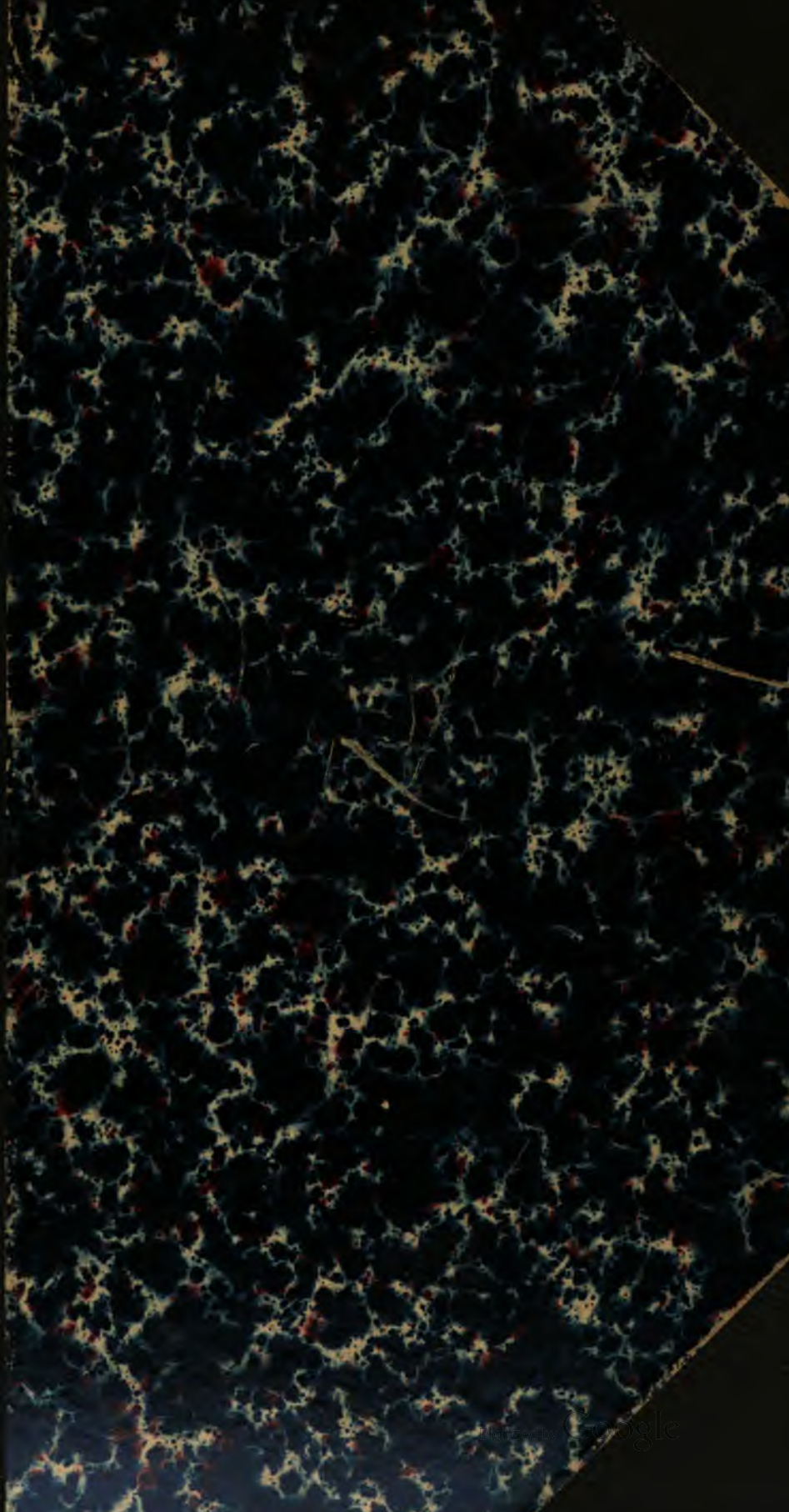

W. G. FARLOW

F. BÖRGESEN.

THE MARINE ALGÆ OF THE FÆRÖES.

REPRINTED FROM THE »BOTANY OF THE FÆRÖES«, PART II,
DET NORDISKE FORLAG, COPENHAGEN.

PUBLISHED BY THE AID OF THE CARLSBERG FUND.

ISSUED NOVEMBER 15 1902.

COPENHAGEN.
PRINTED BY H. H. THIELE.
1902.

INTRODUCTION.

The earliest contribution to our knowledge of the Marine Vegetation of the Færöes was made, so far as I know, by Jørgen Landt, who in his book »Forsøg til en Beskrivelse over Færøerne«, Kjøbenhavn 1800, mentions about 30 species of which some are easily recognizable, though others of the species which he reports from the Færöes, e. g. *Fucus serratus* and *Conferva corallina,* must undoubtedly be due to some error as they have not been found since; whilst with regard to others again, it is impossible to ascertain with any certainty what is meant.

The next and in every way most important contribution which has hitherto been published was that of the Rev. Hans Christian Lyngbye who visited the Færöes in the year 1817 with the support of the Danish Government. The results of this journey are embodied in his famous work »Tentamen Hydrophytologiæ Danicæ«, published in 1819. In this work, in which Lyngbye describes several new genera and species on the strength of the material collected in the Færöes, some 100 Færöese species and varieties are enumerated. In the case of several of these species the name given by Lyngbye has been retained up to the present time, while others have been re-named. And, more particularly with regard to these latter, the fact that Lyngbye's Herbarium is preserved in the Botanical Museum in Copenhagen, has been of great importance to me, as I have constantly been able to consult the specimens to which he refers in Hydrophytologia and to revise his old determinations. While the determinations of the greater part of the species were, on the whole, easy enough to revise, there were some which caused difficulty owing partly to the material of the species contained in Lyngbye's Herbarium being old and decayed, and partly and more

particularly to the material in question being very scanty. In his Hydrophytologia Lyngbye also gives accurate and valuable information regarding the habitat and distribution along the Færõese coasts of almost all the species found by him.

Besides the large number of Færõese algæ which are enumerated in Hornemann's »Plantelære«[1] on the authority of Lyngbye's work, a few are added to the list, viz. *Polyides lumbricalis* = *P. rotundus* and *Callithamnion corymbosum* of which I shall give a fuller account later on. Trevelyan's[2] paper must also be mentioned, though the Færõese algæ reported in it are likewise only an extract from Lyngbye's Hydrophytologia.

The next independant work which has increased our knowledge of the Færõese algæ is »Færøernes Flora« published in 1870 by E. Rostrup[3], in which he gives the results of a journey made in 1867 to the Færões in company with C. A. Feilberg. In this work ten new species of marine algæ are added to the flora, among which, however, as I have explained more fully later on, there is some doubt as to whether the species *Chætopteris plumosa* which Rostrup received from a Mr. Randropp of Thorshavn is really from the Færøes. The total number of species of marine algæ reported by Rostrup is not far from 100. The determinations of the material in question were revised by Professor J. G. Agardh of Lund and Professor J. E. Areschoug of Upsala.

The latest contribution to the marine algæ of the Færões we owe to Herman G. Simmons who visited several parts of the Færões in the same year as I had begun my investigations, viz. in 1895, but somewhat later than I. In his work »Zur Kenntnis der Meeresalgen Flora der Færõer«[4] 125 Færõese species are mentioned, as his list also includes the 16 species (of which 2 are classified as genera only, and 1, *Porphyra miniata*, had been already recorded by J. Agardh as Færõese) which I published in my preliminary list of 1896[5], together with the *Laminaria lingicruris var.*

[1] Hornemann, I. W.: Forsøg til en dansk økonomisk Plantelære. Kjøbenhavn 1821—37.

[2] Trevelyan, W. C.: On the Vegetation and Temperature of the Faroe Islands (Edinburgh New Philosophical Journal for January 1835 t. XVIII. Reprinted with corrections, Florence, 1837).

[3] Botanisk Tidsskrift, Vol 4. København 1870—71.

[4] Hedwigia. 1897, p. 247.

[5] Børgesen, F. and Ostenfeld Hansen, C.: Planter samlede paa Færøerne i 1895 (Botanisk Tidsskrift, Vol. 20. Kjøbenhavn 1895—96, p. 156).

færoënsis nov. var.[1] which I described in the same year. But various causes such as a different definition of species, or the fact of *Simmons* including some species on the authority of old and according to my opinion incorrect reports of previous writers, have combined to reduce the number of *Simmons's* list which I think ought to be brought down to about 115.

Thus, as may be seen from the above, the investigation of the alga-flora of the Færõese coasts has been far from neglected during the last hundred years; and my researches, which I began as already mentioned in 1895, form the last link in the series. I had for some time been thinking that a closer examination of the marine flora of the Færõese coasts would be of great interest as no algologist had investigated it since Lyngbye visited the islands. So when Herman G. Simmons in the beginning of the year 1895 came one day from Lund and told me of his intention to visit the Færøes during the summer for the purpose of studying the flora of the islands, I at once made up my mind to go there and carry out the investigations I had been contemplating. Thus this, my first visit to the Færões, came to form a part of the thorough investigation of the Færõese flora set on foot by Professor Warming in the years 1896 and 97. On the 8th of June I arrived at Thorshavn where I stayed mostly during that year's visit, though I had also an opportunity of carrying on my researches in the greater part of Stromõ and the nearest adjacent islands. In 1896 I again visited the Færões in company with Mr. Jensen and stayed there from the beginning of May to the middle of June. This year I stayed for the most part in Trangisvaag. Klaksvig, Ejde, Midvaag and Kvivig; and also paid a visit to Store Dimon. For the purpose of investigating the alga-vegetation in spring I again went to the Færões in 1898 and stayed there from April 21st to June 16th, and Thorshavn was again my head quarters whence I made longer excursions partly in boats and partly in the steamer »Smiril« to Õsterõ, Bordõ and the Nordreõer. Lastly, in 1899 and 1900, by permission of the Marine Department. I spent about a month in each year on board the man-of-war stationed at the Færões for the protection of the fisheries, and through the kindness of Captain v. Jessen and Captain Schack I had excellent opportunities of visiting the more remote islands, and places difficult of access, and

[1] Børgesen, F.: En for Færøerne ny Laminaria (Botanisk Tidsskrift, Vol. 20. Kjøbenhavn 1895—96, p. 403).

have thereby been able to form a more complete idea of the vegetation as a whole.

This short account of my journeys will show that I visited the Færöes only in the spring and summer months, but as I was anxious to get some collections from the autumn and winter months, Mr. Helgi Jónsson on his return journey from Iceland in the autumn of 1897 very kindly stayed some time in the Færöes for the purpose of collecting, the Carlsberg Fund generously covering the expenses. Jónsson stayed in the Færöes from Oct. 26th to Dec. 9th; he traversed more particularly Nordreöerne, Österö, Syderö and the environs of Thorshavn, and brought home a considerable collection. Lastly, Mr. Ostenfeld brought home some smaller collections especially from Trangisvaagfjord. If we add to this the portions of Lyngbye, Rostrup and Simmons's collections which I have had at my disposal, the material which I have had for examination forms a continuous series from April 21st to Dec. 9th. It has thus been possible with regard to the greater part of the species to form a fairly definite idea of their development at the different seasons, though it has of course been a great drawback to have no material from the 3 winter months proper, a season of the year which is of great importance in arriving at any final conclusion with regard to the development of the algæ.

As Kolderup Rosenvinge has pointed out in his introduction to »Grönlands Havalger«, in order to be able to arrive at a correct conclusion concerning the composition of a flora it is as necessary to exclude those species which have erroneously been referred to it as to include such as really belong to it; consequently, I have omitted those species with regard to which I felt justified in doubting that they really belong to the flora; and in several cases it has been possible for me by the help of the original specimens in the museum in Copenhagen as well as of those kindly lent me from other places to prove the error beyond doubt.

In preparing the following list I have naturally followed Kjellman's »Norra Ishafvets Algflora«, the latter being the standard work more particularly for the Arctic alga-flora, but I differ in some respects from Kjellman's difinition of species in which I follow mostly the opinion of other investigators, such as Foslie and more particularly Rosenvinge, as expressed in his well-known work »Grönlands Havalger«. Thus, I have as a rule adopted the view emphasized by Rosenvinge that such forms as are un-

doubtedly connected by intermediate ones ought to be united, and are only to be regarded as forms or varieties of one and the same species. This has naturally reduced the number of the species, but on the other hand so many species new to the flora have been found that they have helped almost to double the number; some I have been obliged to describe as species new to science.

In a later work on the alga-vegetation along the coast of the Færöes, besides the description of the different alga-associations, etc. I hope to be able to give some notes on the plant-geographical position of the Færöese alga-flora compared with those of the nearest adjacent countries.

It is here my pleasant duty to express my sincere gratitude to the many who have in various ways helped me in this work. My thanks are more particularly due to Dr. E. Bornet, who kindly helped me with regard to the determination of some *Callithamnion;* to Mr. M. Foslie, who determined my collection of calcareous algæ; to Dr. Kuckuck, who, during a short visit I paid to Heligoland, gave me valuable advice especially with regard to my Færöese species of *Ectocarpus;* to Professor Sauvageau for his kind assistance in connection with my *Myrionemaceae* and *Sphacelariaceae*; and to Mr. Johs. Schmidt for determining the greater part of my blue-green algæ. Above all I would express my warm thanks to Dr. Rosenvinge for his constant kind assistance which was of great value to me on account of his wide experience and knowledge of the Northern Algæ, especially those of Denmark and Greenland. Lastly, I must mention those who by lending me Exsiccata or original specimens of species which are wanting in the Botanical Museum in Copenhagen, rendered me great help, more particularly Dr. Nordstedt; Major Reinbold; Dr. Rostrup and Professor Wille.

List of abbreviations[1].

J. Ag., Spec. Alg. = J. G. Agardh, Species genera et ordines Algarum.

Aresch., Phyc. Scand. = J. E. Areschoug, Phyceæ Scandinavicæ marinæ. Upsaliæ, 1850.

Farl., New Engl. Alg. = W. G. Farlow, Marine Algæ of New England and adjacent coast. Washington 1881.

[1] Of the title of books and of names most commonly used.

Fosl., Contrib. I and II = M. Foslie, Contribution to the knowledge of the Marine Algæ of Norway. I and II. Tromsø Museums Aarshefter 13. 1891, and 14. 1892.

Gobi, Algenfl. Weiss. Meer. = C. Gobi, Die Algenflora des Weissen Meeres und der demselben zunächstliegenden Theile des Nördlichen Eismeeres. St. Petersbourg 1878.

Harv., Phycol. Brit. = W. H. Harvey, Phycologia Britannica. Vols. I—III, London 1846—51.

Kjellm., N. I. = F. R. Kjellman, Norra ishafvets algflora. Vega-expeditionens vetenskapliga arbeten. Stockholm 1883. In English: The Algæ of the Arctic Sea, in K. Svenska Vetenskaps.-Akad. Handlingar. Bd. 20, No. 5. Stockholm 1883. (The numbers in brackets are those given in the English version).

Kjellm., Handb. = F. R. Kjellman, Handbok i Skandinaviens hafsalgflora. I. Fucoideæ. Stockholm 1890.

Kleen, Nordl. Alg. = E. Kleen, Om Nordlandens högre hafsalger. Öfversigt af K. Vetensk.-Akad. Forhandl. 1874. No. 9. Stockholm.

Kuck., Ectocarp. = P. Kuckuck, Beiträge zur Kenntnis einiger Ectocarpus-Arten der Kieler Föhrde. Bot. Centralblatt. Vol. 48. 1891.

Kütz., Tab. phyc. = F. T. Kützing, Tabulae phycologicae oder Abbildungen der Tange. Band I—XIX. Nordhausen 1845—69.

Le Jolis, Alg. mar. de Cherb. = A. Le Jolis, Liste des Algues marines de Cherburg. Paris 1863.

Lyngb., Hyprophyt. = H. C. Lyngbye, Tentamen Hydrophytologiæ Danicæ. Hafniæ 1819.

Rke., Algenflora = J. Reinke, Algenflora der westlichen Ostsee deutschen Antheils. Kiel 1889.

Rke. Atlas = J. Reinke, Atlas deutscher Meeresalgen. Kiel 1889-92.

Rostr., Fær. Fl. = E. Rostrup, Færöernes Flora, Botanisk Tidsskrift, Vol. IV. 1870—71.

Rosenv., Grönl. Havalg. = L. Kolderup Rosenvinge, Grønlands Havalger (Meddelelser om Grønland III. Kjøbenhavn 1893).

Rosenv., Deux. Mém. = L. Kolderup Rosenvinge, Deuxième memoire sur les Algues marines du Groenland. (Meddelelser om Grønland XX. 1898).

Simmons, Meeresalg. = H. G. Simmons, Zur Kenntnis der Meeresalgen-Flora der Färöer. Hedwigia 1897.

Strömf., Algv. Isl. = H. F. G. Strömfelt, Om Algvegetationen vid Islands Kuster. Göteborg 1886.

Wittr. et Nordst., Exsicc. = V. B. Wittrock et O. Nordstedt; Algæ aquæ dulcis exsiccatæ præcipue scandinavicæ. Fasc. 1—29.

Lyngb. = H. C. Lyngbye.
Rostr. = E. Rostrup.
H. S. = Herman G. Simmons.
H. J. = Helgi Jónsson.
! = F. Børgesen.

Vid. = Viderö. Öst. = Österö.
Str. = Strömö. Syd. = Syderö.

A. Rhodophyceae.

I. Bangioideae.

Order. BANGIACEAE.

BANGIA Lyngb.

1. **B. fuscopurpurea** (Dillw.) Lyngb., Hydrophyt., p. 83; Kjellm., N. I., p. 241 (192).

This species belongs to the littoral zone and grows on exposed coast at a high level generally considerably above high-water mark, as also mentioned by Lyngbye: — »Habitat ad littora Faeroensia in summo refluxus limite sæpe denudato.« It prefers sharply inclined rock faces where it is liable to be dashed by the spray, and in calm weather it can also survive a longer period of desiccation. I never came across it in rock-pools though Kjellman, l. c. says it is to be found there. It grows gregariously in large patches often associated with *Urospora*. Specimens bearing reproductive organs were found from April to August. The specimen of var. *atropurpurea* Lyngb. (l. c.) in Lyngbye's Herbarium is a fruitbearing plant belonging to this species.

This is a common species of the Færöese coasts; it was first mentioned by Lyngbye.

PORPHYRA C. Agardh.

2. **P. coccinea** J. Ag. Til Algernes Systematik, VI, Ulvaceae, p. 56; Kuckuck, Bemerkungen zur marinen Algenvegetation von Helgoland, II p. 390.

This species belongs to the sublittoral zone and occurs both along exposed and sheltered coasts. It has been found as an epiphyte only, and in abundance especially on *Desmarestia aculeata*, which it sometimes covers quite closely, but it may also be met with though sparingly on *Ptilota plumosa* (at a depth of 20 fathoms) and *Delesseria alata*. It has hitherto been found sterile only. A single specimen from Vestmanhavn was possibly fructifying, but being dried it was not capable of closer examination. As pointed out by Kuckuck, l. c., its chromatophores are not star-like, radiating from a central pyrenoid, as in the true *Porphyra*-species, but they occur as a more or less deeply indented parietal plate, hence I agree with Kuckuck in thinking that this species ought to be separated from the genus *Porphyra*.

This species was first reported from the Færöes in Rostrup's list (l. c. p. 88) to whom it was sent by Mr. Randropp, who probably gathered it near Thorshavn. My specimens are from: — Öst.: Mölen (!), Öre (!); Str.: Vestmanhavn (!), Kvivig (!), Gliversnæs (!); Syd.: Ördevig (!).

3. **P. leucosticta** Thur. Le Jolis, Alg. mar. de Cherb., p. 100.

In comparison with the specimens (especially from France) which I have had the opportunity of seeing in the collections belonging to the Botanical Museum in Copenhagen, the Færöese specimens are generally larger and especially broader and more irregularly shaped; the antheridia-sori are likewise broader and of a more irregular form, and arranged irregularly in the thallus and not in the often almost parallel lines which are met with in the French specimens. The colour is not so red as that of *P. miniata*, but is just between that of *P. miniata* and *P. umbilicalis*.

Along the coasts of the Færöes this species grows both in the littoral zone near low-water mark and in the sublittoral in shallow water. It occurs most commonly in the *Corallina*-belt. Fructifying specimens were found from April to August.

It appears to be fairly common: — Vid: Viderejde (Ostenfeld); Str.: Vestmanhavn (!), Kalbakfjorden (!), Thorshavn (!), Velbestad (!); Sandö: Skopen (!); Syd: Kvalbö (Lyngb.; H. S.), Trangisvaag (Ostenfeld). Lastly, Simmons mentions it with doubt from Klaksvig (Bordö).

First reported from the Færöes by Simmons but as mentioned above, it was already found by Lyngbye, as a specimen in his herbarium determined as *Ulva umbilicalis* and gathered July 8th near Kvalbö is this species.

4. **P. miniata** (Ag.) Ag. Rosenv., l. c. p. 826.
f. typica Rosenv., l. c. p. 827.
f. amplissima (Kjellm.) Rosenv., l. c.
f. abyssicola (Kjellm.) Rosenv., l. c.

After having examined my Færöese material of this species I cannot do otherwise than follow Rosenvinge's definition of this species.

To begin with *f. amplissima* of this species, it occurs most commonly in detached, floating examples which attain a considerable size, just in the same manner as, e. g. detached *Monostroma fuscum* does in the interior of fjords, in which the former often occurs intermingled with the latter, though it is also met with floating in the open sea.

With regard to *f. abyssicola* I may remark that in Trangisvaagfjord opposite Tværaa I gathered some large and small specimens which grew attached to stems of *Laminaria* at a depth of about 5 fathoms, and which, except for their size, were exactly alike in colour (pale rose-red) and habit. They differed from Kjellman's (N. I., p. 191) description in having a distinct, short stipe, but this was doubtless due to their habitat, as specimens growing, e. g. amongst *Corallina* almost invariably have several »callus radicalis« and no stipe. A transverse section of the smaller specimens showed that these consisted of one layer of cells, but the larger specimens of which I examined more particularly one measuring 50 cms., consisted both of one and two layers of cells. By far the greater part, from the base to beyond the middle, appeared to consist of one layer of cells, but some 10 cms. below the apex the thallus consisted distinctly of two layers of cells — and was here quite sterile. Taken as a whole the specimens were as yet almost sterile, only a few had begun to develop ♂ just at the margin of the thallus. Hence I can form no opinion as to whether these specimens are dicœcious or not; Kjellman mentions that this is the case with *Porphyra abyssicola*, but the latter character can hardly be regarded as important (cfr. Foslie, Contribution I, p. 57 and Rosenvinge, l. c.). And Hus has recently published a paper[1] in which he says: »*Porphyra abyssicola* is monœcious (rarely dicœcious).« Hus, who curiously enough does not appear to know Rosenvinge's definition (l. c.), is of opinion that both *f. abyssicola* and *f. amplissima* ought to be regarded as distinct species, and points out several characters

[1] Hus, H. T. A.: Preliminary Notes on West Coast Porphyras (Zoe, vol. 4).

especially, e. g. the thickness of the thallus, and the number of the antherozoids and the carpospores in the antheridium and in the sporocarp respectively, as specific distinctions. How far this view, which appears to me to be somewhat artificial, is the correct one, is rather doubtful, and no definite opinion of it can be formed until Hus's completed work is published. I therefore prefer at present, relying on my above-mentioned observations, to follow Rosenvinge's definition of species, all the more as I had finished the examination of my *Porphyra*-material before receiving Hus's paper.

This species generally grows in the sublittoral zone and has been found down to a depth of 10—15 fathoms; it is also met with near extreme low-water mark especially in rock-pools, and grows both on open sea-shore and in sheltered places. Fructifying specimens were found in May, June and July.

This species is very commonly distributed along the Færões; as mentioned by Simmons (l. c. p. 264) it was first reported from the Færões by J. Agardh, who, however, does not give the name of the discoverer, but it was probably Lyngbye or Rostrup.

5. **P. umbilicalis** (L.) J. Ag. Kjellm., N. I., p. 238 (190); Rosenv., l. c. p. 830; Ulva umbilicalis Lyngb., Hydrophyt., p. 28.

f. laciniata (Ag.) Le Jolis, Liste, p. 99.

f. umbilicalis (L.) Kleen.

f. linearis (Grev.) Le Jolis, l. c.

Forma *laciniata* is most commonly met with in somewhat sheltered localities, occurring there in the littoral zone near high-water mark, e. g. in the narrow part of Sundelaget, where examples, some two feet long, are found spreading over stones and gravel. Forma *umbilicalis* is extremely common and is met with abundantly along all the coasts of the Færões which are exposed to the open sea, where it covers the rocks in small, low tufts resembling crumbled paper; Wille calls the latter form *β scopulorum*[1]. It sometimes extends to a considerable height above sea level. This form always grows attached to rocks, but *f. laciniata* may sometimes be found epiphytic, e. g. on Fucus-species. Lyngbye found *f. linearis* near Kvalbõ on Syderõ and some of the specimens in my collections suggested this form.

Fructifying specimens were found in May, June, July, October and November.

[1] Wille, N.: Bidrag til Algernes physiologiske Anatomi, p. 38.

This is an extremely common species of the Færöese coasts as was mentioned by Lyngbye (l. c.), who says: — »Habitat ad insulas Færoenses saxis in summo refluxus limite ubique et copiosissime adnascens«.

It was first recorded by Landt, l. c. p. 232.

Lyngbye (Hydrophyt., p. 10) does not record *Ulva purpurea* from the Færöes, but his herbarium contains two specimens which bear this name (they are marked: — *Ulva purpurea* Lgb. *Porphyra purpurea* Ag. Færoa), I consider these specimens, which are in fact only small fragments, to be identical with *P. umbilcalis*.

But Lyngbye (Hydrophyt., l. c.) reports a var. *β elongata* of *Ulva purpurea* as occurring in the Færöes: »Varietas ad saxa maritima prope Qualböe, Færoæ, copiose«. None of the specimens in his herbarium are, however, marked with this name, but judging from its habitats, the variety in question must be identical with the specimens in his herbarium called by him »*Ulva umbilicalis var. lanceolata*«, on the label of which he has further added »crispa sinuosa. 8. Juli 1817 ad Qualbö, copiose«. These specimens are like *Porphyra umbilicalis f. linearis*.

ERYTHROTRICHIA Aresch.

6. **E. ceramicola** (Lyngb.) Aresch. Kjellm., N. I., p. 242 (193); Conferva ceramicola Lyngb., Hydrophyt., p. 144.

Found along sheltered coast in deep water in about 5—8 fathoms, epiphytic on *Desmarestia aculeata*, but Kleen (l. c. 24) mentions having found it epiphytic on littoral algæ at Nordland. It had spores in June.

Seems to be rare along the Færöese coasts; I only found it near Öre (Öst.).

CONCHOCELIS Batters.

7. **C. rosea** Batters[1]. Phycological Memoirs edited by Murray, Part I. London 1892.

The chromatophores are differently described. Batters says they are star-like, while Schmitz and Hauptfleish (Engler und Prantl, Natürlich. Pflanzenfam. I Teil, 2 Abteil. p. 315) say: »anscheinend mit wandständigem, unregelmäszig scheibenförmigem Chromatophor.« In the material I have had for examination, which was, however, dried, the chromatophores in the large cells appeared to be star-like.

[1] In a paper: Die perforierenden kalkbohrenden Algen und ihre Bedeutung in der Natur (Scripta botanica: Fasc. 18. p. 35) published by the Russian investigator Nadson he gives it as his opinion, relying on the investigations made at the biological station on Heligoland, that *C. rosea* is identical with *Ostreobium Queketti* as the latter species is said to be sometimes green and sometimes red. It must be owned, that these two species resemble each other very closely, so that his observations may very possibly prove to be true. Here I have, however, preferred to retain *Conchocelis rosea*.

It has been found in the sublittoral zone down to a depth of 25 fathoms along exposed as well as sheltered shores, and grows in the shells of various animals, e. g. *Modiola, Solen, Cyprina, Buccinum, Serpula,* etc.

It is fairly common along the coasts of the Færöes and has been found in the following localities: — Bordö: Kvannesund (H. J.); Öst: Strænder (H. J.); Str.: Thorshavn (!), Vestmanhavn (!), Gliversnæs (!); Syd. Trangisvaag (H. J.).

II. Florideae.

Order HELMINTHOCLADIACEAE.

CHANTRANSIA (Dec.) Schmitz.

8. **C. secundata** (Lyngb.) Thur. Le Jolis, Alg. mar. de Cherb., p. 106.

Callithamnion Dawiesii β secundatum Lyngb., Hydrophyt., p. 129; Trentepohlia Daviesii Pringsheim, Beiträge zur Morphologie der Meeres Algen (Aus den Abhandl. d. Kõnigl. Academie der Wissensch. zu Berlin 1861, p. 351, tab. XXII, figs. 1—6).

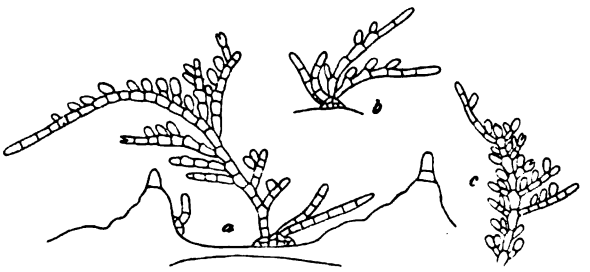

Fig. 51. *Chantransia secundata* (Lyngb.) Thur. *a*, one larger plant and one quite young on Ceramium acanthonotum; *b*, young plant; *c*, portion of plant showing branches mostly opposite. 100 : 1.[1]

This small alga, first described and figured by Lyngbye, l. c., is more particularly characterized by its small basal disc, which often even in young plants consists of several layers of cells, (see Pringsheim's figs. 1—6), as well as by its secund branches, which however, especially in older plants become opposite. But as stated below under *Ch. virgatula*, *Ch. secundata* comes very near to the former[2].

It is an extremely common epiphyte on several algæ between tide-marks, and often forms a close covering on the host plant. It

[1] Throughout this paper all the figures denoting scale are approximate.

[2] Since writing the above I found in my *Cladophora* material a few specimens of the present species bearing tetraspores, the plants occurred on a *Cladophora rupestris* from Höjvig, gathered May 4th 1898. The tetraspores were about 21 μ long and 16 μ broad.

is found both on sheltered and exposed shores, but more commonly on the latter. Specimens bearing monosporangia were met with from April to November, and may doubtless be found all the year round.

It was first found by Lyngbye and is very common everywhere.

9. **C. virgatula** (Harv.) Thur. Le Jolis, Alg. mar. de Cherb., p. 106; Kjellm., N. I., p. 166 (130).

Some of the specimens which I have referred to this species and one of which I have shown in fig. 52 approach most closely to *Trentepohlia virgatula* Farlow in »Marine Algæ of New England«, p. 109, tab. X, fig. 3. The short branches bearing monospores are very often opposite and those in the upper part of the plant especially terminate in long hairs. Chromatophores are star-like, as may distinctly be seen in the young sporangia. The cells in the long branches are about 10 μ thick.

Other specimens differed from these in being almost devoid of hairs, and only after close examination were a few branches found terminating in hairs: these specimens which were gathered near Velbestad epiphytic on *Gigartina mamillosa* were further especially noteworthy because they bore both monospores and tetraspores. As is well-known, Harvey figures in Phycologia Brit., pl. 313 a *Callithamnion virgatulum* bearing monospores as well as tetraspores[1], but as is equally well-known this report

Fig. 52. *Chantransia virgatula* (Harv.) Thur. Portion of filament with monospores (partly emptied). 100 : 1.

[1] and in the following plate he shows the same to be the case in *Callithamnion Daviesii*.

has been regarded as due to some confusion (cfr., e. g. Thuret in Le Jolis's Liste p. 104); in Engler und Prantl., Die natürlichen

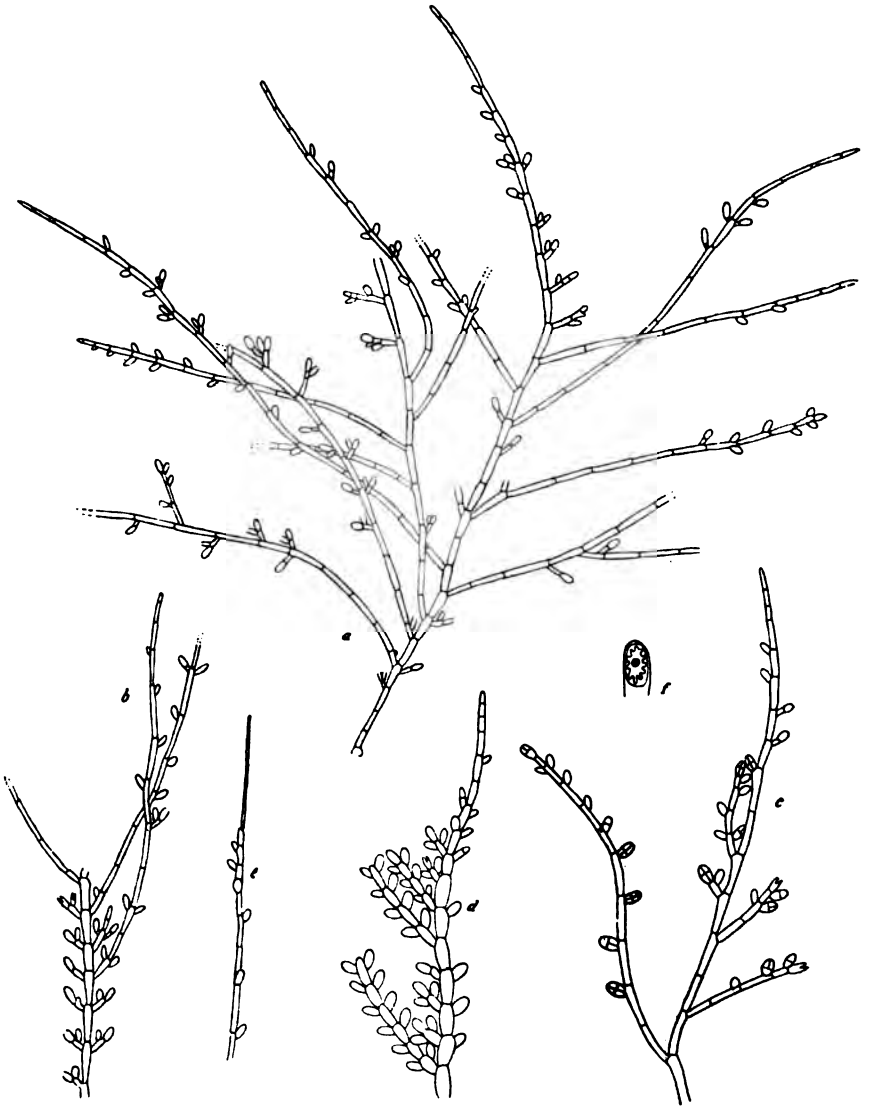

Fig. 53. *Chantransia virgatula* (Harv.) Thur. *a* Part of plant with monospores; *b* and *d* portions of filaments showing branches mostly opposite; *c* filaments with tetraspores; *e* apex of branch with hair; *f* young sporangium with star-like chromatophores and central pyrenoid. *a* and *b* 80 : 1; *c*, *d* and *e* 120 : 1; *f* 400 : 1.

Pflanzenfamilien, Teil I, Abteil 2, p. 331, it is, however, stated that in Ch. secundata both monospores and tetraspores are sometimes, though rarely, to be found on the same plant.

On my visit to Heligoland in the summer of 1901 I mentioned my find to Dr. Kuckuck and he told me that he had found tetraspores both on *Ch. virgatula* and on *Ch. secundata* which is very

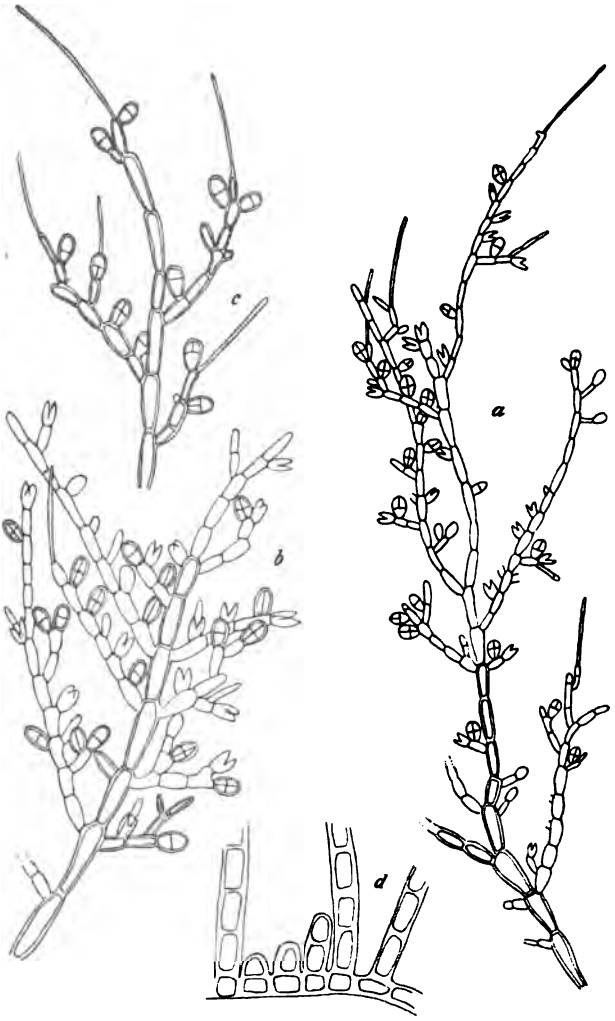

Fig. 54. *Chantransia virgatula* Harv.) Thur. *a*, *b*, *c*, Portions of plant with tetraspores; *d*, transverse section of basal disc. *a* 80 : 1; *b* and *c* 100 : 1; *d* 250 : 1.

closely related to the former, and he has since sent me his slides for examination and the specimens in them except for some minor differences, seem to correspond exactly with my Færõese material. In fig. 53 I have shown portions of the plant in question. Both kinds of spores often occurred on the same plant, frequently even

on the same branch, and that the monospores were really ripe was proved by the fact that branches bearing monospores only also showed numerous empty monosporangia. The monospores (about 19 μ long and 11 broad) are somewhat smaller than the tetraspores which are about 23 μ long and about 16 μ broad. Except for the tetraspores, the plant is exactly like a *Chantransia* and has star-like chromatophores situated round a large central pyrenoid.

Further, a few tetraspores occurred on a small *Chantransia* which I have also referred to this species; it grew abundantly on *Cystoclonium purpurascens* from Klaksvig.

Lastly, I am of opinion that a small, elegant plant which was observed on a conceptacle of *Himanthalia Lorea* from Frodebö preserved in spirit ought to be referred to this species (fig. 54); it occurred as small, semiglobular, cushion-like growths of the size of a pea, and in the accompanying figure some portions of the plant are shown. As far as I could see, it bore tetraspores only, so I naturally to begin with regarded it as a *Rhodochorton*, but on closer examination and after comparison with the above-mentioned specimens it appears to me unquestionably to belong to *Ch. virgatula*. The plant has a distinct basal disc whence proceed erect filaments. These are richly branched and the branches are sometimes alternate (occasionally more or less secund) and sometimes mostly opposite especially in the upper part. The branches generally terminate in short hairs. The branches springing from the lower part of the erect filaments are often prolonged into long branches like the filaments whence they proceed, while those occurring higher up gradually become shorter and either bear tetraspores or produce a new series of branches. The oval or obovate tetraspores are sometimes terminal, sometimes lateral, and in the latter case secund or opposite, they are about 23 μ long and about 16 μ broad. The filaments when thickest attain to a thickness of about 30 μ, the thickness of the upper part of the filaments and of the branches averaging 10 μ. The cells may be as much as 4—5 times as long as they are broad and the thicker cells are usually rather swollen especially towards the top. Judging from the material preserved in spirit, the chromatophores are star-like with a large central pyrenoid.

As mentioned above, this species comes very near to *Ch. secundata*, and they are often difficult to distinguish from each other, as Kuckuck writes to me is also his experience, the fact that both

of them have been found bearing tetraspores making the resemblance still closer. When typically developed, *Ch. virgatula* is easily distinguishable from *Ch. secundata*, but sometimes small specimens of *Ch. virgatula* occur intermingled with the large *Ch. virgatula* and these small ones so closely resemble *Ch. secundata* as to suggest the desirability of classing together the two species. On the other hand, as they are easily to be distinguished when typically developed, I think for the present they ought to be kept distinct, in which opinion I am supported by Dr. Kuckuck. *Ch. secundata* is especially distinguished by its small size, its short cells and its branches which are for the most part secund, though opposite branches also occur, while in *Ch. virgatula* the branches are almost as often opposite as secund. Lastly, the basal disc in *Ch. secundata* generally consists of several layers of cells while in *Ch. virgatula* it often if not always (?) consists of one layer.

This species was found on exposed coasts as well as in sheltered localities especially between tide-marks, but occurred also in the sublittoral zone, and appears to be a common epiphyte on larger algæ, e. g. *Gigartina mamillosa, Rhodymenia palmata, Himanthalia Lorea, Cystoclonium purpurascens, Polysiphonia nigrescens*, etc., and on *Zostera marina*.

Monospore-bearing plants were found in April, June and July, tetrasporic in April, May and June.

This species appears to be rather common along the coasts of the Færöes. It was already found by Lyngbye, as a specimen from Kvalbö which he named *Callithamnion Dawiesii* is this species. It occurred in the following places: — Bordö: near Klaksvig tetrasporic specimens on *Cystoclonium* (!); Str.: Velbestad on *Gigartina mamillosa* (!); Syd: Frodebö on *Himanthalia Lorea* (!), Vaags Ejde likewise on *Himanthalia* (!).

10. **C. efflorescens** (J. Ag.) Kjellm., N. I., p. 166 (129).

I have only seen a few individuals of this species, and they occurred bearing monospores only. Generally they are found only with cystocarps (cfr. Gran, Kristianiafjordens Algeflora p. 19, and Kjellman, l. c. tab. 12, figs 1—2). Dr. Rosenvinge, however, who has seen my specimens, tells me that along the Danish coasts he has found monospore-bearing specimens, which exactly resemble mine; and he also tells me that with the help of his material he will be able to prove with certainty the relationship between the monospore-bearing specimens and those most commonly met with, viz. the cystocarpic. Gobi (Algenfl. Weiss. Meer., p. 50) mentions

only having come across plants bearing monospores and refers his plants to *Ch. Daviesii,* but according to Kjellman (l. c.) they belong to *Ch. efflorescens.*

The thickness of the main branches = 7—8 μ.

This species has been met with in June only, and then bearing monospores; it was found growing in the sublittoral zone epiphytic on several algæ in sheltered places.

It has hitherto been found in the following localities only: — Öst.: Fuglefjord on *Phyllophora Brodiæi* (!), and Öre on *Desmarestia aculeata* (!).

11. **C. Daviesii** (Dillw.) Thur., Kjellm., N. I., p. 167 (129).

The specimens referred to this species agree fairly well with Harvey's figure (Phycol. Brit., tab. 314). This species occurs in the sublittoral zone, epiphytic on several large brown algæ, especially on *Desmarestia aculeata* and on the stalks of *Laminaria hyperborea.* Found with monospores in May, June and November.

Does not seem to be common along the shores of the Færöes. Specimens have been seen from the following localities: — Öst: Fuglefjord (!); Str.: Tinganæs (!), Kalbakfjord (H. J.); Sandö: Skopen (!).

In Hydrophyt., p. 129 Lyngbye reports this species from the Færöes, but the specimens in his herbarium in the Botanical Museum, Copenhagen, which I have examined belong to *Ch. virgatula.*

12. **C. Alariæ Jónss.**[1], The Marine Algæ of Iceland (Botanisk Tidsskrift, 24. Bind, p. 132).

Epiphytic on *Alaria esculenta* covering its lamina with a short, red-matted growth. Observed with monosporangia in July.

Found only on Str.: north of the redoubt of Thorshavn (!).

Order GELIDIACEAE.

HARVEYELLA Schmitz & Reinke.

13. **H. mirabilis** Schmitz & Reinke. Reinke, Algenflora, p. 28; Sturch, Harveyella mirabilis (Annals of Bot., Vol. 13, 1899, p. 83); Choreocolax albus Kuckuck, Choreocolax albus n. sp. ein echter Schmarotzer unter den Florideen (Sitzungsberichte d. kgl. preuss. Akademie der Wissenschaften zu Berlin. 1894). Cfr. Kuckuck, Bemerk. zur marinen Algenvegetation von Helgoland II, p. 395.

Parasitic on *Rhodomela*, on the thicker branches of which it forms small, almost semiglobular, whitish growths.

[1] determ. by Mr. H. Jónsson.

Tetraspore-bearing specimens were found in April, cystocarpic in November.

Rare along the coast of the Færöes: — Kunö (H. J.); Syd: Trangisvaag (!).

Order GIGARTINACEAE.

CHONDRUS (Stackh.) J. G. Ag.

14. **Ch. crispus** (L.) Lyngb., Hydrophyt., p. 15; Kjellm., N. I., p. 212 (167).

This alga is found both in the littoral zone near low-water mark, where it also occurs in rock pools, and in the sublittoral in shallow water. It is met with on fairly exposed coasts as well as in more sheltered localities, and grows on rocks and stones, often in the *Corallina*-belt.

Cystocarp-bearing specimens were found in June and September.

It does not seem to be particularly common along the coasts of the Færöes, as was pointed out by Lyngbye: — »Ad littora Færoensia haud frequens.« Simmons (l. c., p. 135) and Rostrup (l. c., p. 84) mention it as »fairly common«, but they do not give its habitats. In the collections which I have had at my disposal are specimens from: — Str.: Thorshavn (Lyngb., H. J.!), Sandegærde (!); Öst.: Strænder (!); Nolsö: Ejde (!); Kunö (H. J.).

GIGARTINA Stackh.

15. **G. mamillosa** (Good. et Woodw.) J. Ag. Kjellm., N. I., p. 211 (167); Sphærococcus mamillosus Lyngb., Hydrophyt., p. 14.

This is a littoral species and grows gregariously near low-water mark; it prefers exposed coasts and grows most luxuriantly at the most exposed stations. Found attached to gently inclined as well as almost vertical rock faces, and prefers to be left dry by the tide for a time. Occurs seldom in rock-pools and then does not seem to thrive. On the exposed coast north of the redoubt of Thorshavn I found it here and there in rock-pools at half-tide level, mostly forming low, round cushions hardly an inch high. At a higher level it hardly ever occurs in rock-pools, but I have come across a few specimens from pools, which were thinner than customary and more irregularly branched.

Found with cystocarps in July, August, October, November and December; with antheridia in June.

This species is common along the exposed coasts of the Færöes, but rarer in sheltered localities. Its common occurrence was already

noted by Lyngbye (l. c. p. 14), who writes: — »Ad insulas Færoenses copiose.«

PHYLLOPHORA (Grev.) J. G. Ag.

16. **Ph. Brodiæi** (Turn.) J. Ag. Kjellm., N. I., p. 209 (163); Rosenv., Grönl. Havalg., p. 821.

The typical form is most commonly met with along the Færöese coasts; but sometimes the specimens more or less approach to the subspecies *interrupta* (Grev.) Rosenv., without, however, being quite identical with it.

This is a sublittoral species and prefers growing on stony bottoms where it occurs dispersed, but rarely in large quantities. It is met with both in exposed and sheltered localities, but most commonly in the latter. The Færöese specimens which I have seen were sterile, but often infested by *Actinococcus subcutaneus*. Specimens bearing young shoots occurred in November and December.

Found in the following localities: — Viderö: (H. J.); Bordö: Klaksvig (!); Öst.: Fuglefjord (!); Str.: Vestmanhavn (!), Gliversnæs (!), Kvivig (!); Syd.: Tværaa (Ostenfeld), Lobra (!), Vaagfjord (H. J.).

Ph. rubens (Good. & Wood.) J. Ag. Simmons (l. c. p. 266) reports having found this species near Klaksvig, but as I had several times had an opportunity of dredging this locality and had only succeeded in finding *Phyllophora Brodiæi* I naturally had serious doubts as to the correctness of Simmons find, and his original specimens kindly lent to me from the collections belonging to the University of Lund also proved to be small specimens of *Phyllophora Brodiæi*. *Phyllophora rubens* must consequently be omitted from the list of the marine algæ of the Færöes, as it has not hitherto been found there.

17. **Ph. membranifolia** (G. et W.) J. Ag. Kjellm., N. I., p. 210 (165); Darbishire, Die Phyllophora Arten d. westl. Ostsee deutsch. Antheils.

This species must presumably be very rare in the Færöes as only a single, small specimen occurred in the gatherings. It has narrow leaves and resembles most closely a Baltic-specimen (cfr. Darbishire, l. c. p. 5).

Syd.: Tværaa, gathered by Ostenfeld in a plaice net.

Simmons (l. c. p. 266) mentions having found this species near Klaksvig; but his original specimens which Dr. Nordstedt kindly lent me from the collections belonging to the University of Lund proved to be very small specimens of *Rhodymenia palmata*.

On the north side of Kvalbõfjord (Syd.) I found some way inside a cave, rather above low-water mark a small *Phyllophora*, which occurred on the rock as a dense, low covering of a fine, red colour. The single individuals were small, hardly more than 2—3 cm. high. This habitat answers exactly to what Batters (Marine Algæ of Berwick-on-Tweed pp. 334—5) says of *Phyllophora Traillii* Holmes, but it cannot be determined with any certainly as the plant is sterile. Both on this account and also because the Færõese specimens are somewhat larger and more branching than indicated by Batters, I prefer to regard them as small individuals of this species.

ACTINOCOCCUS Kütz.

18. **A. subcutaneus** (Lyngb.) Rosenv., Grønl. Havalg., p. 822; Chætophora membranifolii Lyngb., Hydrophyt., p. 11; Ch. subcutanea Lyngb., Fl. Dan., tab. 2135, fig. 2.

Parasitic on *Phyllophora Brodiæi*, on the thallus of which it forms the well-known dark-red, fruit-like growths. The specimens I saw were sterile.

Found in the following localities: — Vid. (H. J.); Öst: Fuglefjord (!); Syd.: Vaagfjord (H. J.).

CALLOPHYLLIS Kütz.

19. **C. laciniata** (Huds.) Kütz. Sphærococcus laciniatus Lyngb., Hydrophyt., p. 12.

A sublittoral species, found attached down to a depth of 25 fathoms. Occurs both in the open sea and in the fjords, generally epiphytic, especially on the haptera and lower part of the stem of *Laminaria hyperborea*; but also grows attached to stones and shells.

I have come across specimens bearing tetraspores in June, October and November, and cystocarps in May, June, July, October, November and December; hence the plant seems to be able to bear reproductive organs nearly all the year round.

This is a very common species along the shores of the Færões, as already noted by Lyngbye, l. c., who writes: — »Ad insulas Færoenses copiose.«

Callocolax neglectus Schmitz is a rather common parasite on this plant.

CALLOCOLAX Schmitz.

20. **C. neglectus Schmitz.** Batters, On some new British Marine Algæ. (Annals of Botany, vol. 9, p. 316).

This species is rather commonly met with as a parasite on *Callophyllis laciniata*, and occurs on it in small irregularly shaped

bodies, the internal structure of which bears a remarkable resemblance to *Callophyllis*. It is found fairly often bearing tetraspores and on measuring these and comparing them with the tetraspores of *Callophyllis* the former seemed somewhat smaller than the latter, thus: —

The tetraspores of the *Callocolax* were: long. = 32—35 μ; lat. = 17—19 μ
» » » » *Callophyllis* » » = 46—49 μ; » = 22 μ

Plants bearing tetraspores occurred in May, June, July. Appears to be rather common. Found in the following localities: — Str.: Thorshavn (!), Arge (!), Kvivig (!) and Vestmanhavn (!); Syd: Tværaa (!).

AHNFELTIA Fries.

21. **A. plicata** (Huds.) Fr. Kjellm., N. I., p. 210 (166); Gigartina plicata Lyngb., l. c. p. 42.

It has been met with both in the littoral zone in rock pools near low water mark, and in the sublittoral in shallow water. It prefers a somewhat sheltered coast, and grows attached to stones and rocks, often associated with *Corallina* and other algæ, but sometimes it occurs over fairly large areas as pure societies. Here as elsewhere only sterile examples have been found. *Sterrocolax decipiens* Schmitz is a common parasite on the present species and forms small cushion-like growths on it; and in Lyngbye's Herbarium there are specimens from Eide densely covered with *Sterrocolax decipiens*.

It is a rather common species of the Færöese coasts and was first reported from the Færöes by Lyngbye, who writes in Hydrophyt.: — »Ad insulas Færoenses, rarius.«

STERROCOLAX Schmitz.

22. **S. decipiens** Schmitz, Die Gattung Actinococcus Kütz., Flora 1893, p. 367.

Appears to be a fairly common parasite on *Ahnfeltia plicata* and consequently occurs in localities similar to those of the latter. The only reproductive organs it has been known to bear are monospores. The latter occur also on the Færöese specimens.

It is rather common like *Ahnfeltia plicata*.

Order RHODOPHYLLIDACEAE.

CYSTOCLONIUM Kütz.

23. **C. purpurascens** (Huds.) Kütz. Kjellm., N. I., p. 202 (159); Gigartina pinastroides Lyngb., Hydrophyt., p. 45.

In places where the tide is imperceptible, e. g. in Sundene between Stromö and Österö and in Skaalefjord, this species occurs in quite shallow water, often hardly a foot below the surface. But where the tide is felt, e. g. at Klaksvig it grows at so great a depth as to be hardly left dry except at very low ebb-tide. I only found it in particularly sheltered places, but Rostrup and Lyngbye gathered it near Thorshavn, consequently, from a more exposed locality. Grows most frequently on stones and rocks, but sometimes also attached to other algæ.

Tetraspore-bearing specimens were found in May, June and July; cystocarpic in August, September and October, which agrees fairly well with Kleen's report (l. c. p. 18) from Nordland.

This species, which was first reported from the Færöes by Rostrup, was already found there by Lyngbye as what he calls *Gigartina pinastroides*, is this species which was proved by examining the specimens preserved in his herbarium. In Hydrophyt. he mentions it as follows: — »Habitat ad insulas Færoenses, ut in sinu prope Thorshavn, at raro.« But Lyngbye must have been very doubtful as to the correctness of his determination, for to begin with he labelled the specimens in question *Fucus purpurascens*, then he put them in a small wrapper on which he wrote »pinastroides«, and this wrapper with contents was again placed among his material of *Cystoclonium purpurascens*, where it was found by Dr. Rosenvinge some years ago when he arranged Lyngbye's Herbarium; so Lyngbye himself must have discovered his error.

This species does not appear to be widely distributed along the shores of the Færöes: —

Bordö: Klaksvig (Rostr., H. S.!); Öst.: Glibre (!), Strænder (H. J.!); Str.: Sundelaget (!), Kvalvig (!), Thorshavn (Lyngb., Rostr.).

EUTHORA. J. Ag.

24. **E. cristata** (L.) J. Ag. Kjellm., N. I., p. 186 (145); Spærococcus cristatus Lyngb., Hydrophyt., p. 13.

There occur two forms of this species, a broader and more robust form — f. *typica* peculiar to exposed localities, and a narrower but larger form — f. *angustata* Lyngb., which I have only met with in sheltered places in fjords or narrow sounds.

This species generally occurs in the sublittoral zone, and luxuriant specimens were found down to a depth of 25 fathoms. In caves I found it almost at the water's edge, but hardly so far up as to be left uncovered at ebb-tide. Kleen (l. c. p. 17) mentions very much the same occurring in Nordland. It was met with in

the open sea as well as in sheltered localities, in the latter often in its narrow form as mentioned above.

Occurs most frequently epiphytic, especially on the haptera and lower part of the stem of *Laminaria hyperborea*, but also found now and then attached to rocks.

Found bearing tetraspores in June, July, August; and cystocarps in May, June, July, August and November. This seems to agree with Kjellman's report (l. c.) from the Arctic Sea that it appears to be able to form cystocarps all the year round, but tetraspores chiefly during summer.

In Lyngbye's Herbarium there are specimens from different stations along the Færöes; of f. *angustata* he has only Greenland specimens.

This is a very common species of the Færöese coast. Lyngbye mentions it as follows: — »Ad insulas Færoenses in stipite Laminariæ digitæ haud rarus.«

RHODOPHYLLIS Kütz.

25. **Rh. dichotoma** (Lepech.) Gobi. Kjellm., N. I., p. 185 (144); Sphærococcus ciliatus Lyngb., Hydrophyt., p. 12.

The typical form with the broad thallus occurs in the open sea, but in the interior of fjords in quiet water it alters its appearance, the branches getting narrow and ribbon-like, often almost filiform. Kjellman (l. c. tab. 12, fig. 3) has figured such a plant; Lyngbye's Herbarium contains similar specimens from Greenland which he has called *β fuscus* (Hydrophyt., l. c.).

In Epicrisis, p. 362, Agardh describes a var. *atropurpurea* of this species and reports it from the Færöes, and in the considerable Færöese material of this species which I have had at my disposal I found a few specimens which agreed fairly well with his description of this variety, but as they form together with the rest of my material a continuous series, it is impossible to mark the dividing line for this variety. I am therefore of opinion that var. *atropurpurea* can hardly claim to be ranked as a variety.

This species grows in the sublittoral zone in deep water and has been found down to a depth of 25 fathoms. It inhabits more particularly the open sea, but may also be met with in the interior of fjords. It occurs most frequently epiphytic especially on the haptera and lower part of the stem of *Laminaria hyperborea*. I found it very rarely at great depths growing on stones and shells.

Tetraspore-bearing plants were found in June, and November, cystocarpic in June, July and August. Kleen found it bearing cystocarps in July and August in Nordland.

This species is quite common along the shores of the Færöes and was first mentioned by Lyngbye.

Order RHODYMENIACEAE.

RHODYMENIA (Grev.) J. Ag.

26. **Rh. palmata** (L.) Grev. Kjellm., N. I., p. 188 (147); Ulva palmata Lyngb., Hydrophyt., p. 24.

Forma *typica* Kjellm., l. c.

subf. *caespitosa* Simmons, l. c. p. 266.

Forma *prolifera* Kütz. Flora Danica, tab. 1128,

subf. *nana*, nov. subf.

1—3 cm. high, very prolific and branched; the base more or less cuneate and sometimes drawn out into a small stalk.

The easiest transitional stages are met with between the above-mentioned forms, but as they differ widely in their typical development, and there seems to be some dissimilarity in their habitats, f. *typica* growing most commonly on rocks while f. *prolifera* usually occurs epiphytically, I have thought it more practical to keep them apart from each other. F. *typica* is very variable, at times having prolifications (f. *marginifera* Harv.), at others being quite destitute of them (f. *nuda*); sometimes it is broad, sometimes the segments of the thallus are narrow and numerous, and a few such specimens in my collections resembled fairly closely f. *sarniensis*. With regard to subforma *cæspitosa* Simmons — through the kindness of Dr. Nordstedt I have had some specimens for examination from the collection belonging to the University of Lund and have thus been able to ascertain that these belong to f. *typica* —, it may be remarked that some specimens occur which correspond to Simmons's description, but they are often destitute of stipe, and are characterized especially by their small size and tufted or carpet-like growth, often covering large areas. Subforma *nana* is likewise only a very small form of f. *prolifera*, at the most a few inches high, and similarly marked by its carpet-like gregarious growth.

In a few rare instances some otherwise normal specimens of f. *typica* and subf. *cæspitosa* had part of their thallus transformed into small, irregularly shaped growths (fig. 55) by their very copious

branching, which was sometimes dichotomous, sometimes quite irregular.

Along the coasts of the Færões this species grows both in the littoral and in the sublittoral zone. In the former it occurs especially along exposed shores near low-water mark, where it forms rather wide-spread almost pure societies more particularly on horizontal surfaces. In the sublittoral it occurs most often as an epiphyte, e. g. on *Laminaria* species and *Fucus*; sometimes it may

Fig. 55. *Rhodymenia palmata* (L.) Grev. 1 : 1 (compare pp. 363—4).

also be said to occur in the littoral zone as an epiphyte, as it grows by preference on those *Laminaria* of which the leaf and upper part of the stem are left uncovered at low-tide, and then the red bushes of *Rhodymenia* may be seen projecting above the sea together with the brown *Laminaria*. Forms of f. *prolifera* are most commonly met with in the latter habitat, and they can attain to a very considerable size, but f. *typica* also frequently occurs here in large, vigorous examples. On the whole along the Færõese coasts those growing as epiphytes are larger and more vigorous than those occurring on rocks, and they are particularly small on rocks in

exposed localities where their close growth protects them from the violence of the sea.

Tetraspore-bearing plants were found in April, May, June and November.

This is a very common species of the Færöese coasts, as was pointed out by Lyngbye (l. c.), who writes: — »Ad insulas Færoenses copiosissime, tam lapidibus ad superficiem maris agglutinata, quam stipiti Laminariæ digitatæ aliarumque parasitice insidens.«

Forma *typica* is most common on rocks, and subforma *cæspitosa* in exposed places on rocks between tide-marks; Simmons mentions having found it near Ejde (Öst.) and Famien (Syd.). Specimens which correspond fairly closely to f. *sarniensis* occurred between tide-marks in the neighbourhood of Gliversnæs (Str.); f. *prolifera* and f. *typica marginifera* are common as epiphytes; lastly subforma *nana* was found in a small, low cave near Höjvig (Str.).

LOMENTARIA Lyngbye.

27. **L. articulata** (Huds.) Lyngb., Hydrophyt., p. 101, tab. 30 A.; Hauptfleisch, Die Fruchtentwickelung der Gatungen Chylocladia, Champia und Lomentaria (Flora 1892); Chylocladia articulata (Huds.) Grev., Kjellm., N. I., p. 193 (151).

A littoral species, generally grows gregariously, and commonly near low-water mark in the Corallina-belt. It prefers exposed coasts, but may also be met with in sheltered localities, where it does not, however, seem to thrive. It grows attached to rocks and stones and has not been found as an epiphyte. Tetrasporic specimens occurred in May, June, July and November.

Lyngbye, who first found this species in the Færöes, writes in Hydrophyt., p. 10, with reference to its habitat: — »Habitat pulchra hæc species ad rupes insularum Færoensium in summo refluxus limite hic et illic copiose.« The species is also very common, especially along the more exposed coasts.

28. **L. clavellosa** (Turn.) Thur. Hauptfleisch, Die Fruchtentvickelung der Gattungen Chylocladia, Champia und Lomentaria (Flora 1892); Chylocladia clavellosa (Turn.) J. Ag., Spec. Alg., Vol. 3, p. 297.

Var. *sedifolia* (Turn.) J. Ag., Spec. Alg., vol. 2, p. 366; Gastridium purpurascens Lyngb., Hydrophyt., p. 69, tab. 17.

Almost all the *L. clavellosa*-specimens from the Færöes belong to the variety[1], but they vary considerably. In some specimens

[1] I fully agree with Foslie (New or Critical Norwegian Algæ, Kgl. norske Videnskab. Selsk. Skrifter 1894) when he says that he cannot follow Strömfelt in regarding var. *sedifolia* as a distinct species.

nearly all the branches are opposite (cfr. Lyngbyes's fig. l. c.), in others only a few, and all stages are met with intermediate between these extremes. The main filament may attain to a breadth of as much as 4—5 mm. Small specimens of this variety, consisting only of stem and opposite branches, are doubtless identical with var. *pyramidalis* Thur. (cfr. Le Jolis, Liste, p. 132).

A peculiar form with numerous small, irregular branches was found by Ostenfeld in Trangisvaagfjord.

A form has sometimes been found at the bottoms of fjords with long, almost linear branches, consequently, resembling the slender forms of, e. g. *Euthora cristata* and *Rhodophyllis dichotoma* met with in similar localities.

Lyngbye's Herbarium contains only some very imperfect specimens of his *β cæspitosum* (l. c. p. 69), from which no definite conclusion as to its habit can be formed, and which do not appear to be particularly characteristic according to his description.

This species generally grows in the sublittoral zone along the coasts of the Færöes and may occur at fairly considerable depths. I dredged it from various depths of about 15 fathoms, and Simmons (l. c. p. 266) mentions having found it in the »eliittoral« zone; but it also occurs in the littoral zone near low-water mark, where it is very common in clefts of rock and in caves. It grows attached to rocks and stones, as also epiphytic especially on the stems of *Laminaria hyperborea*. Though it grows by preference in the open sea along the most exposed coasts, it is not uncommon in the interior of fjords where it is also found epiphytic on *Lam. fœroensis*.

Tetraspore-bearing specimens were found in May, June, July, August and November, cystocarpic in June, July and August.

This is a very common species of the Færöese coasts; it was first found by Lyngbye (l. c.), who writes with reference to its habitat: — »Habitat ad littora Færoensia saxis et stipitibus Laminariæ saccharinæ adnascens.«

29. **L. rosea** (Harv.).

Found growing near low-water mark as well as in the sublittoral zone in deep water. It prefers exposed coasts. I found tetrasporic specimens only in May and June.

This species appears to be rather rare along the Færöese coasts. Öst.: Mölen pröpe Ejde (!) near low-water mark intermingled with *Corallina*, Ejde (H. S.); Str.: Kalbakfjord (!), specimens very small, and determination uncertain; Kolter (!) on *Lam. hyperborea* at a depth of some 10—15 fathoms; Syd.: Kvalbö Ejde (H. S.).

When I came across this alga — only a few specimens of it — near Mölen where it occurred between tide-marks, it appeared to me to be only a form of *Lomentaria clavellosa*, which also grew there. My material is, however, too scanty to allow me to form any definite opinion of it, but I would call attention to what Foslie (New and critical Norwegian Algae, Trondhjem 1894) writes in his report of *Lomentaria sedifolia* (Turn.) Strömf.: — »I cannot agree with Strömfelt that L. sedifolia is distinct from *L. clavellosa* by characters of the same degree and value as *L. rosea*. To my opinion the latter is a more characterized species than the former. Among rather numerous specimens that I have seen I have not met with any true transition to *L. cavellosa*, though the species is rather varying.« This shows that Foslie admits of the possibility of the existence of intermediate forms.

The specimens which I found on Heligoland, while visiting the biological station there, and which grew epiphytically on *Laminaria hyperborea*, were quite distinct from *L. cavellosa*, which also occurred there; and Dr. Kuckuck told me that he had never come across intermediate forms.

PLOCAMIUM (Lamour.) Lyngb.

30. **P. coccineum** (Huds.) Lyngb., Hydrophyt., p. 39; Kjellm., N. I., p. 188 (147).

Var. *typica* is the most common; var. *uncinata* (Harvey, Phyc. Brit., tab. 44, fig. 9) occurred in Trangisvaagfjord. Lyngbye (l. c.) mentions a form *β subtile*, but none of the specimens in his herbarium are marked with this name; it is probably identical with var. *uncinata*.

This species is generally found in the sublittoral zone, but I have also come across it in the littoral in caves a little above low-water mark. It grows both in the open sea and in more sheltered places and is generally epiphytic especially on the stems of *Laminaria hyperborea* of which it is a characteristic epiphyte; but it is also found attached to rocky bottoms especially in caves.

Tetraspore-bearing plants occurred in April, May, June, October, November and December; cystocarpic in July and August. Kleen found it bearing tetraspores and cystocarps in July and August at Nordland.

It is an extremely common species of the Færöese coasts, as was mentioned by Lyngbye (l. c.), who says: — »Habitat elegantissima hæc Alga ad insulas Færoenses copiose.« It occurs in fine, large specimens.

HALOSACCION (Kütz.) Rupr.

31. **H. ramentaceum** (L.) J. Ag. Kjellm., N. I., p. 196 (153).

f. *robusta* Kjellm., l. c.

f. *ramosa* Kjellm., l. c.

f. *subsimplex* Rupr. Kjellm., l. c.

I think the Færõese material may be referred to the three above-mentioned forms; f. *subsimplex* appears to be the most common, but often occurs as a transition to f. *robusta*. Forma *ramosa* is rare; I have only felt justified in referring a few of the specimens to it.

Along the Færões this species occurred both in sheltered localities and, at a single place (Svinõ), on the open sea-shore which was, however, more or less sheltered by some low rocks standing in the sea opposite to it. According to Jónsson's notes, in the latter locality it grew near low-water mark, but in sheltered places it must most properly be said to grow in the sublittoral zone, though in very shallow water, and the specimens growing at the highest places are doubtless occasionally left dry at very low tide. Here it grows on large or small stones often associated with numerous green algæ, as already noted by Rostrup.

Tetraspore-bearing plants were found in May, June and November.

This species which was first found by Rostrup (l. c. p. 83) appears to be rare along the coasts of the Færões. Besides the well-known habitat near Klaksvig (Bordõ), where it occurs in abundance along the shore, it has been found by Jónsson near the so-called »Havn« (Svinõ) and by me in Vestmanhavn (Str.) where it grew under similar circumstances to that near Klaksvig, and likewise associated with numerous green algæ.

This species has thus been found only in the northern part of the Færões and must probably have been carried thither by the polar current from off the east coast of Iceland. As already pointed out by Rostrup (l. c. p. 16) this seems to be its southernmost limit of distribution.

Order DELESSERIACEAE.

NITOPHYLLUM Grev.

32. **N. laceratum** (Gm.) Grev. J. Agardh, Spec. Alg., Vol. 3, p. 469; Le Jolis, Alg. mar. de Cherb., p. 136.

This alga, which is beyond doubt very rare in the Færões, was found somewhat below low-water mark in a cave near Kvivig, occurring here in small pink patches on *Lithothamnion polymorphum* and *Corallina officinalis* and attaching itself to these algæ by means of its numerous rhizoids. It is probably this form which Crouan (Florule du Finistère, p. 153) called *Nitophyllum reptans*, as pointed out by Le Jolis (l. c.).

Some precisely similar specimens in my herbarium collected by Lange near Malaga were referred to this species by J. Agardh, who has determined Lange's collections of Algæ from Spain.

The Færõese specimens were small, at the most a few cm. in circumference, and sterile.

Found only on Str.: Kvivig (!).

DELESSERIA Lamour.

33. **D. alata** (Huds.) Lamour. Kjellm., N. I. p. 172 (134); Lyngb., l. c. p. 8.

There occurs along the coasts of the Færões both a rather broad form and a more narrow form like le Jolis's no. 245, but they merge into one another by a series of very closely connected intermediate forms. I have not seen specimens referable to *D. angustissima*.

This species generally occurs in the sublittoral zone, but is also common near low-water mark, especially in rock clefts and in caves, where it may often be seen at ebb-tide forming extensive coverings on the rocks. It is also met with here and there in tide-pools at low-levels. Between tide-marks the specimens are small, only a few centimetres high, as Kjellman (l. c.) says is the case also with those growing in similar localities in the north of Norway; but in the sublittoral zone they are much larger, up to about 20 centimetres long.

It grows both in exposed and sheltered localities on rocky and stony bottoms as well as epiphytic especially on *Laminaria hyperborea*.

Tetraspore-bearing specimens occurred in April, May and October, and cystocarpic in May, June, July (a specimen in Lyngbye's Herbarium), October and November. Kjellman has not found fruit-bearing plants in the Arctic regions, but says that in Sweden the plants bear tetraspores during winter (December and January); and Areschoug says that it bears fruit in Bohuslän in March and April.

This species is very common along the Færõese coasts as already noted by Lyngbye (l. c. p. 8), who writes: — »ad littora Færoensia copiose«.

It was first recorded by Landt, l. c. p. 231.

34. **D. sinuosa** (Good. et Woodw.) Lamour. Kjellm., N. I., p. 175 (136); Lyngb., l. c. p. 7.

A variable plant, the leaves being sometimes almost entire,

sometimes deeply sinuate. The greater part of the specimens collected belongs to f. *typica*; f. *lingulata* was met with in several of the fjords, and specimens from quiet waters were on the whole inclined to be prolific. A few of the specimens approached f. *quercifolia*.

It is sublittoral, and while it occurs at the water's edge in caves and ravines during ebb-tide, it also grows luxuriantly at a depth of 25 fathoms. It is met with both in exposed and sheltered localities, and is common on rocky and stony bottoms as well as epiphytic on *Laminaria*-species, especially *L. hyperborea*.

The plant seems to be able to form new shoots all the year round, but most abundantly during spring. Young plants have been gathered in December.

Tetrasporic plants were found in May, June, July, August, October, November and December and were common altogether, while those bearing cystocarps were rarer, and were found only in May, July (a specimen in Lyngbye's Herbarium) and November. This corresponds to Kjellman's (l. c. p. 177 [138]) statement that this species appears to bear reproductive organs all the year round.

This species is very common as already mentioned by Lyngbye (l. c. p. 8): — »Ad stipitem Laminariæ digitatæ ad littora Færoensia copiose«.

35. **D. sanguinea** (L.) Lam. Hydrolapathum sanguineum (L.) Stackh. Kjellm., N. I., p. 184 (143); Delesseria sanguinea Lyngb., l. c. p. 7.

Generally found growing in the sublittoral zone, but is also met with in the littoral in caves and grottoes at extreme low-water mark where it may be left uncovered for a shorter time by the spring tide, and in such a case in exposed places the leaves are often considerably torn. It is one of the algæ which occurs at the greatest depths; thus I have gathered specimens from a depth of 25 fathoms — consequently, from Kjellman's »elittoral« zone.

It is a common epiphyte especially on *Laminaria hyperborea*, but also grows frequently on rocky, stony and shelly bottoms. Found on exposed as well as sheltered shores.

Judging from the material in hand the plant appears to give out new shoots early in spring, vigorous plants being collected late in April while in those gathered late in October the branches were more or less naked. Almost all the specimens I had for examination were sterile. A single specimen collected late in October in Kvanne-

sund by Helgi Jónsson had very young cystocarps on the leafless stems, another collected $^{7}/_{12}$ 97 at Trangisvaag had quantities of small tetrasporic leaves, which clearly indicates that the plants fructify during the winter months, as is also the case with those growing along the Danish shores.

This species is very common, as already mentioned by Lyngbye (l. c. p. 8): — »Ad insulas Færoenses copiose«.

It was first recorded by Landt, l. c. p. 231.

Order RHODOMELACEAE.

LAURENCIA Lamour.

36. **L. pinnatifida** (Gmel.) Lamour. J. Ag., Spec. Alg., Vol. 3, p. 656.

Found in the littoral zone both on the open sea-shore closely covering the bottom of a rock-pool situated at a high level, and also in a sheltered locality on large stones near low-water mark. I have not seen fructifying specimens, nor have I come across it growing epiphytically as it may often be found doing on the Danish coasts.

It seems to be very rare along the coasts of the Færöes.

Rostrup, who first found it, writes: — »we found it sparingly on the coast of Strömö«. I found it on the east coast of Strömö, between Thorshavn and Höjvig, in a large rock-pool situated at a high level, and on Syderö at Tværaa near the shore on stones — where it was first found by Ostenfeld —, and at Ördevig.

POLYSIPHONIA Grev.

37. **P. urceolata** (Lightf.) Grev. J. Ag., Spec. Alg., Vol. 2, pars 3, p. 970.

f. *typica*, Kjellm., N. I., p. 153 (118).

f. *roseola*, Ag. J. Ag., l. c. p. 971.

This is a very common species both of the littoral and sublittoral zone. In the littoral zone it generally grows on rocks and stones near low-water mark, often forming here close societies of wide extent, e. g. in the *Corallina*-belt. In the sublittoral zone it also frequently occurs as an epiphyte especially on the stems of *Laminaria hyperborea*, where f. *roseola* is the most common. This species may be met with down to a depth of at least 10 fathoms; it prefers exposed coasts, but is also to be found in bays and fjords.

Judging from the material in hand this species appears to attain to its highest development during summer; in spring it is small.

Tetraspore-bearing plants were found in May and June, cystocarpic in April, June and July.

This species is extremely common along the coasts of the Færöes; f. *roseola* is also fairly common; the latter appears to prefer somewhat sheltered localities in the interior of fjords, where it occurs as a rather common epiphyte on different *Laminaria*-species.

According to Agardh, l. c. p. 972, Lyngbye's *Hutchinsia stricta* Ag. (Hydrophyt., p. 115) which he reports from the Færöes: — »Ad insulas Færoenses haud frequens«, is this form; but how far his material — which is *Polysiphonia urceolata* — is forma *roseola* I am not prepared to say, though his figure in tab. 36 appears to belong to this form.

P. lepadicola (Lyngb.) J. Ag., Spec. Alg., Vol. 2, p. 945; Hutchinsia lepadicola Lyngb. l. c. p. 113. On examining the specimens in Lyngbye's Herbarium they proved to be creeping filaments of *P. urceolata*; the latter (which commonly occur on Balanus) differing from the erect filaments in appearance induced Lyngbye to regard them as a distinct species. I myself have gathered specimens, e. g. near Kvivig, which are quite like Lyngbye's, but they naturally occurred in all stages of development, ranging from »*P. lepadicola*« to well-developed *P. urceolata*.

38. **P. violacea** (Roth) Grev.

Found epiphytic on *Laminaria* in shallow water. Cystocarp-bearing specimens occurred in May.

Very rare along the Færöes: — Syd.: Trangisvaag (Ostenfeld, H. S., according to the latter epiphytic on *Laminaria saccharina*).

39. **P. elongata** (Huds.) Harv. Kjellm., N. I., p. 158 (122).

A sublittoral species and found down to a depth of 10 fathoms. It occurs on stones and shells as well as epiphytic on other algæ, e. g. on the stems of *Laminaria hyperborea*. It has been found both in sheltered and exposed localities.

Tetrasporic plants occurred in March, May, June and July, those bearing cystocarps in December.

It gives out new shoots in spring, thus specimens collected at Trangisvaag in March had new shoots and leaves; autumn and winter specimens are almost destitute of leaves and new shoots.

This species, which has not previously been reported from the Færöes, was, however, already found there by Mr. Randropp, but the specimens which he sent to Dr. Rostrup were erroneously named *Rhodomela subfusca*, f. *flaccida* (Rostrup, l. c. p. 82). This is not a common species in the Færöes, but at a few places, e. g. Vaagfjord, it occurs abundantly.

Str.: Gliversnæs (!), Kalbakfjord (H. J.); Öst.: Glibre and Mölen (!); Kolter (!); Syd.: Kvalbö (!), Trangisvaag (Ostenfeld, H. J.), Vaagfjord (H. J.).

40. **P. Brodiæi** (Dillw.) Grev. Kjellm., N. I., p. 156 (120); Hutchinsia Brodiæi Lyngb., Hydrophyt., p. 109.

The specimens from my collections generally correspond in the main with the Færöese examples which are to be found in Lyngbye's Herbarium, but they do not agree exactly with his figure (l. c. tab. 33) which Kjellman quotes under forma *Lyngbyei* Kjellm. A few examples, e. g. from Kollefjord, agree fairly well with Areschoug's Exsicc., No. 64; others again are small and somewhat suggest Kützing's figure in Tab. Phyc., Vol. 14, tab. 1.

This species belongs to the littoral zone and occurs near low-water mark often in rock-pools. It is met with both on much exposed coasts and in sheltered localities. It grows on rocks and often gregariously in fairly large quantities.

This species is rather widely distributed along the coasts of the Færöes as it has been found in the following localities: — Öst.: Mölen (!), Ejde (H. S.; !), Næs (Lyngb., H. S.); Str.: Kvivig (!), Kollefjord (H. S., !), Thorshavn (H. J.); St. Dimon (!); Syd.: Kvalbö Ejde (H. S.), Trangisvaag (Ostenfeld, !).

41. **P. atrorubescens** (Dillw.) Grev. J. Ag., Spec. Alg., Vol. 2, pars 3, p. 1035; Greville, Scottish Cryptogamic Flora, Vol. IV, tab. 210; Hutchinsia atrorubescens Lyngb., Hydrophyt., p. 110.

Sublittoral. The specimens few in number and sterile. They occurred amongst some other *Polysiphonia*-species from Trangisvaagfjord which were gathered by Ostenfeld from a depth of some 3—4 fathoms in a plaice net.

Lyngbye (l. c. p. 110) reports this species as occurring along the coasts of the Færöes, but no specimens of it are to be found in his herbarium. Agardh (l. c. p. 1037) also mentions not having seen any specimens gathered by Lyngbye and hence he is of opinion that the species mentioned by the latter can hardly be the one in question, but as this has now been actually found in the Færöes it is very possible that it was already discovered by Lyngbye.

As Lyngbye's Herbarium contains no specimens of his *Hutchinsia badia*, reported in Hydrophyt., p. 114, no opinion can be formed as to what it really is.

42. **P. nigrescens** (Huds.) Harv. Kjellm., N. I., p. 162 (126); Hutchinsia nigrescens Lyngb., Hydrophyt., p. 109.

Found in shallow as well as deep water, and both along sheltered and exposed coasts. At the head of Kalbakfjord it was found attached to stones in quite shallow water which had a strong admixture of fresh water. Fructifying specimens have not been met with.

This species seems to be rather rare along the Færöese coasts. Lyngbye (Hydrophyt., p. 109: »Habitat ad insulas Færoenses«) reports it from the Færöes, but no Færöese specimens of it are to be found in his herbarium. Rostrup writes with reference to it »a few specimens only were found.«

I have seen specimens from: — Str.: Head of Kalbakfjord (!), Gliversnæs (!); Öst.: Öre (!); Syd.: Trangisvaag (Ostenfeld).

43. **P. fastigiata** (Roth) Grev. Kjellm., N. I., p. 159 (123); Hutchinsia fastigiata Lyngb., l. c. p. 108.

Found in the littoral zone, almost exclusively on *Ascophyllum nodosum*; but Lyngbye says that in a few rare instances he found it growing also on *Fucus vesiculosus* and on rocks. Tetraspore-bearing specimens were found in June and July, cystocarpic in July and August. Its dense, bushy growth affords a favourable habitat for numerous small epiphytes, especially *Chantransia secundata* and crusts of *Dermocarpa*. It is perennial and has been found with young shoots in the beginning of March.

This species is common everywhere where *Ascophyllum* is met with, i. e. in somewhat sheltered and perfectly quiet places.

PTEROSIPHONIA Fkbg.

44. **P. parasitica** (Huds.) Fkbg. Die Rhodomelaceen des Golfes von Neapel, p. 265; Kjellm., N. I., p. 152 (117); Hutchinsia Mõstingii Lyngb., Hydrophyt., p. 116, tab. 36.

Found along exposed coasts in the sublittoral zone and especially abundant in caves in shallow water where at low tide it may easily be gathered in a hand-dredge at a depth of about one fathom. Grows here on the vertical faces of rocks and found attached either to the rock itself or to shells and *Lithothamnion polymorphum*, often associated with *Lomentaria clavellosa*, *Plocamium coccineum*, *Delesseria sinuosa* and other *Florideæ*.

In Trangisvaagfjord Jónsson found a specimen growing attached to a crab which he dredged from a depth of 10 fathoms.

This species is hardly rare along the exposed coasts of the Færöes. Found in the following places: — Str.: Kvivig (Lyngb., ! in caves); Öst.: Mõlen (Lyngb., !); Vaagõ: cave on the north side (!), cave opposite Kvivig (!); St. Dimon (!); Syd.: Kvalbõ Ejde (H. S.), Trangisvaagfjord (H.J.).

45. **Rh. lycopodioides** (L.) Ag. Kjellm., N. I., p. 139 (107); Gigartina lycopodioides Lyngb., Hydrophyt., p. 45.

f. *typica* Kjellm., l. c.

Most of the Færõese specimens bear a slight resemblance to subforma *compacta* Kjellm., a few approach somewhat to subforma *laxa* Kjellm.

This species occurs both in the littoral zone, near low-water mark, and in the sublittoral, in shallow water. It grows on rocks and stones and sometimes in rock-pools. It is found along open sea-shores as well as in sheltered localities in the interior of fjords, and in narrow sounds, and grows in quite shallow water where the tide is not felt.

Tetrasporic specimens were found in May and June.

This species, which was already found by Landt (l. c. p. 229), is fairly common along the coasts of the Færões.

I think *Gigartina subfusca β racemosa* Lyngb. (Hydrophyt., p. 47), which Lyngbye reports from the Færões ought to be referred to this species. The specimen in his herbarium, which is from Kvalbõ, is only a small fragment, but is noteworthy on account of its copious branching, which, in connection with its numerous tetraspores, gives it a different appearance.

46. **Rh. subfusca** (Woodw.) Ag., J. Ag., Spec. Alg., Vol. II, p. 883.

Though I am of opinion that it is hardly possible to distinguish the present species from the preceding I have followed Kjellman's definition of species (cfr. N. I., pp. 147—8 (113)) and referred just a few specimens to this species. The transverse section of some gathered at Tværaa showed that the central large-celled tissue was sharply defined from the peripheral small-celled tissue and thus agreed with Kjellman's fig. 4, tab. 8, so that they cannot be *Rh. virgata*; The small branches on the longer ones were distinctly subulate and not fusiformed as Kjellman says is the case in *Rhodomela lycopodioides*. While these characters agree fairly well with *Rh. subfusca*, the specimens (from Tværaa) referred to this species differ from it in being dark-red and not black as Kjellman mentions being the case in *Rh. subfusca*. In habit the plants resembled fairly closely specimens of *Rh. subfusca* gathered by Le Jolis near Cherbourg. Beyond these specimens I have referred only a few to this species laying more particular stress on their outer habit; but as

I said before I believe there are hardly any specially marked differences between this species and the preceding[1].

This species occurs in the littoral zone, but most commonly in shallow water and grows usually on stones and shells. I have come across cystocarpic plants in April and November. *Harveyella mirabilis* occurs on it as a parasite.

Found at the following places: — Syd.: Tværaa (!), Vaagfjord (H. J.); Kunö (H. J.).

For *Rhodomela subfusca β racemosa* Lyngb. see above under *Rhodom. lycopodioides.*

Under *Rhodomela subfusca* Rostrup (l. c. p. 82) writes »Mr. Randropp sent us specimens of f. *flaccida.*« But the only specimen of this form which is preserved in Dr. Rostrup's private collection does not belong to this species, but is a well-developed specimen of *Polysiphonia elongata.*

ODONTHALIA Lyngb.

47. **O. dentata** (L.) Lyngb., Hydrophyt., p. 9; Kjellm., N. I., p. 138 (105).

This is a sublittoral species and is common both in the open sea and in the interior of fjords. It grows on rocky and stony bottoms as also epiphytic especially on *Laminaria hyperborea.* Generally it occurs dispersed, but it may also be found growing gregariously in small patches.

Cystocarp-bearing specimens were found in May and December; tetrasporic in April, May and June. In the Arctic Sea Kjellman found tetraspore-bearing specimens in August, and Ruprecht (Alg. Och., p. 212) mentions having found similar specimens in June. Some specimens collected in August in Altenfjord (Kjellman, l. c. p. 106) showed signs of cystocarps. This species seems thus to grow much in the same way around the Færöes as in the Arctic Sea. Along the English coasts it bears reproductive organs in the winter months. In the Færöes vigorous young shoots occurred in April, May and June.

This species is very common along the Færöese coasts as already mentioned by Lyngbye (l. c.): — »Ad insulas Færoenses copiose.«

It is recorded by Landt, l. c. p. 231.

[1] Since writing the above Falkenberg has published his large Monograph on the Rhodomelaceæ in which he (p. 593) reports *R. virgata* and *R. lycopodioides* as synonymous with *Rh. subfusca,* but places a? against this statement.

Order CERAMIACEAE.

GRIFFITHSIA C. Agardh.

48. **G. setacea** (Ell.) Ag.

In July 1899 I found in Trangisvaagfjord opposite Tværaa (Syd.) in about 10 fathoms of water a large vigorous, but sterile specimen, associated with other Florideæ.

Landt (l. c. p. 233) reports *Conferva (Griffithsia) corallina* (Lightf.) Ag. from the Færöes, but as this species has not been found since it is possible that it was a confusion with the above-mentioned species.

CALLITHAMNION Lyngb.

49. **C. scopulorum** Ag. C. Agardh, Species Algarum, Vol. II, p. 166; J. Ag., Spec. Alg., Vol. 2, pars 1, p. 47; Callithamnion roseum β tenue Lyngb., Hydrophyt., p. 126, tab. 39.

In order to ascertain the relationship between this species and *C. roseum* with which I at first thought it to be most closely allied, I compared my material of *C. scopulorum* — which exactly agrees with Lyngbye's material of what he calls *Callithamnion roseum β tenue* — with the specimens labelled *C. roseum* in the Herbarium of the Botanical Museum in Copenhagen, especially with No. 162 in Le Jolis's Alg. mar. de Cherbourg and No. 703 in Phykotheka universalis, and I came to the conclusion that while my material bore no great resemblance to the former it approached closely to the latter. In fact these two algæ which are here given under one name differ so widely from each other, even on a cursory examination that one is led to suppose that there must have been a confusion of two distinct species; and as our museum with regard to these species is not rich in specimens for comparison, and more particularly as it does not contain specimens, excepting Le Jolis's, on the determinations of which I could quite rely I wrote to Dr. E. Bornet of Paris for his opinion and cannot do better than quote what he very kindly writes to me: — »Je n'ai jamais vu d'échantillon authentique de *Ceramium roseum* Roth, Catalecta botanica, II, p. 183, et je ne saurais, d'après la description, reconnaître l'espèce, dont il s'agit. Mais si vous consultez l'English Botany, tab. 966 et Dillwyn, p. 17, vous verrez que c'est Roth lui-même qui a nommé les exemplaires récoltés par Sowerby et qui sont représentés dans ces deux ouvrages. Or Dillwyn mentionne la particularité suivante: »branches are repeatedly subdivised, so that as they approach the summits, they have a very

clustered appearance.« C'est là un caractère bien marqué du *C. roseum* de Harvey, Agardh etc. et qui est dû à ce que les pinnules ne sont pas distiques et qu'elles regardent le rachis par leur face plane, au lieu que, dans les *C. Hookeri, polyspermum* et *scopulorum,* ils le regardent par la tranche. Vous trouverez des échantillons de la plante que je regarde comme le véritable *C. roseum* (Roth.) Harv. dans les exsiccata suivants: Wyatt, Alg. Danmon. no. 44; Cooke, Collect. of Brit. Seaw. no. 261; Hohenacker, Alg. mar. sicc. no. 123 et 530; Le Jolis, Alg. mar. de Cherb. no. 162; Crouan, Alg. mar. Finist. no. 135; Lloyd, Alg. mar. de l'ouest de la France, no. 213.

L'échantillon no. 703 du Phykotheka universalis n'est pas le *Call. roseum* compris dans le sens de (Roth) Harvey. C'est le *C. polyspermum.* La même erreur a été commise par Juergens, Alg. aquat., Dec. I, no. 9.

S'il est aisé de distinguer le *Call. polyspermum* du *C. roseum,* il l'est beaucoup moins de le séparer du *C. scopulorum*, et c'est sous ce dernier nom qu'on le désignait en France avant la publication du Phycologia britannica. Témoin: Chauvin, Alg. Norm. no. 84; Hohenacker, Alg. mar. sicc. no. 120; Crouan, Alg. mar. Finist., no. 146; Lloyd, Alg. de l'ouest de la France, no. 52. J'ai un trop petit nombre d'exemplaires du *Call. scopulorum* pour savoir dans quelles limites il varie et s'il ne passe point par des gradations insensibles au *C. polyspermum.* Les différences que j'ai cru apercevoir entre les deux espèces se réduisent a deux. Le *C. scopulorum* est une plante en gazons denses, peu élevés et ses filaments sont plus fins et moins raides que ceux du *C. polyspermum.* Ce dernier est un peu cortiqué à la base.«

So far Dr. E. Bornet. According to him, *C. scopulorum* ought perhaps most properly to be regarded as a variety of *C. polyspermum,* but I have preferred to keep it up as a species, partly on account of my not having much material of *C. polyspermum* for comparison, and partly because, as Dr. Bornet also points out, there is at any rate some difference to be traced between them.

Thus *C. scopulorum* (fig. 56) is of a much smaller and more slender habit, the branches at the base, where they are thickest, being some 60 to 80 μ, very rarely 100 μ, while the Færoëse specimens of *C. polyspermum* were about 135 μ, and a French specimen which I measured had a breadth of some 250 μ. Moreover, *C. scopulorum* is quite destitute of cortical cells while these occur even

fairly high up on the branches of *C. polyspermum*. Lastly, the habit of *C. scopulorum* is very constant and easy of recognition — it is always small and never attains to the size of *C. polyspermum*, and the colour also is different.

The accompanying figures (figs. 56, 57) show different parts of the plant. The erect filaments start in a more or less prostrate base (fig. 57) and from this spring numerous vigorous rhizoids by

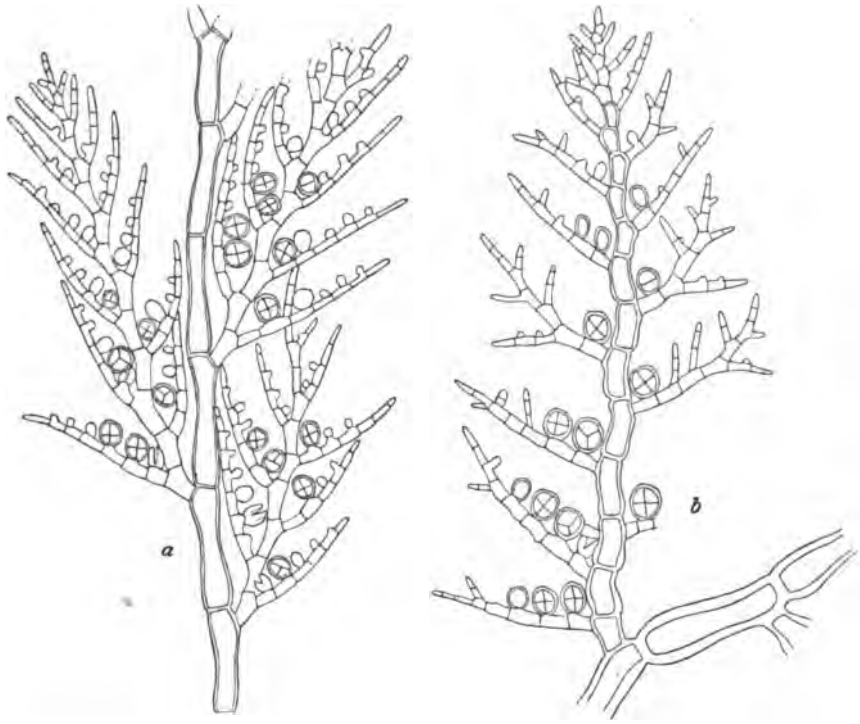

Fig. 56. *Callithamnion scopulorum* Ag. Portions of branches with tetraspores. Fig. *a* 50 : 1. Fig. *b* 75 : 1.

means of which the plant attaches itself to the rocks. Such vigorous rhizoids also spring from the long branches proceeding from the basal part of the plant attaching these also in turn to the rocks so that when they become in some way disengaged from the mother plant they turn into independant plants, and this also accounts for their densely tufted growth. In the lower part of the filaments the cells are short, but those higher up are longer and generally bear only short branches which proceed from the upper part of the cells. These short branches are sometimes naked, but as a rule

they bear other branches and then, with a few rare exceptions, always turn their edges towards the mother plant.

The top cell is divided by oblique walls as Reinke also points out in his textbook. The tetraspores are clustered and are borne on the lateral branches of the 1st and 2nd order, or sometimes first on those of the 3rd order.

This is a species of the littoral zone and occurs at half-tide level where it grows preferably in rock-crevices and caves, but also on vertical rock faces exposed to the open sea. It can grow in the

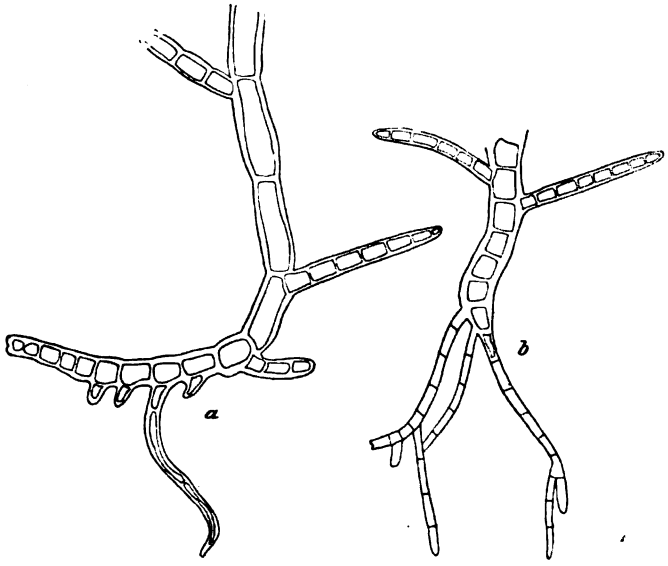

Fig. 57. *Callithamnion scopulorum* Ag. Basal portions of long branches showing rhizoids. 60 : 1.

most exposed places, there forming small, low, dense tufts often associated with *Isthmoplea sphærophora* and *Rhodochorton Rothii.*

Tetraspore-bearing plants were found in April, May, June, July and August, and cystocarpic in June.

This species is common along the exposed coasts of the Færöes, as already mentioned by Lyngbye, l. c.: — »ad scopulos maritimos præsertim abruptos insularum Færoensium in summo refluxus limite, copiosissime.«

It has been gathered at the following places: — Str.: Kvivig (in caves!), Höjvig (Lyngbye, !), Arge (!), Thorshavn (!); Vaagö: North side (in caves!), oposite Kvivig (in caves!); Myggenæs: east side (on steep rock faces!); St. Dimon: (on steep rock faces!); Sandö: Troldhoved (!) Syd.: Trangisvaagfjord (in caves!), Kvalbö (Lyngb.), Famien (Lyngb.). Öst.: Næs (Lyngb.).

50. **C. polyspermum** (Bonnem.) Ag. Kjellm., N. I., p. 223 (177).

I have only felt justified in referring a few specimens collected from Trangisvaagfjord by Rosenvinge to this species. These differ from *Callith. scopulorum* in their darker colour, their somewhat larger size, and more particularly in their being fairly rich in cortical cells; for further details I must refer to the above mentioned species. Kjellman (l. c.) points out that the Nordland specimens resemble Kützing's figure (Tab. Phyc. 11, tab. 97), but not Harvey's figure in Phycol. Brit. pl. 231; and this is also the case with the Færöese specimens.

It is presumably a littoral species, and it had tetraspores in May.

Found only near Tværaa in Trangisvaagfjord (Syd.) by L. K. Rosenvinge.

Callithamnion lanuginosum Lyngb., Hydrophyt., p. 130, which according to Lyngbye has been found: »ad insulas Færoenses in Hutchinsia urceolata aliisque parasitice, raro« seems to be young specimens of *Chantransia virgatula*. There are, however, only a very few fragmentary pieces of it in Lyngbye's Herbarium, and on the label Lyngbye accounts for its scarcity as follows: »Abundabat, sed exemplaria perierunt«. According to Rostrup (l. c. p. 85) it is identical with *C. Dawiesii*.

51. **C. arbuscula** (Dillw.) Lyngb. Hydrophyt., p. 123; Kjellm., N. I., p. 224 (178); Phlebothamnion faroense Kütz., Tab. phycol., Vol. 14, tab. 83.

This is decidedly a littoral species and grows at about half-tide level. It prefers much exposed coasts, where it occurs gregariously more particularly on sharply inclined or vertical faces of rocks which are left dry at ebb-tide. I have not come across it in rock-pools, which is doubtless to be explained by the fact that it cannot thrive unless left dry at intervals.

Though it is generally met with on open faces of rocks fully exposed to the light it may also be found growing rather far into caves, but in the latter case it is more poorly developed, the branches being more slender and of a paler red, while the branches of those growing in broad daylight are of a deep reddish-brown colour.

Found bearing tetraspores in May, June, July, and November, antheridia in June, and cystocarps in June and November. The most robust examples occur during the summer months; the autumn and winter specimens which I have had for examination

looked rather poor, the main branches being more or less naked and new branches few in number. This partly corresponds to Kleen's report (l. c. p. 21) that it »Begins to appear in the beginning of July«; but how far the Færõese ąlgæ are annual, as Kjellman — according to Kleen — reports being the case with those occurring at Nordland, I am not capable of deciding, I am most inclined to think that the basal part of the plant survives the winter and gives out new shoots.

Regarding its habitat Lyngbye writes: — »Habitat ad insulas Færoenses in inferiore refluxus limite scopulis adnascens, copiose«; this is quite true as it is very common on all the shores of the Færöes which are exposed to the open sea.

The following list of localities will show how commonly it occurs: — Str.: Velbestad (!), Kvivig (Lyngb., !), Höjvig (!); Öst.: Gjov (!), Ejde (!), Eldevig (Lyngb.); Bordö: Klaksvig (H.J.); Vid.: Viderejde (!), Vedvig (H.J); Svinö (H.J., !); Vaagö: Midvaag (!), north side (!); Myggenæs (!); Sandö: Troldhoved (!); St. Dimon (!); Syd.: south-east coast (!), Vaags Ejde (!), Trangisvaagfjord (!), Frodebö (!).

52. **C. granulatum** (Ducl.) Ag.

In a collection of *Callithamnion arbuscula* gathered by H. Jónsson was found a small *Callithamnion* which differed from the others in habit. By looking through the *Callithamnion*-material preserved in Lyngbye's Herbarium I found another example of the same species. Dr. Bornet, to whom I sent a few specimens, kindly tells me that he thinks they are identical with *Callithamnion granulatum.*

To judge from its few habitats along the Færöes the species must occur there between tide-marks, perhaps associated with *Callithamnium arbuscula* and like the latter on exposed coasts. Found bearing tetraspores in August and cystocarps and antheridia in November.

This species, which is presumably rare along the Færöes, has hitherto been found only at the following places: — Svinö: (H.J.); Öst.: Eldevig at the entrance to Fundingfjord (Lyngb.).

53. **C. corymbosum** (Smith) Lyngb. var. **amphicarpa** Thur. Le Jolis, Liste, p. 112; Thuret et Bornet, Etudes phycologiques, p. 67, tab. 34.

In a collection of algæ from Öre (Öst.) a few specimens of a small graceful *Callithamnion* were found intermixed amongst several other algæ; it is remarkable for the fact that the same plant bears both cystocarps and antheridia as well as tetraspores. On account

of this peculiarity the Færöese specimens agreed with *C. corymbosum* var. *amphicarpa*, Thur., to which variety they also in other respects bear a rather close resemblance. But as I was not quite sure that the Færöese specimens could be placed under var. *amphicarpa* Thur. I sent an example of the Færöese plant to Dr. Bornet who very kindly tells me that he is of opinion that it approaches closely to the variety in question, the only difference being that the Færöese specimen has short-stalked as well as sessile tetraspores intermixed on the same plant, while the Cherbourg specimens — according to Dr. Bornet — has only sessile sporangia. But Dr. Bornet adds: — »Ce caractere n'a peut-être pas une grande valeur.« I therefore refer the Færöese specimens to Thuret's variety. Fig. 58 shows a branch of the plant bearing young cystocarps as well as stalked and sessile tetraspores.

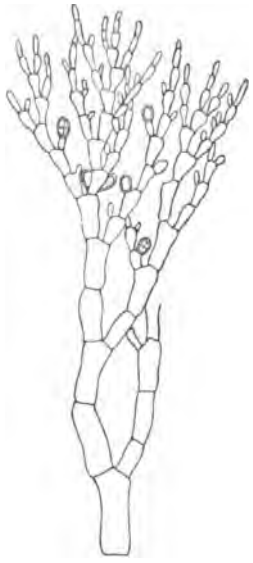

Fig. 58. *Callithamnion granulatum* (Ducl.) Ag. var. *amphicarpa* Thur. Portion of branch with tetraspores and young cystocarps. 70 : 1.

Found in June as an epiphyte in about 8 fathoms of water near Öre on Öst. (!).

As pointed out by Rostrup (l. c. p. 85), Hornemann in Dansk öconomisk Plantelære, second edition, vol. 2, p. 679 reports *Callithamnion corymbosum* from the Færöes, and a specimen labelled in Hornemann's handwriting »e Færoe« also exists in the museum in Copenhagen. Hornemann, however, does not give his authority for this report, and as Lyngbye does not mention this species in Hydrophyt. the above report is probably due to a confusion.

PLUMARIA (Stackh.) Schmitz.

54. **Pl. elegans** (Bonnem.) Schmitz. Ptilota elegans Bonnem., Kjellm., N. I., p. 217 (172).

This is a littoral species and grows on exposed coasts in caves and dark rock-clefts, often associated with *Delesseria alata*, *Callithamnion scopulorum* and other *Florideæ*. It grows gregariously and often occurs as fairly large, pure societies somewhat above low-water mark, appearing at ebb-tide as a covering of a dark, brownish-red colour clinging tightly to the rock. The specimens I examined had only borne cystocarps, they occurred in May and

June. Kjellman (l. c.) says that in the Norwegian Polar Sea it bears cystocarps in August.

This species does not appear to be very common along the coasts of the Færões. I found it at the following places: — Str.: Kvivig (!); Vaagõ: opposite Kvivig (!); St. Dimon (!); Syd.: Kvalbõ (!).

PTILOTA C. Agardh.

55. **Pt. pectinata** (Gunn.) Kjellm., N. I., p. 219 (174); Rosenv., Grønl. Havalg., p. 790; Ptilota plumosa, var. asplenioides Lyngb., Hydrophyt. p. 38.

I have found some examples of this species, most commonly small ones, which are undoubtedly typical *Pt. pectinata*; usually this species is easily distinguishable from *Pt. plumosa*, as Rosenvinge l. c. p. 790 points out in the case of the Greenland specimens. But a single example of the Færõese specimens appeared to be intermediate between this species and *Pt. plumosa* though most closely related to the latter. Owing to the occurrence of such intermediate forms, Gobi disputes the specific value of *Pt. pectinata* and Kjellman also mentions having found some intermediate forms, but is of opinion that the species ought to be retained. The material at my disposal was too scanty to allow me to form any definite opinion on this point.

This species belongs to the sublittoral zone, and has been found down to a depth of more than 20 fathoms, but in caves it may be met with in very shallow water. It is found both epiphytic and growing on rocks, on exposed coast as well as in quiet places. Cystocarp-bearing plants were found in June, July and August which agrees with what is the case in Nordland (Kleen, l. c. p. 20).

This species is presumably rare along the Færõese coasts. Bordõ: Haraldssund (!); Str.: Kalbakfjord (!); Kvivig (!), Thorshavn (Lyngb.), Gliversnæs (!).

As mentioned above, this species was already found by Lyngbye, as the material of *Ptilota plumosa* var. *asplenioides* Ag. (Hydrophyt., p. 38) preserved in his herbarium turned out on examination to be small specimens of this species. In Rostrup's list it is called *Pt. serrata* Kütz. (l. c. p. 84), this determination being probably due to J. Agardh. Simmons (l. c. p. 264) is therefore wrong in saying that it ought to disappear from the list of the Færõese algæ, and also in accusing Lyngbye with some confusion with regard to his var. *β asplenioides*, which Lyngbye very correctly reports both from Greenland and the Færões.

56. **Pt. plumosa** (L.) Ag. Kjellm., N. I., p. 218 (173); Lyngb., Hydrophyt., p. 38.

This is generally a sublittoral species and has been found down to a depth of some 20—25 fathoms, but it is also met with near low-water mark in caves and rock-pools growing attached to rocks and stones. It seems to prefer exposed coasts, but may also be found in fjords in sheltered localities. It occurs most frequently as an epiphyte especially on the stems of *Laminaria hyperborea,* of which plant it is a characteristic epiphyte, and on which it grows luxuriantly.

Tetraspore-bearing plants were found from May to November, cystocarpic in May, June, August, October and December.

This is a very common species of the Færöese coasts, as already noted by Lyngbye (l.c.), who writes: — »Ad insulas Færoenses in stipite Laminariæ digitatæ copiose«.

It was first reported by Landt, l.c. p. 231.

ANTITHAMNION Nägl.

57. **A. floccosum** (Müll.) Kleen, Nordl. Alg., p. 21; Kjellm., N. I., p. 225 (179); Conferva floccosa Müller, whose figure in Flora Danica, tab. 828, fig. 1, is, however, not very good; the specimens from the Færöes come near to Harvey's figure in Phycol. Brit., tab. 81; Callithamnion Plumula β pusilla Lyngb., Hydrophyt., p. 127, tab. 39.

The Færöese form must be referred to var. *atlantica* J. Ag. (Spec. Alg. vol. III, p. 22) because the lesser branches on the lower part of the main branch are generally shorter than the articulation whence they proceed, and I only exceptionally found them as long or somewhat longer. I may add that this species appears to me a decidedly good one, quite distinct from *A. Plumula* (cfr. Rosenvinge, Grönl. Havalg., p. 789).

Along the coasts of the Færöes it is most commonly met with in the littoral zone or in the upper part of the sublittoral, and it grows both on exposed and sheltered coasts, but on the latter it appears to be of more luxuriant growth, the specimens I found on sheltered coasts being up to 6 cm. long, while those from exposed localities — from between tide-marks where they grew epiphytic on *Lithothamnion* — were only 1—2 cm. long, about the size of *Callithamnion scopulorum.* Lyngbye found it in the sublittoral zone, the *Callithamnion scopulorum β pusilla* recorded by him in Hydrophyt., p. 127, being this species, as has been proved by exa-

mining the specimens in his herbarium. With regard to its habitat Lyngbye writes: — »Ad insulas Færoenses in stipite Laminariæ digitatæ inter cæspites Callithamnii Rothii inveni, rarius«.

The greater part of the specimens which I examined were sterile, in June only I found specimens bearing ripe tetraspores.

Does not appear to be common. Öst.: Fuglefjord (!), Mölen (!); Str.: Between Thorshavn and Höjvig (Lyngb.); Sandö: Skopen (!); Syd.: Trangisvaag (Rosenvinge).

58. **A. Plumula** (Ellis) Thur. Rosenv., Grønl. Havalg., p. 786; Callithamnion Plumula Lyngb., Hydrophyt., p. 127.

Main form.

var. *boreale* Gobi, Algenfl. des weiss. Meeres, p. 47; Antithamnion boreale Kjellm., N. I., p. 226 (180), tab. 16, figs. 2—3.

f. *corallina* Rupr. Kjellm., N. I., tab. 16, figs. 4—5.

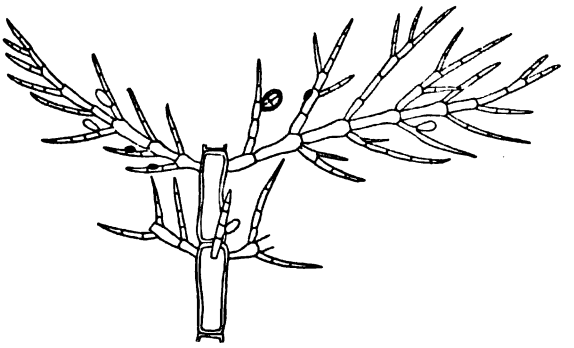

Fig. 59. *Antithamnion Plumula β boreale f. corallina* (Rupr.). 60 : 1. Portion of a filament with tetraspores and glands.

Besides the main form I found the above-mentioned variety and form; I follow Rosenvinge in regarding these as forms belonging to this species.

The specimens referred to var. *boreale* agreed fairly well with Kjellman's figures, but sometimes the tetrasporangia had a unicellular stalk. The specimens bear quantities of glands (cfr. Rosenv., Grønl. Havalg., p. 788).

I have figured (fig. 59) a small portion of one of the specimens which are referred to forma *corallina*, as they differ somewhat from Kjellman's figures; the branches of the second order were more rigid and graceful in form, like a feather, being set with branches of a third order which gradually shortened towards the apex. On the main branch between the two larger opposite

branches there often occurred two smaller at the same height, but they were always much smaller than these, and also than the one in Kjellman's fig. 4. The specimens bear quantities of glands (see fig. 59).

In the Færöes the species occurs in the sublittoral zone down to a depth of about 25 fathoms. It is met with along exposed coasts (especially the main form) as well as sheltered (especially var. *boreale*). Grows sometimes on stones and shells and sometimes epiphytic on different algæ. Tetraspores were found in May, June, July and November; antheridia in May and July.

The main form occurred in the following localities: — Bordö: Haraldsund (!); Öst.: Öre (!); Str.: Gliversnæs (!). — Var. *boreale*: — Öst.: Fuglefjord (!), Öre (!). — F. *corallina*: — Str.: Thorshavn (!); Vid.: on the haptera of *Laminaria hyperborea* in 3—4 fathoms of water (H. J.).

CERAMIUM (Roth) Lyngb.

59. **C. acanthonotum** Carm. Kjellm., N. I., p. 216 (171); Kleen, Nordl. Alg., p. 19; C. ciliatum Lyngb., Hydrophyt., p. 121 ex parte.

Specimens bearing several spines on each articulation were frequently met with, which might consequently be referred to f. *coronata* (Kleen, l. c. p. 19), but they merged by such easy transitional stages into the main form — both forms in fact occurring in the same tuft — that there is no reason to separate them as a distinct variety, as also pointed out by Kjellman, l. c.

It is a littoral species and grows at half-tide level, producing there a characteristic formation together with *Callithamnion arbuscula*. It prefers open shores and occurs in the most exposed localities, where it is left quite dry at ebb-tide, without, however, getting dried up, which would prove fatal to it on account of its somewhat delicate structure. It grows in small, irregularly-shaped clumps, rendered almost spongy in character by its numerous ramifications as well as by its spines, rhizoids and many epiphytes, especially *Chantransia secundata, Isthmoplea* and *Diatoms,* and this enables it to absorb a quantity of water which it retains during ebb-tide, and which can be squeezed out of it as out of an ordinary sponge. It seldom occurs in rock-pools.

Tetraspore-bearing plants were found in May, June, November, and December.

Lyngbye, l. c., writes with reference to its habitat: »Habitat ad insulas Færoenses in summo refluxus limite rupibus hic illic dense et copiose adnascens«. It is very common in exposed localities and rather

rare in sheltered. Lyngbye refers this species to *C. ciliatum*, and in his herbarium there are specimens of it from Thorshavn and Andefjord. Though he did not gather true *C. ciliatum* in the Færöes, yet his figure (tab. 10) is undoubtedly this species, so it must have been drawn from the specimens of *C. ciliatum* from the Mediterranean which are also to be found in his herbarium.

This species, which was first reported from the Færöes by Lyngbye, is very common there.

60. **C. rubrum** (Huds.) Ag. J. Ag., Spec. alg. II, p. 127 and III, p. 100; Kjellm., N. I., p. 214 (170); Foslie, The Norwegian forms of Ceramium, p. 14.

f. *genuina* Kjellm.

f. *decurrens* J. Ag.

f. *prolifera* J. Ag.

subf. *secundata* (Lyngb.). Ceramium secundatum Lyngb., Hydrophyt., p. 119.

subf. *prolifera* (Lyngb.).

f. *corymbifera* (Bonnem.) J. Ag. Foslie, l. c. p. 15, tab. 3, fig. 6.

f. *fasciculata* (Bonnem.) J. Ag. Foslie, l. c. p. 15, tab. 3, figs. 2—3.

Besides these, there were a few specimens which may possibly be referred to f. *tenuis* (Ag.) and f. *pedicellata* Duby.

Ceramium rubrum is an extremely variable species, and of its numerous forms I think I have been able to distinguish the above-mentioned. Of these, forma *decurrens* seems to be the most common; forma *genuina* is more rare. The characteristic subforma *secundata* (Lyngb.), of which there is an excellent drawing in Lyngbye's Hydrophyt., tab. 37, A, is fairly common in the *Corallina*-belt.

Along the coasts of the Færöes this species grows both in the littoral zone near low-water mark and in rock-pools, and in the sublittoral, and it occurs on fairly exposed coasts as well as sheltered, perhaps more commonly on the latter. Usually it grows on rocky and stony bottoms, but it is also frequently found epiphytic on *Fucus, Ascophyllum, Himanthalia, Laminaria* and other algæ.

Tetraspore-bearing plants were found from April to November and cystocarpic from May to July, which agrees very well with what Kleen (l. c. p. 20) says is the case in Nordland.

This is an extremely common species of the Færöese coasts. Strangely enough, as pointed out by Rostrup, p. 84, Lyngbye does not record the main species from the Færöes; but there are several specimens of it in his herbarium. Thus, Lyngbye's specimens of *Ceramium diaphanum* (Hydrophyt. p. 119), of which there are two in his herbarium, one from Thorshavn and one from Eide, are forms of the main species; the

Thorshavn specimen is a distinct forma *decurrens*. And further examination likewise proves his *Ceramium diaphanum δ virescens* (l. c. p. 120) to be small examples of *C. rubrum* bearing ripe tetraspores. Either on account of these, or more probably on account of the plant having been partly dried and killed by a longer intervening period of low-water (it having presumably grown between tide-marks) it has a greenish tinge, which induced Lyngbye to name it *virescens*. There is, moreover, a small specimen in his herbarium which he himself determined as *C. rubrum*.

Lyngbye's Herbarium contains several typical examples of subforma *secundata*, among these the original of his figure; one of the examples, which somewhat resembles my specimens of f. *pedicellata*, Lyngbye has labelled: — »forsan Cer. rubri var.«.

RHODOCHORTON Nägeli.

61. **Rh. membranaceum** Magnus. Rosenv., Grønl. Havalg., p. 794; Kuckuck, Beiträge zur Kenntnis der Meersalgen, 2. Über Rhodochorton membranaceum Magnus, eine chitinbewohnende Alge.

This species grows in different *Bryozoa* and *Sertularia* in the tubes of which the endozoic filaments spread themselves. The free erect filaments are 6—8 μ thick. It has been found in the littoral zone as well as in the sublittoral down to depths of above 20 fathoms, and occurs both in exposed and sheltered localities. Tetrasporic specimens were found in May, June and November.

It is doubtless commonly distributed along the coasts of the Færöes: — Bordö: Haraldsund (H.J.); Str.: Kalbakfjord (!), Thorshavn (H.J.), Gliversnæs (!); Syd.: Trangisvaag (H. J.).

62. **Rh. penicilliforme** (Kjellm.) K. Rosenv., Algues mar. du Groenl., p. 66, (Annales d. sci. nat. VI s., t. 19); Rhodochorton mesocarpum (Carm.) Kjellm. var.(?) penicilliforme Kjellm. Rosenv., Grønl. Havalg., p. 792.

This alga, which is fully described by Rosenvinge, l. c., is especially characterized by its elegant basal disc (fig. 60) which has a marginal growth. The erect filaments were about 12 μ.

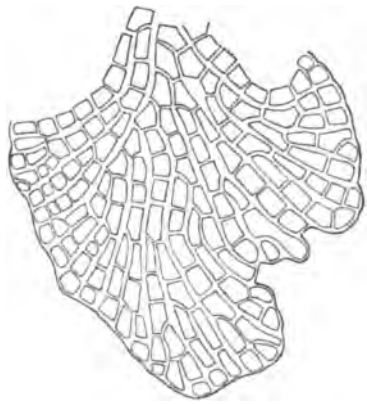

Fig. 60. *Rhodochorton penicilliforme* (Kjellm.) Rosenv. Portion of basal disc. 350 : 1.

It grows on *Bryozoa* and *Sertularia*, most commonly associated with *Rh. membranaceum*, and like the latter occurring both in the littoral and in the sublittoral zone, down to a depth of 20 fathoms.

Tetrasporic specimens were found in June; plants from October to December consisted usually of the basal disc only, though sometimes they had a very few erect branches.

It has been found in the following localities: — Vid.: Kvannesund (H. J.); Bordö: Haraldsund (H. J.); Str.: Kalbakfjord (!), Gliversnæs (!); Syd.: Trangisvaag (H. J.).

63. **Rh. Rothii** (Turt.) Nägl. Kjellm., N. I., p. 232 (185); Rosenv., Grønl. Havalg. p. 791; Callithamnion Rothii Lyngb., Hydrophyt. p. 129.

f. *typica*.

f. *globosa* Kjellm.

This plant, which is very common along the Færöese coasts, varies considerably according to its different habitats. It occurs as a short, perfectly dense, and evenly spreading crimson covering on rocks and stones between tide-marks: most frequently in narrow rock-clefts; on the walls in the interior of caves; and in openings between tumbled down blocks of rock »Ur«; f. *typica* is most common in such localities. Forma *globosa* is met with on vertical rock-faces in much exposed localities from high-water mark to several feet above it; it is especially common on vertical rock-faces in caves, and on rocks with a northern aspect, where it occurs in small, semiglobular, very solid bodies, about the size of a pea, often growing more or less together and forming small irregular crusts. Judging from the following description of Lyngbye (l. c.) he has undoubtedly observed this form: — »Caespites minutissimi, 2—3 lineas alti, maxime gregariæ, interdum ad latera rupium glomerulos durissimos formantes«. The lower part of the filaments were 17 μ thick, higher up they become thinner, about 11 μ. The cell-walls were often very thick, some I measured were as much as 3 μ thick. When Kjellman says that the lower articulations of f. *globosa* are almost as long as broad this does not correspond with the Færöese specimens, the articulations of the latter being, also at the base, twice or thrice as long as broad.

Forma *typica* varies considerably in thickness; generally it is about 10 μ thick, but I have often come across filaments measuring 15 to 20 μ; in a single small example the filaments had even attained to a thickness of 29 μ. It also appears to be a rule that the higher the plant grows above sea-level, or in other words, the more frequently and especially the longer it is left dry, the thicker the branches grow, as also the cell-walls. Rosenvinge (l.c.) reports

that the filaments of the Greenland specimens also vary rather considerably with regard to thickness, never, however, exceeding 16 μ, but as mentioned above, the Færõese specimens are often much thicker, and in this they come very near to the extremely interesting aërial species of the Florideæ *Rhodochorton islandicum* Rosenv.[1] which Helgi Jónsson gathered on his native island. The Færõese material, which especially resembled this species and which perhaps even makes it doubtful whether *Rhodochorton islandicum* ought to retain its value as a distinct species, was also gathered by Jónsson during his visit to the Færões in 1897. As the material in question appears to me to be of special interest, I will describe it more fully. The material was gathered in Skaalefjord, late in October. With reference to its habitat Jónsson writes in his diary as follows: — »Forms a continuous covering on the rocks, and occurs most often above the water, but is, however, now and then washed by the waves«. To this I may remark that there is no doubt whatever that the alga growing here in the fjord where no tide is felt or where it is almost imperceptible, would not, during summer in calm weather or when a land-breeze was blowing, be wetted by sea-water for a long period, even if it did not grow very far above sea-level, just a few inches higher making a great difference here in the fjord. The Færõese material — a very small quantity — is sterile; it corresponded, as a whole, closely to Rosenvinge's exhaustive description and figures, but I have not come across such thin decurrent threads as, according to Rosenvinge's description, are to be found on *Rh. islandicum*; it is true that a few thin threads occurred intermixed, but from a biological point of view they did not seem to be different from the thicker ones. The thickness of the erect branches varied from 16 to 29 μ, i. e. between two somewhat greater extremes than those mentioned by Rosenvinge. The cells of the lower part are about as long as broad and those of the upper part twice or thrice as long as broad. The cell-walls are often very thick, as much as 5 μ. A few poorly developed filaments of *Callithamnion scopulorum* occurred intermixed in the material. This *Rhodochorton* impressed me as being a stunted *Rhodochorton Rothii* which had altered in appearance on account of its habitat, and in the Færõese material I came across the most evenly transitional stages between this peculiar form and typical *Rhodochorton Rothii.*

[1] Rosenvinge, L. Kolderup: Note sur une Floridée aérienne (Rhodochorton islandicum nov. sp.). Botanisk Tidsskrift. 23. Bind, p. 61. København. 1900.

But, however this may be, it is at any rate very interesting that this intermediate form has now been found between the marine *Rhodochorton Rothii* and the true air-alga, *Rhodochorton islandicum*.

As mentioned above, *Rhodochorton Rothii* can grow far above sea-level in places where it is not liable to be reached by the spray for a long period, and here in the Færöes it is not only subject to dissiccation, but owing to the rainy climate that prevails it is often soaked through by rain water, which explains its occurrence in waterfalls near extreme high-water mark, so extreme that it can only be overflowed by the sea during very high water. Thus I found it south of Thorshavn, on the east side of Strömö, near Gliversnæs, where a small stream dashed perpendicularly down over the edge of a rock, and just where the jet of water fell on the subjacent rock, there *Rhodochorton Rothii* grew luxuriantly in dense, reddish-purple tufts, and Jónsson found it growing in similar localities near Klaksvig. The specimens found in waterfalls seem to correspond exactly to *Rhodochorton intermedium* Kjellm.[1] They had — what Kjellman points out as characteristic of the latter — their main filament irregularly branched along their whole length and further scattered lateral branchlets bearing tetraspores (see fig. 61), while the branches of typical *Rhodochorton Rothii* spring from a limited space on the main branch as is figured beautifully by le Jolis (Alg. Mar. Cherb., pl. V). This clustering together of the long branches in typical *Rhodochorton Rothii* is often occasioned by the growing out of the tetraspore-bearing branchlets into numerous long branches after the tetrasporangia have fallen off (see fig. 62). I have often found this to be the case with the Færöese specimens. The above-mentioned specimens from the water-fall resemble Kjellman's not only in their different branch-system, but also in their erect filaments being of the same

Fig. 61. *Rhodochorton Rothii* (Turt.) Näg. Portion of filament with lateral branchlets bearing tetraspores. 65: 1.

[1] Kjellman, F. R.: Om Spetsbergens marina, klorofyllförande Thallophyter. I, p. 28. (Bihang t. K. Svenska Vet.-Akad. Handl B. 3, Nr. 7, 1875).

thickness as that of Kjellman's, viz. some 14—16 μ; they differ from Kjellman's specimens in one point only: in their tufts being

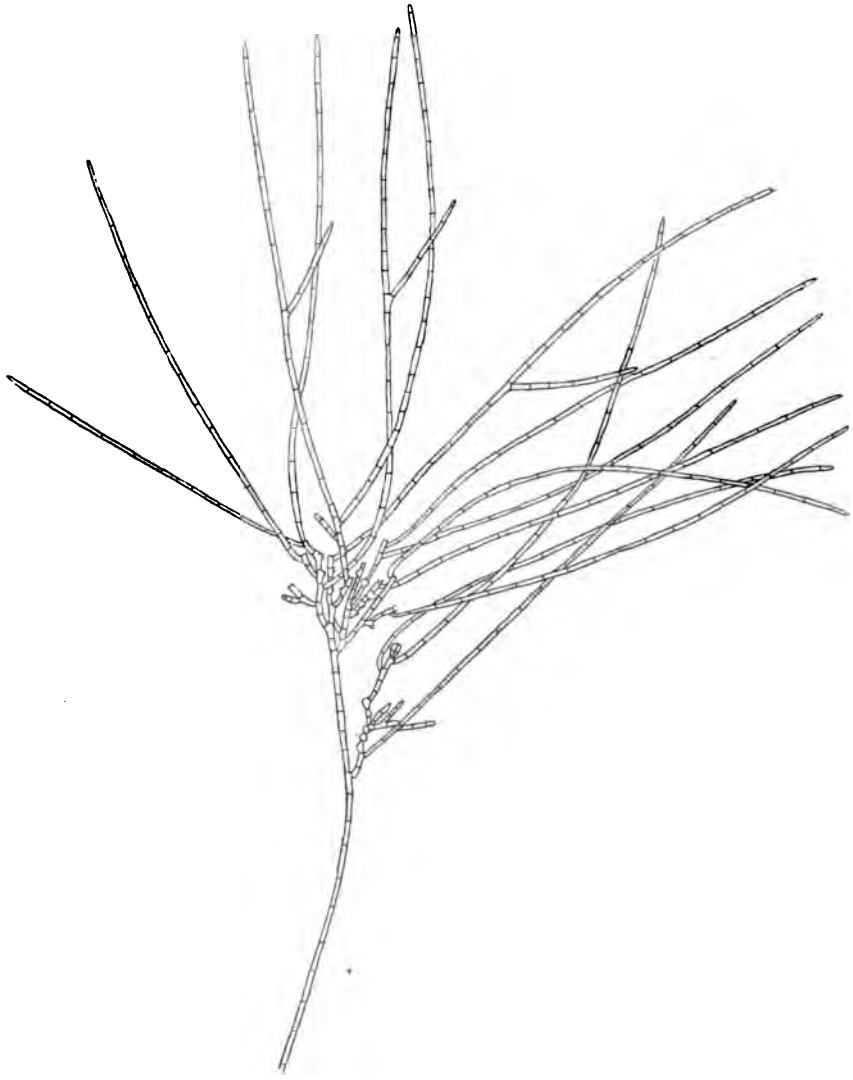

Fig. 62. *Rhodochorton Rothii* (Turt.) NAg. Older tetraspore-bearing branchlets grown out into long branches, a single tetraspore still to be seen. 65 : 1.

somewhat shorter; they have hardly ever been found higher than 1 cm. while Kjellman reports the Spitzbergen specimens to be 2—3 cm. high. Excepting this the Spitzbergen and Færöese specimens seem to correspond exactly. But I think that the differences

mentioned here and which are pointed out by Kjellman as the chief marks of distinction between his *Rh. intermedium* and *Rh. Rothii* cannot be regarded as denoting a distinct species, for I have found all intermediate stages between the former species and typical *Rh. Rothii*, which Jónsson[1] also claims to have done in the Icelandic material. Perhaps it may be regarded as a special form of *Rh. Rothii*, but at any rate the name *intermedium* is hardly correct, it being by no means intermediate between the former species and *Rh. floridulum* — as Kjellman supposes — the latter being quite distinct from *Rh. Rothii*, e. g. by its star-like chromatophores.

Rh. Rothii occurs not only in the littoral zone but also in the sublittoral on *Laminaria hyperborea* — as I quite agree with Jónsson (l. c. p. 147) in thinking that the *Rhodochorton*, which is commonly met with on the stems of *Laminaria hyperborea* where it occurs as a short, dense mat, is this species, and I am also of opinion that *Rh. parasiticum* Batters[2] undoubtedly belongs to this species as pointed out by Jónsson. Fig. 63 shows the basal part, the erect filaments spring from prostrate ones creeping on *Laminaria hyperborea*. How far this alga is really a parasite or only a pseudo-endophyte as mentioned by Jónsson I shall not discuss at any length, merely stating that where it occurs on the *Laminaria* the tissue of the latter is always more or less destroyed, and therefore Jónsson is very possibly right when he says that it can only penetrate into the tissue, after the latter has been destroyed. A single specimen which I found on a *Laminaria*-stipe which Jónsson had gathered from Kalbakfjord differed in some points. Fig. 64 shows some small portions of it. Besides the clustered tetrasporangia commonly occurring on *Rhodochorton Rothii* (see fig. 64 *b*) it had also, as shown in fig. 64 *a*, solitary, terminal sporangia, which were noteworthy by being much larger than the former, the tetraspores in the clusters being 16 μ broad, while the solitary ones attained to a thickness of some 27 μ. The solitary sporangia were borne on short, erect filaments, which were generally branchless; the cells in these filaments were for the most part short, often only just as long as broad, and frequently somewhat swollen in the middle. On the other hand, the filaments bearing the clustered

[1] Jónsson, H.: The marine Algæ of Iceland (I. Rhodophyceæ). Botanisk Tidsskrift. 24. Bind, p. 146.

[2] Batters: New or critical British marine Algæ (Journal of Botany, vol. 34, 1896, p. 389).

tetrasporangia were much longer and richly branched, and the cells, excepting those in the basal part, were 3—4 times as long as broad. The breadth of the filaments averages about 13 μ. The specimen in question had another peculiarity: a longer or shorter

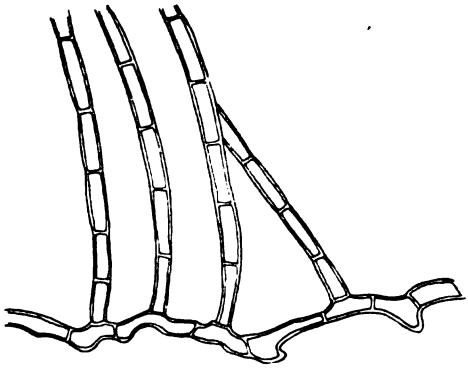

Fig. 63. *Rhodochorton Rothii* (Turt.) Näg. Creeping filament with the basal part of the erect filaments. On *Laminaria hyperborea*. 130 : 1.

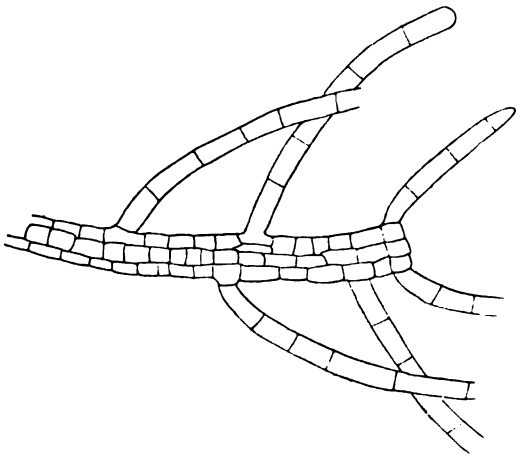

Fig. 65. *Rhodochorton Rothii* (Turt.) Näg. Portion of the filament overgrown with other filaments. 160 : 1.

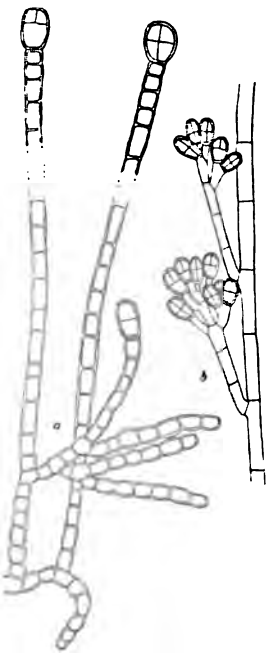

Fig. 64. *Rhodochorton Rothii* (Turt.) Näg. On Laminaria. *a*. Erect filaments with terminal sporangia (the dots indicate that a longer portion of the filament has been omitted). 110 : 1. *b*. Another filament of the same plant to show clusters of tetrasporangia. 90 : 1.

portion of the filaments was often near the base encircled by other cell-filaments which formed a dense, cortical sheath around the central filament (see fig. 65), out of which numerous free filaments grew up. I have not had an opportunity of watching the process by which this sheath is formed.

As indicated above, on the Færõese coasts this alga is very common in the littoral zone. How far above sea-level it can grow

I cannot exactly say, but it may doubtless be presumed to grow at a height of several metres, more particularly in the interior of the large caves which occur so frequently along the exposed coasts of the Færões. Thus, I saw in one of the large caves (at least 20 metres high) at Troldhoved, large, reddish-purple patches, far up on the walls and on the roof of the cave, which were undoubtedly this alga; in a small cave near Kvalbõ on Syderõ it occurred as a dense covering on the roof which was just within reach.

In the sublittoral zone I have only found it epiphytic on *Laminaria*, but Kjellman says that in the Polar Sea he came across it in the latter zone both on stones and algæ. It has been found down to a depth of some 10 fathoms.

I found a small number of specimens in June and July which were still bearing a few tetraspores, but the greater part of them had fallen off. The rest of the specimens gathered from April to August were sterile. On the other hand, specimens rich in tetraspores were found in November and December. Thus, as along the Danish coasts so also along the Færões the period of fructification falls undoubtedly during the winter months, though the alga is sometimes found bearing tetraspores far into the summer. In Iceland Jónsson found a few tetrasporic specimens in the spring and summer; and Kjellman is of opinion that at Spitzbergen the tetraspores are formed in May and June.

The frequent occurrence of this species along the Færõese coasts was also noted by Lyngbye, who writes: — »Habitat ad rupes abruptas insularum Færoensium in summo refluxus limite, copiose; imprimis autem ad stipitem Laminariæ digitatæ, ibidem«.

64. **Rh. seiriolanum** H. Gibson. On the Development of the Sporangia in Rhodochorton Rothii Näg., and Rh. floridulum Näg., and on a new Species of that Genus (Journ. of the Linnean Society. Bot. vol. 28, 1891, p. 204).

Only a small quantity of this species was found epiphytic on *Ceramium acanthonotum* associated with *Chantransia secundata*. It occurred on exposed coast near high-water mark.

Tetrasporic specimens occurred in April.

Found hitherto only on Str.: Velbestad (!).

Order DUMONTIACEAE.

DUMONTIA (Lamour.) J. G. Ag.

65. **D. filiformis** (Fl. Dan.) Grev. Kjellm., N. I., p. 200 (157); Gastridium filiforme Lyngb., Hydrophyt., p. 68.

Found on exposed as well as on sheltered shores, on the former even frequently not far from high-water mark, and most commonly associated with *Scytosiphon lomentarius* and *Phyllitis fascia* in hollows containing a little water. On sheltered shores where the tide is imperceptible it occurs in quite shallow water. Generally it grows attached to rocks and stones, but I have occasionally found it epiphytic on *Gigartina*. So late as July I found quantities of it and large vigorous examples, showing that it occurs later in the season on the shores of the Færöes than it does on the Danish shores where it is decidedly a spring alga. Jónsson, however, has not come across it, so it probably disappears later in autumn.

This species, which was first mentioned from the Færöes by Rostrup (l. c. p. 83) is very common there. Lyngbye, curiously enough, does not record this species from the Færöes in his »Hydrophytologia«, but in his herbarium in Copenhagen there is a small specimen from Kvalbö.

Dilsea edulis Stackhouse is recorded from the Færöes by P. A. Holm in his »Skildringer af Naturen paa Færöerne« (Tidsskrift for populære Fremstillinger af Naturvidenskaberne, Vol. II, p. 204) but as it has not been found since, this statement, as already pointed out by Rostrup (l. c. p. 83, see note), is undoubtedly wrong.

Order NEMASTOMACEAE.

FURCELLARIA Lamour.

66. **F. fastigiata** (L.) Lamour. Kjellm., N. I., p. 201 (158); Furcellaria lumbricalis Lyngb., Hydrophyt., pp. 48—49.

Found most frequently in the sublittoral zone, but also occurs now and then in pools between tide-marks. It is most commonly met with in not very deep water, about 2—3 fathoms, in open ravines and inlets »Skærgaarde«, in fairly exposed places where it occurs rather extensively in dense growths on stones and rocky bottoms. The greatest depth at which I gathered it was about 10 fathoms.

All the spring and summer specimens which have been examined were sterile. Tetrasporic specimens occurred abundantly in

November and December, but none bearing cystocarps and antheridia, so the species doubtless bears fruit during the winter months proper, as is also the case with those growing along the Danish coasts. Kleen (l. c. p. 19) mentions, however, having found sporocarps in June in Nordland.

Lyngbye writes that the species is »Ad insulas Færoenses raro«, and Rostrup says »Here and there«. I found it in several places in exposed as well as fairly sheltered localities, so it may be recorded as fairly common.

Order RHIZOPHYLLIDACEAE.

POLYIDES Ag.

67. **P. rotundus** (Gmel.) Grev. Kjellm., N. I., p. 164 (127).

Along the Færöese coasts it grows in the sublittoral zone; at any rate, I have not found it growing in the littoral zone in rock-pools, as Kjellman says it does along the Norwegian coasts of the Polar Sea. It generally grows on stony bottoms in deeper water (some 10 fathoms), and is most commonly met with in sheltered localities, but I have also gathered it from the open sea.

It was found bearing tetraspores in April and October, and young cystocarps in November. Kleen met with cystocarpic specimens in July in Nordland, and Kjellman gathered it in the same month in Nova Zembla bearing both cystocarps and tetraspores.

It appears to be fairly common along the Færöese coasts: — Str.: Gliversnæs (!), Kvalvig (H. J.); Öst.: Fuglefjord (!), Skaalefjord (H. J.); Bordö: Klaksvig (!), Aaerne (!); Vid: Kvannesund (H. J.); Syd.: Lobra (!), Vaagfjord (H. J.), Trangisvaagfjord (Ostenfeld, H. J., !).

Lyngbye may so far be said to have found this species in the Færöes as there is a packet in his herbarium containing three small pieces of alga, of which the two small ones are undoubtedly *Polyides rotundus*. The packet is labelled in Lyngbye's handwriting »*Furcellaria rotunda?*« In Hydrophyt. he does not record this species from the Færöes.

Order SQUAMARIACEAE.

CRUORIA (Fr.) J. C. Agardh.

68. **Cr. pellita** (Lyngb.) Fr. Kjellm., N. I., p. 182 (142); Chætophora pellita Lyngb., Hydrophyt., p. 193.

This species occurs along the coasts of the Færöes both in the littoral zone and in the sublittoral. In the littoral I most frequently

came across it growing in caves, where it may be found forming large, wide-spread, shiny crusts of a dark-red colour on the rock faces, from somewhat above high-water mark downwards. In the sublittoral zone it grows on shells and stones as also epiphytic on the stalks of *Laminaria* (especially *L. hyperborea*). It is common both on open sea-shores, and in sheltered localities in the interior of fjords and sounds, e. g. in Sundene between Thorsvig and Kvalvig where it grows luxuriantly on stones under *Laminaria fœroensis*. Owing to want of specimens collected during the winter months proper, the greater part of the material was sterile[1], but some specimens, collected in June, August and November, were found bearing a few tetraspores.

It seems to be fairly common along the coasts of the Færöes, and was already found by Lyngbye, whose herbarium contains specimens from Kvivig, and who writes with reference to its habitat: — »Ad insulas Færoenses latera rupium declivium in infimo refluxus limite obvestiens, ut ad Quivig et inter Thorshavn et Höyvig«.

PEYSSONNELIA Decsne.

69. **P. Dubyi** Crouan. Kjellm., N. I., p. 180 (140).

Found in the sublittoral zone from a depth of 2 to 10 fathoms. Usually it grows attached to stones and shells, but also occurs epiphytic on the stems of *Laminaria hyperborea*. Met with both in the open sea and in the interior of fjords in sheltered localities.

Specimens gathered during the summer months were sterile; in a single collection gathered late in October specimens were found bearing tetraspores.

Found at the following places: — Bordö: Haraldsund (H.J.); Öst.: Skaalefjord (H. J.); Str.: Sundene between Thorshavn and Kvalvig (!), Thorshavn (!), Gliversnæs (!).

RHODODERMIS Crouan.

70. **R. elegans** Crouan.

Found in the sublittoral zone a few times on stones and shells. Tetraspore-bearing plants collected in May and July.

Found hitherto: — Str.: Kalbakfjord (H. J.), Gliversnæs (!); Syd.: Trangisvaagfjord (!).

[1] It is very difficult to determine sterile Squamariacé-material, as e. g. *Cruoria pellita*, and *Petrocelis cruenta* and *P. Hennedyi* resemble each other very closely when sterile. I think therefore that, at any rate, *P. Hennedyi*, which has been found along the shores of Iceland, also occurs around the Færöes.

Order CORALLINACEAE.

PHYMATOLITHON[1] Fosl.

71. **Ph. polymorphum** (L.) Fosl.

As in the Arctic Sea, according to Kjellman (N. I., p. 135 [102]) so also in the Færōes this species grows in the littoral zone, where it occurs abundantly; but it is also met with in the sublittoral zone down to a depth of 10 fathoms. Its proper habitat is near low-water mark or strictly speaking on either side of low-water mark, where it occurs especially on smooth, vertical rock-faces as a thick crust, varying in colour from white to pink and forming a belt often several feet in breadth. It grows most luxuriantly in the interior of caves and occurs here from a height of several feet above sea-level downwards into the water as far as the eye can see. According to my observations this species extends farthest into the caves, up to the point where they become too dark even for it.

According to what Mr. Foslie writes to me it bore sporangia in May, July and December.

This species is extremely common along the Færōese coasts.

72. **Ph. lævigatum** Fosl.

Found in the sublittoral zone down to a depth of 10 fathoms on stones and shells. It has been observed both in sheltered localities and in the open sea.

According to Mr. Foslie it bore sporangia in July, October and November.

Vid.: Kvannesund (H. J.); Bordō: Haraldsund (!); Kunō (H. J.); Ōst.: Glibre (H. J.); Str.: Arge (!), Sundene between Thorsvig and Kvalvig (!); Syd.: Vaagfjord (H. J.).

CLATHROMORPHUM Fosl.

73. **Cl. circumscriptum** (Strōmf.) Fosl.

Bore young sporangia in June.

Found once only on Str.: in Sundene between Thorsvig and Kvalvig (!).

LITHOTHAMNION Phil.

74. **L. glaciale** Kjellm.

According to Mr. Foslie all the specimens are young and partly stunted hence the determination is open to doubt.

[1] Mr. M. Foslie of Trondhjem has kindly determined this genus and the ollowing: — *Clathromorphum, Lithothamnion, Lithophyllum* and *Dermatolithon*.

Bordõ: Haraldsund (!); Str.: Sundene between Thorsvig and Kvalvig (!); Syd.: Lobra (!).

75. **L. læve** (Strõmf.) Fosl.

Grows in deep water both in sheltered and exposed places. According to Mr. Foslie it bore sporangia in June and July.

Bordõ: Haraldsund (!); Str.: Arge (!); Syd.: Trangisvaagfjord (!), Lobra (!).

76. **L. Lenormandi** (Aresch.) Fosl.

Bore sporangia and carpospores in June.

Str.: Hõjvig (!).

f. *sublœvis* Fosl.

Syd.: Lobra (!).

LITHOPHYLLUM Phil.

77. **L. incrustans** Phil.

Found between tide-marks growing on *Lithothamnion polymorphum* which occurred amongst *Corallina*.

According to Mr. Foslie it bore sporangia in July.

Vid.: Viderejde (H. J.), specimens sterile, hence the determination is not quite certain; Syd.: Kvalbõ (!).

78. **L. Crouani** Fosl.

Found growing on the haptera and stems of *Laminaria hyperborea* associated with *Dermatolithon macrocarpum* f. *Laminariæ*.

Bore sporangia in June.

Õst.: Gjov (!); Syd.: Lobra (!).

DERMATOLITHON Fosl.

79. **D. macrocarpum** (Ros.) Fosl.

f. *fœroensis* Fosl.

f. *Laminariæ* (Crn.) Fosl.

Forma *fœroensis* was found both in the littoral and sublittoral zone epiphytic on several algæ, e. g. *Gigartina*, *Furcellaria*, *Odonthalia*, *Fucus*; forma *Laminariæ* occurs in the sublittoral zone on the stems of *Laminaria*.

Bore tetraspores and cystocarps in May, June, July, November and December.

Both forms, but especially f. *fœroensis*, are very common along the Færõese coasts.

80. **D. hapalidioides** (Crn.) Fosl.
On a *Patella* shell.
Sporangia in May.
Syd.: Kvanhauge (Ostenfeld).

81. **D. Corallinæ** (Crn.) Fosl.
Epiphytic on *Corallina officinalis*. Sporangia in November.
Appears to be rather commonly distributed.

CORALLINA (Tourn.) Lamour.

82. **Corallina officinalis** L. Kjellm., N. I., p. 114 (86).

I think by far the greater part of the Færöese material may be referred to f. *typica*; only some material from Trangisvaag gathered by Ostenfeld seems to correspond fairly closely to f. *flexilis* Kjellm. (l. c.).

This species grows on rocks and stones near low-water mark and often extends thence to a depth of 1—2 fathoms. It is very common in rock-pools between tide-marks. On low-lying, gently inclined surfaces of rocks it often forms extensive growths which are characterized by the intermixture of certain algæ, especially *Lomentaria articulata* and *Gigartina*. This does not correspond with Kjellman's statement that it mostly grows »dispersed or in small, close groups.« Neither does his statement that »it prefers sheltered localities« apply to the actual conditions on the shores of the Færöes, where the species grows and attains to its highest development in the most exposed localities; as an example I may mention »Muletangen« (tongue of land resembling a muzzle) near Vaags Ejde on Syd., a peculiarly exposed point. *Corallina* forms here a vast growth which extends some distance out of the sea up on the gently sloping rocks. Of course I do not say that *Corallina officinalis* grows exclusively in exposed localities, in fact it is also fairly common in sheltered places.

Luxuriant specimens bearing tetraspores were found in May and June.

This is an extremely common species of the Færöese coasts. It was already found by Landt (p. 292).

HILDENBRANDIA Nardo.

83. **H. rosea** Kütz. Kjellm., N. I., p. 179 (139).

Along the coasts of the Færöes it is extremely common in the littoral zone, where it is found covering rocks and stones. It often

extends far above high-water mark on sloping rock faces in much exposed localities, where it occurs as an undergrowth under other algæ, e. g. *Porphyra, Fucaceæ*, etc.; at such high levels it is only reached by the spray. Near Bosdalafos on Vaagö it has been found growing some 80 feet above sea-level. It is also very often found covering the sides of rock-pools in association with *Ralfsia verrucosa* and different species of *Lichens*. It is always of a fine, dark crimson colour, even when growing in broad daylight, and such bleached, yellowish examples as those which occur along the Danish shores I never met with in the Færöes, owing of course to the sky being so often overcast and perhaps more particularly to the period of sunshine being always so short in the latter place. Rosenvinge (Grønl. Havalg., p. 826) has noticed the same to be the case in Greenland.

Tetraspore-bearing specimens were found in March, May, June, July, November, December, and it is doubtless able to fructify all the year round.

This species is extremely common along the coasts of the Færöes.

B. Phaeophyceae.

Order ECTOCARPACEAE.

ECTOCARPUS Lyngb.

Subgen. Euectocarpus Hauck.

84. **E. confervoides** (Roth) Le Jol. Kuckuck, Beiträge zur Kenntnis einiger Ectocarpus-Arten der Kieler Föhrde; Ectocarpus siliculosus Lyngb., Hydrophyt., pp. 131—2, tab. 43 B.

f. *typica* Kuckuck, l. c.

f. *pygmæa* (Aresch.) Kjellm., Handb., p. 77.

The specimens referred to f. *typica* usually agree fairly well with Kuckuck's figure 3, l. c. The thickness of the main filaments varies with an average of 27 μ. In fig. 66 is shown one of the specimens — gathered at Thorshavn — which I have referred to f. *pygmæa*; it occurred as a short, densely matted growth on the stem of *Laminaria digitata*. The erect filaments, which are about 12—13 μ thick, are sometimes found bearing only one terminal

sporangium, while others bear both terminal and lateral. The sporangia are about 18 μ thick and 50 μ long.

This species belongs to the sublittoral zone and is a fairly common epiphyte on several larger algæ. It has been found in the open sea as well as in sheltered localities and bears both plurilocular and unilocular sporangia. The plurilocular sporangia occurred in May, June, July, November and December, the unilocular in April, May and November.

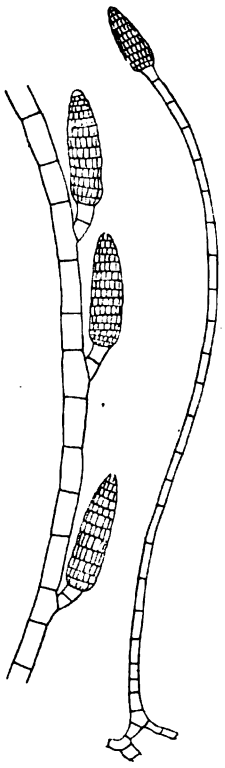

Fig. 66. *Ectocarpus confervoides* (Roth) f. *pygmæa* Aresch. Part of a plant with terminal sporangium, and portion of a filament with lateral sporangia. 80 : 1 and 150 : 1.

F. *typica* has been found in the following places: — Vid.: Östvig (H.J.); Öst.: Glibre (!); Str.: Thorshavn (H. J., !), Gliversnæs (!); Sandö: Troldhoved (!); Syd.: Trangisvaag (Ostenfeld), Frodebö (!), Vaags Ejde (!), Vaagsfjord (H. J.). F. *pygmæa*: — Kunö (H. J.); Syd.: Vaags Ejde (!).

85. **E. siliculosus** (Dillw.) Lyngb., Hydrophyt., p. 131, tab. 43 C; Kuckuck, Beiträge zur Kenntnis einiger Ectocarpus-Arten der Kieler Föhrde, p. 15.

f. *typica* Kuckuck, l. c.

f. *arcta* (Kütz.) Kuckuck, l. c.

f. *varians* Kuckuck, Ectocarpus siliculosus Dillw. sp. forma varians, ein Beispil für ausserordentliche Schwankungen der pluriloculären Sporangienform (Berichte deutsch. bot. Gesellsch., Band X, 1892, p. 256, taf. XIII).

Ectocarpus siliculosus is a very variable species, and its outward appearance differs considerably, hence it is often difficult to distinguish from the nearest allied *Ectocarpus*-species.

The specimens referred to f. *typica* usually agree fairly well with Kuckuck's figs. 1—2, l. c., though as a rule it is comparatively rare for their sporangia to terminate simply in a long, colourless hair, they being most commonly only drawn out into a longer point. The main filaments vary from 40 μ to 70 μ in thickness.

The specimens referred to f. *arcta* are particularly characterized by their shorter sporangia, and in this they resemble *Ectocarpus confervoides* from which they differ, however, amongst other things

in the greater thickness of their main branches as also in the fact that, on a closer examination of the material, sporangia have occasionally been found which were longer in form. In fig. 67 I have

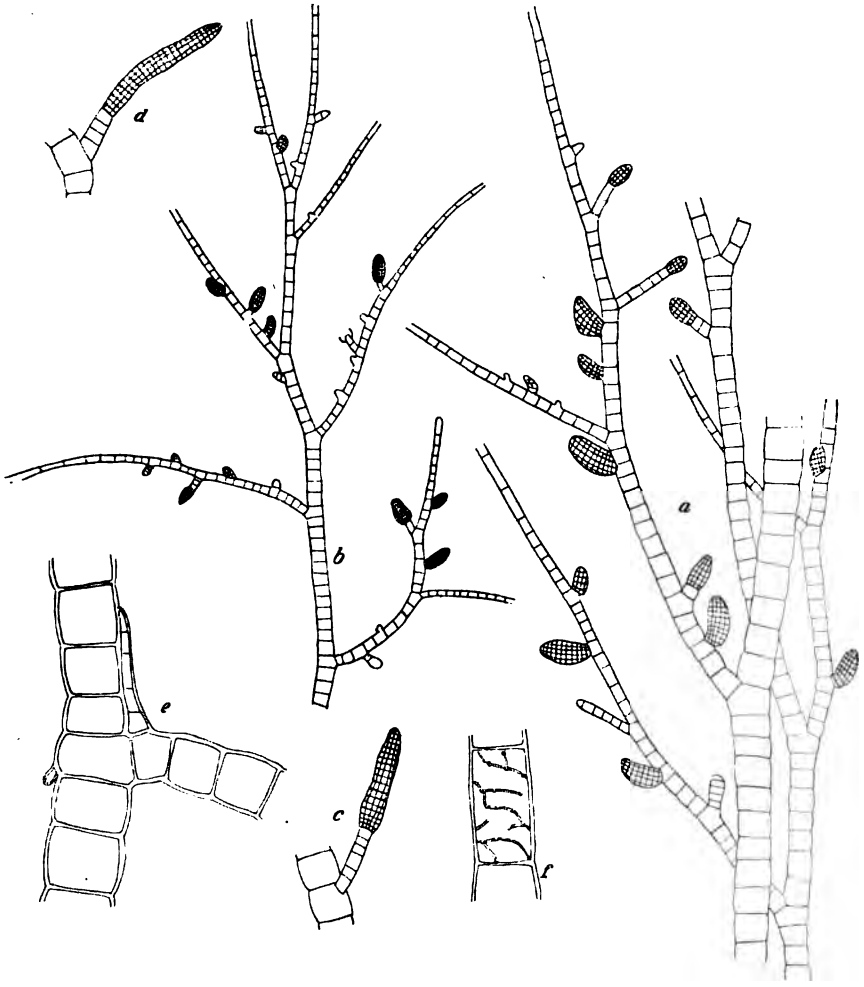

Fig. 67. *Ectocarpus siliculosus* (Dillw.) Lyngb. f. *arcta* (Kütz.). Different parts of the plant; compare text. *a, c, d* 100 : 1; *b* 60 : 1; *e, f* 160 : 1.

shown some portions of a plant belonging to this form which was found in Vaagfjord growing epiphytic on *Zostera marina*. As may be seen the sporangia are in the main short, nearly ovate or oval and most commonly sessile, but stalked examples occur intermingled. The stalk is sometimes composed of a single cell, sometimes of several. Sporangia more long in form occur here and there (fig. 67,

c and *d*). The plant has only a few rhizoids (fig. 67, *e*). The main branches are about 60 μ thick.

Forma *varians* is marked by being subject to considerable variation in the form of its sporangia, and even if the Færõese

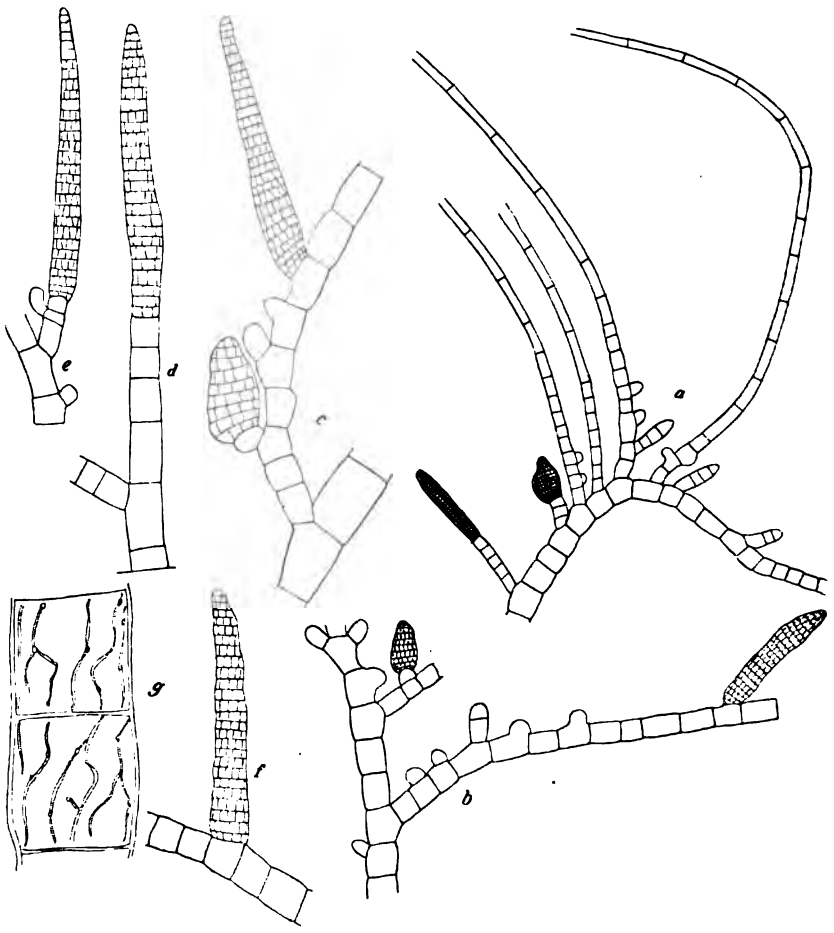

Fig. 68. *Ectocarpus siliculosus* (Dillw.) Lyngb. f. *varians* Kuck. Different parts of the plant. *a*, *b* 100 : 1; *c*, *d*, *e*, *f* 150 : 1; *g* 270 : 1.

specimens do not exhibit the extreme variations described by Kuckuck, l. c., yet I feel quite justified in referring the specimens found by me to this form, and Dr. Kuckuck to whom I showed my preparations agrees with me in this. Fig. 68 represents some fragments of this plant. As may be seen, the form of the sporangia varies considerably, being sometimes like typical *siliculosus*, some-

times quite short and irregularly formed. The sporangia are sometimes sessile, sometimes stalked, and even the larger branches sometimes bear sporangia instead of hairs at their apices. The chromatophores are ribbon-shaped and are often ramified quite in conformity with Kuckuck's description. The main branches attain to a thickness of about 70 μ, and the cells have very thick walls. This plant which grew in quite shallow water was of a dark, yellowish-brown colour.

With regard to f. *hiemalis* (Crouan) which is mentioned doubtfully by Simmons, l. c. p. 270, I have not come across any specimens which I considered could be referred to it.

Lastly, I may mention that a few specimens, e. g. from an open ravine a mile north of Kvivig, resembled in no slight degree *Ect. penicillatus*, but I did not feel justified in referring them to the latter species, typical examples of which I have never met with in the Færöes.

This species which usually occurs as an epiphyte on larger algæ is common both in the littoral zone and in the sublittoral, on open sea-shores as well as in sheltered situations. It has been found bearing plurilocular sporangia in May, June and July, and unilocular in May and June.

It was first found along the Færöese coasts by Lyngbye, and is common both as f. *typica* and as f. *arcta*; f. *varians* I have met with only in Sundene between Thorsvig and Kvalvig (Str.).

86. **E. spec.**

In preparing a *Laminaria fœroensis* from Sundene between Thorsvig and Kvalvig, which had been preserved in salt, an *Ectocarpus*-species was found which I assume to be a new species.

Unfortunately the material, having been kept so long in salt, was somewhat damaged, more particularly the contents of the cells, but in spite of this I thought that I could pretty clearly distinguish the chromatophores as ribbon-shaped.

In fig. 69 I have shown some portions of the plant. It is rather richly branched, the lower part of the main branches being furnished with long branches like themselves, and the upper part being most commonly set with short branches only. The main branches are about 60 μ thick at the base and gradually grow narrower, usually terminating at the apex in longer hair-like cells which have few chromatophores and are about as long as broad, though they vary, being sometimes shorter and sometimes longer.

The specimens collected bore almost exclusively unilocular sporangia. These were ovate, roundish-oval, sometimes sessile, sometimes borne on quite short unicellular stalks; they sometimes sprang directly

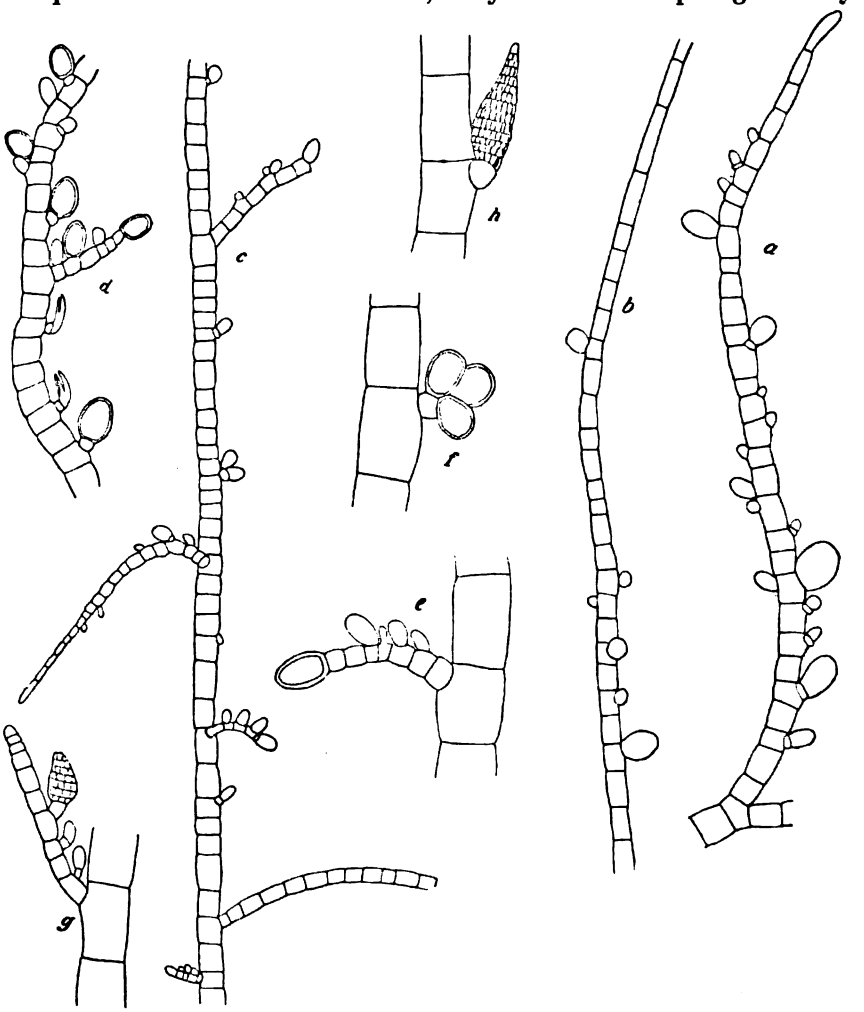

Fig. 69. *Ectocarpus spec.* *a, b, c, d, e* and *f* different parts of the plant with unilocular sporangia; *g* and *h* part of the plant with plurilocular sporangia. *a, b, d* and *g* 100 : 1; *c* 60 : 1; *e, f* and *h* 160 : 1.

from the main filament, sometimes from branchlets. Both the branchlets and the sporangia occur all round the main filaments. The unilocular sporangia are about 38 μ long and 29 μ broad. Here and there a few plurilocular sporangia occur (fig. 69, *g, h*) with the base almost ovate and tapering upwards, the length about 75 μ, and the breadth 27 μ.

The main branches are often surrounded at their base by long rhizoids which, however, only produce a very scanty cortical layer.

This species appears to come near to the group of forms belonging to *Ectocarpus siliculosus*, more particularly its f. *arcta*; but it is as yet so little known that for the present I prefer to call it *Ectocarpus spec.*

Found hitherto only on Str.: Sundene between Thorsvig and Kvalvig (!).

87. **E. dasycarpus** Kuck., Beiträge zur Kenntnis einiger Ectocarpus-Arten der Kieler Föhrde, p. 21.

The specimens referred to this species agree altogether well with Kuckuck's description and figure, differing in some minor points only. Thus the cells in the main branches, which are about 40 μ broad, are generally only as long as broad, sometimes even shorter, and the plurilocular sporangia are sometimes a little broader than recorded by Kuckuck, viz. about 21 μ.

It has been found in the sublittoral zone, growing epiphytic on *Desmarestia aculeata* at a depth of some 5—6 fathoms in a sheltered situation. It bore plurilocular sporangia in the middle of May.

Found only on Ost.: Öre (!).

88. **E. fasciculatus** (Griff.) Harv. Kjellm., N. I., p. 344 (279), Handb., p. 76; Sauvageau, Sur quelques Algues phéosporées parasites (Journal de Botanique 1892, p. 102).

Besides typical specimens, several others were found which I have referred, though doubtfully, to this species, amongst others some which I have referred to var. *refracta* (Kütz.) Ardissone. In fig. 70 I have shown some fragments of them. The specimens in question were marked by their sharply recurved, almost hook-shaped lateral branches, which occurred scattered upwards along the main filaments, and bore on their upper side short-stalked sporangia which agreed altogether well with Sauvageau's figures, l. c.; and, as in Sauvageau's fig. 34, the lateral branches terminated in a sterile part destitute of sporangia-bearing branchlets, and not in a hair-like apex such as frequently occurs in typical *Ectocarpus fasciculatus*. The cells in the thicker filaments of this variety were about 4 μ thick, and had elegant, spirally twisted chromatophores which were often ramified.[1]

[1] An imperfectly known species, *Ect. Constanciæ* Hariot, seems to resemble it fairly closely (Forschungsreise S. M. S. »Gazelle«, IV. Theil, Botanik, Algen von E. Askenasy, p. 17).

Some specimens from Strænder (Øst.) which I must regard as belonging to the typical form bore quantities of plurilocular as well as unilocular sporangia on the same plant, sometimes even intermixed on the same branch; but either one or the other kind greatly predominated on the same branch, and either exclusively unilocular or plurilocular sporangia were frequently met with. The unilocular sporangia often occurred in great abundance and were

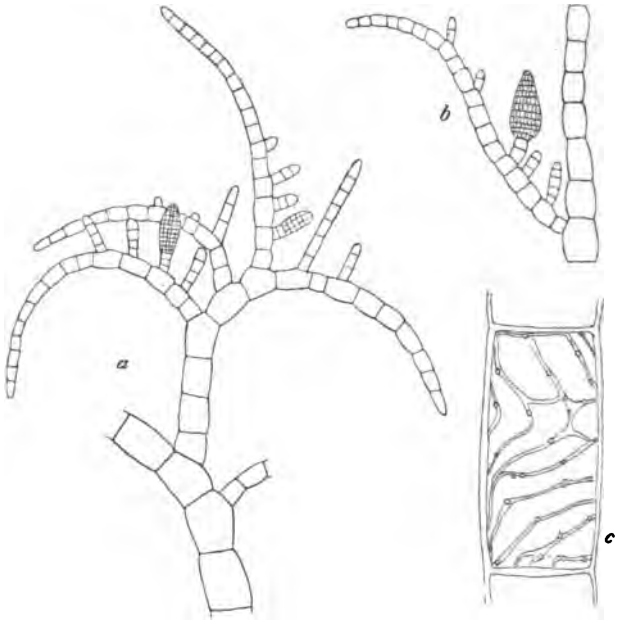

Fig. 70. *Ectocarpus fasciculatus* (Griff.) Harv. var. *refracta* (Kütz.) Ardissone. *a* and *b* 110 : 1; *c* 270 : 1.

placed quite close together so much so that they frequently came in contact with each other, being even closer than is shown in the accompanying figure (fig. 71, *a*). Such plants bore considerable resemblance to *Ectocarpus pycnocarpus* Rosenv. (Grønl. Havalg., p. 886). The unilocular sporangia were about 65 μ long and about 40 μ broad, of about the same size, consequently, as reported by Rosenvinge, and two sporangia on the same cell is also here sometimes met with, and also a vegetative branch proceeding from beside the sporangium. The main filaments could attain to a thickness of up to 70 μ. In fig. 71 is shown a portion of the plant bearing unilocular sporangia (*a*) as well as a branch bearing

plurilocular sporangia (*b*), which latter have not been found on *Ect. pycnocarpus*.

I have also come across plurilocular sporangia occurring on rhizoids such as were observed by Sauvageau (l. c.). They are found on the basal rhizoids, especially of the older plants.

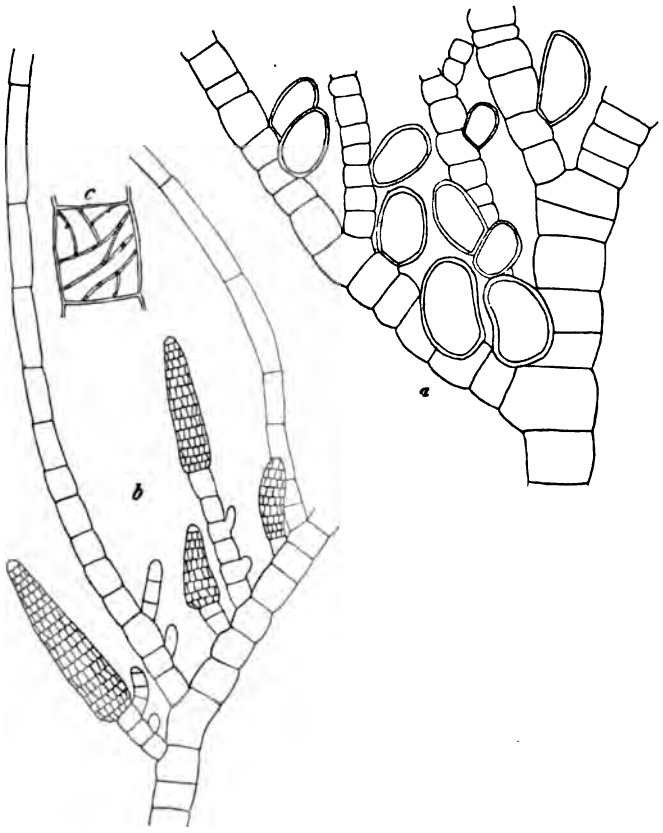

Fig. 71. *Ectocarpus fasciculatus* (Griff.) Harv. Forma. *a* portion of a plant with unilocular sporangia; *b* branch with plurilocular sporangia; *c* cell with chromatophores. *a* and *b* 160 : 1; *c* 200 : 1.

This species is most commonly met with on exposed coast especially in the littoral zone near low-water mark and in the sublittoral in shallow water. It is quite a common epiphyte, especially on old *Himanthalia lorea, Alaria esculenta, Laminaria digitata* and other larger algæ growing between tide-marks. Plurilocular sporangia occurred in May, June, July and November and unilocular sporangia in May and June.

Ectocarpus fasciculatus is commonly distributed along the coasts of the Færöes; var. *refracta* has been found only at the following places: — Str.: Kvivig (!); Syd.: Kvalbö (!), Frodebö (!), Vaags Ejde (!).

89. **E. granulosus** (Engl. Bot.) Ag. J. Ag., Spec. Alg., p. 21.

Found only in the sublittoral zone at a depth of 2—3 fathoms in sheltered stations in the bays and sounds, where it grew epiphytic on *Laminaria*. It has been found bearing plurilocular sporangia in the middle of May and at the end of October.

Found hitherto only near Kvannesund (Vid.) amongst some different algæ growing on the lamina of a *Laminaria* gathered by Jónsson; and in Trangisvaag (Syd.) on the lamina of a *Laminaria* (!) and in a seine (Ostenfeld).

90. **E. Hincksiæ** Harv., Manual p. 59, Phycol. Brit., tab. 22; Sauvageau, Observations relatives à la sexualité des Phéosporées (Journal de Botanique 1896, p. 66).

var. *typica*.

var. *irregularis* nov. var.

Among specimens belonging to the typical form, I have come across a few examples gathered near Thorshavn in June which had involucres round the plurilocular sporangia (fig. 72, *e*) precisely similar to those described and figured by Sauvageau, l. c., as occurring round the unilocular sporangia.

The specimens referred to the variety (fig. 72, *a, b, c, d*) are more particularly marked by the fact that the form of the plurilocular sporangia differs widely from that of the typical plant, besides varying considerably in itself, and also by the plurilocular sporangia being sometimes stalked. Thus, the sporangia are most commonly oblong-ovate and, in contrast to those of the typical species, they are broadest some way above the base and frequently taper down to it. In the majority of cases they are sessile, but very often they have stalks composed sometimes of one cell only, sometimes of several, in which case the sporangium may most properly be said to occur terminally on a short branch. The sporangia-bearing branches are sometimes erect, forming an acute angle with the main filament, and sometimes recurved. The sporangia occur as in the typical form in rows on the inner (upper) face of the branches. The main filaments attain to a thickness of some 50 μ, and produce numerous rhizoids as in the typical form. The chromatophores

are precisely similar to those of the latter. For the rest I must refer to the accompanying figure.

Ectocarpus Hincksiæ occurs both in the littoral zone and in

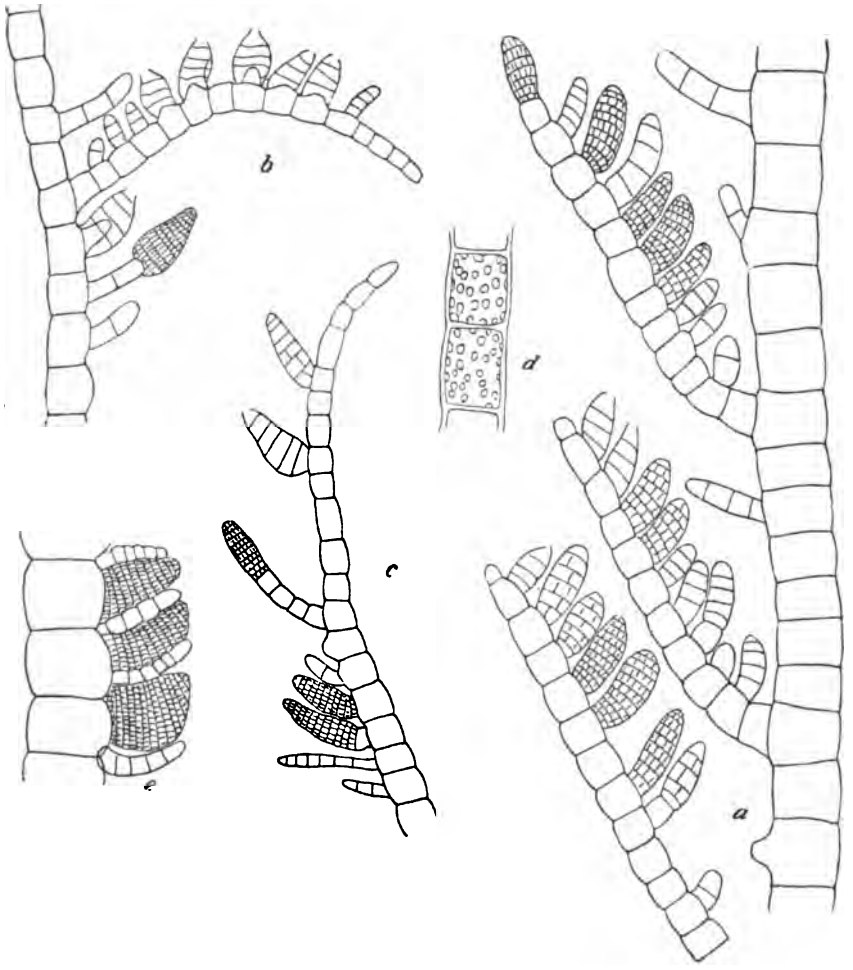

Fig. 72. *Ectocarpus Hincksiæ* Harv. *a*, *b*, *c* and *d* var. *irregularis* nov. var. *a*, *b* and *c* different parts of the plant with plurilocular sporangia; *d* cells with chromatophores. *e* var. *typica*. Plurilocular sporangia with involucre. *a*, *b* and *c* 160 : 1; *d* and *e* 200 : 1.

the sublittoral down to a depth of about 10 fathoms. It is most commonly found on exposed coasts as an epiphyte on different algæ; between tide-marks especially on, e. g. old *Himanthalia lorea*, *Alaria esculenta* and *Laminaria digitata*. It has hitherto been found with plurilocular sporangia only, these being observed in May, June, July and October.

The typical form is undoubtedly quite common along the coasts of the Færões, and has hitherto been found in the following places: — Bordô: Kvannesund (H. J.); Str.: Thorshavn (!), Gliversnæs (!); Sandõ: Troldhoved (!); St. Dimon (!); Syd.: Frodebõ (!), Famien (Ostenfeld, !). Var. *irregularis* has only been found on Syd.: Frodebõ (!) where it grew between tide-marks on *Himanthalia lorea*, associated with the typical form.

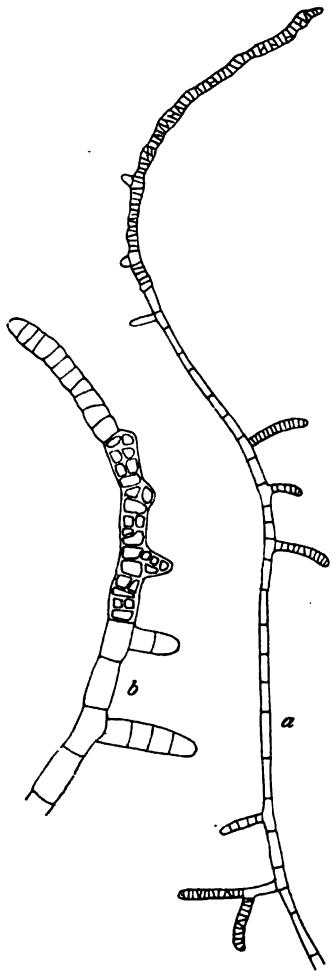

Fig. 73. *Ectocarpus tomentosus* (Huds.) Lyngb. Parts of filaments with the upper portion of the branches transformed into plurilocular sporangia. *a* 120:1, *b* 330:1.

91. **E. tomentosus** (Huds.) Lyngb., Hydrophyt., p. 132; Kjellm., N. I., p. 344 (279).

A specimen which grew epiphytic on *Fucus vesicolosus* at the exit of a stream into Kalbakfjord was peculiar on account of a large upper portion of the branches having been transformed into plurilocular sporangia which ripened and were emptied in basipetal succession (fig. 73). As I am not aware of any previous mention of such a case I have illustrated this in fig. 73. The plant was otherwise quite normal and had the typical, hooked branches. The filaments were 8—10 μ thick.

Ectocarpus tomentosus belongs to the littoral zone and is quite a common epiphyte, especially on different *Fucus*-species, *Himanthalia lorea, Alaria, Gigartina,* and in general on larger algæ growing between tide-marks. It occurs both on exposed coasts and in sheltered situations and grows luxuriantly even in the interior of fjords where freshwater runs into the sea. Plurilocular sporangia occurred in April, May, July and November.

This species, which Lyngbye reports as follows: — »Habitat ad insulas Færoenses, ut in sinu Qualbõe Suderõe, imprimis Himanthaliæ loreæ adhærescens«, is common everywhere along the coasts of the Færões.

92. **E. tomentosoides** Farl., New or imperf. known Algæ of U.S., reprint from Bull. Torr. Bot. Club, Vol. XVI, 1889, p. 11, pl. 87, fig. 4; Rosenv., Grønl. Havalg., p. 890; Gran, En norsk form af Ectocarpus tomentosoides Farlow; Kuckuck, Ueber Polymorphie bei einigen Phaeosporeen (Festschrift für Schwendener).

Besides basal plurilocular sporangia, such as those figured by Rosenvinge and Kuckuck, l. c., I have also come across basal unilocular sporangia, as I cannot doubt that the few I found must be regarded as such. These dehisced at their apex, and were about 40 μ long and about 12 μ broad.

Grows as an endophyte in the stem and lamina of *Laminaria hyperborea*, *digitata* and *saccharina* covering them with a short, fine, matted growth.

Specimens bearing plurilocular sporangia were met with from March to June. It undoubtedly attains to its highest development late in winter, i. e. March to April, as in a collection consisting of fragments of *Laminaria* gathered by Jónsson in March near Thorshavn large quantities of vigorously developed plants were met with which exactly agreed with Kuckuck's fig. 6 (l. c.), while later in the year it only occurred in small quantities and in poorly developed specimens; its occurrence as an early spring plant agrees also with Gran and Kuckuck's report. In Greenland, on the other hand, it has been found as late as August.

In a glass vessel containing *Rhodymenia palmata*, which I had gathered near Thorshavn for the sake of its different epiphytes, I found *Ect. tomentosoides* also amongst *Myrionema globosum* and others, but whether this alga really grows on *Rhodymenia palmata* or not I have not been able to ascertain; at any rate I did not succeed in finding endophytic filaments, but it is just possible that these typical filaments of *Ect. tomentosoides* were allied to the plant I have called with a query *Myrionema globosum* (cfr. 421); and in referring to my description of the latter for further particulars I will here only add that it bore a striking resemblance to *Ect. tomentosoides.*

This species, which doubtless in early spring occurs as a very common endophyte in *Laminaria*-species, has hitherto been found in the following places: — Ôst.: Ejde (!), Fuglefjord (!); Str.: Thorshavn (H.J., !); Syd.: Trangisvaag (Ostenfeld).

93. **E. lucifugus** Kuck., Ûeber zwei höhlenbewohnende Phaeosporeen (Beiträge zur Kenntnis der Meeresalgen, 4, Kiel und Leipzig 1897).

The Færõese specimens agree very well with Kuckuck's description and figures. They have frequently 2—3 and sometimes even 4 terminal sporangia on each branch (see fig. 74), but very often the sporangia occur singly at the apices of the branches, as is chiefly the case in the Heligoland specimens. The sporangia attain to a length of about 60 μ and to a breadth of about 18 μ.

It was found intermixed with *Rhizoclonium* both on fairly ex-

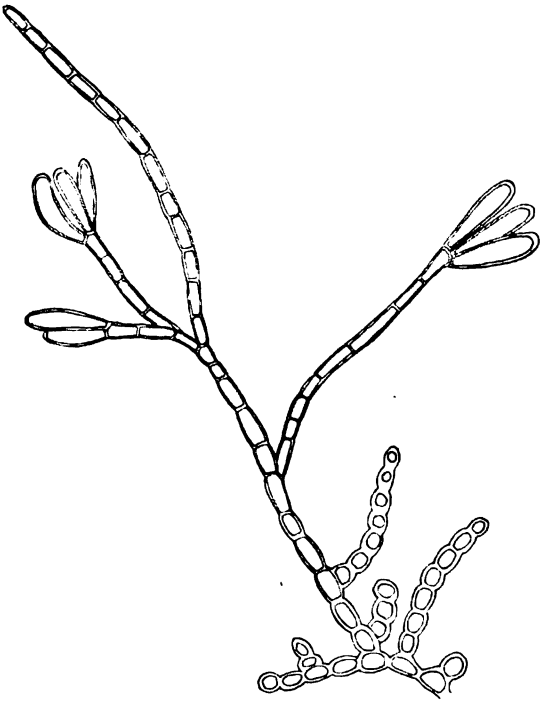

Fig. 74. *Ectocarpus lucifugus* Kuck. 160 : 1.

posed coasts and in sheltered localities. It grows near high-water mark in small hollows in the basalt, though it has not been found in caves proper as is the case in Heligoland.

In November it was found bearing a quantity of unilocular sporangia and Jónsson observed swarmspores in abundance when he looked through the material immediately after gathering.

Found hitherto only at the following places: — Viderõ: Vedvig (H. J.); Bordõ: Klaksvig (H. J.).

94. **E. velutinus** (Grev.) Kütz.

Simmons (l. c. p. 269) reports this species and writes with reference to it: »Auf Himanthalia lorea in Qualbõfjord (S.)«. But

here I may remark that I have searched in vain for this alga on two original specimens gathered by Simmons near Kvalbö on which only *Elachista scutulata* occurred.

95. **E. Stilophoræ** Crouan, Florule du Finistère, Paris 1867.
var. *cæspitosa* Rosenv., Grönl. Havalg., p. 892.[1]

The description given by the brothers Crouan, l. c., is very short, so that it is difficult to base a reliable determination on it, but as the Færöese specimens gathered by me are undoubtedly identical with the plant figured by Rosenvinge (l. c. fig. 26, A), I

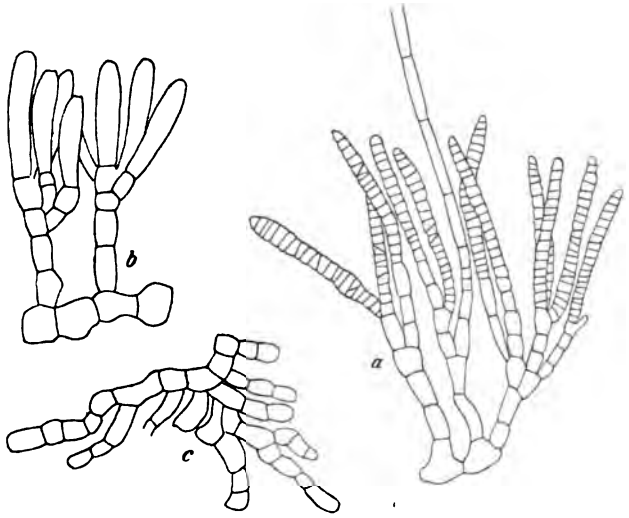

Fig. 75. *Ectocarpus Stilophoræ* Crouan. var. *cæspitosa* Rosenv. *a* part of a plant with plurilocular sporangia; *b* part of a plant with unilocular sporangia; *c* the basal threads. 400 : 1.

report it here under this name. The plant, of which I have shown some fragments in fig. 75, was found growing in the sorus of a *Laminaria*; the plurilocular sporangia often occur several on each branch and attain to a thickness of about 5—6 μ, and, as far as I could see, it bore also unilocular sporangia (see fig. 75, *b*), the latter being cylindrical or somewhat swollen in the middle and attaining to a length of some 20—25 μ and to a breadth of some 5 μ. The erect filaments occur abundantly in small patches, as pointed out by Rosenvinge.

Specimens bearing both unilocular and plurilocular sporangia were met with in July.

Found hitherto only on Str.: Thorshavn (!).

[1] Cfr. Svedelius, »Studier öfver Östersjöns Hafsalgflora«, Upsala 1901, p. 105.

Subgen. Pylaiella (Bory).

96. **E. littoralis** (L.) Lyngb. emend. Kuckuck, Beiträge zur Kenntnis einiger Ectocarpus-Arten der Kieler Föhrde, p. 7; Lyngb., Hydrophyt., p. 130; Pylaiella littoralis Kjellm., N. I., p. 346 (281), Handb., p. 83.

var. *opposita* Kjellm., Handb., p. 84; Kuck., l. c. p. 8.

var. *firma* Ag.; Kjellm., Handb., p. 84; Kuck., l. c. p. 8.

var. *divaricata* Kjellm., Handb., p. 85; Kuck., l. c. p. 11.

var. *varia* (Kjellm.) Kuck., l. c. p. 12; Pyl. varia Kjellm., N. I., p. 348 (282), tab. 27, figs. 1—12; Handb., p. 83.

I think I have been able to discern some of the forms referred by Kjellman and Kuckuck to each of the above-mentioned main groups.

Thus, of var. *opposita* I have found, besides the typical form, f. *rupincola* Aresch. (Kjellm. and Kuck., l. c.) and a few specimens which agreed fairly well with Kuckuck's descriptions of f. *subverticillata* and f. *rectangulans*.

Of var. *firma*, besides f. *typica*, some specimens were found which seemed to answer to Kuckuck's description of f. *subglomerata*.

Of var. *divaricata*, I think I have found, besides the typical form, f. *ramellosa* Kuck., l. c., and f. *prætorta* Kjellm., l. c.

Of var. *varia*, which occurred at a single place only, I have only found the typical form.

Lyngbye mentions in Hydrophyt., l. c. p. 131, tab. 42 C, a δ *protensus* of which there are several specimens in his herbarium in Copenhagen, some of which are like var. *opposita*, while others, judging from the very much decayed material, appear to belong to other *Ectocarpus*-species.

This alga, which is one of the most common along the coasts of the Færöes, occurs both in the littoral zone and in the sublittoral, but usually not at any great depth.

On exposed coast in damp clefts and fissures in the rock, especially in places where fresh-water oozes out, it can grow at a considerable height above high-water mark (upwards of 10 feet).

This plant occurs sometimes as an epiphyte, sometimes as a dense, brown covering on rocks; it is found abundantly at the exit of the streams. Var. *varia* was found in loose examples amongst other algæ.

Plurilocular sporangia occurred in May, June, July and Oc-

tober, and unilocular sporangia in March, May, June, July, October and November, so it is doubtless able to fructify all the year round.

This species is extremely common along the coasts of the Færöes and was already reported by Lyngbye, l. c. Var. *opposita* is the most commonly distributed; var. *firma* is rarer, and var. *varia* I found once only near Kvivig.

Conferva ferruginea Lyngb., Hydrophyt., p. 159, tab. 55 C, belongs to this species, as may be distinctly seen from Lyngbye's figure. In Lyngbye's Herbarium in Copenhagen there are no specimens labelled in Lyngbye's handwriting, but one on which is written in Liebmann's handwriting: »Conferva ferruginea Lyngb. ad rup. marit. Næss.« It is, however, undoubtedly one of Lyngbye's specimens, as the habitat corresponds to that given by Lyngbye in Hydrophyt. On examining this specimen it also proved to be like *E. litoralis*. In Hydrophyt. Lyngbye says: »Habitat ad insulas Færoenses, rupibus maritimis abruptis in summo refluxus limite adhærescens, ut ad Næs Österöe et ad Höyvig prope Thorshavn«.

ISTHMOPLEA Kjellm.

97. **I. sphærophora** (Harv.) Kjellm., N. I., p. 341 (276); Reinke, Atlas, pl. 30.

Found as an epiphyte on, e. g. *Ceramium acanthonotum, Callithamnion Arbuscula* and *C. scopulorum, Gigartina mamillosa, Cladophora rupestris* and other algæ growing in the littoral zone on exposed coasts, also — though rarely — in sheltered situations. Near Mölen on Österö it occurred at the mouth of a stream, closely overgrown with Diatoms. Unilocular sporangia were observed in May and June.

Found in the following places: — Öst.: Mölen (!); Str.: Kvivig (!), Velbestad (!), Arge (!), in Sundene between Kvalvig and Thorsvig (!); St. Dimon: at the landing-place (!); Syd.: Frodebö (!).

Order MYRIONEMACEAE.

MYRIONEMA Grev.

98. **M. globosum** (Reinke) Sauvageau, Sur quelques Myrionémacées, Extrait des Ann. d. sc. nat., Bot., 8 sér., t. 5, 1897, pp. 9—14; Ascocyclus globosus Reinke, Atlas deutsch. Meeresalg., p. 20, pl. 17; Phycocelis globosus Rosenv., Deuxième Mém. sur les Alg. mar. du Groenl., p. 86.

To this species I have referred a small alga which occurred as small, semiglobular cushions, or, where the latter merged into

each other, as irregularly shaped, short, matted expansions on *Himanthalia lorea* near Vaags Ejde. Fig. 76 represents some fragments of the plant which according to my opinion agrees fairly well with the plant figured by Rosenvinge (l. c. fig. 19). The erect filaments, which spring from a basal disc composed of one layer

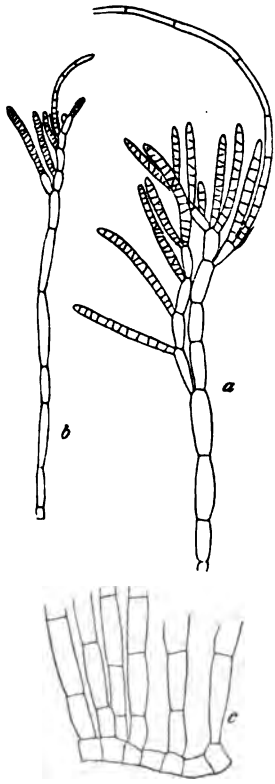

Fig. 76. *Myrionema globosum* (Reinke) Sauvag. *a* and *b* erect filaments with plurilocular sporangia and hairs. *c* part of the base of the plant in transverse section. *a* and *b* 200 : 1; *c* 300 . 1.

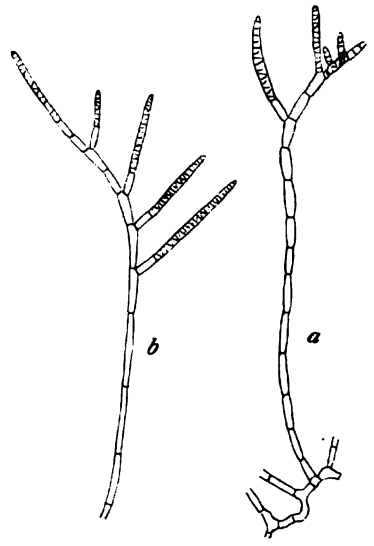

Fig. 77. ? *Myrionema globosum* (Reinke) Sauvag. *a* and *b* erect filaments with plurilocular sporangia. 200 : 1.

of cells, usually bear long hairs the base of which are enclosed in sheaths such as are common in the genus *Myrionema* (cfr. Sauvageau, l. c. p. 44); it was presumably this sheath which Rosenvinge saw and which induced him to write with reference to the hairs: »poussant quelquefois à travers les sporanges vidés«. While Rosenvinge observed in the Greenland plants both basal hairs such as are figured by Reinke, l. c., and hairs on the erect filaments, the Færöese specimens have hairs on the erect filaments only.

Some other specimens, which I have also referred to this species and which likewise grew near Vaags Ejde, but epiphytic on *Laminaria*, have basal hairs only.

Lastly, some examples occurred on *Rhodymenia* near Thorshavn which are quite destitute of hairs. These examples have a basal disc which is composed of filaments more or less free along the margin, but grown together towards the centre. The erect filaments shown in fig. 77 spring from this basal disc and are more slenderly built than is the case with those of the hair-bearing form. The plurilocular sporangia are cylindrical and about 5—6 μ thick.

It is possible that I have here been referring several different species to *Myrionema globosum* and the last-named examples especially appear to me to differ rather widely from it; nevertheless I think for the present we are justified in keeping them together.

This species has been found in the littoral zone as well as in the sublittoral in shallow water in fairly exposed situations. It grows as an epiphyte on different larger algæ.

Sporangia-bearing specimens were met with in April, May and June.

Found hitherto in the following places: — Str.: Thorshavn and Arge on *Rhodymenia palmata* (!); Syd.: Frodebö on *Himanthalia lorea* (!); Vaags Ejde on *Himanthalia* and *Laminaria* (!).

99. **M. speciosum** nov. spec.

This plant (fig. 78) consists of a basal disc (fig. 78, *h*) composed of one layer of cells whence proceed erect filaments. The basal disc has a distinctly marginal growth (fig. 78, *g*) and is composed of filaments which are loosely connected along the margin, but towards the centre are grown together to a pseudo-parenchymatous tissue. The cells in the basal disc are about 8—10 μ broad and of variable length, i. e. from about as long as they are broad to 2—3—4 times as long. From some distance within the margin the erect filaments begin to occur and proceed from almost all the cells in the disc. The erect filaments attain to a length of about 6—800 μ; at first they consist of a longer or shorter vegetative part, the cells of which are 10 μ thick, and about twice as long as they are thick, and higher up they bear either plurilocular or unilocular sporangia. The plurilocular sporangia vary in form from oblong-ovate to oblong cylindrical, and are usually somewhat curved; they occur unilaterally and are generally placed close

together, one sporangium springing from every cell, but sometimes vegetative cells intervene. The sporangia are divided not only by transverse walls, but also by more or less oblique longitudinal walls. As the sporangia gradually arise along the filament a peculiar development takes place, viz. the cells whence the sporangia spring divide and turn into sporangia, transforming the whole of the sporangia-bearing portion of the erect filament into what may be termed a single, large plurilocular sporangium. The latter generally ripens and is emptied successively from the apex downwards to the base, though not always, for, as shown in fig. 78, *c* specimens occur in which some of the sporangia are emptied here and there along the filaments, and most commonly the cells whence these sporangia spring are emptied simultaneously. The plurilocular sporangia are about 11 μ broad and 40 μ long. I have only found a small quantity of unilocular sporangia (fig. 78, *d*); the latter vary somewhat in shape being obovate or nearly so and they sometimes form a sporangium in connection with the cell whence they spring, and sometimes are separated from this cell by a wall. Besides the sporangia, the erect filaments bear now and then true Phæosporé-hairs which grow endogenously and have a distinct sheath as indicated by Sauvageau, l. c. p. 47. These hairs are usually lateral and I have only rarely come across terminal ones such as are shown in fig. 78, *a*. The hairs are about 6—7 μ thick; as I said before they do not occur on all the erect filaments.

Besides long branches, quite short sporangia-bearing branchlets with only one vegetative cell are occasionally met with as, e. g. shown in fig. 78, *f*.

The chromatophores consist of a parietal, irregularly branched or perforated plate (fig. 78, *e*).

This plant was found on the conceptacles of *Himanthalia lorea*, where it occurred as a short, dense mat, often associated with *Myrionema globosum*.

A species which appears to me to be most closely allied to *M. speciosum* is *M. globosum* though the latter differs considerably from the former, more particularly, e. g. in the different ramification of its erect filaments as also in the form and position of its sporangia.

Myrionema speciosum somewhat resembles the *Ectocarpus tomentosoides* var. *norvegica* Gran[1], which is fully described and figured

[1] Gran, H. H.: En norsk form af *Ectocarpus tomentosoides* Farlow (i Christiania Videnskab. Selsk. Forhandlinger for 1893. No. 17).

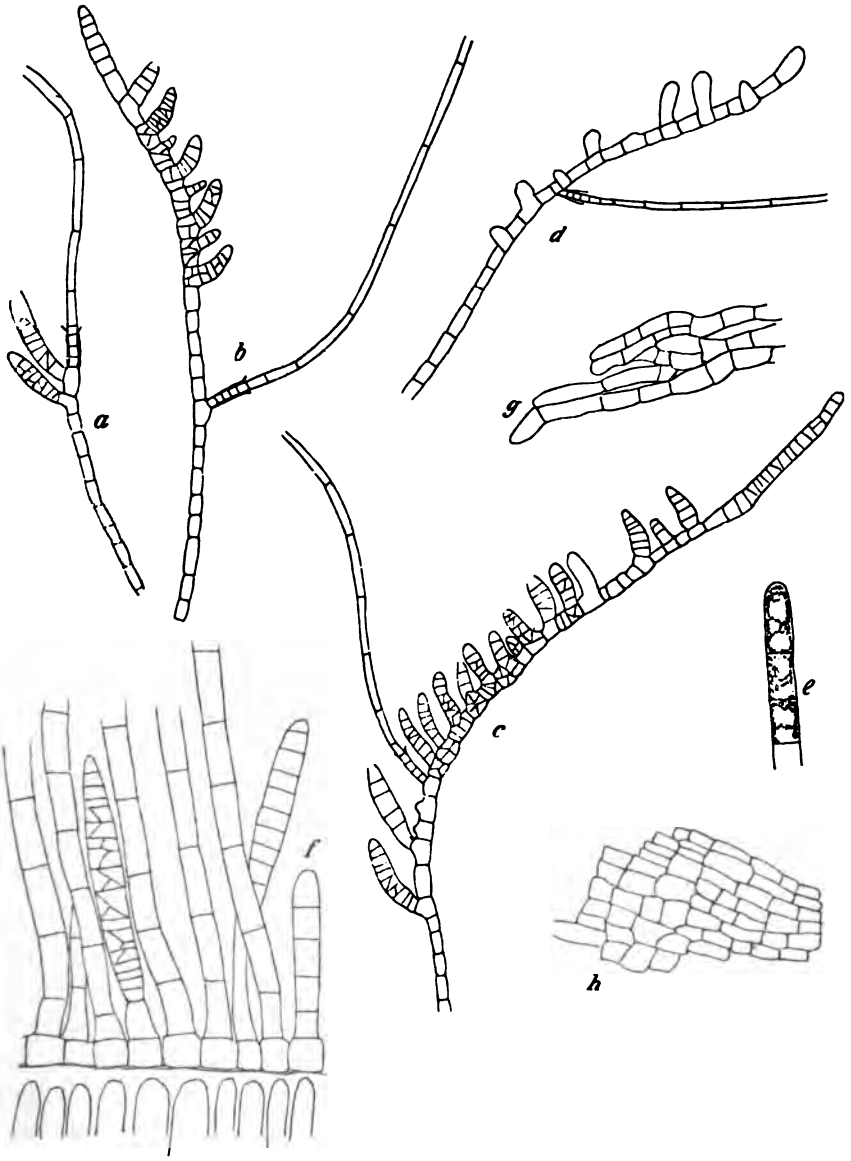

Fig. 78. *Mgrionema speciosum* nov. spec. *a*, *b* and *c* erect filaments with hairs and pluriloculer sporangia; *d* erect filament with unilocular sporangia; *e* young filament showing the chromatophores; *f* part of the base with erect filaments in transverse section; *g* and *h* the basal disc. *a*, *b*, *c*, *d*, *g*, *h* 200 : 1; *e*, *f* 350 : 1.

by Gran. The cells of the main filament whence the sporangia spring, are also in the latter species frequently transformed into sporangia, thus forming what Gran calls half intercalary sporangia,

with reference to which he writes[1]: — »When several such half intercalary sporangia occur in a row at the apex of an assimilative filament then they apparently form one single ramified sporangium. The separate sporangia of which this system is composed ripen in the meantime in basipetal succession and are emptied separately«. Thus, in this point these two plants exactly resemble one another, but otherwise, when examined more closely they prove to differ a good deal.

This plant has been found on exposed coasts as an epiphyte on *Himanthalia lorea* as mentioned above. It bore plurilocular and unilocular sporangia in June.

Found only on Syd.: Vaags Ejde (!).

100. **M. færoense** nov. spec.

Another *Myrionema*, which I assume to be new to science, occurred on *Rhodymenia palmata* from Thorshavn associated with *Myrionema globosum*. Professor Sauvageau to whom I sent some preparations also said that judging from the latter he did not know the plant.

Fig. 79 represents some fragments of the plant. The latter has a basal disc (fig. 79, *g*) composed of a single layer of cells whence spring erect, branching filaments. The basal disc, which has a marginal growth, has in the centre a compact layer of cells, in which the separate filaments can, however, be clearly traced, while along the margin the filaments are more or less loosely connected. The cells in the basal disc are sometimes longer, as much as twice as long as broad, sometimes almost square. The erect filaments arise from the cells and are either simple or ramified. The branchless filaments bear a solitary terminal plurilocular sporangium (fig. 79, *c*); the ramified filaments start at the base with a shorter or longer naked part and then often have a fairly large number of branchlets each terminating in a sporangium. The branchlets shorten towards the apex of the filaments, being composed here of one cell only, and are rarely re-branched, as e. g. is the case with those shown in fig. 78, *a*. I have only found plurilocular sporangia. Their form is oblong-ovate-elliptic and they are about 40—80 μ long and 11—15 μ broad. When the sporangium is

[1] »Naar flere saadanne halvt interkalære sporangier forekommer paa rad i spidsen af et assimilationsskud, kan de tilsammen tilsyneladende danne et eneste, forgrenet sporangium (fig. 4—5). De enkelte sporangier, hvoraf dette system bestaar, modnes imidlertid i basipetal rækkefølge og udtømmes hver for sig.«

emptied it very often happens that a new one grows out inside the one that is emptied. The cells of the erect filaments are about 9 μ broad. I have not found hairs on this plant.

This species bears some resemblance to the *Myrionema globosum* I have shown in fig. 76, though the latter differs widely from it in many respects, more particularly in the copious ramification of its erect filaments; in its narrower, almost cylindrical sporangia which are usually sessile and spring several from the same cell; in the common occurrence of hairs, etc.; all of which are characters serving to keep *M. globosum* quite distinct from the present species.

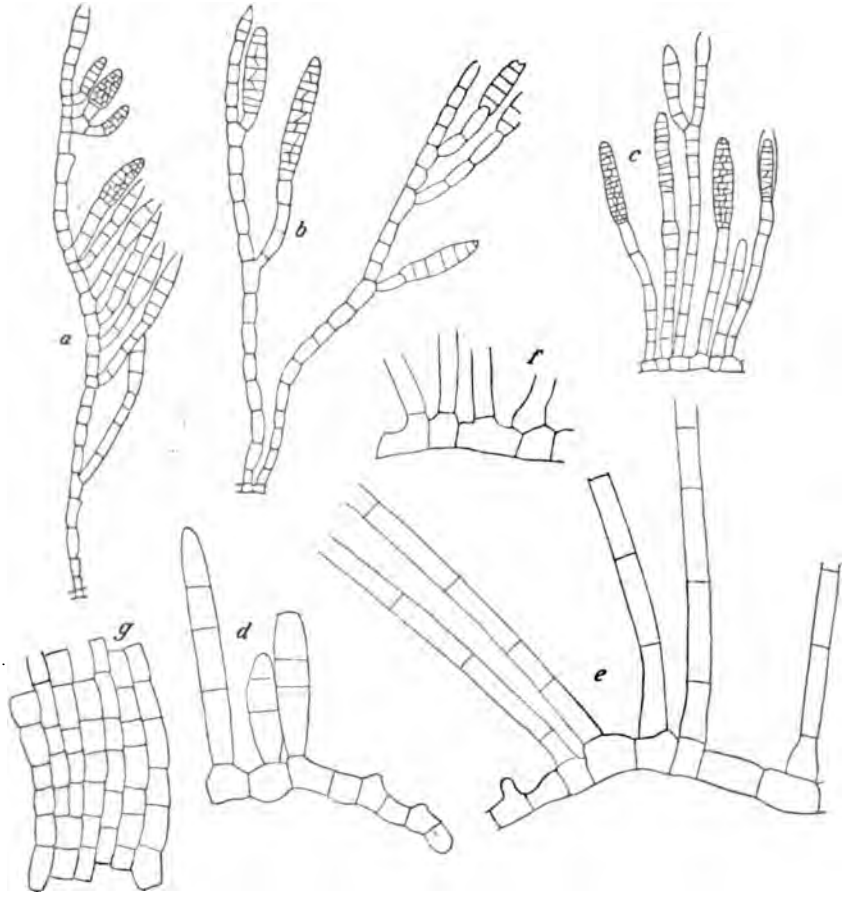

Fig. 79. *Myrionema fœroense* nov. spec. *a*, *b* and *c* erect filaments with plurilocular sporangia; *d*, *e* and *f* part of the base with erect filaments in transverse section (*d* from the margin); *g* part of the basal disc. *a*, *b* and *c* 160 : 1; *d*, *e*, *f*, *g* 390 : 1.

This species occurs epiphytic on *Rhodymenia*, occurring on its

thallus in small, short, densely matted growths. Plurilocular sporangia were observed in April.

Found hitherto only on Str.: near Thorshavn (!).

101. **M. vulgare** Thur. Sauvageau, Sur quelques Myrionémacées, p. 25.

Specimens exactly agreeing with Sauvageau's exhaustive description and figures have been found epiphytic on *Monostroma fuscum*. This species bore both unilocular and plurilocular sporangia in July.

Found hitherto only on Str.: in Sundene between Thorsvig and Kvalvig (!).

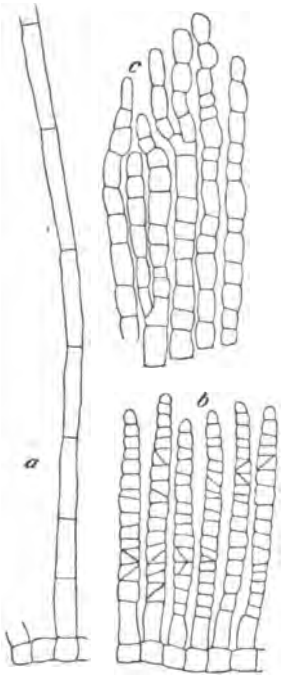

Fig. 80. *Myrionema Corunnæ* Sauvag. Compare text. 370:1.

102. **M. Corunnæ** Sauvageau, Sur quelques Myrionémacées, p. 77.

Occurred on the lamina of *Laminaria digitata* as small, short, dense, roundish, cushion-like growths. In fig. 80 is shown a portion of the plant with plurilocular sporangia (*b*), a hair (*a*), and a small portion of the basal disc (*c*). The plant bore plurilocular sporangia in May which were 5 μ thick. Professor Sauvageau to whom I sent a preparation corroborates my determination.

Found only on Syd.: Famien (!).

103. **M. foecundum** (Strömf.) Sauvageau. Phycocelis foecunda Strömfelt, Algæ novæ quas ad litora Scandinaviæ indagavit, tab. 3, fig. 5 (Notarisia No. 9, 1888); Sauvageau, Sur quelques Myrionémacées, p. 10.

To this species I have referred a small alga which occurred as a short, dense covering on the lamina of *Laminaria hyperborea*. It closely resembled Reinke's var. *seriata* (Atlas, tab. 16, figs. 5—12), but the plurilocular sporangia, unlike what is said to be the case in Reinke's variety were occasionally divided by longitudinal walls. Reinke writes with reference to his variety (l. c. p. 19). »In der Mitte der Scheibe entspringen farblose Haare und kurze Assimilationsfäden aus den Basalzellen, die Assimilationsfäden wandeln sich der ganzen Länge nach durch Quertheilung der

Gliederzellen in Sporangien um«. Thus, according to Reinke this variety has properly speaking no erect filaments, they being all transformed into sporangia, and I have noticed the same to be the case in the Færöese specimens. On this point Sauvageau (l. c. p. 10) appears to have misunderstood Reinke's description, and if we follow the view of Kuckuck, who regards the absence of erect filaments as a characteristic mark of the genus *Phycocelis*, then *M. foecundum* ought to be regarded as a typical *Phycocelis*, but I think with Sauvageau that these two genera can practically hardly be kept distinct.

Fig. 81 represents some fragments of this plant. The plurilocular sporangia are about 8—9 μ broad.

It bore plurilocular sporangia in May.

Found hitherto only on Str.: Thorshavn (!).

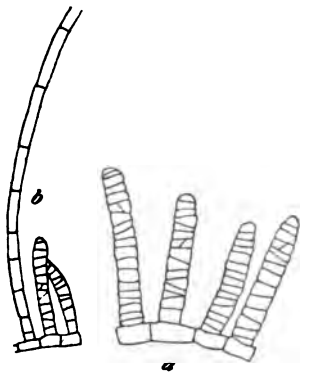

Fig. 81 *Myrionema foecundum* (Strömf.) Sauvag. *a* part of the plant with plurilocular sporangia; *b* part of the plant with a hair. *a* 300:1; *b* 200:1.

104. **M. æcidioides** (Rosenv.) Sauvageau, Myrionémacées, pp. 15—17; Ectocarpus (Streblonema) æcidioides Rosenv., Grønl. Havalg., p. 894; Phycocelis æcidioides Kuckuck, Bemerkungen z. mar. Algenveget. von Helgoland, 1894, p. 234.

Found in the lamina of *Laminaria færoensis*, and agrees fairly well with Rosenvinge's description and figure (l. c.) as also with Kuckuck's (l. c.). The Færöese specimens come near the Greenland and Heligoland specimens in not having the vertical, vegetative, assimilative filaments described by Foslie (New or critical Norw. Alg., p. 24).

Plurilocular sporangia were met with in abundance, and in a vigorously developed plant there occurred just a few unilocular sporangia of the same form as those figured by Rosenvinge.

Sporangiferous specimens were observed in October.

Found hitherto only in the following places: — Öst.: Skaalefjord (H. J.); Str.: Kvalvig (H. J.). If searched for more closely it will doubtless prove to be commonly distributed.

CHILIONEMA Sauvag.

105. **Ch.** spec.

A small plant of the *Myrionemaceae* occurred on the lamina of a *Laminaria* gathered by H. Jónsson, with reference to which Prof.

Sauvageau, to whom I sent some preparations, writes to me: »C'est un *Chilionema* nov. spec., mais vos préparations sont insuffisantes«. Later on I have tried to examine the plant more closely, but have only partially succeeded in doing so owing to the material being apparently rather undeveloped. In fig. 82 I have shown some frag-

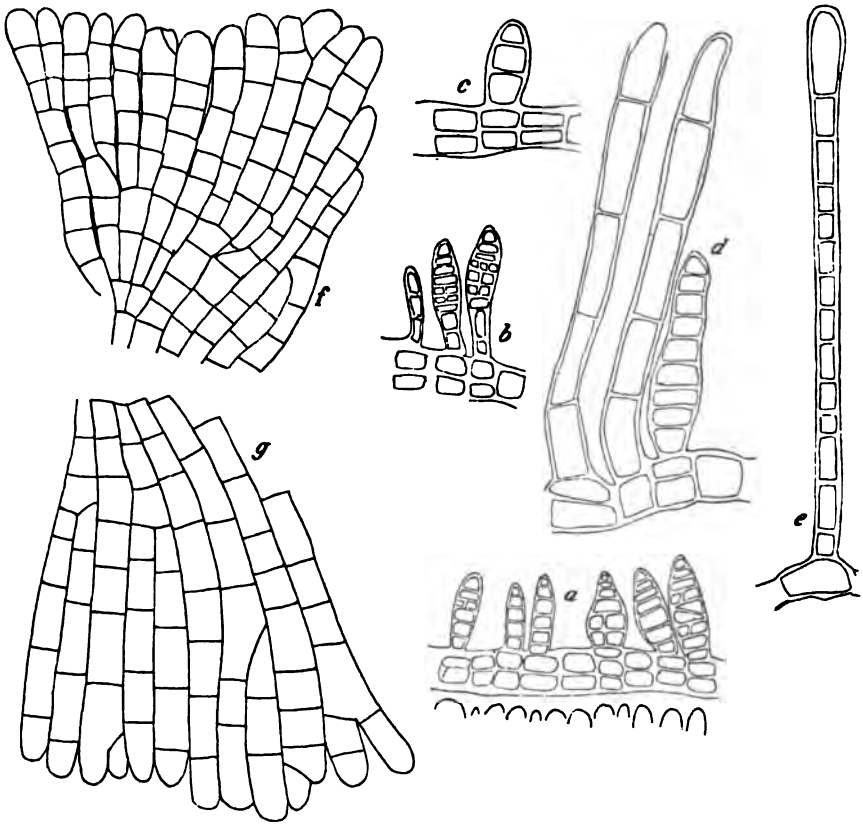

Fig. 82. *Chilionema* spec. Different parts of the plant, compare text. *a*, *b* 200:1; *c*, *d*, *e*, *f*, *g* 300:1.

ments of the plant. The basal disc has a distinctly marginal growth (fig. 82, *f* and *g*) and consists of closely united, branching filaments. The greater part of the disc is composed of two layers of cells owing to the cells dividing in a direction parallel to the surface of the disc; only here and there a few undivided cells occur. The cells are about 10 μ broad.

As is characteristic of the genus *Chilionema* (cfr. Sauvageau, Myrionémacées, p. 103), the erect filaments and sporangia occur in scattered groups on the surface of the basal disc, surrounded by

a more or less sterile belt. The erect filaments are about 70—100 μ long and about 9 μ broad.

The plurilocular sporangia are most commonly sessile, but stalked examples also occur. They are oblong-ovate, often somewhat tapering towards the top, and are about 20 μ thick and about 50 μ long. I have not observed quite ripe or emptied sporangia, nor did I come across hairs.

This plant, which formed small, dark-brown patches on the lamina of a *Laminaria*, was found bearing plurilocular sporangia in October.

Found hitherto only on Str.: Kvalvig (H. J.).

MIKROSYPHAR Kuck.

106. **M. Polysiphoniæ** Kuck., Beiträge zur Kenntnis d. Meeresalgen. 3. Die Gattung Mikrosyphar Kuckuck mit Taf. IX und X (Aus d. Biol. Anstalt auf Helgoland. 1897).

Found endophytic in *Polysiphonia urceolata* and *Callithamnion scopulorum* which grew between tide-marks as well as in the sublittoral zone in more shallow water.

Sporangia-bearing specimens were observed in June.

Öst.: Öre (!); Str.: Höjvig (!), Kvivig (!).

It has been met with in a few places only, but is doubtless rather widely distributed.

107. **M. Zosteræ** Kuck., l. c. p. 25.

Grows on *Zostera marina* exactly in the way as described by Kuckuck amongst *Diatoms* on the epidermis of *Zostera*. It often forms fairly large pseudo-parenchymatous patches such as those observed by Svedelius[1] near Gotland.

Found only on Syd.: Vaagfjord (!).

SORAPION Kuckuck.

108. **S. Kjellmani** (Wille) Rosenv., Deuxième Mémoire sur les Algues marines du Groenland, p. 95; Lithoderma Kjellmani Wille, Wille og Kolderup Rosenvinge, Alger fra Novaia-Zemlia og Kara-Havet, p. 11 (89).

A small, brown crustaceous alga, which was found on a *Chætomorpha Melagonium* gathered near Thorshavn, exactly agreed with Wille's description and figures (l. c.). It had a quite similar basal

[1] Svedelius, N.: Studier öfver Östersjöns Hafsalgflora, p. 105.

disc and the erect filaments formed a parenchymatous tissue answering to Wille's description. Further, only one chromatophore occurred in the cells. Fully developed sporangia I have not met with, but notwithstanding this drawback, I have no doubt as to the correctness of my determination.

Found only on Str.: Thorshavn (!).

LITHODERMA Aresch.

109. **L. fatiscens** Aresch.

Found in the sublittoral zone at a depth of 2—20 fathoms both in the open sea and in the interior of fjords. It grows sometimes on stones and sometimes on shells. It was gathered in June, July, October and November, but the specimens I have examined were sterile.

Found hitherto in the following places: — Vid. (H. J.); Bordö: Haraldsund (!); Kunö (H.J.); Öst.: Glibre (H.J.); Str.: Kalbakfjord (H.J.), between Thorsvig and Kvalvig (!), Gliversnæs (!).

PETRODERMA Kuck.

110. **P. maculiforme** Kuck., Bemerkungen, II, p. 382.

Some small, brown patches occurred on smooth rock-faces close to high-water mark near Saxen (Str.), which on a closer investigation were seen to be caused by the growth of a small alga seemingly precisely similar to the present species. A chromatophore occurred in the cells, which corresponds to Kuckuck's description, and both the unilocular and plurilocular sporangia exactly resembled Kuckuck's figure, with the exception that the unilocular sporangia were somewhat larger than he described them.

Found only on Str.: Saxen (!).

RALFSIA Berk.

111. **R. verrucosa** (Aresch.) J. Ag. Reinke, Atlas, pl. 5 and 6, figs. 1—13; Kjellm., N. I., p. 309 (249).

This species belongs to the littoral zone and grows by preference on exposed coasts, where it occurs associated with *Hildenbrandia* especially in rock-pools, covering the bottom of the latter with a rough, yellowish-brown crust; such crusts are sometimes of considerable extent, thus, in a large, flat rock-pool, near Vaags Ejde on the west coast of Syderö, which contained only a few inches of water at ebb-tide, *Ralfsia verrucosa* occurred over an

area of several square metres. But it may also be met with on sheltered coasts; having been found, e. g. at the head of Kalbakfjord growing on stones in shallow water; according to Kjellman's report (l. c.), in the Norwegian Polar Sea it grows by preference in sheltered situations.

Specimens bearing plurilocular sporangia were met with in May and July.

This species, which is doubtless widely distributed, has been found at the following places: — Vid.: rock on the north side of the island (!); Str.: Kalbakfjord (!), common in rock-pools between Höjvig and Thorshavn (!), Thorshavn (Simmons, !), Myggenæs (!); Sandö: Sandsbugt (!); Syd.: Kvalbö (Lyngbye, !), Vaags Ejde (!).

The present species was already found by Lyngbye and there is a specimen of it in his herbarium in Copenhagen named *Zonaria deusta*. It was gathered by Lyngbye »ad saxa maritima littus Qualböe« on July 15th 1817. It has unilocular sporangia. In Hydrophyt. (l. c. p. 19) Lyngbye mentions *Zonaria deusta*, but does not report it from the Færöes.

On a stone near Glibre in Skaalefjord Helgi Jónsson gathered a *Ralfsia*, which appears to come very near the one mentioned by Kuckuck in »Bemerkungen«, I, p. 241. The specimens in questions — two in number — had a smooth, shiny, yellowish-brown, marginal area, and a darker, more rough central area, in which dark, radiating stripes could distinctly be traced. Even when microscopically examined it closely resembled Kuckuck's plant; the margin of the thallus in the Færöese examples being decidedly arched just as described and figured by Kuckuck, though the cuticula was somewhat thinner in the Færöese specimens. With reference to the arched margin Kuckuck (l. c. p. 242) writes: — »Jedoch scheint es gestattet, die starke Wölbung mit einer Neigung zum bilateral-symmetrischen Bau der *Ralfsia deusta* in Zusammenhang zu bringen«. It was consequently interesting that the thallus in the Færöese examples now and then showed signs of being bilateral, small portions occurring, here and there, in which downward-turned filaments as well could distinctly be observed, in contradistinction to the majority of the filaments which turn upwards as in Kuckuck's fig. 6, though these downward filaments were far from being as distinct as those in the specimen described and figured by Batters in »Marine Algæ of Berwick-on-Tweed«, p. 66 (286), tab. X, fig. 8. I did not come across any hairs. Here and there, where the thallus were not closely pressed against the stone there occurred numerous, strongly interlaced

rhizoids. Unfortunately, my specimens were still sterile. Batters has referred his example which bore plurilocular sporangia to *R. verrucosa*. And Kuckuck has by the help of Batters's original example proved that his Heligoland plant is identical with the English. Kuckuck ends thus: — »Es wird mir vielleicht gelingen, später einmal durch Beobachtungen im Freien und an Kulturen die hier behandelte Frage endgültig zu entscheiden. Vorläufig kann ich nur meinen Zweifel darüber aussprechen, ob unsere *Ralfsia* zu *verrucosa* gehört, und möchte eher vermuten, dass *R. deusta* vorliegt. Wenigstens zeigt die Pflanze, nach welcher Batters seine oben zitirte Figur anfertigte, vollkommen entwickelte Bilateralität«. But *Ralfsia verrucosa* also may occasionally show signs of being bilateral and I am therefore of opinion — Dr. Kuckuck, with whom I discussed the point, said very much the same thing — that the specimens in question are nothing more than a form of *Ralfsia verrucosa*, which possibly, by growing in the sublittoral zone, has acquired a somewhat different appearance; or what is perhaps most probable, as Batters says, — plants bearing plurilocular sporangia differ from those with unilocular fruit.

112. (?) **R. clavata** (Carm.) Farl., Mar. Alg., p. 88; Rosenv., Grønl. Havalg., p. 899.

Amongst some different algæ scraped from rocks at a height of some 8—9 feet above high-water mark near Famien (Syd.) there occurred an insignificant quantity of a small *Ralfsia* which probably belongs to this species, but the sporangia being unripe the determination is open to doubt. It may, however, be presumed that this species, which has been met with in the surrounding countries both to the north and south of the Færöes, also occurs there.

Order SPHACELARIACEAE.

SPHACELARIA Lyngb.[1]

113. **S. britannica** Sauvag., Remarques sur les Sphacélariacées (Journal de Botanique 1901, p. 50).

Found near high-water mark or somewhat above it on damp rocks especially in caves and rock-clefts, where it occurs as a short, dark-brown mat often in association with other algæ, e. g. *Callithamnion, Ectocarpus littoralis, Rhodochorton Rothii,* etc.

Grows on fairly exposed coasts.

[1] Professor Sauvageau has kindly determined my material of *Sphacelaria*.

Specimens bearing unilocular sporangia were observed in July.
Found hitherto only on Str.: Kvivig (!), Gliversnæs (!).

114. **S. cæspitula** Lyngb., Hydrophyt., p. 105.

Found hitherto in the Færöes only by Lyngbye, who writes with reference to it: — »Habitat ad stipitem Laminariæ digitatæ ad littus Færoense rarius«. The specimens in Lyngbye's Herbarium are from Næs on Österö.

115. **S. cirrhosa** (Roth) Ag.

Regarding the specimens I have referred to this species, Sauvageau writes to me: — »c'est en effet ce que l'on apelle le *S. cirrhosa*. Mais je n'ai pas encore terminé l'étude de cette espèce pour mon mémoire en cours de publication, et je serai peut-être obligé de la scinder en plusieurs autres«. Until then I report it under this name.

This species has been found epiphytic on *Desmarestia aculeata* and *Chætomorpha Melagonium* in exposed as well as in sheltered localities. Specimens bearing propagula were met with in December.
Found hitherto only on Svinö (H. J.); Syd.: Vaagfjord (H. J.).

116. **S. furcigera** Kütz.

A *Sphacelaria* which I had gathered near Thorshavn on a *Laminaria* Sauvageau has determined as this species. Sauvageau writes to me concerning it: — »Bien que cela puisse vous étonner, je considère cette espèce comme le *S. furcigera*, qui n'est pas exclusivement tropical comme on le dit. C'est cette plante que Pringsheim a représenté comme *S. olivacea* à propagules, et M. Kuckuck comme *S. furcigera* var. *saxatilis*. Récemment M. Kuckuck (in litt.) revenait à l'opinion que ces propagules appartenaient au *S. olivacea*, mais moi, je tiens pour le *furcigera*«.

This plant has been gathered from 3—4 fathoms of water where it grew on the stem of a *Laminaria* in a fairly exposed locality. It had propagula in May.
Found hitherto only on Str.: Thorshavn (!).

CHÆTOPTERIS Kütz.

117. **Ch. plumosa** (Lyngb.) Kütz.

In Rostrup's list (l.c. p. 86) this species is mentioned as found in the Færöes, Rostrup writes: — »Specimens have been sent to us by Mr. Randropp of Thorshavn«. And in Rostrup's collection of Færöese algæ there are some good examples of this species,

I, consequently, mention it as from the Færões, though I very much doubt its occurring there at all as it has never been found there, either by Lyngbye or by any investigator since his time, e. g. Simmons, Helgi Jónsson or myself. It is just possible that Mr. Randropp has confused the labels or made some other similar mistake. But, on the other hand, I would emphasize the fact that it would be strange if *Chætopteris plumosa* were absent along the Færõese coasts, it having been found along the coasts of the nearest adjacent countries.

CLADOSTEPHUS (Ag.) J. Ag.

118. **Cl. spongiosus** (Lightf.) Ag. Kjellm., N. I., p. 336 (272).

This plant occurred on the open coast in a very exposed locality, where it grew in rock-pools near low-water mark. Being gathered about the middle of May it was sterile.

Found only near Gjov (Öst.) on the projecting point between the village and the large ravine.

Order ELACHISTACEAE.

ELACHISTA Duby.

119. **E. fucicola** (Vell.) Aresch., Pugill. 1, p. 235, tab. 8, fig. 67, and Phyceae scandinavicae, p. 155, tab. IX, fig. C; Kjellm., N. I., p. 314 (253).

var. *typica* Rosenv., Grønl. Havalg., p. 878.

var. *lubrica* (Rupr.) Rosenv., l. c.

The cells in the erect filaments of var. *typica* are very variable, being sometimes longer than they are broad, sometimes only half as long as their breadth. The thickness of the filaments also varies considerably, the latter often attaining to a breadth of 50 μ and even more; the thickest filament I measured was about 65 μ. As *E. flaccida* has been reported from the Færões (see below), one is led to think that these specimens with thick, assimilative filaments might possibly be small examples of the latter species, but in all the specimens which I examined the assimilative filaments tapered gradually to the base, and not suddenly, as is characteristic of *Elachista flaccida*; the assimilative filaments of the latter are also much thicker.

The main form is an extremely common epiphyte on different *Fucaceæ* in the littoral zone and occurs both on exposed coasts

and in sheltered situations. It bore unilocular sporangia in the spring and summer months and in October and November, and appears to be able to fructify all the year round.

var. *lubrica* has been found epiphytic on *Halosaccion ramentaceum* and had unilocular sporangia in May.

While the main form is extremely common everywhere along the coasts of the Færöes, var. *lubrica* has been found only on Bordö: Klaksvig (!).

Elachista flaccida (Dillw.) Aresch. is reported from the Færöes by Lyngbye under the name of *Conferva flaccida* (Hydrophyt., p. 146): — »Habitat ad littora Færoensia, Fuco vesiculoso insidens, haud raro«. The specimens in his herbarium are, however, *Elachista fucicola*. Simmons also (l. c. p. 270) mentions *E. flaccida* »auf *Himanthalia lorea* bei Thorshavn und auf *Fucus vesiculosus* im Qualböfjord«. The specimens[1] from Kvalböfjord growing on *Fucus vesiculosus* which I have had for examination proved, however, to be *E. fucicola*.

120. **E. scutulata** (Smith) Duby. Thuret, Études phycol., p. 19, tab. 8; Thuret, Recherches sur les Zoospores des Algues, p. 27, tab. 25.

Grows on the receptacles of *Himanthalia lorea*.

Found with unilocular sporangia in August and November, having, moreover, young plurilocular sporangia in the latter month. Doubtless an autumn and winter alga, as I have searched for it in vain amongst the material gathered in spring and summer.

Found hitherto in the following places only: — Svinö (H.J.); Syd.: Kvalbö (H. S.).

LEPTONEMA Reinke.

121. **L. fasciculatum** Reinke, Atlas, p. 13, tab. 10; Elachista fasciculata (Reinke) Gran, Algevegetationen i Tönsbergfjorden, p. 29.

var. *subcylindrica* Rosenv., Grønl. Havalg., p. 879.

As I quite follow the opinion expressed by Svedelius in »Studier öfver Östersjöns Hafsalgflora«, p. 94, I do not hesitate in maintaining *Leptonema* as a genus though it is certainly closely related to *Elachista*.

The Færöese specimens agreed well with Rosenvinge's description (l. c.); the vegetative filaments were about 8—9 μ broad; the fructifying 13—14 μ.

[1] One presented by Simmons to the Botanical Museum in Copenhagen, and one kindly lent me by the Botanical Museum in Lund.

Specimens bearing unilocular sporangia occurred in May and June.

Found hitherto only on Öst.: Glibre (!), Fuglefjord (!).

Order PUNCTARIACEAE.

PUNCTARIA Grev.

122. **P. latifolia** Grev.[1] Thuret & Bornet, Études phycologiques p. 13, pl. V.

To begin with I was very doubtful to what species I should refer some small *Phyllitis*-like algæ which I found growing as an epiphyte on *Halidrys siliquosa* near Glibre in Skaalefjord.

I first took them to be broad *Desmotrichum undulatum*, as they agreed fairly well on the whole with Lyngbye's figure of *Ulva plantaginifolia β tenuior* (Hydrophyt., p. 31, tab. 6 B), which figure Reinke in »Algenflora d. westl. Ostsee«, p. 55, refers to *Desm. undulatum*. But on closer examination some of the specimens were found bearing a few immersed plurilocular sporangia at the apex of the thallus, which had quite a different form from those described and figured by Reinke under *Desmotrichum undulatum*, while they agreed well with those figured by Thuret et Bornet in their above-mentioned work under *P. latifolia*. These sporangia-bearing plants were, moreover, composed of two layers of cells which according to Thuret et Bornet (l. c. p. 15) generally occur in young — sometimes even in large — examples of *Punct. latifolia*; there were numerous hairs at the margin of the thallus, as well as on the surface where they occurred in small tufts; and lastly the cells were rather large and fairly regular in form, so that all the characters pertaining to *Punctaria latifolia* were present. But the specimens being very small I was not quite sure of their really belonging to this species.

During my above-mentioned visit to Heligoland I showed my preparations to Dr. Kuckuck, and he afterwards wrote to me that the specimens bearing the plurilocular sporangia should undoubtedly be referred to *P. latifolia* — the sporangia of which exactly agreed with those of the former — while they could by no means be referred to *P. plantaginea*, on which Dr. Kuckuck had found the

[1] In Analecta algologica, Continuatio III, J. Agardh refers this species to a new genus *Homoeostroma* founded by him.

plurilocular sporangia, hitherto unknown in this species, which were also immersed, but were quite different in form from those of *P. latifolia*. On the other hand, some quite small specimens, which occurred among the sporangia-bearing plants, and which, like these grew epiphytic on *Halidrys*, were pronounced by Kuckuck to be unquestionably *Punctaria plantaginea*, the young plants of the latter species having marginal hairs and closely resembling a *Desmotrichum undulatum*.

I have further referred to *P. latifolia* the *P. plantaginea* of my preliminary list, which is by the way wrongly reported from Thorshavn it having been found in Kalbakfjord. On closer examination of the few dried specimens which were all I collected there, the thallus proved to be composed of two layers of cells only, and they agreed altogether well with Thuret et Bornet's figure, l. c. Lastly, a specimen of the *P. plantaginea* mentioned by Simmons (l. c. p. 270) of which he kindly sent me an example, on being examined more closely also proved to agree fairly well with *P. latifolia*, amongst other things in the fact of its thallus containing two layers of cells, but the specimen in question is unfortunately sterile. I also showed Dr. Kuckuck this specimen which he pronounced to be undoubtedly *P. latifolia*.

f. *angustifolia* Kütz., Tab. phyc., Vol. 6, tab. 45.

Some specimens gathered by Ostenfeld from Trangisvaagfjord and by myself epiphytic on *Laminaria* near Arge, I have referred to what Kützing (l. c.) calls *Punctaria angustifolia*. One of the specimens bore quantities of sporangia, a transverse section of which showed that they had exactly the same form as those in Kützing's fig. (l. c.). The form of the plant also agreed well with Kützing's habit illustration.

Judging from its known habitats, *P. latifolia* occurs along the Færöese coasts in sheltered situations epiphytic on larger algæ, e. g. *Laminaria* and *Halidrys*, and at no great depth. Fructifying specimens were found in May only.

Found hitherto in the following places: — Öst.: Glibre (!); Str.: Kalbakfjord (!); Syd.: Trangisvaagfjord (Simmons, l. c. mentions having found it abundantly on *Laminaria saccharina* and *L. hyperborea*); f. *angustifolia* has been found on Str.: Arge (!); Syd.: Trangisvaagfjord (Ostenfeld).

123. **P. plantaginea** (Roth) Grev. Kjellm., N. I., p. 323 (260).

Found hitherto only in sheltered localities in the interior of fjords, or in the narrow sounds in which it occurs in the sublittoral

zone, but in shallow water. I have usually found it growing attached to stones and once only as an epiphyte (cfr. *P. latifolia*).

I came across large vigorous examples bearing sporangia in June and July.

Found in the following places: — Str.: Sundene between Thorsvig and Kvalvig (!); Öst.: Glibre (!).

DESMOTRICHUM Kütz.

124. **D. undulatum** (J. Ag.) Reinke, Algenflora, p. 55; Atlas, p. 15, tab. 11.

Once only in June some small specimens were found, but they bore quantities of plurilocular sporangia and agreed exactly with Reinke's description and figures. They grew in shallow water and were gathered together with *Cystoclonium purpurascens* amongst which alga I first found it on examining the material more closely here in Copenhagen, so I cannot say to what substratum it grew attached.

Str.: Sundene between Thorsvig and Kvalvig (!).

PHYLLITIS Kütz.

125. **Ph. fascia** (O. F. Müll.) Kütz. Ilea fascia Fr., Kjellm., N. I., p. 319 (257); Ulva fascia Lyngb., Hydrophyt., p. 28.

Occurs in the littoral zone, especially on the open sea-shore, but also in sheltered situations. It grows both in places where it is left dry at ebb-tide and in rock-pools. It is usually found attached to rocks and stones but also occurs, though rarely, as an epiphyte, e. g. on *Himanthalia lorea*. In Kalbakfjord it grew at the mouth of a stream where the water was occasionally quite fresh. Fructifying specimens were found in April, May, June, July and November. According to Reinke (Algenflora westl. Ostsee, pp. 61—2) this species is a winter and spring plant in the western part of the Baltic; judging from the material I have had for examination it is met with all the year round around the Færöes, where at any rate it occurred abundantly during summer.

This species is common, especially along the exposed coasts of the Færöes.

126. **Ph. zosterifolia** Reinke, Algenflora westl. Ostsee, p. 61.

This alga which is doubtless rather rare along the Færöes was found both on exposed coast and in somewhat sheltered localities;

it occurs in the littoral zone, and has been met with near high-water mark, where it may often be found in a completely dried up state.

It grows gregariously on rocks.

It was gathered in May and October, well-developed specimens occurring in both these months.

Fructifying plants were found in May.

In Fær. Fl. p. 86 Rostrup mentions a f. *filiformis* of *Phyllitis fascia*, but the specimen in his herbarium bearing this name has proved to be *Ph. zosterifolia*.

It has hitherto been found in the following places only: — Vid.: Viderejde (!); Öst.: Solmunde (H. J.); Str.: The east coast (Rostrup).

SCYTOSIPHON (Ag.) Thur.

127. **S. lomentarius** (Lyngb.) J. Ag. Kjellm., N. I., p. 320 (258); Chorda lomentaria Lyngb., Hydrophyt., p. 74.

Specimens occurred both with and without constrictions. This species grows on rocks in the littoral zone and is met with in sheltered but more especially in exposed localities. In the latter it can occur fairly near high-water mark (e. g. in much exposed localities near Mjovenæs [Öst.], and on Myggenæs it grew near or even somewhat above high-water mark) where it grows by preference in slight depressions in the rock containing a little water left by the receding tide, but it also occurs on sloping rock surfaces where it is left quite dry. In sheltered localities where tides are not felt it grows in shallow water, especially on stony bottoms. It may extend far into the fjords and can bear a strong admixture of fresh-water.

In Vaagfjord it was found epiphytic on *Zostera*.

Specimens gathered in April were still sterile. Fructifying plants were found in May, June, July and it doubtless keeps on fructifying till late in autumn.

This species is extremely common along the coasts of the Færöes, as was pointed out by Lyngbye: — »Habitat in infimo refluxus limite ad littora Færoensia, ut ad Qvivig, copiose«.

LITOSIPHON Harv.

128. **L. Laminariæ** (Lyngb.) Harv., Manual of the Brit. Mar. Alg., p. 43; Bangia Laminariæ Lyngb., Hydrophyt., p. 84.

This species grows on the leaves of *Alaria esculenta*, in the tissue of which the creeping filaments occur, and it frequently forms

a densely matted growth on them. The unilocular and plurilocular sporangia which often occur on the same filament were found in June and July; but in a gathering from Nolsö only plurilocular sporangia were observed so on this point they agreed with *Pogotrichum hibernicum* Johns.[1], though as a transverse section of the filament showed that its median cells were considerably larger than those along its periphery, it could not belong to this species.

This plant was already found by Lyngbye, who writes with reference to its distribution around the Færöes (l.c.): — »Habitat in utraque pagina Laminariæ esculentæ ad littora Færoensia, haud vulgaris«.

Found in the following places: — Öst.: Ejde (!), Mölen (!); Str.: Kvivig (!), Velbestad (!), Kollefjord (H. S.), Kalbak (!), Thorshavn (!); Nolsö (!); Vaagö: Midvaag (!); Syd.: Kvalbö (Lyngbye), Trangisvaagfjord (H. S.), Frodebö (!), Sumbö Holm (!).

POGOTRICHUM Reinke.

129. **P. filiforme** Reinke, Atlas deutscher Meeresalgen, p. 62, tab. 41, figs. 13—25; Kuckuck, Ueber Polymorphie bei einigen Phaeosporeen (Festschrift für Schwendener).

Grows as an epiphyte on the lamina of *Laminaria saccharina* which it sometimes covers with a dense, matted growth. At the base of the filaments the same hyphæ-like threads occurred as mentioned by Kuckuck (l. c. p. 364).

It was found bearing plurilocular sporangia in May and July, but I have not observed unilocular sporangia which Kuckuck mentions as occurring on it (l. c. p. 363).

This species, which is probably fairly common has hitherto been gathered from the following places only: — Str.: Thorshavn (!); Vaagö: Midvaag (!).

STICTYOSIPHON Kütz.

130. **S. tortilis** (Rupr.) Reinke, Atlas, Tab. 31—32; Rosenv., Grønl. Havalg., p. 868.

Found growing in shallow water in sheltered situations in the sublittoral zone. Grows on stones and also frequently epiphytic on *Chordaria flagelliformis.* It can bear a strong admixture of fresh-water. The specimens gathered in June and July which I have examined were sterile.

Found hitherto in the following places only: — Öst.: Strænder (!); Str.: Head of Kalbakfjord (!); Syd.: Lobra (!); a closer search would no doubt show it to be more commonly distributed.

[1] Johnson, Pogotrichum hibernicum n. sp. (Proceed. of the Royal Dublin Society, Vol. VIII, 1893) and Johnson, Two Irish Brown Algae (Annals of Botany, Vol. VIII, 1894).

ASPEROCOCCUS Lamx.

131. **A. echinatus** (Mert.) Grev.

This species has hitherto been found only by Simmons in Kvalbōfjord (Syd.), where it grew epiphytic on *Corallina officinalis*. Fructifying specimens were found in August.

PHÆOSTROMA Kuck.

132. **Ph. parasiticum** nov. spec.

In preparing a large *Laminaria fœroensis* which had been preserved in salt I observed on the lamina some small, dark brown patches which on closer examination proved to be an interesting brown alga which appears to me to be referable to the above-mentioned genus, and Dr. Kuckuck, to whom I showed my drawings while in Heligoland, was of the same opinion. Unfortunately, I can only give a very imperfect description of this plant, as having been preserved in salt the cell-contents were quite destroyed, and the material, moreover, proved to be unfit for dissecting purposes, so that, it has been impossible to obtain good, thin slices. But the plant is so characteristic that it will be easily recognized in spite of the imperfect description.

As mentioned above, the alga forms dark brown patches on the lamina. On examining these patches more closely the margin will be found to consist of richly branching, free filaments (fig. 83, *b* and *c*) which towards the centre gradually grow together and the one above the other, forming a pseudo-parenchymatous tissue, frequently of considerable thickness (fig. 83 *d*). In a transverse section this tissue again will be seen to grow out in the middle of the plant and to extend into the lamina of the *Laminaria* through the epidermis of the latter, going further down between the large cells and finally spreading radiately in the hyphæ-layer in the centre of the lamina.

The margins of all the specimens I examined were invariably composed of free filaments, and usually they could be distinctly traced far towards the centre of the plant; but a disc with marginal growth such as Kuckuck has figured under *Ph. pustulosum* I did not meet with on my plant. The cells in the main branches are generally 3 to 4 times as long as broad, and the main branches frequently bear opposite ones. I did not come across horizontal walls separating the filaments into two layers such as most fre-

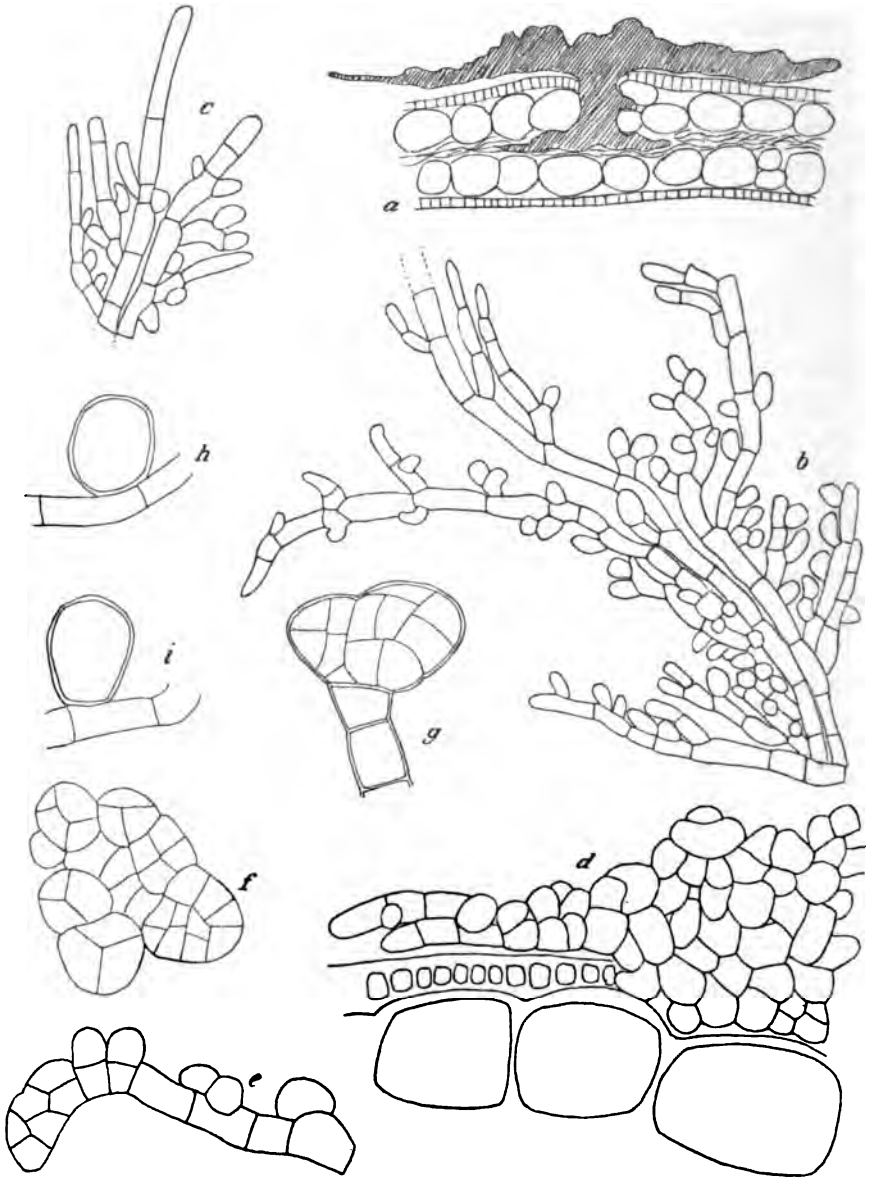

Fig. 83. *Phæostroma parasiticum* **nov. sp.** *a* **transverse section of the lamina of a** *Laminaria* **with** *Phæostroma parasiticum* **nov. sp.;** *b*, *c* **portions of the margin;** *e* **part of filament with young plurilocular sporangia;** *g*, *f* **plurilocular sporangia;** *h*, *i* **unilocular sporangia.** *a* **80:1;** *b* **and** *c* **160:1;** *d* **200:1;** *e*, *f*, *g*, *h*, *i* **270:1.**

quently occur in Kuckuck's plant. The layer becomes pseudo-parenchymatous solely through the filaments creeping over each other and growing together. I did not find hairs, but it is possible

that they were destroyed by the rough handling. I think I found both plurilocular and unilocular sporangia. The former (fig. 83, *e*, *f*, *g*) strikingly resemble those described by Kuckuck and occur in the same small, almost tuber-like protuberances which are undoubtedly always formed by the apical cells of the filaments; the plurilocular sporangia appear to be able to attain to a larger size than stated by Kuckuck, viz. a breadth of 20—30—70 μ. With regard to the unilocular sporangia, I am not quite sure that they really are such, the cell-contents having been destroyed. What I have referred to them are some large cells, of which several frequently occurred close together on a few branches. I have shown them in fig. 83, *h* and *i*, and I think they agree fairly well with Kuckuck's figure, and also correspond well with regard to size, being about 30—40 μ broad. The free filaments are about 16—18 μ broad. As I said before, I can state nothing for certain as to cell-contents, chromatophores, etc. (but I may point out that in some of the cells the chromatophores appeared to be ribbon-shaped or reticular, a character which distinguishes this species from the other hitherto-known *Phæostroma*-species), nor do I know anything about the development of the plant, nor how it penetrates into the *Laminaria*[1].

This plant has been found on *Laminaria fœroensis* which grew in shallow water.

It bore both plurilocular and unilocular sporangia (?) in July.

Found hitherto only on Str.: Sundene between Thorsvig and Kvalvig (!).

Order DICTYOSIPHONACEAE.

DICTYOSIPHON Grev.

133. **D. foeniculaceus** (Huds.) Grev. Kjellm., N. I., p. 333 (269); Scytosiphon foeniculaceus Lyngb., Hydrophyt., p. 63.

Grows in shallow water especially in sheltered localities; occurs commonly as an epiphyte on *Chordaria flagelliformis*.

Sporangia-bearing specimens were found in summer.

This species for the examination of which I have not had much material is undoubtedly rather common along the Færöese coasts as reported by Lyngbye, who writes: — »Ad insulas Færoenses copiose«.

[1] *Ph. pustulosum* was found endophytic by Rosenvinge (Deux. Mém., p. 68) in *Delamarea attenuata*.

134. **D. hippuroides** (Lyngb.) Kütz. Kjellm., N. I., p. 332 (268); Scytosiphon hippuroides Lyngb., Hydrophyt., p. 63.

I have had but comparatively little material of this species for examination. One of the collections resembled very much No. 322 in Hauck and Rickter's »Phykotheka universalis«.

This species like the preceding was found especially in sheltered situations in shallow water and mostly epiphytic on *Chordaria flagelliformis*. Sporangia-bearing specimens were met with in May and October.

Found in the following localities only: — Öst.: Ejde (H. S.), Glibre (H. S.); Str.: Kollefjord (H. S.), Kalbakfjord (H. S., !), Kvalvig (H. J.).

135. **D. Ekmani** Aresh., Observationes 3, p. 33; Coilonema Ekmani Kjellm., N. I., p. 329 (266).

The Færöese specimens have now and then one or at most only a few lateral branches.

Found in sheltered places in shallow water epiphytic on *Scytosiphon lomentarius*.

It bore young sporangia in May.

Found only: — Bordö: Klaksvig (!).

Order DESMARESTIACEAE.

DESMARESTIA (Lamour.) Grev.

136. **D. aculeata** (L.) Lamour. Kjellm., N. I., p. 324 (261); Rosenv., Grønl. Havalg., p. 857. Desmia aculeata Lyngb., Hydrophyt., p. 34.

This species grows in the sublittoral zone and occurs down to a depth of at least 10 fathoms. It grows by choice in the open sea, but is also met with abundantly in sheltered situations. It generally grows attached to stones and rocks, but also now and then occurs as an epiphyte on the stems of *Laminaria*; in sheltered localities it is also frequently found in masses lying detached even on sandy and muddy bottoms as Rosenvinge points out is the case in Greenland.

It bore unilocular sporangia at the end of October; while gathering it Jónsson saw the spores move. The sporangia, only lately discovered by Kuckuck, and found almost simultaneously in some winter-material from Denmark by Rosenvinge, were precisely similar to Kuckuck's figure (Bemerkungen I, 1894, p. 247).

Assimilative hairs occurred on the plant in May and June, and are especially common as late as May, while in June hair-bearing specimens become rare. This agrees very well with what Rosenvinge says is the case in South Greenland where the hairs fall off at the latest in June, while in North Greenland hair-bearing specimens have been observed as late as July and August.

This species is extremely common along the coasts of the Færöes as already reported by Lyngbye: — »Ad insulas Færoenses copiose«.

var. *media* (Ag.) J. Ag., Species Alg., I, p. 168; Rosenv., Grønl. Havalg., p. 858; Desm. hybrida Kütz., Phyc. germ., p. 274, Tab. phyc., Vol. IX, tab. 93. I think that *Ectocarpus densus* Lyngb. (Hydrophyt., p. 133) ought also to be referred to this variety; it is at any rate a richly hair-bearing *Desmarestia aculeata*.[1]

The Færöese specimens exactly resemble the above-mentioned figure and answer in other respects very well both to Rosenvinge's description (l. c.) and to the Greenland specimens in the herbarium of the Botanical Museum in Copenhagen.

The specimens referred to this variety are far more densely covered with hairs than is the case with the main form and the hairs are also much longer. Sometimes a few, sometimes several of the bottom branches are opposite. It also retains its hairs much longer than forma *typica*, specimens gathered in July and August being closely covered with hairs. Spines were wanting, only a single specimen having on one of its branches a few which were not, however, typically developed. Thus we see typical var. *media* differs rather widely from typical *Desm. aculeata* and, consequently, it ought perhaps more properly to be regarded as a distinct species. In habit it reminds one much of *Chorda tomentosa* if one can imagine the latter branched.

It has been found in the following places: — Vid.: Near Viderejde, great quantities were found floating in the sea after a storm (!); Bordö: In Haraldsund near Aaerne (!); Str.: Gliversnæs (!), Kvivig (Lyngbye); Syd.: Trangisvaagfjord (Ostenfeld).

137. **D. ligulata** (Lightf.) Lamour. Desmia ligulata Lyngb., Hydrophyt., p. 33.

I once fished up some specimens of this species in a plaice net from a depth of some 3—4 fathoms in Kvalböfjord (Syd.), but

[1] The Færöese specimen preserved in Lyngbye's Herbarium is certainly very small and has no opposite branches, but otherwise it agrees well with the specimen of *Desm. aculeata* which I have referred to this variety.

as they were gathered from a sandy bottom they were doubtless free-floating examples; otherwise I only found them washed ashore, and it appears as if the specimens found by other collectors were also only such as had been cast ashore; thus, Lyngbye does not enter into any details regarding its habitat. I am therefore not prepared to say anything definite regarding its habitat around the Færöes, but I believe it grows along fairly open sea-shores and probably in the sublittoral zone, as it can only bear a short period of desiccation without injury.

I found it bearing assimilative hairs in June and July.

It is hardly common along the coasts of the Færöes. Lyngbye (l. c.) writes with reference to it: — »Habitat ad littora Færoensia haud frequens, ut in sinu Qualböe Suderöe, et ad littus Mölen prope Eide Österöe«. Rostrup collected specimens of it on the east coast of Strömö where it was also found by me, viz. near Thorshavn and Hvidenæs. Again, Simmons observed it near Ejde (Öst.) and I near Kvalbö (Syd.), i. e. in the same places where Lyngbye found it.

138. **D. viridis** (Müll.) Lamour. Rosenv., Grønl. Havalg., p. 859; Dichloria viridis (Müll.) Grev., Kjellm., N. I., p. 325 (263); Gigartina viridis Lyngb., Hydrophyt., p. 44.

Found growing in the sublittoral zone down to a depth of some 10 fathoms; it rarely occurs at greater depths and Kjellman's statement (l. c.) that specimens were found near Spitzbergen down to a depth of 150 fathoms must undoubtedly be due to detached floating examples having been carried by the stream to deeper waters.

It grows by preference in the open sea but may also be met with in somewhat sheltered situations. It is generally found growing attached to stones and rocky bottoms, but also occurs, though rarely, as an epiphyte, especially on the stem of *Laminaria*.

This is a very common species of the Færöese coasts, as was pointed out by Lyngbye, who writes: — »Ad insulas Færoenses copiose«.

Order CHORDARIACEAE.

CHORDARIA (Ag.).

139. **Ch. flagelliformis** (Müll.) Ag. Lyngb., Hydrophyt., p. 51; Kjellm., N. I., p. 310 (249).

As Foslie (Contrib. I, p. 90) refers all the Norwegian specimens

from East-Finmarken to f. *typica*, so I am of opinion that all the Færöese specimens may be referred to this form.

This species grows both on fairly exposed shores and in sheltered localities, but is most common in the latter. It generally occurs in the sublittoral zone, but not at any considerable depth; where the tide is not felt it is common in 1 to 2 feet of water. Most frequently it is found attached to stones, but may also occur epiphytic on larger algæ.

Sporangia-bearing plants were found in November and December, but the summer specimens which I have examined were sterile.

This species is quite common along the Færöese coasts and was already found by Lyngbye.

CASTAGNEA Derb. et Sol.

140. **C. virescens** (Carm.) Thur. Le Jolis, Alg. mar. de Cherb., p. 85; Eudesme virescens J. G. Ag., Kjellm., N. I., p. 312 (251).

Found in a sheltered situation in quite shallow water growing on stones. It had sporangia in July.

It appears to be very rare along the coasts of the Færöes as it has been found once only, and in a small quantity, in Sundene on the coast of Strömö between Thorsvig and Kvalvig (!).

LEATHESIA (Gray) J. G. Ag.

141. **L. difformis** (L.) Aresch. Kjellm., N. I., p. 313 (252).

It belongs to the littoral zone and has been mostly met with in sheltered localities. It generally occurs as an epiphyte on *Corallina officinalis*, but also grows on rocky bottoms. It was found bearing plurilocular sporangia in July.

Found in the following localities: — Öst.: Ejde (H. S.), Selletræ (H. S.); Str.: Kollefjord (H. S.), Kalbakfjord (!), Thorshavn (H. S.); Syd.: Trangisvaagfjord (H. S.). Simmons, l. c. p. 270, mentions it on the whole as common: — »als Epiphyt in der Corallinaformation, wo sie selten zu fehlen scheint«. The reason why Simmons found it so frequently is doubtless that it is most luxuriantly developed at the end of summer.

Order CHORDACEAE.

CHORDA (Stackh.) Lamour.

142. **Ch. filum** (L.) Stackh. Lyngb., Hydrophyt., p. 72; Kjellm., N. I., p. 307 (245); Reinke, Atlas, tab. 26—28.

This species grows in shallow water down to a depth of a few fathoms, especially in sheltered situations. It is consequently common in the interior of fjords and may even be met with right at their head where the water is brackish owing to the fresh-water streams entering the sea. It grows by preference on gravelly bottoms attaching itself to pebbles and shells, and where the water is $^1/_2$ to 1 fathom deep it often forms a dense growth; the topmost part of the thallus may then be seen floating on the surface of the water.

Sporangia-bearing plants were found in May, June, July and October. Specimens from the spring months were young and still small, during the summer they attained to their highest development, while specimens gathered as early as October were more or less decayed. It probably dies away completely during the winter, as is doubtless also the case along the Danish shores.

This species is common along the sheltered coasts of the Færöes. Bordö: Klaksvig (H.S., !); Öst.: Skaalefjord (H.S., H.J.), Kvalvig (H.J., !), Sundelaget (H.S.); Str.: Kalbakfjord (Rostrup, !); Nolsö: Ejde (!); Syd.: Trangisvaagfjord (Ostenfeld, !).

143. **Ch. tomentosa** Lyngb., Hydrophyt., p. 74; Reinke, Atlas, tab. 20.

This beautiful alga was found in the sublittoral zone both in shallow water on rocky coasts, and in deeper water (some 5 to 6 fathoms) in Haraldsund where a strong current was running. Here it grew attached to stones and shells associated with *Laminaria*, *Alaria* and other algæ, and occurred abundantly in vigorous examples several feet in length.

Fructifying specimens were found in May. Found hitherto only on Bordö: Aaerne near Haraldsund (!); Öst.: Mölen (!) and Ejde (!).

Order LAMINARIACEAE.

ALARIA Grev.

144. **A. esculenta** (L.) Grev. Kjellm., N. I., p. 265 (212), Handb., p. 19; Laminaria esculenta Lyngb., Hydrophyt., p. 23.

f. *typica*.

f. *pinnata* (Gunn.).

Fig. 84 represents the form most commonly met with in the Færöes, and the one which I regard as typical. The lamina is long and very narrow in comparison. One specimen which was

Fig. 84. *Alaria esculenta* (L.) Grev. f. *typica*. From St. Dimon. (F. B. fot.). (Scale: 10 centimetres).

3½ metres long, measured at its broadest only 10½ cm., and another 2 metres in length was only 5 cm. broad. In their very narrow, almost linear sporophylls they resemble f. *fasciculata* Strömfelt (Om Algvegetationen vid Islands Kuster, p. 38). Specimens

bearing such narrow sporophylls occur on exposed coasts; in more sheltered localities the sporophylls get broader and the same often applies also to the lamina. These specimens thus constitute a transition to the broader f. *pinnata*.

This species occurs gregariously in enormous masses from about low-water mark to several fathoms below it, but in particularly exposed places it can grow somewhat above low-water mark, and in narrow rock-clefts washed constantly by the sea it may be found up to 1—2 metres above sea-level at low tide. It grows by preference along open sea-shores, but may also occur in the interior of fjords in more sheltered localities, and is most commonly met with on steeply sloping or quite perpendicular rock-faces and in fact on rocks in general. Fructifying specimens were found in May, June, July and November. This alga undoubtedly attains to its highest development in spring and early summer.

With regard to its change of leaves Wille writes in »Beiträge zur physiologischen Anatomie der Laminariaceen«, Christiania, 1897, p. 7: — »dieses Endblatt fällt jeden Herbst ab und wächst von neuen heraus im Laufe des Winters«, but I do not think that this is always so, as at any rate along the Færöes I never came across specimens which showed the slightest indication of a regular change of leaves as is the case, e. g. in most of the *Laminaria*-species. My own observations lead me to think that the leaf keeps on growing at its base during the greater part of the year, while the apex is continually so to speak worn away by the force of the waves. All the specimens I have seen had leaves which were always fresh at the base, while towards the apex they gradually become older and more and more tattered and the segments were gradually torn away so that the midrib only was left and when examined more closely the latter also proved to be scratched and worn at the apex (cfr. fig. 84). It is true that I have only seen specimens from April to August and October to December and it is very probable that the leaf grows more rapidly at certain seasons, but I feel convinced that a regular change of leaves does not take place. I think Wille's observation (based on the material from Mandal gathered in August) must doubtless be regarded as a result of the warm season which is less favourable to this species at so southerly a habitat. [1]

[1] In connection with this I would call attention to the fact that in the museum in Copenhagen we have some specimens gathered by Dr. Rosenvinge near

This species which is extremely common along the coasts of the Færöes was already reported from the latter place by Landt, l.c. p. 230. Lyngbye writes with reference to it: — »ad insulas Færoenses copiose, ubi rupibus præruptis in superficie maris adnascens summæ fluctuum vehementiæ exponitur«. — f. *pinnata* has been found at a few places in the fjords, e. g. in Trangisvaagfjord (Rosenvinge).

145. **A. Pylaii** (Bory) J. G. Ag. Kjellm., N. I., p. 266 (213), Handb., p. 20; Rosenv., Grønl. Havalg., p. 838.

I have only felt justified in referring a few specimens to this species, and they were all rather small. The specimens in question had a distinctly two-edged mid-rib; and as soon as the latter showed the slightest indication of being four-sided or even if the two sides only ran parallel along a short distance I referred the specimens to *Alaria esculenta*, as young specimens of the latter species often have a mid-rib which must most properly be called two-edged.

This species occurs in fairly sheltered localities where it grows in company with the preceding. Fructifying specimens were found in April, May, June and October.

It has hitherto been found only in the following places: — Öst.: Skaalefjord (!), Saltnæs (H. J.); Str.: Thorshavn (!); Syd.: Trangisvaag (Rosenvinge).

This species was already found by Lyngbye as J. Agardh's Herbarium contains a specimen gathered by him which according to Agardh's determination (cfr. J. Ag., Spec. Algarum I, p. 144) belongs to this species. Of the genus *Alaria* Lyngbye's Herbarium in Copenhagen contains some small fragments only, but they all doubtless belong to *Alaria esculenta*.

LAMINARIA Lamx.

146. **L. saccharina** (L.) Lamx. Lyngb., Hydrophyt., p. 21.

f. *linearis* J. Ag., Spec. Alg. I, p. 132; De Laminarieis, p. 12.

f. *bullata* C. Ag., Synopsis Alg. Scandinav., p. 18; Kjellm., Handb., p. 24.

f. *grandis* Kjellm., Handb., p. 24.

This plant varies very much and a large number of forms have been described (see, e. g. Kjellm., l.c., and Foslie, Ueber die Laminarien Norwegens, p. 90). I think the three above-mentioned forms are distinguishable in the Færöese material. The specimens referred to f. *linearis* (see fig. 85) are marked by their long, narrow lamina, which is highly rugose and slightly or not at all waved,

Haugesund in August on the west coast of Norway which do not show the least indication of having changed leaves, the leaves as in the Færöese specimens being worn at the apex and growing gradually younger towards the base.

and has generally no marginal area at all; on the other hand, it has sometimes a smooth, median stripe. The lamina is thick and of a tough, leathery consistency. The Færõese specimens differ from those mentioned by Kjellman in N. I., p. 287 (230) in always having a short stem which passes insensibly into the lamina. With regard to the size of the specimens referred to this form the following measurements may serve as an example: —

Length of plant	Breadth of lamina	Length of stem
2 metres	8 cm.	6 cm.
1 metre	13 cm.	2 cm.

The specimens referred to f. *bullata* are often larger and especially broader as they have a fairly distinct, strongly waved marginal area. Two of the specimens which I measured were of the following sizes: —

Total length	Breadth of lamina	Length of stem
2 m. 10 cm.	20 cm.	9 cm.
2 m. 30 cm.	20 cm.	8 cm.

Lastly, the specimens referred to f. *grandis* are marked by their thinner and smoother or at any rate only slightly rugose lamina, which can attain to a fairly great breadth and has generally a rather distinct marginal area. With regard to the size of the specimens referred to this form the following measurements may serve as a guide: —

Total length	Breadth of lamina	Length of stem
2 m.	35 cm.	13 cm.
2 m. 15 cm.	37 cm.	4 cm.

I have also referred a few large specimens which were found growing in shallow water at the head of Trangisvaagfjord to this form. The lamina was highly rugose and had a strongly waved margin. The consistency of the lamina was in the middle, thick and leathery; in the margin, thin and membranaceous.

One specimen measured as follows: — Length of lamina 2 metres; breadth 75 cm.; stem 5 cm.

Forma *linearis* is met with in the most exposed situations, e. g. on the south-western side of Sumbõ Holm (Syd.); it occurs here near low-water mark and sometimes beyond it. It answers to f. *stenophylla* of *Laminaria digitata*. Forma *bullata* is found

Fig. 85. *Laminaria saccharina* (L.) Lamx. *f. linearis* J. Ag. From Sumbø Holm. (F. B. fot.). (Scale: 10 cm.).

in more sheltered localities, e. g. in the small inlets on the east side of Strømø between Thorshavn and Højvig, but it may also

be met with in the interior of bays and fjords. It belongs to the sublittoral zone but grows in shallow water. Lastly, f. *grandis* grows in the sublittoral zone most commonly in deeper water of some 8 to 10 fathoms and occurs both in the open sea and in the interior of fjords.

Small, young examples of *Laminaria saccharina*, the so-called forma *phyllitis* (cfr., e. g. Kuckuck, Bemerkungen 1, p. 250) often occur in rock-pools.

This species grows both on rocks and stones, and, more rarely, epiphytic on larger algæ, e. g. *Laminaria hyperborea*. Fructifying specimens were found in June and July. The change of laminæ probably takes place during winter as specimens found in May, June and July still had parts of the old lamina attached.

This is a very common species of the Færöese coasts. It was first reported by Landt, l. c. p. 230.

147. **L. færoensis** nov. spec. Syn. L. longicruris de la Pyl. var. færoensis Børgs., En for Færöerne ny Laminaria (Botanisk Tidsskrift, Vol. 20, p. 403).

I had previously described the present plant as a variety of *L. longicruris*, but after having examined the rich material of it which I gathered on my last journeys, I have no hesitation whatever in reporting it as a distinct species, all the more as it fills a gap between the nearest allied *Laminaria*-species hitherto described, which in my opinion also include besides *L. longicruris*, *L. groenlandica* Rosenv., *L. Agardhii* Kjellm. and *L. saccharina* (L.) Lamx. These species and *L. færoensis* resemble each other in habit; their stems are usually comparatively long, their laminæ undivided, most commonly elliptic with waved margin and of a thin consistency. The following table illustrates the occurrence in these species of hollow stems and muciparous canals in the stems: —

	Hollow stem	Solid stem
With muciparous canals . . .	*L. longicruris*	*L. groenlandica*
Without — — . . .	*L. færoensis*	*L. Agardhii*
— — —		*L. saccharina*

Thus we see that *L. færoensis* resembles *L. longicruris* in having a hollow stem, but differs from it in not having muciparous canals; and the absence of the latter character in *L. Agardhii* and *L. saccharina* distinguishes them from *L. groenlandica*, while all three have solid stems.

L. færoensis with its hollow stem being the one which comes most near to *L. longicruris*, I will now go more fully into the points

Fig. 86. *Laminaria færoensis* nov. sp. f. *typica*. From Sundene. With sorus. (C. Thornam del.). $^1/_{14}$: 1.

which, in addition to the above-mentioned characters, separate these two species. In his notes on the occurrence of muciparous canals in the *Laminariaceæ* Guignard[1] observes that *Laminaria longicruris* has muciparous canals both in the lamina and in the

[1] Guignard: Observations sur l'appareil mucifère des Laminariacées (Annales des sciences nat., VII sér. Bot., t. 15, 1892).

stem, but in the latter, however, only in the basal and not in the inflated part. I have now examined the stem and especially the basal part of the stem of numerous specimens of *L. fœroensis* without, however, finding the least indication of muciparous canals which are doubtless wanting here, though they are distinctly developed in the lamina and exactly resemble those which Kjellman found in *L. saccharina* and figured in N. I., pp. 292—3 (234—5), tab. 25, fig. 7.

The length of the stem varies considerably according to whether the plant grows in shallow or deep water; thus, at the head of Kalbakfjord in quite shallow water — a few feet — I found specimens with lamina measuring 3—4 feet and the stem hardly a foot long, while in normally developed specimens the stem and the lamina are of about the same length; in *L. longicruris*, however, the stem is reported to be generally longer than the lamina. With regard to the hollowness of the stem, it appears as if it often extended for a greater distance. I have closely examined a large example, the stem of which measured somewhat above 2 metres, and found that it was already hollow at the apex just below the lamina, and this hollow expansion widened rapidly so that a few inches from the apex of the stem it attained to a diameter of about one inch and remained this width for a short distance; this inflated part, being filled with air, serves to buoy up the lamina. When growing in shallow water (1—2 metres), which seems to be the favourite habitat of this plant, these inflated apical parts of the stem may be seen in abundance floating about on the surface and bearing the immense lamina which hang thence downwards towards the bottom. The hollow part gradually narrows towards the base, and a foot above it the stem becomes solid. In young specimens the stem is solid. The haptera are long, thin, and very much divided.

In typical, well-developed specimens the lamina is broadly elliptic, has a distinctly cordate base, a strongly waved margin, and sometimes tapers somewhat to the top giving almost an ovate appearance to the lamina. In young specimens the lamina is narrower, oblong elliptic, with base less distinctly cordate, and often agrees well with Harvey's figure of *L. longicruris* in Nereis Boreali-Americ., Part 1, tab. IV and in Phycol. Brit., Vol. III, tab. 339. On the other hand, the lamina in typical, well-developed *L. longicruris*, judging both by the specimens from Greenland and other places preserved in the museum in Copenhagen and by the figures and

descriptions in botanical literature, has a wedge-shaped base, which, however, varies (cfr. e. g. De la Pylaie's figures in Annales d. sciences

Fig. 87. *Laminaria færoensis* nov. sp. forma *saccharinlformis* nov. form. From the mouth of Kalbakfjord. (F. B. fot.). (Scale: 10 cm.).

nat., tome 4, 1828, pl. 9, fig. 8); further, the lamina is comparatively narrow.

The form of the sori also usually appears to differ in the two species. In *L. færoensis* the sporangia-bearing part consisted chiefly

of two longitudinal rows on each side of the lamina which merged into each other at the apex of the latter or frequently broke up into several irregularly formed large and small patches; only rarely and especially in the below-mentioned form, did I find a broad sorus along the centre of the thallus as is to be found in typical *L. longicruris.*

I do not think that a regular change of leaves occurs in this species at any fixed season. At any rate I did not observe it from the middle of April to August, nor Jónsson from October to December. Specimens from these seasons did not show the least indication of a regular change of leaves, the lamina being on the contrary very large and well-developed with the apex generally rotting away and falling off; so it is probably continually growing at the base and dying away at the apex. Of course this does not exclude the possibility of its growing more vigorously at some seasons than at others.

From the above description it will be seen that the typical form of this species is well characterized, at least so it appears to me. But, on the other hand, in a habitat not favourable to this species a form occurred which is especially difficult to distinguish from certain forms of *L. saccharina.* I have named it: —

Forma *saccharinifórmis* nov. form.

This (fig. 87) is distinguished from the main form by the lamina being narrower and less waved, and by the base of the lamina being frequently not cordate, but rounded or sometimes even wedge-shaped; hence its habit bears much resemblance to that of *L. saccharina* and *L. longicruris.* The lamina varies in its consistency from a sort of thin paper to a fairly thick parchment, and one of the specimens had a distinctly chequered surface such as is frequently to be found in *L. saccharina.* The lamina was usually shorter than the stem. The former was destitute of muciparous canals and its stem was generally distinctly hollow, but specimens also occurred with almost or quite solid stems and these could hardly be distinguished from long-stemmed *L. saccharina.* In this connection I would call attention to the specimens which Farlow (Marine Algæ of New England, p. 93) in his description of *L. longicruris* mentions as follows: — »specimens resembling *L. saccharina,* but with hollow stipes have been collected in Long Island Sound. Whether really belonging to *L. longicruris* is doubtful and the subject requires farther investigations«; if the stems of

Farlow's specimens are also destitute of muciparous canals then they resemble the present form in no slight degree.

Thus *Laminaria færoensis*, of which the typical form is particularly characteristic and easily recognizable is owing to the occurrence of this form perhaps not so clearly marked off especially from *L. saccharina*, just in the same way as Rosenvinge (»Grønl. Havalg.«, p. 846) points out that *L. longicruris* on account of the occurrence of not decidedly typical specimens, is less distinct from *L. groenlandica* and *L. cuneifolia*.

The typical *Laminaria færoensis* which is undoubtedly the largest alga of the Færöese coast, grows by preference in the most sheltered situations; it attains to its highest development at the head of fjords and in the narrow sound between Österö and Strömö. As I said before, it develops more vigorously in shallow water — in a few metres — where it can reach the surface by means of its air-vesicles; but well-developed specimens may also occur at greater depths, at about 10 fathoms. Forma *sacchariniformis* occurs at the boundary of the area of distribution of the typical form, especially in deeper water where the sea begins to be somewhat disturbed. But the species has never been met with in the open sea. It grows especially on stony and gravelly bottoms and even on quite fine-grained gravel, and in such a case it attaches itself by means of its finely divided haptera to numerous small stones.

Fructifying specimens were found in May, June and July.

With regard to the size of the plant, I may refer to the measurements given in Bot. Tidsskrift (l. c.).

This is a common species and occurs abundantly in all well-sheltered localities: — Syd.: Head of Vaagfjord and Trangisvaagfjord; Str.: Kollefjord, Kalbakfjord and in fact everywhere in the sound between Öst. and Str. from the narrow tideway to the north to about Kalbakfjord; further, in Skaalefjord on Öst. During a brief stay in the interior of Sörvaagsfjord I searched for it in vain; it is possible that this fjord, being open and rather exposed even in the interior, does not afford a suitable habitat for this species.

148. **L. digitata** (L.) Lamx. Lyngb., Hydrophyt., p. 20 partim.

f. *genuina* Le Jol., Examen des espèces confondues sous le nom de Laminaria digitata auct. (N. Act. Car. Leopold. Vol. 25.)

f. *stenophylla* Harv., Phycol. Brit., Plate 338; Laminaria stenophylla (Harv.) J. Ag., De Laminarieis, p. 18; Kjellm., Handb., p. 24.

f. *cucullata* Le Jol., l. c.

I think the three above-mentioned forms of this plant, which

varies considerably according to its habitat, are to be distinguished in the Færöes.

The forms referred to f. *genuina* somewhat resemble the figure in the centre of fig. 88 which is taken from a small example, but they are generally a little broader and have often a cordate base. Some of the specimens had the upper part of the stem compressed and consequently agreed with Kjellman's f. *complanata*. But in the Færöes I have not come across specimens precisely similar to Foslie's figures of f. *typica* in »Ueber die Laminarien Norwegens« pl. 4 and 5, fig. 1, the stems of the Færöese specimens especially being much shorter. To show the dimensions in f. *genuina* I give the following measurements: —

Total length	Length of stem	Length of lamina	Breadth of lamina
157 cm.	52 cm.	105 cm.	50 cm.
200 cm.	25 cm.	175 cm.	55 cm.

Some of the specimens referred to f. *stenophylla* were precisely similar to Harvey's above-mentioned figure, and had the lamina divided into 2—3 segments only; others had the lamina split into many quite narrow segments (see the two outside specimens in fig. 88) thus agreeing most closely with Kjellman's f. *cuneata* (Handb., p. 23). The Færöese specimens of this form were comparatively small, those figured being, e. g. some 50 cm. long.

The specimens referred to f. *cucullata* are noteworthy by their lamina being more or less cucullate and being either divided into only a few broad segments or being entirely whole; the lamina is frequently very irregularly folded and waved, but in young specimens it is sometimes almost smooth like Le Jolis's f. *ovata*. Such a young specimen is distributed in Areschoug's Alg. scand. No. 167. The length of the stipe also varies considerably, being sometimes short, sometimes long even longer than the lamina (f. *longipes*). In the Færöes I found specimens precisely similar to those figured by Foslie (l. c.).

Forma *stenophylla* is generally met with in the littoral zone and occurs on open sea-shores even in the most exposed situations. Forma *genuina* grows in more sheltered localities in the sublittoral zone or near extreme low-water mark. Forma *cucullata* occurs in the sublittoral zone in the interior of fjords and is particularly well-developed in places where the water is almost stagnant. F. *stenophylla* and f. *genuina* generally grow on rocky bottoms; f. *cucullata* especially on stony bottoms.

Fructifying specimens were found in June, July and November. Judging from the material in hand the plant doubtless changes its

Fig. 88. *Laminaria digitata* (L.) Lam. From Store Dimon. (F. B. fot.). (Scale: 10 cm.).

lamina during the winter; and attains to its highest degree of development during the summer.

This species is extremely common everywhere along the Færöese coasts.

149. **L. hyperborea** (Gunn.) Foslie, Ueber die Laminarien Norwegens, p. 42; L. Cloustoni Le Jolis, Examen des espèces confondues sous le nom de Laminaria digitata auct., p. 56; Kjellm., N. I., p. 298 (239); Laminaria digitata Lyngb., Hydrophyt., p. 20 partim.

While a great many forms of, *Laminaria digitata* e. g., have been distinguished, this has not been the case with the present species, though it also varies considerably, at any rate in the Færöes, and in a manner quite similar to *L. digitata*. Thus in exposed situations small specimens are met with here and there near low-water mark, but rarely in great abundance, which by their narrow lamina and also by the latter being often divided into narrow segments strikingly resemble forma *stenophylla* of *L. digitata*; and in the interior of fjords in stagnant water the lamina becomes less divided or is even entirely whole, also becoming irregularly folded and waved just as is characteristic for forma *cucullata* of *L. digitata*. I have not found Foslie's f. *compressa* in my material.

This species generally grows in the sublittoral zone, but as mentioned above it may sometimes be found near low-water mark, e. g. in rock-pools. Its proper habitat is from a depth of a few to as much as 10 fathoms, sometimes even to almost twice that depth. It grows by preference in the open sea, but may also be met with in the interior of fjords, it grows most commonly on rocky bottoms which it covers with a dense forest-like growth. Frutifying specimens were found in November. It changes its lamina during winter; in the spring months large quantities of the old laminæ are washed ashore but as late as May and June I found specimens which still had the old lamina attached.

This species is extremely common along the coasts of the Færöes where it forms widely spreading growths; Lyngbye (l. c.) who does not keep it distinct from *Laminaria digitata* writes with reference to it: — »Habitat in fundo sinuum Færöensium profunditate plurium orgyiarum superficiem maris, aqua decrescente, sylvæ instar, attingens«.

Saccorhiza bulbosa (Huds.) De la Pyl. On the authority of Landt who (l. c. p. 232) mentions *Fucus polyscides* as found in the Færöes, Lyngbye in Hydrophyt., p. 20, reports *Saccorhiza bulbosa* from the Færöes under the name of *Laminaria bulbosa*. But the synonyms alone which Landt mentions in the same place make the correctness of the above statement doubtful, and as the species has, moreover, never since been found in the Færöes I have thought

that it should be omitted from the list of the Færõese algæ. But, of course, there is just a possibility of its having been conveyed thither from Norway or the British Isles.

Order FUCACEAE.

HALIDRYS (Lyngb.) Grev.

150. **H. siliquosa** (L.) Lyngb., Hydrophyt., p. 37; Kjellm., N. I., p. 243 (194).

Found attached only in Skaalefjord near Glibre, where large specimens of a metre or more in length occur in about one fathom of water. Specimens gathered in the middle of May were sterile, but some found late in October had fruit.

Besides occurring in the above-mentioned habitat — Glibre (Öst.) — where it was observed by Simmons, Jónsson and myself, it has been found detached floating about or cast ashore at the following places: — Bordõ: Klaksvig (Rostr.); Str.: Hvidenæs (Rostr., H. S.), Thorshavn (!). Lyngbye does not mention this species as occurring in the Færões, but Landt (l. c. p. 228) reports it from these islands.

ASCOPHYLLUM Stackh.

151. **A. nodosum** (L.) Le Jol. Rosenv., Grønl. Havalg., p. 832; Ozothallia nodosa Kjellm., N. I., p. 243 (194); Halidrys nodosa Lyngb., Hydrophyt., p. 37.

Besides the common form, another occurs along the coasts of the Færões which is smaller and more delicately built in all its parts. It is much slenderer than the form in Le Jolis's Alg. mar. de Cherb., No. 101, though the latter is far from large. The difference between the common large form and the small one is shown in the accompanying illustration (fig. 66) reproduced from a photograph of the two forms. The branches of the small form are narrower; the largest air-bladders are hardly more than one-third the size of those in the large form, and the same applies to the receptacles, etc. It occurs here and there together with the typical form, and grows in large bushes like the latter.

This species is very common in sheltered localities, but may also be met with in more exposed places, viz., off the west-coast of Syderõ, on rocky islets, where it grows on the sides of the rocks facing the land. During a storm these islets are completely dashed over by the breakers. Where tides prevail it grows somewhat above half-tide level; where their influence is not felt, e. g. in

Fig. 89. *Ascophyllum nodosum* (L.) Le Jol. Compare text. (Scale: 10 cm.). (F. B. fot.).

Sundene it grows in shallow water, but does not occur so abundantly as in the former place, doubtless because it prefers being left dry at ebb-tide.

I found it bearing ripe receptacles as early as the end of April, and it keeps on fructifying throughout the summer, evidently ceasing towards the end, as specimens gathered late in July had only a few receptacles left on them. Lastly, specimens from the beginning of December bore young receptacles, so the latter doubtless develop during the winter. This agrees well with what Kjellman (l. c. p. 244 [195]) says is the case in Arctic Norway.

This is an extremely common species of the Færoese coasts as already pointed out by Lyngbye: — »Ad littora Færoæ copiose«.

FUCUS L.

152. **F. inflatus** L., M. Vahl, Flora Danica, tab. 1127; Foslie, Krit. fort., (Tromsö Mus. Aarshefter, IX, 1886, p. 109); Rosenv., Grønl. Havalg., p. 834; Fucus vesiculosus γ inflatus Lyngb., Hydrophyt., p. 3. (Specimens are lacking in his herbarium in Copenhagen). Fucus furcatus Kleen, Nordl. Alg., p. 29.

f. *edentata* (De la Pyl.) Rosenv.[1] l. c. Fucus edentatus de la Pyl., Flore de Terre Neuve, p. 84, Paris 1829; Fucus furcatus and Fucus edentatus J. Ag., Spetsbergens Alger, Tillåg p. 40[2]; Fucus edentatus de la Pyl., f. *typica* Kjellm., N. I., p. 256 (204).

f. *disticha* (L.), Fucus distichus L. partim[3]; Lyngb., Hydrophyt.,

[1] C. Agardh's *Fucus furcatus* (Spec. Alg., p. 97, 1821, Icones alg. ineditæ, tab. XIV) is certainly older than De la Pylaie's *Fucus edentatus*, and, consequently, on the ground of priority the former name ought to be preferred, but as the specimen of this species which C. Agardh described was — judging especially from his figure — a small, poorly developed one (apparently a transitional form to f. *disticha*) I think it most proper not to use his name.

[2] Cfr. Ruprecht, F. J, Tange des ochotskischen Meeres (Middendorff, Reise in Sibir., 1. Band, p. 346). Ruprecht's objection, quite unjustifiable as it appears to me, to J. Agardh's definition of *Fucus furcatus* in Spec. Alg. was the reason why Agardh in »Spetsbergens Alger« described the two species *Fucus edentatus* and *Fucus furcatus* as distinct, which again has created much uncertainty with regard to *Fucus inflatus*.

[3] Linné's short description (Syst. Nat. Edit. 12, Vol. 2, p. 716) of *Fucus distichus* suits all dwarf forms of *Fucus inflatus*, consequently, both f. *linearis* and f. *disticha*, but I apply the latter name to the small, more robust forms which grow on exposed coasts in contradistinction to the slenderer f. *linearis* which grows in rock-pools. Judging from Kjellman's description of his f. *nana* (Spetsbergens mar. klorof. Thallophyter, II. p. 4) the latter appears to be some poorly developed specimens, belonging to f. *disticha* (cfr. his note l. c. p. 7).

p. 6 (partim, e specim.); a, robustior J. Ag., Spetsb. Alg., Tillåg p. 37; Kjellm., N. I., p. 262 (210).

f. *linearis* (Oed.) Rosenv., l. c. Fucus distichus Lyngb., Hydrophyt. p. 6 (partim) Kleen, Nordl. Hafsalg. p. 30.

Fucus inflatus is an extremely variable plant and many of its numerous forms have been regarded and described as distinct species, as already pointed out by Rosenvinge in Grønl. Havalg., (l. c.). I have long been in doubt how to classify the Færöese specimens of which the accompanying figures may serve to give an idea. Kjellman's »Handbok« certainly contains exhaustive descriptions and a large number of forms are mentioned in it, but as Kjellman has not satisfactorily identified them with those discribed under older names it is often rather difficult to arrive at any definite conclusion about them. As pointed out by Foslie (l. c.), Vahl's description in Flora Danica, tab. 1127 ought to be regarded as the type for *Fucus inflatus* — and e. g. Kjellman in »Handbok« (p. 11) and Rosenvinge (l. c.) have taken it as such. In »Handbok« Kjellman divides the species into two main groups *α finmarkicus* and *β nordlandicus*. As the type for the main form of *finmarkicus* he mentions the species gathered and distributed by him in Areschoug's Exsicc. No. 401, and as he also quotes this example as the type for his forma *typica* of *Fucus edentatus* de la Pyl. in N. I., p. 256 (204) then *finmarkicus* must be regarded as synonymous with f. *edentata*. But in Grønl. Havalg. Rosenvinge mentions *β nordlandicus* as synonymous with *Fucus inflatus α edentatus* (de la Pyl.); and with reference to Vahl's figure, which Kjellman gives as type for *nordlandicus*, Foslie (l. c.) writes: — »it is identical with the species met with in Nordland and Finmarken which later authors have referred to *Fucus edentatus* de la Pyl«. From which again it follows that both *α nordlandicus* and *β finmarkicus* ought to be regarded as synonymous with f. *edentata* and this view is presumably also the most natural one as it appears to me somewhat doubtful how far we are justified in maintaining two such main groups. As marks of distinction between the two groups Kjellman properly speaking, only mentions that in *nordlandicus* the branches are given off at narrow angles and the conceptacles are small and placed close together, while in *finmarkicus* the branches are given off at wide angles and the conceptacles are scattered and irregularly arranged, but in a large collection these characters will hardly be of any use for purposes of classification.

In his work »Om Algvegetationen vid Islands Kuster«, pp. 35

— 36, Strömfelt also includes under the single species *Fucus evanescens* Ag. everything mentioned by Kjellman in his N. I. under this name, and everything reported from Norway under the names of *F. edentatus* and *F. furcatus*, and lastly de la Pylaie's

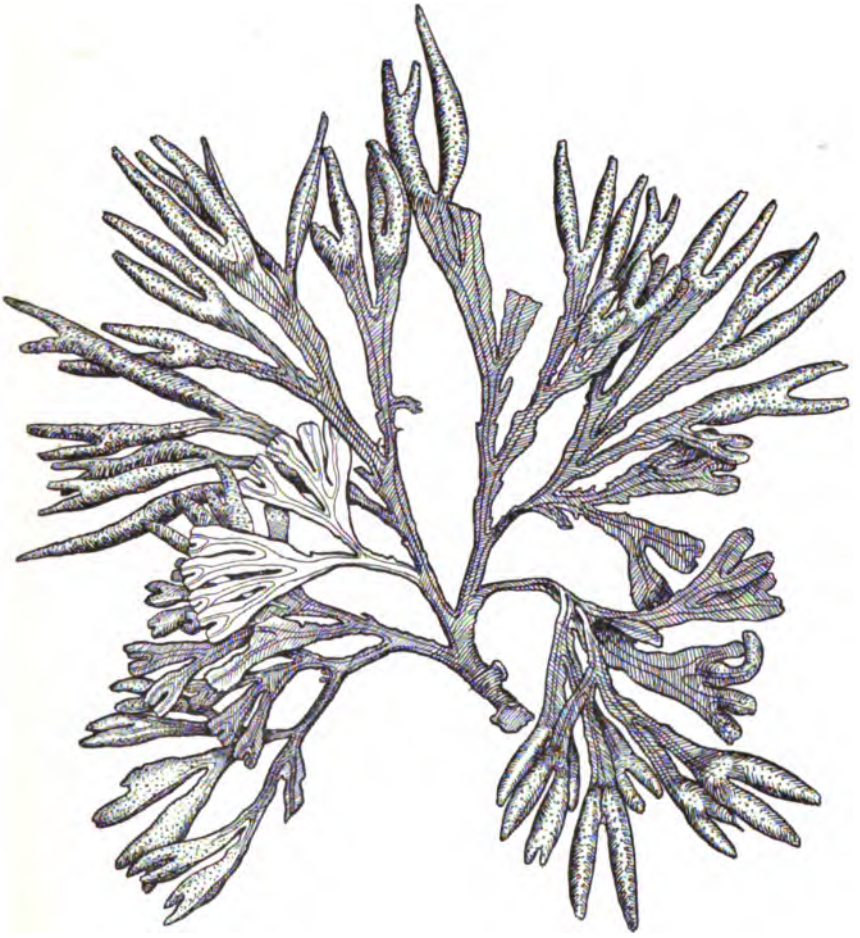

Fig. 90. *Fucus inflatus* L. f. *edentata* de la Pyl. From Thorshavn. $^{3}/_{5}$: 1. (H. Westergaard del.)

F. edentatus; uniting these species, because J. Agardh told him that some of his forms from Iceland bore a close resemblance to the original specimens of de la Pylaie's *F. edentatus*, and I think he is quite justified in doing so. But I do not agree with Strömfelt when he insists that what Kjellman in N. I. calls *Fucus edentatus*, for which, as mentioned above, the type is No. 401 in Areschoug's Exsicc., is not identical with de la Pylaie's *Fucus edentatus;* nor

do I consider him justified in dividing his *Fucus evanescens* into the main groups *arcticus, norvegicus, edentatus* and *dendroides.*

According to my opinion the alga distributed by Kjellman in Areschoug's Exsicc. No. 401, corresponds exactly to the plant named by Collins *Fucus edentatus* de la Pyl. and distributed by him in Hauck et Richter, Phykotheka universalis No. 119. It likewise bears a fair resemblance to specimens of *Fucus edentatus* from Miquelon preserved in our museum in Copenhagen. The specimens of my Færõese material which I have referred to forma *edentata* agree well with these specimens in Phykotheka and Areschoug's Exsicc., as also with others referred by Kjellman, Rosenvinge, Foslie and Collins to *Fucus inflatus* var. *edentata*, so that I do not doubt their identity with this form. Lastly, I may mention that when Professor W. G. Farlow was on a visit to Copenhagen I showed him the specimens which I had referred to this form and he pronounced them to be good *Fucus edentatus.*

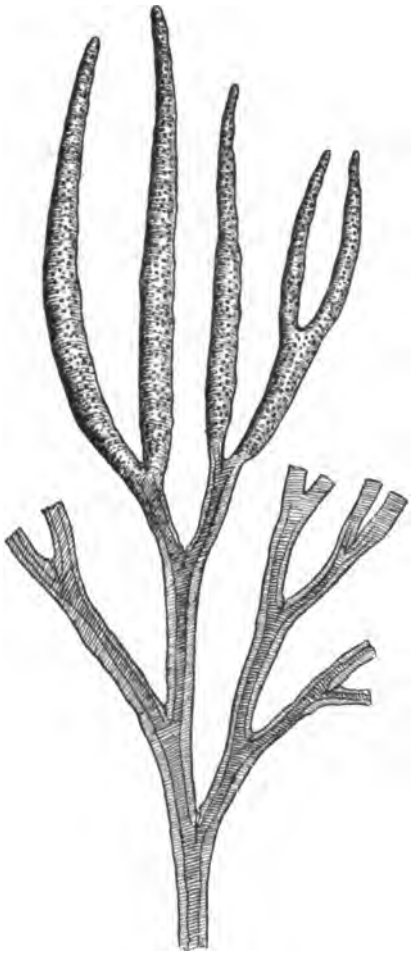

Fig. 91. *Fucus inflatus* L. f. edentata de la Pyl. From Nolsõ. $^{8}/_{5}$: 1. (H. Westergaard del.)

Fucus inflatus f. *disticha* has hitherto been regarded as a distinct species.[1] This is, however, an error, as from observations which I have several times had an opportunity of making in the Færões, I have arrived at the conclusion that it is only a plant whose small size is due to its habitat. As shown in fig. 92, very gradual, almost imperceptibly transitional

[1] I may mention here that in »Handbok«, p. 15, Kjellman writes: »This species is slightly differentiated from the more slender forms of Fucus inflatus β nordlandicus«. (»Arten är svagt begränsad mot finare former of Fucus inflatus β nordlandicus«).

stages occur between the large typical f. *edentata* which often attains to a length of 2 feet, and the tiny forma *disticha* which usually

Fig. 92. *Fucus inflatus* L. Intermediate forms between f. *edentata* and f. *disticha*. From the coast to the south-east of Thorshavn. (Compare *F. spiralis* (fig. 97) with corresponding transitional forms ranging from the typical form to f. *nana*). (Scale: 10 cm.). (F. B. fot.).

measures only a few inches in length. I shall explain this more fully in what follows.

Fucus inflatus f. *edentata* can grow in fairly exposed places and it can grow rather near high-water mark; but the higher the habitat and the more exposed the locality, the smaller the specimens. On the east coast of Strömö from Thorshavn southwards I have distinctly observed this transition in process. Large vigorous examples of f. *edentata* occurred in the two small bays at Thorshavn at about low-water mark (the specimen figured in fig. 90 is from the latter locality). To southward of this the coast gradually grows more exposed, there is almost always some swell and the waves break almost continuously upon the shores which both enables *Fucus inflatus* to grow higher up and also reduces its size. On a gently inclined rock-face south of Arge I observed for the first time intermediate forms in different stages which distinctly illustrated the transition from f. *edentata* to f. *disticha*. The plants growing near low-water mark were fairly large, about one foot in length, but as they spread higher up the face of the rock they gradually grew smaller in all their parts until at the top at about high-water mark or somewhat above they were only a few inches long, or, in other words, occurred as *Fucus distichus*; while still further southwards the coast becomes too exposed for f. *edentata*, and f. *disticha* only is met with. The latter form of *Fucus inflatus* is found in the most exposed localities along the Færöese coasts, often in large quantities and frequently at a considerable height above sea-surface. The more exposed the locality, the more vigorously developed is its attachment-disc, which in specimens measuring 2—3 inches in length often attains to a size of $^1/_2$ an inch in transverse section; and the more graceful and elegant are its branches, while its receptacles also grow longer and more pointed, such particularly elegant specimens (fig. 93) were found by me, e. g. on Myggenæs, Muletangen, Vaags Ejde, Sumbö Holm., etc.

While f. *disticha* always occurs on sloping rock-surfaces left dry at ebb-tide, f. *linearis* occurs between tide-marks in pools at high-levels. Situations adapted to the growth of this form seem to be rare along the Færöese coasts. I have hitherto only found it near Famien on Syderö. The Færöese specimens agree very well with the somewhat broader ones from Greenland which Rosenvinge has referred to this form; I have not come across any Færöese specimens which were quite thread-shaped. Forma *linearis* is distinguished from f. *disticha* by its branches being thinner and more flat, the colour usually somewhat paler and the shoots trans-

parent; prolifications often occur on it. A few specimens from Thorshavn somewhat resembled certain Greenland specimens which Rosenvinge has referred to β *evanescens*, but they not being especially characteristic I think we are justified in referring them to f. *edentata*. When dried the plants become almost black and nearly opaque. The midrib is quite indistinct and receptacles are shorter and broader than in f. *edentata*.

A single specimen of typical f. *edentata* was noteworthy owing

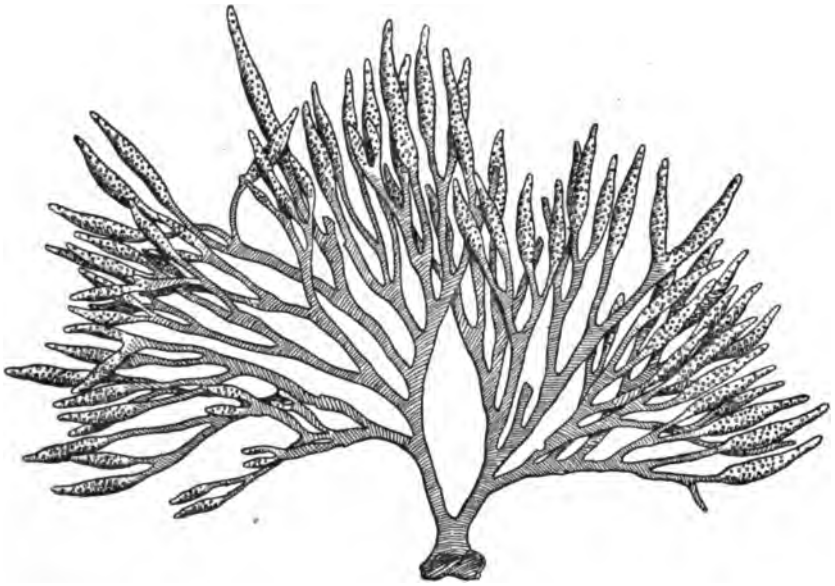

Fig. 93. *Fucus inflatus* f. *disticha*. From Muletangen at Vaags Ejde (Syd.). 1 : 1. (H. Westergaard del.)

to its bearing conceptacles in the middle of a branch at a considerable distance from the apex.

Fucus inflatus occurs in the littoral zone or (f. *edentata*) in the uppermost part of the sublittoral; f. *disticha* belongs exclusively to the littoral zone, and f. *linearis* occurs in tide-pools. The large forms of f. *edentata* require somewhat sheltered coasts, and also grow right in the interior of the fjords even in places where the water has a considerable admixture of fresh water; f. *disticha* can thrive in the most exposed localities.

Fructifying specimens of this species were found in April, May, June, July and August, consequently, during the summer. Specimens gathered in October and November were sterile; in December a few specimens were found bearing young receptacles.

Forma *edentata* is very common along the Færöese coasts, and was first reported by Landt, l. c. p. 227 (*Fucus inflatus*); f. *disticha* was also already mentioned by Landt, l. c.; it had formerly been observed on Syderö only, but I found it to be common almost everywhere on exposed coasts, viz.: — Vid.: Viderejde (!); Bordö: »Skaarene« at the entrance to Arnefjord (!); Vaagö: north side (!); Öst.: Mjovenæs (!), Östnæs (!); Str.: Höjvig Flesen (!), Gliversnæs (!); Svinö (!); Myggenæs (!); St. Dimon (!); Syd.: besides the habitats already known near Norbes Ejde, Kvalbö Ejde and Famien it was found near Huddan at the entrance to Trangisvaagfjord (!), Sumbö Holm (!), Muletangen near Vaags Ejde (!); f. *linearis* was only found on Syd. near Famien (Lyngbye, Ostenfeld, !).

153. **F. spiralis** Linné, Flora Lapponica, p. 350, No. 467, Species Plantarum, Tom. II, p. 1159, Holmiæ 1753; Systema Naturæ, Editio Duodecima, Tom. II, p. 715, Holmiæ 1767; Kjellm., N. I., p. 252 (202); Fucus platycarpus Thur., Etudes phycolog., p. 40; Fucus Areschougii Kjellm., Handb., p. 11; Fucus vesiculosus β spiralis (L.) Lyngb., Hydrophyt., p. 3 (according to the specimens in his herbarium in Copenhagen).

f. *typica*. Fucus Areschougii Kjellm., the main form, Handb. l. c.

f. *nana* Kjellm., Handb., p. 11; Fucus limitaneus Mont., Thuret, l. c. pp. 41—42; Fucus platycarpus var. limitaneus Sauvageau, Sur les Algues du golfe de Gascogne, p. 35 (Journal de Botanique, Vol. 11, p. 268).

I am quite convinced that all the species mentioned here and described by different authors (some more may be added to the list, cfr. e. g. Thuret and Kjellman, l. c.) must be regarded as belonging to Linné's old species *Fucus spiralis*. Linne's description in the works quoted is though short, yet fairly exhaustive, so a sufficiently clear idea may be formed of what he meant.

Now the alga named by Thuret *Fucus platycarpus* and figured by him on tab. 16, l. c. — original specimens of which were very kindly sent to me from Thuret's Herbarium by Professor Sauvageau — differs rather considerably from what, e. g. Kjellman calls *Fucus Areschougii* and of which a typical example is to be found in Areschoug's Exsicc. No. 54 (compare also my figure 94). But to this I may remark that both in the Firth of Forth near North Berwick and at Heligoland I gathered specimens which are exactly intermediate between these. And even amongst my Færöese material I found a very few specimens or portions of plants which reminded one strongly of *Fucus platycarpus* Thur., e. g. the portion of the plant given in fig. 95, the other parts of the same plant being like the main species. My opinion is that Thuret's *Fucus platycarpus*

Fig. 94. *Fucus spiralis* L. From Thorshavn. $^2/_3$: 1. (H. Westergaard del.)

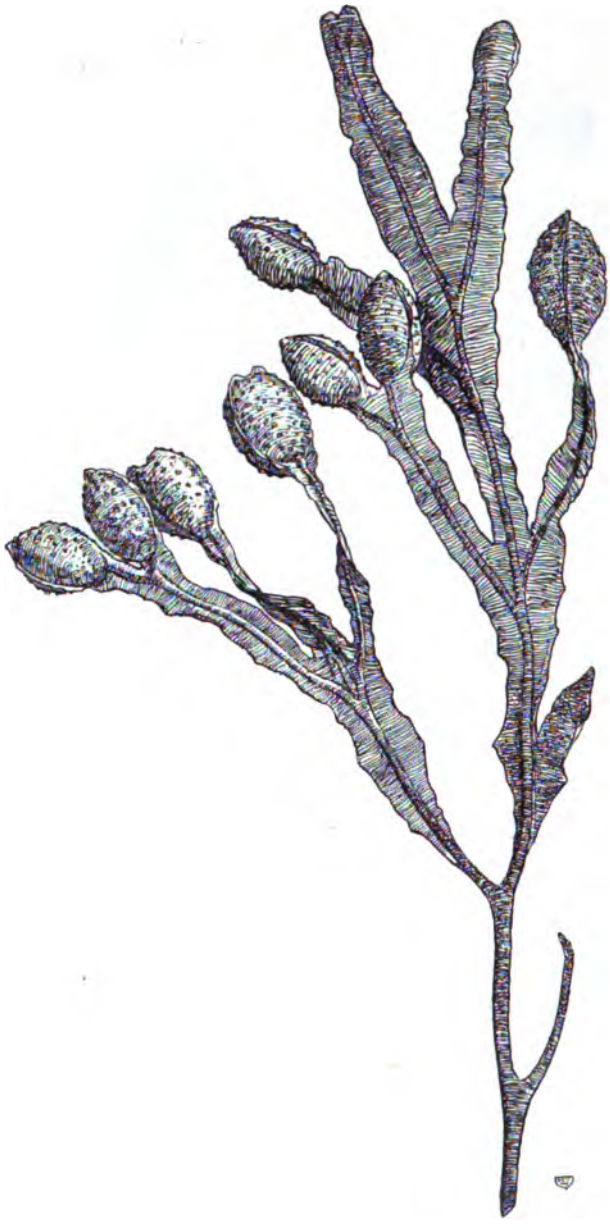

Fig. 95. *Fucus spiralis* L. Part of a plant approaching var. *platycarpa* Thur. From Thorshavn. $^{3}/_{4}$: 1. (H. Westergaard del.)

is a more southerly variety of *Fucus spiralis*, while the typical form occurs more particularly in the northern regions, but may also be found growing together with var. *platycarpa* in the southern. I

would point out as particularly characteristic of var. *platycarpa* that its main branches are distinctly continued along its whole length and set with short, alternating, lateral branchlets bearing receptacles, while *Fucus spiralis* L. *typica* — as I regard it, and to which as I said before I refer, e. g. *Fucus Areschougii* as a synonym — has all its branches, even the topmost distinctly dichotomous, and the latter terminating in receptacles, which are usually more or less swollen and roundish-oval, and occur terminally either 2 on each branch, or cordate if the bipartition is not complete. On observing a well-pressed herbarium specimen of a typical *Fucus spiralis* (e. g. Areschoug's Exsicc. No. 54), all the receptacles will be seen to occur along the periphery of the plant, while in var. *platycarpa* they are situated along the main branches, beginning from somewhere near their base[1]. It is a pity that Kjellman, who in N. I. refers this species to *Fucus spiralis*, does not give any reason for having in »Handbok« given it the name *F. Areschougii*. In his description of *β borealis* Kjellman just writes in a footnote: — »If the name *Fucus spiralis* L. agrees with this species, then it must most properly be applied to the northern form[2].«

Fig. 96. *Fucus spiralis* L. f. *nana*. 1 : 1. (H. Westergaard del.)

With regard to forma *nana* (fig. 96), the latter is only a small dwarf form of f. *typica*. I have reported *Fucus limitaneus* Mont. as synonymous with this form on the strength of some specimens gathered in the Canary Islands by the late Mr. O. Gelert, and also because Thuret, l. c. places it as variety of *F. platycarpus*. Further, Professor Sauvageau kindly sent me specimens of this form from

[1] In connection with this I would call attention to the fact that Rosenvinge is quite of the same opinion, as he not only told me himself when speaking to him on the subject, but as he had also previously written to Sauvageau (cfr. Sauvageau, l. c. pp. 22—23, Journal de Bot., tome 11, p. 211) who, however, partly misunderstood Rosenvinge, for he writes with reference to *Fucus platycarpus*: »Ce serait l'ancien *F. spiralis* de Linné, que Mr. Rosenvinge appelle *F. platycarpus* var. *spiralis*«, but »var.« is a misreading, Rosenvinge having written »ou«.

[2] »Om benämningen Fucus spiralis L. afser denna art, så är den närmast att hänföra till den nordiska formen«.

Fig. 97. *Fucus spiralis* L. Different forms showing the transition to f. *nana*. (Scale: 10 cm.). (F. B. fot.).

Cap du Figuier in the Bay of Biscay; he calls them *Fucus platycarpus* var. *limitaneus*; and with reference to them he writes l. c. pp. 171—2: — »En 1896, j'en ai récolté sur un bloc situé en avant du Casino, de petits, grêles et bien fructifiés, en touffes éparses, de 2 à 3 centimètres de longueur, et j'étonnerai probablement les algologues qui ont exploré seulement les régions plus septentrionales, en disant que j'aie pu faire rentrer dans une boîte d'allumettes ma récolte, qui se composait d'une dizaine d'exemplaires bien entiers«. The Færöese specimens from exposed localities are often as small.

Several Færöese examples are shown in fig. 97, the small ones being forma *nana*, the large f. *typica*.

This species occurs in the littoral zone along the Færöes and grows in fairly sheltered situations (especially forma *typica*) as well as on exposed coasts (forma *nana*). In more particularly exposed places the latter may be found growing at a considerable height above high-water mark, e. g. at Vaags Ejde it occurred at a height of some 5 metres. It grows by preference on steeply inclined cliffs which are incessantly dashed by the sea in rough weather. On the other hand, in calm weather it often suffers from desiccation and I have frequently gathered it so dried that it could easily be broken. It always grows gregariously and this applies especially to forma *nana*. It has also sometimes been found in rock-pools at high levels, e. g. in abundance near Velbestad, specimens from such situations being thinner and of slenderer build answering to f. *linearis* of *Fucus inflatus*, as f. *nana* answers to f. *disticha*.

Fructifying plants were found in April, May, June, July and October. A few specimens gathered in December were sterile. Its period of fructification corresponds exactly to that of plants in the Norwegian Polar Sea where according to Kjellman, l. c. they bear receptacles during summer and a part of October.

This is a very common species of the Færöese coasts and was first mentioned by Landt, l. c. p. 227.

154. **F. vesiculosus** L. Lyngb., Hydrophyt., p. 3; Kjellm., N. I., p. 248 (198); Rosenv., Grønl. Havalg., p. 833.

var. *typica* Kjellm., l. c.

var. *subfusiformis* f. *lanceolata* Kjellm., Handb., p. 9.

var. *rotundata* f. *robusta* Kjellm., Handb., p. 7.

I think by far the greater part of the Færöese material may be referred to var. *typica*; taken as a whole it agreed well with Harvey's figure in Phycol. Brit., tab. 204, fig. 1. A single specimen

gathered by Mr. C. Jensen near Sumbõ (Syd.) was noteworthy on account of its very long, lanceolate, swollen receptacles (like Harvey's fig. 2, l. c.). It had quantities of bladders. It is this specimen which I have thought proper to refer to var. *subfusiformis* f. *lanceolata*. Near Thorshavn I gathered a few specimens, which on account of their large, cordate or broadly oval receptacles appear to correspond to Kjellman's f. *robusta*. Lastly, the Færõese material contains a great many specimens, which are quite destitute of bladders. Both for this reason and on account of the very long, almost lanceolate receptacles these specimens when cursorily examined resemble in no slight degree forms of *Fucus inflatus*, but it is obvious that they do not belong to it, as the conceptacles are unisexual.

It grows attached to rocks and stones, and occurs in the littoral zone at about half-tide level; it grows by choice in well-sheltered localities, but may also flourish luxuriantly in places which are not much sheltered, e. g. in the small inlets (»Skærgaarde«) which occur along the east coast of Strõmõ between Thorshavn and Hõjvig — a comparatively exposed stretch of coast. It is, however, entirely absent from absolutely open sea-shores. At places where tides are not felt it grows directly below the surface of the sea in quite shallow water. It thrives excellently in brackish water, e. g. at the heads of fjords where it even occurs abundantly in the streams at the point where they flow into the sea.

It fructifies during summer. Specimens gathered in November were sterile, a few found in December bore quite young receptacles, and those collected in April had conceptacles which had not as yet fully ripened.

This species is extremely common along those coasts of the Færões which are either not very much exposed or entirely sheltered. It was first reported by Landt, l. c. p. 226.

Fucus ceranoides L. In Hydrophyt. p. 5 Lyngbye reports this species from the Færões: — »etiam ad insulas Færoenses«. But his herbarium contains no specimens of this species, and as it has not been found since, the correctness of his report is open to doubt.

Fucus serratus L. is reported by Landt, l. c. p. 226, who writes: — »Grows everywhere at the foot of cliffs covered by the sea at high-tide«[1]. But this report must be due to some confusion as

[1] »Voxer overalt paa Klippe-Rødderne, hvor Havet gaar op ved Flod«.

it has never since been found along the coast of the Færões and it is hardly possible that it should have been overlooked. Lyngbye writes also in Hydrophyt., p. 5, with reference to this species: — »Ad insulas vero Færoenses non reperitur«.

PELVETIA Dcsne. et Thur.

155. **P. canaliculata** (L.) Dcsne. et Thur. Fucus canaliculatus Lyngb., Hydrophyt., p. 6.

As might be expected plants growing at higher levels are small as they there lack sufficient nourishment, and such small examples are especially met with in the interior of fjords. Simmons, l. c. p. 296 calls them f. *minima*, and as pointed out by him they usually consist merely of a comparatively large receptacle borne on a short stalk; but they are only to be regarded as stunted specimens.

This species belongs to the littoral zone and grows near high-water mark or even somewhat above it; it is rare in exposed localities; it requires some sort of shelter as it never occurs on cliffs which are exposed to the full force of the incoming waves from the open sea, but grows in localities which are somewhat protected by rocks standing out in the sea. In such it occurs several feet above high-water mark and is able to endure a longer period of desiccation. It always grows gregariously. I never observed it in rock-pools.

It was found bearing fruit in May, June, July, October and December so it seems to be able to fructify almost all the year round.

This species is quite common along the Færões though not everywhere, so Lyngbye's (l. c. p. 6) statement: — »Ad insulas Færoenses hic illic copiose« is quite to the point. It was first mentioned by Landt l. c. p. 227.

HIMANTHALIA Lyngb.

156. **H. lorea** (L.) Lyngb., Hydrophyt., p. 36; Kjellm., N. I., p. 242 (193).

This characteristic species grows at about low-water mark or somewhat above it, but in particularly exposed localities it may occur at fairly high levels or at any rate up to some 2 metres above low-water mark. It grows by preference on open sea-shores and is met with at the most exposed places, but it may also grow in more sheltered localities. Where tides are not felt, e. g. in Skaalefjord it grows at a depth of a few feet, but does not seem to thrive,

the receptacles being often more irregularly formed and sometimes swollen, and the colour of the plant being of a paler yellow.

It was found bearing young receptacles in April and May, and the receptacles reached their highest degree of development (1—1½ metres long) during summer, and contained ripe oogonia from July to September. Kjellman (l.c. p.194) says that according to Wahlenberg *H. lorea* is not to be found during winter in Lapland which does not agree with what happens along the Færõese coasts. Here according to my observations the plant is »hapaxanthic«. I think the oogonia germinate immediately in autumn and develop during winter into the well-known button-shaped plants which are often ovately swollen. In my experience the latter can live several years without fructifying, and this appears to be more particularly the case when growing nearer high-water mark than is natural to the plant. It is undoubtedly necessary for the young plant to attain to a certain size and vigour in order to be able to bear fruit; those growing in favourable habitats probably arrive at perfection during the winter, others which are less fortunate keep on living for several years and such older plants are easily recognizable by their darker colour and their more leathery consistency as also by the numerous epiphytes which gradually occur on them. Some of these older plants are perhaps able to fructify later on, others, growing in the most unfavourable habitats, are never able to do so and eventually die. When the plant has fructified it dies away gradually, but the conical lower part and a portion of the receptacles can keep fresh doubtless for several years and form a favourite habitat especially for species of *Ectocarpus,* but they can hardly produce new receptacles.

This is an extremely common species of the Færõese coasts as was reported by Lyngbye, who writes: — »Ad insulas Færoenses copiose, non solum in fundo, sed etiam in summo refluxus limite«. This species was first mentioned by Landt, l. c. p. 228.

C. Chlorophyceae.

Order PLEUROCOCCOCEAE.

PLEUROCOCCUS Menegh.

157. **Pl. spec.** Palmella adnata Lyngb., Hydrophyt., p. 205, tab. 69 A.

On examining Lyngbye's specimens of *Palmella adnata* which are preserved in his herbarium in Copenhagen they proved to be

a gathering of a great many different algæ, e. g. *Calothrix scopulorum*, some very thin *Oscillariaceæ*, fragments of *Ulothrix*, *Porphyra*, etc.; and further, a small, unicellular, yellowish alga, which occurred abundantly in the gatherings and is presumably that which Lyngbye calls *Palmella adnata*, as I think it must be this alga to which he refers when he writes in his diagnosis: »granulis internis globosis, fuscis«, and in Descript.: »granula intra substantiam lutescentem minuta, globosa, fusca«.

Judging from the material in hand, the cell contents are of a yellowish colour, which corresponds to Lyngbye's description. As far as I can see, the chromatophores consist of one or more parietal plates (fig. 98); some of the cells contained one or two fairly large pyrenoids, the chromatophores being generally arranged around the latter somewhat in the form of a star. The cells are almost oval, and are about 11—12 μ long and 5,5—7 μ broad. They are divided sometimes by transverse and sometimes by longitudinal walls (fig. 98).

Fig. 98. *Pleurococcus spec.* 300: 1.

I think this alga may quite naturally be referred to the genus *Pleurococcus*. I have preferred not to give it a name, as it appears to me that Hudson's name *adnata* can hardly be used, for, his original examples not being available for reference, and his description being short, it is very difficult to decide which plant he was describing, and moreover, later authors (Nægeli, Berkeley) have referred his plant to the genus *Gloeocystis*. Further, I have preferred to call it *Pleurococcus sp.* as it appears to me highly probable that the *Protococcus ovalis* described by Hansgirg in Foslie's »Contribution« I, p. 159, is identical with the *Pleurococcus* in question. Hansgirg gives no reasons for calling his plant *Protococcus*, and his description and figures as a whole are not exhaustive enough for comparison.

With regard to its occurrence along the coasts of the Færöes Lyngbye (l. c.) writes: — »Habitat ad rupes maritimas declives Færoenses, inter Thorshavn et Höyvig in superiore refluxus limite, rarior«.

Order PROTOCOCCACEAE.

CHLOROCHYTRIUM Cohn.

158. **Ch. inclusum** Kjellm., N. I., p. 392 (320), tab. 31, figs. 8—17; Rosenv., Grønl., Havalg., p. 963.

The Færöese examples appear to be precisely similar to Kjell-

man's description. They occurred as endophytes in different Florideæ, e. g. *Polyides rotundus*, *Furcellaria fastigiata* and *Chondrus crispus*.

Found hitherto in the following places: — Bordö: Klaksvig (H. J.); Str.: Thorshavn (!); Nolsö (!); Syd: Trangisvaag (H. J.).

Order PRASIOLACEAE.

PRASIOLA (Ag.) Menegh.

159. **P. crispa** (Lightf.) Menegh.

**marina* nov. subspec. Schizogonium radicans Foslie, Contri bution I, p. 128 (e specim.); Gayella polyrhiza Rosenv., Grønl. Havalg., p. 936 (e specim.); Ulothrix discifera Batters, A List of the Marine Algæ of Berwick-on-Tweed, p. 258 (e specim.); Prasiola crispa f. submarina Wille, Studien über Chlorophyceen, III. Eine submarine Form von Prasiola crispa (Lightf.); (?) Ulothrix discifera Kjellm., Om Spetsbergens mar. klorofyllf. Thallophyter, II, p. 52.

On steep rocks facing the open sea I have several times observed a small alga which often occurred in great abundance and was very conspicuous on account of its fresh, light yellowish-green colour when dry. Thus, it occurred abundantly on the rocky coast between Skandsetangen near Thorshavn and Höjvig. In order to be able to compare it with the rather widely differing species of different authors which I have grouped above, and all of which according to my opinion ought to be included under this species, I will here shortly describe the Færöese specimens. They consist originally and for the most part of cell-filaments (about 10—12 μ thick) formed of disc-shaped cells which are generally only about one-third as long as broad, though they are sometimes met with as long as they are broad. Now and then, and most commonly at fairly regular intervals rhizoids arise, generally two together, but occasionally also singly; the cells whence these arise are mostly longer than the others in the filament. These rhizoids are generally connected with the mother-cell, and the chromatophore contained in the latter is continued into the former. But sometimes I have observed rhizoids divided into several cells (see fig. 99, *i, j*) as Wille (l. c. p. 15, fig. 53) also mentions having done in a single instance. While, on the one hand, the single rhizoids, shown in fig. 99, *i*, perhaps may be regarded, in conformity with Wille's opinion, as an abnormal formation, on the other hand, the two illustrated in fig. 99, *j*, appear

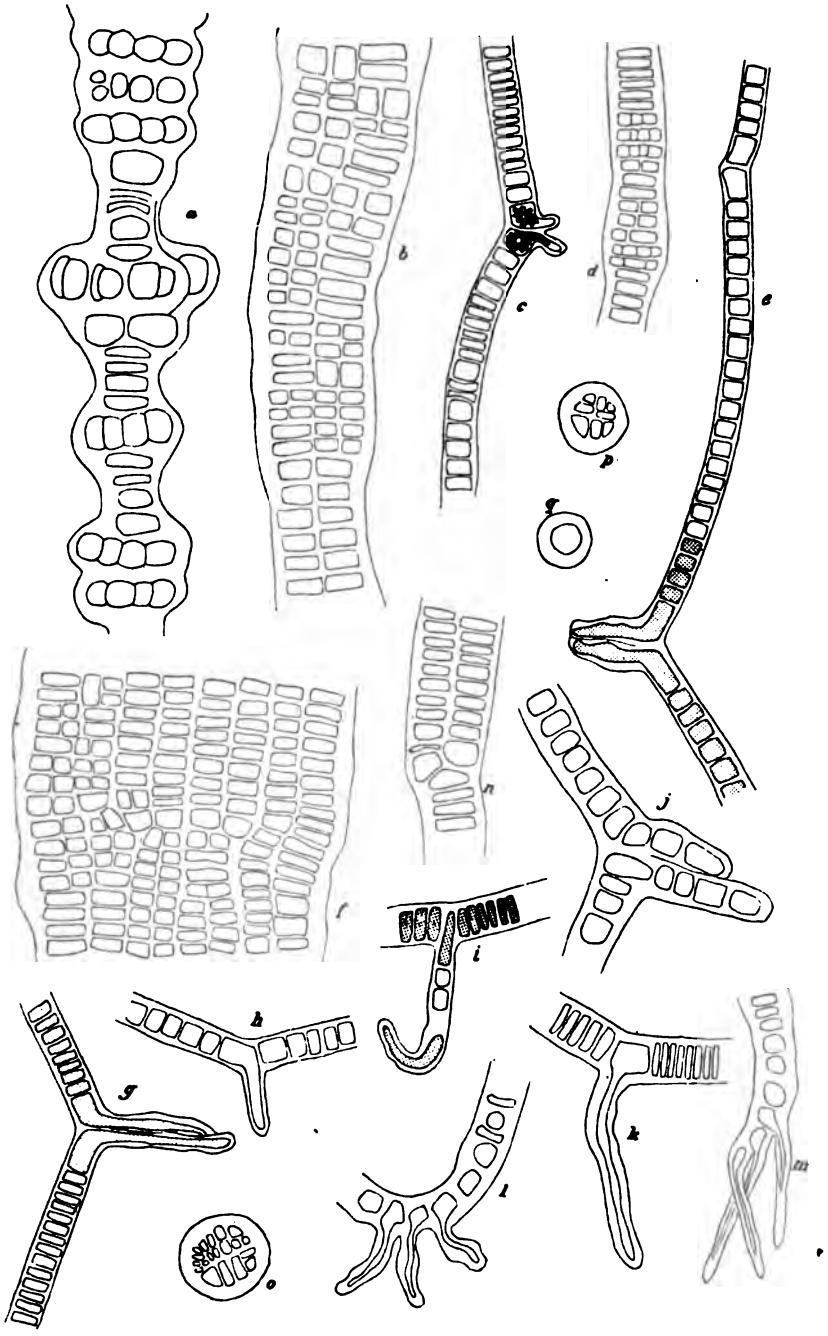

Fig. 99. *Prasiola crispa* (Lightf.) Menegh. *marinn nov. subsp. Compare text. 400 : 1.

to be quite normal. Intermixed with these cell-filaments consisting of one row of cells, occur some filaments in which the cells are divided into two rows (*Schizogonium*-stage fig. 99, *n*), and this division is continued on the same plane so that it forms a complete plate (*Prasiola*-stage fig. 99, *b* and *f*). These plates are sometimes fairly broad much more so than fig. 99, *f*, but plates, as large as those occurring in the land-form of *Prasiola crispa*, were not met with. I have only observed these *Prasiola*-like cell-plates in the material from Höjvig, in which there further occurred some filaments resembling the fragment illustrated in fig. 99, *a*. As may be seen from this figure, the cells have become divided in more than two directions, thereby reminding one of the genus *Gayella* founded by Rosenvinge. Typically developed *Gayella*-specimens did not occur in this gathering, consequently, it was very interesting that a gathering from Svinö contained some well-developed *Gayella*-filaments exactly agreeing with Rosenvinge's description. Fig. 99, *d*, shows a filament which has begun to develop into *Gayella*, the cells being divided in more than two directions; and fig. 99, *o*, *p* show the transverse section of thinner *Gayella*-filaments. In the latter gathering there also occurred cell-filaments exactly agreeing with, e. g. fig. 99, *e*; and fig. 99, *h* represents a fragment of such a filament bearing one rhizoid. Finally in fig. 99, *l* and *m* are shown two fragments of filaments whence proceed several rhizoids side by side, corresponding with Rosenvinge's fig. 45, G.

It is on account of the interesting way in which the filaments consisting of a single row of cells pass by such very gradual stages, on the one hand into the form *Prasiola*, and on the other into the form *Gayella*, that it appears to me to be impracticable to maintain the genus *Gayella*; the latter must therefore be regarded only as a phase in the development of *Prasiola crispa* subspec. *marina* coordinately with the already accepted *Ulothrix radicans*-stage and *Schizogonium-Prasiola*-stage.

With regard to the contents of the cells, the star-like chromatophores, etc., they exactly agreed with Gays's description in »Algues vertes« (pp. 80—86) and Wille's (l. c.).

In »Deuxième Mémoire sur les Algues marines du Groenland« (p. 116), Rosenvinge points out the following characteristic of *Gayella:* — »Les couches intérieures des membranes qui entourent les cellules, donnent la réaction de cellulose avec la chlorojodure de zinc, la membrane épaisse extérieure des filaments reste au con-

traire incolore,« and the same may be said of the Færöese material and of *Prasiola crispa* f. *terrestris*.

Though Wille (l. c. p. 13) writes with reference to his forma *submarina*: — »Es kann vielleicht Zweifel darüber herrschen, warum sie nicht als selbständige Art aufgeführt werden soll, da sie keinerlei Übergang aufweist zu *Prasiola crispa* (typische Flächenform), welche auch keineswegs mit ihr zusammen vorkommt,« it is quite natural, at any rate now that the typical plate-form has also been found, to refer it to *Prasiola crispa*, with which it is very closely allied. The fresh-water material from damp roofs in Thorshavn bears considerable resemblance to the marine form; as to the differences which exist between them I may point out the following: — In the *Hormidium*-filaments the cells are altogether somewhat longer, being generally about $^1/_2$—$^3/_4$ times as long as broad, but cell-filaments also occur in which the cells are as short as those in the salt-water specimens. Rhizoids are comparatively rare in the fresh-water material, though they may sometimes be met with, as I have shown on Plate IX, fig. 2, *a*, and Gay (l. c. figs. 126—127) also figures some which correspond exactly with those in the marine form. The reason why the latter form is so amply supplied with rhizoids may possibly be explained by the fact that the alga growing, as it very often does, in much exposed situations, must attach itself firmly to the rock so as to be able to withstand the force of the waves. The plate-form (*Prasiola*-stage) of the marine specimens exactly resembles that of the land-form in the arrangement of the cells, but it hardly attains to so large a size as in the latter. Lastly, I may here point out that the *Gayella*-stage has not hitherto been found in the land-form. I am therefore of opinion that on the strength of these differences the forms referred to *Prasiola crispa* ought to be divided into two sub-species, the marine subspec. *marina*, and the land-form, which may be called subspec. *terrestris*.

Further, the plant which Batters (l. c. p. 38, tab. VII, fig. 8) calls *Ulothrix discifera*, judging from the specimens which he sent to Rosenvinge asking if they could possibly be *Gayella*, must belong to the present species; there are no rhizoids in his figure, though the examples of his plant which are here in Copenhagen are richly provided with them. *Schizogonium radicans* Foslie (l. c.) likewise belongs to the present species. Foslie's specimens, of which there are two in the museum in Copenhagen, are precisely similar to mine. *Ulothrix discifera* Kjellm (l. c.), on the other hand,

appears to differ somewhat from this species and it is perhaps doubtful whether it belongs to it at all (cfr. Rosenv., Grønl. Havalg, p. 938, and Wille, Færöernes Ferskvandsalger, p. 53).

With regard to its habitat Wille writes (l. c. p. 14): -- »Sie wuchs auf der Schattenseite am höchsten Wasserstandszeichen, so dass sie nur bei Springflut oder starken Wellenschlag von Salzwasser benetzt werden konnte, und deshalb abwechselnd der Durchnetzung mit Salz- und Regenwasser ausgesetzt war.« This corresponds in the main with its distribution along the sheltered coasts of the Færöes, while along the open coasts, according as the place is more or less exposed, it occurs from several feet above high-water mark to upwards of at least 40 feet above it. Nor does it grow here exclusively on the shady sides of the rocks, but it also occurs in open places facing south and exposed to the sun. Consequently, it is often quite dried, and naturally enough in such habitats it is also often liable to be wetted only by freshwater for a longer period at a time.

This species has been observed along the coasts of the Færöes in the summer and autumn months and doubtless occurs there all the year round.

It is presumably very common along the coasts of the Færöes, but is often difficult to gather off the steep rocks; it has hitherto been found in the following places: — Svinö (!); Viderö: Kvannesund (H. J.); Øst.: Skaalefjord (H. J.); Str.: between Höjvig and Skandsetangen (!), Gliversnæs (!); Lille Dimon (!).

subspec. *terrestris* (Roth). Ulva terrestris Roth. Lyngb., Hydrophyt., p. 32.

This is recorded from the Færöes also as a marine alga by Lyngbye (l. c.), who writes: — »In insulis Færoensibus in terrestribus umbrosis humidis, et ad rupes marinas paulo supra littora, aëri marino exposita.« The specimen collected by Lyngbye and preserved in the museum in Copenhagen is from Ridevig, Østerö. In Thorshavn and its environs I have also found *Prasiola crispa* growing in places where it is frequently liable to be wetted by the spray, so that there is good reason to regard it also as a marine alga.

160. **P. furfuracea** (Mert.) Menegh. Lagerstedt: Om algslägtet Prasiola, p. 31; Imhaüser: Entwicklungsgeschichte und Formenkreis von Prasiola (Flora 1889, p. 266); Foslie, Contrib. I, p. 127.

Found on rocks along the shore where it is completely washed by the waves when the sea is rough. The specimens agree well

with the examples of this species distributed by Foslie in Wittr. et Nordst., Exsicc., Nos. 438 and 642, which he gathered in East Finmarken, also on rocks by the sea.

Found hitherto only on Str.: Tinganæs in Thorshavn (!).

161. **P. stipitata** Suhr. Kjellm., N. I., p. 373 (303); Imhäuser, Entwicklungsgeschichte und Formenkreis von Prasiola (Flora 1889).

Found on rocks and stones near high-water mark, and especially on exposed coasts at a considerable height above it. It grows gregariously and often carpets the rocks with a short, dense, almost moss-like growth. It is common at landing and fishing places where fish are cleaned and dried, and as a whole in localities where there are organic remains, as e. g., places which are manured by birds, though it is far from being exclusively confined to such localities.

This species is very common along the coasts of the Færöes. Strangely enough, Lyngbye did not gather it, at least there is no material of it in his herbarium in Copenhagen, and, Simmons's conjecture that Lyngbye's *Ulva terrestris*, found on rocks by the sea, is this species, is not borne out by the facts (cfr. p. 486 above).

Order ULVACEAE.

PERCURSARIA Bory.

162. **P. percursa** (Ag.) Rosenv., Grønl. Havalg., p. 963.

This plant occurred on flat, sheltered sea-shores intermixed with tufts of *Vaucheria*.

Found hitherto only on Str.: Sundelaget, at the narrow tide-way north of Kvalvig (!).

ENTEROMORPHA (Link).

The systematic classification of this genus is, as is well known, very unsettled, and the definitions of its species given by different authors have varied very considerably. Until we have a monograph of the genus *Enteromorpha*, based on experimental culture, I hardly think that we shall arrive at any satisfactory conclusion concerning it. Its great variety of forms can be understood when we consider its occurrence, along a coast for example like that of the Færöes. Thus, this genus is met with along coasts exposed to the fullest force of the breakers, and in the most sheltered localities; it grows in places where the sea is in motion and the water quite salt, and in stagnant, brackish-water often almost tepid, for example, in rock-pools at high levels, having even been found in streams far

up on the hills at a height of some 600 feet[1]; it occurs in places where it is liable to be left dry for a long period and in others where it is never left uncovered. It grows sometimes in dimly lighted clefts in the rock and in caves, sometimes in places exposed to the full rays of the sun. Sometimes it is found attached, sometimes it occurs in detached, floating examples. As these different conditions must exercise a very marked influence both on its outer habit and its anatomical structure it seems well-nigh hopeless to arrive at any definite conclusion as to the variations in the different »species«, until we have by means of experimental culture come to an understanding with regard to the species themselves, the greater part of which according to my opinion are nothing more than biological forms. As already mentioned, the most conflicting theories have been propounded in books as to the definition of this species, of which I will merely mention some of the most important, from modern writings. It is especially the Swedish algologists who maintain that the genus ought to be divided into a great many species, as does also Ahlner in his monograph of the Swedish *Entomorpha*-species, where he lays particular stress on the anatomical characters as marks of distinction. Kjellman and Agardh express much the same opinion on this question, though the latter differs in several points from Ahlner. Quite another definition of species is represented by Le Jolis, who, in his work »Liste des Algues marines de Cherbourg,« records, on the one hand, only a few species, but, on the other, a great many varieties and forms; he lays especial stress on the outer form. In »Grønlands Havalger« Rosenvinge follows the opinion of Le Jolis, but with some modifications; thus, e. g., he makes use more particularly of the anatomical structure as a basis; but in spite of the somewhat scanty material from Greenland which he had at his disposal, he emphasizes the fact that it is impossible to separate the species. Lastly, I must mention Reinbold's »Die Chlorophyceen der Kieler Föhrde« which has been of great use to me in working up the Færöese material. Reinbold follows more particularly J. Agardh's view mentioned above, and, consequently, enumerates many species, though he makes it clear in his description how difficult it is to keep them distinct.

The following description is based on an examination of much

[1] Börgesen, F.: Freshwater Algæ (Botany of the Færoës, Part I, p. 243).

material of this genus, and as may be seen, in the definition of its species I have chiefly followed Le Jolis and Rosenvinge's opinions. Of several of the forms recorded by authors as distinct species, I have certainly found thoroughly typical specimens which were easy to determine, but besides these my material contained a great many specimens which had characters in common with two or three other species, so that it was quite impossible to know how to classify them; and by the occurrence of these intermediate forms, such an even and continuous series of forms were often represented that I could only regard them as varieties or forms of the same species. Having made these introductory remarks, I shall now proceed to point out in more detail the reasons which I consider most important and on which I have based my definition of species.

163. **E. Linza** (L.) J. Ag. Ulva Linza Lyngb., Hydrophyt., p. 32.

A species fairly rich in forms, the thallus being sometimes quite smooth and sometimes having a strongly crisped or undulating surface. Of the forms mentioned by Le Jolis (l. c.), I think I have been able to identify more particularly f. *undulata* and f. *plana*. To unite this characteristic and easily distinguishable species with other *Enteromorpha* species, as Le Jolis does, seems to me unjustifiable.

This species occurs on open sea-shores near low-water mark, especially in rock pools, and in sheltered places in shallow water. It grows attached to rocks and stones, sometimes also as an epiphyte. Fruiting specimens were found in May, June, July, October, November.

This is a common species of the Færoese coasts where it was first found by Lyngbye (l. c.), who writes: — »Ad insulas Færoenses hic illic copiose.«

164. **E. intestinalis** (L.) Link. Rosenv. emend., Grønl. Havalg., p. 957.

var. *genuina*. Rosenv. l. c. p. 957. Ulva enteromorpha γ, intestinalis (L.) Le Jolis, Liste, p. 46.

The cells in the specimens referred to this variety all have an inner wall somewhat thickened which is thickest in the cells at the base and then often grows thinner almost imperceptibly in those of the upper part of the thallus. I have, however, not met with an inner wall as thick as that figured by Ahlner (l. c. f. 16). The typical specimens are all branchless and without, or with hardly

any prolifications; forma *cornucopiæ* was first recorded by Lyngbye under the name of *Scytosiphon intestinalis* f. *cornucopiæ*, Hydrophyt., p. 67.

var. *micrococca* (Kütz.) Rosenv. l. c. p. 957; Ulva enteromorpha *γ*, intestinalis ? *h*, micrococca Le Jolis, Liste p. 47; Enteromorpha saxicola Simmons, Meeresalg., p. 272.

Of this variety, I have found several quite typical specimens, e. g. corresponding exactly to Ahlner's description of *Enteromorpha micrococca* (l. c. p. 45). The specimens were small, 3—4 cm. in length, often somewhat prolific, or branching. The cells were small, 3—5 μ broad, and had in the transverse section an especially thick inner wall so that the thallus was nearly 18—20 μ thick. From these typical specimens, the transition might be traced by quite easy stages to the different varieties mentioned in the following, such as var. *genuina* and var. *minima*. Thus, many specimens were found, in which the cells were becoming by almost imperceptible degrees larger, and the walls thinner, until they merged quite evenly into var. *minima*. In other larger specimens, the cells too became larger, thus forming an easy transition to var. *genuina*.

The rather considerable material at my disposal has shown me conclusively how much the inner wall af typical *E. micrococca* really varies in thickness. I have found the easiest transition between specimens in which the inner wall was thick and others in which both the walls were of the same thickness, and others again in which the outer wall was the thickest; the latter character probably induced Simmons to separate off the new species *E. saxicola*; but my researches prove, as is no doubt sufficiently clear from the preceding remarks, that the species *E. saxicola* cannot be maintained. To explain this more fully I may add that it is not only between the different specimens that such transitions occur, but even in the same individual very often something similar may be observed. A transverse section of the thallus shows, e. g., that the outer and inner walls of the cell of the lowest part of the plant are often almost of the same thickness; in the upper part only the inner wall is specially thickened, while at the top it may happen that neither wall shows any noticeable degree of thickness. I observed something quite similar in the original specimen of *E. saxicola*, in which even if the outer wall is sometimes thicker than the inner, the reverse is also often the case.

var. *minima* (Næg.) Rosenv. l. c. p. 959.

My reason for regarding this as an independent variety, instead of including it under var. *micrococca*, which Hauck, e. g. (»Die Meeresalgen Deutschlands und Oesterreich«, p. 432) points out as perhaps the most correct course, is that I have found quite typical specimens of it, although not in any great number. This variety as already mentioned under var. *micrococca* is otherwise intimately connected with the latter through intermediate forms.

var. *compressa* (L.) Rosenv. l. c. p. 958; Ulva enteromorpha β, compressa Le Jolis, Liste, p. 44; Scytosiphon compressus Lyngbye, Hydrophyt., p. 64, ex parte.

Some of the specimens referred to this variety are almost branchless, though branching or prolific specimens have also been found. Some of these are somewhat similar to f. *complanata*. Others, more richly ramified, closely resembled in habit *E. clathrata*, from which species they may generally be distinguished, as pointed out, e. g. by Reinbold, by the fact that the cells of *E. clathrata* are arranged in rows; it must, however, be borne in mind, that this character cannot always be applied, as I have found specimens in which the cells in the same individual were sometimes in rows, and sometimes without any arrangement whatever, in fact every degree of development exist in the arrangement of the cells. A transverse section of the typically developed plant shows the inner wall to be thin while through others may be traced a quite gradual transition to the more or less thickened inner wall of *E. intestinalis*.

Of var. *compressa*, I have found a forma *trabeculata*, which exactly resembles that which Rosenvinge (l. c. p. 961) has described under *E. prolifera*. The specimens were found in tide-pools near high-water mark on the west coast of Strömö near Velbestad, and they could be seen by the naked eye, as the plant when alive almost resembled a *Chaetomorpha*. As pointed out by Rosenvinge, complete partition-walls were not to be found here either, but merely plates or trabeculæ more or less irregularly extended in transverse and oblique directions. The thickness of the trabeculæ is very slight, and, as stated by Rosenvinge, they turn yellow when stained by chlor-zinc-iodine. I think that a specimen in Lyngbye's Herbarium, called by him *Scytosiphon compressus*, may be referred to this variety; another from Næs, Østerö, has a rather thick inner wall, and must therefore be regarded as belonging to var. *genuina*.

var. *prolifera* (O. F. Müller); Enteromorpha prolifera (O. F. Müller)

J. Ag., Till. Alg. Syst. 3, p. 129; Rosenv., Grønl. Havalg., p. 960; Scytosiphon compressus β crispatus Lyngb., Hydrophyt., p. 64 ex parte.

To the present plant I have referred some specimens more or less ramified and prolific, which bear a close resemblance to the figure in Flora Danica tab. 763 and to Kützing's fig. 3, tab. 30 in Tab. phyc. The cells being arranged in more or less distinct rows or even without any order whatever, and the inner wall being occasionally somewhat thickened. I have further referred to this variety some quite branchless specimens, resembling *E. intestinalis*, var. *genuina* which had, however, only a slightly thickened inner wall, and were, besides, more or less closely covered with quite thin prolifications a few cm. in length. Specimens of this rather characteristic form will be distributed in Wittrock and Nordstedt's Algae exsiccatae.

A ramified and prolific form from Kalbakfjorden, belonging to this variety, also showed distinct trabeculæ, which agreed closely in essential points with Rosenvinge's description (l. c. p. 961). These septa were, however, a great deal thinner than those in the Greenland specimens, and corresponded closely with those described in var. *compressa*.

The specimen of *Scytosiphon compressus β crispatus* Lyngb., Hydrophyt., p. 64 from »littus Eldevig, Østerö,« preserved in Lyngbye's herbarium, may be referred to this variety. And owing to the more thorough knowledge acquired in examining my considerable material of the marine *Enteromorphae*, I have arrived at a somewhat different conclusion regarding the plant which in my paper on the »Freshwater Algæ« (pp. 243—5) I have called *Enteromorpha compressa* on the strength of the material gathered partly by Lyngbye on Stromö, partly by Ostenfeld on Fuglö, in both places in running streams far up on the hills. I think it now most natural to refer the specimens in question to var. *prolifera*, but I must emphasize the fact that they, more particularly on account of their comparatively small cells, also remind one somewhat of var. *micrococca*.

Enteromorpha intestinalis, as here defined, occurs practically everywhere in the most different localities along the Færöese coasts, either between tidemarks or in quite shallow water. But in their typical form each different variety has its distinguishing habitat. Thus, var. *genuina* is most commonly found in high-lying tide-pools where the water is brackish, often almost quite fresh, and even sometimes stagnant. I have found it in tide-pools at a height of about 80 feet above sea-level. Var.

compressa prefers the open sea-shores, where it often forms a dense covering on the rocks during high-tide, e. g., at Höjvig »Flesen«. It is also found in low-lying tide-pools of fresh water. Var. *prolifera* is a form from sheltered localities and is found in the interior of fjords, where, the water is only a little salt, and where it usually forms large detached floating masses. Var. *micrococca* grows commonly on exposed coasts at a very high level, where it is wetted by the spray only in rough weather, and where it forms a pale-green belt, often associated with var. *minima* and forma *cornucopiæ* of var. *genuina*. At Bosdalafos at the west coast of Vaagö I have gathered var. *micrococca* at a height of about 80 feet above sea-level.

Almost all these varieties have been observed in the months from April to December, and fruiting in the same. They are common everywhere along the Færöese coasts in localities suitable for their growth.

165. **E. clathrata** (Roth) J. Ag.

var. *Rothiana* Le Jolis, Ulva clathrata β Rothiana, Le Jolis, Liste p. 50.

var. *Agardhiana* Le Jolis, Ulva clathrata α Agardhiana, Le Jolis, Liste p. 49.

The specimens referred to var. *Rothiana* are filiform, and much branched examples. The specimens referred to var. *Agardhiana* have broader branches, and, the main branch being often distinctly broader, they then strongly resemble forms of what Ahlner calls *E. procera*.

As pointed out by Le Jolis, *E. clathrata* is distinguished by its decidedly genuine ramification, while, on the other hand, *E. intestinalis* var. *compressa* is proliferous, rather than branching, but Le Jolis's expression »rather« (plutôt) indicates that it is often very difficult if not impossible to arrive at any definite conclusion regarding the specimens in hand.

In a gathering from Kalbakfjord, distinct trabeculæ similar to those already mentioned under *E. intestinalis* var. *compressa* and var. *prolifera* were found in branches of a moderate thickness. They were distinctly visible through the walls of an uninjured plant which had been preserved in spirit. In this case again they were not true diaphragms, as a transverse section distinctly showed, but only plates or trabeculæ stretching across a part of the lumen. Some of the specimens referred to this species were more or less closely covered with short prolifications and somewhat resembled Kützing's figure in Tab. phyc., vol. 6, tab. 33; but from these very proliferous examples there was an easy transition to specimens almost entirely without prolifications. I am of opinion that Sim-

mon's *E. ramulosa* (Meeresalg., p. 273) of which I have had a few specimens for examination ought to be referred to this species, I think it differs widely from the true *E. ramulosa* (= *E. uncinata* Mohr, *E. spinescens* Kütz.).

This species was found more particularly in sheltered localities in the interior of fjords and in shallow water, often intermingled with other species of *Enteromorpha* and forming large tangled masses.

Found in the following localities: — »Bordö«: Klaksvig (H. J.!); Øst: the interior of Fundingsfjord(!); Str.: the interior of Kalbakfjord(!); Syd: Trangisvaagfjord (!).

MONOSTROMA (Thur.).

166. **M. fuscum** (Post. et Rupr.) Wittr. Rosenv. emend, Grønl. Havalg., p. 940.

This plant is subject to considerable variation in the size and form of its cells, but, as pointed out by Rosenvinge (l. c.), it is characteristic and easily recognizable by its having 2 chromatophores one at each end of the cells; with regard to the definition of this species I quite follow the opinion expressed in Rosenvinge's description.

This species generally grows in the sublittoral zone, but may also occur in hollows between tide-marks; in the sublittoral zone it is met with from a depth of at least 10 fathoms.

It has been found both on open coasts and in sheltered situations in the interior of fjords. It grows sometimes on rocks and on stony and gravelly bottoms, and sometimes as an epiphyte, especially on the stems of *Laminaria*.

It was observed from April to December, and is probably perennial, as Rosenvinge assumes to be the case along the coasts of Greenland.

Fruiting specimens were found in May, June, July and October.

This species is very common along the coasts of the Færöes as mentioned by Rostrup (l. c. p. 88), since the plant which he calls *Ulva plicata* is in reality this species, as has been proved by examining the specimens in his herbarium. One among them was, indeed, a small specimen of *Ulva Lactuca*; on the other hand, *Ulva plicata* Lyngb. (Hydrophyt., p. 30) must according to the few, very tiny examples preserved in Lyngbye's Herbarium be referred to *M. Grevillei*.

The present species had, however, already been found by Lyngbye, as there is a small, but easily recognizable specimen of it in the museum in Copenhagen; this was gathered near »Höjvig prope Thorshavn« and called by Lyngbye »*Ulva mesenteriformis?* an Lactuca«,

while under the name he wrote: — »Nondum descripta. Radix parvus scutatus; folium infra attenuatum, sæpe spiraliter contortum, tenacius, robustius, ceterum membranaceum, tenue, palmatum vel in plures lacinias irregulares divisum, margine sinuoso et crenulato«. To this description he has further added the following remark: — »I found it in the Færöes, but forgot to record it in my »Tentamen«.«

167. **M. Grevillei** (Thur.) Wittr. Rosenv. emend., Grønl. Havalg., p. 946. Ulva plicata Lyngb., Hydrophyt., p. 30 (The specimen from the Færöes).

var. *typica* Rosenv., l. c.

var. *intestiniformis* Rosenv., l. c.

var. *arctica* (Wittr.) Rosenv., l. c.

I have had a fairly considerable quantity of this species for examination and judging from it I cannot do otherwise than entirely follow Rosenvinge's definition, an excellent one as it appears to me (l. c.).

This species varies greatly in form and appearance as well as in anatomical structure; thus, not only in different transverse sections of the same individual, but in one and the same transverse section, cells may occasionally be met with which are sometimes longer, and sometimes shorter than they are broad, as has also been pointed out by Rosenvinge. The fruiting cells often appear to be drawn out lengthwise, so that they become an elongated cylinder, at right angles to the surface of the thallus. And with regard to the outer form, plants are met with which are sometimes only a few cm. in height and more or less folded, sometimes funnel-shaped or tubular, or they may occur in the form of very large plates; and all these forms merge into one another by a series of very closely connected intermediate forms.

The specimens which I have referred to var. *typica* have fronds which in a transverse section show a thickness of 15—27 μ. Seen from the surface, the cells show slight indications of being arranged in rows. The form of the thallus is rather variable, being sometimes divided into few or more segments with the saccate basal part hardly discernible; and sometimes only slightly divided so that they are almost funnel-shaped, the latter specimens approaching var. *Vahlii* (J. Ag.) Rosenv. But I have not met with quite typical specimens corresponding with the Greenland specimens of this variety. Lastly, large plate-formed specimens occurred, generally in detached plants from sheltered localities.

The specimens referred to var. *arctica* are marked by having a thick, transverse section, most commonly about 35 μ, but varying from 29 μ to 45 μ. In this instance also the thallus are saccate at the base and gradually divide into more or less deeply cleft segments of uncertain number.

Finally, to var. *intestiniformis* Rosenv. I have only felt justified in referring a few single specimens from Klaksvig; they agreed fairly well with Rosenvinge's description, and resembled also the Greenland specimens.

Monostroma Grevillei occurs on sheltered, but most frequently on fairly exposed coasts, where it is met with near low-water mark and at half-tide level. It grows by preference in shallow hollows, which contain just a little water left by the receding tide. In such localities it often forms large green growths; it grows by choice most usually on *Corallina*, but may also be found attached to other algæ: *Fucaceæ*, etc. as well as to rocks. It is more particularly a spring alga and has been observed in great abundance in April, May, June and July but may also occur later on; and fruiting specimens occurred in those months. It had already been found by Lyngbye, as his herbarium contains a small specimen from Kvivig, gathered June 9th. and called by him *Ulva plicata* (Hydrophyt., p. 30) which is unquestionably this species.

Judging from its many habitats, this species is probably common along the coasts of the Færöes.

168. **M. undulatum** Wittr. Monostr., p. 46, tab. 3, fig. 9.

f. typica Foslie, Contrib. I, p. 114.

f. Farlowii Foslie, l. c. M. pulchrum Farlow New. Engl. Alg., p. 41.

The specimens referred to the typical form agree well with Foslie's description, a transverse section of the monostromatic part of the frond showing a thickness of about 20—56 μ.

The specimens referred to *f. Farlowii* were, on the other hand, thinner, about 18—27 μ thick. They also agreed well with Foslie's description and bore a fairly close resemblance to an original specimen of *M. pulchrum* Fosl. preserved in the museum in Copenhagen.

This species occurs littorally at half-tide level and near low-water mark, or sublittorally in shallow water. It is met with on exposed coasts as well as in sheltered localities, and grows sometimes as an epiphyte on other algæ especially *Corallina* and sometimes directly on rocks.

It has been observed in May and June and probably also later (cfr. Simmons, l. c. p. 272), and found with zoospores in the same months.

Found in the following places: — Bordö: Klaksvig (!); Øst.: Ejde (!); Vaagö: Midvaag (!); Str.: Thorshavn (!); Naalsö (!); ? Syd.: Klaksvig (Simmons).

ULVA (L.).

169. **U. Lactuca** L. Lyngb., Hydrophyt., p. 30; Kjellman, N. I., p. 361 (293).

A transverse section of the thallus shows that the cells vary much in form, being sometimes short, about as long as broad, sometimes long and narrow, and in this the latter examples come very near to *Ulva crassa* Kjellm. (l. c. p. 293); one of my reasons for mentioning this here is, that Simmons (l. c. p. 273) regards some specimens gathered by him in Trangisvaagfjord as belonging unquestionably to the latter species. I have not seen Simmons's specimens, but it appears to me that my specimens should properly be referred to *Ulva Lactuca*, with which species *Ulva crassa*, as Kjellmann himself (l. c.) also pointed out, is very closely allied.

Lyngbye (l. c.) describes a var. *β contorta* of this species as follows: — »fronde basi attenuata, spiraliter contorta, crassa, deinde in plures lacinias dilatatas profunde fissa«. His herbarium contains a specimen from Thorshavn.

This species occurs in the sublittoral zone and is met with from about low-water mark down to a depth of some 10 fathoms. In N. I., Kjellman says that this species grows in the littoral zone along the Norwegian coasts of the Arctic Sea and it is consequently perhaps possible that it also occurs littorally along the coasts of the Færöes. It has been found on sheltered as well as on exposed coasts and grows on rocks and stones and more rarely as an epiphyte on larger algæ. Large vigorous plants occurred from May to December, and fruiting examples from May to July and in October.

This species is quite common along the coasts of the Færöes.

Order ULOTHRICACEAE.

ULOTHRIX Kütz.

170. **U. flacca** (Dillw.) Thur. Rosenv., Grønl. Havalg., p. 935; Wille: Studien über Chlorophyceen, p. 18, tab. I, figs. 54—57, tab. II,

figs. 58—63; Conferva flacca Lyngb., Hydrophyt., p. 144; C. contorta Lyngb., l. c. p. 145.

The specimens referred to this species had from 1—3 pyrenoids; the cells were about $^1/_4$ as long as they were broad. The breadth of the cell-filaments varied from about 20—60 μ.

Lyngbye's Herbarium contains several gatherings of *Conferva flacca*; in those which I examined I found intermixed a large *Ulothrix*, which, judging from the dried material, agreed well with *U. flacca;* and *Urospora mirabilis* also occurred in several of the gatherings. Lyngbye's *Conferva contorta* (Hydrophyt., p. 145) must likewise be referred to the present species. His Herbarium contains two gatherings of the latter, one from Kvalbö (Syd.) epiphytic on the stem of *Fucus*, and one from rocks near Thorshavn; on the packets he has written: — *Conferva flacca* var. *contorta*.

This species has been found both on exposed and on sheltered coasts, where it grows sometimes gregariously on rocks, and sometimes as an epiphyte on larger algæ. It occurred with zoospores in May and June.

The present species is doubtless commonly distributed along the coasts of the Færöes. It had already been found by Lyngbye, who writes with reference to it (l. c. p. 144): — »Ad insulas Færoenses saxis insidens«, and (l. c. p. 145) »Habitat ad littora Færoensia stipitem inferiorem *Fuci vesiculosi* viridi suo cæspite parasitice obvestiens«.

171. **U. pseudoflacca** Wille, Studien über Chlorophyceen, p. 22.

The specimens referred to the present species appear to agree well with Wille's description (l. c.). One large pyrenoid occurs in each cell, and the ribbon-shaped chromatophore is thickest where the pyrenoid is situated. The cells vary from about $^1/_2$ as long to about 16 μ thick, thus agreeing with those of forma *minor* Wille, which also grow as an epiphyte.

This species has been met with on exposed as well as on sheltered coasts as an epiphyte on different brown algæ growing between tide-marks. Fruiting specimens were observed in June.

I think it is common along the coasts of the Færöes though it has hitherto been found only on Syd.: Trangisvaag (!), Vaags Ejde (!).

172. **U. consociata** Wille. Studien über Chlorophyceen p. 25.

The specimens referred to this species appear to agree fairly well with Wille's description. The cell-filaments were often adherent

and at the base of the filaments rhizoids occurred as in Wille's fig. 10 (l. c.); but I had only dried material for examination.

This species grew on stones between tide-marks in sheltered localities, associated with *Codiolum gregarium*.

Found hitherto only on Syd.: Trangisvaag (H. J.).

Order CHAETOPHORACEAE.

ACROCHÆTE Pringsh.

173. **A. repens** Pringsh. Beiträge zur Morphologie der Meeres-Algen, p. 326, tab. 19; Huber, Contributions à la connaissance des Chætophorées, p. 306.

Found in old *Chorda filum* gathered in October; the specimens had sporangia.

Found hitherto only on Öst.: Skaalefjord (H. J.); and Str.: Kvalvig (H. J.).

BOLBOCOLEON Pringsh.

174. **B. piliferum** Pringsh. Beiträge zur Morphologie der Meeres-Algen, p. 324, tab. 18; Huber, Contributions à la connaissance des Chætophorées, p. 308, pl. 13, figs. 8—12.

Found in a few instances in June and July creeping between the cortical cells of *Phyllitis Fascia* and *Scytosiphon lomentarius*.

Found hitherto only on Myggenæs (!); and Str.: Sundelaget between Thorsvig and Kvalvig (!).

ENDODERMA Lagerh.

175. **E. Wittrockii** (Wille) Lagerh. Bidrag til Sveriges Algflora (Öfversigt af K. Vetensk.-Akad. Förh. Stockholm 1883, N° 2); Entocladia Wittrockii Wille, Om en ny endoph. Alge (Christiania Vidensk. Selsk. Forh. 1880, N° 4).

Found growing in the cell-walls of different brown algæ.

Found hitherto only in the following places: — Svinö (in *Elachista scutulata* gathered by H. J.); Bordö: Klaksvig (in *Elachista fucicola* gathered by H. J.); Öst.: Ejde (in *Elachista fucicola*!); Str.: Kvivig (in *Sphacelaria*!), Velbestad (in *Elachista fucicola*!).

PILINIA Kütz.

176. **P. maritima** (Kjellm.) Rosenv., Grønl. Havalg., p. 932.

Found on rocks near high-water mark, intermingled in incrustations of blue-green algæ. Bore sporangia in June.

Found hitherto only on Sandö: near Sand (!).

Order MYCOIDEACEAE.

ULVELLA Crouan.

177. **U. confluens** Rosenv., Grønl. Havalg., p. 924.

Specimens which quite agreed with the description and figures of Rosenvinge have been found epiphytic on *Gigartina mamillosa*. Found on open coasts between tide-marks. Bore sporangia in April.

Along the Færöese coasts it has hitherto been found on Str.: Velbestad (!).

178. **U. fucicola** Rosenv., Grønl. Havalg., p. 926.

Found epiphytic on *Fucus inflatus*.

Probably common. Found hitherto only on Syd.: Tværaa (!).

PRINGSHEIMIA Rke.

179. **P. scutata** Rke. Algenflora, p. 81, Atlas tab. 25.

Found as an epiphyte on different algæ, e. g. *Polysiphonia urceolata, Ceramium rubrum, Sphacelaria, Laurencia pinnatifida* as also on *Zostera marina*. It has been found between tide-marks as well as in the sublittoral zone where the water is not very deep, and is met with both on open coasts and in sheltered localities. Sterile plants occurred in May and June, and sexual plants in June.

This species is presumably common along the Færöese coasts. Found in the following localities: — Öst.: Öre (!); Str.: Kvivig (!), between Thorshavn and Höjvig (!); Syd.: Trangisvaagfjord (!), Vaagfjord (!).

Order CLADOPHORACEAE.

UROSPORA Aresch.

180. **U. mirabilis** Aresch. Rosenv., Grønl. Havalg., p. 918.

The basal part of the plant (fig. 100) by which it is attached to rocks and stones, is peculiar in having intracellular as well as extracellular rhizoids. The latter, which seem to be the most common, resemble very closely those of *U. Wormskioldii*, and in both cases they grow downwards along the sides of the shoot. The

intracellular rhizoids on the contrary, grow downwards through the underlying cells, much in the same way as Rosenvinge[1] says is the case with the basal cells of *Chætomorpha;* it is probably this fact, to which Kjellman alludes, when he says[2] that the transformation in the basal part of *U. mirabilis* corresponds closely with that, which according to Rosenvinge, takes place in *Chætomorpha.*

Var. *elongata* Rosenv., Grønl. Havalg. (p. 918, fig. 35). This form which is distinguished by its elongated, not swollen cells, frequently occurred among the main species with which it seemed to be connected by a series of very gradual transitional stages. A fruiting filament was about 30 μ broad.

This species occurs on rocks and stones near high-water mark, especially on exposed coasts where it is washed by the waves. It grows gregariously, often associated with *U. Wormskioldii, Ulothrix flacca, Bangia fuscopurpurea,* etc. Sometimes though rarely, it occurs as an epiphyte on larger algæ, e. g. on *Himanthalia lorea.*

Specimens with zoospores were gathered between April and July and with gametes in April. The latter which are much smaller, are elongated and have two cilia; cells with the latter as well as those with zoospores are often found intermixed in the same filament. Specimens gathered by Helgi Jónsson in November seemed to be sterile.

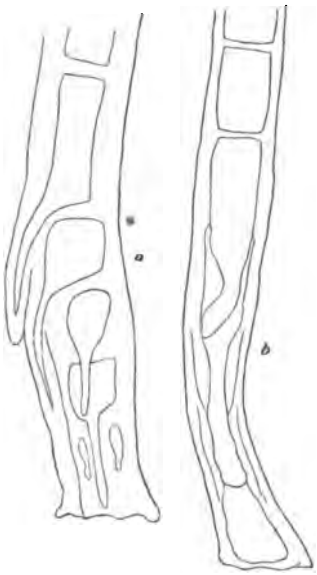

Fig. 100. *Urospora mirabilis* Aresch. Basal portions of 2 young plants; *a* with extracellular and intracellular rhizoids; *b* with intracellular rhizoids only. 200 : 1.

This species, which is undoubtedly common along the coasts of the Færöes, has hitherto been gathered on Str.: Thorshavn, in many places abundantly (!), Kvivig (Lyngb.); Syd.: Frodebö (!), Vaagsejde (!); Myggenæs (!); Lille Dimon (!).

As mentioned above, it had already been gathered by Lyngbye, since it occurs intermixed in his material of *Conferva flacca* in his herbarium. Lyngbye's *Conferva hormoides* is also beyond

[1] Kolderup Rosenvinge, L.: »Om nogle Vækstforhold hos Slægterne Cladophora og Chætomorpha (Botanisk Tidsskrift, 18. Bind. København 1892).

[2] Kjellman, F. R.: Blastophysa polymorpha och Urospora incrassata, två nya Chlorophyceer från Sveriges vestra kust (Bihang till K. Svenska Vet.-Akad. Handlingar. Band 23, Afd. III, N° 9. Stockholm 1897, p. 13).

doubt referable to this species, though no specimens from the Færöes are to be found in his herbarium. He writes with reference to it (Hydrophyt., p. 145): — »Habitat ad littora Færoensia, saxis maritimis in summo refluxus limite adnata, copiose«. Rostrup (l. c. p. 88) calls it *Hormiscia penicilliformis* (Roth) Fr. on the faith of Lyngbye's record, and finally Simmons (l. c. p. 274) calls it *Ulothrix isogona* (Engl. Bot.) Thur. and records it as probably fairly common without, however, naming the habitat.

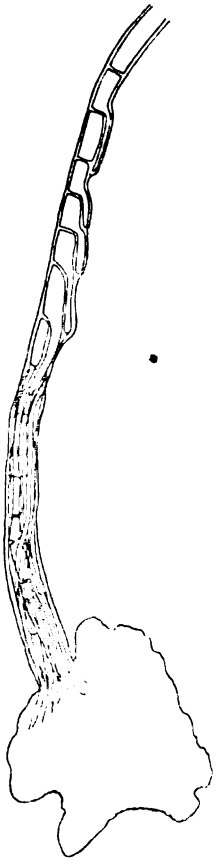

Fig. 101. *Urospora Wormskioldii* (Mert.) Rosenv. Base of plant with numerous downward growing rhizoids. 40 : 1.

181. **U. Wormskioldii** (Mert.) Rosenv., Grønl. Havalg., p. 920; Chætomorpha Wormskioldii Kjellm., N. I., p. 384 (313).

The base of this species — fig. 101 shows the lower part of a young plant — consists of a more or less large disc formed by numerous intertwined rhizoids, which spring from a fairly considerable number of cells situated in the basal portion of the plant, these rhizoids grow downwards along the cell-wall, attaching themselves to the sides of the filament. The single cells in the portion of the filament thus covered by the rhizoids are on the whole distinctly discernable right down to the base. These rhizoids closely resemble the extracellular rhizoids of *U. mirabilis*, but the intracellular rhizoids of the latter are wanting in *U. Wormskioldii*.

The chromatophore, as found in a well-developed cell, has the shape of a very richly and finely reticulated parietal plate, with numerous small pyrenoids, and in a young cell it occurs as an almost unperforated plate or with a very few holes only, and fewer pyrenoids. The chromatophore of *U. mirabilis* is more dense and of a darker colour and has comparatively few, but larger pyrenoids. Wille's figure (77 *a*) in his synopsis of the *Chlorophyceæ* in Engler und Prantl: »Die natürlichen Pflanzenfamilien« gives a good representation of a young cell; in older more developed cells of *U. mirabilis* the chromatophore is richly perforated and is almost quite reticular.

With regard to the opening through which the zoospores escape, I have in living material from the Færöes most frequently found the opening to occur laterally in the middle of the cell, but it may also occur at the cross-wall, and specimens were sometimes met with, which had, as pointed out by Rosenvinge, two openings, one at the upper, and one at the lower end of the cell.

This is a littoral species and is met with on exposed coasts at about high-water mark, and somewhat below it in sheltered localities; in Skaalefjord (Öst.) where tides are not felt it grew at about the surface of the water. It occurs gregariously often associated with *U. mirabilis*. Found April—June, and had zoosporangia in the same months.

This species is probably common along the coasts of the Færöes and has hitherto been gathered in the following localities: — Öst.: Ejde (!), Glibre (!), Strænder (!): Str.: Kvivig (!), Thorshavn (!).

I presume that the *Urospora collabens* figured and described by Harvey in Phycol. Brit. belongs to this species; it is likewise recorded by Holmes and Batters (A revised list of the British marine Algae with an Appendix, London 1892, p. 73); an example gathered by Holmes, and determined by him as *U. collabens*, and presented to our Museum in Copenhagen looks like this species; the specimen I examined had, however, sterile cells only.

CHAETOMORPHA Kütz.

182. **Ch. Melagonium** (Web. et Mohr) Kütz. Kjellm., N. I., p. 382 (311); Rosenv., Grønl. Havalg., p. 917; Conferva Melagonium Lyngb., Hydrophyt., p. 148.

It seems to me that all the material I have had for examination may be referred to f. *rupincola* Aresch., Kjellm. (l. c.), Flora Danica, tab. 2397, fig. 1.

This species has been found in the littoral zone in pools between tide-marks and in caves, as well as in the sublittoral. It grows both on exposed coasts and in more sheltered localities, and is commonly attached to rocks and stones, but occurs also epiphytic, e. g., on the stem of *Laminaria hyperborea*. This species has been observed from April to December.

It is very common along the coasts of the Færöes as had already been noted by Lyngbye, who writes (l. c.): — »Ad insulas Færoenses in superiori refluxus limite, ut ad Ridevig, Quivig, copiose«.

183. **Ch. tortuosa** (Dillw.) Kleen. Kjellm., N. I., p. 384 (313); Rosenv., Grønl. Havalg., p. 917; Conferva tortuosa Lyngb., Hydrophyt., p. 145.

The specimens referred to this species had as observed by Rosenvinge (l. c.) numerous cell-nuclei. The filaments were about 30—60 μ thick, consequently, somewhat smaller than those described by Rosenvinge, the cells were about 2—5 times as long as they were broad.

Fig. 102. *Chætomorpha tortuosa* (Dillw.) Kleen. Base of the plant. 100 : 1.

Generally this species is recorded (e. g. by Kjellm. l. c.) as lying loose at the bottom of shallow lagoons; and Rosenvinge writes with reference to it (l. c.): — »Usually it is not attached«. In the Færöes I once found some plants of it attached to stones in pools, near high-water mark, in an exposed locality. The base of these attached examples consisted of a rhizoid-like cell which at the bottom widened into a small attachment disc (fig. 102). Besides these specimens which occurred attached I found considerable quantities of it, either lying loose in sheltered localities or entangled in other algæ, e. g. *Ahnfeltia plicata* and *Halosaccion ramentaceum* and it is possible that it also grows partly attached to the latter plant.

With regard to its habitat Lyngbye writes (l. c.): — »Habitat ad littora Færoensia, imprimis supra sabulum, quod in summo refluxus limite saxa maritima hic illic obducit, haud frequens; in sinu Qualböensi alibique passim«.

Lyngbye has several specimens of this species in his herbarium, but some of the plants under this name have, however, proved to be *Rhizoclonium*.

Found in the following localities: — Bordö: Klaksvig (!); Öst.: Ejde (Lyngb.); Str.: east coast (Rostr.); Syd.: Kvalbö (Lyngb.), Sumbö Holm (!).

RHIZOCLONIUM Kütz.

184. **Rh. riparium** (Roth) Harv.[1]. Rosenv., Grønl. Havalg., p. 913, Deuxième Mémoire, p. 103; Kjellm., N. I., p. 381 (311).

var. *polyrhiza* Rosenv. l. c. Conferva obtusangula Lyngb., Hydrophyt., p. 159.

[1] For practical reasons, I have followed Rosenvinge's nomenclature and not that of Stockmayer given in his monograph: »Ueber die Algengattung Rhizoclonium« (Verhandlungen der k. k. zool. botan. Gesellschaft in Wien, vol. XI, Wien 1890) which was published before that of Rosenvinge.

var. *valida* Fosl. Rosenv. l. c.

var. *implexa* (Dillw.) Rosenv. l. c. Conferva implexa Lyngb., Hydrophyt., p. 144 (As proved by the specimens in his herbarium).

The specimens referred to var. *polyrhiza* agree well with Rosenvinge's description and figures (l. c.). Now and then, though rarely, ramifications such as are seen in Lyngbye's figure (tab. 55 B) occur in them. The plant attaches itself to rocks, etc. by its numerous multicellular rhizoids.

The specimens referred to var. *valida* are about 30—40 μ thick and the cell wall is about 3—5 μ thick. The rhizoids are either not at all divided or by a few walls only. The plants which were all found at one station only, are gathered in rock-clefts as is also the case with Rosenvinge's plants.

The specimens referred to var. *implexa* have either a very few rhizoids or none at all, and these rhizoids when they do occur are not separated from the mother-cell by a wall. The filaments are about 30—40 μ thick.

This species is found on sheltered coasts as well as in exposed localities; it grows near high-water mark, and in places where the breakers rise high it may occur at about 30—40 feet above sea-level, and has even been found at a height of about 80 feet above sea-level near the exit of Bosdalafos on the west side of Vaagö associated with *Hildenbrandia rosea, Enteromorpha* and a few other algæ. It grew here in damp rock-clefts, and formed large, crisp, pale-green cushions on the rocks. Frequently it grows in places where fresh-water drips down from above or oozes out of clefts in the rocks. Var. *implexa* also grows on the ground associated with *Vaucheria coronata* and *Percursaria percursa;* and var. *valida* was observed in rock-clefts on rather exposed coast and associated with *Rhodochorton Rothii.*

Var. *polyrhiza* is common, and as mentioned above, had been found by Lyngbye, who (l. c. p. 159) writes with reference to it: — »Habitat ad insulas Færoenses, rupibus declivibus maritimis in summo refluxus limite hic illic, ut ad Næs et Quivig Österöe[1], copiose adnata; etiam ad rupes maritimas, quæ aqua dulci irrorantur, ut ad Nosocomium Arge prope Thorshavn«. Var. *valida* occurred near Glivernæs (Str.) (!), and var. *implexa* in Sundelaget (!) north of Kvalvig; Syd.: Trangisvaag (!) and had been found by Lyngbye also (l. c.), who writes: — »Ad littora Færo-

[1] »Österöe« must be an error, as Quivig is on Strömö.

ensia sat frequens«. In his herbarium in Copenhagen there is a Færõese specimen of this variety from Thorshavn.

Rostrup records it from Klaksvig.

ACROSIPHONIA (J. Ag.) Kjellm.

Before I try to describe those of Kjellman's species which I think I have been able to distinguish in my Færõese material I must make a few short preliminary remarks. Kjellman records a great many species in his standard work[1] on this species. They are described and figured very accurately and divided into two subgenera, and then again subdivided into sections; he further gives a key to the determination of the species, and by the help of this key and more particularly by the help of the numerous figures and the exhaustive descriptions I think, as I said before, I have been able to distinguish some of Kjellman's species in my Færõese material; but, on the other hand, the occurrence of several forms has made it necessary to somewhat amend Kjellman's systematic classification of this genus, as, at any rate, the characters which Kjellman utilises for his sections have proved to be unmaintainable. Sectio I. *Speirogonicæ* is, e. g., described thus: — »Cellulæ fertiles saltim ab initio sparsæ, solitariæ, binæ vel ternæ«. Sectio II, on the other hand, is characterized by »Cellulæ fertiles jam ab initio 10—30 vel plures seriatæ, series intercalares formantes«. But I have now found a great many examples which had from 1 to 10 and even more fertile cells in a continuous row and which, as must be remembered, excepting this agreed well with Kjellman's description in Sectio I. Kjellman certainly writes »saltim ab initio«, but on consulting his description of species in Sectio I we find that he describes the species mentioned there as having at most 3 fertile adjacent cells in a row. The conclusion therefore is that the two sections must undoubtedly be united, from which again follows that at least some of the species referred to different sections will unquestionably prove to be allied.

I think, on the one hand, that it is justifiable to emphasize the fact, that we owe Kjellman much in having pointed out to us several characters by means of which we can better than hitherto

[1] Kjellman, F. R.: Studier öfver Chlorophycéslägtet Acrosiphonia och dess skandinaviska Arter (Bihang till K. Svenska Vet.-Akad. Handlingar, Band 18, Afd. III, N° 5).

distinguish the single species or varieties or whatever they are to be called, but, on the other hand, I feel equally justified in saying that there is still much left to be done with reference to this subject, and the reason why Kjellman has failed in arriving at a satisfactory result is doubtless because, of a great many of his species, he has had an insufficient number of examples for examination.

In order to be able to attain to a satisfactory result, and ascertain with certainty the variability of the different species, e. g. with regard to their being furnished with hooked branches or not, the structure of the chromatophore, etc., it is beyond doubt necessary to have a very large number of specimens for examination and specially from as many localities as possible, as this genus, at any rate along the coasts of the Færöes grows in (seen from a biological point of view) widely different habitats, e. g. sometimes in exposed and sometimes in sheltered places; sometimes in water perfectly salt, sometimes in brackish water; sometimes near low-water mark, sometimes near high, etc., conditions which undoubtedly affect the different individuals greatly. I am therefore of opinion that until we have a monograph based on a considerable material, it is hardly possible to arrive at any satisfactory result with regard to the systematization of this genus, consequently, I have for the present preferred to leave a part of my material undetermined.

A few years ago Wille[1] read a preliminary paper on the cell-nuclei of the *Acrosiphonia* in the »Biologisk Selskab« in Kristiania, and in what follows I agree with Wille in referring those species to *Acrosiphonia* which have many nuclei in each cell, but, on the other hand, as proposed by Wille, I utilize Kützing's old generic name of *Spongomorpha* for those which have one nucleus only in each cell. I may add that as early as in 1898 Rosenvinge pointed out in Deux. Mém. (p. 103, footnote) the occurrence of one nucleus only in each cell in forms resembling *Cladophora lanosa*.

185. **A. albescens** Kjellm.

I think a great many specimens in my material may be referred to this species. Fig. 103 shows some portions of the plant. The species is specially characterized by its spiny more or less unilateral branches (fig. 103 *a*, *b* and *f*). Hooked branches also occur, but often only sparingly (fig. 103 *a*, *c* and *d*). According to Kjellman's description

[1] Cfr. Botaniska Notiser 1899, p. 281.

3 fertile cells at most are to be found in a row. This was the case also with a part of the material, which I examined, but some of the specimens had long rows of fertile cells, as many as 25 at least in a continuous row (cfr. fig. 103 *e, f*). The chromatophore in the

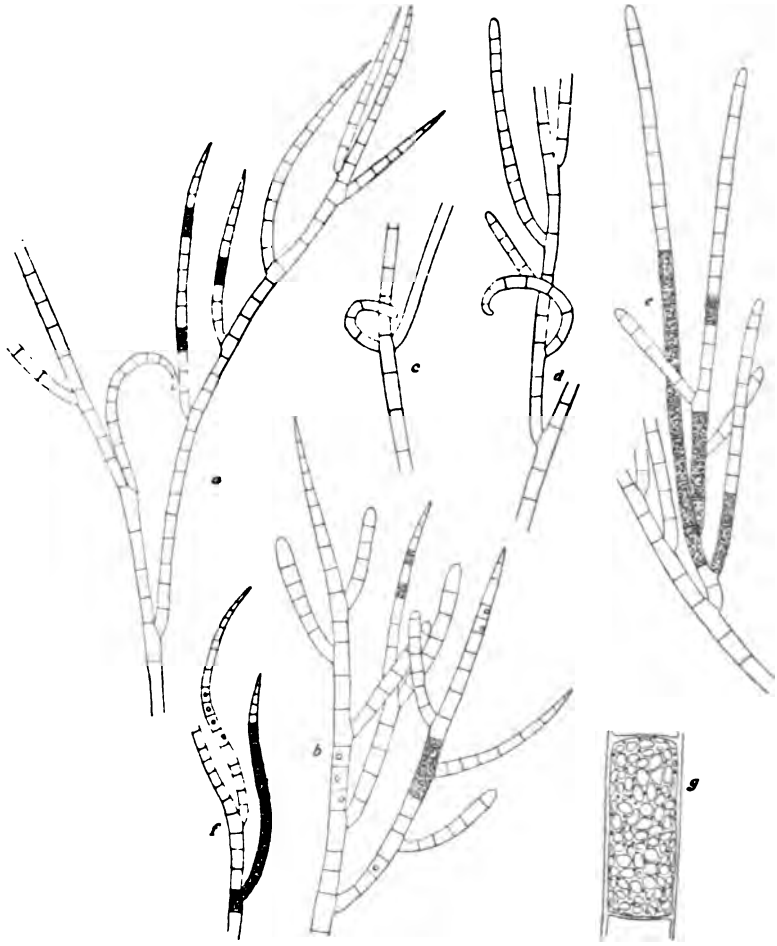

Fig. 103. *Acrosiphonia albescens* Kjellm. Compare text. Fig. *a—f*: 40 : 1, *g*: 150 : 1.

specimen figured (fig. 103 *g*) is reticular, with many small roundish holes and with numerous pyrenoids, other specimens had larger reticular chromatophores. The hole through which the zoospores escape is large and has a distinctly crenated margin. The main branch of the different species varied in thickness from 70—100 μ.

So far as I can see, the *Acrosiphonia Traillii* described by Bat-

ters[1] belongs to this species. Batters points out as characteristic of the species: »The ultimate branches of two kinds, the one having apices drawn out with a long slender point, the other of nearly equal diameter throughout, with very obtuse apices«. And he continues: »The spiny branches greatly outnumber the blunt ones, but both kinds are sometimes found side by side«. But these blunt branches are undoubtedly nothing but young branches, as the spiny branches when young, have round apical cells. I have shown a portion of such a branch in fig. 103 *b*, and if this figure be compared with Batters's fig. 3, pl. II, the identity appears to me unquestionable. It appears to me very doubtful if *Acrosiphonia hamulosa* is really specifically distinct from this species and also from the below-mentioned *A. Binderi* and *A. incurva*.

The species has been found both on open coasts and in sheltered localities, it grows near low-water mark on stones and rocks, and often covers these with a densely matted growth. It often occurs associated with *Corallina officinalis*, and also epiphytic on the latter as well as on *Gigartina mamillosa* and *Rhodymenia palmata*. In the smooth bay near Klaksvig, it formed together with *Acrosiphonia* sp. and *Chætomorpha tortuosa* large, detached, matted masses.

Fruiting specimens were found from April to July.

Appears to be a common species of the Færöes: — Vid.: Viderejde (!); Bordö: Klaksvig (!); Öst.: Glibre (!), Gjov (!); Vaagö: Midvaag (!); Str.: Sundelaget (!), Vestmanhavn (!), Kvivig (!), Velbestad (!), Gliversnæs (!), Arge (!), Thorshavn (!); Syd.: Ördevig (!), Sumbö Holm (!), Tværaa (!).

186. **A. Binderi** (Kütz.) Kjellm.

I have only felt justified in referring one gathering to this species. It differs from Kjellman's description in having as many as 10 fertile cells in a row, but most frequently only 1, 2 or 3 occurred together. The fertile cells are intercalary and have small swarmspores, and finely reticular chromatophore; hooked branches are absent and spinal branches extremely rare; there are numerous rhizoids; the thickest branches are about 60—70 μ. I think this plant is very closely related to *A. albescens*.

Grows on exposed coasts between tide-marks. Fruiting specimens occurred in July.

Found hitherto only on Syd.: at the foot of Höddaberg (!).

[1] Batters, E. A. L.: On Acrosiphonia Traillii, a new British alga (Transactions and proceedings of the botanical society of Edinburgh, vol XX, p. 213).

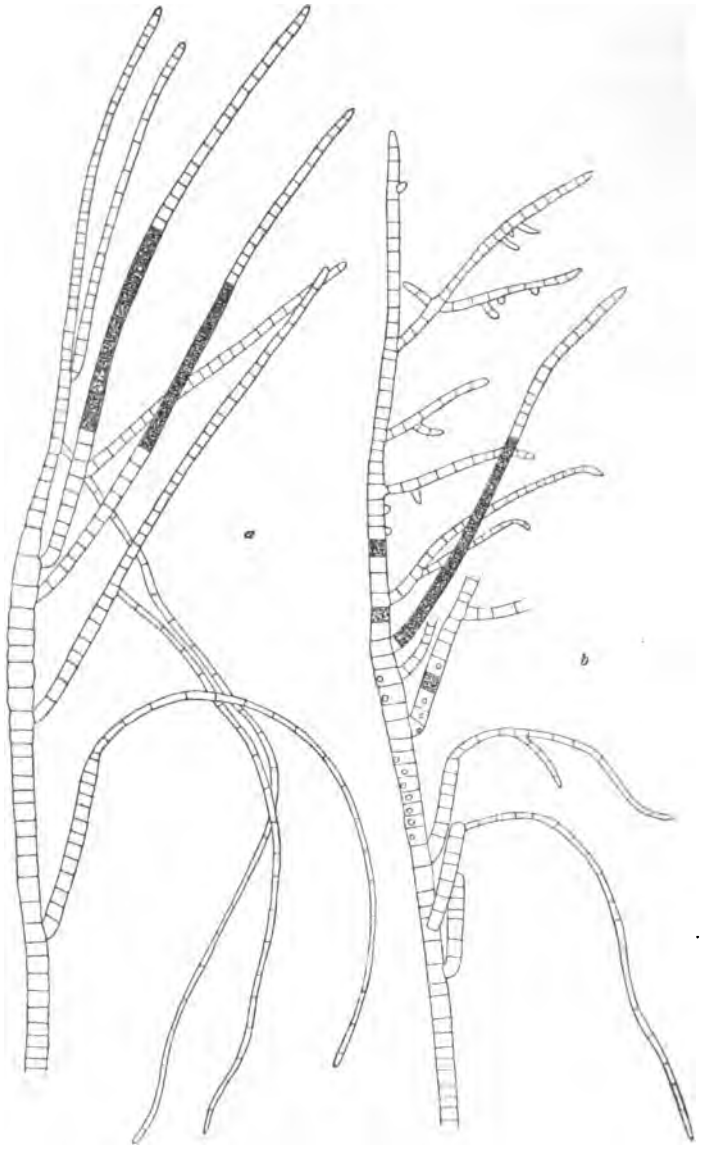

Fig. 104. *Acrosiphonia flagellata* Kjellm.? Compare text. 40 : 1.

187. **A. incurva** Kjellm.

It seems to me that a few specimens in my material agree well with Kjellman's description. They have hooked branches, but no spinal ones. The chromatophore is rather finely reticular with numerous pyrenoids. The fertile cells in my specimens occur singly

or rarely 2—3 together, and have small zoospores. The thicker branches are from 135 to 170 μ thick. This plant undoubtedly comes very near *A. albescens*.

Grows in sheltered localities between tide-marks, and fruiting specimens were found in May.

Found hitherto only on Strōmō: Kalbakfjord at the exit of a stream; Syd.: Tværaa (!).

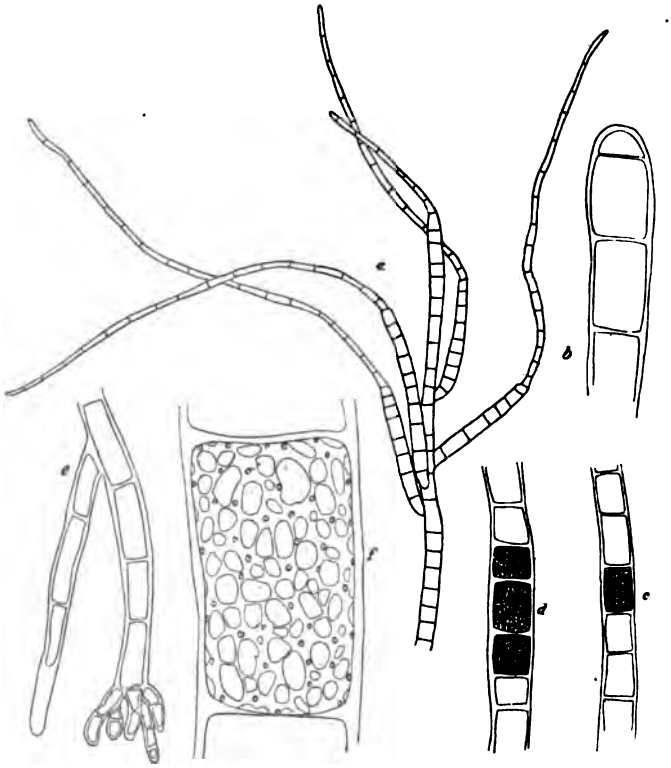

Fig. 105. *Acrosiphonia flagellata* Kjellm.? Compare text. *a* 40 : 1; *b, c, d, e* 75 : 1; *f* 180 : 1.

188. **A. flagellata** Kjellm.?

In figs. 104 and 105 I have given the illustration of an *Acrosiphonia*, which has sometimes a few single fertile cells, sometimes up to 20 together in a continuous row. As shown in the figure the fertile cells are intercalary, and the zoospores small, hence the plant belongs to the sub-genus *Melanarthrum* Kjellm. The chromatophore is rather finely recticulate, with numerous pyrenoids (fig. 105 *f*).

The thicker main branches are about 135 μ thick; growing shoots, particularly vigorous, attain to a thickness of some 120 μ just below

the apex; the top cell is short. The cells are about as long as broad, sometimes somewhat shorter, sometimes somewhat longer. In the fully developed plant the main branches grow thinner towards the apex (fig. 104 *a* and *b*). Lateral branches, and often even the main ones, terminate in thin prolongations resembling rhizoids (fig. 105 *a*); rhizoids growing downwards, occur frequently and most abundantly in the basal portion of the plant (fig. 104). The tips of the rhizoids are often palmately cleft and serve as holdfasts (fig. 105 *c*). The hole through which the zoospores escape is fairly large (fig. 104 *b*).

This plant grew between tide-marks on a rocky, exposed coast, where it occurred on the rock as a matted, dark-green growth, 3—4—5 cm. in height.

Fruiting specimens were found in June.

The present plant appears to agree fairly well with *Acrosiphonia flagellata* Kjellm., but it also comes near to *Acrosiphonia cincinnata* (Foslie) Kjellm. in many respects.

It was gathered on Store Dimon (!).

An *Acrosiphonia* which, in association with *Enteromorpha*-species, *Chætomorpha tortuosa*, etc., formed large. felted growths near Klaksvig was somewhat similar to this plant.

189. **A. flaccida** Kjellm.

A single gathering appeared to agree fairly well with Kjellman's description of the plant he calls *A. flaccida*. Both spiny and hooked branches were absent. The chromatophore was finely reticulate, with numerous pyrenoids. The cells were up to 200 μ thick, i. e. somewhat thinner than recorded by Kjellman. My specimens were unfortunately yet sterile. This species appears to come very near to *Acrosiphonia hystrix* (Strömf.).

The gathering was collected in shallow water near Thorshavn in the beginning of June (!).

Acrosiphonia centralis Kjellm. is recorded from the Færöes by Simmons, but a dried specimen of his plant gathered at Næs (Österö) which I examined appeared to be identical with *A. albescens*. And the same appears to me to be the case with a plant gathered by Rostrup and called by him *Conferva arcta* f. *centralis* Lyngb. Nor have I found any specimens in my own material which I have felt justified in referring to *A. centralis* as it is described by Kjellman, and I cannot help entertaining some doubt as to the

possibility of keeping this species distinct from *A. incurva* Kjellm. on the strength of the differences in the structure of the chromatophore.

190. **A. grandis** Kjellm.?

This species is recorded with some hesitation by Simmons (l. c. p. 274). He had sent his material to Kjellman to be determined, but since it was not in a suitable state of development, the determination is uncertain.

Simmons likewise records *Spongomorpha Sonderi* Kütz. with doubt. »Exemplare, die wahrscheinlich dieser angehören, wurden im Trangisvaagfjord gesammelt«. Judging from a dried specimen I have had for examination it is doubtless like *Acrosiphonia albescens*.

SPONGOMORPHA Kütz.[1]

191. **S. lanosa** (Roth) Kütz.

I have only had scanty material for examination, as the specimens collected were few in number, and were, moreover, sterile; hence I have preferred to retain Kützing's older name for this species and have also adopted his definition of it, the more so as I have not been able with any certainty to identify it with any of Kjellman's species; among the latter my specimens seem to come nearest to *Spongomorpha (Acrosiphonia) bombycina* Kjellm. (l. c. p. 96).

The thicker branches varied from about 25 to 30 μ.

Seems to be very rare along the coasts of the Færöes. Found only in shallow water epiphytic on Cladophora rupestris, Str.: Sundene between Thorsvig and Kvalvig (!).

The *Conferva uncialis* Lyngb. recorded by Rostrup (l. c. p. 87) from Thorshavn may probably be referred to this species.

CLADOPHORA Kütz.

192. **C. rupestris** (L.) Kütz. Kjellm., N. I., p. 377 (307); Conferva rupestris Lyngb., Hydrophyt., p. 156, tab. 54 B.

Found both in the littoral zone, usually near low-water mark, and in the sublittoral, where the water is not very deep. It is met with on open coasts as well as in sheltered localities, and grows on stones and rocks, often covering these with a dark-green, dense growth. It often occurs growing below species of *Fucus*, etc. The specimens growing uppermost often develop less vigorously; one such poorly developed form has been called by Simmons

[1] Cfr. Wille i Botaniska Notiser 1899, p. 281.

forma *contracta*. Fruiting specimens have been found from May to October.

This species is very common along the Færöese coasts, as was noted by Lyngbye: — »Ad insulas Færoenses, copiose«. It is frequently covered with different epiphytes, e. g. *Chantransia secundata*, *Diatoms*, etc., a fact already observed by Lyngbye as he writes: — »Ad insulas Færoenses apices hujus Confervæ interdum fusci vel atro-rubentis conspiciuntur coloris, qui ex porasitis minutis, nempe *Callithamnio Dawiesii*, *Diatomate marino*, *Fragilaria striatula* &c., quæ nonnunquam copiose adsunt, originem ducit«.

193. **C. sericea** (Huds.) Aresch. Phyceae Scand. mar., p. 194. Cfr. Reinbold, Chlorophyceen der Kieler Föhrde, p. 135; Kuckuck, Meeresalgen vom Sermitdlet- und kleinen Karajakfjord, p. 7.

The specimens referred to this species generally fairly well resembled those determined by Areschoug, and preserved in the museum in Copenhagen, partly in the alga-herbarium, and partly in Areschoug's Exsicc. The specimens in question are only a few cm. in length and of a pale-green colour. The cells are elongated from about double as long as broad, to 10 times as long as broad. The main branches are about 75—100—170 μ thick; the thinner branches are 20—30 μ thick. In a plant preserved in spirit the chromatophore was finely reticulated, with numerous pyrenoids. The branches are generally distant, but frequently several spring from the same joint; the branches of the last series often grow somewhat unilaterally. The fruiting cells occur as shorter or longer chains at the apex of the branches.

I must, however, point out that among my material of this species, forms occur, which other authors have referred to other species of *Cladophora*, mostly to *Cl. glaucescens* and to certain forms of the below species; and, on the whole, I am not quite certain where and how the dividing line is to be drawn between this species and the below one. At any rate I am impressed with the idea that the difference in form is a result of the different habitats; in sheltered localities, e. g. in the interior of fjords and especially in high-lying rock pools which receive a fresh supply of water only when the sea is very rough, i. e. perhaps in winter only, but where the water, on the other hand, even if it is somewhat heated by the sun, yet is far from foul owing to the larger size of the basin, in such localities such forms as I have referred to *Cl. gracilis* are found while in low-lying rock pools within reach of the tides and, consequently, more exposed to the force of the waves, small specimens, more

richly branching, are met with which I have referred to this species[1].

Judging from the examples, which according to my definition are referable to *Cl. sericea*, the species grows mostly on fairly exposed coasts in high-lying rock-pools, but it can also be met with in places which are somewhat sheltered.

Fruiting specimens were found in April—May.

It is hardly rare around the coasts of the Færöes.

194. **Cl. gracilis** (Griff.) Kütz. Conferva gracilis Aresch., Phyceæ Scand. mar., p. 197.

The specimens referred to this species agree fairly well with No. 97 quoted by Areschoug in Wyatt, Alg. Danm. The ramification in the Færöese plants though sometimes somewhat unilateral, especially at the apex of the branches, is never decidedly so, as is the case in Areschoug's fig. *B* (tab. II). In their mode of branching the Færöese specimens are also somewhat similar to Lyngbye's figure (fig. 54 *A*) of the plant he calls *Conferva crystallina β virescens*, which figure Areschoug quotes under his var. *β* of *Cl. gracilis*. As may distinctly be seen in Lyngbye's figure, two unilateral branches often spring from the same joint in the main branch, and just the same mode of branching occurs also frequently in the Færöese specimens. Some of the plants referred to this species somewhat reminded one in habit of the specimens of *Cl. glaucescens* f. *scrobiculorum* Kjellm. distributed by Kjellman in Wittr. and Nordst. Exsicc., Fasc. 22, No. 1037. The main branches attain to a thickness of up to 200 *μ*; the thinner branches are 30—50 *μ* thick. The dried specimens are of a pale, yellowish-green colour.

[1] As also pointed out by Reinbold (l. c. pp. 135—7) there is a great deal of uncertainty regarding the definition of this species, and we very often find that characters regarded by one author as peculiar for this species differ altogether from those pointed out by another as such. Kjellman also in his introduction to »Studier öfver Chlorophycéslägtet Acrosiphonia«, where he announces the publication of a second part of his »Handbok i Skandinaviens hafsalgflora« which is to contain a list of the marine Chlorophyceæ of Scandinavia, emphasizes the fact, that by the help of the material in hand it is impossible to arrive at any definite conclusion regarding the *Cladophoraceæ* occurring along the coasts of Scandinavia. Kjellman has already given some determinations in Wittr. et Nordst. Exsicc., Fasc. 22, and these determinations show that he differs in several points from his previous opinion as expressed, e. g. in »Norra Ishafvets Algflora«; but until his completed work is published the specimens in the above-mentioned Exsicc. having only names attached to them, merely help to increase the difficulties.

This species occurs sometimes in highly situated rock-pools on exposed coasts and sometimes in sheltered localities.

Fruiting specimens were found in the summer months.

It is presumably fairly common around the Færöes, and has been found in the following localities: — Bordö: Klaksvig (H. S.!); Str.: Kollefjord (H. S.), Thorshavn (!).

Cl. fracta (Vahl) Kütz. Rostrup (l. c. p. 87) records this as a common Færöese species, but, nevertheless, it is doubtful if it can be included in the list of the Færöese Flora. There are two specimens in Rostrup's Herbarium which are referred to this species, one of them is from Thorshavn (gathered Sept. 1867), and determined by Areschoug as »*Conf. fracta*, proxima«, hence this determination is uncertain. The other is from Bordö (gathered Aug. 1867), and grew on *Halosaccion ramentaceum;* on the paper capsule containing this specimen is written in J. Agardh's handwriting: — »prope C. fractam?«, but a closer examination proved this example to consist mainly of *Rhizoclonium riparium* in which was intermixed some filaments of an *Acrosiphonia.*

In Lyngbye's Herbarium there are no specimens of the *Conferva fracta γ elongata* recorded by him in Hydrophyt. (p. 152), but the Museum in Copenhagen contains a specimen on which is written in Liebmann's handwriting: — »in saxis maritimis ad Thorshavn«, this specimen must, however, undoubtedly have been gathered by Lyngbye. When examined it proved to be a small, stunted *Cladophora* closely overgrown with a *Rhizoclonium riparium* var. *implexa.*

Order GOMONTIACEAE.

GOMONTIA Born. et Flah.

195. **G. polyrhiza** (Lagerh.) Born. et Flah. Sur quelques plantes vivant dans le test calcaire des mollusques, p. 12, pl. VI—VIII; Codiolum polyrhizum Lagerheim, Öfvers. af K. Vetensk. Akad. Förhandl. 1885, p. 21.

Grows in the shells of *Solen, Buccinum undatum, Cyprina, Cardium, Modiola,* etc. often associated with *Ostreobium* and *Hyella.* It was found growing in the sublittoral zone, down to a depth of at least 15 fathoms. Sporangiferous specimens were met with in July.

This species occurred in many localities, and is doubtless common along the coasts of the Færöes.

Order BOTRYDIACEAE.

CODIOLUM A. Braun.

196. **C. gregarium** A. Braun. Alg. unicell. genera nova et minus cognita, p. 20, pl. I.

A great many species of this genus have been described, and I was at first rather doubtful to what species I should refer the Færõese specimens, which I have shown in the accompanying figure (fig. 106). I began by referring them to *C. longipes* Foslie as they appeared to me to agree closely with No. 458 in Nordst. & Wittr., Exsicc. But on examining a specimen of *Codiolum gregarium* from Heligoland, determined by A. Braun and distributed in Rabenhorst, Algen Europa's, No. 1841 I found that my specimens corresponded closely with this species also. While in Alexander Braun's figure of *C. gregarium* (l. c.), the stem and the clavate head insensibly merge into each other, the specimens in the abovementioned Exsicc., at any rate the fully developed examples among them, appeared on closer examination to have the stem and the head separated by quite a distinctly marked constriction, as is also shown in my figure; the stem also proved to be generally longer than in Braun's figures. I therefore quite agree with the opinion of Batters[1] (l. c.), who regards *C. longipes* as synonymous with *C. gregarium*. Foslie's[2] figures of *Codiolum longipes* do not, however, show any decided limit between stem and head, a fact which Kjellman points out in N. I., p. 389 (317), where he writes: — »The stipe does not always pass into the club-head so without a a limit, as appears in the figures of Foslie« and he continues: —

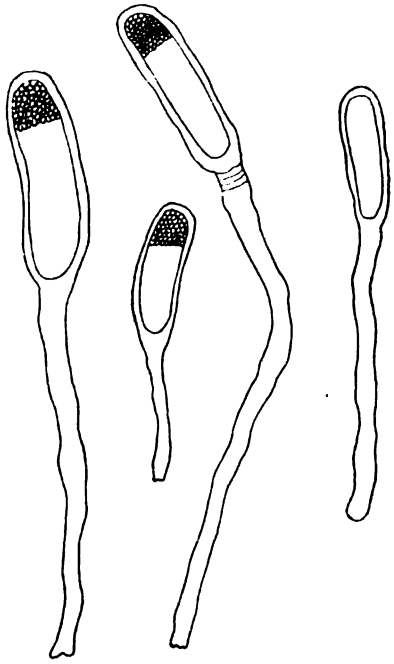

Fig. 106. *Codiolum gregarium* A. Braun. 40 : 1.

[1] Batters, E. A. L.: Marine Algæ of Berwick-on-Tweed, p. 264.

[2] Foslie, M.: Om nogle nye arctiske havalger (Christiania Videnskab.-Selsk. Forhandl. 1881).

»Among the species kindly communicated to me by Foslie there are several that accord nearly with *C. gregarium* Al. Braun in regard to the shape of the club-head. I think I ought to point out this fact because it shows that *C. longipes* is a species very slightly differentiated from *C. gregarium*«. I may further remark that among the very rich material which I had for examination from the Færöes some specimens were found which appeared to correspond exactly with *C. Nordenskiöldianum* Kjellm. On the whole I think that Kjellman is right when he says in his description of *C. Nordenskiöldianum* in N. I., p. 390 (318—9) that the genus *Codiolum* has been shown to possess a great many species differing very slightly from one another, which perhaps ought properly to be referred to the same species. On examining the specimens in the different Alg. Exsicc. at my disposal I have, however, arrived at the conclusion that it is most natural to maintain the two first-described species, *C. pusillum* and *C. gregarium*[1] which are in fact fairly different from each other and I should propose to refer the other species to these as representing different forms of one or the other.

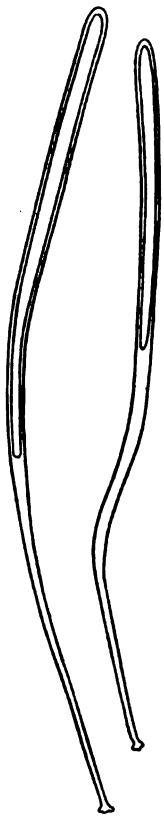

Fig. 107. *Codiolum pusillum* (Lyngb.) Kjellm. 40 : 1.

The head of the Færöese specimens measured about 135—150 μ in length and 54 μ, in breadth and the stem about 250 μ in length and 15 μ in breadth.

This plant has been found on sheltered as well as on open coasts; it grows in the littoral zone near high-water mark or above it, and forms a thin, green, slimy covering on rocks, pales or such like places often in association with *Prasiola, Urospora mirabilis, Ulothrix,* etc.

Specimens bearing zoospores were found in June, October, November and December and the plant occurred, on the whole, most abundantly in October, November and December.

This species has been found in the following places: — Vid.: Kvannesund (H.J.); Str.: Thorshavn (H.J.!); Store Dimon (!); Syd.: Trangisvaagfjord several places (H. J.), Famien (!).

197. **C. pusillum** (Lyngb.) Kjellm., N. I., p. 389 (318); Vaucheria pusilla Lyngb., Hydrophyt., p. 79, tab. 22.

[1] Naturally with the exception of *Codiolum Petrocelidis* Kuck.

In fig. 107 I have shown some of the specimens of this species contained in Lyngbye's Herbarium in Copenhagen. They are rather different from the one mentioned above. The specimens measure at the clavate-head where they are thickest about 30—60 μ in breadth and near the base 8—14 μ. The head and the stem are usually of about the same length, but sometimes the head is a little shorter, and sometimes somewhat longer than the stem, as in the specimens which I have figured.

According to my opinion the plant which was first determined by Foslie (l. c.) as *C. pusillum*, and which he afterwards described as a distinct species *C. cylindraceum* Fosl.[1], should be regarded as a form belonging to *C. pusillum*.

The fruiting specimens in Lyngbye's Herbarium were gathered in July and August.

Found hitherto in the Færöes by Lyngbye only, who writes with reference to it (l. c.): — »Habitat ad saxa littoris Færoensis in superiori refluxus limite, ut ad Qualböe Suderöe, et ad Eldevig Österöe, haud frequens«. In his herbarium there are specimens from the above-mentioned localities.

Order PHYLLOSIPHONACEAE.

OSTREOBIUM Born. et Flah.

198. **O. Queketti** Born. et Flah. Sur quelques plantes vivant dans le test calcaire des mollusques, p. 15, pl. IX, figs. 5—8.

Found in the shells of, e. g. *Modiola, Buccinum undatum, Solen, Cardium, Serpula* as also in *Phymatolithon polymorphum*. Has been met with in the sublittoral zone at extreme low-water mark, e. g. in a cave near Kvivig where it was found in *Phymatolithon polymorphum*. It occurs down to a depth of about 25 fathoms.

It has been found in many localities and is beyond doubt common along the coasts of the Færöes.

Order BRYOPSIDACEAE.

BRYOPSIS Lam.

199. **B. plumosa** (Huds.) Ag.; Br. Lyngbyei Fl. Dan., Tab. 1603; Lyngb., Hydrophyt., p. 75.

This alga was first found by Lyngbye, who mentions it in Hydrophyt. under the name of *Bryopsis Lyngbyei* Fl. dan.

[1] Foslie, M., Nye havsalger (Tromsö Museums Aarshefter X. 1887).

Several beautiful specimens of it are to be found in Lyngbye's Herbarium in Copenhagen. Later on it was found by Rostrup at Tinganæs in Thorshavn, and specimens from the same locality were, moreover, sent to Rostrup by Mr. Randropp. In spite of a very close search both at Tinganæs and Kvivig, I have not succeeded in finding this alga, which, judging also from its occurrence along the Danish coasts is of a somewhat sporadic habit. Lyngbye has gathered it on the 17th of May and on the 24th of August.

With regard to its habitat he writes (l. c.): — »Habitat ad littus Færoense in infimo refluxus limite, ut a Quivig, sed raro«, as mentioned above it has also been gathered at Thorshavn (Str.) by Rostrup and by Randropp.

Order DERBESIACEAE.

DERBESIA Sol.

200. **D. marina** (Lyngb.) Kjellm. Derbesia marina från Norges Nordkust (Bihang till K. svenska Vet.-Akad. Handlingar. Band 23, Afd. III, Stockholm 1897); Vaucheria marina Lyngb., Hydrophyt., p. 79, tab. 22.

Along the Færões this interesting alga had previously been found by Lyngbye only, who in Hydrophyt. (l. c.) writes with reference to its habitat: — »Habitat ad littus Færoense in infimo refluxus limite, ut ad Quivig, sed raro«.

There is only one specimen of it preserved in Lyngbye's Herbarium, which is unfortunately not labelled in Lyngbye's handwriting, but in Horneman's, who has written on it: — »Vaucheria marina Lyngb., Quivig, Færõe«. It must, however, as Dr. Kolderup Rosenvinge wrote to Kjellman (l. c. p. 11), who had borrowed the specimen for examination, undoubtedly have been gathered by Lyngbye, since the locality corresponds with that given by him in Hydrophyt. (l. c.).

This year (1902) when I again visited the Færões I was fortunate enough to find this alga, and fairly abundantly. I found it at a depth of some 8 fathoms on a rather exposed coast near Hvidenæs, growing on *Balanus* and *Serpula*. It occurred on these as a short, rather dense, occasionally somewhat tuft-like expansion, $^1/_2$ to 1 inch in height. Its habit and mode of growth agree very well with Lyngbye's description, but its occurrence on calcareous shells of animals at a depth of 8 fathoms differs altogether from Lyngbye's statement mentioned above that it grows on rocks at extreme low-water mark. Kjellman (l. c. p. 7, cfr. also N. I.,

p. 316) found his Finmark specimens »in 10—20 fathoms attached to *Lithothamnion soriferum* and corals«, and the doubt he expresses as to the identity of the Finmark and the Færõese plant on account of their different habitats is now cleared away by the discovery of my sublittoral plant. He finds further cause for doubt in the fact of his plant being 1—1,5 cm. high only, while Lyngbye records his to be »circa pollicem altus«, but here again, I may mention that some of my specimens were also about 1 cm. high only, while others were almost an inch high. With regard then to the substratum *Derbesia marina* grows on, this appears to be very different, Lyngbye found it on rocks, Kjellman on *Lithothamnion* and corals, and I on *Balanus* and *Serpula*, and, lastly, I may add that at Lerwick on the Shetland Islands[1] I found it at a depth of about 6 fathoms, epiphytic upon the stem of *Laminaria hyperborea* where it occurred as a short cushion about $^3/_4$ inches high.

The Færõese as well as the Shetland plant agreed well with Kjellman's exhaustive description. I shall in what follows point out some of their most important characters. In both plants there usually occurred one short cell at the base of each branch — most frequently in the English specimen — and a similar short cell in the stalk at the base of the sporangium. The erect branches were, at their thickest, as much as 54 μ thick in the plant from the Færões, and somewhat thinner, about 50 μ in the English one. Sporangia occurred in both of them, but unfortunately I did not observe any which were quite ripe. Those in the Færõese specimens were about 160 μ long and 75 μ broad, while those in the Shetland specimens were about 150 μ long and 70 μ broad. A similar immature sporangium in the specimen gathered by Lyngbye measured 156 μ in length and 67 μ in breadth. The stalks of the sporangia vary considerably in length, as mentioned by Kjellman (l. c. p. 10); those which I examined varied in length from 20—60 μ. The sporangia, as I said before, were not fully ripe, so, unfortunately I cannot record with any certainty how many swarmspores are produced in each sporangium, but they were, however, sufficiently developed for me to ascertain that the number would undoubtedly be at least 20.

[1] This year on my way to the Færões I was enabled to pay a short visit to the Shetland Islands, as the Marine Department not only kindly allowed me to make the voyage to the Færões in the cruiser »Beskytteren«, but also permitted the latter to touch at the Shetland Islands.

As may be seen from this short description, the plants in question agree well in their main points with Kjellman's from Finmark, so that the same species of *Derbesia* has now been found along the coasts of Finmark (Norway), the Shetland Islands, and the Færöes.

Lyngbye's specimen, as mentioned above, and as may be seen in his figure, bears fruit. The month in which it was gathered by Lyngbye is not known, but very probably it was August, in which month I found my plant with almost ripe sporangium.

Along the coasts of the Færöes this species has hitherto been found in the following places: — Str.: Kvivig (Lyngbye[1]), Hvidenæs (!).

Order VAUCHERIACEAE.

VAUCHERIA D. C.

201. **V. coronata** Nordst. Botan. Notiser 1879, p. 177, tab. I, figs. 1—9.

Found sometimes in sheltered places in Sundelaget, where it occurred on low, muddy slopes close to the sea, in large, green cushion-like patches associated with *Percursaria percursa* and other algæ; and sometimes on fairly open coast, e. g. near Gliversnæs, where it formed similar low, green, cushion-like growths in rock-crevices filled with mud, at a considerable height above sea-level, so that it could only be reached by the spray. Specimens rich in reproductive organs were found in June.

It has hitherto been found only on Str.: north of Kvalvig at the narrow tide-way (!), Gliversnæs (!).

It is possible that some of the *Vaucheria*-species mentioned in my Freshwater Algæ (p. 256) may occur in places with brackish water.

Order VALONIACEAE.

VALONIA Ginn.

202. **V. ovalis** (Lyngb.) Ag. Spec. Alg., I, p. 431; Gastridium ovale Lyngb., Hydrophyt., p. 72; Halicystis ovalis Aresch. Phyc. scand., p. 22.

This species has hitherto been found by Lyngbye only, who writes in Hydrophyt. (l. c.) with reference to its habitats: — »Habitat

[1] When Lyngbye writes: »ut ad Quivig«, then this seems to indicate that he found it in several places.

ad infimum refluxus limitem littoris Færoensis, ut ad Quivig, Höyvig &c., rupibus tenaciter adhærescens«. In his herbarium in Copenhagen are several specimens from the above-mentioned localities gathered respectively on the 27th of August and the 12th of September.

D. Cyanophyceae.

Order CHROOCOCCACEAE.

CHLOROGLOEA Wille.

203. **Ch. tuberculosa** (Hansg.) Wille. N. Wille: Algologische Notizen I—VI in Nyt Magazin for Naturvidenskab. Bind 38. Kristiania 1900.

Agreed well with Wille's description and figure (l. c. p. 2). Found epiphytic on *Gigartina mamillosa* growing between tide-marks on exposed coast. It occurred on the latter algæ in crusts of a dark, dingy green colour.

Found hitherto only on Str.: Höjvig Flesen (!).

Order CHAMAESIPHONACEAE.

DERMOCARPA Crouan.

204. **D. Farlowii** nov. spec.

A *Dermocarpa* which occurred on *Polysiphonia fastigiata* had a strong resemblance to *D. prasina* Born. et Thur. (Notes algologiques, Fasc. 2, p. 73, tab. 26, figs. 6—9) both in its mode of growth and in its outward appearance, but on closer examination it differred so far from the latter species that I suspected it to be distinct from it. I therefore wrote to Dr. Bornet regarding this specimen, and he kindly informed me that some years ago Professor Farlow had sent him a *Dermocarpa* from Japan which appeared to be identical with the Færöese specimen, and he very kindly forwarded me a preparation of the Japan plant, which also appeared to me to agree exactly with mine. Dr. Bornet also told me that he had written to Prof. Farlow on the subject, and Farlow had answered that he had not described the plant. Before I give a description of it I may add that I have done myself the pleasure of naming it *D. Farlowii* in honour of its first observer.

Fig. 108. *Dermocarpa Farlowii* nov. spec. 115 : 1.

As mentioned above it grows as an epiphyte on *Polysiphonia fastigiata*, and like *Dermocarpa prasina* it occurs in small, roundish, almost semi-globular growths, or when several such grow together, in cushion-like expansions, irregularly shaped. In a transverse section, or, better still, on separating the cells by means of a gentle pressure, they prove to be (fig. 108) cylindrically club-shaped, narrow at the bottom and widening upwards to the top, and with homogeneous contents of a bluish-green colour. The cells are about 60—90 μ long and about 30 μ broad. The entire contents of the cells are transformed into a very considerable number of small conidia; the latter are about 2,5 μ broad. As may be seen from this description the present plant differs essentially from *D. prasina* in having larger cells and much smaller conidia.

Conidiiferous specimens occurred in May.

Found hitherto only on Syd.: Tværaa (!),

205. **D. violacea** Crouan (?), Algues marines nouvelles de la rade de Brest. (Anm. sc. nat. IV Sér., Bot., IX. 1858, p. 70).

Epiphytic on *Ralfsia verrucosa* which grew on exposed rocks in the sea. I found a very small quantity of a *Dermocarpa* which I refer very doubtfully to *D. violacea*. The cells are pear-shaped, and the cell-contents of a yellowish-brown colour, sometimes faintly blue-green. The entire contents of the cells are produced into conidia, which are about 1,5—2 μ in diameter. The cells are 24—30 μ long and as much as 16 μ broad. It differs more particularly from Crouan's description by its different colour and by its conidia appearing to be somewhat smaller.

Found on rocks in the sea off the north-west point of Viderö (!).

PLEUROCAPSA Thur.

206. **P. amethystea** Rosenv. var., Johs. Schmidt[1].

Found epiphytic on *Rhodochorton Rothii*, consequently, in the same habitats as the latter. It has been found on almost all the material of *Rhodochorton* brought home and must therefore be regarded as common along the coasts of the Færöes.

[1] This variety was determined by Mr. Johs. Schmidt whose notes on it will appear in Helgi Jónsson's paper »The Marine Algæ of Iceland« in »Botanisk Tidsskrift«.

HYELLA Born. et Flah.

207. **H. cæspitosa** Born. et Flah. Sur quelq. plant. vivant d. le test calcaire des mollusques (Bullet. d. l. soc. bot. de France, Tome 36, 1889).

var. *typica.*

var. *nitida* Batt. New or crit. brit. mar. Algæ. Journal of Botany. Vol. 34, 1896.

Both the forms were found in the sublittoral zone, down to a depth of about 20 fathoms, inhabiting the cells of various mollucs, e. g. *Solen, Cyprina,* etc. The cell-contents of var. *nitida* were purple or violet showing sometimes a transition to bluish-green. I have not seen any sporangia.

Found hitherto only on S t r.: Vestmanhavn(!), Thorshavn(!), Gliversnæs(!).

A *Hyella,* which occurred in *Phymatolithon polymorphum* gathered from rock-pools at Arge near Thorshavn, had trichomes which measured about 18—19 μ in breadth; perhaps the plant is only to be regarded as a large variety of *Hyella cæspitosa,* but as I have only seen fragments, and have not succeeded in finding conidia, I have preferred to let it remain undetermined.

208. **Hyella endophytica** nov. spec.

A small plant of the *Chamæsiphonaceæ* which occurred directly under the epidermis of an old fruiting specimen of *Chondrus crispus* appears to me to belong to the genus *Hyella.* I have shown some specimens of it in fig. 109. It occurs as small, almost globular bodies, 40—80 μ in breadth formed by more or less richly ramified cell-filaments. The cell-division occurs in all directions. The apical cells are longest, about twice as long as they are broad; the others are about as long as broad. The breadth of the cells varies from 3 to 5 μ. The cells are enclosed in an envelope and have contents of a bluish-green colour. The cells situated towards the periphery of the *Chondrus* are produced into conidangia; the latter are somewhat larger than the vegetative cells, about 4—10 μ and contain numerous tiny conidia.

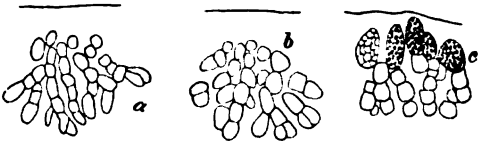

Fig. 109. *Hyella endophytica* nov. spec. The lines above the three plants indicate the surface of *Chondrus crispus.* 370 : 1.

Conidiiferous specimens were found in June.

I have referred to this species, though, doubtfully, another small plant of the *Chamæsiphonaceæ,* which I found very sparingly, endophytic in the lamina of *Laminaria hyperborea* (fig. 110). It occurred directly under the epidermis of the latter in small irregularly shaped

colonies, causing semiglobular swellings on the lamina. A transverse section of the lamina showed that the endophyte more or less destroys or ruptures the cells of the epidermis, and I presume (I have not observed it) that the latter is finally entirely torn asunder to allow the spores to escape. The cells are irregularly shaped, sometimes rounded, sometimes polygonus, and occur most frequently singly or a few together in short, ramified filaments, produced by vegetative division. The vegetative cells are about 5,4 μ thick. The conidangia are somewhat larger, about twice as large, the greatest diameter being 8—10 μ. The conidia are produced abundantly in the conidangia and are about 1 μ broad. As I have had only spirit specimens of this plant for examination I am not prepared to say anything about the colour of its cell-contents.

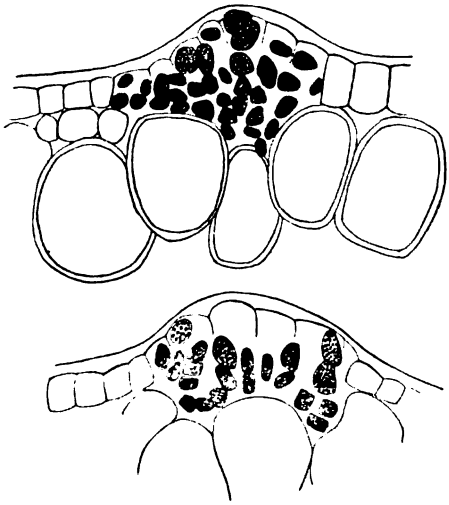

Fig. 110. *Hyella endophytica* nov. spec.? In *Laminaria hyperborea*. 370 : 1.

Found with conidangia in the beginning of May.

This species has hitherto been found only as an endophyte in *Chondrus crispus* on Nolsö: Ejde (!); and in *Laminaria hyperborea* on Str.: Thorshavn (!).

Order OSCILLATORIACEAE.

SPIRULINA Turpin.

209. **S. subsalsa** Ørsted. Beretning om en Exursion til Trindelen, Krøyers Tidsskrift, 3. Bd., p. 566, 1842.

forma β *oceanica* Gomont, Monographie des Oscillariées, p. 274.

Found in rock-pools on fairly exposed coast.

Str.: between Thorshavn and Höjvig (!).

PHORMIDIUM Kütz.

210. **Ph. autumnale** (Ag.) Gomont, emend. Johs. Schmidt[1], Danm. blaagr. Alg., p. 68 (348).

Grows near high-water mark, sometimes on rocks where fresh-

[1] Determ. Johs. Schmidt.

water runs into the sea, and sometimes in rock-pools containing stagnant water polluted by fish remains, etc.

Found hitherto only on Kalsö: Husum (!); and on Str.: Tinganæs in Thorshavn (!).

HYPHEOTHRIX Kütz.

211. **Hypheotrix** spec.[1].

According to Johs. Schmidt very slender plants belonging to this genus occurred frequently in the gatherings.

LYNGBYA C. Ag.

212. **L. lutea** Gomont[1]. Monographies des Oscillariées, p. 161.

Found between tide-marks on fairly exposed coast in October.

Found hitherto only on Vid.: Vedvig (H. J.); and on Str.: Thorshavn (H. J.).

MICROCOLEUS Desmazières.

213. **M. tenerrimus** Gomont[1]. Monographies des Oscillariées, p. 93.

Found only once in November at Kvannesund (H. J.).

Order RIVULARIACEAE.

COLOTHRIX Agardh.

214. **C. aeruginea** (Kütz.) Thur[1]. Johs. Schmidt, Danm. blaagr. Alg., p. 110 (390).

Found near high-water mark, appears to be very rare along the coasts of the Færöes.

Found hitherto only on Str.: In the neighbourhood of Thorshavn (!); Syd: Trangisvaagfjord (!).

215. **C. scopulorum** (Web. et Mohr.) Ag. emend. Johs. Schmidt[1], Danm. blaagr. Alg., p. 110 (390).

Found near extreme high-water mark, frequently at a considerable height above sea-level, e. g. near Bosdalafos where it occurred at a height of 80 feet; it formed here in association with other blue-green algæ, *Lichens*, etc. dark-brown, almost black crusts on the rock. It has been found both in the spring, summer and autumn months, but generally only poorly developed specimens were met with, and Johs. Schmidt tells me that this is the case

[1] Determ. Johs. Schmidt.

with several of the blue-green algæ which occur along the coasts of the Færöes.

It has been found in several places along the coasts of the Færöes, and is probably common.

RIVULARIA Roth.

216. **R. atra** Roth[1]. Catalecta botanica III, p. 340.

Found near high-water mark on exposed coast as well as in sheltered localities. It often grows at such a considerable height that it can only be wetted by the spray, and is, consequently, subject to desiccation for a longer period at a time.

Met with in July, October and November.

Found hitherto only in the following localities: — Vid.: Östvig and Vedvig (H. J.); Kunö (H. J.); Öst. (H. J.); Str.: Thorshavn (!).

[1] Determ. Johs. Schmidt.

ADDENDA ET CORRIGENDA.

As that part of my paper in which the *Fucus* has been treated was already ready printed in the beginning of July I have not been able to refer to the description of *Fucus spiralis* L. given by Batters in his paper »A Catalogue of the British marine Algæ« (Journal of Botany, Vol. XL, September 1902, Supplement, p. 50), in which he has expressed the same opinion of this species as I have in my present paper.

To avoid confusion I may remark that when I write at pp. 465—6: »*Fucus distichus* L., Lyngb., Hydrophyt., p. 6 (partim, e specim.)« then it is to be understood that I fully agree with Lyngbye's definition of this species, but his synonyms (with exception of *Fucus distichus* L.) should be excluded, as also his herbarium contains, besides typical specimens which correspond with his description, also one from the Færöes, which is somewhat similar to f. *linearis*.

At page 346 and throughout for *fructifying* read *fruiting;* pages 371, 403, etc. for *fructify* read *fruit.*

At page 383, Fig. 58, for *Callithamnion granulatum* (Ducl.) Ag..... read *C. corymbosum* (Smith) Lyngb.

At page 349, Lyngbye (Hydrophyt., p. 10) ... read p. 29.

INDEX OF SPECIES.

Including all the names now used, those of Lyngbye, and some other more important synonyms; the latter and Lyngbye's names are printed in Italic.

Plate I.