

THE  
ENGLISH FLORA

OF

SIR JAMES EDWARD SMITH.

CLASS XXIV. CRYPTOGRAMIA, ✓

BY

WILLIAM JACKSON HOOKER, LL.D. F.R.A. & L.S.

MEMBER OF THE ACADEMIES OF  
LUND, MOSCOW, PHILADELPHIA, NEW YORK, BOSTON, ETC.,  
OF THE IMPERIAL ACAD. NATURÆ CURIOSORUM,  
HONORARY MEMBER OF THE ROYAL IRISH ACADEMY,

AND

REGIUS PROFESSOR OF BOTANY IN THE UNIVERSITY OF GLASGOW.

VOL. V.

(OR VOL. II. OF DR. HOOKER'S BRITISH FLORA.)

PART I.

COMPRISING THE

MOSESSES, HEPATICÆ, LICHENS, CHARACEÆ AND ALGÆ.

1833.

LONDON:

LONGMAN, REES, ORME, BROWN, GREEN, & LONGMAN.

MDCCCXXXIII.



Diatomaceae

Greville IN:- W. J. HOOKER,  
The English Flora of Sir  
James Edward Smith.

Class XXIV Cryptogamia.

Vol. V, Part I,

Div. IV Diatomaceae

This Part I of Vol. V has  
X + 432 p.

Of diatom interest only pages  
V-X and 401-415.

## PREFACE.

---

THAT the learned and estimable author of the preceding volumes of the *English Flora*, had it in his expectation, as well as in his contemplation, himself to bring his work to a conclusion, is a point too much in accordance with the general principles of human nature for any one to entertain a doubt upon the subject. The awful memento of our great moral poet, that "all men think all men mortal but themselves," is daily exemplified before the eyes of every one of us; but seldom more forcibly illustrated by the examples of any men, than of those engaged in literary labours; and, among these, it would be difficult to find a more striking instance of the wide difference between human intentions and performances, than in the case of my excellent friend, in reference to the present work. He was arrested by the hand of death, as his amiable and affectionate biographer has told us, on the very day he received from his printer the last sheet of the IVth Volume, in completing which, he had finished his portion of the task that had been particularly the object of his studies throughout life, and regarding which, it may most justly be said, that he was not only eminently qualified to perform it, but even more so than any other living Botanist. What lay before him was of a very different character: it consisted of tribes of plants, minute, ill understood, full of difficulties, and, in many instances, more perplexed than elucidated by the labours of his predecessors. Yet still, as I have observed, it was his intention to complete his task; and, what is little known, the very last note from his pen, connected with any scientific subject, was a declaration of this intention. "All these subjects," he says, in allu-

## P R E F A C E.

---

THAT the learned and estimable author of the preceding volumes of the *English Flora*, had it in his expectation, as well as in his contemplation, himself to bring his work to a conclusion, is a point too much in accordance with the general principles of human nature for any one to entertain a doubt upon the subject. The awful memento of our great moral poet, that "all men think all men mortal but themselves," is daily exemplified before the eyes of every one of us; but seldom more forcibly illustrated by the examples of any men, than of those engaged in literary labours; and, among these, it would be difficult to find a more striking instance of the wide difference between human intentions and performances, than in the case of my excellent friend, in reference to the present work. He was arrested by the hand of death, as his amiable and affectionate biographer has told us, on the very day he received from his printer the last sheet of the IVth Volume, in completing which, he had finished his portion of the task that had been particularly the object of his studies throughout life, and regarding which, it may most justly be said, that he was not only eminently qualified to perform it, but even more so than any other living Botanist. What lay before him was of a very different character: it consisted of tribes of plants, minute, ill understood, full of difficulties, and, in many instances, more perplexed than elucidated by the labours of his predecessors. Yet still, as I have observed, it was his intention to complete his task; and, what is little known, the very last note from his pen, connected with any scientific subject, was a declaration of this intention. "All these subjects," he says, in allu-

sion to the different Orders of the Class CRYPTOGRAMIA, "if not yet brought into perfect daylight, might well, by the help of those brilliant northern lights, Acharius, Fries, and Agardh, have been made more accessible to the student, and more instructive to systematic botanists, by one long accustomed to their contemplation in the wild scenes of nature, and not unfurnished with remarks of his own. If our bodily powers could keep pace with our mental acquirements, the student of half a century would not shrink from the delightful task of being still a teacher; nor does he resign the hope of affording some future assistance to his fellow-labourers, though for the present, 'a change of study,' to use the expression of a great French writer, 'may be necessary by way of relaxation and repose.'"

Neither relaxation nor repose, however, was sufficient to restore the bodily powers of Sir James Smith: exhausted by long suffering, they sank under the pressure of disease; and the task of completing our national Flora is left to another, who, whatever his talents and knowledge, can never look upon the portion finished by the original author, without the sentiment that it is impossible for the succeeding part to be made equal to it. The very nature of the subject would preclude such a hope; and he would be a bold man, who would venture to entertain the expectation that he could rival a performance which has justly obtained the highest encomiums from the most eminent Botanists of Europe, and which will not fail to be prized, so long as accurate description, conveyed in language singularly elegant and agreeable, shall continue to be estimated as it deserves.

Fully impressed with this conviction, I have, nevertheless, in compliance with the wish of the Publishers, undertaken the task; in doing which, I earnestly hope, that my labours will be regarded with the indulgence I know they require, and that those who detect my errors, will have the kindness and the candour to acquaint me with them; for thus only can we hope to obtain a perfect knowledge of these families of the vegetable kingdom, which, from their minute size, are too apt to be regarded as repulsive, instead of attractive, and which, from that same circumstance, necessarily require unusual pains to detect and to discriminate them. These difficulties are, indeed, in some measure, removed by the valuable helps afforded in the

illustrated works of Turner, Dillwyn, Sowerby, and Greville; and not less by an extensive correspondence, and by the kind assistance of my friends, in those tribes which have been hitherto less an object of study with me than others. The obligations I lie under to those friends, are invariably mentioned in the respective pages which owe so much to them; but it behoves me here, in an especial manner, to express my grateful acknowledgments to Mrs. Griffiths, and to Messrs. Borrer, Greville, Arnott, Wilson, and Harvey. The papers of the late Capt. Carmichael have also been an invaluable help to me.

The present Part, or half Volume, is confined to the Orders *Musci*, *Hepaticæ*, *Lichenes*, *Characeæ*, and *Algæ*. Another Part, containing the second portion of the Volume, will embrace the only remaining Order, the *Fungi*, and will be published with all the speed consistent with careful execution. The *Fungi*, as is known by every Botanist, constitute an order of immense extent, and one, which, notwithstanding all that has been done by Withering, Sowerby, Purton, Carmichael, and Dr. Greville, must yet be acknowledged as the least understood of all our British Flora. The labour attending the study of these is much increased by their perishable nature, and by the difficulty, almost amounting to an impossibility, of preserving specimens; so that, in many instances, if they are not carefully examined, and described or drawn on the spot, it is in vain to attempt to remedy the deficiency from the contents of an Herbarium.

Thus much I have a satisfaction in saying, that the Rev. M. J. Berkeley of Margate, (author of *Gleanings of the British Algæ*,) has kindly undertaken to prepare the descriptions of the Agarics and some allied Genera; and to Mr. Purton, who has so well illustrated the *Fungi* in his *Flora of the Midland Counties*, I am indebted for copious MS. notes, on all the species that have come under his observation. Still, in so extensive and intricate a field, I shall greatly need the indulgence of my fellow-students; and I entreat their assistance, in communicating their remarks, as well as specimens and drawings of the rarer kinds, or of new and dubious ones, from every part of the kingdom, particularly from the south of England, which, I have reason to believe, has been but little explored in this department, and which yet, from its climate, bids fair to be very productive.

No apology, I trust, will be deemed necessary for not here giving such enlarged descriptions, and such full synonymy and habitats, as are contained in the earlier volumes of the English Flora. Such a plan would, indeed, have been desirable; and it is impossible to say how much it is to be wished, for the sake of complete their *Lichenographia Britannica*, begun upon this principle; but it is obvious, that had such a plan been adopted, in the present instance, instead of the whole of the Class Cryptogamia, (excepting the Ferns,) being comprised in the 2 parts of a single volume, 5 volumes would scarcely have proved sufficient for it. A larger page, and smaller type, and all possible brevity consistent with clearness, have been employed to bring these plants into as small a compass as possible; many stations, and references to excellent local Floras, have, consequently, been omitted, but none, it is hoped (at least not designedly), that are necessary for the illustration of the species.

W. J. HOOKER.

February 1st, 1833.

ADDENDA ET CORRIGENDA.

Page 80, n. 9, *Didymodon crispulus*, add—Wils. in *E. Bot. Suppl. t. 2734*.

30, n. 10, *Didymodon brachydontius*, add—Wils. in *E. Bot. Suppl. t. 2735*.

35, line 25, for "mitriform," read *dimidiata*.

47, line 31, for "sharp," read *short*.

58, before *Bryum julaceum*, insert

*B. squarrosum*, Hedw. (*squarrose Thread-Moss*); stems loosely branched downy with roots, leaves ovate acute serrulate remarkably reflexed, nerve disappearing below the point, capsule oblong nearly erect unequal substrumose at the base. *Hedw. Sp. Musc. t. 44. f. 6—11*.—*Paludella squarrosa*, *Schwaegr. Suppl. v. 2. P. II. t. 161*.

On Knutsford Moor, Cheshire, in one spot only, and barren, discovered by *William Wilson, Esq.*, on the 16th of April, 1832, at the same time that he gathered abundantly *Hypnum Blandovii* and *Bryum affine*. It is to be hoped, that at some future season, Mr. Wilson will have the good fortune to detect fructification upon this most interesting addition to the British Muscologia.

Page 65, n. 25, *Bryum affine*, add—Wils. in *E. Bot. Suppl. t. 2739*.

73, line 10, from the bottom, for "*F. squarrosa*," read *F. squamosa*.

70, n. 13, *Hypnum trifarium*, add—*Craigallearch*, in *Breadalbane; J. D. Hooker*.

79, n. 14, *Hypnum stramineum*, add—in fruit near *Berwick-upon-Tweed, Dr. Johnston*.

82, before n. 23, *H. pulchellum*—insert

*H. demissum*, Wils. (*prostrate Feather-Moss*); stem prostrate with a few slender branches, leaves erect subunilateral elliptic-lanceolate acute nerveless entire the margin recurved, capsule elliptical cernuous, lid with a long beak. *Wils. in E. Bot. Suppl. t. 2740*.

From the woods of Cromaglou Mountain, near the upper lake of Killarney, Ireland, growing on the most inclined faces of detached rocks; August, 1829. It has since been observed near Bedgelert, in North Wales, *Mr. W. Wilson*.—"A distinct and very elegant little species, remarkable for its glossy slender habit and compact mode of growth."

Page 87, n. 41, erase *Hypnum laricinum*, which proves to be the same as *H. Blandovii*; but under the latter species the peculiar carination of the leaf has been omitted to be described.

Page 159, before n. 13, *E. sinopicum*—insert

*E. polystictum*, (*many-dotted Endocarpon*); scales minute tartareous very thin crowded angular even whitish upon a thick black continuous substratum, apothecia minute immersed at length slightly emerging flat-tish above, shell black throughout, pore obsolete.—*Verrucaria polysticta, Borr. in E. Bot. Suppl. t. 2741*.

Not uncommon on walls, whether of brick or flint, growing chiefly, but not exclusively, on the mortar. It occurs also occasionally on sandstone, and on large flints on the downs of Sussex, *Mr. Borrer*.—"So nearly is this allied to *E. fuscellum*, that it is now proposed as distinct with considerable hesitation. *E. fuscellum* is distinguished, however, not only by the thicker, pulvinate, variously tumid, and often deeply fissured thallus, but more essentially by the structure of its apothecia, which are much more minute, and have the brown solid nucleus enveloped, in the immersed portion, only in a thin pellicle of their own colour, and not inclosed in every part in a thick black shell." *Borr*.

Page 207, n. 2, *Collema microphyllum*, add—*E. Bot. Suppl. t. 2721*.

212, n. 25, *Collema dermatinum*, add—*E. Bot. Suppl. t. 2716. f. 2*.

221, *Roccella tinctoria*, add—*M. Robiquet* has separated the colouring matter of this vegetable. The new and singular product which he has obtained has a very sweet flavour, is easily soluble in water, colourless, crystallizes in beautiful flat quadrangular prisms;—by means of a moderate heat, it may be volatilized without decomposing, and does not acquire the colouring property till it has undergone successively the action of ammonia and of common air.—*Silliman's Journal*, v. 18.

246, n. 7, *Chara aspera*, add—in *Wils. E. Bot. Suppl. t. 2738*.

299, n. 3, *Gracilaria compressa*. To *Mrs. Griffiths'* name, for the station of this plant, add that of *Miss Cutler*, from whom I have received most beautiful specimens.

306, *Chaetospora Wiggii*. To the station for Sidmouth, add the name of *Miss Cutler*.

347, n. 29, *Calithamnion interruptum*, add—Weymouth, *Rev. M. J. Berkeley*.

357, after n. 38, *Conferva Hutchinsiae*—insert

*C. rectangularis*, *Griff. MS.* (*right-angled Conferva*): filaments thick rigid vaguely branched dark-green entangled, branches distant divaricate naked below, upper ramuli opposite spreading very short, articulations thrice as long as broad.

Tor-abbey, *Mrs. Griffiths* and *Mr. Borrer*. Meadfoot, *Mrs. Wyatt*.—2—3 inches high, filaments irregularly branched, the branches divaricating and entangled, nearly bare in their lower part, furnished above with short, opposite, one-jointed, spreading ramuli. Articulations 2—3 times longer than broad; joints contracted. Nearly allied to *C. Hutchinsiae*, from which it is easily distinguished by the opposite ramuli and divaricated entangled branches.

## CLASS XXIV.

### CRYPTOGAMIA CONTINUED.

#### ORDER II, MUSCI. *Linn.* Mosses.

*Fructification*, so called, of 2 kinds; *Anthems* concealed among the leaves; and *Capsules* covered, in an early stage, with a *calyptra* which bursts transversely and regularly at the base, and rises up with the mostly pedunculated and operculated capsule. The operculum, or lid, deciduous in most instances. Mouth of the capsule naked or furnished with a single or double fringe or peristome; the teeth or cilia in each row 4, 8, 16, 32, or 64. The seeds surround a columella, are enclosed in a membranous bag, and not accompanied by spiral filaments.—Plants of small stature, of a more or less compactly cellular texture, readily reviving, after being dry, by the application of moisture, bearing leaves which are very rarely, indeed, divided, often marked with a central nerve or costa, entire or toothed or serrated at the margin.—Among all the plants of the Class CRYPTOGRAMIA, no Order, perhaps, presents a more varied and exquisitely beautiful structure than the Mosses; whether we consider their foliage, their capsules, or the delicate single or double fringe which surrounds the mouth of the latter. They are mostly in perfection in the winter months, and no part of the globe appears to be entirely destitute of them. Their maximum, however, doubtless exists in the temperate and cold climates; where they invest rocks and trees, especially in a northern exposure, to a considerable extent, "affording," says *Linnaeus*, "a harbour to an immense number of insects, protecting them, lest they should be destroyed by the frosts of winter, or be parched by the heats of summer, or withered by the vicissitudes of spring, or decayed by the damps of autumn:"—so that nothing, we may be assured, not even the minutest vegetable, is made in vain.

In fresh-water pools, near the sea. Rivulet near Torquay, *Dr. Hooker*. Appin, *Capt. Carmichael*.—"Fronde unattached, scattered at random in the clefts of the rocks, globular, smooth, olive-green, diaphanous, from  $\frac{1}{2}$  to  $1\frac{1}{2}$  inch in diameter, the larger ones generally compressed, hollow and sometimes ruptured." *Carm. MSS.*

8. *N. sphaericum*, Vauch. (*small globose Nostoc*); densely aggregated minute globose solid smooth olivaceous.—*Ag. Syst. Alg. p. 20.*—*Ulva pisiformis*, Huds.

In fresh-water.—"On mural rocks, exposed to the trickling of water," *Captain Carmichael*.—"Fronde from half a line to two lines in diameter, globular, firm, smooth, solid, heaped on each other like a parcel of small shot. Internal filaments rather thinly scattered through the mass." *Carm. MSS.*

\*\* *Polymorphous.*

9. *N. verrucosum*, Vauch. (*plaited Nostoc*); fronds large gregarious confluent subglobose plaited, at length hollow blackish-green.—*Ag. Syst. Alg. p. 21.*—*Tremella verrucosa*, Linn.—*Hudson.*

On stones, in alpine rivulets, common.—"Fronde half an inch or more in diameter, confluent, adhering firmly to the rock, roundish, plaited, at length hollow. Filaments short, curled and fragile." *Carm. MSS.*

3. *Bluish, small.*

10. *N. cœruleum*, Lyngb. (*bluish Nostoc*); frond minute globose solitary solid smooth pale-blue subpellucid, filaments simple curved moniliform. *Grev.*—*Lyngb. Hydroph. Dan. t. 68. Grev. Crypt. Fl. t. 131. Ag. Syst. Alg. p. 22.*

In flowing water and very moist places, attached to mosses; near Callendar, *Dr. Greville*.—Plants 1—2 lines in diameter, gelatinous, globose, gregarious, but distinct; subpellucid, of a delicate pale-blue colour, rarely almost colourless. In drying, they shrink almost to nothing. *Grev. l. c.*

APPENDIX.

97. SCYTHYMENIA. *Ag. Scythymenia.*

*Fronde* tough, coriaceous, spreading, its surface reticulated with raised, irregularly anastomosing veins; entirely composed of byssoid branched fibres, intermixed with granules.—Name; *σχυρο*, leather, and *μνη*, a membrane; from the leathery texture of the frond.—A highly curious plant, found only, that I am aware of, in a single situation. *Agardh*, supposing it may be related to *Palmella*, places it as an appendix to the *Nostochinea*. I cannot perceive that it has any affinity with that genus or any of its allies; but rather think, that if it be an Alga at all, it would range better with the *Byssoides*—perhaps next to *Hydrogrococcis*.

1. *S. rupēstris*, *Ag. (Rock Scythymenia). Ag. Syst. Alg. p. 30.*—*Ulva rupestris*, *E. Bot. t. 2194 (not characteristic).*

"On the nearly upright face of a rock, bathed with a perpetual trickling rill, at some distance above Fyloge bridge, near Hafod," *Sir J. E. Smith*.—"2—3 feet wide, spreading like a piece of very wet leather."—In a dry state, in which only, of course, I have seen it, this curious production strongly resembles a piece of thickish light-brown leather. The upper surface is very prettily reticulated with raised irregularly anastomosing veins, which form areolæ from 1 to 3 lines in diameter. Under the microscope it is found on dissection to consist of densely packed very slender byssoid fibres, intermixed with minute granules.

Div. IV. DIATOMACEÆ.<sup>1</sup>

*Granules (frustula) of various forms, plane or compressed, more or less hyaline or transparent, rigid and fragile, in parallel series or circles, free, naked, or imbedded in a mucous mass or gelatinous frond, at length separating into definite segments.—Small, often very minute plants, in the sea or in fresh-water, mostly parasitic or forming floating masses, or mixed with other aquatic vegetables.*

TRIBE XXII. DESMIDIEÆ.

*Filaments cylindrical or angular, at length separating into segments (frustula).*

98. MELOSEIRA. *Ag. Meloseira.*

*Frustula* forming simple pseudo-articulated filaments, constricted at the articulations, fragile, easily separating.—Name; *μυλο*, a membrane, and *σειρα*, a chain; in reference to the form of the filaments.

1. *M. nummuloides*, *Grev. (oval-jointed Meloseira)*; filaments fragile, the joints scarcely so long as broad at length converted into a series of oval globules. *Grev. MSS., not of Agardh.*—*M. discigera*, *Ag. Syst. Alg. p. 8.*—*Fragilaria nummuloides*, *Lyngb. Hydroph. Dan. p. 184. t. 63?*—*Conferva nummuloides*, *Dillw. Conf. p. 45. t. B.*

Streams. Among the leaves of water-plants, in the river Lea at Walthamstow, *Mr. Dillwyn*.—The name of *nummuloides* should be retained for the present species, *Dillwyn* having the priority of other authors. This arrangement is the more necessary, since *Agardh* is not at all certain about the plant subsequently published under the same name in *E. Bot.*

2. *M. Borreri*, *Grev. (Mr. Borrer's Meloseira)*; filaments very fragile, the joints rather longer than broad at length con-

<sup>1</sup> By *Dr. Greville.*

verted into a series of circular globules.—*M. nummuloides*, *Ag. Syst. Alg. p. 8?*—*Conferva nummuloides*, *E. Bot. t. 2287*, (not of *Dillwyn*).

Parasitic on *Confervæ* and other filiform marine *Algæ*. Shoreham harbour and at Southwick, *Mr. Borrer*. March.—The filaments of the preceding species are brownish-yellow, those of the present of a grayish-green colour. This is quoted doubtfully by *Agardh*, under his *M. nummuloides*, of which I do not possess a specimen. The filaments of *Mr. Borrer's* plant are short, somewhat tortuous, and beautifully moniliform.

3. *M. lineata*, *Ag. (striated Meloseira)*; filaments fragile contracted at the articulations, transversely striated with one or two fine lines, the joints 2—3 times longer than they are broad.—*Ag. Syst. Alg. p. 8.*—*Fragilaria lineata*, *Lyngb. Hydroph. Dan. p. 184. t. 63.*—*Conferva lineata*, *Dillw. Conf. p. 44. t. B.*

Streams and ditches containing brackish water. In the river *Lea*, at *Walthamstow*, *Mr. Dillwyn*.—According to *Lyngbye*, the filaments form dense tufts, two or three inches long, exceedingly fragile, and pulverulent when dry. *Mr. Dillwyn* found only a single specimen.

### 99. DESMIDIUM. *Ag. Desmidium.*

*Frustula* forming simple, angular, pseudo-articulated filaments, hyaline at the crenate edges, at length separating.—Name; *διεμνος*, a bond; from the union of the filaments.

1. *D. Swartzii*, *Ag. (Swartzian Desmidium)*; filaments triangular, the angles of the joints bicrenate.—*Ag. Syst. Alg. p. 9.* *Grev. Crypt. Fl. t. 292.*—*Diatoma Swartzii*, *Ag. Syst. Alg. p. 34.* *Lyngb. Hydroph. Dan. p. 177. t. 61.*

Shallow pools and ditches. *Appin, Capt. Carmichael.*—Filaments of a fine green, an inch or more in length, flexuose, simple, the angles pellucid and colourless. Before the ultimate separation of the joints, the whole has a curious pinnatifid appearance.

2. *D. cylindricum*, *Grev. (cylindrical Desmidium)*; filaments cylindrical two-angled, the angles of the joints bicrenate. *Grev. Crypt. Fl. t. 293.*

Shallow pools and ditches. *Appin, Capt. Carmichael.* Spring.—Very similar to the preceding; but, under the microscope, the characters above given distinguish it at once.

### TRIBE XXIII. FRAGILARIÆ.

*Filaments plane, extremely fragile, composed of rectilinear frustula. (Frustula sometimes apparently radiating from a centre and not presenting the appearance of a filament.)*

### 100. FRAGILARIA. *Lyngb. Fragilaria.*

*Frustula* forming plane, pseudo-articulated, densely striated,

fragile filaments, separating at the striæ (not cohering at their angles).—Named from their fragile character.

1. *F. pectinâlis*, *Lyngb. (pectinated Fragilaria)*; filaments rigid attenuated densely striated, the joints 3—4 times broader than they are long. *Lyngb. Hydroph. Dan. p. 184. t. 63.* *Ag. Syst. Alg. p. 7.*—*Conferva pectinâlis*, *Dillw. Conf. t. 24. E. Bot. t. 1611.*

Rivers and stagnant waters. Near London, *Mr. Dillwyn*. *Hurst-Pierpoint*, *Sussex, Mr. Borrer.* *Appin, Capt. Carmichael.* Near *Edinburgh, Dr. Greville.* Spring.—Exceedingly fragile. The filaments are of a very pale grayish-green hue, often quite pellucid, and, when dry, becoming pulverulent and somewhat glistening, scarcely adhering at all to paper.

2. *F. âurea*, *Carm. (golden Fragilaria)*; mucose, filaments very fine gradually attenuated, the joints 2—3 times broader than they are long often punctuated in the centre.—*Carm. MSS.*

Parasitic on *Algæ*, in the sea. *Appin, Capt. Carmichael.*—Filaments half an inch or more in length, not fragile, of a golden or bright oliveaceous-yellow colour, apparently of a mucous substance, adhering very closely to paper. The joints have sometimes the appearance of being traversed by a very fine transverse line, and in a drawing by *Captain Carmichael*, are represented as either marked with two minute globules, or with a single pellucid white oval spot.

3. *F. diatomoides*, *Grev. (Diatoma-like Fragilaria)*; filaments very pale yellow pellucid densely striated somewhat flaccid, the striæ about five times broader than they are long.

Parasitic on *Algæ*, in the sea.—The filaments are very minute, with somewhat of the habit of *Diatoma striatulum*. They are not fragile, but, on the contrary, are sometimes seen folded and doubled without fracture. I have not been able to ascertain the exact form of the joints; whether each of the striæ is of itself a joint, or whether the joints themselves (which is more probable) are striated.

4. *F. striatula*, *Ag. (banded Fragilaria)*; filaments brownish-green elongated gradually attenuated, the joints nearly equal in length and breadth transversely striated.—*Ag. Syst. Alg. p. 7. (not of Lyngb.)*—*Conferva striatula*, *Jurg. Decad. 11, No. 7. (not of E. Bot.)*

Parasitic on the smaller filiform marine *Algæ*. *Appin, Captain Carmichael.*—This plant seems to be intermediate between *Diatoma* and *Fragilaria*; the densely striated joints bearing some resemblance to those of *D. striatulum*. The filaments, however, are much finer, distinctly attenuated, and I have not been able to detect any coherence at the angles of the articulation. I have followed *Agardh* in adopting the name from the *Decades of Algæ*, published by *Jurgens*; the species figured by *Lyngbye* under the same appellation being evidently something else.

5. *F. confervoides*, *Grev. (Conferva-like Fragilaria)*; filaments elongated attenuated compressed excessively fragile, the joints about half as long as they are broad.

Streams. In a rivulet on the Pentland hills, attached to sticks and stones, *Dr. Greville*. April.—Tufted, 2—4 inches in length, of a rather bright green hue, but pellucid and colourless under the microscope. On account of its excessive fragility, it is almost impossible to obtain perfect specimens.

### 101. ΑΧΝΑΝΘΗΣ. *Bory*. Achnanthes.

*Fron*d stipitate, standard-shaped, composed of few *frustula*, which at length separate, (without cohering at their angles).—Name; *αχνη*, the froth of the ocean, and *ανθος*, a flower.

1. *A. brevipes*, Ag. (*short-stalked Achnanthes*); joints with two coloured spots, stipes very short.—*Ag. Syst. Alg. p. 1. Grev. Crypt. Fl. t. 295.*—*Echinella stipitata*, *Lyngb. Hydroph. Dan. p. 210. t. 70.*

Parasitic on the smaller filiform marine *Algæ*. Appin, *Captain Carmichael*.—Very minute, apparently covering the plant on which it grows with a greenish pubescence. Joints transversely linear, slightly curved, pellucid, marked with two oval orange spots, at length separating. I have never seen more than five joints present; a single one is sometimes all that remains attached to the stipes.

2. *A. longipes*, Ag. (*long-stalked Achnanthes*); joints with a single coloured spot, striated and traversed with a white band, stipes long.—*Ag. Syst. Alg. p. 1.*—*Conferva stipitata*, *E. Bot. t. 2488.*

Parasitic on the filiform marine *Algæ*, *Enteromorpha compressa*, &c. Near Southampton, *Miss Biddulph* and *Miss Hill*. Summer.—It is observed in *E. Bot.* that when recent, this plant gives almost a golden hue to the *Algæ* on which it is produced; but, when dry, is grayish and mucor-like, feeling soft like cotton. Three or four joints are generally present, in the centre of each of which is a red globular spot.

3. *A. Carmichaelii*, Grev. (*Carmichael's Achnanthes*); joints plane spotless (at least when dry), stipes much elongated.

Parasitic on the smaller filiform marine *Algæ*. Appin, *Capt. Carmichael*.—A very distinct species; the joints wanting the striæ and white transverse band of *A. longipes*, and the stipes is very much longer. I have only seen it in a dry state, and can find no trace of a coloured spot.

### 102. ΔΙΑΤΟΜΑ. *Ag.* Diatoma.

*Frustula* forming pseudo-articulated, plane *filaments*, at length separating and cohering at their angles.—Name; *διζωμη*, incision, from the divisions as far as the angles, which cohere.

\* *Frustula* (or joints) rounded.

1. *D. auritum*, *Lyngb.* (*auriculated Diatoma*); filaments yellow, the joints quadrate rounded with an auricle at each angle.—*Lyngb. Hydroph. Dan. p. 182. t. 62. Ag. Syst. Alg. p. 6.*

Parasitic on various *Polysiphonia* and other filiform marine *Algæ*. Frith of Forth, *Dr. Greville*. Spring.—I have only observed this curi-

ous species, scattered sparingly among other individuals of the genus. The auricular angles give to the *frustula* the appearance of microscopic wool-packs.

2. *D. obliquatum*, *Lyngb.* (*oblique-jointed Diatoma*); filaments short unequal, the joints oblique half as long again as they are broad punctate and transversely banded.—*Lyngb. Hydroph. Dan. 181. t. 62? Ag. Syst. Alg. p. 6.*—*Conferva obliquata*, *E. Bot. t. 1869.*

Parasitic on various small marine *Algæ*.—I believe the only British specimens are those which were discovered by *Miss Biddulph*, growing on *Cladostephus verticillatus* and *Gigartina subfusca*.—The whole tuft is not more than one or two lines in length, but distinguishable by the unassisted eye. The cohesion of the *frustula* is not confined to the alternate angles. *Lyngbye's* figure does not quite agree with that in *E. Bot.*, and may prove a distinct species.

\*\* *Frustula* (or joints) square, (not rounded)

3. *D. unipunctatum*, Ag. (*one-spotted Diatoma*); filaments transversely striated, the joints equal in length and breadth bearing a central rose-coloured spot.—*Ag. Syst. Alg. p. 6.*—*Fragilaria unipunctata*, *Lyngb. Hydroph. Dan. p. 183. t. 62.*—*Achnanthes unipunctata*, *Grev. Crypt. Fl. t. 287.*

Parasitic on various *Polysiphonia*, *Ectocarpi*, &c. Appin, *Captain Carmichael*.—*Filaments* very minute, giving the plants on which they grow a pubescent character. The lowest joint is furnished with a stipes, in the manner of an *Achnanthes*; but there is cohesion at the alternate angles of the *frustula*.

4. *D. Biddulphianum*, Ag. (*Miss Biddulph's Diatoma*); filaments unequal, the joints longitudinally striated and traversed with a white band bearing a central red punctated mass.—*Ag. Syst. Alg. p. 5.*—*Conferva Biddulphiana*, *E. Bot. t. 1762.*

Parasitic on various filiform marine *Algæ*. Southampton, *Miss Biddulph*. November and December.—I do not possess a specimen of this remarkable plant. The *filaments* are said to be half an inch long, and the joints are represented as variable in their length and breadth; the general proportion is probably nearly equal.

5. *D. striatulum*, Ag. (*banded Diatoma*); filaments somewhat curved pellucid at the articulations, the joints nearly as long as they are broad, densely and transversely striated.—*Ag. Syst. Alg. p. 6.*—*D. arcuatum*, *Lyngb. Hydroph. Dan. p. 180. t. 62.*—*Conferva striatula*, *E. Bot. t. 1928.*

Parasitic on various filiform marine *Algæ*. Discovered at Cromer by *Dr. Hooker*. Brighton, *Mr. Borrer*. Plymouth, *Mr. Sconce*. Appin, *Capt. Carmichael*. Frith of Forth, *Dr. Greville*. Spring.—The curved, broad, densely striated *filaments*, distinguish this from every other species. The colour under the microscope, is a pale greenish-yellow. The filaments are half an inch or more in length; but from the deciduous nature of the joints, are often found much shorter.

6. *D. marinum*, *Lyngb.* (*Tænia-like Diatoma*); filaments

unequal, the joints longer than they are broad with a transverse granular yellow mass.—*Lyngb. Hydroph. Dan. p. 180. t. 62.*—*Ag. Syst. Alg. p. 5.*—*Conferva teniaformis, E. Bot. t. 1683?*

Parasitic on *Polysiphoniæ, Confervæ, &c.*—Frequent on every part of the coast in the spring-months, investing the filiform *Algæ* with a minute pulverulent covering, mostly of a green colour, but sometimes very pale or even whitish. The joints are inconstant in their relative proportions; but are generally longer than they are broad; sometimes fully twice as long; while, on the other hand, I have seen them nearly equal. In the process of drying, the colouring matter forsakes the centre of each joint, leaving a hyaline cavity, which often assumes the form of a gothic cross. I am inclined to think that the figure in *E. Bot.* was intended to represent this plant, but it is very incorrect.

7. *D. brachygónum, Carm. (short Diatoma)*; filaments very minute, the joints 4—5 times longer than they are broad. *Carm. MSS.*

On small marine *Algæ*, rare; Appin, *Capt. Carmichael*.—I have only seen a solitary and not very good specimen of this species, which seems to be distinct by its very narrow frustula. In other respects, it is nearly allied to the preceding.

8. *D. fenestratum, Lyngb. (fenestrated Diatoma)*; filaments very minute yellowish, the joints four times longer than they are broad with a transverse band of granules.—*Lyngb. Hydroph. Dan. p. 180. t. 61. Ag. Syst. Alg. p. 5.*

In streams, intermixed with *Confervæ*. Appin, *Capt. Carmichael*.—Filaments pale yellow under the microscope, with pellucid articulations. Two filaments are often seen joined together length-wise, and consequently the whole then seems to separate both longitudinally and transversely.

9. *D. tenue, Ag. (slender Diatoma)*; filaments of an uniform structure (not striated), the joints 3—4 times longer than they are broad.—*Ag. Syst. Alg. p. 4. Svensk, Bot. t. 491. f. 4 and 5. Grev. Crypt. Fl. t. 354.*

Pools and lakes. Northamptonshire, *Rev. M. J. Berkeley*.—Forming a pale brownish-green stratum, on dead leaves, mosses, &c., whitish when dry. The joints ultimately pass through a very curious transformation.

10. *D. elongatum, Ag. (elongated Diatoma)*; filaments with a longitudinal line, the joints ten times longer than they are broad.—*Ag. Syst. Alg. p. 4. Berk. Brit. Alg. p. 21. t. 6.*—*Diatoma tenue, γ. Lyngb. Hydroph. Dan. p. 179. t. 61.*

Pools and ditches, "forming ochraceous masses with other *Diatomaceæ*, or scattered amongst various *Confervæ*." *Rev. M. J. Berkeley*. Summer.—The great length of the joints sufficiently characterizes the present plant. Besides, "it is observable," says my acute friend, *Mr. Berkeley*, "that in *D. elongatum* the division of these (the filaments) is longitudinal—in *D. tenue*, transverse: or in other words, *D. elongatum* is composed of threads coupled lengthwise; *D. tenue* of a single thread."

11. *D. flocculosum, Ag. (flocculose Diatoma)*; filaments with a longitudinal pellucid line, the joints transversely striated nearly

equal in length and breadth.—*Ag. Syst. Alg. p. 4. Lyngb. Hydroph. Dan. p. 179. t. 61.*—*Conferva flocculosa, Dillw. Conf. t. 28. E. Bot. t. 1761.*

Pools, ditches and slow streams; parasitic upon various *Confervæ*. Frequent in Spring and Summer.—Of a pale transparent green under the microscope. The joints vary in their relative length and breadth, even in the same filament.

\*\*\* *Frustula fasciculata or flabelliform.*<sup>1</sup>

12. *D. crystallinum, Ag. (crystalline Diatoma)*; frustula linear elongated obtuse.—*Ag. Syst. Alg. p. 3.*—*Echinella fasciculata, Lyngb. Hydroph. Dan. p. 210. t. 70.*

Parasitic on various filiform *Algæ*, in the sea. Devonshire, *Mrs. Griffiths*. Appin, *Capt. Carmichael*. Spring.—Much larger than the two following species. The frustula are of a pale yellow colour, not attenuated at either extremity, and when dry more or less hyaline and glistening in a very beautiful manner, like spun glass.

13. *D. fulgens, Grev. (glittering Diatoma)*; frustula truncate golden-yellow arising in a flabelliform manner from a crystalline often elongated base.—*Exilaria fulgens, Grev. Crypt. Fl. t. 291.*

Parasitic on various filiform marine *Algæ*; Appin, *Capt. Carmichael*. Spring and Summer.—According to the views of *Agardh*, this plant must be a *Diatoma*; yet the base, on which the frustula are placed, is often so much elongated, as to represent a broad stipes.

14. *D. fasciculatum, Ag. (fasciculated Diatoma)*; frustula linear somewhat acuminate at each extremity.—*Ag. Syst. Alg. p. 3.*—*Echinella fasciculata, Grev. Crypt. Fl. t. 16. figs. 1—3.*

Parasitic on the filiform marine *Algæ*, frequent. Spring and Summer.—Of a pale dull-yellow. The frustula are attached to a minute crystalline base.

15. *D. truncatum, Grev. (truncate Diatoma)*; frustula linear truncate at the extremity.—*Exilaria truncata, Grev. Crypt. Fl. (synops. p. 37.)—E. fasciculata, β. l. c. t. 16. f. 4.*

Pools and ditches, parasitic on various *Confervæ, Vaucheriæ, &c.* Spring and Summer.

103. FRUSTULIA. *Ag. Frustulia.*

*Frustula* linear, free or imbedded in a shapeless mass, solitary or binate. *Ag.*—Name; frustula, small crumbs or fragments, of which a mass of this plant presents an appearance.

1. *F. obtusa, Ag. (blunt Frustulia)*; frustula short truncate at each extremity about three times longer than they are broad.—

<sup>1</sup> As I have adopted Professor *Agardh's* arrangement of the *Diatomaceæ*, I have retained this little groupe in the genus *Diatoma*. My own views led me formerly to separate it, and I have not hitherto seen reasons to change them. A patient investigation of the whole, with the allied genera, foreign as well as British, would be necessary to determine the question.

*Ag. Conspect. Crit. Diat. p. 44. Berk. Brit. Alg. p. 14. t. 4. f. 2.*  
—*Echinella obtusa*, *Lyngh. Hydroph. Dan. t. 69.*

Rivulets (*Ag.*). On wet rabbit-dung, *Rev. M. J. Berkeley*.—Forming a thin stratum. Frustula hyaline, with two yellowish bands. Mr. Berkeley observed some of the frustula to be of an elliptical form, with rather obtuse apices.

#### TRIBE XXIV. STYLLARIEÆ.

*Frustula plane, wedge-shaped.*

##### 104. STYLLÁRIA. *Ag. Styllaria.*

*Frustula* wedge-shaped, separate, stemless, not united into plane laminae.—Name; probably from *στυλος*, or *stylus*, a column, pillar or support; since, according to Bory, who invented the name, the species which he considered to belong to it, are “*stipitated Echinellæ*.” If so, the word should be *Stylaria*. (*Hook.*)

1. *S. cuneata*, *Ag. (wedge-shaped Styllaria)*; frustula with a transverse band of yellow granules, the extremity crenatodentate. *Ag. Conspect. Crit. Diat. p. 38.*—*Echinella cuneata*, *Lyngh. Hydroph. Dan. p. 211. t. 70.*

Parasitic on the filiform marine *Algæ*. Appin, *Captain Carmichael*.—The specimens, communicated by this gentleman, are extremely minute, and may possibly prove to be distinct. Two other species are described by Agardh, one of which is found in fresh-water.

##### 105. LICMÓPHORA, *Ag. Licmophora.*

*Frustula* wedge-shaped, flabelliform, stipitate.—Name; *λίμφορος*, fan-bearer; highly expressive of the form of these minute but beautiful objects.

1. *L. Jurgénsii*, *Ag. (Jurgens' Licmophora)*; stipes very short, frustula subternate bipartite.—*Ag. Conspect. Crit. Diat. p. 42.*—*Echinella cuneata*, *Jurg. Decad. 19.*

Parasitic on the smaller marine *Algæ*. Appin, *Captain Carmichael*.—A very indifferent specimen is before me; but it agrees tolerably well with the plant to which I have referred it.

2. *L. splendida*, *Grev. (shining Licmophora)*; tufted, when dry green and glistening, stipes elongated much branched, the branches alternate, frustula wedge-shaped, both the lateral and terminal ones flabelliform.

Parasitic on marine *Algæ* and *Zostera marina*; Appin, *Capt. Carmichael*.—A very fine species; nearly allied to the following one, but smaller, less divided, and the frustula more broadly wedge-shaped. The tufts are two or three lines in height, and often invest the whole surface of the plant on which it grows.

3. *L. flabelláta*, *Ag. (flabellate Licmophora)*; densely tufted, when dry green and glistening, stipes elongated very much

branched, branches alternate, the frustula linear wedge-shaped flabelliform.—*Ag. Conspect. Crit. Diat. p. 42.*—*Meridion radians*, *Ag. Syst. Alg. p. 3.*—*Exilaria flabellata*, *Grev. Crypt. Fl. t. 289.*

Parasitic on marine *Algæ* and *Zostera marina*; Bantry Bay, Ireland, *Miss Hutchins*. Appin, *Capt. Carmichael* and *Rev. M. J. Berkeley*.—A singularly elegant species, forming dense green tufts, half an inch in height; the frustula united into beautiful fan-shaped expansions at the ends of the branches, and bearing a single or double row of globules, or oblong spots of a darker colour than the yellow frustula themselves. The finest specimens I have seen are those on *Zostera marina*. The Irish ones are smaller, and grew on *Chorda Filum*, var. *Thrix*.

##### 106. MERÍDION. *Ag. Meridion.*

*Frustula* wedge-shaped, in plane sessile circles or segments of circles.—Name; from *μερίς*, *ιδος*, a portion or particle, in allusion to the minute fragments which compose it.

1. *M. circuláre*, *Ag. (circular Meridion)*; mucose stratum scarcely any, frustula united into numerous nearly complete circles.—*Ag. Conspect. Crit. Diat. p. 40.*—*Echinella circularis*, *Grev. Crypt. Fl. t. 35.*—*Exilaria circularis*, *Grev. l. c. (synops.) p. 37.*

Marshes, stagnant waters and rivulets; forming a green stratum on mud, stones, dead leaves, &c. Spring. Near Edinburgh, *Mr. Arnott* and *Dr. Greville*.—Under the microscope, the frustula are found to be very minute, perfectly plane, and united into more or less complete circles of various sizes, partly hyaline, partly of a yellowish-green colour. When dry, the mass is dark-green and somewhat glistening.

#### TRIBE XXV. CYMBELLEÆ.

*Frustula elliptical.*

##### 107. GOMPHONÉMA. *Ag. Gomphonema.*

*Frustula* subgeminata, terminating a very slender, simple or branched filament.—Name; *γομφος*, a wedge, and *νῆμα*, a thread; from the shape of the frustules of the filaments.

1. *G. minutissimum*, *Grev. (smallest Gomphonema)*; minute ochraceous somewhat scattered entangled, stipes subramose, frustula linear wedge-shaped. *Grev. Crypt. Fl. t. 244. f. 1.*

Pools and lakes, investing the submerged stems of grasses, sticks, &c., with a lax cottony covering. Duddingston Loch, *Dr. Greville*. Spring.—The presence of this plant gives a yellowish appearance to the water. The stipes is sometimes simple, sometimes once or twice divided; the frustula united or separated, hyaline at the base and apex, but containing a green granular mass in the centre. The whole is scarcely more than a line in height.

2. *G. Berkeléyii*, *Grev. (Mr. Berkeley's Gomphonema)*; tufted

tawny, stipes subramose, frustula wedge-shaped truncate.—*Excilaria minutissima*, Berk. Brit. Alg. p. 22. t. 7. f. 1.

Attached to sticks, stones, grass, &c., in fresh-water, Rev. M. J. Berkeley. Spring and early Summer.—Tufts or masses several lines thick, of a tawny colour; when dry of a lively green. Mr. Berkeley thinks it may be the same as the preceding, which, however, is a much smaller plant, less tufted, and whitish or slightly ochraceous when dry. I have therefore ventured to keep it distinct.

3. *G. minutum*, Ag. (*minute Gomphonema*); plant forming an apparently pulverulent stratum, stipes sparingly branched, the frustula linear-conical globuliferous at the apex.—Ag. *Conspect. Crit. Diat.* p. 34.

Streams, attached to *Conserveæ*, &c. Appin, Capt. Carmichael.—Stratum, according to Agardh, having a pulverulent appearance to the naked eye, when recent; the stipes branched or nearly simple; the frustula hyaline, with a green globule at the apex. The only specimens I have seen are those in a dry state, from Captain Carmichael, and the globule is not visible. It is therefore possible that I may not be correct in referring it to this place.

4. *G. geminatum*, Ag. (*twin Gomphonema*); densely tufted pale tawny, stipes elongated dichotomous, frustula somewhat urn-shaped. Ag. *Syst. Alg.* p. 12, et *Conspect. Crit. Diat.* p. 35. *Grev. Crypt. Fl.* t. 244.

Stones and rocks, in the beds of alpine and subalpine rivulets. Pentland hills, Mr. Arnott and Dr. Greville. Not unfrequent in the Highlands. Spring.—Tufts compact, distinct, half an inch to an inch or more in diameter, soft and flaccid. Stipes of the same length, many times dichotomous, very slender. *Frustula* with a linear-cuneiform outline, tubular, at length somewhat urn-shaped, containing a green granular mass.

5. *G. ampullaceum*, Grev. (*flagon Gomphonema*); densely tufted, stipes elongated dichotomous, frustula in pairs but distinct urn-shaped rounded at the apex.—*Echinella ampullacea*, Carn. *MSS.*

On rocks and stones in the river of Glenstockdale, abundant: Spring and Summer. Appin, Captain Carmichael.—This species seems to be indicated by Agardh, under *G. geminatum*, in his *Conspectus Criticus Diatomacearum*. He there mentions an allied plant, with a more rigid habit, subglobose tufts, and frustula often solitary, urn-shaped, constricted below the apex, which is furnished with an operculum: the last character I have not observed. The tufts and the frustula are similar to the preceding in size; both when dry, are of a greenish-gray or dirty-white colour.

6. *G. paradoxum*, Ag. (*doubtful Gomphonema*); aggregated yellow, stipes erect dichotomous, the frustula wedge-shaped somewhat corymbose.—Ag. *Syst. Alg.* p. 11, et *Conspect. Crit. Diat.* p. 34.—*Echinella paradoxa*, Grev. *Crypt. Fl.* t. 25. *Lyngb. Hydroph. Dan.* t. 70.

Parasitic on the smaller marine *Algæ*. Frith of Forth, Dr. Greville and Mr. Arnott. Appin, Captain Carmichael. Spring.—Less than a

line in height, once or twice branched, investing various *Algæ*, but particularly *Dumontia filiformis*, with a minute, but fine yellow fringe. When dry, it is green.

#### 108. HOMŒOCLÁDIA. Ag. Homœocladia.

*Frustula* arranged in numerous, binate, distant, parallel series, within a tubular frond. Ag.—Name; ὁμοίος, like or resembling, and κλάδος, a branch; I presume from the branched fronds.

1. *H. Anglica*, Ag. (*English Homœocladia*); filaments thrice dichotomous.

"Plymouth," Agardh.—"Frond an inch and a half or more in length, tubular, terete, erect, filiform, about one line thick at the base, gradually attenuated, containing numerous distant, parallel series of frustula, trichotomous below, dichotomous above, obtuse at the apices. Colour when dry opaque, olivaceous-green. Substance firm. It does not adhere to paper." Ag.—Of this plant I am quite ignorant, nor does Agardh mention from whom he received it. One other species is described, a native of the Adriatic.

#### 109. BERKELÉYA. Grev. Berkeleya.

*Frustula* in longitudinal series, within simple mucous filaments, which are free at the extremity, but united below into a roundish gelatinous mass.—Named in honour of the Rev. M. J. Berkeley, A.M., an assiduous and accomplished British Botanist, author of "*Gleanings of British Algæ*."

1. *B. fragilis*, Grev. (*brittle Berkeleya*.) *Grev. Crypt. Fl.* t. 294. *Ag. Conspect. Crit. Diat.* p. 24.

Parasitic on *Zostera marina*, *Furcellaria fastigiata*, &c. Appin, Capt. Carmichael. Spring.—Plant forming a roundish or oval, firm, gelatinous mass, of a brownish or olivaceous-green colour, and nearly half an inch in diameter, from the substance of which issue numerous gelatinous, simple, tender, free, gradually attenuated filaments, apparently destitute of external membrane, and containing fusiform frustula.

#### 110. MICRÓMEGA. Ag. Micromega.

*Frustula* arranged in longitudinal series, within a cartilaginous or gelatinous frond. Ag.—Named from μικρός, small, and μέγας, large; in allusion to the frond resembling some of the larger *Algæ*, but composed internally of the frustula of the smallest kinds.

1. *M. apiculatum*, Ag. (*apiculated Micromega*); fronds filiform dichotomous or fasciculate, incrassated and obtuse at the extremities, which are apiculate. Ag. *Conspect. Crit. Diat.* p. 23.—*Schizonema apiculatum*, Ag. *Syst. Alg.* p. 11.—*Gloionema apiculatum*, Grev. *Crypt. Fl.* t. 30.—*Monema apiculatum*, Grev. *l. c. (synops.)* p. 38.

Frith of Forth, growing on rocks, in small pools left by the tide, Mr. Arnott, and Dr. Greville. March.—Somewhat tufted; the fronds lax, erect, about half an inch high, olivaceous-green. Substance very tenacious.

### 111. SCHIZONÉMA. Ag. Schizonema.

*Frustula* in longitudinal series and inclosed in a simple or branched, filiform, mucous or membranaceous frond.—Name;  $\sigma\chi\iota\zeta\omega$ , to divide, and  $\nu\eta\mu\alpha$ , a thread, or filament; in allusion to the separation of the frustules.

1. *S. quadripunctatum*, Ag. (*four-dotted Schizonema*); filaments branched tufted, frustula oblong at first in fours, afterwards scattered distinct. *Ag. Syst. Alg. p. 10, et Conspect. Crit. Diat. p. 21.*—*Bangia quadripunctata*, Lyngb. *Hydroph. Dan. t. 26.*—*Monema quadripunctatum*, Grev. *Crypt. Fl. t. 286.*

On stones and rocks in the sea. Appin, Capt. Carmichael. Frith of Forth, Dr. Greville.—Tufts olivaceous-green, one to three inches in length, flaccid, the filaments very slender. *Frustula*, at first arranged in fours in a star-like manner, in a hyaline oval receptacle; they ultimately separate and assume various arrangements within the tubular filaments.

2. *S. helminthosum*, Chauv. (*Worm-like Schizonema*); filaments tufted irregularly branched the extremities setaceous, frustula oblong elongated. *Chauv. Alg. Normand. exsicc. No. 77. Dub. Bot. Gall. 2. p. 985. Ag. Conspect. Crit. Diat. p. 20.*

Rocks in the sea. Frith of Forth, Dr. Greville. Summer.—Tufts one to three inches in length, of an opaque dull-green colour. Filaments much but very irregularly branched; the branches attenuated to a setaceous point. The frustula are remarkable for their length. I have compared our Scottish specimens with those published by my excellent friend, Professor Chauvin, in his beautiful *Algues de la Normandie*, and find them to agree in every respect.

3. *S. Dillwynii*, Ag. (*Dillwyn's Schizonema*); filaments tufted dichotomous capillary acuminate, frustula linear-oblong with a longitudinal line.—*Ag. Syst. Alg. p. 10, et Conspect. Crit. Diat. p. 26.*—*Monema Dillwynii*, Grev. *Crypt. Fl. t. 297.*—*Conserva fetida*, Dillw. *Conf. t. 104.*

On rocks, stones and *Algæ* in the sea. Appin, Captain Carmichael. Frith of Forth, Dr. Greville.—Tufts about two inches in length, of an olivaceous-green colour, and often fetid odour. Filaments flaccid, gradually acuminate to a sharp point. Capt. Carmichael observed them to be sometimes opaque and fuscous. The plant frequently glistens with a faint metallic lustre when dry.

4. *S. spadiceum*, Grev. (*brownish Schizonema*); filaments capillary tufted much branched, ramuli much divaricated.—*Gloionema spadiceum*, Carm. *MSS.*

On rocks and *Algæ*, in the sea. Appin, Captain Carmichael.—Tufts two to four inches in length, of a reddish olivaceous-green colour, and often with a faint metallic lustre when dry. Filaments very slender and nearly of the same thickness throughout, much branched; the

branches divaricated, the ultimate ones patent. *Frustula* linear-oblong, elongated.

5. *S. obtusum*, Grev. (*blunt-pointed Schizonema*); filaments robust laxly tufted branched, axils of the branches rounded the extremities obtuse, frustula oblong geminate.—*Monema obtusum*, Grev. *Crypt. Fl. t. 302.*

Parasitic on various small marine *Algæ*. Frith of Forth, Dr. Greville, Appin, Capt. Carmichael. Summer.—Tufts one or two inches long, lax, flaccid, green or brownish. Filaments branched in a somewhat fasciculate manner, robust and scarcely attenuated till near the extremity. *Frustula* very numerous. This plant exists in Captain Carmichael's collection under the MS. name of *Gloionema myriogramum*.

6. *S. corymbosum*, Ag. (*corymbose Schizonema*); filaments laxly tufted branched, branches divided towards the extremity in a penicillato-corymbose manner.—*Ag. Syst. Alg. p. 11, et Conspect. Crit. Diat. p. 21.*

On various small marine *Algæ*, corallines, &c. Devonshire, Mr. Sconce.—Tufts lax, about an inch in length, pale yellowish or reddish-green. Filaments slender, irregularly branched, but generally at intervals, in a fasciculate manner, the extremities corymbose. Agardh places this plant among those that require to be more closely investigated. I have seen only a single specimen, and it must be confessed that its appearance has somewhat the character of monstrosity.

7. *S. comoides*, Ag. (*tufted Schizonema*); filaments in lax tufts capillary branched, branches nearly simple elongated. *Ag. Conspect. Crit. Diat. p. 19.*—*Conserva comoides*, Dillw. *Conf. t. 27.* (*not of E. Bot.*)

On rocks in the sea and on various marine *Algæ*. Swansea, Mr. Dillwyn. Devonshire, Mr. Sconce.—Tufts an inch or more in length, composed of numerous, very delicate filaments, of a reddish or olivaceous green colour. I have not seen this plant in a recent state. It is certainly distinct from the following.

8. *S. Grevillii*, Ag. (*Greville's Schizonema*); filaments aggregated capillary irregularly branched attenuated, frustula scattered oblong geminate.—*Ag. Conspect. Crit. Diat. p. 19.*—*Monema comoides*, Grev. *Crypt. Fl. t. 358.*

On rocks in the sea; more rarely on the wood-work of piers, &c., and on other *Algæ*. Sidmouth, Dr. Greville. Spring and Summer.—Plant spreading widely over the smooth surface of rocks, especially where there is a slight coating of mud. Filaments very flaccid, about an inch in length; the branches given off at a very acute angle, remote or somewhat fasciculate towards the extremity. *Frustula* cylindrical, oblong. The colour when recent is reddish-brown, when dry, grayish or yellowish-green. I dare not pronounce this to be the *Conserva comoides* of English Botany, which is a plant I cannot understand from the unsatisfactory figure published in that work.

9. *S. Smithii*, Ag. (*Smith's Schizonema*); filaments tufted gelatinous irregularly branched, branches spreading acute, frustula oblong in numerous parallel series geminate at length

separating. *Ag. Syst. Alg. p. 10, et Conspect. Crit. Diat. p. 18. Grev. Crypt. Fl. t. 298.*—*Ulva fetida, E. Bot. t. 2101.*

On rocks, stones and various small *Algæ*, in the sea. Salt-marshes, Norfolk, *Dr. Hooker*. Ireland, *Miss Hutchins*. Appin, *Captain Carmichael*.—Tufts one to three inches in length, of a pale reddish, yellowish or greenish colour. *Filaments* destitute of an external membrane, exceedingly tender and gelatinous, varying in thickness according to the number of smaller filaments which are united together, each of which is marked by a single series of frustula.

10. *S. prostratum*, *Grev. (procumbent Schizonema)*; "threads brown procumbent simple flexuose obtuse containing a single row of granules which are either simple subelliptic with one margin more curved, or cylindrical with obtuse ends, or double of two cylindrical portions."—*Monema prostratum, Berk. Brit. Alg. p. 15. t. 4. f. 3.*

On the boards of a sluice, forming a very thin brown mucous stratum, *Rev. M. J. Berkeley*.—This is a very curious plant, known to me only by my friend Mr. Berkeley's description and representation, which I can depend upon as perfectly correct. If it really belong to the present genus, it is a specimen of its most elementary form. It is well remarked by Mr. Berkeley, that the frustules, taken apart from the filaments, would belong to *Frustulia*, and nearly resemble *F. obtusa*.

## 112. CYMBÉLLA. *Ag. Cymbella*.

*Frustula* elliptical, binate, free, or imbedded in a mucous mass.—Name; the diminutive of *cymba*, a boat; in allusion to the form of the frustules, particularly in one species.

1. *C. hyalina, Ag. (pellucid Cymbella)*; frustula simple hyaline lanceolate and acute at each extremity.—*Ag. Conspect. Crit. Diat. p. 7.*

Shallow ditches. Near Edinburgh, *Dr. Greville*. Early spring.—Floating on the surface, or after the evaporation of water, forming a pulverulent stratum. Colour a yellowish or olivaceous-green. The frustula are excessively minute.

2. *C. minor, Ag. (lesser Cymbella)*; frustula simple lanceolate and acute at each extremity with a narrow band, the ends somewhat opaque. *Ag. Conspect. Crit. Diat. p. 8.*—*Frustulia minor, Ag. Syst. Alg. p. 2.*—*F. lanceolata, Berk. Brit. Alg. p. 13. t. 4. f. 1.*

In pools and quiet streams, *Rev. M. J. Berkeley*.—Plant forming a soft spongy yellowish-brown mucous stratum, entirely composed of frustula. *Frustula* very pale yellow, with a central transverse hyaline band, which, however, is sometimes wanting. The description of Mr. Berkeley's plant comes so near to that of *C. minor*, that I am induced to consider it as the same. Mr. Berkeley has indeed himself remarked its resemblance. The *C. lanceolata* of Agardh is a different species.

3. *C. cymbiformis, Ag. (Corricle Cymbella)*; frustula binate cymbiform obtuse somewhat curved hyaline with a dorsal and central yellow globule. *Ag. Conspect. Crit. Diat. p. 10.*

Moist rocks and on the ground. Appin, *Captain Carmichael*. Pentland hills, *Dr. Greville*.—It forms a thin pale ochraceous stratum. *Frustula* at first united in pairs, at length separated. Two globules are sometimes present, which, in a dry state, seem to disappear, at least in my specimens.

4. *C. reniformis, Ag. (kidney-shaped Cymbella)*; "frustula reniform adhering in pairs." *Ag. Conspect. Crit. Diat. p. 10.*

On reeds, in ponds and streams, *Mr. Arnott*.—I am not certain whether I am right in referring the plant before me to *C. reniformis*. The frustula are hyaline and of a very pale yellow, and at length separate. I have only seen it in the dry state.