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Plate CCCXIX.

POLYSIPHONIA CARMICHAELIANA, *Harv.*

Gen. Char. *Frond* filamentous, partially or generally articulate; joints longitudinally striate, composed of numerous radiating cells or tubes disposed round a central cavity. *Fructification* twofold, on different individuals: 1, ovate *capsules* (*ceramidia*) furnished with a terminal pore, and containing a tuft of pear-shaped spores; 2, *tetraspores* imbedded in swollen branchlets. Polysiphonia (*Grev.*),—from πολυς, *many*, and σιφων, a *tube*.

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

Polysiphonia Carmichaeliana, *Harv. in Hook. Br. Fl.* vol. ii. p. 328. *Harv. Man.* ed. 2. p. 87.

Polysiphonia divaricata, *Carm. MS.* (*not of Agardh*).

Hab. Parasitical on *Desmarestia aculeata*. Appin, *Capt. Carmichael.* Very rare.

Geogr. Distr. (Not known elsewhere.)

Descr. *Filaments* tufted, but not densely so, about four inches high, rigid, thicker than hog's 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 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.

I here figure a specimen collected by Capt. Carmichael, at Appin, and now preserved in the rich Herbarium of Sir W. J. Hooker. No one but Carmichael has met with this plant, to my knowledge, and he only found it once. Its characters are

so peculiar that I formerly considered myself justified in assigning it a specific name. How far I acted wisely may be questioned. At any rate, as it has borne a name in British works for many years, it is right that it should now be figured, that persons visiting the western shores of Scotland may look out for it. Rigid and spiny as it looks, I have sometimes thought that it may be only an extravagant form of *Pol. fibrillosa*.

Fig. 1. Polysiphonia Carmichaeliana:—*the natural size.* 2. A portion of a secondary branch with ramuli. 3. Apex of a ramulus. 4. Portion of the stem. 5. Cross section of a small branch. 6. Cross section of the stem:—*all more or less magnified.*


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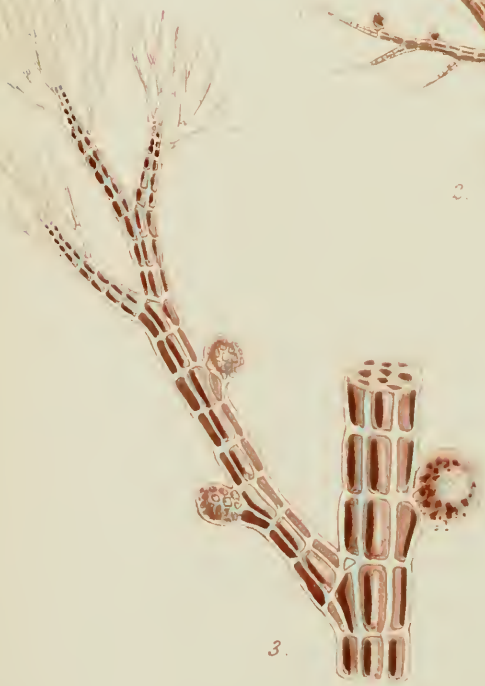
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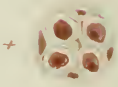
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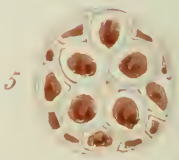
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Plate CCCXX.

POLYSIPHONIA SPINULOSA, *Grev.*

Gen. Char. *Frond* filamentous, partially or generally articulate; joints longitudinally striate, composed of numerous radiating cells or tubes disposed round a central cavity. *Fructification* twofold, on different individuals: 1, ovate *capsules* (*ceramidia*) furnished with a terminal pore, and containing a tuft of pear-shaped spores; 2, *tetraspores* imbedded in swollen branchlets. Polysiphonia (*Grev.*),—from πολυς, *many*, and σιφων, 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. l. c.*

Polysiphonia spinulosa, *Grev. Scot. Crypt. Fl.* t. 90. *Harv. in Hook. Br. Fl.* vol. ii. p. 330. *Harv. Man.* ed. 2. p. 84.

Hab. "Sea-shores" (probably in tide-pools) at Appin, *Captain Carmichael*. Very rare.

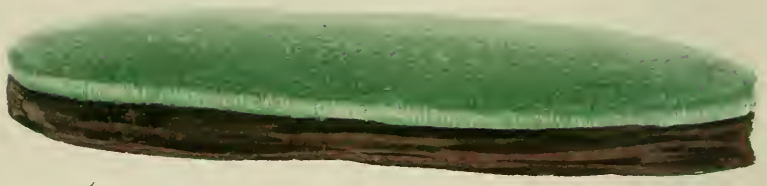
Geogr. Distr. ——?

Descr. "*Frond* 1–2 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. l. c.* A transverse section of the stem (fig. 5) 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, only found by Captain Carmichael, and by him only once, and now figured from a specimen preserved in the Hookerian Herbarium. The resemblance between *P. spinulosa* and our *P. Carmichaeliana* is great, but *P. spinulosa* is a much smaller and more delicate plant, and its stems are articulated throughout.

I have copied Dr. Greville's specific character and description, and refer to his excellent figure in the 'Scot. Crypt. Flora.' The "tubercles" above described are evidently young ceramidia; the specimen having been collected just as they were putting forth. It is obvious from an inspection of the figure that they are metamorphosed ramuli, occupying exactly the position of ramuli. They are profusely scattered over all the branches of the specimen I examined.

Fig. 1. Polysiphonia spinulosa:—*the natural size.* 2. A branch. 3. A small branch and ramuli, with apical fibres and young ceramidia. 4. Cross section of one of the smaller branches. 5. Cross section of the stem:—*all more or less highly magnified.*



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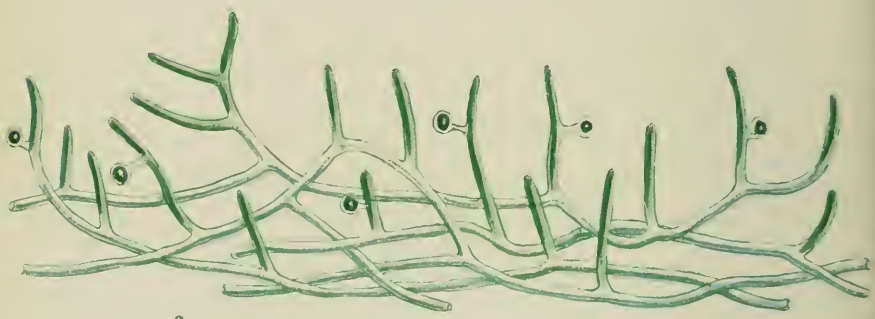

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W.H.H. del et lith.

Reeve & Nichols imp.

Plate CCCXXI.

VAUCHERIA VELUTINA, *Ag.*

Gen. Char. *Fronds* aggregated, tubular, continuous, capillary, coloured by an internal, green, pulverulent mass. *Fructification*, dark green, homogeneous *sporangia* (*coniocystæ*), attached to the frond.—*Grev.* Vaucheria (*De C.*),—in honour of *M. Vaucher*, a distinguished Swiss writer upon fresh-water *Confervæ*, &c.

Vaucheria *velutina*; filaments creeping; branches erect, fastigiate, woven into a velvety stratum; sporangia solitary, globose, lateral, on short stalks.

Vaucheria velutina, *Ag. Syst.* p. 312. *Hook. Br. Fl.* vol. ii. p. 319. *Harv. Man.* ed. 1. p. 147. ed. 2. p. 196. *Kütz. Syst. Alg.* p. 487.

Hab. On the muddy sea-shore, and on mud-covered rocks, between tide-marks, generally above half-tide level. Annual. Spring and summer. Appin, *Capt. Carmichael.* Miltown Malbay; Ross Begh; Cushendall, and several other places on the Irish coast, *W. H. H.* (Probably all round the coast.)

Geogr. Distr. Shores of Europe.

Descr. This plant forms widely spreading, velvety patches, from a few inches to several feet in diameter, and from a quarter of an inch to an inch in thickness. The lower part of the mass consists of innumerable, irregularly branching, interwoven, capillary fronds, of a tough membranous consistence; the larger portion of them being usually dead, with a very offensive odour. The upper stratum of filaments alone exhibits marks of vegetation. The greater portion of each filament is decumbent, but here and there it throws up erect, short branches of nearly equal length, or standing at equal height, and these, closely placed together though originating in separate prostrate threads, from the pile of the velvet-like patch. The lower portions of the tubular filamentous frond are colourless and empty—the upper, and especially the erect branches contain a bright green granular fluid. *Sporangia* globose, very dark green with a pellucid border; each borne at or near the apex of a short branchlet. *Colour* of the stratum a dark, shining green, when free from mud, which frequently nearly chokes the plant.

The specimen here figured was gathered at Cushendall, on the Antrim coast, where the plant grows in scattered patches, over rocks slightly coated with mud, and covered by every tide. It was in fructification in August, but appeared to be rather past

its prime. When properly developed, as on flat, muddy shores, the velvety stratum frequently carpets the mud, with its intense green coating, over a very large extent of surface. The filaments of which the mass consists are inextricably and most closely woven together.

To the naked eye *V. velutina* bears a close resemblance to the fresh-water *V. cæspitosa*, but is less cushioned, and the upright branches forming the pile are shorter.

I take this opportunity of soliciting freshly gathered and fertile specimens of *V. marina* and *V. submarina*, for the purpose of figuring—or the loan and liberty to use drawings of these species made from the living specimen. Dried specimens of these plants are of little value.

Fig. 1. Patch of VAUCHERIA VELUTINA :—*the natural size.* 2. Filiform fronds of which the mass is composed :—*magnified.* 3. Small portions of the same, with fructification :—*highly magnified.*

Plate CCCXXII.

BANGIA CILIARIS, *Carm.*

Gen. Char. *Frond* filiform, tubular, composed (in typical species) of numerous, radiating cellules, disposed in transverse rows, and enclosed within a hyaline, continuous sheath. *Spores* purple or green, one formed within each of the cells of the frond. Bangia (*Lyngb.*), —in honour of Hoffman Bang, a Danish botanist and friend of Lyngbye.

Bangia *ciliaris*; filaments gregarious, very minute, simple, straight, compressed, purple; grains two or three in each transverse band, globose, sometimes solitary.

Bangia ciliaris, *Carm. MSS.* *Hook. Br. Fl.* vol. ii. p. 316. *Harv. Man.* ed. 1. p. 172. ed. 2. p. 218. *Chauv. Recherches*, p. 37.

Goniotrichum ceramicola, Var. *a.* simplex? *Kütz. Sp. Alg.* p. 358. (*so far as reference to Carm. and Chauv.*)

Hab. On the margins of old leaves of *Zostera marina*. Annual. Spring. Appin, *Capt. Carmichael.*

Geogr. Distr. Shores of Scotland, and the north of France.

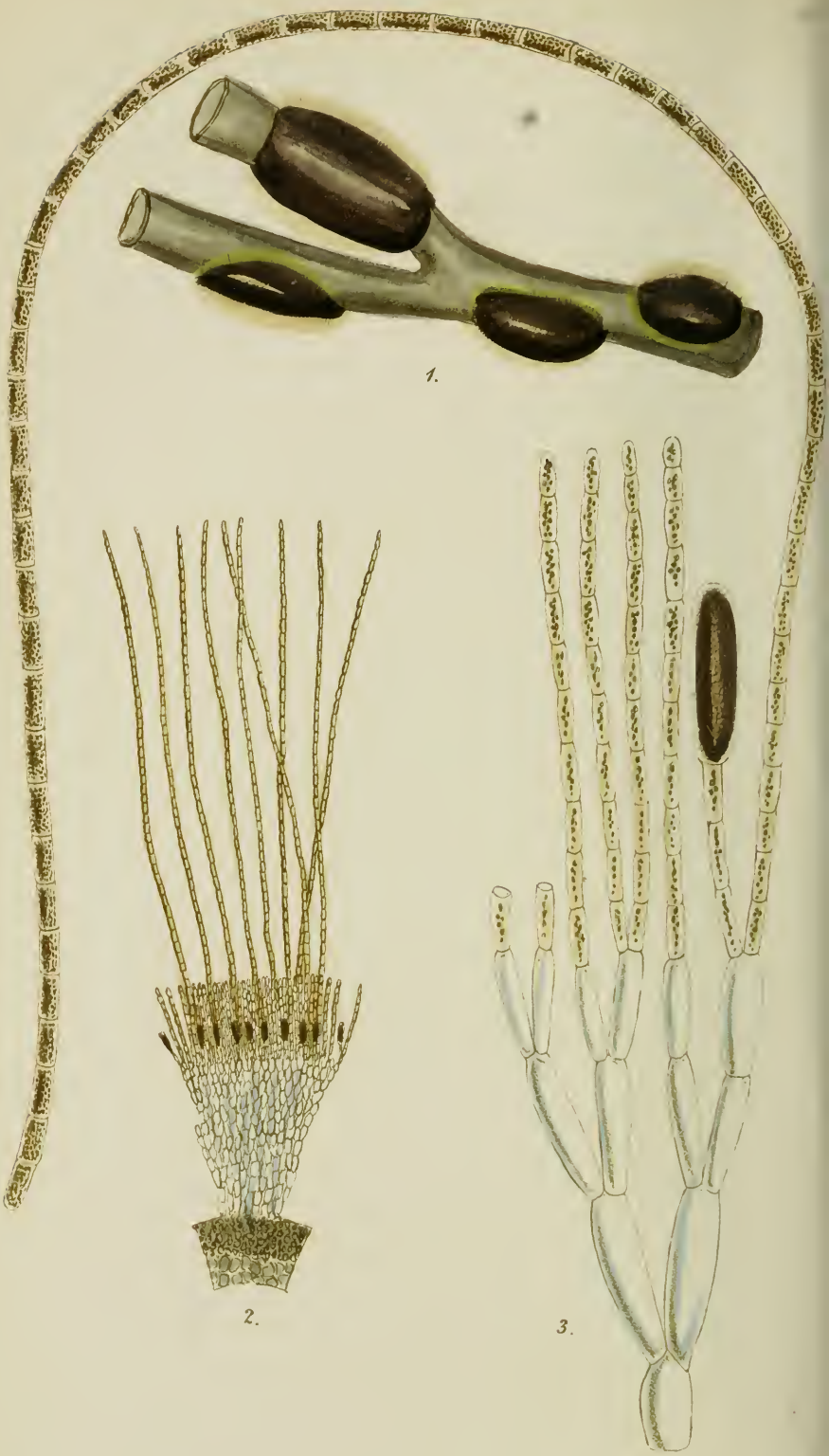
Descr. *Filaments* gregarious, about half a line in length, fringing the leaves of *Zostera* in narrow patches one or more inches in length. Each little thread is erect, straight, or slightly curved, variable in diameter, sometimes containing but a single series or row of granules; oftener containing a double row, and now and then a triple row. All these variations of structure sometimes occur in the same plant, in which case one portion is broader than another, and usually it is the middle portion which is distended. The *granules* are roundish, somewhat depressed at the poles, and of a brilliant purple colour.

By much the most minute of the genuine species of *Bangia*, and not very different from what the youngest state of *B. fusco-purpurea* may be supposed to be. I have seen no specimens but those found by Capt. Carmichael, and now deposited in the Hookerian Herbarium, and from one of these our figure and description have been taken. Capt. Carmichael describes it as commonly fringing the leaves of *Zostera* at Appin, and probably it may be found in many places where it has been overlooked, its minute size protecting it from all but a very careful eye.

On the other hand, its bright colour will make it be easily detected, when specially sought for.

By comparing the figure now given with that of *Bangia ceramicola* (Plate CCCXVII.), the differences between these species may readily be seen; differences which preclude us from regarding them as states of the same plant, as Kützing supposes. Possibly that acute author, not having seen any specimen of our British plant, first described by Capt. Carmichael, has mistaken some other plant for it.

Fig. 1. Portion of a leaf of *Zostera marina*, fringed with BANGIA CILIARIS:—*the natural size*. 2. Fronds of *Bangia ciliaris*, of different diameters:—*highly magnified*.



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Reeve & Nichols

Plate CCCXXIII.

ELACHISTEA SCUTULATA, *Duby*.

Gen. Char. *Frond* parasitical, consisting of a dense tuft of free, simple, articulated, olivaceous filaments, rising from a common tubercular base, composed of vertical branching fibres, closely combined into a cartilaginous mass. *Fructification*, pear-shaped spores attached near the bases of the filaments, concealed in the tubercle, and frequently accompanied by paranemata. Elachistea (*Fries*),—from ελαχιστα, the *least*; from the small size of these plants.

Elachistea *scutulata*; filaments short, rising from an oblong, convex, shield-like tubercle, composed of densely packed, branching fibres; articulations twice or thrice as long as broad; spores oblong.

Elachistea scutulata, *Duby*, *Bot. Gall.* vol. ii. p. 972. *Harv. Man.* ed. 2. p. 50. *Kütz. Syst. Alg.* p. 540. *J. Ag. Sp. Alg.* p. 11.

Conferva scutulata, *Eng. Bot.* t. 2311. *Harv. in Hook. Br. Fl.* vol. ii. p. 355. *Harv. in Mack. Fl. Hib.* part 3. p. 227. *Harv. Man.* ed. 1. p. 132. ed. 2. p. 50. *Wyatt, Alg. Danm.* no. 223.

Hab. Parasitical on the thongs of *Himanthalia lorea*. Annual. Summer and autumn. Very common.

Geogr. Distr. Shores of Europe.

Descr. *Tubercles* forming oblong swellings on the thongs of *Himanthalia*, from half an inch to one, two, or more inches in length, and from a quarter to nearly half an inch in thickness; sometimes extending along the edges of the thong, sometimes occupying its surface, or wholly clasping it round. The *tubercle* is of a very solid, cartilaginous consistence, composed of extremely closely packed, dichotomous, hyaline filaments, whose cells are somewhat pyriform: it continues to grow in thickness as the plant advances to maturity. The apices of these branching filaments, at the outer edge of the tubercle, bear closely-packed *paranemata*, and long, free, penicillate filaments; with *spores* concealed among the paranemata. Penicillate-filaments cylindrical, their cells nearly empty below, toward the apex filled with an olive-coloured granular fluid. *Articulations* about thrice as long as broad. *Spores* oblong, very obtuse at both ends, borne on long pedicels. *Substance* cartilaginous, with a slimy surface. In drying the plant shrinks considerably, and under pressure adheres to paper.

This curious parasite, quite an interesting object under the microscope, is found wherever *Himanthalia lorea* (*Sea-thongs*) abounds. It frequently completely covers the long, strap-shaped

receptacle of that plant for the space of several inches, forming swellings of a dark colour and very slippery surface.

By Prof. Kützing this species alone is retained in the genus *Elachistea*, the other species of authors being placed by him either in *Phycophila* or in *Myriactis*. There are some minor differences of structure observable among these plants, chiefly as respects the composition and degree of development of the tubercular base, but there is so close a resemblance in habit, and such an identity of nature running through the whole, that I am unwilling to cumber the science with additional generic names.

Fig. 1. Shields of ELACHISTEA SCUTULATA on part of a thong of *Himanthalia lorea*:—*the natural size*. 2. Vertical slice of a portion of the tubercle, and of the surface of the nurse-plant. 3. Small portion of the same, showing the *short* filaments (or paranemata); a spore; and one of the long filaments, &c.:—*highly magnified*.

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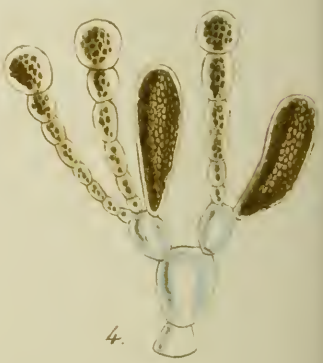

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W. H. H. del et lith.

Reeve & Nichols imp.

Plate CCCXXIV.

LEATHESIA TUBERIFORMIS, *S. F. Gray.*

Gen. Char. *Frond* globose or lobed, fleshy, composed of jointed, colourless, dichotomous filaments, issuing from a central point; their apices, which constitute a fleshy coating to the frond, coloured and tufted. *Fructification*, oval or pyriform *spores*, concealed among the coloured apical filaments. Leathesia (*S. F. Gray*),—in honour of the Rev. G. R. Leathes, a British naturalist; and who first communicated this plant to Sir J. E. Smith.

Leathesia *tuberiformis*; fronds olivaceous, tuberous, when young stuffed with cottony fibres, at length hollow.

Leathesia tuberiformis, *S. F. Gray, Nat. Ar. Br. Pl.* vol. i. p. 301. *Harv. Man.* ed. 2. p. 48.

Leathesia marina, *Endl. 3rd Supp.* p. 23. *Kütz. Sp. Alg.* p. 543. *J. Ag. Sp. Alg.* vol. i. p. 52.

Leathesia difformis, *Aresch. Enum. Phyc. Scand.* p. 154. t. 9. f. B.

Corynephora marina, *Ag. Syst.* p. 24. *Harv. in Hook. Br. Fl.* vol. ii. p. 390. *Harv. Man.* ed. 1. p. 46. *Wyatt, Alg. Danm.* no. 149. *Grev. Crypt. Scot.* t. 53. *Harv. in Muck. Fl. Hib.* part 3. p. 184.

Chætophora marina, *Lyngb. Hyd. Dan.* p. 193. t. 66.

Nostoc marinum, *Ag. Disp.* p. 45. *et Syn.* p. 133.

Tremella difformis, *Linn. Syst. Nat.* p. 714. *Huds. Fl. Ang.* vol. ii. p. 565. *With.* vol. iv. p. 82.

Rivularia tuberiformis, *E. Bot.* t. 1956.

Hab. Between tide-marks, on rocks, corallines, and the smaller Algæ; very common. Annual. Summer and autumn.

Geogr. Distr. Atlantic shores of Europe. Baltic Sea. East coast of North America. Cape of Good Hope, common, *W. H. H.*

Descr. *Fronds* when growing on Algæ scattered or solitary, when on rocks usually heaped together and much crowded, forming wide-spreading tuberculated masses, very variable in size, from that of a pea to that of a large walnut. When young, the interior of the tuberous frond is stuffed with weak, empty, dichotomous, cobweb-like fibres, rising from the base and radiating in all directions, but as the outer wall extends, these gradually perish, and the plant becomes a hollow ball. The lowermost cells of the cobwebby fibres are very long and slender; the upper ones become gradually shorter and wider, and are two-horned, or somewhat half-moon-shaped, a new cell springing from each cusp; those which adjoin to the outer wall are small and globose. The outer wall is formed of closely-packed, moniliform, club-shaped, vertical filaments, lying in a transparent jelly; each filament formed of several spherical cells containing olive granules. *Spores* pyriform, sunk among the club-shaped peripheric filaments, with

which they appear to be homologous. *Colour* a brownish olive. *Substance* cartilaginous. In drying this plant shrinks considerably, and closely adheres to paper if pressed.

Common on all our rocky shores, first appearing about April or May in the form of little, pea-like buttons, attached to small Algæ, or grouped in clusters on the surface of rocks and coral-lines, and, as the season advances, gradually acquiring size; the fronds becoming hollow and cohering in masses. In its young state it constitutes, according to Areschoug, the *Corynophlæa ballica* of Kützing. Not having seen any specimen of the plant so named, I am unable to decide the question.

By most continental authors the specific name *marina* is adopted for this plant, a name which I find for the first time in Agardh's *Dispositio Algarum Sueciæ*, published in 1811. Areschoug alone adheres to the older Linnæan name *difformis*, and if either of these be adopted, the latter is surely preferable, not merely from its elder birth, but because it expresses a natural character of this *deformed*-looking or double-faced plant, while *marina* applies alike to every species of the genus, and even of the family (*Chordarieæ*) to which it belongs:—so that one might as well talk of a *marine sea-weed* as of a *marine Leathesia*. I adopt the name selected by the founder of the genus, and which dates from 1809 (*E. Bot.* t. 1956), because it well expresses the aspect of the plant,—"like a cluster of small potatoes,"—and is at least two years older than *marina*. It is strange that Sir J. E. Smith should have overlooked the *Tremella difformis* of Linnæus, if that plant were rightly taken up by Hudson and Lightfoot.

Fig. 1. LEATHESIA TUBERIFORMIS, in various stages:—*the natural size.* 2. Portion of a longitudinal slice, showing the dense coloured outer wall, or crust, and some of the cobwebby fibres. 3. Apices of the cobwebby fibres, and some of the club-shaped filaments. 4. Some of the same, with *spores*:—*all more or less highly magnified.*

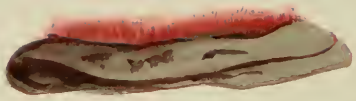

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Plate CCCXXV.

CALLITHAMNION MESOCARPUM, *Carm.*

Gen. Char. *Frond* rosy or brownish-red, filamentous; stem either opake and cellular, or translucent and jointed; branches jointed, one-tubed, mostly pinnate (rarely dichotomous or irregular); dissepiments hyaline. *Fruit* of two kinds, on distinct plants: 1, external *tetraspores*, scattered along the ultimate branchlets, or borne on little pedicels; 2, roundish or lobed, berry-like receptacles (*favellæ*) seated on the main branches, and containing numerous angular spores. Callithamnion (*Lyngb.*),—from καλλος, *beauty*, and θαμνιον, a *little shrub*.

Callithamnion *mesocarpum*; stems rising from creeping filaments, erect, simple or sparingly branched; branches alternate, very erect, naked, or having a few, scattered, erect ramuli; articulations four or five times as long as broad; tetraspores elliptical, on long, simple or forked, lateral pedicels.

Callithamnion mesocarpum, *Carm. Alg. Appin. MSS. Harv. in Hook. Br. Fl.* vol. ii. p. 348. *Harv. Man.* ed. 1. p. 116. ed. 2. p. 184. *Kütz. Sp. Alg.* p. 642.

Hab. On rocks at the extremity of low-water mark, very rare. Appin, *Capt. Carmichael.*

Geogr. Distr.

Descr. "*Tufts* continuous, forming a broad, shaggy, purple crust." *Carm. Stems* from an eighth to a quarter inch or rather more in height, springing from decumbent filaments, which are attached to the surface of the rock by little rootlets, erect, simple or having two or three alternate or secund branches. *Branches* issuing at very acute angles, erect, virgate, either quite naked or furnished with a few, distant, erect, scattered, few-jointed ramuli. *Articulations* four or five times as long as broad, with wide borders. *Tetraspores* elliptical, borne on the tips of the lateral ramuli, which are generally one-jointed and either simple or forked, in which case, one arm of the fork is converted into a tetraspore. *Favellæ* unknown. *Colour* a full deep lake. *Substance* membranaceous, adhering to paper in drying.

Capt. Carmichael, in describing this plant, says, "I could not discover that it sprang from creeping filaments;"—a remark which induced me formerly to place it in the section with *C. Rothii* and *C. floridulum*. But on recently inspecting Capt.

Carmichael's original specimens, in the Hookerian Herbarium, I clearly made out the existence of a creeping *rhizome* from which the erect stems spring, and this species should therefore be removed to the section of *C. Turneri* and *C. pluma*. It comes so close, indeed, to some states of *C. Turneri*, particularly to those varieties constituting *C. repens* of authors, that it may fairly be questioned whether *C. mesocarpum* should not be erased altogether from the list of species, and referred as a synonym to *C. Turneri*. Capt. Carmichael's specimen is mixed with fronds of *C. pluma*. This is curious, as both were found growing on bare rocks, and *C. pluma* is well known to prefer the stems of *Laminariæ*.

The figure here given has been prepared from authentic specimens in Herb. Hook. The upper figure (fig. 1) is, of course, imaginary; the specimens examined being merely a few fronds, partly preserved on talc, and partly on paper.

Fig. 1. Tuft of CALLITHAMNION MESOCARPUM :—*the natural size.* 2. Some of the fronds :—*magnified.* 3. Portion of a branch with tetraspores :—*highly magnified.*

W H Hall et Rith

Reeve & Nichols. imp

Plate CCCXXVI.

DICTYOSIPHON FŒNICULACEUS, *Grev.*

Gen. Char. *Root* a small, naked disc. *Frond* filiform, tubular, branched; its walls composed of several rows of cells, of which the inner are elongated, and connected in longitudinal filaments; the outer small, polygonal, forming a membrane. *Fructification*, solitary or aggregated naked *spores*, scattered irregularly over the surface. Dictyosiphon (*Grev.*),—from δικτυον, a *net*, and σιφων, a *tube*; because the frond is hollow, and has a netted surface.

Dictyosiphon *fœniculaceus*; frond setaceous, very much branched; branches capillary, decompound; ramuli subulate, alternate or scattered, rarely opposite.

Dictyosiphon fœniculaceus, *Grev. Alg. Brit.* p. 56. tab. viii. *Hook. Br. Fl.* vol. ii. p. 279. *Wyatt, Alg. Danm.* no. 205. *Harv. in Mack. Fl. Hib.* part 3. p. 176. *Harv. Man.* ed. 1. p. 32. ed. 2. p. 40. *J. Ag. Sp. Alg.* vol. i. p. 82. *Kütz. Sp. Alg.* p. 485. *Aresch. Phyc. Scand.* p. 147. t. 6, 7,8 (in part). *E. Bot. Suppl.* t. 2746.

Scytosiphon fœniculaceus, *Ag. Sp. Alg.* vol. i. p. 164. *Ag. Syst.* p. 258. *Lyngb. Hyd. Dan.* p. 63. t. 14.

Fucus subtilis, *Turn. Hist.* t. 234.

Conferva fœniculacea, *Huds. Fl. Angl.* vol. ii. p. 594. *Light. Fl. Scot.* vol. ii. p. 981.

Conferva marina fœniculacea, *Dill. Hist. Musc.* p. 16. t. 2. f. 8.

Hab. In rock-pools, between tide-marks, either on stones, or growing parasitically on other Algæ. Annual. Spring and summer. Common on the coast.

Geogr. Distr. Atlantic shores of Europe and of North America. Baltic Sea.

Descr. *Root* a very small disc. *Stem* from six inches to one or two feet or more in length, varying from a quarter to half a line in diameter, generally undivided, but densely furnished throughout its entire length with lateral branches. *Branches* long, similar to the stem, and excessively branched in a very irregular manner. Sometimes the secondary branches are very densely set, capillary, elongated and simple, or nearly so. Sometimes they are short, curved, and twice or thrice divided. Commonly they are decompound and bushy, plentifully furnished with subulate, acute ramuli, which are either scattered or rarely opposite. When young, the whole frond is densely clothed with pellucid, jointed hairs. It is at first solid, but the central cells, which are much larger than the rest, are also weaker and soon perish, leaving the stem and branches fistular. The walls of the tube are composed of several layers of longitudinally connected cylindrical cells, of which the inner ones are elongate, the rest gradually shorter; the

cells of the superficial layer (or epidermis) being short and either square or polygonal. *Spores* scattered freely over the branches. (On some individuals I have observed aggregated spores, forming scattered clusters or sori.) *Colour* a pale olivaceous, becoming darker in age and on being dried. *Substance* membranaceous and soft, closely adhering to paper in drying.

A common inhabitant of tide-pools, and not inelegant, especially when clothed with the fine soft hairs which cover its surface closely, when in a young and vigorous state, before it has suffered from the wear and tear of its short existence.

I believe by most British algologists this plant is regarded as *sui generis*, entitled to a clear place in our system of arrangement, and properly referred to the *Dictyoteæ*. But a distinguished Swede, Areschoug, regards it unhesitatingly as an abnormal state of *Chordaria flagelliformis*, in which the horizontal filaments of the periphery have not been developed, and he states that he has found specimens having some of the branches with the structure of *Chordaria*, and some with that of *Dictyosiphon*. This is a subject worth examining, but requiring a very careful and accurate observation.

It is also possible that we have two species, or perhaps more, confounded under this name. I possess specimens collected on the west of Ireland some years ago, having rather a different habit from ordinary forms, and differing in having their spores collected in clusters, as in *Striaria*, but not disposed in transverse bands. To these I once gave the MS. name of *D. fragilis*, which is adopted by Kützing, in his recent 'Systema Algarum.' I have deferred noticing these specimens hitherto, from an unwillingness to multiply doubtful species.

Fig. 1. DICTYOSIPHON FŒNICULACEUS:—*the natural size.* 2. Portion of a branch:—*slightly magnified.* 3. Small part of the same, with *fruit* and some hairs. 4. Longitudinal section of the stem. 5. Transverse section of a young branch. 6. The same, of an older branch, now become hollow:—*all highly magnified.*

W.H.H. del et lith.

Reeve & Nichols imp.

Plate CCCXXVII.

CONFERVA COLLABENS, *Ag.*

Gen. Char. *Filaments* green, attached or floating, unbranched, composed of a single series of cells or articulations. *Fruit*, aggregated granules or zoospores, contained in the articulations, and having, at some period, a proper ciliary motion. Conferva (*Plin.*),—from *conferruminare*, to *consolidate*; because some of the species were used by the ancients for binding up fractured limbs.

Conferva *collabens*; filaments elongated, straight, tufted, very thick (but of various diameters), gelatinous and flaccid, of a splendid æruginous green colour; articulations from once to once and a half as long as broad, filled with a dense granular mass.

Conferva collabens, *Ag. Syst. Alg.* p. 102. *Harv. in Hook. Br. Fl.* vol. ii. p. 354. *Harv. Man.* ed. 1. p. 130. ed. 2. p. 209.

Conferva ærea β. lubrica, *Dillw. Syn.* p. 48.

Hormotrichum collabens, *Kütz. Sp. Alg.* p. 383.

Hab. At Yarmouth, on a floating piece of deal, *Sir W. J. Hooker*. (Only once found.)

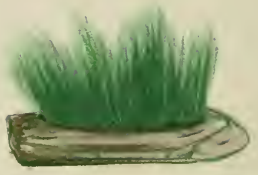
Geogr. Distr. German Ocean.

Descr. *Filaments* densely tufted, three or four inches long or more, of very various diameters in the same tuft, the largest ones being twice as thick as *C. ærea* or more, the smaller not measuring one-fourth as much in diameter. *Articulations* generally somewhat longer than their diameter, filled with a brilliantly coloured, granular and dense mass of endochrome; the dissepiments much contracted, and the walls of the cells thick. *Substance* very flaccid and gelatinous, adhering most closely to paper. The *colour* is a peculiarly rich green, and is well preserved in drying.

Dillwyn notices this species, making it a variety of his *C. ærea*, in the following words:—"This curious variety, which was found on the Yarmouth beach by Mr." (Sir William) "Hooker, in the spring of 1808, attached to a piece of deal, differs so extraordinarily from the common appearance of *C. ærea*, that, except under a microscope, nobody would suspect them of being the same. It grew in a very large tuft, and its filaments were remarkably soft, tender, slippery, and glossy, so as to float with

the slightest agitation of the water, and adhere closely to paper and glass in drying." To this I have only to add that the figure here given has been drawn from the original specimen, and that no one has since met with a similar one in this country. Kützing, however, states that he has received it from the north of Germany. The filaments differ from each other very extraordinarily in diameter, so that one might suppose there were half a dozen different species under the microscope together. The specific character least variable seems to be the extreme lubricity and softness.

Fig. 1. Tuft of CONFERVA COLLABENS:—*the natural size.* 2. Filaments of various diameters:—*all highly (and equally) magnified.*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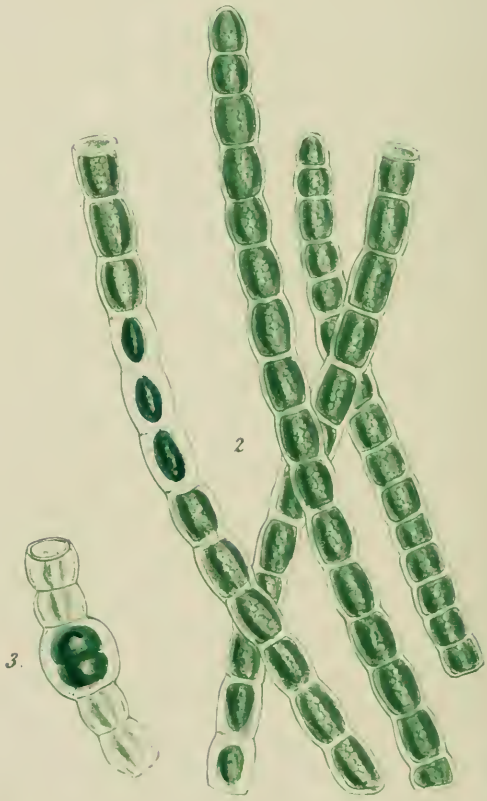
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Plate CCCXXVIII.

CONFERVA YOUNGANA, *Dillw.*

Gen. Char. *Filaments* green, attached or floating, unbranched, composed of a single series of cells or articulations. *Fruit,* aggregated granules or zoospores, contained in the articulations, and having, at some period, a proper ciliary motion. Conferva (*Plin.*),—from *conferruminare,* to *consolidate*; because some of the species were used by the ancients for binding up fractured limbs.

Conferva *Youngana*; filaments short, tufted, straight or nearly so, somewhat rigid; articulations once or twice as long as broad, dissepiments finally contracted.

Conferva Youngana, *Dillw. Conf.* t. 102. *Harv. in Hook. Br. Fl.* vol. ii. p. 354. *Harv. Man.* ed. 1. p. 131. ed. 2. p. 210. *Ag. Syst.* p. 101.

Conferva isogona, *E. Bot.* t. 1930.

Hormotrichum Younganum, *Kütz. Sp. Alg.* p. 382.

Hormotrichum isogonum, *Kütz. Sp. Alg.* p. 382.

Hab. On rocks and stones near high water-mark, on various parts of the coast. Annual. Summer. Discovered by *W. Weston Young, Esq.,* near Dunraven Castle, Glamorganshire. Yarmouth, *Sir W. J. Hooker.* Dingle Bay, Kerry, *Mr. D. Moore.*

Geogr. Distr. Shores of Northern Europe.

Descr. *Filaments* from half an inch to an inch in length, erect, straight or slightly curved, obtuse, tufted, or spreading in wide shaggy fleeces over the surface of a rock. When young, the filaments are cylindrical, but they soon become contracted at the dissepiments. The cells are occasionally only as long as broad, but are usually once and half as long. The endochrome is granular and dense, filling the cell, and of a full green colour, As it becomes mature it acquires still greater density and a darker colour, and shrinks to half its size. Finally, it is changed into a bipartite sporidium lodged in a swollen and colourless cell. *Substance* membranaceous, not very soft, and having little gloss. In drying, the plant adheres, but not very closely, to paper.

To the naked eye this plant has very much the aspect of *Lyngbya Carmichaelii,* with which (as I have already stated under Plate CCC.) it is properly a congener; but it is readily distinguished under the microscope, by the much longer cells,

and, especially in advanced specimens, by the contraction of the tube at the dissepiments. It bears a far closer resemblance to *C. bangioides*, but is a shorter and comparatively stouter plant, and far less lubricous. The contents of the cells also are more granular and dense.

It was originally discovered by Mr. W. Weston Young, a friend of Dillwyn's, to whom that author was indebted for the drawings from which the plates that illustrate his work on the British *Confervæ* were engraved, and to whom he has dedicated this pretty little species.

Fig. 1. Tuft of Conferva Youngana:—*the natural size.* 2. Portions of filaments in various stages. 3. Portion of a filament with a ripe sporidium:—*both figures highly magnified.*

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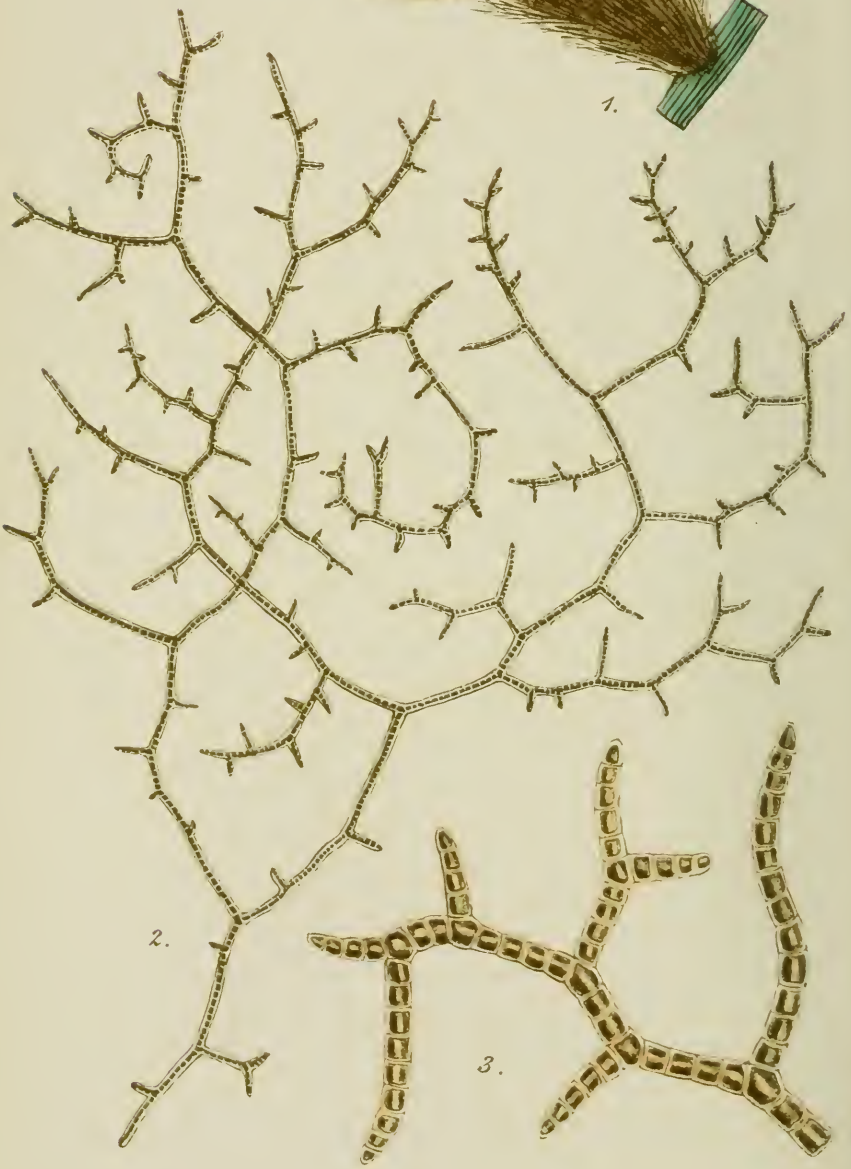

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W H. Taylor Mich. Reeve & Nicholls imp.

Plate CCCXXIX.

ECTOCARPUS DISTORTUS, *Carm.*

Gen. Char. *Fronds* capillary, jointed, olive or brown, flaccid, single-tubed, without longitudinal striæ. *Fruit,* either spherical or elliptical, external or imbedded *spores*; or lanceolate, linear, or conical *silicles* (pod-like bodies); or granular masses formed in consecutive cells of the branches. Ectocarpus (*Lyngb.*),—from εκτος, καρπος, *external fruit.*

Ectocarpus *distortus*; filaments very much branched, matted together, dark-brown, angularly bent; branches spreading at very obtuse angles, alternate or secund; ramuli horizontally patent or recurved, scattered, short, spine-like, obtuse; spores obovate, sessile or subsessile.

Ectocarpus distortus, *Carm. Alg. Appin. MSS. cum Ic. Harv. in Hook. Br. Fl.* vol. ii. p. 326. *Harv. Man.* ed. 1. p. 42. ed. 2. p. 60.

Hab. Parasitical on the leaves of *Zostera marina.* Annual. Summer and autumn. Appin, *Capt. Carmichael* (1824), *Rev. D. Landsborough* (1850).

Geogr. Distr.

Descr. *Tufts* from four to eight inches long or more, very dense and full; the threads of which they are composed closely matted together and inextricable. *Filaments* very much branched, and in a very irregular manner between alternate and dichotomous; the branches spreading at very wide angles, forming almost rounded axils, and bent at intervals in a zigzag manner. Lesser branches either spreading at right angles or recurved. *Ramuli* scattered freely along the branches, divaricating, short, spine-like, but obtuse. *Articulations* pretty uniformly as long as broad, enclosing a square mass of dark-coloured endochrome, the walls of the cells thick, leaving wide colourless dissepiments. *Spores* (which I formerly examined on one of Capt. Carmichael's specimens, but which I have not succeeded in finding on the one now figured) obovate or elliptical, scattered, sessile or slightly stalked, dark brown, with a pellucid limbus. *Colour* a deep chestnut-brown. *Substance* membranaceous, and very brittle, if moistened after having been dried. The plant imperfectly adheres to paper.

In a former number, under *E. Landsburgii* (Plate CCXXXIII.) I have pointed out the marks of distinction between that species and the present, its nearest ally. A comparison of the two figures will now enable the student to appreciate the characters

of these plants, and, I hope, to discriminate between them. *E. Landsburgii* is not only more thorny in aspect, but is of a far more rigid substance, and much less transparent: nor does it grow in large densely interwoven tufts like *E. distortus*. Both species appear to be of rare occurrence.

The figure now given has been prepared partly from an original drawing by Carmichael, and partly from one of his specimens.

Fig. 1. Tuft of ECTOCARPUS DISTORTUS:—*the natural size.* 2. Portion of a filament, to show the branching:—*magnified.* 3. Small fragment of the same:—*highly magnified.*

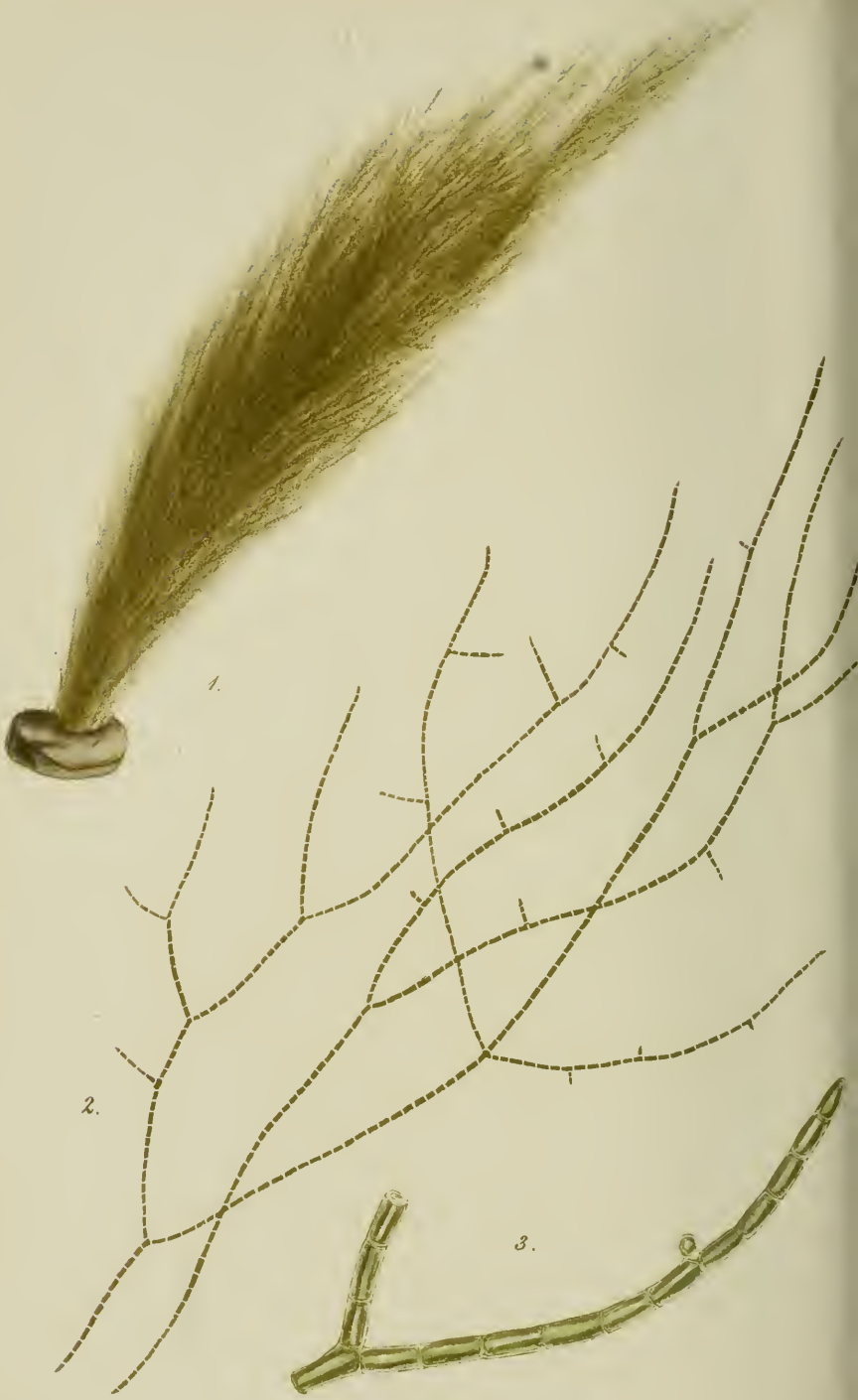
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Plate CCCXXX.

ECTOCARPUS CRINITUS, *Carm.*

Gen. Char. *Frond* capillary, jointed, olive or brown, flaccid, single-tubed, without longitudinal striæ. *Fruit*, either spherical or elliptical, external or imbedded *spores*; or lanceolate, linear, or conical *silicles* (pod-like bodies); or granular masses formed in consecutive cells of the branches. Ectocarpus (*Lyngb.*),—from εκτος, καρπος, *external fruit*.

Ectocarpus *crinitus*; filaments decumbent, forming extensive stratified tufts, sparingly branched; the branches subsimple, distant, elongated; ramuli few, patent; spores globose, scattered, sessile; articulations twice or thrice as long as broad.

Ectocarpus crinitus, *Carm. Alg. App. MSS. Harv. in Hook. Br. Fl.* vol. ii. p. 326. *Harv. Man.* ed. 1. p. 41. ed. 2. p. 60.

Hab. On muddy sea-shores. Annual. Summer. Rare. Appin, *Capt. Carmichael.* Watermouth, Devon, *Mrs. Griffiths.*

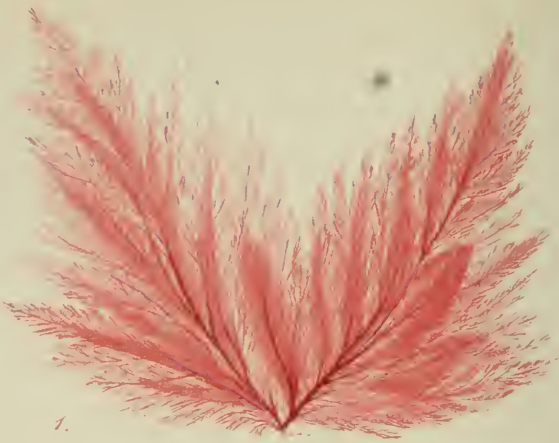
Geogr. Distr.

Descr. *Filaments* from two to six inches long, forming widely spreading, fleecy tufts, which lie prostrate on the mud, at the recess of the tide, and frequently cover wide spaces. *Filaments* sparingly branched (for the genus), the branches long, distant, and subsimple, spreading at wide angles, mostly alternate, rarely opposite. *Ramuli* few, distant, scattered, divaricate or patent, short. *Articulations* twice or thrice as long as broad, containing a pale olive, rather watery endochrome. *Spores* (which I have only seen in a young state) globose, scattered, sessile. *Colour* a pale olive, becoming greener after the plant has been dried, in which state it adheres to paper. *Substance* soft and membranaceous.

I am but imperfectly acquainted with this species, which I have only seen in a dry state; and though I have repeatedly examined several parts of specimens collected by Capt. Carmichael, I have not been able to detect the fructification described by him; save in a single instance that I chanced upon the young spore represented at fig. 3. The nearest affinity of *E. crinitus* seems to be with *E. pusillus*, which has a nearly

similar ramification, but is a smaller plant, and almost always found with fruit.

Fig. 1. Tuft of ECTOCARPUS CRINITUS:—*the natural size.* 2. Parts of two filaments:—*magnified.* 3. Small portion with a ramulus and young spore:—*highly magnified.*



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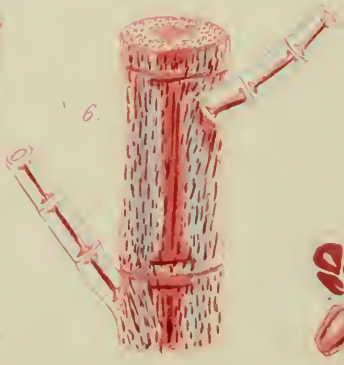

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Reeve & Co. Ltd.

Plate CCCXXXI.

CALLITHAMNION AFFINE, *Harv.*

Gen. Char. *Frond* rosy or brownish-red, filamentous; stem either opake and cellular, or translucent and jointed; branches jointed, one-tubed, mostly pinnate (rarely dichotomous or irregular); dissepiments hyaline. *Fruit* of two kinds, on distinct plants: 1, external *tetraspores*, scattered along the ultimate branchlets or borne on little pedicels; 2, roundish or lobed, berry-like receptacles (*favellæ*) seated on the main branches and containing numerous angular spores. Callithamnion (*Lyngb.*),—from καλλος, *beauty*, and θαμνιον, *a little shrub*.

Callithamnion *affine*; much branched and bushy, the stem rather opake, full of veins; secondary branches long, having a roundish outline, alternately plumulate; plumules very narrow, simply pinnate; pinnæ short, erect, increasing in length upwards, alternate, crowded at top; articulations of the branches three or four times, of the pinnæ once and a half as long as broad; tetraspores generally solitary, rising from the basal cell of the pinnæ.

Callithamnion affine, *Harv. in Hook. Br. Fl.* vol. ii. p. 344. *Harv. Man.* ed. 1. p. 110. ed. 2. p. 180.

Hab. Parasitical on *Fuci*, between tide-marks. Annual. Summer. Shores of Bute, *Dr. Greville*.

Geogr. Distr.

Descr. *Tufts* two to three inches high, with a somewhat pyramidal outline, the lower branches being longest, the upper gradually shorter. *Filaments* with a percurrent, nearly undivided stem, closely set, on all sides and throughout its whole length, with lateral branches. These are once or twice divided, and clothed with very narrow, elongate, erect, and slender, simply pinnated plumules, alternate, one rising from every joint of the branch. *Pinnules* short, erect, awl-shaped, the lowermost shortest and subdistant, the upper gradually longer and closer together, the terminal ones crowded and short. *Main* stem full of slender veins, and sub-opake, its articulations twice or thrice as long as broad. *Articulations* of the branches thrice or four times as long as broad, with wide margins; those of the pinnules about once and a half as long as broad. *Tetraspores* globose, and mostly solitary, at or near the base of the pinnules. *Favellæ* in pairs, on slightly distorted branches, each favella occupying the place of a suppressed ramulus. *Colour* a deep red, pretty well preserved in drying. *Substance* membranaceous. In drying, the plant adheres closely to paper.

If this plant be really entitled to specific rank, it is well named *affine*, for it appears to be akin to several other species, and to form an intermediate link between them. To *C. Hookeri* it is allied in habit, and in the opacity of the main stem, but here the resemblance ends, for the nature of the ramification is extremely different. With *C. roseum* we may also compare it, but the narrow plumules, with short, erect pinnules, afford a clear mark of distinction. Perhaps, after all, the nearest approach is to *C. polyspermum*, which has plumules equally narrow, and pinnules equally short, and which grows in similar places; but the *solitary, basal* tetraspores of *C. affine* seem to point to another species. In making the foregoing contrasts, however, it must be borne in mind that I have compared *C. affine* only with the *normal* states of the species referred to, and no one who has studied the genus *Callithamnion* for any length of time, and in any considerable number of localities, needs to be told that there are many intermediate forms to which it is often difficult to assign the correct name. In the present instance the difficulty has been cut, rather than surmounted, by giving a name to one of these puzzling forms; but though this happened in 1832, no fortunate collector has since met with specimens which could fairly come under our *C. affine*.

Fig. 1. CALLITHAMNION AFFINE:—*the natural size.* 2. Part of a lesser branch, with its alternate plumules. 3. Branch bearing *favellæ*. 4. Branch with *tetraspores* on the ramuli. 5. A tetraspore on a ramulus. 6. Small portion of the main stem:—*all more or less highly magnified.*

2.

3.

W. H. H[illegible] del. et [illegible]n

Reeve & Nichols [illegible]

Plate CCCXXXII.

ELACHISTEA CURTA, *Aresch.*

Gen. Char. *Frond* parasitical, consisting of a dense tuft of free, simple, articulated, olivaceous filaments, rising from a common tubercular base, composed of vertical, branching strings of cells, closely combined into a cartilaginous mass. *Fructification*, pear-shaped *spores* attached to the bases of the filaments concealed in the tubercles, and frequently accompanied by paranemata. Elachistea (*Fries*),—from ελαχιστα, the *least*; from the small size of these plants.

Elachistea *curta*; filaments very short, tapering to the base, obtuse, pencilled, rather rigid, rising from a tubercle; articulations about as long as broad; spores pyriform, on long pedicels; paranemata linear-clavate.

Elachistea curta, *Aresch. in Linn.* vol. xvi. p. 234? *Harv. Man.* ed. 2. p. 50.

Conferva curta, *Dillw.* t. 76. *Ag. Syst.* p. 103. *Harv. in Hook. Brit. Fl.* vol. ii. p. 355. *Harv. Man.* ed. 1. p. 132.

Hab. On *Fuci*, between tide-marks. Annual. Summer. At Swansea, *Mr. L. W. Dillwyn*. (Not found recently.)

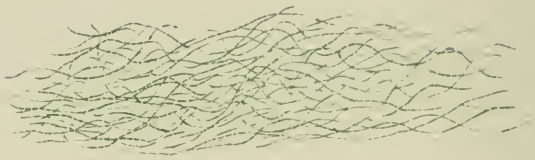
Geogr. Distr.

Descr. *Tufts* minute, from one to three lines in diameter, with an evident tubercular base. *Filaments* linear-club-shaped, very slender below, and gradually widening upwards, ending in a blunt point. *Paranemata* filiform, composed of slender cylindrical cells, and tipped with a pyriform coloured cell. *Articulations* of the filaments about as long as broad, coloured. *Spores* large, pear-shaped, on longish stalks. *Colour* a brownish-olive, or foxy. *Substance* rather rigid. The plant does not adhere to paper.

This species has long been in doubt, and notwithstanding the figure and description now given, my doubts are not fully removed. By Dillwyn, who first described *E. curta*, it is said to be common in the neighbourhood of Swansea, and probably not rare elsewhere; yet no one has met with it of late years. I have repeatedly brought home the battered stumps of *E. fucicola* in the belief, always dissipated by the microscope, that I had met with *E. curta*; and my only acquaintance with the latter is from

an examination of a poor specimen preserved in Sir W. J. Hooker's Herbarium. The accompanying figure has been prepared from that specimen.

Fig. 1. ELACHISTEA CURTA:—*the natural size.* 2. Small part of the tuft:—*magnified.* 3. A *spore,* and four of the paranemata:—*highly magnified.*



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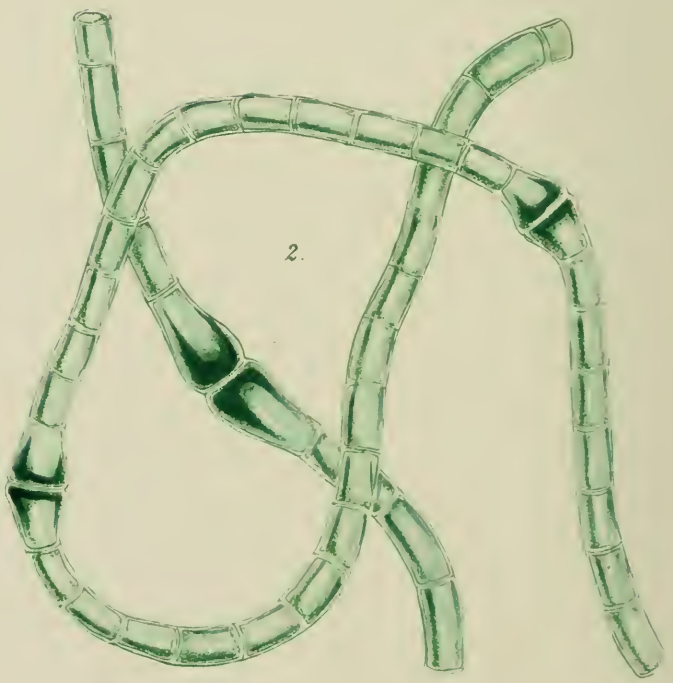

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W. H. H. del. et lith.

Reeve & Nichols

Plate CCCXXXIII.

CONFERVA LITOREA, *Harv.*

Gen. Char. *Filaments* green, attached or floating, unbranched, composed of a single series of cells or articulations. *Fruit*, aggregated granules or zoospores, contained in the cells, having, at some period, a proper ciliary motion. Conferva (*Plin.*),—from *conferruminare*, to consolidate: because some of the species were used by the ancients for binding up fractured limbs.

Conferva *litorea*; filaments thick, rigid, crisped, forming loose, extensive bundles of a dull green colour; articulations once and half as long as broad, here and there swollen in pairs and discoloured.

Conferva litorea, *Harv. Man.* ed. 2. p. 208.

Conferva linum, *Harv. in Hook. Br. Fl.* vol. ii. p. 352. *Harv. Man.* ed. 1. p. 128. *Wyatt, Alg. Danm.* No. 220. (*not of Roth.*)

Hab. In salt-water ditches near the coast; in æstuaries, and along the muddy sea-shore, between tide-marks. Annual. Summer. Appin, *Capt. Carmichael.* Plymouth, *Mrs. Wyatt.* Bangor, North Wales, *Mr. Ralfs.* Orkneys, *W.H.H.*

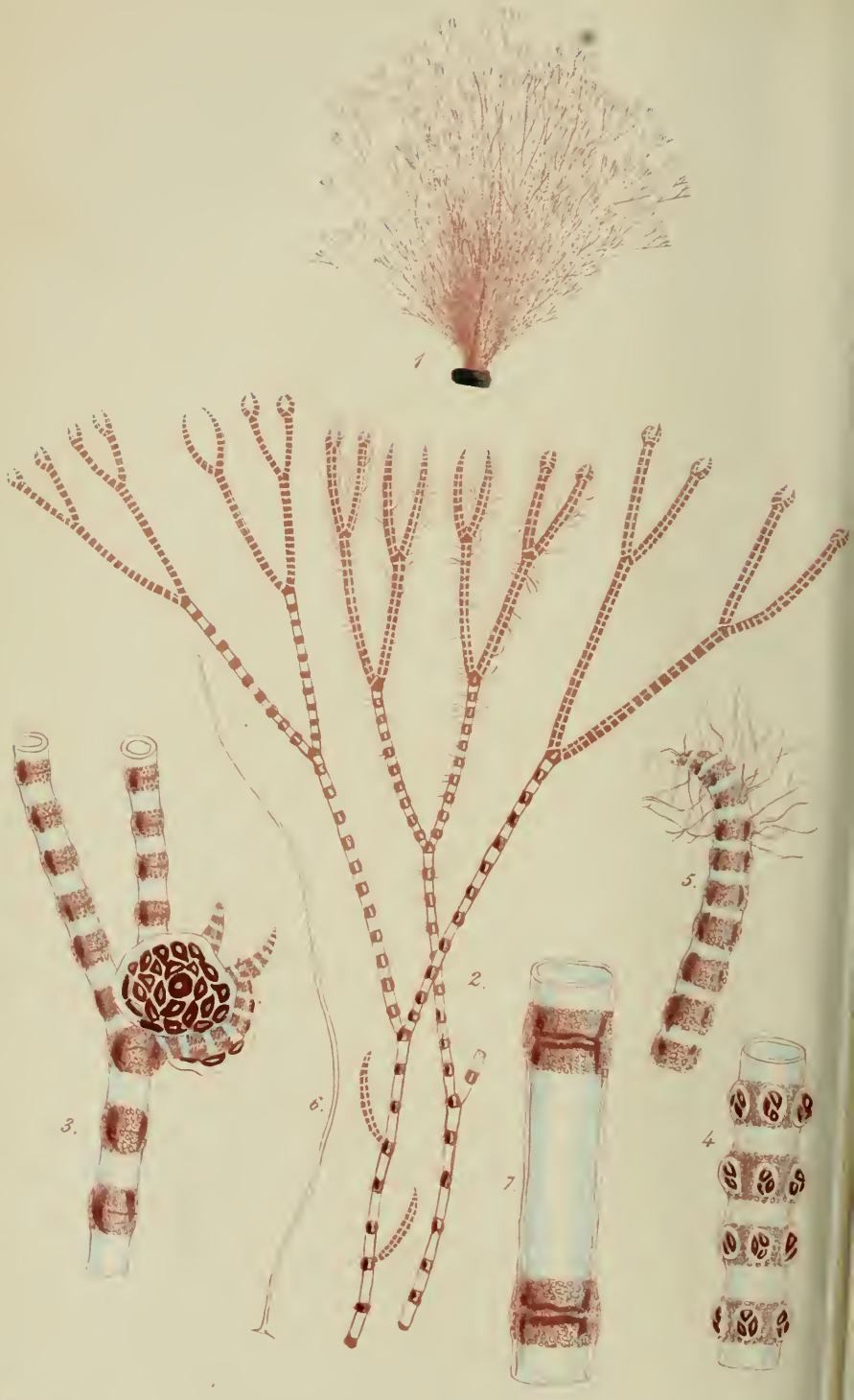
Geogr. Distr.

Descr. *Filaments* three or four inches long or more, about half the diameter of *C. ærea*, loosely bundled together in prostrate or floating strata of considerable extent, and of a pale green colour, becoming darker and duller as the season advances. Each filament is irregularly curled and twisted, and sometimes angularly bent. The articulations are cylindrical, filled with a pale green watery endochrome, and about once and half as long as broad; and here and there, at irregular intervals, two proximate articulations, longer and broader than the rest, form together a spindle-shaped swelling, in which a dark-coloured endochrome collects, the mass being darkest and densest where the two cells touch each other. This looks like the commencement of fructification, but I am unable to say whether a sporangium is ultimately formed. These dark-coloured double cells are frequently so numerous that they give the filaments, when examined with a pocket lens, a variegated appearance. *Substance* membranaceous, and in drying the plant scarcely adheres to paper.

The above description is intended for the plant commonly found in British Herbaria under the name *C. linum*, Br. Fl.,

but which (as already stated under t. CL.) is very different from the plant so named by Roth; and has, indeed, more in common with C. *tortuosa*, Dillw. I regret that I have been unable recently to compare my specimens with those found by Carmichael, and I have therefore relied for the *type* of this species on the specimens published in Mrs. Wyatt's 'Algæ Danmonienses,' as that work is in the hands of many persons. It is possible that in some collections more than one plant may be confounded under the name *linum*, Br. Fl., but I trust the figure now given will sufficiently define what I understand by that exploded species. Not having been able to identify our British specimens with any continental species, I have been forced to bestow a new name on them.

Fig. 1. Conferva litorea:—*the natural size.* 2. Portion of two filaments:—*magnified.*



del et lith.

Reeve & Benham

Plate CCCXXXIV.

CERAMIUM STRICTUM, *Kütz.* (sp.)

Gen. Char. *Frond* filiform, one-tubed, articulated; the dissepiments coated with a stratum of coloured cellules, which sometimes extend over the surface of the articulation. *Fructification* of two kinds, on distinct individuals: 1, *tetraspores*, either immersed in the ramuli, or more or less protrudent; 2, sessile, roundish *receptacles* (*favellæ*) having a pellucid limbus, containing minute, angular spores, and subtended by one or more short, involucral ramuli. Ceramium (*Roth*),—from κεραμος, a *pitcher*; but the fruit is *not* pitcher-shaped.

Ceramium *strictum*; frond capillary, nearly equal, membranaceous, irregularly dichotomous, the lower forkings distant, the upper closer, all the divisions erect and straight, with narrow, acute axils; the apices straight or slightly hooked inwards; articulations colourless, those of the lower dichotomies from three to four times as long as broad, of the upper gradually shorter; dissepiments (smooth or hairy) opake, purple; favellæ near the tips of the branches, involucrate; tetraspores erumpent, bursting from the dissepiments of the larger branches, quadrifarious.

Ceramium strictum, *Harv. Man.* ed. 2. p. 164.

Gongroceras strictum, *Kütz. in Linnæa*, 1842, p. 735. *Phyc. Gen.* p. 380. *Sp. Alg.* p. 678.

Hab. On mussel-shells, corallines, &c.; in tide-pools, near low-water mark. Torquay, *Mrs. Griffiths*. Penzance, *Mr. Ralfs*. Plymouth, *Mr. Boswarva and Dr. Cocks*. Jersey, *Miss Turner*. Dingle, Kerry, *W. H. H.* Roundstone, *Mr. M'Calla*.

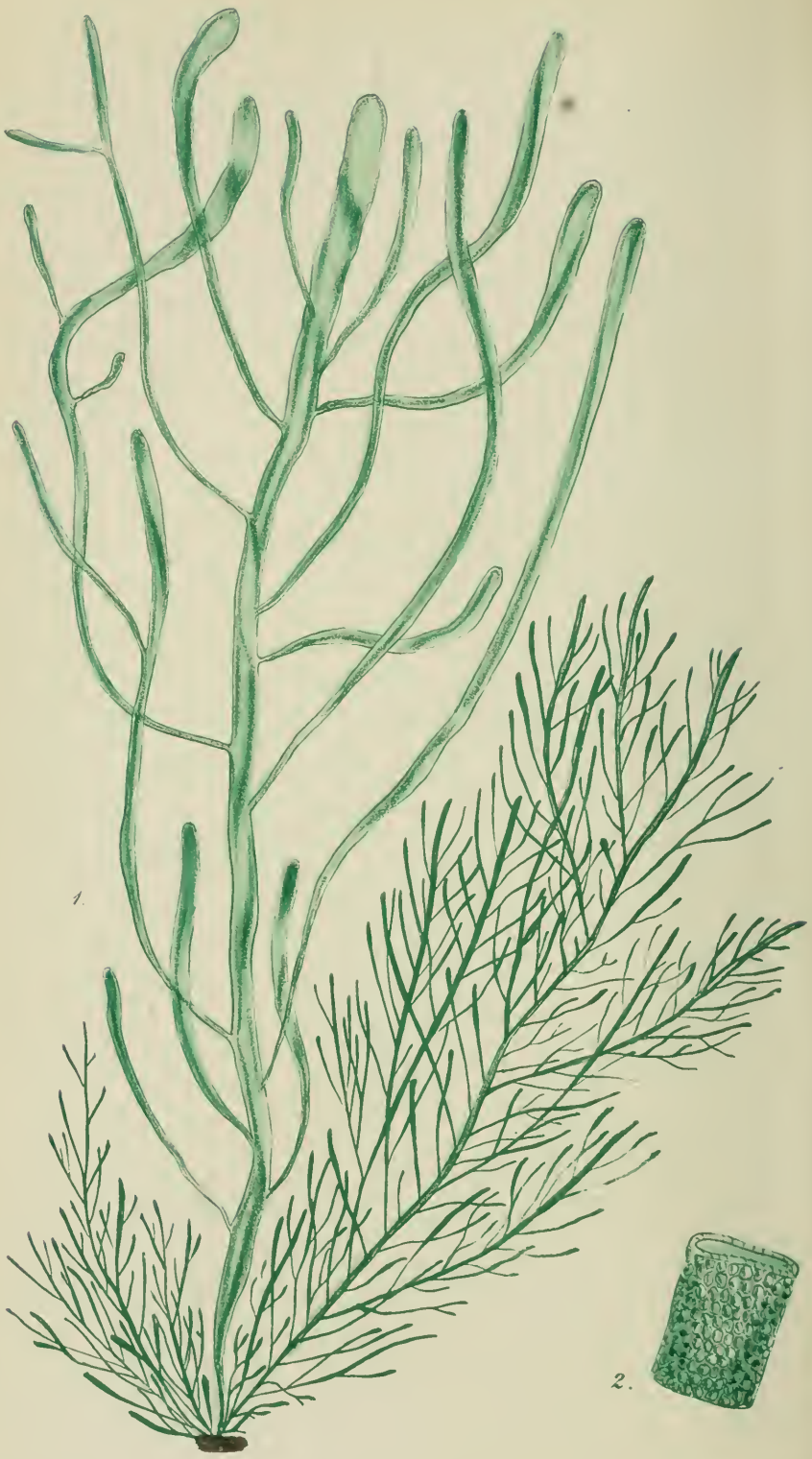
Geogr. Distr. German Ocean, *Kütz.*

Descr. *Filaments* capillary, from two to four inches high, densely tufted, the bases of the tufts entangled, from the presence of irregular creeping fibres. *Filaments* of nearly equal diameter throughout, dichotomous, without principal stem, but sometimes furnished with a few lateral ramuli; the lower dichotomies distant, the upper closer; all the segments of the filament straight and erect, the axils acute and narrow; the apices more or less fastigiate, generally sharply bifid, with the points incurved, but not strongly involute. *Articulations* of the middle and lower portions three to four times, of the upper twice as long as broad, and of the ultimate and penultimate forkings much shorter than their breadth. *Dissepiments* coated with dense, minute, purple cells, slightly swollen, either quite smooth, or (when young) clothed with copious, long, slender, flexible hairs. *Favellæ*

often situated in a forking of the branch, and generally in one of the uppermost forks, subtended by a few short ramuli. *Tetraspores* prominent, forming a whorl round the joint, in the upper (but not ultimate) divisions of the filament. *Colour* a dark purplish-red. *Substance* delicately membranaceous and soft. In drying the plant closely adheres to paper, and has a peculiar glassy lustre, especially in the colourless portions of the thread.

A beautiful species, and a *tolerably* definite one, considering the genus to which it belongs! It is known from *C. nodosum* by its less patent branching, its more purple colour, and different disposition of the tetraspores, besides minor characters, more readily taken in by the eye than the ear. Sometimes the branches are found quite smooth, and at other times every node of the upper branches and ramuli is densely clothed with long, flexible hairs, which appear to be the same pubescence that Kützing describes, and on the presence of which he founds his genus *Trichoceras*. At first, on noticing these hairs, abundantly clothing a specimen sent by Miss Turner from Jersey, I was disposed to regard them as a specific character, and to suspect that I had before me *Trichoceras villosum* of Kützing. Whether this be so or not, I soon abandoned all thoughts of grounding a species on the presence or absence of such hairs, for I found, on examining numerous splendid specimens sent to me by Mr. Boswarva and Dr. Cocks, that nothing could be more inconstant; branches from the same tuft differing in the degree of hairiness, and specimens from the same locality, and identical in all other characters, being some hairy, some perfectly smooth. Lastly, on re-examining my original Dingle specimens, which had been acknowledged by Kützing himself to be truly his *C. strictum*, I found traces of similar pubescence. And such hairs are by no means restricted to this species, but occur on *C. rubrum*, and probably on most other species. They are, I suspect, organs of the same nature as the *fibrillæ* of *Polysiphoniæ*, and if this be the case we may expect to find *antheridia* on them.

Fig. 1. Ceramium strictum:—*the natural size.* 2. Portions of two filaments, one hairy, the other smooth. 3. Part of a branch, with a *favella*. 4. Part of a branch, with *tetraspores* in situ. 5. Apex of a branch, partially clothed with hairs. 6. A hair. 7. An articulation of the lower part of the filament:—all the latter figures *more or less highly magnified.*



W.H.H. del et lith.

Reeve & Nicols imp

Plate CCCXXXV.

ENTEROMORPHA COMPRESSA, *Grev.*

Gen. Char. *Frond* tubular, membranaceous, of a green colour and reticulated structure. *Fructification*, granules, commonly in fours, contained in the cellules of the frond. Enteromorpha (*Link*),—from εντερον, an *entrail*, and μορφη, *form* or *appearance*.

Enteromorpha *compressa*; fronds elongated, branched, cylindrical, or subcompressed; the branches simple, or nearly so, long, obtuse, much attenuated at the base.

Enteromorpha compressa, *Grev. Alg. Brit.* p. 180. tab. xviii. *Hook. Br. Fl.* vol. ii. p. 314. *Harv. Man.* ed. 1. p. 174. ed. 2. p. 213. *Harv. in Mack. Fl. Hib.* part 3. p. 242. *Wyatt, Alg. Danm.* No. 165. *Kütz. Sp. Alg.* p. 480.

Solenia compressa, *Ag. Syst. Alg.* p. 186.

Fistularia compressa, *Grev. Fl. Edin.* p. 300.

Ulva compressa, *Linn. Fl. Suec.* p. 433. *Lightf. Fl. Scot.* vol. ii. p. 969. *Ag. Sp. Alg.* vol. i. p. 420. *Sm. E. Bot.* t. 2739.

Ilea compressa, *Gaill. Dict. Sc. Nat.* vol. iii. p. 373.

Scytosiphon compressus, *Lyngb. Hyd. Dan.* p. 64. t. 15. A. B.

Conferva compressa, *Roth, Cat. Bot.* vol. i. p. 161.

Hab. On rocks, stones, and woodwork in the sea between tide-marks, in æstuaries, &c. Annual. Vegetates at all seasons. Excessively common.

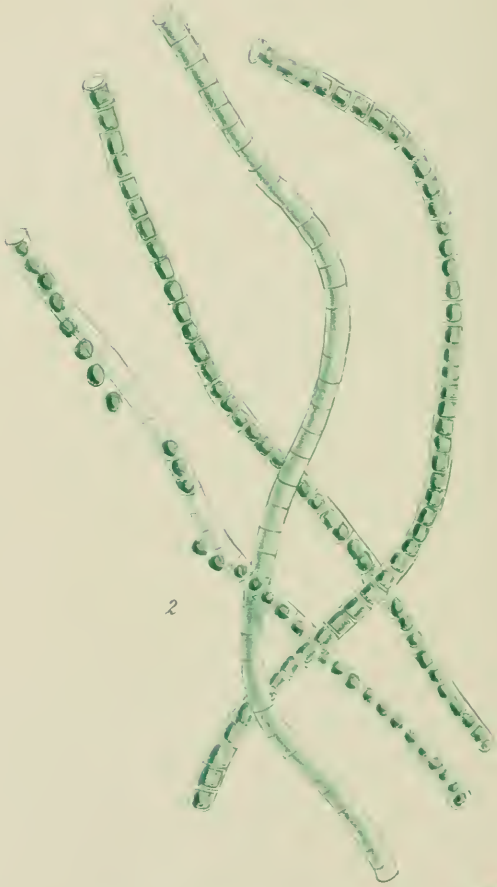
Geogr. Distr. Generally diffused throughout temperate and tropical latitudes, in both hemispheres.

Descr. *Root* a small disc. *Fronds* tufted, or clothing wide spaces of rock, from an inch to six or twelve inches long or more, sometimes as fine as hair, sometimes half an inch or more in breadth, extremely variable in aspect and in ramification. The wider specimens are often but slightly branched, having a principal stem furnished with several, irregularly inserted, long and simple lateral branches; the narrower individuals are repeatedly divided; their branches bearing one or more sets of lesser branches; and other varieties have the branches, or the whole plant, clothed on all sides with slender capillary ramuli. All the branches, and their divisions, taper greatly toward the base, and the apices are generally blunt. The tube is more or less strongly compressed in most cases, but some of the wider varieties are inflated, in which case they can only be known from *E. intestinalis* by being branched. The colour is a beautifully brilliant green, and the surface glossy as silk. The substance is membranous, and adheres but imperfectly to paper.

This plant is dispersed almost over the whole explored ocean, having been brought from nearly every shore, except those few antarctic coasts where nothing marine vegetates, save *Diatomaceæ*. I have never seen a collection of Algæ, of any extent, from any part of the world, which did not contain specimens of *Enteromorpha compressa*. Though always recognizable by the character of its branches tapering toward the base, it puts on a multitude of aspects according to the situation in which it grows. Near high-water mark it forms a short, shaggy pile, of slender fronds, spreading over rocks and stones, and most treacherous to the stepping of unwary feet, being pre-eminently slippery. A little lower down, in the rock-pools, it has the appearance of the varieties figured in our plate; and where fresh-water streams flow into the sea, it becomes broader, with inflated tubes, and often of great length. Such forms closely resemble *E. intestinalis*, which, however, is never branched. Other varieties occur on floating timber, on piles exposed to the tide, and on the vertical walls of quays in tidal rivers; in fact, in nine cases out of ten, when such objects are seen clad in green, the appearance is caused by the presence of this species.

Fig. 1. Sundry varieties of ENTEROMORPHA COMPRESSA:—*of the natural size.*
2. A small portion of a branch magnified, to show the cellular structure.

1.



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3.

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W. H. H. del. et [illegible]

Reeve & [illegible]

Plate CCCXXXVI.

LYNGBYA (HORMOTRICHUM) CUTLERIÆ, n. sp.

Gen. Char. *Filaments* destitute of a mucous layer, free, flexible, elongated, decumbent, not oscillating. *Tube* continuous; endochrome green or purple, densely annulated, and finally separating into lenticular sporidia. Lyngbya (*Ag.*),—in honour of *H. C. Lyngbye*, author of an excellent work on the Algæ of Denmark.

Lyngbya *Cutleriæ*; filaments excessively slender, soft, articulated; articulations about as long as broad, the endochrome at length formed into a spherical sporidium.

Hab. In æstuaries. Annual. Spring and summer. Near the mouth of the Otter, Budleigh Salterton, covered every tide, *Miss Cutler* (May 1850).

Geogr. Distr.

Descr. *Filaments* forming continuous tufts, excessively slender and delicate (like those of *Conferva bombycina*), soft, curved, but not twisted, articulated throughout. In an early stage the filament is confervoid, the cells, which are about as long as, or a little longer than broad, being filled with a pale green fluid endochrome. At a later period this gradually becomes granular and contracts, no longer filling the tube, and finally it is consolidated into a brilliant bead-like green sporidium. Soon afterwards, the membrane bursts, the filaments break up, and the mature fruit is dispersed in the water. *Substance* somewhat gelatinous, the plant adhering most closely to paper in drying.

I am indebted to Miss Cutler, of Budleigh Salterton, for a specimen of the pretty little plant here figured. It has all the generic characters of Kützing's genus *Hormotrichum*, which has been already placed provisionally as a subgenus of *Lyngbya*, but it does not appear to accord specifically with any of the species described by Kützing. Believing myself, therefore, at liberty to assign a specific name to it, I wish to dedicate our new species to its discoverer, who has greatly enriched the British marine

flora with discoveries and observations, and to whom Dr. Greville has already inscribed the genus *Cutleria*.

Fig. 1. Lyngbya (Hormotrichum) Cutleriæ:—*the natural size.* 2. Portions of filaments of various ages:—*magnified.* 3. A small portion of a partly mature filament; and 4, a sporidium:—*both very highly magnified.*

W. H. H. del. et lith.

Reeve & Nichols

Plate CCCXXXVII.

GELIDIUM CARTILAGINEUM, *Gaill.*

Gen. Char. *Frond* linear, compressed, pinnated; its *axis* composed of densely interwoven, longitudinal, tenacious fibres; the periphery of small, polygonal cells. *Fructification* of two kinds, on distinct individuals: 1, *tubercles* (*favellidia*) immersed in swollen ramuli, containing a spherical mass of oblong spores; 2, *tetraspores* contained in club-shaped ramuli, bipartite or tripartite. Gelidium (*Lam.*),—from *gelu*, frost, whence also *gelatine*; but none of the species of the restricted genus are gelatinous.

Gelidium *cartilagineum*; frond several times pinnated, pinnæ and pinnulæ alternate, erecto-patent, with rounded axils, linear, obtuse; 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. *Harv. Man.* ed. 1. p. 81. ed. 2. p. 139. *Kütz. Phyc. Gen.* p. 406. t. 73 (*Anatomy*). *Sp. Alg.* p. 763.

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. Thrown ashore, occasionally, on the south coasts of England. Perennial. Freshwater Bay, Isle of Wight, *Dr. Withering* (*Turn. Syn. l. c.*) Picked up at Ryde, Isle of Wight, in 1849, by *Mr. Sheppard* (*Miss Gifford*, in litt.)

Geogr. Distr. Cape of Good Hope, and Port Natal; abundant. California. Canary Islands. Chinese Sea. (Adriatic, *Wulfen.* Near Nice, *Allioni.* Northern Ocean, as by Finmark, here and there, *Gunner*:—*fide Turn. Hist.* vol. ii. p. 138.)

Descr. *Root* fibrous, matted, extensively spreading. *Fronds* tufted, from one to two feet in length, linear, compressed, scarcely a line in breadth; *stem* undivided or once or twice forked, usually naked below, set in the upper half with decompoundly pinnated spreading branches. *Branches* three or four times pinnate, ovate in outline, the lowermost pinnæ being longest

and most compound, the upper more simple, and the ultimate ones frequently quite simple and spine-like, in which case the apex of the branch runs out in a long acumination. *Pinnæ* and *pinnulæ* linear, obtuse, inserted at wide angles or somewhat horizontal, but the apices usually curved inwards, so as to make the general direction of the ramulus erecto-patent. *Substance* cartilaginous, tough. *Colour*, when quite recent, a very dark brown-red or purplish-red, but after exposure passing through scarlet, orange, yellow, and light green, to white.

This fine species was first introduced to the British Flora by Mr. Turner, in his *Synopsis* (1802), on the authority of specimens collected by Dr. Withering; but in the *Historia Fucorum* (1809) its British habitat is, as Dr. Greville observes, altogether omitted, and it is not alluded to in any way as a British plant. In English Botany it is retained on the authority of Dr. Withering's specimens, which are said to have been collected a short time before that author's death. The *Fucus cartilagineus* of his work (vol. iv. p. 119) has no reference to these specimens, but is merely copied from Hudson (Fl. Ang. 586), whose synonym is commonly referred to *Sphærococcus coronopifolius*.

I am indebted to Miss Gifford for a specimen, from which the figure now given has been prepared, and which forms a part of a tuft of fronds picked up on the shore near Ryde, by Mr. Sheppard. I do not, however, consider the claims of this plant to be regarded as British at all increased by the discovery of these specimens, which were probably thrown overboard from some ship at Spithead, and wafted ashore. They have all the appearance of being Cape-grown: in size and colour, and whole aspect, they are identical with the usual specimens brought by sailors from that coast. Were the plant of British growth we should expect to find some characteristic mark, or, at least, that it would be thrown up from the sea in an unbleached state. From the geographical range of this plant, it is highly improbable that it should be a native of our shores. The nearest point to our shores of any of its well-ascertained habitats, is at the Canary Islands; the Mediterranean habitats being very uncertain, and that in Finland evidently a mistake.

Fig. 1. Gelidium cartilagineum:—*the natural size.* 2. One of the pinnæ:—*slightly magnified.*

Plate CCCXXXVIII.

LAMINARIA DIGITATA,

Var. STENOPHYLLA.

Laminaria *digitata stenophylla*; whole plant dark brown; stipes slender, flaccid, glossy, becoming compressed or flattened upwards; lamina wedge-shaped and tapering at base, much longer than the stipe, digitate, its segments few, and very narrow.

Hafgygia digitata, var. stenophylla, *Kütz. Sp. Alg.* p. 577.

Laminaria conica, *Bory, Dict. Cl. d'Hist. Nat.* vol. ix. p. 190.

Hab. Common round the shores of the Orkney Islands, and the North of Ireland.

On Plate CCXXIII. I have figured a small specimen of the ordinary form of *L. digitata*, and given a detailed description of the species; and I here figure an equally small specimen of what is either a remarkable variety of that species or entitled to specific distinction. My attention was first drawn to it by my friend the *Rev. J. H. Pollexfen*, who directed me to some excellent remarks on these *Laminariæ*, furnished by Rev. C. Clouston, of Orkney, to 'Anderson's Guide to the Highlands and Islands of Scotland.'

The differences between these varieties are so marked, that the Orkney kelp-men have assigned peculiar local names to each, calling the ordinary *L. digitata* (Plate CCXXIII.) *Cuvy*, and the form here figured *Tangle*. I extract the following contrasted characters of each from Mr. Clouston's memoir:—

"*Root*. The fibres of the root of the *Cuvy* (*L. digitata vera*) are arranged in longitudinal lines or rows, not whorls; while the fibres of the *Tangle* (*L. d. stenophylla*) have no order at all. This arrangement of the fibres is particularly evident, as the plant is frequently thrown on shore, having all except the stumps worn away by friction.

"*Stipes*. The *stipes* of the Cuvy scarcely ever exceeds four or five feet in length, while its circumference near the root is sometimes seven inches. It is so stiff as to stand up almost perpendicular two-thirds of its height; but droops at the top from the weight of the frond. It is surrounded by a *rough* bark as thick as pasteboard, which may be separated from it. *Colour* light brown; much infested with parasitical plants, particularly the *Ptilota plumosa* and *R. palmata*, or Dulse. It tapers much towards the top, but retains its *round* figure till it spreads immediately into the frond. The lower end tastes very *salt*, and is *not eatable*. The *stipes* of the Tangle, on the contrary, frequently attains the length

of eight or ten feet, while its circumference seldom exceeds four inches. It is so *flexible* as to lie prostrate on the rocks; has a *smooth* polished surface, and no bark that can be separated, at least easily; *colour* very dark brown or black; rarely hurt by any parasitical plant: the top is considerably *flattened* some time before it expands into the frond, and the lower end tastes *sweet*, and is much eaten by some people.

"*Frond.* The frond of the Cuvy is *thicker*, *shorter*, and the segments more numerous and *clustered*, than in the Tangle. That of the Cuvy swells into blisters by steeping in fresh water, while the frond of the Tangle bleaches white; but the great distinction in this part, and the one which makes this plant so valuable, is, that the Cuvy annually *throws off the old leaf*, and acquires a new one, while this has never been observed in the Tangle." [Here follows an account of the shedding of the old fronds; the history then proceeds.] "The situations in which the two plants grow are also very different; the Cuvy growing so far out in the sea that the highest limit can only be approached at the lowest stream tides, and from this it runs into the ocean, as far as the eye can penetrate, and probably much farther; while the Tangle may be approached at ordinary tides, and forms a belt between the Cuvy and the beach. The general aspect also differs. The stems of the Cuvy stand up like a parcel of sticks, and the leaves wave from them like little flags; while the Tangles lie prostrate on the rocks, the leaves mingle together, and form a darker belt round the shore. Six or eight feet is reckoned a good length for a Cuvy, while Tangles may be found from twelve to twenty feet."—*Anderson's Guide*, ed. 1. p. 721, 722.

I can bear witness to the accuracy of most of the above observations, having had, last summer, an opportunity of seeing, in the neighbourhood of the Giants' Causeway, both plants growing in profusion, and each retaining its peculiarities. The *Tangle* is strikingly obvious, from its dark colour, on the white limestone-rocks near Dunluce Castle, where it forms a clearly defined fringe round the bases of the cliffs. I have traced it from a few inches to many feet in length, and found it retain its form, and colour, and glossy, flaccid stipe; and so far as my opportunities of judging allow me to form an opinion, I am disposed to regard it as a *good species*. But perhaps a more careful observation, and comparison, may be necessary before this be definitively settled, and for the present I leave it as a form of *L. digitata*; recommending the varieties of that species, on all parts of the coast, to the study of observers. In drying the colour becomes olive.

In Mr. Edmondston's 'Flora of Shetland' (p. 54), the trivial name *digitata* is applied to the plant here figured; while the ordinary *L. digitata* (or Cuvy) is called *L. Cloustoni*, Edm.

Tab. CCCXXXVIII. A very young, and a more advanced specimen of *L. d. stenophylla*. Fig. 1. Small portion of a full-grown, compressed stipes:—all the figures *the natural size*.

Reeve & Nichols

Plate CCCXXXIX.

LAMINARIA LONGICRURIS, *De la Pyl.*

Gen. Char. *Frond* stipitate, coriaceous or membranaceous, flat, undivided or irregularly cleft, ribless. *Fructification*, cloudy spots of spores, imbedded in the thickened surface of some part of the frond. Laminaria (*Lamour.*),—from *lamina*, a thin plate, in allusion to the flat frond.

Laminaria *longicruris*; stipes very long, slender at the base, hollow and inflated in the middle, and gradually tapering to the apex; frond undivided, ovato-lanceolate, membranaceous, obtuse.

Laminaria longicruris, *De la Pyl. An. Sc. Nat.* vol. iv. p. 177. t. 9. f. A. *Fl. Ter. Newf.* p. 41. *Post. & Ruppr. Illustr.* p. 10. *J. Ag. Sp. Alg.* vol. i. p. 135. *Kütz. Sp. Alg.* p. 576. *Harv. Ner. Bor. Amer.* t. 6.

Laminaria ophiura, *Bory, Dict. Class.* vol. ix. p. 198.

Hab. Cast ashore. Island of Sanday, Orkney, *Mr. George Firth* (1838), fide *Rev. J. H. Pollexfen*. Coast at Gamnie, Banffshire, *Rev. G. Harris* (May 1850), fide *Prof. Dickie*. Ayrshire coast, *Rev. D. Landsborough* (July 1850). Near Dunluce Castle, county Antrim, *W. H. H.* (August 1850):—all the specimens much worn, and covered with barnacles.

Geogr. Distr. Northern Ocean, at Spitzbergen, *Vahl.* Baltic Sea, *J. Agardh.* Newfoundland (*De la Pylaie*), and common along the American shore as far south as Cape Cod, *W. H. H.* Bahama Islands, *Chauvin.* Kamtschatka, *Postells and Rupprecht.*

Descr. *Root* of numerous, slender, and much branched clasping fibres, issuing at irregular intervals from the lower part of the stipe. *Stem* from eight to twelve feet in length, very slender at the base, and there solid, gradually widening upwards and soon becoming hollow; at length, toward the middle widened to upwards of an inch in diameter, thence tapering to the apex, and terminating in the broadly cuneate base of the lamina. *Lamina*, when full grown, six to eight feet in length and from two to three feet in width, oblong-lanceolate or oval, very much waved at the margins and obtuse at the apex, of thinner substance than in *L. saccharina*. *Colour* of the stem yellowish-brown, of the lamina a beautiful pale greenish-olive.

This is a very distinct and beautiful species, and one of the largest of the genus, the frond being frequently as large as a moderately-sized table-cloth. It abounds along the coast of

North America, as far south as Boston Bay, and is of particularly large dimensions, and in great abundance, in the deep harbour of Halifax. It would seem also, from its other recorded habitats, to be generally dispersed through the Arctic Sea. But what are its claims to a place in the British flora? At present they are extremely doubtful—all the specimens which have been found being merely the stipes, covered with barnacles, and deprived of both root and leaf. The *hollow* stipe, tapering to both ends, is, however, so remarkable that no mistake can be made in identifying the specimens. The question simply is, *where* were these specimens grown? By their colony of barnacles they must have been long adrift, and most probably they were wafted either from the shores of Greenland or the more distant American coasts, swept by the Gulf Stream. To us, therefore, they come with no better claim on our charity than the equally drifted fronds of *Sargassum*. But I am not without hope that future observations, in the bays of Shetland or Orkney, may establish a clearer title; for if *L. longicruris* be truly a native of the Baltic, as Agardh assures us, there is nothing improbable in its vegetating in our most northern bays. In general aspect it resembles *L. saccharina*, but the frond is proportionally broader and more blunt, and of thinner substance; while the very long stem, hollow and somewhat swollen in the middle, will always afford a clear mark of distinction. Our figure is taken from a specimen collected at Halifax, Nova Scotia.

Fig. 1. LAMINARIA LONGICRURIS:—*on a reduced scale, of an inch to a foot.*
2. A portion of the hollow stem:—*the natural size.*

W H.H.del et lith.

Reeve & Nichols, imp

Plate CCCXL.

ENTEROMORPHA CLATHRATA, *Grev.*

Gen. Char. *Frond* tubular, membranaceous, of a green colour and reticulated structure. *Fructification*, granules, commonly in fours, contained in the cells of the frond. Enteromorpha (*Link*),—from εντερον, an *entrail*, and μορφη, *form* or *appearance*.

Enteromorpha *clathrata*; frond cylindrical, filiform, slender, highly reticulated; branches spreading, much divided, set with divaricated or recurved, slender, spine-like ramuli.

Enteromorpha clathrata, *Grev. Alg. Brit.* p. 181 (in part). *Hook. Brit. Fl.* vol. ii. p. 315. *Wyatt, Alg. Danm.* No. 34. *Harv. Man.* ed. 1. p. 175. ed. 2. p. 214. *Kütz. Sp. Alg.* p. 479.

Solenia clathrata, *Ag. Syst. Alg.* p. 186.

Scytosiphon clathratus, *Lyngb. Hyd. Dan.* p. 66. t. 16.

Scytosiphon paradoxus, *Fl. Dan.* t. 1595. f. 2.

Ulva clathrata, *Ag. Syn.* p. 46.

Conferva clathrata, *Roth, Cat. Bot.* vol. iii. p. 175.

Conferva paradoxa, *Dillw. Conf.* p. 70. t. F. *E. Bot.* t. 2328.

Hab. In rock-pools, between tide-marks. Annual. Spring and Summer. Not uncommon.

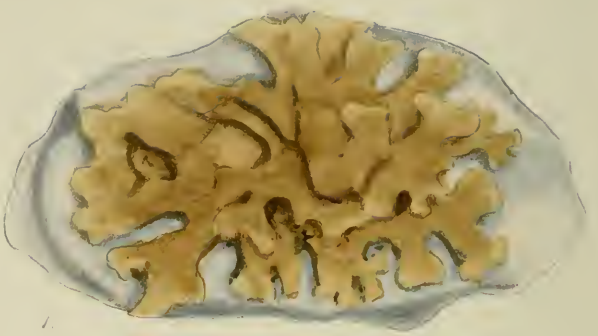
Geogr. Distr. Shores of Europe.

Descr. *Root* a small disc. *Fronds* densely tufted, often inextricably tangled together at the base, from six to eight inches long or more, varying in diameter from the fineness of human hair to that of stout bristles, excessively and irregularly branched; the branches issuing at all sides, of very unequal lengths, patent, and attenuated at the apex, ending in a fine point. The principal branches are furnished with a varying number of lesser divisions, and all are more or less copiously beset with short, slender, awl-shaped, simple or forked, spine-like ramuli, which stand out nearly horizontally from the branches. *Reticulations* of the membrane of large size, and somewhat quadrate. *Colour* of a fine, clear grass-green, becoming paler when dried. *Substance* soft and flaccid, membranous. In drying the plant adheres pretty firmly to paper.

This is nearly related to *E. ramulosa*, but is of a much softer substance, usually more slender in its tube, and more repeatedly

branched, so that its tufts are more bushy and feathery. It frequently lies prostrate, forming a widely spreading fleecy covering either to rocks or to mud, but this character is not very constant. To *Ent. erecta* (Plate XLIII.) it is also very closely allied, but is of less plumy habit than that species, with less difference in diameter between the main stems and branches and their lesser divisions, and the ramuli are shorter and more squarrose. Still, it must be confessed that there is a greater resemblance between these three species, in microscopic characters, than a *species-maker* would desire; and I remain of the opinion formerly expressed, that no great violence would be done to truth by regarding them all as forms of one Protean species.

Fig. 1. ENTEROMORPHA CLATHRATA;—Tuft *the natural size.* 2. Part of a branch:—*magnified.* 3. One of the ramuli:—*highly magnified.*



1.

2.

3.

4.

5.

Plate CCCXLI.

ZONARIA PARVULA, *Grev.*

Gen. Char. *Root* coated with woolly fibres. *Froud* flat, ribless, fan-shaped, entire or variously cleft, marked with concentric lines; the cells of the surface radiating. *Fructification*, roundish or irregular, scattered *sori*, bursting through the cuticle of both surfaces of the frond, consisting, at maturity, of numerous *spores*, nestling among jointed threads. Zonaria (*Ag.*),—from ζωνη, a *girdle* or *zone*; because the frond is usually transversely banded.

Zonaria *parvula*; frond procumbent, attached by fibres issuing from its lower surface, membranaceous, suborbicular, variously lobed; lobes free, rounded, scarcely marked with concentric lines.

Zonaria parvula, *Grev. Crypt. Fl.* t. 360. *J. Ag. Sp. Alg.* vol. i. p. 107. *Harv. Man.* ed. 2. p. 38.

Padina parvula, *Grev. Alg. Brit.* p. 63. *Hook. Br. Fl.* vol. ii. p. 282. *Harv. Man.* ed. 1. p. 31.

Padina reptans, *Crouan.*

Padinella parvula, *Aresch. Pug.* vol. ii. p. 260. t. ix. f. 1–3.

Aglaiozonia parvula, *Zanard. Sag.* p. 38. *Kütz. Sp. Alg.* p. 566.

Aglaiozonia reptans, *Kütz. l. c.*

Hab. On stones and nullipores near low-water mark, and especially on nullipore banks in 4–15 fathoms water. Perennial? Summer. Discovered by *Miss Cutler*, on sandstone tidal rocks near Sidmouth. Miltown Malbay, near low-water mark; and Roundstone, on the nullipore bank, *W. H. H.* Bute, *Rev. D. Landsborough*. Probably all round the coast, in deep water.

Geogr. Distr. British and French Atlantic coasts. Baltic Sea. Adriatic.

Descr. *Root*? *Fronds* procumbent, spreading over the rocks or surface of the nullipore in circular patches, like a *lichen*, closely attached by means of numerous fibrils or rootlets which issue from all parts of the lower surface; when young roundish, and slightly lobed, the lobes rounded; as the plant advances the lobes become elongate, somewhat linear, from a quarter to half an inch in width, simple or subdichotomously divided, with rounded axils; *apices* always rounded, and broader than the inferior portion of the lobe, thus affecting a fan-shaped form. *Margin* somewhat wavy, free from the rock. *Substance* membranaceous, brittle, and not adhering to paper. *Surface* reticulated with small cells, which are arranged in slightly radiating longitudinal lines, the cells at the base of the lobe being small and close-

pressed, those above them wider and longer, quadrate and nearly twice as long as broad: again, the apical cells are always short while the frond is in a growing state, as it increases by successive additions to the outer margin. *Fibrils* simple or forked, taking hold of the rock by discs at their tips.

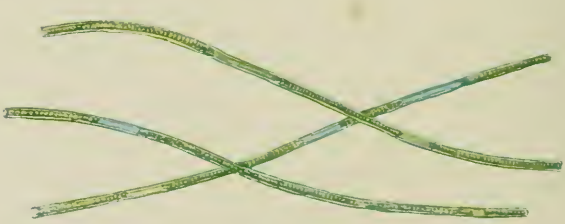
This is not an uncommon plant on various parts of our coast, though frequently overlooked, owing to its hiding in crevices, or creeping through the much-branched stony nullipores. When occurring on rocks near low-water mark it is broader, less branched, and of paler colour than when dredged from deeper water. I am not able to detect satisfactory characters by which to separate the *Padina reptans* of Crouan, for specimens of which I am indebted to M. Lenormand.

No one, in this country, has met with fructification, which seems only to have been found by Dr. Areschoug, in Sweden. He finds spores collected in undefined largish sori, near the base of the frond.

Fig. 1. ZONARIA PARVULA:—*the natural size.* 2. Part of a frond:—*magnified.* 3. Small portion of a lobe, to show the longitudinal, radiating lines of cells. 4. A small part of the same, with undeveloped apical cells:—*highly magnified.* 5. Fibrils:—*highly magnified.*

2.

1.



3.

Reeve & Nichols imp.

Plate CCCXLII.

CALOTHRIX LUTEOLA, *Grev.*

Gen. Char. *Filaments* destitute of a mucous layer, erect, tufted or aggregated, fixed at the base, somewhat rigid, not oscillating. *Tube* continuous; endochrome green, densely annulated, at length dissolved into lenticular sporidia. Calothrix (*Ag.*),—from καλος, *beautiful*, and θριξ, a *hair*.

Calothrix *luteola*; filaments scattered, exceedingly minute and slender, filiform, flexible, obtuse, hyaline and pale yellowish, or containing an opake light green, interrupted, faintly annulated endochrome.

Calothrix luteola, *Grev. Crypt. Fl.* t. 299. *Harv. in Hook. Br. Fl.* vol. ii. p. 367. *Harv. Man.* ed. 1. p. 157. ed. 2. p. 224.

Calothrix melaleuca, *Carm. Alg. Appin. MSS.*

Leibleinia luteola, *Kütz. Sp. Alg.* p. 276.

Hab. On marine, filiform Algæ, in tide-pools. Appin, *Capt. Carmichael.*

Geogr. Distr. ——? Helgoland, *Kütz.*

Descr. *Filaments* of microscopic size, visible to the eye as a minute byssoid coating to small Algæ, when seen under water, but invisible when the affected plant is lifted into the air; scattered, each thread standing apart, of equal diameter throughout, obtuse, very slender, flexible, quite simple, either hyaline and pale yellowish, or more or less filled with an opake, annulated, light-green mass. The whole plant is so minute that it requires the highest powers of a compound microscope to make out its structure.

Our figure has unfortunately been printed in too green an ink, and is less characteristic than I could wish; and will not bear a favourable comparison with the beautiful figure given by Dr. Greville. In one respect, however, I am unable to see this microscopic plant either as Dr. Greville or as Capt. Carmichael has described it, and yet we have all three had the same specimens before us. By Carmichael, its discoverer, it is thus described:—"*Filaments* in small tufts, a line or two in length, exceedingly slender, tortuous, tapering, *of a snow-white colour*, and so *opake* as to appear intensely black when viewed against

the light." The *same specimens* are described by Greville thus :— "Filaments *hyaline*, *yellowish*, exceedingly slender, elongated, flexible, scattered," "neither fasciculate nor tufted." Thus what Carmichael sees *opake* and *snow-white*, Dr. Greville describes as *hyaline* and *yellowish*. If we further contrast the words of the several descriptions, other as striking discrepancies will be seen. So that, had I not received authentic specimens of the original plant, named by Carmichael himself, I should not have hesitated to regard his description as drawn from another species; I can now only attribute the differences to a defective microscope. It should be stated, however, that I have only seen this plant in a dried state, when its colour may have altered from *white* to *green*. Under the higher powers of the microscope the *green* endochrome (of the dried specimen) is very obvious; the "yellow and hyaline" character mentioned by Greville, has reference to the empty tube, from which the colouring matter has been discharged. I have only seen Carmichael's specimen, but as he found it abundantly at Appin, it is probably still to be met with on that coast, and is worth looking after.

Fig. 1. Small fragment of ENTEROMORPHA CLATHRATA, with CALOTHRIX LUTEOLA infesting it:—*the natural size.* 2. The same:—*highly magnified.* 3. Portions of threads of the *Calothrix*:—*more highly magnified.*

Reeve & Nichol

Plate CCCXLIII.

SARGASSUM VULGARE, *Ag.*

Gen. Char. *Frond* furnished with distinct, stalked, nerved leaves, and simple, axillary, stalked air-vessels. *Receptacles* small, linear, tuberculated, mostly in axillary clusters, cellular, pierced by numerous pores, which communicate with immersed, spherical *conceptacles*, containing parietal *spores* and tufted *antheridia*. Sargassum (*Rumph.*),—a word formed from the Spanish *sargazo*, the name given by navigators to floating Sea-weed.

Sargassum *vulgare*; stem filiform, smooth, alternately branched; leaves linear-lanceolate or oblong-lanceolate (very variable in breadth), serrated, strongly ribbed, copiously glandular; air-vessels on compressed stalks about their own length, spherical, pointless; receptacles axillary, dichotomous, tuberculose, unarmed.

Sargassum vulgare, *Ag. Sp. Alg.* vol. i. p. 3. *Ag. Syst.* p. 293. *Grev. Alg. Brit.* p. 2. t. 2. *Hook. Br. Fl.* vol. ii. p. 264. *Harv. Man.* ed. 1. p. 17. ed. 2. p. 15. *J. Ag. Sp. Alg.* p. 342.

Fucus natans (in part), *Turn. Hist.* t. 46. *Syn.* p. 48. *Sm. Eng. Bot.* t. 2114.

Hab. Cast ashore, drifted by oceanic currents from warmer latitudes. Cast on the shores of the Orkney Isles, *Dr. P. Neill.* (Near Falmouth? *Hudson.*)

Geogr. Distr. Atlantic Ocean, abundant on tropical and subtropical coasts. Shores of North America, as far north as Long Island Sound. Coasts of Spain and Portugal.

Descr. *Root* a conical disc. *Fronds* tufted, from one to three feet in length, having a leading, mostly undivided, stem set throughout with alternate, spreading branches, the lowest of which are longest. *Stem* and branches narrow, filiform or subcompressed, smooth (destitute of rough points), somewhat flexuous. *Leaves* coriaceous, an inch or two in length, from a quarter to half an inch in breadth, oblong or linear-lanceolate, sharply serrated, the surface dotted over with muciferous pores or glands, strongly nerved. *Air-vessels* spherical, about as large as a pea, pointless, borne on compressed stalks about as long as themselves, and springing from the lower part of the petiole of the leaves. *Receptacles* in dichotomous cymoid tufts, springing with the air-vessels from the petioles, cylindrical, tuberculated, usually much shorter than the subtending leaf, sometimes elongated and filiform, and many times forked. *Colour* a foxy olive. *Substance* opake and tough.

One of the stray waifs of tropical climes, which are occa-

sionally brought to our shores by the great north-eastern current of the Atlantic, and which have no proper claim to admission into our Flora. Though the present species has had a place in British works for nearly a century, I have never seen a (so called) British specimen, and have made my figure from an American example.

Fig. 1. Branch of SARGASSUM VULGARE:—*the natural size.* 2. A leaf, with *vesicl* and receptacles. 3. A broader leaf:—*the two last somewhat magnified.*

Plate CCCXLIV.

ENTEROMORPHA LINKIANA, *Grev.*

Gen. Char. *Frond* tubular, membranaceous, of a green colour and reticulated structure. *Fructification*, granules, contained in the cells of the membrane. Enteromorpha (*Link*),—from εντερον, an *entrail*, and μορφη, *form* or *appearance*.

Enteromorpha *Linkiana*; "fronds cylindrical, tubular, filiform, reticulated, pellucid, of a very pale green colour, membranaceous (rigid when dry), much branched; branches attenuate."—*Grev.*

Enteromorpha Linkiana, *Grev. Alg. Brit.* p. 182. *Hook. Br. Fl.* vol. ii. p. 314. *Harv. Man.* ed. 1. p. 174. ed. 2. p. 213. *Kütz. Sp. Alg.* p. 481.

Hab. Between tide-marks. Annual. Summer. At Appin, *Captain Carmichael.*

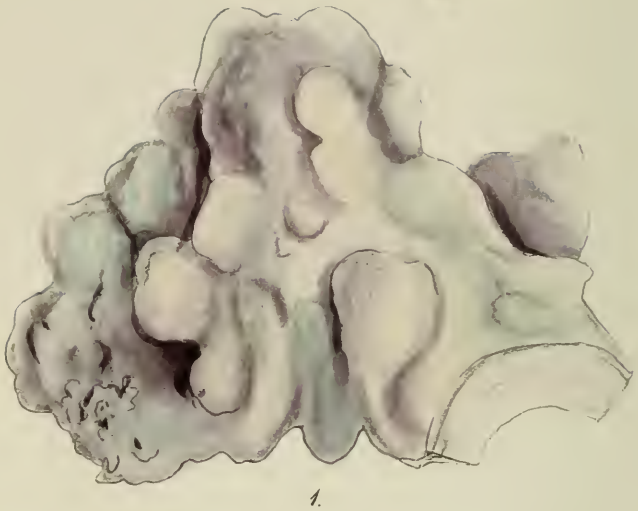
Geogr. Distr. —— ?

Descr. "*Root* a minute disc. *Frond* six to twelve inches in length, filiform, cylindrical, tubular, inflated, rising with a main stem about one line in diameter, on all sides of which, and along the whole length, the branches are inserted; branches two to six inches long, smaller in diameter than the stem, between erect and spreading, set with a second series one or two inches long, which, in their turn, bear a third, which are quite capillary, all of them much attenuated toward the extremity. The *structure* distinctly reticulated, the reticulations roundish, but angular. *Fructification*, three or four subglobose granules within many of the reticulations. *Substance* membranaceous, but firm and somewhat cartilaginous when dry, adhering very imperfectly to paper. *Colour* a very pale, yellowish green."—*Grev. l. c.* (I do not find more than *one* granule in each fertile cell, but three or four fertile cells generally cluster together.)

I prefer copying the above description from Dr. Greville's work, because my knowledge of this species (or form) is limited to a single specimen collected by Capt. Carmichael, and now preserved in the Dublin University Herbarium. From this specimen the figure has been taken. It will be seen that while the external habit is peculiar, the microscopic characters are very similar to those of *E. clathrata*, *E. erecta*, and *E. ramulosa*. Dr. Greville lays stress on the rigidity of substance, which is very observable in the dry state at least. The branches are of

larger diameter than is common in *E. clathrata*, but this is a character of little moment in this genus, and the very pale colour may arise from the peculiar circumstance under which the plant grew :—as, if the specimens were collected in a shallow pool near high-water mark they would assuredly be pale. In such circumstances any species of the genus would be equally bleached.

Fig. 1. Enteromorpha Linkiana :—*the natural size.* 2. Part of a branch and ramuli :—*magnified.* 3. Small fragment of the membrane, with fertile cells :—*highly magnified.*



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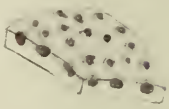

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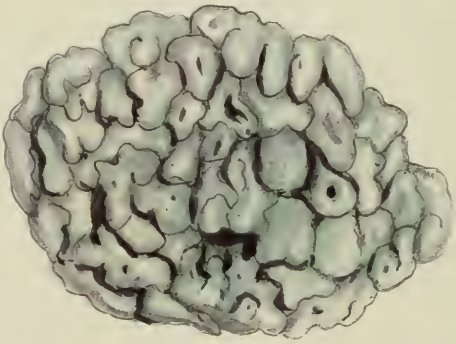

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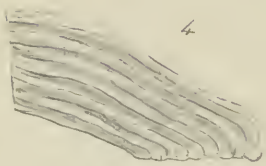

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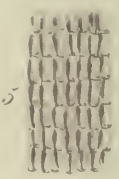


5

W.H.H. del. et lith.

Plate CCCXLV.

MELOBESIA POLYMORPHA, *Linn.* (sp.)

Gen. Char. *Frond* attached or free, either flattened, orbicular, sinuated or irregularly lobed, or cylindrical and branched (never articulated), coated with a calcareous deposit. *Fructification*: conical, sessile *ceramidia*, scattered over the surface of the frond, and containing a tuft of transversely parted, oblong *tetraspores*.—Named from one of the Sea-nymphs of Hesiod.

Melobesia *polymorpha*; frond attached to rocks, thick, stony, encrusting, or rising into short, clumsy branches, which are seldom much divided, and often merely rudimentary; ceramidia minute, depressed, extremely numerous.

Melobesia polymorpha, *Harv. Man.* ed. 2. p. 108.

Millepora polymorpha, *Linn. Syst. Nat.* 1285. *Ellis and Soland. Zoop.* 130.

Nullipora polymorpha, *Johnst. Brit. Lith.* p. 238. t. 24. f. 1, 2, 3 (?), and t. 25. f. 23. (in part.)

Spongites polymorpha, *Kütz. Sp. Alg.* p. 699.

Corallium cretaceum lichenoides, *Ellis, Cor.* p. 76. t. 27. fig. d. D. *(fide fig.)*

Hab. On littoral rocks all round the coast, extending beyond low-water mark. Common.

Geogr. Distr. (*Probably widely dispersed.*)

Descr. *Frond* at first appearing on the surface of rocks, pebbles, or shells, in the form of little stony pimples, which gradually become confluent, so as to form an uneven crust, resembling one of the crustaceous *Lichens*, and spreading over indefinite spaces. This crust gradually grows thicker by successive thin coats of cellular and calcareous substance formed and deposited on the surface, and is very irregular in form; sometimes continuing nearly flat, sometimes rising into irregular stony knobs or lumpy masses, and sometimes throwing up short, erect, scarcely divided branches. *Ceramidia* minute, dot-like, sunk deeply in the outer layer of cells, extremely numerous and often puncturing over the whole surface of fertile fronds as if they had been closely marked with pin-holes. *Colour* variable according to the locality, dark lurid purple near low-water mark, and passing into chalky-white as the specimens grow nearer high-water mark. *Cells* of which the frond is composed about twice as long as their diameter. *Substance* stony.

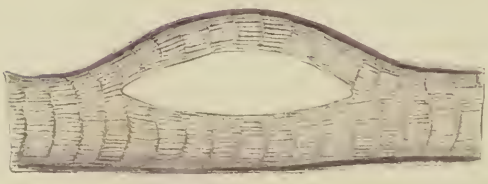
To this form I refer most of the lumpy *Nullipores*, with thick

stony fronds, and of various uncertain shapes, found encrusting tidal rocks, and occasionally thrown up or dredged from deeper water. Dr. Johnston's figures, at Plate XXIV. 1, 2, 3, of his 'History of British Sponges and Lithophytes,' represent a form which abounds in Dalkey Sound, near Dublin, and on which the late Mr. M'Calla founded a species which he called *Nullipora compressa*. It perhaps ought to receive a specific name, but, if left unennobled, it seems to me rather to fall, as a variety, under *M. calcarea*, than under the present species.

Fig. 1 and 2, different specimens of MELOBESIA POLYMORPHA:—*the natural size*. 3. Small portion of a fertile frond, showing the ceramidia. 4. Vertical section of the frond, to show arrangement of cellular coats:—*both magnified*. 5. Cellular structure:—*highly magnified*.

1.

2.



3.

4.

W H H del et lith

Reeve & Nichols imp

Plate CCCXLVI.

MELOBESIA LICHENOIDES, *Borl.* (sp.)

Gen. Char. *Frond* attached or free, either flattened, orbicular, sinuated or irregularly lobed, or cylindrical and branched (never articulated), coated with a calcareous deposit. *Fructification*: conical, sessile *ceramidia*, scattered over the surface of the frond, and containing a tuft of transversely parted, oblong *tetraspores*.—Named from one of the Sea-nymphs of Hesiod.

Melobesia *lichenoides*; frond attached to rocks, free at the margins, foliaceous, lichen-like, variously lobed; foliations spreading, often imbricated; ceramidia large, conical, prominent.

Melobesia lichenoides, *Harv. Man.* ed. 2. p. 109.

Millepora lichenoides, *Borl. Cornw.* p. 239. pl. 24. f. 2, 3, 5. *Soland. Zoop.* p. 131. pl. 23. f. 10, 12.

Hab. On rocks and in tide-pools near low-water mark. Coast of Cornwall, *Rev. Dr. Borlase*. West of Ireland, abundant on the coasts of Galway and Clare, *W. H. H.* Coast of Cork, *Dr. Allman*. (Probably common on the W. and S. W. shores.)

Geogr. Distr. ?

Descr. *Frond* thin and foliaceous, stony, spreading over rocks and stones in somewhat circular patches; not attached at the margins, and frequently but imperfectly attached in the centre. Many fronds grow together in the same patch, and their margins, which are much lobed and somewhat crenate, lie one over another. The lobes commonly extend in a horizontal direction, but sometimes stand erect; the habit varying greatly according to the place where the plant grows. *Ceramidia* large, prominent, obtusely conical, scattered, or collected in groups. *Cells* of which the substance is composed many times longer than their diameter. When the lime has been removed by acid, a thin slice shows a beautifully zoned structure under the microscope. *Colour* varying from dark lurid purple (in deep water) to creamy white near high-water mark. *Substance* thin and brittle.

This is by much the prettiest and most plant-like of the tidal *Nullipores*, strongly resembling in form and general habit one of the foliaceous lichens of the genus *Parmelia*, but differing in being of a stony substance;—thin however as paper, and very brittle. It is closely related to *M. agariciformis*, figured in one of our early numbers, from which it differs more in general

habit than by any precise character; that species growing in globose masses, which are unattached, and lie, subject to the drifting of the waves, on the sea-bottom.

Mastophora licheniformis, Dene., which Kützing refers to the plant now figured, is very different in many ways, generically and specifically.

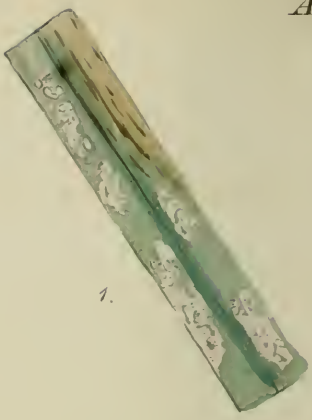
Fig. 1. MELOBESIA LICHENOIDES; growing on a piece of rock:—*the natural size.* 2. Portion of a frond:—*magnified.* 3. Vertical section through an (*empty*) ceramidium:—*magnified.* 4. Portion of the cellular substance:—*highly magnified.*

B.

1.

2.

A.



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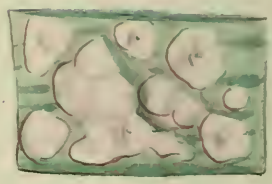

2.

D.

1.

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C.

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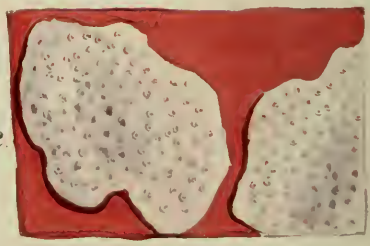


2.

Plate CCCXLVII. *A*.

MELOBESIA MEMBRANACEA, *Lamour.*

Gen. Char. *Frond* attached or free, either flattened, orbicular, sinuated or irregularly lobed, or cylindrical and branched (never articulated), coated with a calcareous deposit. *Fructification*: conical, sessile *ceramidia*, scattered over the surface of the frond, and containing a tuft of transversely parted, oblong *tetraspores*.—Named from one of the Sea-nymphs of Hesiod.

Melobesia *membranacea*; minute, dot-like, very thin, pale purple, circular, at length confluent, attached to other Algæ; ceramidia one or two, depressed.

Melobesia membranacea, *Lamour. Cor. Flex.* p. 315. pl. 12. f. 2, 3. *Harv. Man.* ed. 2. p. 109.

Hab. Common on the leaves of *Zostera*, the fronds of *Chondrus crispus*, &c. All round the coast.

Geogr. Distr. Atlantic and Mediterranean coasts of Europe.

Descr. *Frond* from half a line to a line in diameter, very thin and filmy, circular at first, then, from several becoming confluent, more or less lobed or irregular. *Ceramidia* one or two, depressed.

A. Fig. 1. Melobesia membranacea, growing on a leaf of *Zostera*:—*the natural size*. 2. A portion *magnified*.

Plate CCCXLVII. *B*.

MELOBESIA FARINOSA, *Lamour.*

Melobesia *farinosa*; minute, irregular in outline, rather thin, pallid, with two or three prominent ceramidia.

Melobesia farinosa, *Lamour. Cor. Flex.* p. 315. pl. 12. *Harv. Man.* ed. 2. p. 109. *Kütz. Sp. Alg.* p. 696.

Hab. On various Algæ.

Descr. Rather larger and thicker than the preceding, with more prominent fruit. In other respects similar.

B. Fig. 1. Melobesia farinosa, growing on *Phyllophora rubens*:—*natural size*. 2. A portion *magnified*.

Plate CCCXLVII. *C.*

MELOBESIA VERRUCATA, *Lamour.*

Melobesia *verrucata*; thin, expanded, irregularly lobed, pallid, dotted over with innumerable, small, pimply ceramidia.

Hab. With the preceding.

Descr. *Patches* from a quarter to half an inch in length, oblong, variously lobed at the margin, uneven. *Ceramidia* very numerous, minute.

C. Fig. 1. Melobesia verrucata :—*natural size.* 2. A portion *magnified.*

Plate CCCXLVII. *D.*

MELOBESIA PUSTULATA, *Lamour.*

Melobesia *pustulata*; thick, dull purple or green, oblong or lobed, in crusting, smooth; ceramidia numerous, large, rather prominent, conical.

Melobesia pustulata, *Lamour. Cor. Flex.* pl. 12. f. 2. *a.* B. *Kütz. Sp. Alg.* p. 696. *Harv. Man.* ed. 2. p. 109.

Hab. On *Phyllophora rubens* and other Algæ; common.

Descr. *Patches* often an inch or more in length, and half an inch broad, thickish, of irregular form, frequently lobed, closely adhering to flat surfaces or clasping cylindrical stems, the surface more or less uneven. *Ceramidia* several on each patch, clustered, of large size in proportion to those of other allied species, prominent, conical. *Colour*, when well grown, a dark, reddish purple, changing to green and finally to white.

D. Fig. 1. Melobesia pustulata :—*natural size.* 2. A portion *magnified.*

I have thought it best to figure these four reputed species on one plate, that the slight differences noticed between them may be seen.

PLATE CCCXLVIII.

MYRIONEMA CLAVATUM, *Carm.* (sp.)

GEN. CHAR. *Minute* parasites, consisting of a mass of short, erect, simple, jointed filaments, which spring from a thin expansion formed of decumbent, cohering filaments, spreading in patches on the surface of other Algæ. *Spores* oblong, affixed either to the erect or to the decumbent filaments. MYRIONEMA (*Grev.*),—from μυριος, *numberless*, and νημα, a *thread.*

MYRIONEMA *clavatum*; "very minute, rather convex; filaments clavate, mostly bifid; spores obovate, pedicellate, affixed to the filaments."

MYRIONEMA clavatum, *Harv. in Hook. Br. Fl.* vol. ii. p. 391. *Harv. Man.* ed. 2. p. 51. *Kütz. Sp. Alg.* p. 540.

LINCKIA clavata, *Carm. Alg. App. ined. cum Ic.*

HAB. On a thin purple cartilaginous crust, probably a *Verrucaria*, which covers the pebbles at the half-tide level. Autumn. Appin, *Capt. Carmichael*, who adds, "The parasite is so much of the colour of the crust, it requires a microscope to detect it."

Of this curious little parasite I know nothing more than is learned from the above short description, which, with the two upper figures of our plate, is copied from Capt. Carmichael's manuscripts. The lower figure is added as an enlarged representation of a portion of the middle figure. I am indebted to the Rev. M. J. Berkeley for a sketch, copied from the original by Carmichael.

Fig. 1. MYRIONEMA CLAVATUM, growing on a dark-coloured crust, upon a quartz pebble:—*the natural size.* 2. The *Myrionema* filaments:—*magnified.* 3. A barren and fertile filament:—*more highly magnified.*

Plate CCCXLIX.

SPHACELARIA RACEMOSA, *Grev.*

Gen. Char. *Filaments* jointed, rigid, distichously branched, pinnated; rarely simple or subdichotomous. *Apices* of the branches distended, membranous, containing a dark, granular mass. *Fructification*, elliptical *utricles* (or *spores*), borne on the ramuli. Sphacelaria (Lyngb.), —from σφακελος, *gangrene*, alluding to the withered tips of the branches.

Sphacelaria *racemosa*; "an inch in height, tufted, olivaceous, somewhat rigid, the fronds dichotomous; articulations equal in length and breadth; capsules oval, racemose, pedunculate." *Grev.*

Sphacelaria racemosa, *Grev. Scot. Crypt. Fl.* vol. ii. t. 96. *Grev. Fl. Edin.* p. 314. *Harv. in Hook. Br. Fl.* vol. ii. p. 325. *Harv. Man.* ed. 1. p. 39. ed. 2. p. 57. *J. Ag. Sp. Alg.* vol. i. p. 31. *Kütz. Sp. Alg.* p. 466.

Hab. In tide-pools? Very rare. Frith of Forth, opposite to Caroline Park, *Sir John Richardson.*

Geogr. Distr. Only found in the above locality, and there only once (about the year 1821).

Descr. "*Plant* tufted, about an inch in height, of an olive-green or olive-brown colour. *Frond* filiform, somewhat rigid, 3–4 times dichotomous, the dichotomies acute. *Articulations* equal in length and breadth, diaphanous to the base. *Summits* of the branches not sphacelated in my specimens, but somewhat dilated and hyaline, as in many other species previous to the sphacelation making its appearance. *Fructification*, oval capsules, surrounded by a very narrow pellucid border, pedicellate, and arranged in a racemose manner, on a common jointed peduncle. *Racemes* suberect, arising from various parts of the frond."—*Grev. Scot. Crypt. l. c.*

In this species we have the remarkable fact, occasionally met with in all departments of natural history, of a species distinguished by strongly marked characters having been seen but once, and that in very small quantity. The tuft from which Dr. Greville's figure, and the above description, which I have transferred from his work, were taken, has also served me in making the drawing for the plate now given, having been kindly placed in my hands for that purpose by Dr. Greville, with the liberal per-

mission to abstract a fragment of the precious relic, to be preserved in the Dublin Herbarium. The singular grape-like fructification at once marks the species, and on the specimen found almost every thread had more or less numerous clusters. So that it fortunately happens, that a small specimen of this rarity is as characteristic as a much larger would be,—no small advantage, when a half-crown would cover all the specimens at present known to botanists. Dr. Greville has repeatedly sought it in vain in the spot on which the solitary tuft was picked up by Sir J. Richardson, previous to his first and memorable Arctic Voyage.

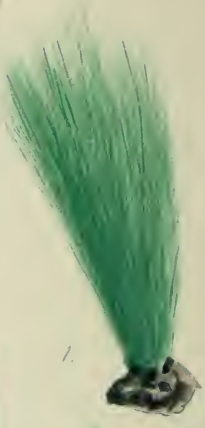
Fig. 1. Tuft of SPHACELARIA RACEMOSA :—*the natural size.* 2. Upper portion of a frond :—*magnified.* 3. Apex of a branch, with branches of spores; and 4, one of the pedicellate spores :—*more highly magnified.*

A.

1.

2.

B.



1.

2.

3.

Plate CCCL. *A*.

VAUCHERIA MARINA, *Lyngb.*

Gen. Char. *Fronds* aggregated, tubular, continuous, capillary, coloured by an internal, green, pulverulent mass. *Fructification*, dark green, homogeneous *sporangia* (*coniocystæ*), attached to the frond.—*Grev.*—Vaucheria (DC.),—in honour of *M. Vaucher*, a distinguished Swiss writer upon fresh-water *Confervæ*, &c.

Vaucheria *marina*; filaments loosely tufted, or distinct; branches few, very long, obtuse; sporangia solitary, obovate, pedicellate, lateral. *Carm.*

Vaucheria marina, *Lyngb. Hyd. Dan.* p. 79. t. 22. *Hook. Br. Fl.* vol. ii. p. 319. *Harv. Man.* ed. 1. p. 14. ed. 2. p. 195. *Wyatt, Alg. Danm.* no. 168(?).

Hab. On sea-plants, mud, &c., between tide-marks. Annual. Summer. At Appin, on *Furcellaria fastigiata, Capt. Carmichael.* On mud at Torbay and Salcombe, *Mrs. Griffiths and Mrs. Wyatt.*

Geogr. Distr. Færroe Islands, *Lyngb.*

Descr. *Fronds* forming more or less dense erect tufts one or two inches in height, very slender and flaccid, irregularly branched, somewhat dichotomous; branches few, erect, their granular contents sometimes interrupted at long interspaces. *Sporangia* few, scattered, broadly obovate or pear-shaped, very obtuse, tapering to the base into a short stalk. *Colour* a bright grass-green, becoming rather brownish, but retaining a gloss in drying.

Not being able to prepare a satisfactory figure of this plant from dried specimens, and not having access to recent ones, I have copied, from the work of Lyngbye, a portion of his figure representing the magnified appearance of a branch in fruit. I regret that I was not earlier aware that a figure of his *V. marina* existed among the manuscript papers of the late Capt. Carmichael; a fact communicated to me since the plate was engraved and printed. Had I known it in time I should naturally have preferred publishing his drawing made from British specimens, to copying the published plate of a foreign author.

A. Fig. 1. Tuft of Vaucheria marina:—*the natural size.* 2. A portion of a filament in fruit:—*magnified*; copied from *Lyngbye.*

PLATE CCCL. *B.*

VAUCHERIA SUBMARINA, *Berk.*

VAUCHERIA *submarina*; "forked fastigiate threads; coniocystæ (sporangia) numerous, lanceolate and ovate, confined to the upper branches." *Berkeley.*

VAUCHERIA submarina, *Berk. Gl. Br. Alg.* p. 24. t. 8. *Hook. Br. Fl.* vol. ii. p. 319. *Hook. Man.* ed. 1. p. 147. ed. 2. p. 195.

VAUCHERIA dichotoma, β. submarina, *Ag. Syst. Alg.* p. 171. *Sp. Alg.* vol. i. p. 460. *Lyngb. Hyd. Dan.* p. 76. t. 20. A. *Grev. Alg. Brit.* p. 190.

HAB. On the muddy sea-shore. Weymouth, *Rev. M. J. Berkeley.*

GEOGR. DISTR. North Sea.

DESCR. "*Plant* growing in dense fastigiate masses in muddy spots covered by the sea every tide. Threads far slenderer than in *Vaucheria dichotoma*, stained below by the mud, above dark green, forked; the branchlets generally somewhat strangulated just above their insertion; the main stem clothed, above the part where the branchlet is given off, with numerous, almost sessile, more or less ovate or lanceolate coniocystæ, which are pointed, at first entirely green, but eventually with a pellucid border. One single instance occurred, in which the *fruit* consisted of two, placed end to end." *Berk. l. c.*

I am only acquainted with this species through Mr. Berkeley's description and figure, both of which I have here, with his permission, made use of.

B. Fig. 1. Tuft of VAUCHERIA SUBMARINA:—*the natural size.* 2. Filaments in fruit:—*magnified.* 3. A portion of a filament with sporangia:—*more highly magnified*; both copied from Mr. Berkeley's plate.


1
2
3

Plate CCCLI.

CLADOPHORA NUDA, *Harv.*

Gen. Char. *Filaments* green, attached, uniform, branched, composed of a single series of cells or articulations. *Fruit,* aggregated granules or zoospores, contained in the articulations, having, at some period, a proper ciliary motion. Cladophora (*Kütz*),—from κλαδος, a *branch,* and φορεω, to *bear.*

Cladophora *nuda*; filaments somewhat rigid, slender, very straight, dull-green, or olivaceous (when dry), sparingly dichotomous; ramuli few and scattered, appressed, the uppermost often opposite; articulations many times longer than broad.

Cladophora nuda, *Harv. Man.* ed. 2. p. 101.

Conferva nuda, *Harv. in Mack. Fl. Hib.* part 3. p. 229. *Harv. Man.* ed. 1. p. 136.

Hab. On basalt rocks, between tide-marks. At Port Stewart, co. Antrim, *Mr. D. Moore.*

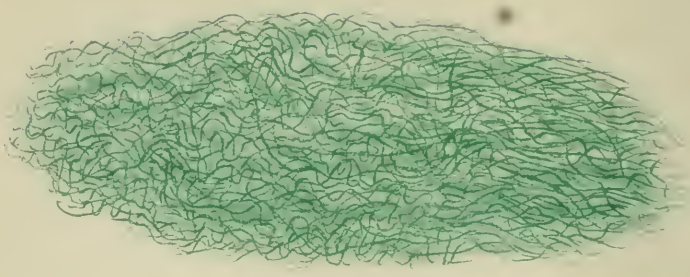
Geogr. Distr. ——?

Descr. *Filaments* loosely tufted, two or three inches high, capillary, sparingly branched, very straight, irregularly forked or sub-alternately divided; secondary branches distant and very erect, of various lengths, naked, or furnished with a few very erect or appressed, short ramuli, the upper ones of which are occasionally opposite. These ramuli are scarcely more slender than the other parts of the frond, and end in a bluntish point. The *articulations,* in the older parts, are many times longer than their breadth, and have thick walls, leaving a wide space surrounding the dull-green endochrome; the dissepiments are slightly contracted. The substance is rather rigid, and without gloss; and in drying the plant does not adhere to paper.

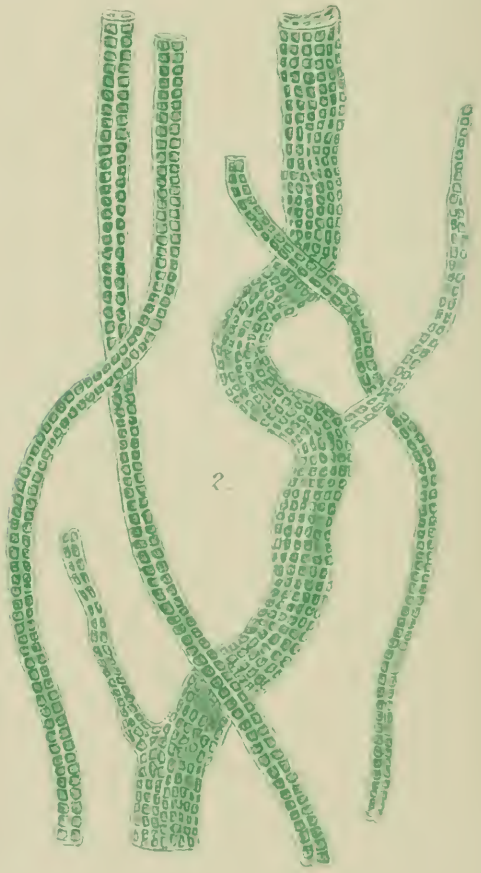
My knowledge of this species, if the plant here figured be entitled to rank as a species, is confined to a specimen collected by Mr. Moore, many years ago, on the coast of Antrim, and now preserved in the Dublin University Herbarium. It is undoubtedly nearly related to *C. rupestris,* from which, at first sight, it differs by its duller colour and more naked branches, and especially by the much longer articulations of the stem, and the wider borders of the tube. Still, I fear this character of long

joints, which is the strongest of those mentioned, is not to be altogether counted on; for though I have not observed the joints in any specimen of *C. rupestris* to be of the extreme length of those of *C. nuda*, yet I have seen a tendency in some specimens of that species to produce long joints; and this, joined to the non-occurrence in recent times of *C. nuda*, has latterly disposed me to consider it a variety of *C. rupestris*. As, however, it has already obtained publicity both in this country and on the Continent, I think it deserving of being figured in this work, and shall be happy to find that future researches prove its title to receive a name. Last summer (1850) I sought for it diligently on the basaltic rocks in the neighbourhood of the Giant's Causeway, but in vain; and it was out of my power to extend the exploration as far as Port Stewart.

Fig. 1. CLADOPHORA NUDA:—*the natural size.* 2. Portion of a branch:—*magnified.* 3. Ramuli:—*more highly magnified.*



1.



2.

Plate CCCLII.

ENTEROMORPHA PERCURSA, *Hook.*

Gen. Char. *Frond* tubular, membranaceous, of a green colour and reticulated structure. *Fructification*: granules, commonly in fours, contained in the cells of the frond. Enteromorpha (*Link*),—from εντερον, an *entrail*, and μορφη, *form* or *appearance*.

Enteromorpha *percursa*; frond capillary, entangled and variously twisted, simple or having a few short spine-like ramuli, compressed, solid (?), reticulated; cells quadrate, two or more (generally two) in the breadth of the frond, the endochrome nearly filling the cell.

Enteromorpha percursa, *Hook. Br. Fl.* vol. ii. p. 315. *Harv. Man.* ed. 1. p. 176. (*not ed. 2. p. 215, where the specific character applies to E. Ralfsii, Harv. Phyc. Br.* t. cclxxxii.)

Solenia percursa, *Ag. Syst.* p. 187.

Scytosiphon compressus, γ confervoideus, *Lyngb. Hyd. Dan.* p. 65. t. 15. f. B. 4–6.

Hab. Muddy sea-shores, at half-tide level. Annual. Spring and summer. Appin, *Capt. Carmichael.* Larne, *Mr. D. Moore.* Clontarf, *Miss Ball* (!). Tor Abbey, *Mrs. Griffiths* (mixed with *Lyngbya Carmichaelii*, &c.)

Geogr. Distr. Shores of Northern Europe.

Descr. *Fronds* decumbent, several inches in length, forming widely spreading, entangled strata; each separate frond variously curled and twisted, and ordinarily of the diameter of human hair. Such fronds are usually quite simple, and formed of a double row of quadrate cells, filled with endochrome, with hyaline borders to each cell; thus the filament appears to be traversed by a colourless central line. Mixed with these characteristic threads are others of twice or four times the diameter, formed of a larger number of rows of cells; and these filaments, which have much the aspect of young plants of *E. compressa*, are frequently furnished with short, or long, simple branches, formed, like the ordinary threads, of a double row of cells. I have not been able (in dried specimens) to find any cavity traversing the filament, as is usual in the genus. The cells composing the filaments are nearly filled with green matter, leaving narrow borders. The colour is a brilliant grass-green, which is generally well preserved in drying; and the substance is membranaceous, and rather soft.

At Plate CCLXXXII. I have already given, under the name *E. Ralfsii*, a representation of an *Enteromorpha* communicated

to me by Mr. Ralfs as *E. percursa*, but which our friend Mr. Thwaites decided to belong to a different species. In the present figure I hope I have given the true plant, but not having had the advantage of examining any authentically-named specimens, I am obliged to trust to the general accordance of the specimens here figured with the description given by Carmichael. My figure is drawn from a specimen collected by Miss Ball some years ago at Clontarf, and now in Herb. T. C. D., and it sufficiently accords with such specimens as I have examined from other parts of the coast. If the threads were all of one diameter, and all built of a double row of cells, there could be no difficulty in ascertaining the identity of the species; but unfortunately this is far from being the case in any specimen I have seen. The character by which *E. Ralfsii* differs is, the large size of the cells and the minuteness of the grain of endochrome in each. This, in the specimens seen, is very obvious. How far it may be of specific importance I cannot say.

Fig. 1. ENTEROMORPHA PERCURSA:—*the natural size.* 2. Portions of filaments of various sizes:—*highly magnified.*

Plate CCCLIII.

CLADOPHORA FLEXUOSA, *Griff.*

Gen. Char. *Filaments* green, attached, uniform, branched, composed of a single series of cells or articulations. *Fruit*, aggregated granules or zoospores, contained in the articulations, having, at some period, a proper ciliary motion. Cladophora (*Kütz.*),—from κλαδος, a *branch*, and φορεω, to *bear*.

Cladophora *flexuosa*; filaments capillary, flexuous or angularly bent, pale green, much branched, the branches of unequal length and (comparatively) but little divided, set with curved secondary or tertiary branches, which are pectinated with secund, short, simple, spreading ramuli; articulations of the branches thrice or four times, of the ramuli twice as long as broad.

Cladophora flexuosa, *Griff.! in Wyatt, Alg. Danm.* no. 227. *Harv. Man.* ed. 2. p. 202 (in part; the synonyms of Dillwyn and Eng. Bot., there quoted, being doubtful.)

Cladophora sirocladia, β gracilis, *Kütz. Sp. Alg.* p. 392.

Hab. In rock-pools, between tide-marks, attached to other Algæ. Torquay, *Mrs. Griffiths.* (Other recorded stations require re-examination and verification.)

Geogr. Distr. (Doubtful.)

Descr. *Filaments* capillary, three to six inches long, tufted, much branched, but not so densely bushy as several allied species, the principal branches angularly bent, and the secondary and tertiary branches, which are long and of unequal lengths, bent from side to side in an undulating manner. From the projecting angles of the bent branches, at either side, spring other lesser laterals, which are usually simple, and either naked, or more commonly pectinated along one side with several short ramuli, each of four or five articulations. These ramuli on some specimens are found lengthening out into branches, and again bearing ramuli. All the divisions are curved. The articulations in the stem are from three to four times as long as broad, not contracted at the joints; those of the ramuli are gradually shorter, and very little contracted, expanding nearly to their full shape when moistened after having been dried. The colour is a pleasant green, tolerably retained in drying. The substance is membranaceous, and the plant adheres to paper.

Not being in possession of any authentic specimen of the *Conferva flexuosa* of Dillwyn, on which the present species is supposed to be founded; and, also, having good reason to doubt

the identity of the plant here figured with that figured by Dillwyn, I think it best to abstain quoting any synonym or habitat which I have not recently verified. My figure and description therefore have reference alone to the specimens published by Mrs. Griffiths in Wyatt's 'Algæ Danmonienses,' and to such as agree with them in character. I am not very sanguine of the validity of this species, and, notwithstanding some differences in minor characters, would place it near *C. glaucescens*, to which it is closely related. The general aspect is not unlike that species, and the articulations are of about the same length; but here the stem and branches are more flexuous, the ramuli shorter in proportion, and the dissepiments are less contracted. I am not disposed to place much reliance on any of these characters.

Meanwhile, as the plant has been published in a work of such celebrity as the 'Algæ Danmonienses,' it is right that it should have a place in our volumes.

Fig. 1. Cladophora flexuosa :—*the natural size.* 2. Portion of a filament :—*magnified.* 3. Small portion of the same :—*more highly magnified.*

A

B

Plate CCCLIV. *A.*

CONFERVA ARENICOLA, *Berk.*

Gen. Char. *Filaments* green, attached or floating, unbranched, composed of a single series of cells or articulations. *Fruit,* aggregated granules or zoospores, contained in the articulations, and having, at some period, a proper ciliary motion. Conferva (*Plin.*),—from *conferruminare,* to *consolidate*; because some of the species were used by the ancients for binding up fractured limbs.

Conferva *arenicola*; "threads soft, simple, extremely fine, matted, somewhat crisped, at first uniform pale green, at length distinctly jointed; articulations once and half as long as broad, dotted; interstices pellucid."—*Berk.*

Conferva arenicola, *Berk. Gl. Br. Alg.* p. 36. t. 13. f. 3. *Harv. Man.* ed. 1. p. 128. ed. 2. p. 207.

Hab. Salt marshes, within reach of the tide, *Rev. M. J. Berkeley.*

Descr. "Creeping on the sandy margins of pools in a salt marsh periodically flooded, forming a thin, soft, delicate, crisped web of a pale yellow-green. *Threads* extremely slender, flexuous, at first self-coloured with a few scattered dots, then with manifest dissepiments, and finally the granules contract and form a distinctly defined mass of a darker green in the centre, with pellucid interstices. Articulations $1\frac{1}{2}$ as long as broad. When dry the articulations are alternately contracted."—*Berk. l. c.*

I am indebted to Mr. Berkeley, from whose 'Gleanings' I copy the above account, for a loan of the original specimen from which his description was prepared. This I have used in preparing the magnified portion of the figure. Except in colour, this plant bears a close resemblance to *C. implexa.* I am not aware that it has been noticed more than once.

A. Fig. 1. Web of Conferva arenicola, as presented to the naked eye.
2. Filaments from the same:—*highly magnified.*

PLATE CCCLIV. *B.*

RHIZOCLONIUM CASPARYI, n. sp.

(For GEN. CHAR. see Plate CCXXXVIII.)

RHIZOCLONIUM *Casparyi*; filaments elongated, extremely slender, decumbent, pale yellow-green, stratified, interwoven, curved and here and there angularly bent; at the angles emitting short root-like branches, which sometimes lengthen, and are filled with endochrome; articulations 2–6 times longer than broad, with narrow dissepiments and granular endochrome.

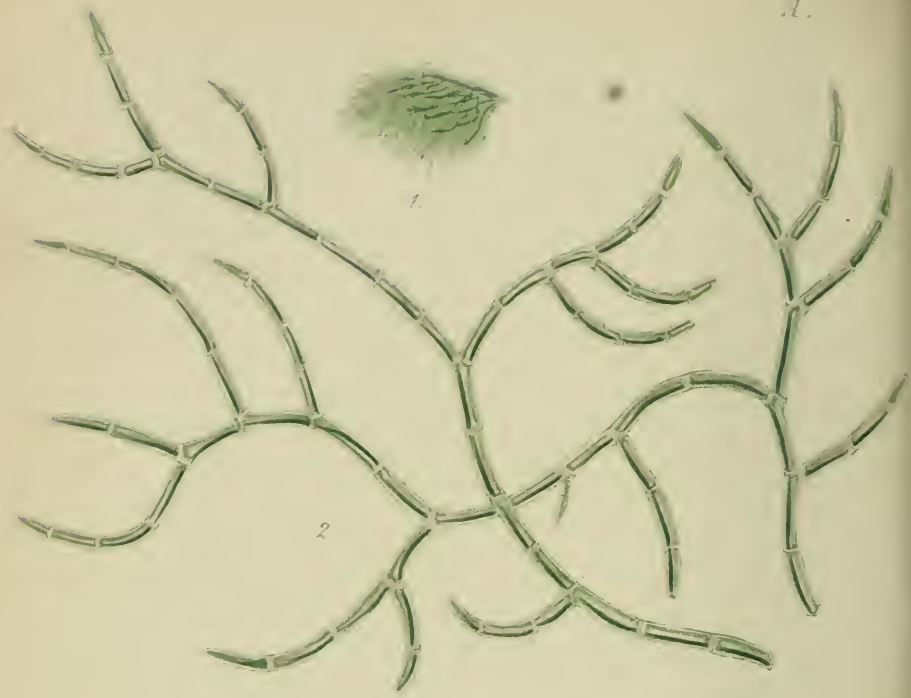
HAB. At Falmouth and Penzance, *Dr. Robt. Caspary.*

DESCR. Forming a thin web of a bright green colour and considerable extent. *Filaments* elongate, more slender than those of *R. riparium*, gracefully curved rather than twisted, interwoven, here and there angularly bent. At the angle issues a root-like process, which sometimes consists but of a few empty cells; at other times lengthens out into a branch. *Cells* in the same fleece very various, and even in the same filament at different ages: the full-grown cell seems to be fully six times as long as its diameter; but short cells once and a half to twice as long as broad, which seem to be cells in process of development are commonly mixed with the long cells. All contain a granular endochrome, the grains of very unequal size.

Having a half plate to spare, I take the opportunity of figuring a *Rhizoclonium*, sent to me some months ago by Dr. Caspary, and found by him near Penzance and Falmouth. It has more slender filaments than the ordinary *R. riparium*, and occasionally appears with longer joints. But the joints vary extremely in different threads, and even in the same thread, so that I find it difficult to fix any satisfactory character by which it can be known from *R. riparium*, in the absence of ascertained specimens of that plant. The root-like branches are sometimes much more developed than is shown in the figure, which was made from less mature specimens than I afterwards received.

B. Fig. 1. Web of RHIZOCLONIUM CASPARYI, as it appears to the naked eye. 2. Filaments from the same:—*magnified.* 3, 4. Portions of different filaments, in one of which the cells have divided, in the other attained their full size.

A.



B.

Plate CCCLV. *A*.

CLADOPHORA MAGDALENÆ, n. sp.

Gen. Char. *Filaments* green, attached, uniform, branched, composed of a single series of cells or articulations. *Fruit*, aggregated granules or zoospores, contained in the articulations, having, at some period, a proper ciliary motion. Cladophora (*Kütz.*),—from κλαδος, a *branch*, and φορεω, to *bear*.

Cladophora *Magdalenæ*; filaments capillary, blackish-green, short, decumbent (?), matted together, slightly branched, irregularly bent; branches patent or divaricate, curved, dichotomous or secund, with wide axils; ramuli few, spreading, falcate, as thick as the cells from which they spring; articulations thrice or four times as long as broad, filled with very dense opake endochrome; dissepiments very narrow, not contracted.

Hab. At Jersey, *Miss Magdalene Turner*.

Descr. *Filaments*, in the only specimen examined, about an inch long, matted together, but not tufted, apparently growing either prostrate or entangled among the bases of other Algæ, not much branched. *Branches* irregularly dichotomous, or angularly alternate, spreading with wide angles, often divaricate, curved, simple or once or twice divided; naked, or furnished with a few secund, falcate ramuli. *Articulations* thrice or four times as long as broad, those of the ramuli the shortest, filled with a very dense, dark green, minutely granulated endochrome (resembling that of *C. rupestris*); the dissepiments very narrow and scarcely at all contracted. The apices obtuse. *Substance* somewhat rigid, not adhering to paper in drying. *Colour* a dark, dingy-green.

Not knowing to what described species to refer the apparently distinct little plant here figured, I give it a provisional name. Unlike as it is in ramification and general aspect to *C. rupestris*, the cells under the microscope strongly resemble those of that species; yet I can hardly think it next of kin to that straight-growing plant, and perhaps *C. fracta* is more nearly related.

Had it been more certainly characterized or more pleasing to the eye, I should have felt a greater pleasure in naming it from its discoverer, to whom this work is indebted for many interesting additions, and for a large proportion of whatever information it affords on the Algæ of Jersey.

A. Fig. 1. Cladophora exilis:—*the natural size*. 2. Portion of filaments:—*magnified*.

PLATE CCCLV. *B.*

CLADOPHORA GATTYÆ, n. sp.

CLADOPHORA *Gattyæ*; filaments an inch long, dingy-green, capillary, matted together in dense tufts, not much branched, dichotomously divided, flexuous, with few ramuli; articulations in all parts of the frond nearly uniform, about once and half as long as broad, filled with endochrome; the dissepiments very narrow, contracted.

HAB. On rocks (?) near low-water mark. Locality uncertain, *Mrs. Gatty.*

DESCR. *Filaments* about an inch long, as thick as human hair, or somewhat thicker, matted together in dense ropy tufts, irregularly branched, somewhat dichotomous, the angles rounded; ramuli few and patent. *Articulations* very uniform, about once and half as long as broad; filled with olivaceous (?) or dull green endochrome, and separated by exceedingly narrow dissepiments. *Apices* on my specimen often broken. *Substance* membranaceous, adhering to paper.

A puzzle, figured with the hope that it may lead to more certain information. The external habit is between that of *C. uncialis* and *Ectocarpus littoralis*, but the threads are very much more robust than in the former; and differently branched from the latter, as well as more robust. The plant is, however, much battered and water-worn, having most of its upper branches and ramuli broken off:—and I am not prepared to say whether it be not some species in a dilapidated condition, whose proper character is thus concealed, or as it were shown in caricature.

B. Fig. 1. CLADOPHORA INAMŒNA:—*the natural size.* 2. Filaments:—*magnified.* 3. Small portion of the same:—*more highly magnified.*

Plate CCCLVI.

CLADOPHORA BALLIANA, *Harv.*, n. sp.

Gen. Char. *Filaments* green, attached, uniform, branched, composed of a single series of cells or articulations. *Fruit*, aggregated granules or zoospores, contained in the articulations, having, at some period, a proper ciliary motion. Cladophora (*Kütz.*),—from κλαδος, a *branch*, and φορεω, to *bear*.

Cladophora *Balliana*; filaments elongate, extremely slender, soft, grass-green, much branched; the branches excessively divided, the penultimate ones virgate, and set with slender, secund, one- or two-jointed ramuli; articulations of the branches eight or ten times as long as broad, of the ramuli six to eight times, all filled with dense, granular endochrome; dissepiments broad and hyaline.

Hab. Sea-shores. At Clontarf, *Miss Ball* (May 16, 1843).

Geogr. Distr. —— ?

Descr. *Filaments* finer than human hair, from six to eight or ten inches long, tufted and much branched, the branching repeatedly alternate, but irregular and difficult to trace; with a more or less evident leading stem. Lesser branches one or two inches long, somewhat virgate, undivided, set with other minor branches, which again bear numerous short, pectinate ramuli, generally along their inner faces. These ramuli are much more slender than the joint from which they spring, and usually consist of but two cells, but occasionally lengthen out into several. The branches and lesser divisions taper, at the extremity, into a slender point. The endochrome filling the cells is remarkably dense, granular, and in great measure recovers its form on remoistening after the plant has been dried; and is of a full grass-green. The length of the cells in the principal divisions is from eight to ten times their diameter, or perhaps more; in the ramuli the cells are shorter. The border of the tube and the dissepiments are both very wide in proportion to the part occupied by endochrome. The substance is soft and tender, and the plant closely adheres to paper in drying.

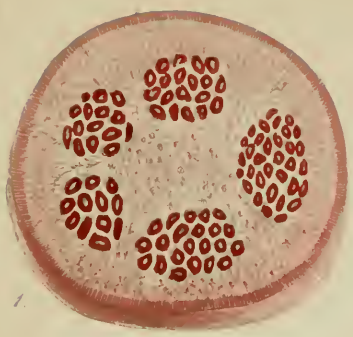
I am glad, in closing the 'Phycologia,' to have an opportunity of paying a grateful tribute to the fair discoverer of the present beautiful species, from whom I have, during the course of this publication, received much assistance—in supplies of specimens, &c.—and to whose acute eye the Irish Flora is indebted for the addition of many interesting species. *Cladophora Balliana*, not the least beautiful of these, is readily known from all its British

congeners but one, by the tenuity and lubricity of the filament, in conjunction with the great length of the cells. The only species with which it can be confounded is *C. Rudolphiana*, but the ramification is so different in that plant, that, notwithstanding a near agreement in the length of the articulations and the general aspect of the tufts, there can be little difficulty in distinguishing one from the other.

As yet I have only seen the specimens collected by Miss Ball, so long ago as 1843. As I have been in no haste to publish it as a novelty, I hope it may stand permanently as a good species.

Fig. 1. Cladophora Balliana :—*the natural size.* 2. Portion of a filament : —*magnified.* 3. Branchlet, and 4, part of the same :—*less and more highly magnified.*

A



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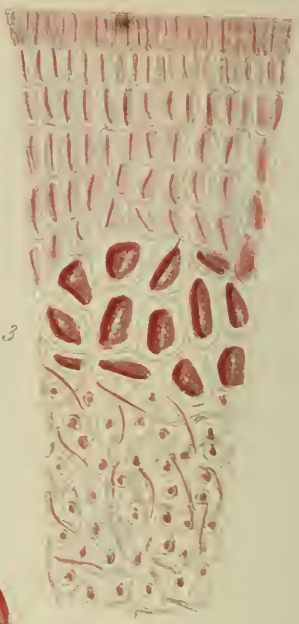
2



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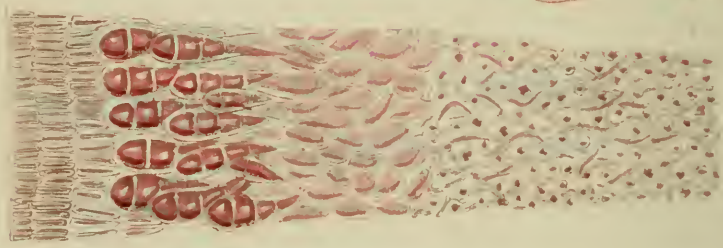

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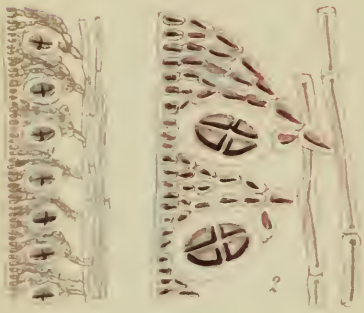
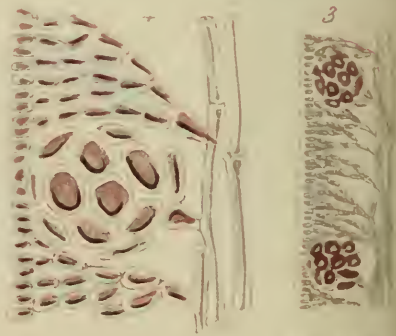
B



1. 2



3

Plate CCCLVII. *A.*

FURCELLARIA FASTIGIATA, *Lamour.*

(For description, &c., see Plate XCIV.)

My remarks appended to Pl. XCIV. had scarcely been made public when I received from Mrs. Griffiths specimens of *F. fastigiata* in both kinds of fruit, which I regret had not reached my hands in time to withhold both that plate, of which the analytic figures 3 and 4 are incorrect, and the remarks appended to it, so far as they refer to the fructification.

Dr. Caspary has given, in the Annals of Natural History (Second Series, vol. vi. p. 87), a minute account of the comparative structure of *Furcellaria* and *Polyides*, with micrometric measurements of the cells composing the various strata of their fronds; but it is due to Mrs. Griffiths to state that she has long been perfectly well acquainted with the fructification of *Furcellaria*, figures of which I now give in detail.

Fig. 1 represents a cross section of one of the pod-like branches, of which fig. 2 is a longitudinal cutting. Fig. 1 shows five *favellæ* formed from the large cells immediately in contact with the fibro-cellular axis. In fig. 2, two of these favellæ are shown, prolonged by several superimposed favellæ having become confluent, as is almost always the case in fully ripe specimens. Fig. 3 is a small transverse slice, to show the cells more highly magnified; fig. 4 represents some spores separated. Fig. 5 is a transverse segment of a frond producing *tetraspores*, which are formed in several rows (according to age) from the cells of the middle stratum most distant from the axis. These *tetraspores* (fig. 6) are pear-shaped and transversely zoned.

I am indebted to Mrs. Griffiths for numerous and beautiful specimens of both kinds of fruit in the most perfect state.

PLATE CCCLVII. *B.*

DUMONTIA FILIFORMIS, *Grev.*

(See description under PLATE LIX.)

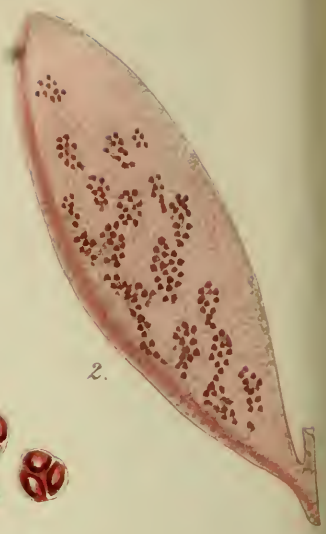
The analysis in Pl. LIX. fig. 2 and 3, and the generic character, are both faulty. It is hoped that the figures now given will show the proper structure of the walls of the frond, and the position of the fructification; and the following emended generic character is offered:—

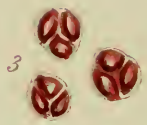
GEN. CHAR. *Frond* tubular; the tube at first occupied by a lax network of longitudinal, anastomosing filaments; at length distended and empty. Walls composed of longitudinal, anastomosing filaments, emitting toward the circumference dichotomous, moniliform branches, which form a middle stratum; cortical stratum composed of a single layer of small cells. *Favellæ* roundish, formed by a metamorphosis of the dichotomous branches. *Tetraspores* dispersed, cruciate, with wide limbs, sunk beneath the cortical stratum, formed of one of the cells of the dichotomous branchlet.

From this it will be seen that *Dumontia* has nearly the same structure as *Catenella*, omitting the constricted branches. The statement made under Pl. LIX. that I had seen no tetraspores of this common plant, has brought me specimens from several kind correspondents, to whom my thanks are due. At the same time (to my shame be it spoken) I find, on examining some old specimens collected in 1832, that I ought to have made no such statement, and further, that the *tetraspores* of this Alga are very common. It sometimes happens that botanists are less acquainted with the structure of very common than of rarer plants, and in this instance I have to plead guilty to a careless want of observation.

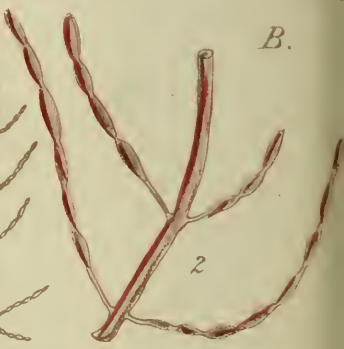
B. Fig. 1. Vertical slice of the wall of DUMONTIA FILIFORMIS, with *tetraspores*. 2. Small portion of the same. 3. Vertical slice of a specimen with *favellæ*. 4. Small portion of the same:—all the figures *more or less highly magnified*.

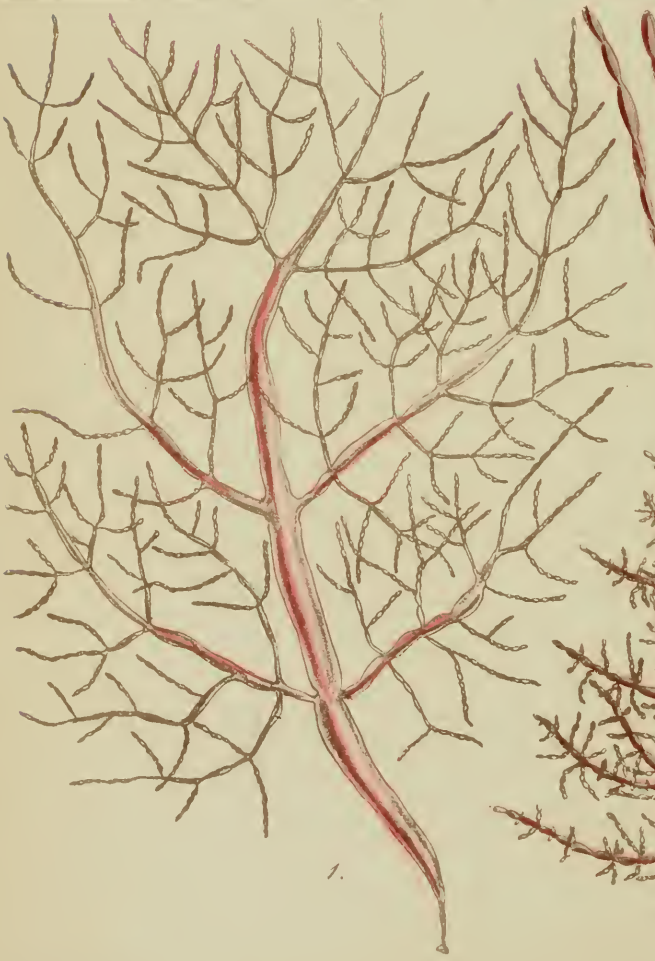
A.





B.





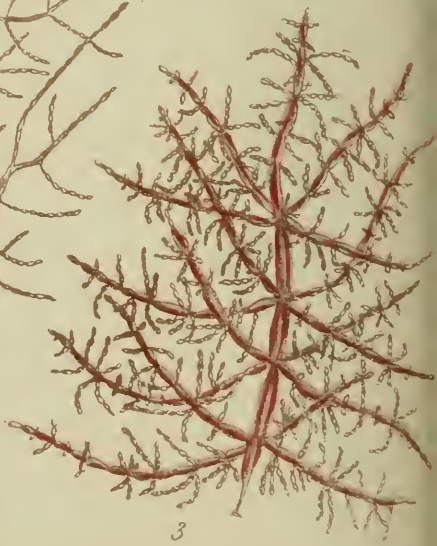


Plate CCCLVIII. *A.*

CHRYSYMENIA ROSEA, *Harv.*

(For description see Plate CCCI.)

I have nothing to add to the account already given of this plant under the above-quoted figure, but merely redeem my pledge by figuring one of Mrs. Gatty's Filey specimens, to contrast with the figure of the Orkney plant already given. The Filey specimen is taller, narrower in proportion, with better developed pinnæ, and is in fruit. Though narrow, in comparison to the Orkney variety, it is greatly broader than any form of *C. clavellosa* with which I am acquainted; but I have been assured by Dr. Walker Arnott that a drawing exists in the late Mr. Brodie's Herbarium, which Dr. Arnott considers identical with my *C. rosea*. I possess specimens of *C. clavellosa*, var. *sedifolia*, of Mr. Brodie's gathering, but they are very unlike the plant here figured.

A. Fig. 1. Chrysymenia rosea:—*the natural size.* 2. A ramulus with *tetraspores*:—*magnified.* 3. Tetraspores:—*highly magnified.*

PLATE CCCLVIII. *B.*

CHYLOCLADIA KALIFORMIS, *vars. β & γ.*

(For description, &c., see PLATE CXLV.)

Under Pl. CXLV. I have characterized what I consider to be two varieties of *C. kaliformis*, but which continental correspondents have sent me as distinct species. The former, our var. *β, patens*, being the *Ch. patens*, Kütz., and the latter, *γ, squarrosa*, the *Ch. squarrosa* of the same author. As there was not room to represent these forms on Pl. CXLV., I avail myself of the present opportunity to figure them. The specimens here drawn are Irish, fig. 1 being from Carrickfergus, and fig. 3 from Roundstone; both collected by the late Mr. M'Calla.

B. Fig. 1. CHYLOCLADIA KALIFORMIS, β patens:—*the natural size.* 2. Ramuli:—*magnified.* 3. Ch. kaliformis, γ squarrosa:—*the natural size.*

1.

2.

3.

4.

Plate CCCLIX.

ZONARIA COLLARIS, *Ag.*

Gen. Char. *Root* coated with woolly fibres. *Frond* flat, ribless, fan-shaped, entire or variously cleft, marked with concentric lines; the cells of the surface radiating. *Margin* fringed. *Fructification*, roundish or irregular, scattered *sori*, bursting through the cuticle of both surfaces of the frond, consisting, at maturity, of numerous *spores* nestling among jointed threads. Zonaria (*Ag.*),—from ζωνη, a *girdle* or *zone*.

Zonaria *collaris*; "frond procumbent, coriaceous, orbicular, or cuneate and variously lobed, from its upper surface emitting cup-shaped, membranaceous fronds; the under surface rooting, densely stupose." *J. Ag.*

Zonaria collaris, *Ag. Sp. Alg.* vol. i. p. 127. *Ag. Syst.* p. 264. *J. Ag. Alg. Medit.* p. 38. *Endl. 3rd Suppl.* p. 25. *Kütz. Sp. Alg.* 565.

Padina collaris, *Grev. Syn.* part xliv. *Menegh. Ital.* p. 245. *Mont. Alger.* p. 33.

Padina omphalodes, *Mont. Crypt. Alger.* p. 15. No. 168.

Zanardinia prototypus, *Nardo. (fide Meneg., &c.)*

Hab. (Washed ashore.) Granville Bay, Jersey (May 1851). *Miss Turner*. (Very rare.)

Geogr. Distr. Mediterranean and Adriatic Seas. West Indian Sea.

Descr. "The primary frond, when mature, is coriaceous in colour and substance, widely spreading, furnished with a dense woolly coating on its lower surface, by which it strongly adheres to rocks; the upper surface is smooth, and variously plaited longitudinally; but by the action of the waves and of animalcules is mostly very much torn and lobed. From the upper surface of this primary frond rise cup-shaped secondary fronds, fixed by a very short stipes, in the dried plant resembling an umbilicus, and with the limb fringed with filaments. The youngest of these secondary fronds are smaller than peas; the full-grown about the height of the cup-shaped fronds of *Himanthalia*; all are delicately membranaceous, entire, and easily torn. The fringe of hairs that crowns the frond is formed of the free apices of the longitudinal strings of cells of the frond. Fruit unknown." *J. Ag.*

This most interesting addition to the Channel *Nereis*, was recently found on the shores of Jersey, by Miss Turner, to whom I am indebted for the specimens here figured, and which I rejoice to be able to include in the present work. They were "quite fresh," Miss Turner informs me, "when picked up;

lying among other Algæ on the sand in Granville Bay; they had a saucer-like shape, which they have lost in pressing." They consist merely of the secondary fronds, accidentally torn from the firmly attached primaries, which may possibly be reached by dredging on the coast. I have compared them with specimens of the Mediterranean plant received from J. Agardh, and the agreement is very perfect. There can, therefore, be no doubt of the indentity of the species.

Never having seen the primary frond, I give the specific character and description nearly in the words of Agardh; and our upper figure (fig. 1) is an attempted restoration of the flattened specimen, more faithfully represented at fig. 2.

Fig. 1. Zonaria collaris:—*the natural size.* 2. One of the fronds of the same opened out:—*the natural size.* 3. Apex of frond, with its fringe. 4. Filaments from the fringe:—*both magnified.*


3.
1

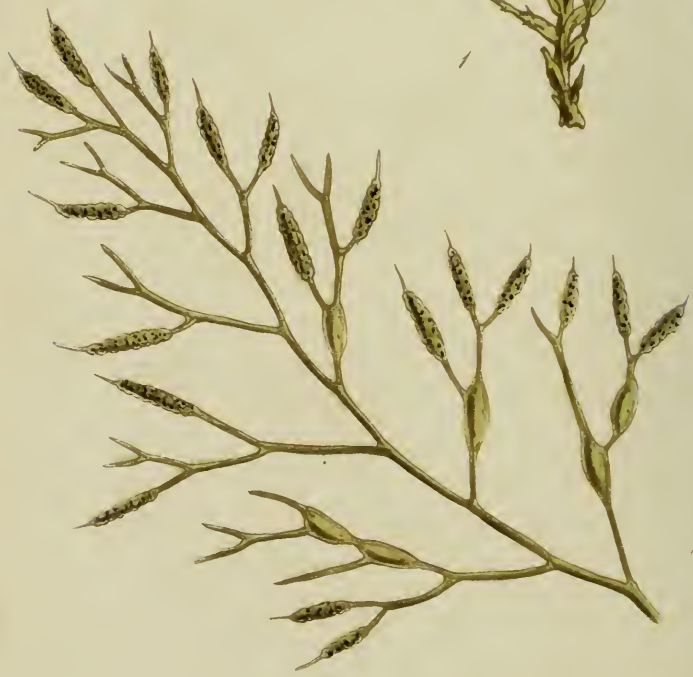

2.

Plate CCCLX.

CYSTOSEIRA BARBATA, *Ag.*

Gen. Char. *Frond* much branched, occasionally leafy at the base; *branches* becoming more slender upwards, and containing strings of simple air-vessels within their substance. *Receptacles* terminal, small, cellular, pierced by numerous pores, which communicate with immersed, spherical *conceptacles*, containing parietal *spores*, and tufted *antheridia*. Cystoseira (*Ag.*),—from κυστις, a *bladder*, and σειρα, a *chain*; because the air-vessels are often arranged in strings.

Cystoseira *barbata*; stem cylindrical, covered with small, elliptical knobs, each of which bears a very slender, many times dichotomo-pinnated, filiform branch; air-vessels lanceolate, one or two together; receptacles small, elliptic-oblong, mucronate.

Cystoseira barbata, *Ag. Sp. Alg.* vol. i. p. 57; *Syst.* p. 283. *Grev. Alg. Brit.* p. 6. *Hook. Br. Fl.* vol. ii. p. 265. *Harv. Man.* ed. 1. p. 18; ed. 2. p. 17. *J. Ag. Sp. Alg.* vol. i. p. 223.

Fucus barbatus, *Good. et Woodw. Linn. Trans.* vol. iii. p. 128. *Turn. Syn.* p. 80; *Hist.* t. 250. *Sm. E. Bot.* t. 2170. *Stack. Ner. Brit.* p. 83. t. 14.

Fucus fœniculaceus, *Gm. Hist.* t. 2 A. f. 2 (!). *Huds. Fl. Ang.* p. 575.

Hab. Rocks between tide-marks. Said to have been gathered by Hudson in Devonshire; but has not been recently found.

Geogr. Distr. In the Mediterranean, Adriatic, and Black Seas. Brest, fide *Lenormand.*

Descr. *Stem* about as thick as a swan's quill, simple or branched, truncate, densely clothed with lateral branches. *Branches* rising from slightly incrassated bases, filiform, very slender, unarmed, decompound, repeatedly pinnate, the lesser divisions dichotomous. *Vesicles*, when present, numerous, elongate, cllipsoidal or lanceolate, two or more together forming a chain in the branch. *Receptacles* terminating the dichotomous ramuli linear, of small size, 1–2 lines long, or rarely 3–4 lines, tuberculated, unarmed, or rarely with one or two spine-like processes, mucronate; the mucro subulate. *Colour* brownish-olive, becoming very dark in drying.

The figure here given has been prepared chiefly from a specimen collected at Catania in Sicily, and given me, many years ago, by Professor Gussone. I have seen no British specimen, nor am I aware that any authentic evidence is on record of the finding of this plant on the British coast, although it is mentioned

as an undoubted native of Devonshire by Hudson, Stackhouse, and other early writers on these plants. Hudson says of it, "in Devonia *passim*," and Stackhouse gives "Devonshire and S.W. coast" as the station, but adds, "This species is rare, and has occasioned mistakes among our English botanists, who, after the example of Gmelin, have given it the trivial name of *F. fœniculaceus*, which appears, by the Linnæan herbarium, to be a very different species," &c. Both these authors quote Gmelin's figure, which, Turner observes, "is so characteristic" of his *F. barbatus* "as to take away all doubts as to the species." The last-named author, however, adds, "How far *F. barbatus* is really entitled to a place in the British Flora I own I entertain much doubt. I never saw a specimen gathered on our shores; and in Devonshire, where Hudson is stated to have gathered it, I have been fortunate enough to enjoy the advantage of correspondents, who would have been little likely to have left it unnoticed." This was written upwards of thirty years ago, since which time no part of England has been more zealously or more successfully explored (as these volumes bear ample evidence) than the coasts of Devonshire and Cornwall, but no one has met with a scrap of this plant; wherefore I fear it is but too evident that it has no claim to a place in this work.

Fig. 1. CYSTOSEIRA BARBATA; branch:—*the natural size.* 2. Dichotomous ramulus:—*magnified.* 3. A receptacle and air-vessel:—rather more *magnified.*

ALPHABETICAL INDEX

TO

VOL. III.

(*The synonymes are printed in Italics.*)