THE

NATURE-PRINTED BRITISH SEA-WEEDS.

VOL. I. RHODOSPERMEÆ.

FAM. I.—IX.

THE NATURE PRINTED BRITISH SEA WEEDS

JOHN LEIGHTON, F.S.A.

BY
W. G. JOHNSTONE
&
A. CROALL.

NATURE PRINTED
BY
HENRY BRADBURY.

LONDON.
BRADBURY & EVANS, 11, BOUVERIE ST
1859.

THE

NATURE-PRINTED

BRITISH SEA-WEEDS:

A HISTORY,

ACCOMPANIED BY FIGURES AND DISSECTIONS, OF THE
ALGÆ OF THE BRITISH ISLES.

BY

WILLIAM GROSART JOHNSTONE, F.B.S.E.,

AND

ALEXANDER CROALL, A.B.S.E.

NATURE-PRINTED BY HENRY BRADBURY.

IN FOUR VOLUMES.

VOL. I.—RHODOSPERMEÆ.

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LONDON:
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1859.

BRADBURY AND EVANS,
PRINTERS EXTRAORDINARY TO THE QUEEN,
WHITEFRIARS.

TO THE MEMORY

OF THE

LATE MRS. GRIFFITHS, OF TORQUAY,

A LADY WHOSE NAME,

ASSOCIATED FOR HALF A CENTURY WITH THE NATURAL HISTORY OF

DEVONSHIRE, HER NATIVE COUNTY,

DESERVES TO BE KEPT IN PERPETUAL REMEMBRANCE

BY ALL NATURALISTS,

AND MORE ESPECIALLY BY PHYCOLOGISTS,

WHOSE PURSUITS SHE ESPECIALLY LOVED, AND TO THE ADVANCEMENT

OF WHOSE SCIENCE

HER MANY DISCOVERIES LARGELY CONTRIBUTED;

This Volume of

THE NATURE-PRINTED BRITISH SEA-WEEDS,

INTENDED TO HAVE BEEN DEDICATED TO HER WHILE LIVING,

IS NOW,

WITH AFFECTIONATE AND GRATEFUL REMEMBRANCE,

INSCRIBED BY

THE AUTHORS.

PREFACE.

The quaint old writers of the sixteenth century were wont to chat sunnily and lovingly, through page upon page of 'Preface' addressed to the 'Courteous Reader,' or 'Kind Reader,' or 'Honored Reader,' or, kindliest and gentlest of all, to 'Dear Hearts,' until *he* had been as the stone who went not with a 'God bless you' to the perusal of the book so goldenly, and not without spice of wit and wisdom, and deftest deprecation, introduced. Alas! that the days of such "linkëd sweetness, long drawn out" in Prefaces, are vanished; and doubly alas! that no Elia! no Robert Southey of 'The Doctor,' has written their epicedium. And yet the Editors of 'The British Algæ,' on concluding (for the time) their Book, feel greatly inclined to imagine the clock-of-time put back a couple of centuries, and to gossip and chat in old style with their 'Courteous,' 'Kind,' 'Honored' Readers and 'Dear Hearts' as in olden time.

First of all, the Editors have very great pleasure in presenting in their Book all promised in their Prospectus.

Next, the Editors may be permitted to congratulate themselves that they have been enabled to redeem their Prospectus in quality as well as in quantity and details. The Sea-weeds of Britain, they flatter themselves, are herein reproduced with all fidelity to structure, character and tint of the originals. The most crystalline water could scarcely more delicately float these lace-like trophies of the Garden of the Sea than do their pages.

Further, the Editors have, with all cordiality, to return their thanks to their numerous Correspondents and Contributors of specimens. It were "long to tell" all who have spontaneously, and with kind words, aided their somewhat arduous and not easily appreciable researches and labours. While the Editors might leave unspecified not a few of the many, all will understand themselves to be included in their right-hearty thanks and most grateful acknowledgments.

Again, the Editors must very gratefully record the welcome everywhere extended to their Book by the 'Press' of all sections and countries. If they feel disposed to 'break a lance' with—to repay a Roland for an Oliver to their genial, albeit jestful and eke half-sarcastic reviewer in the 'Athenæum,' it must be understood as only in chivalric defence of the "ladies faire." Ah! thou 'Athenæum' critic, how could'st thou flout and sneer against lily-handed maidens so daintily occupied as were the gentle constituents of 'The British Algæ!' Fie! fie! And, most erudite 'Athenæum' critic, in thy twitting of our letter-press as too scientific, thou forgettest three things: (1.) Thy 'local' and provincial names should sound as barbaric and uncouth to other ears, yea, beyond thy native Village, as crabbedst Latin or Greek. (2.) Knowest thou not that Science must have its universal language? (3.) Knowest thou not that the Editors report, not impose, the names?

Finally, in view of after-gatherings and of after-enlargement of their Book, they would ask of all interested in the study of Algology to correspond with them as to any difficulties, and to send to them any good specimens; to favour them with any remarks they may have to make, and to correct any mistakes they may have observed. Again, with all good wishes to their friends, correspondents, and patrons, they would in the meantime say, all hail! and farewell.

WILLIAM GROSART JOHNSTONE.
ALEXANDER CROALL.

14, Park Place, Liverpool Road, Islington.
May 31*st*, 1860.

ADVERTISEMENT.

We have in the present volume, which contains the first portion of the *Rhodospermeæ*, prefixed a Conspectus of the whole of that group of the British Sea-weeds, which will be completed in our succeeding volume. In like manner it is intended to prefix to the volumes they will respectively occupy, a Conspectus of the *Melanospermeæ* and *Chlorospermeæ*, reserving till the fourth and concluding volume the full Synoptical Tables of the Orders, Genera, and Species. The structure, uses, classification, and distribution of the British Algæ will also be considered at length in our fourth volume, which, moreover, will comprise instructions for the cultivation, the preservation in the Herbarium, and the preparation as objects for the Microscope, of these beautiful and interesting marine plants. The same volume will contain a Glossary of the technical terms used in the work.

It will be seen that, so far as we have gone, a full, and, we trust, accurate history of each species has been given ; and where the species has not been such as to allow of its being Nature-Printed, engraved magnified dissections have been introduced into the text. The work will be continued on the same plan: every species of which it is practicable to produce satisfactory figures by Nature-Printing will be represented by this process, and dissections of every species will be added.

W. G. J.
A. C.

4, Milan Terrace, Battersea, Surrey.
77, Castle Street, Montrose, N.B.
May 31*st*, 1859.

As already announced in our Prospectus, the volumes of the Nature-Printed British Sea-weeds are to be issued as undernoted, so that any information or specimens, to be available, should be received as soon as possible.

Vols. I. & II.—RHODOSPERMEÆ.
III.—MELANOSPERMEÆ.
IV.—CHLOROSPERMEÆ.

In Quarterly Volumes, commencing June 1859.

CONSPECTUS OF VOLUMES I. AND II.

VOL. I.

SERIES I.—DESMIOSPERMEÆ.

Sporiferous-nucleus consisting of tufted spore-threads attached to a cellular placenta. Single spores formed one in each cell of the spore-thread, or only in the terminal cell.

§ I.—NUCLEUS LODGED IN AN EXTERNAL CONCEPTACLE OR CAPSULE.

* *Placenta basal. Spores pyriform, formed in the terminal cell of the spore-threads.*

FAM. I. **RHODOMELACEÆ.**—Frond more or less articulate, the surface areolate. Tetraspores seriated in the ramuli, or in pod-like receptacles. Containing:

Genus 1.—Odonthalia.
2.—Rhodomela.
3.—Chondria.
4.—Bostrychia.
5.—Rytiphlæa.
6.—Polysiphonia.
7.—Dasya.

FAM. II. **LAURENCIACEÆ.**—Frond inarticulate; surface cells minute. Tetraspores scattered irregularly through the ramuli. Containing:

Genus 1.—Bonnemaisonia.
2.—Laurencia.
3.—Lomentaria.
4.—Champia.

* * *Placenta basal. Spores roundish or elliptical, in moniliform cells; every cell of the spore-thread finally changed into a spore.*

FAM. III. **CORALLINACEÆ.**—Frond calcareous; spore-threads of four spores. Containing:

Genus 1.—Corallina.
2.—Jania.
3.—Melobesia.
4.—Hapalidium.

FAM. IV. **SPHÆROCOCCOIDEÆ.**—Frond cartilaginous, or membranaceous; spore-threads separating into many spores. Containing:

Genus 1.—Delesseria.
2.—Nitophyllum.
3.—Calliblepharis.
4.—Sphærococcus.
5.—Gracilaria.

* * * *Placenta axial, or suspended by filaments in the cavity of the conceptacle.*

FAM. V. **GELIDIACEÆ.**—Containing:

Genus 1.—Gelidium.

§ II.—NUCLEUS NOT LODGED IN A HOLLOW CONCEPTACLE.

* *Nuclei several, contained in wart-like excrescences.*

FAM. VI. **SPONGIOCARPEÆ.**—Frond cylindrical and branched. Containing:

Genus 1.—Polyides.

FAM. VII. **SQUAMARIEÆ.**—Frond lichenoid, rooting from lower surface. Containing:

Genus 1.—Peyssonelia.
2.—Hildenbrandtia.
3.—Petrocelis.
4.—Cruoria.
5.—Actinococcus.

* * *Nuclei immersed in the frond.*

FAM. VIII. **HELMINTHOCLADIEÆ.**—Containing:

Genus 1.—Nemaleon.
2.—Helminthocladia.
3.—Helminthora.
4.—Scinaia.

* * * *Nuclei naked, external, involucrate.*

FAM. IX. **WRANGELIACEÆ.**—Containing:

Genus 1.—Wrangelia.
2.—Naccaria.

VOL. II.

SERIES II.—GONGYLOSPERMEÆ.

Sporiferous-nucleus subglobose, either simple or formed of many nucleoli. Numerous spores congregated without order in each nucleus or nucleolus.

* *Frond inarticulate, flat or cylindrical, compound.*

FAM. X. **RHODYMENIACEÆ.** — Spores developed within the cells of moniliform filaments issuing from a centre. Containing:

Genus 1.—Wormskioldia.
2.—Plocamium.
3.—Rhodymenia.
4.—Rhodophyllis.
5.—Euthora.
6.—Cordylecladia.
7.—Stenogramme.
8.—Dumontia.
9.—Catenella.
10.—Chylocladia.

FAM. XI. **CRYPTONEMIACEÆ.** — Spores developed within solitary or aggregated detached mother cells. Containing:

Genus 1.—Phyllophora.
2.—Gymnogrongus.
3.—Ahnfeldtia.
4.—Cystoclonium.
5.—Callophyllis.
6.—Kallymenia.
7.—Gigartina.
8.—Chondrus.
9.—Halymenia.

FAM. XI. **CRYPTONEMIACEÆ** (*continued*).

Genus 10.—Furcellaria.
11.—Grateloupia.
12.—Schizymenia.
13.—Gloiosiphonia.

* * *Frond filiform, articulate, monosiphonous; the articulations naked, or coated with small cellules.*

FAM. XII. **SPYRIDIACEÆ.**—Sporiferous-nucleus compound, lodged in an external conceptacle. Containing:

Genus 1.—Spyridia.

FAM. XIII. **CERAMIACEÆ.**—Sporiferous-nucleus simple, external, naked or involucrate. Containing:

Genus 1.—Microcladia.
2.—Ceramium.
3.—Dudresnaia.
4.—Crouania.
5.—Ptilota.
6.—Griffithsia.
7.—Corynospora.
8.—Seirospora.
9.—Callithamnion.

ALPHABETICAL INDEX OF SPECIES.

VOLUME I.

In every case where a blank occurs in the column denoting the number of the Plates, engraved magnified dissections, illustrative of that species, will be found at the conclusion of the descriptive text.

Plate 1.

ODONTHALIA *dentata*. LYNGB.

Nature Printed by Henry Bradbury

Plate I.

ODONTHALIA DENTATA.—*Lyngb.*

Gen. Char.—Frond plano-convex, dark vinous red, the sharp edges alternately ; cells rather small and irregular. Fructification of two kinds : 1. Capsules (ceramidia) furnished with a terminal pore, and containing a cluster of pear-shaped spores ; 2. Lanceolate pods or stichidia, containing tetraspores arranged longitudinally in a double row. Name from ὀδοὺς, "a tooth," and φάλος, "a branch."

Odonthalia *dentata.* — Frond irregularly and alternately pinnate ; pinnæ lanceolate, deeply laciniate, pinnatifid or bipinnatifid ; the segments lanceolate or linear lanceolate, alternate, with deep, sharp, and subfalcate teeth towards the summit ; capsules and pods clustered on short stalks all round the margin.

Odonthalia *dentata.—Lyngb. Hyd. Dan.* p. 9, t. 3; *Grev. Fl. Edin.* p. 296 ; *Grev. Alg. Brit.* p. 101, t. 13 ; *Hook. Br. Fl.* vol. ii. p. 293 ; *Harv. Man.* p. 78 ; *Kütz. Phyc. Gen.* p. 448 ; *Endl.* 3rd Suppl. p. 47 ; *Harv. P. B.* plate 34 ; *Harv. Syn.* p. 63 ; *Atlas,* plate 23, fig. 99 ; *Harv. N. B. A.* p. 14.

Rhodomela *dentata.—Ag. Sp. Alg.* vol. i. p. 370 ; *Ag. Syst.* p. 196 ; *Spreng. Syst. Veg.* vol. iv. p. 342.

Delesseria *dentata.—Lamour. Ess.* p. 36.

Fucus *dentatus.—Linn. Syst. Nat.* vol. ii. p. 718 ; *Huds. Fl. Ang.* p. 582 ; *Lightf. Fl. Scot.* vol. ii. p. 952 ; *With.* vol. iv. p. 102 ; *Linn. Trans.* vol. iii. p. 158 ; *Turn. Syn.* vol. i. p. 149 ; *Stack. Ner. Brit.* p. 95, t. 15 ; *E. Bot.* t. 1241 ; *Turn. Hist.* t. 13.

Fucus *atomarius.—Gmelin, Hist. Fuc.* p. 125, t. 10, f. 1.

Fucus *pinnatifidus.—Fl. Dan.* t. 354 (excl. Syn. Huds.)

Hab.—On rocks from half-tide level to a considerable depth. Fruit in spring. Rather a northern plant, being rare, small, and seldom fruiting in the south of England, occurring more frequently in the north. Abundant on most of the shores of Scotland and north of Ireland, producing fruit in abundance.

Geogr. Dist.—North of England and Ireland ; Scotland ; Iceland (*Harvey*) ; Newfoundland ; Norway ; and perhaps all the northern shores of the Atlantic.

Description.—Root, a flat, hard, conical disc. Stem, scarcely any, suddenly expanding into a compressed linear frond ; when young, simply laciniated or pinnatifid, but when old, having the margin fringed with alternate teeth (the remains of former branches) ; from the axils of these arise the branches, which are generally simple, with deep lanceolate laciniæ, erecto-patent, for the most part only deeply toothed in the upper half, but sometimes again deeply laciniated almost to the base. The midrib at the base occupies almost the whole of the breadth of the frond, but gradually becomes flattened upwards, and disappears in the dentate summits of the laciniæ. The fructification generally occupies the whole of the margin, but is occasionally, when scanty, confined to the axils of the laciniæ, and is produced on pellucid, almost colourless, reticulated stalks. Capsules somewhat pitcher-shaped, containing at the bottom a cluster of bright red pear-shaped spores; stichidia lanceolate, nearly colourless, containing generally a double row of darker coloured tetraspores. Substance cartilaginous, the cells forming the surface more closely packed; hence scarcely adhering to paper. Colour, a deep vinous-red, becoming darker in drying. " Smell agreeably pungent, but taste insipid."—*Harvey.*

This beautiful plant seems to delight to grow on flat rocks in our large sheltered bays, where its long bushy fronds, waving in the tidal swell, form a highly interesting object, and where the colour is much brighter and more transparent than when removed from the water; and the colour becomes still darker after the plant has been dried. The capsules and stichidiæ form beautiful and interesting objects for the microscope, as the spores and tetraspores are easily discernible through their open cellular tissue. The spores are at first attached to the bottom of the ceramidium by delicate pedicels, and their colour is pale, and structure lax and open like that of the capsules; but as they reach maturity their structure becomes more dense, and their colour deeper, and they are easily detached, and escape through the pores of the capsules by the slightest pressure.

EXPLANATION OF PLATE I.

Fig. 1.—*Odonthalia dentata,* natural size.
2.—Branch with capsules.
3.—Branch with pods.
4.—Cluster of capsules.
5.—Spores.
6.—A pod or stichidium.
7.—Tetraspores. All magnified.

Plate II

Rhodomela subfusca, Ag.

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Plate II.

RHODOMELA SUBFUSCA.—*Ag.*

Gen. Char.—Frond filiform, solid, inarticulate, the axis composed of oblong hyaline cells, the periphery of minute, irregular, coloured cellules. Fructification: 1. Ovate capsules (ceramidia) containing a tuft of pear-shaped spores; 2. Tetraspores immersed in swollen ramuli, "or contained in proper pod-like receptacles," placed in a double row. Name from *ροδεος*, "red," and *μέλας*, "black," referring to the colour of the plant.

Rhodomela *subfusca.*—Frond filiform, much and irregularly branched; branches somewhat flexuose, more regularly distichous and pinnated upwards; ultimate divisions generally regularly pinnated, with subulate pinnules; capsules placed obliquely on short stalks.

Rhodomela *subfusca.*—*Ag. Sp. Alg.* vol. i. p. 378; *Ag. Syst.* p. 199; *Spreng. Syst. Veg.* vol. iv. p. 343; *Grev. Alg. Brit.* p. 193; *Hook. Br. Fl.* vol. ii. p. 294; *Wyatt, Alg. Danm.* No. 111; *Harv.* in *Mack. Fl. Hib.* part 3, p. 197; *Harv. Man.* p. 79; *Harv. P. B.* plate 264; *Harv. N. B. A.* part 2, p. 26; *Harv. Syn.* p. 64; *Atlas,* pl. 24, fig. 103; *Endl.* 3rd Suppl. p. 47.

Lophura *cymosa.*—*Kütz. Phyc. Gen.* p. 435.

Gigartina *subfusca.*—*Lamour. Ess.* p. 48; *Lyngb. Hyd. Dan.* p. 47, t. 10; *Grev. Fl. Edin.* p. 289.

Sphærococcus *subfuscus.*—*Hook. Fl. Scot.* part 2, p. 104.

Fucus *subfuscus.* — *Woodw.* in *Linn. Trans.* vol. i. p. 131, t. 12; *Good. & Woodw. Linn. Trans.* vol. iii. p. 212; *Turn. Syn. Fuc.* p. 350; *Turn. Hist.* t. 10; *E. Bot.* t. 1164; *Esper, Ic. Fuc.* vol. ii. p. 11, t. 117.

Fucus *confervoides.*—*Huds. Fl. Ang.* p. 591.

Fucus *variabilis.*—*Good. & Woodw. Linn. Trans.* vol. iii. p. 220.

Fucus *setaceus.*— *Wulf. Crypt. Aquat.* No. 40.

Hab.—In the sea, on rocks, shells, and Algæ. Perennial. Summer. Common.

Geogr. Dist.—Atlantic shores of Europe and North America.

Description.—Root, a small flat disc. Fronds much tufted, three to twelve inches long, scarcely half a line in diameter, filiform, from a somewhat contracted cylindrical base, expanding slightly upwards. Stem about half an inch to an inch and a-half long, much and irregularly branched upwards, and everywhere more or less beset with the setaceous remains of the old branches; four or five, or, in luxuriant specimens, even six or seven times divided; the branching becoming more and more regular upwards, the ultimate and young branchlets being beautifully plumose, with regular alternate pinnules. Capsules not uncommon, in summer, on the pinnules, ovate, on short somewhat oblique stalks. Tetraspores also abundant; in summer and autumn immersed in the pinnules, in two rows; in winter contained in branched receptacles arising from the denuded branches.

No Alga perhaps varies more than the present species does at different seasons of the year. Like several other species, its older stems only may be considered perennial, the more delicate and fructified portions becoming abraded with the storms of autumn and early winter, so that before spring little is left (if the winter has been severe) but the main stem, and a few of the principal branches. At other times, if the winter has been mild, vegetation begins at a very early period, and the month of March finds the plants only partially abraded, or the young fronds again feathering the branches with rich and delicate plumules. From these circumstances, combined with the local influences of tides and currents, this species presents a most puzzling variety of appearances; yet the plant is so much *sui generis*, that a little acquaintance will soon enable the botanist to determine the species; the chief difficulty being to the young botanist when meeting with the plant in *dishabille*, while he is drawing his conclusions from figures representing the plant in its most perfect foliage. Still less easy is it to distinguish at all times between this and its congener, *R. lycopodioides*, the microscopical characters of both being almost the same. In *R. lycopodioides*, the upper branches are generally longest; in *R. subfusca*, the opposite is the case. In winter, the former is generally denuded to the simple stem, while in the latter, the principal branches also remain; in the former the branches are generally short and terete, in the latter they are mostly long, loose, and straggling. The former generally grows on the stems of *Laminaria digitata*, the latter most frequently on rocks.

EXPLANATION OF PLATE II.

Fig. 1.—*Rhodomela subfusca*, natural size.
2.—Pinnated (summer) branchlet, with tetraspores in the pinnules.
3.—Tufted stichidia (winter) with tetraspores.
4.—A tetraspore.
5.—Branchlet with capsule.
6.—A capsule.
7.—Transverse section of the stem. All magnified.

Plate III

Nature Printed by Henry Bradbury.

RHODOMELA lycopodioides. AG.

Plate III.

RHODOMELA LYCOPODIOIDES.—*Ag.*

Gen. Char.—Frond filiform, solid, inarticulate; the axis composed of oblong hyaline cells, the periphery of minute, irregular, coloured cellules. Fructification: 1. Ovate capsules (ceramidia) containing a tuft of pear-shaped spores; 2. Tetraspores immersed in swollen ramuli, "or contained in proper pod-like receptacles," placed in a double row. Name from ῥοδεος, "red," and μέλας, "black," referring to the colour of the plant.

Rhodomela *lycopodioides.*—Frond simple or divided near the base into long simple branches, everywhere densely beset with short, slender, much divided branches, often mixed with the short setaceous remains of former branches.

Rhodomela *lycopodioides.*—*Ag. Sp. Alg.* vol. i. p. 377; *Ag. Syst.* p. 199; *Grev. Alg. Brit.* p. 102; *Hook. Br. Fl.* vol. ii. p. 294; *Endl.* 3rd Suppl. p. 47; *Harv.* in *Mack. Fl. Hib.* part 3, p. 196; *Harv. P. B.* plate 50; *Harv. Man.* p. 78; *Harv. Syn.* p. 63; *Atlas,* plate 23, fig. 100.

Gigartina *lycopodioides.*—*Lyngb. Hyd. Dan.* p. 45; *Grev. Fl. Edin.* p. 289.

Furcellaria *lycopodioides.*—*Ag. Syn.* p. 11; *Hook. Fl. Scot.* part 2, p. 97.

Lophura *lycopodioides.*—*Linn. Syst. Nat.* p. 717; *Turn. Syn.* vol. ii. p. 343; *E. Bot.* t. 1163; *Turn. Hist.* t. 12.

Conferva *squarrosa.*—*Fl. Dan.* t. 357.

Hab.—Growing on the stems of *Laminaria digitata.* Perennial. Spring; summer.

Geogr. Dist.—All the shores of Northern Europe.

Description.—Root, a very small flattened disc. Frond: main stem simple, cylindrical, from four to twelve inches, or rarely two feet in length, scarcely half a line in diameter, beset from the base with short but very much divided branchlets, often not exceeding half an inch in length, seldom more than one or one and a-half, though occasionally very much elongated; the main stem more or less densely clothed with the short setaceous remains of former ramuli; these, in old plants, become so dense that the plants resemble a bottle brush. Capsules, in summer, not uncommon on the ramuli, on short oblique stalks, broadly ovate, containing at the bottom a tuft of obovate or pear-shaped spores. Tetraspores divided into three or four, plentiful in winter, immersed in short, much-branched, or pinnated receptacles, resembling stichidia. Substance hard, cartilaginous when old; more tender when young, and then only adhering to paper. Colour, dark purplish brown, almost black when dry.

The summer and winter habit of this plant are so different from each other, that even the "practised eye of the botanist" is very apt to be misled; and the young botanist will often find it difficult to convince himself that the different forms do not belong to really different species. This observation more or less belongs to all perennial and even to biennial species, and to none perhaps more truly than the present. It is only in older plants that the peculiar bottle brush-like appearance, so characteristic of the species, is assumed; and this is more or less the case, according to the more or less exposed situation in which it has grown. In young plants, the stem is quite free from these short spine-like ramuli. Ultimately many more and smaller branches arise from all parts of the stem, and these, together with the former series, fall off, or are torn away by the storms of autumn and winter; so that the plant in spring presents nothing but a simple, or once or twice divided frond, everywhere beset with short, simple, or slightly divided ramuli, generally longest a little below the summit, giving the frond a linear lanceolate outline, but sometimes quite linear or narrower upwards.

It is an easy matter to distinguish the extreme forms of this and of *R. subfusca;* but not so in every case. The present indeed seldom has the branches so much elongated, nor is the central tube or cell so apparent; yet the external habit of both is sometimes so much the same, and the structure in the microscope so similar, that it is often no easy task to distinguish the two.

The present plant is almost invariably found on the old stems of *Laminaria digitata,* whereas *R. subfusca* is as invariably found on rocks, stones, and old shells.

EXPLANATION OF PLATE III.

Fig. 1.—*Rhodomela lycopodioides,* natural size.
2.—Branch with capsules.
3.—A capsule.
4.—Spores from same.
5.—Branch with tetraspores.
6.—Tetraspores from same.
7.—Cross section of the stem. All magnified.

Plate IV.

Chondria dasyphylla, Ag.

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Plate IV.

CHONDRIA DASYPHYLLA.—*Ag.*

Gen. Char.—Frond filiform, decompound, opaque, with a percurrent, polysiphonous, articulated axis. Fructification of two kinds, on distinct plants : 1. Ovate capsules perforate at the summit, containing at the bottom a tuft of pyriform spores ; 2. Tripartite tetraspores irregularly disposed, beneath the surface of the ultimate ramuli. Name from *χόνδρος*, "cartilage."

Chondria *dasyphylla.*—Frond cylindrical and filiform, much and irregularly branched ; branches repeatedly and irregularly pinnated, erecto-patent ; the ultimate pinnules very short and obtuse, much attenuated to the base.

Chondria *dasyphylla.*—*Ag. Sp. Alg.* vol. i. p. 350 ; *Ag. Syst.* p. 205 ; *Spreng. Syst. Veg.* vol. iv. p. 342 ; *Kütz. Phyc. Gen.* p. 436, t. 55, fig. 2 ; *Harv. N. B. A.* p. 20.

Laurencia *dasyphylla.*—*Grev. Alg. Brit.* p. 112, t. 14, figs. 13–17 ; *Hook. Br. Fl.* vol. ii. p. 296 ; *Wyatt, Alg. Danm.* No. 71 ; *J. Ag. Alg. Medit.* p. 113 ; *Mont. Algier.* p. 95 ; *Endl.* 3rd Suppl. p. 43 ; *Hook. fil. & Harv.* in *Lond. Journ. Bot.* vol. vi. p. 401 ; *Harv.* in *Mack. Fl. Hib.* part 3, p. 198 ; *Harv. P. B.* plate 152 ; *Harv. Man.* p. 99 ; *Harv. Syn.* p. 84 ; *Atlas,* plate 32, fig. 144.

Laurencia *cæspitosa.*—*Lamour. Ess.* p. 43 (fide *Ag.*).

Gigartina *dasyphylla.*—*Lamour. Ess.* p. 48.

Fucus *dasyphyllus.*—*Woodw.* in *Linn. Trans.* vol. ii. p. 239, t. 21 ; *Turn. Syn.* p. 38 ; *Turn. Hist.* t. 22 ; *Sm. E. Bot.* t. 847.

Laurencia, β *squarrosa.*—*Harv. P. B.* des. plate 152.

Hab.—On rocks, stones, shells, &c., between tide marks. Annual. Summer. Common on all our shores. β. dredged in four to five fathoms water, Plymouth Sound (*Rev. W. S. Hore*).

Geogr. Dist.—Atlantic shores of Europe and America ; Mediterranean ; Baltic ; West Indies (*Ag.*) ; Tasmania (*Mr. Gunn*) ; Cape of Cood Hope.—*Herb. Mertens.*

Description.—Root scarcely scutate, attached by a mass of pale, branching, entangled fibres. Frond slightly tufted, six to twelve inches in length, scarcely half a line in thickness, cylindrical, filiform, much and irregularly branched ; lower branches mostly longest, giving the branch an ovate or pyramidal outline, all erecto-patent, repeatedly and somewhat less irregularly pinnate ; the ultimate and uppermost pinnules very short and præmorse at the summit, and much attenuated to the base. The branches are frequently very irregular, both in length and distance, sometimes being very numerous, and at other times considerable portions of the stem and branches being quite naked. Substance cartilaginous, very delicate, and readily decomposing; the surface composed of small cells, the axis of a series of five tubes, arranged around a smaller central one, all interrupted at equal intervals; the diaphragms being visible through the outer cellular coating, give to the whole plant the appearance of being striated. Colour, purple, but very evanescent, soon changing to a pale yellow or transparent white. Capsules not uncommon, occurring even on the main branches, but most frequently on the pinnæ and pinnules. Tetraspores apparently less common, immersed in ramuli, generally occupying their whole length.

The genus *Laurencia* of *Phyc. Brit.* includes two groups separated from each other by differences of structure too marked perhaps to allow of their being well associated in the same genus. In the one, the frond is solid throughout, in the other the central axis is composed, like that of *Polysiphonia*, *Rytiphlæa*, &c., of a single series of longitudinal cells, forming the primary axis, around which is arranged several other similar series; the other series, forming the periphery, gradually decreasing in size towards the circumference. It seems desirable that these forms should be separated, although, in other respects, the species appear to be very closely allied; we therefore follow Agardh in keeping the two species, *L. dasyphylla* and *L. tenuissima*, apart, under the generic appellation *Chondria*.

The present species seems to be confined to the south and west coasts, not having been found so far, as we are aware, on the east coast, either of England or Scotland. It may in general be readily known from *C. tenuissima* by its very obtuse or abruptly truncate ramuli; although Dr. Harvey notices a variety from deep water, with many of the branches equally attenuated and even recurved, and which it is difficult at times to distinguish from that species.

EXPLANATION OF PLATE IV.

Fig. 1.—*Chondria dasyphylla*, natural size.
2.—Branch with capsules.
3.—A capsule.
4.—Spores from same.
5.—Branch with tetraspores.
6.—A tetraspore.
7.—Transverse section of stem.
8.—Longitudinal section of stem. All magnified.

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CHONDRIA *tenuissima*. AG.

PLATE V.

CHONDRIA TENUISSIMA.—*Harv.*

GEN. CHAR.—Frond filiform, decompound, opaque, with a percurrent, polysiphonous, articulated axis. Fructification of two kinds, on distinct plants: 1. Ovate capsules perforate at the summit, containing at the bottom a tuft of pyriform spores; 2. Tripartite tetraspores irregularly disposed, beneath the surface of the ultimate ramuli. Name from χόνδρος, "cartilage."

CHONDRIA *tenuissima.*—Frond filiform, cylindrical, very irregularly divided; branches long, gradually attenuated upwards, more or less clothed with slender setaceous ramuli, which are somewhat curved at the base, and tapering to the apex.

CHONDRIA *tenuissima.—Ag. Sp. Alg.* vol. i. p. 352; *Ag. Syst.* p. 205; *Spreng. Syst. Veg.* vol. iv. p. 340; *Harv. N. B. A.* p. 21.

LAURENCIA *tenuissima.—Grev. Alg. Brit.* p. 113; *Hook. Br. Fl.* vol. ii. p. 296; *Wyatt, Alg. Danm.* No. 22; *Endl.* 3rd Suppl. p. 43; *J. Ag. Alg. Medit.* p. 113; *Harv.* in *Hook. Lond. Journ. Bot.* vol. vi. p. 401; *Harv.* in *Mack. Fl. Hib.* part 3, p. 198; *Harv. P. B.* plate 198; *Harv. Man.* p. 99; *Harv. Syn.* p. 85; *Atlas*, plate 32, fig. 143.

ALSIDIUM *tenuissimum.—Kütz. Phyc. Gen.* p. 434, t. 55, fig. 1.

GIGARTINA *tenuissima.—Lamour. Ess.* p. 48.

FUCUS *tenuissimus.—Good. & Woodw. Linn. Trans.* vol. iii. p. 215, t. 9; *Turn. Syn.* p. 35; *Turn. Hist.* t. 100; *E. Bot.* t. 1882.

HAB.—On rocks and stones between tide-marks; generally in shallow pools, about half-tide level. Annual. Summer. Very rare. Weymouth (*Good. & Woodw.*); Isle of Wight (*Rev. G. R. Leathes*); Torbay (*Mrs. Griffiths*); Bovisand (*Rev. W. S. Hore*); Ballycotton, Co. Cork (*Miss Ball*); Jersey (*Miss White* and *Miss Turner*).—*Harv.*

GEOGR. DIST.—Atlantic coasts of France and Spain; Mediterranean and Black Seas; east coast North America; Tasmania.

DESCRIPTION.—Root fibrous. Fronds tufted, from four to twelve inches long, half a line in diameter below, gradually attenuated upwards. Stem seldom simple, generally divided into three to five principal portions, each set with slender, alternate, straight, erecto-patent, undivided branches, which are again sometimes repeated by similar smaller branches. Branches slender, tapering to the base and apex, clothed with setaceous ramuli. Ramuli simple, two to five lines long, straight, or somewhat curved at the base, and tapering to the apex, irregularly inserted. Capsules ovate, subsessile, on the sides of the ramuli, containing a tuft of pear-shaped spores. Tetraspores scattered in the ramuli, globose. Stem contains a central cell surrounded by six large cells, with a wide border of smaller cells. Substance between cartilaginous and gelatinous, very tender, and closely adhering to paper. Colour, when growing in the shade, a pale pinkish purple, soon fading, on exposure to sunshine, to a yellowish or greenish hue.

This is the most delicate as it is also the rarest of the genus. Wherever it grows it is found in tolerable abundance, forming dense tufts, many of which will be found in the same pool. The favourite locality is in very shallow tide-pools, fully exposed to the sun, and frequently situated but a short distance below high-water mark; thus clearly showing a partiality for warmth which marks the straggler from warmer latitudes. In such situations it frequently becomes much discoloured, the purple hue which is natural to it being exchanged for a greenish yellow, at the same time that the cellular substance is much softened. It is found on the north coasts of France, Carolina, and Florida. In Europe it is most abundant in the Mediterranean Sea. I have also received fine specimens from Tasmania, where it appears to be not uncommon.—*Harvey.*

EXPLANATION OF PLATE V.

Fig. 1.—*Chondria tenuissima,* natural size.
2.—Portion of a branch with tetraspores.
3.—A tetraspore from same.
4.—Portion of a branch with capsule.
5.—A capsule.
6.—Tuft of spores from same.
7.—Transverse section of stem. All magnified.

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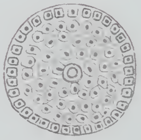

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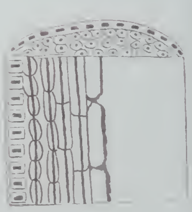

Bostrychia scorpioides, Mont.

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Plate VI.

BOSTRYCHIA SCORPIOIDES.—*Mont.*

Gen. Char.—Frond filiform, much branched, opaque, having a polysiphonous jointed axis, covered throughout by an opaque coating of smaller cells, the cells of the surface quadrate. Fructification of two kinds: 1. "Lateral capsules" (*Roth.*); 2. "Tetraspores contained in terminal lanceolate pods" (*Harvey*).

Bostrychia *scorpioides.*—Frond filiform, subdichotomous; divisions everywhere beset with more or less distichous, bipinnated or tripinnated, very patent branches, revolute at their extremities.

Bostrychia *scorpioides.*—*Mont. Hist. Cuba, Bot.* p. 39 (1838); *Harv. P. B.* plate 48; *Harv. Man.* p. 79; *Harv. Syn.* p. 64; *Atlas,* plate 31, fig. 139.

Helicothamnion *scorpioides.*—*Kütz. Phyc. Gen.* p. 433, t. 53, v.

Alsidium *scorpioides.*—*J. Ag.* in *Linn.* vol. xv. p. 28; *Endl.* 3rd Suppl. p. 46.

Rhodomela *scorpioides.*—*Ag. Sp. Alg.* vol. i. p. 380; *Ag. Syst.* p. 200; *Grev. Alg. Brit.* p. 105; *Hook. Br. Fl.* vol. ii. p. 294; *Harv.* in *Mack. Fl. Hib.* part 3, p. 197; *Harv. Man.* 1st edit. p. 68; *Wyatt, Alg. Danm.* No. 69.

Fucus *scorpioides.*—*Gmelin, Hist. Fuc.* p. 135.

Fucus *amphibius.*—*Huds. Fl. Ang.* p. 590; *Stack. Ner. Brit.* p. 86, t. 14; *E. Bot.* t. 1428; *Turn. Syn.* vol. ii. p. 391; *Turn. Hist.* t. 109.

Plocamium *amphibium.*—*Lamour. Ess.* p. 50.

Hab.—On muddy sea-shores, near high-water mark; at the estuaries of rivers, in salt-water ditches and marshes, adhering to flowering plants. On submarine rocks within tide-marks (*Harv.*). Not uncommon on the south-west coasts of England and east and west coasts of Ireland. Not found in Scotland.

Description.—Root composed of short, almost simple fibres. Frond filiform, three to five inches long, nearly half a line in thickness, bushy, two to three times dichotomously branched; branches distant, few, very patent or even recurved, curiously involute at the extremities, everywhere beset from the base with bi-tripinnated branches, very patent or recurved, short; all from a quarter to half an inch in length, giving the frond a linear outline, all more or less involute, uncinate or curved; the ultimate ramuli subulate. Structure: axis composed of a single series of longitudinal cells, forming a jointed tube, and surrounded by four to five similar series, the cells of which become shorter towards the circumference, rendering the frond opaque; the outermost series of cells quadrate, giving the surface a punctate appearance. Substance somewhat rigid and cartilaginous, not very perfectly adhering to paper. Colour, dark purple or greenish olive, but sometimes having more or less of a brownish hue, according to exposure and the saltness of the water. Fructification we have never seen.

This genus was separated from *Rhodomela* by Dr. Montagne, on account of some differences of structure, habit, and fructification, which seem sufficiently characteristic of the species. The difference of habitat is also remarkable, especially among the Rhodosperms, almost all of which are not only marine, but very impatient of fresh water. The species of the present genus, on the contrary, all delight to grow in brackish water, or where fresh water falls into the sea; attached either to rocks, or the roots of fresh-water flowering plants.

This species may be readily known from its allies, by the curiously involute apices. We are not aware of its occurrence in Scotland, or on the east coast of England, although it seems by no means scarce on the south-west, and has been found both on the east and west of Ireland. The fructification is almost unknown; the capsules having only been observed by Roth. (*Harvey*), and tetraspores are almost equally scarce.

EXPLANATION OF PLATE VI.

Fig. 1.—*Bostrychia scorpioides*, natural size.
2.—Involute apex of the rami.
3.—Transverse section of a branch.
4.—Longitudinal section of same. All magnified.

Plate VI


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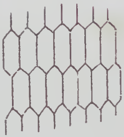
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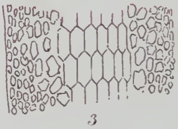
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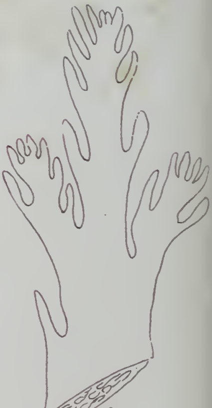
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RYTIPHLÆA complanata. AG.

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PLATE VII.

RYTIPHLÆA COMPLANATA.—*Ag.*

GEN. CHAR.—"Frond filiform or compressed, pinnate, transversely striate, reticulated; the axis articulated, composed of a circle of large tubular elongated cells (siphons), surrounding a central cell; the periphery of several rows of minute, irregular, coloured cellules. Fructification of two kinds: 1. Ovate capsules (ceramidia) containing a tuft of pear-shaped spores; 2. Tetraspores contained in minute lanceolate receptacles (stichidia), in a double row." Name from ῥυτὶς, "a wrinkle," and φλοιὸς, "the bark," from the transverse wrinkles or striæ on the surface.

RYTIPHLÆA *complanata.* — Frond compressed, bi-tripinnate; lower pinnæ short, often abortive; upper longest, twice, or even three and occasionally even four times pinnated or pinnatifid.

RYTIPHLÆA *complanata.—Ag. Sp. Alg.* vol. ii. p. 54; *J. Ag.* in *Linn.* vol. xv. p. 26; *J. Ag. Alg. Medit.* p. 146; *Endl.* 3rd Suppl. p. 48; *Harv. Ner. Austr.* p. 32; *Harv. P. B.* plate 170; *Harv. Man.* p. 80; *Harv. Syn.* p. 65; *Atlas,* plate 25, fig. 108.

POLYSIPHONIA *cristata.—Harv.* in *Mack. Fl. Hib.* part 3, p. 205; *Harv. Man.* 1st ed. p. 85.

FUCUS *cristatus, γ articulatus.—Turn. Hist.* t. 23, f. h.

PLOCAMIUM *cristatum.—Lamour. Ess.* p. 50, t. 5, f. 1, 2, 3.

HAB.—Amongst *Corallina officinalis,* &c., in shallow tide-pools. Perennial. Summer. Very rare. Bantry Bay (*Miss Hutchins*); Caarush Point; Miltown Malbay, abundant in one or two tide-pools, but very local (*Dr. Harvey,* 1847); Whitsand Bay (*Dr. Jacob*); dredged in Plymouth Sound (*Rev. W. S. Hore*).

GEOGR. DIST.—South of England and Ireland; Atlantic coasts of France and Spain; Mediterranean Sea; Cape of Good Hope (*Dr. Harvey*).

DESCRIPTION.—Root fibrous. Frond linear, compressed, much tufted, two to four inches long, about half a line in breadth, two, three, or even four times pinnated, all the divisions becoming more developed upwards; lower pinnæ often very much abbreviated or abortive, those on the upper half of the stem becoming suddenly elongated, of these the lowest are generally the longest, all quite distichous, alternate, two to four times pinnate or pinnatifid, the upper pinnules having often one or two spine-like teeth at the base, pinnate or pinnatifid upwards; the pinnæ again similarly toothed. Fructification: "not found on British specimens." Structure: axis composed of about twelve series of large hyaline tubes surrounding a central similar one; the periphery of smaller coloured cells. Substance cartilaginous, imperfectly adhering to paper. Colour, " a dull brownish or somewhat purplish red, becoming much darker in drying. Unless the specimens of this plant be allowed to remain some hours in fresh water, they will stain the paper on which they may be laid dull brown, and will themselves turn completely black and rigid, and refuse to adhere to the paper; by steeping, a large quantity of brown, offensive matter is discharged, and specimens so treated preserve a shade of red, and adhere to paper."—*Harvey.*

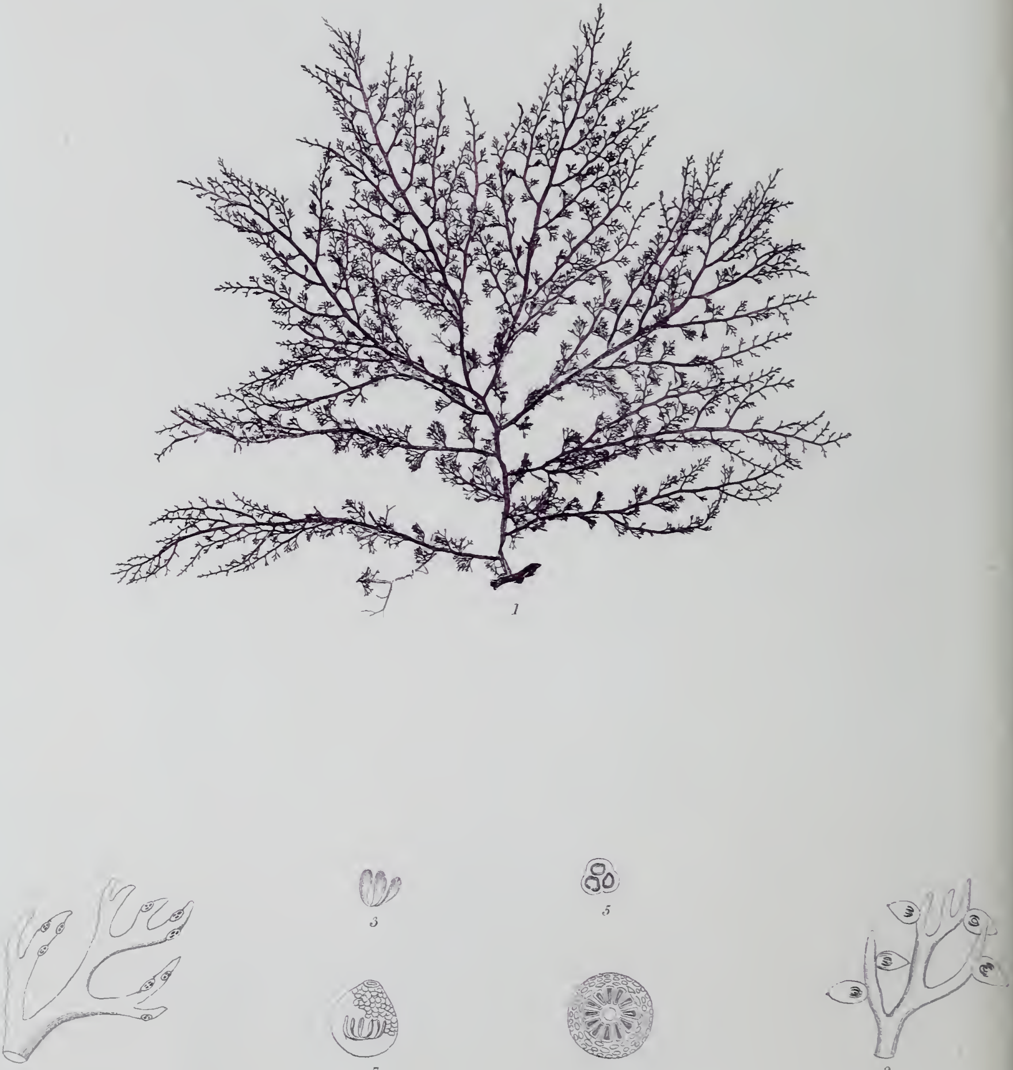
One of the most beautiful as well as rarest of our British Algæ, and, like its congener *R. pinastroides*, having its centre of distribution apparently in the south of Europe.

Dr. Harvey, who had the good fortune to discover it at Miltown Malbay in considerable abundance, informs us that it delights to grow in shallow pools between tides, and that when the water gets deeper than that, the plant disappears. He has also pointed out its close affinity with *Polysiphonia*, with which its internal structure exactly agrees, having a regularly jointed axis, while the outer coating consists of numerous series of irregularly alternating cells, gradually decreasing in size towards the circumference. In this it differs from the true *Polysiphoniæ*, which have either all the cells in each series of equal length, or terminating at certain and regular intervals at one point so as to form a dissepiment. This character, however, is by no means satisfactory, as there are not a few of admitted *Polysiphoniæ* which possess this coating, differing only in its imperfect development, having it only continued over the stem or some of the principal branches, while in *Rytiphlœa* it extends to the apices of the smallest ramuli. It will thus be seen that the two genera are at times somewhat inconveniently allied; and this close connexion becomes the more troublesome to the young student from the circumstance that the external coating in the *Rytiphlœæ* is so transparent that the articulation of the axis is seen through it, so that the frond appears articulated throughout.

EXPLANATION OF PLATE VII.

Fig. 1.—*Rytiphlœa complanata*, natural size.
2.—Portion of branchlet.
3.—Longitudinal section of stem.
4.—Transverse section of stem.
5.—Appearance of surface. All magnified.

Plate VIII



RYTIPHLÆA *fruticulosa*, HARV.

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Plate VIII.

RYTIPHLÆA FRUTICULOSA.—*Harv.*

Gen. Char.—"Frond filiform or compressed, pinnate, transversely striate, reticulated; the axis articulated, composed of a circle of large tubular elongated cells (siphons), surrounding a central cell; the periphery of several rows of minute, irregular, coloured cellules. Fructification of two kinds: 1. Ovate capsules (ceramidia) containing a tuft of pear-shaped spores; 2. Tetraspores contained in minute lanceolate receptacles (stichidia), in a double row." Name from ῥυτὶς, "a wrinkle," and φλοιὸς, "the bark," from the transverse wrinkles or striæ on the surface.

Rytiphlæa *fruticulosa.*—Stem scarcely any; branches divaricating, somewhat flexuose, dichotomous or alternately pinnate, everywhere beset with distichous, alternate, short, setaceous, multifid branches, the upper ones larger; capsules on their pinnules, ovate, sessile; tetraspores also on the pinnules, tripartite.

Rytiphlæa *fruticulosa.*—*Harv. P. B.* plate 220; *Harv. Man.* p. 81; *Harv. Syn.* p. 67; *Atlas,* plate 23, fig. 102.

Polysiphonia *fruticulosa.*—*Spreng. Syst. Veg.* vol. iv. p. 350; *Duby, Bot. Gall.* p. 966; *Wyatt, Alg. Danm.* No. 132; *Mont. Crypt. Alg.* No. 19; *Fl. Alg.* p. 81; *Mont. Crypt. Canar.* p. 170; *Endl.* 3rd Suppl. p. 46; *Harv.* in *Mack. Fl. Hib.* part 3, p. 205; *Harv.* in *Hook. Br. Fl.* vol. ii. p. 327 (in part).

Polysiphonia *Wulfeni.*—*Ag. Alg. Medit.* p. 144; *Kütz. Phyc. Gen.* p. 431.

Hutchinsia *fruticulosa.*—*Ag. Syst.* p. 27.

Hutchinsia *Wulfeni.*—*Ag. Sp. Alg.* vol. ii. p. 95.

Grammita *Wulfeni.*—*Bonn. Hyd.* p. 27.

Ceramium *Wulfeni.*—*Roth. Cat. Bot.* vol. iii. p. 140.

Fucus *fruticulosus.*—*Wulf.* in *Jacq. Col.* p. 59, t. 16; *Crypt. Ag.* p. 56; *Esper, Ic. Fuc.* p. 165, t. 87; *Clem. Ess.* p. 319; *E. Bot.* t. 1686; *Turn. Syn. Fuc.* vol. ii. p. 394; *Turn. Hist.* t. 227.

Hab.—In pools between tide-marks, on the rocky bottom or on the smaller Algæ. Frequent on the south and west coasts. Perennial. Summer.

Geogr. Dist.—Atlantic and Mediterranean shores of Europe; northern coasts of Africa; Canary Islands (*Harvey*).

Description.—Root of numerous branching fibres. Frond filiform, dichotomously multifid, or alternately pinnate upwards, frequently flexuose, branched from the base, and much tufted, four to six inches long, scarcely half a line in thickness; axils generally much rounded, everywhere beset with distichous, alternate branchlets, from half a line to a line or a line and a-half in length, here and there interspersed, especially upwards, with others about half an inch in length; the lower ones once or twice, the upper twice or thrice, dichotomously divided or bi-tripinnated, with short setaceous branchlets. The whole surface marked by transverse striæ of a dark colour, indicating the joints of the internal axis, and covered with a beautiful network of cells. Capsules not common, on the branchlets of the ramuli, broadly ovate, sessile, containing a tuft of pear-shaped spores. Tetraspores imbedded in the somewhat distorted ramuli, triparted, also rather rare. Substance rigid, cartilaginous, imperfectly adhering to paper. Colour, a dark greenish purple, changing to olive green or greenish-yellow when removed from the water. The branchlets are very patent, and when the specimen is lifted out of the water, each point is tipped with a drop."—*Harvey.*

Two species in this genus, *thuyoides* and *complanata*, often so very closely resemble this, that it is difficult indeed to distinguish them, and the difficulty is increased when comparing dried specimens. It is only by studying them in a living state in their native habitats, one can see their then marked difference. The present species is of a rich dark purple, whereas *R. complanata* is a dull brown colour. *R. thuyoides*, again, is much more erect in habit than any of the genus, so that, keeping these points in view, they may be more readily distinguished. There can be no confounding either with *R. pinastroides.*

EXPLANATION OF PLATE VIII.

Fig. 1.—*Rytiphlœa fruticulosa*, natural size.
2.—Branch with capsules.
3.—Spores.
4.—Branch with tetraspores.
5.—Tetraspore.
6.—Capsule.
7.—Section of stem. All magnified.

Plate V.

RYTIPHLÆA pinastroides, AG.

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PLATE IX.

RYTIPHLÆA PINASTROIDES.—*Ag.*

GEN. CHAR.—"Frond filiform or compressed, pinnate, transversely striate, reticulated; the axis articulated, composed of a circle of large tubular elongated cells (siphons), surrounding a central cell; the periphery of several rows of minute, irregular, coloured cellules. Fructification of two kinds: 1. Ovate capsules (ceramidia) containing a tuft of pear-shaped spores; 2. Tetraspores contained in minute lanceolate receptacles (stichidia), in a double row." Name from *ῥυτὶς*, "a wrinkle," and *φλοιὸς*, "the bark," from the transverse wrinkles or striæ on the surface.

RYTIPHLÆA *pinastroides.*—Frond cylindrical, four to five times divided irregularly, the ultimate divisions pinnate; pinnæ secund, falcate, hooked at the extremity.

RYTIPHLÆA *pinastroides.—Ag. Syn.* p. 25; *J. Ag. Alg. Medit.* p. 145; *Endl.* 3rd Suppl. p. 48; *Harv. P. B.* plate 85; *Harv. Man.* p. 80; *Harv. Syn.* p. 65; *Atlas*, plate 24, fig. 104.

RHODOMELA *pinastroides.—Ag. Sp. Alg.* vol. i. p. 381; *Ag. Syst.* p. 200; *Spreng. Syst. Veg.* vol. iv. p. 343; *Grev. Alg. Brit.* p. 104, t. 13; *Hook. Br. Fl.* vol. ii. p. 294; *Wyatt, Alg. Danm.* No. 112; *Harv. Man.* 1st ed. p. 68.

HALOPITHYS *pinastroides.—Kütz. Phyc. Gen.* p. 433, t. 52, f. 2.

GIGARTINA *pinastroides.—Lyngb. Hyd. Dan.* p. 45.

CERAMIUM *incurvum.—Dec. Fl. Fran.* vol. ii. p. 33.

FUCUS *pinastroides.—Gm. Hist. Fuc.* p. 127, t. 11, f. 1; *Good. & Woodw.* in *Linn. Trans.* vol. iii. p. 222; *Turn. Syn.* vol. ii. p. 346; *Turn. Hist.* t. 11; *Stack. Ner. Brit.* p. 74, t. 13; *E. Bot.* t. 1042.

FUCUS *incurvus.—Huds. Fl. Ang.* p. 590; *With.* vol. iv. p. 115.

HAB.—On submarine rocks near low-water mark. Perennial. Winter. Many places on the shores of the south of England. Jersey (*Miss White, Miss Turner, Mr. F. P. Girdlestone*).

GEOGR. DIST.—South of England and Jersey; Atlantic shores of France and Spain; Mediterranean Sea; New Zealand (*Sir J. Banks*); Ceylon (*Sir J. E. Smith*).

DESCRIPTION.—Root, a widely-spreading disc. Fronds, many from the same root, four to nine inches long, scarcely a line in thickness, four to five times divided upwards, irregularly, in a somewhat alternate or subdichotomous manner. Stem and branches everywhere beset from the base with short, simple, subulate, erecto-patent ramuli, of unequal length, giving the stem, especially in old plants, a somewhat shaggy appearance; the ultimate branchlets pectinato-pinnate on the upper side, with secund, generally falcate, club-shaped ramuli, often hooked at the extremity; pinnæ erect, mostly opposite, sometimes irregular, much attenuated to the base; the articulations of the axis being distinctly seen through the outer coating of the branches, giving them the appearance of being articulated. Structure: the axis composed of six series of large oblong cells, surrounding a similar central series; the periphery of coloured cells, becoming smaller towards the circumference. Substance cartilaginous, hardly adhering to paper. Capsules ovate, stalked, produced on the upper edges of the ramuli. Tetraspores triparted, in stalked, lanceolate, hooked stichidia, similarly situated. Colour, a dull red, becoming darker and almost black in drying.

Dr. Harvey has very accurately pointed out the close analogy in structure between this genus and *Polysiphonia* on the one hand, and *Rhodomela* on the other. No other three genera, perhaps, exhibit such a gradual gradation of characters, from the irregular or alternating cells of *Rhodomela* to the regularly articulated stems of some of the *Polysiphoniæ.*

In our native species of *Rhodomela* indeed the absence of a jointed axis is sufficiently characteristic, but, as we are informed by Dr. Harvey that in some foreign species this becomes more or less apparent, a gradual transition from the one genus to the other is established, while the structure of the inarticulated *Polysiphoniæ* is scarcely sufficiently distinct to constitute a generic character.

The present is decidedly a southern species, reaching its northern limit on our southern shores, and even there being far from abundant. Dr. Harvey considers the stations "near Dublin" and "Faroe Islands," as incorrect; yet its being found there does not seem incompatible with the idea of its being of southern habitat, as several species, which do not extend their range into the north of Britain, have been recently noticed on the Irish coast, and even on that of the Faroe Isles.

EXPLANATION OF PLATE IX.

Fig. 1.—*Rytiphlœa pinastroides,* natural size.
2.—Fragment of frond with capsules.
3.—A capsule.
4.—Spores from same.
5.—Fragment of frond with stichidia.
6.—A stichidium.
7.—Tetraspores from same.
8.—Transverse section of stem. All magnified.

Plate X.

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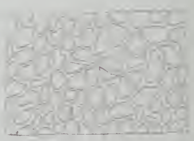

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RYTIPHLÆA thuyoides. HARV.

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PLATE X.

RYTIPHLÆA THUYOIDES.—*Harv.*

GEN. CHAR. — "Frond filiform or compressed, pinnate, transversely striate, reticulated; the axis articulated, composed of a circle of large tubular elongated cells (siphons), surrounding a central cell; the periphery of several rows of minute, irregular, coloured cellules. Fructification of two kinds: 1. Ovate capsules (ceramidia) containing a tuft of pear-shaped spores; 2. Tetraspores contained in minute lanceolate receptacles (stichidia), in a double row." Name from ῥυτὶς, "a wrinkle," and φλοιὸς, "the bark," from the transverse wrinkles or striæ on the surface.

RYTIPHLÆA *thuyoides.*—Stem erect, cylindrical; branches below abortive, generally simple, short, and spine-like above, bipinnate, of nearly equal length; capsules ovate, sessile.

RYTIPHLÆA *thuyoides.*—*Harv. P. B.* plate 221; *Harv. Man.* p. 81; *Harv. Syn.* p. 66; *Atlas*, plate 23, fig. 101.

POLYSIPHONIA *thuyoides.* —*Harv.* in *Mack. Fl. Hib.* part 3, p. 205; *Wyatt, Alg. Danm.* No. 305; *Harv. Man.* 1st ed. p. 86; *E. Bot.* Suppl. t. 2882.

GRAMMITA *rigidula.*—*Bonnem.*

HAB.—In tide-pools. Perennial. Summer. Abundant on the west coast of Ireland, and on the south coast of England and Jersey. Less common on the coasts of Scotland. Ayrshire (*Rev. D. Landsborough* and *Mr. Thompson*).

GEOGR. DIST.—Atlantic shores of Europe.

DESCRIPTION.—Root fibrous, branched and creeping. Frond tufted, filiform, erect, rigid, from three to six inches high, scarcely half a line in thickness, alternately pinnated, or once or twice irregularly divided; branches bipinnated; pinnæ erecto-patent, of nearly equal length, so as to give the frond or branch a linear outline; pinnæ on the lower part obsolete, spine-like, ultimate pinnules spine-like, mostly confined to the upper part of the pinnæ. Capsules ovate, sessile, on the upper pinnæ and pinnules, generally abundant. Tetraspores "in distorted ramuli." Structure: central series of cells large, surrounded by about twelve series of smaller ones, with still smaller ones extending to the circumference. Substance rather rigid, cartilaginous, imperfectly adhering to paper. Colour, a deep brownish purple, greenish in age.

This species is somewhat more northern in its range than *R. pinas-*

troides, being found in considerable plenty all along the south and particularly the west of Ireland.

Dr. Harvey informs us that it does not generally affect so deep water as *R. complanata*, with which it is frequently found intermixed, but often grows where it is left dry at the recess of the tide, which is never the case with *R. complanata*. From this plant it may at all times be distinguished by its rounded stems, and from *R. fruticulosa* by its more regularly pinnated branches, and their acute angles.

The first of these characters, together with the much greater uniformity in the length of the branches, will generally serve to distinguish it from all the forms of *Polysiphonia nigrescens*, small specimens of which, Dr. Harvey observes, have occasionally a considerable resemblance to it; and when this fails, the greater number of cells in *P. nigrescens*, together with the entire absence of secondary series of cells in the periphery, will serve as a ready means of distinction.

It is a beautiful species when well grown, but like other species that grow between tides, it is often from exposure imperfectly developed, and stouter and less regular in its branching. The finest specimens will be found where they are always covered by the tide.

EXPLANATION OF PLATE X.

Fig. 1.—*Rytiphlœa thuyoides*, natural size.
2.—Branchlet with capsules.
3.—A capsule.
4.—Transverse section of stem.
5.—Cells of the surface. All magnified.

Plate XI

Polysiphonia urceolata, GREV.

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PLATE XI.

POLYSIPHONIA URCEOLATA.—*Grev.*

GEN. CHAR.—Frond filiform, articulated (at least in the young state), marked externally with striæ, corresponding to a series of longitudinal internal tubes, interrupted at the joints, and generally disposed in a series round a central cylindrical cavity. Fructification of two kinds, on distinct plants : 1. Capsules (ceramidia) with a terminal pore, and containing a bundle of pyriform spores ; 2. Tetraspores imbedded in swollen ramuli. Name from *πολὺς*, "many," and *σίφων*, "a tube."

POLYSIPHONIA *urceolata.*—Fronds cartilaginous, filiform, much tufted and branched ; branches irregular and subdichotomous ; ultimate branchlets setaceous ; siphons four ; capsules urceolate, with a cylindrical neck, shortly pedicellate.

POLYSIPHONIA *urceolata.—Grev. Fl. Edin.* p. 309 ; *Wyatt, Alg. Danm.* No. 133 ; *Endl.* 3rd Suppl. p. 54 ; *Harv.* in *Hook. Br. Fl.* vol. ii. p. 330 ; *Harv.* in *Mack. Fl. Hib.* part 3, p. 207 ; *Harv. N. B. A.* p. 32 ; *Harv. P. B.* plate 167 ; *Harv. Man.* p. 82 ; *Harv. Syn.* p. 67 ; *Atlas,* plate 25, fig. 109.

POLYSIPHONIA *patens.—Harv.* in *Hook. Br. Fl.* vol. ii. p. 330 ; *Endl.* 3rd Suppl. p. 54.

HUTCHINSIA *urceolata.* — *Hook. Fl. Scot.* vol. ii. p. 88 ; *Lyngb. Hyd. Dan.* p. 110, t. 34 ; *Ag. Syst.* p. 151 ; *Ag. Sp. Alg.* vol. ii. p. 70.

HUTCHINSIA *patens.—Ag. Sp. Alg.* p. 71.

CONFERVA *urceolata.—Dillw.* No. 156, t. G. ; *E. Bot.* t. 2365.

CONFERVA *patens.—Dillw.* No. 157, t. G.

HAB.—On rocks at and beyond low-water mark. Also on the stems of *Laminaria digitata.* Annual. Summer. Common around the British Islands.

GEOGR. DIST.—Atlantic shores of Northern Europe ; Iceland ; North America.

DESCRIPTION.—Root composed of branching fibres. Frond densely tufted and entangled at the base by root-like fibres, six to ten inches long, very slender, and much branched into capillary segments, which are again once or twice divided ; the branchlets sub-erect, patent, sometimes recurved. Articulations at the base about as long or even shorter than broad ; in the branches four to five times as long, at the extremities scarcely so long as broad, but very different in different plants. Structure : central tube rather small, surrounded by four large siphons occupying almost the entire diameter. Substance flaccid, adhering closely to paper. Colour, bright transparent red, soon changing in fresh water, generally darkened in age and when dry. Capsules broadly urceolate, on short stalks, with a short cylindrical neck, attached both to the stem and towards the base of the branchlets, very common. Tetraspores also common, produced in the upper part of the ultimate ramuli.

This is one of the most common as well as one of the most beautiful species found on all our shores, and at almost all depths, from high-water mark to some distance beyond low-water at extreme tides. When well grown, its bright delicate colour and slender not very amply divided stems, form a most beautiful and conspicuous object, whether in its native pool, in the aquarium, or on paper.

It is generally attached to rocks, but sometimes also grows on other Algæ, and from its omnicolous habit is subject to considerable variations. In still, quiet pools between tides, it grows in its greatest luxuriance, often to the length of eight to ten inches; while in the smaller and more exposed pools, its length seldom exceeds three or four inches, but is more robust, of a darker colour, and more bushy. The stems of *Laminariæ* are often densely clad with another variety (*P. patens*, *Agardh*), which is often quite simple, seldom much branched, and often has the branchlets very patent or even recurved; in other points it scarcely differs from the typical form of the plant.

In tide-pools it generally grows in single brush-like tufts, but on *Laminaria* it spreads over the whole stem in a dense mass; and in the shallow streams that issue from the larger pools, it also assumes a cæspitose habit.

EXPLANATION OF PLATE XI.

Fig. 1.—*Polysiphonia urceolata*, natural size.
2.—Branch with capsule.
3.—A capsule.
4.—Branch with tetraspores.
5.—Ramulus from the same.
6.—A tetraspore.
7.—Portion of lower part of stem.
8.—Transverse section of a filament. All magnified.

POLYSIPHONIA *formosa*, SUHR.

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PLATE XII.

POLYSIPHONIA FORMOSA.—*Suhr.*

GEN. CHAR.—Frond filiform, articulated (at least in the young state), marked externally with striæ, corresponding to a series of longitudinal internal tubes, interrupted at the joints, and generally disposed in a series round a central cylindrical cavity. Fructification of two kinds, on distinct plants: 1. Capsules (ceramidia) with a terminal pore, and containing a bundle of pyriform spores; 2. Tetraspores imbedded in swollen ramuli. Name from πολὺς, "many," and σίφων, "a tube."

POLYSIPHONIA *formosa.*—Frond filiform, very slender and flaccid, much branched subdichotomously; branches long, somewhat flexuose, ultimate ramuli subulate; articulations apparently marked by two broad striæ, indicating the internal tubes; those of the main branches five to ten times longer than broad, those towards the apices of the ramuli very short, about half as long as broad; central cavity minute; siphons four, large; capsules urceolate, on short stalks; tetraspores occupying the middle portion of the ramuli.

POLYSIPHONIA *formosa.*—*Suhr. Bot. Zeit.* 1831, p. 709; *Harv. P. B.* plate 168; *Harv. Man.* p. 82; *Harv. Syn.* p. 68; *Atlas,* plate 25, fig. 110; *Wyatt, Alg. Danm.* No. 216.

POLYSIPHONIA *gracilis.*—*Grev. MSS.*

HAB.—Generally in warm quiet pools, under the projecting ledges of rock.

GEOGR. DIST.—Atlantic shores of Northern Europe.

DESCRIPTION.—Root, a minute disc. Fronds filiform, very bushy, four to ten inches in length, scarcely so thick as human hair, very much branched; branches alternate or subdichotomous; internodes long, somewhat flexuose, erecto-patent; ultimate ramuli subulate, often terminated by byssoid fibres. Articulations excessively irregular, short towards the base of the stem, becoming longer upwards, till in the main branches they are often ten times longer than broad; in the ultimate ramuli very short, and at their apices scarcely half as long as broad. Capsules urceolate, on short stalks, scattered on the ramuli. Tetraspores imbedded in the middle portion of the ramuli, which become slightly distended and fusiform. Substance somewhat gelatinous, very flaccid when young, and closely adhering to paper. Colour, a bright but deep red, rapidly decomposing in fresh water, but becoming rather darker in drying.

A beautiful species, but perhaps too closely allied to *P. urceolata*, from which it differs chiefly in the greater tenuity of the stems, and much greater length of the articulations, characters which, although they cannot be dispensed with, should never be too much relied on in this somewhat difficult genus, where they are certainly not remarkably constant. "In the majority of cases, however, the limits are sufficiently marked. *P. formosa* appears to be a plant of bays and estuaries; *P. urceolata* of the more exposed parts of the coast."—*Harv.* May not this very difference in habitat cause the (at all times) only slight difference in habit and character? So close indeed do they sometimes run, that even Dr. Harvey has been puzzled to say which was which.

EXPLANATION OF PLATE XII.

Fig. 1.—*Polysiphonia formosa*, natural size.
2.—Branch with capsules.
3.—Capsule and siphons of the branches.
4.—Branchlet with tetraspores.
5.—Ramulus of the same.
6.—A tetraspore.
7.—Section of stem. All magnified.

POLYSIPHONIA PULVINATA.—*Spreng.*

GEN. CHAR.—Frond filiform, articulated (at least in the young state), marked externally with striæ, corresponding to a series of longitudinal internal tubes, interrupted at the joints, and generally disposed in a series round a central cylindrical cavity. Fructification of two kinds, on distinct plants : 1. Capsules (ceramidia) with a terminal pore, and containing a bundle of pyriform spores ; 2. Tetraspores imbedded in swollen ramuli. Name from πολὺς, "many," and σίφων, "a tube."

POLYSIPHONIA *pulvinata.*—Fronds rising from a mass of creeping fibres, tufted and interwoven, short, very slender, flexuose, sparing and irregularly dichotomous, more or less furnished with very patent, or recurved simple ramuli; articulations of the main branches three or four times as long as broad; of the ramuli very short, four-tubed; capsules urn-shaped, stalked.

POLYSIPHONIA *pulvinata.*—*Spreng. Syst. Veg.* vol. iv. p. 350 ; *J. Ag. Alg. Medit.* p. 124 ; *Mont. Fl. Canar.* p. 172 ; *Endl.* 3rd Suppl. p. 44 ; *Wyatt, Alg. Danm.* No. 215 ; *Harv. P. B.* plate 102, B. ; *Harv. Man.* p. 83 ; *Harv. Syn.* p. 68 ; *Atlas,* plate 25, fig. 112.

POLYSIPHONIA *macrocarpa.*—*Harv.* in *Mack. Fl. Hib.* part 3, p. 296.

HUTCHINSIA *pulvinata.*—*Ag. Sp. Alg.* vol. ii. p. 109.

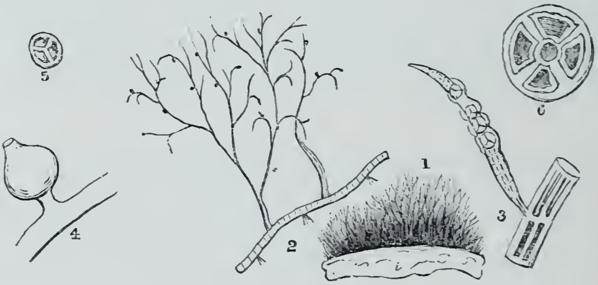
CONFERVA *pulvinata.*—*Roth. Cat.* vol. i. p. 187, t. 3, fig. 4 ; vol. ii. p. 214.

HAB.—On rocks between tide-marks. Annual. Common.

GEOGR. DIST.—Atlantic and Mediterranean coasts of Europe ; Canary Islands.

DESCRIPTION.—Frond filiform, rising from creeping fibres, densely cæspitose or pulvinate, half to one inch in length, very slender, somewhat flexuose, three to four times irregularly divided in a subdichotomous manner; ultimate ramuli short, patent or recurved. Articulations very irregular; of the main stems three to four; of the branchlets two to three; of the upper ramuli, one half as long as broad. Siphons four, about equal in diameter to the central cavity. Capsules rather large, urn-shaped, on short stalks. Tetraspores "imbedded in the ramuli, in a single row." Substance soft, gelatinous, and closely adhering. Colour, a dark reddish brown.

Like *P. obscura* a very small species, but much more generally distributed, as it has been found in several places, both in England, Ireland, and Scotland. Its capsules closely resemble those of *P. urceolata,* but they are rather more distinctly stalked; its articulations also are similar, but it differs in its creeping fibres, and its very much smaller size. It is not so likely to be overlooked as *P. obscura*, as it forms rather conspicuous cushion-like tufts on the rocks where it grows.



POLYSIPHONIA PULVINATA.

EXPLANATION OF DISSECTIONS, &c.

Fig. 1.—*Polysiphonia pulvinata,* natural size.
2.—Filament.
3.—Branchlet with tetraspores.
4.—A capsule.
5.—A tetraspore.
6.—Transverse section of stem. All magnified.

Polysiphonia fibrata, Harv.

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PLATE XIII.

POLYSIPHONIA FIBRATA.—*Harv.*

GEN. CHAR.—Frond filiform, articulated (at least in the young state), marked externally with striæ, corresponding to a series of longitudinal internal tubes, interrupted at the joints, and generally disposed in a series round a central cylindrical cavity. Fructification of two kinds, on distinct plants: 1. Capsules (ceramidia) with a terminal pore, and containing a bundle of pyriform spores; 2. Tetraspores imbedded in swollen ramuli. Name from πολὺς, "many," and σίφων, "a tube."

POLYSIPHONIA *fibrata.*—Stems setaceous, simple or alternately branched; upper branches dichotomous, sub-erect; axils rather patent, but not rounded, upper branchlets somewhat fascicled, often but not invariably fibrillose; articulations marked with two striæ, four-tubed, central cavity small; articulations of the branches, four to six times longer than broad; capsules broadly ovate, mostly stalked.

POLYSIPHONIA *fibrata.*—*Wyatt, Alg. Danm.* No. 39; *Kütz. Phyc. Gen.* p. 426; *Endl.* 3rd Suppl. p. 45; *Harv.* in *Hook. Br. Fl.* vol. ii. p. 329; *Harv.* in *Mack. Fl. Hib.* part 3, p. 206; *Harv. P. B.* plate 208; *Harv. Man.* p. 83; *Harv. Syn.* p. 69; *Atlas,* plate 26, fig. 113.

HUTCHINSIA *allochroa, β fibrata.*—*Ag. Syst.* p. 154.

CONFERVA *fibrata.*—*Dillw. Conf. Syn.* p. 84, t. G.

HAB.—On old shells, rocks, &c., generally near low-water mark. Annual. Summer and autumn. Common.

GEOGR. DIST.—Atlantic shores of Europe.

DESCRIPTION.—Root of branching, matted fibres. Fronds densely tufted, two to six inches in length, as thick as hogs' bristles at the base, capillary upwards, somewhat irregularly dichotomous, repeatedly subdivided in a similar manner; ultimate branchlets somewhat fascicled, apices often fibrillose, fibres single-tubed, two to three times subdichotomous and hyaline. Articulations twice as long as broad at the base, six or eight times as long in the middle of the stem, three or four times as long in the branches, and scarcely twice as long as broad in the ramuli, marked with two wide, coloured tubes; siphons four, rather large, central cavity small. Antheridia abundant, oblong, with rounded extremities, attached by very short stalks to bases of the fibres which terminate the branchlets. Capsules common, shortly stalked, broadly ovate. Tetraspores abundant, imbedded in the middle of the swollen branchlets. Substance very tender, gelatinous, soon decomposing in air or fresh water. Colour, a deep reddish brown, "odour offensive."

A very beautiful and not uncommon species. The apices of the young fronds are abundantly fibrillose, but this character is not by any means peculiar to the species, as they have been observed on almost every species of the genus, in greater or less abundance, at some period of their growth. They are most abundant on young plants, and are the parts to which the bright orange antheridia are attached, but are often abundant without them; nor has their office in the economy of the plant been as yet determined. In the present species the antheridia are often so abundant as to give apices of the fronds a conspicuously yellow appearance.

Our plant delights to grow among other small Algæ by the edges of pools between tides, forming bright starlike tufts, conspicuous among the sombre hues that fringe intratidal pools, or in larger masses carpets the rocky bed of the stream that issues from its side, or forms rich and gorgeous festoons to the ledges of rock that roughen the miniature waterfall, over which the little streamlet not unfrequently leaps as it mingles its waters with the ocean.

EXPLANATION OF PLATE XIII.

Fig. 1.—*Polysiphonia fibrata,* natural size.
2.—Branch with capsules.
3.—A capsule.
4.—Branch with antheridia.
5.—Branchlet with tetraspores.
6.—Transverse section of stem. All magnified.

POLYSIPHONIA SPINULOSA.—*Grev.*

GEN. CHAR.—Frond filiform, articulated (at least in the young state), marked externally with striæ, corresponding to a series of longitudinal internal tubes, interrupted at the joints, and generally disposed in a series round a central cylindrical cavity. Fructification of two kinds, on distinct plants : 1. Capsules (ceramidia) with a terminal pore, and containing a bundle of pyriform spores ; 2. Tetraspores imbedded in swollen ramuli. Name from πολὺς, "many," and σίφων, "a tube."

POLYSIPHONIA *spinulosa.*—"Dark red; branches divaricate, somewhat rigid, the ramuli short, straight, subulate, divaricate; articulations about equal in length and breadth, three-tubed; tubercles" (young ceramidia) "globose, sessile, excessively minute."—*Grev.*

POLYSIPHONIA *spinulosa.*—*Grev. Scot. Crypt. Fl.* t. 90 ; *Harv.* in *Hook. Br. Fl.* vol. ii. p. 330 ; *Harv. P. B.* plate 320 ; *Harv. Man.* p. 84 ; *Harv. Syn.* p. 69 ; *Atlas,* plate 26, fig. 114.

HAB.—At Appin (*Capt. Carmichael*). Very rare.

DESCRIPTION.—"Frond one to two inches in length, of a dark red colour, much branched, with a rigid and spinulose habit; main branches rather remote, irregular, much divaricated, somewhat flexuous; ultimate ramuli straight, subulate, almost thorn-like, divaricated like the rest, sometimes minutely divided at the apex, and each of the divisions terminated in a long, hyaline, jointed filament. Articulations about as long as broad, striated, with three internal tubes of a pale brown pink under the microscope. Tubercles very minute, quite sessile, round, dark red, scattered freely on the branches, and containing several dark granules."—*Grev.* "A transverse section of the stem shows four primary siphons of large size, with secondary and tertiary cells at the angles. In drying the plant adheres to paper."

One of our rarest species found by Captain Carmichael, and by him only once. Now in Hookerian Herbarium. The above specific character and description are by Dr. Greville, and are extracted from Dr. Harvey's *Phyc. Brit.*

POLYSIPHONIA SPINULOSA.

EXPLANATION OF DISSECTIONS.

Fig. 1 & 2.—Branches.
3.—Portion of same.
4.—Transverse section of stem.
5.—Transverse section of a branch. All magnified.

POLYSIPHONIA RICHARDSONI.—*Hook.*

GEN. CHAR.—Frond filiform, articulated (at least in the young state), marked externally with striæ, corresponding to a series of longitudinal internal tubes, interrupted at the joints, and generally disposed in a series round a central cylindrical cavity. Fructification of two kinds, on distinct plants: 1. Capsules (ceramidia) with a terminal pore, and containing a bundle of pyriform spores; 2. Tetraspores imbedded in swollen ramuli. Name from πολὺς, "many," and σίφων, "a tube."

POLYSIPHONIA *Richardsoni.*—"Stems cartilaginous, setaceous; branches alternate, elongate, divaricate, beset in the upper part with very patent, straight, subdichotomous ramuli; articulations of the stem and branches two or three times longer than broad, irregularly veined, of the ramuli shorter; capsules sessile, globose."

POLYSIPHONIA *Richardsoni.*—*Hook. Br. Fl.* vol. ii. p. 33; *Harv. P. B.* plate 10; *Harv. Man.* p. 84; *Harv. Syn.* p. 70; *Atlas*, plate 26, fig. 115.

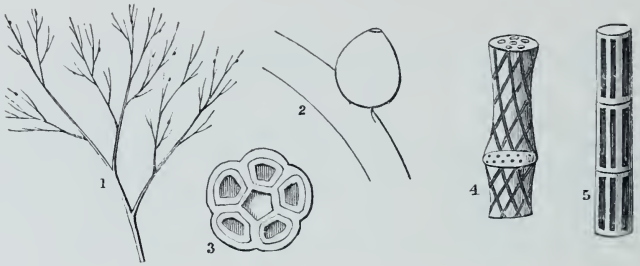
HAB.—Very rare. Colvend, Kirkcudbrightshire.

GEOGR. DIST. —— ?

DESCRIPTION.—Root scutate. Frond three to four inches long, setaceous, rather rigid, with a subdistinct, zigzag stem, very much branched from a short distance above the base; the branches issuing at right angles, angularly bent, as long as the main stem, subquadrifarious, mostly alternate, beset with distant, very patent, subdichotomous, straight branchlets, which bear a few, mostly simple, erecto-patent or erect, subulate ramuli. Articulations visible in the main stem, subtorulose, the lower ones three or four times longer than broad, spirally or irregularly tubed; the upper shorter, with parallel tubes. Capsules globose, sessile, and wide-mouthed, situate near the summits of the lesser branches. Tubes about five in the stem, each with a deep coloured bag of endochrome.

All that is known of this so-called species is from a single specimen now in the Hookerian Herbarium. It was found by Dr. Richardson many years ago. Dr. Harvey states this species (?) has not a very strong relation to any other, except *P. Griffithsiana.*

The character and description are from *Phyc. Brit.*



POLYSIPHONIA RICHARDSONI.

EXPLANATION OF DISSECTIONS.

Fig. 1.—Branchlet.
2.—Capsule.
3.—Transverse section of stem.
4.—Portion of stem.
5.—Portion of branchlet. All magnified.

POLYSIPHONIA GRIFFITHSIANA.—*Harv.*

GEN. CHAR.—Frond filiform, articulated (at least in the young state), marked externally with striæ, corresponding to a series of longitudinal internal tubes, interrupted at the joints, and generally disposed in a series round a central cylindrical cavity. Fructification of two kinds, on distinct plants : 1. Capsules (ceramidia) with a terminal pore, and containing a bundle of pyriform spores ; 2. Tetraspores imbedded in swollen ramuli. Name from πολὺς, "many," and σίφων, "a tube."

POLYSIPHONIA *Griffithsiana.* — Frond filiform, somewhat alternately branched, branchlets subalternate, three to four times subdichotomously divided into very slender ramuli ; articulations of the stem and principal branches nearly twice as long as broad, with straight tubes ; siphons four.

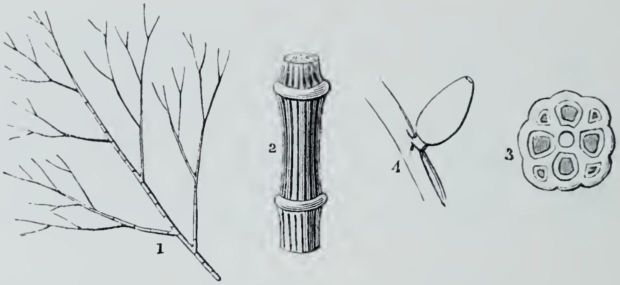
POLYSIPHONIA *Griffithsiana.—Harv. P. B.* plate 228 ; *Harv. Man.* p. 85 ; *Harv. Syn.* p. 70 ; *Atlas*, plate 26, fig. 116.

HAB.—Parasitical on *Polyides rotundus* at Torquay (*Mrs. Griffiths*) ; Isle of Portland (*Miss White*).

GEOGR. DIST.—South coast of England (?).

DESCRIPTION.—Root, a minute disc. Fronds filiform, four to five inches long, scarcely tufted, four to five times divided in a somewhat alternate or dichotomous manner ; ramuli capillary. The lowest branches are longest, giving the frond, when expanded, an ovate outline. Articulations apparent throughout, those of the stem nearly twice as long as broad, "marked with about five tubes, two of which are much narrower than the rest, those of the stem about once and a-half as long as broad, with two tubes only." Siphons four, large, with four very small ones in the exterior angles ; central tube very small. Capsules ovate, sessile, scattered on the upper branchlets. Substance "rather rigid in the stem and branches, flaccid in the ramuli," closely adhering to paper. Colour, "a full red," inclining to brownish in drying, but not much altered by fresh water.

An elegant plant, not unlike *P. violacea*, but readily known from that species by its jointed stem. There is none other of the genus it is likely to be confounded with. "*P. Griffithsiana* was discovered by Mrs. Griffiths in 1837, and has not since been found at Torquay." —*Harvey.*



POLYSIPHONIA GRIFFITHSIANA.

EXPLANATION OF DISSECTIONS.

Fig. 1.—Portion of a branchlet.
2.—Same magnified.
3.—Transverse section of stem.
4.—A capsule. All magnified.

Polysiphonia elongella, Harv.

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Plate XIV.

POLYSIPHONIA ELONGELLA.—*Harv.*

Gen. Char.—Frond filiform, articulated (at least in the young state), marked externally with striæ, corresponding to a series of longitudinal internal tubes, interrupted at the joints, and generally disposed in a series round a central cylindical cavity. Fructification of two kinds, on distinct plants: 1. Capsules (ceramidia) with a terminal pore, and containing a bundle of pyriform spores; 2. Tetraspores imbedded in swollen ramuli. Name from πολὺς, "many," and σίφων, "a tube."

Polysiphonia *elongella.*—Frond filiform, rigid and cartilaginous at the base, when young more delicate and flaccid, irregularly dichotomous; axils mostly patent, rounded; branches much fascicled upwards; articulations of the branches about as long as broad, of the ramuli rather longer; siphons four; the periphery formed of a coating of cells, which become smaller outwards; dissepiments pellucid.

Polysiphonia *elongella.*—*Wyatt, Alg. Danm.* No. 84; *J. Ag. Alg. Medit.* p. 135; *Endl.* 3rd Suppl. p. 45, No. 30; *Harv.* in *Hook. Br. Fl.* vol. ii. p. 334; *Harv. P. B.* plate 146; *Harv. Man.* p. 85; *Harv. Syn.* p. 71; *Atlas,* plate 26, fig. 117.

Hab.—Rocks and stones at and beyond low-water. Most frequent in the south. Sidmouth and Torbay.

Geogr. Dist.—Coast of France (*Lenormand*); Adriatic Sea (*J. Agardh*).

Description.—Frond filiform, mostly solitary, four to six inches high, a quarter of a line in diameter at the base, where it is cartilaginous, very much branched; branches patent, irregularly dichotomous; the axils somewhat rounded; upper branchlets much fascicled, and of a much brighter colour, delicate and soft, falling off in autumn, leaving the naked branches. Articulations of the stem about half as long as broad, becoming slowly and slightly longer upwards, those at the apices being much shorter. Central cavity minute; siphons four, with an external coating of cells, which diminish in size to the circumference. Capsules large, broadly ovate, on short stalks. Tetraspore immersed in the ramuli near the middle, tripartite. Substance in the perennial stem and primary branches, cartilaginous, firm, scarcely adhering to paper; the young branchlets, which are produced in spring, closely adhering. Colour, a somewhat dull red, brighter in the young parts.

A most variable species, in its winter and summer vestments: at one time densely covered with delicate bright coloured ramuli ; at another, presenting hardly anything else but the naked stem and a few of the principal branches, which are able to withstand the buffeting of the winter storms. In early spring these again begin to send out fresh branchlets, which increase, divide, and subdivide until the plants become even much more bushy and plumose than before. It very closely resembles some small forms of *P. elongata,* from which it may be at all times known by its distinctly articulate stems, and the ramuli not at all tapering to the base ; and the lesser number of siphons will serve, as Professor Harvey remarks, to distinguish it from *P. variegata,* to which it also approaches in some of its forms.

EXPLANATION OF PLATE XIV.

Fig. 1.—*Polysiphonia elongella,* natural size.
2.—Branchlet with capsules.
3.—A capsule.
4.—Branchlet with tetraspores.
5.—A tetraspore.
6.—Section of stem. All magnified.

POLYSIPHONIA elongata GREV.

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Plate XV.

POLYSIPHONIA ELONGATA.—*Grev.*

Gen. Char.—Frond filiform, articulated (at least in the young state), marked externally with striæ, corresponding to a series of longitudinal internal tubes, interrupted at the joints, and generally disposed in a series round a central cylindrical cavity. Fructification of two kinds, on distinct plants: 1. Capsules (ceramidia) with a terminal pore, and containing a bundle of pyriform spores; 2. Tetraspores imbedded in swollen ramuli. Name from πολὺς, "many," and σίφων, "a tube."

Polysiphonia *elongata.*—Stems robust, much branched; branches irregular or subdichotomous, ultimate branchlets very much fascicled or pencillate, all much acuminated and attenuated to the base; articulations about as long as broad (in the ramuli rarely longer); those of the stem obsolete or obscured by the cells of the periphery.

Polysiphonia *elongata.*—*Harv.* in *Hook. Br. Fl.* vol. ii. p. 333; *Wyatt, Alg. Danm.* No. 40; *Harv.* in *Mack. Fl. Hib.* part 3, p. 209; *J. Ag. Alg.* p. 136; *Endl.* 3rd Suppl. p. 45; *Kütz. Phyc. Gen.* p. 428; *Sp. Alg.* p. 828; *Harv. P. B.* plates 192, 193; *Harv. N. B. A.* p. 42; *Harv. Man.* p. 86; *Harv. Syn.* p. 71; *Atlas*, plate 24, figs. 105, 106.

Polysiphonia *Ruchingeri.*—*J. Ag. Alg. Medit.* p. 136; *Kg. Phyc. Gen.* p. 428; *Kg. Syst. Alg.* p. 829.

Polysiphonia *rosea.*—*Grev. Fl. Edin.* p. 310.

Polysiphonia *stenocarpa.*—*Kg. Sp. Alg.* p. 830 (fide sp. a *Zanard*).

Polysiphonia *chalarophlœa.*—*Kg. Sp. Alg.* p. 831.

Polysiphonia *clavigera.*—*Kg. Sp. Alg.* p. 831 (fide sp. a *Zanard*).

Hutchinsia *elongata.*—*Ag. Syn.* p. 54; *Hook. Scot.* part 2, p. 87; *Ag. Syst.* p. 152.

Hutchinsia *Ruchingeri.*—*Ag. Sp. Alg.* vol. ii. p. 86.

Ceramium *elongatum.*—*Roth. Cat. Bot.* vol. iii. p. 128; *Ag. Disp.* p. 19; *Lyngb. Hyd. Dan.* p. 117, t. 66, D. 1; *Grev. Fl. Edin.* p. 310.

Ceramium *brachygonium.*—*Lyngb. Hyd. Dan.* p. 118, t. 36.

Conferva *elongata.*—*Huds. Fl. Angl.* vol. ii. p. 599; *Dillw. Conf.* t. 33, and Suppl. t. G.; *E. Bot.* t. 2429.

Hab.—On stones, &c., between tide-marks. Attached to oyster-shells, &c., in two to ten fathoms water.

Geogr. Dist.—Atlantic and Mediterranean shores of Europe; North America.

Description.—Root scutate. Fronds mostly solitary, five to twelve inches long, from half a line to one line in thickness, filiform, eight to ten times divided; branches irregular or somewhat dichotomous, gradually becoming shorter and finer upwards, all more or less attenuated to the base and acuminated to the points; the ultimate ones very much pencillate in summer, tender and gelatinous; in winter more or less denuded, rigid and cartilaginous. Structure: central tube very small, surrounded with a series of four large and somewhat hexagonal, and these again by another series of four similar and alternating, somewhat smaller, and these by a series of eight in pairs alternating and still smaller; the remainder of much smaller size, forming the periphery, and constituting about one-third of the diameter. Substance cartilaginous in the lower part; the branchlets more or less gelatinous. Articulations of the stem obscure at the base, more visible upwards; of the branchlets much more apparent, especially in the younger parts, somewhat broader than long; those of the branchlets somewhat longer, or nearly twice as long as broad; the dissepiments transparent. The cells that cover the upper part are more straight and parallel than those of the stem; and the coating being thinner, the axis becomes more apparent. Colour of the stem and main branches, dark reddish brown; of the young branchlets "a fine crimson lake." Capsules elongate ovate, sessile or nearly so, on the upper ramuli. Tetraspores scattered near the middle of swollen ramuli.

There is scarcely a sea-weed, perhaps, more polymorphous than the present, from the changes which it undergoes in its habit at various seasons of the year. Like many more of its marine neighbours and like deciduous plants among land vegetation, the stem and main branches appear to be perennial, while the lesser branchlets are deciduous, dropping off to a greater or less extent in autumn or early winter, according to the severity of the season; and thus in winter presenting the appearance of some of the more twiggy shrubs bereft of its foliage; whilst in summer it reminds one of the birch or the willow clothed in all the rich luxuriance of their summer tresses. At different seasons, and under different circumstances, it presents every possible variety of appearance between these two extremes, and has under such circumstances been converted into several species. It does not seem to be so much partial to any particular depth of water as to a stony or gravelly bottom, where it delights to attach itself to stones and old shells.

EXPLANATION OF PLATE XV.

Fig. 1.—*Polysiphonia elongata*, natural size.
2.—Branchlet with capsule.
3.—A capsule.
4.—Branchlet with tetraspores.
5.—A tetraspore.
6.—Transverse section of stem. All magnified.

POLYSIPHONIA violacea, GREV.

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Plate XVI.

POLYSIPHONIA VIOLACEA.—*Grev.*

Gen. Char.—Frond filiform, articulated (at least in the young state), marked externally with striæ, corresponding to a series of longitudinal internal tubes, interrupted at the joints and generally disposed in a series round a central cylindrical cavity. Fructification of two kinds, on distinct plants : 1. Capsules (ceramidia) with a terminal pore, and containing a bundle of pyriform spores ; 2. Tetraspores imbedded in swollen ramuli. Name from πολὺς, "many," and σίφων, "a tube."

Polysiphonia *violacea.* — Stem inarticulate, rather stout and rigid, repeatedly divided in a somewhat alternate or dichotomous manner; divisions long and virgate, of nearly equal length, clothed throughout their whole extent with pencils of capillaceo-multifid ramuli, very erect, with acute axils, fibrillose at the points; articulations two to four times longer than broad.

Polysiphonia *violacea.*—*Wyatt, Alg. Danm.* No. 176 ; *Kütz. Sp. Alg.* p. 826 ; *Ag. Sp. Alg.* vol. ii. p. 76 ; *Endl.* 3rd Suppl. p. 46 ; *Harv. P. B.* plate 209 ; *Harv. Man.* p. 86 ; *Harv. Syn.* p. 72 ; *Atlas*, plate 27, fig. 119 ; *Harv. N. B. A.* part 2, p. 44.

Hutchinsia *violacea.*—*Ag. Syn.* p. 54 ; *Lyngb. Hyd. Dan.* p. 112, t. 35 (quoad partem), f. B ; *Ag. Syst.* p. 150.

Hab.—On rocks and stones near low-water mark. Annual. April to July. Not uncommon all round the coast.

Geogr. Dist.—Shores of Northern Europe.

Description.—Root, a small flattened disc. Frond filiform, three to twelve inches long, about a quarter of a line in thickness, branched in a somewhat irregular or dichotomous or quadrifarious manner; the branches very long and virgate, of nearly equal length, everywhere clothed from their bases with slender quadrifarious, capillaceo-multifid ramuli, forming tufts or pencils all along the branch of nearly equal length, giving it a linear or narrow lanceolate outline; each ramulus is terminated by a tuft of dichotomous fibrillæ. Articulations of the stem and main branches not apparent, being concealed by the external coating of cells, those of the ramuli distinct; the lower ones about four times as long as broad, diminishing in length to the tops, where they are only once or twice as long as broad, marked with two tubes. Capsules abundant on the ramuli, ovate, or when immature elongate, ovate, sessile, or on short stalks. Tetraspores immersed in the middle of swollen ramuli. Structure : central tube large, surrounded by four others of about equal size, rather distant, with a second series alternating in the angles, much smaller; and these are covered by a coating, more or less thick, according to its distance from the base, of small, irregular cellules, forming a more or less opaque periphery. Substance more or less cartilaginous in the stem; gelatinous in the ramuli. Colour, brownish or purplish red.

This species is perhaps much less rare than is generally supposed, and may be found to be not uncommon when its characters are better understood. In general appearance it is not unlike *P. Brodiæi*, but differs in the number of siphons, and is generally more delicate and flaccid. Professor Harvey considers the *P. violacea* of the British Flora to be possibly only a variety of *P. nigrescens*, but observes that the *P. violacea* of Mrs. Griffiths and Mrs. Wyatt have been ascertained to be identical with that of Continental authors.

EXPLANATION OF PLATE XVI.

Fig. 1.—*Polysiphonia violacea,* natural size.
2.—Ramuli with capsules.
3.—A capsule.
4.—Spores from same.
5.—Ramuli with tetraspores.
6.—A tetraspore.
7.—Portion of stem with surface cells.
8.—Transverse section of stem. All magnified.

POLYSIPHONIA CARMICHAELIANA.—*Harv.*

GEN. CHAR.—Frond filiform, articulated (at least in the young state), marked externally with striæ, corresponding to a series of longitudinal internal tubes, interrupted at the joints, and generally disposed in a series round a central cylindrical cavity. Fructification of two kinds, on distinct plants : 1. Capsules (ceramidia) with a terminal pore, and containing a bundle of pyriform spores ; 2. Tetraspores imbedded in swollen ramuli. Name from πολὺς, "many," and σίφων, "a tube."

POLYSIPHONIA *Carmichaeliana.*—"Stem inarticulate, percurrent, flexuous, rigid, set throughout with lateral, alternate, inarticulate, divaricating branches; ramuli scattered and very patent, irregularly forked, articulate ; articulations as long as broad, three-tubed."

POLYSIPHONIA *Carmichaeliana.—Harv.* in *Hook. Brit. Fl.* vol. ii. p. 328 ; *Harv. P. B.* plate 319 ; *Harv. Man.* p. 87 ; *Harv. Syn.* p. 73 ; *Atlas*, plate 26, fig. 118.

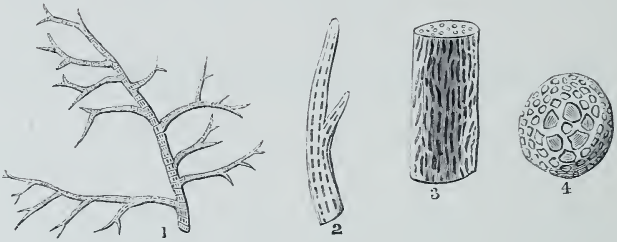
POLYSIPHONIA *divaricata.—Carm. MS.* (not of Agardh). (*Harvey.*)

HAB.—Parasitical on *Desmarestia aculeata.* Appin (*Capt. Carmichael*). Very rare.

GEOGR. DIST.—Not known elsewhere (*Harvey*).

DESCRIPTION.—"Filaments tufted, but not densely so, about four inches high, rigid, thicker than hogs' bristles. Stem undivided, running through the frond, bent alternately from side to side in a slightly angular manner, inarticulate, furnished throughout with lateral branches. Branches widely-spreading and divaricating, bent like the stem, and furnished with very patent, or horizontal lesser branches, which in their turn bear numerous, scattered, irregularly-forked ramuli, standing at right angles to the branch from which they grow. The whole aspect of the plant is thorny and irregular, and the substance rigid. The small branches and the ramuli are alone articulated ; their articulations are about as long as broad, and three-tubed ; and a transverse section shows four large primary siphons, with external secondary cells at the angles. Fruit unknown. Colour, a dark brown red, changing to black in drying, in which state the plant adheres very imperfectly to paper."

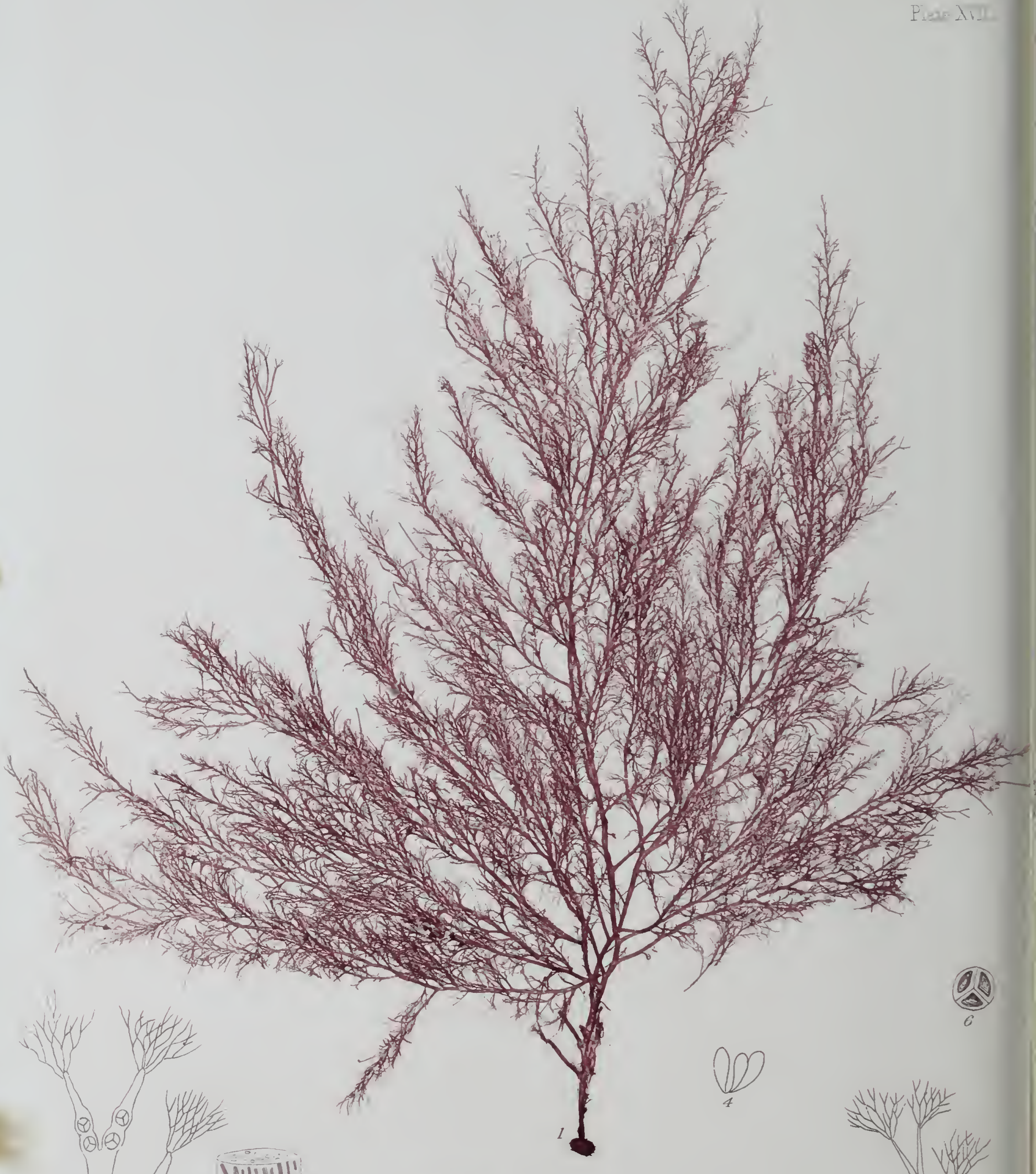
We extract the above characters and description from the *Phy. Brit.*, as we know nothing of this so-called species, which Professor Harvey considers to be too nearly allied to *P. fibrillosa*—the plant has not been met with subsequently by any collector.



POLYSIPHONIA CARMICHAELIANA.

EXPLANATION OF DISSECTIONS.

Fig. 1.—Summit of a branch.
2.—Apex of branchlet.
3.—Portion of stem.
4.—Transverse section of stem. All magnified.



POLYSIPHONIA *fibrillosa*, GREV.

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PLATE XVII.

POLYSIPHONIA FIBRILLOSA.—*Grev.*

GEN. CHAR.—Frond filiform, articulated (at least in the young state), marked externally with striæ, corresponding to a series of longitudinal internal tubes, interrupted at the joints, and generally disposed in a series round a central cylindrical cavity. Fructification of two kinds, on distinct plants: 1. Capsules (ceramidia) with a terminal pore, and containing a bundle of pyriform spores; 2. Tetraspores imbedded in swollen ramuli. Name from *πολὺς*, "many," and *σίφων*, "a tube."

POLYSIPHONIA *fibrillosa.*—Frond "pale straw-colour or brownish;" stems filiform, inarticulate and opaque, with sinuous veins, bipinnated in a somewhat irregularly alternate manner, everywhere beset with short capillaceo-multifid branchlets, abundantly fibrillose at the tips; articulations of the ramuli about as long or rather longer than broad; capsules broadly ovate; tetraspores large, in the terminal swollen ramuli.

POLYSIPHONIA *fibrillosa.—Harv.* in *Hook. Br. Fl.* vol. ii. p. 334; *Wyatt, Alg. Danm.* No. 136; *Endl.* 3rd Suppl. p. 46; *J. Ag. Alg. Medit.* p. 138; *Kütz. Sp. Alg.* p. 827; *Kütz. Phyc. Gen.* p. 427; *Harv. P. B.* plate 302; *Harv. Man.* p. 87; *Harv. N. B. A.* p. 43; *Harv. Syn.* p. 73; *Atlas*, plate 28, fig. 123.

HUTCHINSIA *fibrillosa.—Ag. Sp. Alg.* vol. ii. p. 78; *Lyngb. Hyd. Dan.* p. 113.

HUTCHINSIA *lubrica.—Ag.* l. c. p. 94 (fide *J. Ag.*).

HUTCHINSIA *pilosa.—Nacc.* (fide *J. Ag.*).

HAB.—In exposed, often shallow pools between tides. Annual. Summer. Common.

GEOGR. DIST.—Atlantic shores of Europe; Baltic and Mediterranean seas.

DESCRIPTION.—Root, a small flattened disc. Frond solitary or slightly tufted, four to ten inches long, a quarter to half a line in thickness, sometimes undivided when young, afterwards two or three times divided by alternate somewhat irregular branches, of unequal length, and frequently somewhat flexuose or distorted. Stem, except at the base and branches, everywhere beset with simple setaceous or capillaceo-multifid ramuli, which are not unfrequently penicillate; branches very patent, stout, more or less opaque like the stem, especially in their lower part; the internal siphons being concealed by the external coating of cells, which are curved or sinuous, close-placed, and linear or oblong, becoming fewer upwards, rendering the upper part quite pellucid, and the articulations apparent: these are about as long or a little longer than broad. Apices fibrillose. Structure: central tube very small, first series very large, four in number; surrounded with a broad stratum of lesser cells, decreasing in size from the centre, all roundish, or somewhat angular. Substance cartilaginous below, upwards, tender and gelatinous. Colour, from a pale to a deep brown, according to exposure. Capsules roundish ovate, generally sessile on the upper branchlets. Tetraspores large, imbedded in the ramuli, which are thus much distended.

This seems rather a common species, and like all such, putting on a great variety of appearances from the various situations in which it is found; in very exposed places and shallow pools its habit is more stunted, and its colour paler; while in deeper water and in more sheltered localities, it becomes much more bushy, the divisions more numerous and finer, and very fibrillose at the tips, with twice or thrice dichotomously branched fibrils.

EXPLANATION OF PLATE XVII.

Fig. 1.—*Polysiphonia fibrillosa*, natural size.
2.—Branchlets with capsule.
3.—A capsule.
4.—Spores.
5.—Branchlets with tetraspores.
6.—A tetraspore.
7.—Section of stem.
8.—Portion of stem (lower part). All magnified.

POLYSIPHONIA BRODIÆI, GREV.

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PLATE XVIII.

POLYSIPHONIA BRODIÆI.—*Grev.*

GEN. CHAR.—Frond filiform, articulated (at least in the young state), marked externally with striæ, corresponding to a series of longitudinal internal tubes, interrupted at the joints, and generally disposed in a series round a central cylindrical cavity. Fructification of two kinds, on distinct plants : 1. Capsules (ceramidia) with a terminal pore, and containing a bundle of pyriform spores ; 2. Tetraspores imbedded in swollen ramuli. Name from πολὺς, "many," and σίφων, "a tube."

POLYSIPHONIA *Brodiæi.* — Stem inarticulated, robust, cartilaginous, irregularly branched ; branches everywhere clothed with pencils of capillaceo-multifid ramuli ; articulations rather longer than broad ; siphons seven.

POLYSIPHONIA *Brodiæi.—Wyatt, Alg. Danm.* No. 83 ; *Endl.* 3rd Suppl. p. 45 ; *Kütz. Phyc. Gen.* p. 427 ; *Harv.* in *Hook. Br. Fl.* vol. ii. p. 328 ; *Harv.* in *Mack. Fl. Hib.* part 3, p. 206 ; *Harv. P. B.* plate 195 ; *Harv. Man.* p. 88 ; *Harv. Syn.* p. 74 ; *Atlas,* plate 27, fig. 120.

HUTCHINSIA *Brodiæi.—Lyngb. Hyd. Dan.* p. 109, t. 33 ; *Hook. Fl. Scot.* part 2, p. 88 ; *Ag. Syst.* p. 154 ; *Ag. Sp. Alg.* vol. ii. p. 63.

HUTCHINSIA *penicillata.—Ag. Sp. Alg.* vol. ii. p. 65.

CONFERVA *Brodiæi.—Dillw. Conf.* t. 107 ; *E. Bot.* t. 2589.

CERAMIUM *Brodiæi.—Ag. Disp.* p. 20.

HAB.—Rocks, stones, corallines, and old shells about low-water mark, frequent al round the coasts. Annual. Summer.

GEOGR. DIST.—Atlantic shores of Europe and of North America ; Faroe Islands.

DESCRIPTION.—Root, a small conical disc. Frond filiform, stout, inarticulate, five to twelve inches long, half a line in thickness, once branched, in an irregular or somewhat dichotomous manner ; branches long, undivided, everywhere beset with capillaceo-multifid, penicillate, articulated ramuli, a quarter to three-quarters of an inch long. Structure : central tube about as large as the siphons, which in the stem and branches are seven, in the ramuli three or four, with a second series of the same number alternating ; the rest smaller towards the circumference. Articulations (of the ramuli) about as long or a little longer than broad. Substance cartilaginous in the stem, in the ramuli soft and flaccid. Capsules abundant on the ramuli, ovate, shortly stalked. Tetraspores common in swollen distorted ramuli. Colour, dark purplish red, paler in the branchlets.

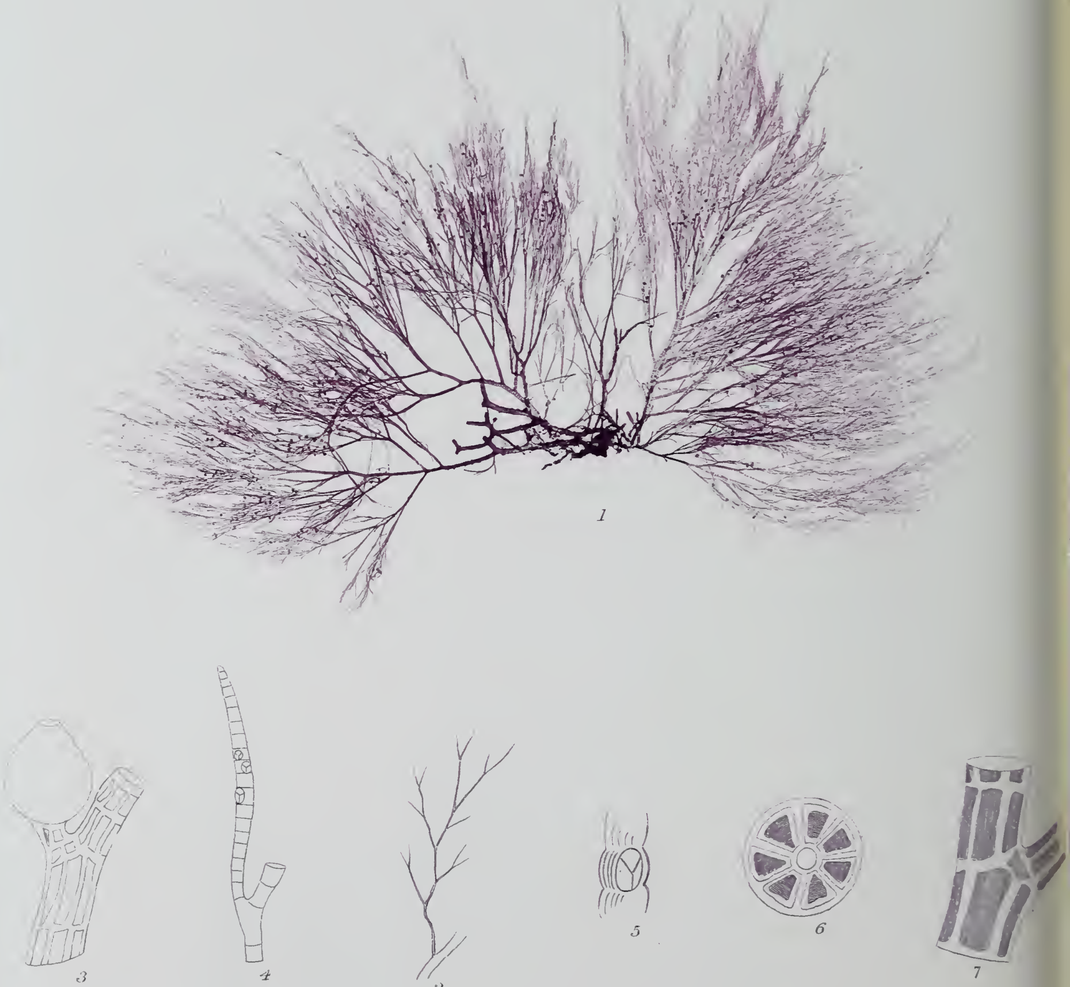
When well grown, this is one of the handsomest of our native species of *Polysiphoniæ*, as well as one of the most satisfactorily distinct. Its stout inarticulate stems, and generally very distinctly penicillated or fascicled articulated ramuli, are strongly characteristic of the species.

We are indebted to James Brodie, of Brodie, near Forres, for the discovery of this species, who noticed it on the shores of the Moray Frith; and subsequent observers have detected it on almost all our shores, in greater or less plenty. Mr. Brodie has added much to our knowledge of the Algæ of his native country, and well merits the tribute of honour which Mr. Dillwin has conferred on his name by attaching it to the present species.

We cordially agree with Professor Harvey in considering the *Hutchinsia penicillata* (*Ag.*) as merely a common form of the present, and identical with *Ceramium Brodiæi*, of the same author, the extreme forms being easily traceable through several intermediate forms, so that, as the same acute observer remarks, if we make two species, we must several. The present species is very flaccid, soon decomposing in fresh water, and "has a very disagreeable smell."

EXPLANATION OF PLATE XVIII.

Fig. 1.—*Polysiphonia Brodiæi*, natural size.
2.—Branchlet with capsule.
3.—A capsule.
4.—Branchlet with tetraspores.
5.—Tetraspores.
6.—Transverse section of stem.
7.—Portion of stem. All magnified.



POLYSIPHONIA variegata, Ag.

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PLATE XIX.

POLYSIPHONIA VARIEGATA.—*Ag.*

GEN. CHAR.—Frond filiform, articulated (at least in the young state), marked externally with striæ, corresponding to a series of longitudinal internal tubes, interrupted at the joints, and generally disposed in a series round a central cylindrical cavity. Fructification of two kinds, on distinct plants : 1. Capsules (ceramidia) with a terminal pore, and containing a bundle of pyriform spores ; 2. Tetraspores imbedded in swollen ramuli. Name from πολὺς, "many," and σίφων, "a tube."

POLYSIPHONIA *variegata.*—Frond filiform, rigid, very much branched ; branches dichotomous, setaceous upwards, patent below, somewhat flexuose or zigzag ; articulations in the stem scarcely so long as broad, in the branches once and a-half or twice as long, gradually becoming shorter upwards, "marked with three broad, parallel, oblong cells, separated by pellucid spaces ;" tubes six, or rarely seven ; capsules broadly ovate, on short stalks.

POLYSIPHONIA *variegata.*—*J. Ag. Alg. Medit.* p. 129 ; *Endl.* 3rd Suppl. p. 45 ; *Kütz. Phyc. Gen.* p. 424 ; *Harv. P. B.* plate 155 ; *Harv. N. B. A.* p. 45 ; *Harv. Man.* p. 88 ; *Harv. Syn.* p. 74 ; *Atlas,* plate 28, fig. 124.

HAB.—On mud-covered rocks, &c. Summer and autumn. Very local ; principally near Plymouth, but abundant there (*Rev. W. S. Hore, Dr. J. Cocks*).

GEOGR. DIST.—Atlantic shores of France and Spain ; Mediterranean and Adriatic seas ; West Indies (*Agardh*) ; eastern and western shores of North America (*Bailey*).

DESCRIPTION.—Root —— ? Fronds tufted, four to eight inches long, a quarter of a line thick, much divided dichotomously, and gradually attenuated upwards to a capillary fineness, rigid at the base, more flaccid upwards ; branches divaricated below, and short, more erect and elongated upwards, and less zigzag. Articulations at the base scarcely so long as broad, in the middle nearly twice as long as broad, gradually becoming shorter to the apices, where they are very short—about twice as broad as long ; in the older parts sometimes becoming obsolete, exhibiting, when viewed laterally, three broad tubes. Structure : central tube small, with six ("rarely seven") large triangular or compressed siphons, occupying the whole of the diameter, except in very old plants, when a few smaller cells are formed exteriorly. Substance rigid at the base, flaccid, and very tender upwards. Colour, reddish purple, "in the lower part sometimes greenish." Capsules broadly ovate, shortly stalked, common. Tetraspores small, triparted, imbedded in the middle of the upper ramuli.

Somewhat resembling *P. elongella* in external habit, this species is nevertheless abundantly distinct in its microscopical structure, not only from that but from every other British species yet published, the number of its tubes rarely exceeding six. It is one of those species that seem to have reached their northern limit in the south of England, where alone it has hitherto, so far as we know, been found. It seems abundant both on the eastern and western shores of the Atlantic, and is particularly so in some parts of the Mediterranean (*Phy. Brit.*), but the specimens are much inferior in size and beauty to those found at Plymouth, whence we may fondly hope that it may be found less restricted in its distribution than it has hitherto been considered.

EXPLANATION OF PLATE XIX.

Fig. 1.—*Polysiphonia variegata*, natural size.
2.—Branchlet.
3.—Capsule.
4.—Branchlet with tetraspores.
5.—Tetraspores.
6.—Section of stem.
7.—Cells, surface of stem. All magnified.

POLYSIPHONIA OBSCURA.—*J. Ag.*

GEN. CHAR.—Frond filiform, articulated (at least in the young state), marked externally with striæ, corresponding to a series of longitudinal internal tubes, interrupted at the joints, and generally disposed in a series round a central cylindrical cavity. Fructification of two kinds, on distinct plants: 1. Capsules (ceramidia) with a terminal pore, and containing a bundle of pyriform spores; 2. Tetraspores imbedded in swollen ramuli. Name from πολὺς, "many," and σίφων, "a tube."

POLYSIPHONIA *obscura.*—Fronds "densely matted together, filaments creeping, throwing up erect, simple, secund branches, which are either naked or furnished with a few secund ramuli; articulations as long as broad, many-tubed."

POLYSIPHONIA *obscura.*—*J. Ag. Alg. Medit.* p. 123; *Endl.* 3rd Suppl. p. 44; *Harv. P. B.* plate 102 A.; *Harv. Man.* p. 89; *Harv. Syn.* p. 75; *Atlas,* plate 25, fig. 111.

HUTCHINSIA *obscura.*—*Ag. Sp.* vol. ii. p. 108.

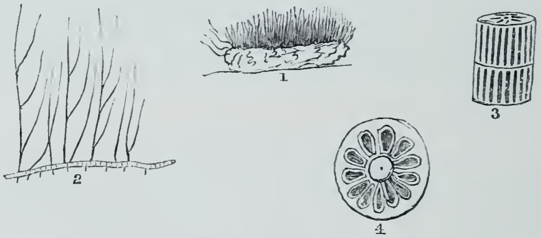
CONFERVA *intertexta.*—*Roth. Cat. Bot.* vol. i. p. 188, t. 3, fig. 5; vol. ii. p. 214.

HAB.—Spreading over rocks at half-tide level. Also parasitical on Fuci. Jersey (*Miss White*); Sidmouth (*Rev. T. Cresswell*).

GEOGR. DIST.—At Cadiz (*Ag.*); Adriatic Sea.

DESCRIPTION.—"Plant spreading over the surface of rocks in patches of six inches to a foot in diameter, covering the roots of such Fuci as it may encounter," the filaments throwing out roots as they proceed, which attach themselves to whatever comes in their way, and throwing up from the upper side, at irregular intervals, numerous branches, which are generally from a quarter to half an inch in height, either simple or with two to four simple, secund ramuli, filiform, and much acuminated to the points. Articulations everywhere apparent, about as long or a little shorter than broad. Siphons "twelve to thirteen," central tube rather large. Fructification unknown in British specimens. Colour, a dark brownish red. Substance rigid, scarcely adhering to paper.

The smallest, and one of the less common of our native species. From its small size, it may often have been overlooked, but when we become better acquainted with the minuter productions of "the great deep," and their geographical distribution, this and many others at present considered rare, will no doubt be found common. Its own history already leads us to hope this: at first a single specimen was found by Miss White, in Jersey, and more recently it has been found in abundance near Sidmouth, by the Rev. Mr. Cresswell. — *Phyc. Brit.*



POLYSIPHONIA OBSCURA.

EXPLANATION OF DISSECTIONS, &c.

Fig. 1.—*Polysiphonia obscura*, natural size.
2.—Portion of a creeping filament.
3.—Portion of a branch.
4.—Transverse section of same. All magnified.

POLYSIPHONIA SIMULANS.—*Harv.*

GEN. CHAR.—Frond filiform, articulated (at least in the young state), marked externally with striæ, corresponding to a series of longitudinal internal tubes, interrupted at the joints, and generally disposed in a series round a central cylindrical cavity. Fructification of two kinds, on distinct plants : 1. Capsules (ceramidia) with a terminal pore, and containing a bundle of pyriform spores ; 2. Tetraspores imbedded in swollen ramuli. Name from πολὺς, "many," and σίφων, "a tube."

POLYSIPHONIA *simulans.*—"Filaments slender, bushy, branched from the base ; branches alternate, patent, repeatedly but irregularly pinnate ; the penultimate branches long and simple, set with short, distant, spine-like ramuli ; articulations of the branches once and a-half as long as broad, of the ramuli shorter, many-tubed ; siphons about twelve ; ceramidia globose or ovate."

POLYSIPHONIA *simulans.*—*Harv. P. B.* plate 278 ; *Harv. Man.* p. 89 ; *Harv. Syn.* p. 75 ; *Atlas*, plate 28, fig. 125.

POLYSIPHONIA *spinulosa.*—*Griff.* in *Harv. Man.* 1st ed. p. 87 (not of *Grev.*).

POLYSIPHONIA *divergens*, γ *Grevilleana.*—*Kütz. Sp. Alg.* p. 822 (Torquay specimens).

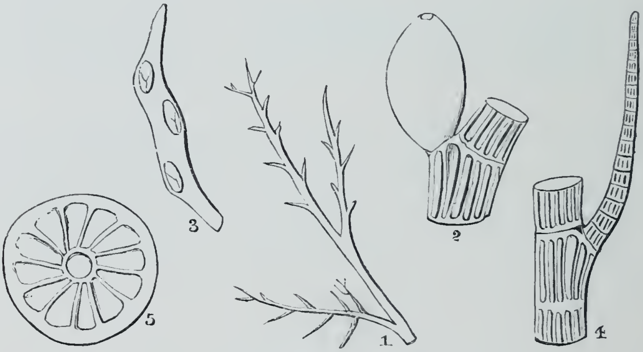
HAB.—On rocks, &c., in tide-pools near low-water mark. Annual ? Summer. Rare. Bathing Cove, Torquay and Torabbey Rocks (*Mrs. Griffiths*) ; Bovisand (*Rev. W. S. Hore*) ; Jersey (*Miss White* and *Miss Turner*) ; Valentia, Kerry (*Dr. Harvey*) ; Skaill, Orkney (*Rev. J. H. Pollefen*).

GEOGR. DIST.—Not noticed out of Britain.

DESCRIPTION.—"Fronds densely tufted, two or three inches high, branched from the base and bushy, setaceous below, capillary above, irregularly divided ; branches alternate, somewhat pinnate, not perfectly distichous, decompound ; the divisions set with short, subulate, scattered, spine-like processes, so that the lesser divisions are difficult to spread out. Articulations of the stem and branches about once and a-half as long as broad, of the ramuli very short, with pellucid dissepiments, multistriate ; siphons about twelve, surrounding a small central tube. Ceramidia ovate, sessile, scattered on the smaller branches. Tetraspores immersed in slightly swollen ramuli. Colour, a dull reddish brown or dark brown red. Substance stiff and brittle, becoming flaccid in fresh water, and then adhering to paper."

We extract figures and descriptions of this species from *Phycologia*

Britannica, not having native specimens; but from these it will at once be seen how closely it resembles *P. subulifera,* from which it differs chiefly, as Professor Harvey very justly remarks, in some of its more minute details, so that there would be no great violence done to nature were the two so-called species combined into one.



POLYSIPHONIA SIMULANS.

EXPLANATION OF DISSECTIONS.

Fig. 1.—Part of a branch.
2.—A capsule.
3.—Branchlet with tetraspores.
4.—Portion of stem showing surface cells.
5.—Transverse section of stem. All magnified.


1


5


2


6


3

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Polysiphonia nigrescens, Grev.

Plate XX.

POLYSIPHONIA NIGRESCENS.—*Grev.*

Gen. Char.—Frond filiform, articulated (at least in the young state), marked externally with striæ, corresponding to a series of longitudinal internal tubes, interrupted at the joints, and generally disposed in a series round a central cylindrical cavity. Fructification of two kinds, on distinct plants : 1. Capsules (ceramidia) with a terminal pore, and containing a bundle of pyriform spores ; 2. Tetraspores imbedded in swollen ramuli. Name from πολὺς, "many," and σίφων, "a tube."

Polysiphonia *nigrescens.*—Frond rigid, much branched; branches tripinnate, alternately and distichously, somewhat flexuose; lower articulations hardly so long, upper a little longer than broad; those at the extremities very short; central tube large; secondary somewhat compressed, eighteen to twenty. Capsules roundish ovate. Tetraspores occupying the upper portion of the ultimate branchlets.

Polysiphonia *nigrescens.*—*Wyatt, Alg. Danm.* No. 135; *Harv.* in *Mack. Fl. Hib.* part 3, p. 208; *Harv. Man.* p. 89; *Harv. P. B.* plate 277; *Harv. Syn.* p. 76; *Atlas,* plate 27, fig. 121; *Harv. N. B. A.* part 2, p. 49; *Endl.* 3rd Suppl. p. 45; *Kütz. Phyc. Un.* p. 421, t. 50, iv.; *Sp. Alg.* p. 813.

Polysiphonia *fucoides.*—*Grev. Fl. Edin.* p. 308.

Hutchinsia *nigrescens.*—*Lyngb. Hyd. Dan.* p. 109, t. 33; *Ag. Syst.* p. 151; *Ag. Sp. Alg.* vol. ii. p. 69.

Hutchinsia *fucoides.*—*Hook. Fl. Scot.* part 2, p. 87.

Conferva *nigrescens.*—*Huds. Fl. Ang.* p. 602; *Dillw. Conf.* No. 155; *E. Bot* t. 1717.

Conferva *fucoides.*—*Huds. Fl. Ang.* p. 603; *With.* vol. iv. p. 141; *Dillw. Conf* t. 75; *E. Bot.* t. 1743.

Hab.—On rocks and on Algæ; everywhere common between tide-marks.

Geogr. Dist.—Atlantic shores of Europe; New Zealand (*Harv.*).

Description.—Root, a broad conical disc. Fronds hard, rigid, very much branched and bushy, frequently more or less covered by the setaceous remains of the old branches, especially below; branches tripinnate, somewhat flexuose; pinnæ and pinnules distant and alternate; the latter, in luxuriant specimens, frequently again partially pinnate towards the summits. The young fronds and branches are always the most regularly pinnate; the older ones, from innovations, becoming frequently very irregular. Ceramidia generally abundant, roundish ovate, with a narrow mouth, almost sessile on the pinnules. Tetraspores three to four, imbedded in the upper portion of the pinnules, also very common. Colour, brownish purple, almost black when old and when dried. Substance rigid, cartilaginous; in the young state only adhering to paper.

This species, in its habitat, reminds us of those little plants, *Montia fontana*, *Bartramia fontana*, &c., which delight to grow in springy places and shallow streams. The subject of our present remarks also delights to carpet the shallow streamlets that issue from the rock-pools between tides, where its young plants often form, in the earlier part of the season, a rich velvety bed for several feet or even yards in extent. Within the tide-pools it generally grows in single tufts of larger size, at once conspicuous by its dark hue and larger size among the *Ceramia* and *Cladopheræ* that form a beautifully variegated fringe round the margin of the pool. In this state it very much resembles *Rhodomela subfusca*, from which it may be readily distinguished by its articulated branches and sessile capsules.

EXPLANATION OF PLATE XX.

Fig. 1.—*Polysiphonia nigrescens*, natural size.
2.—Antheridia.
3.—Apex of a ramulus, with ceramidium.
4.—Ramulus with tetraspores.
5.—Part of the stem.
6.—Transverse section of the same. All magnified.

POLYSIPHONIA AFFINIS.—*Moore.*

Gen. Char.—Frond filiform, articulated (at least in the young state), marked externally with striæ, corresponding to a series of longitudinal internal tubes, interrupted at the joints, and generally disposed in a series round a central cylindrical cavity. Fructification of two kinds, on distinct plants: 1. Capsules (ceramidia) with a terminal pore, and containing a bundle of pyriform spores; 2. Tetraspores imbedded in swollen ramuli. Name from πολὺς, "many," and σίφων, "a tube."

Polysiphonia *affinis.*—"Filaments robust, elongated, cartilaginous below, flaccid, irregularly divided; branches patent at base, multifid, and with an ovate outline above; ramuli very erect, simple or divided, acute; articulations multistriate; the lower, two or three times longer, the upper, as long as broad; siphons about sixteen; ceramidia ovate, stalked or subsessile."

Polysiphonia *affinis.*—*Moore* in *Ord. Surv. Londonderry*, Appendix, p. 11, t. 7; *Harv. P. B.* plate 303; *Harv. Man.* p. 90; *Harv. Syn.* p. 76; *Atlas*, plate 27, fig. 122.

Hab.—On rocks, &c., in the sea, thrown up from deep water. Carnlough, near Glenarm (*Dr. Drummond*); Cushendall (*Mr. Moore; Dr. Harvey*, 1850).

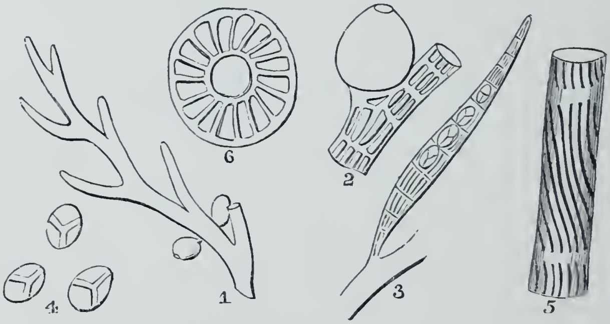
Geogr. Dist.—— ?

Description.—"Root, a small disc. Fronds as thick as hogs' bristles at the base, attenuated upwards, six or eight inches long or more, divided irregularly or subdichotomously into a few principal branches, or alternately branched; branches long, spreading, bare of ramuli in the lowest part, more or less copiously furnished with short branches above. These lesser branches are one or two inches long, with a broadly ovate outline, naked below, multifid above; the lesser divisions repeatedly pinnate, all the divisions alternate. The tendency to branch only at the upper portion of each rachis is equally characteristic of the ultimate divisions, as of the primary and secondary. Articulations of the stem and branches twice or thrice as long as broad; of the ramuli shorter, with pellucid dissepiments. Siphons about sixteen. Capsules ovate or subglobose, on short stalks or subsessile. Tetraspores large, in the ultimate ramuli, which are then distorted. Colour varying from a pale to a dark reddish brown. Substance of the stem cartilaginous, of the upper portion flaccid, and closely adhering to paper."

We prefer giving the characters and description of this species entirely as drawn up by Professor Harvey, rather than any summary drawn up from specimens in our possession, as we have not been able to satisfy ourselves as to its title to specific distinction. We feel sorry for this, as the principal distinction between it and *P. nigrescens* appears to us to be the difference in the number of siphons, a character of considerable value in this somewhat difficult genus, and one the trustworthiness of which we would not wish on slight grounds to undermine. We regret, however, to say, that it is chiefly on this account that we have given it a place; and in order that observers throughout the country may be further induced to direct attention to enable us, if possible, to clear up the doubts with which its specific distinction is still obscured.

Many of our specimens of *P. nigrescens* have nineteen and even eighteen siphons, so that the species does not seem to be constant in this particular; and certainly the difference in the ramification and in the length of the joints, is not more than what is of common occurrence in other species of the genus.

Although the species does not seem to have been as yet found out of Ireland, we are strongly inclined to believe in its much wider distribution. It was first observed, as Professor Harvey informs us, by Dr. Drummond of Belfast, soon after by Mr. Moore, and since in the same locality by Dr. Harvey himself, who however introduces it with considerable hesitation.



POLYSIPHONIA AFFINIS.

EXPLANATION OF DISSECTIONS.

Fig. 1.—Branchlet with capsules.
2.—A capsule.
3.—Ramuli with tetraspores.
4.—Tetraspores.
5.—Portion of stem.
6.—Transverse section of same. All magnified.

Plate XXI

POLYSIPHONIA subulifera, AG.

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PLATE XXI.

POLYSIPHONIA SUBULIFERA.—*Ag.*

GEN. CHAR.—Frond filiform, articulated (at least in the young state), marked externally with striæ, corresponding to a series of longitudinal internal tubes, interrupted at the joints, and generally disposed in a series round a central cylindrical cavity. Fructification of two kinds, on distinct plants: 1. Capsules (ceramidia) with a terminal pore, and containing a bundle of pyriform spores; 2. Tetraspores imbedded in swollen ramuli. Name from πολὺς, "many," and σίφων, "a tube."

POLYSIPHONIA *subulifera.*—Fronds filiform, rigid, articulated throughout, somewhat cartilaginous, much and irregularly branched; branches elongated, more regularly alternate upwards; ultimate ramuli short, spine-like, mostly alternate, pinnate; tubes about thirteen; central cavity small.

POLYSIPHONIA *subulifera.*—*Wyatt, Alg. Danm.* No. 178; *Endl.* 3rd Suppl. p. 46 (No. 96); *Harv.* in *Hook. Journ. Bot.* 1st series, vol. i. p. 301; *Harv. P. B.* plate 227; *Harv. Man.* p. 90; *Harv. Syn.* p. 77; *Atlas*, plate 29, fig. 129.

HUTCHINSIA *subulifera.*—*Ag.* in *Bot. Zeit.* 1827, p. 638; *Ag. Sp. Alg.* vol. ii. p. 97.

HAB.—Dredged in three to ten fathoms water. Annual. Summer. Very rare. Torquay (*Mrs. Griffiths*); Weymouth, "parasitical on *Rytiphlœa pinastroides* and *Polyides rotundus*, between tide-marks" (*Miss White*); Jersey (*Miss Edgar* and *Mr. F. P. Girdlestone*), rather plentiful; Belfast Bay (*Mr. Templeton*); Carrickfergus and Roundstone, at the latter place very abundant (*Mr. M'Calla*); Lamlash Bay, Arran (*Mrs. Balfour*).

GEOGR. DIST.—Adriatic sea (*Agardh*); coast of France (*Lenormand*).

DESCRIPTION.—"Root, a disc; generally accompanied by grasping fibres, or else small discs, rising from the lowest parts of the stems and branches."—*Harvey.* Fronds densely tufted, filiform, from four to six inches in length, one-sixth to one-fourth of a line in thickness, much and irregularly branched, three to four times; branches somewhat elongated, erecto-patent; lower mostly irregular, upper more regularly alternate, frequently somewhat flexuose. All the branches and branchlets are beset with ramuli, which are either simple, short, and spine-like, or elongated and again once or twice pinnated with similar strong, spine-like ramuli. Articulations very variable, not only on the same plant, but on the same parts of different plants; at one time about as broad as long, at other times twice or thrice as long as broad; apparently many tubed. Structure: central tube small, surrounded with thirteen large, very much laterally compressed tubes, occupying the whole of the stem. Substance somewhat cartilaginous, but rapidly decomposing in fresh water or in the air. Colour, dark reddish brown, sometimes "turning black in drying."—*Harvey.* Fructification unknown.

The peculiar spine-like ramuli will at once prevent the confounding of this with any other British species of *Polysiphonia.* Indeed it has, as Professor Harvey justly remarks, a much greater chance of being mistaken at first sight for *Rytiphlœa fruticulosa* than for any of its congeners, from which, however, its less rigid substance, and distinctly articulated stems, will at once distinguish it, independently of its different microscopical structure. It does not seem to be widely distributed, not having been found anywhere in plenty, except on the coast of Ireland, and particularly in Roundstone Bay (*Harvey*), where it has been dredged in considerable abundance. We are not aware of this species having been found in any other part of Scotland than Arran. At all events Mrs. Balfour has the credit of giving us its first Scotch habitat (*August*, 1850).

EXPLANATION OF PLATE XXI.

Fig. 1.—*Polysiphonia subulifera,* natural size.
2.—Part of a branch.
3.—Cells of the surface.
4.—Section of stem. All magnified.

Polysiphonia atro rubescens, Grev.

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Plate XXII.

POLYSIPHONIA ATRO-RUBESCENS.—*Grev.*

Gen. Char.—Frond filiform, articulated (at least in the young state), marked externally with striæ, corresponding to a series of longitudinal internal tubes, interrupted at the joints, and generally disposed in a series round a central cylindrical cavity. Fructification of two kinds, on distinct plants : 1. Capsules (ceramidia) with a terminal pore, and containing a bundle of pyriform spores ; 2. Tetraspores imbedded in swollen ramuli. Name from πολὺς, "many," and σίφων, "a tube."

Polysiphonia *atro-rubescens.*—Fronds tufted, simple, or three or four times branched; branches long, mostly simple or irregularly or somewhat alternately pinnated, with slender, erect or erecto-patent branchlets; the whole beset from near the base with short, somewhat fascicled, multifid, sub-alternate ramuli, much attenuated to the base and apex. Lower articulations twice or thrice as long as broad; upper very short, broader than long, marked when viewed laterally with numerous spiral tubes. Siphons about twelve. Capsules roundish, sessile.

Polysiphonia *atro-rubescens.*—*Grev. Fl. Edin.* p. 308 ; *Hook. Br. Fl.* vol. ii. p. 331 ; *Kütz. Phyc. Gen.* p. 424 ; *Endl.* 3rd Suppl. p. 45 ; *Harv.* in *Mack. Fl. Hib.* part 3 ; *Harv. P. B.* plate 172 ; *Harv. N. B. A.* p. 48 ; *Harv. Man.* p. 91 ; *Harv. Syn.* p. 77 ; *Atlas,* plate 29, fig. 130 ; *Harv. Ner. Aust.* p. 53.

Polysiphonia *Agardhiana.*—*Grev. Scot. Crypt. Fl.* t. 210 ; *Harv.* in *Hook. Br. Fl.* vol. ii. p. 331 ; *Wyatt, Alg. Danm.* No. 134 ; *Kütz. Phyc. Gen.* p. 420 ; *Endl.* p. 45.

Polysiphonia *badia.*—*Grev. Hook. Br. Fl.* vol. ii. p. 331.

Polysiphonia *denudata.*—*Grev. Hook. Br. Fl.* vol. ii. p. 382 ; *Endl.* 3rd Suppl. p. 45

Hutchinsia *atro-rubescens.*—*Lyngb. Hyd. Dan.* p. 110 ; *Ag. Sp. Alg.* vol. ii. p. 64.

Hutchinsia *Agardhiana.*—*Ag. Sp. Alg.* vol. ii. p. 66.

Hutchinsia *badia.*—*Ag. Syn.* p. 56 ; *Lyngb. Hyd. Dan.* p. 114 ; *Ag. Syst.* p. 155 ; *Ag. Sp. Alg.* vol. ii. p. 74.

Hutchinsia *denudata.*—*Ag. Sp. Alg.* vol. ii. p. 73.

Conferva *nigra.*—*Huds. Fl. Ang.* p. 595 ; *Dillw. Syn.* No. 162 ; *E. Bot.* t. 2340

Conferva *atro-rubescens.*—*Dillw.* t. 70.

Conferva *badia.*—*Dillw. Syn.* No. 161, t. G.

Conferva *denudata.*—*Dillw. Syn.* No. 160, t. G.

Hab.—On rocks, stones, &c., in the sea. Annual. Summer and autumn. Common.

Geogr. Dist.—Atlantic coasts of Europe and North America. Falkland Islands (*Dr. Hooker*) ; Cape of Good Hope (*Dr. Harvey*).

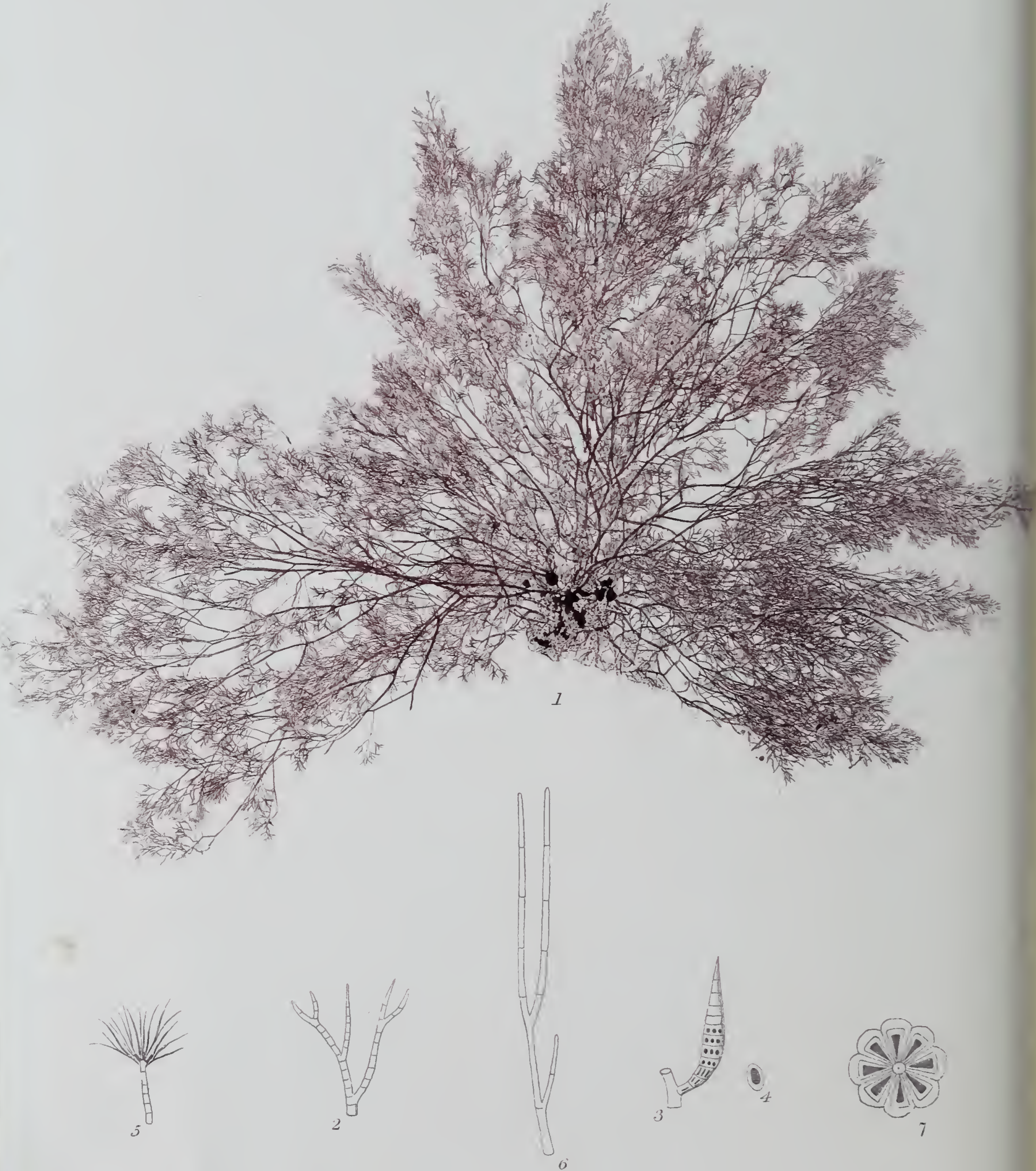
Description.—Root, a minute disc. Fronds much tufted, filiform, slender, three to twelve inches long, scarcely one-sixth of a line in thickness, simple, or three to four times divided, with long, slender, virgate branches, which are not unfrequently furnished with a second series much shorter and more slender. The whole is everywhere beset with short, simple, or multifid ramuli, which have all their divisions very much attenuated to the base and apex; erect and pencillate. Articulations, when viewed laterally, exhibiting numerous spiral tubes; lower, two or three times longer than broad; upper very short, broader than long. Structure: central tube small; siphons about twelve, wedge-shaped, much compressed laterally, occupying the whole of the stem, without secondary series of smaller cellules. Substance cartilaginous, except the older parts, more or less adhering to paper. Colour, a dark brownish red, almost black when dried. Capsules roundish, sessile, mostly near the apices of the ramuli; sometimes terminal. Tetraspores imbedded in middle of the ramuli, minute, not uncommon.

This species does not seem to be of unfrequent occurrence in its favourite habitat, delighting to grow on rocks and stones in exposed places, or where other Algæ are not abundant. Like most other rather common species, it changes its aspect somewhat according to time and place; being, when young in spring, more simple in its ramifications; and in summer, when fully grown, more compound and plumose: while in winter, when the storms of autumn have bereft it of the greater part of its ramuli, it often presents nothing but a few naked, thread-like branches, with here and there a few short scraggy branchlets—the time-worn remains of its former luxuriance. To the first state, the name *badia* has been given, while that of *denudata* has been applied to the last. Most authors who have published these as distinct species, seem to have done so with much hesitation, and we have much pleasure in following the author of the *Phyc. Brit.* in again bringing them together under the name *atro-rubescens.* "It is found at Peterhead on sand and mud covered rocks; not very plentiful, but generally of large size."—*Mr. T. Bell.* "In the Frith of Forth, on the other hand, we have usually found it medium size, but not scarce."—*W. G. J.* "We have not met with it in Forfarshire, but it is by no means scarce in the Moray Frith."—*A. C.*

EXPLANATION OF PLATE XXII.

Fig. 1.—*Polysiphonia atro-rubescens*, natural size.
2.—Branchlet with capsules.
3.—A capsule.
4.—Branchlet with tetraspores.
5.—A tetraspore.
6.—Portion of stem.
7.—Transverse section of same. All magnified.

Plate XXII.



Polysiphonia furcellata, Harv.

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PLATE XXII½.

POLYSIPHONIA FURCELLATA.—*Harv.*

GEN. CHAR.—Frond filiform, articulated (at least in the young state), marked externally with striæ, corresponding to a series of longitudinal internal tubes, interrupted at the joints, and generally disposed in a series round a central cylindrical cavity. Fructification of two kinds, on distinct plants: 1. Capsules (ceramidia) with a terminal pore, and containing a bundle of pyriform spores; 2. Tetraspores imbedded in swollen ramuli. Name from πολὺς, "many," and σίφων, "a tube."

POLYSIPHONIA *furcellata.* — Frond filiform, four to six times divided; branches dichotomous, short, somewhat curved; lower ones patent, with wide rounded axils, upper ones erect, subulate; joints of the stem three to five times longer than broad; tubes about eight.

POLYSIPHONIA *furcellata.*—*Montag. Pl. Cell. Canar.* p. 172; *Endl.* 3rd Suppl. p. 45; *Kütz. Phyc. Gen.* p. 425; *Harv.* in *Hook. Br. Fl.* vol. ii. p. 332; *Harv. P. B.* plate 7; *Harv. Man.* p. 92; *Harv. Syn.* p. 78; *Atlas*, plate 28, fig. 126.

HUTCHINSIA *furcellata.*—*Ag. Sp. Alg.* vol. ii. p. 91.

LAMOUROUXIA *turgidula.*—*Bonnem. MSS.* sec. *Ag.*

HAB.—Found floating in the sea, at Sidmouth (*Mrs. Griffiths* and *Miss Cutler*). Dredged in Torbay (*Mrs. Griffiths*); Carrickfergus (*Mr. W. M'Calla*, 1845); Jersey (*Miss Edgar*). Annual. Summer. Very rare.

GEOGR. DIST. — Atlantic shores of France; south shore of England; north-east of Ireland; Canary Islands (*Webb*).

DESCRIPTION.—Frond filiform, tufted, four to six inches long, about one-sixth of a line thick at the base, gradually attenuated upwards, much branched from near the base; branches dichotomous, slightly curved inwards, short, and somewhat flexuous; the lower ones patent or divaricated, with the axils wide and rounded, the upper ones more erect, with the axils somewhat narrower, frequently curved inwards, sometimes almost straight, except at the base, and subulate. Articulations of the stem three to five times longer than broad, becoming gradually shorter upwards, those of the ramuli very short, broader than long. Structure: central tube very small, surrounded with about eight ovate or angular "thick-walled cells," with a "narrow cord of endochrome;" no secondary series of cellules. "Substance, according to Mrs. Griffiths, at first firm, but becoming flaccid immediately." — *Harvey.* Capsules unknown. Tetraspores not unfrequent.

Of this species we know nothing, except from dried specimens, never having met with it in a living state. It was first found on the British shores by Mrs. Griffiths, who however only found it floating in the sea near Sidmouth (1827). Since then it has been found in several other localities, but nowhere in abundance.

More recently, however, its title to a place in the British flora has been less doubtfully settled, by its being dredged in various localities, as in Torbay, Roundstone, &c., and gives us another link in its history by informing us that it is an inhabitant of deep water. Future research may prove it to be much less rare than has hitherto been supposed; but at present it is still considered one of our rarest species.

In external habit, this species perhaps comes nearer to *P. nigrescens* than to any other British species, between which and *P. fastigiata* Professor Harvey considers it intermediate.

To the latter it approaches only in its ramification, differing in the structure, substance, and habitat. The latter, it should also be remembered, is always parasitical, whereas *P. furcellata* is likely to be a dweller on the rocks. From *P. nigrescens* it differs in habit as well as in structure.

EXPLANATION OF PLATE XXII½.

Fig. 1.—*Polysiphonia furcellata,* natural size.
2.—Branchlet.
3.—Ramulus with tetraspores.
4.—A tetraspore ?
5.—Fibrillous apex.
6.—One of the fibrillæ.
7.—Transverse section of stem. All magnified.

Plate XXIII

POLYSIPHONIA *fastigiata*. GREV.

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PLATE XXIII.

POLYSIPHONIA FASTIGIATA.—*Grev.*

GEN. CHAR.—Frond filiform, articulated (at least in the young state), marked externally with striæ, corresponding to a series of longitudinal internal tubes, interrupted at the joints, and generally disposed in a series round a central cylindrical cavity. Fructification of two kinds, on distinct plants : 1. Capsules (ceramidia) with a terminal pore, and containing a bundle of pyriform spores ; 2. Tetraspores imbedded in swollen ramuli. Name from πολὺς, "many," and σίφων, "a tube."

POLYSIPHONIA *fastigiata.*—Fronds filiform, rigid, cartilaginous, cylindrical, much branched ; branches regularly dichotomous, sub-erect, the axils somewhat rounded ; tufts dense, globular, fastigiate ; articulations scarcely so long as broad, many-tubed ; siphons sixteen to eighteen.

POLYSIPHONIA *fastigiata.*—*Grev. Fl. Edin.* p. 308 ; *Wyatt, Alg. Danm.* No. 177 ; *Endl.* 3rd Suppl. p. 45 ; *Kütz. Sp. Alg.* p. 809 ; *Kütz. Phyc. Gen.* p. 420, t. 50, fig. 3 ; *Harv.* in *Hook. Br. Fl.* vol. ii. p. 333 ; *Harv.* in *Mack. Fl. Hib.* part 3, p. 209 ; *Harv. P. B.* plate 299 ; *Harv. N. B. A.* p. 54 ; *Harv. Man.* p. 92; *Harv. Syn.* p. 78 ; *Atlas*, plate 28, fig. 127.

HUTCHINSIA *fastigiata.*—*Ag. Syn.* p. 53 ; *Hook. Fl. Scot.* part 2, p. 87 ; *Ag. Syst.* p. 154 ; *Lyngb. Hyd. Dan.* p. 108, t. 33 ; *Ag. Sp. Alg.* vol. ii. p. 67.

CERAMIUM *fastigiatum.*—*Roth. Fl. Germ.* vol. iii. p. 463 ; *Cat. Bot.* vol. iii. p. 157.

CONFERVA *polymorpha.*—*Linn. Syst. Nat.* vol. ii. p. 721 ; *Fl. Dan.* t. 395 ; *Dillen. Musc.* t. 6, fig. 35 ; *Ellis, Phil. Trans.* vol. lvii. p. 426, t. 18, fig. a. A. b. B. ; *Huds. Fl. Angl.* vol. ii. p. 599 ; *Lightf. Fl. Scot.* vol. ii. p. 989 ; *Dillw. Conf.* t. 44 ; *E. Bot.* t. 1764.

FUCUS *lanosus.*—*Linn. Syst. Nat.* vol. ii. p. 718 ; *Huds. Fl. Ang.* vol. ii. p. 590.

HAB.—Everywhere round our shores where *Fucus nodosus* is to be found—rarer on *Fucus serratus.* Perennial. Summer and autumn. Very common.

GEOGR. DIST.—Atlantic shores of Europe and North America ; Baltic Sea.

DESCRIPTION.—Root composed of a number of minute confluent discs. Fronds densely tufted, filiform, cylindrical, one to two inches long, scarcely thicker than horse-hair at the base, very much branched from the base ; the branches regularly dichotomous, straight ; ultimate ones frequently slightly curved outwards and subulate. Articulations somewhat broader than long, dissepiments hyaline. Structure : central cell large, containing a slender thread of dense dark-coloured endochrome, and surrounded by a series of about sixteen to eighteen small, compressed cells, entirely occupying the outer half of the diameter. Substance rigid, cartilaginous, very imperfectly adhering to paper. Colour, a fine rich brown, becoming darker in age, and when dried sometimes almost black. Capsules ovate, sessile, "formed by the metamorphosis of one of the prongs of the terminal fork." Tetraspores also common, immersed in the terminal ramuli near their base, very minute. Antheridia are extremely abundant in the early spring months, giving a very conspicuous yellow colour to the tufts on which they are produced; they are oblong, rounded at the extremities, and produced in fascicles at the apices of the ramuli.

One of the most common species of the genus as well as of the littoral Algæ, and almost always parasitical on *Fucus nodosus*, so that it is as rare to find a specimen of *F. nodosus* without its parasite as to find this *Polysiphonia* on anything else. It forms dense globular tufts two to three inches in diameter, and is sometimes so abundant as almost entirely to cover the long thong-like fronds of *Fucus nodosus*, and occasionally of *F. vesiculosus* and *serratus*.

It is difficult to account, as Professor Harvey very justly remarks, for the name *polymorpha*, as applied to this plant by Linnæus and the older botanists, as there is perhaps no Alga more constant in its characters than the present, or less likely to be mistaken.

The same observer has also pointed out its relation to *Bostrychia* both in colour and in the structure of the central tube, each cell of which is occupied by a second cell or bag of dark brown endochrome.

It is rarely found far beyond low-water mark, and is generally exposed for a considerable time to the influence of sun and air, which may probably account in part for its differing so much in colour from the other species of the genus; yet we have not been able to mark any really well defined distinction of colour in those specimens that are most exposed from those that are rarely or ever left by the tide.

EXPLANATION OF PLATE XXIII.

Fig. 1.—*Polysiphonia fastigiata*, natural size.
2.—Portion of a frond.
3.—A capsule.
4.—Branchlet with tetraspores.
5.—A tetraspore.
6.—Apices with antheridia.
7.—An antheridium. All magnified.

Plate X


5


4


2

Polysiphonia parasitica, Grev.

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PLATE XXIV.

POLYSIPHONIA PARASITICA.—*Grev.*

GEN. CHAR.—Frond filiform, articulated (at least in the young state), marked externally with striæ, corresponding to a series of longitudinal internal tubes, interrupted at the joints, and generally disposed in a series round a central cylindrical cavity. Fructification of two kinds, on distinct plants: 1. Capsules (ceramidia) with a terminal pore, and containing a bundle of pyriform spores; 2. Tetraspores imbedded in swollen ramuli. Name from πολὺς, "many," and σίφων, "a tube."

POLYSIPHONIA *parasitica.*—Fronds filiform, rigid, three to four times alternately pinnate; branches distichous, zigzag, close-set, erecto-patent, ultimate ones subulate; articulations below about as long as broad, marked by from three to five tubes; siphons about eight; capsules ovate, on short stalks.

POLYSIPHONIA *parasitica.*—*Grev. Fl. Edin.* p. 309; *Wyatt, Alg. Danm.* No. 175; *Endl.* 3rd Suppl. p. 46; *Harv.* in *Hook. Br. Fl.* vol. ii. p. 330; *Harv.* in *Mack. Fl. Hib.* part 3, p. 3; *Harv. P. B.* plate 147; *Harv. N. B. A.* p. 46; *Harv. Man.* p. 92; *Harv. Syn.* p. 79; *Atlas,* plate 28, fig. 128.

HUTCHINSIA *parasitica.*—*Ag. Syst.* p. 147; *Ag. Sp. Alg.* vol. ii. p. 103.

HUTCHINSIA *Möstingii.*—*Lyngb. Hyd. Dan.* p. 116, t. 36.

CONFERVA *parasitica.*—*Huds. Fl. Angl.* p. 604; *Dillw. Conf. Syn.* p. 87; *E. Bot.* t. 1429.

HAB.—Parasitical on the larger Algæ, and on various species of *Melobesia* in from two to twenty fathoms water. Not uncommon on the west coasts of England and Scotland. (The finest specimens hitherto have been found at Arran.)

GEOGR. DIST.—Atlantic shores of Europe; Malta (*Dr. Lyall*).

DESCRIPTION.—Fronds slightly tufted, filiform, one to three inches long, as thick as horse-hair, tripinnated; pinnæ and pinnules distichous, close-set, middle ones longest, lower, as well as many of the primary pinnæ, obsolete or very much abbreviated, often recurved; ultimate pinnules pectinate, subulate, of nearly equal length, giving the pinnæ on which they stand an ovate outline, while these are gradually shorter upwards. Articulations of the principal branches about as long as broad, becoming shorter upwards, marked with from five to seven tubes, which are elongated hexagons, the interstices hyaline. Structure: central cavity small, tubes eight, large, rhomboidal, occupying the whole stem. Substance rigid, cartilaginous, imperfectly adhering to paper. Colour, "when growing, a fine clear red," assuming in drying more or less of brown, and if dried without steeping in fresh water, imparting a brown stain to the paper."—*Phyc. Brit.* Capsules not plentiful, elliptical-ovate, shortly stalked, formed by the metamorphosis of one of the ultimate ramuli. Tetraspores rather large, occupying the middle portion of swollen ramuli, tripartite.

This is one of the prettiest of our native species, as well as one of the rarer. We are not aware of its having been found on the east coast; all the specimens we have seen are from the west. Its small size, and being an inhabitant of deep water, has no doubt allowed it often to escape observation, and more careful searching may show it to be less rare than it has hitherto been considered. It seems to delight to grow on a hard bottom, particularly where Nullipores are abundant, on which it prefers to vegetate; and as these are much less abundant on the east coast, this *Polysiphonia* may not find a place in its flora.

It is never found between tides, and should be sought for either by dredging, at the extreme limit of the lowest tides, or in deep tide-pools at low-water mark, where it may be found attached to the crustaceous base of *Corallina officinalis* or the *Melobesiæ* that affect such localities. The tetraspores are considered much more common than the capsules, which are neither common nor abundant, the only specimen with these which we have seen has only two or three: it was collected in Arran by Dr. Landsborough.

EXPLANATION OF PLATE XXIV.

Fig. 1.—*Polysiphonia parasitica*, natural size.
2.—Pinnule with tetraspores.
3.—Branchlet with capsule.
4.—Portion of the frond.
5.—Transverse section of same. All magnified.

Plate LX

POLYSIPHONIA byssoides, GREV.

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PLATE XXV.

POLYSIPHONIA BYSSOIDES.—*Grev.*

GEN. CHAR.—Frond filiform, articulated (at least in the young state), marked externally with striæ, corresponding to a series of longitudinal internal tubes, interrupted at the joints, and generally disposed in a series round a central cylindrical cavity. Fructification of two kinds, on distinct plants : 1. Capsules (ceramidia) with a terminal pore, and containing a bundle of pyriform spores ; 2. Tetraspores imbedded in swollen ramuli. Name from *πολὺς*, "many," and *σίφων*, "a tube."

POLYSIPHONIA *byssoides.*—Stem filiform, cartilaginous, bipinnate; pinnæ subalternate, long, slender, of unequal length, but of nearly equal thickness throughout, subdistichous, everywhere furnished with single-tubed, dichotomously multifid filaments.

POLYSIPHONIA *byssoides.*—*Grev. Fl. Edin.* p. 309 ; *Harv.* in *Hook. Br. Fl.* vol. ii. p. 334 ; *Harv. P. B.* plate 284 ; *Harv. Man.* p. 92 ; *Harv. Syn.* p. 80 ; *Atlas*, plate 30, fig. 134 ; *Wyatt, Alg. Danm.* No. 85 ; *Harv.* in *Mack. Fl. Hib.* part 3, p. 209 ; *Endl.* 3rd Suppl. p. 46 ; *Kütz. Phyc. Gen.* p. 430.

HUTCHINSIA *byssoides.*—*Ag. Sp. Alg.* vol. ii. p. 99.

CONFERVA *byssoides.*—*E. Bot.* t. 547 ; *Dillw. Conf.* t. 48.

CERAMIUM *molle.*—*Roth. Cat. Bot.* vol. iii. p. 138.

FUCUS *byssoides.*—*Good. & Woodw. Linn. Trans.* vol. iii. p. 229.

HAB.—On old shells, stones, and various Algæ. Not uncommon round the English and Irish coasts ; rather rare in Scotland. Orkneys (*Thomson* and *McBain*) ; Moray Frith, (not found on the Forfarshire coast) (*A. C.*) ; Frith of Forth, sparingly (*W. G. J.*) ; Peterhead (*Mr. T. Bell*).

GEOGR. DIST.—Atlantic shores of Europe ; Adriatic (*C. A. Agardh*).

DESCRIPTION.—Root, a small conical disc. Frond bushy, eight to twelve inches long, bipinnate, or, in luxuriant specimens, sometimes tripinnate, with long, slender, subdistichous, subalternate pinnæ and pinnules, of unequal length, but of nearly equal thickness throughout, and everywhere furnished, especially towards the summits, with dichotomous capillaceo-multifid filaments ; those near the base of the branches frequently presenting the appearance of a short conical stem (young branch) furnished with three or four filaments like the other branches, and similar also in structure. Substance cartilaginous, adhering closely to paper ; central tube small, secondary series small, seven in number, occupying the greater portion of the stem. Colour, a bright transparent lake or crimson, becoming darker in drying. Fructification: capsules on the pinnules, ovate, nearly sessile, generally abundant; tetraspores in swollen articulations of the pinnules, apparently less common than the capsules.

A highly beautiful species, especially in the young state, becoming, when old, more bushy and of a darker colour. Its favourite habitat seems to be on stones, old shells, &c., in deep quiet bays, where its delicate and richly-coloured plumules form a lovely object, when fully expanded in their native element. This species so far connects the genera *Polysiphonia* and *Dasya*, having the tetrasporic fruit of the former and the true frond of the latter.

EXPLANATION OF PLATE XXV.

Fig. 1.—*Polysiphonia byssoides*, natural size.
2.—Part of the frond, with capsule.
3.—Branchlet with tetraspores.
4.—A tetraspore.
5.—A byssoid ramelli.
6.—Transverse section of the stem. All magnified.

Plate XX

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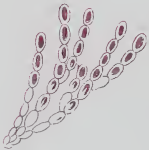

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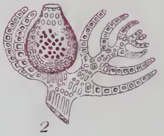

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Dasya coccinea, Ag.

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PLATE XXVI.

DASYA COCCINEA.—*Ag.*

GEN. CHAR.—Frond filiform ; "the stem and branches mostly opaque, irregularly cellular (rarely pellucid and longitudinally tubed), composed internally of numerous parallel tubes surrounding a central cavity ; the ramuli jointed and single-tubed." Fructification of two kinds, on distinct plants : 1. Ovate capsules (ceramidia) furnished with a terminal pore, and containing a tuft of moniliform filaments, the cells of which in maturity become converted into ovate spores ; 2. Oblong pods (stichidia) containing tetraspores, "arranged in transverse bands." Name from δασὺς, "hairy," from the fibrous covering of the stems.

DASYA *coccinea.*—Frond filiform, bipinnate, pinnules dichotomously multifid, single-tubed, the main stem densely clothed with rigid articulated fibres.

DASYA *coccinea.*—*Ag. Spec. Alg.* vol. ii. p. 119 ; *Wyatt, Alg. Danm.* No. 41 ; *Endl.* 3rd Suppl. p. 44 ; *Harv. P. B.* plate 253 ; *Harv. Man.* p. 93 ; *Harv. Syn.* p. 80 ; *Atlas,* plate 30, fig. 135 ; *Harv.* in *Hook. Br. Fl.* vol. ii. p. 335 ; *Harv.* in *Mack. Fl. Hib.* part 3, p. 209.

ASPEROCAULON *coccineum.*—*Grev. Fl. Ed.* p. 309.

ELLISIUS *coccineus.*—*Gray, Br. Pl.* vol. i. p. 334.

TRICHOTHAMNION *coccineum.*—*Kütz. Phyc. Gen.* p. 415.

HUTCHINSIA *coccinea.*—*Ag. Syn.* p. 26 ; *Hook. Fl. Scot.* part 2, p. 89 ; *Ag. Syst.* p. 147.

CALLITHAMNION *coccineum.*—*Lyngb. Hyd. Dan.* p. 124.

CONFERVA *coccinea.*—*Huds. Fl. Ang.* p. 603 ; *With.* vol. iv. p. 141 ; *Dillw. Conf.* t. 36 ; *E. Bot.* t. 1055.

CONFERVA *plumosa.*—*Ellis, Phil. Trans.* vol. lvii. p. 425, t. 18, fig. c. C. d. D. ; *Lightf. Fl. Scot.* p. 996.

CERAMIUM *hirsutum.*—*Roth. Cat. Bot.* vol. ii. p. 169, t. 4.

HAB.—On rocks and Algæ near low-water mark. *β.* in deep water. Annual. Summer. Common.

GEOGR. DIST.—Atlantic shores of Europe.

DESCRIPTION.—Root, a conical disc. Frond filiform, five to ten inches long, scarcely half a line in diameter, bipinnate or tripinnate ; branches distichous, the lowermost the longest, giving the frond an ovate outline, pinnules single-tubed, articulated, with joints about as long as broad, once or twice dichotomously divided. Main stem densely clothed, especially in its lower part, with short bristle-like hairs, often intermixed with short pinnate or bipinnate branchlets. Capsules not uncommon, conical-ovate, almost sessile on the pinnules, containing, when young, a bundle of articulated filaments, the articulations of which ultimately, in maturity, contain each an ovate or pear-shaped spore. Stichidia oblong, nearly sessile, mucronate, placed on the pinnules, apparently less common than the capsules. Structure: axis of the stem hollow, surrounded by a series of nine radiating cells, and these with a series of smaller compressed ones, the periphery of one or more series of smaller ones. Substance cartilaginous, only partially adhering to paper. Colour, bright crimson, becoming brighter by immersion in fresh water, scarcely changing in drying.

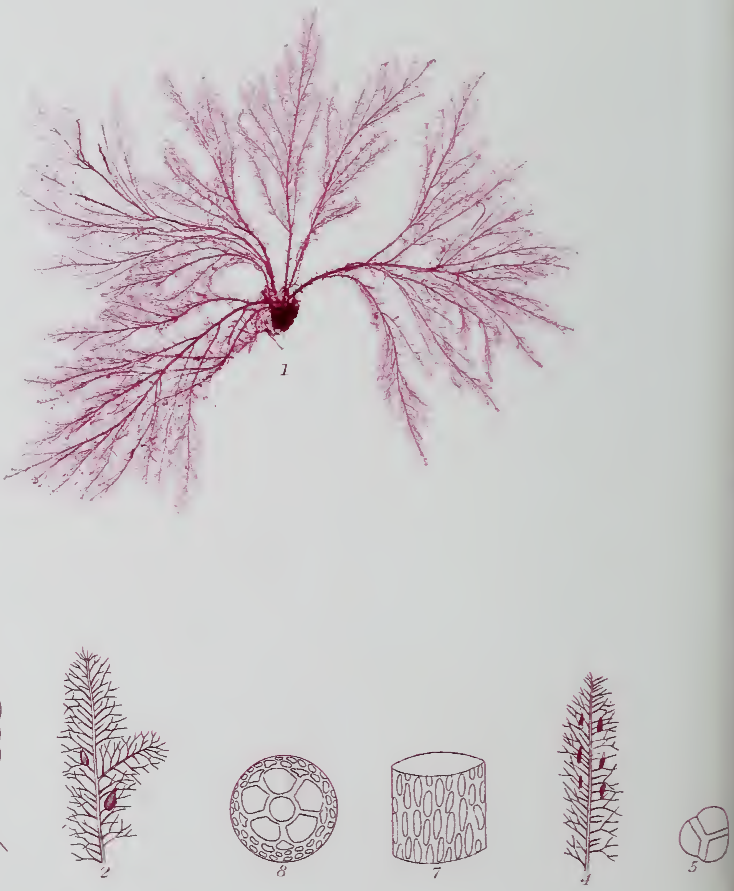
Var. β. *squarrosa* (*Harvey*). — Branches destitute of hair-like fibres, sparingly and often irregularly branched; ramuli squarrose.

CERAMIUM *patens.*—*Grev. Crypt. Scot.* t. 261.

We have gathered in one day specimens of this species which might constitute many varieties (almost species) to those fond of such work. A close examination of them however will enable us to connect each with each, and the most "starved-looking (kine) with those well favoured." Specimens from ten fathoms or more are rarely got in fruit. "Specimens having stichidia are always more slender and delicate than those that bear ceramidia."—*Harvey.*

EXPLANATION OF PLATE XXVI.

Fig. 1.—*Dasya coccinea,* natural size.
2.—Branch with capsule.
3.—Branched articulated filaments from the capsule in its early state.
4.—The same in maturity.
5.—Branch with tetraspores.
6.—Transverse section of stem.
7.—Cells of the surface. All magnified.



Dasya arbuscula, Ag.

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PLATE XXVII.

DASYA ARBUSCULA.—*Ag.*

GEN. CHAR.—Frond filiform; "the stem and branches mostly opaque, irregularly cellular (rarely pellucid and longitudinally tubed), composed internally of numerous parallel tubes surrounding a central cavity; the ramuli jointed and single-tubed." Fructification of two kinds, on distinct plants: 1. Ovate capsules (ceramidia) furnished with a terminal pore, and containing a tuft of moniliform filaments, the cells of which in maturity become converted into ovate spores; 2. Oblong pods (stichidia) containing tetraspores, "arranged in transverse bands." Name from δασὺς, "hairy," from the fibrous covering of the stems.

DASYA *arbuscula.*—Fronds much branched, in an irregular, somewhat dichotomous manner, and everywhere beset with short, divaricating, dichotomous ramuli; articulations (of the ramuli) three to four times longer than broad; stichidia elliptic oblong, mucronate; capsules roundish, with a long cylindrical neck.

DASYA *arbuscula.—Ag. Sp. Alg.* vol. ii. p. 121; *J. Ag. Symb.* p. 33; *J. Ag. Alg. Medit.* p. 118; *Endl.* 3rd Suppl. p. 44; *Mont. Ann. Sc. Nat.* vol. xv. p. 173; *Harv. P. B.* plate 224; *Harv. Man.* p. 94; *Harv. Syn.* p. 81; *Atlas,* plate 34, fig. 153.

DASYA *Hutchinsiæ.—Harv.* in *Hook. Br. Fl.* vol. ii. p. 335; *Harv.* in *Mack. Fl. Hib.* part 3, p. 210.

CERAMIUM *Boucheri.—Duby,* 2nd Mem. p. 15; *Crouan.* in *Desm. Pl. Crypt.* Nos. 302 & 303.

CONFERVA *arbuscula.—Dillw.* t. G. (but not t. 85).

HAB.—On rocks at the verge of low-water mark. Not uncommon on the west shores of Ireland and north and west of Scotland. Rare in England. Salcombe, Land's End (*Mr. Ralfs*); Mewstone, Plymouth (*Rev. W. S. Hore*).

GEOGR. DIST.—Atlantic shores of France and Spain; Mediterranean Sea.

DESCRIPTION.—Root, a small conical disc. Frond much branched from near the base, one to four inches long, about as thick as horse-hair; branches irregular, occasionally alternate and dichotomous, everywhere closely beset, except near the base of the main stem, with short, dichotomous, very patent or divaricating ramuli, of almost equal length and thickness throughout, scarcely a line in length. Stem and branches inarticulate, cells linear, oblong, irregular; articulations of the branchlets three to four times as long as broad, very slightly tapering upwards, three to four times dichotomous. Structure: central tube small, surrounded with a series of about five, rather larger, roundish hexagonal, a second series rather smaller, alternating, the rest smaller towards the circumference; ramuli confervoid, composed of a single series of cells. Substance rather rigid, rapidly becoming flaccid on exposure, and closely adhering to paper. Colour, from a bright crimson to a yellowish or reddish brown. Capsules spherical urceolate, stalked, mouth as long as the diameter of the capsule, which is subtended at the base by several bracts resembling the ramuli. Stichidia produced by the metamorphosis of one of the middle branchlets of the ramuli, elliptic or oblong, mucronate, shortly stalked, containing about three longitudinal rows of tripartite tetraspores, more common than the capsules.

This beautiful little species seems confined to the western shores of the British islands, extending its range, however, as far as Orkney, where it was first discovered by Sir W. J. Hooker and Mr. Borrer. It is everywhere scarce, however, except on the west of Ireland, where in some of the bays it has been found in considerable abundance, and often reaches its largest size.

Dr. Harvey makes two varieties of this species; one from deep water, "more slender, the branches much divaricated, and the order of branching more or less dichotomous, while ramuli are less dense, and more squarrose, and, so far as I know, always barren."—*Phyc. Brit.*

The other variety is found at or a little beyond low-water mark, which seems to be its most favourite habitat. This variety is more rigid, "robust, and bushy, the branches more regularly alternate, and the colour frequently very dark."—*Ibid.* On this variety capsules are not unfrequent, and stichidia still less so.

This species was at one time confounded with *Callithamnion arbuscula*, a much more common plant, and from which it may be at once known by the linear outline of the branches, including the ramuli, their more slender and cylindrical form, and when in fruit by the curious urceolate capsules, and different arrangement of the tetraspores.

EXPLANATION OF PLATE XXVII.

Fig. 1.—*Dasya arbuscula*, natural size.
2.—Branch with capsules.
3.—A capsule.
4.—Branch with tetraspores.
5.—A tetraspore.
6.—Stichidia.
7.—Portion of stem.
8.—Transverse section of same. All magnified.

Dasya venusta, Harv.

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PLATE XXVIII.

DASYA VENUSTA.—*Harv.*

GEN. CHAR.—Frond filiform; "the stem and branches mostly opaque, irregularly cellular (rarely pellucid and longitudinally tubed), composed internally of numerous parallel tubes surrounding a central cavity; the ramuli jointed and single-tubed." Fructification of two kinds, on distinct plants: 1. Ovate capsules (ceramidia) furnished with a terminal pore, and containing a tuft of moniliform filaments, the cells of which in maturity become converted into ovate spores; 2. Oblong pods (stichidia) containing tetraspores, "arranged in transverse bands." Name from δασὺς, "hairy," from the fibrous covering of the stems.

DASYA *venusta.*—"Frond pyramidal, decompoundly pinnate; the branches clothed with exceedingly slender, flaccid, many times dichotomous, attenuated ramuli; articulations five or six times longer than broad; stichidia pedicellate, ovoid, much acuminate; ceramidia ovate, urceolate, with a protruding mouth."—*Phyc. Brit.*

DASYA *venusta.*—*Harv. P. B.* plate 225; *Harv. Man.* p. 94; *Harv. Syn.* p. 82; *Atlas,* plate 25, fig. 107; *Harv.* in *Herb. T. C. D.*

HAB.—Cast on shore. Annual. Summer and autumn. Very rare. Jersey (*Miss White, Miss Turner, Mr. F. P. Girdlestone, Miss Edgar*).

GEOGR. DIST.—— ?

DESCRIPTION.—"Root a small disc. Stem three or four inches long, as thick as hogs' bristles, undivided but furnished throughout with numerous, alternate, lateral branches, the lowest of which are longest, the rest gradually shorter towards the apex. Branches undivided like the stem, and like it furnished with a second series of lesser branches, which likewise diminish in length towards the extremities; these again in large specimens bear a third series, each set being smaller and more slender than the preceding. The main stem is generally bare of ramuli, but all the branches and their divisions are clothed with very slender and flaccid, jointed ramuli, one or two lines in length, and very many times dichotomous; these rapidly diminish in diameter at each successive forking, and at length are reduced to cobweb thinness at the extremities. Axils acute. Articulations cylindrical, five or six times as long as broad. Ceramidia borne on short, inarticulate peduncles, surrounded by a few jointed ramuli; ovate-urceolate, gradually tapering into a conical neck, containing a dense globose mass of small spores. Stichidia borne on the ramuli, pedicellate, ovate, much acuminate, with a long acute point, containing three or four rows of roundish tetraspores. Substance very tender and flaccid, strongly adhering to paper in drying. Colour, a fine crimson lake. In fresh water it gives out a crimson powder. Sometimes the ramuli are tipped with linear lanceolate podlike bodies, full of minute granules, apparently antheridia."—*Phyc. Brit.*

As long as the Channel Islands are considered a part and parcel of the British empire, there can be no great impropriety in arranging its Flora and Fauna along with those of this country, and on these considerations the present plant may be allowed a place in our Phytology, as it has not been observed anywhere either on the English or Irish coasts. It was communicated from Jersey to Dr. Harvey, who at once considered it a new species, and subsequently conferred upon it the name which it still bears, in compliment to the young ladies, its discoverers, making its characters depend on the extreme slenderness of its ramuli, and the form of its stichidia; and if its title to specific distinction be admitted, it is as rare as it is beautiful, not having been found out of Jersey.

EXPLANATION OF PLATE XXVIII.

Fig. 1.—*Dasya venusta*, natural size.
2.—Branch with capsules.
3.—Branch with stichidia.
4.—A stichidium.
5.—Antheridia. *Phyc. Brit.* All magnified.

Dasya ocellata, Harv.

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PLATE XXIX.

DASYA OCELLATA.—*Harv.*

GEN. CHAR.—Frond filiform; "the stem and branches mostly opaque, irregularly cellular (rarely pellucid and longitudinally tubed), composed internally of numerous parallel tubes surrounding a central cavity; the ramuli jointed and single-tubed." Fructification of two kinds, on distinct plants: 1. Ovate capsules (ceramidia) furnished with a terminal pore, and containing a tuft of moniliform filaments, the cells of which in maturity become converted into ovate spores; 2. Oblong pods (stichidia) containing tetraspores, "arranged in transverse bands." Name from δασὺς, "hairy," from the fibrous covering of the stems.

DASYA *ocellata.*—Fronds almost simple, beset on all sides with long, slender, erecto-patent, two to three times dichotomous, pencilled ramuli; articulations of the ramuli three to four times longer than broad; stichidia linear lanceolate, acuminate.

DASYA *ocellata.*—*Mack.* in *Fl. Hib.* part 3, p. 210; *Wyatt, Alg. Danm.* No. 179; *Kütz. Phyc. Gen.* p. 414; *Harv.* in *Hook. Br. Fl.* vol. ii. p. 335; *Harv. P. B.* plate 40; *Harv. Man.* p. 94; *Harv. Syn.* p. 81; *Atlas*, plate 31, fig. 137.

DASYA *simpliciuscula.*—*Ag. Sp. Alg.* vol. ii. p. 122 (1827); *J. Ag.* in *Linn.* vol. xv. p. 35; *Alg. Medit.* p. 118.

CERAMIUM *ocellatum.*—*Gratel.* in *Hist. Soc. Med. Montp.* 1807, p. 34.

HUTCHINSIA *ocellata.*—*Ag. Syst.* p. 157 (1824).

HAB.—On mud-covered rocks in the sea, rare. Annual. Summer. Abundant on the pier, Torquay (*Mrs. Griffiths*); Whitsand Bay (*Dr. Walker Arnott*); Wicklow (*Dr. Harvey*); Smerwich harbour, Kerry (*Mr. W. Andrews*); Balbriggan (*Mrs. Gregg* and *Miss Gower*); Trevol (*Rev. W. S. Hore*).

GEOGR. DIST.—Atlantic coasts of France and Spain; Mediterranean Sea; south of England; east and south of Ireland.

DESCRIPTION.—Root, a minute flattened disc. Fronds tufted, one to three inches long, almost simple, rarely with one or two branches, about as thick as hogs' bristles, inarticulated, somewhat cartilaginous, the surface exhibiting oblong, irregular cells, everywhere clothed with short, slender, quadrifarious, two to three times dichotomous, articulated, patent or erecto-patent ramuli, one to two lines long; the ramuli are divided near the base, the first division taking place after the first joint, the rest after the second, so that the ultimate divisions are long, slender, and many-jointed, cylindrical, capillaceous. Articulations, two to three times as long as broad. Capsules not found in Britain. Stichidia linear-lanceolate, acuminate, on short stalks, formed by the metamorphoses of one of the ultimate ramuli, containing tetraspores generally in their upper half. Structure : central tube rather large, surrounded with a series of seven to eight, angular, somewhat roundish and larger, the rest smaller to the circumference.

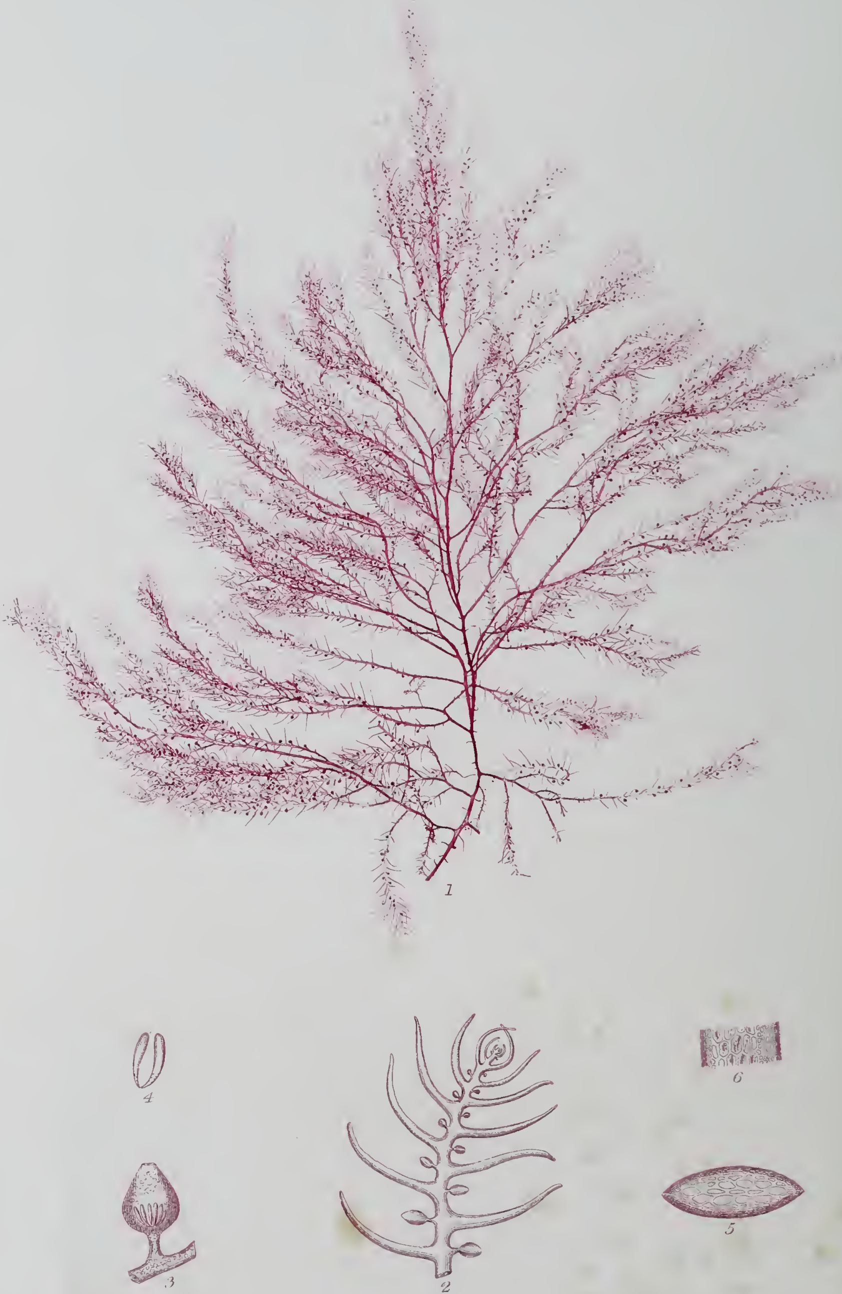
This beautiful little plant is still reckoned among our rarer Algæ, from its small size and limited geographical range. Future research, however, will no doubt detect it in many places where it has not yet been observed. It is a deep-water species, always preferring to be under water, and in places where it is almost always, partly at least, covered with mud, which seems almost as essential to its existence as water. In such situations it should be looked for at extreme low-water mark.

The name conferred upon it by Grateloup is exceedingly appropriate ; the whole plant, when laid out on paper, very much resembling a peacock's feather, the dense ramuli round the apices of the branches forming the ocellus.

Beautiful specimens have been collected at Exmouth by Miss Gulson, at Balbriggan by Miss Gower (*Phyc. Brit.*), and it is said to be abundant on the pier at Torquay. Several other stations on the Irish coast, and in the south and south-west of England, have also been pointed out, and no doubt others will still be added as examination extends. It is a pity, however, that botanists are often obliged, from want of time, to devote the little leisure they have to places already celebrated for their rarities, and where they are in consequence always sure of a harvest, instead of extending their researches to new and unexplored ground, by which they might extend our knowledge of the geographical range of species, as well as the local productions of different parts of the coast.

EXPLANATION OF PLATE XXIX.

Fig. 1.—*Dasya ocellata*, natural size.
2.—Portion of branch with ramuli.
3.—A ramulus. All magnified.



Bonnemaisonia asparagoides, AG.

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PLATE XXX.

BONNEMAISONIA ASPARAGOIDES.—*Ag.*

GEN. CHAR.—Frond filiform, compressed, much and irregularly branched; stem and branches fringed with alternate subulate ciliæ. Fructification: ovate capsules (ceramidia) containing a bundle of pear-shaped spores. Name in honour of M. Bonnemaison, a French naturalist.

BONNEMAISONIA *asparagoides.*—Frond mostly compressed, much and irregularly branched; capsules alternating with and opposite the ciliæ.

BONNEMAISONIA *asparagoides.—Ag. Sp. Alg.* vol. i. p. 197; *Syst.* p. 246; *Grev. Alg. Brit.* p. 107, t. 13; *Hook. Br. Fl.* vol. ii. p. 295; *Harv.* in *Mack. Fl. Hib.* part 3, p. 197; *Harv. Man.* p. 97; *Harv. Syn.* p. 82; *Atlas,* plate 30, fig. 133; *Harv. P. B.* plate 51; *J. Ag. Alg. Medit.* p. 116; *Endl.* 3rd Suppl. p. 43; *Kütz. Phyc. Gen.* p. 438.

PLOCAMIUM *asparagoides.—Lamour. Ess.* p. 50.

CERAMIUM *asparagoides.—Roth. Cat. Bot.* vol. iii. p. 110.

FUCUS *asparagoides.—Woodw.* in *Linn. Trans.* vol. ii. p. 29, t. 6; *E. Bot.* t. 571; *Turn. Syn.* vol. ii. p. 364; *Turn. Hist.* t. 101; *Harv. P. B.* in des. plate 51; *Harv. Man.* p. 97; *Harv. Syn.* p. 82.

β *teres* (*Harvey*).—Frond capillary, terete; ciliæ very long.

Harv. P. B. in des. plate 51; *Harv. Man.* p. 97; *Harv. Syn.* p. 82.

HAB.—On rocks near low water mark; generally distributed around the English and Irish coasts. Rare in Scotland. Ayrshire (*Mr. W. Gourlie*); Moray Frith (*A. C.* and *Miss C. Alardyce*); Peterhead (*Mr. T. Bell*); Solway Frith (*W. G. J.*).

GEOGR. DIST.—Atlantic shores of Europe; Mediterranean Sea (*J. Ag.*).

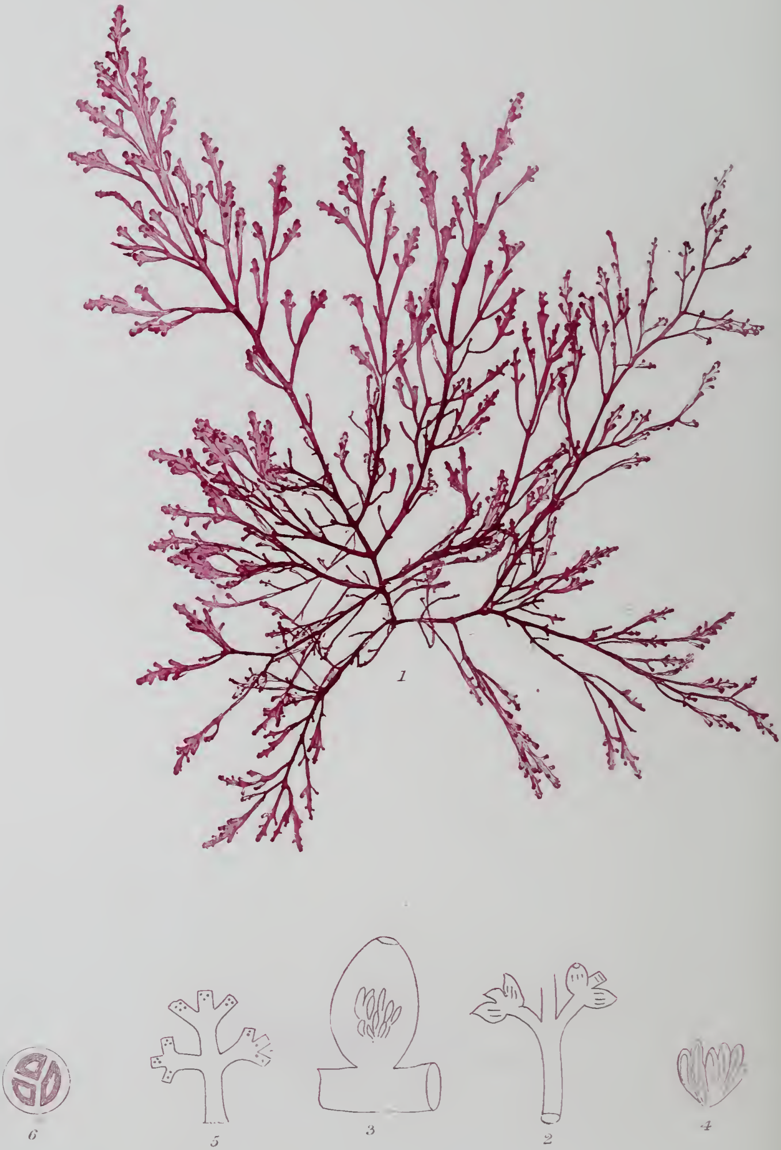
DESCRIPTION.—Root, a small conical disc, suddenly tapering into the stem, which is short, subcylindrical, from four to twelve inches in height, gradually becoming more flattened upwards, very much branched; the primary branches long, slender, and filiform, generally twice, but even three or four times subdivided, in a somewhat alternate but frequently irregular manner; the third or fourth branch generally the longest becoming shorter upwards, and subpatent; the whole plant everywhere beset with marginal, distichous, alternate, setaceous ciliæ; the upper ones rather shorter, but considerably over-topping the stem. The main stem is generally from a quarter to three-quarters of a line in breadth; and in old plants frequently wants the ciliæ, especially towards the base.

The ciliæ are subulate, or, as in most of our specimens, rather setaceous; in Scotch specimens a line in length; but on Irish ones about double that length or more. Substance cellular; cells large in the centre, smaller in the circumference, where it is somewhat cartilaginous, but adheres closely to paper. Colour, a bright crimson. Fructification: ovate capsules on short, slender stalks, alternating with the ciliæ, containing a bundle of elongated, pear-shaped spores.

Well distinguished from every other species of British sea-weed by its beautifully pectinated fronds; and whether spread on paper, or floating in its native element, a more interesting object it would be difficult to find. Its bright transparent colour, and light feathery fronds, render it a great favourite with collectors.

EXPLANATION OF PLATE XXX.

Fig. 1.—*Bonnemaisonia asparagoides*, natural size.
2.—Branch with capsules.
3.—A capsule.
4.—Spores from same.
5.—Cross section of stem.
6.—Longitudinal section of same. All magnified.



Laurencia obtusa Lamour.

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PLATE XXXI.

LAURENCIA OBTUSA.—*Lamour.*

GEN. CHAR.—Frond cylindrical or compressed, linear, pinnate, solid; apices very obtuse; structure densely cellular. Fructification of two kinds, on distinct plants: 1. Ovate capsules or ceramidia furnished with a terminal pore, and containing a bundle of obovate or pyriform spores; 2. Triparted tetraspores imbedded in the ramuli. Name in honour of M. de la Laurencie, a French naturalist.

LAURENCIA *obtusa.*—Frond cylindrical, filiform, branched; branches irregular, opposite, alternate or sometimes ternate, bipinnate or tripinnate; pinnæ and pinnules mostly opposite, sometimes alternate or ternate, patent or erecto-patent; ultimate ones very short and obtuse, or slightly incrassated at the summits.

LAURENCIA *obtusa.—Lamour. Ess.* p. 42; *Duby, Bot. Gal.* p. 951; *Grev. Alg. Brit.* p. 111; *J. Ag. Alg. Medit.* p. 114; *Endl.* 3rd. Suppl. p. 43; *Mont. Algier.* p. 92; *Hook. Br. Fl.* vol. ii. p. 296; *Wyatt, Alg. Danm.* No. 21; *Harv.* in *Mack. Fl. Hib.* part 3, p. 198; *Harv. P. B.* plate 148; *N. B. A.* p. 72; *Harv. Man.* p. 98; *Harv. Syn.* p. 83; *Atlas,* plate 29, fig. 132.

LAURENCIA *intricata.—Lamx. Ess.* p. 43, t. 3, figs. 8, 9.

LAURENCIA *gelatinosa.—Lamx.* sec. *Ag.*

LAURENCIA *lutea.—Lamx.* sec. *Ag.*

LAURENCIA *cyanosperma.—Lamx. Ess.* p. 43.

CHONDRIA *obtusa.—Ag. Sp. Alg.* vol. i. p. 340; *Syst.* p. 202; *Hook. Fl. Scot.* part 2, p. 105; *Grev. Fl. Edin.* p. 290; *Spr. Syst. Veg.* vol. iv. p. 341; *Kütz. Phyc. Gen.* p. 437.

FUCUS *obtusus.—Huds. Fl. Ang.* p. 586; *Turn. Syn.* p. 43; *Turn. Hist.* t. 21; *E. Bot.* t. 1201.

HAB.—Parasitical on the smaller Algæ between tide-marks. Annual. Summer. Common on the shores of England and Ireland. Rare in Scotland. Frith of Forth (*Dr. Greville*); Ardrossan and Arran (*Rev. Dr. Landsborough*); Solway Frith (*W. G. J.*).

GEOGR. DIST.—Throughout the Atlantic and Pacific Oceans; Mediterranean Sea; Mauritius.

DESCRIPTION.—Root a small flattened disc, frequently emitting from its surface pale clasping fibres. Fronds much tufted, three to six inches in length, filiform, very slender, about half a line in diameter, of almost equal diameter throughout, much and somewhat irregularly branched; branches mostly alternate, sometimes opposite or ternate, bipinnate or tripinnate; pinnæ and pinnules mostly opposite, frequently alternate, mostly distichous, or occasionally three together, the middle ones generally much the longest, giving the pinna or pinnule a lanceolate outline; all the divisions patent or erecto-patent, the ultimate ones short, very obtuse, or incrassated at the summits. Capsules near the tips of the ramuli, not common; "more frequently converted into cup-shaped bodies." Tetraspores apparently more frequent, imbedded in the tips of the ramuli. Colour, a pale yellowish or greenish pink. Substance cartilaginous, very delicate, and soon decaying, when it becomes of a yellowish green or nearly transparent white; adheres closely to paper.

The natural colour of this species seems to be a red or reddish brown, but like most plants that live between tides, and are consequently exposed to extreme changes of air, light, and submersion, it is subject to considerable variation, at one time being of a full red, at another of a pale greenish yellow. It seems much more common in the south than in the north of Britain, and on the west than the east coast, where we have not met with it; indeed we are not aware of its having been met with there, except by Dr. Greville, who found it in the Frith of Forth, but whether growing or not seems doubtful.

Collectors of marine Algæ ought always to indicate, either by a mark or in words, when a plant is not found growing in any particular locality, as such a fact is often of more importance even than the localisation of the plant itself; as plants found among rejectamenta may or may not be indigenous in the neighbourhood.

Tetraspores seem to be much more commonly produced than the capsules, which we have had much difficulty in obtaining for our figures.

Dr. Harvey observes (*Phyc. Brit.*), that its range of distribution is almost as extensive as that of *L. pinnatifida;* and that in consequence it presents considerable variation in its ramification, particularly in the short or very much elongated outline of the frond.

EXPLANATION OF PLATE XXXI.

Fig. 1.—*Laurencia obtusa,* natural size.
2.—Branch with capsules.
3.—A capsule.
4.—Tuft of spores from same.
5.—Branch with tetraspores.
6.—A tetraspore. All magnified.

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LAURENCIA pinnatifida, LAMOUR.

PLATE XXXII.

LAURENCIA PINNATIFIDA.—*Lamour.*

GEN. CHAR.—Frond cylindrical or compressed, linear, pinnate, solid; apices very obtuse; structure densely cellular. Fructification of two kinds, on distinct plants: 1. Ovate capsules or ceramidia furnished with a terminal pore, and containing a bundle of obovate or pyriform spores; 2. Triparted tetraspores imbedded in the ramuli. Name in honour of M. de la Laurencie, a French naturalist.

LAURENCIA *pinnatifida.*—Frond linear, subcompressed, tripinnatifid; divisions subalternate, erecto-patent, distichous.

LAURENCIA *pinnatifida.—Lamour, Ess.* p. 42; *Grev. Alg. Brit.* p. 108, t. 14; *Hook. Br. Fl.* vol. ii. p. 296; *Wyatt, Alg. Danm.* No. 113; *Mont. Pl. Canar.* p. 154; *Hook. fil. et Harv. Alg. Nov. Zeal.* No. 65; *Hook. fil. Fl. Ant.* part 1, p. 184; *J. Ag. Alg. Medit.* p. 114; *Mont. Voy. Pole Sud, Bot.* p. 126; *Endl.* 3rd Suppl. p. 43; *Harv.* in *Mack. Fl. Hib.* part 3, p. 198; *Harv. P. B.* plate 55; *Harv. N. B. A.* p. 70; *Harv. Man.* p. 98; *Harv. Syn.* p. 83; *Atlas,* plate 29, fig. 131.

CHONDRIA *pinnatifida.—Ag. Sp. Alg.* vol. i. p. 337; *Syst.* p. 201; *Hook. Fl. Scot.* part 2, p. 105; *Grev. Fl. Edin.* p. 291; *Kütz. Phyc. Gen.* p. 437.

GELIDIUM *pinnatifidum.—Lyngb. Dan.* p. 40, t. 9.

FUCUS *pinnatifidus.—Gm. Linn. Syst. Nat.* p. 1385; *Huds. Fl. Ang.* p. 581; *Lightf. Fl. Scot.* p. 953; *Stack. Ner. Brit.* p. 48, t. 11; *Turn. Syn.* vol. ii. p. 267; *Hist.* t. 20; *E. Bot.* t. 1202.

FUCUS *multifidus.—Huds. Fl. Ang.* p. 581.

HAB.—On submarine rocks, from high to beyond low-water mark. Everywhere abundant on the British coasts.

GEOGR. DIST.—On the shores of the Atlantic, Pacific, Indian and Southern Oceans, abundantly; Mediterranean and Red Seas.

DESCRIPTION.—Root, a flattened disc, frequently emitting from its surface branching fibres. Stem short, about a quarter of an inch, subcylindrical at the base, becoming suddenly compressed upwards. Frond linear, compressed, very much and distichously branched in a tripinnatifid manner; divisions subalternate, erecto-patent, obtuse or somewhat incrassated at the summit. Substance rigid, cartilaginous, adhering to paper. Colour, dark purple or greenish olive, becoming green in age or in decomposition. Fructification: 1. Capsules ovate, on short stalks, containing a bundle of hyaline, articulated filaments, which ultimately become converted into subovate or pear-shaped spores; 2. Tetraspores imbedded in the apices of the ramuli. Besides the above, we frequently find ovate or cup-shaped bodies or capsules, containing a mass of branched, hyaline, articulated filaments (antheridia?) the nature and functions of which are but imperfectly understood. These capsules differ from the true spore cases in being quite sessile or rather partially immersed in the margins of the frond, while the others are furnished with short stalks. Professor Harvey figures and describes other two singular forms of these antheridia (?) cases, which are also common on the more dwarfish forms of the plant. There seems indeed to be much need for further observation on the growth and reproduction of this common Alga.

The following pretty well-marked varieties of this most variable plant are named and characterised in the *Phycologia Britannica:*

Var. β. *Osmunda.*—Frond flat, generally undivided; ramuli short and multifid.

LAURENCIA *pinnatifida, β Osmunda.—Harv. P. B.* des. plate 55; *Harv. Man.* p. 98.

FUCUS *pinnatifidus, β Osmunda.—Turn. Syst.* l. c. *Hist.* t. 20.

FUCUS *Osmunda.—Gm. Linn. Syst.* p. 1385; *Gm. Hist. Fuc.* p. 155, t. 16, fig. 2; *Stack. Ner. Brit.* p. 46, t. 11.

FUCUS *filicinus.—Lightf. Fl. Scot.* p. 954 (excl. *Syn. Huds.*).

Var. γ. *angusta.*—Frond roundish; ramuli cylindrical, elongated, and very erect, slightly thickened upwards. This is subsequently *L. cæspitosa* of the *Phycologia.*

LAURENCIA *pinnatifida, γ angusta.—Harv. P. B.* des. plate 55; *Harv. Man.* p. 98.

FUCUS *pinnatifidus, γ angustus.—Turn.* l. c.

Var. δ. *tenuissima.*—Frond flat, of small size; ramuli very slender, and much branched, the branches divaricated.

LAURENCIA *pinnatifida, δ tenuissima.—Harv. P. B.* des. plate 55; *Harv. Man.* p. 98.

FUCUS *pinnatifidus, δ tenuissimus.—Turn.* l. c.

Var. ε. *littoralis.*—Dwarf, greenish olive; frond flat, broad, tapering to the base; ramuli short, emarginate, bearing cup-like bodies, filled with antheridia ?

LAURENCIA *pinnatifida, ε littoralis.—Harv. P. B.* plate 55.

A very common species, and widely distributed, and consequently exhibiting a vast variety of forms. At the utmost verge of high-water the more stunted forms appear, and these are generally of a paler colour; whilst at and beyond low-water and in deep, quiet tide-pools, the finer and larger forms of the species are to be met with. The varieties with narrow and more cylindrical stems are generally found on flat rocks and by the streamlets that issue from the tide-pools during the recess of the tide.

EXPLANATION OF PLATE XXXII.—Fig. 1.—*Laurencia pinnatifida,* natural size. 2.—Branch with capsules containing antheridia. 3, 4.—Antheridia removed from capsule. 5.—Capsule containing spores. 6.—Branch containing tetraspores. All magnified.

LAURENCIA cæspitosa, LAMOUR.

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PLATE XXXIII.

LAURENCIA CÆSPITOSA.—*Lamour.*

GEN. CHAR.—Frond cylindrical or compressed, linear, pinnate, solid; apices very obtuse; structure densely cellular. Fructification of two kinds, on distinct plants: 1. Ovate capsules or ceramidia furnished with a terminal pore, and containing a bundle of obovate or pyriform spores; 2. Triparted tetraspores imbedded in the ramuli. Name in honour of M. de la Laurencie, a French naturalist.

LAURENCIA *cæspitosa.*—"Frond cylindrical or subcompressed, narrow, repeatedly pinnate, pyramidal; main branches often opposite, erecto-patent; ramuli irregularly scattered, distichous, or spreading on all sides, often crowded, erect, slightly tapering to the base, truncate."—*Phyc. Brit.*

LAURENCIA *cæspitosa.*—*Lamour. Ess.* p. 43; *Mont. Pl. Crypt. Canar.* p. 154; *Harv. P. B.* plate 286; *Harv. Man.* p. 98; *Harv. Syn.* p. 83; *Atlas*, plate 31, fig. 140.

LAURENCIA *hybrida.*—*Lenorm.* in *Dub. Bot. Gall.* p. 951; *Harv. Phyc. Br.* vol. i. p. 13.

LAURENCIA *pinnatifida, γ angusta.*—*Grev. Alg. Brit.* p. 109; *Hook. Br. Fl.* vol. ii. p. 296; *Harv. Man.* 1st ed. p. 69; *Harv. Phyc. Brit.* plate 55; *Wyatt, Alg. Danm.* No. 162.

FUCUS *hybridus.*—*D. C. Fl. Fr.* vol. ii. p. 30.

HAB.—On stones and old shells between tides, chiefly near high-water mark. Common.

GEOGR. DIST.—Atlantic shores of Europe; Canary Islands; Southern Ocean.

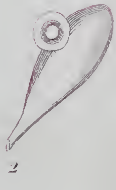
DESCRIPTION.—Root accompanied by creeping fibres. Frond cylindrical or subcompressed, much tufted, two to six inches in length, about half a line in diameter, slightly thickening upwards, repeatedly divided, with mostly alternate pinnæ, which are generally naked at the base, alternately pinnated or bipinnated upwards; all the divisions suberect, very obtuse or incrassated at the summit, sometimes bifid or trifid, with the nascent branchlets. Occasionally the divisions are opposite, rarely fascicled. Structure solid, cellular; cells roundish, oblong. Substance rigid, cartilaginous, becoming flaccid in fresh water, and only then adhering to paper. Colour yellowish, greenish or purplish brown, according to exposure. Ceramidia unknown. Tetraspores tripartite, abundant in the apices of the upper ramuli.

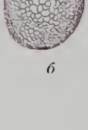
We extract the characters of this species as given in the *Phycol. Brit.* not being quite satisfied of its being a good species. If we understand it right, it seems by no means rare, preferring to live in shallow water, and to attach itself to stones and old shells in bays and estuaries rather than to rocks in the sea, and thus forming solitary tufts rather than extensive patches, like those of *L. pinnatifida.* Both are not unfrequently found growing together, and both exhibiting their distinctive characters.

From *L. pinnatifida* it may be readily known by its cylindrical stems, rarely slightly compressed, and from *L. obtusa* by its alternate, more erect ramuli; still it must be admitted that stunted specimens of *L. pinnatifida* come very near it, whilst occasional specimens of *L. cæspitosa* are sometimes though rarely slightly compressed. It seems indeed to hold an intermediate place between *L. pinnatifida* and *L. obtusa*, of the former of which it used to be, and may still prove to be, only a variety. No capsules have as yet been found on it, which seems to argue favourably in support of the idea of its perfect development.

EXPLANATION OF PLATE XXXIII.

Fig. 1.—*Laurencia cæspitosa,* natural size.
2.—Branchlet.
3.—Apex of same with tetraspores.
4.—A tetraspore. All magnified.



LOMENTARIA ovalis, END.

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PLATE XXXIV.

LOMENTARIA OVALIS.—*Endl.*

GEN. CHAR.—Fronds filiform, tubular (at least in the branches), constricted and jointed, filled with a watery fluid and longitudinally traversed by a few delicate filaments. Fructification of two kinds, on distinct plants: 1. Spherical capsules, without a pore; spores sessile or nearly so, obovate, or obconical: 2. Tetraspores scattered under the surface of the ultimate ramuli. Name from *lomentum*, "bean-meal," possibly from the constricted branchlets, resembling a bag of meal tied.

LOMENTARIA *ovalis.*—Stem cylindrical, solid; branches mostly dichotomous, naked below, towards the extremities beset with elliptical, tubular ramuli, frequently jointed; capsules spherical, with a wide, transparent border.

LOMENTARIA *ovalis.—Endl.* 3rd Suppl. p. 43; *Harv. N. B. A.* p. 78.

CHYLOCLADIA *ovalis.—Hook. Br. Fl.* vol. ii. p. 297; *Wyatt, Alg. Danm.* No. 114; *Harv. P. B.* plate 118; *Harv. Man.* p. 101; *Harv. Syn.* p. 86; *Atlas*, plate 32, fig. 145.

GASTRIDIUM *ovale.—Grev. Alg. Brit.* p. 116, t. 14.

GASTROCLONIUM *ovale.—Kütz. Phyc. Gen.* p. 441.

CHONDRIA *ovalis.—Ag. Sp. Alg.* vol. i. p. 348; *Ag. Syst.* p. 204; *Spreng. Syst. Veg.* p. 342.

GIGARTINA *vermicularis.—Lamour. Ess.* p. 48, t. 4, figs. 8, 9, 10.

FUCUS *ovalis.—Huds. Fl. Ang.* p. 573; *Sm. E. Bot.* t. 711; *Turn. Syn.* t. 30; *Turn. Hist. Fuc.* t. 81.

FUCUS *vermicularis.—Gm. Hist.* p. 162, t. 18, fig. 4; *Lightf. Fl. Scot.* p. 958.

FUCUS *sedoides.—Good. & Woodw.* in *Linn. Trans.* vol. iii. p. 117; *Stack. Ner. Brit.* p. 67, t. 12.

HAB.—On Algæ, stones, old shells, and rocks within tide-marks. Annual. May till August and September. Common on the English and Irish coasts. Little Isles of Jura (*Lightfoot*); Papa Westra (*Lieut. T.* and *Dr. McBain*); Jersey (*Miss Turner, Miss Edgar, Mr. F. P. Girdlestone*).

GEOGR. DIST.—Atlantic shores of Europe; Adriatic Sea; north-west coast of America.

DESCRIPTION.—Root composed of strong branching fibres. Fronds tufted, two to ten inches long, half a line in thickness. Stem cylindrical, four to five times branched, mostly dichotomously; ultimate branchlets tapering, obtuse, densely clothed with patent, elliptical, inflated ramuli, generally simple, but occasionally with one, two, or three joints, indicated externally by a slight constriction, and frequently emitting a second set of ramuli. The lower part is generally naked, but the ramuli become scattered towards the middle, and are thickly set, often densely imbricated towards the summits of the branches. Capsules sessile, on the sides of the ramuli, spherical, with a wide pellucid border. Tetraspores tripartite, imbedded in the cells of the ramuli. Substance cartilaginous, when young soft and flaccid, closely adhering to paper. Colour, a deep purplish red, becoming pale greenish or yellowish white in age.

This species is at once readily distinguished from its congeners, by its solid stems and branches, the only hollow parts being the ultimate ramuli.

This and the two following species, in accordance with the reformed genus *Chylocladia*, as now understood by Professor J. Agardh, constitute with others (of similar fructification) the modern genus *Lomentaria*, while *Ch. articulata*, *clavellosa* and others constitute the reformed genus *Chylocladia.* It thus follows that whereas the genus *Chylocladia* contained (as in *Phyc. Brit.*) *ovalis*, *kaliformis*, *reflexa*, *parvula*, and *articulata*, it can only now boast of one of its original members—*articulata;* the three first species, as already stated, having been removed to the present genus (*Lomentaria*)—*parvula* taking shelter under the genus *Champia*, and *articulata*, taking along with it *Chrysymenia clavellosa* and *rosea*, go to build up the reformed genus *Chylocladia.* And no doubt, taking the fruit and not the frond into our consideration, the new arrangement is preferable to the old.

Dr. Harvey informs us that its season of perfection is April and May, and that by the end of August the plant has almost entirely disappeared. We have a specimen from Arran, collected in the beginning of August, in which a kind of second growth seems to have taken place.

EXPLANATION OF PLATE XXXIV.

Fig. 1.—*Lomentaria ovalis*, natural size.
2.—Branchlet with capsule.
3.—Branch with tetraspores.
4.—Section of same.
5.—Tetraspores.
6.—Transverse section of stem. All magnified.

LOMENTARIA kaliformis, Gaill.

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PLATE XXXV.

LOMENTARIA KALIFORMIS.—*Gaill.*

GEN. CHAR.—Fronds filiform, tubular (at least in the branches), constricted and jointed, filled with a watery fluid, and longitudinally traversed by a few delicate filaments. Fructification of two kinds, on distinct plants: 1. Spherical capsules without a pore; spores sessile or nearly so, obovate or obconical: 2. Tetraspores scattered under the surface of the ultimate ramuli. Name from *lomentum*, "bean-meal," possibly from the constricted branchlets, resembling a bag of meal tied.

LOMENTARIA *kaliformis.*—Frond subgelatinous, tubular throughout; main stem percurrent, constricted at distant intervals; branches three to four times whorled; ramuli longest in the middle; capsules spherical, with a pellucid border.

LOMENTARIA *kaliformis.—Gaill. Res.* p. 20; *Endl.* 3rd Suppl. p. 43; *Kütz. Phyc. Gen.* p. 440, t. 55, fig. 3; *Zanard, Alg. Adr.* p. 97; *Mont. Fl. Alg.* p. 88.

CHYLOCLADIA *kaliformis.—Hook. Br. Fl.* vol. ii. p. 397; *Wyatt, Alg. Danm.* No. 24; *J. Ag. Alg. Medit.* p. 111; *Harv.* in *Mack. Fl. Hib.* part 3, p. 199; *Harv. P. B.* plate 145; *Harv. Man.* p. 101; *Harv. Syn.* p. 87; *Atlas*, plate 32, fig. 146, and plate 34, fig. 151.

GASTRIDIUM *kaliforme.—Lyngb. Hyd. Dan.* p. 70; *Grev. Alg. Brit.* p. 117.

CHONDRIA *kaliformis.—Ag. Sp. Alg.* vol i. p. 355; *Ag. Syst.* p. 207; *Spreng. Syst. Veg.* vol. iv. p. 342; *Hook. Fl. Scot.* part 2, p. 106.

GIGARTINA *kaliformis.—Lamour. Ess.* p. 49.

FUCUS *kaliformis.—Good. & Woodw.* in *Linn. Trans.* vol. iii. p. 206, t. 18; *Sm. E. Bot.* t. 640; *Turn. Syn.* p. 377; *Turn. Hist.* t. 29.

FUCUS *verticillatus.—Lightf. Fl. Scot.* p. 962, t. 31.

HAB.—Old shells, stones, seldom on Algæ, between tide-marks, and in from two to sixteen fathoms water. Annual. Spring and summer. Common. Varieties in deep land-locked, sandy or muddy bays. Var. β. Strangford Lough (*Mr. W. Thompson*); Carrickfergus (*Mr. M'Calla*). Var. γ. Roundstone Bay (*Mr. M'Calla*); Torbay (*Mrs. Griffiths*).

GEOGR. DIST.—North, Atlantic, Baltic, and Mediterranean Seas.

DESCRIPTION.—Root, a small flattened disc. Frond subfiliform, much attenuated to each extremity, four to twelve or "twenty" inches in length, one to two lines in diameter in the middle, constrictions about one inch apart, three to four times branched at the constrictions; branches all three-whorled, longest in the middle or a little below the middle, giving the frond an elliptic or ovate form; constrictions shorter upwards, very short, about as long as broad in the ultimate ramuli, which are erecto-patent, of the same form and structure as the stem, about four in a whorl. Structure: tubular throughout, divided by internal diaphragms at the constrictions; the inner cells rather large, the outer ones very minute. Substance subgelatinous, closely adhering to paper in drying. Capsules spherical, sessile, on the ultimate or penultimate ramuli, destitute of an opening or external pore. Tetraspores imbedded in the ramuli, triparted, roundish, with a broad transparent limbus.

Dr. Harvey characterises and figures in the *Phyc. Brit.* two well-marked varieties of this species. They are thus described:—

"β *patens.*—Frond flexuous, much attenuated; branches opposite, horizontal, flexuous, drawn out into long, slender points; ramuli setaceous, opposite or alternate."

LOMENTARIA *patens.—Kütz. Phyc. Gen.* p. 440.

"γ *squarrosa.*—Frond crisped and entangled, variously curved; branches densely whorled; ramuli very numerous, whorled, squarrose or arching, slender."

LOMENTARIA *squarrosa.—Kütz. Phyc. Gen.* p. 440, t. 55, fig. 4.

These forms are separated as species by some of the Continental botanists. We very much doubt the propriety of so doing, and think a more careful study of the different forms in their native habitats will ultimately justify Dr. Harvey's union of the three into one species.

The species seems to delight in rather sheltered, or land-locked bays, with a shelving shore, and a hard bottom, where it grows attached to stones, old shells, &c., but rarely parasitical on other Algæ.

EXPLANATION OF PLATE XXXV.

Fig. 1.—*Lomentaria kaliformis,* natural size.
2.—Branchlet with tetraspore.
3.—A tetraspore.
4.—Branchlet with capsules.
5.—Tuft of spores from capsule. All magnified.

LOMENTARIA REFLEXA.—*Chauv.*

GEN. CHAR.—Fronds filiform, tubular, at least in the branches, constricted and jointed, filled with a watery fluid, and longitudinally traversed by a few delicate filaments. Fructification of two kinds, on distinct plants : 1. Spherical capsules without a pore ; spores sessile, or nearly so, obovate or obconical ; 2. Tetraspores scattered under the surface of the ultimate ramuli. Name from *lomentum*, "bean-meal," possibly from the constricted branchlets, resembling a bag of meal tied.

LOMENTARIA *reflexa.*—Frond composed of a kind of creeping rhizome, with distant constrictions, arching and attaching itself by short radicles, and throwing up at intervals spindle-shaped, mostly simple branches; constrictions rather longer than broad; capsules spherical.

LOMENTARIA *reflexa.—Chauv. Alg. de Norm.*

CHYLOCLADIA *reflexa—Lenorm. Desm. Pl. Crypt.* No. 865 ; *Harv. P. B.* plate 42 *Harv. Man.* p. 101 ; *Harv. Syn.* p. 87 ; *Atlas*, plate 31, fig. 138.

LOMENTARIA *pygmæa.—Duby, Bot. Gal.* (excl. Syn.)

HAB.—On rocks in the sea near low-water mark. Annual. Summer. Very rare. Hagington, near Ilfracombe (*Miss Amelia Griffiths*, July, 1834) ; Roundstone Bay (*Mr. M'Calla.*)—*Harv. P. B.*

GEOGR. DIST.—North coast of Devon ; coast of Normandy.

DESCRIPTION.—Root, small flattened discs. Frond at first cylindrical, arched, and creeping, attaching itself by small, simple radicles furnished with discs, here and there imperfectly constricted, and throwing up, at irregular intervals, spindle-shaped branches or fronds, one to two or even three inches high, which are regularly constricted at short intervals; the constrictions short, about as long or rather longer than broad, shorter upwards, and sometimes producing toward the summit of the frond one or two short, simple branchlets; all have a greater or less tendency to become arched or secund. Substance very flaccid, adhering closely to paper. Colour, a rather dark, dull purple. Capsules spherical, with a pellucid limbus, "containing a very dense mass of angular seeds." Tetraspores plentiful towards the tips of the branches and ramuli.

With a good deal of the habit of *L. parvula*, this species combines the capsules of *L. kaliformis;* and these capsules again, with the true capsular disposition of the spores, unite the external form of the coccidium of *Plocamium*, *Rhodymenia*, &c.

From *C. parvula*, its former companion, the present species may be known by its creeping fronds, scarcely branched, and when in fruit, by the different form of the capsule; from *L. kaliformis* by its smaller size, simple, creeping, arching fronds.

It is one of our rarer species, being confined to the south-west of England, and south of Ireland, and is not abundant even where it occurs; on the other side of the English Channel it seems rather more frequent.

LOMENTARIA REFLEXA.

EXPLANATION OF DISSECTIONS, &c.

Fig. 1. Portion of plant, natural size.
2. Apex of a branch with tetraspores.
3. Tetraspores. All magnified.

Plate [illegible]

Champia parvula. Harv.

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PLATE XXXVI.

CHAMPIA PARVULA.—*Harv.*

GEN. CHAR.—Frond tubular throughout, jointed and constricted at the joints, filled with a watery fluid, and longitudinally traversed by a few slender filaments. Fructification of two kinds, on distinct plants: 1. Ovate capsules with a terminal pore, containing a tuft of obconical spores, attached by branching spore-threads; 2. Triparted tetraspores scattered under the surface of the joints of the upper ramuli. Name in honour of M. Le Champ, a French naturalist.

CHAMPIA *parvula.* — Frond subgelatinous, irregularly branched; branches constricted at intervals of nearly equal length and breadth; capsules conical.

CHAMPIA *parvula.*—*Harv. N. B. A.* page 76 (1853).

CHYLOCLADIA *parvula.*—*Hook. Br. Fl.* vol. ii. p. 298; *Wyatt, Alg. Danm.* No. 72; *J. Ag. Alg. Medit.* p. 111; *Harv.* in *Mack. Fl. Hib.* part 3, p. 199; *Harv. P. B.* plate 210; *Harv. Man.* p. 102; *Harv. Syn.* p. 88; *Atlas*, plate 34, fig. 153.

GASTRIDIUM *parvulum.*—*Grev. Alg. Brit.* p. 119.

LOMENTARIA *parvula.*— *Zanard, Syn. Alg. Adr.* p. 99; *Mont. Pol. Sud Crypt.* p. 123; *Endl.* 3rd Suppl. p. 43; *Kütz. Phyc. Gen.* p. 331.

CHONDRIA *parvula.*—*Ag. Syst. Alg.* p. 207.

FUCUS *kaliformis*, var. γ *nanus.*—*Turn. Hist.* vol. i. p. 61.

HAB.—Parasitical on the smaller Algæ, in tide-pools near low-water mark. Not uncommon on the south and west coasts.

GEOGR. DIST.—Atlantic shores of Southern Europe and North America; Mediterranean Sea.

DESCRIPTION.—Root composed of branching fibres. Fronds densely tufted, cylindrical, once or twice divided; branches irregular. Stem and branches cylindrical, but slightly tapering at the extremities, obtuse, somewhat patent, curved upward; ultimate branchlets short, elliptical, everywhere constricted; the articulations of the main stem about twice, those of the branches from once to once and a-half as long as broad, more inflated and apparent upwards. Capsules sessile on the branchlets, ovate, conical upwards, filled with deep red obconical spores. Tetraspores minute, triparted, imbedded in the ultimate and penultimate branches. Substance rather gelatinous, closely adhering to paper. Colour, dull red, changing to greenish in age.

This pretty little plant was formerly considered a small form of *L. kaliformis*, from which it may be readily known by its small size, short articulations, few, alternate (not whorled) branches, and when in fruit, by the truly conical capsules with a terminal pore.

Dr. Harvey informs us that it is more abundant on the east coast of America than with us, and that it is by no means scarce along the shores of Southern Europe. With us it seems chiefly confined to the south and west coasts. We are not aware of its having been found on the east, but it may very possibly have been frequently overlooked, on account of its small size and general resemblance to the other species.

As already stated, this species (the only representative of the genus as regards the British flora) was formerly a member of the genus *Chylocladia*, from which it has been removed to the present by Dr. Harvey. Although not in every particular agreeing with that genus (*Champia*) as constituted by Agardh, Dr. Harvey has thought it better to place it here rather than establish a new generic group for it.

EXPLANATION OF PLATE XXXVI.

Fig. 1.—*Champia parvula*, natural size.
2.—Branch with capsules.
3.—A capsule.
4.—Section of same.
5.—Spores from same.
6.—Branch with tetraspores.
7.—A tetraspore. All magnified.

Corallina officinalis. Linn.

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PLATE XXXVII.

CORALLINA OFFICINALIS.—*Linn.*

GEN. CHAR.—Frond filiform, articulated, encrusted with calcareous matter. Fructification: turbinate or obovate capsules, mostly terminal ceramidia, having a terminal pore and containing a tuft of pyriform, or club-shaped, zonate tetraspores. Name from *coralium*, being formerly supposed only a more delicate species of coral.

CORALLINA *officinalis.*— Frond two to three times pinnated; lower articulations cylindrical, twice as long as broad, upper obovate or obconical, with rounded angles; ultimate ramuli cylindrical, obtuse.

CORALLINA *officinalis.*—*Syst. Ed.* x. p. 805; *Pal. Elench.* p. 422; *Ellis* in *Phil. Trans.* vol. lvii. p. 419, t. 17, figs. 12, 13; *Linn. Corresp.* vol. i. p. 201; *Soland. Zoop.* p. 118, t. 23, figs. 14, 15; *Esper, Corall.* t. 3; *Berk. Syn.* vol. i. p. 211; *Jameson* in *Wern. Mem.* vol. i. p. 563; *Turt. Gmel.* vol. iv. p. 671; *Turt. Br. Fauna*, p. 211; *Stew. Elem.* vol. ii. p. 439; *Cuv. Règ. An.* vol. iii. p. 305; *Lamour. Cor. Flex.* p. 283; *Lamour. Corall.* p. 127; *Lamk. An. s. Vert.* vol. ii. p. 328; 2nd edit. vol. ii. p. 513; *Flem. Brit. An.* p. 514; *Gray, Brit. Pl.* vol. i. p. 339; *Blainv. Actinol.* p. 547, t. 96, figs. 3, 3*a*; *Johnst. Br. Sponges and Lith.* p. 216; *Decaisne, Ess.* p. 107; *Kütz. Phyc. Gen.* p. 388, t. 79, fig. 1; *Endl.* 3rd Suppl. p. 48; *Mont. Fl. Alger.* p. 128; *Harv. P. B.* plate 222; *Harv. N. B. A.* p. 83; *Harv. Man.* p. 106; *Harv. Syn.* p. 89; *Atlas*, plate 33, fig. 148.

CORALLINA *anglica.* — *Ger. Herb.* 1572; *Merrett, Pin.* 30; *Raii, Hist.* vol. i. p. 65; *Syn.* 33, No. 1.

HAB.—Generally in rock-pools, sometimes on rocks, extending the whole limits between high and extreme low-water mark. Perennial. Winter and spring. Abundant everywhere round the British Islands.

GEOGR. DIST.—Throughout the Northern Atlantic Ocean and in the Mediterranean Sea.

DESCRIPTION. — Root, a thin, widely-spreading, calcareous crust. Frond filiform, three to five inches long, scarcely a quarter of a line in thickness, densely tufted, and often forming extensive patches over the surface of rocks, two to three times pinnated in a more or less regular manner; pinnæ opposite from the joints, occasionally binate, sometimes wanting, lower ones often abbreviated or wanting, longest a little below the summit. Articulations of the stem about twice as long as broad, cylindrical, becoming more obovate or obconical upwards; those of the ramuli three to four times longer than broad, cylindrical, the terminal joints obtuse, not tapering to a point; those of the pinnæ obconical or obovate. Structure: when macerated in diluted acid, the cellular structure becomes quite apparent, and is seen to be composed of two series of cells alternating with each other, those of the one series very slender, the length many times exceeding the diameter; those of the other short, the diameter about half the length. Substance hard, brittle and stony. Capsules of two kinds: 1, rather large, ovate, terminating the ramuli, perforate, and containing a mass of oblong ovate tetraspores, transversely, mostly four-parted, attached at the bottom; 2, smaller, somewhat urceolate, flattened at the base, and produced on the sides of the articulation, and often so numerous as entirely to cover it; their contents have not been ascertained. Colour, when growing, a dull purple, very evanescent, and soon bleaching to a dirty yellow or pure white by exposure to air and light.

A very common species, and having a wide geographical range in the Northern Ocean, and Dr. Harvey thinks that some of the so-called species from the Southern Ocean may be even too closely allied. Even the characters of our own two native species it would be desirable to settle on a more solid basis. Plants so generally distributed, and so little partial to peculiar localities, are subject to wide variations, both in form and colour, and certainly none more so than the present species. Those which grow in deep, quiet pools being tall and repeatedly pinnated, while at high-water mark, and in exposed situations, they are generally stunted, slightly branched, or even quite simple, and every possible intermediate form may be observed. The colour also is equally sportive, passing through every shade from a dark purple to a pure white. It seems to delight in quiet, rocky pools, but is often found carpeting the bottoms of the little channels which issue from them at the recess of the tide.

The species of this genus have, more than any other, found it difficult to obtain a resting-place in the arrangements of naturalists. The large quantity of calcareous matter contained in their structure was no doubt the reason of their being associated with the mineral kingdom; and the subsequent discovery of animals in zoophytes, and the general resemblance of *Corallina* to these productions, led to the presumption that these would also be found inhabited by similar beings. This anticipation, however, has not been realised, but instead the true nature of Corallines, including the Nullipores, has been satisfactorily demonstrated, and the question as to their vegetable origin entirely set at rest. If a small portion of one of these plants is taken and macerated in diluted acid so as to remove the lime which it contains, and then examined in the microscope, the structure will be found very much the same as that of the *Rhodomelaceæ*, to which also they are closely assimilated in their mode of fructification.

The genus *Corallina* of Linnæus has now been subdivided into three, of which, however, the characters are not so satisfactory as could be wished, and Dr. Harvey informs us that the limits of the species are as yet very imperfectly defined.

EXPLANATION OF PLATE XXXVII.—Fig. 1. *Corallina officinalis*, natural size. —2. Apex of a branch with terminal capsules.—3. A capsule.—4. Tetraspores. —5. Apex of a branch with lateral capsules.—6. Part of same. All magnified.

CORALLINA squamata, PARK.

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PLATE XXXVIII.

CORALLINA SQUAMATA.—*Park.*

GEN. CHAR.—Frond filiform, articulated, encrusted with calcareous matter. Fructification: turbinate or obovate capsules, mostly terminal ceramidia, having a terminal pore, and containing a tuft of pyriform, or club-shaped, zonate tetraspores. Name from *coralium*, being formerly supposed only a more delicate species of coral.

CORALLINA *squamata.*—Fronds two to three, pinnate; lower articulations cylindrical, about as long as broad, upper ones very much dilated upwards, obconical, the angles very acute; ultimate joints of the ramuli acuminated.

CORALLINA *squamata.*—*Parkinson,* 1296; *Ellis. Cor. Pl.* p. 24, fig. c. C.; *Ellis & Soland. Zoop.* p. 117; *Turt. Gmel.* vol. iv. p. 671; *Turt. Br. Faun.* p. 211; *Stew. Elem.* vol. ii. p. 439; *Lamour. Cor. Flex.* p. 287; *Lam. Coral.* p. 129; *Lam. An. s. Vert.* vol. ii. p. 329; *Gray, Br. Pl.* vol. i. p. 340; *Fl. Br. An.* p. 515; *Johnst. Br. Sponges and Corallines,* p. 222; *Decaisne, Ess.* p. 108; *Kütz. Phyc. Gen.* p. 388; *Endl.* 3rd Suppl. p. 48; *Harv. P. B.* plate 201; *Harv. Man.* p. 106; *Harv. Syn.* p. 89; *Atlas,* plate 33, fig. 149.

HAB.—On submarine rocks, at the extremity of low-water mark. Perennial. Summer. South coast of England (*Ellis,* &c.) Abundant at Miltown Malbay, west of Ireland (*W. H. H.*); Youghal (*Miss Ball*); Jersey (*Miss Turner*).—*Phyc. Brit.*

GEOGR. DIST.—Atlantic shores of France and Spain; Canary Islands.

DESCRIPTION.—Root, a widely spreading, calcareous crust. Fronds densely tufted, four to six inches high, about one-fourth of a line in thickness, compressed. Stem simple, or two to three times divided in a somewhat proliferous, dichotomous, or pinnate manner; branches distichous, erecto-patent, once or twice pinnate; pinnules often obsolete at the base, the rest longest in the middle, giving the frondlet an ovate or lanceolate form, but the regularity of the branching is frequently interrupted; the uppermost pinnules are often once or twice dichotomous. Articulations at the base cylindrical, about as long or a little longer than broad, increasing in length upwards, and becoming also more and more widened at the summit, slightly rounded at the top, or with the angles shortly bevelled off, but all very acute and not rounded; all the terminal joints acuminate. Colour, a dark but evanescent purple. "Conceptacles (probably of three kinds, two of which only are known to me), 1. formed out of the last articulation of a branch or ramulus, simple or crowned at its superior angles with a pair of horn-like ramuli, or with another series of conceptacles of smaller size : in these (fig. 3) I have observed trispores (fig. 4); 2. hemispherical conceptacles of a very minute size, resembling grains of sand, plentifully scattered like warts over the surface, hollow, exhibiting, when the calcareous matter is removed, a beautifully tessellated surface, and containing a tuft of crescent-shaped, transversely parted tetraspores" (fig. 5).—*Harvey.*

This species we have not met with on the east coast, and are but imperfectly acquainted with the fruit of it ; it seems mostly confined to the south and west of England, where in a few localities it has been found in considerable abundance.

Dr. Harvey, who has had ample opportunities of becoming acquainted with the species, seems to consider it a good one, and constant to its characters. The whole genus *Corallina* (*Linn.*), however, seems much in want of revision, and this becomes the more difficult from the doubts hitherto entertained as to their real nature, most botanists being willing to leave them to the zoologist, who seems equally well pleased to claim them as the legitimate subjects of his kingdom.

EXPLANATION OF PLATE XXXVIII.

Fig. 1.—*Corallina squamata,* natural size.
2.—Joints of the base of the stem.
3.—Apex of a branch.
4.—Capsule cornuted (*Harvey*).
5.—Trispores from same (*Harvey*).
6.—Apex of a branch with hemispherical capsules.
7.—Tetraspores from same. All magnified.

JANIA rubens, LAMOUR.

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Plate XXXIX.

JANIA RUBENS.—*Lamour.*

Gen. Char.—Frond filiform, articulated, dichotomously branched, coated with calcareous matter. Fructification : urn-shaped ceramidia, formed of the axillary articulation of the uppermost branchlets, perforate, and containing at the bottom a tuft of club-shaped, zonate tetraspores. Name from *Janira*, one of the Nereides.

Jania *rubens.* — Articulations of the branches and branchlets cylindrical, three to four times longer than broad.

Jania *rubens.*—*Lam. Cor. Flex.* p. 272 ; *Gray, Brit. Pl.* vol. i. p. 339 ; *Flem. Brit. Anim.* p. 514 ; *Johnst. Brit. Lith.* p. 224 ; *Dne. Ess.* p. 111 ; *Endl.* 3rd Suppl. p. 49 ; *Kütz. Phyc. Gen.* p. 389 ; *Harv. P. B.* plate 252 ; *Harv. Man.* p. 107 ; *Harv. Syn.* p. 90 ; *Atlas,* plate 34, fig. 154 ; *Harv. N. B. A.* p. 84.

Corallina *rubens.*—*Ellis & Soland. Zooph.* p. 123 ; *Turt. Brit. Faun.* p. 211 ; *Lam. An. s. Vert.* 2nd edit. vol. ii. p. 517.

Hab.—Parasitical on the smaller Algæ. Common in the south and west. Devon ; Isle of Man ; Arran ; Moray Frith and Forfarshire on the east coast, but rare, and cast on shore after storms.

Geogr. Dist.—Shores of Europe ; South Africa.

Description. — Root crustaceous, thin, creeping. Fronds densely tufted, from half an inch to an inch and a-half in height, finer than horse-hair, many times regularly dichotomous ; branches somewhat erect, gradually attenuated upwards ; axes acute. Articulations nearly cylindrical, their angles somewhat rounded ; those at the base about as long or a little longer than broad, those about the middle three to five times longer than broad, those in the ramuli shorter ; terminal joints of the ramuli smaller, acuminate. Capsules mostly terminal, urn-shaped, with long narrow base, and short contracted mouths, somewhat compressed, the mouths truncate and minutely perforate ; the angles at the widest part rather acute, occupied by two horn-like appendages, subulate, three-jointed, erect, or slightly curved inwards. Substance hard, rigid, calcareous, not adhering to paper. Colour, a dull red or purplish red, but very evanescent, soon bleaching to a greenish yellow, and ultimately to a pure white.

We have seldom met with this on the east coast, and only among rejectamenta ; on the south and west coast it seems more common, as we very often find it infesting the smaller Algæ sent from that quarter, such as *Cladostephus*, *Polyides*, *Furcellaria*, &c.; hence we conclude that its habitat is similar, namely, the still pools between tides. When macerated in acid the structure, like that of *Corallina*, is found to be cellular, but the cells are short, nearly as broad as long, and about equal in size.

This genus has been separated from *Corallina* by characters, we fear, somewhat too artificial and of too little importance for generic distinction. Essentially they are nothing more than a little difference in the form of the fruit and in the habit of the plant, characters which, if applied to some of the larger and more cumbrous genera, would enable us without much difficulty to reduce their extent.

EXPLANATION OF PLATE XXXIX.

Fig. 1.—*Jania rubens*, natural size.
2.—Part of stem after maceration.
3.—Apex of a branch with capsules.
4.—A capsule.
5.—Tetraspores.
6.—Joints of the stem. All magnified.

Jania corniculata. Lamour.

Nature Printed by Henry Bradbury.

PLATE XL.

JANIA CORNICULATA.—*Lamour.*

GEN. CHAR.—Frond filiform, articulated, dichotomously branched, coated with calcareous matter. Fructification : urn-shaped ceramidia, formed of the axillary articulation of the uppermost branchlets, perforate, and containing at the bottom a tuft of club-shaped, zonate tetraspores. Name from *Janira*, one of the Nereides.

JANIA *corniculata.*—Articulations of the stem and branches obconical, the upper angles acute, and frequently much produced; upper ramuli cylindrical.

JANIA *corniculata.*—*Lam. Cor. Flex.* p. 274; *Corall.* p. 123; *Gray, Nat. Ar. Br. Pl.* vol. i. p. 339; *Flem. Brit. Anim.* p. 514; *Johnst. Spong. and Lith.* p. 227; *Decne. Ess.* p. 111; *Endl.* 3rd Suppl. p. 49; *Kütz. Phyc. Gen.* p. 389; *Harv. P. B.* plate 134; *Harv. Man.* p. 107; *Harv. Syn.* p. 90; *Atlas*, plate 34, fig. 155.

CORALLINA *corniculata.*—*Linn. Syst.* p. 806; *Pal. Elench.* p. 424; *Ellis & Soland. Zooph.* p. 121; *Turt. Br. Faun.* p. 212; *Lam. An. s. Vert.* 2nd ed., vol. ii. p. 517.

HAB.—Parasitical on the smaller Algæ, in pools between tide-marks, and in four to five fathoms water. Perennial ? Summer. Southern shores of England and Ireland; Jersey. —*Phyc. Brit.*

GEOGR. DIST.—Atlantic and Mediterranean shores of Europe.

DESCRIPTION.—Root, a thin calcareous crust. Fronds densely tufted, from half an inch to an inch and a-half or two inches in length, finer than horse-hair, the upper branchlets tapering to a point, many times dichotomous, in old plants pinnate by innovation. Articulations of the stem and branches twice or thrice as long as broad, oblong or obconical, contracted at the base, slightly compressed, gradually expanding in the upper part into two obtuse, but often very much produced, and occasionally horn-like appendages; articulations of the ramuli cylindrical. Structure minutely cellular. Substance hard, brittle, not at all adhering to paper. Colour, pale purplish red, very evanescent, and soon bleaching to a pure white. Capsules terminal, urn-shaped, with long narrow base and short, contracted mouths, slightly compressed, and having the angles at the widest part somewhat acute, and occupied by two elongated, horn-like appendages, which are three to four-jointed, subulate, but often become capsuliferous ramuli, and whose horns again become capsuliferous, so that we have thus a series of dichotomous branches, a capsule forming the axial joint of each dichotomy.

It will be seen that the present species bears the same relation to *J. rubens* that *Corallina corniculata* does to *C. officinalis,* having much the appearance of varieties in which all the points of extension are unusually developed; and we should not be astonished to find that when the species are properly understood, the two may merge into one. We have already remarked the close relation between this genus and that of *Corallina.*

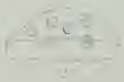
Dr. Harvey even figures a variety of *Corallina squamata* with fruit cornuted as in *Jania,* so that the dichotomous habit is the only character we have left to distinguish the *genera.* This might be considered sufficient had we only to deal with British forms, but when our observation is extended to foreign species, we find that in warm latitudes species are produced, which with the cornuted fruit of *Jania* combine the pinnated habit of *Corallina,* so that it seems greatly desirable that the whole family of *Corallinaceæ* should be thoroughly revised by some one who has ample opportunity of comparing native and foreign species, and, if possible, in a living state.

The present species may be known from *J. rubens* by its obconical joints, whose upper angles are more or less produced, while the joints of *J. rubens* are cylindrical, scarcely compressed, and the upper angles not produced. Yet we have seen forms which seemed to have a tendency to become intermediate. All authors, however, have adopted the species, but apparently with doubts.

EXPLANATION OF PLATE XL.

Fig. 1.—*Jania corniculata,* natural size.
2.—Branchlet with capsules.
3.—A capsule.
4.—Tetraspores.
5.—Joints of the stem. All magnified.

1



Melobesia polymorpha, Linn.

PLATE XLI.

MELOBESIA POLYMORPHA.—*Lamour.*

GEN. CHAR.—Fronds free or attached, crustaceous and appressed, more or less divided into lobes, or cylindrical, attenuated or incrassated branches, but never articulated, brittle and calcareous. Name from *Melobesia*, one of the sea nymphs of Hesiod.—*Harvey.*

MELOBESIA *polymorpha.*—Frond appressed to the rock, attached by its under surface, very thin and smooth or more or less thickened, or even rising into short, mostly simple, papillose branches; ceramidia minute, immersed and slightly elevated above the surface, generally abundant.

MELOBESIA *polymorpha.*—*Harv. P. B.* plate 345; *Harv. Man.* p. 108; *Harv. Syn.* p. 91; *Atlas,* plate 35, fig. 157.

MILLEPORA *polymorpha.*—*Linn. Syst. Nat.* 1285; *Ellis & Soland. Zooph.* p. 130.

NULLIPORA *polymorpha.*—*Johnst. Brit. Lith.* p. 238, t. 24, figs. 1, 2, 3 (?); and t. 25, fig. 23 (in part).

CORALLIUM *cretaceum lichenoides.*—*Ellis, Cor.* p. 76, t. 27, fig. d. D.

LITHOTHAMNION *polymorphum.*—*J. G. Agardh, Sp. Gen. Alg.* vol. ii. p. 524.

HAB.—On rocks, shells, and stones, all round the coasts of the British Islands. Common.

GEOGR. DIST.—Not correctly known. Likely to be widely dispersed.

DESCRIPTION.—Frond at first appearing on the surface of rocks, stones, or shells, in the form of a small red dot, which gradually spreads in every direction in the manner of a crustaceous lichen; the under surface, except perhaps the outer margin, closely adherent; the upper either smooth and plain, or irregular, rough and papillose, or rising into short knobs or roundish or compressed, mostly simple, branches. The fronds are at first very thin, but gradually become thicker, by successive thin layers of cellular and calcareous matter, until the thickness is one-twelfth of an inch or more, and often becoming confluent and rising into ridges at the junction, or the one frond spreading over the other. Ceramidia deeply immersed, their orifices slightly elevated above the surface of the frond, in the form of minute punctures, generally very abundant. Colour, generally a dark purple, but rapidly bleaching to a pure white. Structure consisting of minute cells, somewhat oblong, in regular series. Substance stony, and very brittle.

This may be known from *M. fasciculata* and *M. calcarea* by its attached fronds of a truly crustaceous habit, and from *M. lichenoides* by its thicker substance, and the fronds scarcely or but slightly free at the margin. In this Harvey includes most of the intratidal Nullipores with crustaceous saxicolous fronds.

The species of this genus, at least such of them as were known to the older naturalists, were generally classed with the zoophytes, and it was only when the true nature of their fructification was made known by the researches of Algologists of the present day, that their close relationship to the vegetable kingdom was demonstrated. From the true *Corallinæ* they may be readily distinguished by their much less fruticose, often crustaceous, frequently amorphous habit; in some species, in their habit, closely approaching the Lichens, in others more resembling amorphous masses of coral than anything. In their habitat, too, they are equally variable, some being truly epiphytal, others growing on stones, rocks, or anything in fact that happens to come in their way, while several of the larger species are entirely unattached, and are drifted about by the tides and currents of the ocean, being very limited however in their distribution, and often congregated together in little colonies, or heaped together in larger masses in some quiet bay, where they have been accumulating from time immemorial stratum above stratum, to an unknown thickness, the uppermost only being alive.

EXPLANATION OF PLATE XLI.

Fig. 1.—*Melobesia polymorpha*, natural size.
2.—Section of ceramidia.
3.—Cells. Both magnified.

MELOBESIA CALCAREA.—*Ell. et Sol.*

GEN. CHAR.—Fronds free or attached, crustaceous and appressed, more or less divided into lobes, or cylindrical, attenuated or incrassated branches, but never articulated, brittle and calcareous. Name from *Melobesia*, one of the sea nymphs of Hesiod.—*Harvey.*

MELOBESIA *calcarea.*—Frond free, much and irregularly branched; branches short, obtuse, patent, recurved and spreading in all directions, cylindrical, or tapering to an obtuse point; the apices sometimes bifid or trifid.

MELOBESIA *calcarea.—Harv. P. B.* plate 291; *Harv. Man.* p. 108; *Harv. Syn.* p. 21; *Atlas*, plate 34, fig. 156; *Harv. Ner. Austr.* p. 440.

NULLIPORA *calcarea.—Johnst. Brit. Lith.* p. 240, t. 24, figs. 4, 5.

NULLIPORA *fragilis.—M'Calla.*

SPONGITES *calcarea.—Kütz. Sp. Alg.* p. 699.

MILLEPORA *calcarea.—Ell. et Sol. Zooph.* p. 129, t. 23, fig. 13; *Lam. An. s. Vert.* 2nd edit. vol. ii. p. 312.

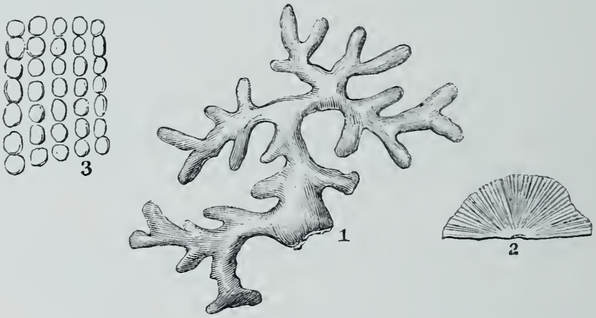
LITHOTHAMNION *calcareum.—J. G. Agardh, Sp. Gen. Alg.* vol. ii. p. 523.

HAB.—On sandy shores, in four to twenty fathoms water. Perennial. Common.

GEOGR. DIST.—Not correctly known. Likely to be widely dispersed. New Zealand (*Dr. J. D. Hooker*); Galapagos group (*Mr. Darwin*).

DESCRIPTION.—Fronds lying at the bottom of the sea, entirely unattached, forming more or less extensive strata; sometimes forming small isolated colonies, at other times covering large and extensive tracts in strata of indefinite thickness, those specimens on the surface only being alive. Each frond is from one to three or four inches in length, simple or variously branched; branches very irregular, patent, straight or curved in every possible direction, cylindrical and obtuse, or tapering to an obtuse point, often bifid or trifid at the apex. Structure consisting of small roundish cells, filled with calcareous matter, and arranged in lines. Substance hard, stony, and very brittle. Colour, deep red when alive, but soon bleaching to a snowy whiteness. Ceramidia we have never seen.

This species seems very common on the west coast, both of England, Scotland, and Ireland, the most shrub-like of the genus, and is perhaps the most extensively distributed, having been brought from several places in the South Pacific Ocean. In the west of Ireland, Dr. Harvey informs us, it is so abundant that the inhabitants often collect it and use it as manure instead of lime; all the purposes of which it will serve equally well when burned. The difficulty however of procuring it, at such depths as it grows, puts it almost beyond the reach of the poor people who are most in want of it in these remote districts.



MELOBESIA CALCAREA.

EXPLANATION OF DISSECTIONS, &c.

Fig. 1.—*Melobesia calcarea,* natural size.
2.—Section of frond.
3.—Cells. Both magnified.

MELOBESIA FASCICULATA.—*Harv.*

GEN. CHAR.—Fronds free or attached, crustaceous and appressed, more or less divided into lobes, or cylindrical, attenuated or incrassated branches, but never articulated, brittle and calcareous. Name from *Melobesia*, one of the sea nymphs of Hesiod.—*Harvey.*

MELOBESIA *fasciculata.*—Frond unattached, roundish, more or less lobed or branched; branches crowded, short, mostly thickened towards the summit, roundish or compressed, broad, truncate or somewhat concave at the extremities.

MELOBESIA *fasciculata.*—*Harv. P. B.* plate 74; *Harv. Man.* p. 108; *Harv. Syn.* p. 92; *Atlas*, plate 35, fig. 158.

MILLEPORA *fasciculata.*—*Lam. An. s. Vert.* vol. ii. p. 203; 2nd edit. p. 211.

NULLIPORA *fasciculata.*—*Blainv. Actin.* p. 605; *Johnst. Br. Spon. and Lith.* p. 240, t. 24, fig. 6.

LITHOTHAMNIUM *crassum.*—*Phil.* in *Wieg. Arch.* (1837), p. 388.

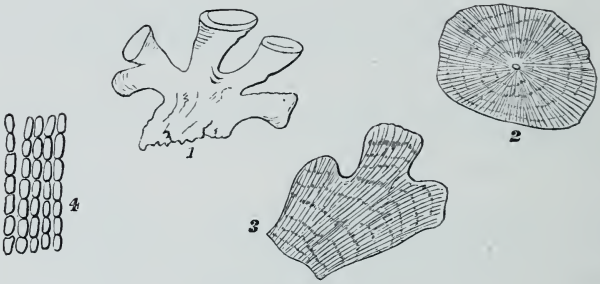
LITHOTHAMNION *fasciculatum.*—*J. G. Agardh, Sp. Gen. Alg.* vol. ii. p. 522.

HAB.—Lying on the sandy bottom of the sea, in four to five fathoms water. Roundstone Bay (*Mr. M'Calla*).

GEOGR. DIST.—Atlantic and Mediterranean shores of Europe.

DESCRIPTION.—Fronds quite free, forming roundish masses, one to three or four inches in diameter, variously lobed or branched; branches very irregular, proceeding in every direction, very short, often obsolete or merely rudimentary, mostly very much thickened at the apices, and truncate or even concave, frequently compressed, often running into ridges, or confluent, forming an irregular lumpy mass of no determinate form, or rather of every possible form. Structure consists of small cells, oblong, a little longer than broad, arranged in radiating lines, and filled with calcareous matter. Substance hard and stony, very brittle. Colour, brownish purple, soon fading to a dirty white. Ceramidia unknown to us.

This species seems confined to the Irish coast, no locality being recorded, so far as we are aware, on the British shore; and is not only less generally distributed, but is much less plentiful even when it does occur than *M. calcarea*, than which it has much more thickened branches, and is more obtuse and truncated at the extremities.



MELOBESIA FASCICULATA.

EXPLANATION OF DISSECTIONS, &c.

Fig. 1.—*Melobesia fasciculata.* Portion of a plant, natural size.
2.—Transverse section of frond.
3.—Longitudinal section of same.
4.—Cells. All magnified.

MELOBESIA AGARICIFORMIS.—*Harv.*

Gen. Char.—Fronds free or attached, crustaceous and appressed, more or less divided into lobes, or cylindrical, attenuated or incrassated branches, but never articulated, brittle and calcareous. Name from *Melobesia*, one of the sea nymphs of Hesiod.—*Harvey.*

Melobesia *agariciformis.*—"Frond unattached, globular, hollow; foliations delicate, papyro-crustaceous, dense, erect, much lobed and sinuate, fastigiate; margin thin, entire."—*Harvey.*

Melobesia *agariciformis.*—*Harv. P. B.* plate 73; *Harv. Man.* p. 108; *Harv. Syn.* p. 92; *Atlas*, plate 35, fig. 159; *J. G. Agardh, Sp. Gen. Alg.* vol. ii. p. 516.

Millepora *agariciformis.*—*Pall. Elench.* p. 263; *Lam. An. s. Vert.* vol. ii. p. 204; 2nd edit. p. 2, 312.

Millepora *coriacea.*—*Linn. Syst.* p. 1285; *Esp. Mill.* t. 12.

Millepora *decussata.*—*Ellis & Soland. Zooph.* p. 131, t. 23, fig. 9.

Millepora *tortuosa.*—*Esper.* t. 22.

Nullipora *agariciformis.*—*Blainv. Actin.* p. 605; *Johnst. Br. Spon. and Lith.* p. 241; woodcut No. 23.

Pollicipora *agariciformis.*—*Ehr. Beitr.* p. 129.

Lithophyllum *expansum.*—*Phil.* in *Wieg. Arch.* (1837), p. 389, excl. syn.

Melobesia *expansa.*—*Endl.* 3rd Suppl. p. 49.

Lithophyllum *decussatum* !—*Phil.* l. c. t. 9, fig. 4.

Melobesia *decussata* !—*Endl.* l. c.

Mosco *petroso.*—*Imperat. Hist. Nat.* 600, cum icone.

Favagine *di Aristotele*, specie prima.—*Ginnani, Op.* t. 44.

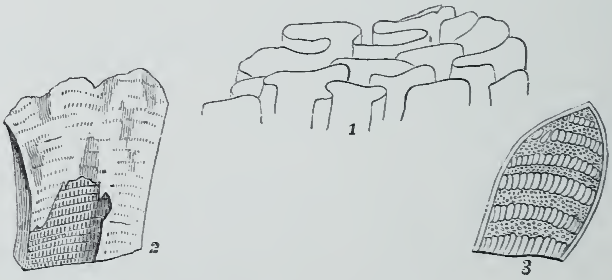
Hab.—Lying on the sandy bottom of quiet bays, in two to three fathoms water. Rare. Roundstone Bay; Connemara, in or two places only, abundant, but very local (*Mr. M'Calla*).

Geogr. Dist.—Atlantic and Mediterranean shores of Europe.

Description.—"Frond unattached, forming globular or ovoid masses from four to eight inches in diameter, hollow within, seemingly from decay of the central portion; very light, of a papery thinness and crustaceous substance, composed of innumerable sinuated and lobed laminæ, issuing from a point towards the centre of the frond, and directed in a radiating manner to the circumference. In the centre of the frond the laminæ are much united together, with vacant spaces and passages, forming an irregular set of chambers; towards the circumference the lobes are distinct from each other, standing erect, variously grouped; either sinuated or bent into semicircular forms, imbricating on each other, or curled round into little cups or trumpet-mounted siphons. The apices of all are nearly fastigiate, and the margin is thin and quite entire. The colour, when recent, is more or less tinged with pink; when dry it fades to a yellowish, and when exposed to the sun becomes perfectly white and rapidly crumbles to powder. Under the microscope, a longitudinal section (when the calcareous matter has been removed by acid) shows a series of concentrical zones, formed of oblong cells separated by narrow spaces, filled with granular cellules, or possibly the appearance of bands may arise from the remains of calcareous matter." Fig. 3 represents a section of this description.

We have seen no perfect specimens of this species, and prefer copying the descriptions of Dr. Harvey, which seem to have been made with his usual care from recent specimens.

Like the preceding species, its habitat in this country seems confined to the coast of Ireland, and is there far from common. It is the largest and finest of our native foliaceous Nullipores, and in external form very much resembles some species of the genus *Parmelia* among the Lichens.



MELOBESIA AGARICIFORMIS.

EXPLANATION OF DISSECTIONS, &c.

Fig. 1.—*Melobesia agariciformis.* Margin of frond, natural size.
2.—Portion of lamina, showing the internal structure.
3.—Longitudinal section. Both magnified.

MELOBESIA LICHENOIDES.—*Borl.*

GEN. CHAR.—Fronds free or attached, crustaceous and appressed, more or less divided into lobes, or cylindrical, attenuated or incrassated branches, but never articulated, brittle and calcareous. Name from *Melobesia*, one of the sea nymphs of Hesiod.—*Harvey.*

MELOBESIA *lichenoides.*—Frond attached by the central parts, free at the margin, and foliaceous, spreading, variously lobed ; lobes short, broad, rounded ; ceramidia large and prominent.

MELOBESIA *lichenoides.*—*Harv. P. B.* plate 346 ; *Harv. Man.* p. 109 ; *Harv. Syn.* p. 93 ; *Atlas*, plate 35, fig. 160 ; *J. G. Agardh, Sp. Gen. Alg.* vol. ii. p. 515.

MILLEPORA *lichenoides.*—*Borl. Cornw.* p. 239, plate 24, figs. 2, 3, 5 ; *Soland. Zoop.* p. 131, plate 23, figs. 10, 12 ; *Johnst. Brit. Spon. and Lith.* t. 25, fig. 1.

? MILLEPORA (*Nullipora*) *byssoides*, var. *β fasciculus.*—*Lamarck, Hist. d'Anim. s. Vertèbr.* vol. ii. p. 204.

LITHOPHYLLUM *lichenoides.*—*Phil.* in. *Wiegm. Arch.* (1837), p. 389.

MELOBESIA *licheniformis.*—*Decne. Ann. des Sc. Nat.* (1842), vol. ii. p. 426 ; *Harv. Ner. Austr.* p. 111.

MASTOPHORA *lichenoides.*—*Kütz. Spec.* p. 697.

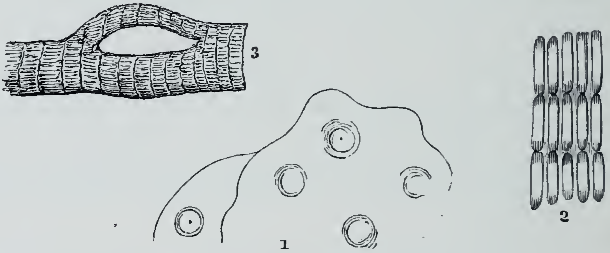
? ZONARIA *rosea.*—*Ag. Syst.* p. 264.

HAB.—On rocks and in tide-pools near low-water mark. Coast of Cornwall (*Rev. Dr. Borlase*) ; Galway and Clare (*Dr. Harvey*), abundant ; coast of Cork (*Dr. Allman*).

GEOGR. DIST.—Not known. Likely to be widely dispersed.

DESCRIPTION. — Fronds appressed, attached to the rock, sometimes imperfectly, by the central portion, free at the margin, thin and foliaceous, but hard and brittle, one to several inches in diameter, often confluent and overlapping, and thus covering a considerable extent of surface ; margin free and appressed, or more or less turned upwards, simply crenated or more or less divided into broad, rounded lobes. Structure consists of cylindrical cells, six to eight times longer than broad, of equal length, and forming radiating lines, so that the frond may be said to be concentrically articulated. Substance thin, but hard, brittle, and crumbling to pieces when dry. Colour, dark purple, soon bleaching to a pure white or yellowish white. Ceramidia immersed, rather prominent, forming rather large, rounded papillæ on the surface.

This species Dr. Harvey considers very nearly allied to *M. agariciformis*, although so different in its habitat. It is of smaller size, but more delicate and plant-like in its habit, and when recent, must be a very pretty species. It is said to be abundant on the west coast of Ireland, but its distribution is as yet very imperfectly known. Being found at all depths in the littoral zone, from high-water mark almost, to a considerable distance beyond low-water, it is subject, as such plants always are, to considerable variations in its external characters, being thin and smooth as paper, or coarse, wrinkled and amorphous, according to the exposure and depth of water.



MELOBESIA LICHENOIDES.

EXPLANATION OF DISSECTIONS.

Fig. 1.—*Melobesia lichenoides.* Portion of frond.
2. —Cells.
3. —Section of ceramidium. All magnified.

MELOBESIA MEMBRANACEA.—*Lamour.*

GEN. CHAR.—Fronds free or attached, crustaceous and appressed, more or less divided into lobes, or cylindrical, attenuated or incrassated branches, but never articulated, brittle and calcareous. Name from *Melobesia*, one of the sea nymphs of Hesiod.—*Harvey.*

MELOBESIA *membranacea.*—Fronds minute, dot-like, very thin, roundish, afterwards confluent, attached to other marine plants; ceramidia scarcely prominent, few.

MELOBESIA *membranacea.*—*Lamour. Cor. Flex.* p. 315, plate 12, figs. 2, 3; *Harv. Ner. Austr.* p. 111; *Harv. P. B.* plate 347, A.; *Harv. Man.* p. 109; *Harv. Syn.* p. 93; *Atlas,* plate 36, fig. 164; *Kutz. Phyc. Gen.* p. 385, t. 78, fig. 1; *Spec.* p. 696; *J. G. Agardh, Sp. Gen. Alg.* vol. ii. p. 512.

CORALLINA *membranacea.*—*Esp.* l. c.

HAB.—Common on the fronds of *Chondrus crispus, Zostera,* &c., all round the British coasts.

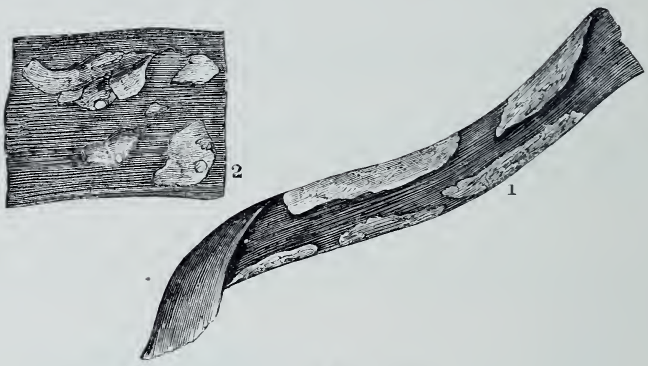
GEOGR. DIST.—Atlantic and Mediterranean coasts of Europe.

DESCRIPTION.—Plants appearing in the form of a minute dot on the frond or leaf, at first roundish, separate; afterwards, as they increase in number, they become confluent and irregular in their outline, excessively thin and delicate, ultimately extending over a space of from a quarter of an inch to an inch or more. Ceramidia immersed, scarcely elevated above the surface.

This, and the three following species, are admitted in deference to those high authorities who have already adopted them, but we much fear that their characters will not stand a rigid scrutiny.

All the species seem common, yet we have never had sufficient leisure thoroughly to examine their microscopical structure so as to ascertain the value of any characters obtainable from it.

They are all parasitical, mostly on the smaller Algæ, and are confined in a great measure to a few genera, such as *Phyllophora, Chondrus, Furcellaria,* and a few others. They are very common on *Phyllophora rubens,* mostly occupying the one side, the other being occupied by serpulæ.



MELOBESIA MEMBRANACEA.

EXPLANATION OF DISSECTIONS, &c.

Fig. 1.—*Melobesia membranacea.* Fronds on *Zostera*, natural size.
2.—Same, magnified.

MELOBESIA FARINOSA.—*Lamour.*

GEN. CHAR.—Fronds free or attached, crustaceous and appressed, more or less divided into lobes, or cylindrical, attenuated or incrassated branches, but never articulated, brittle and calcareous. Name from *Melobesia*, one of the sea nymphs of Hesiod.—*Harvey.*

MELOBESIA *farinosa.*—Fronds small, smooth, slightly convex, roundish oblong or irregular; ceramidia few, two to three, immersed, rather elevated.

MELOBESIA *farinosa.*—*Lamour. Cor. Flex.* p. 315, plate 12 ; *Kütz. Sp. Alg.* p. 696 ; *Harv. P. B.* plate 347 B. ; *Harv. Man.* p. 109 ; *Harv. Syn.* p. 93 ; *Atlas*, plate 36, fig. 164 ; *J. G. Agardh, Sp. Gen. Alg.* vol. ii. p. 512.

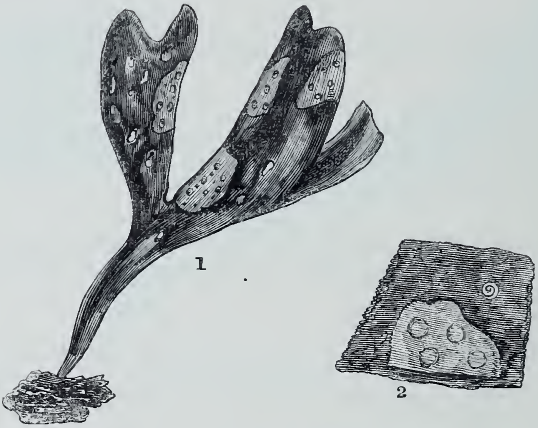
? MELOBESIA *granulata, Meneghini.*—*Kütz.* l. c. p. 696.

HAB.—On *Phyllophora rubens*, &c. Very common.

GEOGR. DIST.—Not well known. Likely to be widely dispersed.

DESCRIPTION.—Fronds very thin, slightly convex, one-twelfth to half an inch in breadth, roundish oblong, or with a somewhat lobed or irregular margin, closely adherent. Ceramidia immersed, somewhat prominent, forming small dot-like papillæ, very few, one to three on a frond.

Scarcely different from the preceding, except in its somewhat larger and thicker fronds, and rather more numerous and more prominent ceramidia; looks very much like a less perfectly developed state of *M. pustulata*, with which it is often associated.



MELOBESIA FARINOSA.

EXPLANATION OF DISSECTION, &c.

Fig. 1.—*Melobesia farinosa*, on *Phyllophora rubens*, natural size.
2.—Portion of same, magnified.

MELOBESIA VERRUCATA.—*Lamour.*

GEN. CHAR.—Fronds free or attached, crustaceous and appressed, more or less divided into lobes, or cylindrical, attenuated or incrassated branches, but never articulated, brittle and calcareous. Name from *Melobesia*, one of the sea nymphs of Hesiod.—*Harvey.*

MELOBESIA *verrucata.*—Fronds thin, scarcely convex roundish, oblong, or more or less irregularly lobed in the margin; ceramidia numerous, very minute.

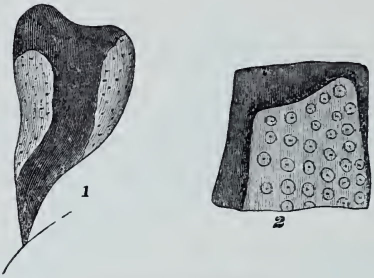
MELOBESIA *verrucata.—Lamour. Hist. des Pol. flexib.* p. 316; *Lamour.* l. c.; *Kütz. Spec.* p. 696; *Harv. P. B.* plate 347 c.; *Harv. Man.* p. 109; *Harv. Syn.* p. 94; *Atlas,* plate 36, fig. 165; *J. G. Agardh, Sp. Gen. Alg.* vol. ii. p. 513.

HAB.—Very common, on *Phyllophora rubens* and other small Algæ.

GEOGR. DIST.—Not well known. Likely to be widely dispersed.

DESCRIPTION.—Fronds closely appressed, scarcely convex, one-fourth to one-half inch broad, at first with a roundish outline, afterwards more irregular, and variously lobed in the margin. Ceramidia very numerous, scattered over the surface of the frond like minute dots, convex, rather prominent, with a very large terminal pore.

This species or variety may be known from the last by its somewhat larger but very thin fronds, and very numerous, minute ceramidia, which are generally sprinkled over the thin fronds in the greatest abundance, and from the following species by the last character; but although thus readily distinguished when growing side by side, as they often are, we are far from satisfied of their specific distinction. The present species is more conspicuous from the large punctures in the ceramidia, than by either the ceramidia, or the frond.



MELOBESIA VERRUCATA.

EXPLANATION OF DISSECTION, &c.

Fig. 1.—*Melobesia verrucata*, on *Phyllophora rubens*, natural size.
2.—Portion of same, magnified.

MELOBESIA PUSTULATA.—*Lamour.*

GEN. CHAR.—Fronds free or attached, crustaceous and appressed, more or less divided into lobes, or cylindrical, attenuated or incrassated branches, but never articulated, brittle and calcareous. Name from *Melobesia*, one of the sea nymphs of Hesiod.—*Harvey.*

MELOBESIA *pustulata.*—Fronds rather thick, smooth, outline irregular; ceramidia numerous, rather large and prominent.

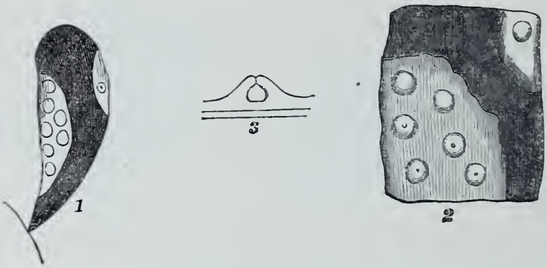
MELOBESIA *pustulata.—Lamour. Cor. Flex.* plate 12, fig. 2, A. B.; *Kütz. Sp. Alg.* p. 696; *Harv. Ner. Austr.* p. 110; *Harv. P. B.* plate 347 D.; *Harv. Man.* p. 109; *Harv. Syn.* p. 94; *Atlas*, plate 36, fig. 166; *J. G. Agardh, Sp. Gen. Alg.* vol. ii. p. 513.

HAB.—On *Phyllophora rubens* and other small Algæ. Common at all seasons.

GEOGR. DIST.—Not well known. Likely to be widely dispersed.

DESCRIPTION.—Fronds appressed, roundish oblong or very irregular when old, round and dot-like when young, rather thick and convex, often becoming confluent, or sending out broad, rounded lobes from the sides, and thus often covering a space of an inch or more with an irregular frond or rather patch of fronds, which is often margined with a pale whitish zone. Ceramidia numerous, rather large and convex, even conical, rounded at the summit.

This has the thickest fronds and the largest ceramidia of any of our native epiphytal *Melobesiæ*, and by these characters may be distinguished from its congeners. The ceramidia are generally much less numerous than in the preceding species, but more elevated, with a very minute pore. In this species the ceramidia are more conspicuous from their size than from the terminal pore, which appears very minute even under a lens, whereas in *M. verrucata* the frond appears as if it had been punctured all over with a pin.



MELOBESIA PUSTULATA.

EXPLANATION OF DISSECTIONS, &c.

Fig. 1.—*Melobesia pustulata,* on *Phyllophora rubens,* natural size.
2.—Portion of same.
3.—Section of a ceramidium. Both magnified.

HAPALIDIUM PHYLLACTIDIUM.—*Kütz.*

GEN. CHAR.—Plant calcareous. Frond flat, composed of a single layer of cellules, arranged in numerous radiating dichotomous series.

HAPALIDIUM *phyllactidium.*—*Kütz. Spec.* p. 695; *Harv. Syn.* p. 95; *Atlas,* plate 35.

HAPALIDIUM *confervicola.*—*Kütz. Phyc. Gen.* p. 295; *J. G. Agardh, Sp. Gen. Alg.* vol. ii. p. 509.

PHYLLACTIDIUM *confervicola.*—*Kütz.* l. c.

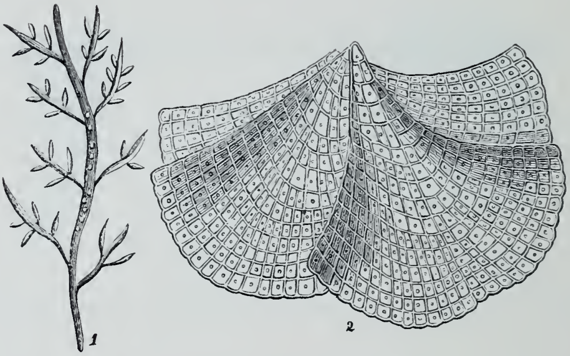
LITHOCYSTIS *Allmanni.*—*Harv. P. B.* plate 166; *Harv. Man.* p. 111.

HAB.—Parasitical on *Chrysymenia clavellosa,* from an oyster-bed, Malahide, Dublin Bay (*Professor Allman*).

GEOGR. DIST.—Not known.

DESCRIPTION.—Frond stemless, closely appressed to the surface of the substance on which it grows, commencing with a single cell, and gradually expanding into a broad, rounded, flabelliform frond, partly by the widening of the cells, and partly by the irregularly dichotomous division of the series of cells, forming a broadly obcuneate frond, rounded at the summit, and repeatedly branched in a somewhat proliferous manner. Structure entirely composed of a single layer of quadrate cells, said to be so completely permeated by calcareous matter, that when the plant has been macerated in acid to remove the lime, so little organic matter remains, that the original plant can with difficulty be detected. Substance hard, exceedingly brittle, and readily pulverising by the slightest pressure. Fructification unknown to us.

This pretty little diatomaceous-looking-like production was first discovered by Professor Allman growing parasitically on a stunted fragment of *Chrysymenia clavellosa,* which in its turn had vegetated on a living oyster-shell. It makes its appearance in the form of minute whitish dots, very inconspicuous to the naked eye, and affords a beautiful illustration of the rich treasures that reward the careful observer among the minute objects of creation.



HAPALIDIUM PHYLLACTIDIUM.
(Reduced from Plate CLXVI. *Phyc. Brit.* by Dr. Allman.)

EXPLANATION OF DISSECTION, &c.

Fig. 1.—*Hapalidium phyllactidium,* forming specks on the frond of *Chrysymenia clavellosa,* natural size.

2.—Same, highly magnified.

Delesseria alata, Lamour.

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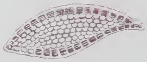

DELESSERIA *alata*
γ. angustissima, TURNER.

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Plates XLII. a., XLII. b.

DELESSERIA ALATA.—*Lamour.*

AND

β ANGUSTISSIMA.—*Turner.*

Gen. Char.—Frond flat, membranous, with a percurrent midrib. Fructification of two kinds, on distinct individuals: 1. Spherical tubercles (coccidia), immersed in the frond, and containing a globular mass of spores; 2. Tetraspores, forming definite spots either in the frond or in proper leaf-like processes. Name in honour of Baron B. Delessert, a distinguished French botanist and patron of botany.

Delesseria *alata.*—Stem much branched dichotomously, and winged throughout with a narrow membrane; midrib pinnate, with opposite, simple nerves.

Delesseria *alata.*—*Lamour. Ess.* p. 124; *Lyngb. Hyd. Dan.* p. 8, t. 2; *Ag. Sp. Alg.* vol. i. p. 178; *Ag. Syst.* p. 250; *Hook. Fl. Scot.* part 2, p. 100; *Grev. Fl. Edin.* p. 293; *Grev. Alg. Brit.* p. 73; *Hook. Brit. Fl.* vol. ii. p. 285; *Wyatt, Alg. Danm.* No. 14; *Harv.* in *Mack. Fl. Hib.* part 3, p. 191; *Harv. P. B.* plate 247; *Harv. Man.* p. 114; *Harv. Syn.* p. 96; *Atlas,* plate 37, fig. 171; *Harv. N. B. A.* part 2, p. 95; *J. G. Agardh, Sp. Gen. Alg.* vol. ii. p. 683.

Wormskioldia *alata.*—*Spreng. Syst. Veg.* vol. iv. p. 293.

Hypoglossum *alatum.*—*Kütz. Phyc. Gen.* p. 445.

Fucus *alatus.*—*Huds. Fl. Ang.* p. 578; *Gmel. Hist.* p. 187, t. 25, fig. 1; *Linn. Syst. Nat.* p. 718; *Lightf. Fl. Scot.* p. 951; *Fl. Dan.* t. 352; *Stack. Ner. Brit.* t. 13; *Esper, Ic. Fuc.* vol. i. p. 20, t. 3; *Turn. Syn.* p. 144; *Turn. Hist.* t. 160; *E. Bot.* t. 1837.

Hab.—On rocks, stones, and the larger Algæ, particularly *Laminaria digitata.* Plentiful all round the British coasts.

Geogr. Dist.—Atlantic shores of Europe and North America.

Var. *angustissima.*—Frond entirely without membranous margin.

Delesseria *alata, β angustissima.*—*Ag. Sp. Alg.* vol. i. p. 179; *Ag. Syst.* p. 250; *Grev. Alg. Brit.* p. 74; *Hook. Br. Fl.* vol. ii. p. 286.

Delesseria *alata, β angustifolia.*—*Lyngb. Hyd. Dan.* p. 8 (?)

Rhodymenia *rostrata.*—*J. Ag. MSS.*

Gigartina *purpurascens, γ rostrata.*—*Lyngb. Hyd. Dan.* p. 46, t. 12, fide *J. Ag.* (bad figure).

GELIDIUM ? *rostratum.—Griff.* in *Harv. Man.* 1st ed. p. 82.

FUCUS *alatus*, γ *angustissimus.—Turn. Syn. Fuc.* vol. i. p. 145 ; *Turn. Hist.* t. 160, fig. K.-l.

FUCUS *alatus, junior.—Gm. Hist.* t. 25, f. 2.

DELESSERIA *angustissima.—Harv. P. B.* plate 83 ; *Harv. Man.* p. 115 ; *Harv. Syn.* p. 97 ; *Atlas*, plate 33, fig. 150 ; *J. G. Agardh, Sp. Gen. Alg.* vol. ii. p. 686.

HAB.—Parasitical on *Laminaria digitata*, often accompanying *D. alata.* Perennial. Winter and spring. Scarborough (*Mr. Pitchford*) ; Lossiemouth, Morayshire (*Mr. Brodie*) ; Aberdeen (*Dr. Dickie*) ; Peterhead (*Mr. T. Bell*, who has found it this season growing abundantly on the stones of the harbour there) ; Orkney (*Rev. J. Pollexfen*) ; Galway (*Mr. Reilly*) ; Cornwall (*Mr. Ralfs*) ; Kingstown (*Mr. Andrews*).

GEOGR. DIST.—Arctic Sea ; Northern Atlantic Ocean ; Greenland ; Norway ?

DESCRIPTION.—Root, a small conical disc. Stem short, flattened, suddenly expanding into the frond, of which it forms the midrib. Frond four to ten inches long, one to six lines broad, becoming narrower upwards and attenuated to the base. The membrane is generally broader at one side of the midrib than the other, and is somewhat waved on the margin, and contracted at the axils, so as to form a roundish sinus, distichous, but frequently, especially in old plants, more or less proliferous from the midrib. The membranous margin is sometimes very broad, upwards of a quarter of an inch, but at times is so narrow that it can scarcely be distinguished, except in younger parts; at other times it is very much torn, or so completely obliterated as to be with difficulty detected. Such plants are very apt to be mistaken for *D. angustissima.* The midrib is everywhere closely pinnated, with oblique nerves, in the narrow varieties mostly simple, in the broader form frequently again pinnated. Capsules immersed in the midrib towards the apices of the branches, or contained in small axillary leaf-like expansions, very convex. Tetraspores grouped together in *sori* at the apices, on each side of the midrib, or contained in leaf-like processes, produced at or near the ends of the branches. Substance cartilaginous, rather soft, adhering to paper. Colour, varying from a deep crimson to a dark red.

A very common species, and not one of the least attractive of the genus, especially those varieties with fronds, often half an inch in breadth, which grow in deep, quiet pools or in deep water. The present species often forms a brush-like coat on the stems of *Laminariæ*, but these are generally the narrower varieties ; and here *angustissima* may often be met with. This we have given as a variety, being of opinion it is its proper position. Most authors, while they have the two forms as species, give it as their decided opinion that they are merely varieties.

Certainly nothing could be more distinct than the broad form of *D. alata* to which we have referred, and the ordinary wingless state of *angustissima.* Yet no one who has paid any attention to the subject will deny that he has met with specimens with the membranous margin so imperfectly developed, that he would hesitate before pronouncing them to belong to *D. alata;* while he would equally hesitate in referring it to *angustissima.* We have not been able to make out any difference in the fruit; the axillary leaf-like processes being as frequently found on fronds with membranous margins as on those without, and the structure in both seems to be identical. The mere fact of the existence of intermediate forms proves nothing. We cannot see a whit more difficulty in believing that *angustissima,* whose normal condition is to be wingless, may sometimes diverge so far from its type as to have a margin more or less perfectly developed, than that *D. alata*—which is certainly the case—may sometimes have a broad membranous margin, and at others a very narrow one.

Indeed, if we allow to *angustissima* one-half the latitude of divergence from its type which no one would think of denying to *D. alata,* we admit that *angustissima* may sometimes have a well developed membrane, although its normal condition is to be without one. We cannot see the least difficulty in supposing the existence of two distinct species, whose characters nevertheless so closely approximate or even coalesce and cross each other, that it becomes impossible to draw the line of distinction between them. This being very much the case in the present instance—so refined is the data on which to constitute a species, that we much fear to do so would be verifying the old proverb of founding our house on the sand.

It may be well to note, as mentioned in habitat, that Mr. Bell has found *angustissima* (at the present time) in great abundance on the stones of the harbour at Peterhead. This we suppose is the first recorded instance of its growing on stone—will we call it a stepping closer to *D. alata?* From the dissections it will be seen there is really no difference in their structure, &c. We therefore give them as varieties, wishing it to be understood that we do so in the hope that future observation may supply the means of speaking with greater certainty either as to their difference or identity.

EXPLANATION OF PLATE XLII. A.

Fig. 1.—*Delesseria alata,* natural size.
2.—Portion of a branch with tubercles.
3.—Section of a tubercle.
4.—Filaments of spores from same.
5.—Portion of a branch with tetraspores.
6.—A tetraspore. All magnified.

EXPLANATION OF PLATE XLII. B.

Fig. 1.—*Delesseria alata, β angustissima,* natural size.
2.—Portion of a branch with tubercles.
3.—Filaments of spores from same.
4.—Portion of a branch with tetraspores.
5.—Axillary leaflet with tetraspores.
6.—Tetraspores from same.
7.—Transverse section of stem. All magnified.

Plate [illegible]

DELESSERIA hypoglossum, AG.

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PLATE XLIII.

DELESSERIA HYPOGLOSSUM.—*Ag.*

GEN. CHAR.—Frond flat, membranous, with a percurrent midrib. Fructification of two kinds, on distinct individuals : 1. Spherical tubercles (coccidia), immersed in the frond and containing a globular mass of spores ; 2. Tetraspores, forming definite spots either in the frond or in proper leaf-like processes. Name in honour of Baron B. Delessert, a distinguished French botanist and patron of botany.

DELESSERIA *hypoglossum.* — Frond linear lanceolate, tapering at each end, repeatedly proliferous from the midrib, with leaflets of similar form; tubercles on the midribs of the smaller leaflets; tetraspores forming spots or sori on each side of the midrib.

DELESSERIA *hypoglossum.*—*Ag. Sp. Alg.* vol. i. p. 176 ; *Syst.* p. 429 ; *Grev. Fl. Edin.* p. 293 ; *Alg. Brit.* p. 75, t. 12 ; *Hook. Br. Fl.* vol. ii. p. 286 ; *Mack. Fl. Hib.* part 3, p. 191 ; *Wyatt, Alg. Danm.* No. 63 ; *J. Ag. Medit.* p. 157 ; *Endl.* 3rd Suppl. p. 52 ; *Montag. Pl. Cell. Canar.* p. 150 ; *Harv. P. B.* plate 2 ; *Harv. Man.* p. 115 ; *Harv. Syn.* p. 98 ; *Atlas*, plate 37, fig. 172 ; *Harv. N. B. A.* part 2, p. 96 ; *J. G. Agardh, Sp. Gen. Alg.* vol. ii. p. 693.

DELESSERIA *hypoglossum.*—*Lamour. Ann. Mus.* vol. xx. p. 124.

WORMSKIOLDIA *hypoglossum.*—*Spreng. Syst. Veg.* vol. iv. p. 331.

HYPOGLOSSUM *Woodwardii.*—*Kütz. Ph. Gen.* p. 444, t. 65, fig. 1.

FUCUS *hypoglossum.*—*Woodw.* in *Linn. Trans.* vol. ii. p. 30, t. 7 : *Linn. Trans.* vol. iii. p. 113 ; *With.* vol. iv. p. 95 ; *Eng. Bot.* t. 1396 ; *Turn. Syn. Fuc.* vol. i. p. 17 ; *Hist.* t. 14 ; *Esp. Ic. Fuc.* vol. ii. p. 17, t. 120.

FUCUS *hypoglossoides.*—*Stack. Ner. Brit.* p. 76, t. 13.

ULVA *lingulata.*—*De Cand. Fl. Fran.* 2nd edit. vol. ii. p. 14.

HAB.—On rocks and Algæ. Annual. Summer. Common on the shores of England and Ireland. Rare in Scotland. Ayrshire coast (*Rev. D. Landsborough*) ; Lough Swilly (*Major Martin*) ; Orkney (*Rev. Gilbert Laing*).

GEOGR. DIST.—Atlantic shores of Europe, frequent. Rare in the Mediterranean Sea, and of small size. Canary Islands (*Webb*).

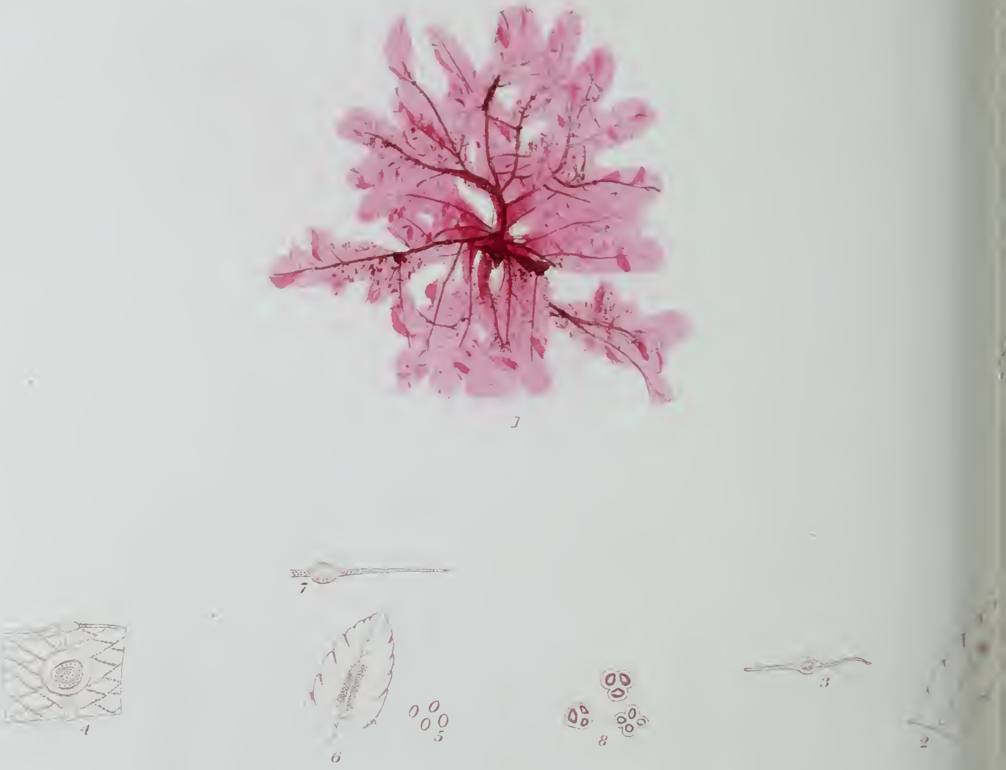
DESCRIPTION.—Root, a small disc. Fronds tufted, two to eight inches in length, and one to six lines in breadth. Stem half an inch in length, then continued as a midrib to the apex of the frond, which is linear lanceolate, acuminated to the point, and attenuated to the base, three to four times proliferous from the midrib, with branches or leaflets similar to the parent frond ; the midrib is very much attenuated to the summit, and the lateral nervures are scarcely apparent. Substance very flaccid, rapidly decomposing in fresh water, closely adherent to paper. Colour, a rich deep lake. Tubercles convex, imbedded in the midribs of the smaller leaflets, containing a mass of very minute spores. Tetraspores arranged in oblong patches along each side of the midrib, three- to four-parted.

This pretty species, like many others that seem to affect a warmer clime, appears mostly confined to the south and south-west coasts, being rare on the east coast and in Scotland. Its remarkably proliferous habit will readily distinguish it from any of the preceding; and from the following, *D. ruscifolia*, it may always be known by its exactly lanceolate or elliptical fronds, tapering to each extremity, and thinner and more delicate substance. The colour is very variable in both; in some specimens of the present it is a pale but bright pink, in others a dark purplish brown.

Dr. Harvey informs us that he has seen no American specimens of the plant, and its place in the southern hemisphere appears to be occupied by a very closely allied species, *D. crassinervia*, which differs chiefly from the present in its thicker, broader midrib.

EXPLANATION OF PLATE XLIII.

Fig. 1.—*Delesseria hypoglossum*, natural size.
2.—Frondlet with tubercle.
3.—A tubercle.
4.—Spores from same.
5.—Portion of a frond with tetraspores.
6.—The same.
7.—Section of same.
8.—Tetraspores from same. All magnified.



Delesseria ruscifolia, Lamour.

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PLATE XLIV.

DELESSERIA RUSCIFOLIA.—*Lamour.*

GEN. CHAR.—Frond flat, membranous, with a percurrent midrib. Fructification of two kinds, on distinct individuals: 1. Spherical tubercles (coccidia), immersed in the frond and containing a globular mass of spores; 2. Tetraspores, forming definite spots either in the frond or in proper leaf-like processes. Name in honour of Baron B. Delessert, a distinguished French botanist and patron of botany.

DELESSERIA *ruscifolia.*—Frond oblong, obtuse at each end, repeatedly—three to four times—proliferous from the midrib, with fronds of a similar form; leaflets traversed by oblique, anastomosing, pellucid striæ; tubercles on the midribs of the smaller leaflets; tetraspores grouped into linear spots on each side of the midrib.

DELESSERIA *ruscifolia.—Lamour. Ess.* p. 124; *Ag. Sp. Alg.* vol. i. p. 175; *Ag. Syst.* p. 249; *Grev. Alg. Brit.* p. 76; *Hook. Br. Fl.* vol. ii. p. 286; *Endl.* 3rd Suppl. p. 53; *M'Calla, Alg. Hib.* No. 12; *Harv.* in *Mack. Fl. Hib.* part 3, p. 192; *Harv. P. B.* plate 26; *Harv. Man.* p. 115; *Harv. Syn.* p. 98; *Atlas*, plate 40, fig. 182; *J. G. Agardh, Sp. Gen. Alg.* vol. ii. p. 695.

WORMSKIOLDIA *ruscifolia.—Spreng. Syst. Veg.* vol. iv. p. 331.

HYPOGLOSSUM *ruscifolium.—Kütz. Phyc. Gen.* p. 444.

FUCUS *ruscifolius.—Turn.* in *Linn. Trans.* vol. vi. p. 127, t. 8, fig. 1; *Syn. Fuc.* p. 11; *Hist.* t. 15; *Sm. Eng. Bot.* t. 1395.

HAB.—Generally on rocks near low-water mark, sometimes on other Algæ. Annual. Spring, summer, and autumn. Not uncommon on the shores of England and Ireland (*Harvey*). Not found in Scotland.

GEOGR. DIST.—Atlantic shores of Europe; Cape of Good Hope (*Dr. Harvey*); Van Diemen's Land (*Mr. Gunn*).

DESCRIPTION.—Root, a small conical disc. Stem, scarcely any, winged almost from the base by the membranous leaflets of the frond. Frond bushy, oblong, obtuse at each end, two to four inches long, and two to four lines in breadth, entire but waved at the margin, three to four, or in very luxuriant specimens, five times proliferous from the midrib, with leaflets of a similar form to the primary frond: midrib strong, without secondary branches, but giving off on each side innumerable indistinct, pellucid, branching striæ; the branches anastomosing, and formed of a single series of oblong cells, proceeding obliquely upwards from the midrib to the margin, and giving off branches obliquely downwards, so as to form very delicate network, with irregularly rhomboidal meshes. Tubercles are produced on the midribs near the apices of the fronds. Tetraspores form linear sori on each side of the midrib, mostly three- or four-parted. Substance cartilaginous, adhering to paper. Colour, a bright but deep crimson.

This species, like its near ally, *D. hypoglossum*, finds its northern limit of distribution on our southern shores, and has not, so far as we know, been found on those of Scotland, or even on the northern ones of England or Ireland. Somewhat rarer in this country than *D. hypoglossum*, its geographical range appears more extensive, as it has been found at the Cape of Good Hope, and even on the shores of Van Diemen's Land.—*Phyc. Brit.*

Besides the differences in the outline of the fronds, noticed under the last species, an additional character may be found in the latter's anastomosing veinlets, which are always much more apparent in the present species than in the last. The cellules are also considerably smaller, and the structure more compact and firmer, than in that species, and the colour somewhat less fugacious.

EXPLANATION OF PLATE XLIV.

Fig. 1.—*Delesseria ruscifolia*, natural size.
2.—Frondlet with tubercle.
3.—Section of same.
4.—Portion of frondlet with globule of spores.
5.—Spores from same.
6.—Frondlet with tetraspores.
7.—Section of same.
8.—Tetraspores. All magnified.

Delesseria sinuosa. Lamour.

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PLATE XLV.

DELESSERIA SINUOSA.—*Lamour.*

GEN. CHAR.—Frond flat, membranous, with a percurrent midrib. Fructification of two kinds, on distinct individuals : 1. Spherical tubercles (coccidia), immersed in the frond and containing a globular mass of spores ; 2. Tetraspores, forming definite spots either in the frond or in proper leaf-like processes. Name in honour of Baron B. Delessert, a distinguished French botanist and patron of botany.

DELESSERIA *sinuosa.*—Stem somewhat elongated, branched, beset with obovate, oblong or lanceolate, sinuate or pinnatifid, transversely ribbed leaves.

DELESSERIA *sinuosa.*—*Lamour. Ess.* p. 124 ; *Lyngb. Hyd. Dan.* p. 7, t. 2 ; *Ag. Sp. Alg.* vol. i. p. 174 ; *Ag. Syst.* p. 248 ; *Hook. Fl. Scot.* part 2, p. 100 ; *Grev. Fl. Edin.* p. 292 ; *Grev. Alg. Brit.* p. 73 ; *Hook. Br. Fl.* vol. ii. p. 285 ; *Wyatt, Alg. Danm.* No. 62 ; *Endl.* 3rd Suppl. p. 53 ; *Harv.* in *Mack. Fl. Hib.* part 3, p. 191 ; *Harv. Man.* p. 114 ; *Harv. Syn.* p. 96 ; *Atlas*, plate 37, fig. 170 ; *Harv. N. B. A.* part 2, p. 93 ; *J. G. Agardh, Sp. Gen. Alg.* vol. ii. p. 691.

WORMSKIOLDIA *sinuosa.*—*Spreng. Syst. Veg.* vol. iv. p. 331.

FUCUS *sinuosus.*—*Good. & Woodw.* in *Linn. Trans.* vol. iii. ; *Eng. Bot.* t. 822 ; *Turn. Syn.* p. 1 ; *Turn. Hist.* t. 35.

FUCUS *crenatus.*—*Gm. Hist. Fuc.* p. 184, t. 24, fig. 4 ; *Linn. Syst. Gm.* p. 1388.

FUCUS *rubens.*—*Huds. Fl. Ang.* p. 573 ; *Light'f. Fl. Scot.* p. 943 ; *Stack. Ner. Brit.* p. 18, t. 7.

FUCUS *roseus.*—*Fl. Dan.* t. 652.

FUCUS *palmetta*, varietas.—*Esper, Ic. Fuc.* vol. i. p. 84, t. 42.

HAB.—Attached to the stems of *Laminaria digitata*, rocks, sponges, &c., at and beyond low-water. Perennial. Summer and autumn. Common all round the British coasts.

GEOGR. DIST.—Atlantic shores of Europe and North America.

DESCRIPTION.—Root, a small flattened disc. Stem, one to two inches long, half a line in thickness, cylindrical, forming the percurrent midrib. Frond flat, membranaceous, oblong, obovate or lanceolate, toothed, sinuate, or more or less deeply pinnatifid ; all the margins toothed or fringed with slender ciliæ. Tubercles situated on the upper portion of the nerve of the leaf or on little leaf-like processes arising from it, containing a tuft of beaded filaments, ultimately resolved into spores. Tetraspores forming sori in the apices of the marginal nerves, or, more frequently occupying the marginal ciliæ. Substance cartilagino-membranaceous, rather tough, imperfectly adhering to paper. Colour, a fine rich lake.

This species when in fine condition is a noble plant. Abundant in its distribution, it may be found almost everywhere, even in places where there is a considerable admixture of fresh water, and in intratidal pools, but never where it is left dry by the tide, and the finest specimens are found at and beyond low-water.

Dr. Harvey gives us the following interesting account of the process of its development: "At first the plant consists of a simple, penninerved leaf, sinuated at the margin. The sinuosities gradually deepen into lateral lobes; and these lobes, as is shown in the lower part of the figure (*Phyc. Brit.* plate 259), deepen into branches or new fronds, at first sinuous, then lobed, and at length divided like the fronds from which they grow. Thus, eventually, a much branched and leafy frond results from the original leaf, by regular growth and subdivision of the margin. When any vigorous part is wounded, an irregular, proliferous growth likewise takes place, new leaflets springing from any part of the midrib."

EXPLANATION OF PLATE XLV.

Fig. 1.—*Delesseria sinuosa,* natural size.
2.—Frond with tubercle.
3.—Section of same.
4.—Filaments from same.
5.—Portion of frond with tetraspores.
6.—Marginal process with same.
7.—A tetraspore. All magnified.

NITOPHYLLUM Bonnemaisoni GREV.

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PLATE XLVI.

NITOPHYLLUM BONNEMAISONI.—*Grev.*

GEN. CHAR.—Fronds membranaceous, reticulated, bright red; without veins, or with irregular veins at the base. Fructification of two kinds, on distinct plants: 1. Spherical tubercles (coccidia), immersed in the frond, containing a mass of angular spores; 2. Tetraspores, in spots scattered over the frond. *Nitophyllum*, corruptly formed from *nitor*, "to shine," and *φύλλον*, "a leaf;" shining-leaf.

NITOPHYLLUM *Bonnemaisoni.*—Frond from a short cylindrical stem, suddenly expanding into a broad, round, or subflabelliform frond, irregularly cleft into numerous, obcuneate segments, very obscurely veined at the base; granular sori roundish, scattered over the frond.

NITOPHYLLUM *Bonnemaisoni.—Grev. Alg. Brit.* p. 81; *Hook. Br. Fl.* vol. ii. p. 287; *Harv.* in *Mack. Fl. Hib.* part 3, p. 193; *Harv. P. B.* plate 23; *Harv. Man.* p. 117; *Harv. Syn.* p. 100; *Atlas*, plate 40, fig. 185; *J. G. Agardh, Sp. Gen. Alg.* vol. ii. p. 665.

DELESSERIA *Bonnemaisoni.—Ag. Sp. Alg.* vol. i. p. 186; *Ag. Syst.* p. 252; *Grev. Sc. Crypt. Fl.* t. 322.

AGLAIOPHYLLUM *Bonnemaisoni.—Endl.* 3rd Suppl. p. 52.

HAB.—On rocks, stones, old shells, and the stems of *Laminaria*, in four to five fathoms water. Annual. Summer. Rather rare. Orkney (*Rev. C. Clouston*); Peterhead (*Mr. T. Bell*); Bute (*Dr. Greville*); Larne (*Dr. Drummond*); Youghal (*Miss Ball*); Torquay and Ilfracombe (*Mrs. Griffiths*); Minehead (*Miss Gifford*); Tramore (*Miss Taylor*); Miltown Malbay and Kilkee (*Dr. Harvey*); Strangford Lough (*Mr. W. Thompson*); Jersey (*Miss White*).

GEOGR. DIST.—British Islands; Coast of Normandy (*Bonnemaison*).

DESCRIPTION.—Root, a very narrow, flattened disc. Frond from a short cylindrical stem, scarcely a quarter of an inch in length, roundish, obcuneate or flabelliform, three to four times divided in a somewhat dichotomous manner into numerous lobes, which are obcuneate or widening upwards; the axils and apices somewhat rounded, the latter trifid or quadrifid, the ultimate divisions unequal, the length two to five inches. The veins at the base are generally very obscure, soon vanishing in the substance of the frond; at other times they are more apparent, and extend to the middle, but are very slightly elevated. The outline of the frond, and its divisions also, varies from broadly obcuneate to irregularly linear. Structure, rather open roundish cells. Substance very thin, delicate, adhering firmly to paper. Colour, a fine bright though somewhat pale rose pink. Tubercles rather small, scattered over the surface of the frond. Tetraspores in minute, roundish oblong spots, plentifully scattered over the surface of the frond.

In this species the basal veins are very obscurely developed, and seem more like a shading down of the short stem into the substance of the frond than true veins; in some specimens, however, they become more apparent, and extend nearly to the middle of the frond ; but even then are scarcely at all branched, and are never so perfectly developed as in *N. Hilliæ*. In colour it more nearly resembles *N. punctatum*, but is darker ; the substance is firmer, and the branching is more palmate than dichotomous, the divisions being always more or less wedge-shaped or widened towards the apices. From *N. Gmelini* it may be known by the more divided outline, more rounded apices of the segments, and when in fruit by the scattered tetraspores.

EXPLANATION OF PLATE XLVI.

Fig. 1.—*Nitophyllum Bonnemaisoni*, natural size.
2.—Portion of frond with tubercle.
3.—Spores from same.
4.—Portion of frond with sorus.
5.—Tetraspores from same. All magnified.

NITOPHYLLUM *Gmelini*, GREV.

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PLATE XLVII.

NITOPHYLLUM GMELINI.—*Grev.*

GEN. CHAR.—Fronds membranaceous, reticulated, bright red; without veins, or with irregular veins at the base. Fructification of two kinds, on distinct plants: 1. Spherical tubercles (coccidia), immersed in the frond, containing a mass of angular spores; 2. Tetraspores, in spots scattered over the frond. *Nitophyllum*, corruptly formed from *nitor*, "to shine," and *φύλλον*, "a leaf;" shining-leaf.

NITOPHYLLUM *Gmelini.*—Frond shortly stalked, roundish, divided in a flabelliform manner into broad, oblong segments, which are mostly widened upwards, waved and crisped at the margins, the base marked with branching veins; tetraspores in linear marginal sori.

NITOPHYLLUM *Gmelini.*—*Grev. Alg. Brit.* p. 82; *Hook. Fl. Brit.* vol. ii. p. 288; *E. Bot.* Suppl. t. 2779; *Wyatt, Alg. Danm.* No. 65; *Harv.* in *Mack. Fl. Hib.* part 3, p. 193; *Harv. P. B.* plate 235; *Harv. Man.* p. 118; *Harv. Syn.* p. 100; *Atlas*, plate 38, fig. 176; *J. G. Agardh, Sp. Gen. Alg.* vol. ii. p. 656.

AGLAIOPHYLLUM *Gmelini.*—*Mont. Endl.* 3rd Suppl. p. 52; *Kütz. Phyc. Gen.* p. 443.

DELESSERIA *Gmelini.*—*Lamour. Ess.* p. 36.

HAB.—On rocks and the larger Algæ, near low-water mark, as well as in deep water. Annual. Summer. South of England, abundant at Plymouth; Minehead, Somerset; north and west of Ireland; Jersey.

GEOGR. DIST.—Atlantic coasts of France and Spain.

DESCRIPTION.—Root, a broad somewhat conical disc. Stem cylindrical, half an inch to an inch in length. Fronds with a roundish outline, three to six inches long, divided half-way in a flabelliform manner into rather broad segments, sometimes tapering upwards, but mostly broad and rounded, and again slightly divided at the summit; the margins waved and crisped; sometimes the divisions extend almost to the base, while at others they only extend about one-third; the margins at one time nearly entire, at another more or less jagged and cut into lobes or laciniæ, but always much waved and crisped. The base marked with more or less evident, slightly branching veins, which sometimes disappear below the middle, at other times extend almost to the summit of the frond. Structure composed of rather large, roundish, or irregularly hexagonal cells. Substance somewhat cartilaginous, firm when fresh, but becoming more flaccid in fresh water, and then imperfectly adhering to paper. Colour, a deep purplish lake, becoming brighter in drying, the surface more or less glossy. Tubercles mostly confined to the margin and the upper parts of the frond, rather large, depressed. Tetraspores triparted, scattered along the margin in rather broad, irregular sori.

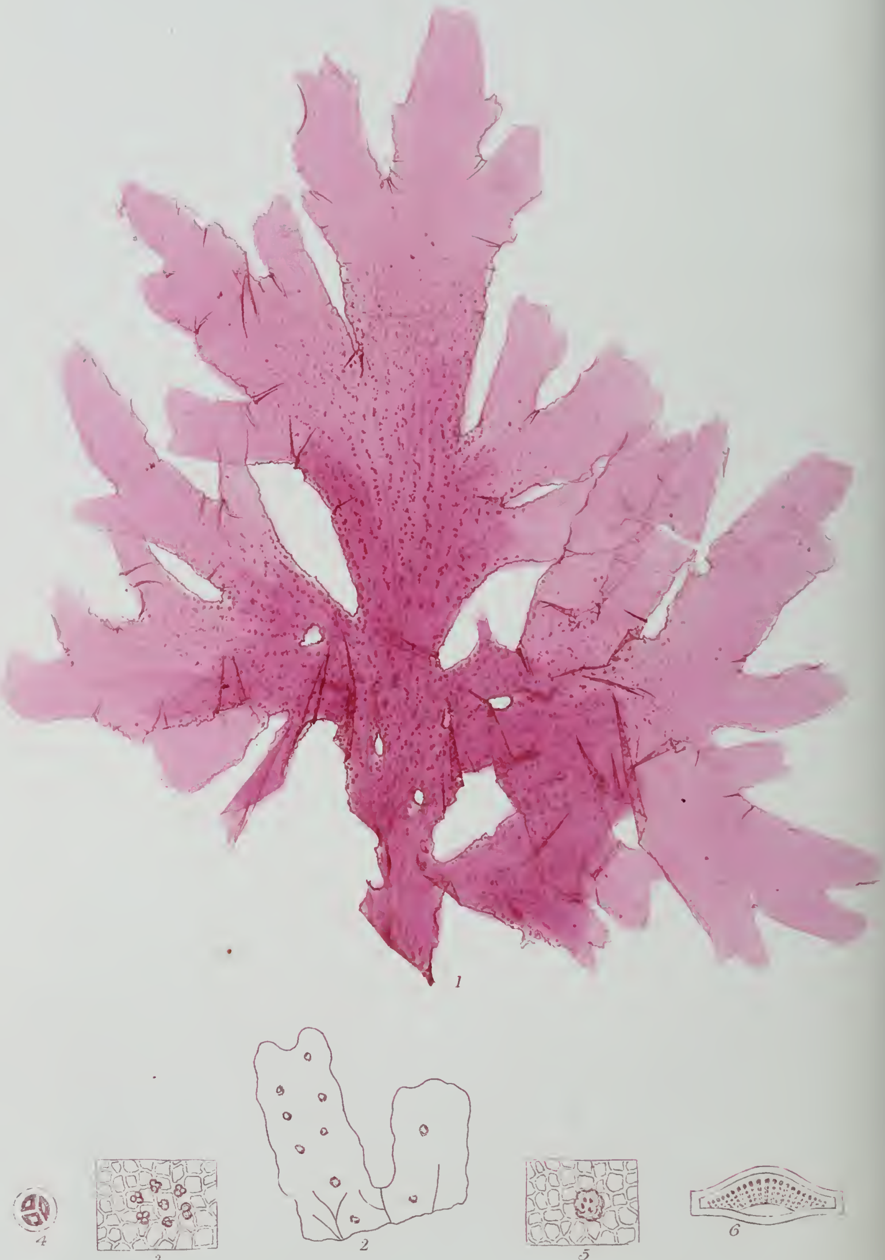
This fine species is best distinguished from all the other British species, except *N. laceratum*, by the marginal lines of tetraspores. From *N. laceratum* it may in general be known by its firmer and more cartilaginous fronds, broader and more rounded segments, and the veins at the base much less conspicuous; the marginal sori generally more elongated and continuous. In fruited specimens the segments are generally narrower and more acuminated than in barren ones, but rarely so linear or so regularly dichotomous as in *N. laceratum.*

It is rather remarkable that almost all the specimens of this species from Minehead are lacerated and jagged in a most irregular manner. We have, through the kindness of Miss Gifford, a suite of specimens all somewhat different, but none of them approaching the form of those found at Plymouth, and as figured in Plate XLVII.

EXPLANATION OF PLATE XLVII.

Fig. 1.—*Nitophyllum Gmelini*, natural size, young.
2.—The same, natural size, fully developed.
3.—Portion of frond with tubercles.
4.—Section of a tubercle.
5.—Sporiferous filaments from same.
6.—Portion of frond with tetraspores.
7.—A tetraspore. All magnified.

Plate XLVIII



Nitophyllum Hilliæ, Grev.

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Plate XLVIII.

NITOPHYLLUM HILLIÆ.—*Grev.*

Gen. Char.—Fronds membranaceous, reticulated, bright red; without veins, or with irregular veins at the base. Fructification of two kinds, on distinct plants: 1. Spherical tubercles (coccidia), immersed in the frond, containing a mass of angular spores; 2. Tetraspores, in spots scattered over the frond. *Nitophyllum*, corruptly formed from *nitor*, "to shine," and *φύλλον*, "a leaf;" shining-leaf.

Nitophyllum *Hilliæ.*—Frond shortly stalked, roundish, veined at the base, more or less deeply divided into broad, oblong lobes, with obtuse but rounded extremities, which, as well as the margins, are more or less waved or crenate; clusters of tetraspores scattered, very minute; tubercles rather large.

Nitophyllum *Hilliæ.*—*Grev. Alg. Brit.* p. 80; *Harv. P. B.* plate 169; *Harv. Man.* p. 117; *Harv. Syn.* p. 99; *Atlas*, plate 38, fig. 175; *J. G. Agardh, Sp. Gen. Alg.* vol. ii. p. 667.

Nitophyllum *ulvoideum.*—*Hook. Br. Fl.* vol. ii. p. 287; *Wyatt, Alg. Danm.* No. 16; *Harv. Man.* 1st ed. p. 57.

Aglaiophyllum *Hilliæ.*—*Endl.* 3rd Suppl. p. 52.

Delesseria *Hilliæ.*—*Grev. Crypt. Fl.* t. 351.

Hab.—On the shady sides of deep, tidal pools, near low-water mark. Rare. Annual. Summer and autumn. Plymouth (*Miss Hill, Messrs. Rohloff, Hore* and *Cocks*); Torquay (*Mrs. Griffiths*); Whitsand Bay (*Dr. Jacobs*); Scilly Islands (*Miss White*); Mount's Bay (*Mr. Ralfs*); Jersey (*Miss Turner, Miss Edgar, Mr. F. P. Girdlestone*); Valentia, Ireland (*Dr. Harvey, Phyc. Brit.*).

Geogr. Dist.—Coast of France. Rare.

Description.—Root, a small conical disc. Stem short, cylindrical for about a quarter of an inch, then gradually expanding for half an inch more. Frond roundish, somewhat flabelliform, very irregularly divided more or less deeply into broad, oblong lobes, which are sometimes again lobed; all their margins, and generally their obtuse but rounded apices, waved or crenate; their sinuses somewhat rounded. From the base proceed innumerable dark, branching, flexuose veins, which in some specimens proceed to the middle of the frond, while in others they terminate about one-third from the base; in some very fine and hair-like, in others much thicker and very apparent, gradually attenuated upwards, until lost in the substance of the frond. Structure composed of rather large, roundish cells, in two layers, the nervures produced by a slight enlargement of the cells, producing a thickening of the frond. Substance rather thick, but tender; and adhering to the paper. Colour, a fine deep crimson, not very glossy when dry. Tubercles rather large, "the size of turnip seed," sparingly scattered over the surface of the frond, containing a tuft of beaded filaments, the terminal articulations of which are at last converted into spores. Tetraspores triparted, grouped into roundish or roundish oblong sori, very minute, plentifully scattered over the surface of the frond.

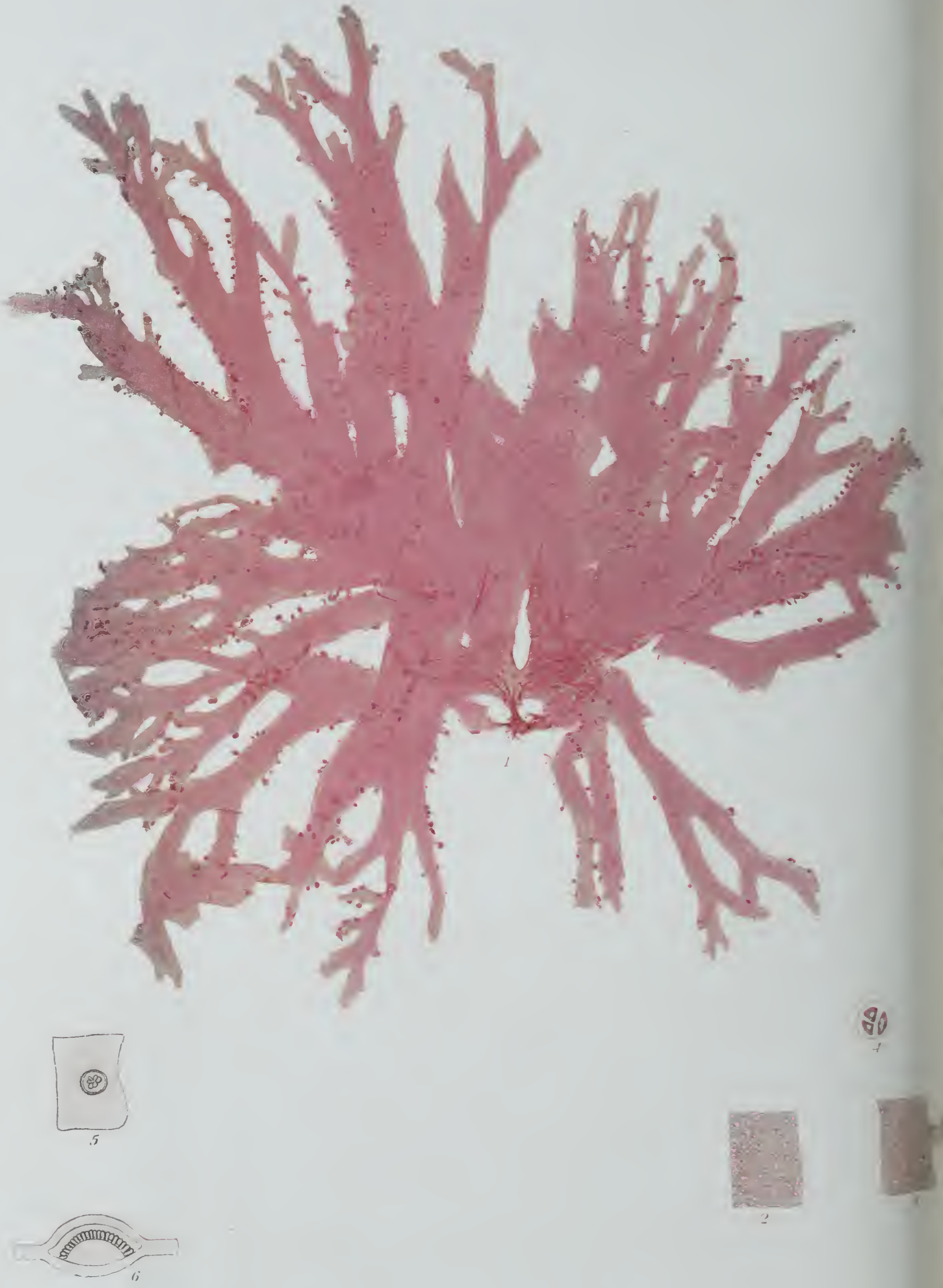
This species may be known in its barren state from its congeners, by its broad rounded lobes, with crenated margins, and when in fruit additional characters are found on the scattered, not marginal fructification. From *N. punctatum*, its thicker substance, darker colour, and basal veins readily distinguish it.

Its specific name commemorates services to botanical science of Miss Hill, a lady who devoted much attention to the elucidation of the marine vegetation of the vicinity of Plymouth.

The species is almost exclusively confined in this country to the south-west of England, and in Ireland has only been found near Valentia (*Dr. Harvey*); everywhere however rather rare, being an inhabitant of deep, quiet, shady pools, where it may at times escape observation except by the keen eye of the enthusiast.

EXPLANATION OF PLATE XLVIII.

Fig. 1.—*Nitophyllum Hilliæ*, natural size.
2.—Portion of a frond with tubercles.
3.—Portion of the surface with a sorus.
4.—Tetraspores.
5.—Portion of the surface with a tubercle.
6.—Vertical section of same. All magnified.



Nitophyllum laceratum, Grev.

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PLATE XLIX.

NITOPHYLLUM LACERATUM.—*Grev.*

GEN. CHAR.—Fronds membranaceous, reticulated, bright red; without veins, or with irregular veins at the base. Fructification of two kinds, on distinct plants; 1. Spherical tubercles (coccidia), immersed in the frond, containing a mass of angular spores; 2. Tetraspores in spots scattered over the frond. *Nitophyllum*, corruptly formed from *nitor*, "to shine," and φύλλον, "a leaf;" shining-leaf.

NITOPHYLLUM *laceratum*. — Frond scarcely stalked, much divided; divisions somewhat irregularly dichotomous, linear, obtuse but rounded, bifid, trifid, or more or less lobed at the summit, the margins waved and crisped; veins at the base well defined, branching and anastomosing; tetraspores marginal, or contained in small marginal leaf-like processes.

NITOPHYLLUM *laceratum*.—*Grev. Alg. Brit.* p. 83; *Hook. Brit. Fl.* vol. ii. p. 288; *Wyatt, Alg. Danm.* No. 107; *Harv.* in *Mack. Fl. Hib.* part 3; *Harv. P. B.* plate 267; *Harv. Man.* p. 118; *Harv. Syn.* p. 101; *Atlas*, plate 39, fig. 177; *Harv. N. B. A.* part 2, p. 104; *J. G. Agardh, Sp. Gen. Alg.* vol. ii. p. 657.

CRYPTOPLEURA *lacerata*.—*Kütz. Phyc. Gen.* t. 68, vol. iii. p. 444; *Sp. Alg.* p. 870.

AGLAIOPHYLLUM *laceratum*.—*Mont. Fl. Canar.* p. 150; *Endl.* 3rd Suppl. p. 52.

DELESSERIA *lacerata*.—*Ag. Sp. Alg.* vol. i. p. 184; *Ag. Syst.* p. 251; *Grev. Fl. Edin.* p. 293.

WORMSKIOLDIA *lacerata*.—*Spreng. Syst. Veg.* vol. iv. p. 332.

CHONDRUS *laceratus*.—*Lyngb. Hyd. Dan.* p. 18.

FUCUS *laceratus*.—*Gmel. Hist.* p. 179, t. 21, fig. 4; *Good. & Woodw. Linn. Trans.* vol. iii. p. 155; *Stack. Ner. Brit.* p. 77, t. 13; *Turn. Syn.* p. 154; *Turn. Hist.* t. 68; *E. Bot.* t. 1067.

FUCUS *crispatus*.—*Huds. Fl. Ang.* p. 58; *Linn. Syst. Nat.* p. 1718; *Esper, Ic. Fuc.* vol. i. p. 130, t. 90.

FUCUS *endiviæfolius*.—*Lightf. Fl. Scot.* p. 948, t. 32.

HAB.—On rocks, stones, and the larger Algæ, near low-water mark, and even to a considerable depth. Annual. Summer. Common round all our shores.

GEOGR. DIST.—Atlantic coasts of Europe and North America.

DESCRIPTION.—Root, a small conical disc, "often throwing out creeping fibres." Fronds almost stemless, four to nine inches long, thick and cartilaginous at the base, thinner and more delicate upwards; the main divisions more or less regularly dichotomous, the upper ones less regular, short, and obtuse, but rounded; all the divisions linear, oblong, or somewhat obcuneate, from one-eighth of an inch in breadth to one inch or more, and equally variable in length. In some specimens the divisions are almost linear, once or twice divided, the segments furnished with lateral lobes in a somewhat pinnated manner; in others they are broad, oblong, or obcuneate, bifid, trifid, or even subpalmate at the summit. The base marked with conspicuous, branched, and anastomosing veins, frequently extending beyond the middle; the margins often waved or fringed with minute laciniæ. We have two other curious varieties before us, in which apparently the remains of the old fronds of last year have resumed their vitality, and becoming repeatedly proliferous, the result has been, in the one case, a compound frond, composed of an aggregation of little, roundish frondlets, with crenated, multifid, or subpalmated margins, or in the other a simply palmated frond, with linear, almost entire segments one and a-half to two inches in length, and about a quarter of an inch in breadth, entire, or with very short lobes at the summit. Structure composed of minute, roundish, angular cells, in a double layer. Substance very thin and delicate, but firm, and not very perfectly adhering to paper. Colour, a bright purple lake or reddish brown, not changing when dry, reflecting glaucous tints when growing. Tubercles mostly marginal or in marginal leaflets, small, slightly convex. Tetraspores similarly disposed in roundish sori, which, by confluence, frequently become oblong or linear, rather large.

The most generally distributed species of the genus in these islands, being found in greater or less abundance all round the coast. It is likewise, however, one of the most polymorphous. It may in general, however, be distinguished by the minute, closely packed cells of the surface from *N. Gmelini*, and from the other species by the marginal fructification, which, especially the tetraspores, are seldom wanting. From *Callophyllis laciniata*, to which it has some outward resemblance, and with which it is occasionally confounded, it may be readily known by the basal veins and the cellular structure.

EXPLANATION OF PLATE XLIX.

Fig. 1.—*Nitophyllum laceratum*, natural size.
2.—Portion of frond with marginal spot of tetraspores.
3.—Marginal processes with spot of tetraspores.
4.—A tetraspore.
5.—Portion of membrane with marginal coccidium.
6.—Section of same. All magnified.

Nitophyllum punctatum, Grev.

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PLATE L.

NITOPHYLLUM PUNCTATUM.—*Grev.*

GEN. CHAR.—Fronds membranaceous, reticulated, bright red; without veins, or with irregular veins at the base. Fructification of two kinds, on distinct plants: 1. Spherical tubercles (coccidia), immersed in the frond, containing a mass of angular spores; 2. Tetraspores, in spots scattered over the frond. *Nitophyllum*, corruptly formed from *nitor*, "to shine," and φύλλον, "a leaf;" shining-leaf.

NITOPHYLLUM *punctatum.*—Frond extremely delicate, entirely nerveless at the base, either oblong or somewhat obovate, with the margin more or less fringed with oblong, subdichotomous segments, their apices emarginate or bifid, or regularly dichotomous from the base; the segments linear oblong; the axils much rounded; spots of granules roundish oblong, scattered over the whole surface of the frond.

NITOPHYLLUM *punctatum.*—*Grev. Alg. Brit.* p. 79, t. 12; *Hook. Br. Fl.* vol. ii. p. 287; *Hook. fil. et Harv.* in *Lond. Journ.* vol. vi. p. 403; *Harv.* in *Mack. Fl. Hib.* part 3, p. 192; *Harv. P. B.* plates 202 & 203; *Harv. Man.* p. 116; *Harv. Syn.* p. 99; *Atlas*, plate 38, figs. 173 & 174; *Harv. N. B. A.* part 2, p. 104; *J. G. Agardh, Sp. Gen. Alg.* vol. ii. p. 659.

AGLAIOPHYLLUM *punctatum.*—*Mont. Endl.* 3rd Suppl. p. 52; *Kütz. Phyc. Gen.* p. 443.

WORMSKIOLDIA *punctata.*—*Spreng. Syst. Veg.* vol. iv. p. 331.

DELESSERIA *punctata.*—*Ag. Sp. Alg.* vol. i. p. 186; *Ag. Syst.* p. 252; *Hook. Fl. Scot.* part 2, p. 101; *Grev. Fl. Edin.* p. 294.

DELESSERIA *ulvoides.*—*Hook. Fl. Scot.* part 2, p. 101.

FUCUS *punctatus.*—*With. Br. Ar.* 6th edit. vol. iv. p. 120; *E. B.* t. 1575; *Turn. Hist.* t. 71.

FUCUS *ulvoides.*—*Turn. Hist.* t. 80.

ULVA *punctata.*—*Stack.* in *Linn. Trans.* vol. iii. p. 236.

HAB.—Attached to Algæ, in pools at extreme low-water mark, and beyond in three to fifteen fathoms water. Annual. Summer. Not uncommon all round our coasts.

GEOGR. DIST.—Atlantic shores of Europe and North America; Mediterranean Sea; Tasmania.

DESCRIPTION.—Root, a small flattened disc. Frond reticulated, very thin and delicate, oblong, ovate or subflabelliform, generally from five to twelve inches long, but very variable in size and form, sometimes twenty inches or even two feet in length, with an obovate or subflabelliform outline, the margin, especially towards the extremity, showing a tendency to divide dichotomously, or the whole frond from the base regularly and repeatedly dichotomous; the divisions linear oblong, their margins either plane or more or less crisped, and their extremities obtuse, emarginate, or bifid, from the commencement of another dichotomy. The intermediate forms between these two extremes are almost innumerable. Generally the frond has more or less of an evident but flattened stem, seldom, however, above a quarter of an inch in length, and entirely without nervures. Structure entirely composed of roundish angular cells, somewhat compressed from the surface. Substance very thin and delicately membranous, closely adhering to paper. Colour, a rather pale but clear rose-pink, bright and glossy, and not changing in drying. Fructification of both kinds not uncommon, generally more or less scattered over the whole surface of the frond, sometimes mostly collected in the central or main portion, and at others grouped together in the marginal segments. Tubercles "as large as turnip-seeds," hemispheric, containing a tuft of obovate, stalked spores. Tetraspores in rounded oblong sori, triparted, sometimes closely packed, at other times few and scattered.

Dr. Harvey has pointed out the following marked varieties of this variable species :—

Var. β. *ocellatum.*—Frond with a roundish outline, cleft nearly to the base ; the segments repeatedly dichotomous, linear.

Nitophyllum *punctatum*, β *ocellatum.*—*Harv. P. B.* plate 203 ; *Harv. Man.* p. 116 ; *Harv. Syn.* p. 99 ; *Atlas*, plate 38, fig. 174 ; *J. G. Agardh, Sp. Gen. Alg.* vol. ii. p. 659.

Nitophyllum *ocellatum.*—*Grev. Alg. Brit.* p. 78 ; *Hook. Br. Fl.* vol. ii. p. 286 ; *Wyatt, Alg. Danm.* No. 15 ; *J. Ag. Alg. Medit.* p. 156.

Aglaiophyllum *ocellatum.*—*Mont.* in *Zanard, Saggio*, &c., p. 46 ; *Endl.* 3rd Suppl. p. 52 ; *Kütz. Phyc. Gen.* p. 443.

Delesseria *ocellata.*—*Lam. Ess.* p. 125 ; *Ag. Sp. Alg.* vol. i. p. 187 ; *Ag. Syst.* p. 252 ; *Grev. Crypt.* t. 347.

Wormskioldia *ocellata.*—*Spreng. Syst. Veg.* vol. iv. p. 331.

Halymenia *ocellata.*—*Duby, Bot. Gall.* p. 945.

Fucus *ocellatus.*—*Lam. Diss.* t. 32.

Fucus *granateus.*—*Lam. Diss.* t. 33, figs. 3, 4.

Hab.—Torquay and Budleigh (*Mrs. Griffiths*) ; Penzance (*Mr. Ralfs*) ; Mount Edgecombe (*Rev. W. S. Hore*) ; Forres (*Mr. Brodie*) ; Bantry Bay (*Miss Hutchins*).

Var. γ. *crispatum.* — Frond thickish, cleft nearly to the base; the segments irregularly dichotomous, linear, with the margin strongly curled.

NITOPHYLLUM *punctatum, γ crispatum.—Harv. P. B.* plate 203.

HAB.—Kilkee (*Dr. Harvey*); Roundstone Bay (*Mr. M'Calla*); Mount Batten (*Mr. Rohloff*).

Var. δ. *Pollexfenii.* — Frond proliferous, the young segments broadly obovate, rounded, very entire or bifid.

NITOPHYLLUM *punctatum, δ Pollexfenii.—Harv. P. B.* plate 203.

NITOPHYLLUM *punctatum, δ Alliaceum.—J. G. Agardh, Sp. Gen. Alg.* vol. ii. p. 660.

NITOPHYLLUM *Pollexfenii.—Grev. MSS.* in *Herb.*

HAB.—Orkney (*Rev. J. H. Pollexfen*).

Var. ε. *fimbriatum.*—Segments broadly obovate, fringed with narrow, forked processes.

Harv. P. B. after description of above.

HAB.—Roundstone Bay (*Mr. M'Calla*).

This genus is readily distinguished from the preceding by the entire absence of the midrib, the only approximation to it being in the form of diffused hair-like basal nervelets as in *laceratum* and *Gmelini*, there being no real costa in any of the species. The species are all beautiful plants, remarkable for their thin, delicately reticulated fronds, the characters of which, however, are unfortunately rather more easily observed by the eye than definable in words. They are mostly ocean rather than sea-plants, only one species so, *N. laceratum*, having been found on the east coasts of Britain; their favourite habitats being on the Atlantic shores, where they are sometimes found luxuriating in great beauty as well as abundantly.

Nothing could be more unlike than the extreme forms of the present species, yet the intermediate states are so numerous, and pass into each other by so imperceptible gradations, that we have not the least hesitation in adopting the above arrangement proposed by Dr. Harvey.

In a plant of such a variable aspect, it is no easy matter to point out any *primâ facie* characters by which it might be readily distinguished from its congeners, especially to the young and inexperienced collector. The paler, more transparent colour will generally distinguish it when the plants are side by side, but that being rather a character of degree, cannot be defined in words so as to be rendered appreciable on first sight. The more regularly dichotomous branching, the larger and more conspicuous fruit, scattered over the whole surface of the frond, will prove valuable when the plants are in fruit, and the linear oblong, obtuse, or emarginate lobes will generally be available ; the substance is also more tender and delicate than in the other species. Although not the most common species in the British islands, it seems to have the widest distribution, being found on the east coast of North America, and even in the Southern Ocean.

EXPLANATION OF PLATE L.

Figs. 1 & 2.—*Nitophyllum punctatum,* natural size.
3.—Vertical section of a tubercle.
4.—Spores from same.
5.—A sorus.
6.—Tetraspores from same. All magnified.

NITOPHYLLUM *versicolor*, HARV.

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Plate LI.

NITOPHYLLUM VERSICOLOR.—*Harv.*

Gen. Char.—Fronds membranaceous, reticulated, bright red; without veins, or with irregular veins at the base. Fructification of two kinds, on distinct plants: 1. Spherical tubercles (coccidia), immersed in the frond, containing a mass of angular spores; 2. Tetraspores, in spots scattered over the frond. *Nitophyllum*, corruptly formed from *nitor*, "to shine," and *φύλλον*, "a leaf;" shining-leaf.

Nitophyllum *versicolor.* — Stem elongated, subcylindrical, cartilaginous, suddenly expanding into a roundish, flabelliform frond, variously divided almost to the base; the segments irregularly palmate or multifid, with rounded, generally callous tips, producing branched, cellular filaments.

Nitophyllum *versicolor.—Harv. P. B.* plate 9; *Harv. Man.* p. 118; *Harv. Syn.* p. 101; *Atlas*, plate 40, fig. 181; *J. G. Agardh, Sp. Gen. Alg* vol. ii. p. 669.

Aglaiophyllum *versicolor.—Kütz. Sp.* p. 868!

Hab.—Thrown up, probably from deep water. Annual. June to August. Ilfracombe (*Miss Hill*, 1800, and *Mrs. Griffiths*); Youghal (*Miss Ball*, 1834).—*Phyc. Brit.*

Geogr. Dist.—Southern shores of England and Ireland.

Description.—Root, a hard, flattened, conical disc. Stem subcylindrical, elongated, from half an inch to an inch in length, simple or once or twice branched in a proliferous manner, suddenly expanding into a roundish, flabelliform frond, variously divided almost to the base with broad, rounded sinuses, into broad, obcuneate, obtuse, multifid segments, the apices of which are rounded, obtuse, and frequently thickened, as well as portions of the lateral margins, into a round or oblong callosity, of which the upper margin, and occasionally the disc, produce elongated, branched fibres of a soft cellular substance. The fibres first appear in the form of minute papillæ at the margin of the callosity. These papillæ soon become elongated into fibres, these ultimately shoot into branches, and become more numerous, till the margin of the disc becomes thickly fringed with them. The callosity itself appears to be filled with a dense mass of granular endochrome. Structure composed of large, roundish cells. Substance rather thick but somewhat flaccid, and rather closely adhering to paper. Colour, when fresh, rose red, changing to a golden yellow by contact with water, but resumes its original colour in drying, and retains it. Fructification unknown.

This very pretty species may at once be known from *N. Bonnemaisoni* and *N. Gmelini*, its nearest allies, by the curious fibrillose callosities on the apices of the fronds, which are seldom absent in full grown plants; the larger cellules, and the much more distinct cylindrical stem with the swelling immediately above will serve as additional marks of distinction.

The plant seems first to make its appearance in the form of a wide obcuneate frondlet, the apex of the wedge terminating in the short, slender, cylindrical footstalk, from one-eighth to a quarter of an inch in length. This frondlet expands, becomes bifid, trifid, or quadrifid, and these divisions form the primary segments of the frond. By the excessive expansion of these in their upper part, and their repeated subdivision, the outer lobes often become so much bent backward as to meet across the stem, giving the frond the appearance of being subpeltate.

The species has only been observed in the south of England and Ireland, and in both places only cast on shore, so that its true habitat is still unknown. Most likely, however, it is a native of deep water, and at no great distance from low water, as the specimens when gathered seem quite fresh and in good condition. By Miss Gifford, of Minehead, we have been favoured with a beautiful series of specimens illustrating the plant in its various states and stages of growth, and to this lady we are deeply indebted for her constant assiduity in collecting, and her unwearied zeal in recording, whatever is interesting in the marine botany of her neighbourhood.

EXPLANATION OF PLATE LI.

Fig. 1.—*Nitophyllum versicolor*, natural size.
2, 3.—The same, young, natural size.
4.—Apices producing calli.
5.—Section of a callus.
6.—Granules with which callus is filled.
7.—Structure of frond. All magnified.

Calliblepharis ciliata Kütz.

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PLATE LII.

CALLIBLEPHARIS CILIATA.—*Kütz.*

GEN. CHAR.—Fronds flat, subcoriaceous, without midrib or veins, cellular; central cells rather large, oblong, those of the surface excessively minute. Fructification of two kinds, on distinct plants: 1. Convex tubercles (coccidia), "having a thick cellular pericarp," containing a dense tuft of articulated filaments, the upper articuli of which are ultimately converted into spores; 2. Zoned tetraspores, imbedded among the cells of the surface, and either scattered over the frond, or contained in the marginal ciliæ. Name from *κάλλος*, "beautiful," and *βλεφαρίς*, "cilia;" referring to the beautifully ciliated margins of some of the varieties.

CALLIBLEPHARIS *ciliata.*—Frond from a fibrous base, shortly stipitate, thick, subcartilaginous, simple or once or twice divided; the divisions simple or having the margins furnished with large lanceolate laciniæ, whose margins, as well as those of the frond, are everywhere ciliated with coarse, simple, dentate or even branched ciliæ, in which the tubercles are imbedded. Tetraspores in cloud-like patches, scattered over the frond.

CALLIBLEPHARIS *ciliata.*—*Kütz. Phyc. Gen.* p. 404, t. 62, vol. iii.; *J. G. Agardh, Sp. Gen. Alg.* vol. ii. p. 619; *Harv. N. B. A.* part 2, p. 105.

RHODYMENIA *ciliata.*—*Grev. Alg. Brit.* p. 90; *Hook. Br. Fl.* vol. ii. p. 291; *Wyatt, Alg. Danm.* No. 67; *Endl.* 3rd Suppl. p. 51; *Harv.* in *Mack. Fl. Hib.* part 3, p. 194; *Harv. P. B.* plate 127; *Harv. Man.* p. 126; *Harv. Syn.* p. 106; *Atlas*, plate 41, fig. 187.

DELESSERIA *ciliata.*—*Lamour. Ess.* p. 37.

HALYMENIA *ciliata.*—*Gaill. Dict. Sc. Nat.* vol. liii. p. 361.

SPHÆROCOCCUS *ciliatus.*—*Ag. Syn.* p. 28; *Lyngb. Hyd. Dan.* p. 12, t. 4; *Ag. Sp. Alg.* vol. i. p. 263; *Ag. Syst.* p. 221; *Spreng. Syst. Veg.* vol. iv. p. 334; *Hook. Fl. Scot.* part 2, p. 103.

FUCUS *ciliatus.*—*Linn. Mont.* pp. 136, 519 (excl. Syn. *Gmel.*); *Syst. Nat.* p. 718; *Huds. Fl. Angl.* p. 580; *Light. Fl. Scot.* p. 944; *Stack. Ner. Brit.* p. 90, t. 15; *Turn. Syn.* vol. i. p. 169; *Sm. E. Bot.* t. 1069; *Turn. Hist. Fuc.* t. 70, fig. a.—e.; *Linn. Trans.* vol. iii. p. 160; *Hook. Iceland Tour*, vol. ii. p. 347.

HAB.—In tide-pools near low-water mark, and in deep water. Annual. Fruit in winter. Common on the shores of England, and of the south and west of Ireland. Rare in Scotland; Iona (*Lightf.*); Orkney (*Lieut. T.* and *Dr. McBain*); Cumbraes (*Major Martin*); Arran (*Rev. Dr. Landsborough*).

GEOGR. DIST.—Northern Atlantic Ocean; Greenland; Iceland; Faroe Islands. Europe: Norway to Spain.

DESCRIPTION.—Root composed of strong cartilaginous branching fibres.

Fronds tufted, from two to ten inches long, or more. Stem short, cylindrical, tapering into an oblong ovate or lanceolate, simple or once or twice divided frond; frequently having the margin furnished with broad, lanceolate, simple or forked laciniæ, which are often much attenuated towards the base, all the margins fringed with small, simple, or more or less toothed ciliæ, which often extend to the surface of the frond. Substance thick and cartilaginous; the older specimens not adhering very well to paper. Colour, a rather dull deep red, becoming darker when dry. Tubercles always lodged near the extremity of the ciliæ on the margin and disc, swelling them generally on the one side, the point of the cilia being turned to the other so as to make the cilia with its inclosed tubercle often resemble the head of a bird in miniature. The tubercle is hollow, and contains, affixed to one side by a central point, a dense tuft of moniliform filaments, becoming gradually thicker and more spherical upwards, the terminal cells being at length transformed into spores. Tetraspores appear in indistinct, oblong spots on the surface of the frond, and are very minute, being ultimately divided transversely into four.

This genus differs from most of the *Rhodymeniæ* in its zoned tetraspores and more rigid coriaceous fronds, and from the species of the previous genus (*Nitophyllum*), by the entire absence of basal veins, and the minute cells of the surface.

The present species is one that assumes very many forms, but still there is little chance of confounding it with any but *jubata;* and we have seen cases where they were much alike. *C. ciliata* is however at all times of a more leathery texture. It is also only to be met with in perfection in winter, while *jubata* is strictly a summer plant. Our plates may be taken as fair specimens of their normal forms well developed.

EXPLANATION OF PLATE LII.

Fig. 1.—*Calliblepharis ciliata,* natural size.
2.—Portion of frond with tubercles.
3.—The same.
4.—A tubercle, transverse section.
5.—Sporiferous filaments from same.
6.—Portion of frond with tetraspores.
7.—The same.
8.—Tetraspore from same. All magnified.

Calliblepharis jubata, Kütz.

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PLATE LIII.

CALLIBLEPHARIS JUBATA.—*Kütz.*

GEN. CHAR.—Fronds flat, subcoriaceous, without midrib or veins, cellular; central cells rather large, oblong, those of the surface excessively minute. Fructification of two kinds, on distinct plants: 1. Convex tubercles (coccidia), "having a thick cellular pericarp," containing a dense tuft of articulated filaments, the upper articuli of which are ultimately converted into spores; 2. Zoned tetraspores, imbedded among the cells of the surface, and either scattered over the frond or contained in the marginal ciliæ. Name from κάλλος, "beautiful," and βλεφαρὶς, "cilia;" referring to the beautifully ciliated margins of some of the varieties.

CALLIBLEPHARIS *jubata.*—Frond linear or linear lanceolate, rather thick, subcartilaginous, much and irregularly branched upwards; the margins and frequently the disc and apices beset with simple or branched ciliæ, in which is imbedded the fructification.

CALLIBLEPHARIS *jubata.*—*Kütz. Phyc. Gen.* p. 404; *J. G. Agardh, Sp. Gen. Alg.* vol. ii. p. 620.

RHODYMENIA *jubata.*—*Grev. Alg. Brit.* p. 91; *Hook. Br. Fl.* vol. ii. p. 291; *Wyatt, Alg. Danm.* No. 18; *J. Ag. Alg. Medit.* p. 153; *Endl.* 3rd Suppl. p. 51; *Harv.* in *Mack. Fl. Hib.* part 3, p. 194; *Harv. P. B.* plate 175; *Harv. Man.* p. 127; *Harv. Syn.* p. 106; *Atlas,* plate 41, fig. 188.

SPHÆROCOCCUS *jubatus.*—*Grev. Scot. Crypt. Fl.* t. 359.

SPHÆROCOCCUS *ciliatus,* vars. *jubatus, linearis, angustus,* and *spinosus.*—*Ag. Sp. Alg.* vol. i. p. 264; *Ag. Syst.* p. 221.

FUCUS *jubatus.*—*Good. & Woodw. Linn. Trans.* vol. iii. p. 162, t. 17; *Stack. Ner. Brit.* p. 51, t. 11.

FUCUS *ciliatus,* vars. *jubatus, lanceolatus, angustus,* and *spinosus.*—*Turn. Hist.* t. 70, fig. f.—h.

HAB.—On stones, shells, and rocks, in tide-pools. Annual. Fruiting in summer. Common on the shores of the British Islands.

GEOGR. DIST.—Atlantic shores of Europe; Mediterranean Sea.

DESCRIPTION.—Root composed of branching fibres. Frond flat, rather thick and subcartilaginous, linear or linear lanceolate, producing a roundish obovate or subflabelliform outline, five to six inches in length, arising from a cylindrical stem, sometimes several inches in length, but more frequently very short, and gradually becoming flattened upwards, and expanding into a much or very irregularly divided frond; branches exceedingly irregular, both in form and mode of division, and often all on the same plant; at one time regularly and alternately pinnated, the pinnæ nearly uniform, at another scattered in the most irregular manner possible; in one specimen every part so narrow as to be almost filiform, with here and there a slight tendency to become flattened; all the divisions acuminated or prolonged into a simple or branched cilia, similar to those which, in the broader varieties at least, everywhere fringe the margins; sometimes the upper as well as the terminal ciliæ are very much produced and become clasping, twisting themselves round each other, and any other object within reach. Structure cellular, cells in numerous layers; inner rather large, ovate-oblong, outer strata of very minute, roundish, closely-packed, coloured cellules, concealing the central ones, and rendering the frond opaque. Substance firm, rigid, and subcartilaginous, scarcely adhering to paper. Colour, a dull purple red, the extremities of the fronds sometimes greenish. Tubercles spherical, sessile, attached to the margin of the ciliæ. Tetraspores imbedded in surface of the ciliæ, roundish oblong, transversely zoned.

We adopt this species with some diffidence, notwithstanding the high authority on which it rests; so puzzling are the forms in the numerous suite of specimens now before us. In the broader varieties, the ciliæ are always more or less abundant, in the filiform varieties they appear to be generally wanting, so that as far as form is concerned, the two extremes appear perfectly distinct, and have more the appearance of species, than many that would be referred to *C. jubata* and *C. ciliata* respectively.

EXPLANATION OF PLATE LIII.

Fig. 1.—*Calliblepharis jubata*, natural size.
2.—Cilium with tubercle.
3.—Vertical section of same.
4.—Tetraspores. All magnified.

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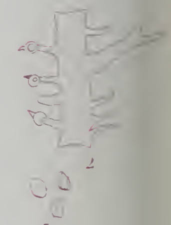

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Sphaerococcus coronopifolius, Ag.

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Plate LIV.

SPHÆROCOCCUS CORONOPIFOLIUS.—*Ag.*

Gen. Char.—Frond linear, much branched, cartilaginous, compressed, with three distinct layers of cells; central very minute, longitudinally elongated, densely packed, forming a kind of midrib of nearly the same width as the frond; second stratum large, roundish, becoming smaller externally; surface cells minute, disposed in vertical series. Fructification: 1. Spherical tubercles (coccidia), with a pericarp similar in structure to the frond, and containing a mass of minute, obconical spores attached to a central placenta; 2. Tetraspores unknown. Name from *σφαῖρα*, "a sphere," and *κόκκος*, "fruit."

Sphærococcus *coronopifolius.*—Frond much branched; branches subdichotomous, secondary series often secund, fringed with ciliæ, in which the tubercles are immersed.

Sphærococcus *coronopifolius.—Ag. Sp. Alg.* vol. i. p. 291; *Ag. Syst.* p. 229; *Grev. Alg. Brit.* p. 138, t. 15; *Hook. Br. Fl.* vol. ii. p. 304; *Wyatt, Alg. Danm.* No. 122; *J. Ag. Alg. Medit.* p. 154; *Endl.* 3rd Suppl. p. 52; *Harv.* in *Mack. Fl. Hib.* part 3, p. 203; *Harv. P. B.* plate 61; *Harv. Man.* p. 128; *Harv. Syn.* p. 108; *Atlas,* plate 42, fig. 191; *J. G. Agardh, Sp. Gen. Alg.* vol. ii. p. 644.

Gelidium *coronopifolium.—Lamour. Ess.* p. 41.

Rhynchococcus *coronopifolius.—Kütz. Phyc. Gen.* p. 403, t. 61, fig. 1.

Fucus *coronopifolius.—Good. & Woodw.* in *Linn. Trans.* vol. iii. p. 185; *Stack. Ner. Brit.* p. 82, t. 14; *Turn. Syn.* vol. ii. p. 288; *Turn. Hist.* t. 122; *E. Bot.* t. 1478; *Esper, Ic.* p. 60, t. 138; *Lamour. Dis.* t. 33.

Fucus *coronopi facie.—Raii Syn.* p. 45, No. 23.

Fucus *cartilagineus.—Huds. Fl. Angl.* p. 586 (not of *Linn.*); *Desf. Fl. Atlant.* p. 425.

Hab.—Found only at extreme low-water mark, and in deep water; mostly cast on shore after a storm. Perennial. Summer and autumn. Frequent on the southern shores of England, and southern and western shores of Ireland. Rare in Scotland. Bute (*Dr. Greville*); Ardrossan, Kilbride, and Arran (*Rev. Dr. Landsborough*); Moray Frith (in fruit) (*A. Croall*); Jersey (*Miss Turner, Miss White, Miss Edgar, Mr. F. P. Girdlestone*).

Geogr. Dist.—Atlantic shores of Europe; Mediterranean Sea.

Description.—Root, a flat conical disc. Frond linear, branched from near the base, compressed, two-edged, five to twelve inches long or more; main stem one to two lines broad; branches subdichotomous, frequently alternate or secund, with an oblong or ovate outline; upper branchlets subflabelliform, margins fringed with minute ciliæ about half a line in length, simple or slightly branched, in which the tubercles are at length imbedded. Structure composed of three distinct strata of cells; central formed of longitudinal, elongated, very minute, closely packed cellules; medial of large, roundish, angular, in numerous strata; the outermost very minute, superficial layer consisting of excessively minute, coloured cellules, arranged in vertical series, very close packed. Substance firm, cartilaginous, very imperfectly adhering to paper. Colour, a fine deep scarlet, passing into orange in decay. Tubercles formed in the ciliæ, near their apices, the point forming a mucro, and containing a mass of very minute spores, attached to a central placenta, and appearing to arise from the central stratum of cells; the two outer strata forming the pericarp. Tetraspores we have not seen.

This genus, at one period the receptacle of a great number of species, of which the only common character was the spherical fruit, has been cut down until nothing remains but the merest shadow of existence; that shadow, however, is a beautiful one, represented almost solely by *S. coronopifolius*, one of the prettiest as it is one of the less common of British Algæ.

This beautiful species is not uncommon on the Irish coasts, less so on those of England, and very rare in Scotland, especially on the east coast. We have never met with it except in the Moray Frith, where it only makes its appearance after a severe storm, among the rejectamenta on the beach, along with hundreds of cartloads of other treasures of the deep. It is sometimes found in deep intratidal pools, near or at extreme low-water mark, but its favourite home is at a greater depth, where it displays its greatest beauty and luxuriance.

EXPLANATION OF PLATE LIV.

Fig. 1.—*Sphærococcus coronopifolius*, natural size.
2.—Portion of a branch with capsule.
3.—A capsule.
4.—Vertical section of same.
5.—Spores from same.
6.—Longitudinal section of a main branch. All magnified.

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Gracilaria confervoides. Grev.

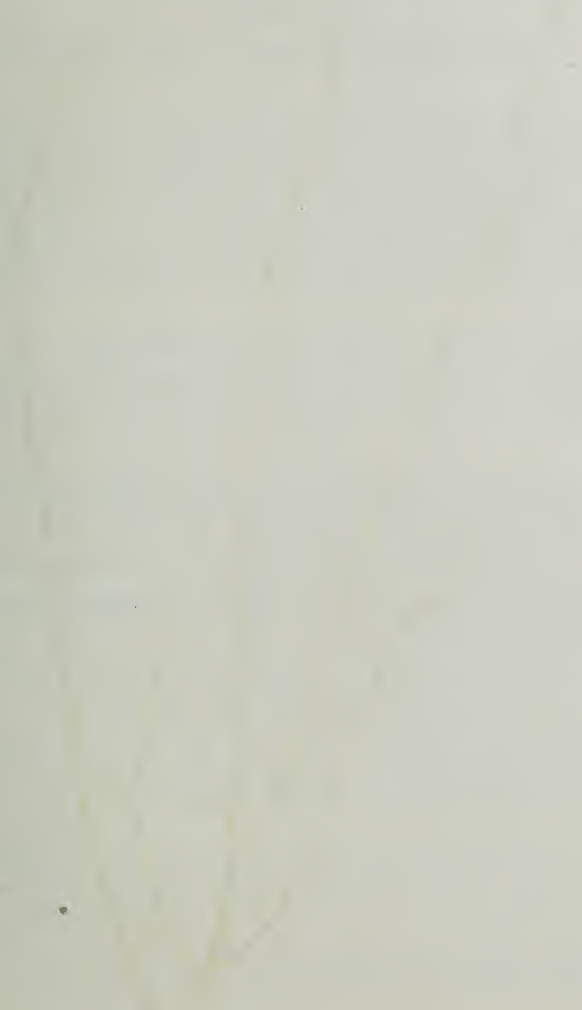

PLATE LV.

GRACILARIA CONFERVOIDES.—*Grev.*

GEN. CHAR.—Fronds filiform, compressed or flat, subcartilaginous, cellular, composed of two distinct strata of cells; central composed of large roundish, angular cells diminishing in size outwards; the exterior of very minute cells, closely packed in vertical series. Fructification of two kinds, on distinct plants: 1. Convex tubercles (coccidia), with a pericarp formed from the periphery of the frond, and enclosing a tuft of minute spores fixed to a central placenta; 2. Tetraspores, tripartite or quadripartite, imbedded in the superficial cells of the frond. Name from *gracilis*, "slender."

GRACILARIA *confervoides.* — Frond filiform, simple or but slightly branched, cylindrical, long and slender; branches similar, mostly simple, attenuated at each end; tubercles scattered on the stem and branches, sessile, roundish.

GRACILARIA *confervoides.—Grev. Alg. Brit.* p. 123; *Harv. P. B.* plate 65; *Harv. Man.* p. 130; *Harv. Syn.* p. 110; *Atlas,* plate 43, fig. 198; *Harv. N. B. A.* p. 108; *J. G. Agardh, Sp. Gen. Alg.* vol. ii. p. 587.

HYPNEA *confervoides.—J. Ag. Alg. Medit.* p. 149; *Endl.* 3rd Suppl. p. 50.

SPHÆROCOCCUS *confervoides.—Ag. Sp. Alg.* vol. i. p. 303; *Syst.* p. 232; *Spreng. Syst. Veg.* vol. iv. p. 338; *Kütz. Phyc. Gen.* p. 408, t. 60, f. 3.

GIGARTINA *confervoides.—Lamx. Ess.* p. 48; *Lyngb. Hyd. Dan.* p. 43; *Hook. Br. Fl.* vol. ii. p. 299; *Wyatt, Alg. Danm.* No. 75; *Harv.* in *Mack. Fl. Hib.* part 3, p. 200; *Harv. Man.* 1st edit. p. 74.

FUCUS *confervoides.—Linn. Sp. Pl.* p. 1629; *Syst. Nat.* vol. ii. p. 719; *With.* vol. iv. p. 114; *Turn. Syn.* vol. ii. p. 328; *E. Bot.* t. 1668; *Turn. Hist.* t. 84; *Esper, Ic. Fuc.* vol. i. p. 136, t. 68; *Stack. Ner. Brit.* p. 96, t. 15.

FUCUS *longissimus.—Gm. Hist.* p. 134, t. 13; *Stack. Ner. Brit.* p. 99, t. 16.

FUCUS *verrucosus.—Huds. Fl. Angl.* p. 588; *Gm. Hist.* p. 136, t. 14, f. 1; *Stack. Ner. Brit.* p. 26, t. 8.

FUCUS *albidus.—Huds. Fl. Angl.* p. 588 (excl. Syn. *Raii*); *Good. & Woodw.* in *Linn. Trans.* vol. iii. p. 210; *Esper, Ic.* p. 147, t. 100; *With.* vol. iv. p. 118.

FUCUS *flagellaris.—Esper,* l. c. t. 105.

HAB.—On stones, old shells, &c., in the sea, near low-water mark, and in deep water. Perennial. Summer and autumn. Generally distributed round the British coasts.

GEOGR. DIST.—Atlantic Ocean from Britain to North Africa; Mediterranean Sea; North Sea, but rare.

DESCRIPTION.— Root, a small conical disc, "accompanied by fibres."

Frond filiform, cylindrical, with few long and slender, often simple, sometimes sparingly divided branches, erect or erecto-patent, often secund, sometimes short and setaceous. The fronds are from five to eighteen inches long, or more, and about one-fourth or half a line in thickness. In some specimens the frond is once or twice divided, near the base, into long, slender branches with only a few slender setaceous ramuli; in others these are again several times subdivided in a somewhat irregularly dichotomous manner, and these are again furnished here and there with simple setaceous ramuli, scattered, or two or three together. Structure : central cells very large, becoming smaller outwards, a few of the outer series coloured ; surface layer very minute, coloured, arranged in vertical series. Substance firm, cartilaginous, very hard when dry, and very imperfectly adhering to paper. Colour, a dull reddish purple, becoming greenish in decay, and at length of a transparent white. Tubercles large, roundish ovate, sessile ; the pericarp formed of the external stratum of cells, lined with a few of those of the inner layer. Tetraspores very minute, imbedded among the cells of the surface, scattered over the branches.

Readily known from *G. compressa* by its cylindrical not compressed fronds. We have not met with it on the east coast, although it is said to be not uncommon on the British coasts, but its less attractive form may occasion its sometimes being overlooked. It is not, however, without beauty, although its slender wire-like stems are far from having the attraction of *Delesseria sanguinea*, and others of the leafy Algæ, yet they give variety to the rock-pool, and assist in covering with an abundant, if not a glowing vegetation, places which, from their exposed position, the more delicate species could not live in, or, if they did venture to fix their habitation there, they would soon appear in such tattered garments as to render them repulsive, rather than objects of pleasure and delight.

Small, stunted specimens of this species have a considerable resemblance to *Gracilaria erecta*, both in form and colour, and unless when in fruit, it is no easy matter to distinguish the one from the other; in general, however, the present species is much larger.

EXPLANATION OF PLATE LV.

Fig. 1.—*Gracilaria confervoides*, natural size.
2.—Vertical section of a tubercle.
3.—Spores from same.
4.—Longitudinal section of a branch.
5.—Transverse section of same. All magnified.

Plate LVI.

GRACILARIA *compressa*. GREV.

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PLATE LVI.

GRACILARIA COMPRESSA.—*Grev.*

GEN. CHAR.—Fronds filiform, compressed or flat, subcartilaginous, cellular, composed of two distinct strata of cells; central composed of large, roundish, angular cells diminishing in size outwards; the exterior of very minute cells, closely packed in vertical series. Fructification of two kinds, on distinct plants: 1. Convex tubercles (coccidia), with a pericarp formed from the periphery of the frond, and enclosing a tuft of minute spores fixed to a central placenta; 2. Tetraspores, tripartite or quadripartite, imbedded in the superficial cells of the frond. Name from *gracilis*, "slender."

GRACILARIA *compressa.*—Fronds compressed, tender and brittle, much branched alternately or subdichotomously; branches slender, acuminate; tubercles sessile, conical, obtuse, scattered over the whole frond.

GRACILARIA *compressa.*—*Grev. Alg. Brit.* p. 125; *J. Ag. Alg. Medit.* p. 151; *Harv. P. B.* plate 205; *Harv. Man.* p. 129; *Harv. Syn.* p. 109; *Atlas*, plate 42, fig. 193; *Harv. N. B. A.* part 2, p. 108; *J. G. Agardh, Sp. Gen. Alg.* vol. ii. p. 593.

PLOCARIA *compressa.*—*Endl.* 3rd Suppl. p. 51; *Mont. Fl. Algier.* p. 71.

GIGARTINA *compressa.*—*Hook. Br. Fl.* vol. ii. p. 299; *Wyatt, Alg. Danm.* No. 25; *Harv. Man.* 1st ed. p. 74; *De Not. Alg. Ligust.* p. 14.

SPHÆROCOCCUS *compressus.*—*Ag. Sp. Alg.* vol. i. p. 308; *Ag. Syst.* p. 233; *Spreng. Syst. Veg.* vol. iv. p. 338; *Kütz. Phyc. Gen.* p. 408.

SPHÆROCOCCUS *lichenoides.*—*Grev. Crypt. Fl.* t. 341 (not of *Agardh*).

HAB.—Cast on shore, attached to Corallines, &c. Annual. Summer. Very rare. Sidmouth (*Mrs. Griffiths*, 1813, and *Miss Cutler*); Jersey (*Miss Turner*).

GEOGR. DIST.—Atlantic coasts of France and Spain. Mediterranean Sea.

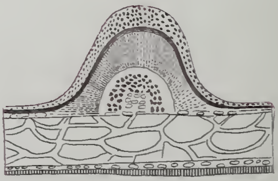
DESCRIPTION.—Root, a minute flattened disc. Frond linear, subcompressed, much branched, bushy, six to ten inches long, one to two lines in breadth, rather tender and brittle; branches subdichotomous or alternate, occasionally fasciculate or secund, three to four times divided, slightly compressed, erect or erecto-patent, all acuminate to the summit, and frequently somewhat to the base. Structure: axial cells large, angular, those of the periphery very minute, in vertical series. Substance, when fresh, very tender and brittle, scarcely adhering to paper. Colour, a bright brownish red (or creamy dull pink), "becoming much brighter after the plant has been steeped in fresh water" (*Harvey*). Tubercles plentifully scattered over the frond, conical, obtuse, almost sessile; pericarp very thick, formed of the periphery of the frond, and containing a mass of minute, ovate spores attached to a central placenta. Tetraspores imbedded among the cells of the periphery, tripartite or quadripartite.

We have seen no specimens of this plant so broad and luxuriant as the figure in *Phyc. Brit.*, none of ours being much more than half a line in breadth, but they are as richly fruited, and appear to be all partially bleached; the lower part being of a dull, transparent, white colour, becoming darker upwards, and in the apices and tubercles are of a dark purplish red. All our specimens are from Sidmouth, and although not so stated, appear to have been picked on the beach; indeed, we are not aware of its ever having been found growing on the British shores, and it is quite possible that such specimens may have been brought by the tides and currents from the adjacent coasts of France or Spain, where the plant appears to be not unfrequent.

From *G. multipartita* it may be readily known by its narrow, compressed, but not flattened fronds, which will also at once distinguish it from the truly cylindrical fronds of *G. confervoides.*

EXPLANATION OF PLATE LVI.

Fig. 1.—*Gracilaria compressa,* natural size.
2.—Vertical section of a tubercle.
3.—Tetraspores from same. Both magnified.



GRACILARIA *multipartita* J. AG.

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Plate LVII.

GRACILARIA MULTIPARTITA.—*J. Ag.*

Gen. Char.—Fronds filiform, compressed or flat, subcartilaginous, cellular, composed of two distinct strata of cells; central composed of large, roundish, angular cells diminishing in size outwards; the exterior of very minute cells, closely packed in vertical series. Fructification of two kinds, on distinct plants: 1. Convex tubercles (coccidia), with a pericarp formed from the periphery of the frond, and enclosing a tuft of minute spores fixed to a central placenta; 2. Tetraspores, tripartite or quadripartite, imbedded in the superficial cells of the frond. Name from *gracilis*, "slender."

Gracilaria *multipartita.*—Frond compressed, sublinear, much branched in a subdichotomous manner; segments linear or obcuneate, erect; tubercles conical, scattered over the frond.

Gracilaria *multipartita.*—*J. Ag. Alg. Medit.* p. 151; *Harv. P. B.* plate 15; *Harv. Man.* p. 129; *Harv. Syn.* p. 109; *Atlas,* plate 43, fig. 196; *Harv. N. B. A.* part 2, p. 107; *J. G. Agardh, Sp. Gen. Alg.* vol. ii. p. 600.

Gracilaria *polycarpa.*—*J. Ag.* l. c. p. 151.

Plocaria *multipartita.*—*Endl.* 3rd Suppl. p. 51.

Plocaria *polycarpa.*—*J. Ag.* l. c. p. 151.

Plocaria *polycarpa.*—*Endl.* l. c. p. 51.

Chondrus *multipartitus.*—*Grev. Syn.* p. 56; *Harv.* in *Hook. Journ. Bot.* vol. i. p. 155.

Sphærococcus *multipartitus.*—*Ag. Sp. Alg.* vol. i. p. 247; *Ag. Syst.* p. 212.

Sphærococcus *polycarpus.*—*Grev. Sc. Crypt. Fl.* t. 352.

Rhodymenia *polycarpa.*—*Grev. Alg. Brit.* p. 87; *Hook. Br. Fl.* vol. ii. p. 289; *Harv. Man.* 1st edit. p. 61; *Wyatt, Alg. Danm.* No. 108.

Fucus *multipartitus.*—*Clem. Hist.* p. 311.

Fucus *granatus.*—*Turn. Hist.* t. 215 (excl. Syn. *Lamx.*).

Fucus *æruginosus.*—*Turn. Hist.* t. 147.

Hab.—On rocks and stones in the sea—in muddy places, at low-water mark, and a greater depth. Rare. Annual. July, August, and September. Shore under Tait's Hill, Plymouth (*Miss Hill,* 1802); Plymouth Sound, abundant (*Dr. Cocks,* &c.); Whitsand Bay (*Dr. Jacob*). Dredged in Salcombe Bay (*Mrs. Wyatt*).

Geogr. Dist.—Shores of Europe; south of England to Spain. East coast of North America; California; West Indies (*Miss Dix*); Pernambuco (*Areschoug*); Red Sea (*Lord Valentia*); Mauritius (*Mrs. Telfair*).

Description.—Root, a small flattened disc. Frond linear or subobcuneate, flat, much branched, six to twelve inches in length, from one to six lines in breadth, somewhat dichotomously, but often very irregularly divided; the segments linear or elongate, obcuneate, upper ones subpalmate or multifid, mostly very erect, but frequently irregularly fringed with distant patent laciniæ, or patent at the base, and then curved upwards. Structure: the axis composed of very large, somewhat compressed, roundish, angular cells, periphery of very minute cellules, arranged in vertical series. Substance rather brittle, subcartilaginous, and very imperfectly adhering to paper. Colour, a dull, brownish purple, often pinkish, and green towards the extremities. Tetraspores triparted or quadriparted, scattered over the whole surface of the frond. Tubercles rather large, conical, flattened at the top, prominent, and formed of the periphery of the frond, and containing a mass of very minute spores placed on a central placenta.

This genus differs from the preceding in having only two distinct strata of cells, the central longitudinal series being altogether wanting; the exterior strata resembling that of the last, but the whole of the interior being made up of large, oblong or rounded cells, diminishing in size outwards. All the species are rather rare in this country, and are mostly confined to its southern shores. Externally they are plants of no great beauty, but their open cellular structure renders them interesting objects under the microscope, and their rarity supplies an interest which their plain exterior has denied.

This species is remarkable among its congeners by its broad flat fronds, having some slight resemblance in colour and outline, especially when dry, to *Calliblepharis jubata*, but is thicker and more flaccid when fresh, thinner and less coriaceous when dry, and may always be distinguished at first sight by wanting the laciniæ; a little attention will show them to be every way different.

EXPLANATION OF PLATE LVII.

Fig. 1.—*Gracilaria multipartita*, natural size.
2.—Section of frond and tubercle.
3.—Spores from same. Both magnified.

Plate LVIII

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GELIDIUM cartilagineum. GAILL.

PLATE LVIII.

GELIDIUM CARTILAGINEUM.—*Gaill.*

GEN. CHAR. — "Frond linear, compressed, pinnated, its axis composed of densely interwoven, longitudinal, tenacious, continuous fibres; the periphery of small polygonal cellules. Fructification of two kinds, on distinct plants: 1. Tubercles (favellidia), immersed in swollen ramuli, containing a spherical mass of oblong spores; 2. Tetraspores, contained in club-shaped ramuli, bipartite or tripartite." Name from *gelu*, "frost."

GELIDIUM *cartilagineum.*—Fronds linear, three to four times pinnated; pinnæ and pinnules alternate, rather patent, the ultimate ones obtuse, or slightly incrassated at the summit; "tubercles elliptical, mucronate, immersed in the ultimate pinnules."

GELIDIUM *cartilagineum.—Gaill. Résum.* p. 15; *Duby, Bot. Gall.* p. 948; *Grev. Alg. Brit.* p. 140; *Hook. Br. Fl.* vol. ii. p. 304; *Kütz. Phyc. Gen.* p. 406, t. 73 (Anatomy); *Sp. Alg.* p. 763; *Harv. P. B.* plate 337; *Harv. Man.* p. 139; *Harv. Syn.* p. 112; *Atlas,* plate 42, fig. 192; *Harv. N. B. A.* part 2, p. 117; *J. G. Agardh, Sp. Gen. Alg.* vol. ii. p. 473.

GELIDIUM *concatenatum.—Lamour. Ess.* p. 41.

GELIDIUM *versicolor.—Lamour. Ess.* p. 41.

SPHÆROCOCCUS *cartilagineus.—Ag. Sp. Alg.* vol. i. p. 286; *Ag. Syst.* p. 227.

FUCUS *cartilagineus.—Linn. Sp. Pl.* p. 1630; *Gun. Fl. Norv.* p. 108, t. 3, f. 5; *Esper, Ic. Fuc.* t. 1; *Turn. Syn.* vol. ii. p. 284; *Turn. Hist.* t. 124; *E. Bot.* t. 1477.

FUCUS *capensis.—Gm. Hist. Fuc.* p. 157, t. 17, f. 1.

FUCUS *versicolor.—Gm.* l. c. p. 158, t. 17, f. 2.

HAB.—Nowhere around the British Islands or Jersey. Now and then cast ashore on the south coast of England. Very rare.

GEOGR. DIST. — Cape of Good Hope and Port Natal, abundant (*Dr. Harvey*); California; Canary Islands; Chinese Sea.

DESCRIPTION.—Root composed of long, matted fibres. Frond linear, compressed, from eight inches to a foot, or even two feet in length, and from half a line to a line in breadth, three to four times pinnated in the upper half, all the divisions patent or erecto-patent, gradually shorter and smaller upwards, the lower part of the stem frequently retaining the spine-like remains of former or imperfectly developed branches. Structure: the central portion composed entirely of longitudinal, interlacing fibres, the surface of very minute, roundish, angular cellules.

Substance very firm and cartilaginous, not adhering to paper. Colour, a deep dark reddish purple, changing to many colours, dull white in decay.

The fructification of this species we have not seen, nor any native specimens,—ours being labelled "Bay of Biscay," and are barren. We are not aware that any well-authenticated British specimens of the species exist, and it would be well perhaps if the species were entirely expunged from the British flora.

Dr. Harvey assures us that the nearest well-ascertained habitat is "the Canary Islands," and that those given in the Mediterranean are uncertain. The above habitat in the "Bay of Biscay, 1854," is equally so, as the plant is not stated to have been found growing there, neither is there any authority given for its being found there at all.

EXPLANATION OF PLATE LVIII.

Fig. 1. *Gelidium cartilagineum*, natural size.
2.—One of the pinnæ, magnified.

Plate LIX.

GELIDIUM corneum, LAMOUR.

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Gelidium corneum. Lamour.

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Gelidium corneum, Lamour.

Plates LIX. a., b., c.

GELIDIUM CORNEUM.—*Lamour.*

Gen. Char. — "Frond linear, compressed, pinnated, its axis composed of densely interwoven, longitudinal, tenacious, continuous fibres; the periphery of small polygonal cellules. Fructification of two kinds, on distinct plants: 1. Tubercles (favellidia), immersed in swollen ramuli, containing a spherical mass of oblong spores; 2. Tetraspores, contained in club-shaped ramuli, bipartite or tripartite." Name from *gelu*, "frost."

Gelidium *corneum.*—Frond linear, compressed or flattish, distichous, bipinnate or tripinnate; pinnules opposite or alternate, patent or erecto-patent, obtuse.

Gelidium *corneum.—Lamour. Ess.* p. 41; *Grev. Alg. Brit.* p. 141, t. 15; *Hook. Br. Fl.* vol. ii. p. 305; *Wyatt, Alg. Danm.* No. 30; *J. Ag. Alg. Medit.* p. 102; *Endl.* 3rd Suppl. p. 41; *Kütz. Phyc. Gen.* p. 406; *Mont. Pl. Canar.* p. 158; *Harv.* in *Mack. Fl. Hib.* part 3, p. 203; *Harv. P. B.* plate 53; *Harv. Man.* p. 138; *Harv. Syn.* p. 113; *Atlas*, plate 43, fig. 197; *Harv. N. B. A.* part 2, p. 116; *J. G. Agardh, Sp. Gen. Alg.* vol. ii. p. 469.

Sphærococcus *corneus.—Ag. Sp. Alg.* vol. i. p. 279; *Syst.* p. 225; *Hook. Fl. Scot.* part 2, p. 104; *Grev. Fl. Edin.* p. 296; *Spreng. Syst. Veg.* vol. iv. p. 337.

Fucus *corneus.—Huds. Fl. Angl.* p. 585; *Stack. Ner. Brit.* p. 61, t. 12; *Turn. Syn.* vol. ii. p. 272; *E. Bot.* t. 1970; *Clem. Ess.* p. 317.

Hab.—On rocky shores. Perennial. Summer. Very common.

Geogr. Dist.—Tropical and temperate zones of both hemispheres.

Description.—Root fibrous. Frond linear or filiform, half an inch to three inches in length, more or less branched in a somewhat alternately pinnated manner; branches mostly attenuated to the base. Tubercles in swollen ramuli, containing a mass of radiating oblong or pear-shaped spores. Tetraspores immersed in club-shaped ramuli, mostly bipartite. Colour, generally a dark purplish red, but often a variety of shades may be found even on the one plant. Substance cartilaginous, almost horny, hardly adhering to paper.

The following varieties have been characterised:—

Var. β. *sesquipedale.*—" Frond long, between compressed and flat, linear, tripinnate ; pinnæ attenuated at their base ; ramuli linear oblong, short and obtuse."—*Grev.*

GELIDIUM *corneum*, var. *sesquipedale.*—*Grev.* l. c. p. 142 ; *Harv. P. B.* descp. plate 53 ; *Harv. Man.* p. 138. Var. α. *J. G. Agardh, Sp. Gen. Alg.* vol. ii. p. 470.

FUCUS *corneus*, var. *sesquipedalis.*—*Turn. Hist.* t. 257 F. f.

HAB.—Sidmouth (*Dr. Greville*).

Var. γ. *pinnatum.*—" Frond narrow, tripinnate ; the pinnæ patent, nearly linear, and bluntish."—*Grev.*

GELIDIUM *corneum*, var. *pinnatum.*—*Grev.* l. c. ; *Harv. P. B.* plate 53, fig. 1 ; *Harv. Man.* p. 138.

FUCUS *pinnatus.*—*Huds. Fl. Angl.* p. 548.

FUCUS *hypnoides.*—*Desv. Fl. Atl.* vol. ii. p. 426.

HAB.—Coasts of Cornwall, Devonshire, and Sussex, everywhere ; and at Scarborough (*Hudson*) ; Exmouth (*Goodenough*) ; Bute (*Dr. Greville*).

Var. δ. *uniforme.*—" All the pinnæ patent, attenuated at the base, obtuse at the points, and scattered."—*Turn.*

GELIDIUM *corneum*, var. *uniforme.*—*Grev.* l. c. p. 143; *Harv. P. B.* descp. plate 53 ; *Harv. Man.* p. 138.

FUCUS *corneus*, var. *uniformis.*—*Turn.* l. c.

HAB.—Ilfracombe (*Goodenough*).

Var. ε. *capillaceum.*—" Frond narrow ; pinnæ clustered towards the summit, nearly setaceous, and somewhat erect."—*Turn.*

GELIDIUM *corneum*, var. *capillaceum.*—*Grev.* l. c. ; *Harv. P. B.* descp. plate 53 ; *Harv. Man.* p. 138.

FUCUS *corneus*, var. *capillaceus.*—*Turn.* l. c.

HAB.—King's Cove, Cornwall (*Turner*) ; Sidmouth (*Dr. Greville*).

Var. ζ. *latifolium.*—" Frond broad, nearly flat ; pinnæ linear-lanceolate, mostly set with numerous, short, setaceous pinnæ."—*Grev.*

GELIDIUM *corneum*, var. *latifolium.*—*Grev.* l. c. ; *Harv. P. B.* plate 53, fig. 3 ; *Harv. Man.* p. 138. Var. β. *J. G. Agardh, Sp. Gen. Alg.* vol. ii. p. 470.

HAB.—Trevane Bay, Cornwall, and Torbay (*Mrs. Griffiths*) ; Sidmouth (*Dr. Greville*) ; Malbay (*Dr. Harvey*).

Var. η. *confertum.*—" Frond compressed, repeatedly pinnated ; pinnæ and pinnulæ long, very thin, acute, and irregularly divided."—*Grev.*

GELIDIUM *corneum*, var. *confertum.*—*Grev.* l. c. ; *Harv. P. B.* descp. plate 53 ; *Harv. Man.* p. 138.

FUCUS *corneus*, var. *confertus.*—*Turn.* l. c.

HAB.—Devonshire (*Mrs. Griffiths*) ; Bute (*Dr. Greville*).

Var. θ. *flexuosum.*—"Frond rather broad, flat, very flexuous and pinnate, or sub-bipinnate; pinnæ curved, tapering to each end, subulate."—*Phyc. Brit.*

Gelidium *corneum*, var. *flexuosum.*—*Harv. P. B.* plate 53, fig. 2.

Hab.—Mount's Bay (*Mrs. Griffiths*).

Var. ι. *aculeatum.*—"Frond compressed and very thin, pinnated very irregularly; pinnæ divaricated, irregularly divided and set with minute, divaricate ramuli, crowded towards the summit of the frond."—*Grev.*

Gelidium *corneum*, var. *aculeatum.*—*Grev.* l. c.; *Harv. Man.* p. 138. Var. δ. *J. G. Agardh*, *Sp. Gen. Alg.* vol. ii. p. 470.

Hab.—North of Cornwall (*Mrs. Griffiths*).

Var. κ. *abnorme.*—"Frond compressed, irregularly branched; branches and pinnæ producing, at their extremities, little tufts of partly deflexed ramuli."—*Grev.*

Gelidium *corneum*, var. *abnorme.*—*Grev.* l. c. p. 144; *Harv. P. B.* plate 53, fig. 7; *Harv. Man.* p. 138.

Fucus *corneus*, var. *abnormis.*—*Turn.* l. c. t. 257 f. r.

Hab.—Bantry Bay (*Miss Hutchins*).

Var. λ. *pulchellum.*—"Frond capillary, compressed, and bi-tripinnate; pinnæ between linear and clavate, obtuse."—*Turn.*

Gelidium *corneum*, var. *pulchellum.*—*Grev.* l. c.; *Harv. P. B.* plate 53, fig. 4; *Harv. Man.* p. 139.

Fucus *corneus*, var. *pulchellus.*—*Turn.* l. c.

Hab.—Bantry Bay (*Miss Hutchins*).

Var. μ. *claviferum.*—"Frond subcylindrical, capillary, irregularly divided; the ultimate ramuli or pinnæ obovate, edged with minute, scattered teeth."—*Grev.*

Gelidium *corneum*, var. *claviferum.*—*Grev.* l. c.; *Harv. P. B.* descp. plate 53; *Harv. Man.* p. 139.

Fucus *corneus*, var. *clavifer.*—*Turn.* l. c.

Hab.—South of England, frequent; Frith of Forth (*Dr. Richardson*).

Var. ν. *clavatum.*—"Frond capillary, between cartilaginous and membranaceous, decumbent, creeping; ramuli in the form of inversely lanceolate or ovate leaves, much attenuated at their insertion."—*Grev.*

Gelidium *corneum*, var. *clavatum.*—*Grev.* l. c.; *Harv. P. B.* plate 53, fig. 6; *Harv. Man.* p. 139. Var. ε. *J. G. Agardh*, *Sp. Gen. Alg.* vol. ii. p. 470.

Fucus *pusillus.*—*Stack. Ner. Brit.* p. 16, t. 6; *Turn.* l. c. t. 79.

Fucus *cæspitosus.*—*Stack. Ner. Brit.* p. 59, t. 12.

Hab.—On submarine rocks, from high to low-water mark, and in deep water; also in tide-pools. Common.

Var. o. *crinale.*—" Frond setaceous, subcylindrical, somewhat dichotomously branched, sometimes three-forked at the top, and bearing a few elliptic-oblong ramuli, attenuated at their insertion."—*Grev.*

GELIDIUM *corneum,* var. *crinale.—Grev.* l. c. ; *Harv. P. B.* plate 53, fig. 5 ; *Harv. Man.* p. 139. Var. ζ. *crinalis, J. G. Agardh, Sp. Gen. Alg.* vol. ii. p. 470.

FUCUS *crinalis.—Turn. Hist. Fuc.* t. 198.

HAB.—East and south of England ; Belfast Lough (*Mr. Templeton*).

This is one of the most variable of our native Algæ, at one time appearing in the form of a simple thread, half an inch or little more in length, and at another presenting the most beautiful feathery fronds, three to five inches in length, and from once to three times pinnated with remarkably regular and alternating branches, and these again as well as the main stems often more or less compressed, or even quite flattened, so as to give the stem or branch a lanceolate or linear-lanceolate outline. The filiform and more simple varieties appear to be the most common, and are in some form or other found in greater or less plenty on almost every shore.

The varieties γ. *pinnatum,* ζ. *latifolium,* and λ. *pulchellum,* are among the most beautiful forms, their broad, flat, compressed, or almost cylindrical fronds, once, twice, or even thrice pinnated, and generally larger size, give them the decided preeminence, and in one way account for the more regularly developed fronds, yet it must be confessed that we not unfrequently find the more simple forms exceeding in size that of the more compound without losing much of their character, leading one to suspect that after all, more than one species may be included under this somewhat anomalous species, and to wish, after all that has been done by Turner, Greville, Harvey, and others, that a more careful study of the various forms in their native habitats could be effected, to enable us clearly to define the limits of the species.

In our list of varieties we have given a goodly number, but there would be little difficulty in making them as many more. On looking at the fifty or sixty specimens now before us, we are strongly reminded of a laborious afternoon's work, undertaken long before we had entered our "teens"—it was to find two blades of the Gardener's Garter-grass (*Phalaris arundinacea*) with the same markings. Even with the promised reward of five shillings on our succeeding, we failed in this our first and last attempt, and so we think would be the same result with *G. corneum* and its varieties. The same variable characters apply to this species as found in North America. Dr. Harvey states in his *Nereis* that Californian specimens are three or four inches high, broadly ovate in outline, the lower branches being long, the upper gradually shorter, very densely set, and about three times pinnated; the pinnæ and pinnules patent, tapering to the base, very blunt at the apices, either rounded or subtruncate. The colour is a dark brownish purple. The specimens from New York and Maine are very much smaller, rarely more than an inch and a-half high, scarcely thicker than hogs' bristles, less strongly compressed, and more flabelliform in outline, the frond and its principal branches being naked below, and pinnated only above the middle. The Charleston specimens are very similar, but less decompound, and the ramuli are not so blunt. These latter are in conceptacular fruit, the conceptacle lodged about the middle of the pinnules, or occasionally even in one of the pinnæ towards the base.

The conceptacular fruit prove very beautiful and interesting objects for the microscope, either as viewed removed from the ramulus, or as seen like small extinct volcanoes dotting its surface.

This species, on being exposed to the air or immersed in fresh water, changes colour, through very many tints of red sometimes most brilliant, to orange, yellow, and lastly to an alabaster whiteness—and in this state is not least beautiful.

It will be found not always an easy matter to obtain *G. corneum* proper—of course it ought to be in accordance with our specific character. Plate LIX. A. we call *G. corneum.* The three middle figures, Plate LIX. B., and the upper fig. on Plate LIX. C. are Var. ζ. *latifolium* in various stages; the others we will not attempt to name.

EXPLANATION OF PLATE LIX. A.

Fig. 1.—*Gelidium corneum,* natural size.
2.—Portion of a frond with capsules in the ramuli.
3.—A ramulus with capsule.
4.—Spores from same.
5.—Portion of a frond with granules in the ramuli.
6.—A ramulus with granules.
7.—Ternate granules from same. All magnified.

EXPLANATION OF PLATE LIX. B.

Three middle figures are Var. ζ. *latifolium* in various stages of growth, natural size.

EXPLANATION OF PLATE LIX. C.

Upper figure Var. ζ. *latifolium,* natural size.

Polyides rotundus, Grev.

Nature Printed by Henry Bradbury.

PLATE LX.

POLYIDES ROTUNDUS.—*Grev.*

GEN. CHAR.—Root a tubercular, "expanded" disc. Frond cylindrical, filiform, solid, the axis composed of very fine, longitudinally interlacing and anastomosing filaments; the periphery of coloured, vertical, dichotomous, moniliform filaments, composed of elliptical cells: those next the axis very large; those towards the surface very minute. Fructification of two kinds, on distinct plants: 1. Irregular wart-like protuberances, formed of dichotomous, vertical filaments, containing imbedded, roundish elliptical favellæ, enclosed in a broad pellucid limbus; 2. Cruciate tetraspores, imbedded among the filaments of the periphery. Name from πολὺ, "many," and ἰδέα "form."

POLYIDES *rotundus.—Grev. Alg. Brit.* p. 70, t. 11; *Hook. Br. Fl.* vol. ii. p. 284; *Wyatt, Alg. Danm.* No. 161; *Harv.* in *Mack. Fl. Hib.* part 3, p. 190; *Harv. P. B.* plate 95; *Harv. Man.* p. 146; *Harv. Syn.* p. 120; *Atlas,* plate 46, fig. 212; *Harv. N. B. A.* part 2, p. 128.

POLYIDES *lumbricalis.—Ag. Sp. Alg.* vol. ii. p. 392; *Ag. Syst. Alg.* p. 194; *Spreng. Syst. Veg.* vol. iv. p. 344; *Endl.* 3rd Suppl. p. 38.

SPONGIOCARPUS *rotundus.—Grev. Fl. Edin.* p. 286.

FURCELLARIA *rotunda.—Lyngb. Hyd. Dan.* p. 49.

FURCELLARIA *lumbricalis.—Kütz. Phyc. Gen.* p. 402, t. 72.

CHORDARIA *rotunda.—Hook. Fl. Scot.* part 2, p. 97.

GIGARTINA *rotunda.—Lamour. Ess.* p. 49.

FUCUS *rotundus.—Gm. Hist.* p. 110, t. 6, f. 3 (excl. Syn. *Huds.* and *Raii*); *Linn. Syst. Nat. Gm.* p. 1383; *With.* vol. iv. p. 110; *Turn. Syn. Fuc.* vol. ii. p. 309; *Turn. Hist.* t. 5; *E. Bot.* t. 1738.

FUCUS *radiatus.—Good. & Woodw.* in *Linn. Trans.* vol. iii. p. 202; *Stack. Ner. Brit.* p. 89, t. 14.

FUCUS *caprinus.—Gunn. Fl. Norv.* vol. i. p. 96.

FUCUS *fastigiatus.—Herb. Linn.* (sec. *Turn.*) *Esper,* t. 16 (excl. syn.).

HAB.—On rocks, stones, and old shells within tide range. Perennial. Winter. Common on the shores of England, Ireland, and Jersey. Rarer in Scotland, but by no means very scarce, more particularly on the west coast.

GEOGR. DIST.—Atlantic shores of Europe; Iceland to France; Atlantic shores of North America; Adriatic Sea.

DESCRIPTION.—Root, a large fleshy spreading disc, very hard when dry. Fronds much tufted from the same root, filiform, three to six inches long, and about one line in thickness, cylindrical, simple for about one-third of its length, then repeatedly dichotomous; the divisions gradually shorter upwards, but thickest about the middle; the axils somewhat rounded, the apices acute. Favellæ imbedded in irregular, warty protuberances formed along the branches, and composed of very slender, vertical filaments; the favellæ numerous, roundish elliptical, containing a mass of obconical spores. Tetraspores rounded oblong, cruciate, imbedded among the cells of the periphery. Structure: axis about one-third of the diameter, composed of very fine, interlacing and anastomosing longitudinal filaments, from the outer of which arise closely-packed, vertical, dichotomous, moniliform filaments, forming the periphery, of which the cells are elliptical; those next the axis large, those towards the surface very minute, deeply coloured. Substance cartilaginous, rather brittle when dry, and not adhering to paper. Colour, a dark reddish purple, greenish and reddish-yellow in decay.

The nearest ally of this species is *Furcellaria fastigiata*, to which it is so closely allied, both in aspect and structure, that it is no easy matter to distinguish the two under every circumstance, and hence the two species have no doubt frequently been confounded, and their distribution rendered doubtful. In the barren state, the scutate root is the best *primâ facie* character, and will readily serve to distinguish them. The present species seems most abundant on the southern shores, being not uncommon on the southern coasts of both England and Ireland, becoming rarer as we proceed northward, and is among the rarer productions of the east coast of Scotland.

EXPLANATION OF PLATE LX.

Fig. 1.—*Polyides rotundus*, natural size.
2.—Section of wart and frond.
3.—Section of frond with tetraspores.
4.—Spores and favella.
5.—Tetraspores. All magnified.

PEYSSONELIA DUBYI.—*Crouan.*

GEN. CHAR.—Frond closely appressed, brownish red, rooting by the under surface, composed of several strata of cells arranged in the form of jointed filaments. Fructification: hemispherical warts scattered over the upper surface, composed of radiating filaments, and containing imbedded tetraspores, oblong, cruciate. Name in honour of J. A. Peyssonel, an early student of the wonders of the deep.

PEYSSONELIA *Dubyi.*—Frond membranaceous, roundish, closely appressed to the substance on which it grows, and attached by short rootlets from the whole of its under surface.

PEYSSONELIA *Dubyi.*—*Crouan*, in *An. Sc. Nat.* 1844, p. 368, t. 11 B; *Harv. P. B.* plate 71; *Harv. Man.* p. 144; *Harv. Syn.* p. 118; *Atlas*, plate 50, fig. 224; *Harv. N. B. A.* part 2, p. 130; *J. G. Agardh, Sp. Gen. Alg.* vol. ii. p. 501.

HAB.—On old shells, stones, &c., in five to twelve fathoms water. Common on the British coasts.

GEOGR. DIST.—Coast of Normandy (*Crouan*). Likely to be on all the Atlantic coasts of Europe.

DESCRIPTION.—Frond thin, membranaceous, rooting by its under surface; roots numerous, short, hyaline. The frond is from half an inch to an inch and a-half in diameter, roundish or waved, and irregularly lobed in the circumference, spreading horizontally over old shells, &c.; the under stratum composed of a single series of cells stretching horizontally, and forming a very thin and indistinct layer, the main portion of the frond being composed of cells arranged so as to form short, vertical, jointed filaments, closely packed side by side. Tetraspores imbedded in warts, slightly convex, scattered over the upper surface, elliptic oblong, cruciate, surrounded with a broad, pellucid hilum. Structure formed of two strata of cells, the under of a single series arranged in the form of radiating filaments, spreading horizontally so as to form a thin stratum, from which arise innumerable closely packed, nearly erect, short filaments, composed of cells whose breadth is almost equal to their length: those in the centre nearly erect, composed of from eight to twelve cells, those at the circumference rapidly diminishing in number, the outermost series consisting of a single cell; the whole forming a thin, slightly convex, smooth frond, of a rather firm consistence, and dull reddish orange or brick-red colour.

This curious production is found forming a thin and well-defined crust on old shells, &c., from rather deep water, and may be not of unfrequent occurrence on the British shores; but its obscure nature, and unobtrusive appearance, has, no doubt, often been the cause of its being overlooked.

It is, perhaps, by no means uncommon on all our shores, and should be looked for in dredging on fragments of old shells and on stones, which are only apt to be thrown carelessly away, and similar objects thrown on shore after severe storms should be carefully examined, as the collector will seldom fail in finding something to reward his trouble among such neglected objects.

It first makes its appearance in the form of little round spots of a brick-red colour; these extend both vertically and horizontally by the addition of new cellular matter, and this seems to be made at intervals, so that the frond is marked by concentric zones.

PEYSSONELIA DUBYI.

EXPLANATION OF DISSECTIONS, &c.

Fig. 1.—*Peyssonelia Dubyi,* on dead shell, natural size.
2.—Vertical section of frond with warts.
3.—Tetraspores from same. Both magnified.

HILDENBRANDTIA RUBRA.—*Meneg.*

GEN. CHAR.—Frond crustaceous, spreading horizontally, and closely adherent by its under surface (but without radicles), composed of innumerable, closely packed, erect filaments; tetraspores are produced in spherical conceptacles, deeply imbedded in the substance of the frond, and communicating with the surface by a minute pore. Name of unknown origin, perhaps in honour of some friend of Nardo, its author.

HILDENBRANDTIA *rubra.—Meneg. Mem. Riun. Nat. Padov.* 1841, p. 10; *Endl.* 3rd Suppl. p. 26 (excl. Syn. *Berk.*); *Kütz. Phyc. Gen.* p. 384, t. 78, f. v.; *Harv. P. B.* plate 250; *Harv. Man.* p. 110; *Harv. Syn.* p. 94; *Atlas*, plate 35, fig. 161.

HILDENBRANDTIA *Nardi.—Zanard, Alg. Adr.* p. 135; *J. G. Agardh, Sp. Gen. Alg.* vol. ii. p. 494.

RHODODERMIS *Drummondii.—Harv.* in *Ann. Nat. Hist.* vol. xiv. p. 27, plate 2.

HAB.—On stones, pebbles, shells, &c., between tide marks and in deep water. Everywhere and at all seasons. Common around the British Islands.

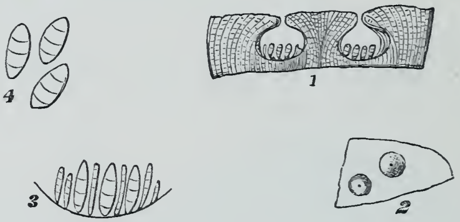
GEOGR. DIST.—Atlantic and Mediterranean shores of Europe.

DESCRIPTION.—Frond thin, uniform, crustaceous, spreading horizontally to the extent of one or two inches, marked with distinct, concentric zones (of growth ?), and closely adherent by its under surface to the object on which it grows, but without radicles; at first the outline is circular, thin, and smooth, but as the plants extend they become irregular in outline, and the surface harsh to the touch. Structure entirely composed of very fine, erect, closely packed, jointed filaments of equal length, forming a very thin "cartilagino-membranaceous" crust, almost as thin as paper, the cells about as long as broad. Colour, a rather dull red.

Although a good deal resembling *Peyssonelia* in its habit, this singular plant bears a by no means distant affinity to the *Melobesiæ* in its mode of fructification. From these, however, it is again widely removed by the absence of the calcareous matter, which forms so important a part of the structure of these plants. The close relation of this species even to the *Corallinæ* is remarkable. The change from pedicellated capsules to immersed conceptacles is not important, and only such as might be expected from the different habit of the plants; but the fact of both containing zoned tetraspores is a coincidence not so readily anticipated, and is striking as well as characteristic.

Like the preceding species, it makes its first appearance in the form of small, roundish spots, resembling drops of blood, preferring smooth, water-worn stones of a rather hard structure; when young, quite circular, but afterwards, by irregular expansion as well as by confluence, the outline is very irregular.

This genus differs from the preceding in being composed of a single stratum of vertical, cellular filaments, the basal stratum being wanting, and in the different arrangement of the tetraspores.



HILDENBRANDTIA RUBRA.

EXPLANATION OF DISSECTIONS.

Fig. 1.—Section of the frond, showing two conceptacles.
2.—Portion of the same, with disc-like depressions.
3.—Tetraspores, showing their position in conceptacle.
4.—Tetraspores. All magnified.

PETROCELIS CRUENTA.—*J. Ag.*

GEN. CHAR.—Frond crustaceous, closely adherent, spreading, "formed of two strata, the lower spreading horizontally, very thin;" the upper formed of erect, nearly simple, jointed filaments, set in a lax gelatine, very closely packed together. Fructification: Cruciate tetraspores (sphærosporæ), formed in one of the articuli of the filament, situate near the middle. Name from πέτρος, "a rock," and κηλìs, "a stain," from the blood-like stains or spots formed by the plants.

PETROCELIS *cruenta.—J. G. Agardh, Sp. Gen. Alg.* vol. ii. p. 490.

CRUORIA *pellita.—Fries, Fl. Scan.* p. 316; *Endl.* 3rd Suppl. p. 23; *Aresch.* in *Linn.* vol. xvii. p. 267; *Harv. P. B.* plate 117; *Harv. Man.* p. 151; *Harv. Syn.* p. 215; *Atlas,* plate 5, fig. 227.

CHÆTOPHORA *pellita.—Lyngb. Hyd. Dan.* p. 193, t. 66; *Berk. Gl. Br. Alg.* t. 1, f. 3; *Harv.* in *Hook. Br. Fl.* vol. ii. p. 390; *Harv.* in *Mack. Fl. Hib.* part 3, p. 223; *Harv. Man.* 1st edit. p. 123; *Fl. Dan.* t. 1728.

CHÆTODERMA *pellita.—Kütz. Phyc. Gen.* p. 326.

HAB.—On exposed rocks, stones, and shells, between tide-marks. Perennial. Fruiting in February (*Carm.*). Common on the British shores.

GEOGR. DIST.—Atlantic coasts of Europe; Faroe Islands.

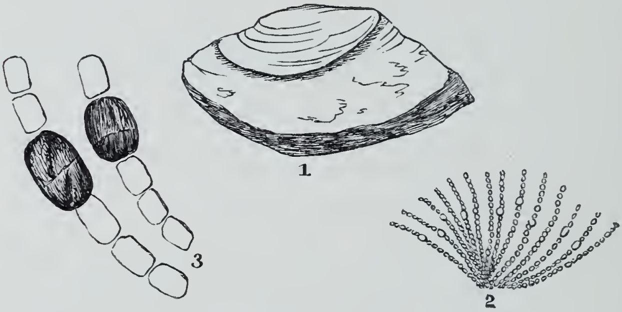
DESCRIPTION.—Frond forming a thin crust, spreading over the stone, composed of "two strata, the lower very thin, spreading horizontally" (*Ag.*), the upper consisting of very delicate, simple or slightly branched, articulated filaments, very closely placed side by side, so as to form a firm, somewhat elastic crust, with a smooth surface, and a reddish purple colour. Fructification (sphærosporæ) formed in one of the articuli of the filament, situated near the middle, solitary, cruciate.

Closely allied to *Cruoria* in the structure of its fronds, the Petrocelides are essentially different in their fructification, which originates not in the transformation of an entire filament or its branch into a zonate tetraspore, but in the formation of a tetraspore, in a single cell or articulation of the filament, and possibly by a simple accumulation and condensation of endochrome within the cell, which is thereby swelled out to more than four times its usual size.

The articulation thus fructified does not seem to be always equally distant from either extremity; even in the same frond, fructified cells may be observed on different filaments at about one-third from the base, and all the way to the apices of the filaments. We have never seen more than one sphærospore in a filament, but it is not rare to see the next or a neighbouring articulation considerably intumescent as if in process of formation, or as if having been partially fructified and become abortive.

Professor Harvey describes and figures the tetraspores as always arising in the central articulation; Agardh also says, "*ex articulo fili medio formatæ* (*sphærosporæ*)." This we have not been able to verify, so that it is quite possible that more than one species may be included under the above name and description, if future observation shall decide that the present genus is really distinct from the following.

This genus differs from *Cruoria* in the frond being composed of two strata of cells, and in the arrangement of the tetraspores, which are produced in a joint of the filament, situate near its middle.



PETROCELIS CRUENTA.

EXPLANATION OF DISSECTIONS.

Fig. 1.—*Petrocelis cruenta*, on a stone, natural size.
2.—Filaments.
3.—Portion of same. Both magnified.

CRUORIA ADHÆRENS.—*J. Ag.*

Gen. Char.—Frond crustaceous, adnate, spreading, carnose, composed of vertical dichotomous (or simple) filaments, closely packed together in a lax jelly. Fructification: Zonate tetraspores, arising from the transformation of the filaments or their divisions. Name from *cruor*, "blood," spots of which the fronds, especially when young, very much resemble.

Cruoria *adhærens.*—Frond crustaceous, adnate, the vertical filaments simple or very sparingly dichotomous, attenuated to the base.

Cruoria *adhærens.*—*J. G. Agardh, Sp. Gen. Alg.* vol. ii. p. 491; *Harv.* in *Nat. Hist. Rev.* vol. iv. (1857) p. 203, and plate 13 c., fig. 1.

Nemaleon *adhærens.*—*Cr.* in litteris.

Chætophora *pellita.*—*Auct.* (quoad partem ?).

Cruoria *pellita.*—*Desmar. Pl. Crypt.* (fide *Crouan*).

Hab.—On rocks and stones between tide-marks, in various places. Kilcraggan, opposite Gourock (*Prof. Walker Arnott*); Aberdeen (*Dr. Dickie*); Penzance (*Mr. Ralfs*); Kilkee, 1844; Cushendall, Co. Antrim, 1850 (*Dr. Harvey*).

Geogr. Dist.—Atlantic shores of Europe.

Description. — Frond forming a thin, somewhat fleshy crust on smooth stones, half an inch to two inches in breadth, and less than half a line in thickness, at first circular, but afterwards more or less irregular in outline. Structure composed of erect, simple, or more frequently once or even twice dichotomous, jointed filaments closely packed together, of equal length, so as to form a smooth, level crust; the filaments are very fine, somewhat constricted at the joints, which are nearly as broad as long, those in the middle of the filament generally longest. Substance, when fresh, more or less fleshy and elastic, when dry, hard and horny. Colour, a rather dull purplish red.

Two species of *Cruoria* are described by Agardh; in the first, *C. adhærens*, the filaments are described as simple or sparingly dichotomous (*filis simplicibus aut parcissimè dichotomis*); in the other, *C. pellita*, they are described as fasciculate, densely branched from the base (*filis fasciculatis inferne dense ramosis*).

We have received specimens of *Cruoria* from various parts of the coast from Dr. Arnott, with tetraspores, under both names, and must acknowledge that these rather serve to confirm our doubts as to the existence of two species. Most of them have the filaments more or less branched, but none of them seem exactly to accord with the character given by Agardh, "*dense ramosis*," while almost in every tuft with simple filaments, may be detected filaments once, twice, or even thrice dichotomous. Even Agardh does not seem satisfied whether the characters given are sufficient to mark a species, or merely a variety, and we have thought it better to introduce the above species in order to draw additional attention to the subject.

The *Cruoriæ* are by no means scarce, and appear to be widely distributed, they are, we believe, as yet but imperfectly understood, and will doubtless, together with the allied forms, afford a rich and interesting field of observation to any one who has leisure and opportunity to devote to the subject.

This genus differs from *Hildenbrandtia*, chiefly in arrangement and origin of the tetraspores, which arise not from special filaments (paraphyses), but from the proper filaments of the frond being changed, and consequently they are not contained in proper conceptacles, but are dispersed through the substance of the frond.

CRUORIA ADHÆRENS.

EXPLANATION OF DISSECTIONS.

Fig. 1.—Filaments and spores.
2.—Filaments showing the apices cohering.
3.—Spores. All magnified.

ACTINOCOCCUS HENNEDYI.—*Harv.*

GEN. CHAR.—Frond uniform, spreading, adnate, entirely composed of slender, moniliform filaments, attenuated to each extremity, and enclosed in a very soft gelatine. Fructification (sphærosporæ) formed by the transformation of all or most of the articulations into tetraspores, cruciate.

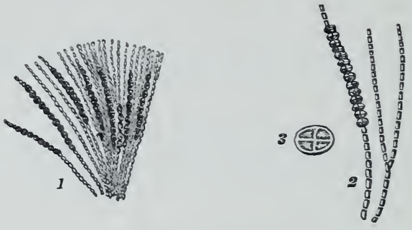
ACTINOCOCCUS *Hennedyi.*—*Harv.* in *Nat. Hist. Rev.* vol. iv. (1857), p. 202, and plate 13 A, fig. 1.

HAB.—On an old root of *Laminaria digitata* at Cumbraes, 1852 (*R. Hennedy*).

GEOGR. DIST. —— ?

The essential difference between this and the preceding genus, consists in the number not the disposition of the sphærospores. In the last only one of the articulations seems capable of maturing these, whilst in the present, the whole or most of the articulations seem capable of producing them. This in the present genus-making age has been considered sufficient grounds of generic distinction, slender enough certainly, but we submit to high authority in the hope that future research may fix the limits of the genera and species of this little known group in a more satisfactory manner.

Dr. Harvey states he should have taken this species to be *A. simplicifilum* (*J. Ag.*), but that the frond or crust is indefinitely extended, and the filaments are frequently once or twice branched; the articulations are nearly similar. The tetraspores in our plant are very large, forming beautiful necklace-like strings of deep red beads. Having, through the kindness of Dr. Arnott, received mounted specimens, we have been enabled to verify these remarks. Our specimens, however, are from the same habitat as those of Dr. Harvey. The specific name is worthily given by Dr. Harvey, in honour of its discoverer, Mr. R. Hennedy of Glasgow.



ACTINOCOCCUS HENNEDYI.
(Reduced from *Nat. Hist. Rev.* vol. iv. (1857), plate 13, fig. 1.)

EXPLANATION OF DISSECTIONS.

Fig. 1.—Portion of the crust.
2.—Fertile and barren filaments separated.
3.—A tetraspore. All magnified.

NEMALEON multifidum, J. Ag.

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Plate LXI.

NEMALEON MULTIFIDUM.—*J. Ag.*

Gen. Char.—Frond filiform, gelatinous, dichotomous, composed of a double stratum of articulated filaments; the axis narrow, composed of densely packed and interwoven, articulated filaments, from which arise innumerable slender dichotomous filaments radiating to the circumference, and forming the periphery; the cells next the axis cylindrical, becoming shorter towards the surface, where they are coloured, short, and moniliform. Fructification, roundish masses of spores (favellidia), formed among the upper axils of the radiating filaments. *Nemaleon*, from *νῆμα*, "a thread," and ληὶον, "a crop:" crop of threads.

Nemaleon *multifidum.*—Frond filiform, more or less branched, dull purple; axils broad and rounded.

Nemaleon *multifidum.*—*J. Ag.* in *Linn.* vol. xv. p. 453; *Endl.* 3rd Suppl. p. 37; *Harv. P. B.* plate 36; *Harv. Man.* p. 153; *Harv. Syn.* p. 126; *Atlas*, plate 46, fig. 210; *Harv. N. B. A.* part 2, p. 135; *J. G. Agardh, Sp. Gen. Alg.* vol. ii. p. 419.

Mesogloia *multifida.*—*Ag. Syst.* p. 50; *Berk. Alg.* t. 16, fig. 1; *Harv.* in *Hook. Br. Fl.* vol. ii. p. 385; *Mack. Fl. Hib.* part 3, p. 185; *Wyatt, Alg. Danm.* No. 98; *Harv. Man.* 1st ed. p. 47; *Mont. Pl. Cell. Canar.* p. 189.

Mesogloia *Balani.*—*Carm. MSS.*

Chordaria *multifida.*—*Lyngb. Hyd. Dan.* p. 51; *Fl. Dan.* t. 1669.

Chætophora *multifida.*—*Hook. Fl. Scot.* part 2, p. 76.

Rivularia *multifida.*—*Web. et Mohr; Roth, Cat. Bot.* vol. iii. p. 335.

Helminthora *multifida.*—*Kütz. Phyc. Gen.* p. 391, t. 44, f. 3.

Hab.—On rocks, stones, and old shells near low-water mark. Common along all our western shores.

Geogr. Dist.—Atlantic shores of Europe; Mediterranean Sea; Canary Islands (*Webb*).

Description.—Root thick, fleshy, and spreading. Fronds somewhat tufted, cylindrical, sparingly dichotomously divided, six to ten inches long, about a line in diameter; divisions distant; axils broad and rounded. Structure: the axis composed of very slender jointed filaments, closely packed and interwoven; the articulations cylindrical, about three to four times longer than broad, occupying about one-fourth or one-fifth of the diameter, the remainder entirely composed of radiating filaments, dichotomous, articulated; the lower articulations cylindrical, three to four times longer than broad, becoming shorter towards the circumference, where they are as broad as long, roundish, coloured, and moniliform. Substance soft and gelatinous, adhering closely to the paper in drying. Colour, a rather dull, dark brownish purple.

This species seems confined to the shores that are washed by the Atlantic, and has not, so far as we are aware, been found on the east coast. It is a plant of no great external beauty, but sections with the beaded filaments form beautiful objects in the microscope. The structure, however, is so tender that they do not revive well after being dried. It is a plant subject to very little variety in its aspect, except to a very limited extent in the thickness of its frond, or in the degree of branching.

This family is of limited extent, containing only four native genera, each of a single species. They are all very soft and lubricous species, and of very similar structure, being constituted of a narrow axis of closely compacted longitudinal fibres, from which arise slender dichotomous filaments, radiating towards the circumference.

EXPLANATION OF PLATE LXI.

Fig. 1.—*Nemaleon multifidum*, natural size.
2.—Cross section of stem.
3.—Filaments of same, showing the structure.
4.—Apical branches of filaments, with favella. All magnified.

Helminthocladia purpurea, Ag.

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Plate LXII.

HELMINTHOCLADIA PURPUREA.—*J. G. Ag.*

Gen. Char.—Frond cylindrical, terete, gelatinous, branching in every direction, composed of two strata of articulated filaments, those forming the axis, capillary; joints cylindrical, five to six times as long as broad, somewhat loosely compacted; from these arise numerous others, which proceed in a radiating, dichotomous manner to the circumference. Name from ἕλμινθος, "a worm," and κλάδος, "a branch;" the soft lubricous branches resembling worms.

Helminthocladia *purpurea.*—Stem undivided, beset with numerous irregularly inserted branches, gradually tapering from the base; these again sometimes furnished with a second series of like branches.

Helminthocladia *purpurea.*—*J. G. Agardh, Sp. Gen. Alg.* vol. ii. p. 414.

Nemaleon *purpureum.*—*Chauv. Mem.* p. 57; *Harv. P. B.* plate 161; *Harv. Man.* p. 153; *Harv. Syn.* p. 126; *Atlas*, plate 48, fig. 261.

Mesogloia *purpurea.*—*Harv.* in *Hook. Br. Fl.* vol. ii. p. 386; *Harv. Man.* 1st ed. p. 48; *Wyatt, Alg. Danm.* No. 47.

Dumontia *Calvadosii.*—*Lamour. Dict. d'Hist. Nat.* vol. v. p. 643; *Gaill. Dict. Sc. Nat.* vol. liii. p. 364; *Duby, Bot. Gall.* p. 941.

Hab.—In sandy places, among *Zostera*, near but without low-water mark. Annual. Summer. Very rare. Sidmouth and Torquay (*Mrs. Griffiths* and *Miss Cutler*); Whitsand Bay (*Rev. W. S. Hore*); Kilkee and Miltown Malbay (*Dr. Harvey*); Balbriggan (*Miss Gower*).

Geogr. Dist.—Atlantic coasts of France.

Description.—Root minute, conical, somewhat cartilaginous. Fronds filiform or somewhat cylindrical, from a slender base gradually widening to the middle, and thence attenuated to a long, slender, acute point, eight to twelve inches or more in length, scarcely divided, but emitting on all sides numerous simple or once or twice divided branches, which, like the stem, are attenuated to a long sharp point. Structure: the axis composed of capillary, longitudinal, somewhat loosely interwoven fibres, with long cylindrical joints, five to six times as long as broad; from these arise the filaments of the periphery, which are slender and cylindrical at the base, upwards rather stout and moniliform, the articulations obovate or obpyriform, and coloured. Substance very soft, lubricous and gelatinous, closely adhering to the paper in drying. Colour, reddish purple, varying in intensity, rapidly dissolving in fresh water, and generally changing to a reddish brown in drying.

This is a rare species on the British shores, and the fruit still more so, being generally an inhabitant of deep water, and only seen in its most perfect state when thrown on shore after a gale. We have seen no fruit, and presume it must be very rare.

From *Nemaleon* it differs in the more laxly compacted cells of the axis, the much larger and curiously obpyriform cells of the periphery, dichotomously divided at every articulation. But the habit of the species is even more characteristic than the structure, resembling as it does, excepting in colour, the species of *Mesogloia*, with which it was formerly associated, rather than *Nemaleon*.

EXPLANATION OF PLATE LXII.

Fig 1.—*Helminthocladia purpurea*, natural size.
2.—Portion of a branch.
3.—Filaments of which the same is composed. Both magnified.

Plate LXIII

HELMINTHORA *divaricata*, J. AG.

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PLATE LXIII.

HELMINTHORA DIVARICATA.—*J. Ag.*

GEN. CHAR.—Frond terete, filiform, gelatinous, composed of three strata of articulated filaments; those of the axis longitudinal, formed of large oblong cells, surrounded by a stratum composed of others which are slender, capillary and anastomosing, from which arise a third series of shorter cells, and dichotomously radiating to the circumference.

HELMINTHORA *divaricata.*—Frond filiform, dull red, much branched; branches generally alternate; ramuli numerous, divaricate, obtuse.

HELMINTHORA *divaricata.*—*J. G. Agardh, Sp. Gen. Alg.* vol. ii. p. 416; *Harv. N. B. A.* part 2, p. 133.

DUDRESNAIA *divaricata.*—*J. Ag. Alg. Medit.* p. 85; *Endl.* 3rd Suppl. p. 37; *Harv. P. B.* plate 110; *Harv. Syn.* p. 127; *Atlas*, plate 49, fig. 221.

MESOGLOIA *divaricata.*—*Ag. Syst. Alg.* p. 51; *Kütz. Phyc. Gen.* p. 332.

MESOGLOIA *Hudsoni.*—*Harv.* in *Hook. Br. Fl.* vol. ii. p. 386 (not of *Ag.*); *Harv.* in *Mack. Fl. Hib.* part 3, p. 186; *Harv. Man.* p. 154; *Wyatt, Alg. Danm.* No. 99.

ULVA *rubens.*—*Huds. Fl. Angl.* p. 571.

HAB.—On stones and shells, between tide-marks. Annual. Summer and autumn. Common.

GEOGR. DIST.—Northern Atlantic; Baltic Sea.

DESCRIPTION.—Frond from a minute disc, filiform, thickening upwards, and much branched from near the base, four to eight inches long, and from half a line to a line in diameter; branches very irregular in length, patent or divaricating, about three to four times pinnated, with subalternate or occasionally opposite branchlets, the ultimate ramuli often short and squarrose. Structure: the primary axis composed of a bundle of longitudinal filaments, formed of oblong cells, about a third longer than broad. These are surrounded by a stratum of slender capillary, anastomosing, jointed filaments, with cylindrical joints, three to four times as long as broad, and from these arise the filaments forming the periphery; these are slender, dividing dichotomously at every joint, radiating to the surface; joints somewhat obovate, becoming shorter towards the circumference. Substance gelatinous, adhering closely to paper. Colour, orange red, becoming somewhat darker in drying.

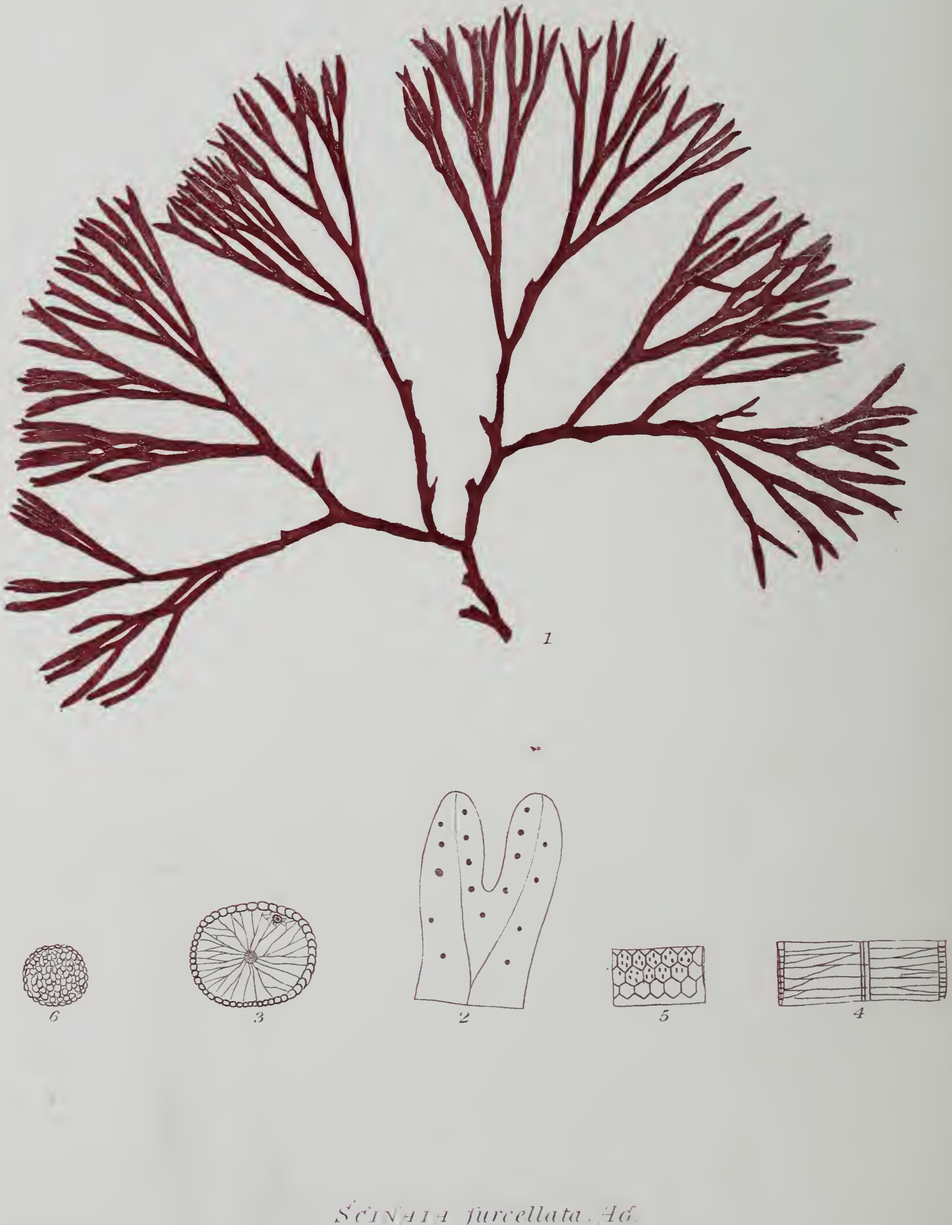
Fructification: favellæ, not uncommon among the filaments of the periphery.

This species may be readily distinguished from the others of the family by its much more compound and divaricate ramification, and by the threefold structure of its stems. Its geographical range is much more extensive, and it is found on most of our shores; possibly, however, it may at times have been passed over as *Mesogloia virescens*, which in habit it somewhat resembles, but may be at once known by its different colour, and still more certainly by its structure and fruit, when submitted to the microscope, where its curious structure renders it an interesting object. When fresh, it is exceedingly soft and lubricous, and is consequently rather a difficult subject to manipulate for the herbarium. The best method, perhaps, for the members of this family, as well as for the *Mesogloiæ* and other lubricous species, is to remove all the superfluous moisture with blotting-paper, cover them with muslin, then put them under a very slight pressure, which may be gradually increased as desiccation proceeds.

EXPLANATION OF PLATE LXIII.

Fig. 1.—*Helminthora divaricata*, natural size.
2.—Longitudinal section of frond, magnified.

Plate LXV.



Scinaia furcellata, Ad.

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PLATE LXIV.

SCINAIA FURCELLATA.—*Bivona.*

GEN. CHAR.—Frond cylindrical, gelatinoso-membranaceous, composed of a central longitudinal axis, consisting of extremely delicate, closely packed filaments, from which proceed towards the circumference very fine capillary, sparingly dichotomous fibres, ending in the periphery, which is composed of several strata of minute, coloured cells. Fructification, attached to the inner surface of the periphery, consisting of spherical masses of moniliferous jointed filaments, radiating from a common centre, the terminal joints being finally converted into spores.

SCINAIA *furcellata.*—Frond cylindrical, gelatinous; segments obtuse.

SCINAIA *furcellata.—J. G. Agardh, Sp. Gen. Alg.* vol. ii. p. 422; *Harv. N. B. A.* part 2, p. 136.

GINNANIA *furcellata.—Mont. Pl. Cell. Canar.* p. 162; *Endl.* 3rd Suppl. p. 40; *Harv. P. B.* plate 69; *Harv. Man.* p. 149; *Harv. Syn.* p. 122; *Atlas*, plate 50, fig. 226.

HALYMENIA *furcellata.—Ag. Sp. Alg.* vol. i. p. 212; *Ag. Syst.* p. 244; *Grev. Alg. Brit.* p. 163; *Hook. Br. Fl.* vol. ii. p. 308; *Harv.* in *Mack. Fl. Hib.* part 3, p. 189; *Wyatt, Alg. Danm.* No. 79; *J. Ag. Alg. Medit.* p. 98; *Hook. fil. et Harv.* in *Lond. Journ. Bot.* vol. iv. p. 548.

MYELOMIUM *furcellatum.—Kütz. Phyc. Gen.* p. 393, t. 73, fig. 1.

ULVA *furcellata.—Turn.* in *Schr. Journ.* (1800—2) p. 301; *E. Bot.* t. 1881.

ULVA *interrupta.—Poir. Encycl.* vol. viii. p. 171; *D. C. Fl. Fran.* vol. vi. p. 3.

DUMONTIA *triquetra.—Lamour. Ess.* p. 45.

CORALLOPSIS *dichotoma.—Suhr, Bot. Zeit.* (1839) p. 70, f. 44.

Var. *β. subcostata.*—Broader than usual.

SCINAIA *furcellata, β subcostata.—J. G. Agardh, Sp. Gen. Alg.* vol. ii. p. 422.

GINNANIA *furcellata, β subcostata.—Harv. P. B.* descp. plate 69.

HALYMENIA *furcellata, β subcostata.—J. Ag. Alg. Medit.* p. 98.

HAB.—On rocks, stones, old shells, &c., from low water to twelve fathoms water. Annual. Summer. On the eastern and southern shores of England, frequent. Rare on the west coast. All round the Irish shores, but not plentiful. Arran (first time it was got in Scotland), (*Mrs. Balfour*, 1850); and near Lamlash, on rocks at very low water, Lamlash Bay (*Major Martin*).

GEOGR. DIST.—Atlantic shores of Europe; Baltic and Mediterranean Seas; Cape of Good Hope; New Zealand; Chili; Sandwich Islands.

DESCRIPTION.—Frond from a small conical disc, cylindrical, dichotomously branched from near the base, scarcely tufted, three to eight inches long, and from a line to four or five in diameter; the axils rounded but narrow; all the branches and branchlets of about equal length, with rounded apices, often a little thickened below the apices, and occasionally proliferous when the apices have become accidentally injured. Structure: central axis very narrow, not occupying above one-eighth part of the diameter, composed of extremely fine, articulated filaments, closely compacted together, so as to form a firm percurrent cord, which may be often observed forming a narrow line resembling a midrib through the whole of the frond, the greater portion of which consists of the radiating, dichotomous filaments, which are extremely fine, sparingly dichotomous and loosely packed. The periphery forms a thin stratum—two to three series of minute, coloured cellules. Substance gelatinous, but firm, adhering to paper. Colour, a brownish or reddish orange, the brown predominating when dry.

This pretty species seems mostly confined to the southern shores of England and Ireland, becoming rarer as we proceed northward.

When fresh, the fronds are nearly cylindrical, but from the extreme tenacity of the radiating filaments, and their very lax disposition, the plant when once dried can never be perfectly revived.

It has no very distant resemblance to small plants of *Nemaleon multifidum*, but may generally be known by the more numerous and shorter branches, and the more fastigiate habit of the frond; and by an appeal to the microscope, the structure will be found entirely different. Indeed, so delicate and peculiar is the structure of the present species, that no British Alga can readily be confounded with it.

The fructification is almost always present in greater or less abundance, and is scattered over the whole frond, but is generally most plentiful about the upper axils.

β *subcostata* is only a little broader, and were it not that the nerve in it is generally stronger, it need scarcely be noticed as a variety at all.

EXPLANATION OF PLATE LXIV.

Fig. 1.—*Scinaia furcellata*, natural size.
2.—Apex of a branch.
3.—Tranverse section of same.
4.—Longitudinal section of same.
5.—Vertical section of the frond, showing membrane.
6.—Globule of fructification. All magnified.

Plate LXV

WRANGELIA Multifida, J. Ag.

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PLATE LXV.

WRANGELIA MULTIFIDA.—*J. Ag.*

GEN. CHAR.—Frond capillary, jointed, with a single tube. Fructification of two kinds, on distinct plants: 1. Stalked gelatinous receptacles, surrounded by a many-leaved involucre, and containing several clusters of obpyriform spores; 2. Tetraspores, sessile, on the upper edge of the ramuli. Name in honour of Baron von Wrangel, a Swedish naturalist.

WRANGELIA *multifida.*—Stem setaceous, pinnate or bipinnate, articulated, each joint whorled with numerous incurved slender ramuli; joints of the stem several times longer than broad.

WRANGELIA *multifida.*—*J. Ag. Alg. Medit.* p. 97; *Endl.* 3rd Suppl. p. 35; *Harv. P. B.* plate 27; *Harv. Man.* p. 170; *Harv. Syn.* p. 141; *Atlas,* plate 55, fig. 253.

GRIFFITHSIA *multifida.*—*Ag. Syst. Alg.* p. 143; *Ag. Sp. Alg.* vol. ii. p. 133; *Harv.* in *Hook. Br. Fl.* vol. ii. p. 338; *Harv.* in *Mack. Fl. Hib.* vol. iii. p. 212; *Harv. Man.* 1st ed. p. 102; *Wyatt, Alg. Danm.* No. 43; *M'Calla, Alg. Hib.* No. 1.

CALLITHAMNION *multifidum.*—*Kütz. Phyc. Gen.* p. 373.

CERAMIUM *verticillatum.*—*Ducleauz.* sec. *Ag.*

CERAMIUM *casuarinæ.*—*D. C. Fl. Gall. Syn.* p. 8.

CONFERVA *multifida.*—*Huds. Fl. Angl.* p. 596; *Sm. E. Bot.* t. 1816; *Dillw. Conf. Syn.* p. 75.

Var. *β. pilifera.*—Ramuli very long, simple and hair-like.

GRIFFITHSIA *multifida, β pilifera.*—*Ag.* l. c.

WRANGELIA *multifida, β pilifera.*—*Harv. P. B.* descp. plate 27; *Harv. Man.* p. 170.

HAB.—On the sides of marine pools near low-water mark, generally shaded by other Algæ. Frequent on the southern shores of England and west of Ireland. Rare in Scotland. Saltcoats, floating (*Mrs. R. M. Stark*); Ardrossan and Arran (*Major Martin*).

GEOGR. DIST.—Atlantic coasts of Europe; Mediterranean Sea; but rare.

DESCRIPTION.—Root composed of numerous slender, branching fibres. Frond capillaceo-multifid, tubular, jointed, four to eight inches long or more, as thick as a stout bristle at the base; branches capillaceous, long, of somewhat irregular length, the upper ones suddenly shortened, giving the frond a broadly ovate or roundish outline. Sometimes all the divisions are opposite, sometimes all alternate, frequently both on the same branch; more or less distichous, or "spirally quadrifarious." Articulations very variable in length even on the same plant, sometimes four to five, or even eight to ten times longer than broad, filled with a narrow thread of endochrome, and each beset at its summit with numerous incurved, multifid ramuli, with short joints, two to three times longer than broad, of equal thickness throughout; the apices rather obtuse. Sometimes the ramuli are simple, from half an inch to an inch and a-half in length, or regularly pinnated with opposite, simple ramuli. This form constitutes the variety β. Substance, when fresh, rather firm, but soon becoming flaccid, and closely adhering to paper. Colour, a fine crimson lake, but very evanescent, and readily given out in fresh water. Favellæ on short stalks, surrounded by an involucre of numerous setaceous, multifid leaves, and containing several star-like clusters of obpyriform spores. Tetraspores sessile, on the upper edge of and near the base of the ramuli, roundish, minute, with a broad pellucid limbus.

From all the other *Griffithsiæ*, in which genus this species was formerly included, it may be readily known by its extremely fine and multifid fronds, with their beautifully whorled ramuli.

It has some slight affinity with *G. equisetifolia*, but it has much longer articulations, and the ramuli arise, not from the summit of the articulation, but from its side a little below the apex; in that species the branches are also much more scattered and very rarely opposite.

EXPLANATION OF PLATE LXV.

Fig. 1.—*Wrangelia multifida*, natural size.
2.—Ramulus with tetraspores.
3.—Tetraspore.
4.—Portion of a branch with a favella.
5.—Cluster of spores from same.
6.—Portion of a branch. All magnified.

Plate LVI

NACCARIA WIGGHII, ENDL.

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PLATE LXVI.

NACCARIA WIGGHII.—*Endl.*

GEN. CHAR.—Frond filiform, solid, cylindrical or flat; central cells very large, those forming the surface very minute; all the younger parts of the frond surrounded with numerous ramuli, consisting of a slender, jointed filament, around which are arranged in more or less closely placed verticellate series, innumerable jointed filaments. Fructification: "groups of spores (favellidia)," arising from the base of the verticellate filaments. Name in honour of F. L. Naccari, an Italian botanist.

NACCARIA *Wigghii.*—Frond cylindrical, much and irregularly branched; "ramuli spindle-shaped, quadrifarious."

NACCARIA *Wigghii.—Endl. Gen. Pl.* No. 68; *Endl.* 3rd Suppl. p. 37; *J. Ag. Alg. Medit.* p. 86; *Kütz. Phyc. Gen.* p. 391; *Harv. P. B.* plate 38; *Harv. Man.* p. 152; *Harv. Syn.* p. 125; *Atlas*, plate 48, fig. 218.

CHÆTOSPORA *Wigghii.—Ag. Syst.* p. 146; *Grev. Alg. Brit.* p. 153, t. 16; *Hook. Br. Fl.* vol. ii. p. 306; *Harv.* in *Mack. Fl. Hib.* part 3, p. 187.

FUCUS *Wigghii.—Turn.* in *Linn. Trans.* vol. vi. p. 135, t. 10; *Syn. Fuc.* vol. ii. p. 362; *Hist. Fuc.* t. 102; *Sm. E. Bot.* t. 1165.

CLADOSTEPHUS *Wigghii.—Spreng. Syst. Veg.* vol. iv. p. 347.

HAB.—On marine rocks at and beyond low-water mark. Annual. Summer. South coast of England and Jersey, not unfrequent. Yarmouth, Norfolk, 1790 (*Mr. L. Wigg*); Bantry Bay (*Miss Hutchins*); Kilkee and Wicklow (*Dr. Harvey*); Belfast Bay (*Mr. W. Thompson*); Scotland, very rare, Macrihanish Bay, Argyleshire (*Mr. D. Landsborough, Jun.*).

GEOGR. DIST.—Atlantic shores of Europe, England to Spain; at Nice (*Risso*).

DESCRIPTION.—Root, a minute, flattened disc. Frond filiform, cylindrical, much and irregularly branched, five to eight inches long or more; stem slender at the base, thickest about the middle or a little above the base, about half a line in diameter; branches long and slender, of very unequal length and thickness; all the younger parts of the frond are more or less thickly beset with short, elliptical ramuli, attenuated to the base, and composed of a slender, jointed axis, around which are arranged articulated, dichotomous filaments, in close verticellate series. Fructification, very minute, obpyriform spores, produced near the base of the verticellate filaments. Structure very peculiar; stem and branches cellular; central cells large, roundish, angular, occupying about three-fourths of the diameter, those composing the remainder becoming smaller towards the surface, where they are very minute ; the ramuli consist each of a very slender, jointed thread, composed of a single series of cells, and inclosed in a stratum of dichotomous jointed filaments, radiating to the surface, the joints of which are short, obovate, the terminal about as long as broad, those at the base a little longer.

The structure of this beautiful species is very peculiar, being widely-distinct from all the other Rhodosperms in many important points. The structure of the stem is not unlike some of the *Rhodymeniaceæ*, but that of the ramuli and the fructification is widely different; and although these, in the present species, are almost identical with that of the *Helminthocladieæ*, the structure otherwise is entirely different except in the ultimate ramuli. Nor does it seem better disposed to associate with the *Mesogloiæ*, among the *Melanospermeæ*.

It is a rare species in this country, having been found chiefly on our southern shores, and there only sparingly, and the supply uncertain.

We have received specimens of another species, *N. hypnoides*, but this, along with some others, we are obliged to refer to an Appendix, as they cannot be sufficiently characterised without the more careful examination of recent specimens.

EXPLANATION OF PLATE LXVI.

Fig. 1.—*Naccaria Wigghii*, natural size.
2.—Portion of a branch with fruiting ramuli.
3.—One of the fruiting ramuli.
4.—Spores from same.
5.—Transverse section of stem.
6.—Longitudinal section of stem. All magnified.

END OF VOL. I.

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