time as the tubes were of different consistence. The use of various acids had also a destructive influence on the contents of the cells and propitiated the swelling of the membranes, circumstances that were unfavourable to the making of good slides.

Another difference between the two algae lies in the size of the filaments. The ascending filaments of *E. biradiata* are ± 8 μ broad and are 2—3 times as high as broad. Those of *E. pacifica* are broad 3—6 μ and 8—9 μ high. The filaments of the perithallus inferior are in both algae longer and broader than the ascending filaments. The colour was gone in the specimens of *E. pacifica* that I had for examination. *E. biradiata* has a bright red colour.

Area of distribution: Endemic.

Fam. Corallinaceae.

Melobesieae, par Mme PAUL LEMOINE.

M. SKOTTSBERG a recueilli quelques espèces intéressantes dans cette ile isolée d'où jusqu'ici non ne connaissait que deux espèces: *Porolithon onkodes* (Heyd.) Fosl. et *Porolithon praetextatum* Fosl.; il a d'ailleurs retrouvé la première de ces deux espèces, associée à d'autres espèces pacifiques littorales.

[1] conf. REINKE, Algenflora der Westl. Ostsee deutschen Anteils, 1889, p. 48.

Lithothamnion (Phil.) Fosl.

L. siamense Fosl. — Fig. 32 a.

M. Foslie in Flora of Koh Chang (Bot. Tidsskr. XXIV, 1901, p. 19 (non f. *simulans*)); Id. in Weber et Foslie, The Corallinaceae of Siboga Expedition, Siboga Expeditie LXI, 1904, p. 10, fig. 3, Pl. I, fig. 1—9.

N'ayant jamais vu d'échantillon de *L. siamense* j'ai quelque hésitation à rapporter à cette espèce un échantillon de l'Ile de Pâques dont les caractères paraissent cependant coincider parfaitement avec la description de M. Foslie; cependant les figures 1, 2 qui représentent le type de l'espèce en donnent une idée confuse.

L'échantillon de l'Ile de Pâques mesure 2 à 3 cm; il est formé de lamelles extrèmement minces (50 à 70 μ d'épaisseur après décalcification) et fragiles, de taille variable, irrégulièrement superposées et imbriquées de manière à constituer un complexe de croûtes d'une épaisseur de 2 à 5 mm; ces lamelles, finement striées sur leur face inférieure, sont lisses sur leur face supérieure; la plupart sont plus ou moins horizontales, mais souvent aussi elles sont contournées ou recourbées, ou s'enroulent en forme de tiges creuses; elles donnent également naissance à de petites excroissances; enfin on remarque aussi des lamelles disposées verticalement.

Cet échantillon paraît correspondre à une variété plus résistance que ceux décrits par M. Foslie; cet auteur a en effet observé des croûtes de 30 à 60 μ d'épaisseur seulement qui, en se superposant n'atteignaient que 300 μ d'épaisseur. Pour les autres caractères sa description s'applique à l'échantillon en question, et les divergences qu'on peut relever sont de faible importance.

Chacune des feuilles qui constitue l'échantillon, de l'Ile de Pâques est constituée par l'hypothalle et le périthalle; dans les lamelles disposées horizontalement le périthalle est plus développé que l'hypothalle; l'inverse se produit dans les parties où les lamelles sont recourbées et presque libres (fig. 32 a). L'hypothalle est formé de cellules courtes de 5 à 15 μ de long et 5 à 8 μ de large; dans certaines lamelles les cellules ne dépassent pas 7 μ de longueur; les cellules hypothalliennes sont rectangulaires à angles arrondis. Le périthalle est formé de files lâches dont les cellules mesurent 3 à 9 μ × 3 à 7 μ.

Je crois avoir observé les deux sortes de conceptacles: les conceptacles à sporanges ont un toit légerement bombé, leur diamètre est de 280 à 480 μ; je n'ai vu ni les pores du toit du conceptacle, ni les spores.

Les conceptacles à cystocarpes ont un toit de forme convexe percé d'un pore au sommet; leur diamètre varie de 300 à 500 μ.

L. siamense se rapproche par sa structure et la fragilité de ses croûtes de *Lithothamnium mesomorphum* Fosl. de l'Atlantique (Bahamas, Bermudes, Antilles).

Répartition géographique: *L. siamense* a été découvert dans le Golfe de Siam, puis retrouvé ensuite en différentes régions du Pacifique: Sumbawa (Est de Java), Archipel Sulu, Ile Nusa-Laut, Ile Kei; il a été recueilli à des profondeurs variant de 5 à 69 mètres. A l'Ile de Pâques il a été recueilli dans la zone littorale à Hanga Piko.

Lithophyllum (Phil.) Fosl.

Deux des espèces de *Lithophyllum* de l'Ile de Pâques n'ont aucunement la structure typique de ce genre, telle que je l'ai caractérisée au point de vue anatomique, mais elles en possèdent les organes reproducteurs; aussi je les laisse provisoirement dans ce genre, dans lequel elles constituent une section spéciale, ainsi que quelques autres espèces déjà signalées dans différentes régions du globe.

L.(?) samoense Fosl. — Fig. 32 b.

M. Foslie: Algologiske notiser II, D. K. N. Vid. Selsk. Skrifter, 1906, no. 2, p. 20.

M. Foslie n'a jamais figuré cette espèce, qu'il avait tout d'abord réunie au *L. decipiens* Fosl. En comparaison de l'échantillon de l'Ile de Pâques, j'ai étudié un échantillon de l'Herbier Bornet, provenant de Tahiti, dont M. Foslie fait d'ailleurs mention loc. cit.

L. samoense montre en coupe verticale un hypothalle peu développé, formé de files horizontales dont les cellules mesurent 6 à 17 μ de longueur et 3 à 7 μ de large, quelquefois 9 μ. Le périthalle est formé de très petites cellules carrées ou rectangulaires de 3 à 5 μ, atteignant 7 et 8 μ de longueur et 3 à 7 μ de large. L'espèce forme souvent plusieurs thalles superposés. J'ai noté, pour les conceptacles les dimensions de 125 à 280, après décalcification, tandis que Foslie indique 100 à 200 μ; ces conceptacles convexes deviennent ensuite déprimés ainsi que le montre l'échantillon de l'Herbier Bornet. *L. samoense* a été recueilli sur un caillon, associé à *Por. onkodes* et *Lithophyllum rasile*, et il recouvre *Melobesia (Litholepis) accola;* il forme une croûte à surface granuleux avec une bordure lisérée de blanc; la limite de chacune des croûtes qui vit sur le même support est marquée par un rebord crénelé.

Répartition géographique: Tahiti (Herbier Bornet, Museum d'Histoire Naturelle de Paris); Samoa, Ile Savaii (Rechinger ex Foslie).

L.(?) myriocarpum (Fosl.) — Fig. 32 c.

Lithothamnion myriocarpum Foslie, On some Lithoth. in Det K. Norske Vidensk. Selsk. Skr., Trondhjem 1897, no. 1, p. 19. *Goniolithon myriocarpum* Forslie, Siboga Expeditie 1904, p. 45, Pl. IX fig. 6, 7; Idem in Alg. Not. III, Det K. Norske Vidensk. Selsk. Skr. 1906, no. 8 (1907), p. 14 (f. *confragosa*); Idem Alg. Not. VI, Ibid. 1909 no. 2, p. 9. Non *Melobesia myriocarpa* Crouan, = *M.* (Pliostroma) *zonalis* (Crouan) Fosl.

L. myriocarpum forme des croûtes d'aspect peu caractéristique, assez fréquentes, semble-t-il dans le Pacifique.

En coupe l'hypothalle montre des cellules plus ou moins rectangulaires de 7 à 15 μ de longueur et 3 à 7 μ de largeur; le périthalle est formé de cellules de forme assez variable; les cellules d'une même file communiquent entre elles par un pore brillant, et souvent par une partie retrécie en forme de petit canal; le même caractère s'observe dans le *Lithothamnium calcareum* d'Europe.

Répartition géographique: Mer Rouge, Indes, Célèbes, Iles Chagos, Seychelles, N^lle^ Guinée, Lucipara, Dammer, Mangareva, Tahiti etc.

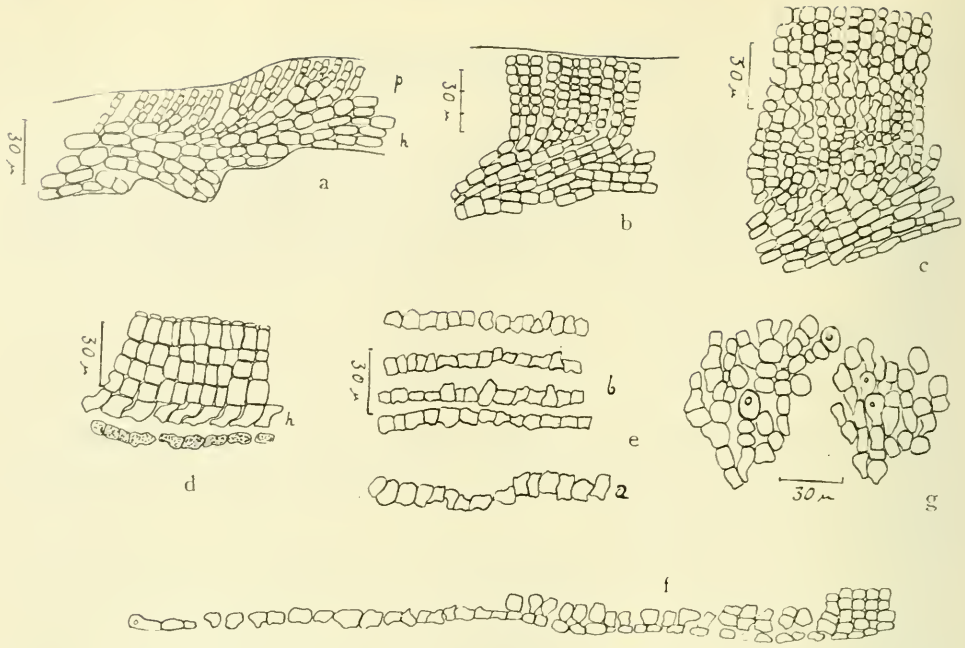

Fig. 32. **a** coupe verticale du thalle de *Lithothamnium siamense; h* hypothalle, *p* périthalle; **b** coupe du thalle de *Lithophyllum*(?) *samoense;* **c** coupe d'un fragment de croûte de *L.*(?) *myriocarpum;* **d** *Lithophyllum (Derm.) rasile* recouvrant *Melobesia (L.) accola* dont les cellules sont en grisé; **e** cellules de *Melobesia (Litholepis) accola*, *a* de Tahiti, *b* de l'Ile de Pâques; **f** coupe d'un thalle de *Melobesia paschalis;* **g** cellules de *Melobesia paschalis* vues de dessus.

L. *(Dermatolithon)* **rasile** Fosl. — Fig. 32 d.

M. Foslie: Alg. Not. III, Det K. Norske Vidensk. Selsk. Skr., Trondhjem 1906, no. 8 (1907), p. 34 et Alg. Not. VI, Ibid. 1909, no. 2, p. 57.

Cette petite espèce est représentée dans la collection de l'Ile de Pâques par un petit thalle d'un rose vif, de 10 mm × 12 mm qui recouvre *Melobesia* (Litholepis) *accola;* sa bordure, lisérée de blanc, montre quelques stries concentriques peu marquées; à la surface de *Lithophyllum*(?) *samoense* on observe également quelques très petits thalles très jeunes qui appartiennent à la même espèce.

M. Foslie indique pour cette espèce une variation assez considérable dans la longueur des cellules hypothalliennes (14 à 54 μ). En effet dans une coupe dans laquelle l'hypothalle était seulement recouvert par une rangée de cellules corticales, les cellules hypothalliennes mesuraient 20 à 60 μ; au contraire dans d'autres coupes (fig. 32 d) j'ai observé l'hypothalle *h*, formé de cellules de 15 μ environ de hauteur, mais il était surmonté de 3 à 4 rangées périthalliennes; celles-ci sont formées de cellules de 8 à 12 μ de hauteur; la dernière rangée est recouverte de cellules corticales; d'après la description de M. Foslie, les cellules périthalliennes peuvent également subir une assez grande variation de taille et pourraient atteindre 36 μ.

Répartition géographique: Océan Indien: Laquedives; Pacifique: Timor (échantillon récolté par M^me^ Weber van Bosse, nommé *L. papillosum* f.? par Foslie in Siboga Expeditie 1904, p. 63); Tahiti (leg. Seurat, Herbier du Museum de Paris).

Melobesia (Lamx.) Fosl.

M. *(Litholepis)* **accola** (Fosl.) Lem. — Fig. 32 e.

On sait que M. FOSLIE a crée *Litholepis* pour des *Melobesia* dont le thalle est formé d'une seule rangée de cellules, et dans lesquelles les thalles se superposent de telle sorte qu'en coupe on observe souvent plusieurs rangées. Dans l'échantillon de l'Ile de Pâques j'ai observé jusqu'à 5 à 6 rangées superposées, toutes semblables (fig. 32 e, b); les cellules sont soit rectangulaires, soit allongées verticalement, souvent aussi de forme assez irrégulière; cependant leur dimension ne varie que de 5 à 10 μ pour la hauteur et 5 à 12 μ pour la largeur.

M. FOSLIE avait indiqué la dimension de 14 à 30 μ pour les cellules de *M. accola;* mais j'ai étudié un échantillon de Tahiti qui fait partie de la collection du Museum d'Histoire Naturelle et qui a été déterminé par lui, et dans la coupe obtenue j'ai observé une rangée de cellules de 5 à 12 μ de hauteur et 7 à 10 μ de largeur (fig. 32 e, a); l'espèce de Tahiti est donc bien semblable à celle de l'Ile de Pâques.

L'aspect de cette petite espèce est curieux: les croûtes sont très minces et sont discontinues; elles sont pourvues de très nombreux conceptacles de 100 à 180 μ environ, percés d'un pore. Lorsqu'on observe le thalle de dessus, les cellules, rectangulaires-arrondies, mesurent 7 à 10 μ × 5 à 7 μ, disposées en files.

L'un des échantillons de l'Ile de Pâques provient de Hanga Piko, région littorale; l'autre sans indication précise partage le même support que les autres espèces étudiées, et est recouvert en certains points par *L. rasile* et *L. samoense*.

Répartition géographique: Tahiti, Hao (leg. SEURAT, Herbier du Museum d'Histoire Naturelle de Paris), Ile de Pâques.

M. paschalis nov. sp. — Fig. 32 f, g.

La seule espèce épiphyte recueillie par M. SKOTTSBERG me paraît être une espèce nouvelle; elle forme sur *Zonaria variegata* une croûte extrèmement mince, à peine calcifiée, de 3 cm environ, de couleur grise sans aucune bordure. A la loupe on remarque que les conceptacles se trouvent au centre de petits épaississements qui forment comme de minuscules croûtes secondaires qui se détachent facilement.

En coupe on constate que la partie la plus mince du thalle est formée d'une seule rangée de cellules; celles-ci ont une forme assez variable et souvent elles ne se touchent pas; leur hauteur est d'environ 5 à 9 μ, leur largeur 5 à 15 μ. Ces cellules, vues de dessus, sont encore plus irrégulières dans leur forme; et variables dans leur taille; certaines sont transformées en hétérocystes (fig. 32 g).

Si on fait une coupe dans une région fructifiée du thalle, on peut suivre le processus de l'épaississement du thalle; j'ai figuré (fig. 32 f) l'aspect de la

coupe telle que je l'ai obtenue; on remarquera l'irrégularité de forme des cellules, leur manque de cohésion; dans les parties formées de 2 rangées il y a souvent un espace entre les deux rangées qui paraissent alors indépendantes l'une de l'autre. Dans les parties les plus épaisses, j'ai observé 5 cellules superposées, toutes de taille à peu près semblable, 3 à 6 μ de hauteur; l'épaisseur maximum du thalle est de 20 à 25 μ.

Les conceptacles, de très petite taille, mesurent environ 160 μ de diamètre; l'un d'eux paraissait contenir des bispores de 30 à 39 μ × 15 à 20 μ, et une tétraspore de 50 μ × 30 μ.

Melobesia farinosa était jusqu'ici la seule espèce pourvue d'hétérocystes; mais le thalle vu de dessus est bien différent de celui de *Melobesia paschalis*, les cellules sont de forme beaucoup plus constante et elles sont alignées en files régulières, même dans la var. *Solmsiana* où le tissu est beaucoup plus lâche et lacuneux que dans le type.

Des différences fondamentales existent aussi dans la dimension des conceptacles, et la structure de l'espèce vue en coupe.

Porolithon Fosl.

P. onkodes (Heydr.) Fosl.

Voir la bibliographie dans M^me^ P. Lemoine, Annales Inst. Océanogr. Monaco, t. II, fasc. 1 (1911), p. 160.

Cette espèce forme des croûtes assez épaisses, qui ainsi qu'on le sait, jouent un rôle important dans la construction et la consolidation des récifs coralliens du Pacifique, où elle est l'une des espèces les plus abondantes.

La croûte étudiée a montré le tissu caractéristique de *P. onkodes* avec les groupes de grosses cellules disséminées au milieu du tissu; mais celles-ci sont de taille plus faible que la normale: 12 à 18 μ au lieu de 16 à 25 μ; peut-être d'autres coupes dans d'autres croûtes donneraient-elles des résultats différents; les autres cellules du thalle mesurent 5 à 10 μ et sont semblables à celles qui ont été décrites dans les autres échantillons de cette espèce.

Dans l'échantillon étudié, la croûte est formée par la superposition de quatre thalles, chacun d'eux constitué par un hypothalle très peu développé, formé de 1 à 3 files, et par un périthalle.

Cette espèce est fixée sur un caillou où elle voisine avec *Lithophyllum* (?) *samoense*, *L. rasile* et *Melobesia (L.) accola*.

Répartition géographique: Océan Indien; Océan Pacifique: Sumatra, Ambon, Ile Tami au N. E. de la N^elle^ Guinée, Funafuti (Iles Ellice), Marutea (archipel des Paumotu), Mangareva, Rikitea; Ile de Pâques; San Diégo (Californie).

Corallineae.

Amphiroa Lamx.

A. fragilissima (L.) Lamx.

Lamouroux, I. V. F., Hist. Polyp. flex., Caen 1816, p. 298. Areschoug, J. E. in J. Agardh, Spec. Alg., vol. 2, pars 1, p. 531. Weber van Bosse, A. and M. Foslie, Corallin. of the Siboga-Exped., p. 89, pl. 16, figs. 1, 2, 5. — *Corallina fragilissima* L., System. nat., ed. 12, vol. 1, p. 1305.

f. *fragilissima* (Lamx.) Weber-van Bosse, l. c. A slender form in which the nodes are not much swollen. In the central strand are mostly 3, sometimes only two rows of long cells between each row of short cells. The long cells measure about 55 μ.

Area of distribution: West Indies, Pacific and Indian Oceans.

A. Yendoi nov. spec. — Fig. 33.

Thallus caespitosus e disco basali plano et filis erectis compositus. Discus basalis expansus substrato adhaerens.

E disco surgunt fila erecta, teretia, 250—300 μ lata, simplicia (raro subdichotomo) et leviter regulariter constricta, articulata.

Singuli articuli plerumque ternas interdum plures constrictiones amplectuntur.

Articuli strato corticali tecti, nodi nudi; cortex e cellulis subrotundis in series breves ex parte interiori ortus.

Stratum thalli inerioris e cellulis diversae longitudinis compositum est, 1) brevibus, 2) sublongis, 3) longis; hae in zonas transversales ordinatae regulariter alternant.

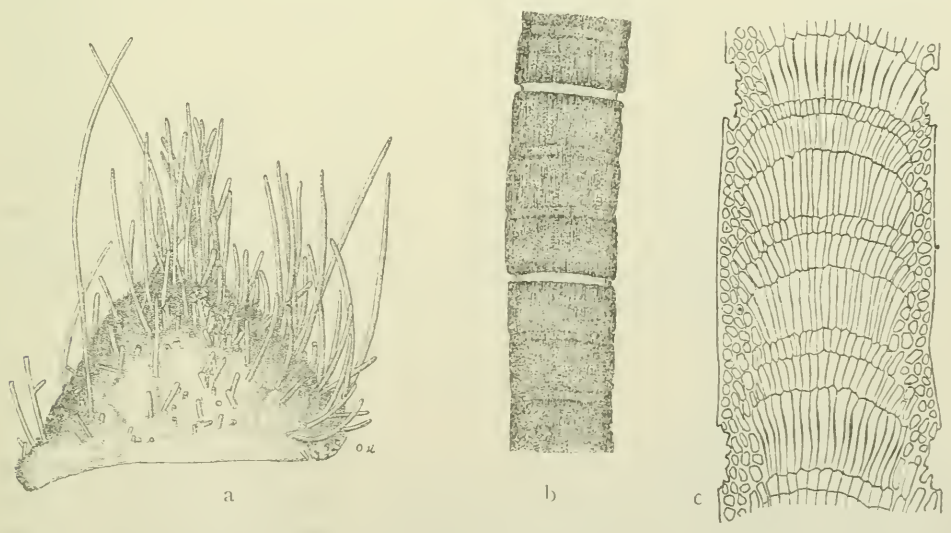

Fig. 33. *Amphiroa Yendoi* nov. spec. a Habit of plant, $^{3}/_{1}$; b part of thallus, c. $^{60}/_{1}$; c length section, c. $^{150}/_{1}$.

On a shell a small tuft of a tiny *Amphiroa* was found which I am unable to refer to any known species. I name it *A. Yendoi* in memory of my regretted Japanese colleague, who has published so many valuable papers on the *Corallinaceae*.

The plant was not much more than 1 cm high; its thallus is terete, rather stiff, erect, much calcified, about 250—300 μ in diameter. It is regularly constricted, broader portions, about twice as wide as high, regularly alternating with slight annular constrictions (comp. Fig. 33 b). Generally every third constriction represents a node (Fig. 33 b), but sometimes the joint is composed of more than three segments, 4—5 or even more having been found.

A longitudinal section of the thallus (Fig. 33 c) shows that the central strand is rather regularly stratified, a sheet of long cells being followed by another of short ones, this again by intermediate ones, then a second layer of long cells and so forth.

This central strand is densely covered by a thick cortical layer formed by small cells. The nodes correspond to a layer of long cells (Fig. 33 c); the cortical layer splits along the middle of this layer and the cells get a more corneous consistence. Within the joints, the constrictions are, too, found just above the row of long cells. The long cells measure c. 80 μ, the medium c. 35 μ and the short c. 15 μ.

Regarding the ramification I can only state that nearly all the shoots were simple. Only a few of the longest had divided subdichotomously. The plant was quite sterile.

YENDO and especially Mme. WEBER have shown that the anatomical structure of the central strand is of great systematic importance in the Corallinaceae, the genus *Amphiroa* being characterised by 1, 2, 3 or more rows of long cells alternating with a row of short ones. Further, the number of cell rows in the node is of systematic value.

As stated above the present species has one cell row only in the nodes and according to the analytical key found in Mme. WEBER's work on the Corallinaceae of the Siboga, p. 99, this is the case only in one species, viz. *Amphiroa valonioides* Yendo. This species is described by YENDO in his paper: »Corallinae verae Japonicae» (Journal of the College of Science, vol. 16, Tokyo 1902). To judge from his description and figures this resembles the present species in size and general appearance but seems to be more branched (as mentioned above, the specimen of *A. Yendoi* is mostly unbranched), the regular constrictions in the latter are wanting and, in the central strand, there are according to fig. 3, pl. 1 of YENDO four rows of different length regularly alternating, while only three rows of cells are found in our plant as described above.

Area of distribution: Endemic.

Jania LAMX.

J. tenella Kütz.

KÜTZING, Tab. Phycol., p. 41, tab. 85, fig. II. WEBER, A. and M. FOSLIE, The Corallinaceae of the Siboga Expedition, p. 108.

I have referred some small, 4—5 mm high repeatedly dichotomous plants to this species. The joints are about 100 μ broad and 2—3 times as long in

the basal part. Higher up they are longer and thinner. The uppermost joint is 46 μ broad only.

The conceptacles are about 240 μ broad.

Area of distribution: Australia, Malay Archipelago, Easter Island. Also Mediterranean?

Fam. Ceramiaceae.

Ptilothamnion Thur.

P. Pluma (Dillw.) Thur. — Fig. 34.

Thuret, G., in Le Jolis, Liste Alg. Cherb., p. 118. Bornet et Thuret, Notes algologiques, p. XII et 179, pl. 46. — *Conferva Pluma* Dillw., Intr. n. 119, tab. F. — *Callithamnion Pluma* Ag., Spec. II, p. 162. Harvey, Man., p. 115; Phycol. Brit., pl. 296. Hauck, Meeresalgen, p. 75, fig. 27.

Growing upon a stone among several other algae some small specimens were found which I have referred to *P. Pluma*. A safe determination is hardly possible, the material being sterile with the exception of a few tetrasporangia. Should the determination prove correct, the occurrence of a species hitherto known only from the Mediterranean Sea and adjacent parts of the Atlantic, in the Pacific Ocean, is very remarkable.

Below I want to give a short description and some figures of the plant to show how well it accords with the descriptions of *P. Pluma*, f. i. with that of Hauck, l. c.

The horizontal creeping and ramified filaments (Fig. 34 a) are fixed to the substratum by means of vigorous rhizoids ending in a broad disc and composed of cylindrical cells about 16 μ broad and as much as 70 μ long. The erect filaments (Fig. 34 b) are unbranched below; thence every cell carries two opposite branchlets, all lying in the same plane. The branchlets are directed upwards, under an angle of about 30°. They are composed of mostly

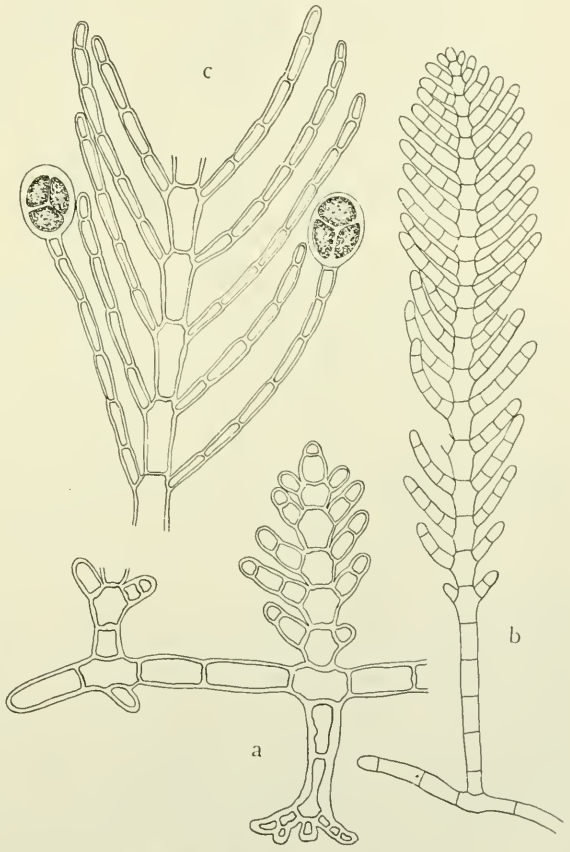

Fig. 34. *Ptilothamnion Pluma* (Dillw.) Thur. a part of creeping filament with rhizoid and erect branches, c. $^{280}/_{1}$; b erect shoot, c. $^{150}/_{1}$; c part of thallus with tetrasporangia, c. $^{240}/_{1}$.

4 (3–7) cells and are about 12—13 μ thick. The cells in the main axis are c. 20 μ thick and have a length of c. 40 μ in the middle of the axis.

The tetrasporangia (Fig. 34 c) are terminal on the pinnules. They measure 35 × 27 μ. Thus, the tetrasporic plant seems to agree well with the Mediterranean species, but for an exact determination sexual plants are essential.

While our plant seems to have occurred in a very similar locality as *Ptilothamnion lucifugum* Cotton, the Irish plant differs from the present one by its bifid branchlets, agreeing in this respect with the Canarian *Ptilothamnion micropterum* (Mont.) Born. Also *Ptilothamnion bipinnatum* (Collins and Hervey) Howe differs much from the present plant among others by the ramose pinnules.

Area of distribution: Mediterranean and adjacent parts of the Atlantic; Easter Island.

Callithamnion Lyngb.

C. paschale nov. spec. — Fig. 35.

C. caespitosum, ca. 4 mm altum. Rami erecti in parte basali nudi, deinde subdistiche ramosi. Rami alterni in plantis ♂ et ⊕ simplices, in ♀ superne pinnati.

Cellulae majores in parte basali ca. 90 μ latae, in parte superiore gradatim tenuiores et 15 μ latis, apice ramorum late rotundato.

Tetrasporangia obovata, ca. 58 μ longa et 47 μ lata, et antheridia utraque in interiore latere pinnularum posita.

Cystocarpia gemina rotundata in pinnis subterminalibus sita.

The height of the few plants I have seen only reaches about 4 mm. The basal part consists of irregularly ramified decumbent filaments originating from the lowermost cells of the erect filaments. These filaments are fastened to the substratum by means of vigorous rhizoids (Fig. 35 d).

From this basal system the erect branches grow up forming small tufts. They are bare in their lower half, ramose in the upper. The branching is very regularly distichous with alternating branches growing out from the upper end of each cell. In the male and tetrasporic plants all the branches are simple.

In the more vigorous female plant (Fig. 35 a) the branches in the upper part of the plant repeat the ramification of the main axis. These branch-systems of second order turn their edges against the mother branch, the whole system lying in the same plane.

In the main filaments the lowermost cells measure c. 90 μ across gradually decreasing upwards, so that the tip is rarely more than about 15 μ thick. The cells are rather short, generally only 1—1 $^1/_2$ times their length. The top cells are obtuse. Hairs do not occur. The cell wall is thick, attaining c. 4 μ in the larger cells of the main filaments.

As is usually the case in *Callithamnion* the tetrasporangia (Fig. 35 c) occur on the inner side of the pinnules; they are obovate, c. 58 × 47 μ. The antheridial stands (Fig. 36 b) occupy corresponding places, gradually covering almost the entire upper side of the pinnules.

The female plant (Fig. 35 a) is more robust. The binate cystocarps are developed near the top; in the largest ones observed the halves were almost spherical, measuring c. 130 μ. Young stages were not observed. No trace of a cortical layer could be found.

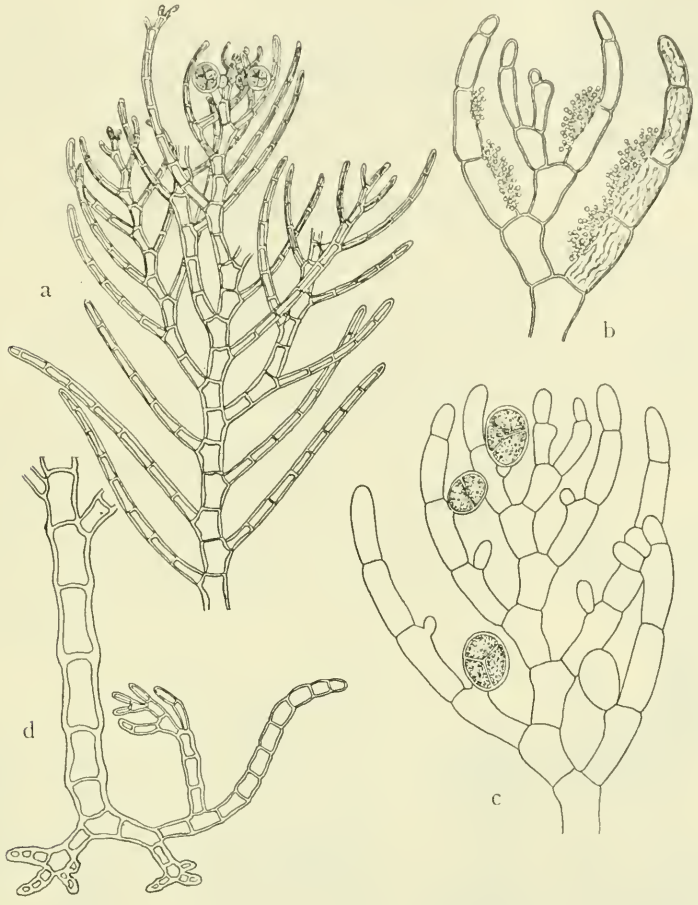

Fig. 35. *Callithamnion paschale* nov. spec. **a** part of ♀ specimen, c. $^{60}/_{1}$; **b** of ♂ specimen, c. $^{180}/_{1}$; **c** of tetrasporic plant, c. $^{150}/_{1}$; **d** base of a plant, c. $^{80}/_{1}$.

C. paschale recalls *scopulorum* as described by the author in »Botany of the Færöes», Part. II, p. 377. But *C. scopulorum* differs, among other things, in being often bi-tripinate, the cells in the main stem are proportionally much longer, the branches taper much more against their apex, the tetrasporangia are more spherical, etc.

C. Pennula Grunow from St. Paul's Island, Novara-Exp. p. 60, pl. 6 fig. 1, with which our new species might perhaps also be compared, is a much larger and more branched plant with a dense nest of basal rhizoids.

Area of distribution: Endemic.

Crouania J. Ag.

C. attenuata (Bonnem.) J. Ag.

AGARDH, J., Algae mediterr., 1842, p. 83.

Some fragments of a very small form were found. GRUNOW in »Alg. Novara», p. 62 mentions having found a very delicate form at Tahiti.

Area of distribution: Mediterranean Sea, warmer shores of the Atlantic and Pacific Oceans.

Carpoblepharis Kütz.

C. Schmitziana (Reinb.) Okamura. — Fig. 36.

OKAMURA, K., On Microcladia and Carpoblepharis (Bot. Mag., vol. XIV, 1900, p. 8, pl. I, figs. 14—17. Icones of Jap. Alg., vol. I, pl. II, figs. 5—18). — *Gloiothamnion Schmitzianum* Reinbold, Hedwigia, 1895, Bd. 34, p. 205, pl. III. — *Reinboldiella Schmitziana* (Reinb.) De-Toni, Syllog. Alg., vol. IV, sect. III, p. 1498.

On a stone with several other small algae some few bits of a very delicate species were found, which I feel convinced belongs to *C. Schmitziana*, first described by REINBOLD, even if the Easter Island plant seems to be much smaller and differs a little in its habit from REINBOLD's figure.

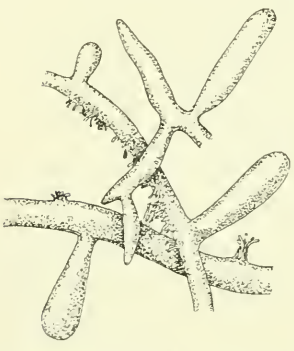

Fig. 36. *Carpoblepharis Schmitziana* (Reinb.) Okam., fragments of plants, c. $^{90}/_{1}$.

The plant grew on a *Cruoriella* to which it is fixed by means of numerous rhizoids growing out mostly in bundles from cortical cells.

The decumbent rhizome-like parts of the thallus are about 60 μ thick. From this now and then branches are given off; some of these soon stop their growth, become more or less vertical, and reach a length of up to 200—300 μ; but most branches show an indefinite growth like the mother filament, fixing themselves to the substratum.

The erect branches become more or less flattened with a broad obtuse tip; they sometimes are as much as 50 μ wide, but often only half that size. Longitudinal growth is performed by a broad top-cell. The segments cut off often remain distinct long after they have become divided into smaller cells.

The main shoots are covered with a dense, untransparent cortex.

The material is sterile.

I have followed OKAMURA in referring this species to *Carpoblepharis*. It seems to be a highly variable plant, more so if the small reduced forms, referred here with some doubt by Mme. WEBER[1], really belong to the same species. The Malayan plant has the creeping rhizome-like base reduced to a monosiphonous filament, a rather remarkable fact.

Area of distribution: Japan, Malayan Archip., Easter Island.

[1] Liste des Algues du Siboga III, Rhodophyceae II, p. 336, figs. 126—7.

Ceramothamnion Richards.

C. Codii Richards.

Richards, Ceramothamnion Codii, A new rhodophyceous alga (Bull. Torrey bot. Club, vol. 28, p. 57).

Some few small loose-lying fragments have been found only which I think are referable to this plant. What species the host plant has been I can not say; no *Codium* was among the material handed over to me.

Dr. H. E. Petersen kindly inspected the material and confirmed the determination.

Area of distribution: Bermuda, Easter Island.

Ceramium (Roth) Lyngb.

By Dr. H. E. Petersen.

C. cruciatum Collins & Hervey. — Fig. 37.

Collins & Hervey, The algæ of Bermuda, 1917, p. 144.

In referring the specimens from Easter Island to this species I base this upon the figures of Mme. Weber, Liste des algues du Siboga, III, Rhodophyceae, p. 331.

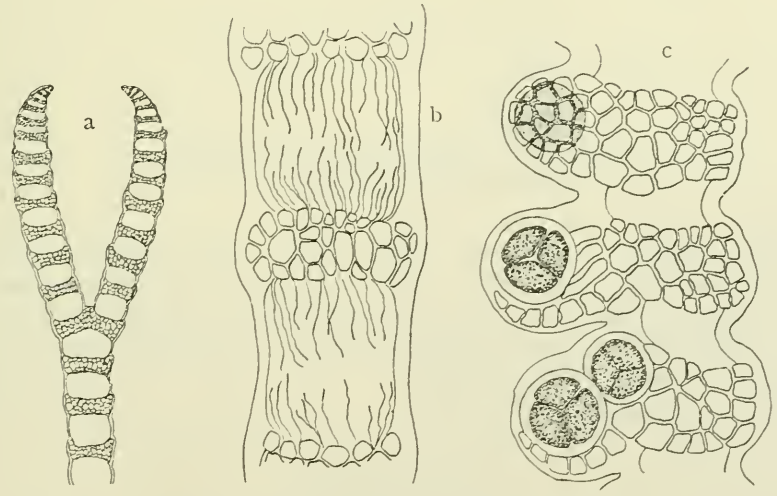

Fig. 37. *Ceramium cruciatum* Collins & Hervey. a top of filament, c. $^{60}/_{1}$; b part of filament lower down, c. $^{240}/_{1}$; c tetrasporangia, c. $^{240}/_{1}$.

According to Collins & Hervey *Ceramium cruciatum* has »cortication consisting of cells elongate in the direction of the filament». Mme. Weber having seen an original specimen of this species now gives a figure of a cortical belt, in which the cells are not arranged in longitudinal rows as in the figures

of COLLINS and HERVEY. As the specimens from Easter Island (Fig. 37 b) regarding the shape of the cortical cells agree with the statement of Mme. WEBER I think I need not lay stress upon the remarks of COLLINS and HERVEY as to his point.

Specimens with cystocarps and tetraspores (Fig. 37 c) were present. In the tetrasporic specimens the tips of the filaments were flattened in a peculiar way (Fig. 37 a).

Area of distribution: Bermuda, Celebes, Easter Island.

C. Skottsbergii H. E. Petersen, nov. spec. — Fig. 38.

In the material a small *Ceramium* is found characterized by very narrow cortical belts in which several pluricellular spinelike hairs are present. I consider this plant to be a new species. Here the diagnosis:

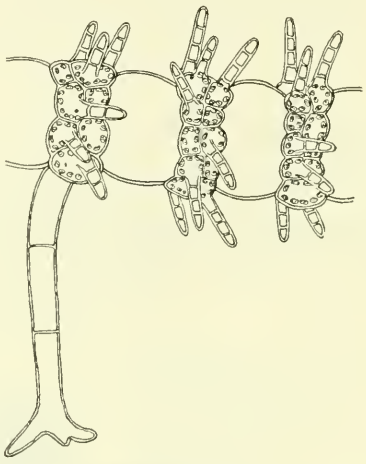

Fig. 38. *Ceramium Skottsbergii* nov. spec.
Part of filament, showing spinose cortical belts, c. $^{180}/_{1}$.

Fronde repente, irregulariter ramosa; zonis semper discretis, paucis cellulis constantibus, altitudine zonarum 15—25 μ, sæpe duobus cellulis formata. Cellulis axialibus usque ad 80 μ altis; 70—75 μ latis. Pilis verticillatis e cellulis zonarum formatis, articulatis, ex 3 cellulis compositis, c. 30—35 μ longis, c. 8 μ latis, obtusis.

Organa fructificationis non visa.

Area of distribution: Endemic.

Fam. Rhodomelaceae.

Laurencia Lamour.

L. claviformis nov. spec. — Fig. 39.

Planta caespitosa, ca. 1 $^1/_2$—2 cm alta, e ramis basalibus repentibus et ramis erectis composita. Rami basales rhizoideis robustis saxo adfixi. Rami

erecti, teretes, clavati, in inferiori parte ca. 1 mm lati, in superiori ca. 2 mm, apice late rotundato, aut simplices, aut ramosi, ramulis clavatis, sparsis, paucis, irregulariter exeuntibus, interdum ramosis, ramellos in superiore parte gerentibus.

Tetrasporangia sparsa in superiore parte ramorum orta.

To judge from the specimens collected the plant forms low dense tufts, ca. 1 $^1/_2$—2 cm high, on rocks between tide marks.

The decumbent creeping filaments, about 1—1 $^1/_2$ mm thick, are fastened to the substratum by means of short, thick, vigorous hapters (Fig. 39 a). From these prostrate filaments erect ones grow up. These measure at their base about 1 mm in diam., gradually thickened upwards, attaining twice their basal diameter and slightly clavate.

Of the erect filaments the more robust ones are branched in their upper half. They carry some few lateral branches, especially near their upper end, where several may be clustered together. The branches grow out to all sides without any order, they are clavate like the primary branch and sometimes carry subterminal branchlets.

Tetrasporic plants only were gathered. The tetraspores are found in the cortical layer, scattered over the surface, especially in the upper end of the branches.

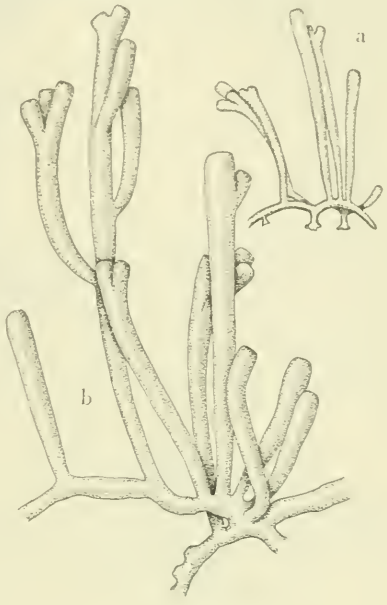

Fig. 39. *Laurencia claviformis* nov. spec. Parts of plants, a c. $^2/_1$, b c. $^5/_1$.

As to the limitation of the species in this troublesome genus I refer to my remarks in »The marine Algae of the D. W. I», vol. II, p. 244. I regret that, in describing a new species, I add to the difficulties. Nevertheless I think this is the best way to take until the very desirable revision of the whole genus has been undertaken.

The present plant surely comes near a group of species (f. i. *L. perforata, radicans, vaga, decumbens* etc., comp. KÜTZING, Tab. Phycol., vol. XV, pl. 49—51) about which J. AGARDH, in »Epicrisis», p. 649 says: »nec mihi patet quomodo distinguantur».

Area of distribution: Endemic.

Chondria Ag.

Subgenus **Coelochondria** Falkenb.

Ch. repens nov. spec. — Figs. 40, 41.

Thallus teres, minutus, ca. 1—2 mm altus et 200—400 μ latus, in aliis algis epiphyticus, partim e ramis repentibus, rhizoideis brevibus robustis adfixis, partim e ramis curtis, erectis constructus.

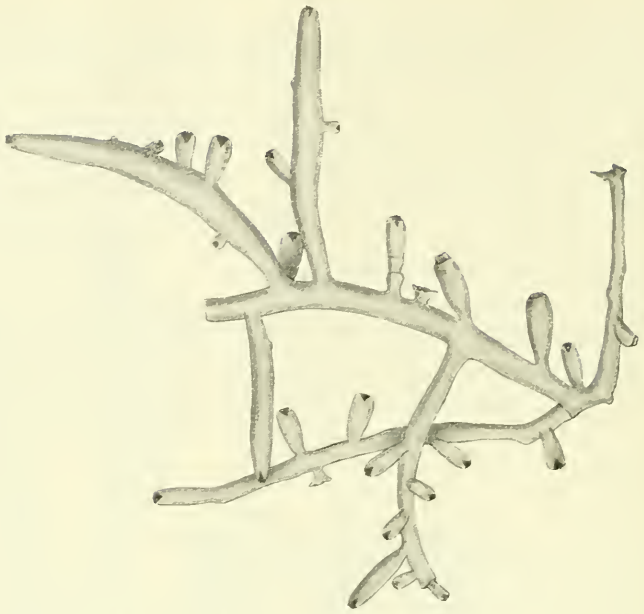

Fig. 40. *Chondria repens* nov. spec., part of specimen, c. $^{10}/_{1}$.

Rami repentes ramosi, ramis aut decumbentibus, repentibus, axi primario similibus, aut erectis, curtis, obovatis, simplicibus, ca. $^{1}/_{3}$—1 mm altis et 300—350 μ latis, tetrasporangiis instructi.

Tetrasporangia in superiori parte ramorum sparsa, ca. 80—90 μ lata.

Of this little plant some very few fragments are found only, the longest specimen being about 1 cm long.

The terete thallus has creeping basal filaments fixed to other algae by means of short thick hapters formed by a bundle of rhizoids. From this basal part shorter or longer branches are given off. Some of these branches may grow out to long shoots like the mother branch fixing themselves to the substratum in a similar way but most of the branches remain short, erect and become fertile. Gradually they become more or less distinctly clavate and produce tetrasporangia in their upper end. The ripe tetrasporangia are about 80—90 μ in diameter.

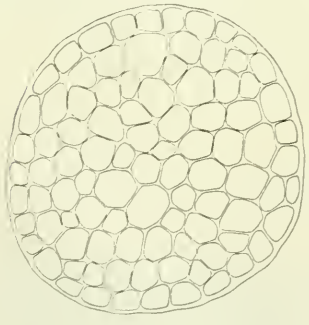

Fig. 41. *Chondria repens* nov. spec. Cross section of thallus, c. $^{125}/_{1}$.

The cortical layer is rather thick and the central strand generally not visible. Seen from above the surface cells are roundish to polygonal with rather thick walls.

A transverse section (Fig. 41) shows that the thallus is composed of a parenchymatic tissue, the central axis not being especially distinct.

In »Algues du Siboga», III *Rhodophyceae*, p. 349 Mme. WEBER has described a small species *Chondria minutula*, of nearly the same size and habit, but otherwise widely different, belonging as it does to the group *Euchondria* Falkenb.

Area of distribution: Endemic.

Polysiphonia Grev.

P. spec.

A small antheridial plant with four pericentral cells. From a decumbent filament fixed to the substratum by means of rhizoids erect filaments arise. The filaments are about 50 μ thick and the length of the cells about 80 μ.

The specimen bears considerable likeness to ASKENASY's[1] figure of an antheridial plant of *Polysiphonia mollis* Hook f. et Harv.

Herposiphonia Naeg.

H. tenella (C. Ag.) Naeg. — Figs. 42, 43.

NÄGELI, C., Herposiphonia (in SCHLEIDEN und NÄGELI, Zeitschr. f. wiss. Bot., 3—4 Heft, 1846, p. 238, tab. VIII). FALKENBERG, P., Rhodomelaceen, p. 304. BÖRGESEN, F., Marine Algae D. W. I., vol. II, pp. 286 and 472.

In referring the plant from Easter Island to this species it must be pointed out that before we know the male plant no exact determination can be made; cfr. my remarks l. c., p. 470.

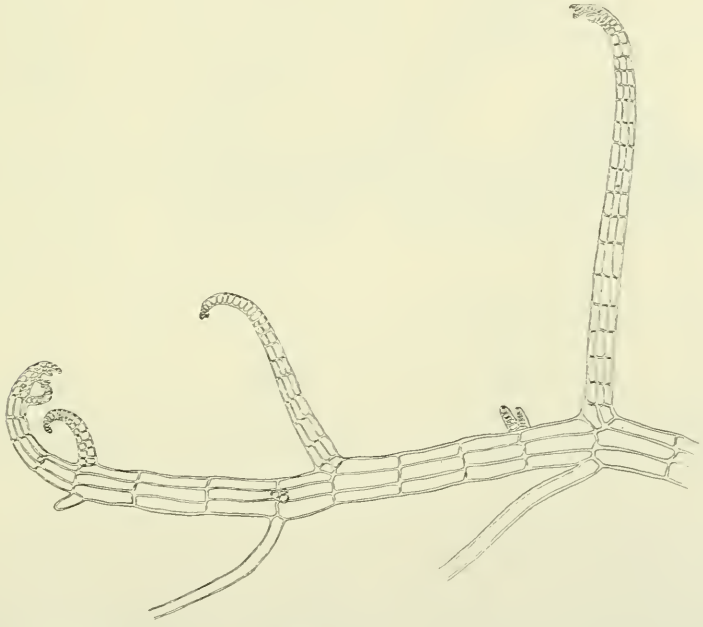

Fig. 42. *Herposiphonia tenella* (C. Ag.) Naeg., part of specimen growing on *Valonia*. C. $^{45}/_{1}$.

Sterile specimens were found on *Valonia ventricosa*. They had 5—8 pericentral cells. The creeping, prostrate main filaments are fixed to the wall of the host by means of vigorous rhizoids quite in the same way as found in the West Indian plant.

[1] ASKENASY, E., Ueber einige australische Meeresalgen. Flora, 1894, p. 13, pl. 4, fig. 22.

The mutual arrangement of the branchlets and branches is seen in Fig. 42. This shows that the branchlets are, as a rule, developed from every fourth segment; the next has a branch and the branches alternate on the right and left side of the thallus. But it happens that the branchlets are developed from every third or rarely from every second segment. The branchlets are of rather variable length; in some specimens I have counted up to 50 segments. The segments are longest in the middle of the branchlets, shorter near the base and summit. The diameter of the branchlets is about 50 μ. The trichoblasts are as a rule poorly developed.

On *Zonaria variegata* I found some few fragments of an other form, both cystocarpic and tetrasporic, but unfortunately no male plant.

Of the female plant Fig. 43 gives an illustration; it is much more robust than the sterile one from *Valonia*. It also differs from this by the scarce development of branches, which generally are arranged without any order.

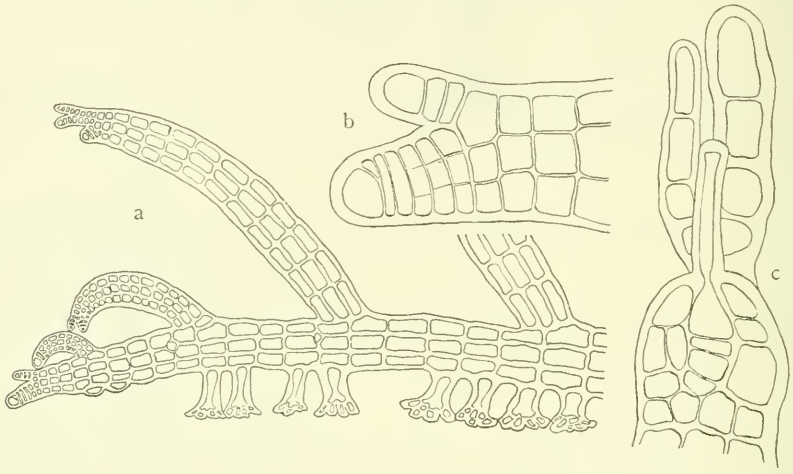

Fig. 43. *Herposiphonia tenella* (C. Ag.) Naeg. ♀. **a** part of creeping plant, c. $^{60}/_{1}$; **b** growing apex of same, c. $^{750}/_{1}$; **c** young cystocarp, c. $^{750}/_{1}$.

The trichoblasts are well developed in the female plant. The cystocarps are formed in the second segment of the trichoblast, the lowermost becoming polysiphonous. The form of the young cystocarp (Fig. 43 c) very much resembles what I have found in *Lophosiphonia cristata* (comp. my fig. 432 l. c.). The trichogyne is thick and comparatively short. The ripe cystocarp is urn-shaped with a short broad neck; it is about 550 μ long and 460 μ broad.

The tetrasporic specimens have longer and much more slender branchlets than the female plant; in the mutual arrangement of the branchlets and branches they agreed with the plant found on *Valonia*. The tetrasporic branchlets are about 60 μ thick and 1,5 mm long.

Area of distribution: Mediterranean Sea, Morocco, West Indies, Malayan Archipelago, Easter Island.

A small piece of a plant with 11 pericentral cells may perhaps belong to *H. subdisticha* Okamura (Bot. Mag. XII, 1899, p. 11, pl. I figs. 12—14). It resembles the figures quoted, but being sterile and lacking growth points it is insufficient for a safe determination.

Dipterosiphonia Schmitz. & Falkenb.

D. dendritica (Ag.) Falkenb. — Fig. 44.

Falkenberg, P., Rhodomelaceen, p. 324. Börgesen, F., Mar. Alg. D. W. I., p. 302. — *Hutchinsia dendritica* Ag., Systema, p. 146; Species Alg., vol. II, p. 104. — *Polysiphonia dendritica* J. Ag., Spec. Alg., vol. II, pars 3, p. 916.

Some small sterile fragments were found on *Laurencia claviformis*. In one respect it differs essentially from the West Indian plant, as described by me l. c.; in this, the branchlets with definite growth are always undivided, while, in the Easter Island form, they often bear a few spine like side branches. These are mostly situated above the middle of the branchlets and their number rarely surpasses two or three. They form acute angles with the main branch.

Otherwise, the Easter Island plant seems to agree perfectly with the West Indian one. Like this it has five pericentral cells, three on the upper side, two below, and it is attached to the host plant by meams of vigorous hapters, which pierce the sides of the host plant like claws.

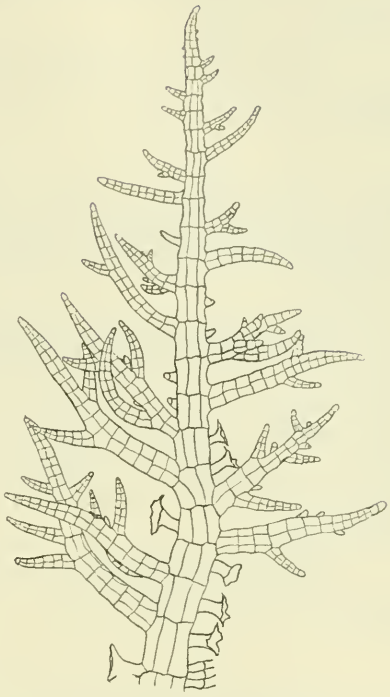

Fig. 44. Part of a specimen of *Dipterosiphonia denaritica* (Ag.) Falkenb. C. $^{80}/_{1}$.

Area of distribution: Brazil, West Indies, Australia, Easter Island.

Dasya C. Ag.

D. villosa Harv.

Harvey, W. H., Algæ of Tasmania, London Journal of Botany, vol. III, 1844, p. 433.

The specimens had been preserved in formaline and were in a state of dissolution, falling to pieces at the least touch. Nevertheless I think the determination is right, the plants being in good accordance with the description of Harvey and with Kützing's Figure; I have also been able to compare them with a specimen of Harvey's Australian Algæ, No. 218 from Van Diemen's Land.

When young the stichidia are rather short and thick, ovate to lanceolate, when older they become longer and subcylindrical with attenuated summit, but perhaps the great length is due to the bad preservation, all the tetraspores having fallen out and the cells getting more or less separated.

Area of distribution: Tasmania, Easter Island.

Falkenbergia Schmitz.

F. rufolanosa (Harv.) Schmitz. in ENGLER u. PRANTL, Natürl. Pflanzenfamilien, p. 479.

FALKENBERG, P, Rhodomelaceen, p. 690. — *Polysiphonia rufolanosa* Harvey, Marine Botany of W. Austr., no. 87 in Trans. Acad. vol. XXII; KÜTZING, Tab., Phycol., vol. 14, pl. 54.

Only a few small pieces of this plant were found, too small in fact for a safe determination. In their general appearance the specimens resemble the figure of KÜTZING; this is, however, as pointed out by FALKENBERG, not very accurate. The thallus was about 40 μ thick and the length of the cells amounts to 30 μ.

On the other hand, it cannot be denied that this plant seems to concord with the form of *Falkenbergia Hildebrandii* which I discovered in the West Indies (l. c., p. 331). According to my note, these species most probably are mere forms of the same species, a conclusion to which YENDO[1] also has arrived, having been able to compare his plant with the original specimen in Herb. HARVEY in Dublin and referring to my figures and description of the West Indian plant.

Area of distribution: Australia, Japan, Malayan Archipelago, and most probably, West Indies etc.

Fam. Delesseriaceae.

Nitophyllum Grev.

Fig. 45. *Nitophyllum* spec., ♂ specimen. C. $^{12}/_{1}$.

N. spec. — Fig. 45.

A small antheridial plant of a *Nitophyllum* was found mixed up in a *Galaxaura* tuft. The height of the whole plant found was 6 mm only. It has no veins, is monostromatic and belongs to the group *Leptostroma* of J. AGARDH. The growth takes place by means of a well developed top-cell.

The antheridial sori are situated in the middle of leaf-like thallus-segments. They are found on both sides of the thallus.

The cells of the thallus are polygonal with thick walls; their diameter is about 40 μ.

To the group *Leptostroma* J. Agardh refers 3 species and in »Sylloge Algarum» DE-TONI mentions a few additional species,

[1] YENDO, Notes on Algae new to Japan, IV (Bot. Mag., vol. XXX, 1916, p. 63).

all from the European Atlantic coast and the Mediterranean Sea. Most likely therefore the present plant is the representative of a new species. In order to describe it we must know at least also the tetrasporic plant, as the male plant in *Nitophyllum* is often very much reduced in size.

Gymnogongrus Mart.

G. aequicrassus nov. spec. — Figs. 46, 47.

Frons caespitosa, e filis decumbentibus, repentibus et filis erectis composita.

Fila decumbentia irregulariter ramosa, aggregata et inter se contexta.

Fila erecta teretiuscula, interdum simplicia saepe di- vel trichotoma, ad apicem versus non attenuata, apex late rotundatus.

Cystocarpia singulas apicibus frondis immersa, rotundata, superne in partem sterilem attenuatam exeuntia.

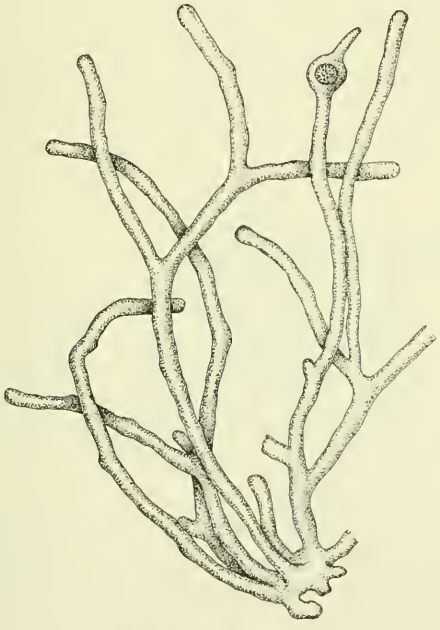

Fig. 46. *Gymnogongrus aequicrassus* nov. spec. C. $^{4}/_{1}$.

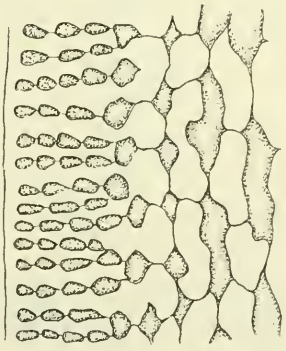

Fig. 47. *Gymnogongrus aequicrassus* nov. spec. Length section of thallus, c. $^{450}/_{1}$.

The plant grows gregariously in dense tufts about 2—3 cm high upon rocks between tide marks.

The tuftlike growth originates from the numerous erect filaments growing out from the prostrate creeping ones. The latter filaments are irregularly bent and branched, gradually more or less united into an irregularly lobed disc. The erect filaments are nearly terete or somewhat compressed, the transverse section being mostly oval. The filaments are a few times dichotomously, rarely trichotomously forked, but quite simple ones also occur. The surface of the

thallus is uneven and irregularly waved. The tips of the shoots are broadly rounded. The angle between the branches approaches 90°.

A few cystocarps occur; these are found near the end of the branches and are almost globular. Above the cystocarp a short sterile narrow prolongation is observed.

The plant is of a rigid cartilaginous or corneous texture.

On a longitudinal section of the thallus (Fig. 47) we find that the subcylindrical cells in the centre are arranged more or less in rows; outwards the cells grow shorter with very thick walls and gradually pass into the cortical layer, composed of short rows of small oval cells — upon the whole a picture quite like that of *Chondrus crispus* as given by KYLIN in Studien über die Entwicklungsgeschichte der Florideen (K. Svenska Vetenskapsakad. Handlingar. Bd. 63, 1923).

The new species appears to be most nearly related to the small species *G. densus* and *G. pygmaeus*.

Area of distribution: Endemic.

Fam. Sphaerococcaceae.

Hypnea Lamx.

H. Esperi Bory. — Fig. 48.

BORY, Voyage de la Coquille, p. 157. KÜTZING, Spec. Alg., p. 759; Tabul. Phycol., vol. 18, pl. 26, a, b, c.

Fig. 48. *Hypnea Esperi* Bory. Part of specimen with a tetrasporangium sorus. C. $^{25}/_{1}$.

The thallus forms small entangled masses among other algae. The filaments are irregularly ramified, often antlerlike in shape, the summit of the filaments often being somewhat curved with short, spine-like side-branches gradually growing out from the convex side. The branches are sometimes short, spinelike, sometimes long and of indefinite growth. The tetrasporangia are formed in the branchlets.

When a branch comes near a favourable substratum short thick discoid hapters are formed by means of which the plant is fastened to other algae. In the same way the branches frequently anastomose.

The terete thallus is 400—500 μ thick.

The specimens found seem to be in good accordance with the fig. of KÜTZING in Tab. Phycologicae (l. c.).

This plant is closely related to the form I called *Hypnea spinella* in my West

Indian work (p. 384, fig. 369). The form figured is somewhat more densely branched and the thallus slightly coarser (500—600 μ), but otherwise they seem to agree so well with each other that I am inclined to regard them as forms of the same species.

H. Esperi differs from *H. pannosa* J. Ag., collected on the Pacific coast of Mexico (San Augustin, LIEBMANN) by its more slender and less ramose thallus, *H. pannosa* being described as »densissime intricato decomposito-ramosissima».

Area of distribution: Brazil, Chile, Australia, Easter Island.

Fam. Rhodymeniaceae.

Chrysymenia J. Ag.

C. Skottsbergii nov. spec. — Figs. 49, 50.

E callo radicali expanso frondes erectae, plerumque 1—2 cm altae, oriuntur, caespitem densum et expansum formantes.

Caules crassius filiformes, in parte basali robustiores (ca. 1 mm lati) superne gradatim tenuiores et ramosi, 5—6 vel plures ramos vesicaeformes gerentes.

Vesiculae subglobosae-pyriformes, 4—5 mm latae et 5—6 mm longae.

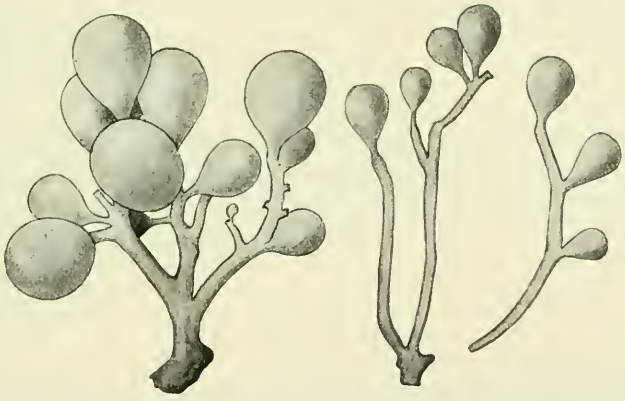

Fig. 49. *Chrysymenia Skottsbergii* nov. spec., parts of specimens. C. 2,5/1.

This fine plant forms low, ca. 1—2 cm high, dense tufts on *Lithothamnion* to which it is fastened by means a large irregular disc. From this the erect main filaments (stems) arise. These are mostly undivided in their lower half, irregularly ramified to all sides in the upper, the branches and, if these are branched again, the branchlets all ending in a vesicle. In this way each main branch may carry up to ten or even more vesicles.

The stem is thickest, c. 1 mm, in the basal part, tapering gradually upwards.

The vesicles are spherical-pyriform, about 4—5 mm broad and 5—6 mm long.

The stem is solid. A transverse section (Fig. 50 a) shows a cortical layer consisting of quite smal roundish thick-walled cells arranged in more or less

distinct rows; inwards the cells gradually increase in size forming an even transition to the medullary tissue. On the cross section this is composed of roundish cells.

A longitudinal section (Fig. 50 b) of the stem shows that the cells of the cortical layer are of nearly the same shape: roundish to oval. The cells of the medullary tissue on the other hand are long, subcylindrical with oblique cross walls. Between the long cells short ones, often arranged in rows, are interposed here and there.

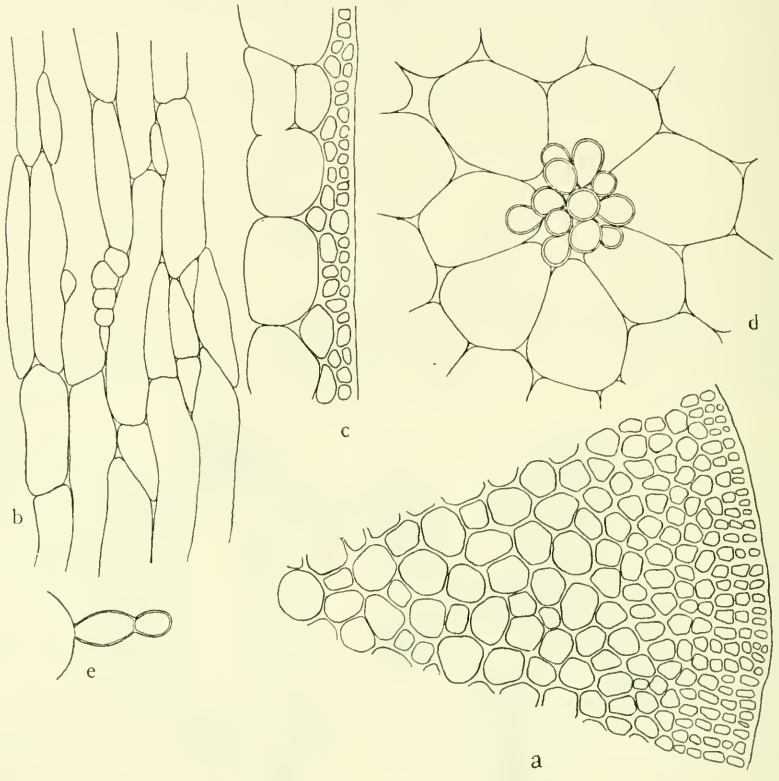

Fig. 50. *Chrysymenia Skottsbergii* nov. spec. **a** cross, **b** length section of stipes; **c** cross section through wall of vesicle; **d** inner surface of wall of vesicle with a cluster of glands; **e** two-celled gland. All c. $^{180}/_{1}$.

A cross section of the vesicles (Fig. 50 c) shows that the wall consists of a single layer (rarely two) of large rounded-rectangular cells, which are covered by a cortical layer of small cells. Opposite the centre of the large cells one or two cortical layers are present, while opposite the cross walls separating the large cells, where more space is left, we find this space occupied by a cell larger than the cortical ones.

Seen from above the large cells in the wall of the bladder are polygonal with rounded corners (Fig. 50 d). The cavity is filled with mucilage. On the inner side of the wall, facing the cavity, we find the glands characteristic of *Chrysymenia*. These occur in groups (Fig. 50 d), but not in great number.

On the other hand the glands themselves are rather large and each group mostly consists of a good number of glands (10—20 or more). They are gathered upon a smaller cell situated among the large wall cells; sometimes, too, this small cell carries another smaller one upon which the glands are borne. The glands are oblong, about 20 μ broad and 40 μ long.

In a few cases I have found the glands divided into two cells (Fig. 50 e).

All the material was sterile.

Of the known species of *Chrysymenia,* the present one is most closely related to *C. Uvaria* (L.) J. Ag. (esp. the Mediterranean form), *pyriformis* Börgs. and *microphysa* Hauck. It differs from *C. Uvaria* in growing less high, by the much smaller number of vesicles on each main stem, by the larger, shortly pedicellate vesicles, further by the gland-cells being larger and arranged in dense groups, while in *C. Uvaria* these cells are small, rounded and scattered singly over the wall (comp. my fig. 388 in Mar. Algae D. W. I., vol. II, p. 403).

From *C. pyriformis* it also differs in the lower, more condensed habit, in the irregular branching and shortly pedicellate vesicles, while, in the former, generally also in *C. Uvaria,* the sessile vesicles form a raceme along the main stem and branches. *C. pyriformis* has larger and more pyriform vesicles. The cortical layer in the vesicles is thicker and more firmly built in *C. Skottsbergii.* The glands are grouped in the same manner in both, but they are larger in the latter and more numerous to each group. The quite robust stem is also more strongly built in the new species. It should be remembered, that this was collected in tide-pools, while *C. pyriformis* is a sublitoral species. For more details I refer to my description of the latter.

Finally, *C. microphysa* is a much smaller plant, mostly with a single terminal vesicle, less often with one or two lateral branches in addition. For a detailed description see P. KUCKUCK, Beitr. zur Kenntnis der Meeresalgen. 13 (Wiss. Meeresuntersuchungen, N. F. Bd. V, Abt. Helgoland, 1912).

Area of distribution: Endemic.

Champia Desv.

Ch. sp.

In a glass tube with various algae a small fragment of a *Champia* was found. Had it come from the West Indies I would have named it *Ch. parvula* without hesitation, but as this species has not been reported from the Pacific with certainty, I prefer to leave it unnamed, the more as it is sterile, the arrangement of the tetrasporangia remaining unknown.